

	REVIEW COMMENT RECORD	Date August 10, 2009	General Comment
		Project No. WMA C Work Plan	Page  Page 1 of 24

Document Number(s)/Title(s) RPP-PLAN-39114, Rev. 0	Program/Project/Building Number Vadose Zone Program	Reviewer Various	Organization/Group Ecology	Location/Phone Mike Barnes 372-7927
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Comment Submittal Approval:

Agreement with indicated comment disposition(s)

Status:

Organization Manager (Optional)

8-10-2009  
Date

Mike Barnes  
Reviewer/Point of Contact  
Michael P. Cant  
Author/Originator

Date

Reviewer/Point of Contact

Author/Originator

Item	Page #	Comment (s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/problem indicated.)	Response(s) (Provide technical justification for the response, if not accepted).
1.	General Comment	Where this document refers to performance assessments and risk assessments, please add text referring to the process that is ongoing with NRC for the WMA C performance assessment. Please make appropriate changes in this document to resolve any inconsistencies between the plans documented here and the ongoing WMA C performance assessment development process.	<b>Accepted.</b> It should also be noted that a number of comments are related to the performance assessment. However, after the release of the RPP-PLAN-39114, a process has been started with Ecology, NRC, EPA, Tribal Nations, and interested stakeholders to develop the scope (conceptual exposure model, conceptual site model, selection of numerical codes, etc.) through a series of working sessions or workshops. This process will be noted in the revision to RPP-PLAN-39114 and in the comment responses.
2.	General Comment	Units of measure should remain consistent, and where both IU as well as British units are given, a conversion should be provided. For example, compare pg. 2-12, line 42 with Table 2-1 (pg 2-13) where the units are different in the two locations. Please correct at this location and throughout the document.	<b>Response:</b> A metric conversion chart is provided at the beginning of the document (p. xiv) to do conversions. The text remains the same and represents the original document's measurements to maintain accuracy and prevent typographical and conversion errors based on previous comments received from Ecology. Information derived from historical or referenced sources is presented in the units cited in the reference. Field and

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<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 2 of 24

			laboratory data are presented in the units as measured in the field or as reported by the laboratory. Due to the loss of precision in converting units, the reader is expected to make the conversion to ensure the correct precision appropriate for the reader's purpose. The following website provides unit conversions <a href="http://www.onlineconversion.com/">http://www.onlineconversion.com/</a>
3.	General Comment	This work plan, RCRA FI/CMS Work Plan for WMA C, Revision 0, Nov 2008, fails to identify the conceptual process for performing RCRA corrective actions to support closure of the SST WMA. The work plan must be revised to address the closure requirements of WAC 173-303.	<b>Response:</b> This work plan was submitted to meet HFFACO Milestone M-45-60, which states "Submit to Ecology for review and approval as an Agreement Primary Document, DOE's Phase 2 RFI/CMS Work Plan and Sampling and Analysis Plan (SAP) for WMA C." The associated Change Control Form (M-45-06-03) states, "This change package establishes a framework for completion of corrective measures within C-Farm and a Phase 2 Tank Farm Correction Action Master Work Plan to define the overall corrective action completion approach and sequence for other tank farms." It was never designed "to identify the conceptual process for performing RCRA correction actions to support closure of the SST WMA." According to revisions to Appendix I from the above-mentioned Change Control Form, "the Phase 2 corrective action process Master Work Plan will describe the overall corrective action conceptual process and sequencing approach for all single shell tank farms." Not this work plan. This comment relates to issues developed in Ecology's review of the <i>Phase 2 RCRA Facility Investigation/Corrective Measures Study Master Work Plan for Single-Shell Tank Waste Management Areas</i> , RPP-PLAN-37243, Revision 1. These comments cannot be addressed simply through changes to RPP-PLAN-39114, and are the subject of a series of workshops already underway with your staff. Once these workshops reach resolution, the outcome will be separately documented. Should this result in additional changes to the WMA C work plan, we will provide a further update for your

REVIEW COMMENT RECORD	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 3 of 24

			approval as described through Section 9.3 of the HFFACO Action Plan.
4.	General Comment	The SST closure plan to be issued by the department of Ecology will include SST corrective actions. The corrective actions described in this document are not independent actions. These are also closure actions and will be incorporated into the SST closure plan.	<b>Response:</b> See Response to comment #3.
5.	General Comment	Source waste sites (soil) inside and potentially adjacent to the WMA are subject to RCRA closure and corrective action, not CERCLA as stated. Groundwater will also be subject to RCRA closure and corrective action, not just CERCLA as stated.	<b>Response:</b> See Response to comment #3.
6.	General Comment	Only cleanup actions that meet the closure performance standards will achieve final closure of the WMAs.	<b>Response:</b> See Response to comment #3.
7.	General Comment	Characterization of the WMAs must consider the closure performance standards to achieve final closure of the WMAs. All characterization conducted on the SST System, whether within a WMA or on ancillary equipment located outside the WMAs, must identify and incorporate constituents and detection levels to be used in the closure process.	<b>Response:</b> See comment response to 3. Constituents that have been identified in the <i>Single-Shell Tank Component Closure Data Quality Objectives</i> , RPP-23403, Rev. 3, are the constituents being addressed in the characterization effort. The constituents identified in the associated DQO report and SAP for this work plan are in agreement with Ecology and were addressed during the DQO process for this work with Ecology, the Tribal Nations and stakeholders. As cited on page 3-43, under Section 3.5, "The DQO for this work plan (RPP-RPT-38152) used the same approach as RPP-23403, Rev. 3 for developing analytical parameters. In this approach, "primary" constituents were identified from the Hanford Facility Dangerous Waste Part A Permit Application, Form 3, Revision 8, for the SST system [Letter 03-ED-009, "Hanford Facility Dangerous Waste Part A Permit Application Form 3, Revision 8, for the Single-Shell Tank (SST) System"] (Part A), underlying hazardous constituents, 10 CFR 61.55, "Licensing Requirements for Land Disposal of

