Phase 1 Emory River Dredging Plan
Kingston Fossil Plant Ash Recovery Project

Tennessee Department of Environment and Conservation
Commissioner's Order, Case No. OGC09-0001

Tennessee Valley Authority
Kingston Fossil Plant

Contract No. 00028244-00014

Prepared by:

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List of Acronyms

BMP	best management practices
CFR	Code of Federal Regulations
CY	cubic yard
DGPS	differential global positioning system
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
ERM	Emory River Mile
GPS	Global Positioning System
HDPE	high density polyethylene
KIF	Kingston Fossil Plant
msl	mean sea level
NTU	nephelometric turbidity unit
PA(E)	program administrator (environmental)
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RPM	revolutions per minute
Shaw	Shaw Environmental, Inc.
SOP	standard operating procedure
TDEC	Tennessee Department of Environment and Conservation
TDS	total dissolved solids
TVA	Tennessee Valley Authority
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard

1.0 Phase 1 Dredging Plan Scope and Objectives

Shaw Environmental, Inc. (Shaw) has been contracted by the Tennessee Valley Authority (TVA) to prepare a Dredging Plan for ash released into the Emory River, Roane County, Tennessee. Shaw will execute Work Order 00028244-00014, issued on January 27, 2009, for Emergency Response services at the TVA Kingston Fossil Plant (KIF).

1.1 Objectives of the Phase 1 Dredging Plan

The Phase 1 Dredging Plan provides the methods and objectives for dredging operations in the Emory River to remove ash and debris in the main channel and focus on getting the original Emory River channel reopened for flow. Currently, part of the river channel is blocked by ash and the river is diverting around the blockage. The dredging of the Emory River will be accomplished in the following phases:

- Phase 1 dredging is to clear the Emory River channel to a design elevation of 710 feet mean sea level (msl) to restore flow to the channel, to minimize flooding, and to prevent further migration of the ash. This phase also will include dredging to assist in safe removal of debris associated with the collapse of the skimmer wall and to re-establish a flow pathway for cold water from the Clinch River to the KIF intake channel.

- Phase 2 dredging is to dredge the remaining ash within the river channel while minimizing disturbance of legacy, native sediments.

- Phase 3 dredging is to remove ash deposits that are outside of the Emory River channel.

In Phase 1 dredging, the river channel will be cleared to a design elevation of 710 feet msl (NGVD 1929) using hydraulic dredging with mechanical debris removal. As part of Phase 1, the recently constructed underwater weir (referred to as Weir 1) will be lowered to the depth of the dredge cut. Ash also will be removed from the debris field from the skimmer wall collapse to allow divers to work in that area in debris assessment and removal. Dredging to the depth of 710 feet msl will restore flow to the original channel without disturbing legacy, native river sediments. Ash recovery, disposal, and water treatment will be addressed under a separate plan to be provided by TVA.

Future work not addressed in this plan includes Phase 2 dredging that will focus on returning the river channel back to its original depths while minimizing disturbance of legacy sediment. Additionally, Phase 2 will include removing Weir 1 completely. Both channel clearing and weir removal are on-water operations. Proposed future work not addressed in this plan includes Phase 3 dredging that will focus on removal of ash deposits outside of the Emory River channel.

During dredging operations the ash is disturbed and some dredged material is re-suspended in the water column and not captured by the dredge. Turbidity will increase in the immediate area of the dredging. Control practices and monitoring are presented in this plan to minimize suspended solids re-suspension during the dredging operations. Best management practices (BMPs) will be developed as part of this plan to minimize impacts to the river. BMPs could include operational controls (i.e., reduce cutterhead speed, reduce rate of advance, reverse cutterhead rotation) and/or engineering controls (i.e., turbidity curtains).

Water quality monitoring procedures are presented as part of this plan. TVA will continue to collect routine water samples (e.g., metals, hardness, pH, temperature) from various sampling locations as described in the sampling plan provided to the Tennessee Department of Environment and Conservation (TDEC). In addition, TVA and/or its contractors will collect additional field data upstream and downstream of the dredging/removal operations to characterize mobilization of particulate from dredging activities. This additional sampling is described in Section 4.3.

1.2 Scope of Work

The scope of the Emory River Phase 1 Dredging Plan is to accomplish the following:

- Develop a Dredging Plan to provide the methods and quality criteria for the Phase 1 river dredging.
- Develop dredging methods that will clear the impacted river channel to an elevation of 710 feet msl primarily utilizing hydraulic dredging and limited mechanical dredging/debris removal.
- Dredge the Emory River to restore flow in the channel without further impacting legacy, native river sediment.
- Describe BMPs to control effects on water quality from dredging operations.
- Develop a plan that will provide surveys and monitoring to be performed to confirm that project objectives and regulatory criteria have been met.
- Provide guidance for sampling, monitoring, and analysis of river water during dredging operations in the Emory River.
- Develop a Health and Safety Accident Prevention Plan for dredging operations.

1.3 Organization of the Dredging Plan

The Phase 1 Dredging Plan describes the work elements for the dredging of the Emory River that are required to open the main river channel for flow and flood control. The plan provides the basic proposed methods for conducting the work, monitoring the completion of the work and monitoring the water quality during dredging operations. Management of ash and water discharge from dredging operations will be provided in a separate document.

Organization of the Phase I Dredging Plan is as follows:

Section 1: Plan Scope and Objectives
Section 2: Site Background
Section 3: Phase 1 Dredging Methods
Section 4: Construction Quality Monitoring Plan
Section 5: Water Quality Monitoring Plan

1.4 Project Organization

TVA (and/or its contractor(s)) will be responsible for the dredging operations and implementation of sampling and monitoring activities during dredging. TVA or its contractor will share the monitoring and analytical results with the Tennessee Department Environment and Conservation (TDEC) and the Environmental Protection Agency (EPA).

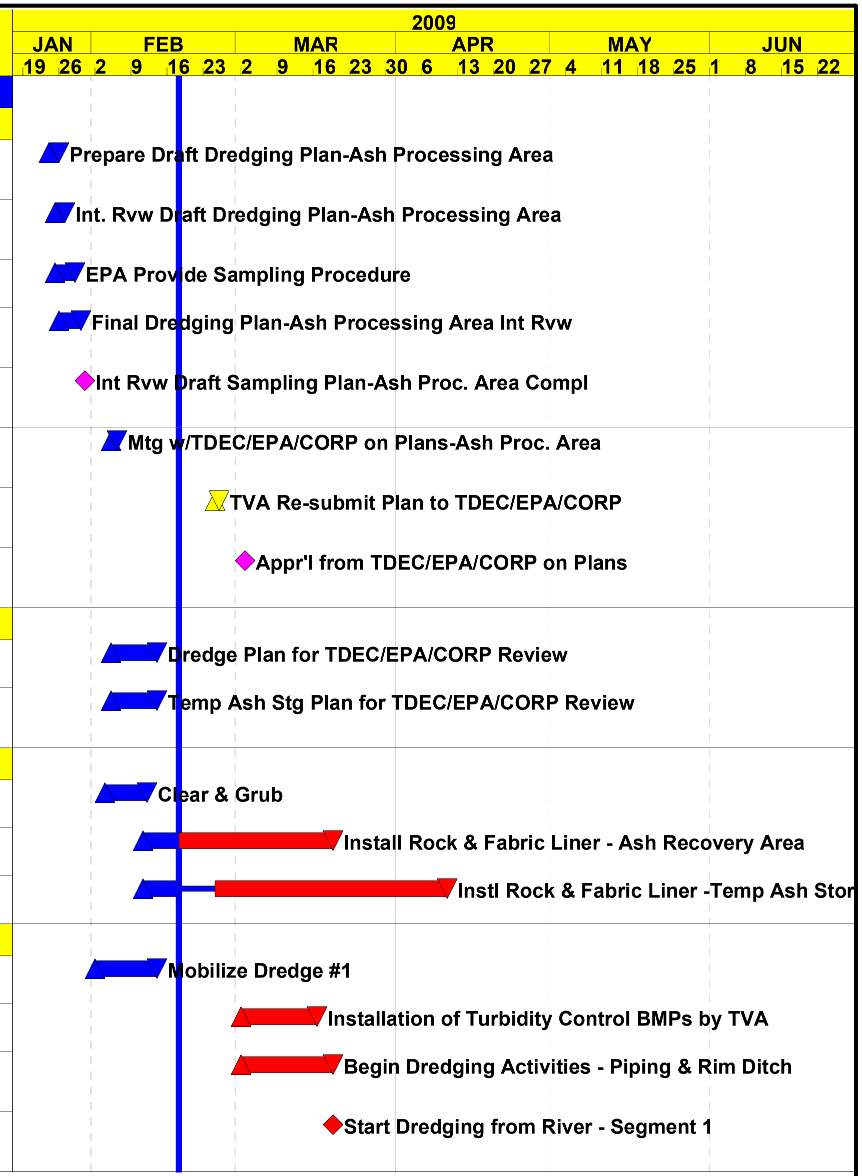
Key Personnel:

- Tim Hope—TVA Kingston Ash Recovery Project Manager
- John Moebes—Jacobs Kingston Ash Recovery Project Manager
- Neil Carriker—TVA Environmental Project Manager
- Cynthia Anderson—TVA Environmental Compliance and Liaison with TDEC, EPA, and other regulators
- Rob Crawford—TVA Sampling and Monitoring Coordinator
- Jonathan Walker – TVA Field Crew Coordinator
- Bill Rogers—TVA Data Management and Verification

1.5 Project Schedule

The project schedule for the Phase 1 Emory River dredging plan preparation, dredging plan regulatory review, and dredging operations is provided on the following page.

Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
KIF Ash Recovery Project						
Dredging Plan						
KR1000	Prepare Draft Dredging Plan-Ash Processing Area	2	0	100	24JAN09A	25JAN09A
KR1010	Int. Rvw Draft Dredging Plan-Ash Processing Area	2	0	100	25JAN09A	26JAN09A
KR1030	EPA Provide Sampling Procedure	4	0	100	25JAN09A	28JAN09A
KR1020	Final Dredging Plan-Ash Processing Area Int Rvw	3	0	100	26JAN09A	29JAN09A
KR1050	Int Rvw Draft Sampling Plan-Ash Proc. Area Compl	0	0	100		30JAN09A
KR1060	Mtg w/TDEC/EPA/CORP on Plans-Ash Proc. Area	1	0	100	05FEB09A	05FEB09A
KR1270	TVA Re-submit Plan to TDEC/EPA/CORP	1	1	0	25FEB09*	25FEB09
KR1070	Appr'l from TDEC/EPA/CORP on Plans	0	0	0		02MAR09
Regulatory Review						
KR1080	Dredge Plan for TDEC/EPA/CORP Review	5	0	100	05FEB09A	13FEB09A
KR1230	Temp Ash Stg Plan for TDEC/EPA/CORP Review	5	0	100	05FEB09A	13FEB09A
Ash Processing Area						
KR1240	Clear & Grub	7	0	100	04FEB09A	11FEB09A
KR1250	Install Rock & Fabric Liner - Ash Recovery Area	37	30	19	11FEB09A	19MAR09
KR1260	Instl Rock & Fabric Liner -Temp Ash Storage	59	45	24	11FEB09A	10APR09
Phase I Dredging Operations						
KR1110	Mobilize Dredge #1	12	0	100	02FEB09A	13FEB09A
KR1120	Installation of Turbidity Control BMPs by TVA	15	15	0	02MAR09*	16MAR09
KR1130	Begin Dredging Activities - Piping & Rim Ditch	18	18	0	02MAR09	19MAR09
KR1140	Start Dredging from River - Segment 1	0	0	0	20MAR09	



Start Date	24JAN09
Finish Date	20JUN09
Data Date	18FEB09
Run Date	25FEB09 11:16

Early Bar
Progress Bar
Critical Activity

KIFR

Sheet 1 of 1

Tennessee Valley Authority

KIF Ash Recovery Project

Date	Revision	Checked	Approved

2.0 Site Background

This section provides background information for the Kingston Fossil Plant (KIF) and the Emory River. Figure 1 shows the location of KIF in the vicinity of Kingston, Tennessee and the Emory and Clinch Rivers.

2.1 Description of the Area and Location

The KIF is located at the confluence of the Emory and Clinch Rivers on Watts Bar Reservoir near Kingston, Tennessee. Kingston is one of TVA's larger fossil plants. It generates 10 billion kilowatt-hours of electricity a year, enough to supply the needs of about 670,000 homes in the Tennessee Valley. Plant construction began in 1951 and was completed in 1955. Kingston has nine coal-fired generating units. The winter net dependable generating capacity is 1,456 megawatts. The plant consumes some 14,000 tons of coal a day.

The KIF is located on the Emory River arm of Watts Bar Reservoir, which feeds into the Clinch River (Figure 2). The Emory River borders the KIF ash cells to the east. The Emory River rises on the Cumberland Plateau in Morgan County, Tennessee and crosses into Roane County near Harriman, Tennessee. Flow on the Emory River in the vicinity of KIF is not controlled upstream by flood control or navigation structures. The river elevation is controlled by Watts Bar Dam located downstream of KIF. Summer pool elevation for the Emory River at KIF is approximately 740 to741 feet msl and winter pool elevation is 735 to 740 feet msl based on Watts Bar headwater. The Watts Bar annual spring reservoir fill period is from March 15 to May 15. The Emory River typical flow volume in the winter and spring ranges from 500 to 50,000 cubic feet per second (CFS). The 10 year flood flow rate is anticipated to be 110,000 CFS and at an estimated flow rate of 12 feet per second. Dredging will only occur during flow conditions that minimize migration of ash and do not cause the downstream turbidity to be 200 NTU or greater than the background turbidity (see Section 4.3.1). Emory River flow data can be found at the following site: http//waterdata.usgs.gov.

2.2 Description of the Ash Release

On Monday, December 22, 2008, just before 1 a.m., a coal fly ash spill occurred at TVA's Kingston Fossil Plant, allowing a large amount of fly ash to escape into the adjacent waters of the Emory River. Ash, a by-product of a coal-fired power plant, is stored in containment areas. Failure of the dredge cell dike caused about 60 acres of ash in the 84-acre containment area to be displaced. At the time of the slide, the area contained about 9.4 million cubic yards of ash. The dike failure released about 5.4 million cubic yards (cy) of coal ash that now covers about 275 acres (Figures 3 and 4).

Fly ash filled the Swan Pond Embayment on the north side of the KIF property adjacent to the failed dredge cell. A dike is being constructed in the eastern portion of the Swan Pond Embayment to contain the fly ash to the west of the dike until a remedial action plan is developed, approved by the regulators, and implemented. Fly ash also entered the channel and overbank areas of the riverine section of the Emory River. TVA is planning to recover the material outside of the Swan Pond Embayment by use of dredging operations.

The fly ash that was released to the Emory River originates from the coal burned in boilers for power production at KIF. The coal, in its natural state, contains various metals that can be retained with the ash after burning. The ash itself is primarily composed of fine silica particles very similar to sand. Trace amounts of arsenic, selenium, cadmium, boron, thallium, and other metals which occur naturally in the coal remain in the ash after coal combustion. These metals are typically bound to the ash.

The U.S. Coast Guard issued an advisory that the Emory River is not navigable from mile marker zero through mile marker 4. Work is complete on an underwater rock weir (Weir 1) built in the Emory River, just north of the existing plant intake skimmer wall. Weir 1 will allow water to continue flowing and retain the ash at the bottom of the river channel. Weir 1 is about 615 feet long. Figure 5 shows the known thickness of ash in the Emory River.

3.0 Phase 1 Dredging Operation

The Phase 1 dredging operation includes four major components, along with a monitoring component. These four major components include:

- Mobilization and site preparation, including erosion control features for the processing area
- Dredging (including installation of controls to minimize mobilization of material)
- Hydraulic dredge material dewatering and material handling
- Demobilization and site restoration

The objectives of Phase 1 dredging are two fold. One objective is to remove the ash from the Emory River while not disturbing the native sediments. The second is to restore the Emory River navigation channel flow to an elevation of 710 feet msl. This will be accomplished by using conventional dredging equipment and methods to remove the ash and debris down to a nominal elevation of 710 feet msl. The original boundaries of the Emory River channel are depicted within the yellow lines on Figure 6. The horizontal limits of the Phase 1 dredging will occur for most part within the boundaries of the Emory River channel, except where ash and debris pose a navigation hazard outside of the channel boundaries.

3.1 Mobilization and Site Preparation

The dredging contractor will mobilize to the Phase 1 Project site and prepare the upland staging area for the Project. In general, mobilization and site preparation activities include the following:

- Installation of erosion control features on the material processing site
- Clearing and grubbing, grading, and surfacing of the staging area
- Delivery of the heavy equipment including excavators, dozers, loaders, forklifts, pumps, and tanks (as required)
- Delivery and installation of office, break, storage, and tool trailers (as required)
- Delivery of all remaining equipment
- Final dewatering and ash processing area construction
- Installation of ash pond or other processing pond controls (as needed)
- Installation of turbidity monitoring system in dredged area

- Identification of lay down areas for equipment
- Launch of marine equipment into Project area

The overall site plan showing the dewatering and ash processing areas for Phase 1 of the Project is shown on Figure 8. The processing and staging areas will be adjusted and/or added as necessary as the dredging proceeds.

The entire dewatering and processing areas will be sloped to drain into the existing plant Ash Pond. High density polyethylene pipe (HDPE) will convey the dredged material from the dredge overland to the dredge sluice channel constructed beside the existing plant fly ash and bottom ash channel. In the event of a dredge effluent overflow or a line rupture, the dredged material will drain into the Ash Pond. All recovered water from the dredged material will be conveyed to the Ash Pond via constructed channels. The Ash Pond discharges directly into the plant intake channel via a diffuser. The controls to be used at the ash pond are described in Section 5.3.

All work performed and equipment utilized will conform to the Environmental Health and Safety Plan. All marine equipment including hydraulic dredges, mechanical dredge equipment on barges, debris barges and work boats will conform to the Project Marine Safety and Transportation Plan.

3.2 Dredging

The Phase 1 dredging operation will be segmented in a manner to minimize the continuing downstream migration of ash material and debris and to maximize the immediate effect of the dredging. The Phase 1 dredging segments are delineated on Figure 6. The proposed order of Phase 1 dredging segments are:

- Segment 1 – approximately 2,994 feet long by 600 feet wide directly east of the ash spill event running north-south along the Emory River navigation channel.
- Segment 2 – approximately 650 feet long by 600 feet wide immediately south or downstream of Segment 1 also running north-south along the Emory River navigation channel up to Weir 1 or Segment 3.
- Segment 4 – approximately one mile long by 500 feet wide running northwest to southeast along the Emory River navigation channel immediately south or downstream of Segment 3.
- Segment 3 – Weir 1 partial removal to elevation 710 msl.
- Segment 5 – approximately 3,050 feet long by 600 feet wide running northeast to southwest along the Emory River navigation channel immediately north or upstream of Segment 1.

3.2.1 Segment 1

To minimize the downstream migration of ash and siltation due to the dredging, the Phase 1 dredging operation will begin on the northern-most block of Segment 1. The dredging will process the first block from north to south. The exception maybe the need for the dredge to dredge a single pass from the south (downstream) to north (upstream) end of Segment 1 to reach the starting end of Segment 1.

Segment 1 will be dredged from east to west at approximately 60-foot wide passes starting at the north end of Segment 1. Each pass will be limited to a depth of no more than five feet per pass. The underwater side slopes of each pass are expected to be sloped at 10 horizontal to 1 vertical. East-west passes moving downstream will stair-step so that no adjacent pass is more than five feet deeper than its contiguous downstream dredge prism. The dredge prisms for Segment 1 are shown on Figure 7. Movement of the ash, if any, due to the dredging will be into the dredge area.

Upon satisfactory completion of the first east-west row, the dredging will then process the next row immediately to the south of the first block. This pattern will continue until the entire channel is satisfactorily dredged to 710 feet msl from north to south.

