Tennessee Valley Authority
Regulatory Submittal for Kingston Fossil Plant

Documents submitted:

Summary of Changes to Non-Time-Critical Removal Action Work Plan
Non-Time-Critical Removal Action Work Plan for the Embayment/ Dredge Cell

Date Submitted:
08/05/2010

Submitted to whom
Craig Zeller

Concurrence

Received	Not Applicable	TVA
☒	☐	Steve McCracken
☒	☐	Dennis Yankee DHY
☒	☐	Michelle Cagley MC
☒	☐	Kathryn Nash KAN
☒	☐	______________

Received	Not Applicable	Jacobs
☒	☐	Steve Richardson
☒	☐	Bruce Haas
☐	☐	______________
☐	☐	______________
☐	☐	______________
☐	☐	______________

Approvals

TVA Kathryn Nash Date 8/9/10

EPA [signature] Date 8/18/10

cc:

- ☒ Anda Ray, TVA
- ☒ Barbara Scott, TDEC
- ☒ Leo Francendese, EPA
- ☒ Craig Zeller, EPA
- ☒ Dennis Yankee, TVA
- ☒ Kathryn Nash, TVA
- ☒ Cynthia Anderson, TVA
- ☒ Steve McCracken, TVA
- ☒ EDM
- ☒ Julie Pfeffer, Jacobs
- ☒ Steve Richardson, Jacobs
- ☒ Michelle Cagley, TVA
- ☒ Greg Signer, TVA
- ☒ KIF Incident Document Control
- ☒ Katie Kline, TVA
- ☒ Dannena Bowman, EPA
- ☒ Jeff Gary, Jacobs
- ☒ Robert Pullen, Jacobs

Comment Response Summary
Kingston Fly Ash Recovery Project
Non-Time Critical Removal Work Plan for the Embayment / Dredge Cell (RAWP-057)
dated May 27, 2010

No.	Page/Section	Comment	Response
		Comments by: Craig Zeller, Remedial Project Manager, EPA	
	Page 1-13, Section 1.3	Post Closure Care - For CERCLA remedies, the long-term monitoring components presented in this section are typically compiled into an Operations and Maintenance Plan (or Manual). I would suggest mentioning that cell monitoring requirements (landfill slopes/drainage, piezos/inclinometers, settlement plates), groundwater/surface water/stormwater, and embayment restoration) will be presented in a site-wide O&M Plan. I would also then refer the reader to Section 7.0 (Closure/Post-Closure Plan) for more details. Some thoughts about future groundwater monitoring. This section mentions that gw quality in the cell will be monitored quarterly for the 1st year (post-closure) and then semi-annually after that. I believe it would be more appropriate to be a bit more generic at this point, and mention that the details of the future gw monitoring plan (network of wells, frequency, COCs) will be presented in the O&M plan. My point here is we will learn more about gw when the MODFLOW effort is completed under the SAP. Also, I think we could probably transition to quarterly frequency for the ball-field wells that were installed in May 2009. Monthly events have produced stable conditions, and I don't see a need to continue monthly sampling for ball-field wells thru the 4 year closure period for Phase 2.	Agree. The O&M Plan will be the same as the Closure/Post Closure Plan. The intent is to create one plan to satisfy both CERCLA O&M requirements and TDEC landfill permit closure requirements. Added: “This document will satisfy the requirements for both a CERCLA O&M Plan and a TDEC landfill permit Closure/Post-Closure Plan. The document will present a comprehensive site-wide plan for both EPA and TDEC review.” Deleted the groundwater monitoring details and replaced with: “the network of wells, frequency of sampling, and suite of analytes will be developed using results of fate and transport modeling, which is being conducted under the Sampling and Analysis Plan for the River System.” Frequency of well sampling in the ball-field will be reduced to quarterly as suggested.
	Page 2-1, Section 2.1	General - Several paragraphs here mention that a "briefing will be held with regulators (TVA and TDEC)". Please replace "TVA" with "EPA".	Corrected the typographical error.
	Section 6.0	General - This section was very informative regarding the amount of construction material transported on-site for cell closure. Due to the large volume (e.g. approx 2M CY) of required material, I encourage TVA to continue to explore methods to reduce truck traffic on local roads. For example, I concur with the statements on page 6-3 that larger tandem trucks and rail will be evaluated for alternate transportation methods.	TVA will continue to explore methods to reduce truck traffic.
	Section 7.0	Closure-Post Closure Plan/general - I generally agree with the major headings and components in Section 7.2 (engineering monitoring, gw/sw monitoring/embayment monitoring, Inspections/Repairs, Land Use Controls, Communication, etc). As mentioned above, I would suggest adding a statement that the details of the closure/post closure plan will be presented in a comprehensive, site-wide O&M plan for EPA/TDEC review at some point in the cell closure project.	Added that the details of the Closure/Post-Closure Plan will be presented in a comprehensive site-wide O&M plan for EPA/TDEC review.
	Section 8.1	General - The project organization presented here is more typical of what would be implemented on a DOE/DOD or long-term CERCLA remedial action. It is not really appropriate for a Removal Action. Suggest deferring instead to the established ICS structure that has been in-place.	Added “The work will be conducted under the Incident Command Structure that has been established for the non-time-critical removal action components.” Separated Kingston Ash Recovery Project Organization from the project team organization for an individual project component.

Comment Response Summary
Kingston Fly Ash Recovery Project
Non-Time Critical Removal Work Plan for the Embayment / Dredge Cell (RAWP-057)
dated May 27, 2010

No.	Page/Section	Comment	Response
	Section 8.2 Table 8-1	Work Breakdown Structure - I understand from the June 4th meeting that Removal Design Packages would be divided into 4 phases for the Working Platform, 4 phases for Ash Stacking, 4 phases for perimeter containment, and 5 phases for final cover. The WBS presented in Table 8-1 does not include the Removal Design Packages for ash removal in the north/middle embayments. Can you please modify this table to specifically identify the above Removal Design Packages and O&M Plan (if my assumptions are correct). Can you also please insert a column that identifies when the specific design packages would be submitted for EPA/TDEC review and comment (quarter/year would be sufficient). In other words, can you please modify Table 8-1 to resemble the document control matrix that we use for the 9am meeting on Wednesday's?	Revised Table 8-1 to reflect the latest anticipated Removal Design Packages, consistent with the document control logs.
		Comments by: Barbara Scott, TDEC	
	Page 1-9, Section 1.3	3rd para, first line: Add "mechanical" dredging.	Added: "using either mechanical or hydraulic dredging methods".
	Page 1-9, Section 1.3	3rd para, fifth line: Substitute "suspension" for "solution".	Change made as suggested.
	Page 1-10	3rd para: Remove reference to XRF, has not been successful on this site.	Change made as suggested.
	Page 1-12, Section 1.3	3rd para, fourth line: Are the thin lift thicknesses of 2 feet consistent with the test fill data?	Correct. This is consistent with the test fill and with Stantec's current specifications for ash stacking.
	Page 2-1, Section 2.1	2nd para, last line: EOR should be an independent P.E. licensed to practice within the state of Tennessee. This comment also applies to Page 8-2, 8.1, third paragraph, sixth line.	Please note that this is already defined in the first paragraph of Section 2.1 as well as the position definitions in Section 8.
	Page 4-1, Section 4.1	4th para: Remove all references to Jacobs. TVA is responsible for safety onsite.	Clarified TVA's responsibility for safety and Jacob's responsibility as agent for TVA in managing the safety program.
	Page 5-1, Section 5.1	Bulleted items: During the drying process, steps should be taken to prevent over-drying the ash and creating a dust hazard.	Added this statement as suggested to the introductory sentence to the bulleted list.
	Page 5-2	Top of page: Define drying agent.	Added: "such as lime or other proprietary reagent".
	Page 5-2, Section 5.1	3rd para: Disposal of plant generated ash – where? May be impacted as a result of upcoming July 7, 2010 meeting.	The disposal will be further clarified following future meetings between TVA and TDEC.
	Page 7-1 & 7-2, Section 7.1	Although the section is titled "closure/post-closure plan", it doesn't actually address the physical closure of the facility (e.g., cap design, side-slope tack on berms, let down structures, etc.), but rather focuses on post-closure care. Should incorporate an equivalent (or better) design that is in current regulatory requirements/performance standards.	This section describes preparation of a closure/post-closure plan. The remedial design packages will present the closure designs.

Comment Response Summary
Kingston Fly Ash Recovery Project
Non-Time Critical Removal Work Plan for the Embayment / Dredge Cell (RAWP-057)
dated May 27, 2010

No.	Page/Section	Comment	Response
	Page 8-1 & 8-2, Section 8.1	Document specifies Jacobs personnel in key roles (project manager, program health and safety manager, site safety and health officer, QA manager, project controller, field engineer and construction manager). Rewrite section to match the ICP – TVA personnel only.	Added: "The work will be conducted under the Incident Command Structure that has been established for the non-time-critical removal action components." Separated Kingston Ash Recovery Project Organization from the project team organization for an individual project component.
	Page 8-4	1st para: Appears to be a change in the estimated dry ash conversion timetable from completion by the end of 2011 to fly 6/12 and bottom 12/12. First mention of a wastewater treatment facility coming online 1/13. When will TDEC see a detailed description of WWTP?	Corrected the time frames to 12/2011 for fly ash and 10/2012 for bottom ash. Wastewater treatment facility for other KIF wastewaters is still be evaluated and is not determined at this time.

TVA

Document No. RAWP-057

Kingston Ash Recovery Project
Non-Time-Critical Removal Action Work Plan
for the Embayment / Dredge Cell

Prepared by:
Jacobs

for the Tennessee Valley Authority

Revision	Description	Date
1	RAWP for TVA Review	March 15, 2010
2	RAWP for EPA/TDEC Review	May 27, 2010
3	Final RAWP	July 28, 2010

This page intentionally left blank

Table of Contents

List of Tables

List of Figures (Attached)

Appendix (Attached)

List of Acronyms

AHA	activity hazard analysis
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environment Response, Compensation, and Liability Act
CM	Construction Manager
CP	Civil Projects
CQAP	Construction Quality Assurance Plan
CQCP	Construction Quality Control Plan
cy	cubic yard
EE/CA	Engineering Evaluation/Cost Analysis
EOR	Engineer-of-Record
EPA	U.S. Environmental Protection Agency
ft	foot
IDW	investigation-derived waste
JSA	job safety analysis
KIF	Kingston Fossil Plant
MAP	Material Access Point
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/L	milligram per liter
msl	mean sea level
NPDES	National Pollutant Discharge Elimination System
PHSM	Program Health and Safety Manager
PM	Project Manager
QA	quality assurance
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
QC	quality control
RAO	removal action objective
RAWP	Removal Action Work Plan
RPM	Remedial Project Manager
RSL	regional screening level
SAP	Sampling and Analysis Plan
SHP	Safety and Health Plan
SLERA	Screening-Level Ecological Risk Assessment
SOP	Standard Operating Procedure
SSHO	Site Safety and Health Officer
SWPPP	Stormwater Pollution Prevention Plan
SWSHP	Site Wide Safety and Health Plan
TCM	Technical Contract Manager
TDEC	Tennessee Department of Environment and Conservation
TMP	Transportation Management Plan
TVA	Tennessee Valley Authority
WBS	work breakdown structure
WMP	Waste Management Plan

This page intentionally left blank

1. INTRODUCTION

This Removal Action Work Plan (RAWP) presents a framework for implementing the design and construction for restoration of areas within the Swan Pond Embayment and for closure of a former Dredge Cell that have been impacted by the spilled fly ash at the Tennessee Valley Authority (TVA) Kingston Fossil Plant (KIF) release site in Roane County, Tennessee. TVA is conducting cleanup of the spilled ash under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. The U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) are providing regulatory oversight of the cleanup.

1.1 SITE CONDITIONS AND BACKGROUND

The KIF is located just off Swan Pond Road at the confluence of the Emory and Clinch Rivers on Watts Bar Reservoir in Roane County, near Kingston, Tennessee (Figure 1). KIF is one of TVA's largest 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. KIF 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. Ash, a by-product of a coal-fired power plant, is stored in unlined containment areas, including a former Dredge Cell.

1.1.1 Initial situation

On Monday, December 22, 2008, just before 1 a.m., a coal fly ash spill occurred at TVA's KIF, allowing a large amount of fly ash to escape from the onsite Dredge Cell into the Swan Pond Embayment and adjacent waters of the Emory River, releasing about 5.4 million cubic yards (cy) of coal ash. At the time of the slide, the Dredge Cell contained about 16.2 million cy of ash and associated dikes. The dike failure caused about 60 acres of ash in the 127-acre containment area to be displaced. The released ash covered about 300 acres. Fly ash filled the Swan Pond Embayment on the north side of the KIF property adjacent to the failed Dredge Cell (Figure 2). A temporary dike (Dike 2) was constructed in the eastern portion of the Swan Pond Embayment to contain the fly ash to the west of the dike until a response action plan could be 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 recovering the material outside of the Swan Pond Embayment by use of mechanical excavators and dredging operations under a time-critical removal action.

The fly ash that was released to the Swan Pond Embayment and Emory River originates from the coal burned in boilers for power production at KIF. The coal, in its natural state, contains various inorganics that can be retained with the ash after burning. Trace amounts of arsenic, chromium, copper, lead, mercury, nickel, selenium, thallium, vanadium, zinc, and other metals which occur naturally in the coal remain in the ash after coal combustion. Naturally-occurring radionuclides, such as isotopes of potassium, radium, uranium, and thorium, also remain in the ash after coal combustion. These metals and radionuclides are typically bound to the ash. The ash itself is primarily composed of fine silica particles very similar to sand.

1.1.2 Location of Hazardous Substances

Failure of the Dredge Cell filled the Swan Pond Embayment. The ash deposits are typically 20 to 40 feet (ft) thick, although thicker piles of ash have been constructed in the embayment area during time-critical removal actions. The extent of fly ash in the Swan Pond Embayment covers approximately 76 acres of land beyond the original boundary of the Dredge Cell, west of Dike 2. The estimated volume of this ash is approximately 2.4 million cy. Approximately 10.8 million cy of ash and associated containment dikes remain in the approximately 127-acre footprint of the former Dredge Cell. Another 4.0 million cy of ash remain in the approximately 120-acre Ash Pond, adjacent to the former Dredge Cell. Residual ash in the river system is not being addressed in this RAWP, but will be addressed in a later remedial action decision for the river system.

More than 50 samples of the ash have been collected and analyzed for metals; 11 samples have been analyzed for organic chemicals, mercury, and radionuclides. Metals, primarily arsenic, have been the focus of this monitoring. Arsenic is present in the ash at an average concentration of 65 milligrams per kilogram (mg/kg), which is above EPA's residential Regional Screening Level (RSL) of 0.39 mg/kg and above the EPA's industrial RSL of 1.6 mg/kg for the hazardous substance.

Surface water samples have been collected from clean water ditches and settling basins constructed within the embayment area. More than 199 samples have been collected and analyzed by TVA since the clean water ditches were completed. As of April 20, 2010, the arsenic concentration in surface water has averaged 0.027 milligrams per liter (mg/L), which is greater than TDEC's Ambient Water Quality Criteria of 0.010 mg/L. Maximum concentrations of antimony and selenium have also exceeded water quality criteria.

