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STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY  
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July 21, 2006

RECEIVED  
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EDMC

Mr. Kevin Bazzell  
United States Department of Energy  
P.O. Box 550, MSIN: A3-04  
Richland, Washington 99352

Re: Cleanup Verification Package/Clean Closure Report for the Soil Column of the 116-N-1  
(1301-N) Crib and Trench; CVP-2006-00004, Rev. 0, May 2006

Dear Mr. Bazzell:

Ecology's comments on the draft cleanup verification package (CVP) are enclosed. Ecology will not approve the 1301-N CVP because:

- The CVP is not complete.
- The CVP does not demonstrate that the site cleanup attained Remedial Action Objectives (RAOs).

The 1301-N CVP is not complete. Ecology's letter dated October 20, 2003, transmitted notification of quarterly modifications to the Hanford Site-wide RCRA Permit. One modification stated:

"Approximately 600 feet (Figure A.4-1) of piping that is associated with the 116-N-1 TSD Waste Site . . . will be deferred until decontamination and decommissioning of these facilities."

The 1301-N associated piping is yet to be remediated. Therefore, closure of the TSD is not complete. Due to this, Ecology deems that the 1301-N CVP is not comprehensive.

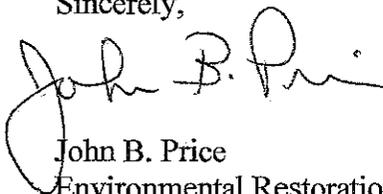
The CVP does not demonstrate that the site cleanup attained remedial action objectives (RAOs). Ecology's letter dated April 11, 2006, states that dangerous waste constituents remain in the soil at levels greater than standards.



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If you have any questions about this letter, contact me at 509-372-7921. If you have any questions about the enclosed comments, contact Noel Smith-Jackson at 509-372-7926.

Sincerely,



John B. Price  
Environmental Restoration Project Manager  
Nuclear Waste Program

lkd

cc: Larry Gadbois, EPA  
Dru Butler, WCH  
Fran DeLozier, WCH  
Rick Donahoe, WCH  
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Todd Martin, HAB  
Ken Niles, ODOE  
Hanford Natural Resource Trustee Council, c/o Dana Ward, USDOE  
Administrative Record: 100-NR-1, 1301-N  
Environmental Portal

## Department of Ecology Document Review

### Document Title/Number:

Cleanup Verification Package/Clean Closure Report for the Soil Column of the 116-N-1 Crib and Trench; CVP-2006-00004, Rev. 0, May 2006

Date: July 19, 2006

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1. **Title:** The title of the document implies “clean closure” was achieved. That should be a conclusion of the document, for evaluation by Ecology. It is requested that the title be changed to be neutral about the results of the cleanup.
2. **Page ES-1, Executive Summary, first sentence:** The text states that this cleanup verification package/clean closure report documents the completion of remedial action for the 116-N-1 Crib and Trench. There are several problems with this statement and it should be changed:
  - The action is an interim action, so at most, the document could document completion of the interim action.
  - A CVP is not a TPA primary document, nor is it a type of document called out in the National Contingency Plan/guidance. A construction completion report is typically used to document the completion of remedial action. So, this CVP is not the right document to make that conclusion [that remedial actions are complete].
  - Remedial actions are not complete. Approximately 600 ft of piping associated with the 116-N-1 TSD has been deferred to a later date. Per RCRA requirements, the 116-N-1 site cannot be considered to have met the Remedial Action Objectives until the entire site is remediated.
  - Ecology’s April 11, 2006 letter stated that “. . . additional field investigations will be required at 100-N Area.” Ecology’s letter required the completion of a focused feasibility study, that could lead to additional remedial actions.
3. **Page ES-1, Executive Summary, first paragraph, fourth sentence:** It is recommended that it be identified that the 116-N-1 site lies above the 100-NR-2 groundwater operable unit by the following re-write: “The 116-N-1 site is located within the 100-NR-1 Operable Unit in the 100 Areas of the Hanford Site in southeastern Washington State and lies above the 100-NR-2 groundwater Operable Unit.”
4. **Page ES-1, Executive Summary, second paragraph, first sentence:** The sentence states: “Site excavation and waste disposal are complete, and ....” As explained above, site excavation is not complete for the 116-N-1 Crib and Trench complete. This sentence should be deleted.
5. **Page ES-1, Executive Summary, second paragraph, second sentence:** The sentence states: “Results of the sampling, laboratory analyses, and data evaluations for the 116-N-1 site indicate that remedial action objectives and goals for direct exposure, protection of

