

**Summation of Comments Received and Response to Comments  
Tennessee Valley Authority (TVA) Kingston Ash Recovery Project  
Engineering Evaluation/Cost Analysis Work Plan  
Public Comment Period October 21-December 20, 2009**

An Administrative Order and Agreement on Consent was signed between EPA and TVA on May 11, 2009 providing the regulatory framework for all restoration efforts. The EPA Order requires TVA to submit for approval a draft work plan for performing one or more Engineering Evaluation/Cost Analyses (EE/CAs) for non-time critical removal actions to be taken at the Site. Current restoration efforts are being conducted as a time-critical removal action.

The EE/CA work plan describes two concurrent non time-critical removal actions: one to address the Swan Pond Embayment and dredge cell area, and the second to address the remaining ash in the Emory River (following the time-critical removal completion), as well as ash in the Clinch and Tennessee Rivers. Significant data uncertainties exist in characterizing the river systems, and additional study and time are needed for comprehensive assessment of ecological risk in the rivers. After completion of additional data collection in the river systems, alternatives will be developed that address any residual ash remaining in the river following completion of the time-critical removal action and any areas impacted by restoration activities.

The scope of the Swan Pond embayment/dredge cell removal action includes removal of the coal ash in the embayment, closure of the dredge cell, and disposal of the removed material. A range of alternatives for the embayment and dredge cell has been developed. Each of these alternatives involves removing ash and restoring the embayment to pre-spill conditions. The three alternatives are:

**Alternative 1 - Excavation of the embayment and off-site disposal.** This alternative would remove the ash in the embayment and the ash from the test embankment within the dredge cell and dispose of the ash off-site. A dike would be installed to keep ash in the cell from entering the embayment in the future, and the dredge cell would be graded for drainage and closed. The height of the closed cell would be approximately 780 to 790 feet (ft) above mean sea level (msl). A total of approximately 2.7 million cubic yards (cy) of removed material would be disposed off-site.

**Alternative 2 - Excavation of the embayment and portions of the dredge cell, both with off-site disposal.** This alternative would remove the ash in the embayment and test embankment, plus enough ash from the dredge cell to limit long-term reliance on a dike between the cell and the embayment. Enough ash would be left in the dredge cell to provide buttressing for the remaining dikes. The dredge cell would be graded to a gradual slope and closed, with a maximum height of approximately 765 to 775 ft msl at its highest point. A total of approximately 6.3 million cy of removed material would be disposed off-site.

**Alternative 3 – Excavation of the embayment and on-site disposal in the dredge cell.** This alternative would use the dredge cell as a disposal facility. No material would be taken off-site. The ash in the embayment would be removed and stacked in the dredge

cell. Material placed in the cell for the test embankment would remain in the cell. A dike would be installed to keep ash in the cell from entering the embayment in the future, and the dredge cell would be graded for drainage and closed. The height of the closed cell would be approximately 790 to 800 ft msl.

On October 20, 2009, EPA approved TVA's EE/CA work plan, a document which describes the non time-critical removal actions at the site.

On October 21, 2009, TVA issued a public notice announcing the availability of the EE/CA work plan and the associated Administrative Record and starting a 30-day public comment period. The initial public comment period ran from October 21-November 20, 2009. On November 19, 2009, TVA announced that it was extending the public comment period on the EE/CA work plan through December 20, 2009.

TVA has reviewed and carefully considered the public's comments. Pursuant to the EE/CA work plan, work has continued at the Site during the 60-day public comment period. Therefore, some of the comments have been addressed by ongoing work at the site, or by work plans or other deliverables prepared under the terms of the EE/CA work plan, including the Embayment/Dredge Cell EE/CA report. A 30-day public comment period on the Embayment/Dredge Cell EE/CA report was initiated on January 19, 2010. These documents are available at the Administrative Record, which can be found online at [http://www.tva.com/kingston/admin\\_record/index.htm](http://www.tva.com/kingston/admin_record/index.htm) or at the locations below:

TVA Outreach Center  
509 N. Kentucky Street  
Kingston, Tennessee  
(865) 632-1700

Kingston Public Library  
1004 Bradford Way  
Kingston, Tennessee  
(865) 376-9905

On computer disk at:

Harriman Public Library  
601 Walden Street  
Harriman, Tennessee  
(865) 882-3195

TVA has concluded that no comments were received that disclosed facts or considerations which indicate that the EE/CA work plan is inappropriate, improper or inadequate. As a result, TVA will not modify the EE/CA work plan based on the comments received during this public comment period. Rather, TVA has prepared the following responses to the comments received during the public comment period by email, mail and during the October 1, 2009 public meeting.

## COMMENTS RECEIVED VIA EMAIL

### 1. TVA Did Not Explore All Coal Ash Removal and Disposal Options at Kingston

TVA did not explore all options in the non-time critical ash removal EE/CA work plan circulated for public comments. For instance, TVA could dispose of coal ash on-site, in a dry, lined landfill instead of placing ash back into the dredge cell from which it came on December 22, 2008. Yet the EE/CA work plan does not consider disposal of the coal ash removed from the Swan Pond Embayment and dredge cell in a lined, engineered landfill constructed on the power plant site. The work plan provides no explanation for the absence of this option. The disposal of the coal ash from the embayment and failed dredge cell in a lined landfill near the power plant would provide the best permanent disposal alternative for the coal ash. Furthermore, the construction of an onsite, engineered landfill would facilitate TVA's stated long-term plan to convert the Kingston Fossil Plant from wet to dry disposal. Moreover, TVA recently purchased 600 acres around Kingston and stated, "To settle other claims arising from the ash spill, TVA had paid approximately \$69 million as of September 30, 2009, \$42 million of which was spent to acquire 145 tracts of land consisting of approximately 600 acres."<sup>1</sup> TVA has more than adequate land holdings to investigate a new, on-site location in which to dispose of ash removed from the embayment and dredge cell, yet TVA failed to include any information about on-site disposal and appears to have never considered the option of disposing of ash in an on-site, dry, lined and properly permitted facility. We ask: *Did TVA consider removing and disposing of ash in an on-site, dry, lined and properly permitted disposal facility? And, if not, why was this option, given TVA's extensive land holdings around the Kingston Fossil Plant, not considered?*

<sup>1</sup>Tennessee Valley Authority (TVA), Annual Report (Form 10-K) (2009).

**TVA Response:** TVA has considered multiple disposal options for the ash to be removed from the embayment during the non-time-critical removal action. Three options (and three subalternatives) that achieve the removal action objectives, and that represent a reasonable range of alternatives, have been developed for further evaluation in the Embayment/Dredge Cell EE/CA report. Other options were considered and not carried forward for further evaluation, as described in the EE/CA work plan. TVA has also considered an option of placing ash in an onsite, lined, and engineered landfill on TVA-owned property at Kingston. However, siting, permitting, and constructing a new landfill would require several years to complete, which would substantially delay removal of ash from the embayment west of Dike #2. The cost to develop and close a new landfill (about 50 acres in size) in addition to the required closure of the Dredge Cell and Ash Pond would be greater. More importantly, disposing of the ash in a new landfill would not be effective in reducing potential contaminant flux from the closed Dredge Cell, and would instead create new land area dedicated to permanent waste management land use. These disadvantages outweigh the perceived protection against leachate migration that a new lined landfill might afford, particularly in view of the fact that groundwater quality at the Dredge Cell has only slightly exceeded drinking water standards for one constituent (arsenic) after more than 50 years of being in contact with the ash. For these reasons, this option was not considered further.

Please note that existing TVA land is permitted for other uses and cannot be converted to a new lined landfill without approval of a new permit. Note also that newly-acquired property in the area surrounding the Kingston plant is unsuitable for siting of a new landfill due to adverse

constraints of terrain, geohydrologic conditions, stormwater and flood management, and surrounding residential land use.

## **2. TVA Did Not Consider “Best Practices” for Coal Ash Disposal**

Proper, on-site disposal would signal to Congress and both state and federal regulators that TVA is serious about transitioning from wet to dry coal ash disposal and is willing to meet or exceed current state regulations for coal ash disposal. Proper on-site disposal of Kingston coal ash could also serve as a model “best practices” for the nation. TVA must consider disposal in a lined on-site landfill as an alternative in the draft EE/CA. Such a landfill must embrace “best practices” for dry ash disposal including full site characterization, installation of a composite liner, installation of a leachate collection system, and implementation of quarterly groundwater monitoring with enforceable corrective action standards. To be clear, TVA should explore the option of on-site, dry disposal for non-time critical ash removal and disposal plans. As presently proposed, TVA’s options consist of: (1) Excavating the embayment and disposing of 2.7 million cubic yards (cy) offsite and grading and closing the dredge cell; (2) Same as previous option, but 6.3 million cy of ash would be removed and disposed offsite; and (3) Excavating the embayment and disposing of ash onsite in the dredge cell (i.e. failed dredge cell would become a new coal ash disposal facility).

**TVA Response:** TVA is committed to converting to dry ash disposal for ongoing plant operations, and has an active project underway to implement that conversion by early 2012. That plant operations project will comply with state regulations and implement appropriate “best practices” for management of ash and leachate, including site characterization, composite liner, leachate collection system, and groundwater management. That plant operations project is separate from the CERCLA actions being addressed in the work plan.

Please note that that TVA has developed an alternative that includes onsite, dry ash disposal for the non-time critical ash removed from the embayment (Alternative 3 in the EE/CA report). This alternative does not include development of a new coal ash disposal facility, for the reasons explained in response to comment #1, but does include closure of the Dredge Cell and adjacent Ash Pond in accordance with TDEC regulations.

## **3. TVA Failed to Explain How the Failed Dredge Cell Could Provide Safe, Long-Term Disposal**

While the work plan suggests the use of the failed dredge cell as a future permanent disposal site for millions of tons of wet ash, the plan does not explain why the failed cell would provide safe and secure disposal. Obviously the issues raised in the recent analysis of the dredge cell’s structural failure would need to be thoroughly researched and an engineering analysis provided to demonstrate that all structural issues are completely resolved.<sup>2</sup> Second, the work plan does not explain why the unlined dredge cell could possibly be a safe permanent repository for the coal ash. EPA has documented that unlined coal ash disposal units pose an unacceptable risk to human health and the environment.<sup>3</sup> In fact, the draft EE/CA work plan notes that elevated levels of arsenic have already been detected in the groundwater downgradient of the dredge cell. The draft work plan notes “Arsenic levels have been historically low; however in recent sampling

arsenic has been detected at 14 µg/L in one well, which slightly exceeds its maximum contaminant level (MCL) of 10 µg/L.”<sup>4</sup> *We ask TVA to provide a detailed justification for using the failed dredge cell as a permanent repository for coal ash removed from the Swan Pond Embayment. In addition, the draft EECA should provide all available groundwater monitoring data, which is simply summarized in the work plan.*

<sup>2</sup>See, e.g., Lessons Learned from the TVA Kingston Dredge Cell Containment Facility Failure, TDEC Advisory Board Recommendations for Safe Performance, November 30, 2009.

<sup>3</sup>See U.S. EPA, Health and Ecological Risk Assessment for Coal Combustion Wastes, August 2009 (draft).

<sup>4</sup>TVA, *Kingston Fly Ash Recovery Project -on-Time Critical Action Scope and EE/CA Work Plan for Public Review* (prepared by Jacobs Engineering), vii (2009).

