

Dike D Interim Stability and Maintenance Plan TVA Kingston Fossil Plant Harriman, Roane County, Tennessee

Stantec Consulting Services Inc. One Team. Infinite Solutions

1409 North Forbes Road Lexington KY 40511-2050 Tel: (859) 422-3000 • Fax: (859) 422-3100 www.stantec.com Prepared for: Jacobs-Kingston Team Harriman, Tennessee

August 7, 2009



Stantec Consulting Services Inc. 1409 North Forbes Road Lexington KY 40511-2050 Tel: (859) 422-3000

Fax: (859) 422-3100

August 7, 2009

rpt_003_171468117

Mr. Tod Woodson Jacobs Project Manager Kingston Fossil Plant 1134 Swan Pond Road Harriman, Tennessee 37748

Re:

Final Report

Dike D Interim Stability and Maintenance Plan

TVA Kingston Fossil Plant

Harriman, Roane County, Tennessee

Dear Mr. Woodson:

As requested, Stantec Consulting Services Inc. (Stantec) has completed our Report of Interim Stability and Maintenance Plan for Dike D at the Kingston Fossil Plant. The report documents the subsurface conditions, results of laboratory testing, findings from the historical document reviews and emergency buttress operations, results of our analyses and evaluation, and recommendations for the structure. These services were performed under TVA's Engineering Service Request ESR/TAO 621, in accordance with the terms and provisions established in our System-Wide Services Agreement dated December 22, 2008.

Stantec appreciates the opportunity to provide engineering services for this project. If you have any questions, or if we may be of further assistance, feel free to contact our office.

Sincerely,

STANTEC CONSULTING SERVICES INC.

Don W. Fuller III, PE

Principal

/rdr

Enclosures: 0

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Dike D Interim Stability and Maintenance Plan TVA Kingston Fossil Plant Harriman, Roane County, Tennessee

1. Introduction and Background

The following report documents an interim assessment and maintenance plan associated with the Dike D structure in response to a specific request by the Environmental Protection Agency (EPA). The EPA request was for the Tennessee Valley Authority (TVA) to provide a short term evaluation of the stability of Dike D as well as recommendations relative to development of an engineering monitoring and maintenance plan to be executed during the recovery phase of the December 2008 Kingston dredge cell failure. As designated by TVA this analysis assumes the short term recovery period extends two years. This report evaluates the current facility geometry including the initial emergency mitigation buttress and provides recommendations relative to short term facility monitoring, maintenance and reporting.

The December 22, 2008 dredge cell incident resulted in collateral impacts to the adjacent Dike D embankment structure which forms the western limits of the remaining facility ash pond. Observations by Stantec Consulting Services Inc. (Stantec) personnel beginning on December 22nd indicated that the northernmost portion of the Dike D structure exhibited numerous longitudinal and transverse cracks at the ground surface and the western slopes along nearly the entire length were left in a near vertical scarp configuration. The reference scarps delineated the eastern limits of the dredge cell mass failure. As part of TVA's emergency response team, Stantec was directed to oversee Dike D damage mitigation engineering. These efforts included short term monitoring, geotechnical evaluation, short term mitigation engineering and oversight of associated buttress construction. Documentation of the initial mitigation engineering program is presented in the Stantec report titled: "Dike D Buttress Construction and Slope Inclinometers" dated June 23, 2009. A general Kingston facility layout is illustrated in Figure 1.

2. Design and Construction

The Dike D design knowledgebase has been formed from available information which consists of historical TVA design drawings, operations manuals, Quality Control (QC) plans, related aerial photographs, topographic mapping, annual TVA inspection reports and direct conversations with TVA personnel. The northern limits of the dike for a distance of roughly 800 feet extending south from the Dike C intersection was formed in the early 1980s as part of the initial dredge cell operations. Available information indicates this segment was part of a series of transitional deflector dikes and divider dikes which eventually formed the eastern limits of the dredge cell in this area. The original dike structure which was predominantly west of the current alignment failed in 1984 as a result of foundation undermining associated with dredging and was later reconstructed. The remaining structure alignment which extends to the south side of the ash pond was completed in 2004 to form the intermediate or emergency dredge cell as shown in TVA's 10W425 series of design drawings. These drawings indicate the dike was to be constructed with an initial 30-foot wide crest and 3:1 (Horizontal: Vertical) outslopes. In association with dredge cell development the original starter dike was overlain by a series of incremental dikes. These overlying dikes were predominantly lost during the 2008 dredge cell failure.



Dike D Interim Stability and Maintenance Plan TVA Kingston Fossil Plant



Dike D Photos.ppt JSD

Figure 1. Kingston Fossil Plant Dredge Cell Failure (photo from TVA)

Historical construction records associated with Dike D are primarily limited to general information presented in TVA annual inspection reports. No formal as-built drawings for the dike have been identified to date. Operational plan narratives related to development of the dredge cell dike system indicate that the dikes were to be constructed from compacted bottom ash and fly ash.

Emergency buttress construction is documented within the June, 2009 Stantec report previously referenced. Dike D western slope grading operations south of the emergency buttress was performed independently by TVA in association with the recovery efforts. It is understood that the overlying incremental dike relics left in place following the dredge cell failure were removed and used as fill for these grading operations.

Dike D geometry currently consists of an approximate 2,800 foot long structure with an elevation profile along the dike crest ranging from 774 feet along the northernmost 800 foot long segment to elevation 780 feet to the south. Crest width ranges from roughly 20 to 80 feet and outslopes range from roughly 2:1 (Horizontal: Vertical) to 4:1.

Engineering observations, monitoring and mitigation construction immediately following the dredge cell failure began with periodic monitoring, construction of a clay soil surface veneer to reduce precipitation infiltration and installation of slope inclinometers along the crest of the dike. Following these initial actions, a western outslope buttress was constructed along the northern limits of the dike. Buttress construction included strategic use of limestone aggregates and geotextiles to form a base stabilization zone. Geotechnical instrumentation was then installed to monitor the foundation materials and embankment performance during construction. The main buttress embankment was constructed through controlled placement of bottom ash materials. The completed bottom ash grade was then covered with clay soils to reduce the potential for surface water infiltration and erosion. Two relic drainage pipes oriented roughly perpendicular to the dike within the buttress construction zone were also abandoned in place through grouting. Detailed information regarding buttress construction documentation and as-built data is presented in the previously referenced report.

3. Stability Assessment

The short term assessment of Dike D stability includes a seepage analysis, slope stability analysis and consideration of key site observations made in association with the work to date. Information available for use in this evaluation includes pertinent exploratory boring logs, laboratory testing and geotechnical instrumentation data from the published AECOM report titled "Root Cause Analysis of TVA Kingston Dredge Pond Failure from December 22, 2008" dated June 25, 2009, recent Stantec geotechnical exploration and testing results as well as historical studies present in the facility records.

3.1. Slope Stability Analysis

The analysis presented herein consists of an assessment of the global slope stability for the existing Dike D configuration under temporary (less than two years), drained, static loading conditions. Slope stability analyses were performed at Dike D baseline Stations 6+50 and 21+50. The locations of these cross sections are illustrated on the drawing titled "Interim Dike D Assessment – Exiting Conditions and Baseline Layout" presented in Appendix A. The purpose of the slope stability analysis is to determine if the existing Dike D geometry and foundation conditions provide adequate factors of safety under the prescribed interim conditions.

For this analysis, the Dike D components are as follows:

- Shale Bedrock
- Fine Grained Sand to Sand with Silt
- Sandy Silt to Silty Sand
- Lean Clay Foundation Soil
- Sensitive Silt/Clay
- Hydraulically and Mechanically Placed Ash
- Constructed Ash
- Stone Base Layer
- Cover Soil

A summary of the general engineering classification and assigned slope stability shear strength parameters associated with these materials are outlined below. Note the materials are listed in order from the base of the stability section to the ground surface.

Shale Bedrock. Available information indicates bedrock immediately underlying the structure consists of the Conasauga Shale formation. This shale has a relatively high strength consistency in relation to the overlying native soils and forms the lower boundary of the stability model.

Fine Grained Sand to Sand with Silt. Located above the shale bedrock is a layer of relatively dense, fine to medium grained sand that is predominately classified as SP-SM and SP according to the Unified Soil Classification System (USCS). Based on a correlation of site specific Standard Penetration Test (SPT) data to shear strengths, this material was modeled with a friction angle of 31 degrees and zero cohesion.

Sandy Silt to Silty Sand. The sandy silt to silty sand layer consists of loose materials that are predominately classified as ML and SM according to the USCS. Based on a correlation of site specific Standard Penetration Test (SPT) data to shear strengths, this material was modeled with a friction angle of 27 degrees and zero cohesion.

Lean Clay Foundation Soil. The lean clay foundation soil layer consists of materials that are predominately classified as CL and CL-ML according to the USCS. Based on the results of site specific direct shear and triaxial testing, this material was modeled with a friction angle of 30 degrees and zero cohesion (conservatively neglecting the measured cohesion).

Sensitive Silt/Clay. The sensitive silt/clay layer consists of a relatively thin (~0.5 to ~2.0 foot) zone of silts and clays or in some cases a reported combination of clayey silts thinly interbedded with very fine flyash potentially located at the base of the ash pond materials. Based on the results of recent site specific testing this material was conservatively modeled with a friction angle of 28 degrees and zero cohesion (neglecting measured cohesion).

It should be noted that the currently limited subsurface data along the Dike D corridor does not fully verify the presence of this material. Varying forms of this material have been recently noted by AECOM in association with the dredge cell root cause analysis study and by Stantec in association with the ongoing Dike C stability evaluation. It is anticipated that operational variables such as the limits of historical pond dredging and physical location

within the ash pond in relation to the sluice discharge points will limit the presence of the material to specific pond zones. It is anticipated that future confirmation borings performed in association with the dredge cell closure design will define the aerial extent of the material as necessary. For the purpose of this evaluation, the sensitive silt/clay layer was included within the stability model as a contingency to provide conservative results without requiring additional intrusive sampling and analysis at this time.

Hydraulically and Mechanically Placed Ash. The hydraulically and mechanically placed ash layer consists of bottom ash and fly ash materials that were placed using hydraulic or mechanical methods. The sluiced and mechanically placed ash layer was conservatively modeled as one material with a friction angle of 25 degrees and zero cohesion based on available test data and Stantec's experience with similar materials and placement conditions.

Constructed Ash. The constructed ash layer consists of bottom ash materials placed within the dredge cell using mechanical methods. The constructed ash layer was modeled with a friction angle of 30 degrees and zero cohesion based on available test data and Stantec's experience with similar materials and placement conditions.

Stone Base Layer. The stone base layer consists of materials placed during recent Dike D buttress construction activities. These materials were placed as a drainage layer below the constructed bottom ash buttress against the Dike D embankment between approximate baseline Stations 1+00 and 8+00. The stone base layer was modeled with a friction angle of 38 degrees and zero cohesion.

Cover Soil. The cover soil layer consists of materials placed over the bottom ash buttress constructed against the Dike D embankment. The cover soil layer was modeled with a friction angle of 24 degrees and zero cohesion based on information presented in <u>Foundations and Earth Structures</u>, Naval Facilities Engineering Command (NavFac), Design Manual 7.1, Department of the Navy, May 1982.

A summary of the shear strength parameters used in the global slope stability analysis is presented in the table below. As discussed above, these values are based on site-specific testing, published information and Stantec's experience with similar materials.

Table 1. Summary of Effective Stress Shear Strength Parameters
Used in the Global Slope Stability Analysis

Component	Unit Weight γ (pcf)	Cohesion/Adhesion \overline{c} (psf)	Internal Friction Angle (°)
Fine Grained Sand to Sand with Silt	118	0	31
Sandy Silt to Silty Sand	105	0	27
Lean Clay Foundation Soil	129	0	30
Sensitive Silt/Clay	127	0	28
Hydraulically and Mechanically Placed Ash	96	0	25
Constructed Ash	93	0	30
Stone Base Layer	105	0	38
Cover Soil	120	0	24

Modeling Methodology

Slope stability calculations were performed using SLOPE/W[®] 2007, a slope stability program developed by GEO-SLOPE International, Ltd. The Spencer Method was used to compute the factor of safety for the considered failure surfaces. An optimization process was then conducted to obtain the critical failure surface. The phreatic surface was positioned based on a review of Dike D piezometer readings, boring logs and seepage analysis results.

Slope Stability Analysis Results

The results of the static slope stability analyses under drained conditions for sections located at Dike D baseline Stations 6+50 and 21+50 indicate factors of safety of 1.9 and 1.5, respectively. Graphical plots of these results are provided in Figures 2 and 3 below.

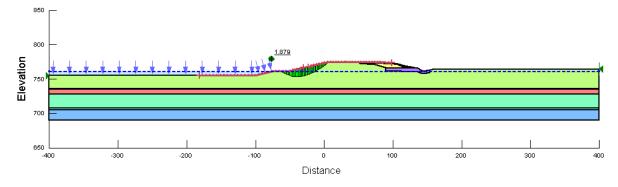


Figure 2. Stability Section – Station 6+50

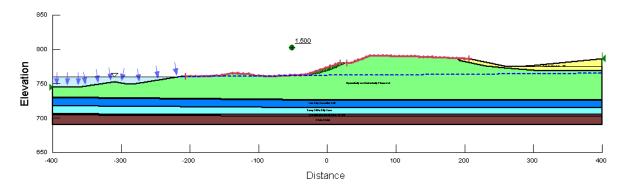


Figure 3. Stability Section – Station 21+50

3.2. Seepage Analysis

Presented herein are the results of the seepage analysis performed for the controlling conditions anticipated at Station 21+50. The objective is to provide an evaluation of anticipated seepage conditions as it relates to the short term stability of the Dike D structure.

The steady state analysis was performed using the computer program SEEP/W (GEO-SLOPE International Ltd). The tailwater (main ash pond side) elevation was assumed at El. 760 feet. The headwater (dredge cell side) elevation was conservatively assumed at El. 765 feet.

Since the phreatic surface will be calculated from the analysis based on the applied boundary conditions, the saturated/unsaturated SEEP/W model was selected for all soils. Both volumetric water content function and hydraulic conductivity function were projected for each material.

The volumetric water content function of each soil was estimated using the SEEP/W built-in sample functions. Soil type and the saturated water content along with the minimum and maximum suctions were the input parameters. The saturated water content, as summarized in Table 1, was determined based on the soil void ratios. The default suctions (max. = 1,000 pounds per square foot (psf) and min. = 0.01 psf) were used in the analysis. The defined volumetric water content functions are shown in Figure 4.

The volumetric water content functions were then used in conjunction with the saturated hydraulic conductivities (k_{sat}) to define the hydraulic conductivity functions. The k_{sat} values used in the analysis are also presented in Table 2. A typical k_{sat} value was assumed for a soil based on the soil type per the guidelines presented by Milton E. Harr, <u>Groundwater and Seepage</u>, McGraw-Hill Book Company, 1962.

The critical vertical hydraulic gradient (i_c) of a soil can be computed from the following equation:

$$i_c = \frac{G_s - 1}{1 + e}$$

Where,

 G_s = Specific Gravity of Solids

e = Void Ratio

The critical hydraulic gradient for each soil is presented in the last column of Table 2.

Table 2. Summary of Soil Parameters

Soil Horizon	Saturated	Ratio	Specific	Void	Critical	Water	metric Content	Basis
3011 110112011	k _v (cm/s)	k _h /k _v	Gravity G _s	Ratio e	Gradient i _{cr}	Saturated (%)	Residual (%)	Dasis
Sluiced and Mechanically Placed Ash	3.0e-5	50	2.31	0.85	0.71	46	0.04	Available Laboratory Data (Test Trench #3)
Silts and Sands	1.0e-5	50	2.70	0.65	1.03	39	0.01	Based on Typical Values
Silty Clay	1.0e-5	50	2.70	0.65	1.03	39	0.01	Based on Typical Values
Sensitive Silt/Ash	3.0e-5	50	2.31	0.85	0.71	46	0.04	Available Laboratory Data (Test Trench #3)
Shale	1.0e-7	10	2.60	0.25	1.28	20	0.01	Available Laboratory Data (Test Trench #3)

Constant pressure (head) boundary conditions were applied to the model. On the main ash pond side (tailwater), the head was assumed at El. 760 feet; on the dredge cell side (headwater), the head was assumed at El. 765 feet.

The finite element mesh was composed of quad and triangle elements with an approximate global element size of 5 feet. The mesh and the applied boundary conditions are shown in Figure 4.

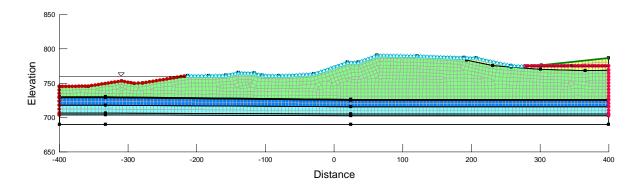


Figure 4. Finite Element Mesh and Boundary Conditions

Seepage Analysis Results

Current standard engineering practice is to design embankment systems to provide a minimum factor of safety of 3 for exit gradient as computed from the following equation:

$$FS_{eg} = \frac{i_c}{i_e} \ge 3$$

Where,

 FS_{eg} = Factor of safety for exit gradient.

 i_c = Critical vertical gradient causing flotation of the emankment material

 i_e = Maximum exit gradient computed from seepage modeling

Review of the seepage analysis results indicates that a maximum projected vertical exit gradient of 0.07 occurs on the tailwater side of the dike. This results in a factor of safety of 10.1 against seepage piping or heave failure for Sluiced and Mechanically Placed Ash which is the material with critical gradient of 0.71 presented in Table 2.

4. Conclusions and Recommendations

Visual observations and instrumentation data reviewed to date indicate that the emergency buttress system and TVA grading related to Dike D have met the objectives of short term stabilization of the structure and eliminating the physical hazards associated with the near vertical western slope scarps that resulted from the adjacent dredge cell failure.

The results of this analysis indicate that the existing Dike D configuration does provide adequate factors of safety for both global stability and steady state seepage under the designated short term two-year period for drained, steady state seepage and static loading conditions. In consideration of initial observations relative to dike strain as evidenced by the surface cracks noted immediately following the dredge cell failure it is recommended that the current facility monitoring activities be formalized into a structured program for the duration of the anticipated two-year facility recovery period. For continuity in the engineering interpretation of site conditions it is recommended that Stantec review and approve the written monitoring and maintenance program.

It is recommended that the Dike D monitoring program include monthly visual inspections and documentation as well geotechnical instrumentation monitoring, engineering review and reporting. It is anticipated that the existing geotechnical instrumentation network consisting of both slope inclinometers and piezometers will be adequate for use in this program. Pertinent geotechnical instrumentation locations, boring logs and installation details are presented in Appendix B. A draft Dike Inspection form is presented in Appendix C. The interim instrumentation monitoring and dike inspection program should be developed and supervised by a qualified professional engineer. The inspection program should include provisions for supplemental inspections to be performed at the discretion of the engineer in response to extraneous conditions such as site operations, construction activities and precipitation events.

Facility maintenance should include maintaining the dike surface to promote positive, controlled drainage and control erosion. It is recommended that sufficient roadway aggregate base designs be implemented to prevent rutting of the dike surface. Specific consideration should be given to developing and maintaining roadway surfaces that are adequate for truck traffic associated with the ash recovery operations. In addition, it is recommended that appropriate roadway side barriers be constructed to reduce the potential for vehicles to leave the roadway and overturn on dike side slopes.

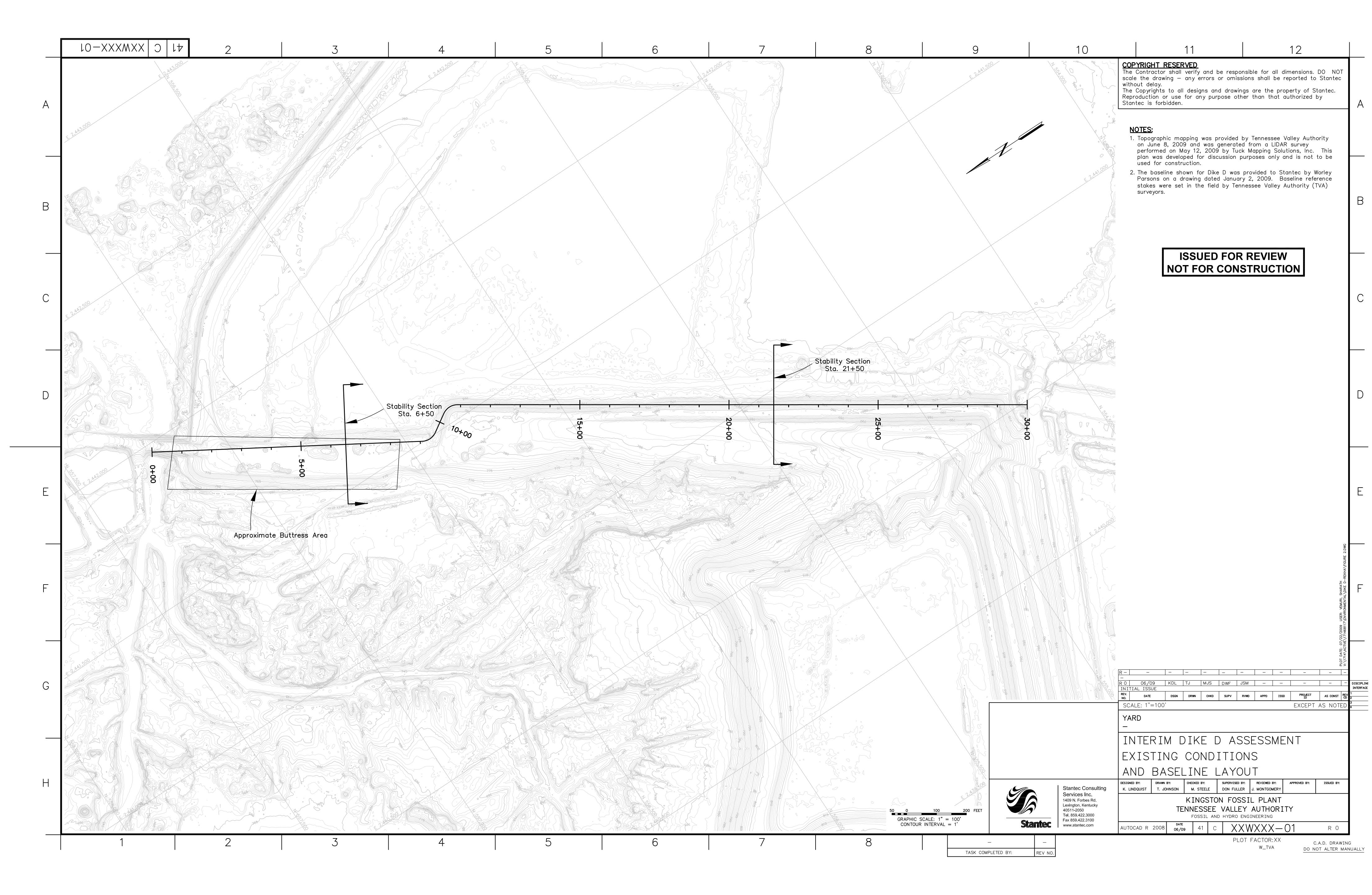
It is recommended that emergency action plans be developed for use in response to potential dike failures. The emergency action plans should include stockpiling of materials and maintaining appropriate equipment and operators at the site for dike repair wherein rapid response may reduce the overall severity, risk and recovery cost. It is recommended that emergency action plans include provisions to reduce the ash pond pool in the event of a dike emergency.

It is understood that the pending dredge cell closure plan will integrate full long term evaluation and mitigation design of Dike D as part of those design and permitting efforts.

The conclusions and recommendations presented herein were developed with the degree of care and skill normally exercised by competent members of the engineering profession. Due to the nature of the project, no warranties can be provided regarding the conditions between boring locations or the actual performance of the dike.

