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Subject:	Next Set of WMA RFI Comments
Date:	Wednesday, February 03, 2016 6:51:51 AM
Attachments:	WMAC_Damon_02_03_16.xlsx

Hi All

Here are the next set of comment responses for review. They are all Damon comments and are associated with the BRA or the Groundwater Screening document.

The attached files has responses for:
BRA Damon: 1, 13, 14, 16, 17, 40, 43, and 57
RFI Damon: 8, 11, 15, 19, 20, 31, and 45

In our last meeting on January 21, we discussed RFI Damon 46 and 47, which relate to the Groundwater Screening document. We provided the below response and Beth R indicated that comments associated with this document should remain open. We would like to note that RFI Damon 33, 34, 35, 38, 39, 40, 41, and 42 are also in this category. Note that RFI Damon 36 and 37 are also associated with the groundwater discussion - however these comments were not technical but rather editorial. We are considering these closed.

Appreciate everyone's support in these reviews. Damon (or anyone else) - please let us know if you have problems with the attached responses. Thank you very much Cindy

"Discussion on Groundwater Screening Report: RPP-RPT-58297, *Screening-Level Evaluation of Groundwater Monitoring Data Collected in Vicinity of WMA C*, was developed to support the WMA C Phase 2 RFI because the 200-BP-5 and 200-PO-1 Remedial Investigation (RI) reports had not been completed (i.e., WMA C Phase 2 RFI provided to Ecology 12/14 and RIs provided to Ecology 8/15). The BP-5 and PO-1 RI reports, which contain groundwater risk assessment information and identify those constituents from WMA C impacting groundwater, are now available, and this information will be summarized in the revised WMA C Phase 2 RFI. The screening report, which was developed to provide necessary groundwater information, will not be updated since the BP-5 and PO-1 RI reports will be used to support the revised WMA C Phase 2 RFI.

Note that the information from this report was additionally used in various sections of the WMA Phase 2 RFI (e.g. Section 5, 6, and 7). Comments on this referenced information, contained in the WMA C Phase RFI, will be discussed in subsequent comment response meetings. It is anticipated that a majority of these comments will be resolved by indicating that the revised WMA C Phase 2 RFI will summarize information from BP-5 and PO-1, as appropriate."

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Comment From (ECY)	Item	Page #/ section # Line #	Comment (s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/ problem indicated.)	Doc	Response
Damon	1	P 1-1, S 1.1, L 27-33	Text states the following: "No groundwater evaluation was performed for the WMA C as it is currently being evaluated as a part of the 200-BP-5 groundwater remedial investigation report. In addition, a screening evaluation of groundwater conditions under WMA C is provided in a separate report. However, potential threats to groundwater are evaluated as part of the WMA C BRA. This portion of the assessment is referred to as the 'protection of groundwater pathway' and is used to understand potential impacts to groundwater from migration of nonrad contaminants in contaminated soil through the vadose zone to the aquifer." This administrative fragmentation of groundwater evaluation makes it difficult to assess risk from all pathways. Risk should include all exposure pathways and correspond to a relevant scenario for human receptors (e.g. residential property over 30 yrs) or presumed exposure setting for eco receptors (e.g., home range over lifespan), rather than to an administratively fragmented set of exposure pathways (i.e., information dispersed in multiple reports).	BRA	Concur with the statement; however, groundwater within WMA C is identified as an area of interest within the 200-BP-5 groundwater OU. Therefore, site-wide and well-specific groundwater risk assessment was performed in 200-BP-5 RI (DOE/RL-2009-127, Draft A) report. The revised WMA C BRA report will include a summary of the groundwater risk assessment for the unconfined aquifer under WMA C. In addition, the revised WMA C BRA will also provide the evaluation of soil and vadose zone contamination on groundwater for both radiological and nonradiological COPCs. Text changes will be made throughout the document to update related information. To address the fragmentation issue, a document will be prepared to summarize conclusions of all elements of the Integrated Performance Assessment (IPA) and to integrate the information generated from the various evaluations.
Damon	13	P 3-11, S 3.2.1.4, L 40-42	Re potential Columbia River impacts, text states, "The impacts of waste left within WMA C on these surface water bodies will be evaluated through the use of a regional fate and transport model." More detail is needed on this model, including where this information will be presented.	BRA	Concur. The following text will replace the quoted text: The scope of this document is limited to evaluation of existing contamination within WMA C and in groundwater up to 100 m downgradient of the WMA. Other documents have anlayzed downgradient impacts including the TC&WM EIS and the 200-BP-5 and 200-PO-1 RI documents. When the Hanford Site Composite Analysis is updated, it will also include updated information on these impacts.
Damon	14	P 3-12, S 3.2.1.4, L 1-6	Text states, "Food chain pathways were evaluated for radiological COPCs. They were not evaluated for nonradiological COPCs as EPA does not provide intake equations or recommend performing food chain analyses for chemicals (EPA/540/1-89/002)." This is not true. EPA (RAGS) does recommend evaluating intake of chemicals in food (e.g., fish, produce, meat, dairy), and RAGS provides intake equations for chemicals in food. Therefore, both rads and nonrads should be evaluated in food chain pathways.	BRA	Concur. RAGS includes intake equations for food chain models. However, one needs to determine the concentrations of the chemicals within the food chain to calculate the intake. EPA 2005, *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities* provides some methodologies for calculating the concentration of chemicals in the food chain based on the concentrations in the soil. However, there are significant uncertainties associated with the bioaccumulation and biomagnification factors associated with those equations such that EPA did not include those equations in their RSL website. In addition, MTCA did not provide any equation related to food-chain pathways either. However, EPA does include the equations associated with the food chain for radionculides in their PRG calculator. By not calculating chemical risk for food chain pathways, total site risk is underestimated. Therefore, text will be updated to include information related to the uncertainties associated with chemical risk calculations for food chain pathways.