groundwater, and protection of the Columbia River have been met.” This statement is contradicted by Ecology’s April 11, 2006 letter: “Our assessment of the backfill concurrence data is that releases have occurred (notably, hexavalent chromium), and remain, in the vadose zone at concentrations that exceed the numeric cleanup values referenced at WAC 173-303-610(2)(b)(i).” Therefore, the Executive Summary statement does not describe remaining contamination.

6. **Page ES-1, Executive Summary, third paragraph:** The paragraph should include the following information: “The excavation of contaminated material from this portion of the 1301-N Trench was done in accordance with the Hanford Past Practice (HPP) Strategy, DOE/RL-91-40, Revision 0. The excavation and sampling of the Trench completes a step in DOE/RL-91-40, Figure 1, “Hanford Past Practice Strategy RI/FS (RFI/CMS) Process. The next steps, for this portion of the trench, in the HPP Strategy are to assess the accumulated data and determine minimum data needs. The results of the additional field investigations, and the previously accumulated data, will have to be evaluated in a Focused Feasibility Study (studies) as shown in Figure 1 of DOE/RL-91-40. The studies will have to consider the alternative of capping the unit if necessary to protect human health and the environment.”
7. **Page ES-1, Executive Summary, third paragraph, first sentence:** The sentence states: “The site meets cleanup standards and has been reclassified as ‘interim closed out’ in accordance with the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) and the Waste Site Reclassification Guideline TPA-MP-14 (RL-TPA-90-0001)(DOE/RL 1998).” The determination that a site has been interim closed out can only be made by the TPA Project Managers. It cannot be made by a subcontractor, nor can it be made unilaterally by the DOE TPA Project Manager. The statement is inappropriate in a CVP and should be deleted.
8. **Page ES-1, Executive Summary, third paragraph, third sentence:** As waste removal from the unit has not been completed, the waste site does not qualify for reclassification. Delete the sentence that states: “A copy of the waste site reclassification form is included as Attachment ES-1.” Insert a sentence that identifies that the WIDS waste site description will be updated to describe the unit’s current configuration.
9. **Page ES-1, Executive Summary:** It is requested that the Executive Summary include a note which states: “Due to radiological dose exposure and safety concerns, approximately 600 feet of piping (i.e., ancillary equipment) associated with the 1301-N Trench and Crib is deferred to Decontamination and Decommissioning (D&D) of the 116-N-2 Facility and support facilities (1322-NA, NB, NC). Therefore, closure of the unit is not complete until such time as the ancillary equipment has been removed and the closure performance standards of WAC 173-303-610 have been satisfied for the entire unit.”
10. **Page ES-2, Table ES-1, Direct Exposure – Radionuclides row:** The Remedial Action Objective to attain the regulatory requirements for direct exposure - radionuclides were not achieved. As a radiologically significant portion of the unit has not been remediated, the remedial action objective of attaining 15 mrem/yr dose rate above background over 1,000

years has not been achieved and the table does not accurately reflect this status. Therefore, the column entitled "Remedial Action Objectives Attained?" should indicate "No" for the row pertaining to direct exposure radionuclides.