Groundwater samples have been collected semiannually from monitoring wells surrounding the Dredge Cell in accordance with its industrial waste landfill permit requirements. Currently, six wells are present in the Dredge Cell area. Wells have been routinely analyzed for 16 metals and fluoride. Arsenic was detected in June 2009 at a maximum of 0.0297 mg/L in well AD-2, which exceeds the TDEC Water Quality Criteria for Domestic Water Supplies maximum contaminant level (MCL) of 0.010 mg/L. Results of subsequent monthly sampling through March 8, 2010, indicate that arsenic concentrations in well AD-2 have dropped to 0.00254 mg/L, below its MCL. Historically, arsenic concentrations in well 6A have remained less than 0.014 mg/L, which slightly exceeds its MCL; concentrations do not indicate either an increasing or decreasing trend. Arsenic concentrations in other wells have not exceeded the MCL. Historically, silver has occasionally been detected in one well (6A) at concentrations that exceed its MCL of 0.10 mg/L. However, in 2006 TDEC granted a site-specific standard of 0.18 mg/L for silver in recognition of the fact that silver is present in natural soil and groundwater sources, but is absent in ash.

A human health risk assessment was conducted for the Engineering Evaluation and Cost Analysis (EE/CA) (Jacobs 2010c) for exposure to ash. Cancer risk estimates exceeded the target risk range for a future onsite resident (adult and child), indoor and outdoor worker, and groundskeeper. The cancer risk estimates were driven by ingestion of arsenic and external exposure to gamma radiation from potassium-40, radium-226, radium-228, and thorium-228. Noncancer hazard estimates for future exposure scenarios exceeded the noncancer hazard threshold of 1 for an onsite resident (child) living and playing directly on exposed ash. The primary contributors to this hazard were ingestion of arsenic, cobalt, thallium, aluminum, iron, vanadium, and chromium in ash; and (for future residents living onsite) ingestion of arsenic in groundwater. Therefore, a removal action is warranted.

A Screening-Level Ecological Risk Assessment (SLERA) was conducted for the EE/CA (Jacobs 2010c) for exposure to ash, sediment, and surface water. The SLERA indicated a potential for adverse ecological effects for terrestrial and aquatic receptors in the embayment/Dredge Cell area. Therefore, a removal action is warranted.

1.1.3 Cause of Release or Discharge

The ash spill was the result of a progressive failure of the perimeter containment dike surrounding the former Dredge Cell. Four contributing factors were cited by AECOM in their root cause analysis of the former dike failure (AECOM 2009):

1. Fill Geometry. The former failed dike was constructed using small dikes stacked progressively up slope on top of nearly 80 ft of sluiced ash and a sensitive silt (“slimes”) layer. Total height of the dikes that surrounded the former Dredge Cell prior to its failure was elevation 820 ft above mean sea level (msl). Restoration of the Dredge Cell will reconstruct the perimeter containment using a single compacted earthen berm placed on a crushed rock working platform. The perimeter berm will be built to a height of 765 ft msl; the Dredge Cell will be built to a maximum elevation of 790 ft msl, which is 30 ft lower than the former Dredge Cell prior to its failure.

2. Fill Rates. The elevation of the ash in the former Dredge Cell prior to failure was increasing at a rate of about 6 ft/year, more rapidly compared to earlier years, which added load to the wet ash beneath the dikes. In particular, the filling resulted in loose, wet ash saturated throughout its depth, which led to high porewater pressures at depth and low strength in the sluiced ash materials. During restoration of the Dredge Cell, the cell fill will be constructed by dry stacking using dewatered ash, compacted in thin lifts. Results of a test embankment have shown that such construction methods will not result in excess porewater pressures in the foundation ash materials under a controlled and monitored rate of filling.

3. Soft Foundation Soils. Creep deformations within the submerged loose slimes was occurring under the load of loose wet ash in the former Dredge Cell, which caused a reduction in the strength of the slimes and led to deep-seated failure of the dike. During the restoration of the Dredge Cell, the foundation beneath the perimeter berm will be reinforced with soil/cement columns that will not rely on the strength of the soft foundation soil layer for stability, but will instead transfer the load substantially to the soil/cement columns. The foundation ash/soil layers beneath the perimeter berm will be mixed in-place with cement grout, to achieve a specified strength. The foundation improvements will be designed to support the landfilled ash, even if a strong earthquake were to liquefy the saturated ash/soil layers beneath the ash fill.

4. Loose Wet Ash. The original sluiced ash was deposited under water, resulting in a high void ratio (very loose ash) that did not consolidate or densify under the surcharge weight of ash placed above it. As a result, the loose wet ash had a low undrained shear strength with a very sensitive structure. During the restoration of the Dredge Cell, the cell fill will be constructed above current grades using dewatered ash, compacted in thin lifts on top of a constructed working platform that serves as a capillary break. . Results of the test embankment study have shown that the shear strength of the compacted dry ash is greater than loose wet ash. The moisture content of the dry ash will be at the optimum level to achieve a specified shear strength. The compacted dry ash will therefore be much stronger than the loose wet ash in the former Dredge Cell.

1.1.4 Previous Response Actions

Shortly after the ash spill, on January 12, 2009, TDEC issued a Commissioner’s Order, Case No. OGC09-0001 (TDEC 2009), requiring action be taken as necessary to respond to the emergency under Tennessee Code Annotated §69-3-109(b)(1), the Water Quality Control Act. The TDEC Order required a plan for the comprehensive assessment of soil, surface water, and groundwater; remediation of impacted media; and restoration of all natural resources damaged as a result of the coal ash release.

On March 2, 2009, TVA submitted a draft Corrective Action Plan to TDEC and EPA for agency review and approval (TVA 2009d). Since the release, EPA, the State, and TVA have conducted extensive sampling of air, water, and ash material. Numerous studies have been conducted of the river system that include biological characterization, such as studies by Appalachian State University, Duke University, Oak Ridge National Laboratory, Tennessee Aquarium, Tennessee Wildlife Resources Agency, U.S. Army

Corps of Engineers Engineer Research and Development Center, U.S. Fish and Wildlife Service, U.S. Geological Survey, University of Tennessee, and Virginia Polytechnic Institute and State University.

On May 11, 2009, an Administrative Order and Agreement on Consent (EPA 2009a) was signed between EPA and the TVA providing the regulatory framework for the restoration efforts. EPA's Administrative Order directed the restoration work to be conducted under the CERCLA and more specifically, under the removal program.

On August 4, 2009, an Action Memorandum was approved for removing ash from the river east of Dike 2 under a time-critical removal action (TVA 2009b). The decision was made to remove ash from the river using hydraulic or mechanical dredging and from dry land areas behind Dike 2 using land-based equipment and then process, transport, and dispose of the ash recovered. The purpose of removing the ash from the river was to limit the potential for future ash migration and to prevent upstream flooding in the event of a large rainfall.

In accordance with Section IX.30 of the EPA Administrative Order, a work plan for performing one or more non-time-critical removal actions at the Site was also prepared. That work plan (Jacobs 2009), issued by EPA for public comment on October 21, 2009, concluded that significant data uncertainties exist in characterizing the river system, so that more study and time are needed for comprehensive assessment of ecological risk in the river system. It was therefore decided to make two separate non-time-critical removal action decisions, one for the Swan Pond Embayment/Dredge Cell area and the other for residual ash in the river.

In January, 2010, an EE/CA was prepared and issued for public comment that evaluated alternative response actions for the Swan Pond Embayment/Dredge Cell with respect to their effectiveness, implementability, and cost (Jacobs 2010c). A subsequent Action Memorandum (TVA 2010a) was prepared that recommended the selection of a preferred removal action (Alternative 3b in the EE/CA). The Action Memorandum is the decision document for the selected non-time-critical removal action, which addresses the restoration of the Swan Pond Embayment and closure of the Dredge Cell associated with the TVA KIF Release Site in Roane County, Tennessee.

Infrastructure improvements that are common to all EE/CA alternatives are being implemented as part of the planned transition from time-critical to non-time-critical actions. These improvements include the following: (1) ash is being consolidated in the north embayment to promote drying; (2) a bridge, underpass, and haul road are being constructed as a means of transporting ash beneath Swan Pond Circle Road; and (3) the bottom of the central Dredge Cell area is being recontoured in preparation for construction of a working platform.

1.2 REMOVAL ACTION OBJECTIVES

Spilled ash within the embayment represents a threat or potential threat of exposure to human and ecological receptors and of migration into the river system. A removal action is needed to mitigate this threat or potential threat to the public or the environment in the Swan Pond Embayment and former Dredge Cell. The following are the specific removal action objectives (RAOs):

- Minimize direct contact between ash material in the embayment and water flowing through the embayment area into Watts Bar Reservoir;
- Minimize migration of ash and its constituents from the embayment or Dredge Cell into affected waters due to erosion;
- Minimize direct contact exposure by human or ecological receptors to ash on the ground;
- Restore the embayment to pre-spill conditions;

- Close the former Dredge Cell (and adjacent Ash Pond) in accordance with Tennessee Solid Waste Rule 1200-1-7; and
- Dispose of waste streams from the removal action in accordance with applicable or relevant and appropriate requirements (ARARs).

1.3 DESCRIPTION OF THE REMOVAL ACTION

The proposed action is to implement Alternative 3b, as evaluated in the EE/CA. Figure 3 presents a conceptual layout and cross-sectional sketch showing the end-state of the proposed action. The following paragraphs describe the primary project components that will be implemented as part of the non-time-critical removal action for the Swan Pond Embayment/Dredge Cell. The removal action components described below are conceptual; details of the components will be further developed during final design and may vary from the conceptual descriptions presented below.

Embayment Ash Removal. Approximately 1.4 million cy of the ash in the northern portion of the Swan Pond Embayment and 0.7 million cy in the middle embayment is expected to be retrievable with excavators, dozers, and trucks. Admixtures, such as lime or other proprietary materials, may be used to help dry the ash so that it is retrievable. The ash will be piled, dewatered (dried) if needed, and when dry enough, transported to the onsite disposal areas in the Dredge Cell and Ash Pond. The wetter ash will be processed before placing on trucks by piling or spreading out the ash, then disking and rolling. In general, a moisture content between 21% and 27% is desired prior to landfilling (-4% to +2% of optimum moisture content). Ash will be moved onsite through off-road trucks or with scrapers and pans. Trees that are retrieved either within the ash or that are removed will be chipped and either used onsite or sent offsite for disposal, but will not be disposed with the ash in the Dredge Cell. Up to 50 truckloads of timber are anticipated. Periodically, disturbed ash will be sprayed with a component like Flexterra® to control dust. Air and surface water monitoring will be conducted throughout the implementation of the removal action.

Ash that is too wet to remove with traditional land-based equipment may be dredged from the embayment using either mechanical or hydraulic dredging methods. It is expected that approximately 0.2 million cy of the material will be dredged. A small dredge will be used to remove most of the material although larger dredges may be useful in some areas. If hydraulic dredging is used, the dredged material will be conveyed to the existing Rim Ditch where the solids will settle out of suspension. The remaining water will then discharge through the Sluice Trench and Ash Pond to the Stilling Pond prior to discharge through a National Pollutant Discharge Elimination System (NPDES) outfall. Ash will be recovered from the Rim Ditch/Sluice Trench with a combination of excavators and clamshells. The ash will then be processed on the Ash Processing area ("Ball Field") to allow it to dry sufficiently and will then be trucked back to the onsite disposal areas.

A series of clean water ditches were installed during the time-critical removal action to bypass upgradient surface water around the ash. Nearly 5,900 linear ft of ditches, 4-ft deep and 16 to 20 ft across were constructed through the north and middle portions of the Swan Pond Embayment. At least one side of the ditch is made of ash and is covered in rock. This portion of the ditch, including the overlying rock, will be removed so as to remove the underlying ash and disposed onsite with the ash, or cleaned and re-used onsite. The clean water ditches will be removed near the end of the project so that upstream water can continue to bypass the ash until no ash remains.

Dike 2 is a temporary rock dike comprised of shot rock, riprap, and smaller-sized rock saturated with ash. The dike is approximately 1,400-ft long with an average height of 12 ft and average width of 30 ft at the top. There are approximately 90,000 tons of rock in the dike. The dike has served as a barrier to prevent ash from moving into the Emory River from the embayment and to serve as a haul road. The dike was founded across foundation silts and sands following removal of displaced ash. The exception is a 500-ft segment located along the northern portion of the dike where complete removal of displaced ash materials was reportedly not performed.

Immediately adjacent to Dike 2 are several settling basins that serve as a treatment system for water that migrates over ash. Approximately 5 acres are used for the basins with 20-ft wide shot rock tops, 2:1 slopes, and 10 ft in depth. At the time of closure, it is assumed that the basins will be 50% full of ash, approximately 38,000 cy. The settling basins are estimated to be built of 40,000 tons of rock.

Both the dike and the settling basins must remain in service until the last of the ash is removed west of Dike 2. At that time, the rock will be removed and transported to the onsite disposal area in the Dredge Cell and Ash Pond. Some of the larger shot rock may be washed of ash so that the clean rock may be used for onsite drainage and erosion control.

Verification of ash removal will be based on the visual observations of the bottom of the excavation for the presence of ash, supplemented with polarized light microscopy or x-ray fluorescent technology as confirmation of the visual observations. If dredging is used for the final ash removal, then verification will be based on the results of systematic vibracore sampling of the embayment bottom. The vibracore samples will be observed for visual presence of ash, supplemented with polarized light microscopy as confirmation of the visual observations. The RAOs do not include a chemical concentration-based cleanup criterion for the Swan Pond Embayment.

Embayment Restoration. Following the removal of ash from the areas west of Dike 2, the embayment ecosystem will be restored to pre-spill conditions, as best determined from a jurisdictional assessment based on analysis of existing data and site observations, data collected from surrounding reference communities in a similar geomorphic position, and best professional judgment. The requirements for a jurisdictional assessment include maps of the site prior to the spill and following the non-time-critical removal action, areas/species/habitat impacted, revegetation with selected species, habitat created, channel slopes, and similar elements. The pre-spill topography of the embayment shoreline and surrounding areas will be reconstructed to an elevation that supports native plant communities. Restoration will incorporate the following actions:

- Achieving suitable elevations within the floodplain necessary to support the restoration of a complex mosaic of forested, scrub-shrub, and emergent wetland plant communities. This includes the restoration of floodplain microtopography and wetland hydrology (i.e., constructed vernal pools and mudflats) that historically provided important off-channel, seasonal, aquatic habitat for amphibians, birds, and other semi-aquatic species.

- Restoring the island that was historically located on the northern perimeter of the central embayment. The island was likely an aquatic habitat feature important to fish and other aquatic species. Restoration will include filling and/or regrading to establish pre-spill topography.

- Constructing artificial snags with onsite coarse wood to provide additional roosting habitat proximal to open water habitat.

- Characterizing the bottom sediments exposed by excavation/dredging or filling/regrading for organic content and moisture retention capacities to determine if soil amendments will be necessary to support the restoration of native plant communities. Hydric soils were identified in the wetland ecosystems surrounding the embayment. Given that the embayment appears subject to high sediment deposition, the bottom substrate of the embayment is expected to reestablish naturally.

The final planting will restore a complex mosaic of native forested, scrub-shrub, and emergent wetland and upland plant communities. Figure 4 presents a conceptual cross-section of the restored embayment, with reference to different native plant communities. Species composition and densities of restored plant communities will be based upon previously collected data within the embayment area, as well as data collected from surrounding reference communities in a similar geomorphic position. Restoration of a complex mosaic of forest, scrub-shrub, and emergent wetland plant communities along the embayment shorelines will encourage natural repopulation of native faunal groups, so that there will be no need to repopulate with benthic invertebrate cultures, fish stocking, or resettlement of faunal groups.

Restoration of the embayment will be consistent with TVA's long-range land use plans. TVA is developing an overall plan for property assessment and disposition. In planning, TVA will consider environmental issues, safety, the Watts Bar Land Use Plan and any future needs of the Kingston Fossil Plant. Any property (housing or land) put into surplus will either be sold (former owners have first right of refusal for up to 5 years from date of sale to TVA) or considered for public and community use.

