

Responses to Citizens' Comments on the Draft Five-Year Review Report

1. First, the second paragraph on page 100-3 (and perhaps the fifth paragraph on page 200-3) probably should acknowledge RL's proposed 2012 plan. A reasonable way might be in a footnote after the 2018 date(s) referencing DOE/RL-2000-62, Rev.2, *Hanford 2012: Accelerating Cleanup and Shrinking the Site*, along with a statement that Congress has not yet funded this plan.

Response: Currently, the 2012 plan is a DOE initiative and not part of the Tri-Party Agreement. At this time, it is unknown whether this plan will be implemented and therefore the reference is not appropriate.

2. Second, the paragraph split between pages 100-3 and 100-4 references only SNF from the 100-N Reactor currently in storage in two water-filled basins in the 100-K Area. The last information that I had indicated some irradiated single-pass reactor fuel was also present in the K-Basins. More is likely to be discovered while F-Basin and H-Basin are being cleaned out. This information could be added to the referenced paragraph.

Response: The document has been changed as suggested.

3. The Action Items contain a great number of Due Dates of March 2001. Since the report probably cannot be released and transmitted to DOE until March, it would seem reasonable to advance the dates at least until April or May 2001.

Response: The dates have been revised appropriately.

4. Action Item 100-1, second bullet: Change improved to reduced.

Response: This action item has been changed as suggested.

5. It is not clear what the rationale is for DOE being responsible for some Items and the Tri Parties being responsible for others.

Response: DOE is responsible for most of the action items. In some cases, such as the action items regarding developing monitoring well networks in the 200 Areas, the responsibility is shared by the Tri-Parties.

6. Item 200-9 has conflicting dates.

Response: The action item requires the production of the Phase III Feasibility Study for the Canyon Disposition Initiative by September 2001. The date was chosen to support development of a ROD by September 2002. There is no conflict in the action item, however the way the item read was ambiguous and was clarified.

7. Page 100-17, Recommendation for in-situ Treatment for Chromium, second bullet: Insert and CR⁺⁶ removal effectiveness after Actual costs.

Response: The document has been changed as suggested.

8. Page 100-19, Action Item 100-2: Is it possible to provide some sort of fencing and warning signs on the shoreline at the N springs to prevent idiots from sipping groundwater from the seeps? I know what the law requires; but there must be some way to use the money spent on pump and treat to better advantage while preventing injury to people.

Response: Appropriate signs to warn of contamination is part of the institutional controls recommendation.

9. Page 300-14, first ¶, line 10: Insert or greater than after equivalent to.

Response: The suggested edit was made.

Responses to the U.S. Fish and Wildlife Service's Comments on the Draft Five-Year Review Report

We have reviewed the subject USDOE Hanford Site, First Five Year Review Report, and have the following general and section specific comments regarding the documents. The report purpose is confusing because the five year review for the 100 area, 200 area and 300 area includes discussions of operable units for which final ROD's have not been issued. The cleanup for these units is also in various stages of planning or implementation. The summary document for the 100, 200, 300 and 1100 area does not provide enough level of detail regarding the levels of contaminant in the environment to make reasonable determinations of risk to the environment. The reports do not provide a complete disclosure of all contaminants present in the environment and cleanup levels which will be protective for unrestricted future public use which is likely to occur due to the designation of the Hanford Reach as a National Monument. An overriding concern for all of the areas is the complete lack of biological data for making decisions regarding cleanup levels that are protective of the environment. There have been limited laboratory studies looking at impacts from hexavalent chromium releases upon aquatic resources, concentrating on chinook salmon. There has been no research on the Columbia River ecosystem and organisms that support salmon and Steelhead trout. As we have requested in the past, baseline biological sampling for terrestrial and aquatic species needs to be conducted in order to determine if cleanup is successful. Specific comments on the reports follow;

General Response: A five-year review is performed on the basis of an entire National Priorities List site, including operable units where remedies are not currently in place. The broad scope of the five-year review provides a complement to the numerous focused analyses associated with specific risk assessment documents, cleanup decision documents, cleanup verification packages for individual waste sites, databases of sample data, and other data-rich documents in the administrative record. The five-year review did not re-evaluate and document each step in the process from identification of sufficient risk to justify a cleanup action, through completion and close-out of the action. That is documented through the Administrative Record which is available on the internet at <http://www2.hanford.gov/arpir/>.

Regarding the baseline biological sampling of terrestrial and aquatic species, the need for biological sampling is mentioned in the opening comment above, and is reiterated in the specific comments that follow. DOE, Ecology, and EPA agree. DOE has monitored terrestrial and aquatic species since inception of the Hanford site. Monitoring has continued with the arrival of EPA and Ecology as regulators and Tri-Party Agreement activities.

1. Page iv, 2nd paragraph. It is stated that "The purpose of a five-year review is to determine whether the remedy at a site is protective of human health and the environment." That purpose does not appear to be adequately documented in this Five-Year Review Report. It seems like this "purpose" would be very difficult to do without investigating the biota

that inhabits the environment. We suggest that a biomonitoring program be established to determine if indeed the remedy is protective of the environment.

Response: This comment correctly recapitulates and highlights the purpose of the five-year review. The reader should be aware that the broad scope of the five-year review provides a complement to the numerous focused analyses associated with specific risk assessment documents, cleanup decision documents, cleanup verification packages for individual waste sites, databases of sample data, and other data-rich documents in the administrative record. The five-year review did not re-evaluate and document each step in the process from identification of sufficient risk to justify a cleanup action, through completion and close-out of the action. That is documented through the Administrative Record which is available on the internet at <http://www2.hanford.gov/arpir/>

The comment correctly notes that investigating the biota and biomonitoring are important elements in ensuring protectiveness. Towards that end the biota at the Hanford site have been monitored since the early 1940s. In recent years this data has been reviewed and presented in an annual monitoring report.

There is an effort underway for the 100-BC Area to do a post-remediation evaluation of human health and ecological risk using data collected during the remedial action including cleanup verification samples, plus biota data collected at the site. The earliest radioactive waste site cleanups covered in this five-year review are in the 100-BC Area. This is the first opportunity to collect post-remedial action biota data from radioactive waste sites that have completed an interim remedial action, been backfilled, revegetated, and have some early successional use by native species. Scoping for the appropriate risk assessment is underway.

2. Page vi, 200 Area, 1st full paragraph. The statement is made that the ERDF is operating in an environmentally protective manner and no change in operation is needed. In the section that discusses the waste disposal facility it is mentioned that construction consisted of using a double liner and a leachate collection system that met minimal RCRA standards. Are there monitoring systems in place for the existing cells to determine if cell integrity will be maintained for ever or will this site be the next huge DOE cleanup project.

Response: ERDF was constructed in accordance with RCRA standards, which are quite rigorous. The term “minimum standards” is a colloquial term and will be deleted. The monitoring program is designed to detect all of the contaminants that could result from ERDF operations.

3. Page vi, 300 Area, There is not any mention made of requiring collection of biological baseline data for operable units in this area.

Response: The draft five-year review stated that “DOE must demonstrate that soil cleanup levels are protective of groundwater, that biological resources are not being adversely impacted...”. Biological data has been collected for many years around the Hanford site, including the 300 Area, before cleanup actions began, during cleanup actions, and will continue following cleanup to document protectiveness.

4. Page vii, 1100 area. The DDT problems that continue at the Horseshoe Landfill are not discussed. The biological data that the Fish and Wildlife Service and the DOE collected that document elevated levels of DDT/DDE in biota should be mentioned. The data from soil samples collected and analyzed by the State of Washington Department of Ecology that indicated that DDT/DDE residues were above the cleanup criteria level of 1ppm should also be mentioned. To state that the only deficiency found during the review was a bad fence is an affront to the efforts of the Trustee Council to resolve this issue.

Response: This comment was made regarding the foreword and the information was discussed in the full 1100 Area section of the document.

5. Page vii, 3rd paragraph, 2nd line. Editorial error: “that crosscuts each all of the...” Delete “each” or “all”

Response: The suggested change was made.

6. Page vii, Action Items Table. This table should be amended to include action items for all Areas, adding biological baseline studies for impacts to terrestrial and aquatic resources. The presence of runs of federally endangered Upper Columbia River Steelhead (*Oncorhynchus mykiss*) and biological studies for all areas that are impacted by contaminated ground water in the 100, 200 and 300 areas require Endangered Species Act, Section 7 consultation with the National Marine Fishery Service. An Action Item that includes biological studies to determine impacts to aquatic invertebrates, benthic organisms and other food chain organisms that may be affected by hazardous material releases to the aquatic environment is needed. An action item to resolve impacts to migratory birds from elevated levels of DDT/DDE at landfills on ALE and the North Slope needs to be added.

