

**Tennessee Valley Authority
Regulatory Submittal for Kingston Fossil Plant**

Documents submitted:

Final Revised Action Memorandum with ARARs

Date submitted

8/ 4/ 2009

Submitted to whom

Leo Francendese, EPA

Concurrence

Received

Not Applicable

TVA

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Date

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Anda A. Ray
Senior Vice President
Office of Environment and Research

August 4, 2009

Mr. Leo Francendese
U.S. Environmental Protection Agency
Region 4
61 Forsyth Street Southwest
Atlanta, Georgia 30303

Dear Mr. Francendese:

Please find enclosed the final revised Action Memorandum (Request for Removal Action for the Tennessee Valley Authority at the Kingston Fossil Plant in Roane County, Tennessee). This revised Action Memorandum is for the time-critical removal action required to remove the released coal ash from the Emory River. This submittal meets the requirements of Section IX, paragraph 28, of the Administrative Order and Agreement on Consent.

Please contact me if you have any questions.

Sincerely,

A handwritten signature in black ink that reads "Anda A. Ray". The signature is written in a cursive, flowing style.

Anda Ray

Enclosures

ACTION MEMORANDUM

DATE: August 4, 2009

SUBJECT: Request for Removal Action at the TVA Kingston Fossil Fuel Plant Release Site, Roane County, Tennessee

FROM: Mike Scott, TVA, General Manager, Kingston Project and TVA's Kingston Project Coordinator

TO: Anda A. Ray, TVA, Senior Vice President, Office of Environment and Research and Kingston Recovery Executive

I. PURPOSE

The purpose of this Action Memorandum is to request and document approval of the proposed Tennessee Valley Authority (TVA) time-critical removal action described herein for the TVA Kingston Fossil Fuel Plant (KIF) Release Site in Roane County, Tennessee. On May 11, 2009, TVA and the Environmental Protection Agency (EPA) entered into an Administrative Order and Agreement on Consent (AOC) under Sections 104(a), 106(a), and 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, pursuant to which TVA will perform the removal action described herein. This removal action involves the removal, processing, and disposal of a major portion of the ash material that was released into the Emory River from the Kingston Fossil Fuel Plant. This removal action also involves the removal of ash material located immediately adjacent to the river. Under CERCLA, the ash spill constitutes a release, as well as a potential for continued releases of hazardous substances into the environment. The release of hazardous substances at the Site poses a threat to public health and the environment pursuant to Section 104(a) of CERCLA and the conditions at the Site meet the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Section 300.415(b)(2) criteria for removal actions.

II. SITE CONDITIONS AND BACKGROUND

ID Number: TN8640006682
Site Specific ID Number: A4XP
Removal Category: Time-Critical Removal Action

A. Site Description

This section of the Action Memorandum provides a description of the Site conditions and relevant background information.

1. Removal Site Evaluation

KIF is located at Clinch River Mile (CRM) 2.6 and is at the headwaters of Watts Bar Reservoir near the confluence of the Clinch and Emory Rivers. Construction of the plant began in 1951 and was completed in 1955. KIF generates 10 billion kilowatt-hours of electricity a year, enough to supply the needs of more than 700,000 homes in the Tennessee Valley.

On Monday, December 22, 2008, a containment dike surrounding a portion of the Class II landfill for ash from the operation of the power plant failed, releasing about 5.4 million cubic yards of fly ash and bottom ash. Ash was released from about 60 acres of the 84-acre dredge cell complex. The spilled material covered about 300 acres of adjacent parts of Watts Bar Reservoir, including most of Swan Pond Embayment and reservoir shorelands. Most of the ash which spilled onto land was on property managed by TVA.

The ash from the Kingston ash pond and dredge cells has been regularly tested for naturally occurring metals since the Kingston dike failure occurred on December 22, 2008. Coal, in its natural state, contains various trace metals that can be concentrated and retained in the ash after burning the coal for power production. The specific chemical composition of fly ash depends on the source of the coal. KIF mostly burns eastern bituminous coal but also has used coal from Illinois and blends low-sulfur Western coal to reduce emissions. The principal components of fly ash are those that are typical of rock and soil. Oxides of silicon, aluminum, iron, and calcium, chemically combined in an amorphous form, comprise 95-99 percent of fly ash. Ash also contains variable amounts of magnesium, titanium, sulfur, sodium, and potassium (TVA 2001). Although the main chemical constituent of ash is silicon dioxide, the material may contain trace amounts of constituents that occur naturally in coal such as arsenic, beryllium, chromium, copper, lead, nickel, zinc, antimony, silver, thallium, vanadium oxide, cadmium, mercury, and selenium (TVA 2009a).

2. Physical Location

The Site is located in Kingston just off of Swan Pond Road in Roane County, Tennessee. Roane County had a total population of 53,399 in 2007. The county is primarily rural in distribution of population with about 60 percent of the population outside of incorporated cities and towns. Most of the 300 acres directly affected by the release was TVA property, although 40 non-TVA owned properties, constituting a total of 8 acres, were affected. TVA has since purchased most of the affected properties and many others in the area that may be affected by response actions.

Drinking water in the immediate area is primarily by residential groundwater wells. All of the wells tested by TDEC immediately after the event were found to be below required drinking water limits (TVA 2009b).

3. Site Characteristics

The magnitude of the ash deposits in the areas nearest the plant (Emory River Mile (ERM) 1.75 to 3.0) vary from about 5 feet in thickness to completely filling in the navigation channel (greater than 30 feet in thickness) and completely filling in Swan Pond Embayment. Ash deposit thickness decreases with increased distance downstream from the original release. Deposits greater than 5 feet in thickness appear to be confined to the Emory River in the immediate vicinity of KIF.

