UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

January 21, 2022

VIA ELECTRONIC MAIL

Mr. Roger B. Petrie
Federal Facility Agreement Manager
Oak Ridge Office for Environmental Management
Department of Energy
Post Office Box 2001
Oak Ridge, Tennessee 37831

Dear Mr. Petrie:

The U.S. Environmental Protection Agency has completed review of the *Remedial Investigation Work Plan for Remaining Ecology/Surface Water/Sediment at East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2912&D1) received by EPA on September 29, 2021.

This document describes the work that will eventually support the development of a Record of Decision (ROD) for contaminated environmental media at the East Tennessee Technology Park (ETTP) not addressed in previous or planned Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (as amended) decisions. The work plan presents the scope and intent of the investigation, a review of the conceptual site model for each of the areas examined, and the data quality objectives used to identify specific investigation needs.

The EPA recognizes the considerable work that DOE has conducted prior to starting this investigation at ETTP, through actions taken to remove principal threat soils and sources. Comments specific to this document are attached and must be resolved before a revised document is submitted.

If you have any questions or concerns regarding this matter or require additional information, then please contact me at (404) 562-8550, or electronically at froede.carl@epa.gov.

Sincerely,

CARL FROEDE
Digitally signed by CARL FROEDE
Date: 2022.01.21 07:18:16 -05'00'

Carl R. Froede Jr.
Senior Remedial Project Manager
Restoration & DOE Coordination Section
Restoration & Site Evaluation Branch
Superfund & Emergency Management Division

Received 01/21/2022

cc: J. Daffron, DOE
J. Hardin, DOE
E. Phillips, DOE
S. Scheffler, DOE
DOSSCP-EM (DOE EM Mailroom)
R. Young, TDEC
R. Hoffmeister, TDEC
H. Lutz, TDEC
J. Brabazon, TDEC
ORSSAB

EPA comments on the Remedial Investigation Work Plan for Remaining Ecology/Surface Water/Sediment at East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2912&D1)

General Comments

1. There are an insufficient number of proposed surface water and sediment samples to calculate refinement-level exposure point concentrations (EPCs) at some of the investigation areas ([IAs]; Oxbow Lake, Beaver Ponds North and South, and K-1007 P3, P4, and P5 Ponds). EPA ProUCL guidance (Version 5.1 User Guide; 2015) states that a minimum of eight samples should be collected for use in generating average and 95% upper confidence limits on the arithmetic mean (95UCL) EPCs. It is also noted that eight samples may not be enough to generate EPCs if sampling results are highly variable. Therefore, it is recommended that more than eight samples are collected for a given exposure area to ensure that EPCs can be generated. Revise the RIWP to include the collection of additional samples as necessary in the respective IAs.

2. The conceptual site model (CSM) shown in the Executive Summary (Figure ES.1, General conceptual site model for Remaining Media) does not agree with the discussion and CSM figure (Figure 4.6, Human health conceptual site model for Remaining Media) shown in Section 4 (Conceptual Site Model). For example, Section 4.6.1 (Adult and Child Receptors) and Section 4.6.2 (Trespassers) mention the potential for inhalation of volatile organics from surface water and sediment. However, there are no human inhalation pathways on Figure ES.1. Also, there are no filled bullets indicating a complete exposure pathway for inhalation of volatiles in surface water by either current or future receptors on Figure 4.6. Revise Figures ES.1 and 4.6 to agree with each other and with the accompanying text discussing complete exposure pathways. Additionally, provide a legend to explain the meaning of the filled bullets on Figure 4.6.

3. There is no connectivity between Phase 1 and 2 sampling described in the RIWP and the ecological risk assessment step-wise process or risk assessment measurement endpoints. Appendix E, Section E.7 (Study Design) summarizes Phase 1 and 2 activities but does not identify how respective activities fit within the screening-level ecological risk assessment (SLERA) and baseline ecological risk assessment (BERA) construct described in previous Appendix E sections. Additionally, there is no description of how assessment and measurement endpoints identified in Appendix E, Table E.1 (Risk Questions, Measurement Endpoints, and Associated Decision Points for Each Assessment Endpoint) relate to the Phase 1 and 2 study design. Revise the RIWP and Appendix E to specifically state how SLERA and BERA assessment and measurement endpoints will be conducted and evaluated in the context of Phase 1 and 2 data collection activities. Note that this may require extensive revisions to the RIWP and Appendix E. Also note that respective revisions will also be dependent on how comments regarding sediment toxicity testing are resolved.

4. The criteria used to justify toxicity testing of ambient media described in Section 6.3.1 (Ambient Media Toxicity Testing) is not adequately described and is too restrictive. This section states that toxicity testing is likely needed if the maximum detected concentrations exceed refinement screening values (RSVs) by a factor of two or more or ecological screening values (ESVs) by a factor of 10. First, the source of screening benchmarks "EPA Region 4" RSVs and ESVs are not cited and respective RSVs for each media are not provided. Therefore, RSV/ESV selection cannot be thoroughly reviewed or validated. Also, RSV/ESVs are receptor-specific and there is no indication as to which receptors and respective values will be considered. Next, there is no description regarding what data/sampling results

will be considered or how maximum detected concentrations will be derived. There is no justification as to why either of the exceedance criteria were selected. Lastly, this approach fails to acknowledge that site media likely contain many different contaminants that could have additive or synergistic toxic effects. The benefit of toxicity testing is that it is an integrated measure of toxicity. As described in Section 6.3.1, prior risk assessments already identifies risk to benthic invertebrates from four of the ponds. These findings, combined with the utility of sediment toxicity testing to provide an integrated measure of risk, support conducting sediment toxicity testing. Revise the RIWP to include sediment toxicity testing regardless of Phase 1 RSV/ESV screening results. The toxicity test sediment selection should consider sediment sampling analytical results for each of the IA ponds so that tests bracket a range of site related chemicals (SRC) concentrations (low to high).

