Tennessee Valley Authority
Regulatory Submittal for Kingston Fossil Plant

Documents submitted:
Non-Time- Critical Removal Action for the Swan Pond Ash Removal (Phase 1) Removal Design Package Rev. 2

Date Submitted:
09/16/2010

Submitted to whom
Craig Zeller, EPA

Concurrence

Received	Not Applicable	TVA
☐	☒	Steve McCracken
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☒	☐	Steve Cherry SK
☒	☐	Michelle Cagley

Received	Not Applicable	Jacobs
☒	☐	Steve Richardson
☒	☐	Bruce Haas
☒	☐	Butch Parton
☐	☐	_____
☐	☐	_____
☐	☐	_____

Approvals

TVA Kathryn Nash Date 9/16/10

EPA Craig Zeller Date 9/16/10

cc:

- ☒ Anda Ray, TVA
- ☒ Barbara Scott, TDEC
- ☒ Brenda Brickhouse, TVA
- ☒ John Dizer, TVA
- ☒ 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

Document No. RDP-0112-A

Kingston Ash Recovery Project
Non-Time-Critical Removal Action for the
Swan Pond Embayment Ash Removal (Phase 1)
Removal Design Package

Prepared by:
Jacobs

for the Tennessee Valley Authority

Revision	Description	Date
0	Phase 1 Removal Design Package for TVA Review	July 8, 2010
1	Phase 1 Removal Design Package for Regulatory Review	July 29, 2010
2	Phase 1 Removal Design Package for Approval	Sept. 16, 2010

SPECIFICATIONS

SECTION 02200

EXCAVATION

1. GENERAL

1.1 SCOPE

1.1.1 This section includes excavation, dewatering, stockpiling, and processing of excavated materials.

1.1.2 Excavation shall be from several different areas of the site as shown on the excavation drawings. These areas include the North Embayment, Middle Embayment, Dike 2, Settling Basins, or other areas of the site as required to meet the specified limits of excavation and minimum lines and grades shown.

1.1.3 Materials to be excavated include ash, ash mixed with natural soil (clay, sand), native sediments, rock, riprap, and other materials. Trees and other vegetative matter that are excavated with the ash and associated soil materials shall be disposed separately. Debris, including concrete debris, pipes, and other debris that are excavated with the ash and associated soil materials, shall be disposed separately.

1.2 REFERENCES

1.2.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D698	(2000ae1) Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3)
ASTM D2216	(1998) Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D3017	(2004) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.3 DEMOLITION/RECORD KEEPING

1.3.1 The following types of documents shall be submitted to the Construction Manager:

1.3.1.1 Moisture tests: Submit weekly
1.3.1.2 Topographic drawings for payment: Submit monthly
1.3.1.3 As-built topographic drawings: At end of construction

1.3.2 TVA shall provide a Transmittal Sheet for each submittal item that clearly identifies the submittal and provides a reference to the design document that requires the submittal. Provide four copies of test results.

2. PRODUCTS

2.1 EQUIPMENT

2.1.1 Examples of equipment (expected) to perform work specified in this section.

2.1.2 Examples of equipment (expected) water tank trucks, pressure distributors, or other equipment designed to apply water uniformly and in controlled quantities at variable surface widths to provide dust suppression.

2.1.3 Examples of equipment (expected) equipment such as scarifiers, disks, spring-tooth or spike-tooth harrows, earth hauling equipment, backhoes, loaders scrappers, and other equipment as required for earthwork construction.

3. EXECUTION

3.1 GENERAL

3.1.1 Erosion and Sediment Control:

3.1.1.1 Install surface water management and erosion controls in accordance with the *Storm Water Pollution Prevention Plan Fly Ash Removal Project* (SWPPP), or as indicated on the drawings.
3.1.1.2 TVA shall maintain the ditches clear of any accumulated sediment, trash, vegetation, or debris.
3.1.1.3 TVA shall maintain the settling basins throughout the ash removal and stacking operations, by removing any accumulated ash/sediment.
3.1.1.4 TVA will monitor water quality at the effluent of the sedimentation basins and clean water ditches.

3.1.2 All construction activities shall be conducted in accordance with applicable state and local environmental laws and regulations and best management practices (BMPs) for control of erosion and sources of sediment, and prevention of pollutant discharges to surface waters. TVA shall install sediment and erosion control measures for the site as needed and as directed by Jacobs SWPPP Manager, including the following BMPs:

3.1.2.1 Tracking slopes with cleat marks parallel to the contour of slopes to reduce runoff velocity and decrease erosion.
3.1.2.2 Placing silt fence and/or fiber coils at the toe of slopes, and above ditches and benches and other areas as needed.
3.1.2.3 Installing rock check dams in drainageways.
3.1.2.4 Constructing berms or temporary pipe drains to divert flow around active work areas or convey flow down slopes.
3.1.2.5 Temporary seeding or mulching to protect surfaces exposed for more than 90 days.
3.1.2.6 Temporary erosion control fabric or interim cover on slopes to prevent gulleying or surface wash.

3.1.3 Dust Control:

3.1.3.1 TVA shall comply with requirements of the *Site Dust Control and Air Monitoring Plan* for the Kingston Ash Recovery Project, available at www.tva.gov/kingston.

3.1.3.2 Unpaved gravel haul roads shall be sprayed with water and/or calcium chloride solution so as to keep the unpaved road surface slightly damp.

3.1.3.3 Periodically, disturbed ash shall be sprayed with a dust-suppression agent, such as Flexterra®, or equivalent, to control dust.

3.1.3.4 TVA will monitor air quality around the job site.

3.1.3.5 National ambient air quality standards for inhalable particulate (PM10) and respirable particulate (PM2.5) shall be strictly adhered to.

3.1.3.6 If TVA's operations result in excessive dust, then operations shall be stopped immediately until appropriate dust suppression measures have been implemented.

3.2 EXCAVATION

3.2.1 Excavate designated areas to the elevations shown on the drawings or as necessary to remove ash and associated soil materials. Excavation may be stopped once native sediments have been encountered and no ash is visible on the bottom of the excavation. Verification of ash removal will be based on the visual observations of the bottom of the excavation for the presence of ash. TVA, in coordination with Jacobs, EPA, and TDEC, will prepare a sampling grid of sections not greater than 200 ft by 200 ft for confirmation of ash removal. Four discrete samples will be collected from each grid section. TVA will perform soil sampling and testing within each grid section using polarized light microscopy (PLM) as confirmation of the visual observations. If results of PLM testing indicate ash is present at the bottom of the excavation, TVA shall excavate further in the grid section until ash is removed. Final acceptance of each grid section will be obtained from EPA by means of concurrence; TVA will prepare the concurrence documentation, including photographs of the excavation and results of PLM testing, as appropriate. TVA shall cooperate with the concurrence process.

3.2.2 Stockpile excavated material in the designated stockpile area or in a TVA-designated processing area. TVA shall deliver ash materials to the stacking areas so that once placed the material is within -4% to +2% of optimum moisture content as determined by ASTM D698, ASTM D2216, ASTM D3017, or other approved method.