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 4 of 24

			Radioactive Waste,” and identified potential risk contributors. Analytical methods were identified for the primary constituents. In addition to the identified constituents, a number of these methods can also detect many other chemicals or radionuclides. These other or “secondary” analytes will be evaluated and reported using strategies described in RPP-23403.
8.	General Comment	Closure will address structures, soil and groundwater contamination.	<b>Response:</b> This work plan was a requirement to satisfy HFFACO Milestone M-45-60 as stated in the document. The work plan addresses releases or potential releases through the corrective action process for soils and groundwater, not structures. Other documentation, like a closure plan will address all of these as noted in your comment.
9.	General Comment	Both RCRA closure and corrective action will be contained in the SST System closure plan.  Corrective action for the SST System is part of the draft closure plan. This section is currently reserved in the closure plan. Detail will be incorporated into the closure plan through permit modifications  Ecology is incorporating the corrective action of the SST System into the SST closure plan in order to integrate schedules and physical actions and regulatory requirements.	<b>Response:</b> See Response to comment #3.
10.	General Comment	It is inappropriate to use only the document number in referring to documents. This practice is repeated throughout the document.	<b>Response:</b> The document number as a citation has been used in numerous reports. It is based on the protocol established at Hanford to issue unique numbers for document control and configuration. Because it is a unique number, no other document has it and thus eliminates confusion as to which document is being referenced, unlike Smith, 2003.
11.	p. 2-12 Sect	Groundwater monitoring at WMA C is conducted FOR	<b>Accepted.</b> Text will read, “At WMA C, groundwater monitoring

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 5 of 24

	2.3.4	compliance with WAC 173-303-400 (and by reference 40 CFR 265, Subpart F) because WMA C is a RCRA TSD unit. Data from some groundwater monitoring wells is used to support the 200-BP-5 groundwater operable unit. Please correct.	is conducted FOR compliance with WAC 173-303-400 (and by reference 40 CFR 265, Subpart F) because WMA C is a HWMA TSD unit. Data from some groundwater monitoring wells are used to support the 200-BP-5 CERCLA groundwater operable unit.” Note that CERCLA was added and RCRA was changed to HWMA since the regulations cited are state requirements.
12.	Pg. 2-12, lines 16 – 19	B Pond was located east of WMA C (not north) and the B Pond mound led to groundwater flow to the west-northwest. With cessation of discharges to B Pond, groundwater flow direction is slowly changing back to the pre-Hanford west to east direction of groundwater flow. Please correct.	<b>Partially accepted.</b> The sentence will be changed to indicate that B Pond is located east-northeast of WMA C. Based on historical data from PNNL-15837, <i>Data Package for Past and Current Groundwater Flow Contamination beneath Single-Shell Tank Waste Management Areas</i> . From this report on p. 3.16, “. . . groundwater flow directions in the area of WMA C have been fairly constant and to the southwest between 1958 and the present.” Currently in the annual groundwater monitoring reports, groundwater flow remains in a southwest direction.
13.	Pg. 2-13, lines 16 – 24	If slug tests at different levels in the well screen indicate different hydraulic conductivities and flow rates, why was a single long screen placed in these wells that bridge different units of differing hydraulic characteristics rather than a single screen at the interval of highest contamination? The effect could be a dilution of contaminants that masks the real level of contamination in a well. Please address.	<b>Response:</b> This work plan as designated in HFFACO M-45-60 addresses soil characterization at WMA C. It does not address groundwater well testing. This section discusses background information on WMA C including ancillary equipment, geology, and WMA historical operations. The reference provided in the above table gives the rationale for completion technique used.
14.	Pg. 3-3, line 27	WMA C is a RCRA TSD unit, NOT a past practice unit. Appendix C of the HFFACO does not include a 200-PO-3 operable unit, but Appendix B does. Please correct this work plan and make the HFFACO consistent.	<b>Accepted.</b> You are correct that is why Appendix B is cited, not Appendix C of the HFFACO. It is not the TOC scope to make the HFFACO consistent. This scope is part of DOE, Ecology and EPA, the Tri-Parties.
15.	Pg. 3-6, line 13.	Please explain what “elevated pH values and high sodium content” means if these are considered indicators of the presence or passage of tank waste.	<b>Accepted.</b> We will provide the values that are given on pp. 3-6 and 3-7 in Section 3.2.1.1 to indicate what “elevated pH and high sodium content” means and reference the FIR for WMAs C and A-AX (RPP-35484) for further information.

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 6 of 24

16.	Pg. 3-6, lines 23, 24	Please provide some details regarding the appearance of Tc-99 in a "nearby monitoring well".	<b>Accepted.</b> The "nearby monitoring well" is actually "nearby monitoring wells" in the text and will be identified accordingly, "(299-E27-4, 299-E27-13, 299-E27-14, 299-E27-21 and 299-E27-23)" after "wells".
17.	Pg. 3-6, 3-7, Sect. 3.2.1.1.	While this is a nice summary of data, it doesn't state whether this data is indicative of a release and why it is. Please clarify and explain.	<b>Accepted.</b> We will clearly state in Section 3.2.1 and 3.2.1.1 that this is tank waste contamination. In addition, at the beginning of Section 3.2.1 (a), it states "Chemical analyses of sediments retrieved from borehole C4297 near C-105 showed several features characteristic of tank waste vadose zone contamination." The beginning line presented in Section 3.2.1.1 starts off saying "Borehole C4297 was drilled near the source of the C-105 leak near the southwest portion of C-105." The overall section of 3.2 is entitled "Nature and Extent of Contamination Determined From Phase 1 Investigations", which discusses known tank waste releases. We will provide additional text to clearly indicate the presence of tank waste past through these zones and reference the FIR for WMAs C and A-AX (RPP-35484).
18.	Pg. 3-13, lines 6, 7.	Please provide a technical basis for the statement, "...and the subsequent natural recharge do not appear sufficient to have contaminated groundwater in the 36 to 38 years since the release events."	<b>Accepted.</b> This sentence will be deleted since no direct support is available to support this statement.
19.	Pg. 3-18, lines 25-31	As Cn is found in groundwater in well 299-E27-7, and the only likely nearby source is C Tank Farm, this constituent should be added. Please add.	<b>Response:</b> Cyanide is a constituent and contaminant of concern that has impacted groundwater at WMA C. It has been identified as such in the work plan and the SAP. In this section on conceptual models as indicated on p. 3-17, lines 12-22 states, "Rather than evaluating individual leaks sequentially, the summary discussion in Appendix A of DOE/ORP-2008-01 is oriented toward comparisons of similar information related to several leak events where possible, particularly the larger leaks that are more completely characterized. The purpose of these comparisons is to emphasize and describe those key characteristics and processes that are common to all leak events