5. Appendix G (Data Quality Objectives) identifies the study boundary vertical extent of sediment to 6- and 8-feet below ground surface (bgs) for K-1007-P Ponds and K-901-A Pond (respectively) but the RIWP Section 6.2 (Characterization Activities – Phase 1) only describes surface sediment sampling (0- to 2-feet bgs). Therefore, proposed sampling methodology does not meet data quality objectives for the K-1007-P Ponds and K-901-A Pond. Revise the RIWP Section 6.2 and associated appendices to include descriptions for the collection, analysis, and use of sediments up to 6- and 8-feet bgs for the K-1007-P Ponds and K-901-A Pond, respectively.

6. Descriptions of the sediment depth intervals that will be used to evaluate human health and ecological risks are not internally consistent. For example, Section 6.2 (Characterization Activities – Phase 1) first states that the 0- to 0.5-foot interval is needed for assessment of potential human and ecological exposures. However, later in this same section, the 0- to 2-foot interval is identified to evaluate ecological exposures in the event that surface sediments are eroded. Furthermore, neither risk assessment appendix describes which sediment depth interval will be used. Revise, Section 6.2 to consistently state which depth interval will be used in the human health and ecological risk assessments. In addition, revise the associated risk assessment appendices to describe which sediment depth interval will be used in the evaluation. Given the indication that surface sediment erosion is anticipated, it is recommended that the 0- to 2-foot interval be used in both risk assessments.

7. K-901-A soil sampling methods are not described in the RIWP nor Appendix A (Sampling and Analysis Plan) or Appendix B (Quality Assurance Project Plan). Soil samples are required for both human and ecological risk assessments. As such, soil sampling methods should be described as done for sediment samples. This includes identifying which depth intervals will be targeted for use in respective risk assessments. Revise Section 6.2 (Characterization Activities – Phase 1) to include information on soil sampling methodology at K-901-A and identify which depth interval(s) sampling results will be used in human and ecological risk assessments. Ensure this information is incorporated into Appendix A and Appendix B as appropriate.

8. Appendix A (Sampling and Analysis Plan for the Remaining Media Investigation at East Tennessee Technology Park, Oak Ridge, Tennessee) does not describe how surface water, sediment, and soil samples will be physically collected. Specifically, what type of sampling equipment will be used and how samples will be prepared. It is not apparent how the work plan can be used to direct field sampling activities without this information. Revise Appendix A to include a description on how samples will be physically collected. This description should be specific enough to direct the planning and execution of field sampling activities.

9. Appendix B (Quality Assurance Project Plan for the Remedial Investigation Work Plan for the Remaining Ecology/Surface Water/Sediment at East Tennessee Technology Park, Oak Ridge, Tennessee) does not provide enough information to assess whether analytical sensitivity is sufficient in detecting contaminants of concern above relevant human health and ecological toxicity screening benchmarks. Although Appendix A (Sampling and Analysis Plan) and Appendix B both state that analytical methods/laboratories will be selected so that detection limits will be at or below regulatory screening levels, respective screening levels are not identified in Appendix B. Revise Appendix B to include target detection limits for constituents in surface water, sediment, and soil samples. Respective limits should consider the lowest risk screening levels needed to conduct risk assessments. Ideally, target detection limits should be compared to the actual/selected laboratory detection limits to ensure that proposed analytical/laboratory methods are sensitive enough to satisfy data quality objectives.

10. Appendix E (Ecological Risk Assessment) does not sufficiently describe how data from IA ponds will be evaluated according to exposure units (EUs). Environmental chemistry data are aggregated into EUs when deriving EPCs for each receptor. It is especially important to understand how data are aggregated when estimating wildlife exposures because species home ranges may be smaller or larger than the contaminated area being evaluated. Revise Appendix E to identify EUs and data used to derive respective EPCs for each community-level and wildlife receptor. Note that it might be appropriate to aggregate data from some or all of the IA ponds for large home range wildlife receptors that could forage throughout the ETTP.

11. Appendix E does not identify a small home range insectivorous avian receptor that would be exposed to soil invertebrates. American robin is a common wildlife receptor that would fill this feeding guild and is often included in ecological risk assessments. Revise Appendix E to include American robin that is exposed to soil (incidental ingestion), surface water, and soil invertebrates. Note that the American woodcock can be replaced by American robin.

12. Appendix E does not adequately describe how wildlife food-chain exposure modeling will be conducted. Appendix E, Section E.6 (Measurement Endpoints) states that wildlife exposures will be estimated using food-chain models and summarizes respective wildlife receptor life history parameters. However, the actual models in which life history parameters are used to estimate exposures are not provided. Revise Appendix E to include food-chain exposure models. Models should identify and define all of the life history parameters that will be used. If refinements to exposure estimate models are anticipated, respective models and life history parameters should also be identified.

13. Frequency of detection criteria are inappropriately used to eliminate site-related chemicals (SRCs) when screening for contaminants of potential ecological concern (COPEC). Supporting guidance cited for this action (EPA, 2018, Regional 4 Ecological Risk Assessment Supplemental Guidance Report) is incorrectly interpreted. Eliminating the COPEC before risks can be assessed has potential to underestimate risks associated with contamination "hot spots." The identification of hot spots can be important for sites with heterogeneous distributions of contamination. As stated in EPA (2018), an analysis of frequency of detection for COPEC that drive risk should be discussed as an uncertainty but only after respective risks are thoroughly characterized. Revise Appendix E, Section E.4.1 (Refinement of Contaminants of Potential Ecological Concern) to remove the frequency of detection COPC refinement action.