**TVA Response:** Please note that the work plan provides a framework for writing an EE/CA; the engineering evaluations and cost analyses are ongoing and will be presented in the actual Embayment/Dredge Cell EE/CA report. The EE/CA report will present an engineering analysis of structural stability of the final Dredge Cell dikes under both static and dynamic (earthquake) conditions, and will in particular address the four primary contributors to the cell failure as noted in the AECOM Root Cause Analysis report. The EE/CA report will present a summary of groundwater monitoring data and describe the landfill closure actions for capping the landfill to reduce leachate generation in compliance with TDEC regulations.

Please note that TVA has considered excavating the entire Dredge Cell area and disposing of all material offsite, as was presented in the EE/CA work plan. However, the shear volumes of material would be overwhelming on offsite transport, transportation risks, implementability at a depth of 40 ft below reservoir level, and cost. As explained in response to comment #1, the disadvantages outweigh the perceived protection against leachate migration that a new lined landfill (onsite or offsite) might afford, particularly in view of the fact that groundwater quality at the Dredge Cell has only slightly exceeded drinking water standards for one constituent (arsenic) after more than 50 years of being in contact with the ash.

#### **4. The EE/CA Work Plan Failed to Address the Need for a Hydrological Assessment of the Kingston Site**

Although the work plan provides evidence of groundwater contamination, as described above, there is no plan to conduct a comprehensive hydrological investigation of the site to determine the nature and extent of the contamination, the rate and direction of groundwater flow, and the potential impact that contaminated groundwater may have on drinking water or surface water. The draft EE/CA should contain the results of such an investigation, and if necessary, suggest remedial actions to address contaminated groundwater. The draft EE/CA should also set forth a long-term plan for monitoring groundwater at the site, because it is possible that adverse impacts have not yet reached the monitoring wells. *We ask TVA to provide a detailed hydrologic study of the site to (1) determine the nature and extent of the adverse impact of the coal ash on groundwater and surface water; and (2) determine how the site should be monitored in the future to ensure that migrating contaminants are discovered before reaching drinking water wells or sensitive receptors.*

**TVA Response:** TVA recognizes the need for a hydrological assessment of the site and is developing detailed plans to determine the potential long-term impact that groundwater beneath

the Dredge Cell and Ash Pond may have on surface water in the Watts Bar Reservoir. This hydrological assessment is being conducted as part of the EE/CA for the river system, not as part of the EE/CA for the Dredge Cell. Please note there are no drinking water aquifers on the site, since groundwater discharges only a short distance to the reservoir, and that contamination has not been found in bedrock underlying the site. In addition, please note that all alternatives under evaluation would install a foundation treatment zone, consisting of soil-cement columns installed to bedrock; this zone will have a lower permeability than the sandy alluvium soils beneath the site to further retard groundwater transport.

TVA is currently preparing a detailed Sampling and Analysis Plan (SAP), which will outline planned hydrological assessment and 3-dimensional fate and transport modeling of the closed Dredge Cell. That SAP will specify the installation of additional permanent and temporary wells to augment historical information and the existing well network. Data to be compiled includes: (1) additional stratigraphic data to define the 3-dimensional overburden lithology, thickness, and top of bedrock elevation within the groundwater model domain, (2) water-level measurements in wells, piezometers, and surface water reference points to calibrate the groundwater flow model to the current local head field; (3) porosity and hydraulic conductivity data to develop and calibrate the hydrologic flow model; (4) column leaching tests on ash samples to establish relationships between concentration and leaching pore volumes for each modeled parameter; (5) soil attenuation capacity (adsorption and ion-exchange capacity) to define aquifer conditions affecting constituent fate and transport; (6) “leachate” concentrations to define the source term and to evaluate ash-leachate partitioning; (7) aqueous-phase concentrations in the aquifers through which the leachate migrates to define initial transport model conditions regarding nature and extent; and (8) surface water monitoring to define river system conditions following the end of river dredging.

Please note that all alternatives under evaluation will develop a plan for long-term groundwater monitoring to ensure that contaminants are discovered before reaching drinking water wells or sensitive receptors. That plan would be developed as part of the closure of the Dredge Cell.

## **5. TVA Failed Entirely to Address Closure of the Failed Dredge Cell in the EE/CA Work Plan**

Totally absent from the draft EE/CA work plan is any mention of the closure of the failed dredge cell. The work plan does mention, as described above, that groundwater contamination from arsenic may be increasing, with the implication that the remaining coal ash in the unlined cell is the source of that contamination. The structural integrity of the cell and the continued leaching of contaminants from the millions of tons of coal ash still remaining in the cell must be addressed in the draft EE/CA. If the cell is not properly closed, such waste deposits may be a security concern to downstream residents as well as a significant source of contamination to groundwater and surface water. *TVA must include, therefore, a plan for closing the dredge cell to ensure that no further damage, either to groundwater or surface water or public safety, occurs from the cell. If the dredge cell is closed with coal ash remaining in the unit, the closure plan must include an assessment of whether additional measures are necessary (e.g., a slurry wall or pump and treat system) to address the leaching of contaminants and, at a minimum, must present plans for long-term monitoring of the disposal unit.*

**TVA Response:** The EE/CA work plan specifically identifies closure of the Dredge Cell as a requirement of the TDEC Commissioner's Order and EPA Administrative Order on Consent, as described in the sections regarding the scope and path forward for the site. As explained in response to comment #3 above, the Embayment/Dredge Cell EE/CA report will present an engineering analysis of the structural stability of the final Dredge Cell dikes under both static and dynamic (earthquake) conditions, and will in particular address the four primary contributors to the cell failure as noted in the AECOM Root Cause Analysis report. The EE/CA report will present a summary of groundwater monitoring data and describe the landfill closure actions for capping the landfill to reduce leachate generation in compliance with TDEC regulations. As explained in response to comment #4 above, a hydrological assessment is being conducted as part of the EE/CA for the river system, not as part of the EE/CA for the Dredge Cell. All alternatives under evaluation will develop a plan for long-term groundwater monitoring to ensure that contaminants are discovered before reaching drinking water wells or sensitive receptors. That plan would be developed as part of the closure of the Dredge Cell.

#### **6. TVA Failed to Consider the Federal Regulatory Setting and State Law Regarding Coal Ash Disposal in its Non-Time Critical Ash Removal and Disposal Work Plan.**

At minimum, TVA must comply with current requirements for the disposal of coal ash and should anticipate and consider the impact of upcoming federal regulation of coal ash disposal. For example, following the Kingston spill, the State of Tennessee enacted a new coal waste disposal law, codified at T.C.A. 68-211-106, which requires coal ash disposal facilities to have a liner to prevent leaching, and final cap before closure. T.C.A. 68-211-106 is an "applicable or relevant and appropriate requirement" (ARAR) that TVA must comply with as it carries out its non-time critical removal action. Further, as TVA's disaster triggered this new requirement, TVA's cleanup must follow this law and dispose of Kingston coal ash in lined disposal areas that meet all state permit requirements for coal ash disposal. As TVA's long-term disposal plans do not pre-date Tennessee's enactment of this law, TVA will not and should not seek to be "grandfathered" under Tennessee's prior disposal laws, or otherwise circumvent current state requirements for coal ash disposal. We ask: *What are TVA's plans to comply with current Tennessee requirements for coal ash disposal?* In addition, EPA is currently planning to propose federal regulations in early 2010 for the disposal of coal ash that could, among other things, classify coal ash as hazardous waste and require stringent disposal requirements. Since TVA is aware of impending coal ash disposal regulations, we ask: *What are TVA's plans to comply with federal coal ash disposal regulations, should they become effective during TVA's long-term clean-up efforts at Kingston?* TVA failed to acknowledge state requirements and impending federal coal ash disposal regulations in its consideration of the regulatory environment in which it is undertaking coal ash removal and disposal.

**TVA Response:** TVA has reviewed state and Federal requirements in its preliminary evaluation of ARARs and will continue such evaluation in the actual EE/CA report. In accordance with the EPA Administrative Order on Consent, TVA will comply with all applicable or relevant and appropriate requirements of the regulatory agencies unless a waiver is approved by EPA.

With respect to Tennessee's new coal waste disposal law found at T.C.A. 68-211-106, TVA has determined that this law is not an ARAR for the embayment/dredge cell removal action as it is applicable to new landfills or expansions of existing landfills. All three options under consideration by TVA in the EE/CA report will involve the closure of existing, permitted landfill areas, which closure will be implemented under CERCLA to address solid waste closure and post-closure care regulations found within TDEC 1200-1-7-.04.

With respect to TVA's plans to comply with Federal coal ash disposal regulations should they become effective during long-term cleanup efforts at the Site, while TVA cannot speculate as to what may be included in any newly-promulgated EPA regulations, TVA will comply with such regulations to the extent they are applicable or relevant and appropriate unless a waiver is approved by EPA.

### **7. TVA Lacks Necessary Data to Make Informed Decisions Regarding Long-Term Ash Removal Options to Restore Area to Pre-Spill Conditions**

TVA will undertake two actions that are inextricably linked, yet are proceeding on separate tracks, namely the actions to restore the Swan Pond Embayment and failed dredge cell and actions to clean up the remaining ash in the Emory and Clinch Rivers. Deciding how to restore the Swan Pond Embayment and dredge cell without properly characterizing the health of the Emory and Clinch River leaves EPA and TVA without the data necessary to take restorative actions that are protective of the environment and public health. It is essential to know which protective measures are required to prevent water pollution from the embayment and dredge cell before deciding the condition in which to leave the embayment and dredge cell. The health of the river may require that Kingston coal ash be completely removed, in which case engineering (and cost) concerns would be different than they would if the river was found to be able to withstand further degradation. To be clear, the Swan Pond Embayment contains 2.4 million cy of ash, and 3.0 million cy of ash entered the Emory River. Further study of the Emory, Clinch and Tennessee Rivers is needed (see points below) before deciding which non-time critical ash removal option should be pursued, but the data below indicate using abundance of caution in restoration efforts so as not to further pollute nearby waterways and the adjacent aquatic environment.

**TVA Response:** All alternatives under evaluation will restore the Swan Pond Embayment to the functional level occurring prior to the ash release, per Paragraph 34 b) of the EPA Administrative Order and Agreement on Consent. A restoration plan is presented in Appendix D of the Embayment/Dredge Cell EE/CA report. Long-term assessment of the river system, including collection of additional data for assessing potential risks to the environment or human health, will be performed as part of the EE/CA for the river system. An SAP is being prepared that will specify the additional data collection necessary to make informed decisions regarding the river system, and including the restored Swan Pond Embayment. These longer-term studies will be used to assess potential risks, tradeoffs between alternative remedial actions, and required mitigation measures for any damages to natural resources within the river.

## **8. TVA Should Eliminate Contact Between Spilled Coal Ash and the Clinch and Emory Rivers To Prevent Further Water Pollution**

As noted above, primary among our concerns is the need for TVA to eliminate contact between the coal ash in the embayment/dredge cell areas and adjacent waterways. Although the Emory, Clinch and Tennessee Rivers have yet to be fully characterized by TVA, current data suggest the need to eliminate further contact between Kingston coal ash and adjacent waters. For example, support for eliminating contact between Kingston coal ash and the Emory and Clinch Rivers is provided by the work plan itself, which acknowledges: Ash deposits in the river may physically degrade or eliminate the habitat for bottom-dwelling organisms. At sufficiently high flow velocities, ash may be suspended in the water column. The small size and lack of cohesion of the ash particles mean that they may be easily detached and entrained in flowing water, so this material would continue moving downstream as suspended sediment during periods of high flow rates. The fly ash deposits may also exhibit cohesive behavior, and may consolidate over time in the river channel. In addition, cenospheres (inert floating ash material) can move downstream on the water surface. The chemical constituents of greatest concern are the metals contained in the ash. Temperature, pH, and oxygen availability in the water affect the dissolution of metals from the ash.<sup>5</sup> These serious aquatic impacts warrant consideration of other ash disposal options in order to eliminate further contact between coal ash and the surrounding aquatic environment.