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 7 of 24

			and therefore are indicative of systematic behavior. At the same time, it is important to keep in mind that each tank waste release site is unique in some way and that site-specific factors not emphasized in this general discussion may provide significant impacts to contaminant behavior in the subsurface. These factors, which must be determined from site specific evaluation, may result in more refined or alternative conceptual models that are most appropriate for a given site.” This conceptual model discussion acknowledges we are well aware of tank waste releases that are site-specific in nature as well as their similar characteristics related to migration.
20.	Pg. 3-18, lines 8 – 17	This discussion mentions soil waste interaction in the vadose zone to include sorption and precipitation, but doesn’t address desorption which can be facilitated by later addition of moisture to the soil. Please include desorption.	<b>Accepted.</b> The word desorption will be added.
21.	Pg. 3-18, 19, lines 37 through 3	Mention of the depth limitation of information is appropriate here, because push technology and some boreholes do penetrate the entire vadose zone. Yet, contaminants in the deep vadose zone can be inferred based on data from groundwater monitoring wells. Please include depth limitations of characterization boreholes.	<b>Accepted.</b> A range of depth for the characterization boreholes will be included. None of these are probeholes using push technology. Most of them were boreholes and extended through the depth of contamination. Depth limitations in the work plan were decided in the DQOs associated with those Phase 1 work plans and included boreholes in SX, T, TX, BX, and B.
22.	Pg. 3-19, line 7.	Change “will” to “is expected to”, and that expectation was used in model simulations. Please change.	<b>Accepted.</b> Text will be changed to read, “... an engineered barrier is expected to reduce recharge rates from approximately 100 mm/yr to much less than 1.0 mm/yr for some time (PNNL-14744).”
23.	Pg. 3-21, lines 5 – 8.	The February 1979 flooding of T Farm is but one example of a process that likely occurred at other farms in February 1979 as well as other times in the past during site operations. Please qualify.	<b>Accepted.</b> Text will be added to state, “Flooding events probably occurred at other tank farms in the past during site operations. In 2001 and 2002, interim measures were conducted to mitigate flooding on tank farms.”
24.	Pg. 3-23, line	Clastic dikes are TABULAR (not tubular) bodies.	<b>Partially accepted.</b> The typographical error will be corrected.

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 8 of 24

15		<p>Previous model simulations incorrectly portrayed clastic dikes as pipes and thus incorrectly concluded that clastic dikes have no significance in fate and transport of contaminants to groundwater. Please correct.</p>	<p>For information purposes to provide better understanding of how this is portrayed in a 2-D simulation for this response: A clastic dike placed in a 2-D model is infinite in a 2-D cross-section. This information will not be added to the document, since the discussion is on conceptual models and not simulations.</p> <p>Simulations are not discussed in this section and are inappropriate at this time with the ongoing performance assessment working session process started with Ecology, NRC, EPA, Tribal Nations, and interested stakeholders. The ongoing process started with Ecology, NRC, EPA, Tribal Nations, and interested stakeholders to develop the scope (conceptual exposure model, conceptual site model, selection of numerical codes, etc.) through a series of working sessions or workshops will address model simulations.</p> <p>Please see comment response 1.</p>
25.	Pg. 3-23. Lines 34 - 42.	<p>While it is true that the possibility of intersecting a clastic dike in a characterization is limited, there is sufficient information on clastic dikes and their properties to “create” an imaginary clastic dike in modeling simulations of fate and transport analyses</p>	<p><b>Response:</b> Simulations are not discussed in this section and are inappropriate at this time with the ongoing performance assessment working session process started with Ecology, NRC, EPA, Tribal Nations, and interested stakeholders. The ongoing process started with Ecology, NRC, EPA, Tribal Nations, and interested stakeholders to develop the scope (conceptual exposure model, conceptual site model, selection of numerical codes, etc.) through a series of working sessions or workshops will address model simulations. Please see comment response 1.</p>
26.	General Comment on conceptual models	<p>With each conceptual model, it is possible to also conduct sensitivity studies that vary the input parameter values for a specific input characteristic. For example, one could run sensitivity analyses of the number, geometry and material characteristics of clastic dikes within a farm, the location and number of</p>	<p><b>Response:</b> Simulations are not discussed in this section and are inappropriate at this time with the ongoing performance assessment working session process started with Ecology, NRC, EPA, Tribal Nations, and interested stakeholders. The ongoing process started with Ecology, NRC, EPA, Tribal Nations, and interested stakeholders to develop the scope (conceptual exposure</p>

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 9 of 24

		unsealed boreholes, variations on recharge, flood frequency and volume, and water releases from pipelines. Please include some discussion of sensitivity studies and their value to planning future site characterization and in planning for remediation/closure.	model, conceptual site model, selection of numerical codes, etc.) through a series of working sessions or workshops will address model simulations. Please see comment response 1.
27.	p. 3-24 – 3-27, Section 3.3.5	Please include a conceptual model for shallow releases within C farm. There are at least 6 UPRs inside the farm that have not been discussed in this section, (UPR-200-E-16, UPR-200-E-27, UPR-200-E-68, UPR-200-E-81, UPR-200-E-107, UPR-200-E-118), which include surface spills from pipelines, leaks and airborne releases from diversion boxes and vaults, and airborne releases from tanks.	<b>Accepted:</b> A conceptual model for shallow releases within C farm section exists in the work plan (Section 3.3.5.4). In Section 3.3.5.5, Conceptual Model of Contaminated Surface Sites outside the C Farm, UPR-200-E-107, -115, -118 and -91 are discussed. <u>UPR-200-E-16, -27 and -68 will be added.</u> The title will be modified to remove outside the C Farm since some of these UPRs are inside the tank farm. UPR-81 is a pipeline leak that is addressed in Section 3.3.5.3, which addresses the conceptual models for pipelines, diversion boxes and CR vault. In Hanford Site Waste Management Units Report (DOE/RL-88-30, Rev. 18) created to meet the requirements of the HFFACO Action Plan Section 3.5, UPRs -16, -27, -68 have been consolidated with 200-E-133. Consolidation is defined in the document as “the site will be dispositioned as part of another site. 200-E-133 is included as part of boundary to be characterized in the DQO process.  Please see comment response 1 that address the ongoing performance assessment working sessions that will address conceptual models.
28.	p. 3-27 to 3-42, Section 3.4	Re performance assessment, text on human health risk (Section 3.4.1) appears short, relative to text on eco risk (Section 3.4.2). For example, eco risk describes identification of contaminants of concern (Section 3.4.2.3.1) and uncertainty analysis (Section 3.4.2.3.3),	<b>Response:</b> This entire section will be revised based on the ongoing performance assessment working sessions for WMA C. Additional wording will be included to state, “After submittal to Ecology in December 2008, a process was developed in February 2009 and is ongoing that addresses performance assessments. The ongoing process started with Ecology, NRC, EPA, Tribal