3.2.3 Minimize sloughing and caving of excavations. Flatten excavation slopes to 6:1 (H:V) or as required to minimize sloughing or caving.

3.2.4 All excavations shall drain toward the existing dirty water ditch as long as practical. Water that comes in contact with ash materials is considered dirty water and shall be directed to drainage ways that pass through the settling areas.

3.3 EXCAVATION DEWATERING

3.3.1 Anticipate seepage of groundwater into and accumulation of surface-water runoff in excavations. Manage groundwater and surface-water runoff in excavations shall be discharged to the dirty water drainage system. Protect areas of discharge from erosion.

3.3.2 Collect water that accumulates in the excavation in a toe drain or other suitable sump, and pump to discharge structures.

3.3.3 Prevent surface water run on from adjacent areas from entering the excavation.

3.4 PROCESSING

3.4.1 Excavated ash materials that do not meet the moisture requirements for stacking shall be dewatered or otherwise processed to obtain the proper moisture content. Processing methods shall be approved by the Construction Manager prior to use.

3.4.2 TVA shall propose the means and methods of construction for achieving the required moisture content prior to ash stacking. Moisture content shall be -4% to +2% of optimum moisture as determined by ASTM D698. Moisture content may be controlled by windrowing, either by piling or spreading out the ash, then disking and rolling, or by adding water as necessary. Moisture conditioning may be performed near the excavation point of removal, or in either of two ash drying/processing areas: the "West Storage Area" located at the northern shore of the Middle Embayment, or the "Ash Processing Area" located in the former Ball Field area south of the former Dredge Cell. If admixtures, such as lime, cement, or other proprietary admixtures are used for moisture content control, then TVA shall submit an Admixture Design Plan.

3.4.3 TVA shall take necessary precautions to protect the excavated ash from becoming re-wetted due to precipitation, such as by covering the ash, smooth-rolling to promote runoff and reduce moisture infiltration, or any other means and methods proposed by TVA.

3.5 CONSTRUCTION QUALITY CONTROL REQUIREMENTS

3.5.1 Perform in-place moisture tests in accordance with ASTM D2216, ASTM D3017, or other approved ASTM methods.

3.5.2 Determine moisture-density curves in accordance with ASTM D698 (Standard Proctor).

3.5.3 TVA shall perform enough moisture tests to ensure the material arrives at the stacking location at the required moisture content. If in-place moisture tests indicate that material does not meet specified requirements, material shall be processed to obtain the required moisture content for hauling to the stacking areas.

3.6 DISPOSAL

3.6.1 Material excavated that meets the required moisture content shall be hauled to the ash stacking locations as shown on the drawings.

3.6.2 Trees, miscellaneous debris, concrete, and other items shall be stockpiled at a designated location. The locations will be designated at a later time.

3.7 SURVEY CONTROL

3.7.1 Survey control points shall be established by TVA. TVA shall perform construction staking and controls within the work area. TVA shall perform topographical surveys prior to construction which will become the baseline topographical surveys monthly.

3.7.2 Additional surveys as necessary to ensure the work is being accomplished in accordance with the drawings and specifications.

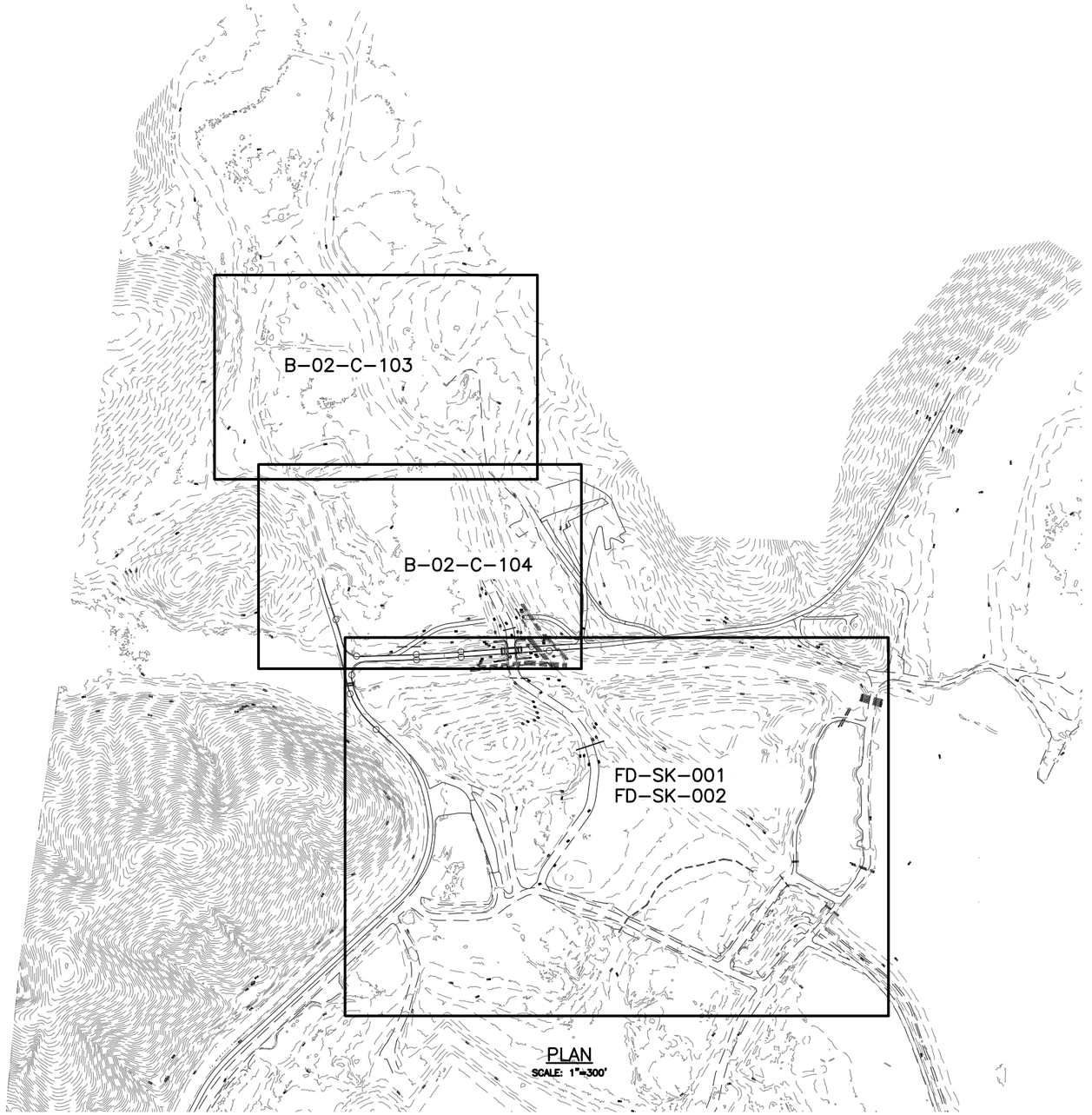
3.8 AS-BUILT DRAWINGS

3.8.1 Red-line mark a set of design plans and specifications for use in preparing final as-built. Include horizontal and vertical locations and other features that deviate from construction drawings.

