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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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May 10, 2018

18-NWP-079

Mr. Joe R. Franco, Assistant Manager for the River and Plateau
Richland Operations Office
United States Department of Energy
PO Box 550, MSIN: H5-20
Richland, Washington 99352

1245961

Re: Department of Ecology's (Ecology) Review of the *Remedial Investigation for the 100-OL-1 Operable Unit Hanford Orchard Lands*, DOE/RL-2016-54, Draft A (100-OL-1 RI Report)

Dear Mr. Franco:

Ecology received the reference document from the United States Department of Energy (USDOE) on September 12, 2017. This report was submitted as a Primary Document under the *Hanford Federal Facility Agreement and Consent Order*, 89-10, Revision 8 (HFFACO) Action Plan Section 9. USDOE submitted the report as one of the actions to fulfill HFFACO Milestone M-015-96, "Submit the 100-OL-1 Remedial Investigation Report and a change request to establish a date for the Feasibility Study report to Ecology", due August 31, 2018.

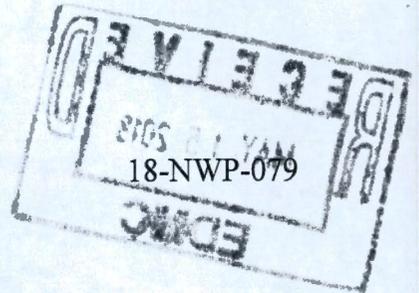
Ecology's technical review of the 100-OL-1 RI Report is now complete. You will find our detailed comments on the attached Review Comment Record.

As communicated in our meeting with your staff on May 8, 2018, Ecology would like to continue discussing the following concerns:

- The report concludes that the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 42 U.S.C.A §§ 9601 to 9675) should not apply because the contamination is due to the application of pesticides. Ecology does not agree that a basis has been provided for an exemption from CERCLA.
- Approximately 50 decision unit boundaries could be adjusted based on patterns in contaminant levels and old aerial photos of land use. This would reduce the acres of orchard lands that would exceed screening levels.
- The 100-OL-1 RI Report should focus on risk calculated using health based and ecological thresholds.
- A Feasibility Study should be developed with a variety of controls and technologies.



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Mr. Joe R. Franco
May 10, 2018
Page 2 of 2

If you have any questions, please contact me at nina.menard@ecy.wa.gov or (509) 372-7941, or Alicia Boyd, Environmental Specialist, at alicia.boyd@ecy.wa.gov or (509) 372-7934.

Sincerely,

Nina M. Menard
Environmental Restoration Project Manager
Nuclear Waste Program

ab/sh

cc electronic:

- Dave Einan, EPA
- Jim Hansen, USDOE
- John Sands, USDOE
- Amoret Bunn, PNNL
- Jon Perry, MSA
- Robert Piippo, MSA
- ERWM Staff, YN
- Ken Niles, ODOE
- Alicia Boyd, Ecology
- Jim Pendowski, Ecology
- Environmental Portal
- Hanford Facility Operating Record
- MSA Correspondence Control
- CHPRC Correspondence Control
- USDOE-RL Correspondence Control

cc:

- Matt Johnson, CTUIR
- Rod Skeen, CTUIR
- Jack Bell, NPT
- Alyssa Buck, Wanapum
- Rose Longoria, YN
- Susan Leckband, HAB
- Administrative Record: 100-OL-1
- NWP Central File