<sup>5</sup> *Id.* at 7.

**TVA Response:** TVA fully acknowledges that the TDEC Commissioner's Order requires restoration to minimize direct contact between ash material in the embayment and water flowing through the embayment area into Watts Bar Reservoir. Therefore, TVA has taken the following specific actions: (1) drainage features have been constructed to separate clean water runoff from the ash ("Clean Water Ditch"), and to remove ash in runoff from exposed areas ("Sediment Basins"); (2) mechanical and hydraulic dredging operations have been ongoing throughout the time-critical removal action to restore the river and eliminate contact between ash and the river waters and to restore water quality; and (3) as explained in response to comment #7, all alternatives under evaluation will excavate the ash and restore the Swan Pond Embayment to pre-spill conditions, which will eliminate contact between spilled coal ash and the waters flowing through the embayment, and thereby prevent further water pollution.

### **8a. TVA failed to take into consideration surface discharge data**

For example, the TVA Kingston Fossil Plant reported to the U.S Environmental Protection Agency (EPA) that it released over 2.6 million pounds of toxic pollutants into the Emory and Clinch Rivers in 2008 – more than 45 times the amount Kingston discharged in 2007, and more toxic pollutants than the entire electric utility industry discharged to surface waters in 2007. Specifically, Kingston released high levels of lead, arsenic and other toxic pollutants. We ask: *Why has TVA failed to include surface water discharge data, as TVA Kingston reported to the U.S. EPA Toxic Release Inventory for 2008, in the non-time critical ash removal work plan for consideration along with other surface water data?* The staggering amount of pollution released by TVA to the Emory and Clinch Rivers, and reported by TVA to EPA's Toxic Release Inventory, should be considered in this work plan as well as future plans to characterize the Emory, Clinch and Tennessee Rivers. These data should also be considered as TVA and EPA

move forward with decisions regarding the spilled ash and its continued contact with adjacent waterways.

**TVA Response:** Please note that the Toxic Release Inventory for 2008 included the fly ash spill discharged on December 22<sup>nd</sup>, 2008, resulting in the higher levels mentioned. The time-critical and non-time-critical CERCLA actions being taken at the site are in response to that release.

**8b. TVA Did not Consider That the Clinch and Emory Rivers May Be Impaired for Additional Pollutants from the Kingston Spill**

In addition, before TVA moves forward with plans to place spilled ash back into the dredge cell that failed in December 2008 (spilling ash above and below the water line), TVA should ensure that the Emory and Clinch are not impaired for any additional pollutants. Both the Emory and the Clinch Rivers are already on Tennessee's 2008 303(d) list of impaired waters, and both rivers were impacted by the Kingston spill. Although TVA acknowledges that Kingston operations, which date back to the 1950s, played a role in the impairment of these waterways, TVA's work plan fails to acknowledge that these waters could be impaired for additional pollutants. We ask: *What are TVA's plans to study the Emory and Clinch to determine if the Emory and Clinch are impaired for additional pollutants in the aftermath of the Kingston spill? Also, what are TVA's plans to limit future discharges of toxic pollutants to the Emory and Clinch Rivers since these waterways are already impaired for pollutants such as mercury, iron, and manganese?*

<sup>6</sup> TVA, *Kingston Fly Ash Recovery Project -on-Time Critical Action Scope and EE/CA Work Plan for Public Review* (prepared by Jacobs Engineering) 6-7 (2009).

**TVA Response:** As explained in response to comment #7, TVA is currently preparing an SAP that will specify the additional data collection necessary to make informed decisions regarding the river system. These longer-term studies will be used to assess potential risks, tradeoffs between alternative remedial actions, and required mitigation measures for any damages to natural resources within the river. TVA will include additional pollutants (referred to as "legacy" constituents) in that study.

Please note also that TVA is preparing both short-term and long-term plans for ash management and water management. These plans are outside of TVA's evaluations under the EE/CA work plan. As explained in response to comment #1, TVA is committed to converting to dry ash disposal for ongoing plant operations, and has an active project underway to implement that conversion by early 2012. Similarly, TVA is studying options for new permitted wastewater treatment facilities at the plant; TVA will comply with all NPDES permit requirements for regulated discharges to the Emory and Clinch Rivers.

**8c. TVA Must Make All Data Regarding Water Quality Exceedances Available for Public Review and Incorporate Into Future Work Plans**

Furthermore, TVA surface water data sampling (discussed below) indicated that Tennessee Water Quality Criteria (TN WQC) was exceeded for arsenic and other metals.<sup>7</sup> We ask: *At what sampling locations, on what dates, and for which metals did TVA find exceedances of T- WQC?* This information should be made available in this work plan, and in the draft EE/CA, which should comprehensively discuss water quality concerns, risks and impacts. For these reasons,

and others discussed in these comments, we urge TVA to consider new ash removal and disposal options that will eliminate further contact between Kingston coal ash and nearby waterways, and thereby protect the Emory and Clinch Rivers from further coal ash related pollution.

<sup>7</sup> *Id.* at vii.

**TVA Response:** Please note that surface water quality data collected by TVA and the regulators is posted online. TVA data are available at: [www.tva.gov/kingston](http://www.tva.gov/kingston). TDEC data are available at <http://www.state.tn.us/environment/kingston>. The sampling locations, dates, metal analytes, and concentrations are presented in detail on those websites. The EE/CA report will summarize those data regarding water quality impacts and risks. Please note that the purpose of this document is not to provide extensive presentation and analysis of water quality data; future EE/CA documents for the river system will provide the specific locations, dates, and metals concentrations for exceedances as part of the comprehensive discussion of water quality concerns, risks, and impacts to which the commenter refers.

As explained in response to comment #8, TVA is undertaking multiple actions to eliminate further contact between ash and the waterways, including the Clean Water Ditch and Sediment Basins, mechanical and hydraulic dredging operations throughout the time-critical removal action, and planned excavation of ash from Swan Pond Embayment during the non-time-critical removal action.

### **9. TVA Failed to Consider all Surface Water Sampling Data**

We are especially concerned about ongoing data quality problems and consistently different data from surface water testing by TVA, TDEC, EPA, universities, independent organizations, and environmental groups. TVA's non-time critical EE/CA work plan fails to include data from outside sources and states Only data that have been validated through rigorous quality control processes to ensure data defensibility will be used in calculating risk. Other data will be referenced for comparison purposes and weight-of-evidence evaluations. Additional sampling efforts (such as, plant effluent monitoring, ash characterization for disposal, and ash particle size analysis) that do not support the EE/CA are not discussed.<sup>8</sup> The exclusion of data by TVA raises serious concerns and implies that all data (and even some of TVA's own data) were not "validated through rigorous quality control process." We ask: *What surface water testing data did TVA examine in preparing this EE/CA work plan? Why was some data rejected by TVA for inclusion in this work plan? Did TVA consider water sampling test data from any non-TVA source (i.e. any university or organization)? If so, why were these water sampling results not included in this EE/CA work plan?* Not only have independent water sampling results shown higher levels of metals than TVA sampling results, but concerns have also been raised about TVA's water sampling locations and testing methodology. TVA does not acknowledge any of these highly relevant issues regarding surface water data and fails to include independent surface water test results in the Kingston non-time critical ash removal and disposal EE/CA work plan without explanation. For example, both Appalachian State University and Duke University conducted independent sampling of ash, water, sediment and fish tissue collected from the Kingston area in the last year. Elevated levels of arsenic, barium, cadmium, chromium, copper, lead, lithium, nickel, selenium, strontium and vanadium were reported (*see* attachment A and B). Completely missing from TVA's analysis is any reporting on the bioaccumulation of pollutants

in aquatic life even though sample results from fish tissue testing are available from Appalachian State University and the Tennessee Wildlife Resources Agency (TWRA). The TWRA fish sampling locations were approximately 1.5 miles downstream of the ash spill while the Appalachian State University samples were collected in the immediate area of the ash spill. As expected, samples collected miles downstream from the ash spill showed lower levels of metals. Additionally, deformed fish with elevated levels of selenium have been collected, underscoring the need for TVA to consider all data in order to protect the environment and public health. (*see* attachment C) Given these facts, there is ample data available to clearly demonstrate that impacts to fish in the area surrounding the ash spill range on a continuum from:

- 1) extremely severe (deformities) in fish in TVA ash ponds; to
- 2) at a toxic threshold tipping point in fish collected at the spill site; to
- 3) beginning to bio-accumulate selenium as far away as 1.5 miles downstream.

Thus, the expected trend of severest impacts found closest to the source of pollution is unequivocally present at Kingston and yet completely unreported and unacknowledged anywhere in the report. The exclusion of publicly available independent sampling results by academic researchers finding consistently higher levels of toxic elements than TVA and the failure to include pollutant levels from discharges seems to be an attempt to cherry pick the most favorable data and avoid reporting critical information that shows a much greater level of potential harm. Therefore, it appears that TVA's work plan incorrectly analyzes the proper scope of potential harm, resulting in a minimalist plan of action that fails to adequately protect the public and the environment. In addition, we are concerned that TVA is not examining effluent discharges to the Clinch and Emory River from the Kingston Fossil Plant. The Kingston plant discharges coal waste effluent consisting of many toxic pollutants (including the pollutants for which the Emory and Clinch are already impaired such as iron, manganese and mercury).<sup>9</sup> TVA should consider effluent data when deciding how best to restore the environment and rivers to pre-spill conditions. For example, TVA's non-time critical ash removal EE/CA work plan states, "TVA also added a monitoring location at the plant effluent on May 29, 2009"<sup>10</sup> We ask: *Why did TVA exclude data from the effluent monitoring location from this EE/CA work plan?* We ask TVA to make these data available to the public for review as part of the EE/CA, in future studies of the Emory and Clinch River, and considered as a factor impacting decisions about how best to restore the aquatic environment, wetlands and waters to pre-spill conditions. Furthermore, the Kingston Fossil Plant recently installed scrubbers and is proposing to discharge approximately 1 million gallons/day of wastewater, laden with heavy metals from coal combustion waste, specifically flue gas desulfurization (FGD) waste into the adjacent rivers. We ask: *Why has TVA left effluent data regarding its proposed FGD wastewater discharge out of this EE/CA work plan?* TVA's new FGD system could have a serious impact on water quality and water pollutant levels, and TVA made data regarding its proposed discharge available to the state for water permitting purposes, but has not considered the environmental impact of this new waste stream on the Emory or Clinch Rivers and their recovery under the non-time critical ash removal plan. TVA must include these effluent data in their analysis of the health of the river and the estimate of the effectiveness of cleanup alternatives. Finally, TVA is a defendant in over a dozen lawsuits arising out of the Kingston spill. TVA has an interest in limiting its liability and should be utilizing independent water testing data wherever possible as not to create a conflict of interest between its legal strategy and its environmental monitoring. This is especially important as TVA's own Inspector General (IG) publicly exposed TVA for improperly limiting the scope of their Kingston investigation for litigation purposes. The IG reported that "TVA management

handled the root cause analysis in a manner that avoided transparency and accountability in favor of preserving a litigation strategy”<sup>11</sup> Given this well-documented concern regarding TVA’s potential conflict of interest, TVA and EPA should make efforts to include (rather than exclude, as mentioned above) independent analysis and environmental testing data in the draft EE/CA as well as in future Human Health and Ecological Risk Assessments. One of the noted differences between the sample results of independent researchers and TVA has been the monitoring location of collected samples. Independent researchers have not avoided detailed sampling in the area of the spill itself, thus their results have tended to show higher levels of some heavy metals and other pollutants than TVA’s test results collected from further away. The EE/CA fails to propose an appropriate level of sampling and monitoring closest to the impacted area. We ask: *is TVA limiting the scope of the investigation by failing to examine some of the most potentially polluted areas at Kingston?* Finally, the issues raised here regarding independent environmental testing data must be addressed as these data will form the basis for TVA’s assumptions and analyses regarding Human Health Risk Assessments and Ecological Risk Assessments.