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 10 of 24

		while human health risk does not. Please address.	Nations, and interested stakeholders to develop the scope (conceptual exposure model, conceptual site model, selection of numerical codes, etc.) through a series of working sessions or workshops will address various performance assessment issues.”  Please see comment response 1.
29.	p. 3-27, Section 3.3.5.5, lines 30-31	Please delete the text “These releases and the conceptual model are not believed to represent a risk to groundwater but potentially are a risk through direct contact and to ecological receptors.” Ecology considers them a threat to groundwater as well as a threat through direct contact and ecological contact. WAC 173-340-740(6)(b) gives the point of compliance for soil cleanup levels based on the protection of groundwater to be the soils throughout the site (no depth limit is considered). We will use soil concentrations when evaluating whether or not the UPRs are a threat to groundwater.	<b>Accepted.</b> This text will be deleted.  Please see comment response 1 and 28.
30.	p. 3-28, para 4	EPA eco risk guidance should also be listed: 1) EPA. 1998. Guidance for ERA. EPA/630/R-95/002F. 2) EPA. 1997. ERAGS. EPA/540-R-97-006. 3) EPA. 1997. EPA Region 10 Supplemental ERAGS. EPA 910-R-97-005.	<b>Accepted.</b> We will include these references. Please see comment response 1 and 28.
31.	p. 3-29, para 2	Although it is stated, “the reasonably anticipated future land use for the 200 Areas is continued industrial activities for the foreseeable future,” it should be acknowledged that land use will be unknown at some time in the future. Therefore, a conservative approach would evaluate a range of human exposure scenarios (e.g., residential, farmer, fisher, Native American), as well as relevant ecological receptors (e.g., terrestrial,	<b>Accepted.</b> This text will be deleted.  Please see comment response 1 and 28.

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 11 of 24

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32.	p. 3-29, Section 3.4.1.1, Lines 16-18	<p>The text states “The reasonably anticipated future land use for the 200 Areas is continued industrial activities for the foreseeable future. This land-use assumption is applied to the pathway and receptor considerations in risk calculations for the waste sites.”</p> <p>For the groundwater and pathway to groundwater Ecology considers only unrestricted use scenarios (WAC 173-340 Method B) as this is the most beneficial use of the groundwater and is consistent with closure requirements in WAC 173-303-610.</p> <p>Additionally, the Tri-Party response to the Hanford Advisory Board Advice #132 stated “An Industrial land use scenario will set cleanup levels on the Central Plateau. Other scenarios (e.g., residential, recreational) may be used for comparison purposes to support decision making especially for</p> <ul style="list-style-type: none"> <li>• The post-institutional controls period (&gt; 150 years).</li> <li>• Sites near the Core Zone perimeter to analyze opportunities to “shrink the site”.</li> <li>• Early (precedent-setting) closure/remediation decisions. “</li> </ul> <p>Additionally, Ecology expects evaluation of Native American scenarios. Please evaluate unrestricted as well as Native American scenarios for risk assessment at WMA C.</p>	<p><b>Accepted.</b> This text will be deleted.</p> <p>Please see comment response 1 and 28.</p>
33.	p.3-29, Section 3.4.1.1, Lines 38-41	<p>Please delete the text “Given the local hydrogeology at WMA C, protection of the groundwater from the contaminants, by design, also will result in protection of the Columbia River.” This is not the case for</p>	<p><b>Accepted.</b> This text will be deleted.</p> <p>Please see comment response 1 and 28.</p>

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 12 of 24

		contaminants that are more harmful to aquatic biota and those with stringent ambient water quality criteria. This issue was discussed in comment resolution meetings for the SST PA. Ecology realizes that there may be a need to set a point somewhere in the Central Plateau or near the River Corridor for compliance with requirements for surface water protection. This could be acknowledged here.	
34.	p. 3-30, Section 3.4.1.4	Though the land use selected by DOE for the Core Zone in the CLUP is industrial (exclusive) for at least the next 50 y, Ecology's expectations for the analysis of risk are included on the attached draft document ( <i>Washington State Department of Ecology Guidance: Exposure Assessment Criteria for the Core Zone of the Central Plateau on the Hanford Site, Mar. 2009 draft</i> ).	<b>Response:</b> This text will be deleted. Please see comment response 1 and 28.
35.	p. 3-30, para 4	Partitioning land use, according to location inside (i.e., industrial) vs. outside (i.e., unrestricted) the Central Plateau Core Zone, makes sense for the foreseeable future (e.g., institutional control period), but not for longer time horizons (e.g., post institutional control period).	<b>Response:</b> This text will be deleted. Please see comment response 1 and 28.
36.	p. 3-31, Figure 3-13	Include under the primary release mechanisms surface liquid discharges. An example of this type of release is UPR-200-E-16.	<b>Response:</b> This figure was deleted. Please see comment response 1 and 28.
37.	p. 3-31, Figure 3-13	Re the conceptual exposure model, human and biota receptors could each be subdivided into more specific groups (e.g., residential/industrial/farmer/Native American for human; terrestrial/aquatic for biota). A complete pathway should be shown for human ingestion of biota. "Uptake" of biota is redundant and should be deleted (since ingestion is already specified).	<b>Response:</b> This figure was deleted. Please see comment response 1 and 28.