Response: As mentioned in other comment responses, biological studies are important, and many have been conducted in Hanford plants and animals. There is routine biological monitoring and numerous special studies that look at specific contaminant and ecological exposure issues. CERCLA cleanup actions at Hanford are major federal actions and may trigger ESA Section 7 consultation requirements. The DOE, the action agency as per the ESA, is responsible for ESA Section 7 consultations, and has provided information to the National Marine Fishery Service. The Hanford Natural Resource

Council continues to work towards resolution of the DDT/DDE issues at ALE and the North Slope.

7. Page 100-3, 4th paragraph, 1st line. Editorial error: “The are nine nuclear reactors...”

Response: The editorial error was corrected.

8. Page 100-4, 1st paragraph. There have not been any biological baseline studies conducted at the over 400 waste sites that were mentioned. These studies are needed for determining impacts to and success of cleanup remedies for terrestrial species particularly for the burial ground sites. The report does not identify all of the potential contaminants that are present and the levels that occur in the environment. The implication is that if the reviewer wants this information we should all go and read the documents used to write the report. The value of this report then becomes similar to a public relations document.

Response: The EPA does not agree with the opening statement of the comment. There are numerous programs at Hanford that collect biological baseline data. These include “near-field” sampling for waste sites, that provides bioavailability and uptake information into plants and animals. There is also site-wide environmental monitoring that provides a ecological community scale assessment of contaminant uptake. There are ecological risk assessments as part of the cleanup planning process. There are many in-depth studies of specific contaminant-receptor risks. These documents are available to the public. The five-year review is a review and not a recapitulation of all the supporting data and analyses that underpin the conclusions presented in the five-year review. The goal of the five-year review was to determine the protectiveness of the CERCLA cleanup actions. To determine protectiveness, it is not necessary to quantify the impact present prior to the cleanup action. It is necessary to verify that the cleanup levels chosen were appropriate, and that the cleanup actions achieved the required cleanup level. Generally the selected cleanup levels involved models and assumptions that have uncertainty. There are CERCLA cleanup and restoration activities that have been completed, and the opportunity now exists to document the post-cleanup conditions via biological studies. Some studies have already taken place and were identified in the draft five-year review (e.g., the contaminant studies on the North Slope and ALE). The Tri-Parties have begun planning a biological assessment of the 100 BC Area, where active remedial action – including restoration – has been completed.

As correctly noted in the comment, the five-year review does not identify all of the potential contaminants that are present and the levels that occur in the environment. There are many hundreds of potential contaminants at Hanford, and their levels in the environment are highly variable, depending on the location. The implication expressed in the comment, i.e., if the reviewer wants this information, the reviewer must read many other documents, is correct. The value of this report is that it presents a summary level analysis of a very complex contaminated site.

9. Page 100-7, 1st paragraph, last sentence. It is stated that “...long term monitoring are required for sites where wastes are left in place...” Does this mean biomonitoring? Please explain the monitoring requirements. The paragraph which describes the 1996 ROD for groundwater at 100-HR-3 and 100-KR-4 states that the principle threat being addressed is ecological risk to bottom dwelling organisms in the Columbia River via the cleanup standard of 11µg/l for hexavalent chromium. There have not been any studies conducted however that evaluates the actual impact to benthic organisms in the vicinity of up welling groundwater (porewater) that has over 600µg/l of hexavalent chromium.

Response: The Tri-Parties expect to continue groundwater monitoring for the foreseeable future. In addition, a baseline risk assessment will be conducted and it is anticipated that biomonitoring may be a component of that assessment.

The comment correctly states that there have not been any studies of actual impact to benthic organisms in the area of where river bottom porewater has been documented at over 600 µg/L. The Tri-Parties have decided a bias-for-action was appropriate and set a cleanup standard of 11 µg/L to be protective of the Columbia River salmon population.

10. Page 100-8, 1999 ROD for K Basin. What is meant by the statement “Water will be removed, treated and disposed of at Hanford”? What is the water contaminated with, nuclear waste?, and where at Hanford will it be disposed?

Response: The water will be pumped out of the basins, transported by truck to the effluent treatment facility in the 200 Area, treated to remove essentially all the contaminants except tritium, and then discharged to the ground north of the 200 Area. The principal contaminants in the water are radionuclides. This information has been added to the document.

11. Page 100-10, 2nd paragraph, last sentence. It is stated that “Based on the methods and models, all 35 waste sites have achieved the remedial action goals set forth in the ROD.” None of the models assess or analyze biotic indicators and thus the remedy may not be protective of the environment. The contaminants that were present prior to and levels after cleanup are not provided. A summary of the verification data that is referenced to claim remedial action goal attainment should be included.. There have been no baseline biological studies conducted at these sites to determine if cleanup has been protective of the environment (terrestrial resources). The observational approach is used to guide cleanup, however if hazardous materials have not been disposed in a homogenous manner, materials that are discontinuous might not be removed.

Response: The cleanup decision documents used evaluations of risk to both ecological receptors and human health to set cleanup levels. The cleanup levels had to be protective of both upland human and ecological users of the site, plus ecological and human users of

the downgradient Columbia River, therefore protection of the environment is built into the remedy. Cleanup verification is a process of taking post-cleanup data and comparing the data to cleanup levels set forth in the cleanup decision document. Protection of human health was the more stringent criteria for most of the contaminants. For radionuclides, the cleanup standard for human health was many times for stringent for human health protection than for ecological protections. Therefore, cleanup verification contained more human health analysis than ecological. The comment states that “none of the models assess or analyze biotic indicators,” which is an incorrect statement.

The comment correctly states that “the contaminants that were present prior to and levels after cleanup are not provided.” The concentrations of contaminants prior to cleanup is not relevant to documenting the protectiveness of the remedy when it is completed. With so many waste sites, so many contaminants, and so many measurements collected as part of the close-out process, it is not feasible to reproduce the cleanup verification data for this five-year review, except to summarize it by saying the remedial actions goals were attained. The issue of baseline biological studies has been discussed in other responses. Cleanup must be planned to minimize the possibility that if hazardous materials have not been disposed in a homogenous manner, materials that are discontinuous might not be removed. This has not been a challenge for the liquid effluent disposal sites. For the burial grounds, this will be a greater concern. The recently approved burial grounds record of decision requires that the burial grounds be exhumed. This will better support the process of sorting contaminated material that needs disposal from uncontaminated soil that can be placed back into the excavation.

12. Page 100-11, 2nd paragraph. Insufficient explanation of the chromium/salmon studies. Suggest adding text before the last sentence to explain the results better. It is also important to note that the studies conducted to date have not addressed the impact of hexavalent chromium upon benthic or invertebrate food chain organisms essential to chinook salmon and Steelhead trout. The suite of studies proposed by the Trustee Council in the Aquatic Assessment document through Phase III have not been completed. We recommend the following language to describe the results of the studies that have been conducted thus far:

The results of these studies, however, indicate that concentrations of chromium from 54 to 120 µg/L caused changes in DNA strand breakage, histology, and lipid peroxidation. The health of salmon studied was significantly impaired at these concentrations. Growth of salmon was significantly reduced at 120 µg/L and survival was significantly effected at 266 µg/L. The avoidance-preference response to aqueous chromium indicated that chinook salmon were capable of detecting and avoiding concentrations as low as 54 µg/L. All of these effects occurred at concentrations that potentially occur in or near chinook salmon spawning areas. The highest concentration of chromium recorded in the Columbia River in pore water from near-shore areas was 632 µg/L. These studies indicate that the current cleanup plan to achieve the ambient water quality criteria

(AWQC) of 10 µg/L for chromium entering the Columbia River would most likely be protective of developing chinook salmon.

Response: The suggested paragraph was be added with the minor change that the reference to 10 µg/L is a standard rather than a criteria.

13. Page 100-11, third paragraph. The establishment of the Hanford National monument will change the ability of the DOE to restrict public exposure to radiological and organic contaminants in the future. Information on the monument should be updated.

Response: Additional information on the monument was added as requested.

14. Page 100-11, last paragraph, 4th line. Editorial error: Two periods (..) are present. The release of petroleum contaminants into the Columbia River aquatic environments has never been addressed by either DOE or the other Tri-Party agencies and it needs to be, due to the occurrence of endangered Steelhead runs.

