Tennessee Valley Authority
Regulatory Submittal for Kingston Fossil Plant

Documents submitted:
Valley Area #2 Temporary Storage Work Plan, Revision 1

Date Submitted:
03/11/2010

Submitted to whom
Leo Francendese

Concurrence

Received	Not Applicable	TVA
☒	☐	Mike Scott
☐	☐	Steve McCracken
☒	☐	Kathryn Nash KAN
☒	☐	Dennis Yankee
☒	☐	Michelle Cagley MC
☒	☐	Tom Spurlock SSR
☐	☐	_____

Received	Not Applicable	Jacobs
☒	☐	Steve Richardson
☒	☐	Julie Pfeffer
☐	☐	_____
☐	☐	_____
☐	☐	_____
☐	☐	_____

Approvals

TVA Michael J Scott Date 3/11/10

EPA Leo Francendese Date 3/15/10

Consulted w/ TDEC
(see attached email)

cc:

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

From: "Chuck Head" <Chuck.Head@tn.gov>
To: Leo Francendese/R4/USEPA/US@EPA, "Barbara Scott" <Barbara.Scott@tn.gov>
cc: "Stephen H. McCracken" <McCrackenSH@oro.doe.gov>, "Glen Pugh" <Glen.Pugh@tn.gov>

Date: Wednesday, March 17, 2010 12:03PM
Subject: Re: Fwd: Transmittal Cover for Regulatory Submittal - Valley Area 2 Temp Storage R1.pdf - Adobe Acrobat Professional

Barbara, Leo and Steve, The Department of Environment and Conservation approves the Valley Area Temporary Storage Plan with the following understanding

1. This temporary storage area will be maintained as described in the plan - The criteria for placement in this temporary storage will be the same as for Valley Area # 1 (as provided in the attached Stantec letter report) and is as follows:

a. Unsaturated material only
b. 6H:1V side slopes
c. 10' maximum fill height.

TVA agrees to repair/recontour slopes within five days horizontal/vertical slope ratio falls below 6H:1V and TVA agrees that it will notify the Department and EPA within three weeks of reaching the 10" maximum fill height. The Department requests that TVA submit an amended work plan should it determine there is a need to temporarily store coal ash above the level approved in this plan.

2. Approval for temporary storage is only for the area described in the plan/drawings; The Valley Area #2 which is a portion of the area formerly approved Test Embankment Area B.

3. No additional fill be placed north of the existing toe, which is located roughly 60 feet south of the defined northern Relic Placement Area limits, until the repairs of the numerous erosion features located toward the north are approved by EPA and TDEC.

4. TVA agrees to stop placement of ash should instrumentation indicate a change in the stability of the working area that is unsafe for workers or instrument readings indicate the temporary storage approved in this plan are affecting the instrumentation readings for the Dredge Test Cell Embankment.

>>> Barbara Scott 3/12/2010 12:52 PM >>>
FYI - I understand that BOR is reviewing and Leo will forward their recommendations.

Valley Area # 2 Temporary Storage Work Plan, Revision 1

1.0 Purpose of Work

This work plan is to continue filling the valley area to the north and to then to continue the temporary ash storage in this area to the north as detailed on the attached sketch. The Valley Area # 2 is a portion of the area formerly approved as the Test Embankment Area B. This activity is to support Time Critical Ash Removal.

2.0 Design Components

The fill in the valley will be placed in approximate 24" lifts starting at the deepest point and filling upward until a uniform grade with the existing valley area is reached (see attached sketch). Once this uniform grade is reached a continuation of the temporary ash storage placement will continue per established criteria. The criteria for placement in this temporary storage will be the same as for Valley Area # 1 (as provided in the attached Stantec letter report) and is as follows:

- Unsaturated material only
- 6H:1V side slopes
- 10' maximum fill height

The existing Stantec instrumentation installed for the test embankment will be used to monitor this area during fill placement and for the duration of the temporary storage.

3.0 Construction Management

The construction will be accomplished with track hoes, dozers and trucks.