14. This work plan was scoped and developed before the ETTP airport plan was discussed with the project team. The proposed sampling plan for the K-1007 P1 Pond presented within this document does not met the requirements of 40 CFR 761 in dealing with the polychlorinated biphenyl (PCB) contaminated sediments. Specifically, a grid approach must be used to define PCB sediment contamination as described in 40 CFR 761(a)(2) and 40 CFR Part 761 Subpart N. Characterization requirements are described in Subpart N. Verification or confirmation sampling requirements are described in 40 CFR Part 761 Subpart O. Subpart 761.61(a)(2) refers to Subpart N which describes requirements and methodology for a grid sampling method for collecting new characterization data and for assessing the sufficiency of existing characterization data. Subpart 761.61(a)(2) also refers information required in 761.61(a)(3) which summarizes characterization requirements. The information required by 761.61(a)(3) applies to approvals issued under 761.61(a) and/or 761.61(c). The DOE must determine if the ETTP K-1007-P1 Pond should be removed from this work plan and dealt with separately in association with the ETTP Airport Project or remain a part of this document. In either case, the PCB regulations must be followed.

15. The K-901 Pond, Beaver Ponds, Oxbow Lake, and Mitchell Branch (all potentially containing PCB contaminated sediment) characterization activities must follow the 40 CFR 761 regulations in this work plan.

16. While an updated data set is important, in few cases will having new data or having more data eliminate the need for a baseline ecological risk assessment with ecological data collection. The assessment and measurement endpoints in Appendix E and the data quality objectives in Appendix G describe ecological data as necessary to support a decision of whether remedial actions are warranted to protect the environment. The sampling and analysis plan and quality assurance project plan (QAPP) do not cover ecological data collection. Ecological data collection is contingent on Phase 1 results. However, the document does not indicate that an updated sampling and analysis plan and QAPP will be provided. There was no presentation of the baseline problem formulation, the scientific and management decision point, or current issues data gaps based on past assessments. DQOs in Appendix G do not discuss ecological risk assessment steps or how risk conclusions will trigger Phase 2 data collection. These deficiencies must be addressed in the revised document.

17. The DQO tables in Appendix G are generic and do not explain what was presented to the project team on the existing data or the feedback from the project team on what they identified. EPA recommends adding a baseline problem formulation with conceptual site model for each waterbody to explain the surrounding hazardous waste releases that may affect the waterbody. Questions to be addressed by the data collection should be developed such as “Does groundwater from the plume discharge into Mitchell Branch?” It may be useful to consider questions related to potential historical or ongoing sources to frame the remedial options. The contamination in the waterbodies could potentially be addressed by controlling sources such as contaminated drainage ditches or sewer lines. Address these issues in the revised document.

18. While Section A.4 included a heading for conceptual site model and is broken out by investigation areas, Appendix A does not contain the information but refers to Section 4.2, Source Areas, which discusses sources overall not specific to investigation areas. Please provide a discussion of source areas broken out for individual investigation areas and figures showing their location. This information can help guide the evaluation of where to sample and the contaminant analytes to consider.

19. A baseline problem formulation was not provided to describe the current habitat, overall values to be protected, or the desired end state. Please add this information to the revised document and reference it where appropriate.

20. Tables of summary statistics of historical data were screened against ecological screening values in Appendix C. The document did not use the tables to draw any conclusions. There was no discussion of contaminants of COPECs based on the evaluations in Appendix C. Appendix C conclusions were not refined to provide an understanding of the current issues with these waterbodies to focus the investigation. Please correct Appendix C in the revised document to address the contaminants identified and state the presumed conclusions from the data.

21. The K-720 Slough is just north of the K-720 Covered Fly Ash Pile (Figure 4.3). A sluice pond at the K-720 Covered Fly Ash Pile drains by a small channel into the North Beaver Dam Pond. It would make sense to sample the drainage ditches leading into and out of the K-720 Slough and Beaver Dam Ponds to assess whether releases from the K720 Ash Pile serve as potential ongoing sources. The surface water sample positions should consider locations of drainage ditches leading from potential sources. Please place surface water collection points consistent with this strategy to maximize the opportunity to assess for contamination.

22. The investigation should be framed to answer specific questions regarding the significance of potential ongoing sources. Surface water in the South Beaver Dam Pond is potentially impacted by a groundwater plume from the K-1085 Firehouse Burn Area (Figure 4.3). Constituents detected in surface water were total tetrachlorodibenzofurans, phenanthrene, and trichloroethene to name a few associated with the K-1085 Firehouse Burn Area. Only one surface water monitoring station is proposed for the South Beaver Dam Pond. A surface water monitoring station in the vicinity of the likely impact of the contaminated groundwater is recommended. A new surface water sample in the northern portion of the South Beaver Dam Pond is recommended to assess potential impacts from the groundwater discharge from the K-1085 Firehouse Burn Area. Please add these sample locations to the revised document to address appropriate surface water characterization.

23. The data collection to support potential remedies like the addition of organic carbon to the K-901-A Pond to sequester PCBs is beneficial. Higher resolution cores to assess whether the contamination is being buried by cleaner materials may help. Section 6.3 on Phase 2 characterization activities should address data to support remedy design.

24. PFOS & PFOA were detected in the Fifth Five Year review at MIK 0.39 in Mitchell Branch below the K-1045-A Fire Training Area. Therefore, these constituents should be added to the analyte list for surface water. Also, the K-1085 Firehouse Burn Area groundwater drains to the Beaver Dam Ponds. There is a potential for perfluorinated compounds to have been used in fire training. Please discuss this possibility in the revised document on account of the K-1085 Firehouse Burn Area whether there should be sampling for perfluorinated compounds in surface water of the Beaver Dam Ponds.

25. The conceptual site model excludes several potentially complete exposure pathways for human receptors at the site without any rationale for elimination. Adequate rationale should be provided for any elimination or exclusion of potentially complete exposure pathways.

26. The RIWP does not discuss the methodology proposed for use in calculating the exposure point concentrations. The statistical method(s) used along with the decision rules including how nondetect data and duplicate sample results will be evaluated in the baseline risk assessment should be presented.