Response: The editorial error was corrected. The comment “the release of petroleum contaminants into the Columbia River aquatic environments has never been addressed by either DOE or the other Tri-Party agencies” is incorrect. There have been cleanup actions for the petroleum, and petroleum-contaminated soil is addressed in the 1999 100 N Area ROD, and the petroleum cleanup was addressed in the draft five-year review.

15. Page 100-15, 2nd paragraph, 2nd line. Editorial error: “Columbia” is misspelled.

Response: The editorial error was corrected.

16. Page 100-15, 6th paragraph. It is stated that 82.1 kilograms and 91.3 kilograms of chromium have been removed from two wells. Can these values be put into the context of how much chromium is estimated to be in the groundwater (similar to the discussion of the inventory of strontium-90)?

Response: The mass of chromium in the groundwater plumes being treated by the pump-and-treat systems has been estimated at 590 kg for 100 D Area, 42-250 kg for the 100 H Area, and 250 kg in the 100 K Area. This can be compared to the mass of chromium that has been removed by the pump-and-treat system, which is 103 kg for 100 D Area, 20 kg for the 100 H Area, and 80 kg in the 100 K Area. Removal by the pump-and-treat systems should not be interpreted as progress proportional to the estimated total inventory because the groundwater plume is sustained by chromium that enters from the deep vadose zone. This is evidenced by the fact that chromium concentrations throughout most of the plumes in these areas, which are upgradient from the extraction systems, have

not declined during this period. This underscores the necessity of addressing deep vadose zone chromium to attain the final remedial action goals for these plumes.

17. Page 100-17, Table 100-4 and associated text. Is it accurate to report the “mass” of strontium-90 as “curies”? Isn’t “curies” a measure of radioactivity?

Response: The comment is correct. The document has been changed to use “curies” and not “mass”.

18. Page 100-18, last paragraph. The text states that “...8 Ci of strontium-90 have been removed due to natural decay.” What is the product of decay? Is it a non-toxic substance?

Response: Strontium-90 undergoes a beta decay to Yttrium-90. Yttrium-90 itself is radioactive, with a half life of 64 hours, and it undergoes a beta decay to Zirconium-90 which is not radioactive and is not listed as a CERCLA hazardous substance.

19. Page 100-19, second paragraph. The statement is made that no changes in standards that were identified in the ARARs have been made. The release of Strontium-90 to the Columbia river and it’s impact upon endangered Steelhead runs has not been adequately addressed. To date only one early life stage study using chinook salmon smolts has been conducted. There have not been adequate studies done to determine if there are impacts to benthic organisms in the vicinity of groundwater discharge points. The 5 year report needs to include this as an action item.

Response: The EPA believes that there have been adequate studies to justify taking remedial action for the Sr-90 plume. the Department of Energy has prepared the “Salmon and Steelhead Threatened and Endangered Species Management Plan,” (DOE/RL-2000-27, dated April 2000). This document was the culmination of efforts by the Department of Energy to consult with NMFS, pursuant to ESA. This plan was prepared in response to the 1998 and 1999 listing of Steelhead and Spring Chinook Salmon within the Columbia River system in the lower Columbia Basin for protection under the ESA. The Tri-Parties will continue to work with members of the Hanford Natural Resources Trustee Council, to ensure that appropriate expertise is factored into the Hanford cleanup process in a constructive manner. A complete risk assessment that evaluates the impact of residual contamination on all human and ecological exposure pathways will also be performed in support of the final ROD for the 100-NR-2. No action item is required in the Five-Year Review.

20. Page 100-24, Protectiveness Statements. Missing from the 5 Year review is any discussion of the landfills on the North Slope and the residual DDT/DDE contamination.

The USFWS does not agree that the remedy for cleanup of these landfill has been protective of the environment. Studies conducted by the USFWS indicate elevated levels of DDT/DDE in biota associated with these landfills.

Response: Reviewers of the five-year review are encouraged to read the full citations from CERCLA and the NCP provided in the first (general) portion of the forward, which identify the scope for five-year reviews. The North Slope was cleaned up to support unlimited used and unrestricted exposure, which means it is not subject to 5 year review.

21. Page 200-6, 200-TW-2. The groundwater and vadose zone are contaminated with carbon tetrachloride however no discussion is provided whether this plume may reach the Columbia River. There is also no discussion regarding a need for an action item to establish an aquatic baseline for carbon tetrachloride impacts.

Response: Text was added to the 200-ZP-1 section that discusses preliminary modeling results and potential impacts to the river. Currently there are no plans to set an aquatic baseline because one of the primary goals of the carbon tetrachloride interim action is to assure that the plume remains on the central plateau.

22. Page 200-6, 200-ZP-1. This unit has carbon tetrachloride, chloroform and trichloroethene in the groundwater and vadose zone however no discussion is provided whether this plume may reach the Columbia River. There is also no discussion regarding a need for an action item to establish an aquatic baseline for carbon tetrachloride, chloroform and trichloroethene impacts.

Response: Text was added to discuss preliminary modeling results and potential impacts to the river. Currently there are no plans to set an aquatic baseline as one of the primary goals of the carbon tetrachloride interim action is to assure that the plume remains on the central plateau.

23. Page 200-8, 200-UP-1. The principle contaminants are described as uranium, Technetium with secondary contaminants consisting of carbon tetrachloride, nitrate, chromium, trichloroethylene, tritium and Iodine-129. There is no discussion provided whether these plumes may reach the Columbia River. There is also no discussion regarding a need for an action item to establish an aquatic baseline for contaminant and whether there is a possible terrestrial impact associated with cleanup.

Response: As with the 200-ZP-1 system, the goal of this action is to assure that contaminants remain on the central plateau and therefore will not have adverse impacts on the river.

24. Page 200-12, 200-PO-1 Operable Unit. The plume from this unit which is described as being contaminated with arsenic, chromium, Iodine-129, manganese, Strontium-90, tritium, vanadium, and nitrate which has reached the Columbia River. It is not clear whether the other contaminants in other plumes such as carbon tetrachloride, chloroform and trichloroethene are present. There have been no studies initiated by the Tri-Party agencies to determine the biological impact of these contaminants to aquatic and terrestrial resource in the Columbia River. An action item clearly needs to be added to the list to do baseline environmental risk assessment research. Studies should be conducted to look at the impact these compounds have upon benthic organisms and higher level organisms that support endangered Steelhead runs. There are also threatened bald eagles that utilize the Columbia River riparian zone for feeding and perching.

Response: EPA disagrees that an action item for additional baseline environmental risk assessment research is necessary.

25. Page 200-15, 200-BP-5 Operable Unit. Ground and surface water in ponds in the Gable Mountain Area are contaminated with Technetium-99, cobalt- 60, Strontium-90, Cesium-137 and Plutonium-223/240. No biological studies have been conducted or referenced which provide a baseline for cleanup for this unit. This should be added as an action item.

Response: EPA disagrees that an action item for additional baseline environmental risk assessment research is necessary.

26. Page 200-20, Disposal facility. We assume that the life of the ERDF cells is intended to be as close to for ever or until radioactive decay products are gone. This section indicates that a double liner was used in construction of the first two cells and that the minimal standards were used for the RCRA requirements. Does this mean that the cells were built to minimal containment standards? A monitoring program to measure the effectiveness of the containment cells and leachate collection system is mentioned. Is this a long term system that monitors for all of the contaminants disposed? The final comment regarding this facility is that the initial footprint of it's construction upon habitat in the Central Plateau of Hanford has not been mitigated for and needs to be.

Response: ERDF was constructed in accordance with RCRA standards, which are quite rigorous. The term "minimum standards" is a colloquial term and will be deleted. The monitoring program is designed to detect all of the contaminants that could result from ERDF operations. The issue of mitigation for the first two cells of ERDF is still unresolved. The Tri-Parties will be working with the Hanford Natural Resources Trustee Council to resolve this issue.

27. Page 300-6, Remedial Actions. Several remedial actions were discussed in the 5 Year Report for the 300 Area. In all of the instances there is not any reference made to the

collection of any baseline biological data in order to determine if cleanup has occurred that is protective of terrestrial resources. The discussion for the 300 Area Process Trench does not adequately describe the contaminants present or the cleanup levels achieved.

Response: The five-year review did not re-evaluate and document each step in the process from identification of sufficient risk to justify a cleanup action, through completion and close-out of the action. Specifically, those data are in documents in the administrative record. The administrative record also contains cleanup verification reports that document post-excavation site conditions.