— END OF SECTION —

DRAWINGS

KINGSTON FOSSIL PLANT - SWAN POND EMBAYMENT ASH REMOVAL



PLAN
SCALE: 1"=300'

DRAWING INDEX

B-02-C-100	TITLE SHEET
FD-SK-001	MIDDLE EMBAYMENT STAGE 1A
FD-SK-002	MIDDLE EMBAYMENT STAGE 1B
B-02-C-103	NORTH EMBAYMENT (NORTH END)
B-02-C-104	NORTH EMBAYMENT (SOUTH END)

DOCUMENT CONTROL NO. RDP-0112-A_rev_0

REVISION NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED
00	07/08/10	ISSUED FOR REVIEW	JGA	FMP	JH

SEAL

JACOBS

KINGSTON FOSSIL PLANT
TENNESSE VALLEY AUTHORITY

SWAN POND EMBAYMENT ASH REMOVAL

TITLE SHEET

SCALE	DRAWING NO.	REV.
SHOWN	B-02-C-100	00

NORTH EMBAYMENT

SWAN POND CIRCLE BRIDGE/ HAUL ROAD UNDERPASS

SWAN POND CIRCLE ROAD

WEST EMBAYMENT

CLEAN WATER DITCH

CLEAN WATER DITCH

EAST EMBAYMENT

N 558298.62
E 2440418.08
EL 748.00

N 558250.27
E 2440056.65
EL 748.00

N 558202.44
E 2440587.83
EL 749.00

N 558166.82
E 2440629.84
EL 749.31

N 558103.90
E 2440626.18
EL 749.68

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E 2440009.95
EL 748.57

N 558076.10
E 2440584.45
EL 749.75

N 558051.73
E 2440705.55
EL 750.19

N 558041.85
E 2440052.08
EL 748.81

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N 557913.56
E 2440277.03
EL 750.00

N 557903.73
E 2440210.69
EL 749.90

N 557793.11
E 2440848.75
EL 760.00

WEST STORAGE AREA

N 558075.92
E 2441442.05
EL 756.50

N 558022.34
E 2440904.23
EL 743.00

N 557982.84
E 2440896.22
EL 749.00

DIRTY WATER DITCH

N 557819.47
E 2440916.48
EL 750.00

OLD DREDGE CELL DISCHARGE PIPE

SETTLING AREA 1 & 2

DIKE 2

MAP

MAP BYPASS ROAD

NORTH EMBANKMENT AREA HAUL ROAD

NORTH DREDGE CELL

N 557589.48
E 2441387.59
EL 749.00

N 557585.03
E 2441410.99
EL 749.00

N 557548.75
E 2441465.88
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E 2441705.52
EL 750.00

N 557169.08
E 2441730.27
EL 750.00

N 557190.79
E 2441929.21
EL 750.00

SWAN POND ROAD

WEST HAUL ROAD

TEST FILL HAUL ROAD

EAST/WEST HAUL ROAD

CENTRAL DREDGE CELL

DIKE C

DIKE D

DIKE D

SWAN POND CIRCLE

PROJECT SITE

SWAN POND RD

KEY PLAN
NOT TO SCALE

PLAN
SCALE: 1"=100'

0 100' 200' 300'

DOCUMENT CONTROL NO. RDP-0112-A_rev_0

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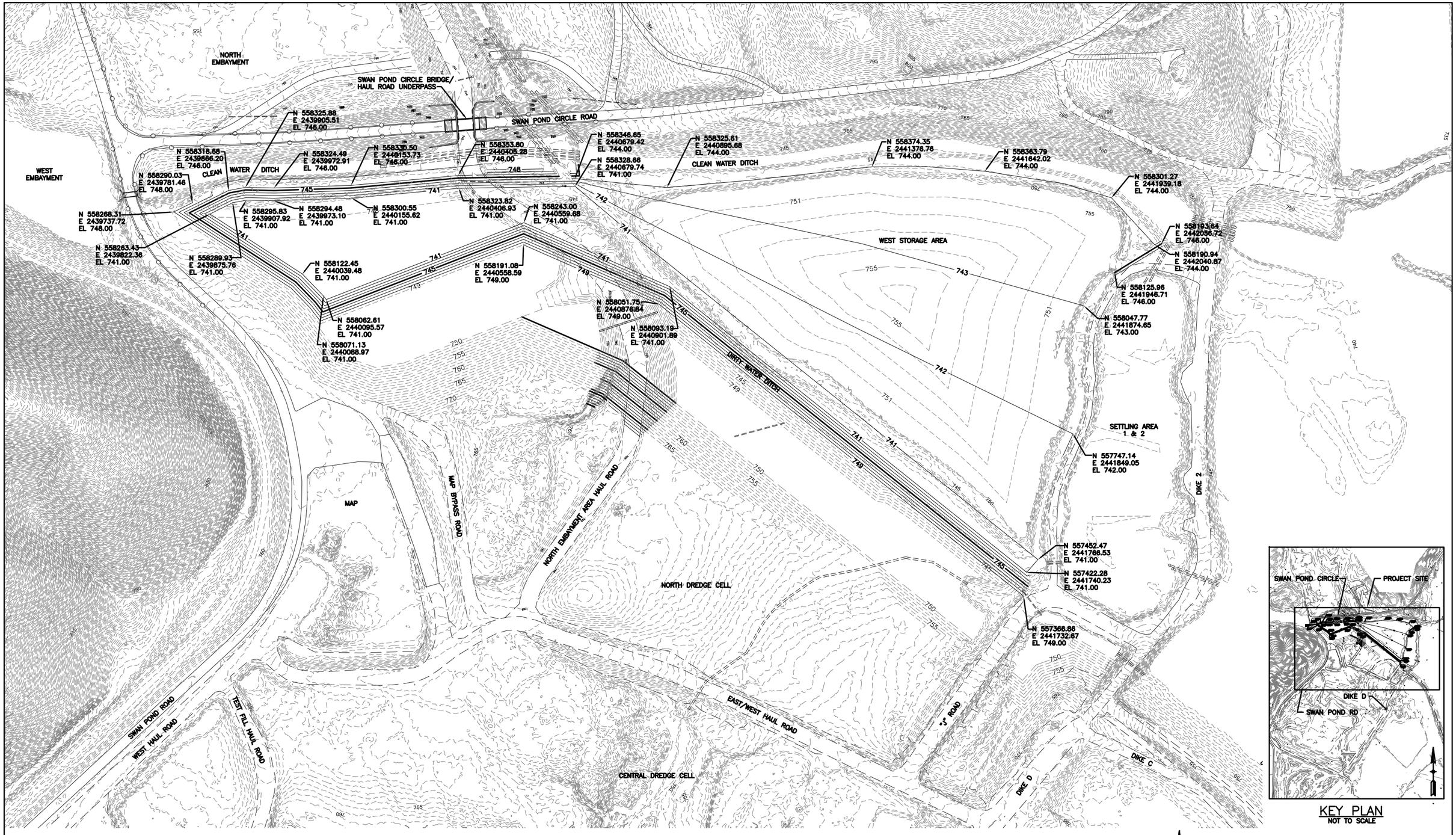
KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