Review Comment Record		Washington State Department of Ecology Nuclear Waste Program Cleanup Section/ER Project		Date May 10, 2018	
Document Title(s)/Number(s): Remedial Investigation for the 100-OL-1 Operable Unit Hanford Orchard Lands, DOE/RL-2016-54 Draft A Project Manager/Phone #/email: Nina Menard 372-7941 nina.menard@ecy.wa.gov Document Lead/Phone #/email: Alicia Boyd 372-7934 alicia.boyd@ecy.wa.gov				Page 1 of 10	
Item # Page # Section # Line#s	Comment and Basis/Justification		Modification Needed		
Item 1 S: General	<p>Comment: It is possible that the levels of lead and arsenic observed across the 100-OL-1 Operable Unit are from lead arsenate pesticides that were applied according to recommended guidelines from agricultural agencies. However, given the high concentrations and variation across decision units (DU) it is more likely that the OU represents some areas where lead arsenate wasn't used, some areas where it was used according to guidelines of the day, and some areas where spilling, dumping, over-application, drifting, and other types of releases occurred. (EPCs of lead ranged from 12 to 1050 mg/kg and EPCs of arsenic ranged from 4 to 61 mg/kg. Standard deviation of lead in DUs ranged from 2 to 665 and for arsenic ranged from 0 to 90.)</p> <p>Risk assessment language should focus on risk so DOE can produce a remedial investigation and subsequent feasibility study/proposed plan to minimize exposure to contaminants by current and future users of the site such as remediation contractors, well drillers, future public users of the Hanford National Park and Hanford Reach National Monument, and future landowners.</p> <p>Basis: Section 1.3.3.1 has a good overview of investigations of former orchard lands here at Hanford, across Washington, and across North America. The conclusion of the section is that "the concentrations of arsenic and lead in soil measured in these samples are consistent with soil sampling studies across the United States on orchards treated with lead arsenate pesticide." This is a reasonable statement. However, the conclusion in Section 7.2 adds the following "results demonstrate that the use of lead arsenate in the former orchards in the OU is consistent with the intended purposes of the pesticide". This conclusion has no basis. None of the studies discussed in Section 1.3.3.1 were performed on orchard lands with historical pesticide application documentation that showed use consistent with standards or guidelines of the day. Some studies included areas in Washington State that have subsequently had MTCA cleanups performed at them (for example, public school sampling in central and eastern Washington). Jumping from the conclusion that the concentrations represent typical values found in orchard lands to the assumption that these levels represent use according to proper guidelines is unfounded.</p> <p>When the pesticide exemption applies, it is interpreted narrowly.¹ Courts have interpreted 42 U.S.C. 9607(j) to exempt the "application" of a registered pesticide from CERCLA liability, but to retain liability for a "release" of such a pesticide.² The definition of release has been interpreted broadly within the courts including pesticide disposal, storage, spills, transport,³ and drift.⁴ DOE has no documentation to show proper historical pesticide use across these different areas. The text discussing the FIFRA "exemption" to CERCLA should be removed.</p> <p>MTCA also does not include an exemption for FIFRA registered pesticides being considered a release. In fact, pesticide or fertilizer applications are called out as a release in the reporting requirement exemption (underlined emphasis added): WAC 173-340-300(3): The <u>following releases</u> are exempt from these notification requirements: (a) Application of pesticides and fertilizers for the intended purposes and according to label instructions;</p> <p>An exemption from the notification requirements in this section <u>does not imply a release from liability under this chapter.</u></p> <p>¹ (See, e.g., United State v. Tropical Fruit, 96 F. Supp. 2d 71, 86 (D.P.R. 2000); Jordan v. S. Wood Piedmont Co., 805 F. Supp. 1575, 1582 (S.D. Ga. 1992). ² (In re Sundance Corp., Inc., 149 B.R. 641, 663 (Bankr. E.D. Wash. 1993); see also Redwing, 875 F. Supp. at 1565</p>		<p>Rewrite the introduction and conclusion (Chapters 1 & 7) to remove the discussion of the FIFRA "exemption" to CERCLA.</p> <p>Focus the conclusions of the Remedial Investigation on decision units that exceed established health based and ecological thresholds such as MTCA A and/or Hanford Tier 2 ecological values, rather than Area-Wide Soil Contamination Task Force recommendations or ecological values established at Bunker Hill.</p> <p>Concentration based conclusions should clearly discuss groups of DUs that are well below threshold values, above MTCA A or Hanford Tier 2 eco values, and those that seem anomalously high such as DU-95.</p>		

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**Washington State Department of Ecology
Nuclear Waste Program
Cleanup Section/ER Project**

Date **May 10, 2018**

Page 2 of 10

Review Comment Record

Document Title(s)/Number(s): Remedial Investigation for the 100-OL-1 Operable Unit Hanford Orchard Lands, DOE/RL-2016-54 Draft A
 Project Manager/Phone #/email: Nina Menard 372-7941 nina.menard@ecy.wa.gov
 Document Lead/Phone #/email: Alicia Boyd 372-7934 alicia.boyd@ecy.wa.gov

Item # Page # Section # Line/¶ #s	Comment and Basis/Justification	Modification Needed
	("Application" is exempt, but CERCLA "retains liability for a 'release' of such pesticide"). ³ See Cameron v. Navarre Farmers Union Coop. Ass'n, 76 F. Supp. 2d 1178, 1182 (Not everything done with a pesticide is an "application," and CERCLA retains liability for a "release" of a pesticide); State v. Almy Bros., Inc., 1998 WL 438523, at *5 (N.D.N.Y. 1998) (CERCLA exempts "application" but retains liability for "spilled or released pesticides on the site"); United States v. Hardage, 761 F. Supp. 1501, 1519 (W.D. Okla. 1990) (Pesticide exemption not applicable to "disposal," transport, or storage). ⁴ Tropical Fruit, 96 F. Supp. 2d at 86, where the court held that pesticides drifting or migrating "beyond the boundary of the farm... clearly falls within the scope of a 'release.'" 	
Item 2 S: General	Comment: The following 81 decision units should be summarized. These should move forward into a feasibility study under only the "no action" alternative. 001 016 033 050 071 101 120 002 017 034 051 074 102 121 004 018 035 057 075 103 122 005 023 036 058 077 104 123 006 024 037 059 078 106 124 007 025 038 060 082 107 125 009 027 041 061 083 108 126 010 028 042 065 088 109 132 011 029 043 066 091 112 133 012 030 044 067 092 117 014 031 045 069 098 118 015 032 046 070 099 119 Basis: All of these decision units appeared to have reasonable boundaries, had EPCs below the most restrictive screening levels of 20 mg/kg for As (human health) and 156 mg/kg for Pb (eco risk), and lacked anomalous results within their boundaries (anomalous results based on greater than 10% of results exceeding screening level or any results exceeding twice the screening level).	Summarize the findings that these 81 decision units can move into the FS under the "no action" alternative.
Item 3 S: General	Comment: The following 52 decision units should be investigated further in the RI and potentially the FS for action. For a number of the DUs with exceedances, the areas where the concentrations exceed screening levels are somewhat localized. It should be possible to divide the DUs in a way that minimizes acreage with risk based exceedances. For example, the Section 7.1 summary listed 23 DUs (849 acres) that had EPCs exceeding the MTCA A screening levels, while Ecology's preliminary analysis results in 50 DUs for further evaluation with a roughly similar acreage. 003 039 055 076 089 105 128 008 040 056 079 090 110 129 013 047 062 080 093 111 130 019 048 063 081 094 113 131 020 049 064 084 095 114 021 052 068 085 096 115 022 053 072 086 097 116 026 054 073 087 100 127	Work with Ecology to investigate these DUs further. Ecology will provide our analysis of these 52 decision units. Consider a case by case approach to subdividing or redrawing DU boundaries. Use 1943 aerial photos to adjust DU boundaries (including dividing existing DUs) when useful. Re-calculate statistical data based on new boundaries when possible. Re-calculate how many DUs/acreage exceeds human health and ecological screening levels. Print Appendix A style figures for groups of DUs where it makes sense.

