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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 HANFORD PROJECT OFFICE  
712 SWIFT BOULEVARD, SUITE 5  
RICHLAND, WASHINGTON 99352

April 30, 1996



Nancy A. Werdel, Project Manager  
U.S. Department of Energy  
P.O. Box 500, H0-12  
Richland, Washington 99352

Re: 100 Area Remedial Design Report/Remedial Action Work Plan  
and 100-B/C Sampling Analysis Plan Comments

Dear Ms. Werdel:

Enclosed are the Washington State Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA) comments on the 100 Area Remedial Design Report and the 100-B/C Sampling and Analysis Plan.

Enclosure 1 details our comments on the design report. In general, this report is lacking key elements of a typical design report. The elements include, but are not limited to; discussions on data management, public involvement, cost information and sampling strategy. In addition, in previous discussion with the U.S. Department of Energy (DOE), EPA and Ecology have expressed the need for a rational for the disposition of Investigation Derived Waste.

EPA and Ecology are aware that the subcontractor has proposed an accelerated schedule when compared to the one provided in this document. EPA and Ecology would like to review the schedule when it becomes available and discuss any relevant changes with DOE. Milestones will be established after discussion of the schedule.

Decoupling the Sampling and Analysis Plan (SAP) from the remedial design report made the review of both documents difficult. It is recommended that these documents be combined.

Enclosure 2 details our comments on the SAP. The format and layout of the SAP made the review difficult. It is not clear why so many appendices were attached instead of providing the discussion in the text. In addition, the SAP refers to the FMC strategy in a number of places. However, no where in the SAP is rational for using the strategy or a discussion of the strategy provided.

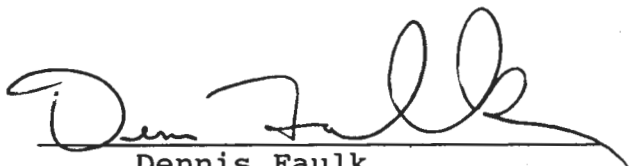
Nancy A. Werdel

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April 30, 1996

Feel free to contact either Keith Holliday at (509) 736-3036 or Dennis Faulk at (509) 376-8631 if you have any questions regarding these comments.

Sincerely,



Dennis Faulk  
Remedial Project Manager  
U.S. Environmental Protection  
Agency



Keith Holliday  
Remedial Project Manager  
Washington State Department  
of Ecology

Enclosures

cc: w/o Attachment  
Linda McClain, DOE  
Rich Holten, DOE  
Steve Liedle, BHI

w/Attachment  
Glenn Van Sickle, BHI  
Dick Jaquish, DOH  
Administrative Record (100-BC-1, 100-HR-1, 100-DR-1 Operable  
Units)

**REMEDIAL DESIGN REPORT COMMENTS: enclosure 1****General Comments:**

There are several areas that are not addressed in this document that are typically considered as fundamental to RD/RA work Plans including the following.

Process Flow Chart for Pre-remedial Activities. The document would greatly benefit from a simple process flow chart that shows the steps required to "get to the field". Such as, award of RA subcontract, RA submittals, readiness review, sampling strategy, etc., as well as who are the key participants and areas where DOE and regulatory approvals are required. This will be important for the current and future procurements under this action. In addition, this would help to describe the overall management of the remediation beyond the generic description of activities in Section 3.0.

Cost Information. There is no cost information provided in the document. The RD/RA Work Plan should have some level of detail for preliminary cost estimates (using the latest rollups) and the key inputs to the cost model. This information can be used as a baseline versus what experience shows us the RA subcontractor is capable of executing. It is likely that the RA Sub will be more efficient (less costly) than predicted. With an established baseline in the RD/RA Work Plan, acceleration of Milestones becomes a benchmark to measure against.

There is no discussion of Public Involvement in the event that the balancing factors need to be invoked. Recommend adding the public involvement plan that was developed to support RD/RA be included as an appendix.

There is no discussion of data management provided in the document. A detailed discussion on how information will be managed should be included.

A discussion on how investigation derived waste will be dispositioned is required. In addition, disposition of IDW should be put into the schedule detailed in figure 3-1.

Does DOE plan to include appendices to the RDR/RAWP such as the Sampling Analysis Plan, Site Health and Safety Plan, Addendum to Contractor Quality Control Plan, Environmental Protection Plan, Preliminary Design Report, technical specifications, vendor supplied information and calculations, Operation and Maintenance Manual and other details including drawings. If not, how will this information be provided?