A "Pilot" dredging program will begin in Segment 1 and will continue for the first 60-days. After completion of the Pilot, the dredging of Segment 1 and the other segments will continue at the sustainable pace determined in the Pilot.

3.2.2 Segment 2

Segment 2 will be dredged in the same block pattern as Segment 1 beginning at the northeasterly-most block. Phase 1 dredging in Segment 2 will begin either after the completion of the dredging for Segment 1 or concurrently based upon the availability of the dredging equipment and the ability to proceed safely and adequately handle the return water from the second dredge.

3.2.3 Segment 4

Additional surveys of the extent of ash in the Emory River in Segment 4 will determine the limit of Phase 1 dredging for ash above the 710 foot msl elevation. Segment 4 will be dredged in the same block pattern as Segment 1 and Segment 2 beginning at the northeastern most block. Phase 1 dredging in the northern section of Segment 4 will begin as soon as practical to remove ash and debris from the mouth of the KIF intake channel. This area must be cleared to replace the damaged skimmer wall for maintenance of summer plant operations, so this dredging may occur concurrently with dredging of Segment 1. The rest of Segment 4 will be dredged after the completion of the dredging for Segment 1 and Segment 2.

3.2.4 Segment 3

Weir 1 will be lowered to 710 feet msl as part of Phase 1 dredging only after the satisfactory completion of Segment 1, Segment 2 and Segment 4.

3.2.5 Segment 5

Segment 5 will be dredged in the same block pattern as Segment 1 and Segment 2 beginning at the northeastern-most block. Phase 1 dredging in Segment 5 will begin after the completion of the dredging for Segment 1, Segment 2, and Segment 4 dredging or concurrently, based upon the availability of the dredging equipment and the ability to proceed safely and adequately handle the return water from the second dredge. Surveying will evaluate the extent of ash presence upstream to determine the appropriate end point for Segment 5 Phase 1 dredging.

3.3 Hydraulic Dredging

The primary equipment selected for the Phase 1 will be a hydraulic cutterhead swinging ladder or hydraulic swinging ladder dredge. For the Pilot, the dredge will be capable of moving at least 3000 in-situ cubic yards per day. The dredging will begin with a "Pilot" phase testing at the minimum capacity. After proof-of-process, the capacity will be selected for full-scale dredging. A single dredge or series of hydraulic cutterhead dredge(s) will be retained to dredge at the total operable dredge rate determined in the Pilot as sustainable on a continuous basis.

The dredge(s) will be capable of performing the work in a safe, orderly, and environmentally acceptable manner. The dredge(s) will be delivered to the Project site on over the road vehicles and launched from the KIF boat ramp. The dredge will meet the requirements defined in the Marine Safety and Transportation Plan.

The dredge will use a cutter head with variable speed operation and with a ladder that is long enough to reach a final depth of 30-feet. During the pilot a shallower depth will be allowed for the proof-of-process. The cutter head dredging will be positioned with a global positioning system (GPS) operated onboard in order to maintain dredging with the specified Project limits. The dredge discharge will be by HDPE pipe that is fusion welded in segments to convey the dredge discharge to the dewatering and processing area shown on Figure 8.

Unaffected areas in the Emory River navigation channel containing navigable depths will not be impaired except as allowed by applicable laws or regulations. Dredge discharge pipes in these areas may be submerged and at no time will the depth and width of the existing navigation channel be reduced. Management of the dredge discharge lines will conform to appropriate Federal and State regulations. When the submerged line is placed in shallow water, outside the navigable channel, where the possibility exists for small outboard powered skiffs to cross over the submerged pipeline, the pipeline will be marked with fluorescent orange buoys and signs stating "DANGER SUBMERGED PIPELINE" every 150-feet throughout the length of the submerged pipeline.

Dredge discharge pipes that are floating or supported on trestles will display appropriate lights at night and in periods of restricted visibility in accordance with USCG regulation and "33 CFR 88.15." Floating discharge pipes are any pipelines that are not laid along the bottom and include rubber discharge hoses.

Ash processing capacity, discharge line capacity and water quality restrictions may vary the dredge rate during dredging operations. Additional pumping capacity or larger dredges will be added as required after the Pilot to convey the dredge discharge to the dewatering and processing areas shown on Figure 8. Flow meters will be utilized to monitor and record the dredge discharge conveyed to the processing area.

The hydraulic dredging will be staffed and operated 24 hours per day, 7 days per week . The dewatering and process equipment will also be staffed 24 hours per day, 7 days per week, as required to meet the needs of dredging. It is expected that the overall operation of the dredging, dewatering, and processing area will be approximately 20 hours of the 24 hour day. Light plants will be installed on land and on barges in the work area as necessary to provide lighting required for dredging work performed at night. If circumstances arise that would cause a change in the 24 hours per day, 7 days per week schedule, TVA will notify and coordinate with TDEC.

Targeted ash deposits from the Phase 1 dredging area will be removed using the number and capacity of dredges as determined possible during the Pilot. Since the Phase 1 goal is to reach approximately elevation 710, no effort will be made to complete a clean-up pass to adjust elevation of the bottom at the end of Phase 1.

Material encountered that is too large or too dense to be dredged hydraulically will be identified and the location recorded for subsequent removal by means of mechanical dredging/debris removal as described below. After the material has been removed by mechanical dredging these areas shall be inspected and re-dredged with the hydraulic dredge to insure the required depth is obtained.

3.4 Mechanical Dredging

It is anticipated that debris (e.g., trees, debris from demolished structures, boulders, large rocks, and any other dense or large objects that would hinder dredging operations) will be encountered within the Phase 1 Project area. At this time TVA cannot make a total assessment of the amount of debris that will be encountered or the extent of mechanical dredging in Phase 1. TVA will be prepared to use mechanical dredging as well as hydraulic dredging as appropriate. Mechanical dredging will be a 7-day week operation.

An excavator with a clam shell bucket on a barge will be used to perform debris removal activities. The clam shell bucket will allow ash and water to pass through the bucket while the oversized materials will remain in the bucket for removal. A specially designed rake and grapple may also be utilized as required during debris removal operations, depending upon the nature and size of the debris encountered. The debris will be transferred to an on-site debris processing area.

The floating silt curtain containment systems fastened to the crane barge will be deployed prior to initiation of mechanical dredging operations in all Phase 1 dredging areas. The top of the silt curtain will float with the curtain hanging in the water stopping the movement of suspended ash that has reached the surface from moving out of the immediate area that is being mechanically cleaned.

3.5 Hydraulic Dredge Material Dewatering and Material Handling

The hydraulic dredge material dewatering and material handling will be performed in the dewatering and processing areas on Figure 8. The extent and definition of this activity is outside the Phase 1 scope of the Project and is defined elsewhere. The material flow balance summary for managing dredged solids and water is included in Attachment 1 of this document.

3.6 Demobilization and Site Restoration

Upon completing all work for the Emory River dredging activities, the Project site will be demobilized. Demobilization will include the following:

- Removal of office, break, storage, and tool trailers
- Removal of all heavy equipment used for the Project
- Breakdown and removal of the dredge discharge piping, dredge traverse materials and any markers
- Removal all debris, trash, and garbage resulting from construction activities
- Site restoration

Site restoration activities will involve restoring all disturbed areas to conditions specified in the Solid Waste Closure Plan or “clean closure” conditions.

4.0 Monitoring of Construction Activities

This section provides a general overview of monitoring activities for Phase 1 of the Emory River ash dredging.

4.1 Utility Clearance Survey

Dredging activities may cause significant property damage to utilities, structures, and operational equipment, which can result in electrocution from damaged electrical lines, fires from broken fuel/gas lines, and disruption of telephone service. Underground/underwater utilities have been found in areas that have been properly investigated and thought not to have utilities present. Before dredging activities can start in a designated area, an underground utility clearance survey will be conducted to determine if the area contains underground utilities or overhead hazards. The utility clearance survey will identify and protect underground utilities or indicate that none exists. The survey will consist of the following procedures:

- Prepare a map indicating the area(s) where dredging activity is planned to occur and perform the necessary KIF department and utility company reviews.
- Contact the utility notification service, where available. This notification is to be made a minimum of two working days prior to the initiation of intrusive activity (excluding Saturdays, Sundays, and Holidays). The contact information to locate utilities for the Project site is as follows.

Tennessee One Call System
www.tnonecall.com/
(800) 351-1111 or (615) 367-1110

- Contact the utility companies, landowners, or responsible authorities to locate and mark the locations of the underground installations and, if they so desire, direct or assist with protecting the underground installations.
- Verify that all underground installations have been located, physically marked, and then noted on the map.
- Mark all overhead utilities with kilovolts rating on the map (work with heavy equipment should not be performed directly below overhead utilities).
- Recall utility location service for utility mark outs that have been removed, covered, or destroyed during site activities.

4.2 Bathymetric Surveying

Bathymetric surveys will be performed covering the area of Phase 1 of the Project area (Figure 2) at critical stages of the work to track dredging progress. These surveys will also be the basis for determining removal quantities throughout Phase 1 dredging of the Project. The dredging contractor will utilize a combination of surveying equipment to ensure that the dredging in the river at the Kingston power plant is in the required areas and to the design depths. All dredges will be outfitted with GPS position devices that allow the operator to track the location of the dredge to ensure that cutting is within the main channel. Mechanical indicators will provide cutting depth control to limit cutting to the 710 foot msl elevation.

Hydrographic surveys will be performed on at least a weekly basis, or more often as needed, to verify progress of ash removal. The hydrographic surveys will utilize RTK GPS equipment for location and elevation, an echo sounder for depth, and other associated computer programs and equipment to coordinate the data. These surveys will be conducted from a dedicated survey boat set up for this task and will comply with Engineering & Design Hydrographic Surveying EM 110-2-1003.

4.3 Water Quality Monitoring

4.3.1 In-Stream Turbidity Monitoring

In order to monitor the potential impacts of dredging and to provide feedback for operational controls, turbidity monitoring systems will be set up in the area where active dredging is being performed. Five continuous monitoring stations will be established at ERM 0.5, ERM 4.0, in the KIF intake channel, and at locations ¼ mile north of the dredging operations and ¼ mile south of the dredging operations to support environmental monitoring during dredging operations. The five monitoring stations will measure the river flow (velocity and direction) and water quality parameters (turbidity, temperature, dissolved oxygen, conductivity and pH).