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Project Manager/Phone #/email: Nina Menard 372-7941 nina.menard@ecy.wa.gov					
Document Lead/Phone #/email: Alicia Boyd 372-7934 alicia.boyd@ecy.wa.gov					
Item # Page # Section # Line#s	Comment and Basis/Justification			Modification Needed	
	<p>Basis: Many of these DUs had EPCs that exceeded 1 or more screening levels, but when compared to 1943 aerial photographs show a clear relationship between higher/lower concentrations and field boundaries. While the DUs exceeded screening thresholds, often elevated concentrations can be found strictly in one half or one quarter of the DU, corresponding to certain fields. Once boundaries have been reconsidered, DU-095 does not look as anomalous as it currently seems from the tabulated statistical results. It becomes much clearer that there were distinctly different uses among the farm field boundaries.</p> <p>Some DUs had boundaries that aligned with Hanford oriented roads, which were constructed at an angle to the original roads & property boundaries (DU-127 through DU-131). DUs could be redrawn and re-analyzed based on existing data in a way that would provide more insight.</p> <p>Many of these DUs share borders with the other 50. It could be beneficial to look at maps similar to Appendix A figures that include batches of DUs together.</p>				
Item 4 S: General	<p>Comment: It is unclear why the Tier 3 Bunker Hill eco soil level for songbirds for Pb (530 mg/kg) is introduced, given that a Hanford specific Tier 2 PRG has already been developed (see Table 6-2, LOAEL-based Tier 2 PRG for the killdeer of 156 mg/kg). Although songbirds may be relevant to Hanford, they were not an avian receptor selected for Hanford wildlife PRG development (CHPRC-00784, CHPRC-01311). Perhaps more important, the Bunker Hill site is not relevant to Hanford former orchard habitat.</p> <p>Basis: Tier 2 values are Hanford-specific, while the Tier 3 value (developed at Bunker Hill) is not. A site specific PRG is more applicable than a non-site specific PRG.</p>			<p>Delete Tier 3 Bunker Hill analysis, and include EPC comparison to Tier 2 eco LOAELs (156 mg/kg for Pb, 127 mg/kg for As). Similar to human health (with MTCA Method A screening levels), an analysis (i.e., identifying numbers of DUs with exceedances and associated areas) should be performed for eco screening levels (156 mg/kg for Pb, 127 mg/kg for As), as well. Text should also note that the most restrictive screening levels are 20 mg/kg for As (human health) and 156 mg/kg for Pb (ecorisk) at Hanford.</p> <p>Locations that will need to be changed include: Summary, P: ix, L: 20-25</p> <p>S: 6.1.3, P: 6-5, L: 3-8</p> <p>S: 6.7, P: 6-10, L: 36-39</p> <p>S: 6.7, P: 6-11, L: 8-11</p> <p>S: 7, P: 7-1, L: 9-11;</p> <p>S: 7.1, P: 7-2, L: 14-16, 20-22</p> <p>S: 7.2, P: 7-2, L: 43-44</p>	
Item 5 S: General	<p>Comment: There is a potentially complete pathway for transport from the soil to the groundwater and to the Columbia River, leading to the potential exposure to the aquatic resources. Wind and surface runoff could transport contaminated soil into the river, also leading to exposure to the aquatic resources. However, the significance of the contribution from these pathways is not clear. The soil to groundwater to surface water pathway may also expose human receptors via fish consumption.</p>			<p>See related comments #15, #16, #19, #36, #38 for specifics. Update the Summary Section as needed.</p>	