<sup>8</sup> *Id.* at 10.

<sup>9</sup> TVA, Kingston Fossil Plant NPDES Permit Application (December 2002) (expired as of August 31, 2008).

<sup>10</sup> TVA, *-on-Time Critical Action*, *supra* note <sup>4</sup> at <sup>12</sup>.

<sup>11</sup> TVA, Office of the Inspector General, Inspection 2008-12283-02, Review of the Kingston Fossil Plant ash Spill Root Cause Study and Observations about Ash Management, (July 23, 2009).

**TVA Response:** TVA has, and will continue to coordinate and collaborate with independent agencies and organizations performing independent assessments at the site. In particular, TDEC is conducting fully independent sampling of surface water quality at multiple locations twice every week. In addition, EPA collects split samples of TVA surface water quality sampling for independent quality assurance of the surface water data. TVA conducts detailed quality control procedures to document field collection protocols, shipping chain of custody, laboratory analytical protocols, and data management protocols, including detailed Level IV data verification and validation in accordance with EPA procedures. TVA continues to coordinate with other agencies and organizations, including Appalachian State University, Duke University, Tennessee Wildlife Resources Agency, and other third-party researchers. In assessing risks to human health or the environment as part of the EE/CA for the river system, data collected by these outside agencies and organizations (including TDEC, EPA, universities, TWRA, and others) will be used in a qualitative manner in assessing trends and uncertainties.

Please note that TVA coordinates sampling activities with other independent third-party researchers upon request and to the extent permissible by the demands of TVA’s on-going monitoring and ecological investigations. We have established a process to facilitate coordination of third-party researchers’ requests that includes an offer to provide boats, sampling equipment, and staff assistance (including qualified escorts in the portion of the Emory that is closed by the US Coast Guard) in return for the opportunity to observe the third party’s methods and to collect duplicate or split samples. Information on that process is available upon request. To date, researchers from Duke University, Appalachian State University, and the Tennessee Aquarium have participated in joint sampling events with TVA.

Please note that the EE/CA for the river system will address long-term risks associated with constituents remaining in the river following completion of all dredging and closure of the Dredge Cell. Samples collected from the ash settling pond or from the river during active

dredging do not represent long-term conditions in the river, and will therefore not be applicable to that study. The study will, however, address bio-accumulation of site-related constituents which also naturally occur in the environment. The study will also address legacy constituents, as noted in response to comment #8b. The study will integrate any impacts of plant discharges through NPDES permitted outfalls by sampling the river downstream and upstream of such outfalls. The sampling will target the entire impacted river system, including areas where impacts from the coal ash spill were greatest.

**10. TVA Should Include All Clean Water Act Requirements As “Applicable” to Kingston Non-Time Critical Ash Removal and Disposal Plans.**

TVA’s non-time critical ash removal EE/CA work plan states that the Clean Water Act requirements regarding technology-based limits are “to be considered.”<sup>12</sup> However, federal Clean Water Act requirements should be listed as “applicable” in TVA’s list of Proposed Applicable or Relevant and Appropriate Requirements (Appendix C).<sup>13</sup> We ask: *Why does TVA believe that Clean Water Act requirements are not “applicable” to its -on-Time Critical Ash Removal plan?*

<sup>12</sup> TVA, *-on-Time Critical Action*, *supra* note 4 at 70-71.

<sup>13</sup> *Id.*

**TVA Response:** Technology-based limitations on direct discharges to surface waters apply only to certain aspects of the discharger’s operation and are subject to regulation on a case-by-case basis, considering the appropriate technology. TVA’s ongoing wastewater treatment discharges are regulated through the approved NPDES permit; dredge discharges to the wastewater treatment system are in compliance with that permit. Stormwater discharges from the CERCLA site will comply with substantive requirements for stormwater discharges. As there are no other wastewater treatment technologies anticipated at this time, limitations in the Clean Water Act to those technologies are not directly applicable, but are “to-be-considered” guidance.

**11.** Finally, TVA should try to preserve the integrity of its water sampling data. TVA appears to have averaged sampling results from at least three different monitoring locations in order to determine pollutant levels in the Emory and Clinch Rivers.<sup>14</sup> Raw data should be used – not an average of various sampling locations – to determine environmental risk, water impacts and the feasibility of non-time critical ash removal options that can restore the waterways and aquatic environment to its pre-spill conditions.

<sup>14</sup> *Id.* At Table 21.

**TVA Response:** Please note that the minimum and maximum detected concentrations are presented in the tables; the integrity of the water sampling data has been preserved. For purposes of the work plan, sample results were combined in analyzing surface water impacts, which concluded that potential risks cannot be ruled out and that additional study is warranted. As explained in response to comment #9, the EE/CA report for the river system will present additional risk assessment information and will use new data collected following completion of dredging and closure of the Dredge Cell. The sampling will target the entire impacted river system, including areas where impacts from the coal ash spill were greatest. Data from different

locations will be combined to represent appropriate reaches of the river, but data from all reaches of the river will not be combined into a single data set.

Given the dynamic nature of surface water, averaging of analytical results is appropriate for assessment of risks to human health and the environment in accordance with EPA Risk Assessment Guidance for Superfund. Specifically, the 95% Upper Confidence Limit (UCL95) on the mean is used for risk assessment purposes.

**12.** In summary, the EE/CA work plan asks the following question with respect to the scope of the decision: “In what condition should the embayment area be left?” The unequivocal answer is that the Swan Pond embayment must be completely cleaned up as quickly and safely as possible such that the Emory and Clinch Rivers, as well as other public waters are fully restored. We look forward to hearing TVA’s response to our comments and questions, and to participating in TVA’s development of future work plans and restoration options at Kingston in 2010.

**TVA Response:** TVA agrees that the Swan Pond Embayment should be restored as quickly and safely as possible. All alternatives being evaluated in the EE/CA report include restoration of the Swan Pond embayment. Alternatives are being evaluated for tradeoffs in effectiveness, implementability, and cost, which include overall protectiveness of human health and the environment, reliability of the alternative, and time to achieve removal action objectives.

**13.** The Cahaba River Society is a twenty-year-old 501(c)3 river conservation organization whose purpose is to restore and protect the Cahaba River watershed and its rich diversity of life. We include in our definition of “diversity of life”, the people who live in our watershed. For the reasons that follow, we support a decision by TVA to adopt *Alternative 3* from the EE/CA Work Plan. We request TVA keep the ash onsite in Tennessee and not move it to Perry County Alabama. Leachate from the Arrowhead Landfill in Perry County Alabama has been trucked to a municipal wastewater treatment plant (MWWTP) in the City of Marion, AL for treatment. While that practice has been discontinued because of concerns about the inadequacy of that facility to properly handle the leachate and while promises have been made not to return to that practice until after the Marion MWWTP has been appropriately upgraded, the intent of local officials is to return to treating and discharging leachate to Rice Creek, a tributary of the Cahaba River, after those facility upgrades are made. We are concerned about the long-term ecological impacts of metals discharge from the leachate to the Cahaba River and its tributary. There has been an assumption by TVA and EPA that the operation and management at the landfill and at the Marion WWTP follow respective Alabama state regulations. Through independent investigators, we have learned of what we believe are numerous permit violations at the Marion WWTP or other inappropriate activities occurring at the landfill that undercut the assumption that responsible management is guiding the handling of ash and leachate. For example:

- The Marion MWWTP has a poor NPDES permit compliance record<sup>1</sup>, particularly regarding controlling discharge of ammonia, a pollutant considerably enriched in landfill leachate.
- There is strong evidence the Arrowhead Landfill is illegally directing landfill leachate to adjacent stormwater drainage during nighttime hours.

A Perry County commissioner, Mr. Albert Turner, Jr., has expressed the desire for Perry County and the Arrowhead Landfill to become a destination for disposal coal ash from any and all sources. That desire, we presume, would extend to the Non-time Critical Coal Ash disposal as well as all other potential coal ash sources. While the Arrowhead Landfill may have appropriate physical controls in terms of liners and storm water management for handling municipal *solid waste*, handling the significant volumes of *water* that accompanies this phase of the ash disposal seems to be presenting challenges for which the landfill is not prepared.

1 See EPA's "Enforcement and Compliance History Online (ECHO) at <http://www.epa-echo.gov/cgi-bin/get1cReport.cgi?tool=echo&IDNumber=AL0023809>

The TVA has an obligation to assure that ash is properly disposed. The October 2009 U.S. Environmental Protection Agency Non-time Critical Removal Action Scope, Engineering Evaluation/Cost Analysis Work Plan Fact Sheet for the TVA Kingston Fly Ash Release Site, Harriman, Roane County, Tennessee states that: *The EE/CA for the Kingston Fly Ash Release Site is being conducted under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)*. The first word in *CERCLA* stands for "Comprehensive". Unfortunately, there has been inadequate regulatory oversight or local community involvement accorded to the Perry County community. For example, the precautions to minimize air-dispersal of fly ash exercised in Roane County, Tennessee, are not being encouraged or required here in Alabama. Nor has there been a careful "cradle-to-grave" assessment of the fate of metals in the ash and leachate from the landfill. An assumption has been made that the staff with the Alabama Department of Environmental Management are attending to assuring compliance with our state regulations regarding landfills and municipal waste treatment facilities. Unfortunately, we are discovering that ADEM's oversight has been inadequate. TVA and EPA are obliged to assure our citizens that a "comprehensive" examination includes assurance that the landfill and the disposal of leachate will meet state regulations and that the precautions similar to those exercised in Roane County Tennessee will be applied for the safety of our citizens living adjacent to the Arrowhead Landfill. We are concerned that coal ash in the landfill will be subject to extensive leaching over time. Rain will not be excluded from falling on and leaching through multiple layers of ash and municipal solid waste. Over time, a significant proportion of the metals in the ash could mobilize. Indeed, a study conducted by the U.S. Army Corps showed the rate of leaching of barium, arsenic and vanadium continues over a 10-day elutriation experiment<sup>2</sup> (see figure provided). Since this is the only investigation we have been able to find that evaluates the potential long-term mobilization of metals from this material and since it shows a continued mobilization of metals over time, we appeal to TVA and EPA to take a closer look at the fate of these metals before a determination regarding the remaining, non-time critical ash removal is made. While we understand the experiment described above was designed to *maximize* the conceivable mobilization of metals, we point out that the disposed ash will be exposed to conditions that might similarly maximize metal mobilization. Landfill disposal of this ash will be subjected to rain and leaching for an indeterminate length of time until the landfill's receiving cell is closed and capped. A given cell of a landfill may be open for years. The area around the landfill has historically experienced an average of 137 cm rainfall each year<sup>3</sup>. Estimated runoff per square mile is over 46 cm per year. That amount of rainfall and runoff could, in the long-run, mobilize a significant proportion of the metals in this ash. We have been unable to locate any studies that focus on the fate of metals subjected to the handling this ash has experienced. Specifically, this ash has been subjected to the following: inundation in the Emory River,

removal by dredges, transport by rail, transport by truck, drying to some degree in the sun, spreading in the landfill, and subsequently allowed to be exposed to the elements (rain and wind) until covered with a layer of municipal solid waste, whereupon another layer of ash is overlain. The long-term potential for leaching of metals from ash in a municipal solid waste landfill has not been directly evaluated so far as we can find (if such an evaluation has been done, we would appreciate some help in being directed to those studies). The ability to immobilize metals is far better understood as it would be managed there in Tennessee. There are too many unknowns involved in bringing this material to Alabama. Until the fate of metals that could mobilize under these landfill conditions are better understood, no additional ash should be transported to Perry County Alabama.