4.0 Schedule

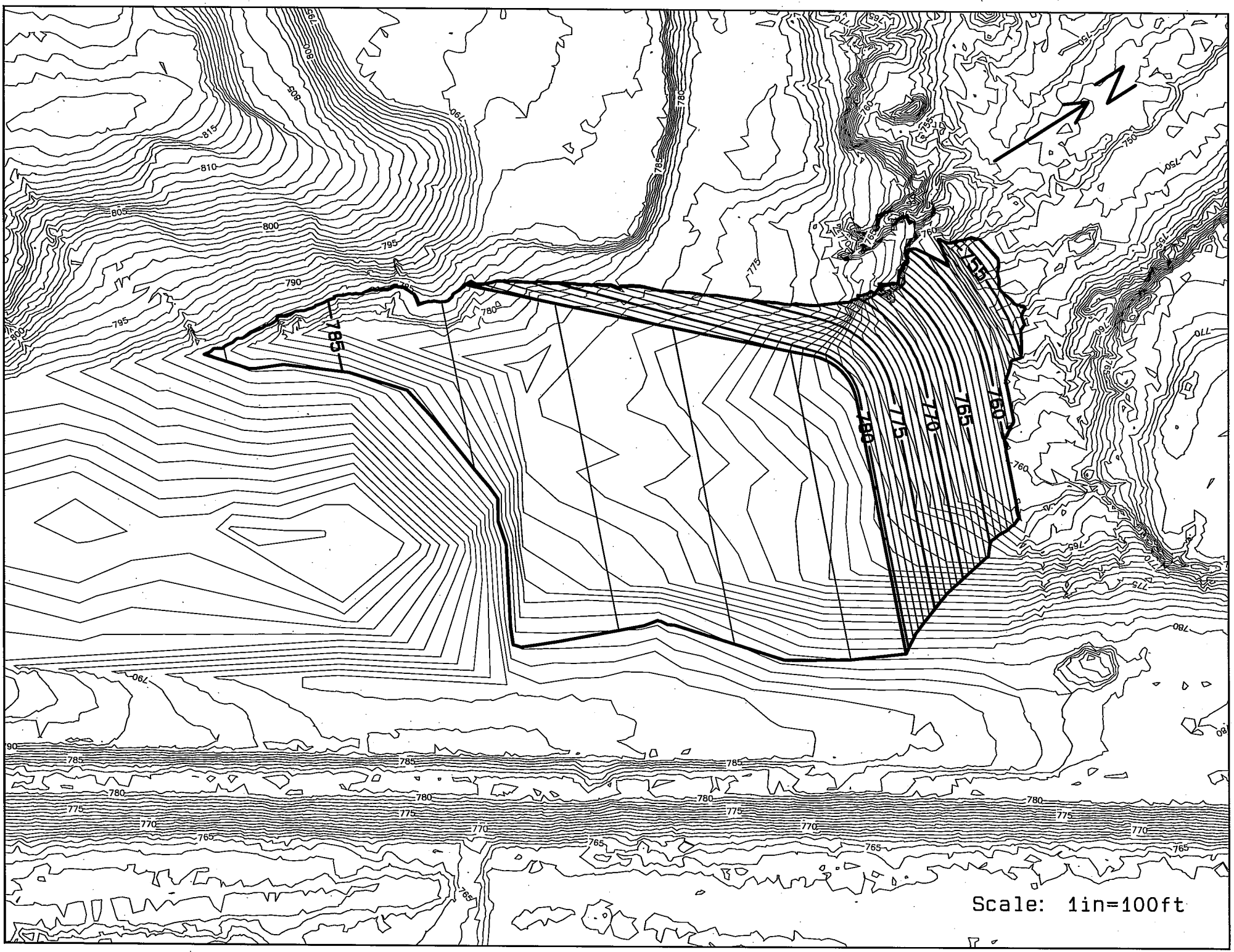
The activity would begin as soon as possible and continue until the storage volume has been depleted

5.0 Waste Management

No waste will be generated by this work.