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Item # Page # Section # Line/¶ #s	Comment and Basis/Justification			Modification Needed	
	Basis: See Comment #2 and Additional Comment #2 from the RI Work Plan. DOE committed to include additional discussion of the pathway to groundwater in the Remedial Investigation and to summarize existing monitoring results for lead and arsenic.				
Item 6 P: vii S: Summary /Regulatory Considerations L: 4-5	Comment: Text states, "Further, according to the Washington State's Area-wide Soil Contamination Task Force (AWSCTF), there is too much uncertainty to recommend an ecological protection procedure for these types of contaminants." Uncertainty requires precaution and does not necessarily infer low risk. Basis: The AWSCTF report also states, "Given the lack of definitive evidence of substantive impacts on ecological systems and the complexity of these issues, the Task Force recommends that Ecology conduct or support studies that evaluate the potential ecological impacts associated with low to moderate level arsenic and lead soil contamination. The results of these studies might suggest circumstances where measures beyond those recommended by the Task Force to limit human exposure are needed to protect plants and animals." (AWSCTF, 2003).			Note that uncertainty should trigger further iteration of the ERA process to better characterize ecological risk.	
Item 7 P: 2-2 S: 2.1.1 L: 16-31	Comment: Provide the algorithm used by VSP to calculate number of samples/DU. Also, please cite Table 4.7 in Bunn et al (2014). Basis: Number of samples/DU is a function of many variables (e.g., screening level, confidence level, RSD), as well as assumed data distribution.			Please clarify the VSP method and final recommendation from the pilot study for number of samples/DU. Please cite Table 4.7 in Bunn et al (2014).	
Item 8 P: 2-12 S: 2.2.2 L: 2-11	Comment: Explain the basis of the Pb and As soil concentrations for starting (Pb≥150 mg/kg, As≥15 mg/kg) and stopping (Pb≤51 mg/kg, As≤15 mg/kg) the "step out sampling" method. Basis: Criteria should have rationale.			Explain why these concentrations limits were selected for the "step out sampling" method.	
Item 9 P: 2-16 S: 2.3.3 L: 11	Comment: Text states, "Concentrations flagged with a "J" or "UJ" qualifier should be considered estimated but useable." Note that even "U" qualified data (i.e., nondetects) are "usable" (e.g., estimation of EPC with nonparametric Kaplan-Meier method). Basis: Nondetects contain information.			Note that "U" qualified data (i.e., nondetects) are "usable" in risk assessment (e.g., estimation of EPC with nonparametric Kaplan-Meier method).	
Item 10 P: 4-2 S: 4.1 L: 13-15	Comment: ECF-11-0038 [Rev 0] (Table APP-A2) merely cites DOE/RL-92-24 [Rev 4] for As and Pb background concentrations in Hanford soils (does not "re-evaluate").			Delete this sentence, citing ECF-11-0038.	
Item 11 P: 4-3 S: 4.1 L: 11	Comment: Looks like you mean "Table 4-1" (not "Figure 4-1").			Correct to reference Table 4-1, not Figure 4-1.	
Item 12 P: 4-7 S: 4.3.1 Table 4-2	Comment: Remove footnote "d" from EPC column heading, but retain footnote "d" in table body for clarity and identification of specific DU (e.g., DU-006). Basis: Footnote "d" only refers to certain decision units, not all EPCs.			See comment.	
Item 13 P: 4-16 S: 4.3.1	Comment: Re footnote "d," cite Helsel (2005) for the "<20% detects" (equivalent to >80% nondetects) criterion to consider statistics unreliable.			Re footnote "d," cite Helsel (2005) for the "<20% detects" (equivalent to >80% nondetects) criterion to consider statistics unreliable.	