Specific Comments

1. Acronyms, Page xi: The acronym listed for Investigation Areas is IA. However, the acronym "IAs" is used as the plural throughout the document. Please correct.

2. Section 1.6, Overall Project Objectives, Page 1-16: There appears to be two typos in the bulleted list of investigation areas and project objectives. First, there should be a line break when listing project objectives after each investigation area is listed. Second, the second to last project objectives bullet states that data need to be collected to make a decision for groundwater in source areas. Groundwater appears to be out of place since the RIWP is focused on surface water, sediment, biota, and soil data. Revise the RIWP to address these apparent typos and/or provide more information on how decisions for groundwater will be addressed.

3. Section 1.3, Facility-Specific Remediation Program, Page 1-7: The last sentence on this page appears to incorrectly identify Zone 2 as including large, contiguous natural habitats managed for the protection of ecological population and communities. Given previous descriptions and map figure showing boundaries of Zone 1 and 2, it appears that the text is referencing Zone 1. Revise Section 1.3 to address this apparent discrepancy.

4. Section 1.4, Intent and Scope of the RIWP, Figure 1.4 Phased process of RIWP implementation, Page 1-12: There are acronyms in the figure and figure title that are not defined. Please revise Figure 1.4 to define acronyms so that the figure is independent from the RIWP text.

5. Section 4.4, Site-Related Chemicals, Page 4-10: Section 4.4 identifies site SRCs without any context as to how they relate to the RIWP or attached risk assessment work plans. Additionally, this section does not identify which data were considered when identifying SRCs. Revise Section 4.4 to include a description of how SRCs are used and what data will be used to identify them.

6. Section 4.6 Human Receptors and Exposure Pathways, Page 4-28: The acrynom "EPCs" is used but not spelled out. Please correct. Also, please add EPCs to the acronym list.

7. Table 4.1., Potential Site-Related Chemicals* for Remaining Media Investigation Areas – Sediment and Table 4.2., Site Related Contaminants for ETTP Surface Water by Area, Pages 4-11 to 4-19: It appears that each of the tables use a different symbol to identify SRCs that do not have screening values. Table 4.1 uses an open square and Table 4.2 uses "NS." The footnote for Table 4.1 indicates that the identified SRCs have been detected at least once but Table 4.2 does not indicate whether respective SRCs have been detected. If both tables are identifying SRCs that have been detected but do not have a screening value, then the symbols and footnote for Table 4.2 should match Table 4.1. If this is not the case, then Table 4.2 footnote should be expanded to identify whether "NS" identified SRCs have been detected and at what frequency (if applicable). Revise Table 4.2 accordingly.

8. Section 4.5.1, Fate and Transport of Contaminants in Aquatic Environments, Page 4-20: The discussion of fate and transport mechanisms in Section 4.5.1 is missing descriptions of potentially important transformation pathways. Examples include, cycling and speciation of metals/metalloids in sediments and water and environmental metabolism of SRCs that can lead to ultimate removal from the system or potential generation of new, novel SRCs which could be the case with some polycyclic aromatic hydrocarbons. Revise Section 4.5.1 to include descriptions of metals speciation and environmental metabolism as they relate to site conditions and contaminants.

9. Section 4.6, Human Receptors and Exposure Pathways, Page 4-26 and Table 4.3, Receptor Populations and Exposure Pathways at ETTP, ETTP Site-Wide RI Work Plan, Oak Ridge, Tennessee, Page 4-29: Subsections 4.6.1 (Adult and Child Recreators) and 4.6.2 (On-Site Trespasser) and supporting table (Table 4.3) appear to be internally inconsistent with respect to what sediment types/classifications will be evaluated for future potential human health risks. These sections attempt to differentiate sediment types and respective exposure evaluations based on seasonally exposed, perennial exposed, and bottom sediments; however, it is not clear which exposure pathways are relevant for each sediment type. Exposure pathways appear to be specific to each of these sediment types but Table 4.3, only lists exposed sediment without differentiating between seasonally or perennial exposed. Regardless of these inconsistencies, all sediments (seasonally exposed, perennial exposed, and bottom sediments) should have complete current and future incidental ingestion, dermal contact, inhalation of particulates and volatile organics, and external exposure to radionuclides exposure pathways. This is important so that no risks are overlooked during screening steps and all possible future exposure pathways can be evaluated. The consideration as to whether seasonally exposed, perennial exposed, and bottom sediments have complete inhalation pathways can be evaluated as potential refinements or uncertainties when drafting the HHRA. Revise the human receptor Section 4.6 (and subsections) text to state that all sediment types will have complete current and future incidental ingestion, dermal contact, inhalation of particulates and volatile organics, and external exposure to radionuclides exposure pathways.

10. Section 6.3.1, Ambient Media Toxicity Testing, Pages 6-31 and 6-32: This section does not identify Phase 1 criteria used to assess whether soil and surface water toxicity testing will be conducted. Section 6.3.1states that soil and water testing will be performed “if probable risks are indicated” and “if indicated” respectively. These criteria are too subjective and cannot be evaluated. Revise this section to include specific criteria that will be used to determine whether soil and water toxicity testing is needed.

11. Section 6.4, Benthic Community Surveys, Page 6-32 and Section 6.5, Fish Community Surveys and Tissue Analysis, Page 6-32: Sections 6.4 and 6.5 do not provide enough information to evaluate whether criteria used to determine the need for conducting benthic invertebrate and fish community surveys are justified. These sections state that invertebrate and fish community surveys will be performed “by comparing contaminant data representative of current ecological exposures with ecological effects benchmarks.” Revise respective RIWP section to specifically identify the source(s) of contaminant data and effects benchmarks. The criteria that would trigger the need to conduct respective surveys should also be described.