6.0 Health and Safety

All construction activities will be done in accordance with the site-wide Health and Safety Plan.


N
785
780
775
770
765
760
Scale: 1in=100ft

Stantec Consulting Services Inc.
1409 North Forbes Road
Lexington, KY 40511-2050
Tel: (859) 422-3000
Fax: (859) 422-3100

February 23, 2010 let_011_175669015

Mr. Michael T. Scott, PE
General Manager
TVA Kingston Fossil Ash Recovery Operations
1134 Swan Pond Road, KFP 1T-KST
Harriman, Tennessee 37748

Re: Stability Evaluation of Temporary Ash Storage
Dredge Cell Valley Area
Kingston Fossil Plant
Harriman, Roane County, Tennessee

Dear Mr. Scott:

Stantec Consulting Services Inc. (Stantec) has completed the requested stability evaluation for temporary ash storage within the Dredge Cell Valley Area. This letter summarizes the results of our evaluation and provides recommendations relative to the embankment configuration requirements and filling operations.

Background

In association with the ash recovery efforts, Tennessee Valley Authority (TVA) has used the Valley Area for temporary (discrete) stockpiling or staging of unsaturated ash material prior to placement in the Test Embankment. On February 8 and 9, 2010, increased filling rates were observed by Stantec field personnel, which quickly resulted in a non-engineered embankment configuration. Stantec verbally recommended to Jacobs Engineering Group, Inc. (Jacobs) on February 9, 2010 that subsequent filling operations be limited to a maximum fill height of 10 feet and that existing outslopes be graded to 6(H):1(V). Stantec also recommended that no additional fill be placed north of the existing toe, which is located roughly 60 feet south of the defined northern Relic Placement Area limits, until numerous erosion features located toward the north are backfilled. TVA Civil Projects Group (CP) is currently performing this remediation work. The planned filling limits will then be extended further north with the toe established roughly 50 feet south of the existing instrumentation line located within the northern portion of the former designated "Area B" of the Test Embankment.

To confirm the verbal recommendations presented above, Stantec initiated an evaluation to assess the slope stability of the temporary ash embankment configuration along the Valley Area and its impact on Dike D. A total of three cross sections were analyzed, which include two sections along the Valley Area (parallel to Dike D) to represent both filling sequences (or phases) described above and one section perpendicular to Dike D.

Slope Stability Analysis

Two-dimensional, limit equilibrium stability analyses were carried out using Spencer's method for drained effective stress conditions. The computer program SLOPE/W (Geo-Slope International) was used to complete this effort. The temporary ash embankment is being constructed over loose, hydraulically placed fly ash. The peak undrained strength of the foundation ash material occurs at relatively low strains with significant strength loss occurring when the peak undrained strength is achieved. The primary concern is the potential to trigger undrained conditions within wet foundation ash layers.

A refined (three-stage) analysis was discussed and agreed upon by TVA, AECOM, and Stantec at a meeting in Knoxville, Tennessee (December 16 and 17, 2009) and via teleconference (January 20, 2010) to compute the undrained factors of safety. The three-stage computations consist of three complete sets of stability calculations. The first stage involves stability analysis of the slope using the effective stress approach to calculate both effective normal stresses and shear stresses along the potential slip surface. These stresses represent the anisotropic consolidation stresses and are used to calculate the undrained shear strengths (to be used in the second stage calculation) for materials without free drainage. Linear interpolation is used to estimate the undrained strengths based on the principal consolidation stress ratio. The second stage involves stability analysis of the slope using the computed undrained shear strengths. The third stage computation compares the drained and undrained shear strengths at each slice base along the potential slip surface, and selects the smaller strength to compute the final undrained factor of safety. The three-stage calculations were conducted using the computer program UTEXAS4 (Shinoak Software).