The direction of Emory River flow reverses at times due to TVA reservoir operations or when the Emory River flow is less than the KIF intake flow. The flow direction can be very transient. At Emory River flows greater than about 1500 cfs, water may flow down the Emory River and pass into both the KIF intake and the Clinch River. However, under that condition water can also be flowing from the Clinch River up the Emory River and into the KIF intake due to the suction of the plant intake and thermal stratification. At Emory River flows less than about 1300 cfs the majority of water entering the intake channel may be from the Clinch River. Lastly, water can be flowing down the Emory and up from the Clinch River into the KIF intake at the same time under moderate Emory River flows and thermally stratified conditions in Watts Bar Reservoir.

The monitoring station located ¼ mile from the dredging operations that is determined to be upstream of dredging (depending on the river flow direction) will be considered the background station. The two downstream monitoring stations will be compared to the background station to evaluate water quality. The downstream monitors in use will vary with the direction of stream flow—up the Emory River (ERM 4.0 and the station ¼ mile north of dredging), into the Clinch River (ERM 0.5 and the station ¼ mile south of dredging), or into the KIF intake channel (the KIF intake channel station and the other station would vary with dredging segment and river flow). The measured difference in turbidity between stations will be the change in turbidity between the upstream and downstream stations. Each monitoring station will be outfitted with a Hydrolab® water quality meter and will transmit through telemetry 15-minute data on turbidity, temperature, dissolved oxygen, conductivity and pH. The monitors located at ERM 0.5 and ERM 4.0 will also have velocity meters to determine the velocity and direction of flow on the Emory River. The Hydrolab® depth at each site will initially be approximately six feet where possible. During the first two weeks of dredging, field crews in boats will use Hydrolab® meters to define the three-dimensional boundaries of the suspended solids plume downstream of dredging. The crews will collect water samples daily and request 24-hour turnaround for the total suspended solids (TSS) results. Evaluation of the data from the first two weeks will determine the appropriate frequency and locations for water quality monitoring needed for the duration of phase 1 dredging. TVA will determine the most appropriate depths to measure turbidity at the fixed monitoring stations based on the field crew monitoring and sampling results, knowledge of dredge cutting depths, and site conditions. Calibration of the Hydrolabs® will occur as needed to ensure water quality measurements are accurate.

The turbidity readings will be monitored with real-time readings and will be reviewed on one-hour intervals. The turbidity readings will be averaged during dredging operations on a twenty four-hour rolling average. If the difference in the twenty four-hour average turbidity measurements between the background station and the station located ¼ mile downstream of dredging is 200 NTU or greater, then dredging operations and BMPs will be evaluated and the downstream monitoring data will be reviewed. If the twenty four-hour average turbidity differences between the background and the two downstream monitoring stations are both 200 NTU or greater, then dredge production would be decreased, cutting depth would be modified, and/or other operational controls would be utilized. Other BMPs, such as turbidity curtains or addition of flocculants would also be evaluated. Water quality monitoring and sampling could also be increased. If field observations and/or water quality data trends indicate that the 200 NTU trigger is not going to be protective enough of the downstream water uses, TVA will consult with TDEC regarding implementation of more protective mitigation measures.

Visual observations during daylight hours will be another way TVA will monitor turbidity. If turbidity levels seem excessive then real-time turbidity measurements will be checked and dredging operations and BMPs will be modified as needed.

4.4 Daily Dredging Operations Reporting

A project-specific electronic document transmittal site for the Phase 1 dredging operation will be used to transfer data and reports relative to the Project. The electronic document transmittal site will be updated on a daily basis (working days only) and will include, at a minimum the following information:

- Contractor's daily production reports including a summary of volumes dredged, etc.
- Debris removal summary
- Environmental monitoring data (turbidity)
- Survey information (as available)
- Post dredging survey results (as available).

Access to the electronic document transmittal site will be provided to registered users with username and password.

5.0 Surface Water Monitoring Plan

This water quality monitoring plan specifically addresses the Phase 1 dredging operations. The plan will be amended or updated, as needed, for each subsequent phase of dredging or as other changes warrant. This section contains the information on the reporting requirements for this investigation.

The objectives of this water quality monitoring plan are to:

- Provide guidance for sampling, monitoring, and analysis of river water during dredging operations in the Emory River;
- Assure that the water sampling, monitoring, and analysis is in compliance with the overall quality assurance project plan (QAPP) developed for soil, surface water, sediment, and groundwater sampling efforts; and
- State the technical rationale for the monitoring and analytes prescribed for each phase of dredging.

5.1 Location of Sampling and Monitoring Stations

As described in section 4.3 of this plan, five continuous monitoring stations will be established to support environmental monitoring during dredging operations. See Table 1 for station location and identification. Each monitor will be outfitted with a Hydrolab® and will transmit 15 minute data on turbidity, temperature, dissolved oxygen, conductivity and pH. The locations of the proposed water quality monitoring stations are shown in Figure 9.

Table 1
Continuous Hydrolab® Fixed Monitoring Stations

Identifier	Location	Turbidity Difference between Upstream and Downstream
Emory River Station 1 (ERS1)	ERM 0.5	If Emory River is flowing toward Clinch River: ERS1-ERS2, ERS3-ERS2
Emory River Station 2 (ERS2)	1/4 mile upstream north of dredging	Background Station
Emory River Station 3 (ERS3)	1/4 mile upstream south of dredging	Background Station
Emory River Station 4 (ERS4)	ERM 4.0	If Emory River is flowing away from Clinch River: ERS4-ERS3, ERS2-ERS3
Emory River Station 5 (ERS5)	KIF Intake Channel	If all flow is towards KIF intake channel: ERS5-ERS2 or ERS5-ERS3; ERS3-ERS2 or ERS2-ERS3

5.2 Water Quality Monitoring Methods and Analytical Parameters

TVA will continue its routine sampling of surface water three times per week at five locations on the Emory River, four locations on the Clinch River, and one (or two) locations on the Tennessee River (see Table 2). These sites will also be sampled after every 0.5" or greater (24 hour total) rain event.

Each sample will be collected using an ISCO peristaltic pump, a Kemmerer sampler, or equivalent equipment. Samples will be collected from the water column fifteen feet below surface or at mid-depth (if total depth is <15'). Appropriate sample bottles and cooler(s) with ice shall be used for proper collection and storage of samples. Crews will collect samples in two-one liter unpreserved sample bottles and one-one liter sample bottle preserved with nitric acid from each location. Surface water samples will be analyzed for total metals, dissolved metals, TSS, dissolved silica, total hardness, and total alkalinity (see Table 3). Concurrent field parameters will be measured using a Hydrolab®. Parameters of interest include turbidity, temperature, dissolved oxygen, conductivity, and pH. Turbidity at Clinch River mile 0.0 will be used as a trigger for additional sampling. If the turbidity reading at Clinch River mile 0.0 is equal to or greater than 20 NTU, crews will sample at Tennessee River mile 563.5 . In addition, during dredging field crews in boats will monitor water quality from multiple depths at various locations upstream and downstream of dredging, as described in Section 4.3.1.

Standard Operation Procedures for field sampling will be followed and field logs will be kept to document all sampling activities. Duplicate turbidity, temperature, dissolved oxygen, conductivity, and pH field samples will be conducted on a 1/10 sample frequency. Duplicate samples will also be collected on a 1/10 frequency for TSS, total dissolved solids, total metals, dissolved metals, total hardness, dissolved silica, and alkalinity. Additionally, a matrix spike/matrix spike duplicate sample (MS/MSDS) will be taken on a 1/10 frequency and submitted to the lab.

Table 2 Routine Surface Water Sampling Locations							
Sample Number	**Location**	**RM**	**Site Label**	**Sample Type**	**Depth (ft)**	**Latitude**	**Longitude**
1	Clinch River	0.0	KIF-CRM0.0-Date	Grab	15	N35.86364	W84.53181
2	Clinch River	2.0	KIF-CRM2.0-Date	Grab	15	N35.88621	W84.52778
3	Clinch River	4.0	KIF-CRM4.0-Date	Grab	15	N35.88956	W84.49892
4	Clinch River	5.5	KIF-CRM5.5-Date	Grab	15	N35.89274	W84.48142
5	Emory River	0.1	KIF-ERM0.1-Date	Grab	15	N35.88986	W84.48778
6	Emory River	1.75	KIF-ERM1.75-Date	Grab	15	N35.90305	W84.49708
7	Emory River	2.1	KIF-ERM2.1-Date	Grab	mid-depth	N35.90925	W84.50055
8	Emory River	4.0	KIF-ERM4.0-Date	Grab	15	N35.92416	W84.48255
9	Emory River	12.2	KIF-ERM12.2-Date	Grab	0.5	N35.92899	W84.55450
10	Tennessee River	563.5	KIF-TRM563.5-Date	Grab	15	N35.83941	W84.58283
11	Tennessee River	568.5	KIF-TRM568.5-Date	Grab	15	N35.85539	W84.53068

Table 3 Requested Laboratory Analyses					
Analysis	**Method**	**Units**	**Container**	**Preservation Technique**	**Holding Time**
Alkalinity	EPA 310.1/SM 2320B	mg/L	Poly	None	28 days
Dissolved Silica	EPA 200.7/200.8/6020	mg/L	Poly	Nitric Acid, < pH 2	6 months
Total and Dissolved Metals	EPA 200.7/200.8/6020	mg/L	Poly	Nitric Acid, < pH 2	6 months
Hardness	EPA 200.7/200.8,/6020 SM 2340B	mg/L	Poly	Nitric Acid, < pH 2	6 months
Total and Dissolved Mercury	EPA 245.1	mg/L	Poly	Nitric Acid, < pH 2	28 days
Total Suspended Solids (TSS)	EPA 160.2/SM 2540D	mg/L	Poly	< 6^{o} C	7 days
Total Dissolved Solids (TDS)	SM 2540C	mg/L	Poly	< 6^{o} C	7 days

5.3 Material Dewatering Best Management Practices

Facility Ash Pond

TVA is planning to implement various best management practices for the return water from the ash processing area. Return water flow from the dredged material will be directed to the ash sluice channel that flows to the ash pond. This is similar to normal ash sluicing operations and it is expected that some ash will settle out in the channels in the ash processing area. A turbidity curtain will be deployed in the main ash pond as a baffle between the lateral expansion cell and the sluice channel discharge to reduce short circuiting and increase solids retention time. The curtain will be installed prior to commencing dredged material dewatering activities.