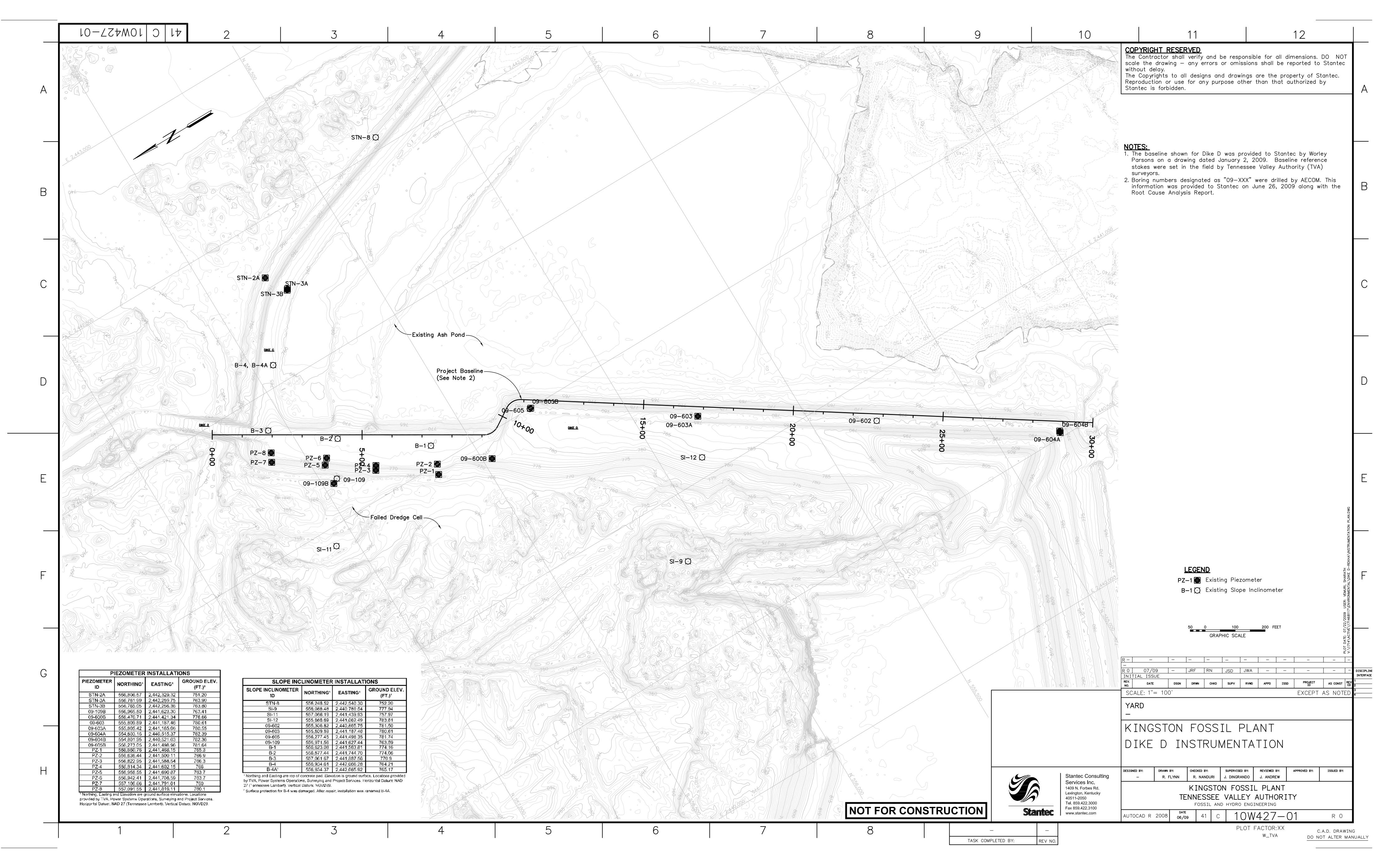
Appendix A

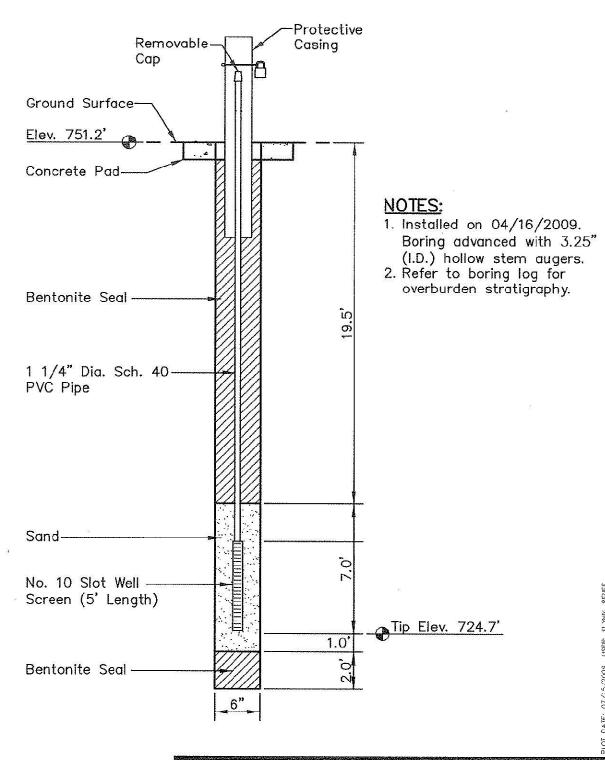
Interim Dike D
Assessment – Exiting
Conditions and Baseline
Layout Drawing



Appendix B

Geotechnical Instrumentation Location Plan, Boring Logs and Installation Details





Northing: 556,806.57 Easting: 2,442,329.32 Ground Elevation: 751.2 feet

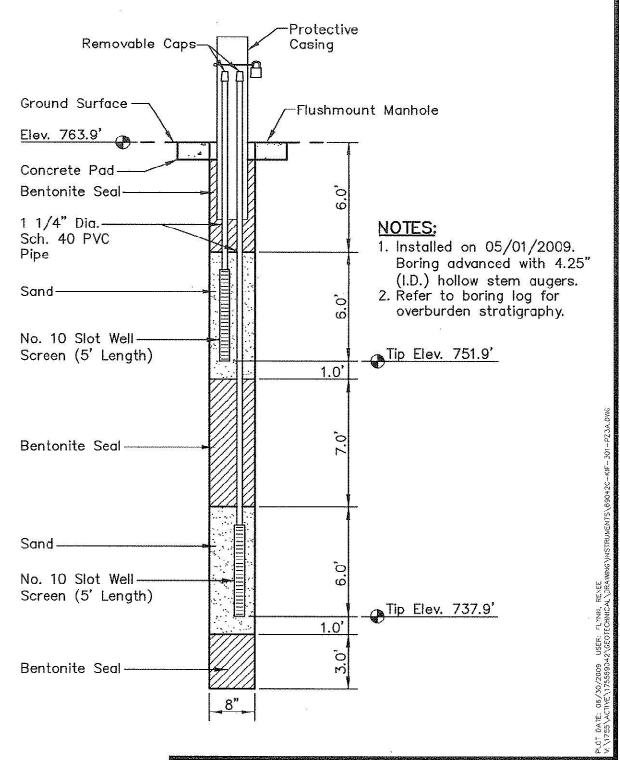
Locations to be provided by TVA, Power Systems
Operations, Surveying and Project Services.

Horizontal Datum: NAD 27 Vertical Datum: NGVD29 PIEZOMETER STN-2A ASH POND STABILITY KINGSTON FOSSIL PLANT



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 659-422-3000

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Northing: 556,761.99 Easting: 2,442,259.75 Ground Elevation: 763.9 feet

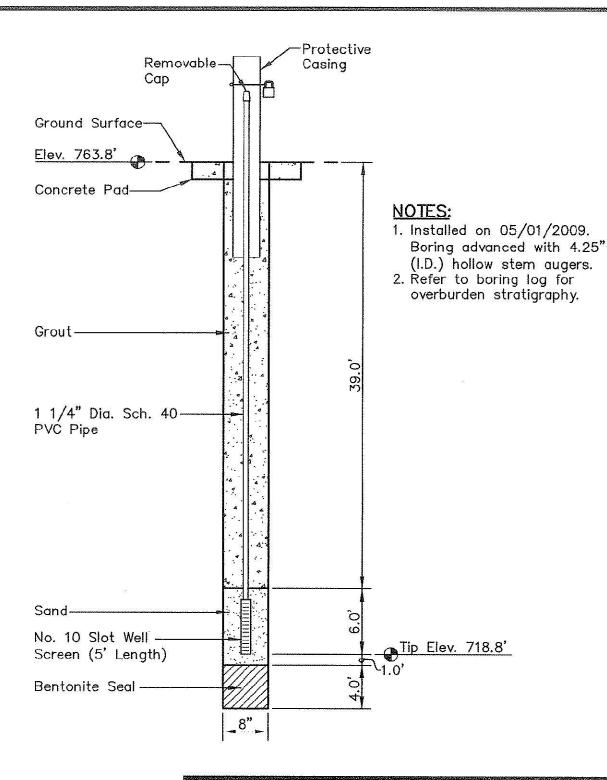
Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

Horizontal Datum: NAD 27 Vertical Datum: NGVD29 PIEZOMETER STN-3A ASH POND STABILITY KINGSTON FOSSIL PLANT



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Northing: 556,765.05 Easting: 2,442,256.36 Ground Elevation: 763.8 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.
Horizontal Datum: NAD 27

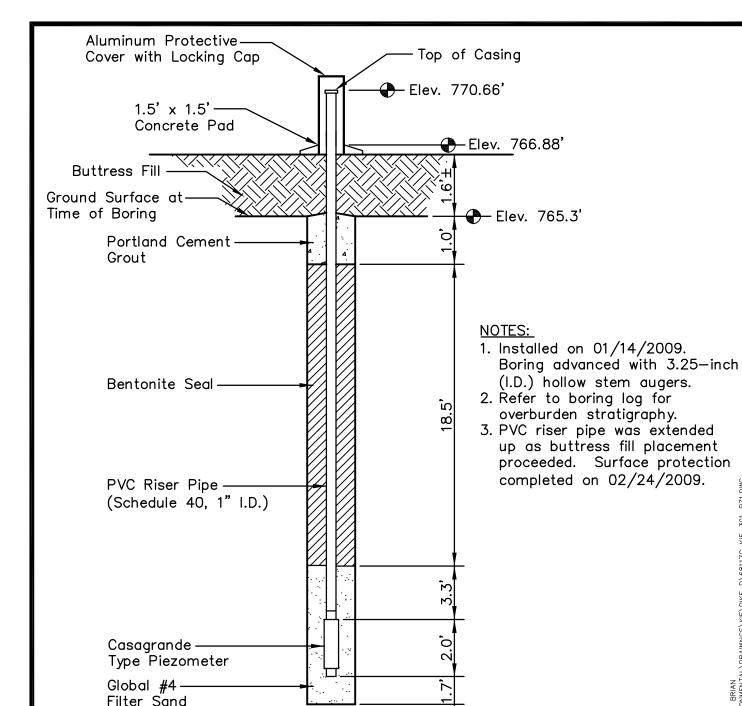
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PIEZOMETER STN-3B ASH POND STABILITY KINGSTON FOSSIL PLANT



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Northing: 556,650.76 Easting: 2,441,468.15 Elevation: 770.66'

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27

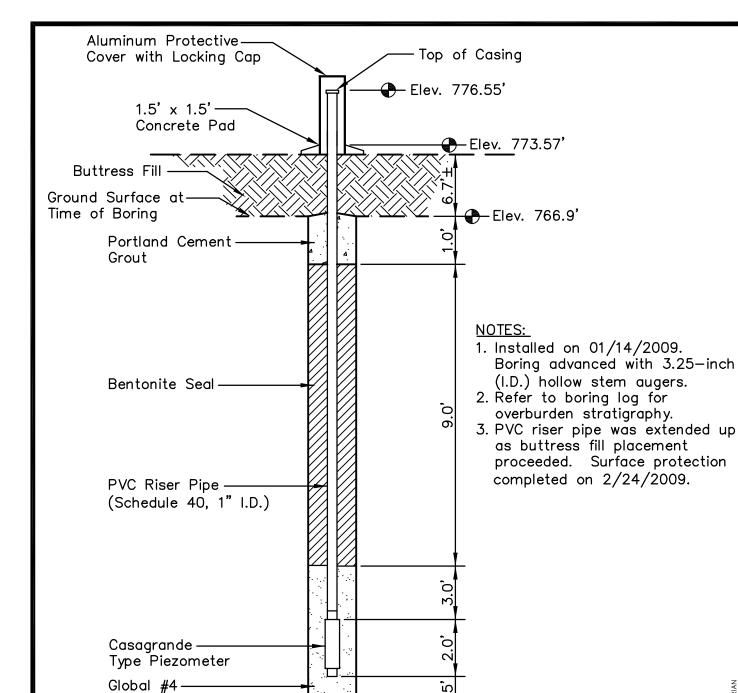
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PIEZOMETER PZ-1 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



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Filter Sand

Northing: 556,636.44 Easting: 2,441,500.11 Elevation: 776.55

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27

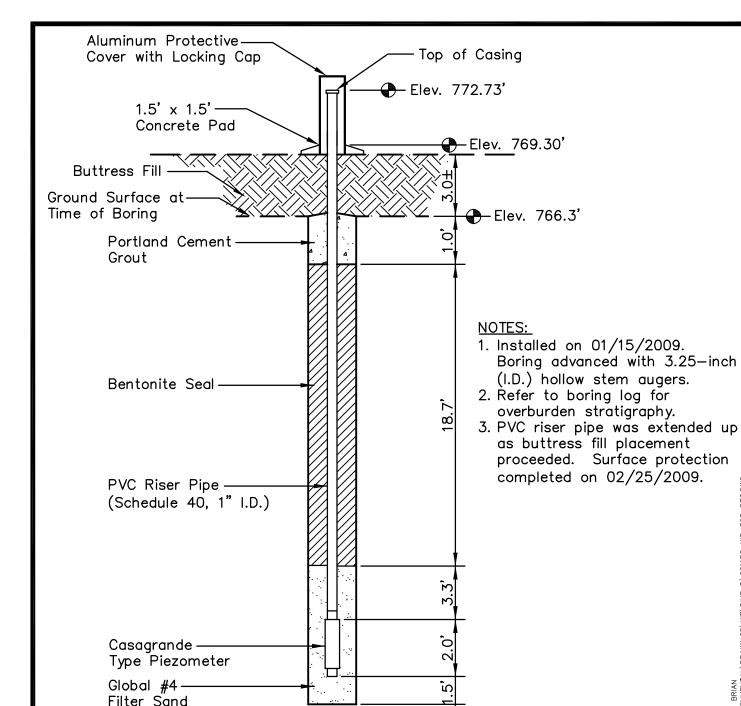
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PIEZOMETER PZ-2 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 859-422-3000

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Northing: 556,822.95 Easting: 2,441,588.54 Elevation: 772.73

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27

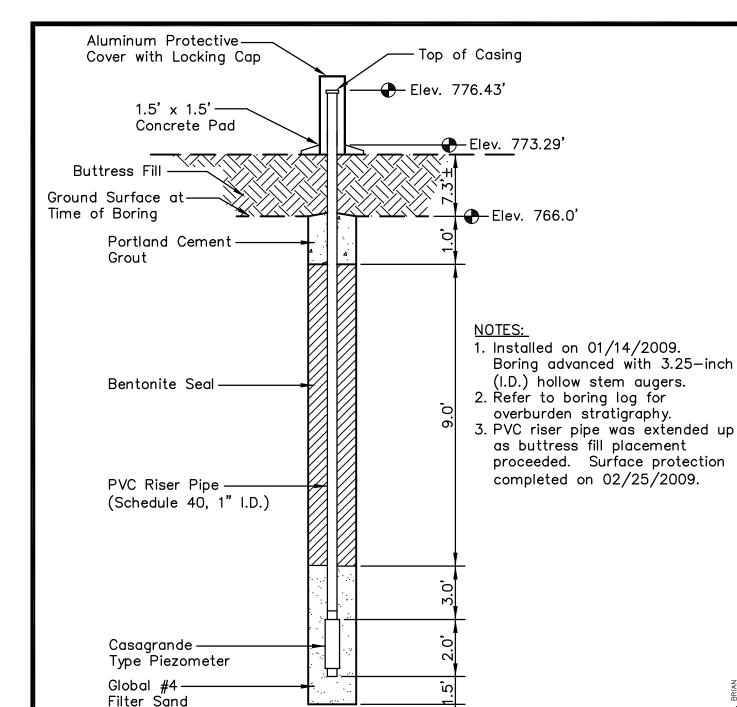
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PIEZOMETER PZ-3 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



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Northing: 556,814.34 Easting: 2,441,602.15 Elevation: 776.43

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27

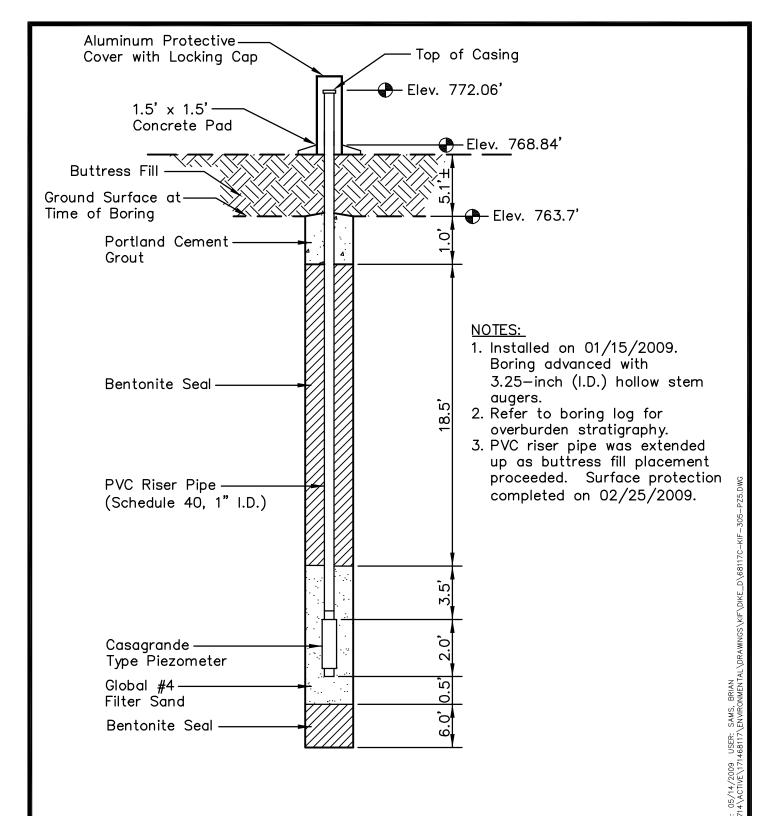
(Tennessee Lambert) Vertical Datum: NGVD29

PIEZOMETER PZ-4 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



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Northing: 556,958.55 Easting: 2,441,690.87 Elevation: 772.06'

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27

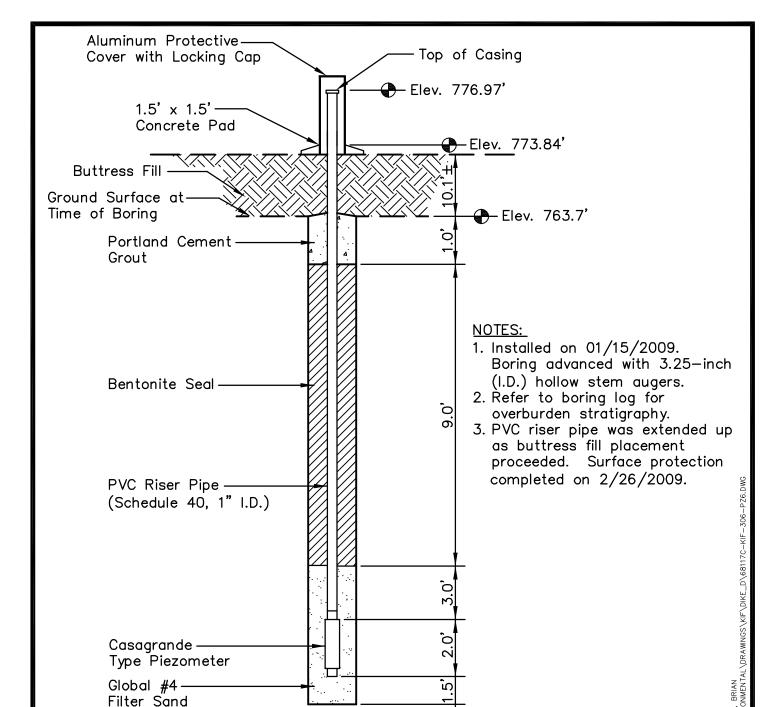
(Tennessee Lambert)
Vertical Datum: NGVD29

PIEZOMETER PZ-5 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



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Northing: 556,942.41 Easting: 2,441,708.59 Elevation: 776.97

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27

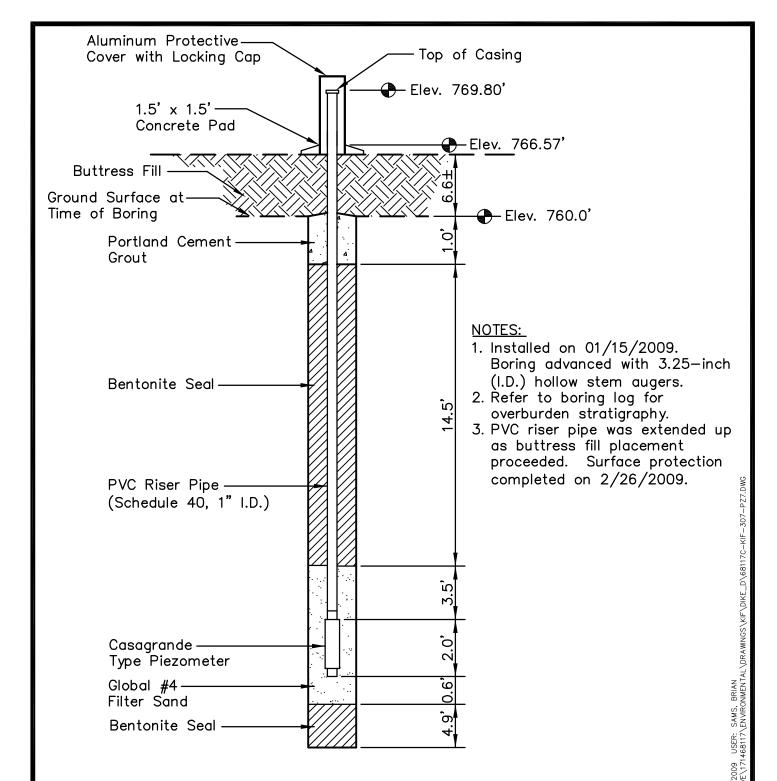
(Tennessee Lambert) Vertical Datum: NGVD29

PIEZOMETER PZ-6 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 859-422-3000

DRAWN BY	RWE	DATE	MAY,	2009	REV	ISED	SHEET	
CHECKED BY	JDE	PROJ. NO.	1714	68117	1.	3.	6 OF 8	
CHECKED BY	JSD	SCALE		NTS	2.	4.		•



Northing: 557,106.66 Easting: 2,441,791.01 Elevation: 769.80'

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27

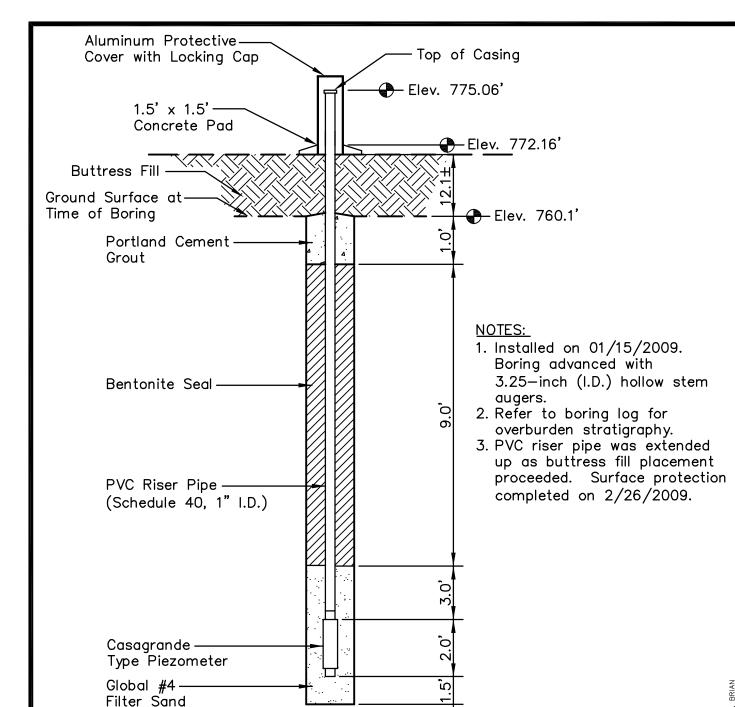
(Tennessee Lambert) Vertical Datum: NGVD29

PIEZOMETER PZ-7 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 859-422-3000

DRAWN BY	RWE	DATE	MAY,	2009	REVISED		SHEET	
CHECKED BY	JDE	PROJ. NO.	1714	68117	1.	3.		7 OF 8
CHECKED BY	JSD	SCALE		NTS	2.	4.		7 01 0



Northing: 557,091.55 Easting: 2,441,819.11 Elevation: 775.06

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27

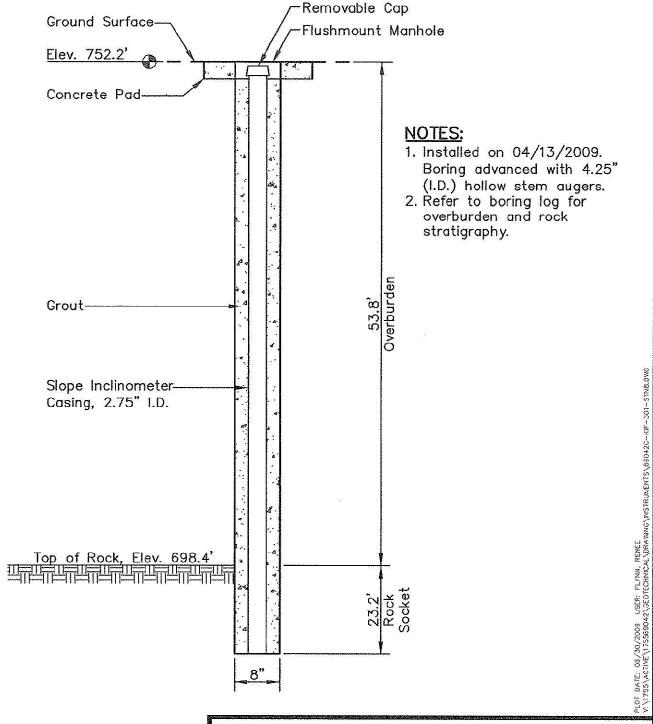
(Tennessee Lambert)
Vertical Datum: NGVD29

PIEZOMETER PZ-8 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 859-422-3000

DRAWN BY	RWE	DATE	MAY,	2009	REVISED		SHEET		
CHECKED BY	JDE	PROJ. NO.	1714	68117	1.	3.		8 OF 8	Q
CHECKED BY	JSD	SCALE		NTS	2.	4.		001	و



Northing: 556,298.52 Easting: 2,442,540.30 Ground Elevation: 752.2 feet

Locations to be provided by TVA, Power Systems Operations, Surveying and Project Services.