12. Section 6.8, Data Evaluation and Interpretation, Pages 6-33 and 6-34: Section 6.8 (Data Evaluation and Interpretation) does not provide any information on how Phase 1 and 2 sampling relates to human health and ecological risk assessment methodology. Different data sets will be generated according to Phase 1 and 2 sampling. As such, risk assessments could be conducted using either Phase 1 and/or Phase 2 sampling data. Revise Section 6.8 to specifically identify what phase-specific data will be used to conduct respective assessments.

13. Appendix D, Section D.3.3, Toxicity Assessment Exposure Assessment, Page D-11: This section states the primary sources of toxicity values that will be used in the HHRA, but it does not cite what secondary sources could be considered as necessary. In some cases, Integrated Risk Information System (IRIS) may not contain toxicity values for all the constituents to be evaluated in this HHRA, and as a result, additional sources could be consulted. Revise Section D.3.3 to cite which other sources of toxicity values could be considered for this HHRA.

14. Appendix E, Table E.1, Risk Questions, Measurement Endpoints, and Associated Decision Points for Each Assessment Endpoint, Page E-12: This table identifies fathead minnow surface water toxicity testing as a measurement endpoint but Section 6.3.1 (Ambient Media Toxicity Testing) does not identify fathead minnow testing. Revise Appendix E or the RIWP to address this apparent discrepancy.

15. Appendix E, Table E.3, Life History Parameters for Piscivorous Wildlife, Page E-15: Table E.3 identifies piscivorous wildlife receptor life history parameters without supporting references or justifications. This is problematic because three of the five receptors identified in this table (kingfisher, mink, and river otter) appear to be lacking incidental sediment ingestion (assuming Psed is the fraction of sediment in total diet). It is ecologically relevant and a common risk assessment practice that these three receptors should be exposed to sediment via incidental ingestion. Revise Appendix E, Table E.3 to include the fraction of sediment in total diet for kingfisher, mink, and river otter. The table should also be revised to include references for cited life history parameters for all receptors. If parameters are based on interpretations of general life history attributes, supporting text should also be included so that selections are adequately justified.

16. Appendix E, Table E.4, Life History Parameters for Aerial Insectivores, Page E-15: Incidental sediment ingestion is not identified for northern rough-winged swallow and little brown bat. Revise this table to include the fraction of diet for incidental sediment ingestion. Note that life history attributes for little brown bat may preclude the addition of sediment ingestion but this is not the case for the swallow.

17. *Table 6.1, Summary of Phase 1 Sampling Approach, Page 6-2.* Please revise the table to include the analytes for the proposed samples in the table. Table B.4.1, Analytical Parameter Group, indicates methods for parameters overall but there is no table describing which analytes will be measured in specific samples. According to Section 6.8.2, new data collected at each investigation area will be screened for ecological risks from the beginning – through additional sampling (i.e., COPECs are not eliminated based on historical risk assessments). However, narrowing the analyte list may have the effect of eliminating COPECs. In the revised document ensure that the full suite of relevant chemical classes will be analyzed in environmental media.

18. *Section 6.2, Characterization Activities – Phase 1, Page 6-2*. Text indicated that data collected previously will be compared with newly collected data to determine whether the data sets can be combined to provide a more robust characterization of current conditions. The decision of how many samples to collect should be based on a statistical evaluation of how many samples would be needed to detect a difference from the historical results. For some sampling units there may be too few data available to consider actions. At those locations new samples must be collected to ensure the contaminant(s) are defined spatially and at depth.

19. *Section 6.2.4 K-901-A Pond, Page 6-14.* Transect samples for the K-901-A Pond are designated as media type "SO" for soil in Table 6.1. The samples from transects are described as exposed sediment samples. The treatment of these samples in the ecological risk assessment will depend on whether they

are considered soils or sediments. Revise the work plan to describe the type of habitat provided and how often soils are flooded to help explain whether they are soils or sediments.

20. *Section 6.2.4 K-901-A Pond, Page 6-14.* Samples of surface water, sediment, and transect samples of exposed sediments for the K-901-A Pond should include analysis for hexavalent chromium. Hexavalent chromium was identified as a site-related contaminant in Table 4.2. Chromium was previously identified as a chemical of potential concern for the K-901-A Pond.

21. *Section 6.2.7, Beaver Ponds, Page 6-20.* The N BEAVER POND E sample had the highest concentration of arsenic and other constituents. It is proposed to sample from this location again. However, there are no step out samples nearby to assess the extent of the contamination. There are no samples proposed for the channel entering from the southwest that leads to the K-720 Fly Ash Pile. The metals contamination may come from the fly ask pile. Samples in the vicinity of where the potential impacts from the fly ash pile may have occurred are necessary to determine if the fly ash is a principle threat source material. Add necessary sample locations in this area to assess this determination in the revised document.

22. *Section 6.2.9, Mitchell Branch, Page 6-25.* Mitchell Branch sediments are proposed for the sampling of PCBs, mercury, nickel, and thallium. These constituents have previously been identified as of concern. No reference was provided where this conclusion was presented. The work plan does not explain the nature of the concerns or how this relates to Table 4.2 and identifies additional site-related constituents. The identification of constituents of potential concern did not consider the evaluation in Appendix C. It is not clear why other investigation areas are being sampled for full scans while Mitchell Branch is only sampled for a limited set of constituents. Many potential sources could impact Mitchell Branch. The existing data for Mitchell Branch is potentially outdated. The surface water sampling described on Page 6-26 should state what parameters will be analyzed. Hexavalent chromium should be among the parameters analyzed in Mitchell Branch surface water. Section 6.3.1 indicated that detection of hexavalent chromium in Mitchell Branch surface water could trigger *Ceriodaphnia* testing in Phase 2.

23. *Section 6.2.9, Mitchell Branch, Page 6-25.* Discuss whether suitable background samples are available for Mitchell Branch surface water and sediment. If insufficient then additional background data will need to be collected.