Perimeter Containment. A foundation stabilization zone consisting of a grid of soil/cement columns will be installed beneath the perimeter berms surrounding the former Dredge Cell and Ash Pond using deep soil mixing techniques. Figure 5 presents a conceptual cross-section and plan view of the foundation stabilization zone. The foundation zones will be stabilized by mechanically mixing in-situ soil materials with a cement-grout slurry using a hollow-stem paddle mixer. The drilling equipment will be configured using nominal 6- to 8-ft diameter augers to create a soil/cement column. Successive columns will be installed to create a contiguous subsurface "wall" of soil/cement. These walls will then be configured into the required grid pattern. A 20 to 25% soil replacement ratio (treated soil as a percent of total soil volume) is anticipated in the foundation treatment zone. The conceptual design for the soil/cement calls for a minimum unconfined compressive strength of 150 pounds per square inch (psi), which is equivalent to a shear strength of 75 psi. The conceptual foundation treatment zones are as follows; the final configuration of these zones will be determined during final design:

- Dike C corridor: 130-ft wide foundation stabilization zone beneath a proposed earthen berm, about 40-ft deep; riprap armoring along the upstream face (outslope).

- Ball Field corridor: 25-ft wide foundation stabilization zone, about 60-ft deep.

- Swan Pond Road corridor: 25-ft wide foundation stabilization zone, about 60-ft deep.

- Ash Pond corridor: Along the northern Dike C, a 25-ft wide zone at the dike crest, about 60-ft deep, and another 25-ft wide zone at the dike toe, 50-ft deep. Along the eastern divider dike, a 15-ft wide zone at the dike crest, 60-ft deep, and a 15-ft wide zone at the dike toe, 50-ft deep. Along the southern Dike C, one 25-ft wide zone at the dike crest, 30-ft deep.

A working platform will be built along the perimeter berm corridor prior to stabilizing the underlying foundation material. The working platform will consist of layers of biaxial geogrid, sand, and stone, or equivalent placed over the ground surface. Compactible fill will then be placed and compacted to create an earthen berm along Dike C. Quality control (QC) samples will be taken to confirm appropriate moisture content for optimum compaction. Outslope armoring of the new berms will be constructed of riprap.

A perimeter ditch will be constructed around the perimeter of the Dredge Cell and Ash Pond to divert surface drainage away from the site and to control runoff from the site. The ditch will be lined with fine-grained soil, covered with topsoil, and protected with a synthetic turf reinforcement mat to establish a vegetative (grass) cover.

A deep soil mixing field demonstration is underway to demonstrate the constructability of soil/cement panels, establish mix design parameters required to achieve target strengths, establish construction metrics (production rates, sequence), and gain site-specific experience to facilitate the bidding process.

Design of the perimeter berm and foundation stabilization is being conducted with post-earthquake conditions as the critical loading condition. The design earthquake is based on TDEC guidance for landfills; namely, a 10% probability that the acceleration will not be exceeded in 250 years. Two earthquake scenarios are being modeled: one a local magnitude 6.0 earthquake located 36 kilometers (km) from the Kingston site, and the other a magnitude 7.6 earthquake located on the New Madrid fault, 435 km from the Kinston site. Results have indicated widespread liquefaction will occur in the saturated foundation ash and silty sand layers. Slope stability is being evaluated using advanced numerical modeling using the Fast Lagrangian Analysis of Continua (FLAC) model and 3-dimensional equivalency. Key performance criteria are that no displacement of the perimeter foundation stabilization zone is allowed beyond the facility boundary. Both static and dynamic analyses are being conducted to model porepressure generation, strength reduction, effective stresses, and shear strains. These analyses will be used to optimize the ground improvement design, including layout, spacing, and strength parameters of the soil/cement panels, and to predict deformations.

Ash Stacking. A working platform will be constructed across the Dredge Cell and Ash Pond before dry ash is stacked to serve as a capillary break and thereby control water content within the ash fill. The working platform will be constructed of layers of biaxial geogrid, sand, and stone or equivalent. Dried ash (-4% to +2% of optimum moisture content) will be placed in relatively thin lifts of up to 2-foot thickness, and each lift will be compacted to a minimum of 90% of standard Proctor maximum dry density. QC samples will be taken to confirm appropriate moisture content for optimum compaction. Periodically, disturbed ash will be sprayed with a component like Flexterra® to control dust.

Ash stacking will be conducted in phases as the area becomes filled, progressing from the northern end of the Dredge Cell (Cells 2 and 3) to the Lateral Expansion area (Cell 4), and finally to the southern end of the Ash Pond. Comprehensive engineering monitoring, including measurements of groundwater pressure heads in piezometers, earth pressures due to constructed fill heights, vertical movements of settlement plates, and horizontal movements in inclinometers, will be conducted to control the rate and configuration of ash placement. Design drawings and specifications will be prepared to describe the stacking sequence, procedures, and monitoring required for safe ash stacking.

A test embankment program was successfully implemented during the time-critical removal action to demonstrate that stable embankments can be constructed across the Dredge Cell subgrade. The results verified key design parameters, including settlements, horizontal displacements, pore pressures, strength, and drainage from the ash fill. The results also verified key construction methodology, including control of moisture content, compaction, daily lift thickness and filling rates, and erosion control. Successful completion of the test embankment program was primarily attributed to use of a working platform, geotechnical instrumentation and evaluation, moisture conditioning, embankment geometry, and surface runoff and erosion control. The test embankment results will be used as a basis for embankment design and construction.

Ash stacking will be closely coordinated with closure of the Ash Pond and other ongoing TVA KIF projects, including the dry ash conversion project for both fly ash and bottom ash, and construction of new water treatment facilities for process flows from the operating power plant. Ash stacking within the Ash Pond can only occur once plant flows have been redirected from the Ash Pond.

Leachability testing is being conducted on ash and lime-treated ash for use in modeling fate and transport of constituents (particularly arsenic and selenium) from the closed Dredge Cell to Watts Bar reservoir.

Groundwater velocity and contaminant flux will be evaluated using advanced numerical modeling using the 3-dimensional MODFLOW model. Results will be used to verify the equilibrium water level within the closed Dredge Cell and Ash Pond, and the rate and concentrations of contaminant migration in groundwater from the closed cell.

Dredge Cell and Ash Pond Closure. Approximately 127 acres are contained within the old Dredge Cell footprint; approximately 120 acres are within the Ash Pond footprint (including the Lateral Expansion area). The cell will be regraded with 5% outslopes and a maximum 2% crest slope to a peak elevation of approximately 790 ft msl. It is assumed that over 1.3 million cy of ash will be moved around within the cell to establish these final grades. The regrading will occur over time and will be coordinated with the construction of the working platform for the new perimeter containment berm and foundation stabilization and with the closure of the Ash Pond water treatment operations.

Closure of the Dredge Cell and Ash Pond will be in accordance with Tennessee Solid Waste Rule 1200-1-7, thereby complying with terms of the TDEC Commissioner's Order. A soil cover will be placed to control erosion, control dust generation, promote runoff and evapotranspiration, limit infiltration, and provide a surface for vegetative growth. Approximately 2 ft of clay having a permeability no greater than 1×10^{-7} centimeters per second, and 1 ft of topsoil will be placed over the entire area and contoured. Other low-permeability caps, such as a composite clay or geosynthetic liner system, may also be used provided that it has equivalent or superior performance in minimizing infiltration. Once the cover reaches final grade, it will be seeded and mulched with an approved permanent seed mixture and mulch material. Seeded areas will be maintained through irrigation appropriate for weather conditions until vegetation is established. The cover may require periodic repairs of erosion features or of areas that did not sustain vegetation.

Earthen borrow materials will be required for construction of the earthen berms and cover system. A borrow source investigation will be conducted to evaluate the availability of suitable materials on TVA property and vicinity.

Operation and Maintenance (O&M) / Post-Closure Care. Post-closure care activities include the institutional controls necessary for operation, maintenance, and monitoring of the restored embayment and closed landfill cell. Currently, there are no permanent mechanical or electrical systems anticipated to be installed as part of the embayment restoration and Dredge Cell closure. Therefore, no long-term system operations are planned. Refer to Section 7.0 for further details of the Closure/Post-Closure Plan.

Following closure, the following controls will be implemented:

- Comprehensive engineering monitoring of the closed landfill slopes, including measurements of piezometric pressure heads and inclinometer movements, will continue to be conducted to assess long-term structural integrity of the perimeter berm and foundation systems.

- Because ash will remain in the Dredge Cell and Ash Pond area, the groundwater underneath the cell and surface water flowing from the cell will be monitored for the 30-year post-closure period. A permanent network of groundwater monitoring wells will be established and monitored for metals and radionuclides. The specific network of wells, frequency of sampling, and suite of analytes will be developed using results of fate and transport modeling, which is being conducted under the Sampling and Analysis Plan for the river system.

- The surface topography, vegetation, drainage, and stormwater management systems will be periodically inspected, and repairs made as necessary. Monitoring and inspection results will be documented in a five-year effectiveness review report.

- The Dredge Cell will be maintained as a disposal location for the foreseeable future. Under Tennessee solid waste regulations, access to the cell will be controlled to allow access for maintenance or monitoring. TVA will also be evaluating beneficial re-use of the area in its long-term stewardship planning for KIF.

- Within the embayment, monitoring will include observations of the plant survivability and habitat growth and maturation, natural aquatic species reintroduction, natural sediment deposition, and bank erosion or sedimentation. Long-term assessment of the embayment will be addressed as part of the river system restoration.

2. REMOVAL ACTION DESIGN

Removal action designs that detail the steps to be taken during construction will be developed for individual project components. This section describes the processes to be used for developing, reviewing, approving, and documenting the designs for those individual project components. This section also defines the elements to be addressed in each component design; namely the specific engineering analyses, drawings, and specifications.

2.1 DESIGN PROCESS

TVA will designate an Engineer-of-Record (EOR) for each unique element of work. The EOR will be responsible for developing the full component design package, complete for construction. The EOR will be a Professional Engineer licensed in the state of Tennessee.

The design process is shown on Figure 6. The EOR will establish the design requirements by reviewing the EE/CA and Action Memorandum, checking the Applicable or Relevant and Appropriate Requirements (ARARs), and identifying the criteria, codes, and standards to be met by the design. A Project Team meeting will be held to discuss the design requirements, roles and responsibilities, and design schedule. The Project Team meeting will include the Project Manager (PM), EOR, Project Controls, Health and Safety, Procurement, and Construction Manager (CM). A representative of TVA Central Engineering will also attend. At the Project Team meeting, the planned design review schedule (30%, 60%, 90%, 100%) will be discussed, and appropriate adjustments made based on the complexity of the removal design package.

At the completion of the Project Team meeting, the PM will prepare a procurement plan, identifying the key construction contracts or material purchase contracts required for implementation. Pre-qualification of specialty contractors or pre-ordering of long-lead materials or equipment would be implemented at that time, if appropriate.

The EOR will then prepare the 30% design, including design calculations and analyses, layout drawings and sketches, typical sections, list of specifications, and updated Engineer's estimate of probable construction cost. The 30% design will be submitted to TVA and Jacobs for review. A briefing will be held with the regulators (EPA and TDEC) to describe the 30% design status. However, design will continue without pausing to wait for comments.

The EOR will then prepare a 60% design, including updated design analysis, drawings, markup of standard specifications, draft Construction Quality Control Plan (CQCP), and updated Engineer's estimate of probable construction cost. The 60% design will be submitted to TVA and Jacobs for review; however, design will continue without pausing to wait for comments. A briefing will be held with the regulators (EPA and TDEC) to describe the 60% design status. At the completion of the 60% design, the PM will begin preparation of the project execution plan for the respective project component, as discussed in Section 7. The CM and Field Engineer will perform a constructability review of the design at this stage.

The EOR will then prepare a 90% design, including final design analysis, drawings, specifications, CQCP, and updated Engineer's estimate of probable construction cost. The 90% design will be submitted to TVA, EPA, and TDEC (and their respective consultants) for review. After resolution of review comments, the EOR will prepare the final 100% design suitable for construction. The EOR will sign and seal the 100% design and submit it to TVA for final approval by EPA, in consultation with TDEC. The approved 100% design will be issued for construction and archived as part of the Administrative Record for the project.

Other designs will be prepared for related construction elements that are not part of this removal action, but must be closely coordinated. These include designs for the TVA KIF dry ash conversion, wastewater treatment, and long-term regional ash disposal facility.

2.2 DESIGN ELEMENTS

The following design elements will be included in each project component removal design package:

- Design analysis, prescribing the design requirements, general design parameters, functional and technical requirements, design objectives, design assumptions, and design calculations. The design analysis will address the various considerations and provisions for removal action construction, QC, and verification of meeting the removal action objectives and design requirements.

- Drawings, presenting the required construction layout, configuration, and details.

- Specifications, prescribing the required procedures for materials, equipment, and execution of the construction.

3. CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL PLAN

This section summarizes the quality program and organization for the Kingston Ash Recovery Project. Construction Quality Assurance Plans (CQAPs) and CQCPs that detail the steps to be taken during construction to verify compliance with the design will be developed for individual project components. This section describes the processes to be used for developing, reviewing, approving, and documenting the CQCPs for those individual components. This section also defines the elements to be addressed in each CQCP.

3.1 CONSTRUCTION QUALITY ASSURANCE PROGRAM

3.1.1 Construction Quality Assurance

The Kingston Ash Recovery Project has developed a Quality Program, which governs the program-level quality assurance (QA) requirements associated with the overall design and construction. The QA Manager is responsible for implementing the overall Quality Program, including preparation of project-specific CQAPs, and review of CQCPs and quality requirements of applicable work orders. The QA Manager carries out internal audits and surveillances to verify that QC activities are conducted in accordance with the CQCP and program level policies and procedures.

The Quality Program establishes QA roles and responsibilities, requirements for project-specific CQCPs, identification and reporting of nonconformances, and the implementation of corrective actions, management assessments, and QA audits. QA personnel have sufficient authority, organizational independence, and access to work areas so as to perform the following:

- Identify quality problems through nonconformance reporting;
- Request, initiate, recommend, or provide corrective actions to resolve quality problems through designated channels;
- Verify that corrective actions have been implemented;
- Verify that further processing is controlled to prevent reoccurrence of the quality problem; and
- Monitor through audits, surveillances and management assessments to identify deficiency reoccurrences.

3.1.2 Quality Assurance for Environmental Sampling

The PM will identify the need for any sampling and analysis of environmental media in the project execution plan for the project component. The Kingston Ash Recovery Project has developed a comprehensive QA Project Plan (QAPP), which governs the collection, analysis, reporting, and use of environmental data associated with the overall project. The QAPP (ESI 2009) was prepared in accordance with EPA's *Guidance for Quality Assurance Project Plans*, EPA QA/G-5 (EPA 2002). The QAPP provides the framework for implementation of the environmental sampling to support both time-critical and non-time-critical removal actions, as needed. The QAPP has been approved by EPA and TDEC and is available in the Administrative Record, at the following Web address:

http://www.tva.gov/kingston/admin_record/index.htm.

The QAPP addresses most of the EPA-required elements of a QAPP and a set of Standard Operating Procedures (SOPs). For each new sampling event, a Sampling and Analysis Plan (SAP) will be prepared. The SAP will include task-specific information for the EPA-required elements that are not included in the approved QAPP (e.g., task-specific data quality objectives, task-specific SOPs). The QAPP contains a "cross-walk" that is to be used for each new sampling event to summarize the document location where the task-specific QAPP-required elements may be found.

3.2 CONSTRUCTION QUALITY CONTROL PLANNING PROCESS

QC is critical to demonstrating that the completed construction meets the RAOs and achieves long-term safety, stability, and performance. Therefore, construction QC planning must begin early in the design stage of each project component. The CQCP must be a joint development of the entire project team, including EOR, PM, CM, and Construction Contractor.

