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Mr. Cliff Clark
U.S. Department of Energy
Richland Operations Office
P.O. Box 550, MS A3-04
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Dear Mr. Clark:

Thank you again for the opportunity to review DOE's CERCLA Five Year Review Report for the Hanford Site, and for your participation in several meetings to discuss the review with us. The 2006 Five Year CERCLA Review marks an important event at Hanford because it provides an opportunity for critical review and mid-course adjustment as DOE is moving from interim actions toward final cleanup decisions, particularly for the river corridor. To supplement the comments we previously provided on the Five Year Report, the attached technical comments provide a set of more narrowly-focused technical comments and recommendations on the May 8 review draft.

1. The report is very much an insider's document, and is often hard or confusing to use. Descriptions are often cryptic (e.g., description of new technologies for 100-K, Section 1.4.5.3) and not very informative for those not already conversant with details of the Hanford Site and issues. Remedial action objectives are not listed for the 100 Area operating units (OUs), so readers have no basis for assessing whether remedies are working. Maps of individual reactor areas or OUs do not have labels to identify waste sites or wells, so readers are unlikely to know what part of an area is being discussed.
2. We appreciate the revised format for listings of issues and action items in the May draft. This style is much easier to understand than the separate sets of statements in the March draft.
3. This report lumps statements of protectiveness into one all-encompassing statement for all OUs in each NPL site. We believe the process would be better served by summarizing, assessing, and discussing data for each individual OU in each NPL site, as this would encourage DOE to more thoroughly review cleanup status and monitoring data for each site and OU.
4. One of Oregon's concerns with the review is that DOE has taken a very narrow perspective on protectiveness. By relying on ICs and work in progress, DOE has simplified the process to the point that only the most egregious remedy failures are likely to be recognized and

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acknowledged as non-protective. We believe this trivializes a process that should be providing a critical self-review of the effectiveness of cleanup. We advocate a much broader scope that looks past the short-term (i.e., beyond ICs and work in progress) to examine in detail whether remedies are really working and will be effective in the long term.

5. Section 1.4.1 describes the 1995 interim ROD for the 100 Area waste sites and describes removal of wastes to a depth of 15 feet. The continued presence of waste in vadose zone soils provides an ongoing source for contaminants to groundwater, as is noted in this report for chromium in the 100 Area. In making evaluations of protectiveness, this is exactly the kind of issue that should be triggering an answer of "No" in determining whether remedies are working as intended, and/or as a "Yes" is describing whether new information has come to light. Because DOE has relied on ICs and "will be protective when completed" in determining protectiveness, these kinds of issues are not adequately addressed and it is unclear whether they have been seriously considered in DOE's analyses.
6. DOE's claims of protectiveness, based on ICs, ignores the fact that those controls do not prevent discharges of contaminated groundwater to the Columbia River, nor do they prevent exposure to riparian and aquatic flora and fauna.
7. It also appears that in making assessments of protectiveness, DOE has not considered tribal use scenarios. Exposures under various tribal use scenarios will need to be run and analyzed as part of the risk assessment process and in assessing cleanup for final RODs.
8. Throughout the report, DOE reports groundwater concentrations of contaminants based on what appears to be dissolved concentrations. For risk assessment purposes, total (dissolved plus suspended) concentrations need to be used. This needs to be factored into analyses of protectiveness.
9. Protectiveness assessments seem to be based on evaluation of single contaminants. Risk assessments need to consider cumulative exposure and cumulative risk for multiple contaminants, and protectiveness analyses need to do the same. This is another reason that determinations of protectiveness should be deferred pending completion of risk assessments.
10. In describing the Explanation of Significant Differences for 100-NR-1 (pg. 1.15), the report states that "modeling the contaminants remaining still demonstrated protectiveness of the groundwater." Given the long history of problems with groundwater modeling at Hanford, model projections should not be relied on as the basis for protectiveness. This is certainly true at 100-N, where significant ongoing release of strontium 90 to riparian and near-shore areas is a significant problem for the environment.
11. Section 1.4.2.4 notes that "...deep vadose zone chromium residues continue to act as a reserve for future contamination of groundwater." This statement should be factored into any determinations of protectiveness for groundwater, but it seems unlikely this was done.
12. Discussions of the river corridor should identify and discuss status and trends for all contaminants that are present in concentrations above drinking water and/or aquatic life

standards. This report does a poor job of identifying and discussing the "second-tier contaminants" such as tritium, carbon-14, nitrate, TCE, and strontium 90 at reactors other than 100-N (the second tier is really everything except the big hitters - chromium at 100-D and 100-K; strontium 90 at 100-N; and uranium in the 300 Area). Mention of these contaminants is hit-and-miss, and they are virtually never considered in identifying issues and action items. If there is an implicit assumption that cleanup of source areas will take care of these contaminants, the report should say so and provide evidence to support the assumption. If no such assumption is made, DOE needs to define a path forward in issues/action items for managing these materials.