11. **Page ES-2, Table ES-1, Direct Exposure - Nonradionuclides row:** The Remedial Action Objective to attain the regulatory requirements for direct exposure - nonradionuclides were not achieved. The results table does not take the non-remediated portion of the unit into consideration. Therefore, the column entitled "Remedial Action Objectives Attained?" should either indicate "No" or "Unknown".
12. **Page ES-2, Table ES-1, Meet Nonradionuclide Risk Requirements row:** The Remedial Action Objective to attain the regulatory requirements for nonradiological risk were not achieved. The results table does not take the non-remediated portion of the unit into consideration. Therefore, the column entitled "Remedial Action Objectives Attained?" should either indicate "No" or "Unknown".
13. **Page ES-2, Table ES-1, Groundwater/River Protection Radionuclides row:** The Remedial Action Objective to attain the regulatory requirements for groundwater/river protection of radionuclides were not achieved. The results table does not take the non-remediated portion of the unit into consideration. Also, see comments below regarding RESRAD. A RESRAD model deficiency is that the model does not take into consideration high river stage and the upwelling of ground/surface water into contaminated vadose zone. This mechanism is very likely to allow immediate contaminant migration. Thus, vadose zone contamination is very likely to reach groundwater sooner than the stated criteria of 1,000 years. Therefore, the column entitled "Remedial Action Objectives Attained?" should indicate "No".
14. **Page ES-2, Table ES-1, last Groudwater/River Protection - Nonradionuclides:** The Remedial Action Objectives to attain individual nonradionuclide groundwater and river cleanup requirements were not achieved.
  - The Trench DZ-09 sample exceeded the hexavalent chromium Columbia River protection RAG of 2.0 mg/kg, with a result of 2.52 mg/kg.
  - The statistical deep zone value calculated for hexavalent chromium is 2.96 mg/kg, exceeding the soil RAG for river protection.
  - Hexavalent chromium also failed the WAC 173-340 3-Part Test due to the following: 95% UCL > Cleanup Limit, and >10% of the samples were above the Cleanup Limit.
  - In addition to the hexavalent chromium failures, total chromium for Trench DZ-09, Crib DZ-05 and Crib DZ-10 exceeded the RAG. The values were 31.7 mg/kg, 22.1 mg/kg, and 19.0 mg/kg, respectively. The Ecology split results were also elevated for the Crib DZ-05 and Crib DZ-10 samples. (A split sample of Trench DZ-09 was not analyzed.)
  - Furthermore, the results table does not take the non-remediated portion of the unit into consideration.

- Also, see comments regarding RESRAD. A modeling deficiency of RESRAD is that the model does not take into consideration high river stage and the upwelling of ground/surface water into contaminated vadose zone. This mechanism is very likely to allow immediate contaminant migration. Thus, vadose zone contamination is very likely to reach groundwater sooner than the stated criteria of 1,000 years.

Therefore, the column entitled “Remedial Action Objectives Attained?” should indicate “No”. Please edit the last row as follows:

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?	Ref.
Groundwater River Protection - Nonradionuclides	1. Attain individual nonradionuclide groundwater and river cleanup requirements	1. Residual hexavalent chromium concentrations are not predicted to leach to groundwater or the Columbia River at concentrations exceeding the applicable water quality criteria. The statistical deep zone value calculated for hexavalent chromium exceeded the soil RAG for river protection. Individual total chromium results also exceeded the soil RAG for river protection.	Yes No	a, b

15. **Page ES-3, Table ES-1, footnote “d”:** This footnote is not referenced in the table, nor is it applicable to the report, as uranium is not a site contaminant of concern. Please delete the footnote.
16. **Page ES-5, Attachment ES-1:** This attachment should be replaced with an updated WIDS description of the waste management unit. Since the unit is not closed and has not met remedial action objectives, it does not qualify to be reclassified as having been remediated.
17. **Page 4, section 3.1, last two sentences:** The text states the following:  
 “The contamination within the boundaries of the UPR-100-N-31 waste site was also removed but the waste site is not proposed to be interim closed out because of contaminant plumes that impacted active facilities and cannot be excavated until the active facilities are closed out or relocated. Contaminated materials were disposed of at ERDF.”

This reasoning used for the UPR-100-N-31 should also apply to the entire 116-N-1 site, due to the remaining unremediated 600 ft of associated piping which was deferred. The issue of the deferred piping needs to be discussed in detail within the 116-N-1 report. This discussion should include the basis for deferment, site specific map, and remediation schedule.