The EOR will develop an initial draft of the CQCP as part of the design analysis to identify the criteria and test methods needed to demonstrate that the installed work conforms to the design requirements. In preparing the initial CQCP, the designer must also consider long-term monitoring requirements for demonstrating post-closure stability and monitoring of groundwater, surface water, and air quality, so that any monitoring systems can be installed during closure. The initial draft of the CQCP will be reviewed at the 60% design stage as part of the Constructability Review.

3.3 CONSTRUCTION QUALITY CONTROL PLAN ELEMENTS

The following elements will be included in the CQCP for each project component:

- Identification (name and telephone number) of the QA/QC roles and responsibilities for individuals involved in QC management. Different individuals may be responsible for conducting different checks, measurements, inspections, or acceptance.
- Project-specific training or reporting requirements.
- A table, unique to the planned work, summarizing the QC parameters, verification method, verification frequency, and acceptance criterion to be met. The QC parameters may include field observations or inspections, field measurements or testing, laboratory measurements or testing, manufacturer or supplier certifications, or other parameters.
- Frequency of planned surveillances or audits.

4. SAFETY AND HEALTH PLAN

This section summarizes the Safety and Health Program and organization for the Kingston Ash Recovery Project. Project-specific Safety and Health Plans (SHPs) will be developed for individual project components. This section describes the processes to be used for developing, reviewing, approving, and documenting the SHPs for those individual projects. This section also defines the elements to be addressed in each project-level SHP.

4.1 SAFETY AND HEALTH PROGRAM

The Kingston Ash Recovery Project has developed a comprehensive Site-Wide Safety and Health Plan (SWSHP), *Site Wide Safety and Health Plan for the TVA Kingston Fossil Plant Ash Release Response* (Jacobs 2010b), which governs the overall health and safety program. The SWSHP has been approved by EPA in consultation with TDEC, and is available in the Administrative Record, at the following Web address: http://www.tva.gov/kingston/admin_record/index.htm.

The SWSHP describes the potential hazards at the site, the health hazard monitoring, and personal protective equipment required for the protection of workers. In addition, the SWSHP addresses work zones, site control, personal hygiene, medical surveillance, training, hazard communication, and emergency response. The SWSHP provides the framework for project-specific plans and health and safety procedures, including job-specific hazard analysis, meetings, logs, reports, and recordkeeping. The SWSHP is prepared and controlled by the Program Health and Safety Manager (PHSM).

Every individual on site has the right and obligation to stop any activity or address any condition on the spot that is an immediate safety hazard. Every individual on site must have continuous safety awareness, vigilance of job site conditions, and questioning attitude toward safety. Every individual has authority to stop any work that is dangerous to life and/or health with no fear of repercussions.

TVA is responsible for safety on the project. Jacobs is responsible for managing the Safety and Health Program for the Kingston Ash Recovery Project as agent for TVA. Each contractor is responsible for implementing the Safety and Health Program and complying with their corporate requirements. Jacobs CM and safety personnel will support the development and implementation of task plans and will challenge work methods that do not meet site requirements and provide suggestions for improvement. They have the authority to request any work being conducted by any contractor to be done in a different manner to improve safety.

4.2 SAFETY AND HEALTH PLANNING PROCESS

The Activity Hazard Analysis (AHA) is a systematic way of identifying the potential health and safety hazards associated with major phases of work on the project and the methods to avoid, control, and mitigate those hazards. The AHAs will be used to train work crews in identifying and controlling hazards prior to beginning a task. The Site Safety and Health Officer (SSHO), in consultation with the CM and Field Engineer will develop project-specific AHAs for the planned work or obtain them from contractors, and will review them for accuracy. Based on the scope of work, AHAs will be developed for each individual project component expected to be performed onsite during the non-time-critical removal action for the Embayment/Dredge Cell. Appendix E of the SWSHP contains AHAs for typical work elements.

Project-specific AHAs will be reviewed and approved by the PSHM. Completed AHAs will be documented in the SHP for the specific project component.

The Job Safety Analysis (JSA) is a task-specific planning tool and is completed by the craft lead on the actual day of activity. The superintendent or foreman as well as the work crew participate in developing the JSA as a collective effort. A JSA is required for each work task on a daily basis. The following steps can be used to assist in developing a JSA:

- Review the SWSHP and AHA with the work crew. Consider weather, nearby activities, changing conditions and any relevant items that may impact your plans.

- Cross items off the AHA that do not apply. Add items by annotating directly on the document. If necessary use a blank AHA to note additions.

- Have the entire work crew sign the annotated document which acknowledges their understanding of the hazards and controls. This annotated and signed AHA becomes the JSA.

- Change the JSA at any time, if changing conditions are observed in the field.

- On subsequent days, review the JSA with the work crew to address specific details impacting the day's task. Have the work crew sign the review document. The annotated and signed review document becomes the JSA.

A "Start of the Day Evaluation" will be conducted before the start of any shift to check that the site environment is safe for planned activities. The superintendent and Jacobs safety professional responsible for the area will conduct a walkdown of the area. Notes will be taken of hazards, changed conditions, tools out of place, trip hazards, equipment paths, flagging locations, and housekeeping issues (trash, items out of place). Any issues identified will be brought to the crew's attention in the Plan of the Day, and appropriate changes will be made to the JSAs to correct or work around the issue.

4.3 SAFETY AND HEALTH PLAN ELEMENTS

The following elements will be included in the SHP for each individual project component:

- Identification (name and telephone number) of SSHO and the Construction Contractor's health and safety professional;
- Project-specific training or reporting requirements; and
- The AHA, including identification of work activities, hazards, and mitigation methods unique to the planned work.

5. WASTE MANAGEMENT PLAN

This section summarizes the waste management procedures and organization for the Kingston Ash Recovery Project. Project-specific Waste Management Plans (WMPs) will be developed for individual project components, if needed to supplement this section. This section describes the processes to be used for developing, reviewing, approving, and documenting the WMPs for those individual project components. This section also defines the elements to be addressed in each WMP.

5.1 WASTE MANAGEMENT PLANNING PROCESS

As part of field construction activities, various types of waste materials will be generated, including standard municipal refuse (i.e., cardboard, plastic, paper), solid (i.e., ash, soil and sediments), and liquid (i.e., decontamination fluids) wastes. Because additional waste streams may be identified during design, and because quantities of wastes expected to be generated may vary by work element, the PM may prepare a project-specific WMP as part of the project execution plan for each project component, if needed.

Waste management will be conducted in accordance with Kingston Fly Ash Recovery Project procedure Document No. SSP.EV.011, *Program Process, Waste Management*. The following discusses the types of wastes expected to be generated as a result of the removal action construction, and the planned disposition of those wastes.

Ash, Soil, Sediment. Ash is the primary "waste" generated. Ash (as well as associated soil or sediment) removed from the embayment will be transported primarily by trucks to the active ash stacking operations within the Dredge Cell/Ash Pond. Ash stacking operations will be detailed in the corresponding component design. No containerization or testing of ash, soil, or sediment is required prior to ash stacking, although the materials will be dried to achieve acceptable moisture content for stacking and compaction. Processing areas for drying of the ash are located strategically around the site –in the middle embayment area, and in the Ball Field (Figure 2). In addition, a working platform has been designed to control water draining from the ash, so an additional area may also be constructed for ash processing, if required in the future.

Ash drying will use one or more of the following different techniques to dewater the ash. During the drying process, steps will be taken to prevent over-drying the ash and creating a dust hazard.

- Stockpiling to allow the ash to drain. The maximum height of stockpiles of ash so as to maintain suitable foundation bearing capacity and slope stability will depend on location, subgrade conditions, degree of moisture and rainfall, and slope configuration. The EOR will be responsible for establishing safe stockpile heights, and geotechnical monitoring to verify conditions as construction progresses.

- Windrowing, which consists of progressively moving the material across the processing area and allowing it to air dry. Dried material will then be stockpiled or taken directly to the active ash stacking operations. Dust suppression will be maintained by spraying stockpiles with appropriate dust suppressant.

- Lime conditioning, which consists of mixing up to 6% lime into the material and removing the moisture through hydration reactions. Dried material will then be managed as described for windrowing.

- Disking, which consists of aerating the material with disk tillers to assist air drying.

– In-situ treatment, which consists of drilling auger-type equipment into the ash and injecting a drying reagent, such as lime or other proprietary reagent, to the material prior to excavation.

Ash, soil, and sediment will also be generated during dredging operations from the embayment, if conditions become too wet to remove with traditional land-based equipment. Mechanically-dredged material will be barged to shore, stockpiled to allow the material to drain, and dewatered as described above. Hydraulically-dredged material will be conveyed in pipes to the existing Rim Ditch (with a booster pump) and discharged to the ditch. The remaining water will then discharge through the Sluice Trench and Ash Pond to the Stilling Pond for settling prior to discharge through the KIF NPDES-permitted outfall. Ash will be recovered from the Rim Ditch/Sluice Trench with a combination of excavators and clamshells, consistent with operations conducted during the time-critical removal action. The ash will then be processed on the Ball Field as described above.

At the end of the ongoing time-critical removal action, ash will be removed from the Ash Pond as needed to establish the free water volume required by the NPDES permit; the ash will be removed either by mechanical or hydraulic dredging, then dried and disposed with the time-critical ash.

TVA is currently implementing a dry ash conversion project for both fly ash and bottom ash. Ash generated from the KIF plant operation will continue to be discharged to the Sluice Trench until such time as the plant has been converted to dry ash processing methods. The generated ash will be dipped out of the Sluice Trench and/or dredged from the Ash Pond, and stockpiled in the Ball Field for processing prior to disposal of the plant-generated ash.

Debris. Miscellaneous debris that may be excavated during ash removal from the embayment will be handled with the ash, if sufficiently small, or will be set aside, if large. Large debris will either be washed to remove ash, then either size-reduced by crushing, cutting, or dismantling, or disposed as general refuse. Vegetative debris, such as trees, that are in contact with the ash will be moved to a debris staging area and shredded for use onsite as mulch. Vegetative debris that is not in contact with ash will be removed from the CERCLA site and chipped at the Gypsum Pond area for use on KIF as mulch.

General Refuse. General refuse includes paper, plastic bags, cardboard, personal protective equipment (such as nitrile gloves, Tyvek), and similar sanitary waste. General refuse will be placed in a municipal trash or recycling receptacle as appropriate.

Other Wastes. Special wastes (e.g., paint cans, oil filters, petroleum-contaminated articles), universal wastes and potentially hazardous wastes (used oil, grease, solvents, paints, batteries, aerosol cans) will be characterized, handled, and disposed in accordance with procedure SSP.EV.011, *Program Process, Waste Management.* Waste containerization, storage, and labeling requirements are specified in procedure SSP.EV.011.

Decontamination Liquids. Decontamination fluids will be collected from personnel and equipment wash stations and taken to the Sluice Trench for disposition with the KIF plant wastewater discharges. Treatment will be conducted together with plant wastewaters in the Ash Pond and Stilling Pond, and discharged through the NPDES-permitted outfall. During final closure of the Ash Pond, once the KIF dry ash conversion project is complete and new wastewater treatment facilities are operational, then the decontamination liquids will be transported to an appropriate KIF plant washdown area for disposition with plant wastewater discharges.

Stormwater Management. Stormwater will continue to be managed in a manner consistent with that which as has been conducted under the time-critical removal action. Stormwater management will be conducted in accordance with the *Site Stormwater Management Plan* and attached *Stormwater Pollution*

Prevention Plan (SWPPP) (TVA 2009c). Drainage features have been constructed within the Swan Pond Embayment to separate clean stormwater runoff from the runoff in contact with the ash in the embayment and Dredge Cell. These clean water ditches have been designed for a 25-year storm recurrence interval. Sediment basins have been constructed in the middle embayment (Figure 2) to capture ash prior to discharge to the clean water ditch. These settlement basins have been designed for a 2-year storm recurrence interval. Routine maintenance of stormwater management areas is conducted through grading of the ditches and sediment basins to remove accumulated ash or sediment. Erosion and sediment control features, including silt fences, hay bales, temporary berms, Flexterra®, temporary seeding, and other dust and erosion control practices will be used while moving the ash. These stormwater management features will be revised as restoration of the embayment and closure of the Dredge Cell and Ash Pond progresses; revised stormwater management, erosion, and sediment control features will be included in applicable removal action designs for individual project components.

Investigation-Derived Waste (IDW). As part of field verification sampling and analysis activities, various types of IDW will be generated, including general refuse, solid (i.e., ash, soil and sediments), and liquid (i.e., decontamination fluids and purge water from groundwater sampling) wastes. IDW will be handled in accordance with TVA-KIF-SOP-12 *Management of Investigation-Derived Waste.*

5.2 WASTE MANAGEMENT PLAN ELEMENTS

The following elements will be included in the WMP for each project component:

- Identification (name and telephone number) of the individuals involved in waste management, and their roles and responsibilities. Different individuals may be responsible for conducting different checks, measurements, inspections, or acceptance.

- Project-specific training or reporting requirements.

- A table, unique to the planned work, summarizing the waste types expected to be generated, the estimated volumes of each waste type, and the planned disposition of the waste.

This page intentionally left blank

6. TRANSPORTATION MANAGEMENT PLAN

This section describes the types of traffic expected during implementation of the non-time-critical removal action for the Embayment/Dredge Cell, and the traffic control provisions planned for mitigating transportation impacts to residents and maintaining safety of construction workers. Project-specific Transportation Management Plans (TMPs) will be developed for individual project components, if needed to supplement this section. This section therefore also defines the elements to be addressed in a TMP.

6.1 TRANSPORTATION MANAGEMENT PLANNING PROCESS

Transportation of materials from the KIF to offsite locations is expected to be minor for the non-time-critical removal action. However, for at least some period of time, rail transport of ash generated during the time-critical removal action will continue, concurrent with non-time-critical activities. Such offsite shipments will be conducted in accordance with approved work plans for the time-critical removal action. At the completion of the time-critical removal action offsite shipment of ash, railroad operations associated with the ash spill cleanup will cease; subsequent railroad transportation will be primarily associated with raw coal supplies for power production at the KIF plant.

Transportation of construction materials from offsite locations to the KIF during the non-time-critical removal action is expected to be substantial. The TMP is to identify the material types and mitigation measures that will minimize transportation impacts to residents and maintain safety of construction workers. Because additional materials of construction may be identified during design, and because quantities of materials expected to be imported to the site may vary by work element, the PM may prepare a project-specific TMP as part of the project execution plan for each project component, if needed.

TVA has established a Material Access Point (MAP) adjacent to Swan Pond Road in the northern section of the former Dredge Cell. The MAP is used for receipt of construction materials from offsite, temporary storage, and transfer of materials between the unrestricted zone and the CERCLA exclusion zone. The MAP will continue to be used during the non-time-critical removal action. However, during the course of implementing the removal action, construction of the perimeter containment berm and foundation stabilization will need to progress to the area of the MAP. At that time, the MAP will be relocated to a location within the Ball Field or other onsite area designated by the Construction Manager. Transportation access would continue off Swan Pond Road.

6.1.1 Material Types

The following discusses the types of materials expected to be transported to the site as a result of the removal action construction, and the planned application or placement of those materials.

Ash, Soil, and Sediment. Ash and associated soil and sediment will be mechanically excavated from the Swan Pond Embayment and transported to the Dredge Cell/Ash Pond for dry stacking. Approximately 2.1 million cy of mechanically-excavated materials are expected to be hauled, predominantly using traditional dump trucks; however pan scrapers may be used for hauling drier ash material. This quantity of material would result in approximately 100,000 truck loads (assuming 22 cy capacity per truck).