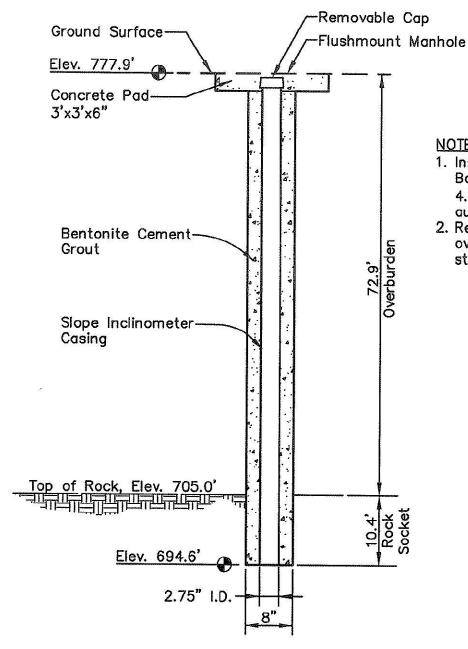
Horizontal Datum: NAD 27 Vertical Datum: NGVD29

SLOPE INCLINOMETER STN-8 ASH POND STABILITY KINGSTON FOSSIL PLANT



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 859-422-3000

CHECKED BY 7CM	475556646		
CUECUED DI TOMI	PROJ. NO.175569042	1. 3.	4 OE 4
CHECKED BY AAC S	SCALE NTS	2. 4,	TIOFI



- 1. Installed on 05/11/2009. Boring advanced with 4.25-inch (I.D.) hollow stem augers.
- 2. Refer to boring log for overburden and rock stratigraphy.

LOCATION

Northing: 556,088.48 Easting: 2,440,789.54

Vertical Datum: NGVD29

Ground Elevation: 777.9 feet

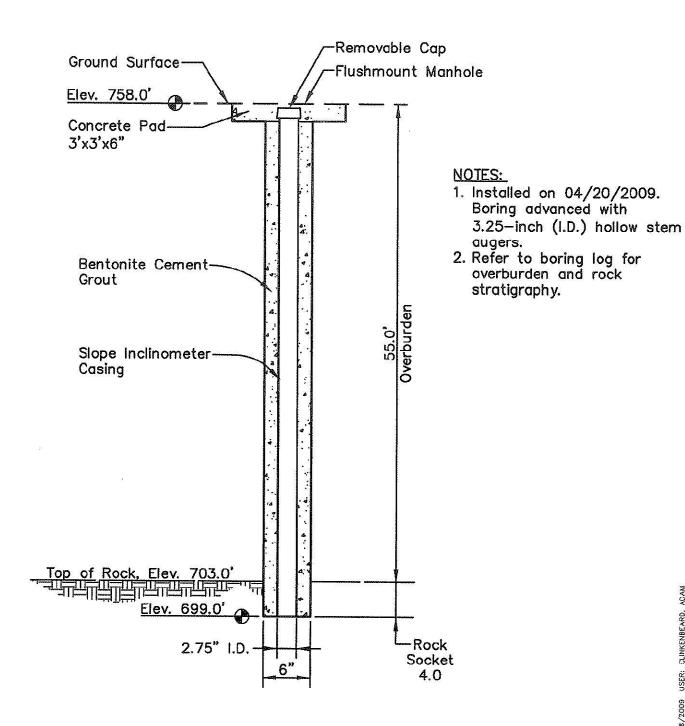
Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27 (Tennessee Lambert)

SLOPE INCLINOMETER SI-9 KINGSTON FOSSIL PLANT TEST EMBANKMENT AREA B



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 859-422-3000

DRAWN BY	PJB	DATE MAY, 2009			REVISED	SHEET		
CHECKED BY	ZCM	PROJ. NO. 17	75669015	1.	3.	1 0F 1		
CHECKED BY	AAC	SCALE	NTS	2.	4.	- IUFI		



SLOPE INCLINOMETER SI-11

KINGSTON FOSSIL PLANT

TEST EMBANKMENT AREA B

LOCATION

Northing: 557,066.19 Easting: 2,441,439.93

Ground Elevation: 758.0 feet

Locations provided by TVA,
Power Systems Operations,
Surveying and Project Services.
Horizontal Datum: NAD 27
(Tennessee Lambert)

(Tennessee Lambert) Vertical Datum: NGVD29

Stantec

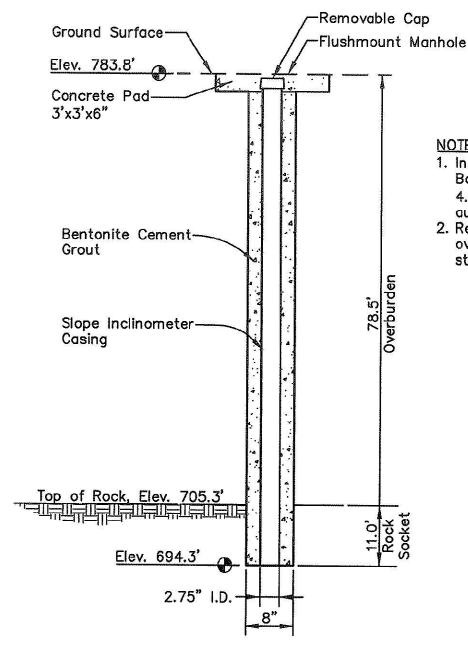
Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 859-422-3000

www.stantec.com

 DRAWN BY
 BFS
 DATE
 MAY, 2009
 REVISED
 SHEET

 CHECKED BY
 ZCM
 PROJ. NO. 175669015
 1.
 3.
 1 OF 1

 CHECKED BY
 AAC
 SCALE
 NTS
 2.
 4.



- 1. Installed on 04/21/2009. Boring advanced with 4.25-inch (I.D.) hollow stem augers.
- 2. Refer to boring log for overburden and rock stratigraphy.

LOCATION

Northing: 555,868.69 Easting: 2,441,062.49 Ground Elevation: 783.8 feet

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27 (Tennessee Lambert)

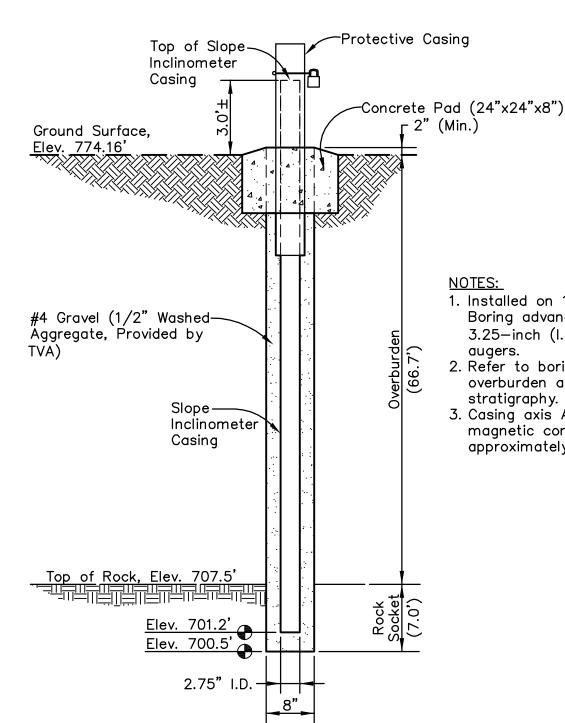
Vertical Datum: NGVD29

SLOPE INCLINOMETER SI-12 KINGSTON FOSSIL PLANT **TEST EMBANKMENT AREA B**



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 859-422-3000

DRAWN BY	BFS	DATE MAY, 2009		VISED	SHEET	
CHECKED BY	ZCM	PROJ. NO. 175669015	1.	3.		
CHECKED BY	AAC	SCALE N73	2.	4.	- I OF I	



- 1. Installed on 12/28/2008. Boring advanced with 3.25-inch (I.D.) hollow stem augers.
- 2. Refer to boring log for overburden and rock stratigraphy.
- 3. Casing axis AO oriented to magnetic compass bearing of approximately 308 degrees.

LOCATION

Northing: 556,623.08 feet Easting: 2,441,563.81 feet Ground Elevation: 774.16 feet

Locations provided by TVA, Power Systems Operations, Horizontal Datum: NAD 27 (Tennessee Lambert)

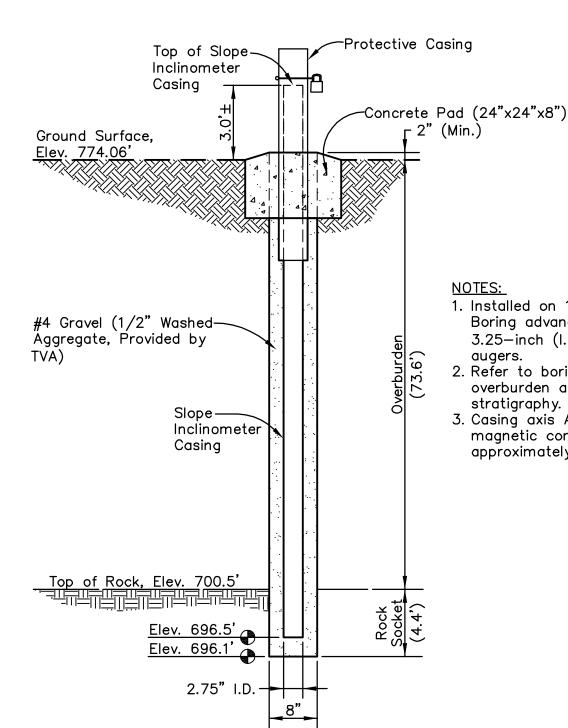
Surveying and Project Services. Vertical Datum: NGVD29

SLOPE INCLINOMETER B-1 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexinaton, Kentucky 40511-2050 859-422-3000

DRAWN BY	RWE	DATE	MAY,	2009	REVISED		SHEET		
CHECKED BY	JDE	PROJ. NO.	1714	68117	1.	3.		1 OF 5	
CHECKED BY	JSD	SCALE		NTS	2.	4.			



- 1. Installed on 12/27/2008. Boring advanced with 3.25-inch (I.D.) hollow stem augers.
- 2. Refer to boring log for overburden and rock stratigraphy.
- Casing axis AO oriented to magnetic compass bearing of mately 292 degrees. 3. Casing axis AO oriented to

LOCATION

Northing: 556,877.44 feet Easting: 2,441,744.70 feet Ground Elevation: 774.06 feet

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27 (Tennessee Lambert)

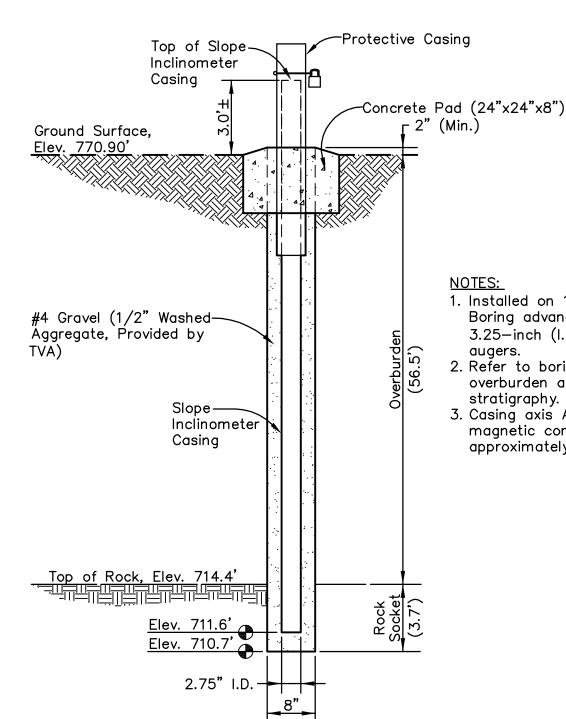
Vertical Datum: NGVD29

SLOPE INCLINOMETER B-2 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexinaton, Kentucky 40511-2050 859-422-3000

DRAWN BY	RWE	DATE	MAY,	2009	REVISED		SHEET		
CHECKED BY	JDE	PROJ. NO.	1714	68117	1.	3.		2 OF 5	
CHECKED BY	JSD	SCALE		NTS	2.	4.			



- 1. Installed on 12/29/2008. Boring advanced with 3.25-inch (I.D.) hollow stem augers.
- 2. Refer to boring log for overburden and rock stratigraphy.
- 3. Casing axis AO oriented to Casing axis A0 oriented to magnetic compass bearing of approximately 36 degrees.

LOCATION

Northing: 557,061.67 feet Easting: 2,441,887.56 feet Ground Elevation: 770.90 feet

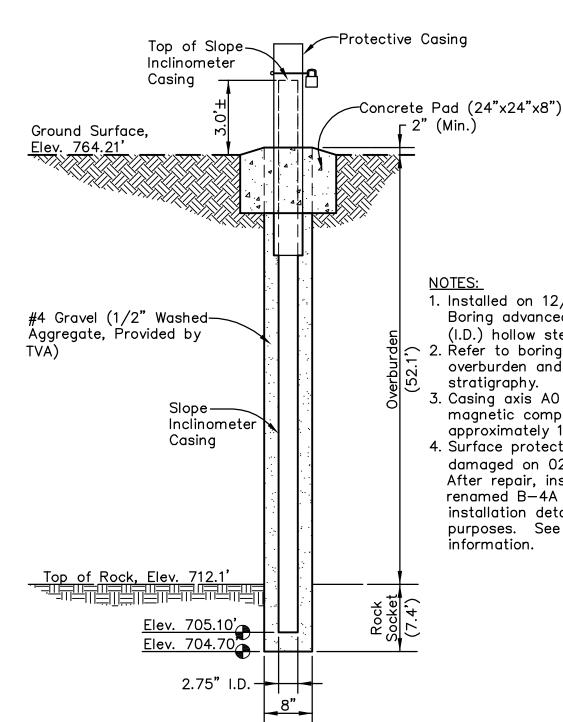
Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27 (Tennessee Lambert) Vertical Datum: NGVD29

SLOPE INCLINOMETER B-3 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexinaton, Kentucky 40511-2050 859-422-3000

DRAWN BY	RWE	DATE	MAY,	2009	REVISED		SHEET		
CHECKED BY	JDE	PROJ. NO.	1714	68117	1.	3.		3 OF 5	
CHECKED BY	JSD	SCALE		NTS	2.	4.			



NOTES:

- 1. Installed on 12/28/2008. Boring advanced with 3.25-inch (I.D.) hollow stem augers.
- 2. Refer to boring log for overburden and rock stratigraphy.
- 3. Casing axis A0 oriented to magnetic compass bearing of approximately 18 degrees.
- 4. Surface protection was damaged on 02/05/2009. After repair, installation was renamed B-4A for data installation detail reporting purposes. See B-4A for more information.

LOCATION

Northing: 556,934.61 feet Easting: 2,442,066.28 feet Ground Elevation: 764.21 feet

Locations provided by TVA, Power Systems Operations, Surveying and Project Services. Horizontal Datum: NAD 27

(Tennessee Lambert) Vertical Datum: NGVD29

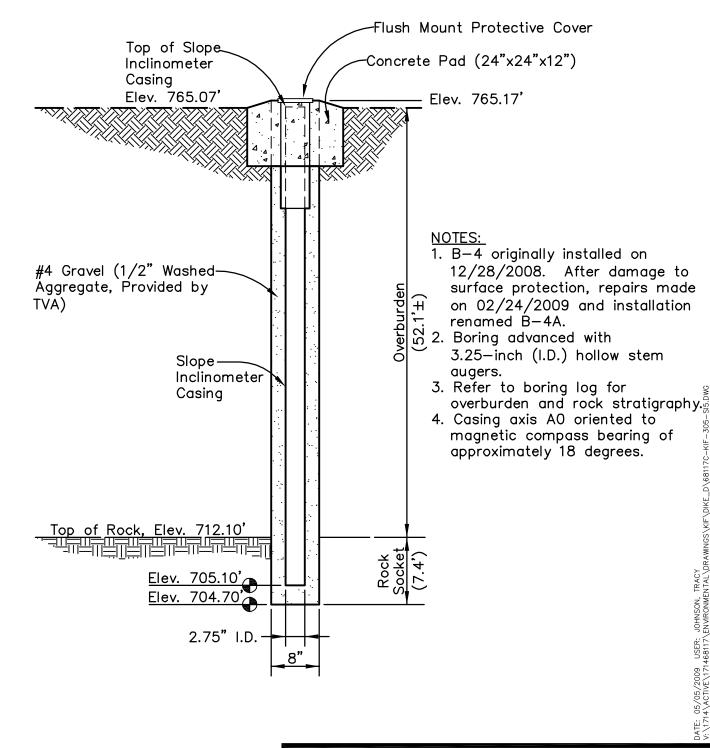
SLOPE INCLINOMETER B-4 KINGSTON FOSSIL PLANT DIKE D BUTTRESS



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexinaton, Kentucky 40511-2050 859-422-3000

www.stantec.com

DRAWN BY	RWE	DATE	MAY,	2009	REV	ISED	SHEET
CHECKED BY	JDE	PROJ. NO.	1714	68117	1.	3.	4 OF 5
CHECKED BY	JSD	SCALE		NTS	2.	4.	7 01 3



LOCATION (TOP OF CONCRETE)
Northing: 556,934.37 feet
Easting: 2,442,065.92 feet
Top of Concrete Elevation:
765.17 feet
Locations provided by TVA,
Power Systems Operations,
Surveying and Project Services.
Horizontal Datum: NAD 27
(Tennessee Lambert)
Vertical Datum: NGVD29

SLOPE INCLINOMETER B-4A KINGSTON FOSSIL PLANT DIKE D BUTTRESS



Stantec Consulting Services Inc. 1409 N. Forbes Rd. Lexington, Kentucky 40511-2050 859-422-3000

www.stantec.com

DRAWN BY	RWE	DATE	MAY, 2009	REV	ISED	SHEET
CHECKED BY	JDE	PROJ. NO.	171468117	1.	3.	5 OF 5
CHECKED BY	JSD	SCALE	NTS	2.	4.	5



Project N	No.	175569042			Location	!	N 556806.5	57, E 24423	29.32 (NAD27)
Project I	Name	Kingston Ash Pond	l		Boring No.		STN-2A	Total Depti	n 29.5 ft
Location	1	Kingston, Tenness	ee		Surface Elev	vation	75	1.2 ft. (NGVI	D29)
Project 1	Гуре	Geotechnical Expl	oration		Date Started	d _ 4	4/16/09	Completed	4/16/09
Supervis	sor	Ben Halada D	iller Kent C	lements	Depth to Wa	ater I	N/A	Date/Time	N/A
Logged	Ву	Ben Halada			Automatic H	lammer	·	ety Hammer	☐ Other ☐
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
751.2'	0.0'	Top of Hole							_
751.2'	29.5'	No Refusal / Bottom of Hole	og for STN-2						Boring advanced using 3 1/4 " Hollow Stem Augers -
-								_	
_								-	
_						_			
							7/04/00		
		011	Conculting 9		L				7/21/09



Project I	 No.	175569042			Location	N	556806.	57, E 2442329.	32 (NAD27)
Project I		Kingston Ash Pond			Boring No.	-	TN-2A	Total Depth _	29.5 ft
Litholo	oav		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
	'	'							
_	•	'		•	1			'	
_									
_									
- -									_
_									
-									
-		D7 Installed tip at alove	tion 704 7!						
_		PZ Installed, tip at eleva							-
_		Flushmount well cover a	ind concrete pa	d installed.					
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			Consulting 9		-				7/21/0



Project N	No.	175569042		Location	1	N 556761.9	99, E 24422	59.75 (NAD27)	
Project I	Name	Kingston Ash Pond		Boring No.		STN-3A	Total Depti	h 30.0 ft	
Location	1	Kingston, Tenness	ee		Surface Elev	vation_	76	3.9 ft. (NGVI	D29)
Project 1	Гуре	Geotechnical Explo	oration		Date Started	d	1/27/09	Completed	5/1/09
Supervis	sor	Ben Halada Dr	iller Steve E	Bradford	Depth to Wa	ater I	N/A	Date/Time	N/A
Logged	Ву	Adam Smith			Automatic H	 lammer	⊠ Safe	ety Hammer	☐ Other ☐
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
763.9'	0.0'	Top of Hole							
763.9'	0.0'	Top of Hole OVERBURDEN, (Auge sampling) See Log for STN-3	red without						Boring advanced using 4 1/4 " Hollow Stem Augers -
_								_	
733.9'									_
- - - -		No Refusal / Bottom of Hole						- - - -	
		Stantec	Consulting S	Services	Inc.				7/21/09



Project No.	175569042			Location	N	556761.9	99, E 2442259	9.75 (NAD27)	
Project Name	175569042 Location N 556761.99, E 2442259.7 Kingston Ash Pond Boring No. STN-3A Total Depth								
Lithology		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %		
Elevation Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks	
Elevation Depth	Two PZ's Installed, tip a	at elevation 751.	9' and 737.		Rec. Ft.	Rec. %	Run Depth	Remarks	
-								_	