28. Page 300-7, 300-FF-1 Operable Unit. The cleanup levels described for this unit indicates that institutional controls will be needed because cleanup technology will not allow for unrestricted or unlimited human exposure. The discussion does not describe what contaminants will remain or the level of exposure that will occur. The goal of remedial action for ecological receptors is to protect them from exposure in soil by inhalation or ingestion of radionuclides, metals or organic chemicals. The goal is also to protect human and ecological receptors from ground water contamination and to protect the Columbia River. As wildlife is not overly skilled at reading and comprehending signs we wonder how this will be accomplished? We need to repeat our request that biological studies for ecological risk assessment of both terrestrial and aquatic species need to be conducted and these studies should be added as an action item.

Response: Remedial actions are designed to be protective of ecological receptors. Also, continued environmental monitoring of the 300 Area is a component of the remedy selected in the 300-FF-2 ROD.

29. Page 300-9, 300-FF-5 Operable Unit. Similar comment as above apply to all of the ground water plumes and the surface contamination in this unit.

Response: The updated operations and maintenance plan for 300-FF-5 will include ecological monitoring requirements.

30. Page 1100-7, 2nd paragraph. Replace “outlying datum” with “very high result”. The paragraph titled Horse Shoe Landfill needs to be amended to reflect that the State of Washington, Department of Ecology collected three soil samples at Horseshoe Landfill and that two of the samples exceeded the 1ppm DDT/DDE cleanup standard. We do not believe that a 1ppm cleanup standard is adequate considering the nature of DDT/DDE to bio-accumulate in biota; rather, that cleanup standards for these compounds should be based upon a site specific ecological risk assessment focused upon sensitive species.

Response: Statistically, the high result in the bird egg is an outlier. However, that does not mean that the result is invalid. Regarding Ecology’s sample data, DOE and EPA

were not informed of, or coordinated with for the sampling. DOE and EPA were first informed that soil sampling had occurred when the results were shared with us. Where and how the samples were collected, what sort of quality assurance and quality control were used was requested but never provided to the lead regulator (EPA) or the responsible agency (DOE). Thus the quality of the data is unknown.

When the landfill was exhumed, there were discrete pockets of soil highly contaminated with DDT from disposal, which was exhumed and disposed off-site. DDT was routinely used by the Army during the operational years of these landfills, and it would be expected that these sites were treated with DDT for the control of nuisance insects. The top soil from the landfill cap was set aside as the first step of the cleanup actions, because this soil was inoculated with native seeds and cryptogam organisms which was a valuable commodity to return to the top of the site following the cleanup actions. Residual DDT from application would be expected in this soil. Because DDT bioconcentrates to very high proportions, residual DDT from the cleanup level of 1.0 ppm and residual from application to the landfill could be expected in organisms living at the site. The ecological risk portion of the revised MTCA will go into effect on August 15, 2001. These regulations establish a soil concentration for protection of terrestrial plants and animals that is expected to be protective at any MTCA site (WAC 173-340-900, table 749-3). That concentration, based on the most sensitive receptor in the MTCA model – the robin, is 0.75 ppm. Robins are not typically present at Hanford. A Hanford-specific evaluation using the meadowlark resulted in a DDT concentration of 1.5 ppm (Doctor, P.G., K.A. Gano, and N.K. Lane “Evaluation of a Terrestrial Foodweb Model to Set Soil Cleanup Levels”, *Environmental Toxicology and Risk Assessment: Recent Achievements in Environmental Fate and Transport: Ninth Volume ASTM STP 1381*. Published 2000). Given the uncertainties associated with the risk information and the sample analyses, it is our conclusion that 0.75 and 1.0 ppm are equally protective.

31. Page 1100-10, 1100-IU-1. We do not agree that the cleanup that has occurred is protective of the environment.

Response: EPA accepts your opinion, but still concludes that the remedy is protective. When the landfill was exhumed, there were discrete pockets of soil highly contaminated with DDT from disposal, which was exhumed and disposed off-site. DDT was routinely used by the Army during the operational years of these landfills, and it would be expected that these sites were treated with DDT for the control of nuisance insects. The top soil from the landfill cap was set aside as the first step of the cleanup actions, because this soil was inoculated with native seeds and cryptogam organisms which was a valuable commodity to return to the top of the site following the cleanup actions. Residual DDT from application would be expected in this soil. CERCLA liability does not apply to authorized application of DDT. Because DDT bioconcentrates to very high proportions, residual DDT from the cleanup level of 1.0 ppm and residual from application to the landfill could be expected in organisms living at the site. The cleanup level of 1.0 ppm assumes that residual amounts of this bioaccumulating chemical could be seen in biota.

Responses to the Nez Perce Tribe's Comments on the Draft Five-Year Review Report

General Comments

1. In the foreword it states that the “*purpose of a five year review is to determine whether the remedy at a site is protective of human health and the environment.*” It is unclear that this is truly being determined at each waste site. We submit that the only way you can be sure that a remedial action is protective of the environment is by sampling some of the biological indicators at selected waste sites to determine if contaminants are being incorporated into the food chain. We contend that in the absence of any such data that it is not possible to ascertain that a given remedial action is truly protective of the environment. The five-year review in its present form seems to rely on educated guesses and visual observations. We feel that this approach is probably inadequate and misleading at many of the waste sites included in the document.

Response: There is a great deal of biological data available and that information was considered in the five-year review.

2. It appears that insufficient sampling is being conducted to characterize waste sites. Since the transport mechanisms within in the vadose zone are poorly understood, it may be prudent to investigate the soil column of each waste site before remediation begins rather than using the analogous site approach. Further study, to define the waste sites, would aid the remediation workers in anticipating potential hazards, estimating the volume of soil to be excavated, and projecting remediation costs.

Response: Investigations and remediations conducted have shown that the analogous site approach is valid. Not all hazards can be anticipated and funds are best spent on cleanup.

3. The grouping of waste sites in the 200 Areas by historic process information and waste site type minimizes the importance of subsurface geology and ignores the potential for waste migration and mixing (i.e. waste sites located together in close proximity) in the vadose zone. Subsurface geology and geographic location should be factors in how waste sites are grouped together for characterization and remediation.

Response: EPA agrees that understanding subsurface geology is key in selecting appropriate remedies. As investigations occur, geologic information is collected. Irrespective of how the waste sites are organized, the same information is being collected. No changes are required in the text.

Specific Comments

1. Page vii
The table that begins at the bottom of the page should be labeled as Table 1 with an appropriate title.

Response: This is the only table in the foreword and therefore a number is not needed.

2. Page 100-7, 1995 ROD as Amended in 1997
In many cases, soil remediation to a depth of only 15 feet will not remove enough of the contaminant inventory to prevent further degradation of groundwater. In these cases, it is unclear how future impacts to groundwater are being prevented. Use of the RESRAD model to establish the criteria for the cleanup levels for the deeper soil is inadequate as RESRAD addresses only impacts on human health. Improper parameter selection and inputs into the model are also a concern.

Response: The contaminant transport (leaching to groundwater resulting from irrigation) portion of the RESRAD model is used to calculate the potential for contaminants to reach groundwater. That resulting potential groundwater contamination is then compared to ecologically-based chronic ambient water quality criteria to determine ecological risk and to drinking water standards to determine human health risk.

Regarding parameter selection and inputs, we understand the concern over inputs to the model. The parameters used reflect the current understanding and the model's parameters are reviewed and modified when appropriate.

3. Page 100-9, A. Soil Sites
Inadequate soil characterization prior to remediation has caused the extent of soil contamination to be underestimated.

Response: The purposes of pre-remedial characterization are to determine whether or not an action is necessary and make a reasonable estimate of the extent of contamination. The characterization performed was adequate for these purposes.

4. Pages 100-14 & 100-15, Pump and Treat for Chromium
The fundamental problem with the chromium pump and treat systems is that the extraction wells were not placed in the areas with the highest concentrations of chromium in the groundwater. Placement of extraction wells in these areas would increase the effectiveness of the pump and treat systems.

Response: The goal of the remedial action was to intercept the chromium before it entered the Columbia River. The problem with the current system is that it isn't

capturing enough of the groundwater flow. Therefore a recommendation of this five-year review is to upgrade the system to eliminate this problem. Pumping from the locations as suggested in this comment would not achieve the goal.

5. Page 200-18, Figure 200-9

The figure should be labeled to make it clear that the contours represent concentrations of strontium-90 in groundwater.

Response: The title on the figure was changed as recommended.

6. Page 200-29, Protectiveness Statement

The statement that the groundwater plumes (200-PO-1 Operable Unit) do not require an immediate response action to protect human health and the environment should be supported within the text. Because of these plumes, groundwater with concentrations of tritium and ¹²⁹iodine above drinking water standards are entering the Columbia River. Please reference ecological studies that indicate that there is no immediate impact to wildlife resulting from these plumes.