With the exception of the stockpiled ash layer, the material parameters modeled herein were previously determined. These parameters, along with the supporting field and laboratory data, are documented in a draft report entitled "Material Properties for Geotechnical Analyses – Dredge Cell Closure Plan" and prepared by Stantec. That report has been submitted to TVA for review, and was discussed at a design team meeting held at the project site on October 8, 2009. Based on the discussions and subsequent review comments, there is a general consensus that the material parameters, as listed in Table 1, are appropriate for representing the ash material and the foundation soils within the Dredge Cell.

Table 1 – Material Parameters Used in Stability Analyses

Material Name	Unit Weight		Effective Stress Strength		Total Stress Strength	
	γ_m, (pcf)	γ_{sat}, (pcf)	ϕ', (deg.)	c', (psf)	ϕ, (deg.)	c, (psf)
Hydraulically Placed Ash Above Groundwater	100	--	25	0	25	0
Hydraulically Placed Ash Below Groundwater	--	107	25	0	10	0
Stockpiled Ash (unsaturated)	95	--	28	0	28	0
Sensitive Silt/Clay	--	107	28	0	10	0
Lean Clay Foundation Soil	--	130	32	0	24	0
Sandy Silt to Silty Sand	--	128	30	0	12	1,000

Modeled pore water pressures for each stability section were obtained from recent readings from adjacent piezometers taken between February 6 through 16, 2010. The temporary ash stockpile embankment was modeled up to 15 feet at selected locations to conservatively account for potential variations in constructed field conditions.

Results of both drained and undrained stability analyses for each cross section are presented on the enclosed computer output plots and the calculated critical factors of safety are summarized in Table 2. Current TVA design criteria require a factor of safety of 1.3 or greater for slope stability for undrained conditions and 1.5 or greater for drained conditions.

Table 2 – Calculated Factors of Safety

Cross Section	Critical Factors of Safety	
	Drained Condition	Undrained Condition
Section 1 (South End, Parallel to Dike D)	1.98	1.42
Section 2 (North End, Parallel to Dike D)	2.61	1.72 (Stage 1)
		1.82 (Stage 2)
		1.32 (Final Stage)
Section 3 (Perpendicular to Dike D)	1.79	1.33

Conclusions and Recommendations

The following conclusions and recommendations are based on the results of our evaluation.

1. Slope stability analyses conducted for the modeled temporary ash storage embankment configuration yielded factors of safety for both drained and undrained conditions that meet or exceed current TVA defined criteria. These results confirm the verbal recommendations provided to Jacobs on February 9, 2010 for the initial filling sequence along with the planned second sequence described herein.

2. It is recommended that filling operations be limited to a maximum fill height of 10 feet with embankment outslopes maintained at 6(H):1(V). The initial filling sequence should not be extended north of the existing toe, which is located roughly 60 feet south of the defined northern Relic Placement Area limits until numerous erosion features located toward the north are backfilled. CP is currently performing this stage of remediation work. The planned filling limits may then be extended further north with the toe established roughly 50 feet south of the existing instrumentation line located within the northern portion of the former designated "Area B" of the Test Embankment.

3. Embankment material should consist of unsaturated ash. The sequence of filling should commence at the lowest section (in elevation) of the subject footprint (to the approximate Stage 2 geometry shown in the enclosed computer output plots) and proceed upward in maximum 24-inch loose lifts in a manner to maintain positive drainage at all times. Each lift should be fully tracked-in-place with appropriate equipment.

4. Stantec will continue to observe filling operations and monitor existing instrumentation (slope inclinometers and piezometers) located near the embankment. If the instrumentation records high pore water pressures or unacceptable deformations, filling operations should be halted immediately and slope stability analyzed for current conditions.

Please let us know if you have additional questions

Sincerely,

STANTEC CONSULTING SERVICES INC.