13. Arguably, DOE should be stating an "issue" for every contaminant at every OU where concentrations remain about a standard, and should identify one or more actions to define the path forward for resolution.
14. Continuing on the issue of second-tier contaminants, the 100-F area provides an example of the importance of addressing these contaminants. While chromium concentrations seem to be generally decreasing at this site, they remain well above standards. In addition, concentrations of nitrate are increasing, concentrations of strontium are "neither increasing nor decreasing," and TCE, tritium, and uranium are present. Observations at this site show that dynamics of chromium and the other contaminants are independent, and that a cleanup strategy focused on chromium might not resolve the secondary contaminant plumes. We note that there are other examples of concentration trends for chromium and other contaminants behaving differently at other reactor areas, highlighting the need to address all contaminants in identifying issues and action items and in planning cleanup.
15. We strongly disagree with DOE's determination that current remedies are protective for groundwater at the 100-K area. Chromium concentrations in some wells are "steadily increasing," a new chromium plume has reached the river, the plume has escaped the eastern end of the pump and treat system, and several secondary contaminants (strontium 90, carbon 14, tritium, and nitrate) are present at high levels, with the report acknowledging that at least one of them (tritium) is unlikely to be successfully controlled by cleanup of waste sites. In spite of all these major problems, DOE states that current remedies are protective.
16. Findings of the 100-N ecological impacts assessment report need to be incorporated into this report.
17. Discussion in Section 1.4.5 probably understates the effectiveness of the pump and treat at the 100-N area. The report dwells on the rate of strontium 90 removal by pump and treat and compares it unfavorably to the rate of decay. The remedial action objective for the 100-N Area interim ROD was not removal of strontium from groundwater, but to intercept and capture strontium flowing into the Columbia River in groundwater. The effectiveness of achieving that goal is undetermined. The interim ROD identified a stopgap procedure (pump and treat) for use until better technologies could be developed and implemented. While the pump and treat might not be a resounding success, the actual success of the pump and treat in reducing contaminant flow to the river is unknown.


18. The description of ISRM in Section 1.4.6.2 places an optimistic spin on a remedy that has failed. This section should be rewritten. Action 11-1 indicates that iron amendments will be emplaced above the ISRM barrier and evaluated to determine whether they improve performance of the ISRM system. Does DOE have expectations for the longevity of the modified system, and do they have plans to assure long-term performance of this system for protection of groundwater and the river corridor? More importantly, by shifting to a new approach for trying to control chromium, DOE is implicitly acknowledging failure of the original ISRM system.
19. Section 1.4.6.2 describes the efficiency of the 100-HR-3 pump and treat as "over 95%." What does this mean - it has operated 95% of the time; it removes 95% of chromium in solution; something else?
20. As was the case for the 100-K area, we disagree with the assessment that the current remedy at 100-D is protective of groundwater and of the environment in the river corridor. ISRM has failed and efforts to locate chromium sources have been unsuccessful. DOE needs to look past ICs to assess the real protectiveness of the existing remedies.
21. Concentrations of chromium at 100-F are described in the context of drinking water standards, not the much lower aquatic life standard.
22. For all discussions of non-radiological contaminant concentrations at all sites and in all groundwaters, DOE needs to review whether new standards have been promulgated since RODs were written or since the previous Five Year Review in 2001. If so, these need to be factored into assessments of protectiveness and noted as a change in assumptions or as new information.
23. As indicated by other comments, we believe that Section 1.5 needs to be completely rewritten to address protectiveness for each OU, and to modify unsupportable assertions of protectiveness.
24. Section 1.7 asserts that in OUs where work has not been completed, "exposure pathways that could result in unacceptable risks are being controlled." We believe this assertion is incorrect for exposure and risk for the environment, and needs to be modified to indicate that risks are being controlled only for human exposure and only through use of ICs.
25. RAOs are listed for the 200 and 300 Area RODs; these make understanding remedies and evaluating their effectiveness much easier. Discussion for the 100 Area would benefit from inclusion of the RAOs.
26. The failure to locate waste drums at the 618-7 burial ground raises a number of concerns. First, this went unacknowledged in the assessment of protectiveness for the 300-FF-2 OU. Second, this calls into question the reliability of existing information regarding the nature and location of buried wastes, and of plans based on that information.

