KINGSTON ASH RECOVERY PROJECT
DOCUMENT REVIEW

Document Title:	Baseline Ecological Risk Assessment (BERA)			
Document/RDP No.:	49002-0167-03-A-00654R0	Project No.:	WBS Code:	011503
Reviewed by:	Multiple	Organization:	EPA	Date: August 3, 2012
Response by:	Dan Jones	Organization:	ARCADIS	

No.	Section / Para / Page	Reviewer Comment	Response to Comment
		Black & Veatch	
1.	General	Black & Veatch commends the authors for interpreting and synthesizing a tremendous amount of data regarding numerous receptors and measurement endpoints. The weight of evidence approach to combine multiple lines of evidence to assess ecological risks from residual ash in river sediment condenses substantial quantitative information and all its associated uncertainties down into four qualitative estimates (negligible, low, moderate, or high) of risk based on professional judgment. Although this approach may accurately group most of the risks into one of these four categories, it does not provide a mechanism to estimate the concentrations of chemicals (COECs) in the ash mixtures that may be responsible for the estimated risk. The result becomes somewhat problematic when determining specific cleanup goals or predictions of risk-reduction from potential remedial alternatives, or risk management efforts for particular receptor groups. The comments attached herein primarily pertain to language modifications related to the professional judgment process and it is not the intent to quibble over semantics, but to help confirm that the voluminous scientific data support the qualitative conclusions.	Comment noted, no response required.
2.	General	The document is clearly focused on the assessing risks to all of the various receptors, including discussions of bioavailability. There should be more discussion on the contaminant release mechanisms because the lingering question will be: *"Does and will the residual ash in sediment continue to release metals into the river environment that may pose a low level long-term risk to receptors?"* The BERA does not adequately address the contaminant release mechanisms that contribute to receptor exposure. It is assumed that the main EE/CA report will provide a convincing argument to address this question.	The text was revised to include a discussion of the contaminant release mechanisms that contribute to ecological receptors (Section 2.2.1).

No.	Section / Para / Page	Reviewer Comment	Response to Comment
3.	General	Biota Tissue Data – Were the original analytical results reported in wet weight (ww) or in dry weight (dw)? Unable to consistently track ww/dw conversions between the Human Health Risk Assessment (HHRA) and the BERA. Were actual percent moisture values used for each tissue sample? or was an average percent moisture (e.g., 21%) used for the conversions between ww and dw?	Analytical results for biota were originally reported in wet weight. Sample-specific percent moisture was performed according to Pace standard operating procedures. In some instances, sample volumes were too small or samples were held too long to accurately measure percent moisture (ES 2011). In these situations, a site-specific value was calculated using valid percent moisture estimates from similar tissue types if available, or a default literature-based value was used. All derived or default percent moisture values are identified in footnotes for each of the tissue types presented in Appendices A and C.
4.	General	There is common language used throughout the text that there is no conclusive or definitive evidence that the ash release had ecologically significant adverse impacts on virtually all of the assessment endpoint receptors; and that most impacts or downward trends are generally discussed as being related to other factors that are not well described. The specific comments below provide examples of where this occurs.	Comment noted, no response required.
5.	Sect 2.1.3 pg 2-3	Change the first sentence to read: "The ash *was* released into the Emory River, which flows from the Cumberland Plateau into the Watts Bar Reservoir."	The text was revised as suggested.
6.	Sect 2.1.3.4 pg 2-6	It is mentioned that thermal stratification and anoxic conditions occur seasonally. A discussion of where this occurs and whether the extent of these conditions could affect benthic organisms.	The text was revised as suggested.
7.	Sect 2.1.4.2 pg 2-9	A few examples of aerial feeding birds should be listed in the text since they are later selected as an assessment endpoint. Also, state whether any of the state listed threatened/endangered species listed in Table 2-5 may occur along the study area shoreline.	The text was revised as suggested. A discussion of the state-listed threatened/endangered species was also added, indicating which species may be present along the study area shoreline.
8.	Sect 2.1.4.2 pg 2-10	A few examples of piscivorous mammals (i.e., mink), and the muskrat (as another example of a herbivorous mammal) should be listed in the text since they are later selected as assessment endpoints.	The text was revised as suggested.
9.	Sect 2.2 pg 2-13	The text should mention that the associated risk questions and the valued characteristic(s) to be protected for each of the assessment endpoints are provided in their specific chapters.	The text was revised as suggested.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
10.	Sect 2.2.1 pg 2-13	The text regarding the Conceptual Site Model should clarify that the release of ash has already occurred, and this discussion should be more explicit about the chemical, physical and biological processes that have occurred that have resulted in exposures or potential for exposures. For example, chemical transport and bioaccumulation processes should be briefly discussed or reference the appropriate sections of the EE/CA. Also, ambient surface water should be listed as a bullet item under incidental ingestion as a potential exposure pathway.	The text was revised as suggested.
11.	Sect 2.3 pg 2-14	This section should mention that the linkage between the measurement endpoints to the assessment endpoints and the valued characteristics to be protected are presented in more detail in each of the assessment endpoint chapters.	The text was revised as suggested.
12.	Sect 2.4.1.2 pg 2-18	*Toxicity Tests*. The first bullet should be revised to state that *C. dubia* and *P. promelas* are commonly used test organisms for surface water toxicity tests, and to a lesser extent for sediment toxicity.	The text was revised as suggested.
13.	Sect 2.4.1.3 pg 2-18	*Community Surveys*. Please remove the italics in the second sentence as benthic surveys may not be most relevant because they do not address causality (i.e., dose/response relationships).	The text was revised as suggested.
14.	Sect 2.4.3 pgs 2-19 thru 2-26	*Weight-of- Evidence Framework*. This section lays out the framework for evaluating the weight-of-evidence for each line of evidence. Qualitative measures such as “Negligible”, “Low”, “Moderate” and “High” are defined for each risk characterization attribute. The determination that the magnitude of the HQ exceedance would equate to a qualitative determination of “low”, “moderate” or “high” could lead to biased conclusions. For example, is an HQ of 50 low or high or something in between? Although this seems to be a reasonable approach to evaluating the weight-of-evidence; however, it is difficult to put this type of qualitative evaluation into practice without introducing the potential for professional bias. Additional discussion on how this approach is substantially dependent on professional judgment should be added.	The text was revised as suggested.
15.	Sect 2.5 pg 2-27 Exhibit 2-4	It appears the USDOE legacy radionuclides (cesium-137 and cobalt-60 should be added to the table.	The text was revised as suggested.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
16.	Sect 2.5.3.3 pg 2-31	The section on Treatment of Duplicates mentions AVS/SEM. This is the first mention of AVS/SEM in the report. This should be introduced in previous sections of the report where appropriate such as a specific measurement endpoint.	The text was revised as suggested.