Several field sampling surveys have been performed to characterize the spatial extent of ash deposition. Results indicate that initially, the ash may have traveled upstream as far as ERM 5.75 and as far downstream as Tennessee River Mile (TRM) 564. It is noted that the fly ash contains cenospheres which are inert, hollow balls of sand-like material. Cenospheres are created in a coal-fired boiler when molten ash solidifies around a bubble

of flue gas to form a hollow sphere. The gas bubble allows cenospheres to be so lightweight that the particles float on water and therefore can be transported on the surface of the water for long distances. The cenospheres are collected by hydraulic vacuum mechanism. The deposits of ash that settle to the river bottom are the focus of the river dredging discussions in this Action Memo.

In the downstream direction, ash deposition diminishes to trace amounts by about ERM 1.0 with original pockets of up to a foot in some places occurring in depositional areas in the Clinch River. Ash deposition of less than one inch was originally observed at the mouth of the Clinch River in the Tennessee River. Two large rainfalls in January and again in May resulted in Emory River discharges of 26,000 cubic feet per second (cfs) and 69,000 cfs, respectively. Normal river discharge is approximately 700 cfs to 1300 cfs. Surveys post-event showed some filling in of depressions in the ash and scouring in areas of high flows, as well as movement of some of the ash downstream. Evidence of dredged channels remains, even after the May high flow event. While quantitative evaluation of ash migration is still pending based on more advanced bathymetry, it is clear that migration of the ash downstream on the Emory and into the Clinch took place during the May high river flow event.

4. Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant

The ash material at the Site contains metals such as arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc, which are hazardous substances as defined by CERCLA Section 101(14). The released ash is present through several miles of riverways. The main area affected by the failure of the KIF ash dredge cell extends from ERM 1.5 to 3.5. Prior to the failure of the dredge cell, the 100-yr flood elevations for this reach of the Emory River varied from elevation 747.6 feet above mean sea level (msl) at ERM 1.5 to 749.4 feet above msl for ERM 3.5. The river levels post-event could rise by 2.3 to 2.9 feet above the pre-event flood stage under the 100-yr flood, causing greater upstream flooding (TVA 2009a).

During periods of high river flow, fly ash containing metals is suspended in the water column for short periods of time as occurred immediately after the spill event. At the Site, analysis of water samples taken on December 22 and 23, 2008, from the Emory River immediately after the release showed high amounts of suspended materials, with the concentrations of some metals exceeding Tennessee state requirements for drinking water. Furthermore, the analysis of total metals in some surface water samples indicated some metals exceeded Tennessee state requirements for drinking water. These included arsenic, antimony, beryllium, cadmium, chromium, lead, and thallium. Later in-stream testing on December 28 and 29, 2009, near KIF yielded much lower amounts of suspended solids indicating that the ash had settled out of the water column. In those samples, with the exception of one arsenic value, metals concentrations met state drinking water criteria. A similar spike in concentrations was seen immediately after the January high river flow events, although a spike was not seen in the days following the May high river flow event period. Water sampling on the day of the event was not conducted due to unsafe water conditions.

Data from ash samples on the roadway adjacent to the fly ash failed cell showed some arsenic levels detected exceeded EPA residential removal action levels but were below EPA industrial removal action levels for the hazardous substance.

5. NPL Status

The Site is not on the National Priority List, although, pursuant to the AOC, a Preliminary Assessment will be conducted at the Site at the completion of all removal activities.

6. Maps, Pictures, and Other Graphic Representations

All removal file information, including maps and aerial photos of the Site, will be maintained by TVA and the EPA On-Scene Coordinator (OSC) and released to the EPA record center, and the Administrative Record for inclusion in the Site files. Please see attachment labeled Ash Structures.

B. OTHER ACTIONS TO DATE

1. Previous Actions

Early Monday morning on December 22 the Kingston Ash Spill occurred. The Incident Command Center was established and before dawn, the EPA, U.S. Coast Guard (USCG), Norfolk Southern Railroad (to reroute trains), and the Tennessee Emergency Management Agency (TEMA) had been notified; five boats were in route for environmental sampling of the river, a helicopter was airborne to survey the scope of the spill, and Incident Command Center was activated at KIF; the Agency Emergency Response Plan was activated, Emergency Operations Commands were set up in Knoxville and Chattanooga, and the Roane County Emergency Management Agency representative was in the Command Center on-site. On the first day TVA and a variety of local, state, and federal agencies, checked on the safety of people in the area, contained and evaluated the damage, and planned recovery. TVA took samples of air, water, and ash that were analyzed for contaminants by a Maryville, Tennessee, lab. The USCG closed river traffic, and by evening EPA and the USCG were on-site. TVA released the first of their daily fact sheets and posted it to the Web site. Several routine monitoring programs are in place to monitor river water, drinking water, and air quality near and adjacent to the Site. Groundwater sampling has also occurred. Immediately after the release, railroads, roads, and utilities were repaired and replaced. Dikes and weirs, both on land and in the water, were constructed to control the ash movement. Dust control activities such as covering the ash with flexterra were implemented and are ongoing. Storm water management systems, such as clean water diversion and ash water collection and settling, are constructed.

2. Current Actions

Dredging and ash processing has begun. Ash is being recovered from the Emory River through a series of dredges and pumped to two ditches located parallel to the existing ash sluice channel where the ash is recovered. Water generated during the dewatering operation is channeled to the rim ditch and then sluice channel, and through a settling and stilling ponds which allows for additional settling of ash from the water prior to being discharged back to the Emory River. The recovered ash is windrowed or piled into long rows, and allowed to dry. This stockpile of dried ash, located in the 'triangle' or former ball field area, is currently being processed (dried) to later be shipped off-site. Cenospheres and entrained river debris are being removed from downstream coves and

deposited into enclosed holding ponds located adjacent to the ash pond Cenospheres will be managed according to the approved Cenosphere Collection Area Consolidation Work Plan.