24. *Section 6.2.9, Mitchell Branch, Page 6-25.* Sediment sampling will consider the substrate to target depositional areas. However, areas of upwelling of groundwater were not considered for sampling of surface water. Describe the groundwater interaction with Mitchell Branch and justify why no areas of groundwater daylighting along Mitchell Branch are necessary – based on data and not assumptions.

25. *Section 6.3., Phase 2 Characterization Activities, Page 6-31.* For sites where comparison to conservative screening values or when food-chain models with modeled prey tissue concentrations cannot screen out the COPECs. Site-specific tissue data collection may be needed to fill data gaps. Discuss existing tissue data to support the ecological risk assessment and data gaps that require additional data.

26. *Section 6.3.1 Ambient Media Toxicity Testing, Page 6-31.* The toxicity testing recommended is provided in Table 1. The current proposal is less conservative because only short-term acute toxicity tests are planned. Table E.1 of assessment and measurement endpoints has survival and growth of earthworms in 21-day toxicity tests. Earthworm reproduction or cocoon production should be added.

Table E.1 has a measurement endpoint of survival of *Hyalella* in 10-d sediment toxicity tests and should add chronic survival, growth, and reproduction in 42-day tests. More than one test organism is recommended for sediments such as Chironomids. Appendix A and Appendix B did not contain information on the toxicity testing or indicate which test method will be used. Revise the appendices to include the toxicity test sampling procedures and quality assurance project plan information included below:

Table 1. Recommended toxicity testing			
Medium	Test Species	Test Type	Test Method
Soil	Earthworm, *Eisenia fetida*	Acute, survival	EPA/600/3-88/029; A.8.5, ASTM E1676-12
Earthworm, *Eisenia fetida*	Chronic, reproduction	ISO 11268-2:2012	
Lettuce seed	Acute, germination	EPA/600/3-88/029; A.8.6	
Lettuce root	Chronic, elongation	EPA/600/3-88/029; A.8.7	
Sediment	Amphipod, *Hyalella azteca*	Chronic, survival, growth,	EPA/600/R-99/064 (42-day); 100.4
Midge, *Chironomus dilutus* (formerly *Chironomus tentans*)	Life Cycle	EPA/600/R-99/064: 100.5	

27. *Section 6.5, Fish Community Surveys and Tissue Analysis, Page 6-32.* The text indicates that a onetime fish community survey and tissue analysis for the Beaver Dam Ponds was identified as a known data need. It is unclear why the data is not being collected in Phase 1. The methodology for fish community surveys was indicated to be provided in Section 4 of the SAP in Appendix A. The information, however, was not found. Please address this omission in the revised document.

28. *Appendix C, Summary Statistics for Surface Water and Sediment.* Tables were provided for sediments. However, summary statistics for surface water were not provided. Please provide summary statistics/screening tables for surface water.

29. *Table E.1, Risk Questions, Measurement Endpoints, and Associated Decision Points for Each Assessment Endpoint*. Additional assessment endpoints are needed to address the risk questions and measurement endpoints. Add survival, growth, and reproduction of fish communities to go along with the first risk question regarding comparison of surface water concentrations to benchmarks for survival, growth, and reproduction of fish. The measurement endpoint for growth and survivorship of larval fathead minnows would apply to this assessment endpoint. The measurement endpoint for fecundity and survivorship of *Ceriodaphnia* pertains to an assessment endpoint for survival, growth, and reproduction of aquatic invertebrates. Species richness and abundance is part of the assessment endpoint for survival, growth, and reproduction of fish communities. Survival, growth, and reproduction should be included in the assessment endpoint for the benthic invertebrate communities as well. Survival, growth, and reproduction should be part of the assessment endpoints for the wildlife populations. Tissue residues in invertebrates, such as dragonflies, compared to tissue residue effects levels can be a measurement endpoint. Address the issue of survival, growth, and reproduction as appropriate in the revised document.

30. *Tables E.2 though E.4.* The exposure parameters are conservatively assuming high end-point estimates of ingestion rates from EPA (2005) guidance. However, central tendency ingestion food rates from Nagy (2001) equations are now recommended. [Nagy, K.A. 2001. Food requirements of wild animals: predictive equations for free-living mammals, reptiles, and birds. Nutrition Abstracts and Reviews, Series B 71, 21R-31R]. Table E.4 is missing the complete dietary components for the rough-winged swallow. The swallow should be assumed to consume 100% aerial invertebrates. Tables need to add the sources of the information. The concentration in aquatic invertebrates is not included in the measurement endpoints. It is unclear how the concentrations in aquatic invertebrates will be derived. Bioaccumulation factors and toxicity reference values to support the ecological risk assessment were not provided and must be added to the revised work plan. At a minimum the bioaccumulation factors and toxicity reference values should be provided for the COPECs described in Section 6.

31. *Appendix G, Data Quality Objectives.* Table G.1 for K-1007-P Ponds indicates that historical and new dragonfly data was an input to the decision. Historical and new dragonfly data was also indicated to be an input to the decision for the K-901-A Pond and the K-720 Slough. However, Section 6.3 does not describe the collection of insect tissue samples. The number of dragonfly samples to be collected and locations for the samples are not provided. Appendices A and B do not cover the collection of insect tissue data. Please add this information to the revised document.

32. *Appendix G, Data Quality Objectives.* Section 6.1 indicates there will be contingent collection of ecological data. The data quality objectives (DQOs) do not include a testable hypothesis or question linked to the data that will determine whether the collection of ecological data is warranted. Most of the decision points in Table E.1 pertain to ecological data collection. The DQOs currently state that ecological data is needed to support decision making and do not reflect a contingency such as a concentration above an effects level benchmark. Another decision in the tables was whether surface water and sediment were adequately characterized. The DQO process should define adequate characterization of surface water and sediment versus including it as a question. The statement of the decisions is inadequate because it does not guide the optimization of the sample design. EPA is aware that certain constituents in sediment and surface water are currently a concern. If the goal of the new data collection is to compare current conditions to historical data, this should be clearly stated in the DQO. The number of samples needed to detect a difference in concentration should be based on a statistical evaluation that considers the variability and power to detect a difference. The DQOs do not explain how the collection of proposed samples will decide whether remedial actions are warranted to protect the environment. The DQOs do not describe what the data will be compared with or the process by which data will be evaluated. Please update the document with this information.