SWAN POND EMBAYMENT ASH REMOVAL

MIDDLE EMBAYMENT STAGE 1A

SCALE	DRAWING NO.	REV.
SHOWN	FD-SK-001	00



PLAN
SCALE:1"=100'

KEY PLAN
NOT TO SCALE

0 100' 200' 300'

DOCUMENT CONTROL NO. RDP-0112-A_rev_0

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REVISION NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED

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KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

SWAN POND EMBAYMENT ASH REMOVAL

MIDDLE EMBAYMENT STAGE 1B

SCALE	DRAWING NO.	REV.
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E 2439537.27
EL 740.00

N 560201.09
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EL 741.00

N 560095.44
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EL 741.00

N 560056.95
E 2439688.25
EL 741.00

N 559975.32
E 2439699.32
EL 741.00

N 560152.32
E 2439368.14
EL 739.00

N 559921.06
E 2439581.59
EL 740.00

N 559915.99
E 2439381.65
EL 739.00

N 559817.20
E 2439167.12
EL 738.00

N 559711.04
E 2439575.61
EL 740.00

NOTE:
EXCAVATE TO NATURAL SEDIMENTS
AT BOTTOM OF FORMER EMBAYMENT

CLEAN WATER DITCH

SWAN POND ROAD

NORTH
EMBAYMENT

BERKSHIRE ROAD

N 559649.37
E 2439231.23
EL 738.00

N 559624.38
E 2439384.75
EL 739.00

N 559604.47
E 2439596.15
EL 740.00

N 559529.62
E 2439404.50
EL 739.00

N 559516.64
E 2439659.92
EL 740.00

NOTE:
EXCAVATE TO NATURAL SEDIMENTS
AT BOTTOM OF FORMER EMBAYMENT

N 559489.45
E 2439280.24
EL 738.00

DIRTY WATER DITCH

N 559449.47
E 2439458.75
EL 739.00

N 559423.75
E 2439764.99
EL 740.00

N 559397.61
E 2439334.27
EL 738.00

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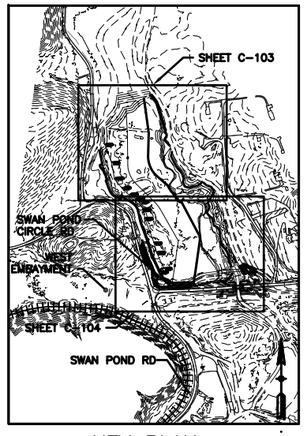

KEY PLAN
NOT TO SCALE

0 50' 100' 150'

DOCUMENT CONTROL NO. RDP-0112-A_rev_0

REVISION NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED
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SEAL

JACOBS

KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

SWAN POND EMBAYMENT ASH REMOVAL

NORTH EMBAYMENT (NORTH END)

SCALE	DRAWING NO.	REV.
SHOWN	B-02-C-103	00

N 559299.22
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N 559273.10
E 2439490.95
EL 738.00

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N 559270.33
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N 559211.16
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EL 738.00

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N 558922.41
E 2440064.53
EL 740.00

NOTE:
EXCAVATE TO NATURAL SEDIMENTS
AT BOTTOM OF FORMER EMBAYMENT

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EL 738.00

N 558895.28
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EL 738.00

NORTH
EMBAYMENT

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EL 739.00

N 558793.23
E 2439616.86
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EL 738.00

N 558519.86
E 2440006.72
EL 740.00

N 558524.86
E 2439805.39
EL 739.00

SWAN POND ROAD

BERKSHIRE ROAD

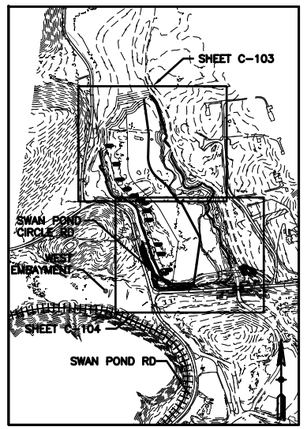
DIRTY WATER DITCH

CLEAN WATER DITCH

SWAN POND CIRCLE ROAD

SWAN POND CIRCLE BRIDGE/
HAUL ROAD UNDERPASS

WEST
EMBAYMENT



PLAN
SCALE: 1"=50'

0 50' 100' 150'

DOCUMENT CONTROL NO. RDP-0112-A_rev_0

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REVISION NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVAL

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KINGSTON FOSSIL PLANT
TENNESSE VALLEY AUTHORITY

SWAN POND EMBAYMENT ASH REMOVAL

NORTH EMBAYMENT (SOUTH END)

SCALE	DRAWING NO.	REV.
SHOWN	B-02-C-104	00

CONSTRUCTION QUALITY CONTROL PLAN

CONSTRUCTION QUALITY CONTROL PLAN (CQCP)

1. GENERAL

Quality control (QC) is critical to demonstrating that the completed construction meets the removal action objectives and achieves long-term safety, stability, and performance. This CQCP details the steps to be taken during construction to verify compliance with the design.

2. CONSTRUCTION QUALITY CONTROL (CQC) ACTIVITIES

Table 1 summarizes the CQC requirements for the embayment ash removal work, summarizing the QC parameters, acceptance criteria to be met, verification methods, and verification frequencies. The QC parameters may include field observations or inspections, manufacturer or supplier certifications, field measurements or testing, laboratory measurements or testing, or other parameters.

Table 1. Summary of Construction Quality Control requirements

Component	QC Parameter	Acceptance Criterion	Verification Method	Frequency
Bottom of Excavation	Presence of ash	No observable ash layer	Observation of exposed soil/sediment	Once per area being approved
Volume of Excavation	Net volume	+/- 0.1 ft vertical elevation	As-built from land survey	Once prior to start of work; once per area being approved
Verification of Ash Removal	Presence of ash	< 50% ash particles in sediment	Polarized light microscopy	Four discrete samples per 200-ft square grid section

2.1 Field Observations

The QC Manager and CQC Team will observe and document in field logbooks the construction to verify moisture conditions and material handling. Extent of ash removal will be based on visual observations of the excavation; ash removal will be terminated when native soils or sediments are encountered below the ash. General observations will be made of materials, excavation, hauling, and drying operations to verify compliance with the design specifications.

2.2 Manufacturer/Supplier Certifications

Certification statements submitted by the manufacturer or supplier will be reviewed by the QC Manager for compliance with the specifications. In particular, material submittals for rock or gravel used in constructing temporary haul roads will be reviewed.