17.	Sect 2.5.3.4 pg 2-32	The text discusses how the reporting limit was used when the analyte was not detected, and goes on to discuss some reasons why analytes were not detected in some samples. The more important issue question that should be addressed is whether or not the detection limits were adequate and mostly below screening levels.	The text was revised as suggested.
18.	Sect 2.5.4.2 pg 2-34	Last paragraph: Cesium-137 and cobalt-60 are legacy contaminants but are not listed as COPECs (comment 2.11). Briefly state how these analytes are going to be used in the BERA.	Cesium-137 and cobalt-60 were inadvertently excluded from Exhibit 2-4, and have been added. All naturally-occurring and legacy radionuclides were included to estimate total potential risk to ecological receptors in the river system.
19.	Sect 2.5.4.2 pg 2-35 Exhibit 2-5	The list of pesticides and radionuclides in the footnote should match the list of COPECs in Exhibit 2-4.	The pesticide and radionuclide constituents listed in Exhibit 2-4 only include those COPECs identified as legacy pesticides and radionuclides. Seasonally-exposed sediment samples were analyzed for a full suite of pesticides and radionuclides. All pesticides and radionuclides detected in seasonally-exposed sediment samples were included in the footnotes in Exhibit 2-5 and therefore this list should not match the list identified in Exhibit 2-4.
20.	Sect 2.5.4.3 pg 2-37 Exhibit 2-6	The list of pesticides and radionuclides in the footnote should match the list of COPECs in Exhibit 2-4.	The pesticide and radionuclide constituents listed in Exhibit 2-4 only include those COPECs identified as legacy pesticides and radionuclides. Submerged sediment (VibeCore™) samples were analyzed for a full suite of pesticides and radionuclides. All pesticides and radionuclides detected in submerged sediment samples were included in the footnotes in Exhibit 2-6 and therefore this list should not match the list identified in Exhibit 2-4.
21.	Sect 2.5.4.3 pg 2-38	First paragraph: The text states that only one reference bulk sediment sample for each river was collected. It should be mentioned here or in other sections where bulk sediments are discussed that only one reference sample is unlikely to provide statistical comparisons with the site.	The reference bulk sediment samples were not intended for use in statistical comparisons with impacted site samples. Reference bulk sediment samples from the Emory and Clinch Rivers provided a reference treatment in the toxicity tests in order to compare exposures and effects from impacted versus upstream reference samples. These samples were also used to dilute impacted ash mixtures from downstream sites. Concentrations measured in both reference and impacted bulk sediment samples were used to determine total concentrations of constituents associated with the diluted samples.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
22.	Sect 2.5.4.3 pg 2-38 Exhibit 2-7	The list of pesticides and radionuclides in the footnote should match the list of COPECs in Exhibit 2-4.	The pesticide and radionuclide constituents listed in Exhibit 2-4 only include those COPECs identified as legacy pesticides and radionuclides. Bulk sediment samples were analyzed for a full suite of pesticides and radionuclides. All pesticides and radionuclides detected in bulk sediment samples were included in the footnotes in Exhibit 2-7 and therefore this list should not match the list identified in Exhibit 2-4.
23.	Sect 2.5.4.4 pg 2-39	The text states should be changed to state that sediment pore water is …" the primary source of exposure to rooted aquatic plants"…	The text was revised as suggested.
24.	Section 2.5.5 pg 2-45	Please clarify the second sentence to state that the presence of COPECs in tissues of prey provides information for estimating exposure and risk to their predators, rather than estimating bioavailability in their predators.	The text was revised as suggested.
25.	Sect 2.5.5.4 pg 2-49	*Piscivorous Birds*. Text should be added to explain that dietary models will also be developed for herbivorous, omnivorous birds, and insectivore avians.	The text was revised as suggested.
26.	Sect 2.5.5.5 pg 2-50	*Mammals*. Similar to the previous comment, text should be added to explain that dietary models will also be developed for herbivorous, omnivorous birds, and insectivore mammals.	The text was revised as suggested.
27.	Sect 3.2.1.1 pg 3-5	Last paragraph. There were no data or evidence presented in Appendix E regarding the other factors that may have been contributing to the observed effects. Consequently, in the first sentence, please replace "indicated no" with '*provided no clear evidence of*' and in the second sentence, replace "provides strong evidence" with '*suggest*'.	The text was revised as suggested.
28.	Sect 3.2.1.3	Should include the conclusion from Appendix F that states "*Though there is some indication that individual fish health may have been impacted immediately after the ash spill, as reflected by increased parasite loads, however increased parasite loads have been higher since 2009 compared to prior 2009 reservoir-wide suggesting other factors may be contributing to the increase."* This would be consistent with the data presented in Appendix E. Therefore, in the second sentence of the paragraph, delete "and instances of external parasites"; replace "provides strong evidence" with '*suggest*'; and replace "were" with '*appear to be*'.	The text was revised as suggested.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
29.	Sect 3.2.2.3 pg 3-12	Delete "worst-case" from the last sentence in the first paragraph; and replace the words "or biomass" with '*hatching success, or developmental abnormalities*' in the second paragraph.	The text was revised as suggested.
30.	Sect 3.2.3.1 pg 3-16	2nd whole paragraph: It is stated that the observed delay in female bluegill ovarian development "was more likely due to habitat alteration and food web disruptions than to direct toxic effects." This conclusion is not supported by the data presented. The Appendix H conclusion states that female bluegill were "adversely affected". Also, it is likely that the habitat alteration and food web disruption resulted from the fly ash spill.	The text has been revised to state that "the observed delay in ovarian development may have been due to habitat alterations and food web disruptions or direct toxic effects."
31.	Sect 3.2.3.2 pg 3-18	Modify the risk conclusion for fish reproductive studies to be more consistent with Appendix H. There were adverse effects noted for ovarian development in bluegill and downward trends in female reproductive condition in largemouth bass.	The risk estimation and risk conclusions have been modified to reflect the previous edits regarding the fish reproductive studies.