Damon	16	P 3-15, 3.2.1.4.6, L 12-14	Exposure pathways for the CERCLA resident for food intake (produce, meat, milk) should include both rad and nonrad COPCs.	BRA	Refer to Damon BRA Comment Response 14.
Damon	17	P 3-15, S 3.2.1.4.7, L 34-35	In addition to soil ingestion and soil inhalation, MTCA Method B unrestricted land use scenario includes soil dermal contact (WAC 173-340-740[3][c][iii]) and soil contaminants leaching to groundwater (WAC 173-340-747[4]) with subsequent ingestion of groundwater.	BRA	Concur. For comment related to dermal contact, the following text will be added to Section 3.2.1.4.7: Under WAC 174-340-740[c][iii], dermal contact pathway is applicable for other hazardous substances under receptor scenario based on Modified Method B soil cleanup levels. This particular section of the WAC is only applicable when "the proposed changes to Equations 740-1 and 740-2 would result in a significantly higher soil cleanup level than would be calculated without the proposed changes". For WMA C, the risk assessment was performed for the standard MTCA Method B unrestricted land use receptor scenario; and no modification is proposed. Under standard MTCA Method B unrestricted land use receptor scenario, dermal contact pathway is applicable for petroleum mixture hydrocarbon, which is not a contaminant of concern for WMA C. Therefore, dermal contact pathway was not evaluated. During this BRA, an assessment referred to as the "protection of groundwater pathway" was performed as part of the WMA C BRA (section 3.5.11) to evaluate the potential impacts to groundwater from leaching of contaminants in contaminated soil through the vadose zone to the aquifer. However, risk due to subsequent ingestion of groundwater was not evaluated in this BRA. Groundwater within WMA C are a part of 200-BP-5 groundwater OU. Therefore, the ingestion of drinking groundwater pathway is evaluated as a part of 200-BP-5 RI (DOE/RL-2009-127, Draft A) report. Therefore, ingestion of groundwater pathway was not evaluated in this BRA report.
Damon	40	P 3-72, S 3.5.11, L 32-37	The inference is that a "representative site-specific model" (presumably STOMP) will trump results of the MTCA three phase model in the case of CUL exceedences with the MTCA three phase model. Please clarify.	BRA	The fate and transport model for the vadose zone and local groundwater aquifer around WMA C using STOMP will be used to complete this evaluation. This model was developed in support of the WMA C PA and provides a site-specific evlautaion. Under the graded approach (DOE/RL-2011-50), site specific models are alwyas preferred to generic evaluations. Results of this evaluation will be discussed in this report.
Damon	43	P 3-91, S 3.6.1, L 41-44	Text states, "Since, the RME receptors are exposed to contamination present in the shallow surface soil, soil sampling results from the shallow surface zone (0 to 15 ft bgs) for each EA were then used to determine the source term during the risk assessment." This source term (shallow soils) does not capture a groundwater drinking scenario, where receptors ingest groundwater that has been contaminated by soil COPCs leaching to groundwater through the full depth of the vadose zone.	BRA	As mentioned in BRA Damon Comment Response 1, groundwater within WMA C is identified as an area of interest within the 200-BP-5 groundwater OU. Therefore, groundwater drinking water scenario was being evaluated as a part of site-wide and well-specific groundwater risk assessment in 200-BP-5 RI (DOE/RL-2009-127, Draft A) report. However, sampling results for both shallow soil and deep vadose soil were considered during the protection of groundwater pathway evaluation in this BRA. Text will be updated in Section 2.5 to clarify this.
Damon	57	P 4-21, S 4.5, L 13-20	Although EA P contamination will be remediated as a result of unacceptable human rad risk, Table 4-5 identifies H-3 and Sr-90 at EA P as eco rad COPECs to be retained in this SLERA. Remedial actions are a downstream risk management issue.	BRA	Concur. The last sentence will be modified as follows: "Both H-3 and Sr-90 will be retained as radiological COPECs in this SLERA. Those COPECs will be addressed as a part of future remedial action."