2.3 Field Measurements

TVA will perform topographic land surveys of the pre-excavation and post-excavation surfaces to verify the net volume of excavation completed within a given area. Surveys will be taken at 25-ft spacing between surveyed points. Vertical accuracy will be within 0.1 ft.

2.4 Laboratory Testing

Laboratory QC tests for the presence of ash will be conducted on samples collected by the CQC Team from the bottom of the excavation to verify ash has been removed. TVA, in coordination with Jacobs, EPA, and TDEC, will prepare a sampling grid of sections not greater than 200 ft by 200 ft for confirmation of ash removal. Four discrete samples will be collected from each grid section. TVA will perform soil sampling and testing within each grid section using polarized light microscopy (PLM) technology as confirmation of the visual observations. If results of PLM testing indicate ash is present at the bottom of the excavation, TVA shall excavate further in the grid section until all ash is removed. Final acceptance of each grid section will be obtained from EPA by means of concurrence; TVA/Jacobs will prepare the concurrence documentation, including photographs of the excavation and results of PLM testing, as appropriate. TVA shall cooperate with the concurrence process. A sample Non-Time-Critical Concurrence Form is included as Attachment 1 to this CQCP. A summary of the confirmation sampling design for the north embayment is included as Attachment 2 to this CQCP.

If dredging is used for the final ash removal, verification of ash removal will be based on the results of systematic vibracore sampling of the embayment bottom. TVA will perform the vibracore sampling; the vibracore samples will be observed for visual presence of ash, supplemented with PLM testing as confirmation of the visual observations. Vibracore sampling will be done on the grid sections specified above for EPA concurrence.

3. CQC ROLES AND RESPONSIBILITIES

The following identifies the name and telephone number of the individuals involved in CQC for the embayment ash removal.

Name	Role
Jimmy Moore, Jacobs	QC Manager
Diane Odom, Jacobs	QA Manager
Rock Vitale, ESI	Analytical QA Manager

The QC Manager is a qualified individual responsible for implementing the designated field observations, field testing, and/or laboratory testing and for review of CQC data to assess conformance with project requirements. Following this review, the QC Manager will determine whether a section of the work is completed. As sections of the embayment are cleaned of ash to the native soils or sediments, visual observations of the excavation will be made in conjunction with EPA. EPA acceptance of that section will be documented in a Removal Action Concurrence form. Completed and accepted sections will be protected from recontamination through runoff and runon controls, as described above. For this reason, sections will be completed in series, progressing from the northern/western portions of the embayment to the southern/eastern portions of the embayment.

The QC Team consists of qualified personnel working under the direct supervision of the QC Manager. The QC Team is responsible for making field observations, performing field testing or data collection, and collecting samples as required. Different individuals may be responsible for conducting different checks, measurements, inspections, or acceptance.

The QA Manager is an independent qualified professional responsible for conducting surveillances, audits, and independent verification checks of the CQC testing. The QA Manager prepares QA surveillance notes, identifies nonconformances, and confirms that corrective actions have been taken to remedy all nonconformances.

The Analytical QA Manager is an independent qualified professional responsible for conducting independent verification checks of the field laboratory CQC testing, sampling, and analysis.

The TVA Surveyor is a licensed surveyor in the state of Tennessee responsible for conducting land surveys of completed sections of the embayment ash removal. The TVA Surveyor will also prepare as-built topographic maps of the bottom of the excavation (bottom of the embayment).

4. PROJECT-SPECIFIC TRAINING AND REPORTING

The QC Manager and QC Team members will receive the following project-specific training:

- Reading assignments on the overall Kingston Ash Recovery Project QA Plan, the Removal Action Work Plan for the Embayment/Dredge Cell, and this Removal Design Package for the Swan Pond Embayment Ash Removal (Phase 1).

- Reading assignments and on-the-job training in Standard Operation Procedures (SOPs) for soil samples collection and moisture content testing.

Field logbooks will be used to record daily observations and CQC activities. Results of CQC testing will be reported weekly by posting on a website available for access by project stakeholders, including TVA, EPA, TDEC, and the project team (QA Manager, Project Manager, Construction Manager, and Field Engineer).

At the completion of the ash stacking, a summary QC Report will be prepared of the results of final CQC testing. As-built drawings will be prepared to document the actual areas, bottom of excavation contours, and materials removed. The summary QC Report and as-built drawings will be attached to the final Removal Action Report for the Non-Time-Critical Removal Action for the Embayment/Dredge Cell.

5. CONSTRUCTION QUALITY ASSURANCE

The QA Manager, or designee, will conduct the following QA activities:

- Surveillance of QC Team training records, conducted once at the beginning of construction, or periodically if staff members or SOPs change.
- Surveillance of QC Team field logbooks, sampling, and monitoring activities; conducted once every 3 months.
- Review of weekly QC Reports, as posted on the website, conducted weekly throughout construction.
- Audit of project management processes and procedures, including data and document archiving, document and calculation review, and conformance with program-level QA, Health and Safety, Waste Management, and Project Management requirements; conducted once during the work.

The Analytical QA Manager, or designee, will conduct the following QA activities:

- Audit of the field laboratory, moisture content testing; conducted once during the work.

Attachment 1: Sample Non-Time-Critical Concurrence Form

Agreement Log #: KIF-10-00

Non-Time-Critical Concurrence

Area:

Agreement:

Concurrence Comments:

Jacobs Project Manager	Date
Tennessee Valley Authority	Date
U. S. Environmental Protection Agency	Date

Attachment 2: Confirmatory Sampling Design for the North Embayment

This memorandum summarizes the design methods used, associated statistical assumptions, as well as recommended sampling design guidelines for conducting post-excavation sampling for confirmation of ash removal from the embayment during the non-time-critical removal action. Sampling plan components presented here include the sampling locations (grid pattern). The type of medium to sample (i.e., soil) and how to analyze the samples (in-situ, fixed laboratory, etc.) are described in the Construction Quality Control Plan. Table 2-1 summarizes the objective and basis of the statistical sampling design developed.

Table 2-1. Summary of Statistical Sampling Design Basis

Primary Objective of Design	Detect the presence of a hot spot that has a specified size and shape
Type of Sampling Design	Hot spot accounting for false negatives
Sample Placement (Location) in the Field	Systematic (Hot Spot) with a random start location
Formula for calculating number of sampling locations	Algorithm developed by Sego and Wilson
Type of samples	Point Samples

Primary Sampling Objective

The primary purpose of sampling at this site is to detect "hot spots" (local areas of residual ash presence) of a given size and shape with a specified probability, 1-β. Residual ash presence is defined as more than 50% ash as determined by polarized light microscopy in a sample.

Selected Sampling Approach

The statistical sampling design was developed using Visual Sample Plan (VSP). VSP is a software tool developed for the U.S. Department of Energy that supports the development of a defensible sampling plan based on statistical sampling theory and the statistical analysis of sample results to support confident decision making. VSP couples site and sample location visualization capabilities with optimal sampling design and statistical analysis strategies. This design was produced using Visual Sample Plan (VSP) software version 5.3. Software and documentation are available at http://dqo.pnl.gov/vsp. Software copyright 2010 Battelle Memorial Institute.