Mark L. Jones, EIT
Project Engineer

Michael J. Steele, PE
Associate

/sj

Attachment

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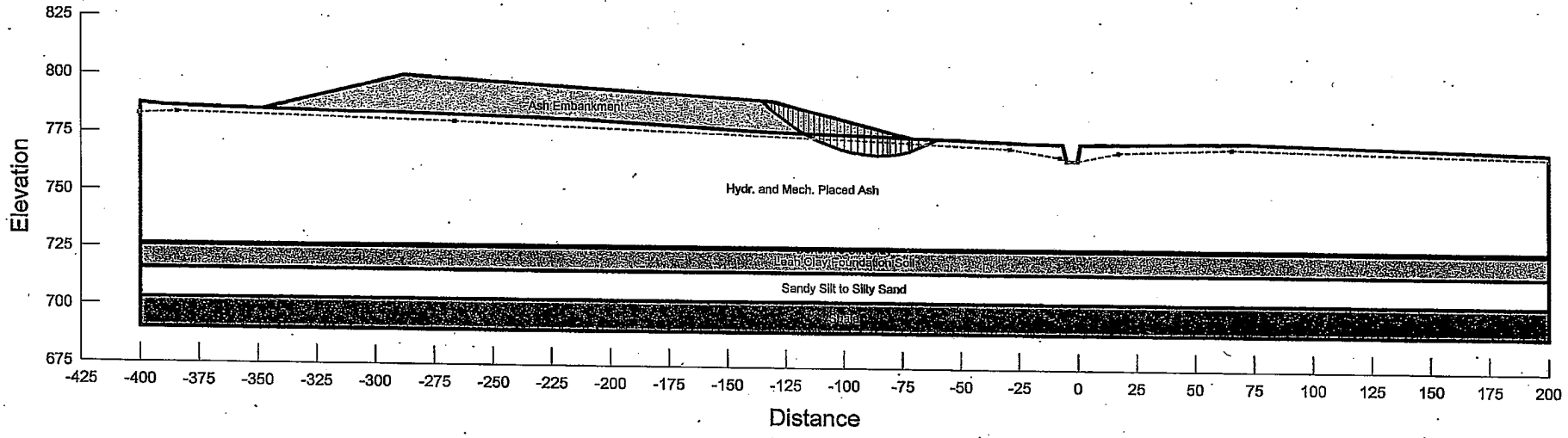
Assessment of Temporary Ash Storage Embankment
Section 1 - Drained Conditions
Valley Area - South End, Parallel to Dike D

Kingston Fossil Plant - Tennessee Valley Authority (TVA)

Material Name	Unit Weight (Saturated/Moist)	Effective Strength Parameters
Hydr. and Mech. Placed Ash	107 pcf, 100 pcf	c'=0 psf; phi'=25 °
Ash Embankment	N/A, 95 pcf	c'=0 psf; phi'=28 °
Sensitive Silt/Clay	107 pcf, N/A	c'=0 psf; phi'=28 °
Lean Clay Foundation Soil	130 pcf, N/A	c'=0 psf; phi'=32 °
Sandy Silt to Silty Sand	128 pcf, N/A	c'=0 psf; phi'=30 °