## Specific Comments:

1. Page i, suggest using "ESD" for explanation of significant difference and spelling out environmental sites database whenever its used.
2. Intro page 1-1, paragraph 1; The second sentence states that the Hanford defense mission changed when the Hanford Site was listed on the NPL. This is not accurate. While it is accurate that the change in mission and NPL listing happened in the same time frame, there was no cause and effect. The defense mission ended with the collapse of the Cold War and a shift in international policy on the production of nuclear weapons. Part of the "peace dividend" was a shift in emphasis to environmental restoration. Recommend changing the text to reflect this information.
3. Page 1-1, Section 1.3. A discussion should be provided regarding the inclusion of additional waste sites that are adjacent to the 37 sites listed in the ROD, is there a partial and/or complete listing of such sites ? Also, provide rational for how remediation of such sites will be implemented.
4. Page 1-2, Sections 1.3.1 and 1.3.2, these sections imply that the waste sites in an operable unit are associated with the reactor in the operable unit. This is not the case. For example, the waste sites in 100-DR-1 received waste from both reactors, not just 105-D. It would be misleading to suggest waste sites were grouped into operable units by reactor, when it was by contaminated media disposed. Suggest deleting "associated" and changing "with" to "within" in the fourth sentence of these sections.
5. Page 1-3 through 1-5, Figure 1-1, 1-2, and 1-3, titles need to reflect the fact that these figures only identify the waste sites addressed in this ROD. The 116-B-3 crib in figure 1-2 is in an incorrect location. This crib should be adjacent to the 116-B-4 crib.
6. Page 1-7, Table 1-1, This table should provide the volumes in loose cubic yards also.
7. Page 1-8, Table 1-1, what was the soil volume associated with the 116-H-4 Pluto Crib? Please identify the volume and footnote the action taken.
8. Page 2-1, Section 2.1.1, first paragraph, first sentence, delete "underlying."
9. Page 2-1, Section 2.1.1, second sentence, why differentiate between "near-surface and subsurface soil", when the RAO quoted in the ROD states "contaminants in soils?"

10. Page 2-2, RAO # 3, The text instructs the reader to Section 2.1.2 for information related to achieving this RAO. It is inferred that Section 2.1.2 contains information on removing the engineered structure, and institutional controls.."in the event that DOE relinquishes the site." Section 2.1.2 addresses RAOs # 1 and # 2, but does not address RAO # 3, beyond the extent that RAO # 3 would comply with ARARs. Information concerning the removal of the engineered structure and potential institutional controls should be provided.
11. Page 2-2, Section 2.1.1., This paragraph references that soil will be removed to a depth of 15 feet. The ROD also provides for the removal of the engineered structure in the event that the structure continues below 15 feet. This discussion should be added in this paragraph.
12. Page 2-3, Section 2.1.2, As noted in the comment above, this Section provides information on RAOs # 1 and # 2, but not on RAO # 3. Add discussion on RAO # 3.
13. Page 2-3, Section 2.1.2.1, third paragraph, first sentence, why include Method A? Please keep in mind that Method A concentrations do not equate to a risk of  $10^{-6}$  or  $10^{-5}$  for some analytes. Calculate concentrations for analytes which there is not a CLARC II value.
14. Page 2-4, bullet 2, This bullet indicates that a resident is exposed for 350 day per year. The Hanford Risk Assessment Methodology requires a 365 day exposure duration. This difference should be noted. In the next paragraph please describe the "other radiation standards promulgated by EPA."
15. Page 2-4, Section 2.1.2.2, third paragraph, first sentence. The text states that limiting exposure levels to 15 mrem/yr above background acknowledges that background varies from site to site. This is an open ended statement. Does DOE intend to define the aerial extent of background for the these three operable units? It is recommended that the rationale for establishing background be provided. Also, there should be a reference to the DOH Radiological Clean up Guidance.
16. Page 2-4, Last paragraph, The discussion on the radionuclide specific concentrations from RESRAD not being used to verify achievement of cleanup goals needs clarification. It should be stated that the concentrations in the table represent default or "look up" values that individually equate to a 15 mrem/yr dose. The expectation is that some sites will have multiple radionuclides driving the cleanup, therefore a cumulative dose of 15 mrem/yr would potentially result in individual radionuclide concentrations that are lower than

the look up values.