*2 Evaluation of Metals Release from Oxidation of Fly Ash during Dredging of the Emory River. Final Draft. October 9, 2009.*

Prepared for Paul E. Davis, Director, Division of Water Pollution Control, Tennessee Department of Environmental Conservation. Prepared by Environmental Laboratory, U.S. Army Engineer Research and Development Center, Vicksburg, MS. Technical Point of Contact: Dr. Jeffery A. Steevens, 601 634-4199.

**TVA Response:** TVA will consider the tradeoffs between all alternatives, including Alternative 3, with respect to its effectiveness, implementability, and cost. The EE/CA effectiveness evaluations will acknowledge that any offsite disposal facility would be an existing, permitted solid waste landfill that would operate under the restrictions of its specific permit, including waste acceptance criteria, groundwater protection systems, leachate collection and treatment systems, interim and final cover, and other terms of the operating permit. The EE/CA effectiveness evaluations will also consider the inherent short-term risks associated with shipment of ash over public roadways or railways. The EE/CA implementability evaluation will acknowledge regulatory and/or public opposition to use of a particular disposal facility as a complication to implementing the alternative. The EE/CA cost evaluation will consider the combined costs of loading, shipment, and disposal offsite.

**14.** I would like to see option two implemented where option two is excavating ash from the embayments, and from the failed dredge cell AND disposing of the ash off site. The embayments and surrounding areas should be restored to a natural aquatic environment.

**TVA Response:** TVA will consider the tradeoffs between all alternatives, including Alternative 2, with respect to its effectiveness, implementability, and cost. Please note that all alternatives evaluated in the EE/CA would restore the Swan Pond Embayment to pre-spill conditions.

**15.** A No-Action option should be included and explained in the EE/CA. This option should outline conditions and outcome if the coal ash is left in its current position.

**TVA Response:** The no-action alternative has been specifically rejected by TDEC and EPA because it violates the requirements of both the TDEC Commissioner's Order and the EPA Administrative Order on Consent. The TDEC Order requires the "restoration of all natural resources damaged as a result of the coal ash release". The EPA Order requires TVA to "remove [and] restore area waters impacted by the coal ash release". The no-action alternative would not

comply with these requirements and is therefore not developed further. Please note that the National Contingency Plan does not require evaluation in an EE/CA of a no-action alternative for non-time-critical removal actions under CERCLA.

**16.** The plan should include a plans and budget for maintaining Swan Pond Rd and Swan Pond Circle Road. These roads will be subjected to too much additional heavy duty traffic that will cause predicted deterioration. Details should be included that schedule regular maintenance. A projected date should be set for repaving the existing roads.

**TVA Response:** TVA has budgeted and scheduled for road repairs, and has implemented such repairs on Swan Pond Road and Swan Pond Circle Road. TVA will continue to make repairs for roads impacted by the restoration work.

**17.** Maps of Wind Currents should be located and provided for public view. Air monitors will be placed as appropriate.

**TVA Response:** Meteorological data are being collected hourly at the site, and are posted online at [www.tva.gov/kingston](http://www.tva.gov/kingston). As these data change hourly, maps would not be appropriate. TVA, in conjunction with TDEC and EPA, has selected the locations for routine air monitoring stations following USEPA siting criteria for ambient particulate monitors to the extent possible. Factors such as proximity to roads, proximity to tree obstructions and vertical distance from nearby horizontal structures were considered. Fixed locations were selected to represent areas closely associated with and proximal to the released fly ash. These areas were selected to characterize ambient concentrations of particles and target compounds potentially associated with fly ash in community-based locations near the fly ash. Included in this category is the one background sampling location selected to best represent typical upwind air quality conditions nearby, but not impacted by the ash release. Prevailing wind direction near the plant is strongly influenced by ridge and valley topography oriented along the southwest to northeast axis of the Tennessee River Valley. Two monitoring locations have been established to the northeast of the plant and one to the southwest roughly along this axis so that “upwind” and “downwind” air sampling will exist for most days. In addition, on a line roughly perpendicular to this orientation (northwest-southeast) a second pair of sampling sites are located. A high ridge located just west of KIF will occasionally induce downslope airflows under stable atmospheric conditions.

**18.** All information that is available on the DOE legacy contamination in the spill area should be made available.

**TVA Response:** TVA and DOE continue to conduct sampling of the Emory and Clinch Rivers to evaluate the presence and concentrations of DOE legacy contaminants. TVA data are available online at [www.tva.gov/kingston](http://www.tva.gov/kingston). Information on DOE legacy contamination is available in documents published by DOE and are publicly available at DOE’s Information Resource Center (IRC) in Oak Ridge. This information will be used to guide dredging activities to avoid disturbing legacy contamination, and to guide future investigations of sediment

contamination in the Emory and Clinch Rivers. Long-term assessment of the river system, including collection of additional data for assessing potential risks to the environment or human health, will be performed as part of the EE/CA for the river system. An SAP is being prepared that will specify the additional data collection, including data on legacy contamination, necessary to make informed decisions regarding the river system.

**19.** The published health risks posed in the area should also be applied to children and elderly and made public.

**TVA Response:** A human health risk assessment is being prepared for the Embayment and Dredge Cell EE/CA and will specifically address potential risks to children and potential risks to adults from potential lifetime exposures to ash-related constituents. These assessments will evaluate health risks posed in the area and will be publically available in the EE/CA report.

**20.** The three options are quite different in approach and in final outcome. The work plan could present more combinations of removal and storage, but it is not clear what advantage would be gained by additional options. The current options include maximum on-site storage and maximum removal, with just one option that is a combination of the two other approaches. Other possible treatments would just be variations of these three options. Other technologies for how to contain any coal ash left on site could apply to greater or lesser volumes of coal ash, depending on the removal/storage ratio. These three options seem to represent a reasonable range and all three have the possibility of achieving the cleanup goals.

**TVA Response:** Agree. The EE/CA report will present alternatives that represent a range of approaches and all alternatives will achieve the removal action objections.

**21.** There is not a “No Action Alternative” planned or described in the work plan, an unusual absence. All work plans for Remedial Investigation/Feasibility Study (RI/FS) reports or EE/CA reports usually include the “No Action Alternative” according to CERCLA and EPA guidance and practice. CERCLA stands for Comprehensive Environmental Compensation and Liability Act and embodies a set of laws that provides guidance on remediating hazardous waste sites. The “No Action Alternative” is meant to serve more than one practical purpose. First, the harm from leaving the contamination in place and untouched is explained and, to the extent possible, quantified in the description. Second, a quantitative estimate of risk would include the specific risks from leaving the contamination untreated. Third, other alternative cleanup options can be compared to “No Action” in order to better put the improvements or cleanups in perspective. The range of clean up options in an EE/CA (or RI/FS) is meant to explain the best and least that can be done to clean up a site and present a reasonable range of choices. The reasonable range of choices, however, must always meet the legal requirements to protect public health and the environment. Thus, options often include different combinations of technologies, but the combined effect is supposed to be protective of health and the environment. If an option, such as the “No Action Alternative” does not meet the requirements of protecting health and the environment, then that alternative is dropped from further consideration.

**TVA Response:** As explained in the response to comment #15, the no-action alternative has been specifically rejected by TDEC and EPA because it violates the requirements of both the TDEC Commissioner's Order and the EPA Administrative Order on Consent. The TDEC Order requires the "restoration of all natural resources damaged as a result of the coal ash release". The EPA Order requires TVA to "remove [and] restore area waters impacted by the coal ash release". The no-action alternative would not comply with these requirements and is therefore not developed further (dropped from further consideration). Please note that the National Contingency Plan does not require evaluation in an EE/CA of a no-action alternative for non-time-critical removal actions under CERCLA. Note also that the EE/CA report will present a human health risk assessment and screening-level ecological risk assessment, which are quantitative estimates of risk from leaving the contamination untreated.

**22. Definition of hazardous waste:** There is a difference between the legal definition of a constituent as hazardous waste and the scientific definition of a constituent as toxic. This document does not take into account the fact that although the heavy metals found at high concentrations at the TVA site may not qualify as hazardous waste under the federal definition, they can still be toxic to humans and wildlife, pending exposure pathways, receptor characteristics and other biological factors. For a detailed analysis of this language issue in the work plan's discussion of hazardous waste definition, please see specific comment 18.

**TVA Response:** Agree, there is a difference between the definition of a constituent concentration in a material displaying a hazardous waste characteristic and a constituent having inherent toxicity. The discussion of hazardous waste characteristic is solely presented for the purpose of regulatory definition of the material for purposes of disposal under EPA's RCRA requirements. The inherent toxicity of a constituent is discussed in the human health and ecological risk assessments, which develop quantitative estimates of risk due to exposure to the constituent, including dose and toxicity.

**23. Single name for project:** The U.S. Environmental Protection Agency (EPA) and TVA have used at least three different names for the accident site in written material. TVA's EE/CA work plan uses the name Kingston Fly Ash Recovery Project. TVA's Community Involvement Plan calls it the TVA Fossil Plant Release Site. The EPA Web site calls it TVA Kingston Fly Ash Release. Choosing an official name for the site so that one name is used uniformly over the course of the cleanup would avoid public confusion and distinguish the cleanup site from the active fossil plant.

**TVA Response:** The project name is the Kingston Fly Ash Recovery Project.

**24. Amount of ash removed:** The time critical removal action is supposed to be treating the majority of ash in the river and the ash east of Dike 2 before the onset of the non-time critical removal action (the subject of this work plan), but there is no mention of the exact volume, or even a ballpark figure, of ash that is supposed to be removed during the time critical. That

number or estimate could be included in the EE/CA work plan to give relevance and meaning to the numbers estimated for Range of Alternatives developed for the non-time critical removal action. The work plan could include the specific numerical goals for ash removal during the time-critical removal action and provide more information on the volume of ash that will remain at the site after the time-critical removal, as well as how the Range of Alternatives will treat the specific amount remaining.

**TVA Response:** As stated in the Executive Summary of the work plan: “Failure of the dredge cell dike released about 5.4 million cy of coal ash. Approximately 2.4 million cy of that ash filled the Swan Pond Embayment, and the remaining 3.0 million cy entered the Emory River. Most of the ash in the river is found between Emory River Mile (ERM) 1.0 and 3.5 and is being removed under the time-critical removal action.”

**25. User-friendliness:** The work plan is highly technical and likely difficult for the public to fully understand. It relies on the reader’s initiative to seek out the tables, reports and legislation that form the basis of the document’s information. For example, the list of contaminants of potential ecological concern is not given in the body of the document. The information presented in the work plan also uses language that is not familiar to a lay audience. Section 7 is a good example of how language can be simplified to present a clear picture of the issues at the site, but it is the only section in the work plan written in this concise, non-expert language. There are also typographical errors scattered throughout the document.

**TVA Response:** The work plan is indeed a technical document and is written both to address its technical complexity as well as to inform the public. An Executive Summary is offered to summarize key points and has been written in language more familiar to a lay audience.