Of this quantity, approximately 1.4 million cy will be excavated from the north embayment area and transported to the Dredge Cell/Ash Pond. To avoid transportation impacts for trucks crossing Swan Pond Circle Road, and to avoid truck decontamination that would be required if the trucks had to exit and reenter the CERCLA exclusion zone, a steel and concrete bridge is being constructed on Swan Pond Circle Road. A new haul road is also being constructed under Swan Pond Circle Road, across the middle embayment, to the current East/West Haul Road. This haul road will be removed after the removal action is complete.

The remaining 0.7 million cy will be excavated from the middle embayment area. Hauling of this material to the Dredge Cell/Ash Pond will use the same haul road as discussed above. However, as the excavation and dry stacking operations progress, additional temporary haul roads may be constructed to facilitate ash transportation. Haul roads will be located onsite, within the exclusion zone; therefore transportation impacts to local residents are expected to be negligible due to ash hauling.

Dredged Ash. Ash and associated soil and sediment will also be hydraulically dredged from the embayment and processed in the Rim Ditch and adjacent Ball Field. Approximately 0.2 million cy of dried ash will be loaded onto dump trucks and transported to the Dredge Cell/Ash Pond for dry stacking, which would result in approximately 9,000 truck loads. Existing onsite haul roads leading from the Ball Field to the Dredge Cell along Dike D will continue to be used; therefore transportation impacts to local residents are expected to be negligible. Near the end of final dredging, dredged material will be allowed to fill the Ash Pond to accommodate final closure, which will reduce the need for truck hauling.

Gravel and Shot Rock. Coarse gravel and shot rock will be imported from commercial quarries for use in constructing the working platforms beneath the Dredge Cell, Ash Pond, and perimeter berms and for use in constructing temporary haul roads. Approximately 320,000 cy of gravel/shot rock material will be transported directly to the construction location or to the MAP for temporary storage, which would result in approximately 15,000 truck loads (at a rate of approximately 120 trucks per day). Materials may be purchased from multiple quarries so as to obtain sufficient quantity in the time required. Traffic impacts may therefore be divided between the Swan Pond Road (north of the site) and I-40/Hwy 70/Swan Pond Road (south of the site).

Riprap. Riprap will be imported from commercial quarries for use in erosion control and armoring the outside slopes of the earthen berms surrounding the Dredge Cell/Ash Pond. Approximately 115,000 cy of riprap will be transported to the MAP, which would result in approximately 5,000 truck loads (at a rate of approximately 75 trucks per day). Similar to gravel and shot rock, riprap materials may be purchased from multiple quarries so as to obtain sufficient quantity in the time required. Traffic impacts may therefore be divided between the Swan Pond Road (north of the site) and I-40/Hwy 70/Swan Pond Road (south of the site).

Earth Fill. Compactible earth fill will likely be imported from borrow sources located either on TVA KIF property or from sources within a 10-mile radius of the project for use in constructing the earthen berms around the perimeter of the Dredge Cell and Ash Pond. Approximately 100,000 cy of earth fill will be transported directly to the construction location or to the MAP for temporary stockpiling, which would result in approximately 4,500 truck loads (at a rate of approximately 75 trucks per day). The borrow source for this material has not yet been located. Optional borrow sources include TVA-owned property north of the MAP, or TVA-owned property east of the KIF plant. Transportation of earth fill from these borrow sources to the MAP will likely require crossing of Swan Pond Road or Swan Pond Circle Road, and may require hauling along portions of the road. Transportation from offsite areas will likely require hauling along Swan Pond Road, either from the north or from the south.

Clay. Low-permeability clay may be imported from offsite borrow sources for use in constructing the clay cap and cover over the Dredge Cell/Ash Pond. Approximately 940,000 cy (42,000 truckloads) will be transported to the site (at a rate of approximately 240 trucks per day). The borrow source for this material has not yet been located. Alternative cover materials may be considered during design of the cap and cover system; however, an equivalent quantity of earth fill would likely be required. Transportation from offsite areas will likely require hauling along Swan Pond Road, either from the north or from the south.

Topsoil. Topsoil may be imported from either onsite or offsite borrow sources for use in constructing the vegetative support cover over the Dredge Cell/Ash Pond. Approximately 470,000 cy (21,000 truckloads) will be transported to the site (at a rate of approximately 240 trucks per day). The borrow source for this material has not yet been located; borrow sources located on TVA-owned property will be used as much as possible, but other offsite sources may also be used. Transportation impacts from these borrow areas will be similar to those described for earth fill.

6.1.2 Mitigation Measures

TVA has already implemented measures to mitigate transportation impacts from traffic at the site. These measures are described below.

Railroad Crossings. TVA has installed railroad crossing signals, supplemented with TVA police traffic controls, to control traffic during rail car transfers crossing Swan Pond Road. In February 2010, TVA constructed addition rail spurs within the KIF property to reduce the number of rail car crossings of Swan Pond Road. These mitigation measures decrease the risk of rail-car or rail-truck incidents and decrease traffic wait times. Rail transportation will substantially decrease as offsite shipments of ash from time-critical activities stop.

Grade Separation. TVA is installing an underpass beneath Swan Pond Circle Road, which allows ash transport and other construction-related traffic to pass between the north and middle embayment areas without crossing Swan Pond Circle Road. This underpass may also be used to haul earth fill materials from borrow areas located northwest of Swan Pond Circle Road. These mitigation measures will decrease the risk of car-truck incidents by separating the traffic.

Tandem Trucks. Larger 25-ton tandem trucks may be used to import clay, earth fill, or topsoil to the site, which would reduce the number of trips.

Rail Delivery. As shipments of ash are completed under the time-critical removal action, rail delivery of material and equipment may be used to import clay, earth fill, or topsoil to the site, which would reduce traffic impacts on the roadways.

Dust Suppression. Dust suppression measures will continue throughout the non-time-critical removal action as specified in the *Site Dust Control and Air Monitoring Plan* (TVA 2009a) and SOP-OPS-002. Unpaved gravel haul roads will continue to be sprayed with water and/or calcium chloride solution so as to keep the unpaved road surface slightly damp, which reduce dusting.

Road Cleaning. Paved roadways surrounding the facility (public roads, paved onsite roads) will continue to be sprayed with water and cleaned by sweeper vacuum trucks. Vehicle traffic exiting the exclusion zones will be cleaned prior to leaving the site. Wheel wash stations are located strategically around the KIF plant where trucks enter and leave the site. Vehicles that have traveled through the ash containing areas will routed through the wheel wash stations before traveling on public roads. If ash is present on the truck other than the wheel area, it will be further cleaned at this point.

Local haul roads will be used by trucks bringing in materials from commercial quarries or borrow sources. If notable dusting of the roads is noticed, or if a community concern is raised, TVA will contact the quarry and verify that mitigation actions are taken by the quarry.

Road Inspection and Repair. Paved roadway surfaces surrounding the facility may be damaged as a result of the increased traffic loads. Roads will be inspected monthly to check for pavement conditions. If conditions become detrimental to traffic, or if a community concern is raised, TVA will develop an appropriate road repair design and implement those repairs.

6.2 TRANSPORTATION MANAGEMENT PLAN ELEMENTS

The following elements will be included in the TMP for each project component:

– A table, unique to the planned work, summarizing the major material types expected to be transported to the site, the estimated volumes of each material type, origin of the material, transportation route, and any additional planned mitigation measures to be implemented.

7. CLOSURE/POST-CLOSURE PLAN

Closure of the Dredge Cell and Ash Pond will include the institutional controls necessary for operation, maintenance, and monitoring of the restored embayment and closed landfill cell. A Closure/Post-Closure Plan will be prepared near the end of the non-time-critical removal action once the conditions in which the embayment and Dredge Cell/Ash Pond are being left are known. This document will satisfy the requirements for both a CERCLA O&M Plan and a TDEC landfill permit Closure/Post-Closure Plan. The document will present a comprehensive site-wide plan for both EPA and TDEC review. This section defines the elements to be addressed in the Closure/Post-Closure Plan.

7.1 OBJECTIVES

Closure is to comply with applicable post-closure care requirements as specified in TDEC rule 1200-1-7, *Solid Waste Processing and Disposal.* The rule sets a general performance standard, which requires a facility be closed in a manner that (1) minimizes the need for further maintenance; and (2) controls, minimizes, or eliminates, to the extent necessary to prevent threats to public health and the environment, post-closure escape of solid waste, solid waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere.

Post-closure care is the set of activities necessary to protect human health and the environment from physical hazards and residual wastes following the removal action. Post-closure care starts when the removal activities are complete and continues for as long as wastes remain on site and pose a potential threat to human health or the environment.

The objectives of post-closure care are to confirm that remediation remains effective. The objectives of the Closure/Post-Closure Plan are to:

- Execute, evaluate, and document the post-closure care activities;
- Incorporate operation and maintenance (O&M) and groundwater monitoring requirements into TVA's planning and management processes for the KIF; and
- Identify the resources needed to sustain long-term stewardship.

7.2 CLOSURE/POST-CLOSURE PLAN ELEMENTS

Elements to be included in the Closure/Post-Closure Plan are described below.

Roles and Responsibilities. Those individuals responsible for developing, implementing, and overseeing the post-closure activities will be identified and their roles and responsibilities and their interactions will be defined. TDEC rule 1200-1-7-.04 requires TVA to state the name, address, and phone number of the person or office to contact about the facility during the post-closure care period. This person or office must keep an updated post-closure plan during the post-closure care period.

Operations. Operations are those activities necessary to verify the integrity of the remedy and include the following:

− Engineering Monitoring. Comprehensive engineering monitoring of the closed landfill slopes, including measurements of piezometric pressure heads and inclinometer movements, will continue to be conducted to assess long-term structural integrity of the perimeter berm and foundation systems. The engineering monitoring plan will describe the inspections and testing protocols, frequency, and evaluation criteria or action thresholds that will be used to evaluate the performance of selected remedy components.

- Groundwater and Surface Water Monitoring. Because ash will remain in the Dredge Cell/Ash Pond area, the groundwater underneath the cell and surface water flowing from the cell will be monitored. The groundwater and surface water monitoring plan will describe the sampling and analysis protocols, locations, frequency, and evaluation criteria or action levels that will be used to evaluate water quality. TDEC rule 1200-1-7-.04 requires TVA to maintain and monitor the ground and/or surface water monitoring program established in the permit during the post-closure care period, unless the permit is modified to establish a different program. Monitoring data must be reported in writing to TDEC within 30 days after the completion of the analyses.

- Embayment Monitoring. Within the embayment, monitoring will include observations of the plant survivability and habitat growth and maturation, natural aquatic species reintroduction, natural sediment deposition, and bank erosion or sedimentation. The embayment monitoring plan will describe the inspections and observations, frequency, and evaluation criteria or action levels that will be used to evaluate habitat restoration.

Maintenance, Inspections, and Repairs. Maintenance of the closed landfill will include routine mowing or weeding to control vegetation growth. The surface topography, vegetation, drainage, and stormwater management systems will be periodically inspected, and repairs made as necessary. TDEC rule 1200-1-7-.04 requires TVA to maintain the approved final contours and drainage system, a healthy vegetative cover, and the drainage facilities, sediment ponds, and other erosion/sedimentation control measures. The operation and maintenance plan will describe the routine maintenance, inspections and surveillance frequency, and procedures for making repairs.

Land Use Controls. The Dredge Cell will be maintained as a disposal location for the foreseeable future. Under Tennessee solid waste regulations, access to the cell will be controlled. TDEC rule 1200-1-7-.04 requires that, within 90 days of completion of final closure of the facility, there be recorded a notation on the deed of property that will in perpetuity notify any person that the land has been used as a disposal facility. TVA will also be evaluating beneficial re-use of the area in its long-term stewardship planning for KIF.

Records Management. Information systems will be used to maintain records of the post-closure activities, including results of operations, monitoring, maintenance, inspections, and repairs. The records management plan will describe the information systems to be used to obtain, maintain, and retrieve the information for as long as the residual wastes pose a potential risk to human health or the environment.

Communication. Public participation will be continued throughout the post-closure care period. The public will be involved in reviewing the performance of the remedy and results of post-closure activities. Public communication and outreach will be used to inform the public of land use controls, monitoring results, residual contamination, and other records. The communication plan will describe the communication strategy and frequency.

8. PROJECT MANAGEMENT PLAN

8.1 PROJECT ORGANIZATION

8.1.1 Kingston Ash Recovery Project Organization

The overall Kingston Ash Recovery Project is being conducted by TVA as the lead agency. The project is directed by the TVA General Manager. Implementation of the non-time-critical removal action for the Embayment/Dredge Cell will be closely integrated with EPA and TDEC, who are responsible for regulatory oversight. EPA and TDEC will review and approve the designs of individual project components, schedules, and reports. The work will be conducted under the Incident Command Structure that has been established for the non-time-critical removal action components.

Jacobs will assist TVA in program, project, and construction management, including management of the overall safety and health program and quality program. Engineering consultants (e.g., Stantec and Geosyntec) will perform geotechnical engineering analysis, design, and QC management. TVA's construction organization, Civil Projects (CP) and/or competitively-procured contractors will execute the earthwork-related construction. TVA will procure specialty contractors to execute unique project elements, such as the soil-cement foundation stabilization using deep soil mixing techniques and associated perimeter berm.

8.1.2 Project Team Organization for Individual Project Components

A PM will be identified for each individual project component to lead the project team. The organization is structured so as to provide clear lines of authority and responsibility, regardless of the specific individual fulfilling a particular role. The following describe the key roles and responsibilities for personnel on the non-time-critical removal action for the Embayment/Dredge Cell. Detailed job descriptions are provided in the *Project Management Plan for the Kingston Ash Recovery Project* (Jacobs 2010a).

Technical Contract Manager (TCM). The TCM is the TVA representative responsible for overseeing the project, verifying assigned contractors' work in accordance with their contractual obligations, approving contractor invoices, and maintaining communication with TVA management and regulators. The TCM works with the TVA Contract Manager to issue contracts and approve any contract modifications.

Contract Manager. The TVA Contract Manager is responsible for developing the procurement plan, obtaining and reviewing bids, awarding contracts for design and construction, administering contract modifications, and managing and closing the contracts upon project completion.

Project Manager. The Jacobs PM administers and executes the entire project, responsible for implementing design and construction activities and verifying compliance with health and safety and quality requirements. The PM is responsible for planning and managing scope, cost, and schedule within the project baseline. The PM is responsible for verifying that the work is conducted in accordance with program requirements, including requirements of the Administrative Order, Action Memorandum, and this RAWP. The PM prepares the project execution plan for the individual project component, and directs the work of assigned staff, including the EOR, CM, and Construction Contractor. The PM, or designee, prepares the Statement of Work for contractor procurement. The PM reviews and recommends approval of contractor invoices for design and construction. The PM is also responsible for project closeout and turnover to TVA.

Program Health and Safety Manager. The Jacobs PHSM oversees the development and approval of the project-specific addendums to the SWSHP; serves as the primary contact to review health and safety matters that may arise; and maintains availability for project emergencies and staffing support. The PHSM also approves individuals who are assigned SSHO responsibilities, and approves revised or new safety protocols for field operations. The PHSM is also responsible for leading any incident investigation.

Site Safety and Health Officer. The Jacobs SSHO prepares the project-specific AHAs and is present on site during field activities to implement the SWHSP; conducts project-specific training and initial worker site orientation; and works as part of the project team to ensure implementation of site safety, checking that health and safety activities identified in site safety plans (AHAs and JSAs) are conducted and/or implemented and that any deficiencies are corrected.

Quality Assurance Manager. The Jacobs QA Manager implements the QA surveillances and audits as independent verification of CQCP activities.

Quality Control Manager. The QC Manager directs the field QC measurements, testing, and inspection and evaluates the QC results against defined project CQCP requirements.

Project Controller. The Jacobs Project Controller assists the PM in establishing baseline scope, cost, and schedule; providing weekly updates of schedule performance and monthly updates of cost performance; and complying with applicable change control processes.