17. Page 2-5, Section 2.1.2.3, Protection of Groundwater, Based on the discussion in this section and the values presented in Table 2-3 and 2-4, it appears that soil concentrations for radionuclides were calculated in a manner that considered MCL's, NBS MPC values, and DOE's 1/25th of DCG. It also appears that the highest concentration for groundwater from one of those three approaches is the one used to back-calculate soil cleanup levels. If this is the case, what is the justification for using an agency guideline (e.g. DOE's DCG's) in preference of a promulgated ARAR (SDWA MCL's) ? Recommend MCL's be used for all groundwater calculations. Is the 4 mrem part of the 15 mrem RAO for the rest of the site? Please clarify.
18. Page 2-5, Section 2.1.2.3, second paragraph, need to state the limitations of the Summer's model. Why was the 116-C-1 trench used to calculate concentrations in soil for all sites? Have Kd s been developed for this site so that it represents all of the 100 Areas for all COC?
19. Page 2-5, Section 2.1.2.4, third paragraph, need to state if the model referred to is the Summer's model from Appendix C or the model in Appendix D. If the Summer's model is used, restate limitations or reference Section 2.1.2.3. Last sentence in this paragraph leads us to think that there are no other COC's out there. This is not true. Recommend rewriting sentence so primary groundwater contaminants are identified, but other COCs are still of concern. Also, this section mentions that dilution to the Columbia river has been accounted for. No dilution factor is provided. Provide the dilution factor that was used. To be consistent with the groundwater operable units the dilution factor used should be 2.
20. Page 2-6, Section 2.1.3, bullet 1, this section refers to the EPA proposed cleanup standard of 15 mrem. It should be noted that this also the proposed NRC standard. This comment applies to all sections that discussed the proposed standards.
21. Page 2-7, Section 2.1.4, See previous comment #16 regarding contaminant specific concentrations for radionuclides.
22. Page 2-7, Section 2.1.5, first paragraph, first sentence, what is "marginally contaminated?"
23. Page 2-7, Section 2.1.5 Balancing Factors, The discussion on decay to 2018 needs to be deleted from this document. This is inconsistent with management discussions and decisions on this topic.
24. Page 2-8, Section 2.1.5, second paragraph, bullets, suggest

adding a bullet for removal of the engineered structure.

25. Page 2-9, Section 2.1.6.1, Chemical Specific ARARs, The chemical specific ARARs listed in the ROD will remain as chemical specific ARARs for the action. It is not in DOE or BHI authority to decide that NPSAAQS (40 CFR 50) and NESHAPS (40 CFR 61) are action specific ARARs. The concentrations for contaminants of concern under those two ARARs must be monitored for during remedial action, as necessary.
26. Page 2-10, The findings from the LDR sampling events should be provided in this section. It is the regulatory agencies opinion that data to date shows that LDR material should not be encountered in significant quantities. In addition, a table showing the ERDF waste acceptance criteria should be presented in the work plan.
27. Page 2-10, miscellaneous units, a rationale for dropping volume reduction and thermal treatment should be provided in the section.
28. Page 2-11, Minimum Standards for Construction of Wells, It should be noted in the last sentence that a well installation and monitoring plan will be prepared as a requirement to meet the ARAR.
29. Page 2-11, Section 2.1.6.2, sixth paragraph, does the sampling and analysis plan address ambient air monitoring?
30. Page 2-12, Section 2.1.6.4, second paragraph states that a goal of 4 mrem/y is in 10 CFR 20 proposal. There was a recommendation of 3 mrem/y which was called ALARA in the NRC 10 CFR 20 draft standard. It is our understanding that this has been eliminated from the NRC proposal. We are not aware of a 4 mrem/y guide in the NRC proposal. EPA has a provision for drinking water to meet MCLs which is based on 4 mrem/y.
31. Page 2-13, Section 2.1.7, see comment 27.
32. Page 2-13, Section 2.1.7, see comment 26.
33. Page 2-13, section 2.1.7, this section should include a description of what action will be taken.
34. Page 2-13, section 2.1.7, second bullet, explain why soil washing is not cost-effective at this time. What factors control cost effectiveness? When does it become cost effective? Isn't there a cost-benefit analysis of this treatment?
35. Page 2-13, section 2.1.7, third bullet, if LDR waste is encountered, how will it be handled?