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 13 of 24

		As a result of a groundwater connection, surface water and sediments in the Columbia River should be added as exposure media. Complete pathways should be shown for ingestion, inhalation, direct contact, and external radiation of surface water to biota (given their potential exposure at riverbank seeps), as well as ingestion, direct contact, and external radiation of river sediment to biota (as a result of contaminant accumulation in the sediment). Finally, human and biota exposure to vadose zone soils (below 15 ft bgs) may occur via an intruder drilling scenario (where deeper soils are brought to the surface and mixed with surface soils).	
38.	p. 3-32, para 1	It is stated, "the ERA for WMA C will adopt relevant methodology and data that were used in the Central Plateau ecological risk assessment (CPERA)." Adopting consistent methods makes sense, although results are currently lacking. That is, the Jan 2008 Central Plateau Terrestrial Ecological Risk Assessment report (p. v in: DOE-2007-50, Draft A, Reissue) noted, "the tank farms [and US Ecology site] were not identified for ecological sampling in Phase II because their operations, regulatory plans, and interim stabilization plans (unique to the tank farms) represented a poor fit from an ecological risk characterization standpoint."	<b>Accepted:</b> Clarity will be provided that states, "This ecological risk assessment is not tiering off of the CPERA, just adopting consistence methods to maintain consistency."  Please see comment response 1 and 28.
39.	p. 3-32, para 2	MTCA and USDOE ERA guidance should also be consistent with EPA ERA guidance (EPA/630/R-95/002F; EPA/540-R-97-006).	<b>Accepted:</b> Guidance documents cited will be added. Please see comment response 1 and 28.
40.	p. 3-32, para 3	In addition to terrestrial eco receptors, risk to aquatic	<b>Accepted:</b> A new section entitled, "Aquatic Receptors of

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 14 of 24

		receptors in or near the Columbia River should also be evaluated via a groundwater pathway.	Concern” will be added in Section 3.4.2.2. The section will read as follows:  “ <b>Aquatic Receptors of Concern.</b> Aquatic receptors of concern will be evaluated through numerical modeling.”  Please see comment response 1 and 28.
41.	p. 3-33, para 5	The purpose of the WMA C ERA should include evaluation of both terrestrial and aquatic environments.	<b>Accepted:</b> Same as comment response #40.  Please see comment response 1 and 28.
42.	p. 3-35, para 3	The WAC citation should be “WAC 173-340-7493(2)(a)(i-iv),” not “WAC 173-340-7493(2)(i-iv).”	<b>Accepted.</b> Text will be corrected to reflect the comment.
43.	p. 3-35, para 6	Please clarify that both nonradionuclide and radionuclide COPECs should be derived from the SST DQO (RPP-23403), as well as WMA C soil data, and not be limited to MTCA Table 749-3 and USDOE BCG constituents.	<b>Accepted.</b> The text needs no modification, because it already says the starting COPECs will be derived from RPP-23403. RPP-23403 includes both radionuclides and nonradionuclides as constituents. This is also consistent with the groundwater COPCs using RPP-23403.
44.	p. 3-36, para 5	The WAC citation should be “WAC 173-340-7493(2)(a)(iv),” not “WAC 173-340-7493(2)(iv).”	<b>Accepted.</b> Text will be corrected to reflect the comment.
45.	p. 3-40, para 1	Substitute “evaluate” for “verify,” since contaminant exposure to small mammals is uncertain before tissue data are obtained.	<b>Accepted.</b> Text will be corrected to reflect the comment.
46.	p. 3-40, para 2	Although text indicates that dietary exposure modeling is not identified in WAC 173-340-7493, this method is described for birds and mammals in WAC 173-340-7493(3).	<b>Accepted:</b> “and dietary exposure modeling” will be deleted.
47.	p. 3-41 to 3-42, Section 3.4.2.4	In addition to the CPERA and RCBRA, please acknowledge that other eco risk work has been conducted at Hanford (e.g., CRCIA, WTP, 100 Areas,	<b>Accepted.</b> Text will be added with the citation to these documents and referenced in the reference section of the document.

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 15 of 24

		300 Area, PNNL surveys).	
48.	p. 3-43, para 4	Please describe criteria for selecting “threshold indicator constituents.”	<b>Accepted.</b> The criteria for selecting these “threshold indicator constituents” are based on their historically associated with tank waste, indicative of tank farm constituents released into the environment and drive risk, and were the most detected constituents in Phase 1 investigations. These criteria will be added to the text of the work plan.
49.	p. 3-44, para 1	Specify detection limits for Tc-99, I-129, and CN. This section (3.5.1) should be labeled as inorganics and rads, since organics are discussed in the next section (3.5.2).	<b>Accepted.</b> The text will be changed to read “Detected at Method Detection Limit”. Text will be added to state, “Sample analysis will be performed using a two-step approach. Step 1 analytes and methods are a subset of Step 2 analytes and methods. If a Step 1 threshold is met or exceeded, then all Step 2 methods (minus methods already performed in Step 1) will be performed.”
50.	p. 3-44, para 4	Provide rationale for the number and location of the five sampling locations.	<b>Accepted.</b> Will revise the text to include the following discussion:  WIDS indicates that the release occurred in the waste transfer line near the 241-CR-151 Diversion Box on October 15, 1969. The release is associated with the 241-CR-151 Diversion Box, the 241-C-102 tank and the PUREX 202-A Building. The source of the release was in an underground transfer line from the 202-A Building to the 241-C-102 tank via the 241-CR-151 diversion box. Analysis of the History of 241-C Farm, Stephen F. Agnew. LAUR-93-3605. October 1993 states:  “An organic layer was noted in C-102 in 1969 and reported (Anderson, T. D. “Organics in 102-C Tank,” letter to W. L. Godfrey, October 2, 1969) to be 36 kgal. This organic layer was subsequently transferred to C-103 in a P-10 pumping of C-102 in 1975. There is a recorded transfer of 111 kgal in '75-4, but the