Engineer-of-Record. The EOR is responsible for developing the full component design package, complete for construction, including the design analysis, drawings, and specifications. The EOR will be a Professional Engineer licensed in the state of Tennessee, and will sign and seal the design package.

Field Engineer. The Jacobs Field Engineer is responsible for analysis and design of field-related implementation details, including stormwater management, erosion and sediment control, infrastructure, field support facilities, haul roads, and similar elements. The Field Engineer also serves as the design interface, providing constructability review and construction interface by submitting Requests-for-Information from the field to the EOR and providing clarifying information from the EOR to the field Construction Contractor. The Field Engineer tracks and expedites submittal and approvals, reviews change order requests, monitors field change notifications, coordinates design/scope changes, develops the construction punch list, and coordinates closeout of engineering documentation.

Construction Manager. The Jacobs CM oversees the daily construction activities and is present onsite during field activities to implement the construction work for the specific project component. The CM interfaces with the Construction Contractor Site Superintendent in directing work crews and setting work priorities. The CM is responsible for verifying that the work is conducted safely and efficiently in accordance with the approved design and that the completed work is in compliance with the CQCP verification testing requirements.

Construction Contractor. The Construction Contractor is responsible for safely executing the work in accordance with the approved plans; providing the trained work crews, equipment, and personnel; preparing JSAs with the work crews. The Construction Contractor may be TVA, CP, or a competitively-procured contractor.

8.2 WORK BREAKDOWN STRUCTURE

The Work Breakdown Structure (WBS) is a deliverable-oriented hierarchical decomposition of the work to be executed by the project team, to accomplish the project objectives and create the required deliverables. The WBS subdivides the project into smaller, more manageable pieces of work, with each descending level of the WBS representing increasingly detailed definition of the project work. The planned work contained within the lowest-level WBS components can be scheduled, cost estimated, monitored, and controlled. The 3rd-level WBS for the non-time-critical removal action for the Embayment/Dredge Cell is shown in Table 8-1.

During preparation of the project execution plan for each project component, the PM will identify the applicable WBS element(s) involved. Table 8-1 lists the designs anticipated to be prepared for the individual project components. When possible, designs will be combined into a single document to facilitate review. The PM will prepare detailed descriptions of the work, referred to as the WBS dictionary, and will identify the verifiable products, services, or results. The WBS elements will be defined in terms of how the work of the project will actually be executed and controlled.

Table 8-1. Work Breakdown Structure and Anticipated Project Components

WBS	ITEM DESCRIPTION	ANTICIPATED REMOVAL DESIGN PACKAGES	DOCUMENT NUMBER
0112	EMBAYMENT RESTORATION	• Swan Pond Embayment Ash Removal (Phase I) • Swan Pond Embayment Ash Removal (Phase II) • Swan Pond Embayment Ecosystem Restoration	RDP-0112-A RDP-0112-B RDP-0112-C
0113	FAILED DREDGE CELL	• Central Dredge Cell Working Platform • Central Dredge Cell (Cell 3) Ash Stacking • North Dredge Cell (Cell 2) Working Platform and Ash Stacking • North Dredge Cell (Dike C) Perimeter Containment • Swan Pond Road and Ball Field Corridors Perimeter Containment • North and Central Dredge Cells (Cells 2 & 3) Closure • South Dredge Cell (Cell 1) Closure	RDP-0113-A RDP-0113-B RDP-0113-C RDP-0113-D RDP-0113-E RDP-0113-F RDP-0113-G
0114	LATERAL EXPANSION / ASH POND	• Lateral Expansion (Cell 4) Working Platform and Ash Stacking • Lateral Expansion (Cell 4) Perimeter Containment • Lateral Expansion (Cell 4) Closure • Ash Pond Working Platform and Ash Stacking • Ash Pond Perimeter Containment • Ash Pond Closure	RDP-0114-A RDP-0114-B RDP-0114-C RDP-0114-D RDP-0114-E RDP-0114-F

8.3 SCHEDULE

Scheduling involves identifying the project execution activities, sequencing those activities, estimating the necessary resources and durations of each activity, and developing a logic-based project schedule to be executed by the project team. The TVA Kingston Ash Recovery Project uses Primavera® Project Planner as a software tool for developing project schedules. The project schedule will continue to be refined during the course of the project to reflect additional detail resulting from changes in planned project execution, such as design modifications, unforeseen constraints, achievable productivity rates, or resource availability.

During preparation of the project execution plan for each project component, the PM will review the planning-level schedule, and identify the overall start and end dates and any key milestones (especially interim reporting or approval requirements) as appropriate for the specific work package. Changes to the project schedule will be controlled through approved Change Control Board procedures.

Schedule control involves the process of monitoring schedule performance to detect and understand variances from the schedule baseline, then planning and implementing appropriate mitigation steps. The PM will update the schedule progress on a weekly basis so that impacts in project execution can be identified early. The Project Controller will prepare schedule performance reports monthly to report actual progress made relative to the work performed. Earned value analysis will be performed by comparing earned value with the schedule baseline to identify schedule variances and schedule performance indexes. The PM will then analyze the schedule performance reports, identify cost variance issues, and evaluate and recommend appropriate mitigation measures.

The planning-level schedule at the 3rd-level WBS for the non-time-critical removal action for the Embayment/Dredge Cell is shown in Figure 7. The preliminary schedule for regulator review of anticipated removal design packages is presented in Appendix A. The sequence of construction requires careful coordination between excavation, dredging, perimeter berm construction, ash stacking, the KIF dry ash conversion project, and the construction of an alternative wastewater treatment facility for KIF. The plan assumes that the dry ash conversion project for fly ash will be completed by December 2011 and for bottom ash by October 2012, at which time plant-generated fly ash will no longer be discharged to the Ash Pond. The plan also assumes that the wastewater treatment facility will be completed by January 2013, at which time plant-generated wastewaters will no longer be discharged to the Ash Pond. The current planning-level schedule shows filling of the Ash Pond beginning in the spring of 2013.

The Dredge Cell and Ash Pond will be progressively filled and closed in phases, as described below. The rate of dry ash stacking and corresponding rate of ash removal from the embayment is dependent on the effort needed to dry the ash to achieve near optimum moisture content. An average rate of ash stacking of 16,000 cy per week has been assumed, which is comparable to the rate achieved in constructing the Test Embankment.

- Central Dredge Cell (Cell 3) ash stacking. A working platform will initially be constructed in the central Dredge Cell area to allow dry stacking of ash removed from the embayment. The working platform will be kept at least 100 ft away from the perimeter of the Dredge Cell to allow future construction of the perimeter berm and foundation stabilization zone. Ash will be removed initially from the middle embayment until the bridge and underpass system that is being constructed on Swan Pond Circle Road becomes operational. Once the underpass is operational, ash will be removed from the north embayment for dry stacking in the central Dredge Cell. The central Dredge Cell is expected to be filled to capacity by spring 2011.

- North Dredge Cell (Cell 2) ash stacking. A working platform will be constructed in the north Dredge Cell, similar to that in the central Dredge Cell. Ash will continue to be removed from the north embayment and dry-stacked in the north Dredge Cell. Reconstruction of Dike C will begin in spring 2011, once the design of the deep soil mixing foundation stabilization zone has been completed. The perimeter berm and foundation stabilization zone will be constructed beginning on Dike C and progressing to the Swan Pond Road corridor, then to the Ball Field corridor. Once the perimeter berm is in place, ash stacking within the north Dredge Cell next to the Swan Pond Road corridor can be completed. The north Dredge Cell is expected to be filled to capacity by late summer 2012. At that time, closure of the Dredge Cell (Cells 2 and 3) will be implemented, by placing the final cap and cover.

- Lateral Expansion (Cell 4) ash stacking. The perimeter berm and foundation stabilization zone will be constructed along the northern Dike C adjacent to the Lateral Expansion area, following completion of the Ball Field corridor perimeter berm and foundation stabilization. At the same time, a working platform will be constructed within the Lateral Expansion area. Ash removal will continue from the north embayment, removing the wetter ash at the bottom of the north embayment. Preliminary plans anticipate that the wetter ash may be removed mechanically, avoiding the need to dredge the north embayment. Once the north embayment has been cleared, restoration of the north embayment ecosystem can begin, and ash removal will progress to the middle embayment. Eventually, Dike 2 and the settling basins will be removed to allow final dredging of the bottom of the middle embayment, with the ash processed for dry stacking in the Lateral Expansion. A portion of the south Dredge Cell (Cell 1) will be excavated to lower its elevation and the excavated ash will be dry stacked in the Lateral Expansion. The Lateral Expansion is expected to be filled to capacity by the end of 2013. At that time, closure of the Lateral Expansion (Cell 4) will be implemented, by placing the final cap and cover.

- Ash Pond ash stacking. The final dredging of the middle embayment will initiate filling of the Ash Pond. At that time, the perimeter berm and foundation stabilization zone can be constructed around the Ash Pond, and the working platform can be constructed. Restoration of the middle embayment ecosystem can also begin. Because the Ball Field will no longer be needed for ash processing, it will be closed, with the materials removed from the Ball Field dry stacked in the Ash Pond. Ash will continue to be excavated from the south Dredge Cell to lower its elevation and dry stacked in the Ash Pond. The Ash Pond is expected to be filled to capacity by late summer 2014. Once final grades are reached within both the south Dredge Cell and Ash Pond, closure of both areas can begin, by placing the final cap and cover first in the south Ash Pond and progressing across the site to the Dredge Cell (Cell 1).

8.4 COST ESTIMATE

Cost estimating involves developing an approximation of the costs of the resources needed to complete each schedule activity. Cost estimates will continue to be refined during the course of the project to reflect additional detail resulting from changes in planned project execution, such as design modifications, procurement contracts, resource availability, or budget constraints. The planning-level cost estimate at the 3rd-level WBS for the non-time-critical removal action for the Embayment/Dredge Cell is shown in Table 8-2.

During preparation of the project execution plan for each project component, the PM will review the planning-level cost estimate and revise the resource-loading and corresponding cost estimate as appropriate for the specific project component. Changes to the project baseline will be controlled through approved Change Control Board procedures.

Cost control involves the process of monitoring of cost performance to detect and understand variances from the cost baseline, then planning and implementing appropriate mitigation steps. The Project Controller will prepare cost performance reports monthly to report actual costs incurred relative to the work performed; the project baseline will be compared to forecasted costs. Earned value analysis will be performed by comparing earned value with actual costs to identify cost variances and cost performance indexes. The PM will then analyze the cost performance reports, identify cost variance issues, and evaluate and recommend appropriate mitigation measures.

Table 8-2. Estimated Cost by Project Component

WBS	ITEM DESCRIPTION	QTY.	UNIT	TOTAL ($)
0112	**EMBAYMENT RESTORATION**			**$43,300,000**
011201	Project Management	4.14%		1,591,000
011202	Field Management	8.49%		3,266,000
011206	Construct Infrastructure	1	lot	2,500,000
011207	Construct Underpass	1	ea	3,000,000
011208	North Embayment Ash Removal	950,000	cy	13,144,000
011209	Middle Embayment Ash Removal	1,350,000	cy	18,218,000
011210	Dike 2 / Settling Basin Removal	120,000	cy	750,000
011211	North Embayment Restoration	14	ac	398,000
011212	Middle Embayment Restoration	14	ac	448,000
0113	**FAILED DREDGE CELL**			**$64,300,000**
011301	Project Management	4.14%		2,365,000
011302	Field Management	8.49%		4,855,000
011306	Test Deep Soil Mixing	1	lot	250,000
011307	Failed Dredge Cell Containment Construction	6800	lin ft	22,358,000
011308	Failed Dredge Cell Ash Stacking	1,870,000	cy	14,781,000
011309	Failed Dredge Cell Closure	127	ac	18,330,000
011310	Failed Dredge Cell Geotechnical Monitoring & Testing	527	dy	1,453,000
0114	**LATERAL EXPANSION / ASH POND**			**$55,800,000**
011401	Project Management	4.14%		2,051,000
011402	Field Management	8.49%		4,211,000
011405	Lateral Expansion Containment Construction	2100	lin ft	5,795,000
011406	Lateral Expansion Ash Stacking	1,160,000	cy	9,781,000
011407	Lateral Expansion Closure	42	ac	6,052,000
011408	Ash Pond Containment Construction	3400	lin ft	4,500,000
011409	Ash Pond Ash Stacking	690,000	cy	10,642,000
011410	Ash Pond Closure	78	ac	11,263,000
011411	Ball Field Closure	25	ac	865,000
011412	Geotechnical Monitoring & Testing	251	dy	691,000
0111	**ENVIRONMENTAL MONITORING**	**53**	**mo**	**$28,300,000**
	TVA MANAGEMENT	**53**	**mo**	**$31,800,000**
	SUBTOTAL			**$223,500,000**
	CONTINGENCY (20%)			**$44,700,000**
	TOTAL			**$268,200,000**

8.5 PROCUREMENT OF CONTRACTORS

At the completion of the Project Team meeting for the design of a project component, the PM, together with the TCM and Contract Manager, will prepare a procurement plan, identifying the key construction contracts or material purchase contracts required for implementation. Pre-qualification of specialty contractors or pre-ordering of long-lead materials or equipment would be implemented at that time, if appropriate. Contract approvals are required at varying levels within TVA management depending on the value of the contract award.

The TCM will work with the TVA Contract Manager to issue contracts and approve any contract modifications. The TCM will also verify assigned contractors' work in accordance with their contractual obligations, and approve contractor invoices.

8.6 COMMUNICATIONS AND COMMUNITY RELATIONS

The Kingston Ash Recovery Project has developed a Community Involvement Plan (TVA 2010b), that specifies outreach activities TVA will use to address community concerns and expectations. It also explains the opportunities for public involvement in the decision-making process at the site. The Community Involvement Plan has been placed in the Administrative Record and is available for the public to read.

TVA maintains the Administrative Record, which contains copies of the Administrative Order, EE/CA, Action Memorandum, and other site documents. The Administrative Record is available online at the following web address: http://www.tva.gov/kingston/admin_record/index.htm. Site documents can also be read and reviewed at the following locations:

TVA Outreach Center	Kingston Public Library	Harriman Public Library (CD only)
509 North Kentucky Street	1004 Bradford Way	601 Walden Street
Kingston, Tennessee	Kingston, Tennessee	Harriman, Tennessee
(865) 632-1700	(865) 376-9905	(865) 882-3195

This RAWP will be placed in the Administrative Record, and will be available for the public to read. Comments from the public on this RAWP are encouraged, so that proper adjustments to planned work activities can be considered and incorporated into the work.

This page intentionally left blank

9. REFERENCES

40 CFR Part 300. *National Oil and Hazardous Substances Pollution Contingency Plan (NCP)*.

42 U.S.C. § 7401 et seq. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1980*.

AECOM 2009 (June 25). *Root Cause Analysis of TVA Kingston Dredge Pond Failure on December 22, 2008*.

U.S. Environmental Protection Agency (EPA) 2009a (May 11). *Administrative Order and Agreement on Consent, Docket No. CERCLA-04-2009-3766*, Region 4.

EPA 2002 (December). *Guidance for Quality Assurance Project Plans, EPA QA/G-5*.

Environmental Standards, Inc. (ESI) 2009 (December 18). *Quality Assurance Project Plan for the Tennessee Valley Authority Kingston Ash Recovery Project. TVA-KIF-QAPP*. Prepared for the Tennessee Valley Authority, Office of Environment and Research, Environmental Resources.

Jacobs 2010a (May 11). *Project Management Plan for the Kingston Ash Recovery Project*.