- 36. Page 2-13 , Section 2.2, Remedial Design, What is meant by a "manageable work package" in the context of justifying splitting the remedial action into several separate procurements ? It appears that this creates more work by duplicating procurement activities and the management of multiple subcontractors performing the same function. Recommend providing the rational for this strategy.
- 37. Page 2-14, Section 2.2.1 and 2.2.2, Recommend that another terminology be utilized other than Group 1, Group 2, etc, or change the definitions of the Groups. The current RFP for the "first phase" of remediation includes a subset of Group 1 sites. The next package as currently contemplated includes some from Group 1 and Group 2. This is already leading to confusion as to what scope is associated with what work.
- 38. Page 2-17, Figure 2-1. The use of a symbol having text with a line through the center generally indicates that the action described by the text should not be done. The symbol should probably be revised.
- 39. Page 2-19, Table 2-1, MTCA Cleanup Levels, Chromium should be listed as hexavalent chromium. Why is manganese listed in this table ? Table 2-1 needs to be revised for the latest CLARC II update of February 1996. PQL does not equate to CRQL/CRDL. Care should be taken when using Method A levels, they do not always equal  $10^{-6}$  risk.
- 40. Pages 2-20 through 2-25, Tables 2-2 through 2-7, identify assumptions, models, whatever to add some merit to the numbers. The 15 mrem/y RAO is for a level above background. Where is background addressed in this document? The U.S. DOE documents that have been issued on background should be referenced and a brief discussion as to how they will be used.
- 41. Page 2-20, Table 2-2, Soil Concentrations Corresponding to 15mrem/yr dose, Why have the concentrations listed in this table changed since the last submittal ? See the table below for examples of changes for key radionuclides. Soil concentration levels should be carried to a maximum of two significant figures and no figures below 1 pCi/g.

Radionuclide	Previous Calculations	Current Submittal
Cs-137	pCi/g	pCi/g
Co-60	pCi/g	pCi/g
Eu-152	pCi/g	pCi/g
Eu-154	pCi/g	pCi/g
Sr-90	pCi/g	pCi/g



42. Page 2-21 through 2-25, Table 2-3, 2-4, 2-5, 2-6 and 2-7. There are some errors in the concentrations based on NBS MPC. The National Interim Primary Drinking Water Regulations EPA-570/9-76-003 shows the following concentrations yielding 4 mrem/y: Cs-137 200 pCi/l, Eu-152 60 pCi/l, Eu-154 200 pCi/l, Eu-155 200 pCi/l. Other values in table 2-3 are also wrong. The incorrect values are also carried over into tables 2-4, 2-5, 2-6, and 2-7.
43. Page 2-23, Table 2-5, the method of calculating the surface water criteria is not clear, even in the Appendix that addresses the models used. The factors used and the algorithm used should be provided. Is Columbia River dilution used in the calculation of the surface water calculation?
44. Page 3-1 Section 3.1, It is stated that the ROD requires..."soil removal, segregation, storage, transportation, disposal, and backfilling. It would be more accurate to state that the ROD requires, excavation, treatment as appropriate or required, disposal and backfilling. Clean overburden can be segregated and stockpiled onsite for backfill purposes.
45. Page 3-1. Section 3.1.1, Pre-Excavation, Recommend deleting the second paragraph under this section that details extensive pre-excavation characterization work. This work is not needed and will not provide any value added to the work to be performed.
46. Page 3-2, Section 3.1.2, third paragraph, what if a container isn't released? Where are the contingencies of this remedial action approach?
47. Page 3-2, Section 3.1.2, fifth paragraph, there needs to be a section discussing the RCMS, application, detection abilities, etc.
48. Page 3-2, Section 3.1.2, sixth paragraph, Section 3.1 states "Soil treatment is not included in the current anticipated scope of work." However, a soil treatment storage area is identified in this paragraph. Are there plans to treat or not? There appears to be an inconsistency throughout on this subject.
49. Page 3-2, Section 3.1.2, seventh paragraph, authorization for final release?
50. Page 3-2, Section 3.1.3, paragraph 2, How many containers will be made available for the subcontractor excavation activities. It is not stated here and may become a critical aspect that affects (restricts) the rate of excavation. Intermodal containers is a term most often used by industry to describe containers which can be leased on an as needed

basis for the delivery of goods. Upon termination of the delivery need the containers are then returned. Is it DOE's intent to use containers which meet this definition?