The stability of remaining dikes is being assessed under both the Tennessee Commissioner's Order (see below) and the EPA AOC. On June 25, 2009, TVA publicly released the results of a root cause investigation that was performed by a leading geo-technical engineering firm to determine the cause of the failure.

C. STATE AND LOCAL AUTHORITIES' ROLE

1. State and Local Actions to Date

On January 12, 2009, the Tennessee Department of Environment and Conservation (TDEC) issued TVA a Commissioner's Order which directed TVA to undertake numerous response activities at the Site including, but not limited to:

- implement measures to prevent the movement of contaminated materials and minimize further downstream migration of contaminated sediments;
- fully cooperate and support TDEC's review of all TVA fly ash impoundments located in the State;
- submit all existing studies, reports, and memoranda that are potentially relevant to explaining or analyzing the cause of the catastrophic failure of the containment structures;
- fully cooperate and provide support for TDEC's initial assessment of the impact of the ash release on all waters of the State;
- prepare and submit a Corrective Action Plan (CAP) within 45 days after receipt of the Commissioner's Order, to include:
 - i. a plan for the assessment of soil, surface water and groundwater; remediation of impacted media; and restoration of all natural resources damaged as a result of the release;
 - ii. a plan for monitoring the air and water in the area during the cleanup process;
 - iii. a plan to ensure that public and private water supplies are protected and that alternative water supplies are provided if contamination is detected;
 - iv. a plan for addressing both the short-term and long-term management of fly ash at the Site, including remediation and stabilization of the failed ash waste cells, proper management of the recovered ash, and a revised closure plan for the Class II ash disposal facility; and
 - v. a plan to address any health and safety hazards posed by the ash to workers and the public.

On March 2, 2009, TVA submitted a draft CAP to EPA and TDEC for agency review and approval. Since the release, EPA, the State, and TVA have conducted extensive sampling of air, water, and ash material.

2. Potential for Continued State and Local Response

TDEC will continue to play a large role in the response activities at the Site and will continue to oversee activities under the Commissioner's Order that are not addressed by

the EPA/TVA Administrative Order and Agreement on Consent. In addition, the State will continue to be involved in sampling surrounding water bodies and air, as well in the long-term ash management decisions at KIF, including any landfill permitting. The State will have control over final closure of the failed dredge cell. It will also have responsibility for approving any off-site disposal locations in the State of Tennessee. EPA will coordinate with the State to ensure they are apprised of all progress made under the Administrative Order and Agreement on Consent.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

The conditions resulting from the ash release at KIF present a substantial threat to the public health or welfare and the environment if not properly managed and meet the criteria for a time-critical removal action as provided for in the NCP Section 300.415(b)(2). The primary criteria include:

- **Section 300.415(b)(2)(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants:**

The area where the ash spilled is temporarily devoid of benthic life. The benthic invertebrates were smothered during the ash spill. This minimizes the food available to aquatic life, impacting the health of the aquatic environment in the area. The presence of metal constituents in the ash and, if and when resuspended, in the water column, can also have an impact on the aquatic environment.

- **Section 300.415(b)(2)(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems:**

Although monitoring results indicate that the downstream river water supplies have not been impacted, it has been established that the fly ash contains hazardous substances such as metals, and should sufficient ash migrate through the Clinch and Tennessee Rivers, there is the future potential for short-term contamination of the surface water that serves as a source of water for drinking water treatment plants.

- **Section 300.415(b)(2)(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released and,**
- **Section 300.415(b)(2)(viii) Other situations or factors that may pose threats to public health or welfare of the United States or the environment**

Weather conditions, including the high water event of May 4, 2009, have already contributed to the release of the ash material and release of ash into adjacent waterways. High river flows could result in upstream flooding of residences as well as to future migration of the ash into the Clinch River. Historical flow information from the Oakdale Monitoring station at ERM 18.3 upstream of the plant shows that high flows most often occur during the winter and spring months. Of the last 24 years, 22 of the maximum flows for the year have occurred between late November through May with January and March having the highest river flow events. Therefore, the greatest risk of flooding is within these time frames.

IV. PROPOSED ACTION

A. Proposed Actions

The proposed actions listed below have been developed in coordination with the TDEC and EPA. These actions are designed to promote public welfare by removing the major portion of the ash in the Emory River that is most likely responsible for upstream flooding and has the greatest potential for migration. A removal action work plan will be developed to implement the actions described below.

1. Proposed Action Description

The primary component of this removal action is the dredging and processing of material from the Emory River. The ash material will be dredged hydraulically, accompanied by appropriate monitoring and best management practices to ensure protection of human health and environment. Mechanical dredging will be used to remove debris. Ideally, as much debris as possible will be removed before hydraulic dredging to maximize productivity of the dredges. However, there are physical limitations related to both methods of dredging, so a combination of dredging methods will often be used.

The initial dredging program covered under this Action Memorandum, which is intended to address the time-critical actions under the EPA AOC, will focus on reopening the original Emory River navigation channel. Currently, nearly one mile of the channel is blocked by the ash material and debris. Opening the channel reduces the potential for upstream flooding. It may also reduce the potential for downstream ash migration as the flow channel widens, reducing the potential for scouring. This initial phase of dredging is anticipated to recover around 1.5 million cubic yards of ash. As a second priority, the river channel will be recontoured, removing additional ash down to native sediment where practicable. Once sufficient ash has been removed from the river so as to significantly remove the risk of further downstream migration, the weir constructed across the Emory River to help contain the ash will be removed in order to reduce the flood risk and restore normal hydrologic flow.