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Item # Page # Section # Line/¶ #s	Comment and Basis/Justification		Modification Needed	
Table 4-2	Basis: Helsel, DR. 2005. Nondetects and Data Analysis: Statistics for Censored Environmental Data. Wiley Interscience.			
Item 14 P: 4-18 S: 4.3.2 L: 15-16	Comment: Update text error. Basis: DU-052 only had 3 location that were above concentrations.		Correct text on DU-052	
Item 15 P: 4-22 S: 4.5 L: 29-31	Comment: Peryea and Creger (1994) suggest that As may leach to groundwater where groundwater is relatively shallow. Because many of the Hanford orchards border the river, where depth to groundwater is shallow, this scenario should be acknowledged. Basis: Peryea, FJ and TL Creger. 1994. Vertical distribution of lead and arsenic pesticide residues. Wat Air Soil Pollut 78:297-306.		Include text noting that As may leach to groundwater, where depth to groundwater is shallow (near river orchards).	
Item 16 P: 4-22 S: 4.6 L: 39-42	Comment: Because many of the Hanford orchards border the river, surface water and river sediment may also be impacted by lead arsenate pesticides. Basis: This may be due to leaching to shallow groundwater at these locations, followed by transport to the river. In addition, soil disturbance during construction/remedial activities, along with windblown transport of contaminated surface soils to the river, may have occurred.		Include text noting that As may leach to groundwater, where depth to groundwater is shallow (orchards near river), followed by transport to surface water and river sediments. Soil disturbance and windblown processes may have also transported contaminated soils to the river.	
Item 17 P: 4-23 S: 4.7 L: 2	Comment: Note that biota (cheatgrass, darkling beetles) in Hanford orchards were sampled by Delistraty and Yokel (2011). Basis: These biota data show some relationship to Pb and As soil concentrations.		Note that plant and soil invertebrate data have been collected in Hanford orchard areas and show uptake of soil Pb and As.	
Item 18 P: 4-23 S: 4.7 L: 2	Comment: The Lead and Arsenic Risk-based Soil Thresholds and Screening Levels for Protection of the Environment February 2011, Ecology Publication No. 11-03-006 includes a discussion of the Biota collected they collected at Hanford. Basis: Page 20 Table 3, Lead and Arsenic Risk-based Soil Thresholds and Screening Levels for Protection of the Environment. Soil Biota, Darkling Beetles and invertebrates, were collected.		Include this discussion. Add this publication to the reference section.	
Item 19 P: 5-3 S: 5.4 L: 22-26	Comment: In the discussion on contaminant migration, please address the shallow soil depth to groundwater for orchard soils bordering the river over the 1000 yr STOMP simulation period. Basis: Shallow groundwater near the river may complete a soil leaching pathway for As into groundwater, river, and sediment.		Please address the shallow soil depth to groundwater for orchard soils bordering the river over the 1000 yr STOMP simulation period.	
Item 20 P: S: 6 L: 21-23	Comment: The Sloan document, Lead and Arsenic Risk-based Soil Thresholds and Screening Levels for Protection of the Environment February 2011, Ecology Publication No. 11-03-006 should be referenced and discussed in this section. Basis: Relevant information on the Hanford Site Old Orchards.		Add.	
Item 21 P: 6-1 S: 6.1 L: 21-23	Comment: Text states, "To date, scientific studies have not found conclusive evidence that exposure of low-to-moderate levels of lead and arsenic contamination in soil has caused or is causing deleterious health effects (AWSCTF 2003a)." However, AWSCTF (2003a) also states, "In recent years, the majority of scientific review committees formed to evaluate the available scientific information on arsenic and lead have concluded that there is a sufficient scientific basis to justify efforts to reduce exposure to all sources of arsenic and lead, including arsenic and lead occurring in soil."		Include both quotes in the comment for a more balanced review, especially since human toxicity of Pb and As are commonly acknowledged (e.g., see ATSDR profiles).	

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Item # Page # Section # Line/¶ #s	Comment and Basis/Justification		Modification Needed	
	Basis: A precautionary approach is warranted when information is incomplete and uncertain.			
Item 22 P: 6-1 S: 6.1 L: 21-23	Comment: Remove last sentence, caveat it with the date and more details on the source, or update based on more current information. Basis: Using the phrase "to date" to summarize a conclusion from a task force study that is now 15 years old is misleading.		Replace the phrase "to date" with details on the 2003 study or update based on more current information.	
Item 23 S: 6.1.1	Comment: All or most of the current Section 6.1.1 text should be moved into Section 2. Any remaining discussion of the Asarco and Bunker Hill studies should include text that describes the differences between the wide-spread air deposition by smelters and the relatively confined locations associated with orchards. Basis: Too much emphasis has been placed on these studies within the Risk Assessment. These may include historical information for comparison. But the information contained within these sections belongs in the Historical Review. Decisions in the Asarco and Bunker Hill Superfund cleanups were related, in part, due to the vast areas of contamination (approximately 1000 square miles of the heavily populated Puget Sound for Asarco Tacoma Smelter and 60+ square miles of the mountainous Silver Valley and Coeur d'Alene river basin for Bunker Hill) compared to the 7.8 square miles of relatively flat and uninhabited former orchards under investigation with the Hanford 100-OL-1.		Move Section 6.1.1 discussing the Asarco Tacoma Superfund Site, Area-Wide Soil Contamination Task Force, Asarco Tacoma Smelter Plume, and the Soil Contamination at Washington Schools, and the Bunker Hill Superfund site to Section 2 or specifically to a section regarding other relevant studies. Screening levels developed during these projects can be retained within Tables 6-1 & 6-2.	
Item 24 P: 6-2 S: 6.1.1 L: 4-6	Comment: Remove the phrase "and the efforts of the task force are being used to address contamination from the Asarco Tacoma Smelter plume, the Everett Smelter, and at schools built on former orchard lands across the state". Basis: This phrase is not justified by the cited reference (AWSCTF 2003a) and inflate the level upon with Washington State Department of Ecology relies upon these recommendations. The AWSCTF recommendations were not published by rule-making.		Remove the phrase. If needed, a substitute phrase can be found from the published findings and recommendations on the intended purpose of the task force.	
Item 25 P: 6-2 S: 6.1.1 L: 26-27	Comment: Please include the information that the second phase of the action plan for the Asarco Tacoma Smelter Plume has not been issued. Basis: As written, a reader could assume that both phases of the project had been completed.		Include text regarding the second phase of the action plan has not been completed.	
Item 26 P: 6-3 S: 6.1.1 L: 20	Comment: Sample et al (2011) is missing from the reference list. Basis: (Sample, et al. 2011) is cited on page 6-3 line 20.		Include Sample, BE et al. 2011. IEAM 7:596-611 in Section 8 References.	
Item 27 P: 6-3 S: 6.1.2 L: 40	Comment: The MTCA CLARC database lists the arsenic soil value to protect groundwater as 2.92 mg/kg (not 0.00737 mg/kg, as text notes). Basis: MTCA Equation 747-1.		Please correct the MTCA soil concentration to protect groundwater (from 0.00737 mg/kg to 2.92 mg/kg).	
Item 28 P: 6-3 S: 6.1.2	Comment: Additional sections discussing the applicability of the Interim Action cleanup levels (353 mg/kg) and final action cleanup levels in the river corridor should also be included.		Include discussions of river corridor interim actions and final cleanup levels.	