51. Page 3-3, Section 3.1.3, third paragraph, is the intent to use state highways or site roads?
52. page 3-3, paragraph 4, line three...delete "are" before "have".
53. Page 3-3, Section 3.1.3, fourth paragraph, what value is added by repeating two sentences from the third paragraph?
54. Page 3-3, paragraph 4, Recommend descriptions of haul trucks be compared to RFP specifications for consistency.
55. Page 3-4, Section 3.1.4, second paragraph, if radionuclides are not detected is the site considered clean?
56. Pages 3-3 and 3-4, Section 3.1.4. How is the gamma radiation determined to be a surrogate for the non-rad and even non-penetrating radiation? Since the commonly occurring gamma emitters <sup>60</sup>Co and <sup>137</sup>Cs are generally considered to be less mobile than perhaps other constituents of potential concern, how is it that they may be considered surrogates for other more mobile constituents that may not be gamma emitters (i.e., <sup>90</sup>Sr or the metal, chromium)? How will the nonpenetrating radioactivity and the hazardous chemicals be evaluated when there are no gamma emitters present? Do you consider the gamma emitters to contribute to the primary pathway of risk and the other pathways are not of concern?
57. Page 3-4, Section 3.1.5, what levels can be mini-decontaminated? What levels require aggressive decontamination?
58. Page 3-4, Section 3.1.6, what is the need for a printed tracking form? Can't this be done electronically? How does this fit into the data management system?
59. Page 3-4, Section 3.2, reference Figure 3-1.
60. Page 3-5, Section 3.2.1.3, where are descriptions for subcontractor oversight, excavation, material handling, analytical system operations, worker health and safety, radiological controls, data gathering, and overall daily conduct of operations?
61. Page 3-5, Section 3.2.1.4, Recommend deleting the first sentence. Site closure is not distinct from remedial action work...it is the end result.

62. Page 3-5, Section 3.2.2, first sentence, In signing the September 1995 ROD, DOE committed to cleanup of 37 sites, rather than was given the authority as stated in the text.
63. Page 3-6, Section 3.2.2, second bullet, could we be a bit more specific, such as referencing the schedule?
64. Page 3-6, Section 3.2.2, fourth bullet, add "However, continuous remediation in at least two areas will be maintained."
65. Page 3-6, Section 3.2.2, fifth bullet, reference public involvement plan.
66. Page 3-7, Section 3.4.2, rewrite to reflect the decision to have one SAP for all 37 waste sites in the 100 Area.
67. Page 3-8, paragraph 1, last sentence, This sentence should be re-written to clarify that the development of a mitigation action plan is DOE's responsibility and the plan will be provided to the Trustee's for their input and concurrence.
68. Page 3-8, Section 3.5, third paragraph, first bullet, 50% increase for what, a site, this ROD or the 100 Area? Need to be specific.
69. Page 3-8, third bullet, under both non-significant and significant changes the addition of investigation derived wastes to the scope of the action is discussed. This needs to be reviewed for consistency, it can be one or the other, but not both.
70. Page 3-9, first paragraph, Bullets number one and three (waste remain in place due to cultural resources; an ARAR waiver is request for LDR treatment) are not examples of fundamental changes to the remedy. The ROD contemplates the potential use of balancing criteria under situations were there may be tradeoffs against achieving unrestricted use, including the presence of cultural resources that would be damaged/disturbed by remediation. The ROD states that this would require an ESD with Public Comment. In regard to the statement that an ARAR waiver for LDR treatment would constitute a fundamental change, an ARAR waiver itself is not necessarily a fundamental change. Furthermore, for LDR treatment, if it is demonstrated that it is technically impractical to meet the LDR treatment standard, then a treatability variance could be requested, not an ARAR waiver.
71. Fundamental changes to a remedy are more typically activities that change the basic approach to how a site will be remediated. An example would be stabilization of waste in place in the 100 Area instead of excavation and disposal

of soils at ERDF.