Factor of Safety = 1.98

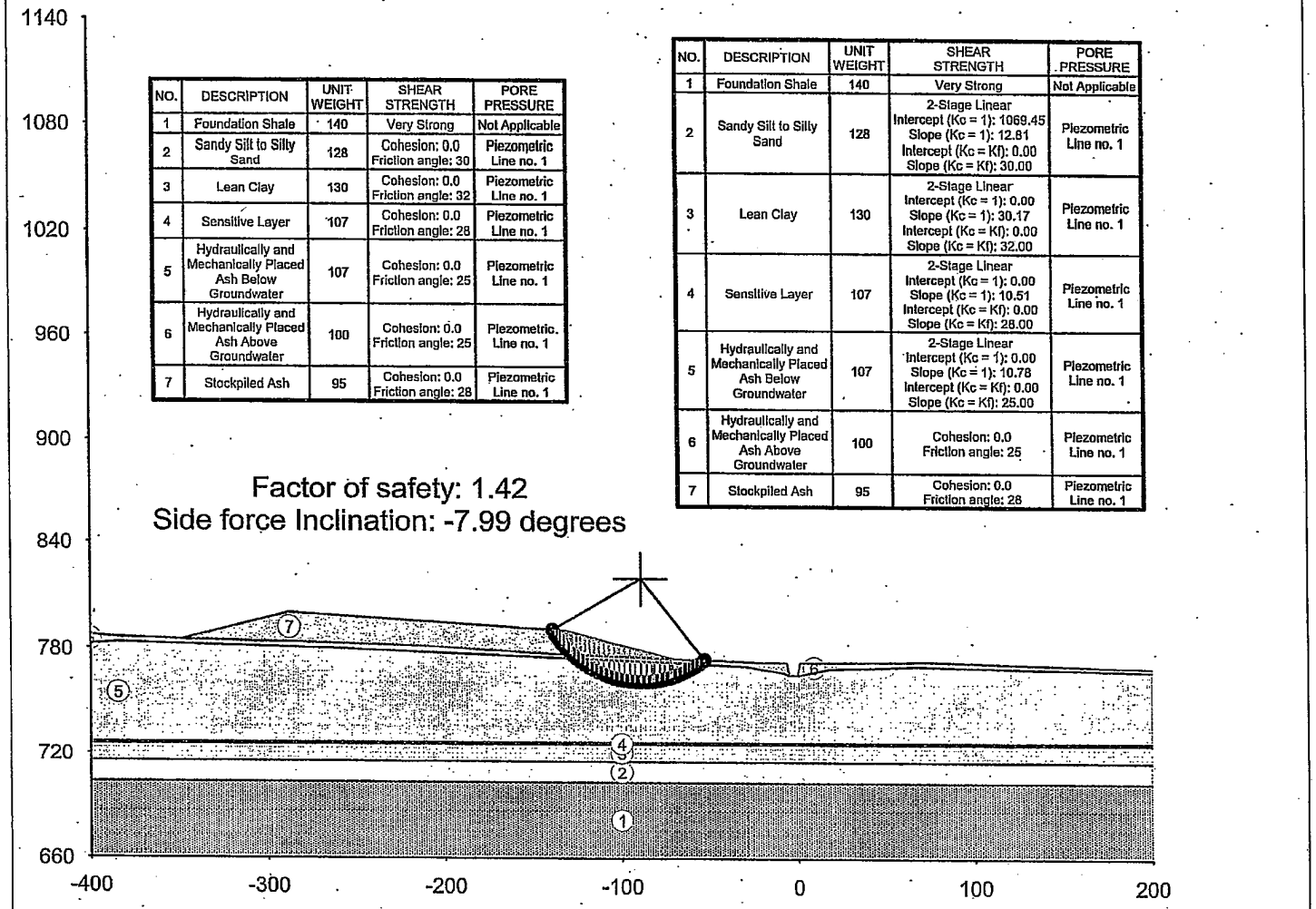


Section 1 - Valley Area, South End, Parallel to Dike D

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	Cohesion: 0.0 Friction angle: 30	Piezometric Line no. 1
3	Lean Clay	130	Cohesion: 0.0 Friction angle: 32	Piezometric Line no. 1
4	Sensitive Layer	107	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater	107	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater	100	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
7	Stockpiled Ash	95	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	2-Stage Linear Intercept (Kc = 1): 1069.45 Slope (Kc = 1): 12.81 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 30.00	Piezometric Line no. 1
3	Lean Clay	130	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 30.17 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 32.00	Piezometric Line no. 1
4	Sensitive Layer	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.51 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 28.00	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.78 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 25.00	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater	100	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
7	Stockpiled Ash	95	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1