**26. Using all available data:** When developing the separate EE/CA work plan for the rivers section, this work plan calls for using data that have already been collected on the Emory, Clinch and Tennessee Rivers as part of the investigation and time critical removal action. This approach is a customary one that is intended to be efficient in using time and resources. Data on the rivers gathered by other reputable sources after the spill may also contribute to a more informed understanding of the extent of site-derived contamination and the conditions in the rivers. The Clinch River, for one, is well known for having the most diverse assemblage of freshwater mussels in the world. As a result of the mussel diversity, scientists and resource managers have a large amount of data on conditions in at least some parts of the rivers. These other data will likely prove useful for understanding the ecological conditions. The other sources of data could be obtained and examined, and then a decision made as to how they can best guide the cleanup efforts alongside the data gathered by TVA, EPA and Tennessee Department of Environment and Conservation (TDEC).

**TVA Response:** In assessing risks to human health or the environment as part of the EE/CA for the river system, data collected by outside agencies and organizations will be used in a qualitative manner in assessing trends and uncertainties. In calculating risks, inclusion of this data for quantitative purposes introduces unacceptable uncertainty into the process due to

concerns over quality assurance/quality control on sample collection and analysis and the limited temporal and spatial boundaries of the samples. Available data on mussels in the river system will be further evaluated during the preparation of the ecological risk assessment, as part of the EE/CA for the river system.

**27. Specificity:** The work plan tends to generalize, using vague descriptions like “low” and “trace,” rather than giving the exact concentrations of contaminants. Being specific does not hinder the document and, in fact, gives a less biased, clearer representation of information.

**TVA Response:** The text uses modifiers to put information in perspective for the lay audience, supplemented with specific concentrations to demonstrate the point. Detailed summaries of specific concentrations of contaminants are provided in the numerous tables and appendixes attached to the document.

**28. Visual aids:** The document repeatedly refers to various sections of the Emory, Clinch and Tennessee rivers, delineated by river mile. It is unlikely that knowledge of each specific river mile is common to the public, and a map labeling the specific location river miles would be helpful for increasing understanding of the site plans. It would also benefit readers to have a map to show the extent of the ash upstream and downstream, as well as to give a frame of reference when discussing specific sections of the impacted rivers.

**TVA Response:** Agree. Maps labeling the river miles will be provided in future documents. Please note that river miles are shown on Figures 4 and 7 of the work plan; however, clearer maps will be prepared.

**29. Incomplete information on site characteristics:** The work plan does not mention whether or not there is a liner in the dredge cell. This information is important so that the remedial alternative is selected based upon the best available information and effectively prevents recontamination in the future.

**TVA Response:** Agree. There is no man-made liner beneath the ash in the dredge cell. This information will be included in the subsequent EE/CA reports.

**30. Historical contamination:** The work plan mentions that the Clinch and Emory rivers were listed on the national 303(d) impaired waters list prior to the contamination from the spill. However, the document is silent on how TVA plans to address historical contamination released from fly ash settling ponds to the receiving waters in past decades, as documented by the EPA’s Toxic Release Inventory. The work plan could be more specific in addressing how the cleanup will incorporate both the accidental and historical releases of toxins from the fly ash into the Emory.

**TVA Response:** The Kingston Fly Ash Recovery Project is specifically required under CERCLA and in accordance with the requirements of the TDEC Commissioner’s Order and

EPA Administrative Order on Consent to address the response to the ash released on December 22, 2008, which includes restoration of the waters impacted by the release and closure of the Dredge Cell. Historical contamination (referred to as “legacy” constituents) is being fully integrated into the sampling and risk assessments for the river system. An SAP is being prepared that will specify the additional data collection, including data on legacy contamination, necessary to make informed decisions regarding the river system. The risk assessments will integrate contributions from all pathways and all constituents, including legacy constituents, in calculating risks to human or ecological receptors.

**31. Explanation of cleanup progress:** The work plan introduction does not present information on the cleanup decisions and progress that have led to the non-time critical removal actions. An explanation of the difference between the two types of removal actions would be helpful.

**TVA Response:** Time-critical removal actions are those which require on-site response activities to begin within 6 months; non-time-critical removal actions are those where a planning period of at least 6 months exists before on-site activities must begin. The scope and purpose of the time-critical action, as stated in Section 1.1 of the work plan, is to removing the ash from the river to limit the potential for future ash migration and to prevent upstream flooding in the event of a large rainfall. The scope of the non-time-critical removal actions, as stated in Section 2 of the work plan, is being addressed in two separate EE/CAs; namely, to: (1) remove any residual coal ash released into the embayment area west of Dike 2 from the failure of the dredge cell, and close the failed dredge cell itself, and (2) address any residual ash in the Emory, Clinch, and Tennessee Rivers remaining after the time-critical removal action is completed including areas impacted by previous restoration efforts. Cleanup progress is ever-changing; please refer to the TVA website: [www.tva.gov/kingston](http://www.tva.gov/kingston), the TDEC website: [www.state.tn.us/environment/kingston](http://www.state.tn.us/environment/kingston), and/or EPA website: [www.epakingstontva.com](http://www.epakingstontva.com) for the latest progress.

**32. Clear understanding of site language:** Figures 1 and 2 provide excellent, detailed and well-marked depictions of the dredge cell and immediately affected areas that are of importance when discussing the cleanup. These characteristics are important to consider when creating figures for future documents.

**TVA Response:** TVA will continue to strive to present clear depictions of the site.

**33. Incongruence in map and text:** Figure 4 provides information that does not seem to agree with the text in Section 3.1. For more information on how this information could be clarified, please see specific comment 8.

**TVA Response:** Agree. Figure 4 shows ¼-inch thickness of ash found at ERM 6.0.

**34. Use of appropriate EPA guidance:** The exposure scenarios for children in contact with contaminated soil and water are not based on EPA's *Child-Specific Exposure Factors Handbook* (2008). EPA recommends using this handbook as a primary source of information for risk assessment. The values listed in the handbook are specific to children and consider the differences between children and adults in order to be as receptor-specific as possible. The work plan does not discuss how the exposure parameters for this site were derived, and it remains unclear whether children were considered using this most recent EPA guidance for that age category.

**TVA Response:** The risk assessments for the non-time-critical removal actions will be conducted in accordance with current EPA guidance found in "Risk Assessment Guidance for Superfund, Parts A, B, C, D, E, and F" as well as guidance from EPA Region 4. EPA's *Child-Specific Exposure Factors Handbook* (2008) is a refinement of the factors found elsewhere in EPA guidance documents. Use of the *Child-Specific Exposure Factors* is not appropriate, as toxicity values for evaluating early life exposure are not available. The EE/CA risk assessment will clearly assess risks specific to a child, separately from those to adults.

**35. Spatial extent of site:** It would benefit readers if the document clarified what spatial area the official site includes and then referred to that area as "the site" throughout the rest of the document. Instead, the document uses "KIF [Kingston Fossil Plant] and the area affected by the ash release," which is vague. The full spatial extent of the site would include as far up and down the rivers as ash is detected. In other words, until samples return clean, without any trace of ash, that area should be considered part of the cleanup site.

**TVA Response:** As stated in Section 3.1 of the work plan, per the EPA Administrative Order, the "site" is defined as "those areas of the KIF where waste material has been deposited, stored, disposed of, or placed or has migrated or otherwise come to be located." To date, this has been characterized as extending to ERM 6.0 upstream and downstream into the Tennessee River. Cleanup of the river system is to address all areas impacted by the spill.

**36. Cumulative risk:** The work plan does not mention evaluating long-term risks from multiple chemicals and other harmful conditions that exist in the area, for people or ecological resources. This type of risk is referred to as cumulative risk and EPA has developed an approach for addressing this issue. Will cumulative risks be considered in the full evaluation?

**TVA Response:** The Kingston Fly Ash Recovery Project is specifically required under CERCLA and in accordance with the requirements of the TDEC Commissioner's Order and EPA Administrative Order on Consent to address the response to the ash released on December 22, 2008, which includes restoration of the waters impacted by the release and closure of the Dredge Cell. Historical contamination, including the other multiple chemicals that exist in the area (referred to as "legacy" constituents), is being fully integrated into the sampling and risk assessments for the river system. An SAP is being prepared that will specify the additional data collection, including data on legacy contamination, necessary to make informed decisions regarding the river system. The risk assessments will integrate contributions from all pathways

and all constituents, including legacy constituents, in calculating risks to human or ecological receptors.

**37. Construction risks:** The work plan does not mention if TVA will consider the various conditions and changes that will be imposed on the community by construction work in each remedial alternative. These conditions may include increased train and truck traffic, dust and runoff. Presumably a table could show the types of risks for each alternative, with the risks from each cleanup option along with the risks from contamination left in place.

**TVA Response:** The EE/CA report will address short-term impacts of the removal action, including increased transportation, dust, and runoff. The human health risk assessment will present estimates of risk, both for current and future receptors.

**38. Limitations of risk assessments:** For every risk assessment there are standard limitations on its ability to precisely calculate risk. These limitations can result in an overestimation or underestimation of risk. Some of the variables that are not incorporated into a risk assessment are: the combined effects of multiple chemicals, novel responses to exposure, toxicity data for some chemicals and a uniform exposure pathway from site to site.

**TVA Response:** The EE/CA report will address uncertainties in the human health risk assessment, which can result in an overestimation or underestimation of risk.

**39. Executive summary, page vi:** The question “In what condition should the rivers be left?” seems too broad to address the issues associated with residual ash in the Emory, Clinch and Tennessee Rivers. The scope of the river action could explicitly mention all aspects of the rivers, including recreation, ecology, fishing, and health implications and how these will influence the restoration. The same is true for the question “In what condition should the embayment be left?” The language used in this section does not give a clear understanding of the role these areas play within the broader scope of community and environment.

**TVA Response:** These questions pose the ultimate decision to be made as a result of the EE/CA process. Removal Action Objectives will be developed during preparation of each of the EE/CA reports to expand upon these general decision questions. The risk assessment for the river system will address human receptor exposure pathways, including recreation and fishing, as well as numerous ecological receptor exposure pathways.

**40. Executive summary, Sampling and Monitoring Activities, page vii:** The acronym TDEC is used for the first time here, but it is not spelled out. The document would be clearer if it consistently spelled out every acronym the first time it is used.

**TVA Response:** Agree. An acronym will be spelled out the first time it is used.

41. Executive summary, Ecological Risk Assessment, page viii: The language in this section leads the reader to expect an actual list of the constituents of potential concern, using the names of each constituent. Instead, what follows is a list of the number of inorganic constituents detected in ash as soil, as sediment, and in surface water. There is no reference in this section that would direct a reader to the full list. The section could be edited to be more explicit.

**TVA Response:** The Executive Summary is an overview of the contents of the report. For details, please refer to the respective human health and ecological risk assessments, in the Appendixes.

42. Executive summary, Range of Alternatives, page ix: The Range of Alternatives does not include a “No Action Alternative.” It is standard cleanup procedure to provide a full range of cleanup alternatives, from the “No Action,” which involves doing nothing to alter the current conditions of the site, to an alternative that spares no expense to fully restore the site to as close to its original conditions as possible.

**TVA Response:** As explained in response to comment #15, the no-action alternative has been specifically rejected by TDEC and EPA because it violates the requirements of both the TDEC Commissioner’s Order and the EPA Administrative Order on Consent. Please note that the National Contingency Plan does not require evaluation in an EE/CA of a no-action alternative for non-time-critical removal actions under CERCLA.