Project No) .	175569042			Location	N	1 556765.0)5, E 24422	56.36 (NAD27)
Project Na		Kingston Ash Pond			Boring No.		STN-3B	Total Depti	
Location	-	Kingston, Tennesse			Surface Elev	/ation	 76:	3.8 ft. (NGVI	
Project Ty	pe -	Geotechnical Explo	ration		Date Started	- I 4	/27/09	Completed	5/1/09
Supervisor	r			Bradford	Depth to Wa	iter N	I/A	Date/Time	N/A
Logged By	y -	Adam Smith			Automatic H	ammer	⊠ Safe	ety Hammer	☐ Other ☐
Lithology	,		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
763.8'	0.0'	Top of Hole							
-		OVERBURDEN, (Auger sampling) See Log for STN-3	red without						Boring advanced – using 4 1/4 " Hollow Stem Augers –
- - -									Revert used to keep — augers clear —
- -									- - -
- - -									-
_									-
-									
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- L									-
CGD FMSWIGD									-
DO THE PROPERTY OF THE PROPERT									-
71468117 KINGS									
FMSM_LEGACT									7/21/09



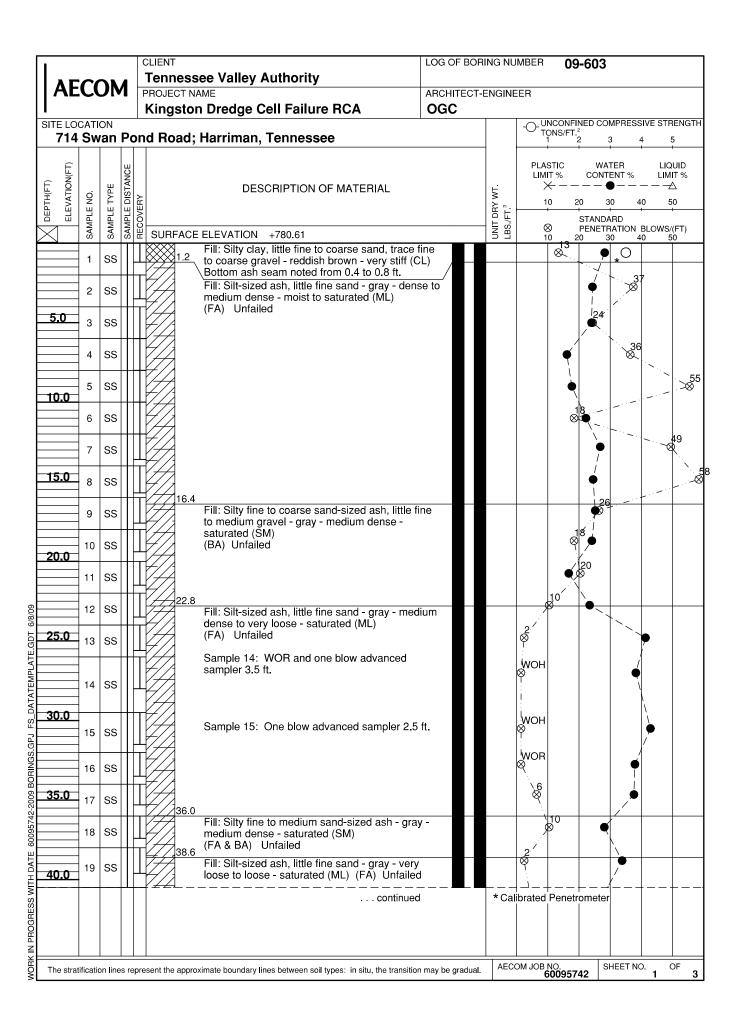
Project N	No.	175569042			Location	N	556765.0)5, E 24422	56.36 (NAD27)
Project I	Name	Kingston Ash Pond			Boring No.	S	TN-3B	Total Depti	n50.0 ft
Litholo	nav.		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
	Бори	OVERBURDEN, (Auge sampling) See Log for STN-3 (Ca	red without	rigo	rvan	100.11.	100. 7	run Bopun	
_									=
_									_
- 713.8'	50.0'								_
- - - - - -		No Refusal / Bottom of Hole PZ Installed, tip at eleva	ation 718.8'						- - - - - -
_		Flushmount well cover a		ıd installed					_
- - - - - - -									- - - - - - - -
- -									- - -

				- 1	CLIENT		ee Valley Authority	LOG OF BOF	RING NL	IMBER 09-	109B	
A E	C	NC	1	F	PROJE	CT NA	ME	ARCHITECT	ENGINE	EER		
SITE LO	CATI	ON			King	stor	n Dredge Cell Failure RCA	OGC		LINCONFIN	ED COMPRESS	SIVE STRENGTH
			Po	on	d Ro	ad;	Harriman, Tennessee			TONS/FT 2		4 5
DEPTH(FT) ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	PLE DISTANCE	RECOVERY			DESCRIPTION OF MATERIAL		UNIT DRY WT. LBS./FT.³	PLASTIC LIMIT % X 10 20	WATER CONTENT % 30 4	LIQUID LIMIT % — — A
	SAME	SAME	SAME	REC	SURF	-ACE	ELEVATION +763.41		UNIT LBS./		ENETRATION	BLOWS/(FT) 0 50
5.0		PA										
15.0		RB				20.5	Following retrieval of 3 in. tube sample, cutting were taken from top and bottom for water contesting. Samples designated with an "A" we taken from bottom of sample; the others were taken from top. Pneumatic Piezometer Installed at	ntent re e 20.0 ft.				
60/6/9	1	osī					Fill: Silt-sized ash, trace fine sand, trace clay gray - saturated (ML) (FA) Failed				•	
25.0	2	OST				25.5	Sample 2: Poor recovery. Sample placed in jars.				,	
APLA	3	osī	Ш				See UMass Direct Shear Test results (DeGro 2009) for Sample 3 description.	oot,				
30.0	3A 4	OS OS	П			28.0	Clayey silt, some fine to coarse sand - brown gray - saturated (CL-ML)	and		× 4	•	
HINGS:GP	5	osī				33.0	Pneumatic Piezometer Installed at			×-Δ	•	
35.00	6	OST				35.5	Silty fine to medium sand, trace clay - light brown - saturated (SM)	rown		-		
10009 H DATE 60099 H DATE	-	RB										
40.0 He stra					- -		continue	d				
The stra	tification	on line	es re	pre	sent the	approx	ximate boundary lines between soil types: in situ, the transition	on may be gradual.	AEC	OM JOB NO. 6009574	2 SHEET NO	D. 0F 2

				CLIEN			LOG OF BORING NUMBER 09-109B					
$ _{\Delta E}$	ECO	71	A		nessee Valley Au	thority						
^'	-CI	ノい	4		JECT NAME gston Dredge Cel	I Egiluro BCA	OGC	ENGINE	EER			
SITE LC	CATI	ON		KIII	gston breage cer	I Fallule NCA	OGC		UNC	ONFINED COI	MPRESSI	VE STRENGTI
			Po	nd R	Road; Harriman, Te	ennessee			TONS	S/FT. ² 2	3 4	5
DEPTH(FT) ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE		DESCF	RIPTION OF MATERIAL		UNIT DRY WT. LBS./FT.³	PLASTI LIMIT 9 ————————————————————————————————————	6 CONT	ENT % 0 40	LIQUID LIMIT % - — — 50
	SAM	SAM	SAM	SU	RFACE ELEVATION +7	763.41	(Continued)	LBS.	⊗ 10	PENETF		LOWS/(FT) 50
					Pneuma	atic Piezometer Installed at 4	10.0 ft					
50.0 55.0 60.0		RB			62.0	atic Piezometer Installed at 6	51.0 ft.					
WORK IN TAILER BOARD SOLVE STORE BOARD SOLVE STO	The	stra	tifica	tion li	Borehole advar rock bit and dril Casing used: 2: OST = Osterbe Pneumatic Piez 40.0, and 61.01	3 ft. of 4 in. rg sampler zometers installed at 20.0, 31.0),	in situ,	the trans	iition may k	pe gradu	ual.
WL BORING STARTED					BORING STARTED		COM OFF	105				
NORTHIN			ved			2/14/09 BORING COMPLETED 2/16/09		TERED B	,	Chicago Ar SHEET NO.	OF	
EASTING	5696					2/16/09 RIG/FOREMAN		KK P'D BY	R	AECOM JOB	2	2
EASTING RIG/FOREMAN D-50/JHO						D-50/JHC		RC	R	CCIVI 00D	6009574	12

				LIENT	ssee Valley Authority	LOG OF E	BORI	NG NL	MBER	09-6	00B		
AEC	ON	1	PF	ROJECT	NAME	ARCHITE	CT-E	NGINE	ER				
SITE LOCATI	ON				ton Dredge Cell Failure RCA	OGC			-O-UNC	ONFINE	O COMPRES	SSIVE ST	RENGTH
714 Sw	an	Po	nc	Roa	d; Harriman, Tennessee				TON 1	S/FT. ² 2	O COMPRES	4	5
DEPTH(FT) ELEVATION(FT) PLE NO.	ш	SAMPLE DISTANCE			DESCRIPTION OF MATERIAL				PLAST LIMIT	% (WATER CONTENT %		QUID IIT %
DEPTH(FT) ELEVATION IPLE NO.	E TYP	E DIST	<u></u>		DESCRIPTION OF MATERIAL			RY WT	10	20	30		 50 +
DEPTH(F ELEVATI SAMPLE NO.	SAMPLE TYPE	SAMPL	AECOVERY	SURFA	CE ELEVATION +776.66			UNIT DRY WT LBS/FT ³	⊗ 10	ST PE 20	ANDARD NETRATION 30	I BLOWS	/(FT) 50
"	0,	0,	+		•	×	M		10		30	40 (
5.0 10.0 15.0 20.0 25.0 30.0 1 35.0	RB RB				2.0 Silt-sized ash, little fine sand - gray - satura (ML) 4.5 (FA) Unfailed								
The stratificati	on line	s ren	res	ent the an	proximate boundary lines between soil types: in situ, the transit	ion mav be grad	lual	AEC	OM JOB NO 60 0	205722	SHEET	NO. 1	OF 2

1					LIENT			LOG OF BO	RING NU	MBER	09-60	0B	
AE)	4		Tennessee Vall	ey Au	uthority						
^L') [*	•		ROJECT NAME Kingston Dredo	re Cel	II Failure RCA	OGC	-ENGINE	ER			
SITE LOC						-		OGO		-O-UNCO	ONFINED (5/FT. ² 2	OMPRESS	SIVE STRENGTH
714	Sw	an	Po	no	d Road; Harrim	an, T	ennessee			1	2	3	4 5 + +
E			빙							PLASTIC		VATER	LIQUID LIMIT %
DEPTH(FT) ELEVATION(FT)	_	PE	SAMPLE DISTANCE			DESC	RIPTION OF MATERIAL		-	LIMIT %			
EVA	SAMPLE NO.	SAMPLE TYPE	E DIS	ZECOVERY -					UNIT DRY WT.	10	20	-	50
	AMPI	AMPI	AMPI	3	SURFACE ELEVAT	ION +	776 66	(Continued	UNIT DRY LBS/FT.3	⊗	PENE		BLOWS/(FT)
	0)	0)	0) [+		1011	770.00	(Juliano)		10	20	30 4	50
		RB											\
		וטוו											\
			$^+$	\perp	44.0 See UM	lass Dir	rect Shear Test results (DeGro	oot					\
5.0	2	ost					ole 2 description. Piezometer Installed at	<u> </u>	<i>i.</i>				•
			╫	Ц		3: No r	recovery of sample. Sample lo	[]	: :				
	3	эѕт			borehol	e durin	g retrieval.						
			+		49.0 Clavev	silt. little	e fine to medium sand - brown	and					
0.0	4	OST					d (CL-ML)				\times \wedge		
			4	L¦	51.5						1		
		RB									ļ		
					EE 0						ļ		
5.0			T	П	55.0 Silt, trac	e clay	and sand - brown - saturated ((ML)	· .				
57.5	5	OST			57.5		Piezometer Installed at	56.0 ft.					
					Boring a and drill Borehol Casing	advance advance ling fluid e grout used: 1 eters in Tly Ash	ed upon completion. 0 ft. of 4 in. stalled at 46.0 and 56.0 ft.	< bit					
The stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistical property of the stratification lines represent the approximate boundary lines between some statistica					en soil types	in situ,	the trans	ition ma	y be grad	dual.			
- No	t Oh	serv	/ed				BORING STARTED 1/19/09	AE	ECOM OFF	FICE (Chicago	Area - 01	I
RTHING	3470		cu				BORING COMPLETED 1/19/09	El	NTERED B		SHEET NO		
ASTING		1.34					RIG/FOREMAN D-50/RT		PP'D BY		AECOM J		
	+ + +2	4					D-30/R1		пС			000331	76



ΑE	C) /	1	•	Ter	n	ess	see Valley Authority		LOG OF				09	9-603			
/\L	<u> </u>	٠١ ٠		1				AME n Dredge Cell Failure RCA		ARCHIT OGC	ECT-E	:NGINE	±Η					
SITE LO																MPRESS	IVE STF	RENGTH
714	Sw	an	Po	n	d R	lo	ad;	Harriman, Tennessee					1	ONS/FT	2	3 4	4 !	5
DEPTH(FT) ELEVATION(FT)	·	E E	SAMPLE DISTANCE					DESCRIPTION OF MATERIAL				Ë.	PLAS LIMI			TER ENT %		UID IT % 2
DEPTH(FT)	SAMPLE NO.	E TYPE	EDIS	VERY								UNIT DRY WT. LBS /FT ³	1	0 .	+	+	0 5	0
	AMPI	SAMPLI	AMPI	ECO	CLI	DE		ELEVATION +780.61		(Contin	a/\	NIT D BS./F	8			RATION		
	S	S	S T	T	30 77	A	ACE	Fill: Silt-sized ash, little fine sand - gray -	very	(Contin	iuea)	<u> </u>		0 .	20 3	30 4	0 5	0
	20	SS		_	//	4		loose to loose - saturated (ML) (FA) Unfa										
	21	ss			<u> </u>								₽			1		
45.0	22	ss			4								⊗			•		
	23	ss											\5 ⊗					
50.0	24	ss		I									% WOH			•		
JU10	25	SS	\parallel	_	 		<u>50.5</u>	Silty clay, trace fine sand - gray - soft (CL	.)				WOH ♥		+ ,			
	26	ss	\parallel	T		4	52.5	Silty fine to medium sand, little to some cl					\ \& \&					
55.0				+				brown with gray - loose to medium dense (SM)	- ma	oist								
	27	SS											6 ⊗ 6 ⊗					
	28	ss		l										\	1			
60.0	29	ss												` _≫ 14	>			
	30	ss					62.5						\&\delta \(\)		₩.			
	31	ss		1			64.5	Silty fine to medium sand, some clay - gra	ay - v	ery			WOH ⊗		•			
65.0	32	SS					04.5	Silty fine to medium sand, little to trace cla- very loose to loose - saturated (SM)	<u>ау - с</u>	gray			WOR ♥		•			
	33	SS		I									\ 4 ⊗					
70.0				<u> </u>			69.0	Silty fine to medium sand, trace clay - gra	<u>y -</u>				l `·. l	13 ⊗				
	34	SS		<u>Т</u>				medium dense - saturated (SM)						12				
	35	SS		<u>Т</u>										\ }				
75.0	36	SS				7	75. <u>0</u>	Marker and series and series						<u>/</u>	P - 1.			
76.0	37	SS	\perp		/./		76.0	Weathered shale - gray Pneumatic Piezometer installed	at 7	6.0 ft		* Cal	ibrated	Penet	 romete	-		
								End of Boring Boring advanced to 10.0 ft. with power au Boring advanced from 10.0 to 76.0 ft. with and drilling fluid. Pneumatic piezometer installed at 76 ft. Borehole backfilled upon completion.		≺ bit		- Ca	ibrated	renet				
							- -	contin	 nued		- -	* Cal	ibrated	— — Penet	rometer	 	_ -	
The strat	ificatio	on line	s re	pre	sent t	he	appro	oximate boundary lines between soil types: in situ, the tran		may be gra	adual.	AEC	OM JOB I	NO. 6 0095 7	/42 S	HEET NO). ₂ (OF 3

1				CLIENT		LOG OF B	ORI	NG NU	MBER	09	-603			
AEC	M	Л	Ļ.	Tennessee Valley Aut	thority	ADOLUTEO	·T [NOINE						
	.01	•		Kingston Dredge Cell	Failure RCA	ARCHITEC OGC	/I-E	INGINE	:EK					
SITE LOCA	TION		<u> </u>	Kingston Breage Och	Tallate HOA	000			-()- UN	ICONFI	NED CO	MPRESS	SIVE ST	RENGTI
		Po	n	d Road; Harriman, Te	nnessee				TC	NS/FT.	2 3	3	4	5
									PLAS	TIC	· WA	TER	L10	QUID
DEPIH(FI) ELEVATION(FT)		SAMPLE DISTANCE							LIMI	Γ%	CONT		LIN	1IT %
ELEVATION	<u>;</u> $\frac{1}{2}$	IST/	ا≾	DESCR	IPTION OF MATERIAL			≯		-				∆
LEV.		삘	VER					DRY FT.³	10		20 3		0	50
ELEVATI	SAMPLE IVO.	SAME	2	SURFACE ELEVATION +7	 80 61	(Continue	,q)	UNIT DRY WT. LBS./FT ³	8)	STANDA	RATION	BLOWS	
	δ	S S S S S S S S S S S S S S S S S S S	æ :	Casing used: 10 Automatic-Mobil Penetration Test	oft. of 4 in. e hammer used for Standard ts. e based on first 6 in. of Hammer of Rod	(Continue	ed)) 2	20 3	0 4		50 (
														<u></u>
Th	ne stra	atific	ati	on lines represent the appro	ximate boundary lines betwee	n soil type	s: i	n situ,	the tra	nsitior	ı may t	oe grad	dual.	
L 12 (1	ft W	S: 10) 0	ft. BCR; 8.0 ft. ACR	BORING STARTED 3/9/09	,	AEC	OM OFF	ICE	Chic	ago Ar	rea - 01		
RTHING			<i>J</i> .U		BORING COMPLETED		ENT	ERED B	<u>Y</u>		ET NO.	OF		
5558	309.89				3/10/09				В			3	3	
ASTING 244	1187.4	6			RIG/FOREMAN Mobile B-57 (V.H.)/ME	з ′	4FP	D BY RC	R	AEC	OM JOB	NO. 60095 7	742	

CLIENT Tennessee Valley Authority	LOG OF BOF	RING NU	MBER (09-603	A	
PROJECT NAME	ARCHITECT-	ENGINE	ER.			
Kingston Dredge Cell Failure RCA	OGC	1	-O-UNCON	IFINED CC	MPRESS	SIVE STREN
wan Pond Road; Harriman, Tennessee			TONS/F	T. ²	3	SIVE STRENG
ANCE			PLASTIC LIMIT % —	CONT	TER ENT %	LIQUID LIMIT %
DESCRIPTION OF MATERIAL		Y WT.	10		30 4	— — <u>—</u> ∆ 10 50
DESCRIPTION OF MATERIAL NAME DISTRICT AND THE DISTRICT A		UNIT DRY WT. LBS./FT 3	⊗	STAND.	ARD RATION	BLOWS/(FT)
통 중 등 명 SURFACE ELEVATION +780.55		5 9	10	20 :	30 4	0 50
RB						

	1					LIENT		LOG OF B	ORI	NG NU	MBER	09	-603/	4		
	AE	C(Л	1	T	ennessee Valley Au	thority	ARCHITEC	·T F	NOINE						
	' `_	. • •	, , ,	•		Kingston Dredge Cel	I Failure RCA	OGC	/I-C	INGINE	En.					
	SITE LO							<u> </u>			-O-UNO	CONFIN	NED CO	MPRESS	IVE STR	ENGTH
	714	Sw	an	Poi	nd	l Road; Harriman, Te	ennessee				1	NS/FT. ²	2 3	3 4	5	i
	T) ON(FT)		ш	ANCE		DESCE	RIPTION OF MATERIAL				PLAST LIMIT	%	WATCONTI		LIQI LIMI' — — —	T %
	DEPTH(FT) ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE		DESCR	IF HON OF MATERIAL			UNIT DRY WT. LBS /FT ³	10	2				
		SAMF	SAMF	SAME		SURFACE ELEVATION +7	780.55	(Continue	d)	UNIT LBS./I	⊗ 10			RATION E	BLOWS/(0 50	
WORK IN PROGRESS WITH DATE 60095742-2009 BORINGS.GPJ FS_DATATEMPLATE.GDT 6/8/09	50.0 55.0 56.0		RB		5	Vane Shear Test #1 a Peak Su >1900 psf 66.0 Pneuma End of Boring Borehole advanced to fluid.	atic piezometer installed at 5 o 56.0 ft. with rock bit and drilli	6.0 ft.								
TH DA																
S WIT		L The	strat	ifica	⊥ tio	on lines represent the appro	oximate boundary lines betwee	en soil type	s: i	n situ	the tran	sition	mav h	e grad	lual.	
3RES.	WL	1116	Jual	oa	.,0		BORING STARTED			OM OFF						
I PROC	NORTHING	ot Ol		/ed			3/10/09						ago Ar ET NO.	rea - 01 OF		
R N	55 EASTING	5580	5.42				BORING COMPLETED 3/10/09 RIG/FOREMAN			ERED B KK D BY	В			2	2	
Ŏ N	24	14118	35.06	6			Mobile B-57 (V.H.)/ME	3 <i>"</i>	7F.F.	RC	R	AEC	OIVI JOB	600957	42	

. —	_		_		LIENT ennessee Valley Authority	LOG OF B	ORII	NG NU	MBER	09	-60	4A	
AE	C()N	1	P	ROJECT NAME	ARCHITEC	CT-E	NGINE	ER				
TE LOC	CATIO	ON			Kingston Dredge Cell Failure RCA	OGC			-()- UI	NCONFI	NED C	OMPRESS	SIVE STRE
714	Sw	an	Po	n	Road; Harriman, Tennessee				<u>т</u>	ONS/FT.	2 2 	3	4 5
Œ			빙							STIC IT %		VATER	LIQU LIMIT
NOIL	Ö.	YPE	ISTAN	_	DESCRIPTION OF MATE	RIAL		×	>	\leftarrow $ -$		•	 -
ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY				UNIT DRY WT LBS/FT ³	1	-	:0 STAN	30 4 DARD	10 50
	SAM	SAM	SAM	띪	SURFACE ELEVATION +782.39			UNIT LBS.	1	3		TRATION	BLOWS/(F 10 50
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										NO. 800957		SHEET N	