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Item # Page # Section # Line¶ #s	Comment and Basis/Justification		Modification Needed		
	Basis: The only text of consequence in Section 6.1.2 is relevant to using the MTCA A value for Arsenic as a screening level. Most of the other numbers come from studies that have been summarized in this document (even if the summaries move out of Section 6). Interim action cleanup values should be discussed. Also, final action cleanup values from the surrounding river corridor are relevant.				
Item 29 P: 6-3 S: 6.1.2	Comment: Include discussion regarding the use of MTCA A cleanup values as screening values. See WAC 173-340-900 Table 740-1 footnote a.		Include reason why MTCA A values (including lead) were included in Table 6-1 for human health.		
Item 30 P: 6-4 S: 6.1.2 Table 6-1	Comment: The reference for the second line item in Table 6-1 (MTCA Method A) should be MTCA Table 740-1 (rather than WAC 173-340-740).		Change WAC 173-340-740 to WAC 173-340-900, Table 740-1.		
Item 31 P: 6-4 S: 6.1.2 Table 6-1	Comment: Change the reference on footnote (a) to that used in MTCA (WAC 173-340-900 Table 740-1 footnote b). Basis: The reference cited is not appropriate to reference to MTCA A values.		Replace reference on footnote (a) with "Cleanup level based on direct contact using MTCA Equation 740-2 and protection of ground water for drinking water use using the procedures in WAC 173-340-747(4), adjusted for Washington State natural background for soil."		
Item 32 P: 6-5 S: 6.1.3 Table 6-2	Comment: Recommended SSL values from Table 20 on page 53 of the Janice Sloan document should be included and values compared. Basis: Table 6-2, Lead and Arsenic Risk-based Soil Thresholds and Screening Levels for Protection of the Environment February 2011, Ecology Publication No. 11-03-006		Add to table.		
Item 33 P: 6-4 S: 6.1.3 L: 12-18	Comment: Tier 1, 2, and 3 values reflect increasing specificity to the Hanford site. Basis: CHPRC-00784 (Rev 1) and CHPRC-01311 (Rev 2) define Tier 1, 2 and 3 values as specific to the Hanford site. A valid Tier 3 value (in this context) would be derived from and applied to a specific waste site at Hanford (not a waste site in Idaho).		Note that Tier 1, 2, and 3 values are defined here in the context of the Hanford site.		
Item 34 P: 6-4 S: 6.1.3 L: 19-20	Comment: Add a sentence on the controversy that surrounds the NOEC model (e.g., http://onlinelibrary.wiley.com/doi/10.1002/etc.3086/pdf). Basis: This addition would to inform readers of the uncertainty associated with this approach.		Add a sentence on the controversy that surrounds the NOEC model (e.g., http://onlinelibrary.wiley.com/doi/10.1002/etc.3086/pdf).		
Item 35 P: 6-5 S: 6.1.3 Table 6-2	Comment: Include EPA EcoSSLs in Table 6-2 for As and Pb for birds, mammals, and soil invertebrates (only plant EcoSSLs are listed). Basis: EcoSSLs are widely used.		Include EPA EcoSSLs in Table 6-2 for As and Pb for birds, mammals, and soil invertebrates.		
Item 36 P: 6-6 S: 6.2 L: 14-16	Comment: A groundwater ingestion pathway may be complete (for residents and casual users) for orchards that border the river, given shallow groundwater and river seeps at these locations. At these locations, other groundwater pathways could also be complete (e.g., groundwater used for cooking, showering, irrigation of crops, watering livestock). Basis: Where orchards border the river, shallow groundwater and river seeps may render groundwater pathways complete. For example, downward migration of As in soils contaminated with lead arsenate has been reported by Peryea and Creger (1994).		Show groundwater pathways as potentially complete (for residents and casual users) for orchards directly adjacent to the river.		