Response: Text has been added to the 200-PO-1 section to support the statements.

7. Page 1100-7 Horse Shoe Landfill

The summary of available information from this site is too brief and not consistent with the level of detail provided throughout the report for other waste sites. There is no mention of the conclusions by the USFWS in their reports and letters that indicate there might be a high risk to wildlife and especially migratory birds. There is no mention of the three soil samples collected by Ecology in the fall of 1999 and the fact that two of those samples exceeded the cleanup level of 1 ppm. The last sentence states that "*the biota data is reasonable, given the 1 ppm soil cleanup standard.*" We think this statement needs more explanation and clarification, especially since we have just heard from DOE that the new MTCA standards for the state of Washington indicate that levels of DDT from 0.7 -1.5 ppm in biota may be cause for concern. We also do not agree with how the 45-ppm of DDT that was found in a bird egg can be characterized as an "*outlying egg shell datum.*" This seems like an attempt commonly made by statisticians to insinuate that if there is only one value that is high that it may not reflect actual site conditions. If more eggs could have been collected we may have found that more than one egg had elevated levels of DDT.

Finally, there is no mention of the 1100 PAD's that were issued by two of the tribes regarding their concerns about Horse Shoe Landfill. It seems that EPA has not recognized the problem or any liability because of an inadequate cleanup. EPA should acknowledge the problem and become proactive in helping to resolve the whole issue.

Response: Regarding Ecology's sample data, DOE and EPA were not informed of, or coordinated with for the sampling. DOE and EPA were first informed that soil sampling had occurred when the results were shared with us. Where and how the samples were collected, what sort of quality assurance and quality control were used was requested but never provided to the lead regulator or the responsible agency. Thus the quality of the data is unknown.

Regarding the revised MTCA regulations, the ecological risk portion of MTCA will go into effect on August 15, 2001. These regulations establish a soil concentration for protection of terrestrial plants and animals that is expected to be protective at any MTCA site (WAC 173-340-900, table 749-3). That concentration, based on the most sensitive receptor in the MTCA model – the robin, is 0.75 ppm. Robins are not typically present at Hanford. A Hanford-specific evaluation using the meadowlark resulted in a DDT concentration of 1.5 ppm (Doctor, P.G., K.A. Gano, and N.K. Lane "Evaluation of a Terrestrial Foodweb Model to Set Soil Cleanup Levels", *Environmental Toxicology and Risk Assessment: Recent Achievements in Environmental Fate and Transport: Ninth Volume ASTM STP 1381*. Published 2000). Given the uncertainties associated with the risk information and the sample analyses, it is our conclusion that 0.75 and 1.0 ppm are equally protective.

Statistically, the high result in the bird egg is an outlier. However, that does not mean that the result is invalid. It may mean that the bird that laid the egg was carrying a burden of DDT from another location, possibly quite distant. The Five-year Review acknowledges that the DDT is an issue being addressed by the natural resource trustees.

8. Page 1100-9 Action Items, First Paragraph

It is true that the EPA has been a participant in the discussions about the Horse Shoe Landfill on the Hanford Natural Resource Trustee Council; however, the EPA has been reluctant to address the issue and has not been proactive in proposing possible solutions at this landfill. EPA determined in 1995 that the site was cleaned up based on only three confirmatory soil samples. We believe that EPA should be more active in proposing a possible resolution to the residual levels of DDT that still remain at the site. EPA has been perfectly content for the trustee council to debate the issue for the last 3 years without any resolution.

Response: The DOE is currently planning, in coordination with the other Hanford trustees, to do additional sampling at the Horseshoe Landfill to help resolve this issue.

9. Page 1100-10 Protective Statements

ERWM strongly disagrees with the statement under 1100-IU-1 that states it "*is protective of human health and the environment and that the remedial actions allow for unrestricted use and unlimited exposure.*" Part of the ALE management plan that is being written has a Tribal Uses Section that is going to allow the tribes to collect plant material from the

site for consumption, ceremonial and medicinal purposes. Under no circumstances could we assure tribal people that it would be perfectly safe to collect such material at the Horse Shoe Landfill given the residual DDT contamination that still exists. We also think that if the public knew about the levels of DDT that may still exist at the site that no one would use this area for recreation or any other purpose. It is inconsistent for EPA to acknowledge elevated levels of DDT at Horse Shoe Landfill (page 1100-7) and then make the comment that all is well.

We do not understand how his conclusion can be reached given the fact that three separate sampling efforts by three different organizations have found elevated levels of DDT at Horse Shoe Landfill. All of these studies should raise a red flag about potential problems at that site that should be taken seriously by EPA. The statements about Horse Shoe Landfill make the credibility of the five year review extremely suspect.

Response: EPA still concludes that the remedy is protective. When the landfill was exhumed, there were discrete pockets of soil highly contaminated with DDT from disposal, which was exhumed and disposed off-site. DDT was routinely used by the Army during the operational years of these landfills, and it would be expected that these sites were treated with DDT for the control of nuisance insects. The top soil from the landfill cap was set aside as the first step of the cleanup actions, because this soil was inoculated with native seeds and cryptogram organisms which was a valuable commodity to return to the top of the site following the cleanup actions. Residual DDT from application would be expected in this soil. CERCLA liability does not apply to authorized application of DDT. Because DDT bioconcentrates to very high proportions, residual DDT from the cleanup level of 1.0 ppm and residual from application to the landfill could be expected in organisms living at the site.

Responses to the Washington State Department of Fish and Wildlife's Comments on the Draft Five-Year Review Report

GENERAL COMMENTS

1. **Ecological Risk**

To date, the Tri-Parties, i.e. EPA, U.S. Department of Energy (USDOE), and Washington Department of Ecology (Ecology), have been using a qualitative ecological risk assessment in the Remedial Investigation/Feasibility Study (RI/FS) process to determine risk to biological receptors. The approach is based on modeling, and the models have never been validated or calibrated. It can not be determined whether a selected remedy is protective of the environment (i.e. fish and wildlife) at a remedial waste site and surrounding areas during the RI/FS and 5-year review process, or whether the remedy is functioning as intended without collecting biological data or validating models.

The qualitative risk assessment failed in the 1100 Area and the 100-IU-3. Exposure routes are being documented after the fact, such as, DDT in biota in the 1100 Area and 100-IU-3. The results of studies assessing effects of hexavalent chromium on fall chinook salmon indicate potential injury. The Tri-Parties knowing this still have not changed to a pre-remedial quantitative ecological assessment in the remaining NPL areas (i.e. 100, 200 and 300 Areas).

A quantitative approach, such as, a pre-remedial ecological exposure/effect assessments, is needed immediately to assist the decision-makers in the RI/FS and future 5-year review processes and in establishing remedial action objectives that are protective of biological receptors. This approach would be consistent with EPA guidance. Without gathering pre-remedial biological data, we are unable to determine whether selected or proposed remedies are/will be protective of the environment (i.e. fish and wildlife).

Response: The comment correctly notes that the Tri-Parties have used what we have termed “qualitative risk assessments” for most of the RI/FSs at Hanford. Some of these “qualitative risk assessments” have used extensive data sets, calculated exposure using multiple pathway models for multiple species, and calculated risk for multiple species. Based on content, those are quantitative risk assessments. (Example: The Qualitative Risk Assessment for the 100-KR-4 Groundwater Operable Unit calculated hazard quotients for six receptors – a plant, a fish, a crustacean, a plant-eating duck, a fish-eating duck, and a heron – from exposure to seven radionuclides and 16 non-rad contaminants.) Although these risk assessments are quantitative in many respects, the Tri-Parties have called them qualitative risk assessments, because at the end of the risk calculations, the numeric calculations are expressed as a qualitative risk such as “very low,” “low,” “medium,” “high,” or “above/below” a hazard quotient.

The comment states that the risk models have never been validated or calibrated. The CRITR2 code that was used for the qualitative risk assessments in the early-mid 1990s was not validated or calibrated for the Hanford radionuclides of interest. The Columbia River Comprehensive Impact Assessment document, completed in 1998, was done under Tri-Party Agreement milestone M-15-80. This assessment used a spreadsheet-based model based on the work of Thomann, et al., which has a pedigree of validation and calibration. This assessment was for 52 species exposed to 25 contaminants. The risks identified in the qualitative risk assessments were also identified as risks in the Columbia River Comprehensive Impact Assessment.