32.	Sect 3.2.4	Fish Tissue Concentrations of COPECs. Overall, the methodology presented here was a screening-level approach to interpret fish tissue data. This conservative screening-level approach led to conclusions such as: liver and ovarian HQs provide little useful information in estimating risks (page 3-23) or the overall risk conclusion for fish tissue chemistry (page 3-24) was that many of the selected critical body residues (CBRs) from the literature were questionable in terms of relevance. There were 289 fish fillet samples, 122 whole body samples, 58 ovary and 36 liver samples compared to single CBRs. It would be more useful to provide a range of NOAELs and LOAELs based on geometric means of the growth and reproductive endpoints in the literature presented (Appendix D). This would reduce some the large uncertainties associated with comparisons to single screening-level CBRs. The conclusion that *"the chemistry results indicate limited uptake/bioaccumulation of ash related metals and no substantial risk to fish"* is not supported by the existing screening-level analysis. With respect to selenium, it is unclear why the draft aquatic life criterion for ovary tissue was not used.	Given the availability of more detailed site-specific studies for fish, conducting a more intensive comparison of fish tissue concentrations to statistical manipulations of the generic and non-site-specific toxicity values from the general literature will not affect the risk outcome. The comparison of fish tissue concentrations to CBRs was meant to provide a screening-level evaluation of potential for effects based on tissue concentrations above the CBR NOAELs and LOAELs, and additional analysis is unwarranted. The fact that many background samples also exceeds the CBRs is indicative of the conservative nature of any approach using generic CBRs, and hence the reliance of the BERA on more site-specific lines of evidence. Using the highest NOAEL or lowest LOAEL is consistent with standard ecological risk assessment practices, and provides a conservative screening of the fish tissue data. Alternately, the range of the CBR values provided in the U.S. Army Corps of Engineers (USACE)/USEPA Environmental Residue-Effects Database (ERED) was very large; therefore comparing data to a range of values or a geometric mean would be less conservative. Considering that elevated risks to fish were not shown based on a comparison of data to the very conservative CBRs, using ranges or geometric means of CBRs is unlikely to change the risk conclusions.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
			In terms of CBRs for selenium, the ERED database includes values for liver, muscle, ovary, and whole body tissues (Table 3-23). The aquatic life criterion developed by USEPA considered studies for nine fish species, but is singularly based on a study of bluegill sunfish (Lemly 1993, as cited in USEPA 2004), with the endpoint being a lowest observed adverse effect concentration for juvenile mortality as measured in whole body tissue. Ovary tissue was not considered in the selection of a criterion due to the seasonal nature of ovary tissue and the difficulty in extracting quantities sufficient for analysis (USEPA 2004, page 56). The draft aquatic life criterion for selenium in whole body samples is 7.91 µg/g dry weight (USEPA 2004). Converting the aquatic life criterion to wet weight assuming 75% moisture yields 1.98 µg/g (1.98 mg/kg), which is generally comparable to the ERED LOAEL of 2.18 mg/kg wet weight for ovary tissue chosen as a CBR. Source: USEPA. 2004. Draft Aquatic Life Water Quality Criteria for Selenium - 2004. EPA-822-D-04-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. November.
33.	Sect 3.2.5.1 pg 3-27	Last paragraph: This paragraph states that there was a similar number of spatial patterns observed in 2009 and 2010. It is not the overall number of patterns but the distinct types of patterns that matter. The sentence assumes that each fish health parameter is treated equally among each species. A review of Table 3-29 suggests spatial gradients for gill or ovary histopathology and ananine transaminase gradients for bluegill and channel catfish. Also in catfish, there are gradients observed for other parameters, or the liver somatic index in largemouth bass in the Spring. Do these specific gradients not actually matter? If they do, then the conclusion that such responses *"neither improved or declined"* should be qualified.	While there were spatial gradients noted in various health matrices for bluegill sunfish and largemouth bass in spring and fall of 2009 and 2010, there is not a clear trend which could lead to a conclusive statement regarding overall fish health in the river as related to the gradient from the ash release. If there was a decline in fish health, or conversely an improvement in health, a clear trend would be established comparing condition matrices from 2009 and 2010. Since an overall trend was not evident, no conclusion can be drawn from the spatial gradients in health metrics. The text on pages 3-27 and 3-28 has been revised to further qualify the conclusions.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
34.	Sect 3.2.5.2 pg 3-31	Last paragraph, 2nd bullet. Please clarify what is meant by the deviation of fish health metrics below the ash release area are localized to a small area. In the risk conclusion for fish health studies (page 3-32), the first bullet should be modified to state that the various observed changes in fish health did not appear to be of sufficient magnitude or duration to result in significant adverse impacts. In the second bullet, the words "exceeds or equals" should be replaced with '*cannot be clearly distinguished*' because the rates of impact and repair were not directly assessed.	The statement regarding that the deviation of fish health metrics being localized to a small area reflects the fact that affects to health metrics were less pronounced in downstream areas. The text has been revised to state this more clearly. In terms of the risk conclusions, the bullets have been revised as requested.
35.	General	In the few cases of lead exceeding the water quality standards, would the actual hardness value have made any difference in the HQs?	Epi-benthic water samples from two sites exceeded the chronic criteria when they are adjusted using a hardness value of 50 mg/L $CaCO_3$. These samples do not exceed criteria when concentrations are adjusted using actual sample-specific hardness values of 126 and 137 mg/L $CaCO_3$ for the Emory River Reach B and Clinch River Reach A, respectively.
36.	Sect 4.2.1 pg 4-3	It is unclear why the 2009 benthic community data were not evaluated or summarized in the BERA to assess potential trends in recovery by comparing January 2009 and December 2009 with the December 2010 data as was done in Appendix M. Some summary discussion should be provided and a reference to Appendix M for more details.	The text was revised as suggested to include a brief discussion of the 2009 benthic invertebrate community data as well as an explanation for why the evaluation focused on the 2010 data.
37.	Sect 4 Figures	All Section 4 figures and tables related to the December 2010 Benthic Invertebrate Community (BIC) data should be labeled accordingly to avoid any confusion with other BIC data from Appendix M.	The figures and tables were revised as suggested.
38.	Sect 4.2.1.1 pg 4-12, 4-13; Figures 4-28 thru 4-30	Please provide a rationale for why barium, mercury, and zinc were for the spatial representation rather than other COPEC?	Figures 4-28 through 4-30 present nearest neighbor analyses using physical properties of sediment (e.g., percent ash, gravel, and silt) compared to concentrations of barium, mercury, and zinc, respectively. These analyses were conducted to evaluate correlations to the benthic community data, physical properties of the sediment, and concentrations of those constituents (see bullet points on pages 4-12 and 4-13). Figures for other constituents were not included because no relationships or only weak relationships were found when compared to the benthic invertebrate community data.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
39.	Sect 4.2.1.2 pg 4-13	The risk estimation paragraph suggests promising results in recovery of the BIC. Unfortunately, we do not know how badly affected the BIC was because the 2009 data was not summarized in the text. See comment 4.1 above.	The text was revised to include a brief discussion of the 2009 benthic invertebrate community data.
40.	Sect 4.2.2.1 pg 4-20 Exhibit 4-4	It is surprising that a 44 percent reduction in biomass in *Chironomus dilutus* at CRM 3.0 would not be statistically significant from the reference. Suggest that the reference sediment results be added to this Exhibit and to the others in this subsection for comparative purposes.	Exhibits 4-1 through 4-4 are showing percent reductions; therefore, negative values actually indicate greater survival, emergence, and/or biomass relative to the reference. Consequently, CRM 3.0 had an increase in endpoints which translates to this treatment resulting in better organism performance relative to the reference treatment. The reference treatment results were not included here, because these results were what all the other treatments were based on (i.e., percent reductions relative to the reference) and therefore all reference sample results would be set at 100% or 0% reduction. Additional footnotes were added to these exhibits for clarification.