Damon	8	P 7-8, Figure 7-3	In addition to soil ingestion and soil inhalation, MTCA (WAC 173-340) includes soil dermal contact and soil contaminants leaching to groundwater with subsequent ingestion by residential receptors. Also, CERCLA includes soil contaminants leaching to groundwater with subsequent ingestion by residential and tribal receptors or other subsequent uses (e.g., showering, irrigation of crops). Perhaps an intruder driller (accessing groundwater) should be included too. Contaminated groundwater may also impact fish in the Columbia River which may be consumed by residential or tribal receptors.	RFI	Figure 7-3 will be update to include exposure pathways were considered, but not evaluated. The pathways identified in the comments will be included under that category. Under WAC 174-340-740[c][iii], dermal contact pathway is applicable for other hazardous substances under receptor scenario based on Modified Method B soil cleanup levels. This particular section of the WAC is only applicable when "the proposed changes to Equations 740-1 and 740-2 would result in a significantly higher soil cleanup level than would be calculated without the proposed changes". For WMA C, the risk assessment was only performed for the standard MTCA Method B unrestricted land use receptor scenario; and no modification is proposed. Under standard MTCA Method B unrestricted land use receptor scenario, dermal contact pathway is applicable for petroleum mixture hydrocarbon, which is not a contaminant of concern for WMA C. Therefore, dermal contact pathway was not evaluated. During this BRA, an assessment referred to as the "protection of groundwater pathway" was performed as part of the WMA C BRA (section 3.5.11) to evaluate the potential impacts to groundwater from leaching of nonradiological contaminants in contaminated soil through the vadose zone to the aquifer. However, risk due to subsequent ingestion of groundwater was not evaluated in this BRA. Groundwater within WMA C are within the 200-BP-5 groundwater OU. Therefore, the ingestion of drinking groundwater pathway is evaluated in the 200-BP-5 RI (DOE/RL-2009-127, Draft A) report.
Damon	11	P 7-10, S 7.2.2.1, L 44-46	Text notes that consumption of fruits/vegetables/grains, meat, and milk are only applicable to rad COPCs for the CERCLA resident receptor. Nonrad COPCs should also be included here for these food ingestion pathways.	RFI	Concur. RAGS includes intake equations for food chain models. However, one needs to determine the concentrations of the chemicals within the food chain to calculate the intake. EPA 2005, Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities provides some methodologies for calculating the concentration of chemicals in the food chain based on soil concentrations. However, there are significant uncertainties associated with the bioaccumulation and biomagnification factors associated with those equations such that EPA did not include those equations in their RSL website. In addition, MTCA does not provide equations or methods related to food-chain pathways either. However, EPA does include the equations associated with the food chain for radionculides in their PRG calculator. By not calculating chemical risk for food chain pathways, total site risks could be underestimated. Therefore, text will be updated to include information related to the uncertainties associated with chemical risk calculations for food chain pathways.
Damon	15	P 7-15, S 7.2.4.1, L 15-17	Considering that a background risk assessment was performed for soil nonrads, explain why a corresponding background risk assessment was not performed for rads (using Hanford soil background data for rads).	RFI	Lines 11 to 17 will be deleted. Text changes will be made throughout the report to reflect such changes.