18. **Page 1, section 1.0, first paragraph:** The first sentence is written in the past tense as follows: "The purpose of this cleanup verification package...is to document that the 116-N-1 Crib and Trench site (herein referred to as the 116-N-1 site) was [emphasis added] remediated in accordance with ...." As the remediation is not complete, the sentence is incorrectly written in past tense. The sentence should be written to communicate that the remediation is not complete and that the information contained in this report is intended to provide a status of remediation activities. Also, per a comment on the Executive Summary, it is requested that "clean closure report" be deleted from the first sentence.
19. **Page 1, section 1.0:** The introduction needs to identify that part of the unit remains unremediated. The following statement is recommended: "Due to radiological dose exposure and safety concerns, approximately 600 feet of piping (i.e., ancillary equipment) associated with the 1301-N Trench and Crib is deferred to Decontamination and Decommissioning (D&D) of the 116-N-2 Facility and support facilities (1322-NA, NB, NC). Therefore, closure of the unit is not complete until such time as the ancillary equipment has been removed and the closure performance standards of WAC 173-303-610 have been satisfied for the entire unit."
20. **Page 7, first sentence:** Change the text to the following: "In October 2005, the excavation planned for the interim remedial action was completed."
21. **Page 17, Table 5, Combined Crib and Trench Deep Zone, Hexavalent chromium row:** The statistical cleanup verification data value of 2.96 mg/kg exceeds the remedial action goal of 2.0 mg/kg. However, the report is declaring that the RAG was attained based on the findings of 100-D, 100-F, and 100-H Area hexavalent chromium leach studies. Since the leach tests were approved under the 100 Area RDR/RAWP (DOE-RL 2005), and not the 100-N RDR/RAWP (DOE-RL 2001), Ecology has not, and does not approve the applicability of this approach for the 100-N soils. In order for this approach to be applied to the 116-N-1 data, a 100-N Area study will need to be completed to determine if the findings presented for the 100-D, 100-F, and 100-H Area soils also apply to the 100-N Area. Furthermore, based on the chromium contamination issues detected in the groundwater in various areas of the Hanford Site, it is not clear that the leach studies have been proven to be technically valid. Therefore, the applicability of the studies is questionable.
22. **Page 18, section 5.3.2:** Ecology does not support the applicability of "Hexavalent Chromium Issues at 100D-DR Project" (BHI 2000b) to the hexavalent chromium RAG exceedance at the 116-N-1 site. In order for this approach to be applied to the 116-N-1 data, a 100-N Area study will need to be completed to determine if the findings presented for the 100-D, 100-F, and 100-H Area soils are applicable to the 100-N Area.
23. **Page 18, section 5.3.2, second paragraph, last sentence:** Please correct 7.2 µg/L and 5.7 µg/L to 7.2 mg/kg and 5.7 mg/kg for the 100-F and 100-H Area soils, respectively.
24. **Page 19, Table 6, Combined Crib and Trench Deep Zone, Cr and Cr (VI) row:** Please correct the table as follows:

**Table 6. Application of the WAC 173-340 (MTCA Cleanup Regulation) Three-Part Test.**

Nonradionuclides	Most Stringent Applicable RAG (mg/kg)	Statistical Value (mg/kg) <sup>a</sup>	Maximum Detected (mg/kg) <sup>b</sup>	Total Number of Samples <sup>c</sup>	Percent Exceeding Most Stringent Applicable RAG <sup>d</sup>	RAGs Attained?
<b>Combined Crib and Trench Deep Zone</b>						
Chromium (total)	18.5	14	31.7	22	14%	Yes <sup>e</sup> No
Hexavalent chromium	2	2.96	2.96	22	14%	Yes <sup>h</sup> No

Hexavalent chromium for the combined crib and trench deep zone failed the RAG of 2.0 mg/kg. Both total and hexavalent chromium also failed the WAC 173-340 3-Part Test for various reasons. However, Table 6 is declaring that the WAC 173-340 Three-Part Test was attained for both of these COCs; based on the Kd value for total chromium, and the 100 Area leach study results for hexavalent chromium. These claims are not proven to be acceptable.