41.	Sect 4.3.1 pg 4-45 Exhibits 4-6 and 4-7	It is very surprising that sediment chemistry is considered to have low relevance to benthic organisms and therefore low relative weight. Suggest changing its relevance and weight to "*moderate*" in Exhibit 4-6 and 4-7, respectively.	The classification of sediment chemistry as "low" was related to uncertainty associated with the available toxicity benchmarks rather than to the importance of sediment to the benthic community. Therefore, this revision was not incorporated.
42.	Sect 4.3.3 pg 4-51	In the first sentence, please remove the word "potential" as the ash did impact the BIC based on the 2009 and 2010 results largely presented in Appendix M. The second to the last sentence should be modified by at least deleting the words "*no definite*" in order to be consistent with the data. Also, suggest that the last sentence be changed to replace the words "appear more likely related" with 'also appear to be related" to be more consistent with the Appendix M.	The text was revised for clarification that based on sediment data, tissue chemistry, and toxicity test results, there is the potential for impacts. However, the lack of obvious and significant changes to the benthic invertebrate community supports the stated conclusions that the effects for benthic invertebrates are no worse than "moderate".
43.	Sect 5.2.2.1 pg 5-6	Please include the shoreline and emergent tissue concentration data so that the reader can evaluate the exposure and effects.	A reference to Appendix T (*Trace Element Concentrations in Aquatic Vegetation and Periphyton: 2011*) was added, pointing the reader to the evaluation of shoreline and emergent tissue concentration data. In addition, a reference to the summary tables (e.g., minimum detection, maximum detection, and average detection) of shoreline and emergent tissue concentrations was also added (Tables 2-186 through 2-203).

No.	Section / Para / Page	Reviewer Comment	Response to Comment
44.	Sect 5.2.4.1 pg 5-8	While the statements regarding the use of soil screening levels as conservative benchmarks may have some merit, it should also be pointed out that rooted aquatic plants may be more sensitive to certain metals than upland plants, which may not necessarily be conservative.	The text was revised to recognize potential differences in sensitivity to metals among upland plants and aquatic plants. While aquatic plants may be more sensitive to certain metals than upland plants, it is also possible that upland plants may be more sensitive to certain metals compared to aquatic plants. Use of SSL values in this context is therefore considered potentially conservative because preference was given to studies with high bioavailability of metals in upland soils when the SSLs were derived, which can overestimate exposure and effects when applied to sediment. Section 5.2.4.1 was also revised to recognize that this approach is only potentially conservative.
45.	Sect 5.3.1 pg 5-13 Exhibit 5-1	It is unclear why periphyton and aquatic vegetation tissue concentrations have low relevance to the aquatic plant communities. It seems moderate would be more suitable.	The text was revised as suggested.
46.	Sect 6.2.1.1 pg 6-6 and Sect 6.2.1.2	The text needs to provide a discussion of the adequacy of the statistical tests performed on small sample sizes and the uncertainty to extract meaningful conclusions regarding exposure and risk based on the sample size. Statements such as "*almost significantly higher*" and "*close to being significantly lower*" should be clarified to state that the results and conclusions are highly uncertain and likely low confidence due to small sample size.	Small sample sizes do not necessarily mean high uncertainty or low confidence. The sample size needed can be determined based on desired confidence, power of the test, and desired magnitude of difference that is detectable. Confidence is set at a desired 95%, power at 80%, and magnitude at less than or equal to the difference between the reference and benchmark for adverse effects. For example, for selenium in heron eggs, power to detect a 2 mg/kg difference in a two-way ANOVA between impacted and reference for heron with the sample sizes in the study was over 80% at 95% confidence because sample size required is 4 in each group, which gives greater than 80% power using highest pooled standard deviation; actual n was 4 to 9). Such sample size analyses indicated sample size was adequate for constituents with known benchmarks for osprey and heron egg concentrations, and this information was added to the text. However clutch size and egg health metrics may not have had adequate sample sizes to have high confidence in the results. Alpha values were set at 0.05; however, comparisons were considered to be "almost significant" or "close to being significant" when alpha values fell between 0.05 and 0.1. This was used to be conservative to help avoid false negatives of no difference from reference when there is a difference, and mostly is helpful for evaluations of egg clutch size and egg health metrics.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
47.	Sect 6.2.2 pg 6-9	Third paragraph: The text states that "For the screening model, bioavailability of COPECs was not set to 100 percent but was set to actual mean estimates (described in Appendix W) for the refined analysis." It is not clear if bioaccessibility testing was performed on the full range of bulk sediment concentrations observed in all samples collected from the site. Due to the uncertainties associated with the sequential extraction procedure, the utilization of mean estimates of bioavailability is also uncertain and should be mentioned in the uncertainty section. Also, the text should clarify those media associated with bioavailability less than 100 such as sediment (Appendix W). Was food items always assumed to be 100%?	The referenced sentence was deleted and replaced with more details on the approach. Bioaccessibility was performed on the full range of bulk sediment samples, food items were set at 100% bioavailability except aluminum and iron in fish and invertebrate guts and iron on the invertebrate body, and for iron in plants. Sediment bioavailability was less than 100% based on sequential extraction procedure results. The actual method used by the laboratory, based on Querol et al. 1996, has been added as an exhibit in Attachment 2 of the dietary exposure model appendix, Appendix W. The uncertainty of the method is addressed in the response to comments on the wildlife dietary exposure model, and changes have been made in the BERA text and Appendix W.