This sampling approach requires systematic grid sampling with a random start. If a systematic grid is not used, the probability of detecting a hot spot of a given size and shape will be different than desired or calculated.

Assumptions that Underlie the VSP Method for Locating a Hot Spot

1. The shape of the hot spot of concern is circular.
2. The level of contamination (presence of ash) that defines a hot spot is well defined.
3. The location of the hot spot is unknown, and if a hot spot is present, all locations within the sampling area are equally likely to contain the hot spot.
4. Samples are taken on a square, rectangular or triangular grid pattern.
5. Each sample is collected, handled, measured or inspected using approved methods that yield unbiased and sufficiently precise measurements.
6. A very small proportion of the surface being studied will be sampled (the sample is much smaller than the hot spot of interest).
7. Sample locations are independent of the measurement process.

8. The systematic grid is placed at a randomly determined starting place to cover the surface area of interest.
9. There are no false positives (a clean area is not mistakenly identified as a hot spot).
10. The false negative error rate is known and is the same for all measurements.

For quantitative samples, the false negative error rate is the probability that a sample measurement indicates that ash is present below the acceptable threshold, when, in fact, it is at or above the threshold. For presence/absence measurements, the false negative error rate is the probability the sample does not detect ash when it is present.

Calculation Equation and Inputs

The algorithm used to calculate the grid size (and hence, the statistical number of samples) is based on work by Sego and Wilson, which builds upon the approach developed by Singer and Wickman for locating geologic deposits [see Sego and Wilson (2007), Singer and Wickman (1969) and Hassig et al. (2004) for details]. Inputs to the algorithm include the radius of the circular hot spot of interest, an acceptable probability of finding a hot spot, the false negative error rate, and the desired type of sampling grid. For this design, the inputs to the algorithm and are summarized in Table 2-2.

Table 2-2. Input Parameters to the Calculation

Input Parameter	Description	Value
1-β	Probability of detection	90%
η	Probability of a false negative error	0%
Grid Type	Grid pattern (Square, Triangular or Rectangular)	Square
Hot Spot Size	Radius of hot spot	71 feet
Hot Spot Area [a]	Area of hot spot (Radius^2 * π)	16,000 ft^2
Sampling Area	Total area to sample	2,066,000 ft^2

[a] Radius of the hot spot is used by the algorithm. Hot spot area is provided for informational purposes.

The total sampling area is the area of the north embayment. A hot spot area of 16,000 square feet was chosen to match the target hot spot that had been used for the east embayment during the time-critical removal action.

Calculation Outputs

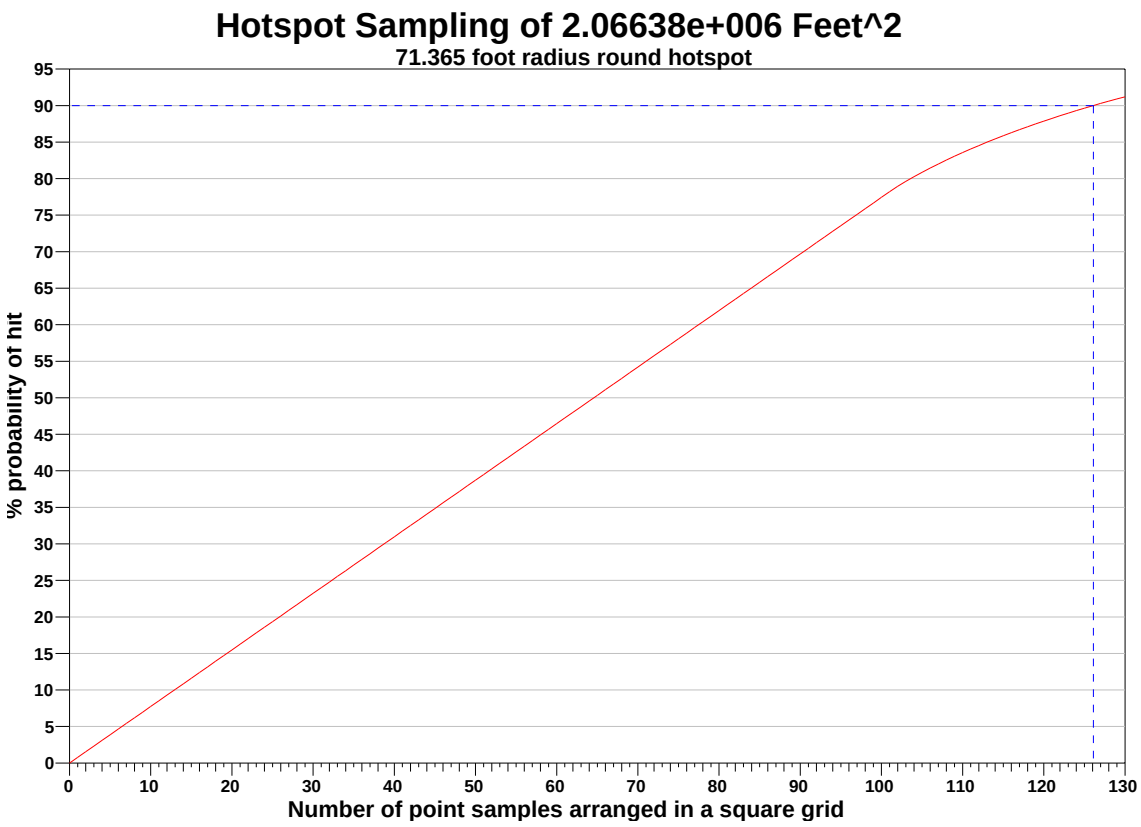
Outputs from the calculation algorithm include the grid size, grid area, and optimum number of samples. For this design, the outputs from the algorithm are summarized in Table 2-3.

Table 2-3. Output Parameters from the Calculation

Output Parameter	Description	Value
Grid Size[a]	Spacing between samples	128 feet
Grid Area[a]	Area represented by one grid	16,000 ft^2
Samples[b]	Optimum number of samples	126

[a] Size of grid / Area of grid gives the linear and square dimensions of the grid spacing used to systematically place samples.
[b] The optimum number of samples is calculated by dividing the sampling area by the grid area.

The following graph shows the relationship between the number of samples and the probability of finding the hot spot. The dashed blue line shows the actual number of samples for this design (which may differ from the optimum number of samples because of edge effects).



Sensitivity Analysis

The sensitivity of the calculation of number of samples was explored by varying the false negative error rate (%), radius of the hot spot and total sampling area. Table 2-4 shows the results of this analysis.