TVA will increase visual observations of the final stilling pond to daily, observing the pond for increased turbidity. TSS monitoring currently occurs on a monthly basis at the ash pond discharge (IMP 001). During the first two weeks of dredging, TVA will increase TSS monitoring at IMP 001 to daily and require a 24-hour laboratory turnaround. The daily TSS monitoring will be evaluated at the end of the two week period and reduced to weekly if the data supports the change. Weekly monitoring of the TSS will continue for the duration of the dredging operations that provide dredge return water to the ash pond, or until a reliable data trend may be observed that does not violate NPDES permit limitations. This will be included with the Ash Release Program Administrator's (Environmental) or PA(E)'s inspection responsibilities.

Objectionable turbidity will be communicated to dredging personnel to investigate and/or consider additional BMPs or modification(s) to the dredge operation. The Ash Release PA(E)'s routine inspections will also include observations about collected cenospheres in the main ash pond and stilling pond. Notification to TVA's By-Products Marketing Staff for increased collection will be made if excessive cenospheres are observed.

TVA is also investigating the use of polymers for a variety of applications related to the release. There is a request for proposals being sent to certain water treatment vendors. Initial tests for efficacy and toxicity will be performed to determine the best product that may be used for this purpose in the ash pond to promote settling. TVA will continue to monitor free water volume in the ash pond to promote effective treatment.

TVA is investigating possible modifications to the frequency of sluicing ash to the ash pond. There may be other ash sluicing schedules from the routine handling of ash that can be used to avoid overwhelming the treatment capacity of the ash pond. (See Attachment 1 for material flow analysis information.) The presence of diffusers on the ash pond discharge pipes (except for the emergency overflow) will minimize the likelihood of objectionable color contrast in the receiving stream as the discharge is extremely well mixed.

Other Dredge Return Water Locations

TVA is also pursuing development of an area near the gypsum pond for handling dredged material and return water. If this area is also allowed by the Division of Solid Waste for ash processing, similar inspections of the discharge area would be conducted by the Ash Release PA(E).

5.4 Water Quality Results and Action Levels

As stated in section 4.3, if the downstream turbidity measurement is 200 NTU or greater than the background turbidity measurement over a twenty four-hour rolling average, dredging operations will be modified and other BMPs will be evaluated and adapted as needed to reduce the downstream turbidity.

The water quality data will be routinely assessed and compared to TDEC Fish and Aquatic Life Use Classification and Recreation Use Classification (water and organisms) criteria. The data results will be shared with TDEC. TVA management decisions based on the data will be made in coordination with TDEC. The laboratory detection levels requested for each analyte are listed in Table 4. These detection levels are based on the TDEC Required Method Detection Levels (RDL) and applicable water quality criteria (Rules of Tennessee Department of Environment and Conservation, Tennessee Water Quality Control Board, Division of Water Pollution Control, Chapter 1200-4-3 General Water Quality Criteria), and laboratory reporting limits.

Table 4
Analytes and Target Detection Levels

Constituent	Detection Levels (ug/L)	Constituent	Detection Levels (ug/L)
mercury	0.2	manganese	10
aluminum	100	molybdenum	40
antimony	1	nickel	1
arsenic	1	selenium	2
barium	200	silver	1
beryllium	1	thallium	1
boron	200	tin	1
cadmium	0.5	titanium	10
chromium	1	zinc	5
cobalt	10	alkalinity	10 mg/L
copper	1	hardness	1 mg/L
iron	100	total suspended solids	1 mg/L
lead	1	total dissolved solids	10 mg/L
magnesium	100		

5.5 Draft and Final Water Quality Monitoring Reports

At the end of the Phase 1 water quality monitoring effort for dredging, TVA will prepare a draft report that will compile the data and findings of the water quality monitoring during dredging operations and present the report to TDEC, the USACE, and EPA. Regulatory comments generated by this review will be incorporated into the final water quality monitoring report. TVA will work with TDEC to determine the frequency and nature of routine reporting regarding the dredging progress and water quality monitoring.

6.0 Health and Safety Plan

A site-specific health and safety accident prevention plan has been prepared to supplement Shaw's Phase 1 Dredging Plan to identify, evaluate, and provide control measures for safety and health hazards associated with this Project. All site operations will be performed in accordance with applicable state, local, TVA corporate regulations and procedures, and Occupational Safety and Health Administration requirements, specifically 29 CFR 1926. All TVA employees and subcontractors must comply with the requirements of this site specific health and safety plan and be familiar with the requirements established in the Health and Safety Accident Prevention Plan, Emory River Dredging health and safety accident prevention plan.

7.0 References

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FIGURES

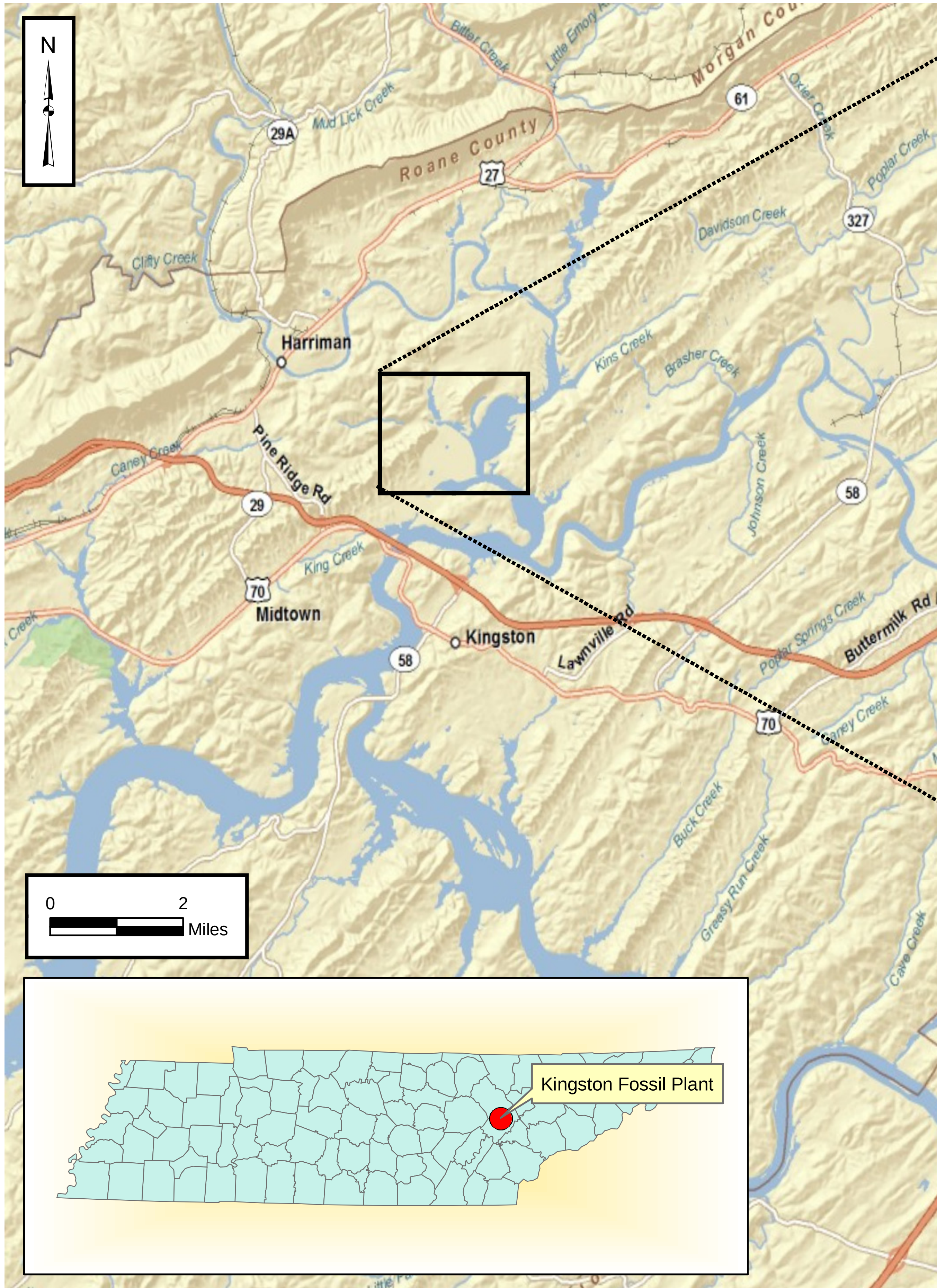

Figure 1

Site Location Map
Phase I Interim Draft
Dredging Plan ,
TVA Kingston Fossil Plant

Shaw™ Shaw Environmental, Inc.