Damon	19	P 7-21, S 7.2.5.7, L 1-3	Text identifying EAs with ELCR>1E-5 for nonrads does not match up with Table 7-8 data (child or adult).	RFI	Concur. The following text changes will be made: **CERLCA Residential Adult** For nonradiological carcinogenic COPCs, the total ELCR for all EAs were less than or equal to the 2007 MTCA ("Human Health Risk Assessment Procedures" [WAC 173 340 708(5)]) cumulative risk threshold of 1×10^{-5}. Therefore, nonradiological risk contributors were not identified. For noncarcinogenic COPCs, the HI for all EAs was less than the 2007 MTCA ("Human Health Risk Assessment Procedures" [WAC 173 340 708(5)]) target HI of 1. Therefore, nonradiological noncancer hazard contributors were not identified. **CERCLA Residential Child** For carcinogenic COPCs, the cumulative ELCR at EA C is greater than the 2007 MTCA ("Human Health Risk Assessment Procedures" [WAC 173 340 708(5)]) cumulative risk threshold of 1×10^{-5}. Arsenic was identified as the major risk contributor for those EAs. For noncarcinogenic COPCs, all EAs report an HI greater than the 2007 MTCA target HI of 1. Aluminum, antimony, arsenic, cadmium, chromium, cobalt, iron, lithium, manganese, and vanadium were identified as hazard contributors. Therefore, an evaluation was performed for each EA to segregate the HIs associated with those hazard contributors by similar mechanisms of action (critical effect) and toxicological effects. When the HI based on similar mechanism of action is greater than 1, those hazard contributors will be retained. However, the results of risk evaluation showed that the HI based on similar mechanism of action is less than one. Therefore, no analytes were retained as hazard contributors.
Damon	20	P 7-23, S 7.2.5.8, L 2	Text identifying EAs with ELCR>1E-5 does not match up with Table 7-9 data.	RFI	The following text changes will be made: For carcinogenic COPCs, the cumulative ELCR at EA C is greater than the 2007 MTCA ("Human Health Risk Assessment Procedures" [WAC 173 340 708(5)]) cumulative risk threshold of 1×10^{-5}. Arsenic was identified as the major risk contributor for those EAs. For noncarcinogenic COPCs, all EAs report an HI greater than the 2007 MTCA ("Human Health Risk Assessment Procedures" [WAC 173 340 708(5)]) target HI of 1. Aluminum, antimony, arsenic, cadmium, chromium, cobalt, iron, lithium, manganese, and vanadium were identified as hazard contributors. Therefore, an evaluation was performed for each EA to segregate the HIs associated with those hazard contributors by similar mechanisms of action (critical effect) and toxicological effects. When the HI based on similar mechanism of action is greater than 1, those hazard contributors will be retained. However, the results of risk evaluation showed that the HI based on similar mechanism of action is less than one. Therefore, no analytes were retained as hazard contributors.
Damon	31	P 7-43, S 7.5.5, L 9-10	MTCA defines the biologically active soil zone as 0-6 ft (not 6-15 ft), per WAC 173-340-7490 (4)(a).	RFI	Concur. Per WAC 173-340-7490 (4)(a), the biologically active soil zone (a conditional point of compliance) is assumed to extend to a depth of six feet. Text will be corrected as follows: WAC 173-340-7490(4)(a) identifies the biologically active zone extends to a depth of six feet. It should be noted that based on the requirements included in WAC 340-7490[4][b], soil sampling results upto a depth of 15 ft below ground surface were considered during the ecological risk assessment.

Damon	45	P 7-52, S 7.8.1, L 36-41	Text states, “For nonradiological COPCs, cancer risks and noncancer hazards indices fell below the acceptable risk value of 1 x 10-5 for multiple contaminants and multiple pathways (WAC 173-340-708[5])…” While true for the MTCA Method C industrial scenario (Table 7-3), this is not true for the MTCA Method B residential scenario (Table 7-9). ELCR≥1E-5 in several EAs for the resident (Table 7-9). However, with the exception of HI=2.4 in EA C, risks and HI≤background (Table 7-9).	RFI	Concur, text will be updated as follows: Except for EA C under MTCA B residential scenario, the total ELCRs for all EAs underl all other CERLCA and WAC receptor scenarios were less than the 2007 MTCA (“Human Health Risk Assessment Procedures” [WAC 173 340 708(5)]) cumulative risk threshold of 1×10^{-5}. Arsenic was identified as the major risk contributor for EA C under MTCA Method B for direct contact . For noncarcinogenic COPCs, the HI for all EAs under all CERCLA and WAC receptor scenarios were less than the 2007 MTCA target HI of 1. Therefore, no noncancer hazard contributors were identified.