Review Comment Record		Washington State Department of Ecology Nuclear Waste Program Cleanup Section/ER Project		Date May 10, 2018
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Item # Page # Section # Line/¶ #s	Comment and Basis/Justification		Modification Needed	
Item 37 P: 6-6 S: 6.2 Fig. 6-1	Comment: For exposure pathways marked with "O" in Figure 6-1 ("potentially complete pathway, but not reasonably foreseeable land use"), land use will become unknown at some future point in time (and should then be viewed as unrestricted), making these pathways complete. Text should acknowledge a future unrestricted land use. Basis: Future land use is unknown.		Provide text acknowledging that future land use is unknown, so that exposure pathways may become complete.	
Item 38 P: 6-7 S: 6.3 L: 7-9	Comment: Text states, "There is an incomplete pathway for the aquatic resources because there is a low potential for the lead arsenate residues from groundwater or overland flow to transport lead and arsenic into surface water." "Low potential" is not suitable rationale to dismiss a pathway. Airborne wind transport of contaminated surface soil to the river may also occur, especially for orchards near the river. Basis: A complete pathway to surface water exists.		Show a complete pathway for aquatic biota via surface soil and groundwater pathways.	
Item 39 P: 6-7 S: 6.3 Fig. 6-2	Comment: Re Figure 6-2, please provide a distinction between "Soil Biota" vs. "Invertebrates." Basis: Depending on definitions, there can be overlap between organisms, classified as soil biota vs. invertebrates.		Re Figure 6-2, please provide a distinction between "Soil Biota" vs. "Invertebrates."	
Item 40 P: 6-7 S: 6.3 Fig. 6-2	Comment: Soil biota, invertebrates, and plants are links of a food web transport pathway and should be designated as such with an upper case "X." Basis: Soil biota, invertebrates, and plants are links of a terrestrial food web pathway.		Soil biota, invertebrates, and plants are links of a food web transport pathway and should be designated as such with an upper case "X."	
Item 41 P: 6-7 S: 6.3 Fig. 6-2	Comment: The food web transport pathway (linked directly to the "Surface Soil" box under "Exposure Points") includes the "Animals Plants" box under "Exposure Points." Basis: Pathways in a CEM should not be redundant.		Delete the "Animals Plants" box under "Exposure Points."	
Item 42 P: 6-8 S: 6.5 L: 32-38	Comment: Text states, "The alternatives for the EPC other than the 95% UCL are described in Table 4-2. The alternatives include the MDL (DU-004 arsenic), maximum concentration (DU-069 arsenic), and the H-statistic (DU-117 lead)." Note that the H-statistic produces a "95% H-UCL" (based on a lognormal distribution), so it is not really an alternative to a 95UCL. Furthermore and perhaps more importantly, footnote "(c)B" in Table 4-2 states, "ProUCL computes and outputs H-statistic based UCLs for historical reasons only. H statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the technical guide. It is therefore recommended to avoid the use of H-statistic." However, this warning is unclear if ProUCL recommends the 95% H-UCL in some cases (as "Suggested UCL to Use"). Basis: ProUCL, Version 5.1, Tech Guide, Section 2.4.3.		Revise text to indicate that 95% H-UCL is also a UCL approach, and reiterate that it was selected for 13 cases (ProUCL Comment "(c)B" in Table 4-2), because it was the only UCL recommended by ProUCL for these cases (according to p 4-6, line 17-19). Therefore, there are really only 5 of 266 cases that did not use a 95UCL for EPC. These 5 cases used either max or MDL.	
Item 43 P: 6-8 S: 6.5 L: 25	Comment: With the exception of data exceeding certain AWSCTF thresholds (700 mg/kg for Pb, 200 mg/kg for As) data in Table 6-3 are redundant with data in Table 4-2. Basis: Redundancy detracts from clarity.		Note in text that with the exception of data exceeding AWSCTF thresholds (700 mg/kg for Pb, 200 mg/kg for As), data in Table 6-3 are redundant with data in Table 4-2.	
Item 44 P: 6-9	Comment: Text states, "The average lead and arsenic concentrations for DU-078, -132, and -133 (Table 4-2) were below the average concentrations considered in the assumptions for the minimum number of samples, thus meeting the minimum sample locations for the		Please indicate if this statement is based on Table 4.7 in the pilot study (Bunn et al, 2014). If so, please cite this table.	