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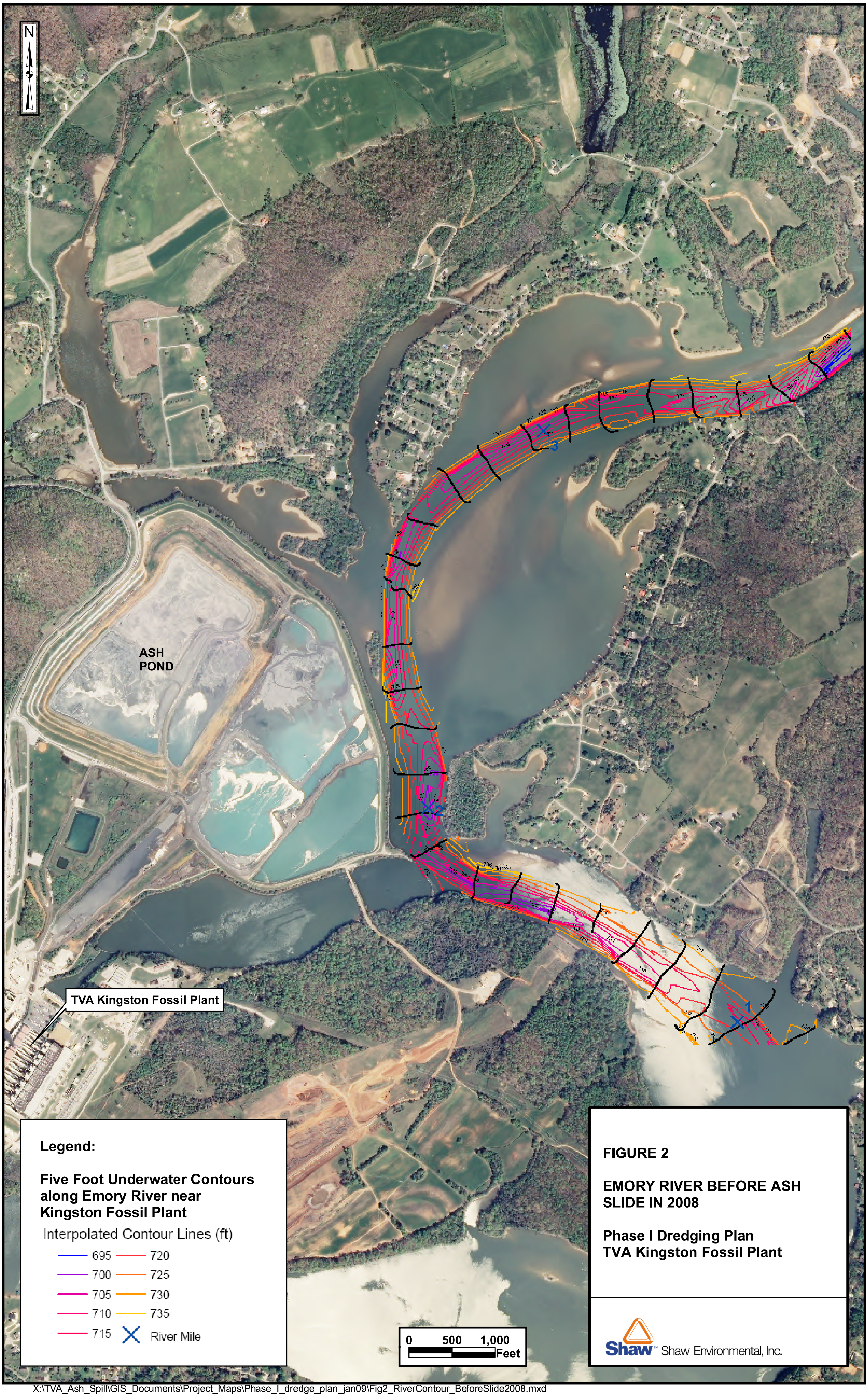

FIGURE 2

EMORY RIVER BEFORE ASH SLIDE IN 2008

Phase I Dredging Plan
TVA Kingston Fossil Plant

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Aerial Image of Kingston Ash Slide 12/30/2008

FIGURE 3

ASH SLIDE EXTENT IN EMORY RIVER DECEMBER 30, 2008

Phase I Dredging Plan
TVA Kingston Fossil Plant

Legend

River Navigation Channel

0 400 800 Feet

Note:
Emory River Elevation is 739.07 feet.

Shaw™ Shaw Environmental, Inc.

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Aerial Image of Kingston Ash Slide 01/17/2009

FIGURE 4

ASH SLIDE EXTENT IN EMORY RIVER JANUARY 17, 2009

Phase I Dredging Plan
TVA Kingston Fossil Plant

Shaw™ Shaw Environmental, Inc.

Legend

River Navigation Channel

Note:
Emory River Elevation is 739.00 feet.

0 400 800 Feet

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Legend

River Navigation Channel

Underwater Ash Depth (feet)

26' Underwater Ash Depth 01/15/2008

25' USACE sounding difference 9/27/2007 vs 12/29-30/2008

Note:
Emory River Elevation is 736.94 feet on January 25, 2009.
Aerial Photo is dated January 24, 2009.

0 450 900 Feet

FIGURE 5

ASH THICKNESS AND KNOWN EXTENT IN EMORY RIVER

Phase I Dredging Plan
TVA Kingston Fossil Plant

Shaw Environmental, Inc.

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Legend

Dredge Segments

River Navigation Channel

0 450 900 Feet

FIGURE 6

PROPOSED EMORY RIVER SEGMENTS FOR DREDGING SEQUENCE

Phase I Dredging Plan
TVA Kingston Fossil Plant

Shaw™ Shaw Environmental, Inc.

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FIGURE 7

PROPOSED EMORY RIVER SEGMENT 1 BLOCK CUTS

Phase I Dredging Plan
TVA Kingston Fossil Plant

Shaw™ Shaw Environmental, Inc.

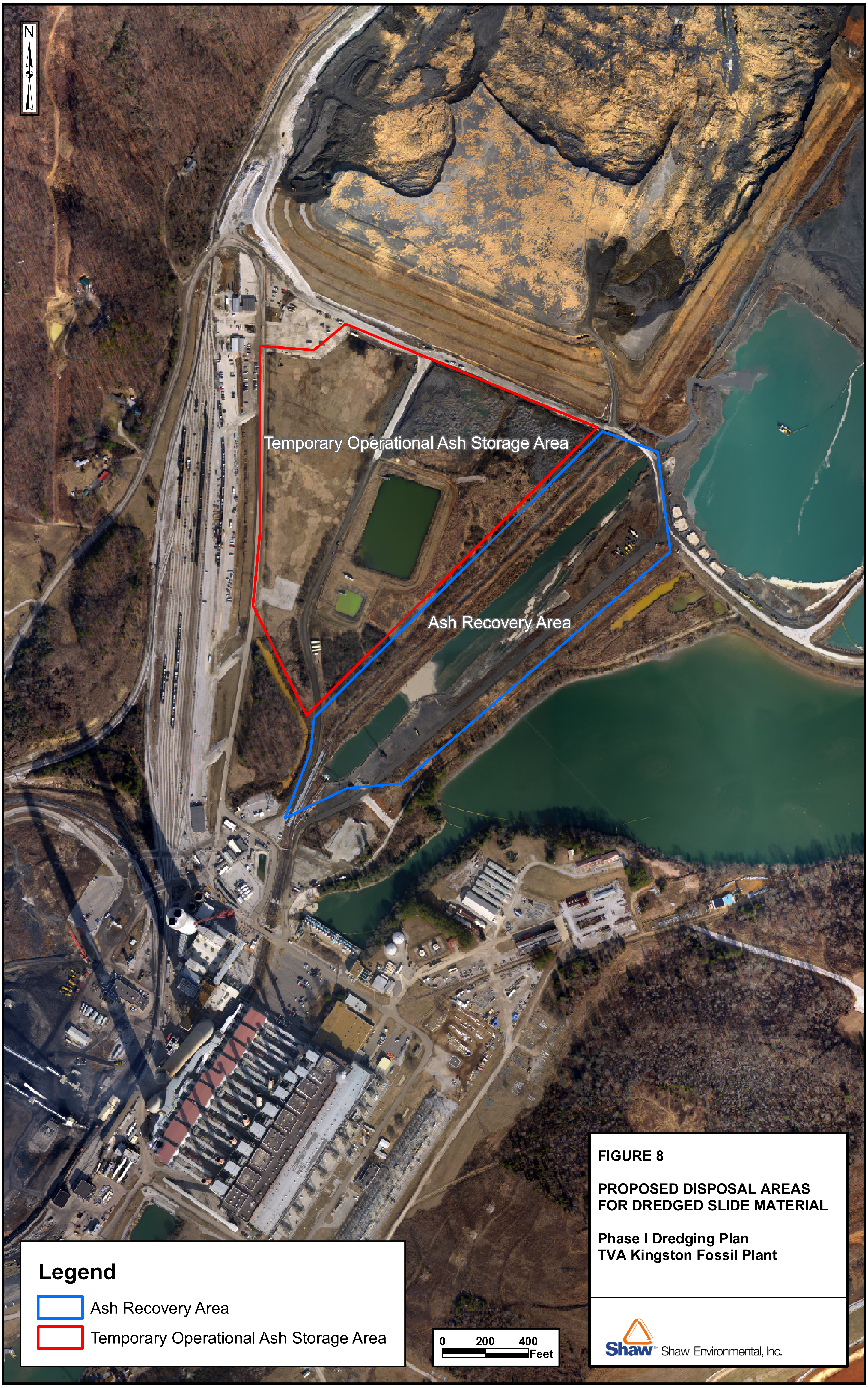

FIGURE 8

PROPOSED DISPOSAL AREAS FOR DREDGED SLIDE MATERIAL

Phase I Dredging Plan
TVA Kingston Fossil Plant

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FIGURE 9

TVA SAMPLING AND MONITORING STATIONS NEAR PHASE 1 DREDGING

Phase I Dredging Plan
TVA Kingston Fossil Plant

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ATTACHMENT 1

KIF DREDGING MATERIAL FLOW ANALYSIS SUMMARY

KIF Dredging Material Flow Analysis Summary
Phase 1
February 2009

Two parts to material flow analysis:

1. Solids flow questions
   a. What are the possible solids removal rates?
   b. How much dredge supernatant water produced?
   c. Does total combined flow of supernatant water & plant production exceed ash pond capacity/diffuser capacity?
   d. Will adding dredge water cause short-circuiting or other problems in pond?

2. Metals mass questions
   a. Which metals are of concern?
   b. Will they have an unacceptable/unmanageable impact on the environment?

Information required:

1. Solids mass balance
   a. Daily solids recovery production rates
      (# Dredges, dredge volume rates, daily duration of dredging, % solids pumped, % solids dipped, drying time, % solids in dried ash for disposal; specific gravity of 15%, and 70% ash slurries)
   b. Water flows (plant flows--by category, volume per dredge operated)
   c. Rate of plant ash production.