Although there is a significant distance of river to dredge, priority will be given to that ash that has the greatest potential for flooding (an issue upstream on the Emory) or migration into the Clinch River. Also, dredging near the intake channel will be prioritized to limit the potential for ash, during high flows, to enter the plant's cooling system and be discharged into the effluent channel in the Clinch River.

As appropriate, other land-based equipment such as draglines or amphibious trackhoes may be used or considered to remove ash near the shoreline. This material will need to be air dried before transport to the processing/loading area.

To minimize noise impacts to the surrounding community, hospital grade mufflers and other noise reduction devices will be used on the dredges and on booster pumps. Bathymetric surveys (mapping of the river bottom elevations) or other appropriate surveys and sampling will be performed periodically to confirm progress of dredges and after major flow events to assess ash migration.

The dredged material will be pumped to the rim-ditch/sluiice channel ash recovery system which will be used to settle out the ash. Ash will be recovered from the ditches and windrowed to dry to appropriate moisture levels for transport and disposal. In the ash recovery and processing area, ash may be stored awaiting disposal. Monitoring will be performed to assure the stability of the ash underlying the processing area.

The supernatant water generated during the dewatering process will be routed through on-site process ponds where additional settling of solids will take place and discharged through an existing outfall unless an alternate location is found.

In accordance with the AOC, TVA has prepared an Off-Site Disposal Options Analysis for the off-site disposal of the ash material. Given the limited capacity of on-site interim storage space, the ash will be transported for ultimate disposal off-site once it is dried appropriately to approximately 80 percent ash and 20 percent water or drier. Pursuant to the requirements of the AOC, all ash shipped off-site must be disposed of in a RCRA Subtitle D landfill which meets the following requirements: use of a synthetic liner, leachate collection system, groundwater monitoring, financial assurance, and closure and post-closure care. TVA anticipates, based on the Off-Site Disposal Options Analysis, that the majority of the ash will be transported by rail, although truck transportation may be used if necessary. TVA will provide written notification of any shipment of ash to the appropriate state environmental official in the receiving facility's state and to the EPA OSC. All off-site shipments will be in compliance with CERCLA's Off-Site Rule, 40 C.F.R. 300.440.

Ash is also located in areas near the mouth of the embayment as it empties into the Emory River that is retrievable with dry land equipment. Roughly 300,000 to 400,000 cubic yards of dried ash will be moved to a more secure location on-site. Some may be shipped off-site and some may be stored on-site for an undetermined period of time while additional disposal options are evaluated. The material that must be recovered at the mouth of the embayment will be removed via dredging as part of the second phase of recontouring the river bottom.

This Action Memorandum also covers the following additional near-term activities.

- Develop and implement a Site Health and Safety Plan,
- Develop and implement a Site Storm Water Management Plan,
- Develop and implement a Site Dust Control and Air Monitoring Plan,
- Compile existing information on the structural stability of Dikes D (remaining dredge cell dike) and #2 (temporary dike installed to retain ash) and prepare a report with recommendations and maintenance requirements. These requirements include submitting a schedule for development of a Structural Integrity Evaluation and developing recommendations and Maintenance Plan for Existing Site Dikes/Berms being used to contain spilled ash,
- Evaluate off-site ash disposal options,
- Develop and implement a Data Management Plan,

- Submit work plans for monitoring of additional water quality parameters of water discharged during dewatering related to the CERCLA Removal Action operations, including metals, and a monitoring and reporting plan, to be approved by TDEC and the EPA OSC.
- Submit to the EPA OSC for approval a work plan for fly ash dewatering operation including technical evaluation of best management practices concerning treatment of effluents generating during the fly ash dewatering operation.
- Develop and implement a Surface Water Monitoring Plan for the Emory, Clinch, and Tennessee Rivers, and
- Develop financial expenditure report and schedule for development of any other work plans necessary to implement the actions selected in this Action Memo.

If time-critical dredging activities create further stability issues for Dike C, any action taken under this Action Memorandum to address the instability will be integrated with TVA's structural integrity project of impoundments currently underway.

2. Contribution to Remedial Performance

The proposed removal action will address the threats discussed in Section III, which meet the NCP Section 300.415(b)(2) removal criteria. The removal action contemplated in this Action Memorandum is consistent with future removal actions that are anticipated at the Site. A remedial preliminary assessment will be conducted at the completion of the removal work to address whether additional assessment or remedial work is necessary to address any residual contamination remaining at the Site.

3. Description of Alternative Technologies

The use of alternative technologies is not anticipated at this time. TVA will submit to the EPA OSC for evaluation, a technical memorandum documenting the evaluation of best management practices and available technologies concerning treatment of water generated during the fly ash dewatering operation. An evaluation of stabilization and/or treatment technologies that may be applicable to the fly ash will be considered in future actions at this Site.

4. Engineering Evaluation/Cost Analysis (EE/CA)

This proposed action is a time-critical removal and does not require an EE/CA.

5. Applicable or Relevant and Appropriate Requirements (ARARs)

Pursuant to the NCP, removal actions conducted under CERCLA are required to attain ARARs to the extent practicable, considering the exigencies of the situation. Waivers described in 40 CFR 300.430 may also be used for removal actions. This action is being conducted as a time-critical removal action. A list of ARARs is provided in the Attachment. In particular, all wastes transferred off-site will comply with the CERCLA Off-Site Rule pursuant to CERCLA 121(d)(3) and 40 CFR 300.440.