25. **Page 20, Table 6, footnotes g and h:** The following footnotes are incorrect and should be deleted:

<sup>g</sup> the deep zone total chromium data set does not meet the 10% Criteria (footnote d). However, because total chromium has a Kd of 200 mL/g, and evaluation based on the 100 Area Analogous Sites RESRAD Calculations (BHI 2005) shows that total chromium will not reach groundwater (and therefore the Columbia River) within 1,000 years.

<sup>h</sup> Since the deep zone hexavalent chromium data set did not meet the 10% criteria (note d), protection for the deep zone hexavalent chromium is demonstrated based on the 100 Area leach study results discussed in Section 5.3.2.

26. **Page 22, section 7.0:** Because cleanup levels were not attained and because remediation actions are not complete, the “Statement of Protectiveness” should be revised to state that the cleanup levels were not achieved, the actions are not protective, and to recommend further actions, e.g., Limited Field Investigation and Focused Feasibility Study in accordance with Ecology’s 11 April 2006 letter.

27. **General:** Based on groundwater information, Part A waste codes, and process information, the closure plan should have included more constituents to be analyzed at the deep zone than nitrate, mercury, and hexavalent chromium. The Part A permit identifies the following dangerous waste codes: F003 (spent solvents), D002 (corrosive waste), D006 (cadmium), D007 (chromium), D008 (lead), D009 (mercury), WC02 (no longer a waste code, but formerly pertained to carcinogens), and WT02 (pertains to toxic wastes). During development of groundwater permit conditions, it was concluded that the following constituents occurred at higher concentrations in downgradient wells than in upgradient wells: antimony, arsenic, barium, boron, cadmium, calcium, chromium, lead, magnesium,

mercury, selenium, silver, sodium, strontium, tin, zinc, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate.

28. **Appendix B, Data Quality Assessment:** There are some pathways in the decision logic for evaluation of split/duplicate sample results that are not carried out automatically in the data spreadsheets. Specifically, (Section B1.5.4 of the CVP, item 3 of the EPA guidelines) comparison with the "two times TDL" criterion for cases where either of the results is greater than five times the TDL (but not both) is carried out by direct human evaluation rather than automatically in the spreadsheet. Ecology's primary concern is for a potential case where the DOE result is not detected, but the regulator split is detected. It seems prudent to have this evaluation included in the automated calculations to ensure that no potentially important evaluations are missed. For data in the present CVP, there are indeed instances of this situation but the results are very low compared to the RAGs so that none of the instances cause concern. However, it is important to be confident that these situations will be "caught" and evaluated in general. Ecology will request that this change be made for the 100 Area Remedial Design/Remedial Action Work Plan.
29. **Appendix B, Data Quality Assessment:** Appendix B concludes that all data were found to be acceptable for decision-making purposes, yet also discusses instances where the relative percent difference (RPD) evaluation for split/duplicate samples exceeds the acceptable limits. Ecology agrees with the discussion that occasional exceedance of the RPD limit is expected due to lack of homogeneous samples. However, please provide discussion (quantitative preferred if possible) of how it was determined that the number of split/duplicate samples exceeding the RPD limits, and the degree of exceedances, are acceptable.
30. **RESRAD Modeling:** The *User's Manual for RESRAD Version 6* (July 2001) ANL/EAD-4 describes "pathway factors" as the model's way of expressing the relationship between radionuclide concentrations in soil and the dose to a member of a population group. Pathway factors correspond to pathway segments connecting compartments in models of the environment between which radionuclides can be transported or radiation transmitted. The pathway factors are structured such that they may be added, deleted, or replaced without affecting the other pathways or pathway factors. In this way, RESRAD is designed to be "easily" modified or tailored to model any given situation by merely adding or replacing factors or terms in the pathway sum. However, from the information provided in the backfill package, it is concluded that this RESRAD configuration does not include a pathway factor segment for river water upwelling into the contaminated vadose zone, thus mobilizing contaminants and allowing contaminant transport to the river. This should be noted in the report as an uncertainty.