2. Metals mass balance
   a. Concentrations of metals of interest in materials to be dredged
   b. Concentrations of metals expected in water in contact with materials to be stacked
      (Settled material supernatant dissolved results)

Assumptions:

1. 4000 gpm dredge rate
2. 20 hr/day dredging
3. Specific gravities: fly ash = 2.6, 15% slurry = 1.24, 70% = 2.12
4. Dipped material will be 70% solids, "Dried" material to move will be 20% moisture

Analysis:

1. Dredged solids production mass balance
   a. Solids production @ 4000 gpm dredge rate, average 15% solids
      i. Per current operations at Johnsonville Fossil Plant facility , this will be 3000 cu yd/day
      ii. Calculation to verify - daily basis:

   (4000 gal/min)(60 min/hr)(20 hr/day) = 4.8 MGD of 15% solids slurry

   (4.8 MGD)(1.24 sp gr)(8.35 lb/gal) = 49.70 Mlb/day 15% slurry

   (49.70 Mlb/day)(0.15) = 7.46 Mlb dry solids/day

(7.46 Mlb/day dry)(1/0.7)(1gal/8.35 lb)(1/2.12 sp gr)(1 cu yd/202 gal) = **2,978 cu yd/day @ 70% solids**

b. Supernatant volume from 4.8 MGD is 4.8 MGD, less water removed with 70% slurry ((3000 cu yd)(.3)(202 gal/cu yd) = 0.18 MGD) = **4.6 MGD** Because the processing area will be adjacent to the ash sluice channel, we estimate that all of the supernatant volume will drain into the ash sluice channel and go through the ash pond and be discharged into the plant intake.

c. Solids to be moved to temporary storage:

i. Assuming 15% shrinkage to 20% moisture yields **2550 cu yd/day @ 20% moisture**

1. Flow analysis:

Current ash pond flow is 40.512 MGD, of which ~7.7 MGD is station sump
Capacity of diffusers is 88 MGD

Diverting station sump flow directly to ash pond and combining fly ash & bottom ash sluice flows will give 32.0 MGD through large sluice ditch.

Each dredge will add 4.6 MGD to the flow

# Dredges	Flow through ash ditch	Station Sump	Total flow
0	32.0 MGD	7.7 MGD	39.7 MGD
1	36.6	7.7	44.3
2	41.2	7.7	48.9
3	45.8	7.7	53.5

So, adding 3 dredges would result in a total flow 34.5 MGD (38%) less than the design capacity of the ash pond diffusers.

The processing ditch for dredged material will be 40 ft wide by 10 ft deep and 1200 ft long. Ash will be allowed to build in the ditch to a depth of roughly 6 ft resulting in 4 ft of slurry flow in the ditch. Flow through the ditch will be controlled by the number of dredges operating, since the processing ditch has no slope. The ditch will discharge into the plant ash sluice line at its endpoint. The dredger expects a 10% solids return to the plant operations ash sluice channel which discharges into the ash pond. An additional small dredge in the ash pond may be utilized to maintain free water volume requirements. This material will be sent back through the dredge processing ditch.

Residence time in the processing ditch:

Assumptions:

1. 3 dredges in operation

2. 4000 gpm dredge rate
3. Processing ditch dimensions are 40ft wide by 1200 ft long by 4 ft deep (slurry depth)

Volume of processing ditch (40 ft)(1200 ft)(4 ft)= 192,000ft^3 or 1.44 Mgals.

Residence time in the processing ditch (1.44 Mgals)/(4000gal/min)(3 dredges) $\underset{\sim}{}$ 2 hrs.

Residence time in the ash pond:

<u>Assumptions:</u>

1. Ash pond free water volume (145.5 Mgal), survey completed 12/11/2008
2. Average flow rate through ash pond system, assuming normal plant operations and 3 dredges = 54.3 MGD

Ash pond residence time (145.5 Mgal)/(54.3 MGD) = 2.68 days

2. <u>Metals Balance</u>

The metals are primarily bound in the solids matrix as metallic oxides and other compounds, so the metals in the solids processing area will be related to the solids amounts. Analytical methods to be used are provided in Section 5.2, Table 3 and analytical detection methods in Table 4, of the Phase 1 dredging plan. The earlier solids mass balance calculations indicated that each 3,000 cu. yard per day dredge would produce 7.46 Mlb dry solids/day. The ash processing is estimated to capture 90% of the dredged solids with approximately 10% of the solids (0.746 Mlb/day) entering the ash sluice system. Those same calculations showed that each dredge would produce 4.6 MGD of supernatant. Three dredges would produce 22.4 Mlb/day. The amount entering the ash sluice system is calculated to be 2.24 Mlb/day (10%) of dry solids and 13.8 MGD of supernatant. .

KIF usually produces 390,000 dry tons of ash per year, which is 2.14 Mlb/day. The current plan includes dredging from the ash pond itself to ensure capacity is maintained, so ultimately the 10% solids from the external dredging (5.578 Mlb/day) plus a portion of 2.14 Mlb/day normal ash production will be removed routinely from the ash pond. This will be processed together with the material dredged from the river, then temporarily stored for ultimate disposal. Because the metals are primarily in the solids, the planned dredging from within the ash pond should remove these metal loadings such that they aren't available to impact the ash pond discharge. The calculations in Part 1 show that these solids and flow should not cause any problems in the ash pond. Therefore, the total metals are not considered again in the following mass balance.

TDEC Water Quality Criteria for Domestic Water Supply and also for Recreation are for total metals concentrations. However, the TDEC Water Quality Criteria for Fish & Aquatic Life, which are normally lower, are for dissolved metals. To simulate dredging followed by minimum time in the ash pond system, a quantity of ash was thoroughly mixed with river water and then allowed to settle for 1 hour. Following that short settling period a sample was taken of the liquid above the settled ash. As stated earlier the theoretical retention time in the ash pond is 2.68 days or 64 hours with three dredges in operation.

The table below lists the dissolved metals concentrations in that supernatant. Because we estimate that the majority of the solids will separate and be removed from the ash pond during that 64 hour period, the following calculations are based on dissolved metals only. Wherever an analytical value was less than the laboratory's detection limit, the assumption was made that the actual concentration was one-half the minimum detection limit (MDL). For example in the table below, the mercury concentration was reported as < 0.0002 mg/L and we had no historical data to indicate that the mercury concentration would be above 0.0002 mg/L. So for all subsequent calculations, the value of 0.0001 mg/L was used for dissolved mercury in the dredged supernatant.

Estimated Metals Concentrations in the Supernatant from Dredged Liquid to the Ash Pond		
Analyte	**Dissolved fraction (mg/l)**	
Aluminum	0.989	
Arsenic	0.127	
Barium	0.147	
Beryllium	0.001	<
Cadmium	0.001	<
Chromium	0.02	<
Copper	0.02	<
Iron	0.309	
Lead	0.02	<
Mercury	0.0002	<
Magnesium	2.66	
Manganese	0.077	
Nickel	0.02	<
Selenium	0.01	
Silver	0.01	<
Thallium	0.107	
Tin	0.01	<
Titanium	0.039	
Zinc	0.02	

Based on the concentrations above and estimated flows of 4.6 MGD per dredge or 0.746 Mlb/dredge/day, the estimated metals loadings from the supernatant should be those listed in the table below.

Loadings from Supernatant from Dredged Liquid to the Ash Pond, Dissolved			
Analyte	**Normal Ash Pond Loading, lb/day**	**1 dredge loading, lb/day**	**3 dredges loading, lb/day**
Aluminum	270	38	114
Arsenic	7.43	4.9	14.6
Barium	128	5.6	16.9
Beryllium	0.34	≤0.04	≤0.12
Cadmium	0.17	≤0.04	≤0.12
Chromium	4.06	≤0.77	≤2.3
Copper	0.88	≤0.77	≤2.3
Iron	40.6	11.9	35.6
Lead	0.34	≤0.77	≤2.3
Mercury	0.07	≤0.0077	≤0.023
Manganese	5.41	2.96	8.87
Nickel	1.79	≤0.77	≤2.3
Selenium	2.84	0.38	1.15
Silver	0.17	≤0.38	≤1.15
Thallium	0.34	4.1	12.3
Zinc	6.08	0.77	2.3

Adding the estimated loadings from the dredged supernatant above to the normal ash pond loadings results in the estimated total ash pond loadings in the table below. The normal ash pond discharge concentrations were obtained from the NPDES permit application. As above, where the ash pond discharge concentration was less than the MDL, the subsequent calculations utilize one-half that concentration. The estimated total combined ash pond discharge loadings in pounds per day are maximum probable loadings because some of the dissolved metals in the original supernatant would probably precipitate, be adsorbed onto particulate material, and be removed in the ash pond. Therefore, the combined loadings below are considered to be conservative.

Combined Dredging & Normal Ash Pond Discharge Loadings				
Indicator Metal	Normal Ash Pond Discharge mg/L	Normal Ash Pond Discharge lb/day	3 dredge to Ash Pond lb/day	Total Ash Pond Discharge lb/day
Aluminum	0.8	270	114	384
Arsenic	0.022	7.43	14.6	22
Barium	0.38	128	16.9	145
Beryllium	<0.001	≤0.34	≤0.12	≤0.45
Cadmium	<0.0005	≤0.17	≤0.12	≤0.29
Chromium	0.012	4.06	≤2.3	≤6.36
Copper	0.0026	0.88	≤2.3	≤3.18
Iron	0.12	40.6	35.6	76.1
Lead	<0.001	≤0.34	≤2.3	≤2.64
Mercury	<0.0002	≤0.07	≤0.023	≤0.093
Manganese	0.016	5.14	8.87	14.27
Nickel	0.0053	1.79	≤2.3	≤4.09
Selenium	0.0084	2.84	1.15	3.99

Silver	<0.0005	≤0.17	≤1.15	≤1.32
Thallium	<0.001	0.34	12.3	≤12.66
Zinc	0.018	6.08	2.3	8.39

The Kingston ash pond (NPDES Internal Monitoring Point 001) discharges to the plant intake. The Kingston plant intake flow is 1,297 MGD and the intake concentrations from the NPDES permit application are listed in the table below together with the calculated loadings. As before, when the concentration was less than the MDL, one-half that value was utilized in subsequent calculations. When combined with the calculated ash pond discharge loadings, we can calculate the mixed concentrations in the Kingston mixed condenser cooling water (CCW) NPDES Discharge 002 discharge and compare them to the TDEC Water Quality Criteria. Because most of the intake concentrations are routinely below the minimum detection limits, we used half of the intake concentration in these calculations.