					CLIENT		ıthority	LOG OF B	BORI	NG NL	IMBER	09	-604/	4		
A	EC	ON	1			lessee Valley Au	ithority	ARCHITE	CT-E	NGINE	ER					
I					King	ston Dredge Cel	I Failure RCA	OGC								
SITE L			Р	on	d Ro	ad; Harriman, Te	ennessee				-O-UN	NCONFI NS/FT. ²		MPRESS 3 4	SIVE STRE 4 5	
		T				,					<u> </u>			<u> </u>		
DEPTH(FT)	-		NOE								PLAS LIMI	T %		TER ENT %	LIQU LIMIT	Γ%
DEPTH(FT)	9	TYPE	DIST	≿		DESCF	RIPTION OF MATERIAL			W	10	← — — 0 2	 0 3	0 4	— — <u>—</u> ∆ 0 50	
DEP'	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY						UNIT DRY WT LBS./FT ³	<u> </u>		STANDA	NRD	-	
	SAN	SAN	SAN	REC	SUR	FACE ELEVATION +	782.39	(Continue	ed)	UNI	10			RATION 0 4	BLOWS/(F 0 50	FT))
45.0 45.0 50.0 50.0 60.0 60.0 60.0 70.0 74.0 74.0 74.0	1 2	ST ST ST				Vane Shear Te Peak Su = 202 Pneum Vane Shear Te Peak Su = 35 Silty clay, little t - very stiff (CL) Vane Shear Te Peak Su = 35 68.0 Vane Shear Te Peak Su = 27 No recovery fro Silty fine sand, Vane Shear Te Peak Su = 23 Clayey silt, little saturated (CL-N Vane Shear Te Peak Su = 21 Vane Shear Te Peak Su = 21 Vane Shear Te Peak Su = 34 End of Boring Boring advance	st #1 at 62.5 ft. 25 psf, Remolded Su = 850 ps atic Piezometer installed at 6 st #2 at 64.5 ft. 75 psf, Remolded Su = 1400 p to some fine to medium sand - st #3 at 66.5 ft. 50 psf, Remolded Su = 1350 p st #4 at 68.5 ft. 50 psf, Remolded Su = 850 ps om 68 to 70 ft. little clay - gray (SM) st #5 at 70.5 ft. 50 psf, Remolded Su = 550 ps om fine to medium sand - gray - will st #5 at 72.0 ft. 75 psf, Remolded Su = 500 ps st #7 at 74.0 ft. 50 psf, Remolded Su = 825 ps om fine to 8 ft. with power auger. om fined from 8 ft to 74 ft. with rocket.	f 63.0 ft. sf gray			ibrated	× * Penetr	*			
H DAI						Borehole backf	illed upon completion. zometer installed at 63 ft.									
M S	The	stra	tific	cati	ion line		oximate boundary lines betwee	en soil type	es: i	in situ	the tra	nsition	mav h	oe arac	L dual.	
WL WL						spreading appro-	BORING STARTED			OM OFF				rea - 01		
NORTHI	Not O			d			3/2/09 BORING COMPLETED 3/2/09			ERED B	Y		ET NO.	OF		
EASTING	55480						RIG/FOREMAN			D BY	В		ОМ ЈОВ	2 NO.	2	
¥[2440 5	15.3	7				Mobile B-57 (V.H.)/MI	В		RC	R			600957	42	

1 = 00 : 1	CLIENT	nessee Valley Authority	LOG OF BOF	RING NU	MBER	09-604	В	
AECOM	PROJE	ct NAME ston Dredge Cell Failure RCA	ARCHITECT-	ENGINE				
TE LOCATION 714 Swan Po	nd Ro	oad; Harriman, Tennessee			-O-UNCON TONS/F	NFINED CC FT. ² 2	OMPRESSI 3 4	VE STRENG [*] 5
ELEVATION(FT) IPLE NO. PLE TYPE PLE DISTANCE					PLASTIC LIMIT %	CON	ATER TENT %	LIQUID LIMIT %
ELEVATION(FT) PLE NO. PLE TYPE PLE DISTANCE	<u></u>	DESCRIPTION OF MATERIAL		™ Y	10		30 40	- — <u>→</u> ∆ 50
ELEVATION(FT) SAMPLE NO. SAMPLE TYPE SAMPLE DISTANCE	RECOVERY AUS	FACE ELEVATION +782.36		UNIT DRY WT. LBS./FT.³	⊗ 10	STAND PENET 20		LOWS/(FT)
O PA .O RB .O RD		Following retrieval of 3 in. tube sample, cutt were taken from top and bottom for water or testing. Samples designated with an "A" we taken from bottom of sample; the others we taken from top.	ontent vere					
					1 — — + — :	-+	-1	+ -
0	+	continu	ed					
.0		continu	ed					

1					LIENT		oo Valloy Au	thority		LOG OF	BORI	NG NU	MBER	09-	-604E	3		
	EC	NC	1	PF	ROJEC	CT NA	ee Valley Au	tnority		ARCHITE	ECT-E	NGINE	ER					
I				k	Cings	ston	Dredge Cel	I Failure RCA		OGC								
SITE LC 714			Ροι	nd	Ros	ad. F	Harriman, Te	nnessee					-O-UN	ICONFIN NS/FT. ² 2	IED COM			ENGTH 5
		<u> </u>			1100	, .	idiriiridii, re						'		, ,	· -		-
DEPTH(FT) ELEVATION(FT)			NCE										PLAS LIMIT	Г%	WAT CONTE		LIQ L I MI	UID IT %
'H(FT	ġ.	 	NSTA	<u></u>			DESC	RIPTION OF MAT	ERIAL			. WT	10		(<u>-</u>	<u>^</u> 50
DEPTH(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY								UNIT DRY WT. LBS /FT ³			STANDA		J 5	+
	SAM	SAM	SAM	지 기	SURF.	ACE	ELEVATION +7	82.4		(Contin	ued)	UNIT LBS.	⊗ 10) F	PENETR	ATION E		(FT) 50
	=																	
45.0					4	45.0												
	1						Fill: Silt-sized as saturated (ML)	sh, trace fine sand,	trace clay - gr	ay -								•
	1	OST		4	\mathcal{A}	47.5	Saturated (IVIL)	(FA) Offialled										
				Ť		17.0												
50,0																		
30,0		RB																
EE A							Sample 2: No re	ecovery										
55.0	2	OST			,	56.0	•	atic piezometer i	nstalled at 56	.0 ft.								
	3	OST		K			Fill: Silt-sized as saturated (ML)	sh, trace fine sand,	trace clay - gr	ay - 📑	• •							
	1	OST			\mathcal{A}			Organic Content	= 0.60%									
		OST					Sample OST-4:	Organic Content	= 2.77%									
60.0	┪			k			•	· ·									Ī	
	5	OST OST	Ħ			61.4	Silty clay, little fi	ne to medium sand	d - brown and	grav								
	5A	OST		7			(CL)			gy							/	
	1	OCT		T													_/	
65.0	┪	OST		Ľ.												//		
	4	OST		T/														
6/22/09	1	OST	L	<u>L</u>										×-	_ 🚣	- 		
	1	OST	H	Ľ,										×	- 🍑			
70.0	8	OST																
IPLA I	+_		$\parallel \parallel$	T											1			
ATE TO THE	9	OST				72.5												
73.5	9A	OST		7	////	73.5	End of Boring							<u> </u>	<u>-A</u>			
J FS								d to 10.0 ft. with po d from 10.0 to 71.0		oit								
S.GP							and drilling fluid	ometer installed at	56 ft									
RING							Casing used: 40		OO II.									
09 BO																		
12-200																		
09574	•	The	strati	ifica	ation li	ines r	epresent the app	proximate boundary	y lines betweer	n soil type	1			tion ma	ay be g	radual.		
ω Nr	lot Ol	oserv	ed					BORING STARTED	3/1/09		AEC	OM OFF	ICE		ago Are	ea - 01		
WLO								BORING COMPLETE	3/2/09		ENT	ERED B'	Y B	SHEE	ET NO.	OF	2	
AECOM LOG 60095742-2009 BORINGS.GPJ FS_DATATEMPLATE.GDT A. A								RIG/FOREMAN	B-57 (V.H.)/MB		APP	'D BY RC I	R	AECO	OM JOB	NO. 300957	42	

	١.	CLIE Te l	⊓ nessee Valley Authority	LOG OF BOR	ing nu	MBER	09-60)5B	
f	F	PRO	ECT NAME	ARCHITECT-	ENGINE	ER			
		Kır	gston Dredge Cell Failure RCA	OGC		UNCC	NFINED	COMPRESS	SIVE STRENG
or	on	nd F	oad; Harriman, Tennessee			TONS	5/FT. ² 2	3	SIVE STRENG 4 5
	7					PLASTIC		WATER	LIQUID
			DESCRIPTION OF MATERIAL		₽	LIMIT %		ONTENT % — ● — —	LIMIT % — — <u>—</u> △
VERY	RECOVERY				UNIT DRY WT.	10	20		40 50
BECC	RECC	SL	RFACE ELEVATION +781.64		UNIT DRY LBS./FT³	⊗ 10	PEN 20	NDARD ETRATION 30 4	BLOWS/(FT) 40 50
_	+	-							
	+	-	Pneumatic piezometer installed at	28 0 ft					
	Н	1	Sample OST-1: Organic Content = 0.06%				_ T\.		
	П	1	Sample OST-2: Organic Content = 0.14%					`\	
	\perp		Sumple GGT 2. Grganio Gonton = 0.117/0					T .	
			Sample OST-3: Organic Content = 3.51%						
Н	#								•
									',
П	$^{+}$								'
	Ш	↓_	Sample OST-4: Organic Content = 0.63%						
			continue	d					
epr	repre	resent			pe gradual.	pe gradual. AECC	pe gradual. AECOM JOB NO.	pe gradual. AECOM JOB NO. 60095742	pe gradual. AECOM JOB NO. 60095742 SHEET N

					ENT	see Valley Au	ıthority	LOG OF BO	RING NU	JMBER	09-605	3	
Al	E C (ON	1	PRO	OJECT I	NAME	II Failure RCA	ARCHITECT	Γ-ENGINI	EER			
SITE L								ouc		-O-UNC	CONFINED CO	MPRESSI	VE STRENGTH
71	4 Sv	van	Po	nd	Road	; Harriman, To	ennessee			1	S/FT. ² 2 5	3 4	5
DEPTH(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY S		DESCF	RIPTION OF MATERIAL		UNIT DRY WT.	PLAST LIMIT ———————————————————————————————————	% CONT	ENT %	LIQUID LIMIT % - — — △
					URFAC	E ELEVATION +	781.64	(Continued	I) IN	⊗ 10	PENETF 20 3		BLOWS/(FT) 50
		OST	Ш	Ħ		Pneum	atic piezometer installed at 4	12.0 ft.				7	
45.0	5 5A	OST		ļ		Sample OST-5	: Organic Content = 0.26%				•		•
	6	OST			47.	-	: Organic Content = 0.20%				•	•	
50.0	7	OST			49.	See UMass Dir 2009) for Samp Pneum	ect Shear Test results (DeGro ble 7 description. atic piezometer installed at 4	19.0 ft.					
50.0	8	оѕт	Ⅱ		50	2009) for Samp	ect Shear Test results (DeGro ble 8 description.	ot,	, ·				
	9 9	OST		T	<u>52.</u>	Silty clay, little	fine to medium sand - brown a	nd					
	οΔ	OST				gray (CL)					*•-		
55.0	-	OST	╟								* -		
	11	ST3			<u>57.</u>	Clayey silt, little gray - saturated	e fine to medium sand - brown d (CL-ML)	and			×A		
60.0	114	ST3		#11	1 59.	5					•		
MORK IN PROGRESS WITH DATE 60095742-2009 BORINGS.GPJ FS_DATATEMPLATE.GDT 6/8/09 7.00 7.0		RB			777.	End of Boring Borehole advar Borehole advar bit and drilling f Casing used: 2	7 ft. of 4 in. cometers installed at 28.0, 42.0	ger. ock					
SS WI	The	stra	tifica	ation	lines r	epresent the appre	oximate boundary lines betwee	en soil types	: in situ	the tran	sition may b	oe gradı	ual.
WL WL	Not O	hser	ved				BORING STARTED 2/25/09	Al	ECOM OF	FICE	Chicago Aı	ea - 01	
NORTHII			·ou				BORING COMPLETED 2/27/09	E	NTERED E	Y B	SHEET NO.	2 OF	2
EASTING	3 24414	98.9	3				RIG/FOREMAN D-50/JC	Al	PP'D BY RC	R	AECOM JOB	NO. 600957 4	42



Project No.	171468117			Location	١	1 556650.9	99, E 24414	68.02 (NAD27)
Project Name	Kingston Fossil Pla	nt Dike D Bu	uttress	Boring No.	F	PZ-1	Total Depti	n 26.5 ft
Location	Kingston, Tennesse	ee		Surface Elev	vation	76	5.3 ft. (NGVI	D29)
Project Type	Geotechnical Explo	ration		Date Started	 1 1	/14/09	Completed	1/14/09
Supervisor	Jim Andrew Dri	ller G. Tho	mpson	Depth to Wa	ater 3	6.6 ft	Date/Time	1/14/09
Logged By	Jim Andrew			Depth to Wa	ater 5	5.4 ft	Date/Time	1/16/09
Lithology		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
765.3' 0.0'	Top of Hole							
- - -	Bottom Ash, dark gray, very loose to loose, fine grained sand-sized partinon-plastic	to coarse	SPT-1	0.0 - 1.5	0.5	5-3-2		SPTs driven with - 140-lb auto hammer
-			SPT-2	5.0 - 6.5	1.0	4-3-2		Boring performed — prior to completion of _ buttress — —
- - -			SPT-3	10.0 - 11.5	1.5	1-1-1	25	 - - -
- - - -			SPT-4	15.0 - 16.5	1.0	1-1-1	23	- - - -
- - 744.8' 20.5' - -	Fly Ash, dark gray, wet, soft, non-plastic	soft to very	SPT-5	20.0 - 21.5	1.5	2-1-2		
- - - 738.8' 26.5'			SPT-6	25.0 - 26.5	0.5	wh-wh-2	28	hammer _ Piezometer installed —
MSM_LEGACY 771488 17 PZ BORINGS GPJ FISBAGGT 42009	No Refusal / Bottom of Hole							- - - - - - - - - - - - - - - - - - -



Project I	No.	171468117			Location	N	1 556636.9	98, E 24415	00.52 (NAD27)
Project l	Name	Kingston Fossil Pla	ınt Dike D Bı	uttress	Boring No.	F	PZ-2	Total Depti	h 16.5 ft
Location	า	Kingston, Tenness	ee		Surface Ele	vation_	766	6.9 ft. (NGVI	D29)
Project ³	Туре	Geotechnical Explo	oration		Date Starte	d1	/14/09	Completed	1/14/09
Supervis	sor	Jim Andrew Dr	iller G. Tho	mpson	Depth to Wa	ater 3	.8 ft	Date/Time	1/14/09
Logged	Ву	Jim Andrew			Depth to Wa	ater4	.7 ft	Date/Time	1/16/09
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
766.9'	0.0'	Top of Hole							
762 4	4.5'	Buttress Aggregate (No	t Sampled)						SPTs driven with 140-lb auto hamme
762.4'	4.5'	Bottom Ash, dark gray, very loose to loose, fine grained sand-sized part non-plastic	to coarse	SPT-1	5.0 - 6.5	1.0	5-3-5		Boring performed prior to completion buttress
				SPT-2	10.0 - 11.5	1.5	3-2-3		wh = weight of hammer
750.4'	16.5'			SPT-3	15.0 - 16.5	1.0	wh-wh-wh		Piezometer installe
		No Refusal / Bottom of Hole							



Project I	No.	171468117			Location	N	l 556822.8	39, E 24415	88.49 (NAD27)	
Project I	Name	Kingston Fossil Pla	nt Dike D Bu	uttress	Boring No.	F	PZ-3	Total Depti	n26.5 ft	
Location	1	Kingston, Tennesse	ee		Surface Elev	vation_	76	6.3 ft. (NGVD29)		
Project ⁻	Туре	Geotechnical Explo	ration		Date Started	_ d 1	/14/09	Completed	1/15/09	
Supervis	sor	Jim Andrew Dri	iller G. Tho	mpson	Depth to Wa	ater 4	.0 ft	Date/Time	1/15/09	
Logged	Ву	Jim Andrew		<u> </u>	Depth to Wa	ater 5	5.9 ft	Date/Time	1/16/09	
Litholo	-		Overburden	Sample #		Rec. Ft.	Blows	Mois.Cont. %		
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks	
766.3'	0.0'	Top of Hole								
		Buttress Aggregate (Not	Sampled)						SPTs driven with	
- 763.3'	3.0'								140-lb auto hammer _	
- - - -	0.0	Bottom Ash, dark gray, moist, loose, fine to coarse grained sand-sized particles, non-plastic, some fly ash		SPT-1	5.0 - 6.5	1.5	3-4-4	31	Boring performed — prior to completion of _ buttress —	
- 756.3' -	10.0'	Bottom Ash (50%), dark very loose, fine to coars	SPT-2	10.0 - 11.5	1.5	2-2-2		- - -		
- - 751.3'	15.0'	sand-sized particles, non-plastic, mixed with fly ash (50%)							_ -	
-	13.0	Fly Ash, dark gray, moist to wet, very soft, non-plastic		SPT-3	15.0 - 16.5	1.5	2-2-3		- - -	
- - - -				SPT-4	20.0 - 21.5	1.5	1-1-1		- - - -	
- - - 739.8'	26.5'			SPT-5	25.0 - 26.5	1.0	1-1-1		Piezometer installed —	
- - -		No Refusal / Bottom of Hole		ı		1			- - -	
472008									- - - -	
									_ - -	
P P P P P P P P P P P P P P P P P P P									_ _ _	
MSM_LEAACY 177468177 PZ BORNOSS GPJ FNRM GD1 4/2009									- - -	
<u> </u>		Stantec	Services	Inc				4/20/09		



Project I	No.	171468117			Location		N 556814.1	1, E 24416	02.33 (NAD27)	
Project I		Kingston Fossil	Plant Dike D B	uttress	Boring No.		PZ-4	Total Depth		
Location	-	Kingston, Tenn			Surface Elev			766.0 ft. (NGVD29)		
Project ⁻	-	Geotechnical E			Date Started	_	1/14/09	Completed	<u> </u>	
Supervis		Jim Andrew	Driller G. Tho	mpson	Depth to Wa		3.5 ft	Date/Time	1/14/09	
Logged	-	Jim Andrew	<u> </u>	p	Depth to Wa		5.0 ft	Date/Time	1/16/09	
Litholo		on in a contract of the contra	Overburden	Sample #	Depth	Rec. Fi		Mois.Cont. %	1710700	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft		Run Depth	Remarks	
766.0'	0.0'	Top of Hole								
- -		Buttress Aggregate (Not Sampled) Bottom Ash, dark gray, dry to moist, loose to medium dense, fine to coarse grained sand-sized particles, non-plastic, some fly ash							SPTs driven with 140-lb auto hammer	
762.0' - -	4.0'			SPT-1	5.0 - 6.5	1.0	9-5-5		Boring performed prior to completion of buttress	
- - - 754.5'	11.5'	Et. Ash. dada ass.		SPT-2	10.0 - 11.5	1.5	2-5-5		10.0 - 11.5, bulk sample taken	
- -		Fly Ash, dark gray, non-plastic	wet, very soπ,						wh = weight of hammer	
— - 749.5'	16.5'			SPT-3	15.0 - 16.5	1.0	wh-wh-wh	35	Piezometer installed -	
		Bottom of Hole								
- : : : - -										



Project I	No.	171468117			Location	N	556958.4	41, E 24416	90.90 (NAD27)
Project I	Name	Kingston Fossil Pla	nt Dike D Bu	uttress	Boring No.	P	Z-5	Total Deptl	h31.5 ft
Location	1	Kingston, Tennesse	ee		Surface Elev	vation	76	3.7 ft. (NGVI	D29)
Project ⁻	Туре	Geotechnical Explo	ration		Date Started	d1	/15/09	Completed	I1/15/09
Supervis	sor	Jim Andrew Dri	iller G. Tho	mpson	Depth to Wa	ater 5	.7 ft	Date/Time	1/16/09
Logged	Ву	Jim Andrew			Depth to Wa	ater N	I/A	Date/Time	N/A
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
763.7'	0.0'	Top of Hole							_
- - -		Buttress Aggregate (Not	t Sampled)						SPTs driven with - 140-lb auto hammer
- - - -									prior to completion of _ buttress
- 750.7'	13.0'								_
- - - -	10.0	Bottom Ash, dark gray, to medium dense, fine to grained sand-sized partinon-plastic	o coarse	SPT-1	15.0 - 16.5	0.5	4-5-5	16	- - - - -
	21.0'	Fly Ash, dark gray, mois		SPT-2	20.0 - 21.5	1.5	2-2-3		 - -
-		medium stiff, non-plastion	С						_
-				SPT-3	25.0 - 26.5	1.0	2-2-2	17	_ _ _
<u> </u>	00.5								– Piezometer installed —
733.2' 732.2'	30.5' 31.5'	Sandy Clay, red - brown	n, moist, soft	SPT-4	30.0 - 31.5	1.5	2-2-3		i iezomietei ilistalleu —
	01.0	No Refusal / Bottom of Hole	, most, sort						- - - - - - - -
Z MM		<u> </u>	Consulting S	·	L				4/20/09



Description Top of Hole Buttress Aggregate (Not Bottom Ash, dark gray, or dense, fine to coarse grasand-sized particles, nor Clay, red - brown, moist,	ee ration Iller G. Tho Overburden Rock Core Sampled) dry, medium ained n-plastic		Location Boring No. Surface Elev Date Started Depth to Wa Depth to Wa Depth Run 5.0 - 6.5	vation	Z-6	Total Depti 3.7 ft. (NGVI Completed Date/Time Date/Time Mois.Cont. % Run Depth	D29) 1/15/09 1/16/09
Geotechnical Exploration Jim Andrew Description Top of Hole Buttress Aggregate (Note dense, fine to coarse grasand-sized particles, nore clay, red - brown, moist, Fly Ash, dark gray, wet, and the coarse grasand sized particles.	ee ration Iller G. Tho Overburden Rock Core Sampled) dry, medium ained n-plastic	mpson Sample # RQD SPT-1	Surface Elev Date Started Depth to Wa Depth to Wa Depth Run	ater 4. Rec. Ft. 0.5	/15/09 3 ft /A Blows Rec. %	3.7 ft. (NGVI Completed Date/Time Date/Time Mois.Cont. %	D29) 1 1/15/09 1/16/09 N/A Remarks SPTs driven with 140-lb auto hammer Boring performed prior to completion of
Geotechnical Explor Jim Andrew Description Top of Hole Buttress Aggregate (Not Bottom Ash, dark gray, or dense, fine to coarse grasand-sized particles, nor Clay, red - brown, moist, Fly Ash, dark gray, wet, si	Overburden Rock Core Sampled) dry, medium ained n-plastic , very stiff	Sample # RQD	Depth to Wa Depth to Wa Depth Run 5.0 - 6.5	Rec. Ft. 0.5	/15/09 3 ft /A Blows Rec. %	Completed Date/Time Date/Time Mois.Cont. %	1/15/09 1/16/09 N/A Remarks SPTs driven with 140-lb auto hammer Boring performed prior to completion of
Jim Andrew Jim Andrew Description Top of Hole Buttress Aggregate (Not Bottom Ash, dark gray, of dense, fine to coarse gras sand-sized particles, nor Clay, red - brown, moist, Fly Ash, dark gray, wet, significant controls and significant controls and significant controls are controlled and significant controls are controls and significant controls are controls and significant controls are controls and significant controls are controlled a	Overburden Rock Core Sampled) dry, medium ained n-plastic	Sample # RQD	Depth to Wa Depth to Wa Depth Run 5.0 - 6.5	Rec. Ft. 0.5	3 ft //A Blows Rec. % 8-6-9	Date/Time Date/Time Mois.Cont. %	1/16/09 N/A Remarks SPTs driven with 140-lb auto hammer Boring performed prior to completion of
Description Top of Hole Buttress Aggregate (Not Bottom Ash, dark gray, of dense, fine to coarse gras sand-sized particles, nor Clay, red - brown, moist, Fly Ash, dark gray, wet, significant controls and significant controls are controls as a control of the co	Overburden Rock Core Sampled) dry, medium ained n-plastic	Sample # RQD	Depth to Wa	Rec. Ft. Rec. Ft. 0.5	Blows Rec. % 8-6-9	Date/Time Mois.Cont. %	N/A Remarks SPTs driven with 140-lb auto hammer Boring performed prior to completion of
Description Top of Hole Buttress Aggregate (Not Bottom Ash, dark gray, of dense, fine to coarse gras and-sized particles, nor Clay, red - brown, moist, Fly Ash, dark gray, wet, six	Rock Core Sampled) dry, medium ained n-plastic , very stiff	RQD	Depth Run 5.0 - 6.5	Rec. Ft. Rec. Ft.	Blows Rec. %	Mois.Cont. %	Remarks SPTs driven with 140-lb auto hammer Boring performed prior to completion of
Top of Hole Buttress Aggregate (Not Bottom Ash, dark gray, or dense, fine to coarse gras and-sized particles, nor Clay, red - brown, moist, Fly Ash, dark gray, wet,	Rock Core Sampled) dry, medium ained n-plastic , very stiff	RQD	Run 5.0 - 6.5	Rec. Ft.	Rec. %		SPTs driven with 140-lb auto hammer Boring performed prior to completion of
Buttress Aggregate (Not Bottom Ash, dark gray, of dense, fine to coarse gras and-sized particles, nor Clay, red - brown, moist, Fly Ash, dark gray, wet,	dry, medium ained n-plastic						140-lb auto hammer Boring performed prior to completion of
Bottom Ash, dark gray, or dense, fine to coarse grasand-sized particles, nor Clay, red - brown, moist, Fly Ash, dark gray, wet,	dry, medium ained n-plastic					1	140-lb auto hammer Boring performed prior to completion of
dense, fine to coarse gra sand-sized particles, nor Clay, red - brown, moist, Fly Ash, dark gray, wet,	n-plastic						prior to completion of
Fly Ash, dark gray, wet,		SPT-2	10.0 - 11.5	0.5	8-11-13		
Fly Ash, dark gray, wet,		SPT-2	10.0 - 11.5	0.5	8-11-13		
	soft,						
	Fly Ash, dark gray, wet, soft, non-plastic						
		SPT-3	15.0 - 16.5	1.0	1-2-2		Piezometer installed
Bottom of Hole							
	No Refusal / Bottom of Hole						