48.	Sect 6.3.1 pg 6-12 Exhibit 6-1	Based on the results for clutch size, egg weight, and egg concentrations, the estimate of magnitude of adverse effects should be changed from negligible to low primarily because there were too few samples to conclude that there is no concern for these effects. Confidence in the egg concentration data should be low (again due to low sample size). The estimate of magnitude of adverse effects for the piscivores dietary exposure model should be changed from negligible to low in accordance with the definition of negligible as defined in section 2.4.3 (i.e., in the conservative analysis, HQs exceeded 1.0 for total PCBs, aluminum, radionuclides (radium-228, radium-226, potassium-400), and iron). The estimate of magnitude of adverse effects for the herbivores dietary exposure model should be changed from negligible to low in accordance with the definition of negligible as defined in section 2.4.3 (i.e., in the conservative analysis, HQs exceeded 1.0 for aluminum, iron, radionuclides (radium-228, radium-226, potassium-40), and vanadium).	Additional explanation was provided to explain professional judgments used in determining the risks and confidence for each of the wildlife assessment endpoints and some changes were made to the exhibits in Chapters 6, 7, and 8 to increase consistency between receptors as suggested. As previously addressed in Comment 46, the sample size of eggs was adequate to detect concentration differences with 80% power and 95% confidence. The magnitude of the effect for the egg study is negligible for almost all COPECs because none of the averages or maximums exceed benchmarks, although much uncertainty exists with the copper outlier of 18.5 mg/kg dw. Over a 3-year period, 1 of 24 heron eggs in the impacted reaches, exceeded 10 mg/kg in eggs, an estimated adverse effect level (highest in reference is 7.1 mg/kg). However, because of this one outlier for copper for the heron, the magnitude was changed to low with high confidence that it is no greater than low magnitude. These explanations were added to the BERA text, and the suggested changes to Exhibit-6-1 were made. The estimate of magnitude of adverse effects for the herbivorous dietary exposure models was also revised as suggested.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
49.	Sect 6.3.1 pg 6-13 Exhibit 6-2	Even though differences in egg concentrations were noted between ash-impacted and reference area locations, the egg results may not carry more weight than the killdeer dietary exposure model. The confidence in risk determination based on egg concentrations should be low due to so few egg samples. Also, the confidence in risk determination based on the dietary exposure model for the killdeer should be moderate as it is for the other receptors evaluated.	See response to Comment 46 on sample size. Weight was based on ecological relevance and quality of the data and analysis. Both the dietary exposure model and egg study are studies focusing on effects at the individual, not population scale, meaning they are no more than a moderate weight. The dietary exposure models had site-specific tissue, sediment, and bioavailability estimates, but all other parameters and the TRVs were from the literature, warranting a weight of low. In contrast, the egg concentrations and egg health metrics were evaluated two ways. The first was against a reference area on site, which is site-specific. The second is based on evaluation against egg TRVs that were based on the literature. Because more of the egg study is site-specific (only the egg TRVs were from literature), it was weighted higher than the dietary exposure model for egg concentration data, warranting a weight of moderate. But for clutch size and egg health metrics, which were analyzed with tests having low power, the weight assigned was low. Confidence for the killdeer is based upon the confidence given for the set of COPECs that apply to a killdeer, which are aluminum, selenium, and arsenic. Selenium effects are well-studied in birds, providing adequate range of TRVs, and thus the confidence is moderate for selenium for this species and the other receptors in the table. Arsenic in prey tissue and gut is less well-studied, and this component, in addition to the well-studied inorganic component is driving risk, making overall confidence low. Aluminum TRVs are highly uncertain, making confidence in risk from aluminum low, but evaluation of other mammal TRVs (see uncertainty section) suggests there is at least moderate confidence risk is low. Therefore, the overall confidence in killdeer was changed to moderate, as requested. This explanation of “professional judgment’ is provided in the text.
50.	Sect 6.3.1 pg 6-14	Last paragraph: The text states that the overall highest risk level for insectivores is estimated with low confidence. The confidence level for the dietary model for the insectivore should be moderate (same confidence level of the dietary model for the other feeding guilds). The use of site-specific invertebrate tissue concentrations to estimate exposures for insectivores results in moderate uncertainty (moderate confidence in the results).	The confidence level was originally set as low because of the high uncertainty in the aluminum results in the probabilistic model and because of the poor quality of the TRV aluminum studies. However, analysis of other studies suggests the TRV may be conservative and thus the text was revised to state moderate confidence that the risk is no more than low.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
51.	Sect 6.3.2.1 pg 6-15	With respect to the discussion of detection limits, it should be stated whether or not the detection limits were low enough to observe an adverse effect. Also, it was stated that the potential influence of dredging on heron and osprey egg concentrations was likely to be limited; however, insufficient information was presented to support this statement.	Detection limits are well below adverse effect levels for eggs in the various egg studies, with the exception of three constituents in tree swallow eggs (copper, manganese, and boron). Detection limits that are near levels of adverse effects may result in failing to detect a significant difference in impacted eggs compared to reference eggs. This possibility is small because copper and manganese were still identified as COPECs in tree swallow egg evaluations, even with high detection limits for a few samples. Furthermore, copper and manganese both had low non-detect frequencies (3% and 11%, respectively). Boron data were only affected in 2009 by high detection limits; however, results from 2010 provided the same conclusion as 2009 with boron only detected in 1 out of 171 eggs. While detection limits for aluminum seemed high, no adverse benchmark is currently available for aluminum. Such information with more detail on the analysis of detection limit adequacy was added to the text of the uncertainty sections of the egg studies. In addition, the statement regarding influence of dredging being limited was removed.
52.	Sect 6.3.2.2 pg 6-17	The text states that the probability analysis used the average and standard deviation of these concentrations (EPCs), which is more accurate than the deterministic analysis which used the 95% UCL or maximum. The average and standard deviation are not necessarily more accurate, but do provide for a range of EPCs that may be more representative of exposures to the general population. Also, a discussion should be added to this section that addresses the uncertainty associated with the input values used for bioavailability in the dietary model. This should include a discussion of some of the issues associated with the method used to measure bioaccessability.	By definition, an estimate is accurate when it is not biased upward or downward. By its very nature of being an upper bound, the 95UCL is a biased estimate of the mean and is therefore less accurate. The deterministic analysis used the 95UCL of exposure point concentrations (or maximum) by reach. Also, the most conservative TRV found for a species was used, rather than the range of more likely TRV possibilities, characterized by means, standard deviations, and likely distribution. The deterministic model biases the analysis high, as it should to be protective. The probabilistic analysis is less conservative, but more informative, and is helpful for evaluating confidence in the deterministic results. However, even the probabilistic analysis used conservative assumptions that all prey and soil/sediment ingestion came only from the river when likely some came from the less contaminated adjacent floodplain and riparian zone. Nevertheless, the text was revised as suggested, indicating that the ranges of EPCs are more representative of exposures to the general population. Issues with bioavailability uncertainty are discussed in response to Comment 47.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
53.	Sect 6.3.3 pg 6-18	*Summary and Conclusions*. This section may need revision based on any recalculations and weight of evidence revisions.	The text was revised as suggested.
54.	Sect 7.1.2 pg 7-4	The fourth bullet should be clarified to state that the fraction of total metals extracted was based on the sum of all four extractions, rather than at just the last extraction at pH 1.5.	The text was revised as suggested.
55.	Sect 7.2.1.1 pg 7-5	The sample size for concentrations of metals in raccoon blood is small to make very meaningful conclusions regarding this data. The result should be low confidence in the results.	The text was revised as suggested.
56.	Sect 7.2.1.2 pg 7-6	The text states that long-term exposure of chromium (based on chromium in hair samples) at the site may not affect raccoon populations. There data presented does not adequately support this conclusion. The relationship of chromium levels in human hair and effects to raccoon populations is weak.	Humans were used for comparison because they are omnivores like raccoons. However, they do not experience the stressors of wild raccoons, who may be more sensitive to elevated chromium in tissues. Therefore, the text was revised to say long-term effect on raccoons is unknown.