The EPA Toxicity Characteristic Leaching Procedure (TCLP) uses acid digestion to provide an indication of the potential for leaching metals and is used to define if a material will be considered a hazardous waste under the Resource Conservation and Recovery Act (RCRA). Several ash samples taken over the last few months were sent for TCLP analysis and all indicate that the ash is not considered a hazardous waste under RCRA.

A. Project Schedule

The dredging and recovery operations are currently underway. A removal action work plan will be developed to provide more details on the anticipated productivity of the dredging and disposal, both of which will impact the schedule. The schedule is highly dependent on weather and underwater debris removal (which is necessary with use of hydraulic dredges). The goal is to remove as much ash as possible from the river before the spring of 2010.

B. Estimated Costs

The total costs of this action cannot be estimated as there are many activities going on at KIF and many personnel are supporting multiple activities. TVA has provided an estimate of total project costs in its March 2009 10-Q Quarterly Financial report which was filed with the Securities Exchange Commission. The estimated cost for all recovery time-critical and non-time critical response actions is between \$933 million to \$1.2 billion.

V. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

The possibility of upstream flooding or additional ash migration into the Clinch River exists if the ash material is not properly managed. Although a recent five-year flow event did not result in flooding and although most of the originally released ash remains in the Emory River, significant ash migration into the Clinch River could occur under a more significant flow event. The chances of a significant flow event are greatest in the winter/early spring months as explained in Section III.

VI. OUTSTANDING POLICY ISSUES

There are no outstanding policy issues.

VII. ENFORCEMENT

This action is being undertaken pursuant to an AOC between TVA and EPA.

VIII. REFERENCES

Tennessee Valley Authority (TVA) 2001. Material Safety Data Sheet, Class "F" Fly Ash, MSDS No. BP-001.

TVA 2009a. Final Environmental Assessment, Emergency Dredging for the Kingston Fossil Plan Ash Dike Failure, Roane County, Tennessee. March 2009.

TVA 2009b. Corrective Action Plan for the TVA Kingston Fossil Plant Ash Release, Roane County, Tennessee. March 2, 2009.

ATTACHMENTS

ASH STRUCTURES



Potential ARARs and TBC guidance for CERCLA response actions at the Kingston Fossil Plant Ash Spill, Roane County, Tennessee

Media/Resource/Action	Requirements	Prerequisite	Citation
Chemical -specific ARARs			
Restoration of Emory River classified for <i>Domestic Water Supply</i>	Waters shall not contain toxic substances, whether alone or in combination with other substances, which will produce toxic conditions that materially affect the health and safety of man and animals, or impair the safety of conventionally treated water supplies.	Presence of pollutant(s) in waters of the State as defined in TCA 69-3-103(33)— relevant and appropriate	TDEC 1200-4-3-.03(1)(j)
	May not exceed AWQC in surface water(s) for the listed toxic substances		TDEC 1200-4-3-.03(1)(j)
	Shall not violate physical and chemical parameters or conditions related to Dissolved Oxygen, pH, Total Dissolved Solids, Solids, Turbidity, and Temperature		TDEC 1200-4-3-.03(1)(a) through (g)
	Waters shall not contain other pollutants in quantities that may be detrimental to public health or impair the usefulness of the water as a source of domestic water supply		TDEC 1200-4-3-.03(1)(k)
Restoration of Emory River classified for <i>Industrial Water Supply</i>	Waters shall not contain substances which will result in taste or odor that would prevent the use of the water for industrial processing	Presence of pollutant(s) in waters of the State as defined in TCA 69-3-103(33)— relevant and appropriate	TDEC 1200-4-3-.03(2)(i)
	Shall not violate physical and chemical parameters or conditions related to Dissolved Oxygen, pH, Total Dissolved Solids, Solids, Turbidity, and Temperature		TDEC 1200-4-3-.03(2)(a) through (g)
	Waters shall not contain other pollutants in quantities that may adversely affect industrial processing		TDEC 1200-4-3-.03(2)(j)
Restoration of Emory River classified for <i>Fish and Aquatic Life</i>	Waters shall not contain toxic substances or a combination of substances including disease-causing agents that, by way of either direct or indirect exposure through food chains, may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, physical deformations, or restrict or impair growth in fish or aquatic life or their offspring	Presence of pollutant(s) in waters of the State as defined in TCA 69-3-103(33)— relevant and appropriate	TDEC 1200-4-3-.03(3)(g)
	May not exceed AWQC in surface water(s) for the listed toxic substances		TDEC 1200-4-3-.03(3)(g)
	Shall not violate physical and chemical parameters or conditions related to Dissolved Oxygen, pH, Total Dissolved Solids, Turbidity,		TDEC 1200-4-3-.03(3)(a) through (g)

Potential ARARs and TBC guidance for CERCLA response actions at the Kingston Fossil Plant Ash Spill, Roane County, Tennessee (continued)