**Washington State Department of Ecology
Nuclear Waste Program
Cleanup Section/ER Project**

Date **May 10, 2018**

Page 9 of 10

Review Comment Record

Document Title(s)/Number(s): Remedial Investigation for the 100-OL-1 Operable Unit Hanford Orchard Lands, DOE/RL-2016-54 Draft A
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Item # Page # Section # Line/¶ #s	Comment and Basis/Justification	Modification Needed
S: 6.6 L: 18-21	average concentrations in the DU to be considered "clean" with 95% confidence." Please indicate if this statement is based on Table 4.7 in the pilot study (Bunn et al, 2014). If so, please cite this table.	
Item 45 P: 6-9 S: 6.6 L: 25	Comment: Re DU-026, reference to Figure D.15 and Table D-7 (Appendix D) appear to be in error. DU-026 corresponds to Figure D.12, and there is no Table D-7. Justification: Editorial.	Please revise text, commensurate with the comment.
Item 46 P: 6-9 S: 6.6 L: 35	Comment: For clarity, replace "concentrations of concern" with "average concentrations above the MTCA Method A screening level" (since this is the case for DU-020 and DU-049). Basis: Terminology should be clear.	Replace "concentrations of concern" with "average concentrations above the MTCA Method A screening level."
Item 47 P: 6-9 S: 6.6 L: 45-47	Comment: Text states, "For all the DUs where the RSD exceeded 125% for arsenic, the concentration exceeded the MTCA Method A screening level...." This does not appear to be entirely true, assuming "concentration" refers to average concentration (e.g., DU-013: RSD=277%, average conc=16.9 mg/kg, DU-039: RSD=133%, average conc=9.18 mg/kg). Even if "concentration" refers to 95% UCL, the cited statement is not true for DU-003 (RSD=217%, 95% UCL=17.1 mg/kg). Basis: Terminology should be clear.	Revise text to accurately reflect data in Table 4-2.
Item 48 P: 6-10 S: 6.6 L: 7-8	Comment: Text states, "As shown by Peryea and Creger (1994) and Yokel and Delistraty (2003), there could be higher concentrations of lead and arsenic below the soil surface." Although this statement is true for Peryea and Creger (1994), our depth profile analysis (Table V1 and Figures 2 and 3) did not generally show this.	Please delete the Yokel and Delistraty (2003) citation from this statement.
Item 49 P: 6-12 through 6-15 S: 6.7 Table 6.3	Comment: Update Table 6.3 to reflect the most applicable human health and ecology values. Basis: Washington State Area-Wide Soil Contamination Task Force has made recommendations on concentration ranges for Ecology to use. This information constitutes "to be considered" (TBC) concentrations, but have never been promulgated by rule making and are not ARARs.	Update Table 6.3 to include comparisons to the following: MTCA A lead (250 mg/kg), MTCA A arsenic (20 mg/kg), Hanford Tier 2 lead (156 mg/kg), and Hanford Tier 2 arsenic (127 mg/kg).
Item 50 P: 7-1 S: 7.1 L: 32-35	Comment: Text states, "Investigations of the mobility of lead and arsenic (estimating the Kd, or soil/water distribution coefficient) in soil from the Hanford Site demonstrated that lead and arsenic are bound to the soil and may require more than 1000 years to move through the soil column." Please provide a reference for this statement. Also, address the issue of vertical migration for As, especially in DUs which border the river (characterized by shallow depth to groundwater and potential river seeps). Basis: Peryea and Creger (1994)	Provide a reference for Kd data for Pb and As. Address the issue of vertical migration for As, especially in DUs which border the river (characterized by shallow depth to groundwater and potential river seeps).
Item 51 P: 7-1 S: 7.1 L: 38	Comment: Possible typo "soil at depth (>1 m [3 ft])..." Should this have been a less than symbol rather than greater than? If it is not in error, much more discussion of deep lead and arsenic being related to the orchard lands needs to be added. This is not obvious from a brief review of Appendix F, where many of the samples in question are from staging pile areas or other shallow decision units. Basis: All of the deferrals of lead and arsenic during the river corridor interim action to the 100-OL-1 RI were done on soils less than 1 m from the surface.	Fix typo or add discussion of lead and arsenic throughout the river corridor related to depth.

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Item # Page # Section # Line/¶ #s	Comment and Basis/Justification		Modification Needed		
Item 52 Appendix A & Appendix D	<p>Comment: Update Appendix A and Appendix D color coded maps to reflect the most applicable human health and ecological values.</p> <p>Basis: Washington State Area-Wide Soil Contamination Task Force has made recommendations on concentration ranges for Ecology to use. This information constitutes "to be considered" (TBC) concentrations, but have never been promulgated by rule making and are not ARARs.</p> <p>We have Hanford Tier 2 ecological risk-based screening levels. Discussion of these levels is far more important than comparing to Bunker Hill values.</p>		Update Appendix A and Appendix D maps. Include in the 4 color coded quadrants whether the following are exceeded: MTCA A lead (250 mg/kg), MTCA A arsenic (20 mg/kg), Hanford Tier 2 lead (156 mg/kg), and Tier 2 arsenic (127 mg/kg).		
Item 53 Appendix A & Appendix D	<p>Comment: Update Appendix A and Appendix D color coded maps to reflect the 1943 aerial surveys as the background. If updating the maps is not helpful in the printed report, this can be omitted. See later comment on redrawing DU boundaries based in part on 1943 aerial survey.</p> <p>Basis: Most of the decision units show patterns that appear to be related to actual field usage in the 1943 aerial survey. Patterns can clearly be established from Appendix A color coded maps to the 1943 survey where fields and roads can be seen.</p>		Update Appendix A and Appendix D color coded maps to reflect the 1943 aerial surveys as the background.		
Item 54 Appendix F	<p>Comment: The waste sites that are discussed in Appendix F should all be included on a map. Also, the waste sites that are co-located with OL-1 DUs should be marked on the aerial photos in Appendix A, especially the sites with high lead and arsenic: 600-151 in DU-020, 128-H-1 in DU-021, 600-351 in DU-086, and 600-331 in DU-095.</p> <p>Basis: This is another layer of information that is valuable to the understanding of contamination.</p>		Include Appendix F waste sites on both an overview map and on updated Appendix A maps.		