# REVIEW COMMENT RECORD

Date  
August 10, 2009

General Comment

Project No.  
WMA C Work Plan

Page  
  
Page 16 of 24

			<p>level change in C-102 indicated that only 25 kgal was transferred, with another 8 kgal in '78-3, for a total of 33 kgal. Presumably, this combined 33 kgal transfer was largely the organic layer, and would have left 3 kgal in C-102.”</p> <p>RPP-PLAN-39114, Rev.0 Table 2-8 indicates that in “2-1965 - PUREX CWP2 - "A liquid level rise in Tank 103-C, the cesium feed tank, was apparently caused by a failed line in the encasement between the 152-CR diversion box and Tank 102-C which permitted coating waste from the PUREX Plant to leak into the encasement and drain to Tanks 101-C, 102-C, and 103-C via the tank Pump pits. Coating waste has been routed through a spare line to Tank 102-C and no further leaks have been detected. The coating waste solution accumulated in Tank 103-C did not significantly affect cesium loading capability as a cask was loaded normally following the incident.”</p> <p>“Note: Pipeline 8041 is inside a concrete encasement was used to route the PUREX CW to SST C-102 (see drawing H-2-44501, sheet 92). This encasement traverses from diversion box 24 1-CR- 152 along the west side of SSTs C-101, C- 102, and C- 103. In order for the PUREX CW to drain into SSTs C-101, C-102, and C-103, the encasement containing the failed transfer pipeline must have partially filled with waste. The integrity of this encasement is unknown and may have leaked waste to the soil. Drawing H-2-2338, sheet 45 indicates pipeline 8041 is out of service. Pipeline 8041 connects from nozzle U-3 in the 24 1-CR-152 diversion box and nozzle U-2 in pit 02C atop SST C-102.”</p> <p>Based upon this information it would appear that the potential exists that more than one release may have occurred in and around CR-151,CR-152 and C-101/102/103 tanks from 1965 to</p>
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REVIEW COMMENT RECORD	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 17 of 24

			<p>1969. While waste is referenced as PUREX coating waste (WIDS), PUREX cladding waste (RPP-PLAN-39114) the presence of organics is documented in C-102 during this time frame. While these data are inconclusive that a release of organic contaminated waste occurred the rationale for selecting sites in the DQO was to identify areas of known or suspected releases having some potential for containing organic contamination. It was felt that sample locations "L" and "P" satisfied these criteria which are located at each end of the encasement.</p>
51.	p. 3-44, para 3	Just because TBP is not detected, it is nonconservative to eliminate all organics from the list of COPCs at WMA C.	<p><b>Response:</b> Will revise the text to indicate the organics (i.e. VOA, SVOA, DRO/GRO, PCBs) will be eliminated if TBP is not found. TBP was chosen because it has the highest probability of being found. It is the only organic constituent other than acetone and 2-Butanone found above detection limits in all tank residual samples and it is found at higher concentrations 75 to 73,000 µg/g (mg/kg) which is 10 to 100,000 times higher than all other organics including PCB. It was presented during the DQO process that if TBP is not found than it is unlikely that other organic (i.e. VOA, SVOA, DRO/GRO, PCBs) contaminants related to tank waste would be found.</p> <p>Furthermore, if the data for the organic analytes from the pre-retrieval samples taken at the C-200 Tanks is examined, the Best Basis Inventory reports the following organic analytes were found above the MDL in the pre-retrieval samples Butylbenzylphthalate, 1-Butanol, Acetone, Aroclor 1254, 2-Butanone, Xylenes (total), Xylene (m &amp; p), Trichloroethene, Xylene (o), Hexone, Methylenechloride, Toluene. The mean concentrations for Butylbenzylphthalate, 1-Butanol, Acetone were 66.7 ug/g, 16.8 ug/g, and 1.01 ug/g, respectively. The only PCB above MDL was Aroclor-1254 with a mean concentration of 0.46 ug/g. 2-Butanone had a mean concentration of 0.29 ug/g,</p>

REVIEW COMMENT RECORD	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 18 of 24

			<p>with the rest of the non-detected organic analytes having a mean concentration of less than 0.1 ug/g. Tri-Butyl Phosphate was found as a TIC in all of the pre-retrieval samples with the highest concentration found at C-204 at greater than 200,000 ug/g. Tri-butyl phosphate in the post-retrieval samples for these tanks had results ranging from ~5,000 mg/kg (C-201) to ~73,000 mg/kg (C-204).</p> <p>Other organic compounds found above detection limits in some, but not all tank residuals, are Butylbenzylphthalate (3.27 mg/kg (C-103)), Di-n-butylphthalate (6.11 mg/kg C-103, 6.08 mg/kg C-204), Hexone (2.27E-02 mg/kg C-202), Xylenes (Total) (2.0E-02 mg/kg C-203).</p> <p>Additionally, the work plan and the SAP have been modified to include the following language</p> <p><i>“The stepped approach will also be further evaluated following the examination of the sample results from the first five direct pushes. The approach may be modified after consultation with Washington’s Department of Ecology.”</i></p>
52.	p.3-44, Section 3.5.1	Please lower the threshold values of nitrate and hexavalent chromium to concentrations that are used as preliminary remediation goals or cleanup levels elsewhere on the site. For nitrate this value is 40 mg/kg as N, based on WAC 173-340-747 Equation 747-1 and the MCL for nitrate. For hexavalent chromium, a value of 2 mg/kg is used in consideration of dust resuspension, and a value of 0.2 mg/kg is used both for ecological protection, which is consistent with the value calculated for soil for the protection of	<p><b>Response:</b> These threshold values are based on soil background levels established in the footnoted documents, not on clean-up requirements. Please see comment response # 49.</p>