Media/Resource/Action	Requirements	Prerequisite	Citation
	and Temperature		
	Waters shall not contain other pollutants that will be detrimental to fish or aquatic life		TDEC 1200-4-3-.03(3)(h)
Restoration of Emory River classified for <i>Recreation</i>	Waters shall not contain toxic substances, whether alone or in combination with other substances, that will render the water unsafe or unsuitable for water contact activities including the capture and subsequent consumption of fish and shellfish, or will propose toxic conditions that will adversely affect man, animal, aquatic life or wildlife	Presence of pollutant(s) in waters of the State as defined in TCA 69-3-103(33)— relevant and appropriate	TDEC 1200-4-3-.03(4)(j)
	May not exceed AWQC in surface water(s) for the listed toxic substances (applies to waters classified for both recreation & domestic water supply)		TDEC 1200-4-3-.03(4)(j) As written in TDEC 1200-4-3-03
	Shall not violate physical and chemical parameters or conditions related to Dissolved Oxygen, pH, Solids, Total Suspended Solids, Turbidity, and Temperature		TDEC 1200-4-3-.03(4)(a) through (e)
	Waters shall not contain other pollutants in quantities that may have a detrimental effect on recreation		TDEC 1200-4-3-.03(4)(k)
Restoration of Emory River classified for <i>Irrigation</i> and/or <i>Livestock Watering and Wildlife</i>	Waters shall not contain toxic substances, whether alone or in combination with other substances, that will produce toxic conditions that adversely affect the quality of the waters for irrigation and/or livestock watering and wildlife	Presence of pollutant(s) in waters of the State as defined in TCA 69-3-103(33)— relevant and appropriate	TDEC 1200-4-3-.03(5)(f) and (6)(f)
	Shall not violate physical and chemical parameters or conditions related to Dissolved Oxygen, pH, Solids, and Temperature		TDEC 1200-4-3-.03(5)(a) through (e); and TDEC 1200-4-3-.03(6)(a) through (e)
	Waters shall not contain other pollutants in quantities that may be detrimental to the waters used for irrigation and/or for livestock watering and wildlife		TDEC 1200-4-3-.03(5)(g) and (6)(g)

Location-specific ARARs

Floodplains

Potential ARARs and TBC guidance for CERCLA response actions at the Kingston Fossil Plant Ash Spill, Roane County, Tennessee (continued)

Media/Resource/Action	Requirements	Prerequisite	Citation
Presence of floodplain	An evaluation shall consider (1) the effect of the proposed action on natural and beneficial floodplain and wetland values and (2) alternatives that would eliminate or minimize such effects. The initiating office shall determine if there is no practicable alternative to siting in a floodplain or constructing in a wetland. If a determination of no practicable alternative is made, all practical measures to minimize impacts on the floodplain or wetland shall be implemented. If at any time prior to commencement of the action it is determined that there is a practicable alternative that will avoid affecting floodplains or wetlands, the proposed action shall not proceed.	Federal actions that involve potential impacts to, or take place within, floodplains – to be considered	Tennessee Valley Authority Instruction, Section IX, Environmental Review: Procedures for Compliance with the National Environmental Policy Act, April 28, 1983, which incorporates E011988 and E011990 requirements.
<i>Aquatic resources</i>			
Waters of the State as defined in TCA 69-3-103(33)	<p>Must comply with the substantive requirements of the (ARAP) Aquatic Resources Alteration Permit for erosion and sediment control to prevent pollution.</p> <p>Pollution control requirements include, but are not limited to the following:</p> <ul style="list-style-type: none"> • Limit clearing, grubbing, and other disturbances in areas in, or immediately adjacent to Waters of the State to the minimum necessary to, accomplish the proposed activity; • Unnecessary vegetation removal is prohibited, and all disturbed areas must be properly stabilized and revegetated as soon as practicable. • Limit excavation, dredging, bank reshaping, or grading to the minimum necessary to install authorized structures, accommodate stabilization, or prepare banks for revegetation; • Maintain the erosion and sedimentation control measures throughout construction period; and • Upon achievement of a final grade, stabilize and revegetate, within 30 days, all disturbed areas by sodding, seeding, or mulching, or using appropriate native riparian species. • 	Action potentially altering the properties of any Waters of the State – applicable	<p>TCA 69-3-108(b)(1)</p> <p>TDEC ARAP Program general requirements (TBC)</p>

Potential ARARs and TBC guidance for CERCLA response actions at the Kingston Fossil Plant Ash Spill, Roane County, Tennessee (continued)

Media/Resource/Action	Requirements	Prerequisite	Citation
Waters of the State as defined in <i>TCA</i> 69-3-103(33)	Bank stabilization activities along Waters of the State must be conducted in accordance with the requirements of the aquatic resources alteration program (TDEC 1200-4-7). The general permit requirements for stream bank stabilization include the following: <ul style="list-style-type: none"> the erosion and sedimentation control practices indicated above under the TDEC ARAP general requirements; adverse impacts to T&E species are prohibited; placement of rip rap is limited to 300 linear feet of stream bank; material may not be placed such that it impairs surface water flow into or out of any wetland area; and stabilization materials shall not contain waste metal, construction debris, hazardous substances or toxic pollutants. 	Bank-stabilization activities affecting Waters of the State.— to be considered	ARAP General Permit for Stream Bank Stabilization
Waters of the State as defined as <i>TCA</i> 69.3-103(33)	Wet weather conveyances may be altered provided the following conditions are met: <ul style="list-style-type: none"> erosion and sedimentation controls must be maintained throughout the construction period; and adverse impacts to T&E species are prohibited. 	Activities that alter wet weather conveyances — to be considered	ARAP General Permit for Alteration of Wet Weather Conveyances
Within area impacting stream or any other body of water — <i>and</i> - presence of wildlife resources (e.g., fish)	The effects of water-related projects on fish and wildlife resources and their habitat should be considered with a view to the conservation of fish and wildlife resources by preventing loss of and damage to such resources.	Action that impounds, modifies, diverts, or controls waters, including navigation and drainage activities — relevant and appropriate	Fish and Wildlife Coordination Act (16 <i>USC</i> 661 <i>et seq.</i>)
Location encompassing aquatic ecosystem as defined in 40 <i>CFR</i> 230.3(c)	No discharge of dredged or fill material into an aquatic ecosystem is permitted if there is a practicable alternative that would have less adverse impact No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps in accordance with 40 <i>CFR</i> 230.70 <i>et seq.</i> are taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.	Action that involves discharge of dredged or fill material into waters of the U.S., including jurisdictional wetlands— applicable	40 <i>CFR</i> 230.10(a) 40 <i>CFR</i> 230.10(d)
<i>Endangered, threatened, or rare species</i>			
Presence of Tennessee nongame species as defined in <i>TCA</i> 70-8-103	May not take (i.e., harass, hunt, capture, kill or attempt to kill), possess, transport, export, or process wildlife species. May not knowingly destroy the habitat of such wildlife species.	Action impacting Tennessee nongame species, including wildlife species which are “in need of management” (as listed in TWRCP 94-16 and 94-17) — applicable	<i>TCA</i> 70-8-104(c) TWRCP 94-16(II)(1)(a) and TWRCP 94-17(II) (to be considered guidance)