33. **Section 1.6, Overall Project Objectives, Page 1-16:** This section states the overall project objectives are to "Identify the data needed to make a decision for groundwater for the identified source areas, and describe the methods to be used to collect the necessary data." The RI objectives are narrow in scope and do not address other impacted media discussed in the report (i.e., surface and submerged sediment, surface water, etc.). The RI objectives should be broadened to include the following:

A. Identify all sources of contamination at the site and define the nature and extent of contamination.
B. Identify and define sources, if any, due to past and current discharges or spills to surface water, and define the nature and extent of contamination on the banks and submerged sediments at the site.
C. Collect data for treatability studies and feasibility studies, if needed.

For the purposes of the scope of this remaining media work plan (the final such effort by DOE across the ETTP), these three objectives should be integrated into all of the activities associated with the work plan to ensure adequate data collection to move forward to the Record of Decision. Revise the document to include these objectives.

34. **Figures ES-1 and 4.1, General Conceptual Site Model for Remaining Media:** Please include the depth intervals that are proposed for exposed and submerged sediments in the CSM and the onsite human receptors (recreators, trespassers, industrial workers, etc.) to be evaluated in the baseline risk assessment. In addition, volatile organic compounds (VOCs) have been detected in groundwater at the ETTP. Therefore, VOCs may be present in sediments and surface water via surface runoff and other migratory pathways (e.g., groundwater discharge to surface water). Recreational and industrial receptors may potentially be exposed to VOCs via inhalation of contaminated ambient air. The inhalation of volatiles in ambient air should be included in the note at the bottom of the figure for excavation workers. Further, Section 3.3 "Demography" (page 3-3) states, "Sport hunting of game birds and game animals occurs seasonally in the region, and deer and wild turkey hunting is conducted on much of ORR as a conservation measure. Surface water bodies, specifically the K-1007-P ponds and K-901-A Pond have been used for illegal fishing by individuals who trespass onto the DOE controlled property." Based on this information, the CSM should include the additional exposure pathways:

A. Direct contact with surface and submerged bank and pond sediment/soil during excavation activities along the banks of the floodplain (including inhalation of VOCs in ambient or trench air for shallow aquifers and radiation exposure);
B. Seasonal consumption of game animals, waterfowl, and other aquatic organisms including invasive or exotic aquatic species, such as frogs and turtles, taken from impacted surface water bodies; and
C. Seasonal consumption of agricultural crops and other floodplain vegetation.

For the purposes of the scope of this remaining media work plan (the final such effort by DOE across the ETTP), these three exposure pathways should be added to the work plan to ensure sufficient data collection to move forward to the Record of Decision. Revise the document to include these objectives or add text to justify why these exposure pathways were not necessary.

35. **Section 3.6, Radiological Survey, Page 3-9:** It states, "Additional radiological surveys will be performed as needed based on site use and the potential residual radioactive contamination." However, it is unclear what investigation areas have been surveyed and whether any of the areas investigated have been designated as impacted in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (EPA 402-R-97-016, August 2002). The RIWP does not address decisions pertaining to how samples were selected or will be selected and what surveys and samples were implemented. There are also no figures provided that outline the boundaries of the areas screened. Please provide a reference or include in the appendices any previously furnished documents, such as a radiological screening survey plan or supporting information describing the walkover survey and sampling that took place and the radiological classification for the site. In addition, the RIWP scope should include generating radiological data, which when combined with data from the gross gamma survey, will support a determination of a MARSSIM classification, the need for additional delineation data, and any potential impacts on groundwater flowing to the creeks and seeps.

36. **Section 3.8.9, Surface Water and Sediment Background, Page 3-62:** The text states, "Reference levels for radionuclides that were not analyzed in soil samples collected from reference locations were inferred, when feasible, using analytical data for parent radionuclides or through mass-to-activity concentration conversions." A reference and/or rationale for this approach is not described in the RIWP. It is also unclear from this statement what qualifies as a feasible condition for using analytical data for parent radionuclides or mass-to-activity concentration conversions. Address these issues in the revised document.

37. **Table 3.19, Freel Bend – Surface Water and Sediment Reference Levels, Page 3-64:** Footnote [d] states, "It is unknown if the full or one-half detection level was used in calculating the mean reported in Tables 3.21 and 3.22 for analytes that were not detected. Reference levels are applicable to evaluation of ETTP surface water and sediment samples collected at Mitchell Branch." This uncertainty has implications on the calculation of the background means being reported for Gum Branch for comparison to analytical results in Mitchell Branch. This data sensitivity issue should be further discussed in the uncertainty section of the risk assessments particularly in instances where the detection limit is elevated.

38. **Table 3.20, Inferred Background Values for Radionuclides, Page 3-64:** The inferred activity concentrations were described as being based on the assumption of secular equilibrium with the nearest parent for which a reference level was established by analytical data. However, no information is provided to support this approach and it is unclear whether surface water and sediment background levels will be established/refined at a later time as part of the RI activities. In addition, assuming secular equilibrium for radiological background level, but not for risk characterization is inappropriate. Please address these issues in the revised document.