Jacobs 2010b (February). *Site-Wide Safety and Health Plan for the TVA Kingston Fossil Plant Ash Release Response.*

Jacobs 2010c (January). *Kingston Ash Recovery Project, Non-Time-Critical Removal Action, Embayment/Dredge Cell Engineering/Cost Analysis (EE/CA).*

Jacobs 2009 (August). *Kingston Ash Recovery Project, Non-Time-Critical Removal Action Scope and Engineering Evaluation/Cost Analysis (EE/CA) Work Plan*.

Tennessee Department of Environment and Conservation (TDEC) 2009 (January 12). *Commissioner's Order, Case No. OGC09-0001*, Division of Water Pollution Control.

Tennessee Valley Authority (TVA) 2010a (May 18). *Action Memorandum: Request for Non-Time-Critical Removal Action at the TVA Kingston Fossil Fuel Plant Release Site, Roane County, Tennessee*.

TVA 2010b (March 1). *Community Involvement Plan for the TVA Kingston Ash Recovery Project.*

TVA 2009a (August 13). *TVA Kingston Fossil Plant, Ash Recovery Project, Time-Critical Action, Site Dust Control and Air Monitoring Plan.*

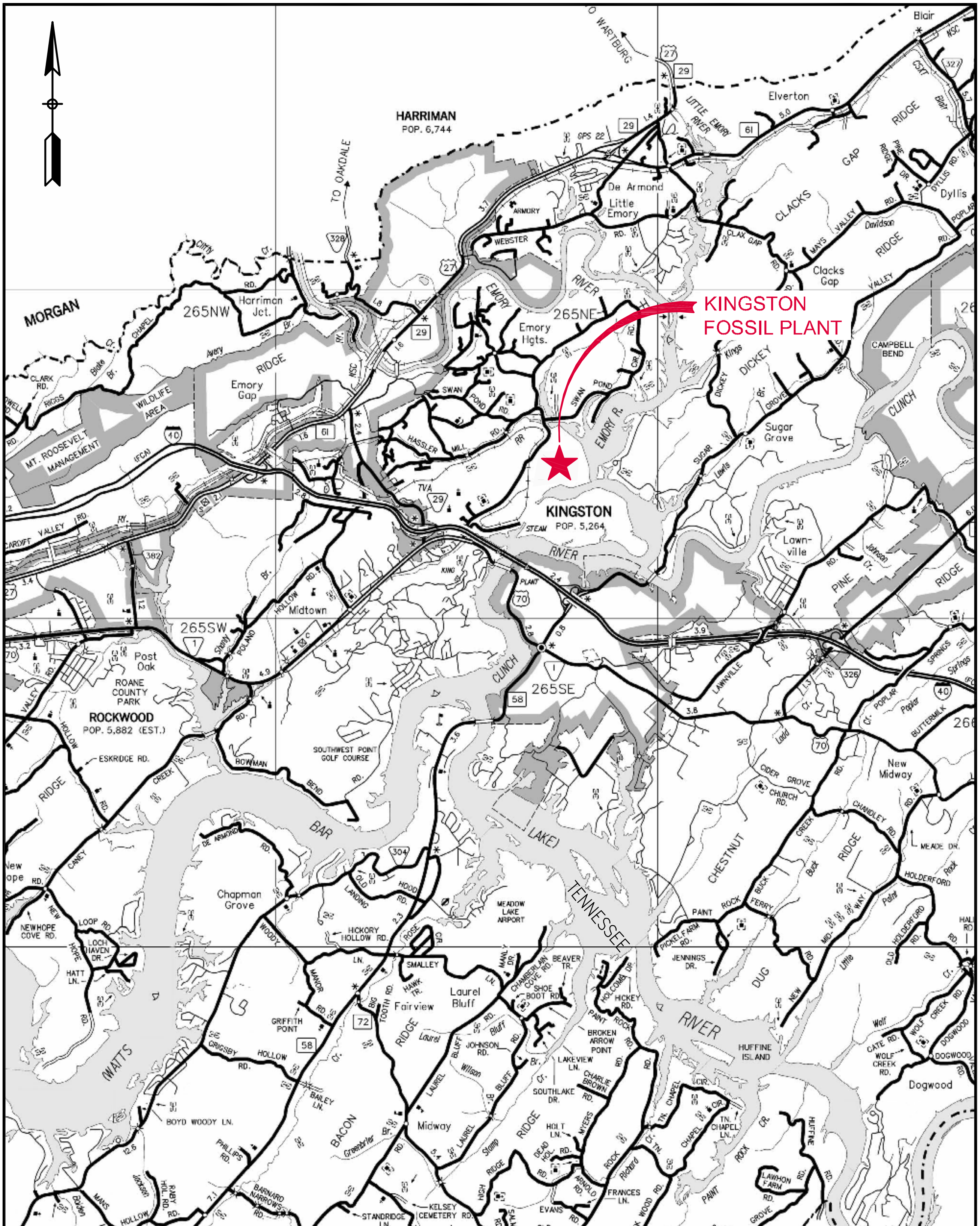
TVA 2009b (August 4). *Action Memorandum: Request for Removal Action at the TVA Kingston Fossil Fuel Plant Release Site, Roane County, Tennessee*.

TVA 2009c (June 29). *Site Stormwater Management Plan, TVA Kingston Fossil Plant, Ash Recovery Project, Time-Critical Action,* and attached *Stormwater Pollution Prevention Plan* (SWPPP).

TVA 2009d (March 2). *Corrective Action Plan for the TVA Kingston Fossil Plant Ash Release*.

This page intentionally left blank

FIGURES



T:\0002 ENGINEERING\01 DRAWINGS AND SPECS\Report Graphics\RAWP Embayment-Dredge Cell\088_Fig 1 RAWP Location Map.dwg Jul 28,2010 -bperatro

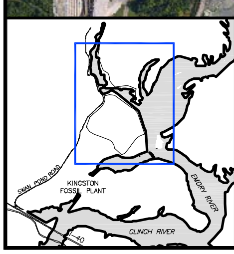
SOURCE:
GENERAL HIGHWAY MAP, ROANE COUNTY, TENNESSEE
TENNESSEE DEPARTMENT OF TRANSPORTATION, 2006

0 1 2 4
SCALE IN MILES

FIGURE 1
LOCATION OF THE KINGSTON FOSSIL PLANT

KINGSTON ASH RECOVERY PROJECT

DATE:	PHASE:
28 July 10	RAWP Embayment / Dredge Cell



LEGEND:

ASH PROCESSING AREA

SCALE IN FEET

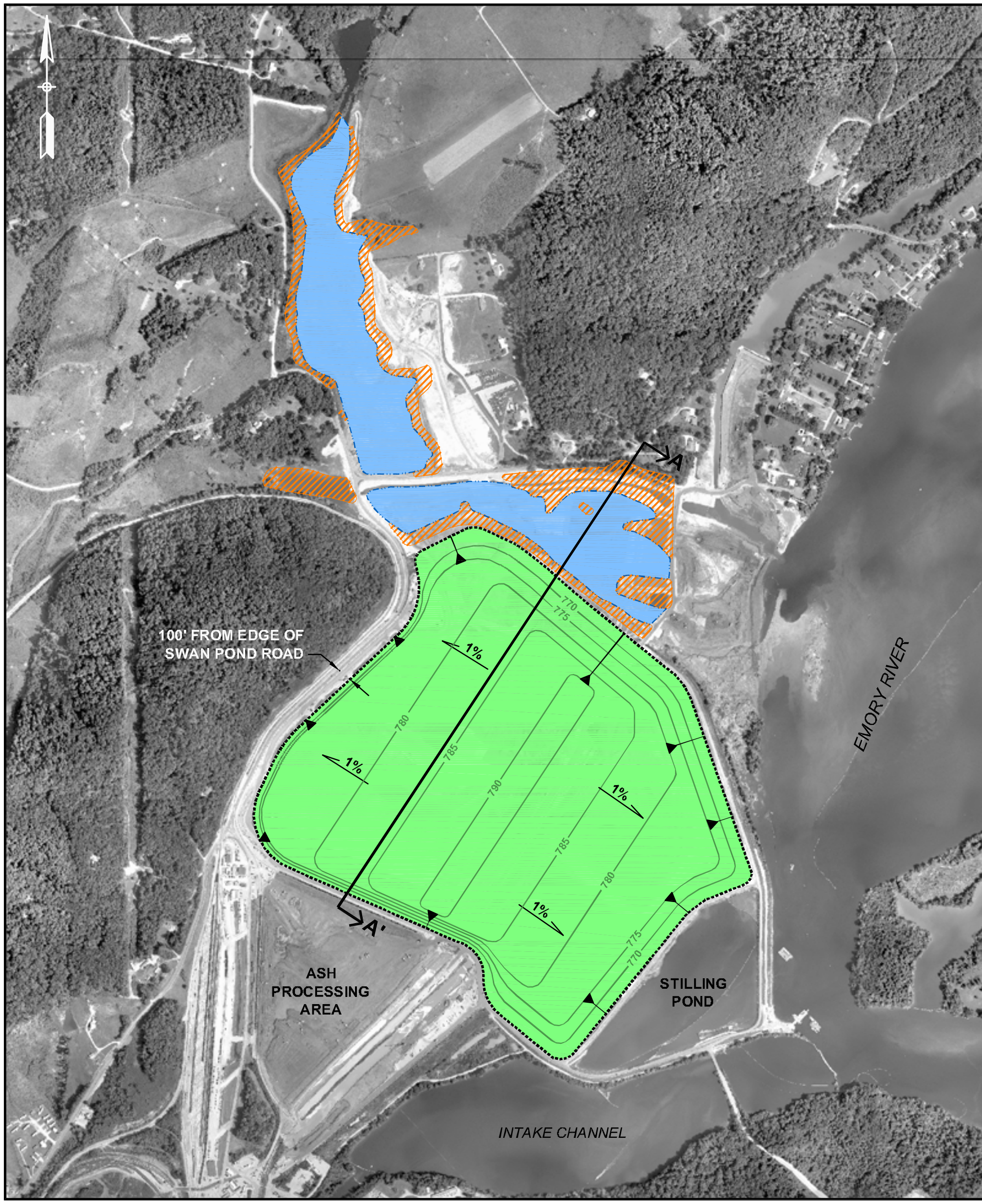
DATE OF PHOTO: AUG. 2009

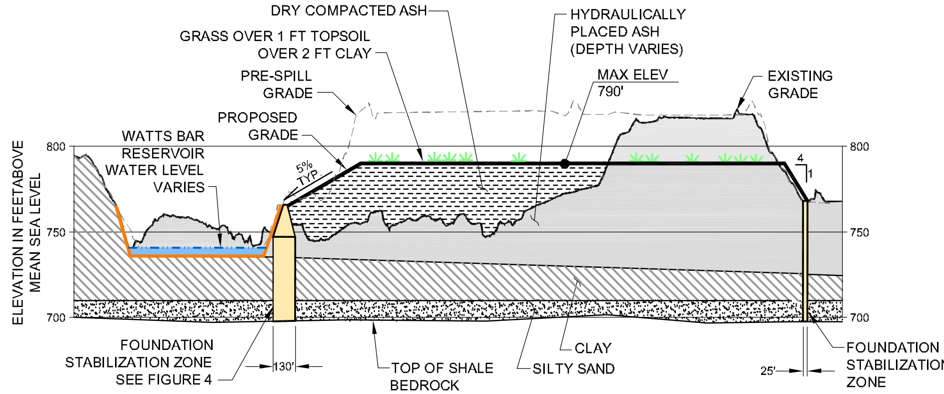
FIGURE 2
KEY FEATURES OF THE KINGSTON FOSSIL PLANT AREA

KINGSTON ASH RECOVERY PROJECT

DATE:	PHASE:
28 July 10	RAWP Embayment / Dredge Cell

T:\0002 ENGINEERING\01 DRAWINGS AND SPECS\Report Graphics\RAWP Embayment-Dredge Cell\089_Fig 2 RAWP Site Features.dwg Jul 28,2010 -bperatro





SECTION A-A'

NOT TO SCALE

LEGEND:

- RESTORED WETLANDS (MIXED FORESTED, SCRUB-SHRUB, AND EMERGENT)
- OPEN WATER
- TOPSOIL AND SEEDING

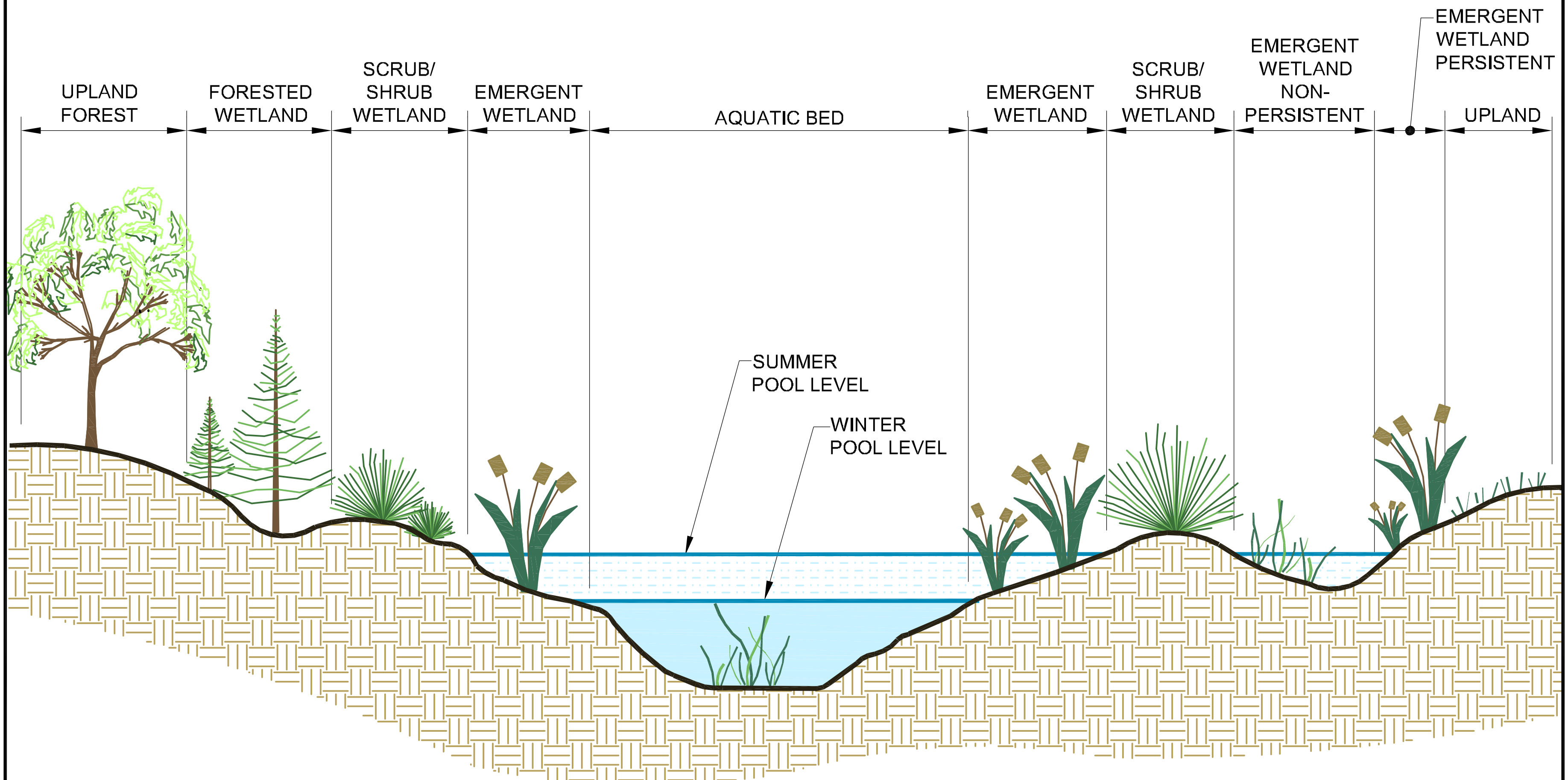
0 500 1000 2000

SCALE IN FEET

FIGURE 3
CONCEPTUAL LAYOUT AND CROSS-SECTION
OF THE REMOVAL ACTION
KINGSTON ASH RECOVERY PROJECT

DATE:	PHASE:
28 July 10	RAWP Embayment / Dredge Cell

T:\0002 ENGINEERING\01 DRAWINGS AND SPECS\Report Graphics\RAWP Embayment-Dredge Cell\090_Fig3 Layout-Section.dwg Jul 28,2010-bpento