The second two paragraphs of the comment focus on the issue of how much information is necessary before taking a remedial action, including how much characterization is appropriate. The purposes of pre-remedial characterization are to determine whether or not an action is necessary and make a reasonable estimate of the extent of contamination. Biological resource surveys are often part of the pre-remedial characterization (either using existing data or with a specific task). The characterization performed was adequate for these purposes. As remedial actions progresses, new information is gained. This was the case with the DDT in the 1100 Area that was discovered during the remedial action. During the characterization phase, there was no reason to suspect DDT was present.

The 1993 “qualitative” risk assessment for 100-KR-4 discussed earlier calculated a hazard quotient greater than 1.0 for chromium, therefore it is not surprising that the recently-completed Trustee’s study indicates potential injury. The Tri-Parties were aware of and responded to this issue years earlier by implementing remedial actions.

All of the remedial actions selected thus far have included protection of ecological receptors as remedial action objectives.

2. **New Contaminant Exposure Pathways** [First part of comment]

With the current RI/FS risk assessment approach, no new data have been collected during the RI/FS or 5-year review process to determine if there are any open contaminant exposure pathways to fish and wildlife that may pose unacceptable risk to them. However, in the past several years, several scientific efforts have documented open pathways. These include DDT, ⁹⁰Sr, and Cr⁺⁶ and were initiated by U.S. Fish and Wildlife Service (USFWS), Washington Department of Health, and the Hanford Natural Resource Trustee Council (Council), respectively. Unfortunately, it appears that EPA staff failed to recognize and/or act on this information and the need to conduct further evaluations on these contaminants.

Response: The comment opens with the statement, “with the current RI/FS risk assessment approach, no new data have been collected during the RI/FS.” The EPA does not agree with this statement, and encourages the commenter to review an RI/FS document. These are available in the administrative record. The comment also mentions

collection of new data as part of the five-year review process. A five-year review is not intended to be a new data collection activity; it is a review.

The comment correctly notes that, “open contaminant exposure pathways to fish and wildlife that may pose unacceptable risk to them” is important scope for the five-year review. Cleanup actions are designed to eliminate or minimize open contaminant exposure pathways to fish and wildlife. The CERCLA decision documents and the ARARs are the benchmarks in the five-year review to define what is an unacceptable risk. Hence the approach in the five-year review to achieve the objective identified in the comment is to review the cleanup action relative to the decision documents and ARARs.

The comment states that recent studies by a number of agencies or organizations have identified open pathways for DDT, Sr-90, and Cr⁺⁶. These contaminants were all identified years earlier in the CERCLA RI/FS process as posing a human health or ecological risk. The presence of these contaminants has resulted in remedial actions for DDT on the North Slope and ALE, Sr-90 at N Springs and contaminated soil sites, and for Cr⁺⁶ in 100 Area groundwater at four plumes and at contaminated soil sites.

New Contaminant Exposure Pathways [Second part of comment]

DDT was documented by USFWS while performing a level III preacquisition survey on the North Slope (100-IU-3) and Arid Lands Ecology Reserve (1100-IU- 1). Concentrations observed in small mammal samples exceeded >5.0 ppm and the ratio of DDT/DDD/DDE in one sample at the H-06-LE site on the North Slope was very close to 1: 1: 1 indicating a relatively unweathered source of DDT still exists there. Contaminant concentrations of ⁹⁰Sr in biota were substantially higher near the N reactor than at a background site (Vernita Bridge). The hexavalent chromium study is the most extensive study to date at the Hanford Site in terms of documenting ecological exposure and effects. It is still incomplete but initial results indicate potential injury to fall chinook salmon somewhere between 11 ppb and 24 ppb. Upper Columbia River steelhead, which are federally listed, may be more sensitive than fall chinook salmon and additional studies are warranted.

Response: The cleanup level of 1.0 ppm that Ecology, as lead regulator, chose for the North Slope implies residual amounts of this bioaccumulating chemical could be seen in biota with significant exposure to the residual DDT. It is typical in this arid region of Washington state that decades-old DDT and its metabolites are in ratios typical of relatively unweathered sources.

Since Ecology selected 1.0 ppm for the North Slope and concurred on 1.0 ppm for ALE, Ecology has promulgated revisions to the ecological risk portion of MTCA that will go into effect on August 15, 2001. These regulations establish a soil concentration for protection of terrestrial plants and animals that is expected to be protective at any MTCA site (WAC 173-340-900, table 749-3). That concentration, based on the most sensitive receptor in the MTCA model – the robin, is 0.75 ppm. Robins are not typically present at

Hanford. A Hanford-specific evaluation using the meadowlark resulted in a DDT concentration of 1.5 ppm (Doctor, P.G., K.A. Gano, and N.K. Lane “Evaluation of a Terrestrial Foodweb Model to Set Soil Cleanup Levels,” *Environmental Toxicology and Risk Assessment: Recent Achievements in Environmental Fate and Transport: Ninth Volume ASTM STP 1381*. Published 2000). Given the uncertainties associated with the risk information and the sample analyses, it is our conclusion that 0.75 and 1.0 ppm are equally protective.

Concentrations of Sr-90 above background near the N reactor is a statement of fact, so no response is needed, except to state that the contaminated waste sites are currently being exhumed and the groundwater plume is subject to a pump-and-treat remedial action. “The hexavalent chromium study” is actually a set of many hexavalent chromium studies. Routine monitoring of groundwater wells have documented groundwater contamination with chromium adjacent to the river. Groundwater is known to discharge into the river. Springs and seeps that discharge to the river have been sampled and show contamination with chromium. Pore water sampled adjacent to and in the river bottom has confirmed the extrapolation of the groundwater data into the river bottom environment with some dilution. There have been many surveys of the salmon spawning areas in the river bottom. This collection of data documents an exposure of early life states of salmon to chromium derived from groundwater. Recently the USGS and Battelle have conducted laboratory studies, in coordination with the Hanford Natural Resource Trustee Council, that show physiological/behavior consequences under laboratory conditions. All the chromium studies have supported the cleanup level used in the remedial actions.

3. **Federally Listed Species**

The authors of this Report failed to consider recent federal listings under the Endangered Species Act. Species listed include: upper Columbia River steelhead (*Oncorhynchus mykiss*) as endangered (8/97), upper Columbia River spring chinook salmon (*O. tshawytscha*,) as endangered (3/99), and bull trout (*Salvelinus confluentus*), as threatened (6/98). These listings occurred after Records of Decisions had been issued for remedial ground water actions in the 100 and 300 Areas. USDOE continues to allow the release, as defined under CERCLA § 101 (22), of hazardous substances that exceed state ambient water quality standards to the Columbia River that may potentially harm these listed species and their critical habitat.

EPA's 5-year review guidance recommends an interagency, multi-disciplinary team approach to ensure a high quality, thorough review, especially at complex sites. It is unknown why EPA's Hanford Project Manager decided against this approach. WDFW believes that it is necessary to utilize other federal agency expertise from the USFWS and National Marine Fisheries Service (NMFS) given the complexity of the site, the multitude of contaminants present, and their potential detrimental affects to biological receptors. In light of the recent listings at a minimum, USFWS and NMFS should be consulted and the ground water Records of Decisions in the 100 and 300 Areas should be modified to reflect the new listings and list ESA as an ARAR. These RODs should be modified to

include language that requires USDOE to gather biological data to determine potential impact to listed species and establish clean-up standards protective of them.

Response: The EPA does not agree with the comment that “the authors of this report failed to consider recent federal listings under the Endangered Species Act.” The ESA was identified as an ARAR in the appropriate decision documents. Chromium is the contaminant of concern that has been identified as providing potential risk to the species identified in the comment. The cleanup actions for the groundwater chromium plumes have used the state ambient water quality standard for chronic exposure as the cleanup standard. All recent studies mentioned by this commenter have supported this cleanup standard as protective. The Tri-Parties recognized the risk to these species, and the DOE implemented the pump-and-treat actions prior to any of these species being listed under the ESA. It is unclear in the comment how the pre-emptive actions by the Tri-Parties are considered by the commenter as having “failed to consider recent federal listings.” Deficiencies in the groundwater capture of the chromium plumes have been documented by the DOE, identified in this five-year review, and constitute one of the recommendations in this document.

Regarding the second paragraph, EPA has the appropriate staff to conduct this five-year review. Further, DOE did initiate consultation with the NMFS in response to the listing of salmonids in the Hanford portion of the Columbia River. With regards to the comment that “the ground water Records of Decisions in the 100 and 300 Areas should be modified to reflect the new listings and list ESA as an ARAR,” these RODs already list ESA as an ARAR which provides for new listings.