57.	Sect 7.2.1.2 pg 7-7	It is stated that the study by Yokel (1982 & 1987) reported no adverse effects in rabbits or their offspring exposed to aluminum. Insufficient information is presented in the text to judge the appropriateness of this study involving subcutaneously injected does of aluminum and whether acute, chronic, or sub-lethal effects were applied.	The text was revised to clarify the length of the study, types of doses, and that the focus is on whether high hair concentrations are associated with adverse effects.
58.	Sect 7.2.1.2 pg 7-8	The text states that detection limits for raccoon livers were too high to be certain of no effects. Yet concluded that the lack of aluminum detections in most of the tissue data could support that toxicity of aluminum in raccoons may not have an adverse effect. Since detection limits were too high, it is unlikely to conclude that aluminum in raccoons has no adverse effect. The text also suggests that there is no evidence that aluminum concentrations are due to the ash release. Aluminum was selected as a COPEC because it was detected at elevated concentrations in ash impacted sediment even though the correlation between aluminum concentrations and ash may not be highly correlated.	The text was revised to say “The lack of aluminum detections in most of the tissue data could support that toxicity of aluminum in raccoons may not have an adverse effect but it also may be due to inadequate detection limits.” Aluminum was elevated in sediment in the Emory and Clinch Rivers compared to reference, but not elevated in the Emory River in depurated larval mayflies near the release point. This suggests the aluminum from ash is not very bioaccumulative and of concern to wildlife, even if elevated. The aluminum issues identified may be from legacy sources.
59.	Sect 7.2.2.1 pg 7-9	The text states that the health metrics showed few significant differences between impacted and reference raccoon samples, and none could be attributed to the ash. A table showing the mean tissue concentrations from raccoons collected from the ash-impacted area relative to the reference areas should be presented in the text or in Appendix Y to allow the reader to make a comparison of the means.	Mean tissue concentrations from raccoons collected from the ash-impacted area relative to reference areas are presented in Tables 2-214 through 2-244. A reference to these tables was added to Section 7.2.2.1. In addition, summary tables comparing 2010 reference and impacted raccoon tissue were created and are presented in Tables 7-1 through 7-7. A reference to these tables was also added to the section.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
60.	Sect 7.2.2.2 pg 7-10, 7-12 Exhibit 7-1	It is concluded that risk is negligible for raccoon health metrics LOE. Care should be taken when making such conclusions as is high uncertainty (low confidence) associated with low sample size and low confidence to comparative tissue-effects data to definitively conclude that that risk to omnivorous mammals associated with the ash is negligible, when it could just as well be low.	The text was revised as suggested.
61.	Sect 7.2.3.2 pg 7-11	Second paragraph: Since there is high uncertainty associated with the data for aluminum, replace the word "*indicate*" with "suggest" and refer the reader to the discussion of uncertainties.	The text was revised as suggested.
62.	Sect 7.3.1 pg 7-12 Exhibit 7-1	The estimate of magnitude of adverse effects for the herbivores dietary exposure model should be changed from negligible to low in accordance with the definition of negligible as defined in section 2.4.3 (i.e., in the conservative analysis, HQs exceeded 1.0 for aluminum, radionuclides (radium-228, radium-226, potassium-40), iron, and manganese. In addition, the refined analysis for aluminum still exceeded an HQ of 1 in a few reaches).	The text was revised as suggested.
63.	Sect 7.3.1 pg 7-13 Exhibit 7-2	The conclusion of negligible risk is not supported when at least one constituent at some locations resulted in a significant difference compared to reference or an HQ greater than 1 in the refined and probabilistic analysis. Therefore, please change negligible to *low* for all lines of evidence. Confidence in the risk determination for the dietary exposure models should be moderate instead of low.	The text was revised as suggested.
64.	Sect 7.3.2 pg 7-14	The word “birds” should be changed to “mammals”.	The text was revised as suggested.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
65.	Sect 7.3.2.3 pg 7-16	The text states that the TRVs are from the literature and are associated with significant uncertainty. Generally, there is low uncertainty with the screening level TRVs, moderate uncertainty with the refined TRVs, but high uncertainty with the TRV for the probabilistic evaluation from which negligible risk was concluded. Therefore, there is low confidence in the negligible risk conclusion. The last sentence on page 7-16 states that the probability analysis used the average and standard deviation of these concentrations, which is more accurate. Attachment 3 of Appendix W points out the high uncertainty associated with the probability analysis because the average and standard deviation were not always based on a robust data set. In several cases, the standard deviation and type of distribution was assumed (e.g. aluminum). Consequently, the probability analysis is not necessarily more accurate. The text should be revised accordingly.	The text was revised as suggested.
66.	Sect 7.3.3 pg 7-18	Delete the words “and could be negligible” as this is not supported by all the uncertainties. Also, please identify COECs responsible for the risks.	The text was revised as suggested. COECs selected are only those COPECs that are clearly related to the ash, not legacy COPECs, and had HQs >1 from the refined dietary exposure models.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
67.	Sect 8.2.1.2 pg 8-8	The text states that mean strontium concentrations found in eggshells were considered to be “somewhat elevated”. The supporting studies suggest that the term "*somewhat*" should be deleted. The study cited (Rattner et al. 2000) is not an adequate basis for the determination of the conclusion that strontium concentrations observed in tree swallows are "*probably not of concern*" and that selenium is slightly affecting fledglings per nesting female. The discussion for manganese relies on a study by Mora (2003) conducted in Arizona to conclude that manganese is not a problem for tree swallows even though manganese concentrations in eggs from ash-impacted locations were much higher than reference locations. Levels shown to be without effects in one geographic area may be associated with adverse effects in other geographic areas due to local differences in bioavailability, the presence of other contaminants, baseline health status of the receptor populations, and other factors related to the quality of the natural environment. Consequently, the study by Mora (2003) may not be relevant to the exposures at the Kingston Site.	Somewhat was deleted from text and a comparison of eggshell concentrations in different areas of the United States was used instead to determine background concentrations for comparison to TVA impacted reach concentrations. Rattner’s results were included but his conclusion of likely no embryotoxicity based on the Karnosfsky paper was removed as well as the speculative statement that selenium may be the main driver, not strontium. Mora (2003) was also removed from the manganese comparison because manganese in eggs was elevated in an area with lower hatching success, and may represent a manganese-impacted site, although it is unknown. Because manganese in eggs had significant correlation with a productivity measure, it was included as potential risk of low, but was not a COEC because thresholds for adverse effects are unknown and concentrations are not much higher than background.