Mixed Ash Pond & CCW Concentrations & TDEC Criteria						
Analyte	Intake Conc. mg/L	River* Loadings lb/day	Total Ash Pond + CCW lb/day	Total Ash Pond + CCW mg/L	TDEC Criteria** mg/L	TDEC Classification/ Standard***
Aluminum	0.5	5411	5795	0.51	0.2	2^o DW
Arsenic	<0.001	5.41	27.5	0.0024	0.01	Rec. Use
Barium	0.041	444	589	0.052	2	Dom. Water Supply
Beryllium	<0.001	5.41	5.64	0.0005	0.004	Dom. Water Supply
Cadmium	<0.0005	2.71	2.85	0.0003	0.00025	F&A Life
Chromium	<0.001	5.41	10.6	0.0009	0.011	F&A Life
Copper	0.0013	14.07	16.1	0.0014	0.009	F&A Life
Iron	0.3	3247	3323	0.295	0.3	2^o DW
Lead	<0.001	5.41	6.73	0.0006	0.0025	F&A Life
Mercury	<0.0002	1.08	1.13	0.0001	0.00005	Rec. Use
Manganese	0.049	530	545	0.048	0.05	2^o DW
Nickel	<0.002	10.82	13.8	0.0012	0.052	F&A Life
Selenium	<0.001	5.41	9.4	0.0008	0.005	F&A Life
Silver	<0.0005	2.71	3.37	0.0003	0.0032	F&A Life
Thallium	<0.001	5.41	17.9	0.0016	0.00024	Rec. Use
Zinc	<0.01	54.1	62.5	0.0055	0.12	F&A Life

* River Loadings were calculated using 0.5 of MDL

** TDEC Criteria, Rule 1200-4-3-.03; and
TDEC Maximum Contaminant Levels, Rule 1200-5-1-.12

*** 2^o DW = Secondary Drinking Water Standard
Rec. Use = Recreational Use Classification (Water and Organisms)
Dom. Water Supply = Domestic Water Supply Classification
F&A Life = Fish and Aquatic Life Classification (Criterion Continuous Concentration (CCC) assuming a total hardness of 100 mg/L)

The table above shows that even using conservative assumptions, such as no removal in the ash pond, all of the estimated mixed discharge concentrations should meet the lowest most stringent TDEC limits except for aluminum, cadmium, mercury, and thallium.

Aluminum is primarily part of the ash matrix and probably associated with fine particulate which should have significant removal in the ash pond system. The aluminum level is also a secondary drinking water standard and should not cause any significant impact to aquatic life downstream. The river itself is also providing 93 percent of the estimated total ash pond and CCW loading of aluminum.

The cadmium exception is likely due to fact that the TDEC Fish and Aquatic Life Use Classification CCC criterion of 0.00025 mg/L is below the laboratory detection limit of 0.005 mg/L. No measurements above the MDL have been detected in the plant intake. If one-fourth the MDL is used then the apparent estimated level in Discharge 002 would be below the TDEC limit for cadmium. The river itself is also providing 95 percent of the estimated total ash pond and CCW loading of cadmium.

The mercury exception is most likely due to the fact that the TDEC criterion of 0.00005 mg/L is below the laboratory detection limit of 0.0002 mg/L. No measurements above the MDL have been detected in the plant intake. If one-fourth the MDL is used then the apparent estimated level in Discharge 002 would be below the TDEC Fish and Aquatic Life Use Classification CCC criterion (0.00077 mg/L) but just 0.000002 mg/L above the TDEC Recreation Use Classification (Water & Organisms) criterion (0.00005 mg/L). The TDEC criterion for Fish and Aquatic Life is based on chronic long-term exposure. The TDEC criterion for Recreation (Water & Organisms) is not listed in terms of chronic or acute, but TVA's understanding is that chronic exposure was the rationale behind this very low level. The river itself is also providing 96 percent of the estimated total ash pond and CCW loading of mercury.

The thallium exception is most likely due to the fact that the TDEC criterion of 0.00024 mg/L is below the laboratory detection limit of 0.001 mg/L. No measurements above the MDL have been detected in the plant intake. If one-fourth the MDL is used then the apparent estimated level in Discharge 002 would be below the TDEC Domestic Water Supply criterion (0.002 mg/L) but just 0.001108 mg/L above the TDEC Recreation Use Classification (Water & Organisms) criterion (0.00024 mg/L). The TDEC criterion for Recreation (Water & Organisms) is not listed in terms of chronic or acute, but TVA's understanding is that chronic exposure was the rationale behind this very low level. The river itself is also providing 30 percent of the estimated total ash pond and CCW loading of thallium.

Because the estimated discharge concentration values above TDEC criteria/standards may be primarily due to analytical detection limitations, and because dredging will not be a chronic long-term activity, TVA believes that the proposed dredging and processing operations should have no significant impact on the receiving stream caused by the final discharges from the KIF ash pond and CCW (NPDES Discharges 001 and 002).

ATTACHMENT 2

TDEC SUBMITTAL

TVA

Tennessee Valley Authority, 714 Swan Pond Road Trailer Park, Harriman, Tennessee 37748

February 4, 2009

Mr. Paul Davis, Director
Division of Water Pollution Control
Tennessee Department of Environment
and Conservation
6th Floor, L&C Annex
401 Church Street
Nashville, Tennessee 37402

TENNESSEE VALLEY AUTHORITY (TVA) – COMMISSIONER'S ORDER, CASE NUMBER OGC09-0001 – APPLICATION FOR DREDGING ASH FROM AFFECTED WATERS OF THE STATE AND NOTIFICATION TO THE U.S. ARMY CORPS OF ENGINEERS

Dear Mr. Davis:

The Commissioner's Order, Section VIII.1, directs TVA to implement measures to prevent the movement of ash into waters of the State as well as prevent its migration downstream in the river. To that end, TVA is submitting this application for an ARAP along with a detailed Phase I Emory River Dredging Plan. The check for $2,500.00 to cover processing that we would usually enclose is not being included. Since this project is responsive to the order, we assume you will not be assigning it an NPDES tracking number, and the permit fee ordinarily submitted will not be needed. This assumption is being made as the previous check that was submitted for the storm water construction permit is being applied to TDEC's costs on this project, according to your email dated January 31, 2009.

TVA appreciates your expeditious review and approval of the enclosed application and plan in order to commence removal of ash from waters of the state as soon as possible.

By copy of this letter, TVA is also notifying the U.S. Army Corps of Engineers to pursue any necessary authorizations from them.

If you have any questions, please contact me at (423) 871-1666 or by email at cmanderson@tva.gov. If I am not available, please contact Lindy Johnson at (423) 751-3361 or by email at lpjohnson@tva.gov.

Sincerely,

Cynthia Anderson

Cynthia Anderson
Manager, Water and Waste Programs

LPJ:PAB
Enclosures
cc (Enclosures):
Bradley Bishop
U. S. Army Corps of Engineers Regulatory Branch
3701 Bell Road
Nashville, TN 37214-2660

L. P. Johnson, LP 5D-C
C. W. McCowan, KFP 1T-KST
A. A. Ray, WT 11A-K
G. R. Signer, WT 6A-K
EDMS, WT CA-K

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT
(33 CFR 325)

OMB APPROVAL NO. 0710-003
Expires October 1996

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application for a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME TVA Kingston Fossil Plant Tim Hope, Incident Commander	8. AUTHORIZED AGENT'S NAME AND TITLE *(an agent is not required)*
6. APPLICANT'S ADDRESS 714 Swan Pond Road Harriman, TN 37746	9. AGENT'S ADDRESS
7. APPLICANT'S PHONE NOS. W/AREA CODE	10. AGENT'S PHONE NOS. W/AREA CODE
a. Residence b. Business (865) 751-3500	a. Residence b. Business

11. **STATEMENT OF AUTHORIZATION**

I hereby authorize, ______________________ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT'S SIGNATURE DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE *(see instructions)*
Kingston Fossil Plant – dredging of ash above Emory River Mile 1.0 in response to release on 12/22/08 in accordance with enclosed Phase I Dredging Plan.

13. NAME OF WATERBODY, IF KNOWN *(if applicable)* Emory River	14. PROJECT STREET ADDRESS *(if applicable)* TVA Kingston Fossil Plant 714 Swan Pond Road Harriman, Tennessee 37746
15. LOCATION OF PROJECT Roane County — TN COUNTY — STATE	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN, *(see instructions)*

17. DIRECTIONS TO THE SITE

18. Nature of Activity *(Description of project, include all features)*
TVA plans to begin dredging above Emory River Mile (ERM) 1.0 in accordance with the enclosed Phase I Dredging Plan.

19. Project Purpose *(Describe the reason or purpose of the project, see instructions)*

To begin the recovery of ash that was released from the Kingston ash disposal facility on 12/22/08.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge
N/A

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards
N/A

22. Surface Area in Acres of Wetlands or Other Waters Filled *(see instructions)*
N/A – to recover ash that was released to waters.

23. Is Any Portion of the Work Already Complete? Yes______ No __X__ IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

TVA is the adjoining property owner below El. 750'.

25. List of Other Certifications or Approvals/Denials Received from other Federal, State or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

TDEC ARAP and Corps of Engineers authorization being applied for simultaneously. DOE working group has stated that dredging above ERM 1.0 requires no special handling.

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Robert J. Hope — SIGNATURE OF APPLICANT
2/4/09 — DATE
(N/A) — SIGNATURE OF AGENT
DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

*U.S.GPO:1994-520-478/82018