With regards to the statement in the comment that “These RODs should be modified to include language that requires USDOE to gather biological data to determine potential impact to listed species and establish clean-up standards protective of them,” data has already been gathered, species surveys have documented their presence, so potential impact is established. Quantifying actual injury isn’t necessary prior to taking a cleanup action, which is the strategy that has been used by the Tri-Parties. Regarding the cleanup standards portion of the comment, that fact that focused toxicological studies performed for the Hanford Natural Resource Trustees have thus far supported the protectiveness of the selected cleanup standard has already been discussed in the previous response. A complete risk assessment that evaluates the impact of residual contamination on all human and ecological exposure pathways will be performed in support of the final RODs for the 100 and 300 Areas. No action item is required in the Five-Year Review.

4. **Hanford Reach National Monument**

There are waste sites that lie within the Hanford Reach National Monument's boundary. The proclamation signed on June 9, 2000, by the President of the United States included language recognizing the USDOE's responsibility to restore the natural resources at the Hanford facility and within the Monument's boundary. To achieve that goal, it is appropriate and consistent with ESA requirements for EPA to recommend to USDOE that they implement a quantitative ecological risk assessment to ensure remedial actions

are indeed attempting to sever or reduce exposure of hazardous substances to biological receptors. The current qualitative risk assessment approach does not achieve this objective, nor does waiting to conduct an ecological baseline risk assessment after remedial actions are finished achieve this objective. WDFW has concluded that the Tri-Parties are currently unable to document whether selected or proposed remedial actions are/will be protective of biological receptors.

Response: The EPA has recommended and DOE has conducted many quantitative ecological risk assessments at Hanford. As described in another response, many of these have been called “qualitative,” which regrettably has misled those who have judged the document’s worth based on the title rather than the content. The DOE is preparing to conduct a post-remedial action human health and ecological risk assessment at the 100-BC Area, the first of the major remedial action areas that has reached the backfill and revegetation stage which allows sampling of post-cleanup ecological receptors. Post-cleanup biomonitoring is also a requirement in the 300 Area. We understand from the last two sentences of the comment that WDFW does not accept this information as documenting protectiveness, and accept that as the WDFW position. The EPA anticipates this baseline risk assessment data will be able to achieve the objective of determining the protectiveness of the remedial action to biological receptors.

SPECIFIC COMMENTS

100 Area

1. This NPL site and associated operable units lack the same quantitative ecological risk assessment as the 200 and 300 Areas. Insufficient scientific data exists to show that selected remedies are indeed protective of the environment. Additional biological data sampling is warranted.

Response: This specific comment was addressed in the responses to the general comments from WDFW.

2. Although the Tri-Parties foreclosed on conducting a 5-year review for the 100-IU-3 Operable Unit in the *draft Interim Closeout Report North Slope Expedited Response Action*, a review appears appropriate given the assumptions used at the time of the remedy selection. The foreclosure action is also inconsistent with EPA 5-year review guidance that states, “An entire site is subject to a statutory review if any one of its remedial actions is subject to a statutory review. The triggering action for a statutory review at a site with multiple OUs is the initiation of a remedial action at the first OU where hazardous substances, pollutants, or contaminants will remain above levels allowing for unlimited use and unrestricted exposure after completion of the remedial action.” We interpret the word “site” to mean the 100 Area NPL site. The guidance

further states, “Five year reviews should address all operable units and remedial actions for which there is a ROD or Action Memorandum.” We believe that the 5-year review should include the Action Memorandums for 100-IU-4, 100-IU- 1, 100-IU-3, 100-IU-3 North Slope 2-4-D Burial Site, and the no action ROD for the 100-IU-1, 100-IU-3, 100-IU-4 and 100-IU-5. These exclusions from the review are not consistent with the way the 5-year review process applied to the 1100-IU-1.

Response: The sites included in the five-year review include those that fit the NCP criteria as explained in the foreword. In addition, because there have been removal actions at Hanford that are larger than envisioned in the NCP (note that the NCP only requires a five-year review for remedial actions), some removal actions have been included (see Table 100-1). Regarding the last comment and 1100-IU-1, this operable unit was included to mention the DDT issue and to acknowledge that it would not be the subject of future reviews.

3. In addition, new ecological exposure pathways and receptors have been identified for waste sites within the 100-IU-3 Operable Unit. The source of this information came from a USFWS preacquisition survey. The contaminant of concern is DDT and its metabolites and receptors include small mammals, insects, and raptors. No ecological risk assessment was conducted prior to the remedial action or prior to the Operable Unit being deleted from the 100 NPL site via a partial deletion. Implementation of a biomonitoring plan is appropriate at this time given that the 100-IU-3 OU lies within the Hanford Reach National Monument.

Response: This comment was addressed in the general comments.

4. The Council's assessment plan (*i.e. Hanford Site 100 Area Assessment Plan, Volume I: Columbia Rivers Aquatic Resources*) is mentioned on page 100-11. Unfortunately, EPA only mentions the Cr⁺⁶ study. The assessment plan also identified tritium and ⁹⁰Sr as contaminants of concern and identified potential ⁹⁰Sr studies involving sculpin. The proposed studies would assist in fulfilling the evaluation of ecological receptor impact requirements as identified in the Interim Remedial Action ROD for the 100-NR-1 and the 100-NR-2 Operable Units. The requirement states, “Obtain information to evaluate technologies for Sr-90 removal and evaluate ecological receptor impacts from contaminated groundwater (by October 2004).” No quantitative ecological assessment studies have been proposed other than those USDOE agreed upon in supporting the Council's 100 Area Assessment Plan (Resolution 99-01).

Response: This comment is correct. The five-year review only mentioned the Cr⁺⁶ study because that is the only potential study identified in the assessment plan that was implemented. The assessment plan did identify tritium and Sr-90 as contaminants of concern. The highest concentration tritium plume in the 100 Area is downgradient of the 100 K East fuel storage basin. The EPA is overseeing, as lead regulator, the remedial action for the basin. The highest concentration Sr-90 plume is in the 100 N Area. The

Ecology is overseeing, as lead regulator, the groundwater pump-and-treat and soil excavation remedial actions for that contaminant problem.

5. On page 100-18, EPA states "the pump-and-treat system does not appear to be effective method for reducing Strontium-90 concentrations in the aquifer relative to natural decay." This may be the case for ⁹⁰Sr, but the pump-and-treat may be effective in creating a hydraulic barrier that prevents other contaminants of concern from impacting the Columbia River. Its evaluation as a hydraulic barrier that prevents other contaminants of concern from impacting the Columbia River does not appear to have been performed. In addition, proposals have not been presented to treat these contaminants of concern.

Response: The comment states "the pump-and-treat may be effective in creating a hydraulic barrier that prevents other contaminants of concern from impacting the Columbia River." That is true. The comment continues "its evaluation as a hydraulic barrier that prevents other contaminants of concern from impacting the Columbia River does not appear to have been performed." That statement is not correct. Please note the following statement in the five-year review: "The pump-and-treat interim action continues to reduce the hydraulic gradient toward the river...reducing the net flux of groundwater by approximately 96 percent."

Recommendations

1. USDOE shall recalculate ecological risk for the 100 NPL site using a quantitative approach for terrestrial and aquatic environments (i.e. biological receptors), and initiate by July 2001. The emphasis of the assessment shall be to gather pre-remedial biological data, and shall be coordinated with the Hanford Natural Resource Trustees.

Response: This comment is addressed in the general comments.

2. Action item 100-2 needs to be revised to include "USDOE shall initiate a quantitative ecological evaluation of ecological receptor impacts from contaminated ground water by December 2001 and complete by October 2004."

Response: In essence this requirement was put into the Tri-Party Agreement in 1994 and resulted in the Columbia River Comprehensive Impact Assessment published in final form in January 1998.

3. USDOE shall develop a remedial treatment train that addresses the other ground water contaminants of concern originating from the 100 N-Area by October 2004.

Response: The comment does not indicate what the other contaminants of concern are.

4. Action item, 100-1, second bullet, needs revised to state that “downtime must be dramatically reduced and the system must achieve an operational efficiency of a minimum of 90%.” Efficiency would be comparable to the Strontium-90 pump-and-treat.

Response: The requirements for the chromium pump-and-treat systems are laid out the ROD and RDR/RAWP, which were designed to be protective. The systems need to be upgraded to achieve those protectiveness standards.