68.	Sect 8.2.2.1 pg 8-10	The text states that that probability of HQs exceeding 1 are low (10 to 30 percent). The text should also point out that these probabilities were determined through the probabilistic analysis which has a high level of uncertainty associated with some of the assumptions used in the analysis.	The text was revised as suggested.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
69.	Sect 8.3.1 pg 8-12 Exhibit 8-1	The magnitude of estimated effects for the eggshell line of evidence should at least be "*low*" instead of "negligible" based on the elevated concentrations of strontium in eggshells and that selenium is slightly affecting fledglings per nesting female (reference to 2nd paragraph on page 8-8).	Mean strontium in eggshells of non-raptor birds sampled in five states (CA, ID, AZ, TX, and KS) ranged from 197 to 2,666 mg/kg (Mora et al. 2011), while the mean concentration of strontium in eggs from impacted reaches at the TVA site were below these levels (102 mg/kg in the Emory River, 123 mg/kg in embayments, 125 mg/kg in Tennessee River). While Mora et al. (2011) found that means were lower for raptors in Texas and Michigan (39 to 98 mg/kg), in general raptors have the lowest and insectivores the highest strontium concentrations (Mora et al. 2011). Although strontium can adversely affect productivity at high concentrations, the concentrations at TVA are below most populations investigated in the United States, making it highly unlikely eggshell concentrations have more than negligible impacts. Nevertheless, dose was negatively correlated to fledglings produced per female and may have caused the elevated eggshell concentrations, and therefore magnitude and risk for eggshells was converted to low, as requested, similar to the level assigned to eggs and nestlings. Risk to strontium in eggshells is assigned low risk, but likely is negligible because of the low values relative to background, and lack of correlation of eggshell concentrations to clutch size, hatching success, nestling survival or fledglings produced. This suggests eggshell cracking from strontium is not occurring. Strontium in the egg, not eggshell, appears to be potentially creating risk, because egg content of strontium in eggs was negatively correlated to nestling survival (based on ranks, not linear regression). These correlation plots have been added to the BERA (Figure 8-3), and show no obvious increase in adverse effects with increasing strontium, making even this conclusion questionable. Moreover, although strontium dose was negatively correlated to fledglings produced per female, the dietary exposure model did not support the conclusion of risk from dose, although the TRV is not based on accepted EcoSSL studies. The selenium dose could be causing the correlation with fledglings produced instead. Note that nestling concentrations of strontium were not correlated with any productivity measures and were not considered high in the literature. Furthermore, change in fledglings produced between the reference and impacted sites was not significantly different. Thus, evidence supporting strontium as decreasing productivity of aerial-feeding birds is low.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
70.	Sect 8.3.1 pg 8-12 Exhibit 8-2	The potential risk for the eggshell line of evidence should at least be "*low*" based on the elevated concentrations of strontium in eggshells and the adverse effects of strontium on egg production in Peking ducks (*Anas peking*). Reduced egg production was reported by Wheeler (1919), as well as because fledglings per nesting female are negatively correlated to strontium. Strontium should also be listed as a COPEC/COEC.	See response to Comment 69. Potential risk from strontium in eggshells is low due to the magnitude of adverse effects being low, but eggshells show no significant correlations with any productivity measures. Strontium is not listed as a COEC for a number of reasons. The dietary models did not support impacts from strontium, the decrease in fledglings produced with increasing dose could be due to other metals or metalloids in the eggs (i.e., selenium, which shares the identical correlation), no evidence supports that hatching success was decreased by eggshell cracking from strontium replacing calcium in the eggshell, and the plot of strontium in eggs vs. all productivity measures shows no clear pattern that increasing strontium is reducing survival or fledglings produced (Figure 8-3). Thresholds in eggs or eggshells for impacts to reproduction are not available in the literature, which creates too much uncertainty to warrant identifying strontium as a COEC.
71.	Sect 8.3.2.1 pg 8-13	The text states that no negative correlation was found between any egg, nestling, or eggshell COPEC concentrations with any of the three reproductive measures (hatching success, nestling survival, or fledglings produced per female). Negative correlation was reported previously for strontium and fledglings per female.	The text was revised as suggested to correct this inadvertent error.
72.	Sect 8.3.3 pg 8-16	The text should clearly indicate the COECs for each river segment.	The text was revised as suggested.
73.	Sect 9.2.2.2 pg 9-8	The text should specifically state that the comparison to the Navy NOECs and LOECs is presented in Table 9-10.	The text was revised as suggested.
74.	Sect 9.2.3.2 pg 9-9	Please clarify the home range of these amphibians during different life stages. The discussion relies on an averaging approach to conclude that there is no risk for mobile amphibians. Some life stages of amphibians (e.g. larval forms) are not expected to be particularly mobile and the averaging approach to conclude that there is no risk, may not be fully supportable.	Larval forms were not evaluated; however, the home ranges of the three adult amphibians that were evaluated were relatively small. Estimates of home ranges were added to the report text.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
75.	Sect 9.3.1 pg 9-10 Exhibit 9-2	The potential risk should be "*low*" instead of "negligible" for the tissue and sediment lines of evidence. COPECs with relatively high frequency of detection and present in statistically higher concentrations at the ash-impacted locations than at the reference locations were barium, copper, selenium, and strontium. Sediment HQs exceeded USEPA Sediment Quality Screening Levels for arsenic, copper, lead, mercury, and nickel in several river segments.	The text was revised as suggested.
76.	Sect 9.3.2.4 pg 9-11	The text states that the assessment of bioavailability for amphibians was conservative and resulted in an overestimation of risk. A dietary exposure model was not evaluated for amphibians, no amphibian toxicity testing was conducted, and it is not clear what assumptions were made concerning bioavailability for amphibians and how that was incorporated into the risk evaluation. In addition, the conclusion in Appendix AA state that amphibians exposed to ash in the North and West Embayments have significantly accumulated strontium. Please modify the sentence accordingly.	The text was revised to indicate that the assessment of bioavailability had low to moderate confidence in the risk determination.
77.	Sect 9.3.3 pg 9-12	Based on the above comments, it appears that a conclusion of negligible risk is not well supported. The text should be revised to indicate that there is a *low* risk to amphibians and indicate those COECs for each river segment. In addition, central tendency estimates may actually underestimate risk to amphibians because certain life stages are relatively immobile and may not be representative of exposure to localized hot spots.	The text was revised as suggested.