- 72. Page 3-9, Section 3.6, reference SAP for verification sampling and analysis.
- 73. Pages 3-10 and 3-11, Section 3.6.3, reference the SAP. Please use the specifics from that document to explain cleanup verification.
- 74. Page 3-11, Section 3.6.5, discuss the control of gamma exposure from contamination at depth through institutional controls (e.g., drilling wells). The statement "External gamma exposure is assumed to be the only exposure pathway from contaminants at the bottom of the excavation, ...." must explain why this route is the only exposure pathway.
- 75. Page 3-12, Section 3.6.8 para two, line four..delete CQ-137, Also, It would be useful to state in this section that remediation to minimize further release of Cr 6+ to the Columbia River is a primary concern in the 100-D, 100-H, and 100-K areas.
- 76. Page 3-12, Section 3.6.8, third paragraph, EPA and Ecology are unaware of the dilution/attenuation model discussed here. Please provide rational for including this model.
- 77. Page 3-13, Section 3.8, DOE's comprehensive land use and strategic planning efforts are outside the scope of these remedial actions. Please delete the first paragraph.
- 78. Page 3-13, Section 3.8, second paragraph, A Five Year Review is a CERCLA requirement for waste that are left in place, sites that are in Long term Operations and Maintenance, or where the action(s) taken are not the final action(s). What is the basis for contemplating that Five Year Reviews will be required for 100 years after closure ? This implies that DOE does not intend to relinquish the 100 Areas for at least 100 years post remediation.

Recommend re-writing this section to be consistent with CERCLA.

- 79. Page 3-13, Section 3.8, second paragraph, how are the need for institutional controls being recorded? When and how will monitoring be done?
- 80. Pages 3-17 and 3-18, Figure 3-2, under the column labeled MTCA, the next square denotes "Summers statistics meet MTCA decision rules". This probably should be Summary Statistics meet MTCA Decision Rules, since Summers is applied when the contamination is below 15 ft and is of concern to the ground water.

81. Appendix A Waste Site Information. This section requires the following changes:

Each drawing should contain a listing of the contaminants of concern. Also, the initial waste site classification, (ie. shallow, intermediate, deep) should be provided.

Thirty-six sites are listed in the Appendix for remediation. All of the documentation to date discusses thirty-seven sites. Was a site dropped post-ROD? Were multiple sites combined? What is the explanation for this discrepancy?

Seven sites are shown as having no contaminated volume. These are 116-D-9 Crib, 100-D/DR Effluent Pipelines, 116-B-4 French Drain, 116-B-5 Crib, 116-B-12 Seal Pit Crib, 116-H-4 Pluto Crib, 100-H Process Effluent Pipelines. Volumes should be shown. If the waste has already been removed via other actions this should be noted. No drawing is presented for 100-B/C Process Effluent Pipelines. Revise corresponding tables as appropriate.

82. Appendix B, Page B-1, Summary of RESRAD Model, Exposure Scenario, It is stated that the..."Regulatory agencies (EPA and Ecology) have expressed the intent that the interim remedial measures for 100-Area sites should not restrict future use of those sites." It would be much more accurate to state... "A primary goal of the ROD signed in September, 1995 by the Triparties is to achieve cleanup levels that would not restrict the future use of the land in the 100 Area. This goal was identified by the Future Sites Uses Work Group Report and strongly emphasized by many stakeholders during the development of the Proposed Plan and during Public Comment on that Plan."
83. Appendix B, RESRAD has limitations in evaluating dose when using transport of radionuclides from near surface to ground water or to offsite surface waters. The basis for the input assumptions. The groundwater pathway of RESRAD is to be used only for the calculation of cumulative dose, not clean up levels.
84. Appendix B, Table B-1, thickness of contaminated area is currently listed as 14.6 meters. Recommend changing the depth to 4.6 meter to correspond to 15' if that is the desired depth of the contaminated area.
85. Appendix B, table B-1, the irrigation rate is listed as "0". It is our understanding that in the rural residential scenario an irrigation rate of 30 inches would be used. This was based on information provided by WSU. Recommend changing the irrigation rate to 30 inches. Also this will change the recharge rate of .005 m/year presented in table C-2.