Project No).	171468117			Location	N	l 557105.4	7, E 24417	47, E 2441791.06 (NAD27)		
Project Na	ame	Kingston Fossil Plan	nt Dike D Bu	uttress	Boring No.	P	PZ-7	Total Depti	n 26.5 ft		
Location	_	Kingston, Tennesse	ee		Surface Elev	/ation	760	0.0 ft. (NGVI	D29)		
Project Ty	pe -	Geotechnical Explo	ration		Date Started	1	/15/09	Completed	1/15/09		
Supervisor	r	Jim Andrew Dri	ller G. Tho	mpson	Depth to Wa	ater 5	.4 ft	Date/Time	1/16/09		
Logged By	y	Jim Andrew			Depth to Wa	ater N	 /A	Date/Time	 N/A		
Lithology	,		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %			
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks		
760.0'	0.0'	Top of Hole									
-		Buttress Aggregate (Not Sampled)							SPTs driven with – 140-lb auto hammer		
755.0' - - -	5.0'	Bottom Ash, dark gray, moist, medium dense, fine to coarse grained sand-sized particles, non-plastic		SPT-1	5.0 - 6.5	0.0	4-8-7		Boring performed — prior to completion of _ buttress —		
750.0'	10.0'	Fly Ash, dark gray, mois very soft, non-plastic	SPT-2	10.0 - 11.5	0.5	2-1-1	20				
- - - -			SPT-3	15.0 - 16.5	0.5	wh-wh-wh	9	wh = weight of — hammer — —			
- - - - 736.8'	23.2'			SPT-4	20.0 - 21.5	0.5	1-1-1		-		
- 730.0	20.2	Sandy Clay, red - brown	, moist, soft						-		
-				SPT-5	25.0 - 26.5	1.0	1-2-2		Piezometer installed —		
- 733.5'	26.5'	No Refusal / Bottom of Hole		241-2	25.0 - 26.5	1.0	1-2-2		- - - - - - - - - - - - - - - - - - -		



Project N	No.	171468117			Location	N	N 557088.5	57, E 24418	18.68 (NAD27)
Project I		Kingston Fossil Pl	ant Dike D Bı	uttress	Boring No.	-	PZ-8	Total Deptl	
Location	·]	Kingston, Tenness	see		Surface Elev	vation	760	0.1 ft. (NGVI	D29)
Project 7	Гуре	Geotechnical Expl	oration		Date Started	_ 1	/15/09	Completed	1/15/09
Supervis	sor	Jim Andrew D	riller G. Tho	mpson	Depth to Wa	ater 5	5.0 ft	Date/Time	1/15/09
Logged	Ву	Jim Andrew			Depth to Wa	ater N	 I/A	Date/Time	N/A
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
760.1'	0.0'	Top of Hole	at Camania d\						
- - -		Buttress Aggregate (N	ot Sampled)						SPTs driven with - 140-lb auto hammer
 - - 752.8'	7.3'								Boring performed — prior to completion of _ buttress —
-		Ash, dark gray, wet, venon-plastic	ery soft,						- - -
-				SPT-1	10.0 - 11.5	0.0	1-2-2		- - -
- - - -	40.51			SPT-2	15.0 - 16.5	0.0	2-1-1		Piezometer installed —
- 743.6' -	16.5'	No Refusal /							
		Bottom of Hole							-
-									_
<u> </u>									_ _
-									-
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-									-
F000Z									_ _
M.GDT 4									_
- Land									-
PRINGS:									-
- LA PZ BY									-
171468									
MSM_LEGACY 1714881 171 PZ BORNOSS GPJ FNSM_GDT 4/2009									_
WSW-				Sonvicos					4/20/09



Project No.	175569042		Location	N	556248.5	52, E 24425	40.30 (NAD27)
Project Name	Kingston Ash Pond		Boring No.	S	STN-8	Total Depti	h 76.7 ft
Location	Kingston, Tennessee		Surface Elev	/ation	752	2.2 ft. (NGVI	D29)
Project Type	Geotechnical Exploration		Date Started	4.	/13/09	Completed	4/13/09
Supervisor	Ben Halada Driller Kent Cl	ements	Depth to Wa	iter 1	7.5 ft	Date/Time	4/13/09
Logged By	Ben Halada		Automatic H	ammer	⊠ Safe	ety Hammer	☐ Other ☐
Lithology	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation Depth	Description Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
752.2' 0.0'	Top of Hole						
-	LEAN CLAY (Fill), red brown, moist, stiff	SPT-1	0.0 - 1.5	1.0	4-6-5	18	Boring advanced – using 3 1/4 " Hollow
749.7' 2.5' 749.2' 3.0'		SPT-2	1.5 - 3.0	0.7	4-8-10	16	Stem Augers
749.2 3.0 748.2' 4.0'	BOTTOM ASH (Fill), black, moist, medium dense	SPT-3	3.0 - 4.5	1.5	9-16-22	17	Piston sampler and -
746.7' 5.5'	LEAN CLAY (Fill), red brown, moist, very stiff	SPT-4	4.5 - 6.0	1.3	6-11-13	13	sucker rods were utilized to obtain recovery during
	BOTTOM ASH (Fill), black, moist,	SPT-5	6.0 - 7.5	1.0	11-13-14	14	Shelby Tube sampling
-	\medium dense LEAN CLAY (Fill), brown, moist,	SPT-6	7.5 - 9.0	1.0	11-15-14	16	_
741.2' 11.0'	very stiff, some fine grained sand, some gravel	ST-1	9.0 - 11.0	1.2			ST-1: sandy clay in — bottom of tube
-	SAND, light brown, dry, very loose, fine to medium grained, some silt	SPT-7	11.0 - 12.5	1.2	WOR- WOH-WOH	20	_
738.2' 14.0'		SPT-8	12.5 - 14.0	1.1	2-3-2	17	<u>-</u>
_	LEAN CLAY, light red brown, moist, very soft, some fine grained sand	SPT-9	14.0 - 15.5	1.1	1-1-2	21	_
734.7' 17.5'		ST-2	15.5 - 17.5	2.0			-
-	SAND, light brown, saturated, very loose, fine grained, trace clayey silt	SPT-10	17.5 - 19.0	1.3	WOR-1-1	20	-
-		SPT-11	19.0 - 20.5	1.1	WOR- WOH-1	18	_
		SPT-12	20.5 - 22.0	1.3	WOH-1-1	21	_
-		SPT-13	22.0 - 23.5	1.1	1-WOH- WOH	17	_
		SPT-14	23.5 - 25.0	1.4	1-WOH- WOH	21	
_		SPT-15	25.0 - 26.5	1.3	1-1-WOH	22	_
M.GDT 7/21/0		SPT-16	26.5 - 28.0	1.1	WOH- WOH-1	24	- -
PPU FMSI		SPT-17	28.0 - 29.5	1.3	1-1-1	20	-
DONOL HE		SPT-18	29.5 - 31.0	1.2	1-WOH-1	19	_
KINGSTON A:		SPT-19	31.0 - 32.5	1.1	WOH- WOH-WOH	17	_
1468117		SPT-20	32.5 - 34.0	1.0	WOH-1-1	21	_
EGACY 13		SPT-21	34.0 - 35.5	1.3	1-2-3	24	_
MSW T		SPT-22	35.5 - 37.0	1.0	1-2-1	21	7/21/09



Project N	No.	175569042			Location	N	556248.5	52, E 24425	40.30 (NAD27)
Project N	Name	Kingston Ash Pond			Boring No.	S	STN-8	Total Dept	h 76.7 ft
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
- - -		SAND, light brown, satu loose, fine grained, trace (Continued)		SPT-23 SPT-24	37.0 - 38.5 38.5 - 40.0	1.3 1.3	1-1-1 WOR- WOH-WOH	18 19	- - -
711.2'	41.0'	_		SPT-25	40.0 - 41.5	1.2	WOR- WOH-2	19	-
-		SAND, light gray, satura medium dense, fine gra		SPT-26	41.5 - 43.0	1.4	4-3-4	17	-
_				SPT-27	43.0 - 44.5	1.1	WOR- WOH-3	19	-
				SPT-28	44.5 - 46.0	1.2	2-3-5	16	_
-				SPT-29	46.0 - 47.5	1.1	4-3-2	19	-
703.2'	49.0'			SPT-30	47.5 - 49.0	1.3	2-3-6	21	-
_		_	SAND, light brown to brown, moist, very dense, fine to medium grained,		49.0 - 50.5	1.3	6-11-22	21	_
-		some medium to coarse gravel		SPT-32	50.5 - 52.0	1.0	18-17-12	21	-
698.7'	53.5'			SPT-33	52.0 - 53.5	1.1	6-7-13	22	-
	33.3			SPT-34	53.5 - 53.9	0.4	50/0.4		-
696.4'	55.8'	Shale, (Augered)		SPT-35	55.0 - 55.3	0.3	50/0.3		 Began Core
- - - -		Shale, gray, fine grained bedded, 45° bedding an		0%	5.9	0.5	8	61.7	- - - -
- - -				070	5.5	0.0		31.7	- - -
				0%	5.0	2.0	40	66.7	-
- - - - - - - - - - - - - - - - - - -				0%	4.5	1.8	40	71.2	- - - -
	76.7'			0%	5.5	2.3	42	76.7	Boring backfilled with bentonite cement grout from 0.0 ft to 76.7 ft
		Bottom of Hole							7/21/09



Page: 3 of 3

Γ	Project N	 اه.	175569042			Location	N	556248.5	52, E 2442540).30 (NAD27)
	Project N	Name	Kingston Ash Pond			Boring No.	S	TN-8	Total Depth	76.7 ft
r	Litholo	gy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
	Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
- - - -			Top of Rock = 53.5' Elevation (698.7')							- - - -
 - -										- - -
-	WOH = Weight of Hammer WOR = Weight of Rods								- -	
F			Split Samples: SPT-2, 3							_
ŀ			Slope Indicator (76.7 ft o	of pipe) installe	d with a co	ncrete pad and fl	ushmount c	over		_
F										-
\vdash										-
L										_
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L										7/21/09



SUBSURFACE LOG (DRAFT)

Project N	No.	171468117	171468117			Location N 557065.24, E 2441439.30 (NAD27)			
Project I	Name	Kingston Ash Pond			Boring No.	S	I-11	Total Depti	h59.0 ft
Location)	Kingston, Tennesse	ee		Surface Elev	ation_	757	7.8 ft. (NGVI	D29)
Project 7	Гуре	Geotechnical Explo	ration		Date Started	4/	20/09	Completed	4/20/09
Supervis	sor	Ben Halada Dr	iller Kent C	lements	Depth to Water N/A			Date/Time	N/A
Logged	Ву	Ben Halada			Automatic H	ammer l	□ Safe	ety Hammer	☐ Other ☐
Litholo	gy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
757.8'	0.0'	Top of Hole							
_		OVERBURDEN, (Auger sampling)	red, no						Boring advanced – using 3 1/4 " Hollow _
<u>-</u> -		37							Stem Augers
-									_
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SUBSURFACE LOG (DRAFT)

Project N	No.	171468117			Location	N 557065.24, E 24414			39.30 (NAD27)
Project I		Kingston Ash Pond			Boring No.		I-11	Total Depth	
Litholo	nav		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
-		OVERBURDEN, (Auger sampling) (Continued)	ed, no						- - - -
- - 702.9'	55 O'								-
702.8' _	55.0'			1					-
_ _ _ _ 698.8'	59.0'	No Core, Rock like resis (Augered)	tance						- -
090.0	59.0	Auger Refusal /							
_		Bottom of Hole							-
_									_
_									=
_									_
- -									_
-									-
-		Slope Indicator (59.0 ft o	of pipe) installe	d with a co	ncrete pad and fl	ushmount o	cover		_
- - -									Boring backfilled with – bentonite cement _ grout from 0.0 ft to 74.0 ft –
<u> </u>									
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Project I	No.	171468117			Location	N	555869.2	23, E 24410	63.93 (NAD27)
Project I		Kingston Ash Pond			Boring No.		I-12	Total Depti	
Location	1	Kingston, Tennesse	ее		Surface Elev	/ation	784	4.1 ft. (NGVI	D29)
Project ⁻	Туре	Geotechnical Explo	ration		Date Started	4/	30/09	Completed	J 5/1/09
Supervis	sor	Ben Halada Dr	iller Kent C	lements	Depth to Wa	ater N	/A	Date/Time	N/A
Logged	Ву	Ben Halada			Automatic H	lammer [Safe	ety Hammer	☐ Other ☐
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
784.1'	0.0'	Top of Hole							
-		OVERBURDEN, Ash (Augered without sample)	ing)						Boring advanced – using 4 1/4 " Hollow _ Stem Augers
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		Stanton	Consulting S	Convisoo	Ino				7/21/09



SUBSURFACE LOG (DRAFT) Page: 2 of 3

Project N	No.	171468117			Location	_ N	555869.2	23, E 244106	63.93 (NAD27)
Project I	Name	Kingston Ash Pond			Boring No.	S	l-12	Total Depth	n89.5 ft
Lithole	2011		Overburden	Comple #	Donth	Rec. Ft.	Blows	Mois.Cont. %	
Litholo Elevation	Depth	Description	Rock Core	RQD	Depth Run	Rec. Ft.	Rec. %	Run Depth	Remarks
Elevation	Берит	Description	Rock Core	RQD	Kuii	Rec. Ft.	Rec. %	Run Depun	Remarks
L		OVERBURDEN, Ash							
-									-
_		(Augered without sampli (Continued)	ing)						-
- -									1
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- 705.6'	78.5'			-					-
_									
-		No Core, Rock like resis	stance						-
_		(Augered)							-
[-]
_									Boring backfilled with — bentonite cement
<u> </u>									grout from 0.0 ft to
ļ-									89.5 ft –
- - - - - - - - - 694.6'	89.5'								-
<u> </u>		Auger Refusal / Bottom of Hole							
_		DOLLOTT OF FIGURE							-
			Consulting S						7/21/09



Page: 3 of 3

Project I	No.	171468117			Location	N	555869.2	23, E 244106	33.93 (NAD27)
Project I	Name	Kingston Ash Pond			Boring No.	S	I-12	Total Depth	89.5 ft
Litholo	anv.		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
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-		Slope Indicator (100 ft o	of nine) installed	l with a con	crete nad and nr	otective cov	ver		-
_		Glope indicator (100 it c	n pipe) motalice	with a con	orete pad and pr	Olcolive cov	Ci		-
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Project I	No.	171468117			Location	N	ot Yet Su	veyed	
Project I		Kingston Ash Pond			Boring No.		I-9	Total Depti	h 83.3 ft
Location		Kingston, Tenness			Surface Elev	/ation	 77	7.9 ft. (NGVI	
Project ⁻	Туре	Geotechnical Explo	ration		Date Started		11/09	Completed	5/11/09
Supervis	sor	Ben Halada Dr	iller Kent C	lements	Depth to Wa	ater N	/A	Date/Time	N/A
Logged	Ву	Ben Halada			Automatic H	lammer [□ Safe	ety Hammer	☐ Other ☐
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
777.9'	0.0'	Top of Hole							
- - -		OVERBURDEN, (Auge sampling)	red, no						Boring advanced using 4 1/4 " Hollow Stem Augers
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SUBSURFACE LOG (DRAFT) Page: 2 of 3

	Project N	No.	171468117			Location	No	ot Yet Su	rveyed	
	Project N	Name	Kingston Ash Pond			Boring No.	S	I-9	Total Depth	83.3 ft
H	Litholo			Overburden	Comple #	Donth	Rec. Ft.	Blows	Mois.Cont. %	
H	Litholo Elevation	Depth	Description	Rock Core	RQD	Depth Run	Rec. Ft.	Rec. %	Run Depth	Remarks
H	Licvation	Верит	Везсприон	TOOK OOIC	TOOL	Tun	1100.11.	1100. 70	Ruit Beput	Remains
L			OVERBURDEN, (Auger	ed, no						_
\mathbf{l}			sampling) (Continued)							-
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F	705.01	70.01								-
-	705.0'	72.9'			-					-
F			No Core, Rock like resis	tonoo						4
\vdash			(Augered)	tance						-
ļ										Boring backfilled with
<u>_</u>										Boring backfilled with – bentonite cement _ grout from 0.0 ft to
D/12// 10										grout from 0.0 ft to 83.3 ft
-MSM.GL										-
25	694.6'	83.3'	No Refusal /							
- All			Bottom of Hole							4
- NS -										-
LECACY 1748917 KINGSI ON INSI KUMENI ALION GPU FINSINGU I 72709										-
7										1
M_LEGA										-
2			Otantas	Consulting S	Samilana.	lna				7/21/09



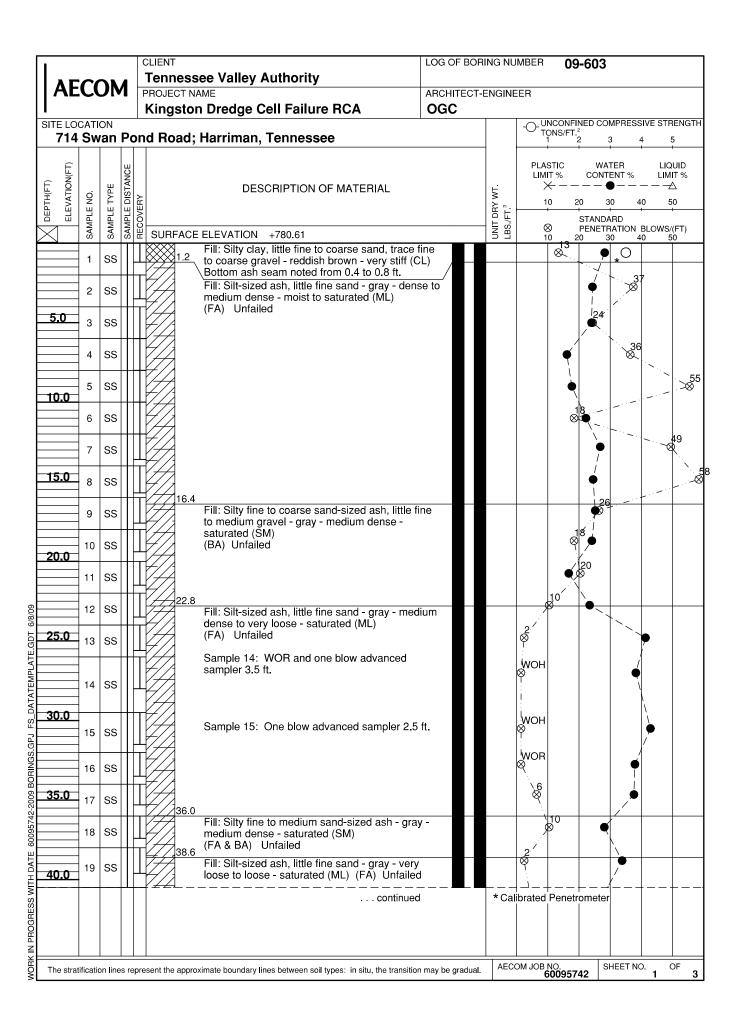
Page: 3 of 3

Project N	No.	171468117			Location	N	ot Yet Su	rveyed	
Project I	Name	Kingston Ash Pond			Boring No.	S	I-9	Total Depth	83.3 ft
Litholo	nav		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
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 -		Slope Indicator (83.3 ft	of pipe) installe	d with a co	ncrete pad and fl	ushmount c	over		-
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ITE LOC	ΔΤΙ	ON		ľ	ving:	sior	n Dredge Cell Failure RCA	OGC	1		NCONFI	NED CON	//PRESS	IVE STR	ENGTH
			Po	n	d Ro	ad;	Harriman, Tennessee			-O-UI	ONS/FT.	2 3	1 4	1 5	
DEPTH(FT) ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	OVERY			DESCRIPTION OF MATERIAL		UNIT DRY WT. LBS./FT ³	1	IT % ← — — 0 2	WAT CONTE •	ENT % — — - D 4 RD		7 % 2 0
	SAN	SAN	SAN	EE	SURF	ACE	ELEVATION +781.50		LBS	1		PENETR 20 30			
	1	ss				2.0	Fill: Silty clay, little fine gravel and fine to co reddish brown - hard (CL)				14 ⊗	->	*		
	2	ss				4.0	Fill: Silty fine to medium sand-sized ash, litt dense - moist (SM) (BA) Unfailed				•		, ,	- 8 ⁴	7
5.0	3	ss				6.0	Fill: Silt-sized ash, little fine sand - gray - de (ML) (FA) Unfailed							4 5 ⊗	
	4	ss				8.0	Fill: Silty fine to medium sand-sized ash, litt dense - moist (SM) (FA) Unfailed					- - 1	Ŕ		
10.0	5	ss					Fill: Sandy silt-sized ash - gray - dense to m - moist (ML) (FA) Unfailed	nedium dense				•	35 ⊗		
	6	ss									4	•	32 ⊗		
	7	ss				14.0					<u>-</u>	1 • 1	· · · <u>·</u> · ·		
15.0	8	ss					Fill: Silty fine to coarse sand-sized ash, little to medium gravel - gray - extremely dense - (BA) Unfailed	clay and fine moist (SM)			•				
	9	ss				18.0)			
20.0	10	ss					Fill: Sandy silt-sized ash, little fine gravel - gextremely dense to dense - moist (ML) (FA) Unfailed	jray -				•	33 _	,,_,,_	
	11	SS				22.0	Fills Cills tipe to google and sized ash little	fine to				•	Ø /9		
	12	ss					Fill: Silty fine to coarse sand-sized ash, little medium gravel - gray - medium dense to de saturated (SM)	inse -)	7	
25.0	13	ss					(BA) Unfàiled					21/\	Ø		
	14	SS				28.0	Fill: Silt-sized ash, little fine sand - gray - ve	ry loose to		5		21/ \ Ø	,		
30.0	15	SS					medium dense - saturated (ML) (FA) Unfailed	19 10000 10		5⊗ 7			•		
	16	SS	-	↓ T						₩OH					
25.0	17	SS	-	Ц П						र ं %					
	18	SS	#	† 						4			Ĭ		
	19	SS	#	LL T						×,	∑ 25 ≫		<i>,</i>		
40.0	20 	SS	<u> </u>	 					<u> </u>		· — —		Ĭ <u> </u>		
							continu	ed	*Ca	librated 	Penetr	ometer			
The stratif	icatio	on lines	s re	pres	ent the	approx	ximate boundary lines between soil types: in situ, the transit	ion may be gradual.	AEC	ом Jов I 6	NO. 00957	42 SH	HEET NO). C)F