Table 2-4. Results of Sensitivity Analysis

		Number of Samples		
		Area=1.03319e+006	**Area=2.06638e+006**	**Area=3.09957e+006**
η=0	**r=35.6825**	253	505	757
	r=71.365	64	127	190
	r=107.047	29	57	85
η=5	**r=35.6825**	282	564	846
	r=71.365	71	141	212
	r=107.047	32	63	94
η=10	**r=35.6825**	320	640	959
	r=71.365	80	160	240
	r=107.047	36	72	107

η = False Negative Error Rate (%)
r = Radius of the Hot Spot
Area = Total Sampling Area

Recommended Sampling Design

Based on the statistical results from VSP calculations, a 100-ft spacing between grid points is recommended (approximately four samples per acre). This number may differ from the calculated number because of 1) grid edge effects, 2) adding judgment samples, or 3) selecting or unselecting sample areas. The recommended spacing results in somewhat greater numbers of samples over the area of the north embayment.

A map of the actual sample locations will be generated so that the sampling plan and the field implementation may be compared. Deviations from planned sample locations due to topographic, vegetative, or other features will be noted. Their impacts will be qualitatively assessed. If a hot spot is discovered, additional sampling may be performed to determine its size and shape, in which case, the initial assumptions of the sampling design may then be assessed and/or reconsidered.

References

EPA 2006. *Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S*, EPA/240/B-06/003, U.S. Environmental Protection Agency, Office of Environmental Information, Washington DC.

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Hassig, N.L., J.E. Wilson, R.O. Gilbert and B.A. Pulsipher. 2004. *Visual Sample Plan Version 3.0 User's Guide*. PNNL-14970. Pacific Northwest National Laboratory, Richland, WA, December 2004.

Sego, L.H. and J.E. Wilson. 2007. *Accounting for False Negatives in Hot Spot Detection*. PNNL-16812. Pacific Northwest National Laboratory, Richland, WA, August 2007.

Singer, D.A. and J.E. Wickman. 1969. *Probability Tables for Locating Elliptical Targets with Square, Rectangular, and Hexagonal Point Nets*. Pennsylvania State University, University Park, Pennsylvania. Special Publication 1-69.

Tennessee Valley Authority
Regulatory Submittal for Kingston Fossil Plant

Documents submitted:
Non-Time- Critical Removal Action for the Swan Pond Ash Removal (Phase 1) Removal Design Package Rev. 3 (Revised Drawings only)

Date Submitted:
10/14/2010

Submitted to whom
Craig Zeller, EPA

Concurrence

Received	Not Applicable	TVA
☒	☐	Steve McCracken
☐	☒	Kathryn Nash
☒	☐	Steve Cherry
☒	☐	Michelle Cagley

Received	Not Applicable	Jacobs
☒	☐	Jack Howard
☒	☐	Butch Parton
☐	☐	_____
☐	☐	_____
☐	☐	_____

Approvals

TVA _____ Date 10/14/10

EPA _____ Date 10/27/10

AFTER CONSULT W/ TDEC

cc:

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☒ EDM
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☒ 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

Document No. RDP-0112-A

Kingston Ash Recovery Project
Non-Time-Critical Removal Action for the
Swan Pond Embayment Ash Removal (Phase 1)
Removal Design Package

Prepared by:
Jacobs

for the Tennessee Valley Authority

Revision	Description	Date
0	Phase 1 Removal Design Package for TVA Review	July 8, 2010
1	Phase 1 Removal Design Package for Regulatory Review	July 29, 2010
2	Phase 1 Removal Design Package for Approval	Sept. 16, 2010
3	Phase 1 Removal Design Package Drawings Replacement	Oct. 12, 2010

NORTH EMBAYMENT

SWAN POND CIRCLE BRIDGE/ HAUL ROAD UNDERPASS

SWAN POND CIRCLE ROAD

CLEAN WATER DITCH

WEST EMBAYMENT

CLEAN WATER DITCH

EAST EMBAYMENT

WEST STORAGE AREA

N 557978.68
E 2440725.42
INV 751.8

NEW CULVERT

CLEAN WATER DITCH

SETTLING AREA 1 & 2

DIKE 2

MAP

BYPASS ROAD

NORTH EMBAYMENT AREA HAUL ROAD

PC 165+13.58

NORTH DREDGE CELL

N 557261.78
E 2440007.48
INV 757.4

SWAN POND HAUL ROAD

WEST HAUL ROAD

TEST FILL HAUL ROAD

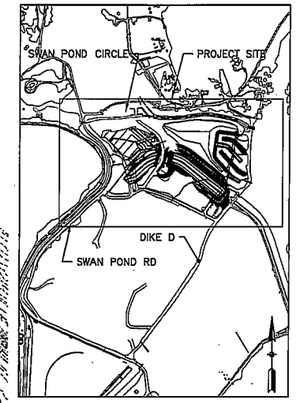
EAST/WEST HAUL ROAD

CENTRAL DREDGE CELL

DIKE D

DIKE D

PLAN
SCALE: 1"=100'



KEY PLAN
NOT TO SCALE

0 100' 200' 300'

DOCUMENT CONTROL NO. RDP-0112-A_rev_0

REVISION NO.	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED
	10/11/10				
A	09/15/10	ISSUED FOR REVIEW	JGA	GD	JH