Potential ARARs and TBC guidance for CERCLA response actions at the Kingston Fossil Plant Ash Spill, Roane County, Tennessee (continued)

Media/Resource/Action	Requirements	Prerequisite	Citation
	Upon good cause shown and where necessary to protect human health or safety, endangered or threatened species may be removed, captured, or destroyed.		TCA 70-8-106(e) TWRCP 94-16(II)(1)(c) (to be considered guidance)
Presence of Tennessee-listed endangered or rare plant species as listed in TDEC 0400-6-2-.04	It is a violation for any person other than the landowner, lessee, or other person entitled to possession (or the manager, in the case of publicly owned land) or a person with the written permission of the landowner (or manager) to knowingly uproot, dig, take, remove, damage or destroy, possess or otherwise disturb for any purposes any endangered species.	Action impacting rare plant species including but not limited to federally listed endangered species — relevant and appropriate	TCA 70-8-309(a) TWRCP 94-16(II)(1)(a) TWRCP 94-17(II)
Presence of federally endangered or threatened species, as designated in 50 CFR 17.11 and 17.12 or critical habitat of such species	Actions that jeopardize the existence of a listed species or results in the destruction or adverse modification of critical habitat must be avoided or reasonable and prudent mitigation measures taken	Action that is likely to jeopardize fish, wildlife, or plant species or destroy or adversely modify critical habitat — applicable	16 U.S.C. § 1536(a)(2) – Sect. 7(a)(2)
Action-specific ARARs			
<i>Site preparation, construction, and excavation activities</i>			
Activities causing fugitive dust emissions	<p>Shall take reasonable precautions to prevent particulate matter from becoming airborne. Reasonable precautions shall include, but are not limited to, the following:</p> <ul style="list-style-type: none"> • use, where possible, of water or chemicals for control of dust and in demolition of existing buildings or structures, construction operations, grading of roads, or the clearing of land; and • application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stock piles, and other surfaces which can create airborne dusts; <p>Shall not cause or allow fugitive dust to be emitted in such a manner to exceed 5 minutes/hour or 20 minutes/day beyond property boundary lines on which emission originates</p>	Fugitive emissions from land-disturbing activities (e.g., excavation, construction) — applicable	<p>TDEC 1200-3-8-.01(1)</p> <p>TDEC 1200-3-8-.01(1)(a)</p> <p>TDEC 1200-3-8-.01(1)(b)</p> <p>TDEC 1200-3-8-.01(2)</p>
Activities causing storm water runoff (e.g., demolition)	Implement good construction management techniques (including sediment and erosion controls, vegetative controls, and structural controls) in accordance with the substantive requirements of <i>General Permit No. TNR10-0000, Appendix F</i> to ensure water discharge:	Storm water runoff discharges from land disturbed by construction activity—disturbance of ≥1 acre total— applicable	TCA 69-3-108(j) TDEC 1200-4-10-.03(2)(a)

Potential ARARs and TBC guidance for CERCLA response actions at the Kingston Fossil Plant Ash Spill, Roane County, Tennessee (continued)

Media/Resource/Action	Requirements	Prerequisite	Citation
	<ul style="list-style-type: none"> does not violate water quality criteria as stated in TDEC 1200-4-3, including but not limited to prevention of discharges that cause a condition in which visible solids, bottom deposits, or turbidity impairs the usefulness of water of the state for any of the uses designated for that water body by TDEC 1200-4-4, and does not violate other conditions detailed in <i>General Permit No. TNR10-0000</i> 	Stormwater discharges from construction activities— to be considered	<i>General Permit No. TNR100000</i> Section 4.3.2(a) (to be considered)
	<ul style="list-style-type: none"> does not contain distinctly visible floating scum, oil, or other matter; 		<i>General Permit No. TNR10-0000</i> Section 4.3.2(b)
	<ul style="list-style-type: none"> results in no materials in concentrations sufficient to be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream 		<i>General Permit No. TNR10-0000</i> Section 4.3.2(d)
Technology-based limitations on direct discharges to surface waters	Where promulgated effluent limitations guidelines only apply to certain aspects of the discharger's operation, other aspects or activities are subject to regulation on a case-by-case basis considering the appropriate technology and other unique factors.	Discharges of pollutants to surface waters – to be considered	40 C.F.R. § 125.3(c)(1)-(3)
Technology-based limitations on direct discharges to surface waters	In considering best available technology requirements, consider:	Discharges of pollutants to surface waters – to be considered	40 C.F.R. § 125.3(d)(3)
	<ul style="list-style-type: none"> age of equipment and facilities involved; 		
	<ul style="list-style-type: none"> process employed; 		
	<ul style="list-style-type: none"> engineering aspects of the application of various types of control techniques; 		
	<ul style="list-style-type: none"> process changes 		
	<ul style="list-style-type: none"> cost of achieving effluent reduction; and 		
	<ul style="list-style-type: none"> non-water quality environmental impact. 		
<i>Waste generation, characterization, management and disposal</i>			
Characterization of solid waste (all primary and secondary wastes)	Must determine if waste is hazardous or is excluded under 40 CFR 261.4; and	Generation of solid waste as defined in 40 CFR 261.2— relevant and appropriate	40 CFR 262.11(a) TDEC 1200-1-11-.03(1)(b)1
	Must determine if waste is listed under 40 CFR Part 261; or		40 CFR 262.11(b) TDEC 1200-1-11-.03(1)(b)2