- 86. Appendix C, As for the RESRAD code, the Summer's Model parameters must be documented and justified and agreed upon by all concerned parties. These parameters probably have already been discussed by the participating parties during the meetings that took place on the RD/RA. These parameters appear to be site-specific.
- 87. Appendix D, What are the parameters that have been agreed upon that will be used for determination of time for contaminants to move to the Columbia River? What are the agreed upon values for bulk density and effective porosity for the 100 Areas?
- 88. Table D-2, what is the dilution factor used? 2 is the recommended dilution factor.
- 89. Schedule & Remediation Volumes, site 1607-D-2 appears on the schedule on Figure 3-1, but not on Table 1-1 or in Appendix A.
- 90. The table below presents a listing of the sites in the RD/RA Work Plan, preliminary volume estimates, and days scheduled for remediation. There is a lack of consistency on durations that have been presented for remedial actions when compared to volumes. For some of these items it may be an artifact of the schedule model, for example it may be that 116-B-13 and 116-B-14 are planned for remediation in tandem with 116-B-11, and the schedule for 116-B-11 has become the default for the other two sites (303, 303, and 340 days for 1000 LCM, 500 LCM, and 63,000 LCM respectively). However, there is insufficient information in this document to determine what are the assumptions that are driving the schedules. Other examples that are less clear are comparisons of times and volumes for 116-C-1, 116-B-1, and (77 days, 28,000 LCM; 140 days, 10,000 LCM; 83 days, 12,000 LCM, respectively). Other concerns include; 116-B-5, 55 days, 13 LCM; all of the sites under 100 LCM have between 7 and 20 days of scheduled remediation; the sites from 100 LCM to 1500 LCM have between 16 and 30 days scheduled for remediation - these would constitute painfully slow remediation rates for the sites. Further analysis also raises questions such as why are the production rates so different for the three large sites (116-D-7, 219 days, 40,000 LCM; 116-DR-1 & 2, 121 days, 26,000 LCM; 116-DR-9, 154 days, 46,000 LCM) in the 100-D Area? Similar comparisons and questions are evident for the other large sites as well.

Waste Site	Days to Remediate (LCM) *	Volume Estimate (LCM)
116-D-1A	16	635
116-D-1B	16	489
116-D-2	7	37

116-D-4	7	63
116-D-6	7	26
116-D-7	219	39,961
116-D-9	7	0
116-DR-1 & 2	121	25,922
1116-DR-9	154	46,284
107-D-1	30	1,334
107-D-2	27	1,334
107-D-3	28	1,334
107-D-4	20	720
107-D-5	15	423
100-D-Pipelines	37	0 4021 meters pipe
116-B-1	140	10,211
116-B-2	60	2,809
116-B-3	14	49
116-B-4	NA	2,548
116-B-5	NA	0
116-B-6A	7	61
116-B-6B	55	13
116-B-9	7	4
116-B-10	20	3
116-B-11	340	63,018
116-B-12	7	0
116-B-13	303	1,066
116-B-14	303	530
116-C-1	77	28,058
116-C-5	350	83,154
100-BC-Pipelines	185	1,748 6533 meters pipe
116-H-1	34	1,916
116-H-2	83	12,926
116-H-4	NA	0
116-H-7	278	32,358
10-H-Pipelines	275	0 1228 meters pipe

\* Not all sites include time for backfill.

What is the confidence level for sites that are listed as having "zero" contaminated volume that there is no contamination present?

**SAP COMMENTS: enclosure 2**General Comments

1. The SAP should contain enough detail to cover all 37 waste sites listed in the interim ROD.
2. Number of samples required for final verification dropped from six to three. The explanation for each is lacking.
3. The correlation graphs were deleted in the April SAP. Correlate areas where there is sufficient data to see trends and note areas of data gaps. This could be useful information, so don't delete the effort.
4. The discussion of the statistical model used at the FMC in the April SAP should be reviewed in its entirety before approval for radiological cleanup. Detailed discussion of the FMC strategy must be provided. After review of this strategy, EPA and Ecology will determine if this sampling strategy is applicable to the 100 Area conditions.