Factor of safety: 1.42
Side force Inclination: -7.99 degrees



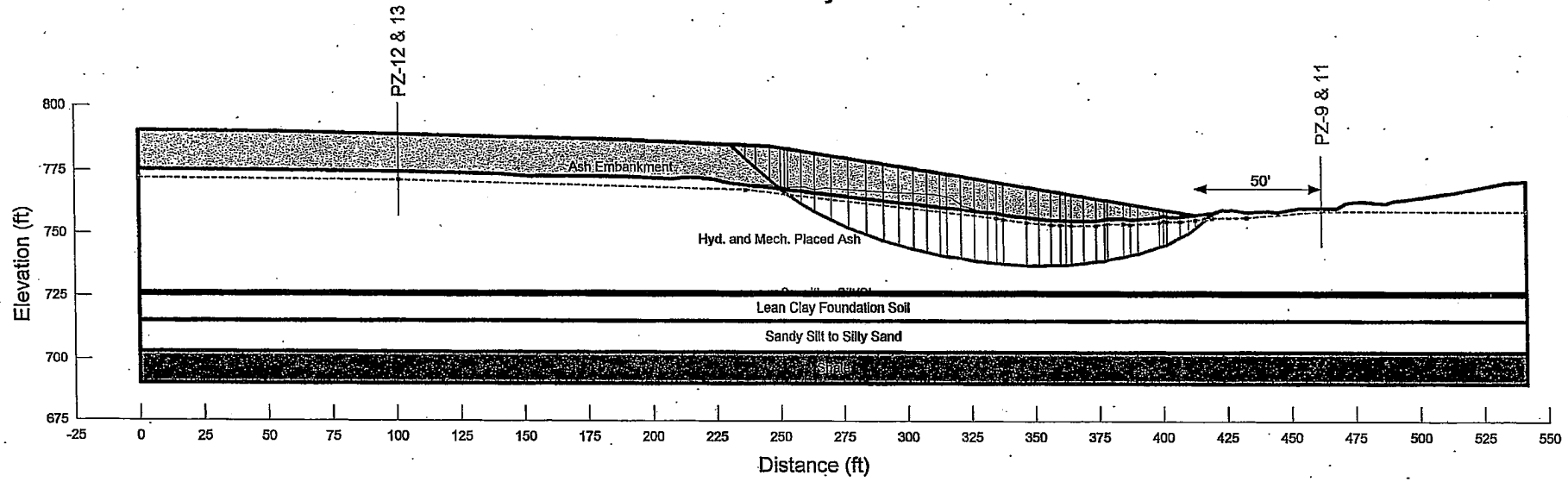
Date: Tue Feb 23 2010 Filename: Valley Parallel to Dike D - South End - Existing.UT4 Time: 11:06:39

Assessment of Temporary Ash Storage Embankment
Section 2 - Drained Conditions
Valley Area - North End, Parallel to Dike D

Kingston Fossil Plant - Tennessee Valley Authority (TVA)

Material Name	Unit Weight (Saturated/Moist)	Effective Strength Parameters
Hyd. and Mech. Placed Ash	107 pcf; 100 pcf	c'=0 psf; phi'=25 °
Ash Embankment	N/A, 95 pcf	c'=0 psf; phi'=28 °
Sensitive Silt/Clay	107 pcf, N/A	c'=0 psf; phi'=28 °
Lean Clay Foundation Soil	130 pcf, N/A	c'=0 psf; phi'=32 °
Sandy Silt to Silty Sand	128 pcf, N/A	c'=0 psf; phi'=30 °