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 19 of 24

		groundwater. If 0.2 mg/kg is above the detection level, then the hexavalent chromium indicator concentration should be set at the detection limit.													
53.	p. 3-44 – 3-45, Section 3.5.2	Methylene chloride, acetone, 2-butanone, and chloroform may be common lab contaminants but they also may be present in tanks. Some of these have been found in tank headspaces. If they are observed in samples the associated blanks should be considered when deciding if these are from the tanks or a lab source. They should not automatically be attributed to lab contamination.	<b>Accepted.</b> The intent of the discussion was intended to capture that if observed in samples, the associated blanks will be considered when deciding if these are from contamination associated with a tank release or a lab source. The text will be modified to reflect the above statement.												
54.	p. 3-45, para 3	Re PCB congener analysis, please specify Method 1668 and quantify dioxin like toxic equivalents (TEQ) with WHO 2005 toxic equivalency factors (TEFs) for humans/mammals and with WHO 1998 TEFs for fish and birds. PCB congeners should be evaluated in a portion of all soil samples collected at WMA C, rather than being constrained to the initial 5 locations (EPA. 2007. Recommendations for human health risk-based chemical screening and related issues at EPA Region 10 CERCLA and RCRA sites. OEA-095, Memo from Michael Cox).	<b>Accepted.</b> The analytical method will be specified as EPA Method 1668.  The language in the sampling and analysis plan has been modified to include the following  <i>“Results from the initial five samples will be used in an attempt to establish a correlation between PCB Aroclors and congeners. The correlation will be used to evaluate whether or not future analysis of PCB congeners is necessary.”</i>												
55.	p. 3-45, para 4	Specify detection limits for pesticides and petroleum products.	<b>Accepted.</b> For the contaminants available the detection limits will be specified.  <table style="width: 100%; border: none;"> <tr> <td style="width: 80%;">Aldrin</td> <td style="text-align: right;">0.1 mg/kg</td> </tr> <tr> <td>Benzene hexachloride (including lindane)</td> <td style="text-align: right;">6 mg/kg</td> </tr> <tr> <td>Chlordane</td> <td style="text-align: right;">1 mg/kg</td> </tr> <tr> <td>DDT/DDD/DDE (total)</td> <td style="text-align: right;">0.75 mg/kg</td> </tr> <tr> <td>Dieldrin</td> <td style="text-align: right;">0.07 mg/kg</td> </tr> <tr> <td>Endrin</td> <td style="text-align: right;">0.2 mg/kg</td> </tr> </table>	Aldrin	0.1 mg/kg	Benzene hexachloride (including lindane)	6 mg/kg	Chlordane	1 mg/kg	DDT/DDD/DDE (total)	0.75 mg/kg	Dieldrin	0.07 mg/kg	Endrin	0.2 mg/kg
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Endrin	0.2 mg/kg														

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 20 of 24

			Hexachlorobenzene 17 mg/kg Heptachlor/heptachlor epoxide (total) 0.4 mg/kg Pentachlorophenol 3 mg/kg TBP Detected Gasoline range organics 100 mg/kg Diesel range organics 200 mg/kg
56.	Section 5, general	Ecology is submitting comments on the Phase 2 Master Work Plan. Please revise this section so that it is consistent with the revisions needed in the master work plan.	<b>Response:</b> Changes have been made in Section 5 to eliminate as much as possible any changes that would be required based on changes to the Phase 2 Master Work Plan. Section 5.5 and 5.6 has been removed. Discussion of program integration has been minimized to support field work aspects only.
57.	GENERAL COMMENT Chapter 5.	Soil is one component to be closed as part of the WMA C RCRA closure process following WAC 173-303-610. Therefore, these activities should be called a RCRA Component Closure Work Plan. Please correct in the title and throughout this RPP-PLAN-39114 document.	<b>Response:</b> This work plan was submitted to meet HFFACO Milestone M-45-60, which states "Submit to Ecology for review and approval as an Agreement Primary Document, DOE's Phase 2 RFI/CMS Work Plan and Sampling and Analysis Plan (SAP) for WMA C.  Please see the response to comment 56.
58.	Pg. 5-1 lines 22, 23.	Any revisions to the work plan must be submitted to Ecology for APPROVAL. Please correct.	<b>Response:</b> No correction is warranted. This is straight from Section 9.3 of HFFACO specifically addressing document revisions. The first sentence will be modified to read, "approval BY ECOLOGY without notification of Ecology and DOE."
59.	Pg. 5-6, lines 38, 39.	Groundwater is another component of WMA C to be closed under RCRA. Although HFFACO agrees that groundwater operable units will be closed/remediated under past practice authority, groundwater must at least be addressed here—even if only a reference to another work plan, RI/FS or program is included. Closure/remediation of groundwater must meet closure performance standards of WAC 173-303-610. Please include this information here and in this section of the	<b>Accepted.</b> A reference to the BP-5 work plan or program for groundwater will be added as will the criteria that all structures, soils and groundwater must meet closure performance standards of WAC 173-303-610.

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 21 of 24

		work plan.	
60.	Pg. 5-9, Sect. 5.4.	See comment 58 and replace all references to corrective measures to closure investigations and closure actions—including the implementation of any interim measures. Please correct.	<b>Response:</b> This work plan was submitted to meet HFFACO Milestone M-45-60, which states “Submit to Ecology for review and approval as an Agreement Primary Document, DOE’s Phase 2 RFI/CMS Work Plan and Sampling and Analysis Plan (SAP) for WMA C.
61.	p. 5-11, para 1	Please add the following EPA guidance: 1) EPA-540-R-070-002. Jan 2008. RAGS, Part F, Supp. Guidance for Inhalation Risk Assessment. 2) EPA/600/R-07/038. Apr 2007. ProUCL Version 4.0, User Guide.	<b>Accepted.</b> This EPA guidance documents will be added to the list.
62.	p. 5-11, para 3	It should be a requirement (rather than an option) that other scenarios (i.e., Native American, residential, intruder) be evaluated to assess post-remediation risk.	<b>Response:</b> Residential is being addressed. As you know, it is a requirement for residential and industrial land uses to be used to establish a cleanup level. The other scenarios are not a regulatory requirement under WAC 173-340-708(3)(d).
63.	p. 5-12, para 3	In addition to terrestrial eco risk, aquatic eco risk should be assessed, as a result of a contaminant groundwater pathway to the Columbia River. Additional ERA guidance should be consulted (e.g., EPA/630/R-95/002F; EPA/540-R-97-006).	<b>Accepted.</b> These guidelines will be included in this section to be consistent.
64.	Pg. 5-14, Sect. 5.4.7	Pg. 5-14, Sect. 5.4.7 addresses soil only. Soil is one component to be closed under RCRA. Also included are the tanks and the waste contained therein, as well as ancillary equipment. These should be included as closure actions/options. Please address.	<b>Response:</b> This follows the requirements of the HFFACO Milestone 45-60 that this document was intended to meet. Ongoing closure documents will address the tanks and waste contained therein, as well as ancillary equipment and other structures on WMA C. This includes groundwater.
65.	Pg. 5-21, lines 19-22.	Actions in the Central Plateau under CERCLA will have to be coordinated with corrective measures AND closure actions being implemented under a RCRA	<b>Response:</b> This entire section (Section 5.5) has been deleted to address comment #56.