				1 -	LIENT Ten r		ee Valley Authority	LOG OF BOR	ii (a i (a	, wild Litt	U	-602			
AE	C)N	1			CT NA		ARCHITECT-	ENGINE	EER					
				ı	King	stor	Dredge Cell Failure RCA	OGC							
TE LO			Da	'n	d Da	od.	Harriman Tannassas			-O-U	NCONFI ONS/FT. 1	2		SIVE STR	
/ 14	SW	an	7	110	u no	au,	Harriman, Tennessee			-	1	2 :	3 4	4 5	
E)			S								STIC IT %		TER ENT %	LIQ! LIMI	
ELEVATION(FT)	.	'nE	SAMPLE DISTANCE				DESCRIPTION OF MATERIAL		<u> </u>		-) – –	— — _ _	
ELEVATION	E NO	ĒŢ		ÆRY					RY V	1	0 2	20 3	0 4	0 5	0
7 -	SAMPLE NO.	SAMPLE TYPE	AMPL	RECOVERY	OLID		ELEVATION 704 FO	(O ti1)	UNIT DRY WT. LBS./FT ³		⊗	STANDA PENETE		BLOWS/((FT)
	Ś	Ś	ν) Τ	Œ T	50H	FACE 1	ELEVATION +781.50 Fill: Silt-sized ash, little fine sand - gray - very	(Continued)	5 5	3/ ⊗	0 2			0 5	
	21	SS			///	1	medium dense - saturated (ML)	, 10000 10		Ø			•		
			Ц		#	1	(FA) Unfailed Sample 21: Final blow advanced sampler 2	ft.		\5 \8			Ì	\ <u>_</u>	
	22	SS		Н	<u> </u>	44.5	·			2/6'					
5.0	22A 23	SS SS	+	Ħ	///	45.0 45.8	Fill: Medium to coarse sand-sized ash, trace \(\lambda \) loose - saturated (SP) (BA) Unfailed	silt - gray -	_	 					
	23A	55	П		1	46.1	Fill: Sandy silt-sized ash - gray - very loose -	saturated /		⊗2/6' Ø			•		
	23B	SS			<i>H</i>]	\	\(ML) (FA) Unfailed Fill: Medium to coarse sand-sized ash, trace	fine gravel		WOR			\		
			П	4	<i>4//</i>	}	gray - loose - saturated (SP) (BA) Unfailed			Ø			•		
0.0	24	SS			<i>[]</i>		Fill: Silt-sized ash, little fine sand, trace clay	gray - very		: 					
			\mathbb{H}	-{	<i>H</i>	1	loose - saturated (ML) (FA) Unfailed			WOR ⊗					
	.	SS			7//	1	Sample 23B: Final blow advanced sampler No recovery from 51 to 53 ft.	l ft.							
			Ħ	Т	7//	1	The reservery mention to do it.			WOH					
5.0	25	SS	$\ \cdot\ $	Ц	/ //	55.0				Y		/	/•		
	26	SS		П			Silty clay, little fine to medium sand - brown -	stiff (CL)		\3 & (
	20		Ш	Щ			0 1 07 0 " 1: 1: 1 :			×,	12	Γ,			
	27	ss					Sample 27: Gray fine sand inclusions noted.			, () k O*	•			
			H	$\overline{}$		1					VI.	<u>/</u> ′			
0.0	28	SS				61.0				×	*				
			Ħ	\parallel		101.0	Clayey silt, little to some fine to medium sand	d - brown -		26					
	29	SS		Ц			medium to stiff (CL-ML)		*	4	ixe"	Ī			
		SS	Ш	Ц		64.0	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			2/6		•			
5.0	30A		Ш	Ц			Sandy clay, some silt - stiff to soft (CL)			⊗ WoH	Ø				
		SS	Ш	\coprod	////	66.0	Silty fine to medium sand, little to some clay	- grav - verv	*	WOH	· '				
	31A	SS	\forall	\dagger			loose - saturated (SM)	gray rary		WOR		7			
	32	SS	li	_								/			
0.0			П	П			Sample 33: WOH advanced sampler 3 ft.			WOH		_/			
	33	SS		Ц		:	and the second s			 T		Ī			
	34	SS	\parallel	T		70.0				WOH		1			
			+	\dagger		73.0	Clayey silt, little to some fine to medium sand	d, trace		WOH		1			
'5.0	34A	SS	\parallel	뷔		1	organics - gray - very loose - moist (CL-ML)		,			Ī			
	35	ss				70 -				₩OH		$\not\models$			
	36	SS*	\parallel	\parallel	1411	76.5 77.0	Fine to medium sand, little silt - gray - mediu	m dense -			6/6"/ ⊗-●				
	36A	SS				78.5	moist (SP-SM) Silty fine to coarse sand, little fine gravel - br	/							
		RB			/:/.		gray - extremely dense - saturated (SM) We	athered /							
30.0				\dashv	/:/.,	'	\shale noted.								
			- †	-	/_• <u>/</u> _	L	Apparent bedrock	d	⊢ – – * Cal	— — - librated	+ Penet	⊢ – – rometer			
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AEC	:ON	1	P	Tennessee Valley Au	tnority	ARCHITEC	T-F	NGINE	FR					
				Kingston Dredge Cel	l Failure RCA	OGC	J, L	TTO ITTE						
SITE LOCA		_							-O-U	NCONFII	NED COM	MPRESS	IVE STRE	NGTH
/14 S	wan	Ρο □ □	ne	d Road; Harriman, Te	ennessee				· · ·	1 2	2 3	3 4	. 5	
DEPTH(FT) ELEVATION(FT)	SAMPLE TYPE	SAMPLE DISTANCE	٨٤	DESCR	RIPTION OF MATERIAL			UNIT DRY WT. LBS./FT.³	LIM >	STIC IT % ← — — 0 2	WAT CONTE	ENT % 	LIQUI LIMIT — — —	
DEPTH(F		PLE						PBO L		-	STANDA			
	SAM	SAM	띪	SURFACE ELEVATION +7	781.50	(Continue	ed)	LBS.			PENETR	ATION E	BLOWS/(F 50	T)
85.0	RB			Boring advance drilling fluid. Borehole groute Casing used: 10 Automatic-Mobi Tests.	ed to 10.0 ft. with power auger. Indige of the decision of the	bit and 85 ft.	n	*Cal	ibrated	Penetr	ometer			
	ne stra	tifica	atio	on lines represent the appro	oximate boundary lines betwee	en soil type	es: i	n situ.	the tra	nsition	mav b	e grad	ual.	_
WL				approximate approx	BORING STARTED			OM OFF			ago Ar			
14.0 NORTHING	ft. WE)			3/11/09 BORING COMPLETED 3/12/09						ET NO.	OF		
555	306.82				3/12/09 RIG/FOREMAN		APP'I	RED B KK	В		OM JOB	3	3	
EASTING 244 0	0865.7	5			Mobile B-57 (V.H.)/MI	В	, u F	RC	R	ALO		600957	42	



ΑE	C) /	1	•	Ter	n	ess	see Valley Authority		LOG OF				09	9-603			
/\L	<u> </u>	٠١ ٠		1				AME n Dredge Cell Failure RCA		ARCHIT OGC	ECT-E	:NGINE	±Η					
SITE LO																MPRESS	IVE STF	RENGTH
714	Sw	an	Po	n	d R	lo	ad;	Harriman, Tennessee					1	ONS/FT	2	3 4	4 !	5
DEPTH(FT) ELEVATION(FT)	·	E E	SAMPLE DISTANCE					DESCRIPTION OF MATERIAL				Ë.	PLAS LIMI			TER ENT %		UID IT % 2
DEPTH(FT)	SAMPLE NO.	E TYPE	EDIS	VERY								UNIT DRY WT. LBS /FT ³	1	0 .	+	-	0 5	0
	AMPI	SAMPLI	AMPI	ECO	CLI	DE		ELEVATION +780.61		(Contin	a/\	NIT D BS./F	8			RATION		
	S	S	S T	T	30 77	A	ACE	Fill: Silt-sized ash, little fine sand - gray -	very	(Contin	iuea)	<u> </u>		0 .	20 3	30 4	0 5	0
	20	SS		_	//	4		loose to loose - saturated (ML) (FA) Unfa										
	21	ss			<u> </u>								₽			1		
45.0	22	ss			4								⊗			•		
	23	ss											\5 ⊗					
50.0	24	ss		I									% WOH			•		
JU10	25	SS	\parallel	_	 		<u>50.5</u>	Silty clay, trace fine sand - gray - soft (CL	.)				WOH ♥		+ ,			
	26	ss	\parallel	Ι		4	52.5	Silty fine to medium sand, little to some cl					\ \& \&					
55.0				+				brown with gray - loose to medium dense (SM)	- ma	oist								
	27	SS											6 ⊗ 6 ⊗					
	28	ss		l										\	1			
60.0	29	ss												` _≫ 14	>			
	30	ss					62.5						\&\delta\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \		₩.			
	31	ss		1			64.5	Silty fine to medium sand, some clay - gra	ay - v	ery			WOH ⊗		•			
65.0	32	SS					04.5	Silty fine to medium sand, little to trace cla- very loose to loose - saturated (SM)	<u>ау - с</u>	gray			WOR ♥		•			
	33	SS		Ι									\ 4 ⊗					
70.0				<u> </u>			69.0	Silty fine to medium sand, trace clay - gra	<u>y -</u>				l `·. l	13 ⊗				
	34	SS		<u>Т</u>				medium dense - saturated (SM)						12				
	35	SS		<u>Т</u>										\ }	<u></u>			
75.0	36	SS				7	75. <u>0</u>	Marker and series and series						<u>/</u>	P - 1.			
76.0	37	SS	\perp		/./		76.0	Weathered shale - gray Pneumatic Piezometer installed	at 7	6.0 ft		* Cal	ibrated	Penet	 romete	-		
								End of Boring Boring advanced to 10.0 ft. with power au Boring advanced from 10.0 to 76.0 ft. with and drilling fluid. Pneumatic piezometer installed at 76 ft. Borehole backfilled upon completion.		≺ bit		- Ca	ibrated	renet				
							- -	contin	 nued		- -	* Cal	ibrated	— — Penet	rometer	 	_ -	
The strat	ificatio	on line	s re	pre	sent t	he	appro	oximate boundary lines between soil types: in situ, the tran		may be gra	adual.	AEC	OM JOB I	NO. 6 0095 7	/42 S	HEET NO). ₂ (DF 3

1				CLIENT		LOG OF B	ORI	NG NU	MBER	09	-603			
AEC	M	Л	Ļ.	Tennessee Valley Aut	thority	ADOLUTEO	·T [NOINE						
	.01	•		Ringston Dredge Cell	Failure RCA	ARCHITEC OGC	/I-E	INGINE	:EK					
SITE LOCA	TION		<u> </u>	Kingston Breage Och	Tallate HOA	000			-()- UN	ICONFI	NED CO	MPRESS	SIVE ST	RENGTI
		Po	n	d Road; Harriman, Te	nnessee				TC	NS/FT.	2 3	3	4	5
									PLAS	TIC	· WA	TER	L10	QUID
DEPIH(FI) ELEVATION(FT)		SAMPLE DISTANCE							LIMI	Γ%	CONT		LIN	1IT %
ELEVATION	<u>;</u> $\frac{1}{2}$	IST/	ا≾	DESCR	IPTION OF MATERIAL			¥		-				∆
LEV.		삘	VER					DRY FT.³	10		20 3		0	50
ELEVATI	SAMPLE IVO.	SAME	<u> </u>	SURFACE ELEVATION +7	 80 61	(Continue	,q)	UNIT DRY WT. LBS./FT ³	8)	STANDA	RATION	BLOWS	
	δ	S S S S S S S S S S S S S S S S S S S	æ :	Casing used: 10 Automatic-Mobil Penetration Test	oft. of 4 in. e hammer used for Standard ts. e based on first 6 in. of Hammer of Rod	(Continue	ed)) 2	20 3	0 4		50 (
														<u></u>
Th	ne stra	atific	ati	on lines represent the appro	ximate boundary lines betwee	n soil type	s: i	n situ,	the tra	nsitior	ı may t	oe grad	dual.	
L 12 (1	ft W	S: 10) (ft. BCR; 8.0 ft. ACR	BORING STARTED 3/9/09	,	AEC	OM OFF	ICE	Chic	ago Ar	rea - 01		
RTHING			<i>J</i> .U		BORING COMPLETED		ENT	ERED B	<u>Y</u>		ET NO.	OF		
5558	309.89				3/10/09				В			3	3	
ASTING 244	1187.4	6			RIG/FOREMAN Mobile B-57 (V.H.)/ME	з ′	4FP	D BY RC	R	AEC	OM JOB	NO. 60095 7	742	

A F-4	~	\	4	1	ELIENT Fennessee Valley Authority	LOG OF BOR	IING NL	IMBER	09-6	05			
AE) V	1	F	ROJECT NAME	ARCHITECT-	ENGINE	ER					
NTE LOO		211			Kingston Dredge Cell Failure RCA	OGC	1	- UNCC	NICINICI	D COM	IDDECC	N/E CT	DENC
714 ;			Pc	n	d Road; Harriman, Tennessee			TONS	/FT. ² 2	3	IPHESS	SIVE STE 4	5
DEPTH(FT) ELEVATION(FT)	NO.	SAMPLE TYPE	SAMPLE DISTANCE	ERY	DESCRIPTION OF MATERIAL		۲۷ WT ع	PLASTIC LIMIT % ————————————————————————————————————	C	WATI CONTE — •	NT %) — — -	_ LIM	QUID IIT % A
	SAMPLE NO.	SAMPLE	SAMPLE	RECOVERY	SURFACE ELEVATION +781.74		UNIT DRY WT.	⊗ 10	PE		ATION	BLOWS	· /(FT)
		ss	Ï	Ī	Fill: Silty clay, little fine to coarse sand, trace coarse gravel - reddish brown - hard to very			10	460 ⊗	9	<u>, </u>	0 !	
		SS	$\frac{1}{1}$	Ŧ	2.5 Fill: Silty fine to coarse sand-sized ash, trace	clay and				12/6'	3. ×	7	\vdash
5.0		SS	$\frac{\parallel}{\parallel}$	+	4.0 fine gravel - gray- dense - moist (SM) (FA & BA) Unfailed		_		18.				\vdash
		ss ss		T	Fill: Sandy silt-sized ash, trace gravel - gray dense - moist (ML) (FA) Unfailed	- medium			119				
	5	ss		t					- \2 &	22			
0.0	6	ss	\parallel	\dagger	Fill: Silty fine to medium sand-sized ash - gradense -moist (SM)	ay - medium) 25			\vdash
	7	SS		\dagger	(FA & BA) Unfailed				1 /	`. \2 &	9		
5.0	8	ss		t					•		` ⊗	8	
	9	ss			18.0				lacksquare		Ø	39)	
20.0	10	ss			Fill: Sandy silt-sized ash, trace clay - gray - r dense to dense - moist (ML) 20.0 (FA) Unfailed	nedium					30		
	11	ss			Fill: Silty fine to coarse sand-sized ash, trace medium dense - moist to wet (SM)	clay - gray -			8				
		SS			(BA) Unfailed			2/6"	8 ●				
25.0	13	SS SS			Fill: Silt-sized ash, little fine sand, trace clay - saturated (ML) (FA) Unfailed	- gray - loose		√4 ⊗3/6"			•<		
	14	SS SS			26.0 Fill: Medium to coarse sand-sized ash, little s loose - saturated (SP-SM) (BA) Unfailed Fill: Silt-sized ash, little fine sand and trace c very loose - saturated (ML)	/		2 ⊗ JWOH					
0.0	15	ss		<u> </u>	(FA) Unfailed			♥ -				/	
	16	ss						WOH ⊗				k'	
	17	ss			34.0			WOH ⊗					
,,,,	_	SS SS	\parallel	_	Fill: Sandy silt-sized ash - gray - loose - satu (FA & BA) Unfailed 36.0 Fill: Silt-sized ash little fine sand trace clay.	` '	_	2 6"		\dashv	•		•
	19	SS SS	\parallel	Ŧ	36.0 Fill: Silt-sized ash, little fine sand, trace clay loose - saturated (ML) (FA) Unfailed Fill: Fine to coarse sand-sized ash, little silt -			3/6" ⊗ ⊗		#		•	1
		SS	\parallel	Ī	- saturated (SP-SM) (BA) Unfailed	giay 10038		11			Ī		
10.0				1	///	d	 *Cal	_ ∠ _ _ ibrated Pe	netrom	– – ıeter	_`		-
								OM JOB NO. 600		\perp	EET NO		OF

				C	LIEN	Т		LOG OF BOR	ING NU	JMBER	09	9-605			
AE		71	A				see Valley Authority								
AE	C	JV	1	1		ECT NA		ARCHITECT-	ENGIN	EER					
SITE LO	CATI	ON			Kınç	gstor	n Dredge Cell Failure RCA	OGC	I		NCONE	INED CC	MPRESS	SIVE STE	ENGTH
			Pc	n	d Ro	oad;	Harriman, Tennessee			- - 7	ONS/FT	2	3		5
							•				-	+	-	-	
DEPTH(FT) ELEVATION(FT)			NGE NGE								STIC IT %		TER ENT %	LIQ LIM	UID IT %
DEPTH(FT) ELEVATION	Ö.	TYPE	DISTANCE	≻			DESCRIPTION OF MATERIAL		UNIT DRY WT. LBS /FT ³		← – -		• — — ·		
LEV	LE N	'LE T	띹	VERY					PRY FT.°°	1	0	20 STAND	-	0 5	0
	SAMPLE NO.	SAMPLI	SAMPLE	RECOVER	SUB	REACE	ELEVATION +781.74	(Continued)	JNIT BS./F		⊗	PENET	RATION		
			T	T	7-7-	4	Fill: Silt-sized ash, little clay, trace fine sand	gray		1./ Ø	0	20 :	30 4	0 5	0
	21	SS		Ц	14		 -medium dense to very loose - saturated (ML Unfailed) (FA)		P :			/		
	22	SS		П	4//	7	Officialed			¹ ∳ _(<u> </u>		6		
	22	33		Ц	<i>[]</i>	1							Ť		
45.0	23	SS			<u> </u>	1							\downarrow		
			-	∦	74	1				WOH			\ \ \		
	24	ss			+/_	4				Ø			•	\	
	25	SS	H	╗	1	48.0 49.0	Silt, little clay interbedded with silt-sized ash	slimes, trace		WOR €					
50.0	25A		H	\dagger		50.0	fine to medium sand - dark gray to black - ve	ry loose -	\vdash	\(\frac{\frac{1}{1}}{\omega}\)		•			
50.0			Ш	T		100.0	\saturated (ML) & (FA) \ Clayey silt, little fine to medium sand - gray -	verv loose - /	\vdash	WOH					
	26	SS		Ц		52.0	\wet (CL-ML)	/		ØØ.		Ĭ			
	27	SS				\	Silty clay, little fine to medium sand - brown a medium (CL)	ind gray -	1	WOH		•			
			Ш	H		54.0	Clayey silt, little fine to medium sand - brown	and gray -				<u> </u>			
55.0	28	ss				`	soft (CL-ML) Sandy silt, little to some clay - brown to gray	- loose -			Ø	 			
			H	$^{+}$		56.0	moist (ML)	/	_	,	12	/			
	29	ss				58.0	Silty clay, little fine to coarse sand - brown ar (CL)	id gray - stiff			×,¢	*			
	30	SS	H	T		59.0	Clayey silt, little to some fine to coarse sand	- brown and			4				
60.0	30A		H	Ц	A Y V A	100.0	gray - stiff - moist (CL-ML) Silty fine to medium sand, little to trace clay -	aray lagas			*				
	31	SS		П			to very loose - wet - saturated (SM)	gray - loose		8 €		-			
	31	33	Ш	_								1			
	32	SS		Н						1 ⊗		•			
			H	$^{+}$		64.0	Silty fine to medium sand, trace clay - orangi	eh brown -		! MOH		1			
65.0	33	ss		Н			very loose - saturated (SM)	SII DIOWII -		× CII		•			
			H	Ħ		66.0	Silty fine to medium sand - orangish brown -	loose -			<u> </u>				
	34	SS		Ц		1	saturated (SM)			}	1	/			
	0.5	00	П	T						8		6			
70.0	35	SS				70.0					11.	112	7		
	36	ss		Ц			Fine to coarse sand, little silt - orangish brow dense - saturated (SP-SM)	n - medium							
				\perp			delice saturated (er em)					2/3			
	37	SS		Ц		73.5									
75.0	37A 38	00				75.0	Silty fine to medium sand, little gravel, trace				•				
75.0	39	RB SS	П	Т	/•/	75.0 75.8			 						
				1	7:7.		remaining open over night. Drilled to 75.0 ft.	//							
					/:/.		Weathered shale - dark brown and gray Driller's Note: Apparent shale bedrock	/							
		RB			///	1	Eber and and aggreen.								
80.0					<u> </u>	<u>L</u> .			L	l	L	L		l	Ll
			$ \ $			_	continue	d	*Ca	librated	Penet	romete	-		
										ОМ ЈОВ					