43. Introduction, page 3: The scope of the work is described oddly in the four questions pertaining to the cleanup. The fourth question, “In what condition should the river be left?” makes a presumption that the regulatory agencies are leaving open the option that the river will not be restored to the pre-spill conditions or better. If the question is really how to improve the conditions of the river, then such a question could be explicitly stated, rather than imply that the river may not be restored. A suggested change to the language is “*To* what condition should the rivers be *restored*?” This wording indicates that the cleanup will proactively change the condition of the rivers for the better.

**TVA Response:** As explained in response to comment #39, these questions pose the ultimate decision to be made as a result of the EE/CA process. Suggested wording is noted; the condition in which the river is to be left is the condition to which it has been restored.

44. Introduction, third full paragraph, page 3: The language could be changed to include re-vegetation with *native* species, rather than “selected” as the work plan is currently written. It is important to restore this site to its original conditions, using plants that naturally occur in the area in order to encourage the ecosystem to recover to the fullest extent possible.

**TVA Response:** Agree. The EE/CA reports will provide applicable restoration plans, including replanting with selected native species.

45. Introduction, fourth full paragraph, page 3: There is a typo in this paragraph. “effortsUltimately” should be edited to “efforts. Ultimately.”

**TVA Response:** Noted. TVA regrets any typographical errors.

46. Section 3.1 Site/Ash Conditions, page 4, and Figure 4: The text of the work plan states that no coal ash was found in the Little Emory River. The text on Figure 4 also states that no coal ash was found in the areas sampled in the Little Emory River. However, according to the Figure 4 legend, green dots symbolize that ash was found. There are five green dots in the mouth of the Little Emory River on Figure 4. It is unclear whether this is a mistake or if ash was found at these sampling locations, as the dots indicate. The map and/or text in Section 3.1 should be changed to properly reflect the results of the sampling.

**TVA Response:** Agree. Ash was found at the confluence of the Little Emory River with the Emory River. Ash was not found upstream in the Little Emory River.

47. Section 3.2 River Conditions, page 5: TRM and ERM are spelled out in the second paragraph, but both acronyms were already used, without being spelled out, on page 4.

**TVA Response:** Agree. An acronym will be spelled out the first time it is used.

48. Section 3.2 River Conditions, page 5: The abbreviation for cubic feet per second (cfs) is used for the first time in the document without giving the full name. After several uses throughout the document, cfs is spelled out on page 55 for the first time. The document’s readability would be improved by consistently spelling out acronyms and abbreviations the first time they are used in the document.

**TVA Response:** Agree. An acronym will be spelled out the first time it is used.

49. Section 3.2.4 Water Quality, page 6: This section states that there “may” be elevated levels of metals in the Emory River. It is unclear whether data exists with this information. For clarity, the document could state how this information is relevant to the cleanup by giving definite background data on water quality.

**TVA Response:** As stated on page 6, the Emory River may have elevated metal levels because several upstream tributaries are listed for manganese, iron, and pH from historic coal mining activities. An SAP is being prepared that will specify the additional data collection necessary to make informed decisions regarding the river system, including presence of metals upstream in the Emory River.

**50.** Section 3.3 Ground water Conditions, page 7: Rather than using the phrase “KIF and the area affected by the ash release,” the language could be adjusted to use “The Site.”

**TVA Response:** Agree. Please note that the KIF refers to the actively operating power plant; as explained in response to comment #35, the “site” includes other areas affected by the ash release.

**51.** Section 3.3 Ground water Conditions, pages 7-8: Figure 5, used to depict the rock formations that influence ground water, does not give a clear understanding of the hydrology near the site. Specifically, the work plan states that ash does not threaten the ground water due to the hydrogeology, but it concurrently states that ground water “within the site locality” is recharged by infiltration during precipitation events. Rainwater will continue to infiltrate the terrain, regardless of whether it is soil or ash. In this case, rainwater can filter through the ash that remains on the ground at the site into the rock formations below and eventually to either the river or ground water. A figure in addition to Figure 5 could provide directional arrows or a layered depiction of how precipitation reaches the ground water or discharges to the river. This figure would serve to assure the community that leachate is being appropriately considered and monitored to prevent ground water contamination. In addition, acid rain conditions will increase the leaching of metals into waters (surface and ground), presumably raising the risks from ash to ground water in the area.

**TVA Response:** Agree. A figure will be included in the EE/CA report showing a groundwater conceptual site model, with arrows depicting movement.

**52.** Section 3.3 Ground water conditions, page 8: There is a typo in the third full paragraph. “Affect” should be “effect.”

**TVA Response:** Noted. TVA regrets any typographical errors.

**53.** Section 3.4 Ecological Conditions, page 8: This section omits discussion of the aquatic environment and ecosystem. It is also silent on mammals that are native to the area. The relationship of vegetation and terrestrial species is integrally linked to the aquatic plants and animal species, which is relevant to the discussion of ecology at the site.

**TVA Response:** Noted. This section is intended to be a general introduction to the ecological conditions in the area. Further definition of ecological conceptual site model, receptors, exposure pathways, environmental media, and assessment endpoints will be developed as part of the Sampling and Analysis Plan for the River System.

**54.** Section 3.4 Ecological Conditions, first full paragraph, page 9: The first sentence indicates that fauna have been described earlier in this section. However, the preceding discussion only

mentions various types of plants, not animals. It is possible that the author confused flora and fauna. If this is the case, “fauna” should be replaced with “flora” in this paragraph.

**TVA Response:** Noted. TVA regrets any typographical errors.

**55. Section 4 Sampling and Monitoring Activities, page 10:** This text is the first time that the name “Kingston Fly Ash Recovery Project” has been used. It is unclear whether this is the official name of the cleanup project, what the project entails, or generally to what it is referring. The work plan could include a paragraph in the “Background” section that would introduce this name and its relevance to the cleanup.

**TVA Response:** The project name is the Kingston Ash Recovery Project, as also used in the title of the document. No other relevance to the cleanup is expressed nor implied.

**56. Section 4.1 Soil and Ash Sampling Results, first full paragraph, page 11:** This explanation of why coal ash is not classified as a hazardous material under federal law either does not make the point clearly or is incorrect. Rewriting this section of the work plan would make it more accurate. Coal ash is classified according to the legal definition under the Beville Amendment. It is also important to mention that the legal definition of hazardous is different than the scientific description of toxicity. The scientific definition of toxic (capable of causing injury or death) depends on the site specific concentrations, exposure pathways and durations, and a range of other biological factors. The legal definition of hazardous is derived not only from scientific evidence, but also from political factors, and therefore the list of hazardous wastes may not include all wastes that are toxic to humans and the environment. This paragraph states that “In all instances, the concentrations of the TCLP metals, including arsenic, found in samples from the KIF release site were below the threshold values that would categorize the ash as hazardous waste material under 40 CFR Part 261.” EPA uses the TCLP to determine how much of the contaminants will leach out of the ash and compares that number to a federal standard, but this method is never mentioned and the data from this testing are not made available in this document. Moreover, there is a distinct set of standards used to determine the threat posed to human health and ecological quality, which is not clarified in the work plan. The document gives the impression that because the ash does not qualify for disposal in a hazardous waste landfill, there is no threat to human health or wildlife. Using the data provided in Table 8, we prepared a comparison of the maximum detected concentrations of metals at the TVA site to the federal threshold values listed under CERCLA (see Table 1 below). These maximum concentrations will be used for the risk assessments that will determine the threats to human and ecological health posed by the site, according to the document.

**Table 1.**

| <b>Contaminant/Constituent in ash</b> | <b>Federal hazardous waste parameters* (mg/L)</b> | <b>Maximum detected concentration at TVA site (mg/L)</b> |
|---------------------------------------|---|--|
| Arsenic                               | 5.0   | 166  |
| Barium                                | 100   | 1410   |
| Chromium                              | 5.0   | 68   |
| Lead                                  | 5.0   | 60.5   |

|          |     |      |
|----------|-----|------|
| Mercury  | 0.2 | 0.2  |
| Selenium | 1.0 | 17.8 |

\*If any of the constituents present in waste fall within one of the four characteristics of hazardous waste according to RCRA and are present in concentrations above the parameter, that waste is considered hazardous. Coal waste is exempted from this classification system.

**TVA Response:** As explained in response to comment #22, there is a difference between the definition of a constituent concentration in a material displaying a hazardous waste characteristic and a constituent having inherent toxicity. The discussion of hazardous waste characteristic is solely presented for the purpose of regulatory definition of the material for purposes of disposal under EPA’s RCRA requirements. The inherent toxicity of a constituent is discussed in the human health and ecological risk assessments, which develop quantitative estimates of risk due to exposure to the constituent, including dose and toxicity. Please note that a table of TCLP results compared to EPA’s RCRA limits will be included in the EE/CA report. Note also that the table provided in the comment above incorrectly compares aqueous-phase (water) concentrations (Federal hazardous waste parameters in mg/L) with solid-phase (ash) concentrations (Maximum detected concentration at TVA site, which are actually in units of mg/kg). The correct comparison must be made between test results on the same aqueous-phase media (water), in which the TCLP results on the ash are reported.

**57. Section 4.1 Soil and Ash Sampling Results, second full paragraph, page 11:** This section makes a vague statement that TDEC has posted “relevant information” on its Web site, but it does not give the Web site or any name for the data that would encourage a reader to search for it. If these data are important to the EE/CA work plan, TVA could include it as an appendix to encourage proactive reading, as opposed to sending readers away from the document looking for information that was excluded.

**TVA Response:** Because of the large volume of data collected, and because the volume of that data is increasing as cleanup progresses; the reader is encouraged to refer to the TVA website: [www.tva.gov/kingston](http://www.tva.gov/kingston), the TDEC website: [www.state.tn.us/environment/kingston](http://www.state.tn.us/environment/kingston), and/or EPA website: [www.epakingstontva.com](http://www.epakingstontva.com) for the latest verified results.

**58. Section 4.1 Soil and Ash Sampling Results, second full paragraph, page 11:** The language of this paragraph states that arsenic presents a potential health hazard, which is in direct contrast to the statements made in the first full paragraph above it. The work plan should clarify whether or not the sampling data indicate that arsenic is above the screening levels that would qualify it as a human health hazard.

**TVA Response:** Correct. The first paragraph states that levels of arsenic in the ash generally vary from approximately background levels to three times background levels. The second paragraph states that in all instances, the concentrations of the TCLP metals, including arsenic, were below the threshold values that would categorize the ash as hazardous waste material under 40 CFR Part 261. The first defines its presence, the second its level in TCLP testing used to define a hazardous waste material for purposes of disposal under EPA’s RCRA requirements. The results of the human health risk assessment are summarized in Section 5.1.5, and show that

arsenic is a constituent of potential concern in ash as soil or sediment, in surface water in the Emory and Clinch Rivers, and in fish. Therefore, the work plan clearly states that arsenic is a potential human health hazard, based on this preliminary risk assessment screening.

**59. Section 4.4 Groundwater Sampling Results, second and third full paragraphs, page 13:** This paragraph, rather than simply listing the 17 organic constituents that are included in Appendix I of the TDEC state rule, only references Appendix I. The paragraph could be amended to provide the full list of constituents in the body of the text, or a second option would be to create a list of these constituents and provide it in an appendix to the work plan. Including information in technical documents, rather than sending readers away from the document to look for it, gives a better sense of the information that the document relies on and engages the reader beyond surface level.

**TVA Response:** A summary of groundwater sampling results will be presented in the EE/CA report.

**60. Section 4.5 Ecological Sampling Results, entire section, page 14:** This section does not give any reference to when or where these results will be published and how they will be used in the scope of designing and implementing the cleanup. In addition, this section only mentions the physical impact of the coal ash spill, but it could include a holistic presentation by giving the chemical impact as well.