SEAL

JACOBS

KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

SWAN POND EMBAYMENT ASH REMOVAL
CENTRAL DREDGE CELL
PHASE 1 EXCAVATION

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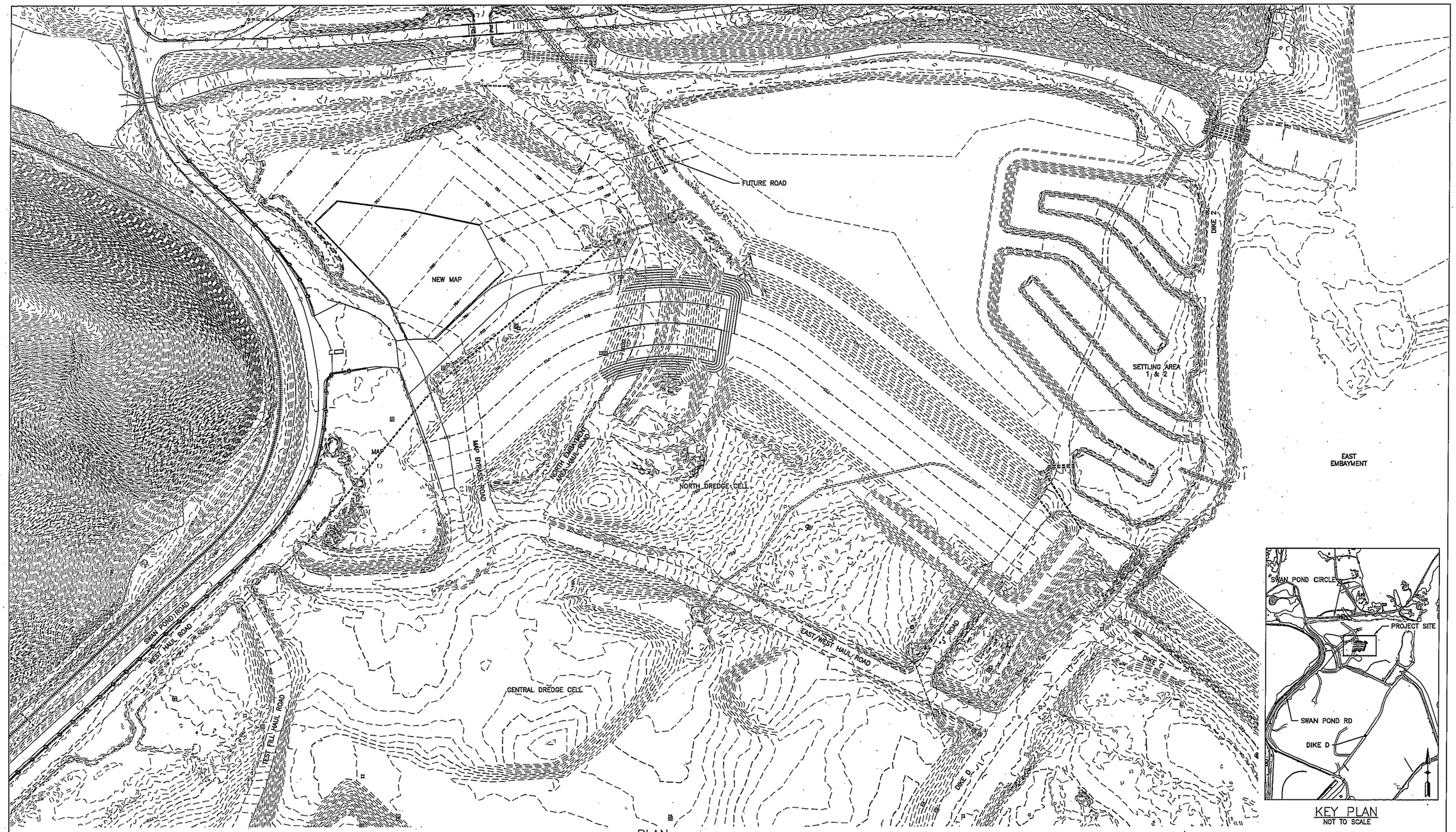


PLAN
SCALE: 1"=100'

KEY PLAN
NOT TO SCALE

0 100' 200' 300'

REVISION NO.	DATE	DESCRIPTION	DRAWN BY	DESIGNED BY	APPROVED BY
A	10/11/10	ISSUED FOR REVIEW	SCA	GW	

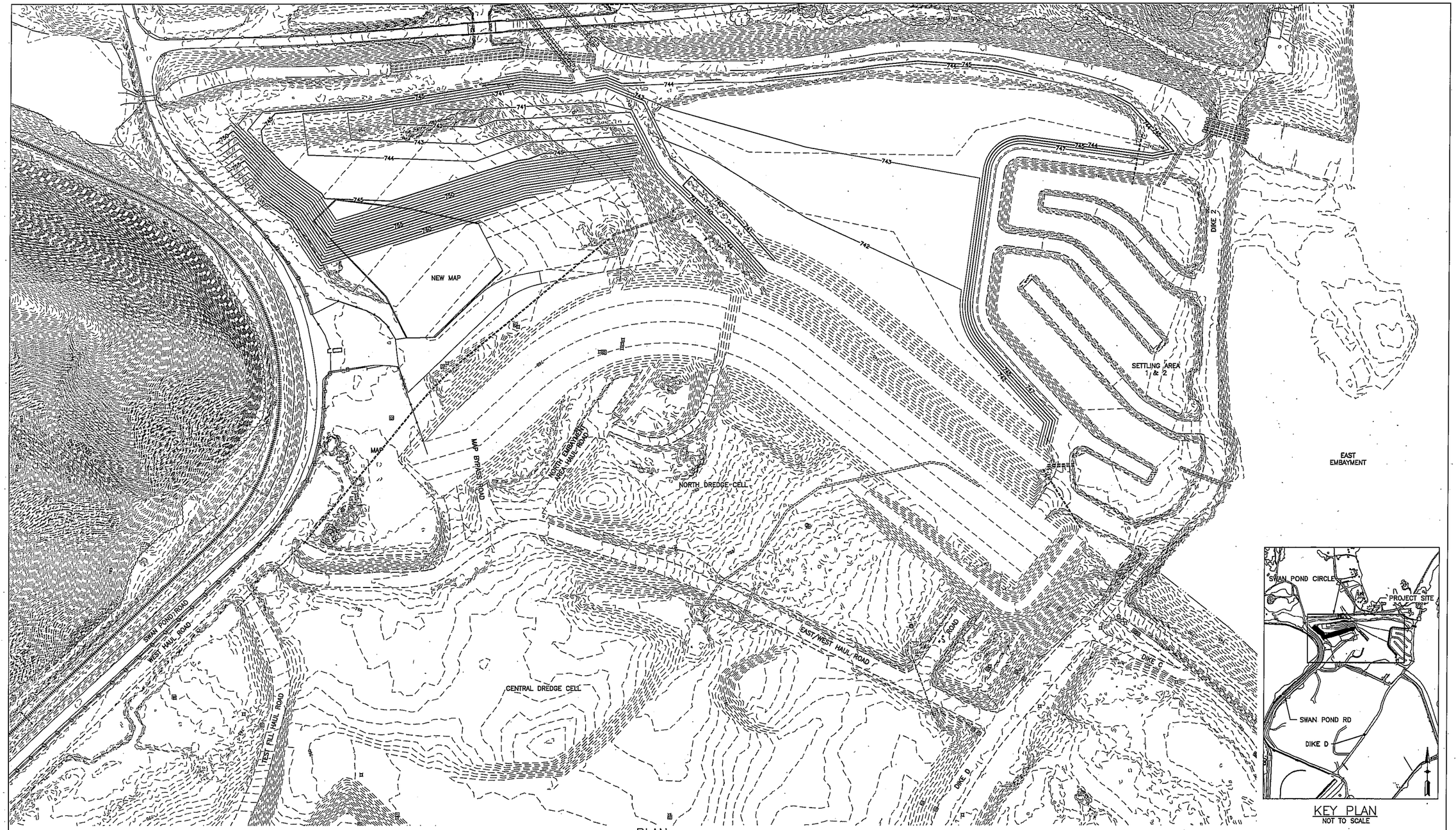
SEAL

JACOBS

KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

SWAN POND EMBAYMENT ASH REMOVAL
NORTH DREDGE CELL
PHASE 1A EXCAVATION

SCALE	DRAWING NO.	REV.
SHOWN	FD-SK-013	A



PLAN
SCALE: 1"=100'

KEY PLAN
NOT TO SCALE

0 100' 200' 300'

REV.	DATE	DESCRIPTION	DRAWN BY	DESIGNED BY	APPROVED BY
A	10/11/10	ISSUED FOR REVIEW	JGF	GW	

SEAL

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KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

SWAN POND EMBAYMENT ASH REMOVAL
NORTH DREDGE CELL
PHASE 2 EXCAVATION

SCALE	DRAWING NO.	REV.
SHOWN	FD-SK-014	A