5. All 100 Area interim RODs shall be modified to include ESA and Migratory Bird Treaty Act as ARARs.

Response: These laws are already included in some of the RODs as ARARs. This comment is partially addressed in the response to WDFW general comment number 3. Also, these laws should not be identified as ARARs when endangered species and migratory birds aren't involved.

200 Area

1. This NPL site and associated operable units lack the same quantitative ecological risk assessment as the 100 and 300 Areas. Insufficient scientific data has been collected to assist in establishing appropriate remedial action objectives. Additional biological sampling is warranted.

Response: EPA and Ecology are requiring DOE to develop an ecological assessment for the 200 Area NPL site to support remedy evaluation and selection. The evaluation will include data collected as part of the site-wide environmental report. It is anticipated that biological sampling may occur as part of this assessment. No changes are required in the text.

2. WDFW has repeatedly requested a 200 Area quantitative ecological assessment (please reference letters dated 14 January, 1999; 4 August, 1999 and 4 January, 2000 from J. McConnaughey to Bryan Foley of USDOE). It is extremely difficult to properly frame remedial action objectives when insufficient biological data that can assist in determining the extent of a release of a hazardous substance to the environment has been gathered. Without biological data, the remedial project managers are merely speculating that proposed/selected remedies will be protective of the environment.

Response: EPA and Ecology are requiring DOE to develop an ecological assessment for the 200 Area NPL site to support remedy evaluation and selection. The evaluation will include data collected as part of the site-wide environmental report. It is anticipated that biological sampling may occur as part of this assessment. No changes are required in the text.

3. Given that a conservation land use designation surrounds the industrial exclusive area, as designated in the final Comprehensive Land Use Plan, it is appropriate to gather biological data to assist in the on-going remedial characterization there. Institutional Controls, such as, signs and fencing, will not prevent or hinder avian, insects, or small mammal species from entering waste sites, or the industrial exclusive area.

Response: EPA and Ecology are requiring DOE to develop an ecological assessment for the 200 Area NPL site to support remedy evaluation and selection. The evaluation will include data collected as part of the site-wide environmental report. It is anticipated that biological sampling may occur as part of this assessment. No changes are required in the text.

Recommendations

1. USDOE shall calculate ecological risk by conducting a quantitative ecological assessment for the 200 NPL site, and initiate by December 2001. The effort shall be coordinated with the Hanford Natural Resource Trustees.

Response: Agreed. This effort is already underway. No changes are required in the text.

2. USDOE shall include the Migratory Bird Treaty Act as an ARAR in all 200 Area Operable unit RODS.

Response: Agreed. The Migratory Bird Treaty Act will be included in future remedy evaluations and selections. No changes are required in the text.

300 Area

1. This NPL site and associated operable units lack the same quantitative ecological risk assessment as the 100 and 200 Areas. Insufficient scientific data exists to show that selected remedies are indeed protective of the environment. Additional biological data sampling is warranted.

Response: Potential impacts to ecological receptors from 300 Area contamination were evaluated in ecological investigation reports performed in support of the 300-FF-1 and 300-FF-5 Record of Decision which was approved in 1996. Information on biota and habitats collected for 300-FF-1 and 300-FF-5 is considered analogous to the 300-FF-2 due to the close proximity of the operable units. Most of the 300 Area waste sites are located in areas that have been highly disturbed by industrial/waste management operations and would be unable to support complete ecological communities represented

by common food webs. Ecological impacts are isolated and can not be tied to an exposure scenario that would result in an adverse impact to a wildlife receptor. There are no data that indicate the need for a full-scale reevaluation of the conclusions of past 300 Area ecological investigations at this point in time. The 300-FF-2 ROD requires ongoing environmental monitoring of the 300 Area as part of the selected remedy. This information will be reviewed in the future in support of five-year reviews to ensure that the selected remedy (i.e., remove, treat, and dispose of contaminated soil and debris) is sufficient to protect both human health and the environment. No changes required.

2. Goals listed on pages 300-7 and 300-8 for the 300-FF- I Operable Unit are unachievable without gathering ecological receptor data.

Response: Data on ecological receptors will be gathered pursuant to the 300-FF-2 ROD. In addition, data will also have to be gathered to support a comprehensive baseline risk assessment that will have to be performed in support of the final RODs for the 300-FF-5 and 300-FF-2 operable units. No change is required

3. A uranium plume that originates from the 300 Area NPL site is reaching the Columbia River. Data indicate that the uranium concentration levels are not attenuating as predicted (reference letter dated 5 September, 2000 and see enclosure from J. McConaughy of WDFW to Mike Goldstein of EPA). The half-life for uranium radioactive isotopes is hundreds of thousands to millions of years. EPA is currently requiring USDOE to pump and treat a uranium plume in the 200 Area but is not requiring USDOE to pump and treat a plume in the 300 Area that is directly and currently impacting the Columbia River. Containment is cited as justification for pump-and-treat in the 200 Area; the same justification exists in the 300 Area. Furthermore, EPA's policy directive 9200.4-17P and USDOE's guidance document entitled *Decision-Making Framework Guide for the Evaluation and Selection of monitored Natural Attenuation Remedies at Department Of Energy Sites* (USDOE Office of Environmental Restoration, May 13,1999) are not being adhered to. According to Ecology staff, the policy and guidance are not being met, (reference letter dated December 19, 2000 from John Price, Environmental Restoration Project Manager to Mr. Michael Goldstein of EPA). As part of a performance evaluation, a scientific approach to this problem would include a quantitative ecological assessment to determine if the uranium plume is affecting aquatic receptors. Aquatic receptors were not considered during the RI/FS qualitative risk assessment process. Part of the evaluation should include potential effects/harm to federally listed fish species.

Response: EPA's assessment of this issue can be found on page 300-14 of the Five-Year Review Report. Insufficient data exists at the present time to evaluate the effectiveness of the natural attenuation remedy and the current Operations and Maintenance plan for the 300-FF-5 Operable Unit is not adequately addressing this issue. Action item 300-4 will result in a new O&M plan. A complete assessment of the natural attenuation remedy for

all groundwater plumes contained in the 300-FF-5 Operable Unit will be performed in support of EPA's next five-year review. No change is required.

4. Our comments submitted on the 300-FF-2 remain unresolved and applicable. Please reference letter dated 12 January, 2000 from J. McConnaughey to Mike Goldstein of EPA, and letter dated 5 September, 2000 to same addressee.

Response: The referenced comments are addressed in the responsiveness summary of the 300-FF-2 ROD.

5. Institutional Controls, such as, signs and fencing, will not prevent or hinder fish, insects, burrowing mammals and migratory birds from entering waste sites or contaminated ground water plumes.

Response: Past 300 Area studies have resulted in the conclusion that ecological impacts are isolated and can not be tied to an exposure scenario that would result in an adverse impact to a wildlife receptor. Continued environmental monitoring will provide necessary data to evaluate this conclusion. No change is required.

Recommendations

1. USDOE shall recalculate ecological risk for the 300 NPL site using a quantitative ecological risk assessment approach for terrestrial and aquatic environments (i.e. biological receptors), and initiate an assessment by July 2001. The emphasis of the assessment shall be to gather pre-remedial biological data, and shall be coordinated with the Hanford Natural Resource Trustees. Evaluation shall include species listed under ESA and the Migratory Bird Treaty Act.

Response: A complete risk assessment that evaluates the impact of residual contamination on all human and ecological exposure pathways will be performed in support of the final RODs for the 300-FF-2 and 300-FF-5 Operable Units. No action item is required in the Five-Year Review.

2. USDOE shall include quantitative ecological risk assessment language in the 300FF-2 ROD.

Response: This comment does not apply to the Five-Year Review Report.

3. USDOE shall revisit the 300-FF-5 selected remedy to ensure that it is protective of federally listed fish species and their critical habitat.

Response: Available data supports the interim action described in the ROD. In addition, the Department of Energy has prepared the “Salmon and Steelhead Threatened and Endangered Species Management Plan,” (DOE/RL-2000-27, dated April 2000). This document was the culmination of efforts by the Department of Energy to consult with NMFS, pursuant to ESA. This plan was prepared in response to the 1998 and 1999 listing of Steelhead and Spring Chinook Salmon within the Columbia River system in the lower Columbia Basin for protection under the ESA. The Tri-Parties will continue to work with members of the Hanford Natural Resources Trustee Council, to ensure that appropriate expertise is factored into the Hanford cleanup process in a constructive manner. A complete risk assessment that evaluates the impact of residual contamination on all human and ecological exposure pathways will also be performed in support of the final RODs for the 300-FF-2 and 300-FF-5 Operable Units. No action item is required in the Five-Year Review.