78.	Sect 10.2.1.2 pg 10-4	Based on the reptile community survey data, the text states that qualitative observations indicate that turtle health has not been impacted. Since the examination of the turtles was qualitative (based only on visual observations), a definitive conclusion that turtle health has not been impacted is premature. Please replace the word "indicate" with "suggest" to reflect the qualitative nature of the evaluation.	The text was revised as suggested.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
79.	Sect 10.2.2.1 pg 10-5	The text states that arsenic, barium, cobalt, mercury, selenium, and strontium were found to be statistically higher in blood from at least one of the three turtle species from the ash-impacted locations when compared with those from the reference locations. The discussions in the text that follow address each of these COPECs and basically claim other factors, such as inherent variability of these naturally-occurring elements. The fact that metals are elevated in blood samples from ash-impacted locations compared to reference locations is strong evidence for exposure regardless of undocumented local natural variability. In addition, data on metal levels in blood of other reptiles from other locations in the country that are reported in the literature may not be directly comparable to the levels found in turtles from the Kingston Site due to species differences and local exposure conditions and health of the populations sampled. Consequently, this information is only useful for qualitative comparison and should not be used to conclude that there is no or negligible risk associated with the elevated levels.	Exhibit 10-2 tissue concentrations were revised from “negligible” to “low”. The lack of a consistent response for all three species of turtles suggests that natural variability is an important consideration in the interpretation of the tissue results.
80.	Sect 10.2.2.1 pg 10-6	It is stated that higher arsenic concentrations could be the result of other types of anthropogenic input (e.g. agricultural herbicides). While this may be possible, arsenic is elevated in ash and is likely the primary source. Also, the text states that barium blood levels reported in aquatic snakes, suggest that the levels observed in blood from common musk/mud turtle samples collected from the Clinch River do not appear to show evidence of barium accumulation. First of all, when compared to the reference locations, barium was significantly higher in the blood of turtles collected from ash-impacted locations. This is strong evidence of exposure. It is not appropriate to use data for snakes from a different study location to conclude that there is negligible risk to turtles at the Kingston Site.	Exhibit 10-2 tissue concentrations were revised from “negligible” to “low”. Because of the low frequency of detection for arsenic, the possibility of natural variability for both arsenic and barium, and the lack of a consistent response among turtle species and river segments, comparisons with other reptile species are important to place the observed tissue concentrations into perspective.
81.	Sect 10.2.2.1 pg 10-7	The text states that the higher concentrations of cobalt may be due to natural variation in the river system or could be due to legacy sources at the USDOE’s Oak Ridge Reservation. The text should be revised to indicate that the ash-impacted sediment could also be the cause of the higher concentrations of cobalt.	The text was revised as suggested to include “or may be due to the ash-impacted sediment.”

No.	Section / Para / Page	Reviewer Comment	Response to Comment
82.	Sect 10.2.4.2 pg 10-10	While it may be true that sediment benchmarks designed for the protection of benthic invertebrate toxicity may overestimate the potential for risks to turtles, there is no toxicity information available to conclude that benthic invertebrates are more sensitive than reptiles exposed to ash. The text also goes on to say that risk conclusions for amphibians support the LOEs considered for reptiles. Since the data for amphibians is not robust (lack of TRVs, etc). It really should not be used to make conclusions for other receptor groups. Also, the text does not provide any information about the home range of the aquatic turtle, and how it compares to the spatial scale of data for each reach of the rivers that were evaluated. While one may concluded that negligible risks would occur at a large scale, there is inadequate evidence to conclude that only negligible risks would be likely at the spatial scale relevant to the turtles investigated.	The text was revised from “negligible” to “low” risks to address this comment. Estimates of home ranges were added to the text for the three adult reptiles that were evaluated.
83.	Sect 10.3.1 pg 10-11 Exhibit 10-1	The community survey should provide moderate confidence and moderate relevance to the assessment endpoint.	The text was revised as suggested.
84.		The sediment chemistry LOE should indicate a low potential for risk. Sediment chemistry shows low potential risk and several COPECs were identified in Tables 10-10 through 10-13. Also the third bullet should be modified to replace “indicate no toxicity” with “*suggest the potential for limited low-level toxicity*”.	The text was revised as suggested.
85.	Sect 10.3.1 pg 10-12	The bullet at the top of this page should be modified to state that it is unknown whether the elevated levels of selenium and strontium may cause adverse effects since no adverse TRVs could be found in the literature for these two chemicals. The lack of TRVs does not equate to no adverse effects, but does suggest high uncertainty. Generally, increased exposure trends toward increased risk.	The text was revised as suggested.
86.	Sect 10.3.2.4 pg 10-13	The statement that bioavailability of COPECs for reptiles was conservative and likely overestimates risks is not supported. A dietary exposure model was not evaluated for reptiles, no reptile toxicity testing was conducted, and it is not clear what assumptions were made concerning bioavailability for reptiles and how that was incorporated into the risk evaluation.	The text was revised to indicate that the assessment of bioavailability had low to moderate confidence in the risk determination.

No.	Section / Para / Page	Reviewer Comment	Response to Comment
87.	Sect 10.3.3 pg 10-14	Based on the above comments, change the last two sentences by replacing "very likely results in a significant overestimation of risks" with "*had low to moderate confidence in the risk determination, and therefore the Site poses low to negligible risks to reptiles.*"	The text was revised as suggested.
88.	Sect 11	It is likely that the conclusions will need to be revised based on the specific comments above and that Exhibit 11-2 on page 11-23 may need revision.	The conclusions and exhibits in Chapter 11 were revised as necessary.
89.	Appendix U	Average body weights for various receptors (muskrat, mink, wood duck, mallard, and great blue heron) were listed but there were no cited references for these body weights. Please provide the literature references for these receptor body weights.	The references for the studies used to obtain average body weights were inadvertently excluded in Appendix U – Wildlife Exposure Profiles - in the initial submission. The text has been revised to include these but since been added to the document.
90.	Appendix W	The previous comments submitted on the draft Wildlife Dietary Exposure Model will need to be considered in the BERA revision as provided in Attachment 7 – Response to Comments.	The previous comments submitted on the draft Wildlife Dietary Exposure Model Methodology document were considered in this revision of the BERA. The comments and an updated version of the responses are included in Attachment 8 – Response to Comments – to Appendix W - Wildlife Dietary Exposure Models.
91.			
92.			

Acronyms

ANOVA	Analysis of Variance
AVS/SEM	acid volatile sulfides/simultaneously extracted metals
BERA	Baseline Ecological Risk Assessment
BIC	benthic invertebrate community
$CaCO_3$	calcium carbonate
CBR	critical body residue
COEC	constituent of ecological concern
COPEC	constituent of potential ecological concern
CRM	Clinch River mile
dw	dry weight
Eco-SSL	Ecological Soil Screening Levels
EE/CA	Engineering Evaluation/Cost Analysis
EPC	exposure point concentration
ERED	Environmental Residue-Effects Database
ES	Environmental Standards, Incorporated
HQ	hazard quotient
LOAEL	low observed adverse effect level
LOE	line of evidence
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NOAEL	no observed adverse effect level
PCB	polychlorinated biphenyl
TRV	toxicity reference value
TVA	Tennessee Valley Authority
UCL	upper confidence limit
µg/g	micrograms per gram
USACE	U.S. Army Corps of Engineers
USDOE	U.S. Department of Energy
USEPA	U.S. Environmental Protection Agency
ww	wet weight