Potential ARARs and TBC guidance for CERCLA response actions at the Kingston Fossil Plant Ash Spill, Roane County, Tennessee (continued)

Media/Resource/Action	Requirements	Prerequisite	Citation
	Must characterize waste by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used. If waste is determined to be hazardous, it must be managed in accordance with appropriate sections of 40 CFR 260–272.		40 CFR 262.11(c) TDEC 1200-1-11-.03(1)(b)3
Management and disposal of solid waste	If a waste is determined to be a solid waste, it must be managed in accordance with the applicable state regulations at TDEC 1200-1-7 et seq. May receive for disposal only those solid wastes it is allowed to manage under the terms of its permit (i.e., those which meet its WAC) or “special wastes” as approved in writing by the TDEC Commissioner	Generation of a solid waste— relevant and appropriate Disposal of solid waste in a class I, II, III, IV disposal facility regulated by TDEC— relevant and appropriate	TDEC 1200-1-7 et seq. TDEC 1200-1-7-.04(2)(k)
Temporary storage of remediation waste in staging piles (excavated soils)	An accumulation of solid, non-flowing remediation waste defined in 40 CFR 260.10 not in a containment building may be temporarily stored, including mixing, sizing, blending or other similar physical operations intended to prepare the wastes for subsequent management or treatment, at a facility if used only during remedial operations provided that the staging pile will: <ul style="list-style-type: none"> • facilitate a reliable, effective and protective remedy; • prevent or minimize releases of hazardous wastes and constituents into the environment and minimize or adequately control cross-media transfer as necessary to protect human health and the environment (e.g. use of liners, covers, run-off/run-on controls); 	Accumulation of remediation waste on site as defined in 40 CFR 260.10 --- to be considered	40 CFR 264.554(a)(1) 40 CFR 264.554(d)(1)(i) 40 CFR 264.554(d)(1)(ii)
Closure of staging piles of remediation waste located in previously contaminated area	Must be closed within 180 days after the operating term by removing or decontaminating all remediation waste, contaminated containment system components, and structures and equipment contaminated with waste and leachate	Storage of remediation waste in staging pile in previously contaminated area --- to be considered	40 CFR 264.554(j)
Closure of staging piles of remediation waste located in an uncontaminated area	Must be closed within 180 days after the operating term according to 40 CFR 264.258(a) and 264.111 or 265.258(a) and 265.111	Storage of remediation waste in staging pile in uncontaminated area --- to be considered	40 CFR 264.554(k)

Potential ARARs and TBC guidance for CERCLA response actions at the Kingston Fossil Plant Ash Spill, Roane County, Tennessee (continued)

Media/Resource/Action	Requirements	Prerequisite	Citation
Characterization and management of universal waste	<p>A large quantity handler of universal waste must manage universal waste in accordance with 40 CFR 273 (TDEC 1200-1-11-.12) in a way that prevents releases of any universal waste or component of a universal waste to the environment.</p> <p>Must label or mark the universal waste to identify the type of universal waste.</p>	Generation of universal waste [as defined in TDEC 1200-1-11-.12(1)(a)] for disposal— applicable	<p>40 CFR 273 TDEC 1200-1-11-.12</p> <p>40 CFR 273.34 TDEC 1200-1-11-.12(3)(e)</p>
On-site storage of used oil	<p>Used oil shall not be stored in a unit other than a tank or container</p> <p>Containers and aboveground tanks used to store used oil must be:</p> <ul style="list-style-type: none"> • in good condition (no severe rusting, apparent structural defects or deterioration); and • not leaking (no visible leaks) <p>Containers and aboveground tanks used to store used oil and fill pipes used to transfer used oil into USTs must be labeled or marked clearly with the words “Used Oil”</p>	Generation and storage of used oil— applicable	<p>40 CFR 279.22(a) TDEC 1200-1-11-.11(3)(c)1</p> <p>40 CFR 279.22(b) TDEC 1200-1-11-.11(3)(c)2</p> <p>40 CFR 279.22(b)(1) TDEC 1200-1-11-.11(3)(c)2(i)</p> <p>40 CFR 279.22(b)(2) TDEC 1200-1-11-.11(3)(c)2(ii)</p> <p>40 CFR 279.22(c)(1) and (2) TDEC 1200-1-11-.11(3)(c)3(i) and (ii)</p>
Transportation			
Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the HMTA and HMR at 49 <i>CFR</i> 171-180	Any person who, under contract with a department or agency of the federal government, transports “in commerce,” or causes to be transported or shipped, a hazardous material— applicable	49 <i>CFR</i> 171.1(c)

ARAR = applicable or relevant and appropriate requirement
 CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
 CFR = *Code of Federal Regulations*
 CMBST = combustion
 DEACT = deactivation
 DOT = U.S. Department of Transportation
 EPA = U.S. Environmental Protection Agency
 NHPA = National Historic Preservation Act of 1966

NPDES = National Pollutant Discharge Elimination System
 PPE = personal protective equipment
 S&M = surveillance and maintenance
 TBC = to be considered
 TCA = *Tennessee Code Annotated*
 TDEC = Tennessee Department of Environment and Conservation
 USC = *United States Code*
 WAC = waste acceptance criteria