**TVA Response:** Ecological sampling is being performed under numerous TVA programs, not solely under the CERCLA project. These are long-term ongoing studies to investigate ecological conditions in the KIF area and any long-term effects or impacts to natural resources. Results of those studies will be published as the individual studies are completed. Adjustments to work scopes and study plans that will make the results of these investigations more useful in planning for long-term cleanup have been incorporated into the continuing work as a result of review by EE/CA technical committee members (TVA, EPA, TDEC, and others). Results that are available at the time that the ecological risk assessment for the river is prepared will be used in the ecological risk assessment.

Please note that none of the ecological investigation results have been published yet. Preliminary results were presented at a SETAC conference in November; the TVA posters and abstracts from that conference have been published on the TVA-Kingston public website, along with the abstracts from the non-TVA investigations and the posters from those investigations. TVA has begun drafting several technical papers on baseline fish tissue contaminants levels, fish health, tree swallows, and other terrestrial and avian species to submit to peer-reviewed journals. Researchers at the US Army Corps of Engineers published results of their geochemical and toxicological investigations in a technical report to TDEC and TVA that was released in October, and have drafted two papers for journal publication that currently are undergoing peer review. TVA also is organizing an environmental symposium focusing on Kingston-related research that will provide an opportunity for researchers to evaluate the work currently underway or planned.

**61. Section 4.5 Ecological Sampling Results, third full paragraph, page 14:** The information given in this section would be categorized under the chemical effects of the coal ash spill, not physical. The reproductive, neurological, and developmental impacts on fish in the rivers are all influenced by the specific constituents present in the river as a result of the spill at a more complex level than simply their physical presence.

**TVA Response:** The referenced passage is not intended to address physical, rather than chemical, effects. The exposures to ash that are being evaluated are not limited to the physical presence of ash particles. The studies being performed are, in fact, intended to evaluate potential effects of ash-related constituents at the more complex level of understanding noted in the comment.

**62. Section 4.6 Air Sampling Results, first full paragraph, page 14:** The third sentence beginning with “The hand-held...” and ending at “2.5 microns” is a run-on sentence. There should be a period, instead of a comma, after “(PM10).” In addition, this sentence gives the abbreviation for 10 microns, but does not give the abbreviation for 2.5 microns. For consistency, this sentence should provide the abbreviation for both.

**TVA Response:** Noted. TVA regrets any typographical errors.

**63. Section 5 Human Health Risk Assessment, bulleted list, page 15:** The document could be clearer by indicating that the list of EPA guidance documents is not exhaustive, rather than using the word “may,” which implies that certain documents will be selected from this list and that other documents absent from the list will not be considered. One specific reason this amendment is important is that the list does not include the *Child-Specific Exposure Factors Handbook* (2008), which serves as the primary guide on risk assessment for children and should be an integral part to the risk assessment portion of this cleanup.

**TVA Response:** Noted. The documents actually used in the EE/CA risk assessments will be referenced in the respective EE/CA report. As explained in response to comment #34, the EE/CA risk assessment will clearly assess risks specific to a child, separately from those to adults; however, the cited handbook will not be used.

**64. Section 5.1 Data Evaluation, second bullet, page 16:** This entire sentence is a run-on. There should be a period between “evaluated” and “sediment.”

**TVA Response:** Noted. TVA regrets any typographical errors.

**65. Section 5.1.2 Identification of Site Related Contaminants, Determination and Use of Background Concentrations, page 18:** It is unclear which data will be used, and from which

agency, to serve as the reference for the background concentrations of soil in the Roane County Region.

**TVA Response:** The EE/CA will use each of these data sources as reflecting the range of concentrations typical of regional soils. Please note that soil “background” concentrations are not applicable to ash, since ash is not a natural soil.

**66. Section 5.1.2 Identification of Site Related Contaminants, Determination and Use of Background Concentrations, second full paragraph, page 19:** The document would be clearer if the specific sampling depths for each location were listed, instead of saying “several.”

**TVA Response:** The EE/CA will use the data as reflecting the range of concentrations typical of regional soils; the sampling depths are therefore irrelevant to the range. Please note that soil “background” concentrations are not applicable to ash, since ash is not a natural soil. As such, natural soil horizons, or “depths”, are also not applicable.

**67. Section 5.2.1 Soil/Ash, page 23:** It is unclear whether there is currently public access to the site.

**TVA Response:** Access to the site is restricted with fencing and security patrols, as it is an active CERCLA site. The EE/CA will evaluate potential risks to the public under current and future scenarios; namely current residents living off the site (no access to the site), as well as trespassers (unauthorized entry to the site).

**68. Section 5.2.3 Surface Water, Recreator (fisher) paragraph, page 25:** There is a typo in this paragraph. The word “isfrom” in the fourth sentence should be separated into two words.

**TVA Response:** Noted. TVA regrets any typographical errors.

**69. Section 5.2.5 Quantification of Exposure, first and second paragraphs, page 26:** There is an entire body of scientific evidence indicating that 10 mg/L is not a low enough threshold to protect children from the effects of lead. In order to be as conservative as possible and to protect the community’s youth, TVA could revise this section to indicate that they will use the IEUBK model at a threshold below 10 mg/L.

**TVA Response:** The risk assessment will continue to compare estimated blood lead levels to the 10ug/dL threshold until such time as EPA revises the lead threshold. Please note that the risk assessment will report the actual modeled lead level, which is on the order of 1.3 ug/dl for an on-site child resident (1-2 year age range), which is below the threshold of 10 mg/dL.

70. Section 6.1 Conclusions of the SLERA, first paragraph, page 33: It is unclear what “steps” are being referenced, what step 1 is, or where one could find these steps.

**TVA Response:** Agree. The steps are explained in Appendix B, page 54. TVA regrets that the text should have explained that.

71. A.1. Sources, first sentence, page 45: There is a typo in this sentence. It is unclear whether it should be “a constituent” or “constituents.”

**TVA Response:** Noted. TVA regrets any typographical errors. “Constituents” is intended.

72. A.1.1 Primary Source, page 45: This is a great introductory, background paragraph that would have served well in the introduction to the entire document. It gives important background information that is relevant to a clear understanding of the cleanup.

**TVA Response:** Noted. TVA appreciates the comment.

73. A.5.4 Benthic Invertebrate Communities, page 48: This section does not mention specific benthic invertebrates that are known to reside in the Emory, Clinch and Tennessee Rivers. This omission is important because of the variety of special and endangered species of freshwater mussels that are federally protected.

**TVA Response:** The purpose of this section is to identify general ecological receptors that could be exposed to constituents from the released ash, and not as a biological survey. The specific benthic communities are being delineated in biosurveys conducted within the Emory and Clinch Rivers as one of the ongoing ecological studies. Additional biosurveys will be identified in the SAP for the river system. Federally-protected species will be addressed in the EE/CA for the river system.

74. A.5.6 Amphibians and A 5.7 Reptiles, page 49: Neither of these sections reference the different species found at this site. To be consistent with the other Ecological Receptor sections, these sections could be amended to specifically reference the animals that fall into these categories.

**TVA Response:** The purpose of this section is to identify general ecological receptors that could be exposed to constituents from the released ash, and not as a biological survey of individual species representative of the general receptor.

75. First paragraph, page 53: There appears to be a typo in this paragraph. There is a large space before the last sentence.

**TVA Response:** Noted. TVA regrets any typographical errors.

**76. Second paragraph, page 54:** The information in this paragraph would be useful in the risk assessment section of the document to provide background information.

**TVA Response:** Noted. The main text is intended as a summary of the more detailed information available in the Appendix.

**77. B.1.1 Screening-Level Problem Formulation, Identification of Constituents Detected in relevant Media, page 56:** There is a typo in this sentence. There is a series of spaces and a period before the last sentence.

**TVA Response:** Noted. TVA regrets any typographical errors.

**78.** Risk assessment is a good method, but it is not perfect for determining the likelihood, nature and extent of harm from environmental conditions both for human health and ecological endpoints. Risk assessments can make reasonable estimates for some conditions, especially for the risks from single chemicals to average people. Risk assessment is less effective for ecosystems, multiple chemicals and chemicals for which there are limited toxicological data. All risk assessments are supposed to estimate the probability, nature, extent and magnitude of harm from stresses. They are typically used to assess chemical exposures for people and experimental animals. The basic method for all risk assessments is common to human health and ecological analysis and includes an exposure analysis, a hazard analysis, a dose-response estimation and a risk characterization. Ecological risk assessment adds an additional initial step of problem formulation that serves to focus and define the assessment. Human and ecological risks assessments differ in some important aspects:

- 1) Human health risk assessments consider individuals and not communities.
- 2) Ecological risk assessments evaluate populations and not individuals, except for rare and endangered species.
- 3) Much less is known about the ways that animals and plants respond to environmental stressors.
- 4) Ecological risk assessments should consider how assemblages of animals and plants and not just single species are affected.
- 5) Ecological risk assessments always begin with a Problem Formulation that narrows the scope because it is not possible to assess all species and all potential effects.

Risk assessments depend on a base of knowledge regarding the conditions of the risk situation. These conditions will determine the source of stress, the exposure pathways and the people and non-human species affected. The conditions also include the condition or status of the communities exposed to stresses. Risks are difficult to assess for multiple chemical exposures, as is the case at the TVA Coal Ash Spill. The most common method for handling multiple chemicals is simply summing the individual calculated risks. This approach does not take into account interactions among chemicals that cause responses greater than can be predicted by adding them together nor can risk assessment predict novel responses that are only observed with

multiple chemical exposures. Oftentimes, the limitation for estimating human health risks is the fact that most toxicological information is based on experimental animals that have significant biological differences from humans. These differences are taken into account via uncertainty factors. Uncertainties regarding the exposed people are also considered.

**TVA Response:** Agree. As explained in response to comment #38, the EE/CA report will address uncertainties in the human health risk assessment, which can result in an overestimation or underestimation of risk.

**79.** Risk assessments are supposed to consider the most sensitive and vulnerable members of a community or population. Children or young animals, fetuses and the chronically ill are all more sensitive or vulnerable and will suffer more severe harm than the average adult. Chronic illnesses such as cardiovascular disease and respiratory problems (asthma, COPD) also result in greater sensitivity to many environmental stressors, especially airborne ones. Risk assessments have only recently begun to address how human communities respond to stressors. Literature from the social science field indicates that communities already under stress are more vulnerable to subsequent stress. These stressors can stem from high unemployment rates, poor health care and school systems, high disease burdens and other social factors. Communities that are already under stress from these types of conditions will experience more severe effects and recover poorly from major stress from natural or human disasters. This type of risk assessment is referred to as a cumulative risk assessment and EPA has completed at least two substantial documents on conducting cumulative risk assessment. The risk assessments for the TVA Fly Ash Release will be shaped by a number of these social and ecological conditions that apply to the specific situations in Roane County.

**TVA Response:** Agree. As explained in response to comment #19, a human health risk assessment is being prepared for the Embayment and Dredge Cell EE/CA and will specifically address potential risks to children and potential risks to adults from potential lifetime exposures to ash-related constituents. As explained in response to comment #36, the risk assessments will integrate contributions from all pathways and all constituents, including legacy constituents, in calculating risks to human or ecological receptors. Other social or emotional stresses resulting from unemployment, health care, school systems, disease burdens, or disasters are not appropriate considerations under CERCLA risk assessment guidance. The effects of various stressors on an individual's susceptibility to impacts from potential exposure to hazardous constituents and their ability to recover from those exposures are not well understood. The combined effect of exposure to hazardous constituents and other stressors cannot be quantified.