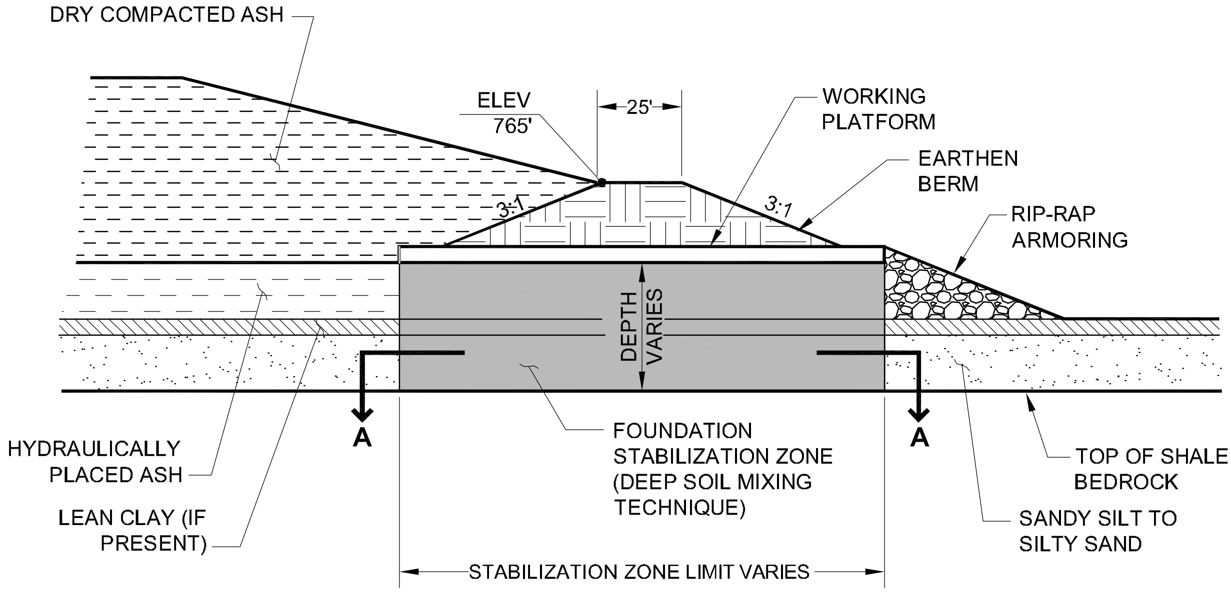


NOTE:

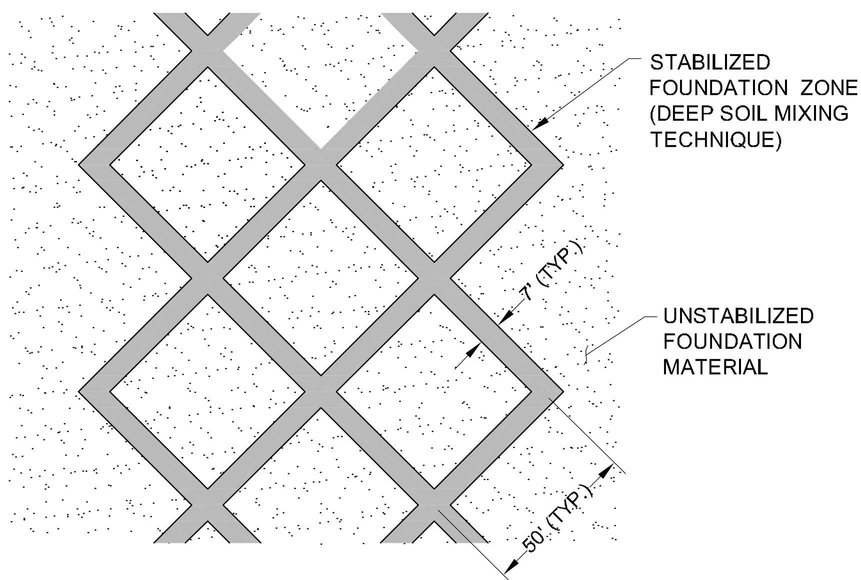
EXAMPLE OF COMPLEX MOSAIC OF NATIVE PLANT COMMUNITIES PROXIMATE TO THE RESTORED EMBAYMENTS. NOTE THE MICRODEPRESSION ON THE LEFT AND RIGHT SIDE OF THE AQUATIC BED THAT FACILITATES THE RESTORATION OF FORESTED AND EMERGENT WETLAND COMMUNITIES IN THE FLOODPLAIN.

FIGURE 4
CONCEPTUAL CROSS-SECTION OF THE RESTORED EMBAYMENT
KINGSTON ASH RECOVERY PROJECT

DATE:	PHASE:
28 July 10	RAWP Embayment / Dredge Cell



CONCEPTUAL FOUNDATION STABILIZATION SECTION

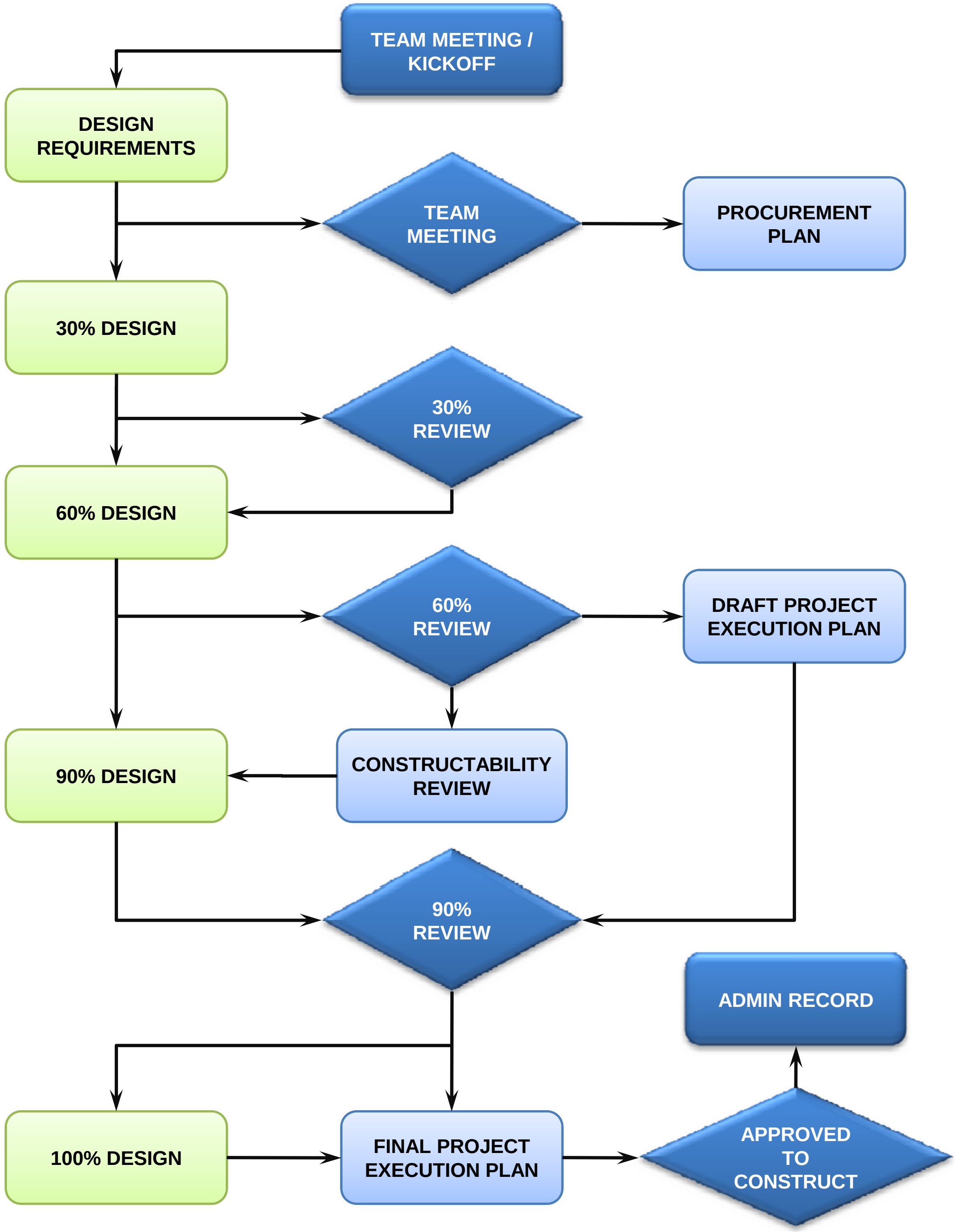


SECTION A-A

0 30 60 120
SCALE IN FEET

FIGURE 5
CONCEPTUAL CROSS-SECTION OF
THE PERIMETER IMPROVEMENTS
KINGSTON ASH RECOVERY PROJECT

DATE:	PHASE:
28 July 10	RAWP Embayment / Dredge Cell



LEGEND:

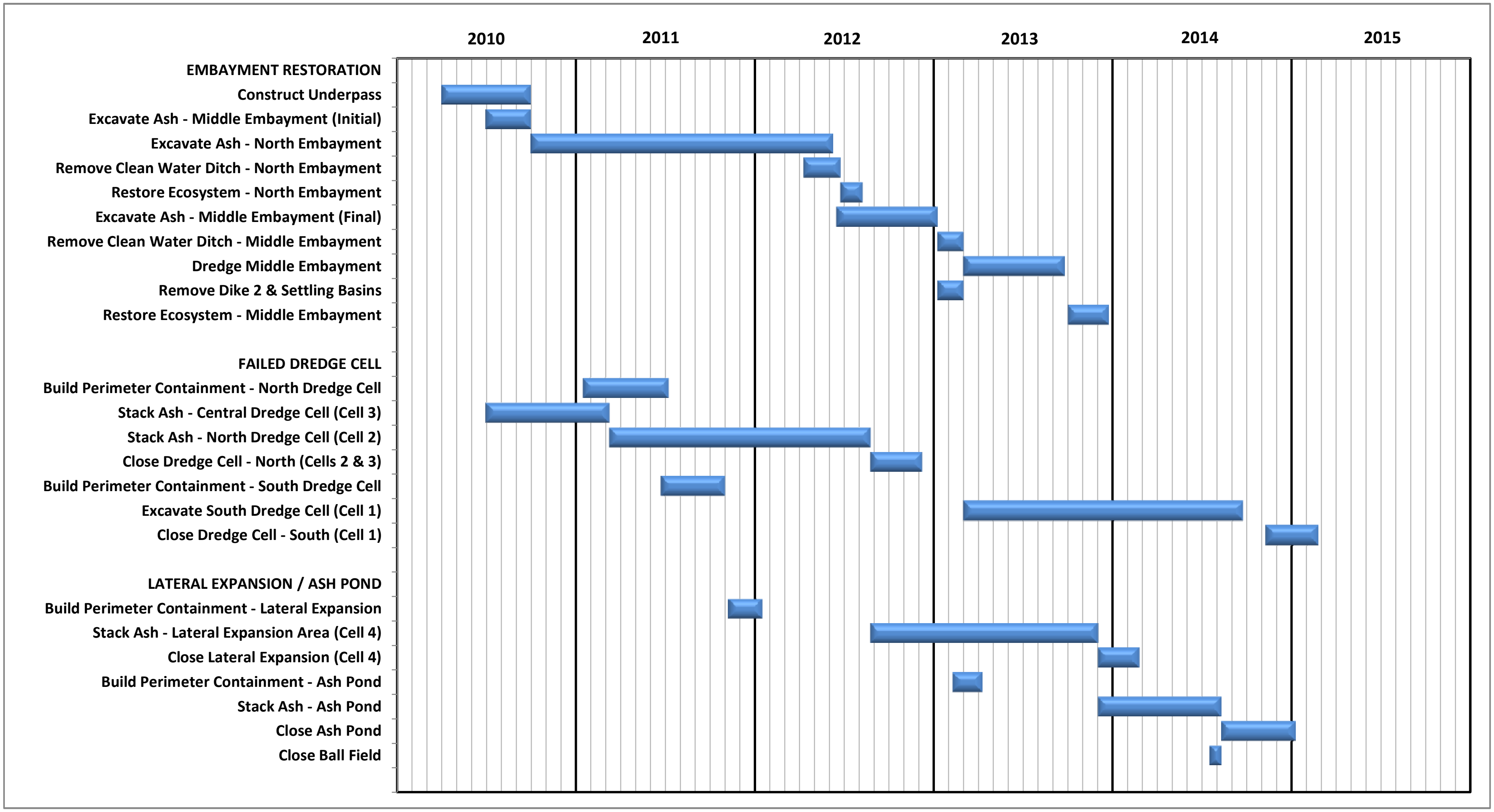
- ENGINEER-OF-RECORD (EOR)
- JACOBS
- PROJECT TEAM (TVA, EPA, TDEC, EOR, JACOBS)

FIGURE 6
DESIGN PROCESS

KINGSTON ASH RECOVERY PROJECT

DATE: 28 July 10	PHASE: RAWP Embayment / Dredge Cell

Fig 7: Planned Schedule for the Non-Time-Critical Removal Action



APPENDIX A

Preliminary Schedule for Regulator Review of Anticipated Removal Design Packages

Appendix A. Preliminary Schedule for Regulator Review of Anticipated Removal Design Packages

WBS	ITEM DESCRIPTION	ANTICIPATED REMOVAL DESIGN PACKAGES	DOCUMENT NUMBER	PRELIMINARY SCHEDULE FOR 90% REGULATOR REVIEW
0112	EMBAYMENT RESTORATION	• Swan Pond Embayment Ash Removal (Phase I) • Swan Pond Embayment Ash Removal (Phase II) • Swan Pond Embayment Ecosystem Restoration	RDP-0112-A RDP-0112-B RDP-0112-C	06-Aug-10 TBD 22-May-12
0113	FAILED DREDGE CELL	• Central Dredge Cell Working Platform • Central Dredge Cell (Cell 3) Ash Stacking • North Dredge Cell (Cell 2) Working Platform and Ash Stacking • North Dredge Cell (Dike C) Perimeter Containment • Swan Pond Road and Ball Field Corridors Perimeter Containment • North and Central Dredge Cells (Cells 2 & 3) Closure • South Dredge Cell (Cell 1) Closure	RDP-0113-A RDP-0113-B RDP-0113-C RDP-0113-D RDP-0113-E RDP-0113-F RDP-0113-G	20-Aug-10 20-Aug -10 15-Dec-10 08-Dec-10 20-Apr-11 31-Jan-12 29-Jan-14
0114	LATERAL EXPANSION / ASH POND	• Lateral Expansion (Cell 4) Working Platform and Ash Stacking • Lateral Expansion (Cell 4) Perimeter Containment • Lateral Expansion (Cell 4) Closure • Ash Pond Working Platform and Ash Stacking • Ash Pond Perimeter Containment • Ash Pond Closure	RDP-0114-A RDP-0114-B RDP-0114-C RDP-0114-D RDP-0114-E RDP-0114-F	12-Apr-11 06-Sep-11 25-May-12 09-Aug-11 25-Jan-12 21-Sep-12