				1	CLIENT		LOG OF	BORI	NG NL	JMBER	09	-605			
۵ا∐	EC	\cap	A		Tennessee Valley Au	ıthority	ADOLUTE								
'	LC	Uli	'	1	ROJECT NAME	I Eciluro DCA	ARCHITE OGC	ECT-E	ENGINE	EER					
SITE	LOCAT	ION		'	Kingston Dredge Cel	I Fallure NCA	OGC				NCONFI	NED CO	MPRESS	IVE STR	RENGTH
			Po	n	d Road; Harriman, To	ennessee				TC	ONS/FT.	2	3 4		5
					· · · · · · · · · · · · · · · · · · ·					<u> </u>		-	+	· · · · ·	-
	E		빙							PLAS LIMI			TER ENT %		UID IT %
E.	ELEVATION(FT) PLE NO.	H	DISTANCE		DESCF	RIPTION OF MATERIAL			Ŀ		←			— — <u>—</u>	
DEPTH(FT)	INO IN			뇖					≶ ∞.	1	0 2	:0 3	30 4	0 5	50
DEI	ELEVATI SAMPLE NO.	SAMPLE TYPE	SAMPLE	RECOVERY					UNIT DRY WT LBS /FT ³			STANDA			
\boxtimes	SAI	SAI	SAI	뿐	SURFACE ELEVATION +		(Continu	ıed)	L BS	1			RATION 80 4		(FT) 60
					Driller's Note: A	opparent shale bedrock									
82.	0				/./. 82.0										
WORK IN PROGRESS WITH DATE 60095742-2009 BORINGS.GPJ FS_DATATEMPLATE.GDT 6/8/09 YELD A MILL DATE 60095742-2009 BORINGS.GPJ FS_DATATEMPLATE.GDT 6/8/09					End of Boring Boring advance Boring advance drilling fluid. Borehole groute Installed inclino Casing used: 1 Automatic-Died Penetration Tes	8 ft. of 4 in. Irich hammer used for Stand sts. Ie based on first 6 in. of Hammer of Rod	ock bit and		*Cal	ibrated	Penetr	ometer			
ĒL															
N SS M	The	stra	tific	ati	on lines represent the appro	oximate boundary lines betw	een soil typ	es:	in situ,	the tra	nsition	n may l	oe grac	lual.	
WL WE						BORING STARTED			OM OFF				rea - 01		
NORT	Dry to 20.0 ft. WD			VV	<u>U</u>	2/23/09 BORING COMPLETED 2/25/09		ENT	ERED B	Y		ET NO.	OF		
EASTII	55627 NG					RIG/FOREMAN				D	AEC	OM JOE	3 3 NO.	3	
ĭL Š	24414	198.3	5			D-50/JC		APP'D BY AECOM JOB NO. 60095742							

l <u>. </u>		-	_	- 1	CLIENT Tenr		see Valley Authority	LOG OF BOF	RING NU	JMBER	09	-109			
 AE	C	JM	1	h	PROJE	CT NA	AME	ARCHITECT-	ENGINE	EER					
ł					King	stor	n Dredge Cell Failure RCA	OGC							
SITE LO			D	۸n	d Da	ad.	Harriman, Tennessee			-O-U	NCONFI ONS/FT. 1	NED CC		SIVE STRI	
/ 14	J	all	F'			au,	namman, remiessee		+		1	+	3	4 5	
Œ			핑								STIC IT %		TER ENT %	LIQU LIMI	
DEF LA(F1) ELEVATION(FT)	_	PE	TAN				DESCRIPTION OF MATERIAL		ļ <u>.</u>	l .	-		● — —	— — <u>—</u>	
ELEVATION	E NO	ΕTΥ	EDIS	ERY					≱ ∾	1	0 2	20 :	30	40 50	0
<u> </u>	SAMPLE NO	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY					UNIT DRY WT		⊗	STAND.		BLOWS/((FT)
	SA	SA	δ	=	SUR	FACE	ELEVATION +763.59	and alone arrang	5 9	1			30	40 50	
	1	ss				2.0	Fill: Silty fine to medium sand-sized ash, tra - loose - moist (SM) (FA) Failed			8	10	•			
	2	ss					Fill: Silt-sized ash, little fine sand - gray - m to loose - moist (ML)	edium dense		,	10 8)			
5 A			H	+			Sample 3: 2 in. seam of reddish brown silty	clay noted.		4 ∕		<u>_</u> /			
5.0	3	ss	$\ $	Ц		6.0	(FA) Failed					1			
			\dagger	\dagger		10.0	Fill: Silty sand-sized ash - gray - very loose	- wet (SM)	1	8					
	4	SS	Ц	Ľ			(FA & BA) Failed					<u>`</u>			
	5	ss	$ \Gamma$	μ						8		'	P .		
0.0	Ĭ		\coprod			10.0	Fills Conducities and sale little state of	ioni lecce	1	13 Ø			<u> </u>		
	6	ss	$\ $	\vdash			Fill: Sandy silt-sized ash, little clay - gray - v saturated (ML)	very 100se -		×			•		
	 		${\mathbb H}$	+			(FA) Failed			2]	/_	
	7	ss		Ц						8				,	
5.0			H	\dagger						\ <u>S</u>				1	
J.U	8	ss	$\ $	Ц		16.0				1 :					
	9	SS	IT	T			Fill: Silt-sized ash, little clay, trace fine sand	d - gray - very		3 ⊗					
	9	55		Ц			loose - saturated (ML) (FA) Failed								
	10	ss								\$					
0.0			Н	Ħ									/ /		
	11	ss								Ø					
			H	H						1					
	12	ss		Ц						×			7		
5.0			Ħ	П						WOH			1		
	13	ss				26.0				⊗ 1			7		
		SS*	H	H		26.5	Silt, little clay and trace fine sand interbedd silt-sized ash slimes - dark gray and black -			ØVOH ⊗	× -7			+	
	14A	SS	\coprod	Ľ		1	\(FA)	` ′ /	<u>'</u>	<u> </u>	^ ^				
	15	ss	$\ $	$\ $			Clayey silt, some fine to medium sand - bro grayish brown - very loose (CL-ML)	wnish gray to		WOH ⊗		ľ			
0.0	_		${}$	$^{+}$		30.0	Clayey silt, little fine to medium sand - brow	n and grav -	1	WOH		<u>\</u>	-		—
	16	ss	$\ $	$\ $			stiff (CL-ML)	g- J		× Cit		🛉			
			H	$\dagger \dagger$						\6,		<u> </u>			
	17	SS	\prod	\prod		34.0			1	\&\delta(\mathbb{L}°		L		
5.0	18	SS	I	Π			Silty fine to medium sand, little clay - light b saturated (SM)	rown - loose -		\$ 5		>)		
			\coprod	片			Saturated (OW)			'.		/ /			
	19	ss	$\ $	$\ $		1					*	ullet			
_	_		${\parallel}$	H		38.0	Silty fine to medium sand, little clay - reddis	sh brown -	-	3′		+	-		—
10.0	20	ss	$\ $				very loose to loose - saturated (SM)			3∕ ⊗		•	1		
<u>.U.U</u>		\vdash	۲	Ė	1474	·L		 led	* Cal	│— — - librated	+ — — Peneti	⊢ – [∟] romete	- — - r	††	
							····continu								
	lification	on line	s r	enre	esent the	annro	ximate boundary lines between soil types: in situ, the transi	tion may be gradual	AEC	OM JOB	NO.	s	HEET N	0. 1)F

					LIENT			LOG OF	BORII	NG NL	MBER	09-109)		
AE	c)V	4			ee Valley Au	ıthority								
^_		ノ(*	•		ROJECT NA		I Failure RCA	ARCHITE OGC	ECT-E	NGINE	:ER				
SITE LO	CATI	ON		ľ	Milysioi	i bieuge cei	I I allule NCA	OGC			UNC	ONFINED C	OMPRES	SIVE STF	RENGTH
			Ро	nc	d Road;	Harriman, To	ennessee				TONS	S/FT. ² 2	3	4 !	5
(PLASTI	. w	ATER	LIO	UID
DEPTH(FT) ELEVATION(FT)		l	SAMPLE DISTANCE								LIMIT %		TENT %	LIM	IT %
DEPTH(FT) ELEVATION	9 9	SAMPLE TYPE	DIST.	ځ		DESC	RIPTION OF MATERIAL			, WT	10	20	30	40 5	50
DEPT	PLE	Bre								. FF	- 10	STAND	-	+0 0	ř
$\overline{\mathbf{x}}$	SAMPLE	SAM	SAM	ᇍ	SURFACE	ELEVATION +	763.59	(Continu	ued)	UNIT DRY WT.	⊗ 10		FRATION	BLOWS/	(FT)
		SS	T	П		Silty fine to me	dium sand, little clay - red	dish brown -			⊗ 1		<u> </u>		
	21	33	Ш			very loose to lo	ose - saturated (SM)					j			
	22	ss										•			
			╀	7								<i>i</i>			
45.0	23	ss									& P				
			Ħ	7							و ۱	_/			
	24	SS		Ц.	48.0						8	7			
	25	ss	\dagger	П			dium sand, little clay - red	dish brown to			1	14 8	•		
50.0	23	33	Ш			brown - mealur	n dense - saturated (SM)					/	´		
	26	ss									∳	2 •			
	_		╁	H								2			
	27	ss	11	Ų.							≪	, P			
55.0			\dagger	П	54.0	Fine to medium	sand, little silt, trace clay	- brown -				8			
JJ.U	28	SS	╁	4		medium dense	- saturated (SM)					7.7			
	29	ss	Ħ	Π								• >	28 ⊗		
	_ 23		Щ									9/6"			
	30	SS	4	<u>l</u>	59.0	Cravally fine to	agazag gand little gilt tra	oo olov brown	n		-	8		42 Ø	
60.0	30A	SS	+	\mathbb{H}		and black - der	coarse sand, little silt, traduse to extremely dense - s	ce clay - browl aturated (SM)	n]		32		
	31	ss	1	Ц		Weathered sha	le noted.					•	∞		
	32 22A	SS*		Ė	62.4	Weathered she	lo grov								
	102/1			-	•/•	Weathered sha Drilled without			-1						
65.0	1			ľ	<i>:/:</i> /	Driller's Note:	Apparent bedrock								
		RB			/./										
	1				<i>':/</i> .}										
68.0				ᅷ	/•/ 68.0	End of Boring				* Cal	brated Pe	netromete	or .		
						Borehole advar	nced to 8.0 ft. with power a	auger.	.	Oui			-		
						drilling fluid.	nced from 8.0 to 68 feet w	ith rock bit and	d						
						Borehole groute	ed upon completion and ir	nclinometer							
						installed to 68 f Casing used: 8	ft. of 4 in.								
							lrich Hammer used for Sta	ındard							
						SS* = SPT valu	ıe based on first 6 in.								
						WOH = Weight (FA) = Fly Ash	of Hammer								
						(BA) = Bottom	Ash								
	The	strat	ifica	atic	n lines rer	resent the appro	oximate boundary lines be	tween soil typ	es. i	n situ	the trans	ition may	he ara	ldual	<u> </u>
	ine	oual	iiiCc	111	71 IIIIG2 IG	present the appli	·	rween son typ	1		105				
	3 ft.	WD					BORING STARTED 2/12/09			OM OFF		Chicago A	Area - 0	1	
ORTHING 5	G 5697	1.56					BORING COMPLETED 2/12/09	ENTERED BY SHEET NO. OF KKB 2 2							
ASTING	4416		ı				RIG/FOREMAN D-50/JD		APP'I	D BY	R	AECOM JC	B NO. 60095	742	
	7710	_, .+4								nu	••		00033	.74	



Project No.	171468117			Location	N	556623.0	08, E 24415	63.81 (NAD27)
Project Name	Kingston Fossil Plan	ıt Dike D Bı	uttress	Boring No.	В	B-1	Total Depti	n 73.7 ft
Location	Kingston, Tennesse	e		Surface Elev	/ation	77	4.2 ft. (NGVI	D29)
Project Type	Geotechnical Explor	ation		Date Started	1:	2/28/08	Completed	12/28/08
Supervisor	Patrick Kiser Dril	ler G. Tho	mpson	Depth to Wa	iter N	/A	Date/Time	N/A
Logged By	Patrick Kiser			Depth to Wa	iter N	/A	Date/Time	N/A
Lithology		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
774.2' 0.0'								
- 772.5' 1.7'	Fat Clay (fill), red - browr medium stiff	n, moist,	_					Boring location – surveyed by TVA _
- - -		Ash, dark gray, dry, fine to coarse grained sand-sized particles, non-plastic						Boring logged by — auger cuttings; no sampling performed
765.7' 8.5'	765.7' 8.5'							-
- - - - - - - - - - - - -		Bottom Ash, dark gray, dry to wet, fine to coarse grained sand-sized particles, non-plastic						material becomes wet at 18.5 feet
	Silty Sand (alluvium), ora brown, wet, fine grained, graded							- - - - - - - - - - - - - - - - - - -



Project	No.	171468117			Location	N	556623.0	08, E 24415	663.81 (NAD27)
Project	Name	Kingston Fossil Pla	ant Dike D Bu	uttress	Boring No.	В	-1	Total Dept	h 73.7 ft
Lithol	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
		Silty Sand (alluvium), o brown, wet, fine graine graded <i>(Continued)</i>							decreasing fines content with depth
- - - - - - - -									- - - - - - - - -
707.5'	66.7'								_
- - -		Shale, (augered)							- - -
	70.71								Slope Inclinometer - B-1 installed _
	73.7'	No Refusal / Bottom of Hole Top of Rock = 66.7' Elevation (707.5')							- - - - - - - - - - - - - - - - - - -



Project I	No.	171468117			Location	N	556877.4	4, E 24417	44.70 (NAD27)
Project	Name	Kingston Fossil Pla	nt Dike D Bu	uttress	Boring No.	Е	3-2	Total Depth	n 78.0 ft
Location	1	Kingston, Tennesse	ee		Surface Elev	ation	774	4.1 ft. (NGVI	D29)
Project ⁻	Туре	Geotechnical Explo	ration		Date Started	I 1:	2/26/08	Completed	12/27/08
Supervis	sor	Jim Andrew Dri	iller G. Tho	mpson	Depth to Wa	iter N	/A	Date/Time	N/A
Logged	Ву	Jim Andrew			Depth to Wa	iter N	/A	Date/Time	N/A
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
774.1'	0.0'	Top of Hole							
- - - - - -		Bottom Ash, gray to dari to wet, very loose to der coarse grained, sand-siz particles, non-plastic	nse, fine to	SPT-1	5.0 - 6.5		5-6-15		Boring location - surveyed by TVA _ SPTs driven with 140-lb auto hammer
- - -				SPT-2	10.0 - 11.5		8-14-11	15	material is dry from — 5.0 feet to 12.5 feet
-				SPT-3	12.5 - 14.0		19-24-24		-
-				SPT-4	15.0 - 16.5		8-13-14		-
- -				SPT-5	17.5 - 19.0		5-5-6		material becomes wet at 17.5 feet
<u>-</u>				SPT-6	20.0 - 21.5		3-2-2		_
-				SPT-7	22.5 - 24.0		wh-wh-wh	24	-
- -				SPT-8	25.0 - 26.5		wh-wh-wh		wh = weight of — hammer
-				SPT-9	27.5 - 29.0		wh-wh-wh		-
				SPT-10	30.0 - 31.5		wh-wh-wh		
# I I I I I I I I I I I I I I I I I I I				SPT-11	32.5 - 34.0		wh-wh-wh		-
				SPT-12	35.0 - 36.5		1-1-3		-
A SLOPE INCLIN				SPT-13	37.5 - 39.0		2-2-1	26	-
				SPT-14	40.0 - 41.5		wh-wh-wh	46	=
730.6'	43.5'			SPT-15	42.5 - 44.0		wh-wh-3		-
<u> </u>		2	Conculting 9						4/20/09



ı	Project N	No.	171468117			Location	N	556877.4	14, E 24417	'44.70 (NAD27)	_
	Project N	Name	Kingston Fossil Pla	nt Dike D Bu	uttress	Boring No.	B	3-2	Total Dept	h 78.0 ft	-
H	Litholo	gy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %		\dashv
t	Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks	
-			Silty Sand (alluvium), orderown, wet, very loose to dense, fine grained, poo (Continued)	o medium	SPT-16	45.0 - 46.5		2-3-2			
Ł			(Conunaea)		SPT-17	47.5 - 49.0		1-wh-wh	21		1
					SPT-18	50.0 - 51.5		wh-wh-wh			-
ŀ					SPT-19	52.5 - 54.0		2-1-3			
-					SPT-20	55.0 - 56.5		2-4-5		decreasing fines content with depth	-
F					SPT-21	57.5 - 59.0		2-2-2	24		-
					SPT-22	60.0 - 61.5		5-5-6			-
F					SPT-23	62.5 - 64.0		6-9-8			_
F					SPT-24	65.0 - 66.5		3-2-1			=
F					SPT-25	67.5 - 69.0		9-10-10			
F					SPT-26	70.0 - 71.5		9-7-10	23		-
E	700.5'	73.6'									
\mid											\dashv
F	696.1'	78.0'	Shale, (augered)							Slope Inclinometer B-2 installed	_
F			No Refusal / Bottom of Hole								4
-MSM_LEGACY 171468117 SLOPE INCLINOMETERS.GPJ FMSM.GDT 4/20/09			Top of Rock = 73.6' Elevation (700.5')								- - -
TERS.GPJ F											4
PE INCLINOME											
8117 SLOF											-
2Y 17146k											\exists
SM_LEGAC											+
EMS _			Stantag	Consultina S	Convioca	Inc				4/2	0/09



Project	No.	171468117			Location	N	I 557061.6	67, E 24418	87.56 (NAD27)
Project	Name	Kingston Fossil Pla	nt Dike D Bı	uttress	Boring No.	E	3-3	Total Depti	n 60.2 ft
Location	า	Kingston, Tennesse	ее		Surface Elev	vation	77	0.9 ft. (NGVI	D29)
Project ¹	Туре	Geotechnical Explo	ration		Date Started	_ d 1	2/29/08	Completed	12/29/08
Supervis	sor	Patrick Kiser Dr	iller G. Tho	mpson	Depth to Wa	ater N	I/A	Date/Time	N/A
Logged	Ву	Patrick Kiser			Depth to Wa	ater N	I/A	Date/Time	N/A
Lithol	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
770.9'	0.0'	Top of Hole							
		Bottom Ash, dark gray to damp to wet, fine to coal sand-sized particles, no	rse grained						Boring location surveyed by TVA Boring logged by auger cuttings; no sampling performed
- - - -									25.0 feet - 30.0 feet
60/0									+
NSM_LEGACY 771489177 SLOPE INCLINOMETERS GPU FMSM.GDT 4/2009									- -
- FMSM									-
TERS.G									-
CLINOME									=
LOPE IN									- -
468117 S									-
⊱ }728.9'	42.0'								-
SM_LEG									-
Σ <u></u>	<u> </u>	Stantec	Continue	Inc		<u> </u>		4/20/09	



Project N	No.	171468117			Location	N	557061.6	67, E 24418	87.56 (NAD27)
Project I	Name	Kingston Fossil Pla	int Dike D Bi	uttress	Boring No.	В	-3	Total Dept	h 60.2 ft
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
- - - - -		Silty Sand (alluvium), or brown, wet, fine grained graded (Continued)							-
— - 714.4' -	56.5'								-
- - 710.7'	60.2'	Shale, (augered)							Slope Inclinometer B-3 installed
- -		No Refusal / Bottom of Hole Top of Rock = 56.5'							
- - -		Elevation (714.4')							-
- -									
- - -									
- - -									-
- - -									
- - -									-
- - -									-
- - -									
- - 									-
-			Consulting						4/20/0



Project N	No.	171468117			Location	N	l 556934.6	61, E 24420	66.28 (NAD27)
Project I	Name	Kingston Fossil Pla	nt Dike D Bu	uttress	Boring No.	Е	3-4	Total Depti	n 59.5 ft
Location	1	Kingston, Tennesse	ee		Surface Elev	/ation	76	4.2 ft. (NGVI	D29)
Project 7	Туре	Geotechnical Explo	ration		Date Started	1 1	2/28/08	Completed	12/29/08
Supervis	sor	Patrick Kiser Dri	iller G. Tho	mpson	Depth to Wa	iter N	I/A	Date/Time	N/A
Logged	Ву	Patrick Kiser			Depth to Wa	iter N	I/A	Date/Time	N/A
Litholo	ogy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
764.2'	0.0'	Top of Hole							
- - - 759.7'	4.5'	Bottom Ash, gray to dar to damp, very dense, fin grained sand-sized parti non-plastic	e to coarse	SPT-1	2.0 - 3.5	1.5	8-24-35		Boring location - surveyed by TVA _ SPTs driven with - 140-lb auto hammer _
 - - 756.4'	7.8'	Sandy Lean Clay, red - brown, moist, medium stiff to stiff, with sand sized chert particles Bottom Ash, gray to dark gray, dry		SPT-2	5.0 - 6.5	1.4	5-5-7	24	- - -
- 730.4	1.0	Bottom Ash, gray to dar to wet, loose to medium		SPT-3	7.5 - 9.0	1.2	5-14-16	17	-
- - -	to coarse grained sand-si particles, non-plastic		sized	SPT-4	10.0 - 11.5	0.6	3-7-5	17	- material becomes wet -
-									at 12.0 feet
748.3'	15.9'	Sandy Lean Clay, red - moist, medium stiff to s		SPT-5	15.0 - 16.5	0.6	2-3-1		- - -
<u>-</u>		sand layers and lenses							- - -
- - 741.6'	22.6'			SPT-6	20.0 - 21.5	0.9	1-1-3	29	- -
-		Bottom Ash, gray to dark to wet, loose to medium	dense, fine	SPT-7	22.5 - 24.0	1.5	4-10-9		-
-		to coarse grained sand- particles, non-plastic	sized	SPT-8	25.0 - 26.5	1.0	3-4-5		-
-				SPT-9	27.5 - 29.0	1.5	4-5-3	20	- -
4/20/09				SPT-10	30.0 - 31.5	1.5	2-2-4		
FMSM.GDT				SPT-11	32.5 - 34.0	1.5	3-3-1		-
MSM_ECACY 17488117 SLOPE NOLINOMETERS GPJ FMSM.GOT 4/2008	35.4'	Silty Sand (alluvium), or brown, wet, very loose to	-	SPT-12	35.0 - 36.5	1.5	2-1-3		SPT-12 sample split, — 35.0 - 35.6 & 35.6 36.5
17 SLOPE INC		grained, poorly graded		SPT-13	37.5 - 39.0	0.6	1-2-3		
GACY 1714881				SPT-14	40.0 - 41.5	1.2	1-1-1	19	
MSM_LEC									-
ш —		Stantec	Inc		1		4/20/09		



Project N	No.	171468117			Location	N	556934.6	61, E 24420	66.28 (NAD27)
Project N	Name	Kingston Fossil Pla	nt Dike D B	uttress	Boring No.	В	-4	Total Depti	h 59.5 ft
Litholo	gy		Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
- - - -		Silty Sand (alluvium), or brown, wet, very loose grained, poorly graded	to loose, fine						- - - -
- _ 712.1'	52.1'								- -
- - - -		Shale, (augered)							- - - -
- - 704.7'	59.5'								Slope Inclinometer B-4 installed
		Bottom of Hole Top of Rock = 52.1' Elevation (712.1')							
<u>-</u> -			Consulting						- - 4/20/09

Appendix C

Draft Dike Inspection Reporting Form



TVA Fossil Power Group Monthly CCP Impoundment Safety Inspection Checklist

1. General Information

Monthly safety inspections of CCP disposal impoundments / facilities shall be performed by plant personnel and documented using this form. Forms shall be filed on site. Any serious findings shall be immediately reported to appropriate TVA personnel. Particular attention should be given to evidence of (or changes in) seepage, slope instabilities, sinkholes, boils, crest settlement, cracking, and improper functioning of spillways and outlet structures.

Plant:			Inspect	ion Date:	
CCP Fa	acility:	Inspection Personnel:			
Weathe	er Conditions:		3,		
2.	Observations and Notes			300	
2.1	Dike Crest:				
	Settlement/Cracking:	Yes ()	No ()	New ()	Existing ()
		Location/Description/Observations:			
	Rutting:	Yes ()	No ()	New ()	Existing ()
		Location/Description/Observations:			
	Erosion:	Yes ()	No ()	New ()	Existing ()
		Location	/Descript	ion/Obser	vations:
2.2	nterior and Exterior Dike Slopes:				
	Freeboard:	fe	feet (estimated)		
		Changes from Last Inspection/Observations:			
	Steep Slopes:	Yes ()	No ()	New ()	Existing ()
		Location	/Descript	ion/Obser	vations:



Instabilities (slides, sloughs, or scarps):

Yes () No () New () Existing ()

Location/Description/Observations:

Erosion:

Yes () No () New () Existing ()

Location/Description/Observations:

Vegetation/Brush:

Bare () Sparse () Adequate () Dense ()

Change from Last Inspection/Description /Observations:

Trees:

Yes() No() New() Existing()

Location/Size/Observations:

Animal Burrows:

Yes() No() New() Existing()

Location/Description/Observations:

Sinkholes:

Yes() No() New() Existing()

Location/Description/Size/Observations:

Seepage:

Yes() No() New() Existing()

Location/Description/Size:

Increase in flow from last inspection?

Yes () No () NA ()

Estimated Flow Rate: _____ gallons per minute

Clear () or Dirty () water emitting

Growing in Size? Yes () No ()

Other Observations:



100000000000000000000000000000000000000		1	320
2.3	Dile	Tan	Areas:
1.5	IJIKA	INE	Areas.

Seepage:

Yes() No() New() Existing()

Location/Description/Size:

Increase in flow from last inspection?

Yes () No () NA ()

Estimated flow rate: ____ gallons per minute

Clear () or Dirty () water emitting

Growing in Size? Yes () No ()

Other Observations:

Boils:

Yes() No() New() Existing()

Location/Description/Size:

Increase in flow from last inspection?

Yes () No () NA ()

Estimated flow rate: _____ gallons per minute

Clear () or Dirty () water emitting.

Growing in Size? Yes () No ()

Other Observations:

2.4 Seepage Collection System:

Is there a seepage collection system for this impoundment? Yes () No ()

If yes, provide the following information:

Location of System:

Increase in flow from last inspection? Yes () No ()

Estimated flow rate: _____ gallons per minute

Clear () or dirty () water emitting.

Other Observations/Changes from Last Inspection:



2.5 Spillway Weirs and Out	let System:
----------------------------	-------------

Outlet System Type:

Spillway Weir/Risers () Pumps() Other ()_

Riser or Outlet Pipe Joint

Leakage/Separation:

Yes() No () New() Existing () Not able to inspect ()

Description/Observations:

Riser or Outlet Pipe

Misalignment:

Yes () Existing () Not able to Inspect () No() New()

Description/Observations:

Headwall Condition

At Outlet:

Good () Poor w/ Cracking () No Headwall ()

Description/Observations:

Working Order of Pump Outlets (if applicable):

Good () Need Maintenance () NA ()

Description/Observations:

Discharge Channel

Condition:

Good () Erosion () Sloughing () Blockage ()

Description/Observations:

Other Observations:

3. Closure

Recommended Maintenance (as a result of this inspection):

Items for Follow-up Next Inspection:

List of Attachments (Photos, Sketches, Drawings or Illustrations):