27. Section 3.5.3 of the report acknowledges that the interim remedy for 300-FF-5 (monitored natural attenuation, or MNA) is not working as planned, but Section 3.4.2.1 states that the interim remedy "remains appropriate" and that RAOs for the unit "also remain appropriate." These statements are inconsistent and we suggest that Section 3.4.2.1 be changed.
28. Section 3.4.2.1 cites reliance on ICs to make the case that interim remedies for 300 Area groundwater are protective of the environment. This argument is unsupported, since no risk assessment data are available. Assessments of protectiveness of the environment, for this area and for all of Hanford, must be deferred until appropriate risk assessments have been completed.
29. Section 3.4.4 states that "computer simulation models are under development to provide better estimates for the flow of groundwater and transport of contaminants of concern beneath the 300 Area..." The failure of MNA and the ongoing limited field investigation in the 300 Area speak to the lack of an adequate understanding of uranium inventories and solubility controls in the 300 Area. It is premature to model when a fundamental understanding of processes and critical data are lacking. We note and support ongoing hydrologic modeling in the 300 Area, but would argue that hydrologic models that do not incorporate behavior in three dimensions (no data are available for movement parallel to the river) are insufficient for understanding or predicting contaminant movement.
30. We are disappointed by report language regarding the issue of future land uses in the 300 Area. Given the divergent perspectives of DOE and the City of Richland regarding future land uses of this area, we strongly encourage DOE to plan and clean to standards consistent with the least restrictive land use. While the Five Year Review is not a decision document for land use decisions and cleanup plans, language in this and other recent documents indicates a preference by DOE to clean up to the lowest possible standard. Cleanup to a lower standard means several things, none of which we view as favorable.
- DOE is either precluding options for future use of the area, or is forcing additional cleanup in the future when land use decisions for the 300 Area are modified to be consistent with needs of the City of Richland.
 - DOE would be required to monitor and review status of the area for the indefinite future; has the Department fully evaluated the relative life cycle costs of full cleanup as compared to partial cleanup, followed by long term monitoring and land use controls?
 - A lower level of cleanup compromises environmental protection by allowing long-term releases of uranium via groundwater.
31. Section 3.5.1 could be shortened to a few critical issues - MNA is not working, and DOE does not understand uranium inventories and controls. We're not sure we see the need to restate what turned out to be incorrect assumptions, or to speculate about what might explain the failure. We also ask that the statement of protectiveness near the bottom of page 3.13 be modified. Since the remedy has failed, the statement is irrelevant. Moreover, statements of protectiveness for the environment need to be deferred until ecological risk assessments are completed.

32. We don't understand the statements of protectiveness for the 300-FF-2 OU. DOE was unable to locate source material at 617-8, and the tritium plume at 618-11 is not yet understood. There is apparently no knowledge of the tritium source, no information whether similar releases might occur in the future, and plume migration is not well understood. These suggest to us that determination of protectiveness should be deferred until these waste areas and groundwater plumes can be better characterized.
33. For the 1100 Area, please explain why a "memo to File" was used as the vehicle for removal of DDT during 2005. We don't understand why the 2005 cleanup was done outside the CERCLA process, and why the removal is deemed a "non-significant change." It is hard to understand how a site can go through cleanup and delisting and can have remedies deemed protective, then need additional cleanup. This failure of the original process at this site raises significant doubt about the comprehensiveness and reliability of this and other cleanups on the site. We also wonder how remedies can be called protective and how it can be asserted that there was no new information during the past five years when additional cleanup was required. Section 4.5 should be rewritten to reflect the additional work done in the 1100 Area during 2005.
34. Issue 20 indicates that DOE wishes to end groundwater monitoring for TCE in the 1100 Area. We would support a reduction in frequency of monitoring, but given the often erratic dynamics of contaminants in Hanford groundwater and the stochastic nature of events, we believe it is premature to call for cessation of monitoring.
35. Section 4.3.2 notes that the 1100 Area ROD required monitoring of nitrate in the vicinity of Horn Rapids Landfill. There is no mention of nitrate monitoring or of nitrate status in groundwater in this report. What is the status of nitrate, and how would monitoring be affected by the proposed cessation of monitoring for TCE?

We look forward to working with DOE to plan continued cleanup of Hanford in a manner that is efficient and protective of human health and the environment. As a step toward that goal, we encourage you to carefully consider our comments as you develop the final Five Year Report. Should you have any questions or wish to discuss any of our comments, please call me at 503-378-4456.

Sincerely,



Paul W. Shaffer