39. **Section 3.9, Ecology, Page 3-66:** This section states that the wetlands identified occurs in association with springs and seeps along stream bottomlands, in areas of seasonally elevated groundwater and high surface water levels on the alluvial islands and floodplains of Poplar Creek and the Clinch River. It is known that buried waste contaminants have migrated to shallow groundwater which flows into the creeks. As noted in Section 4.2.2, these buried wastes remaining at industrial facilities below the water table or the Zone 2 Record of Decision (ROD) limits of 10 feet in depth represent a continual source of radiological and chemical contamination via leaching through the waste and migration to the creeks and seeps. However, it is unclear whether previous seep investigations have been conducted or will be conducted as part of the RI. Please address this likely need for further seep/creek characterization in the revised document.

40. **Section 4.2.5, Storm Drains, Page 4-4:** This section mentions "91 permitted outfalls covered by the current ETTP NPDES Permit, 27 of which are designated as representative outfalls." At a minimum, at least one sediment and surface water sample should be collected from each outfall/discharge pipe, in addition to proposed locations, to determine the presence/absence of site-related contamination. Based on the historical sampling locations described for each of the investigation areas in Section 6.2 and the proposed sample counts, it does not appear that all of the outfalls/discharge pipes have been or will be investigated. Please provide the rationale for excluding sample collection at certain outfalls/discharge points.

41. **Table 4.2, Site-Related Contaminants for ETTP Surface Water by Area:** This table indicates the site related contaminants (SRCs) for ETTP surface water by investigation area. However, the sources of the SRCs in each of the seven investigation areas listed is not presented or discussed in the RIWP. In addition, please explain why sample filtration was not proposed for chromium and hexavalent chromium

in surface water yet the text in Section 6.2.1 "Surface Water Sampling" and Section A.4.2.2 "Identification of Samples to be Collected" states that filtered water will be analyzed for metals to support ecological risk assessments. Note that there is a filtration requirement (within 15 minutes of sample collection) for hexavalent chromium in EPA Method 218.6 to prevent interconversion of chromium species. Address these issues in the revised work plan.

42. **Section 4.4, Site-Related Chemicals, Page 4-10:** It was stated that there are two compilations of screening levels for protection of human health when assessing radionuclides. These are the DOE Oak Ridge National Laboratory's Risk Based Screening Levels (RBSLs) and EPA's Preliminary Remediation Goals (PRG) for Radionuclides. However, the text does not describe the differences between these two online calculators. It should be noted that EPA no longer recommends the use of +D slope factors in Superfund risk assessments. Instead, the slope factors provided in EPA's online PRG for Radionuclides calculator should be used in lieu of DOE's online calculator. EPA's slope factor recommendation is described in Section 2.3 "Slope Factors" of the User's Guide. The +D slope factors are less protective than EPA's slope factors because they do not account for all short-lived and immediate progeny that may be present in contaminated media. Some of the disadvantages of using the old +D values from FGR-13 and HEAST are discussed in Section 2.8.2 of the User's Guide. Please make these corrections to the revised document.

43. **Appendix A, Section A.5, Analytical Approach, Page A-41:** This section states, "Fillet and whole body samples will be analyzed for mercury, metals, polychlorinated biphenyls (PCBs), dioxin/furans, including radiological parameters." However, this statement conflicts with the information presented in Table A.1.1. (Remaining Media Proposed Sample Summary) which lists whole body samples for some areas but not others. Please rectify this inconsistency between the text and tables. It was also stated in this section that all samples for radiological parameters will be analyzed for alpha and beta activity, uranium (U) isotopes (U-233/236 and U-238) and technetium-99. Please provide an explanation as to why U-233/U-234 and U-235/U-236 are not the U isotopes being analyzed. While it is recognized that the alpha and beta activity and gamma spectroscopy will be used to confirm that additional significant isotopes of concern are not present, the rationale for limiting the analysis to these specific radioisotopes should be provided.

44. **Table A.1.1, Remaining Media Proposed Sample Summary Table:** The following deficiencies were observed and should be addressed accordingly:

A. The rationale for selecting the number of samples per sampling location should be discussed in further detail. Although Section A.4.2.2.1 states, "A combination of random and biased locations being selected based on prior data to augment/verify existing data in areas not covered with clean fill during the removal action and to evaluate potential recontamination of clean fill" for the K-1007-P Ponds, it is unclear whether this was also conducted for other investigation areas. It is suggested that the sampling rationale follow EPA's Superfund Program Representative Sampling Guidance (EPA 540/R-95/141, December 1995) or other EPA sampling guidance documents. In general, a systematic sampling approach would provide representative concentrations and sources present onsite.

B. Footnote [a] states that field screening will be performed for health and safety purposes. However, all sediment/soil borings require field screening with monitoring instruments to assist in collecting the highest reading sample from the mid-interval depth being proposed in the RIWP.

C. No radiological analysis is proposed for game fish collected in Beaver Pond (North and

South). It appears no previous sampling investigations have been conducted in Beaver Pond, yet no radiological samples are proposed and no rationale is provided for its exclusion. It is also unclear why 6 filleted game fish are proposed in one location in the pond, but 30 whole body prey fish in another location. The table also does not specify which group of samples would come from the North versus South Beaver Pond locations.

D. No rationale was provided for the target fish species selected for the North and South Beaver Pond. For instance, large mouth bass and/or bluegill sunfish (as available) are listed but no other game fish including bottom feeding fish, such as catfish, were proposed. Bluegill sunfish was the only fish proposed for collection in one of the Beaver Pond locations.

The target species of game fish selected should be based on the results of the fish community survey and should be flexible to allow collection of other game fish observed that may have migrated into the investigation area.

45. **Table F.1, Applicable or Relevant and Appropriate Requirements:** For radioactive contaminated soils/sediments, DOE O 458.1(k)(6)(f)(1)(a) states, "If both thorium-230 and radium-226 or both thorium-232 and radium-228 are present and not in secular equilibrium, the appropriate pre-approved limit must be applied to the radionuclide with the higher concentration." The RIWP does not discuss the implications of this rule when assuming secular equilibrium and inferring background reference levels for progeny based on the analytical results of its parent.

(End of Comments)