Specific Comments

1. Page viii, "RESRAD" with explanation must be a typo. MTCA is the acronym for the Model Toxics Control Act. Volatile is misspelled volittle.
2. Page I-1, Section I.1, 2nd and 3rd paragraph, Paragraph two discusses the need to generate specific descriptions of work for each waste site. EPA and Ecology do not agree with this statement. The SAP should and does contain sufficient detail to be applicable for all 37 sites. If needed change sheets can be produced for any waste sites that fall outside the parameters detailed in the SAP.  
What is paragraph three trying to communicate. From the text provided it is difficult to determine. Please clarify.
3. Page I-2, Section 1.1.2, 2nd paragraph, This paragraph states that there are six sites in the BC-1 OU. This statement is not correct, there is 16 sites listed in the RD/RA workplan. In addition, as stated above this SAP should cover all 37 sites. In the last sentence this plan is referred to as a safety analysis plan. This should be changed to reflect that in fact this document is a sampling analysis plan!
4. Page I-2, Section I.1.2, Bullets, This section lacks specifics, the information provided has little value to the SAP. Information that needs to be added include contaminants of concern, waste site classification, and waste profile if known.



5. Page I-5, Remedial Action Goals, last sentence, the term site closeout is incorrect. It would be more appropriate to say site verification or site clean up. Site close out will occur at a later date when the final ROD is written.
6. Page 1-5, 2nd to the last paragraph, where did the 1,000 years come from. Please provide a reference.
7. Page I-7, 2nd paragraph, last sentence, since the ROD was issued the clean up standard is no longer proposed. Recommend dropping the word proposed.
8. Page 1-9, last paragraph, define initially, the correlation discussion needs to be enhanced. It is not clear what the purpose of this sampling is.
9. Page , I-10, Disposal, this paragraph states pre- characterization will be preformed. This is not EPA and Ecology's understanding. Please clarify.
10. Page I-13, Section I.4.4, the statement regarding the criteria for rejecting imported backfill is not clear. What is the criteria? Some multiple of background? Make Sections I.4.4 and II.3.1.4 consistent. Also there is no rational for dropping metals and organics from the screening.
11. Page I-13, Section I.4.5, Site Closeout, Change title to site verification. Also define QTL and SFL.
12. The tables in the SAP and the RD/RA should be consistent. The SAP uses SI unit with standard units in parentheses, the RD/RA does not. The SAP does a better job of consistent significant figures. Hanford cleanup documents have generally not used SI units.
13. Page II-1, Section II.2.4, Please clarify that the DQO process was internal to BHI and no regulatory agencies were involved.
14. Page II-4, Table II-2, where is percent recovery?
15. Page II-6, Section II.3.1.1, last paragraph, what is the rational for sampling every 500 yards?
16. Page II-7, Section II.3.1.2, FMC approach, This approach needs to be explained and the rational for choosing this approach provided.
17. Page II-9, Table II-4, does this table refer to in situ or is it for inorganic non-radionuclides, etc.?
18. Page II-11, Section II.3.4.1, the capability of the RCMS instrument is described; what is needed is the data on the calibration and correlation with sampling and analysis results. Please provide this information.

19. Page II-12 The dose factors to be used to convert micro-R measurements to concentrations should be those in Federal Guidance Document No. 12, since these factors are used in RESRAD 5.61. There are some significant differences in these dose factors.
20. Page II-16, II-17, Figures 1 and 2. This figures are not legible. Please provide legible copies for regulator review.
21. Page III-1, Sampling objectives, As stated earlier the regulators do not concur with pre-characterization. What is the rational for this work?
22. Page III-2, Table III-1, defer to the Draft DOH guidance for radiation closeout or explain confidence for not following this guidance.
23. Table A-1 The statement on  $^{99}\text{Tc}$  that it was excluded because it had no dose impact because it is a low energy beta is not technically correct.  $^{99}\text{Tc}$  is listed in the tables in the RD/RA. These two documents should be consistent. Also, what is the rational for having appendix A. Why not include this table in Section I.
24. Page B-1, what is the schedule to complete this section? EPA and Ecology will not approve the SAP without this information.
25. Appendix C, General, There is an abundance of useful information in this appendix mixed in with alot of DQO verbiage and redundant information. EPA and Ecology would like to discuss with DOE the information we find pertinent and include this information in the body of the document,.
26. Page C-7, Remedial Action goals, remove the reference to 2018. This is not the agreement of the three agencies.
27. Page C-9, ARAR's, the ARAR's discussion in the SAP should be consistent with the ARAR's discussion in the RD/RA workplan.
28. Page E-3, Table E-1, explain the values for the Deep Zone. Are these for all sites in the 100 Area and at what distance from the river?
29. Page E-5, Section E.5, explain the reason for taking a minimum of three samples for closeout. Does this apply to larger sites?