REVIEW COMMENT RECORD	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 22 of 24

		permit to assure that actions on TSD units fulfill the closure performance standards of WAC 173-303-610. Please correct.	
66.	Pg. 7-1 and Section 7	Pg. 7-1 and Section 7. The title of this section includes program integration, but the section only discusses the various groups that will participate, and not how the program/project and resulting data are integrated. Please revise to address integration activities and how they will be accomplished.	<p><b>Accepted.</b> The following text will be provided to clarify integration activities and how they will be accomplished. An insert on page 7-1, after line 30: A detailed draft work breakdown structure has been developed as part of the Tank Operations Contract Performance Management Baseline. This draft work breakdown structure lays out the scope elements that address vadose zone characterization and corrective measures, including interim measures, as well as closure and regulatory actions.</p> <p>After page 7-2 line 16 add: A draft Tank Operations Contract Performance Management Baseline, providing detailed scope, schedule and logic of activities in the next 5-10 years, and broader information regarding long term activities. This draft baseline provides a schedule for the characterization activities described in this work plan, as well as the related activities required to complete corrective measures. The baseline addresses both regulatory and physical actions that must be performed to address closure, and shows how corrective actions are logically related to closure actions. ORP has initiated a series of workshops with Ecology and the TOC to further define the closure plan for WMA C, including the corrective measures related work described in this work plan. These workshops will be used to better define future activities as the baseline is finalized.</p>
67.	Appendix A	Appendix A is the SAP which is not included, but was released as a separate document. Will the document stand alone, or be incorporated here as Appendix A? Please clarify.	The SAP is a stand-alone document.

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 23 of 24

68.	p. B-5, para 1	Water terms (C, I, AUF, d) in the oral exposure equation are not defined. Please fix.	<p><b>Accepted.</b> These oral exposure equation water terms are negligible for terrestrial exposure because there is no contaminated surface water source is present in the WMA C tank farm investigation area. Therefore, water parameters have been omitted from the terrestrial wildlife exposure equation.</p>
69.	p. B-5, para 2	Provide rationale for 3 transects, a minimum of 6 organisms/transect, and for deriving a mean COPEC tissue concentration by weighting carcass (90%) and liver/kidney (10%) composites.	<p><b>Accepted.</b> Six organisms per transect will yield the minimum sample mass required for COPEC analysis. While this number of samples is not statistically based, the number of samples is sufficient for exploratory data analyses including calculation of mean concentrations, upper confidence limits (UCLs) on the mean, and contaminant distributions (e.g., box plots).</p> <p>The two habitat transects are situated in vegetated areas within close proximity to the WMA C tank farm, thus are areas appropriate for capturing potential exposure from WMA C. The perimeter transect is intended to capture small mammals in direct association with WMA C. The location and number of transects is intended to optimize successful capture of small mammals for tissue analysis.</p> <p>The exposure point concentration calculations use weighted COPEC concentrations in small mammal carcass and organs to account for differential uptake by tissues (i.e., potential bioconcentration in the organs). Liver and kidney weights will be recorded and their contaminant contributions to diet accounted for on a fraction-of-body-weight basis. This will be clarified in the text. The following clarification will also be included in the text to document the rationale for the isolation of liver and kidney tissue: "Liver and kidneys are target organs for accumulation of some types of COPECs, including metals. In addition, these organs have tissue-specific toxicity reference values (TRVs) for</p>

<b>REVIEW COMMENT RECORD</b>	Date August 10, 2009	General Comment
	Project No. WMA C Work Plan	Page  Page 24 of 24

			some COPECs which allow for extrapolation between the concentrations observed in the field and laboratory-based effects.”
70.	p. B-6, para 1	The list and hierarchy of analytes given here in Section B1.7 differs slightly from that specified in Section B1.3. Please reconcile.	<b>Accepted.</b> Inconsistencies in the text have been reconciled.
71.	p. B-8, Table B-2	Please clarify footnote “a” and indicate where it applies in the table body.	<b>Accepted.</b> Footnote “a” was included in error. Footnotes have been reconciled.
72.	p. B-10, para 3	Provide a reference for home range and dispersal distance for a deer mouse.	<b>Accepted.</b> The origin of home range and dispersal distance values have been cited in the text. The values are average home range and dispersal distance calculated from representative environments listed in EPA/600/R-93/187, p. 2-298.
73.	p. B-10, Section B3.2	The home range specified for a deer mouse is 0.077 hectares. It does not seem reasonable to expect that the home range is known to that degree of precision. Please cite references for this value.	<b>Accepted.</b> This value is an average home range calculated from representative environments listed in EPA/600/R-93/187, p. 2-298. Values have been cited in the text.
74.	p. B-11, Figure B-2	Although the study area dimension is based on a deer mouse home range, provide rationale for specific transect locations (i.e., one perimeter transect group inside WMA C and two vegetated habitat transect groups outside WMA C).	<b>Accepted.</b> Two transect locations are based on available habitat for foraging small mammals and proximity to areas of known or suspected contamination in WMA C. These vegetated (habitat) transect locations are situated in close proximity to WMA C, thereby increasing likelihood of contaminant exposure and subsequent transport. Because WMA C is largely non-vegetated, the instance of inhabitation or site use by small mammals is likely to be limited. However, the perimeter transect will capture small mammals directly using the site. This explanation has been included in Section B3.2.1.