Factor of Safety = 2.61

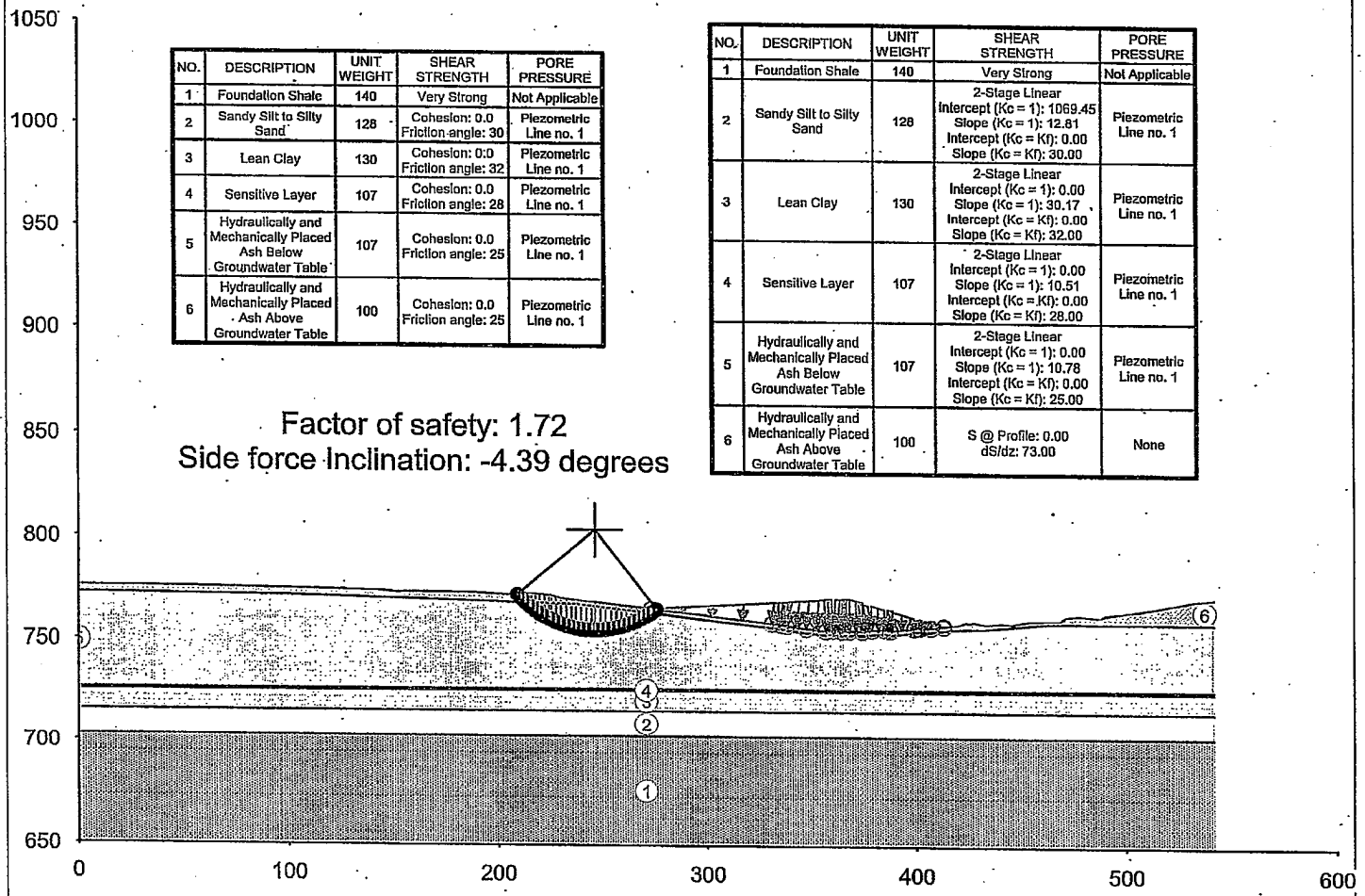


Section 2 - Valley Area, North End, Parallel to Dike D, Stage 1

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	Cohesion: 0.0 Friction angle: 30	Piezometric Line no. 1
3	Lean Clay	130	Cohesion: 0.0 Friction angle: 32	Piezometric Line no. 1
4	Sensitive Layer	107	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater Table	107	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater Table	100	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	2-Stage Linear Intercept (Kc = 1): 1069.45 Slope (Kc = 1): 12.81 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 30.00	Piezometric Line no. 1
3	Lean Clay	130	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 30.17 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 32.00	Piezometric Line no. 1
4	Sensitive Layer	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.51 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 28.00	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater Table	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.78 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 25.00	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater Table	100	S @ Profile: 0.00 dS/dz: 73.00	None

Factor of safety: 1.72
Side force inclination: -4.39 degrees



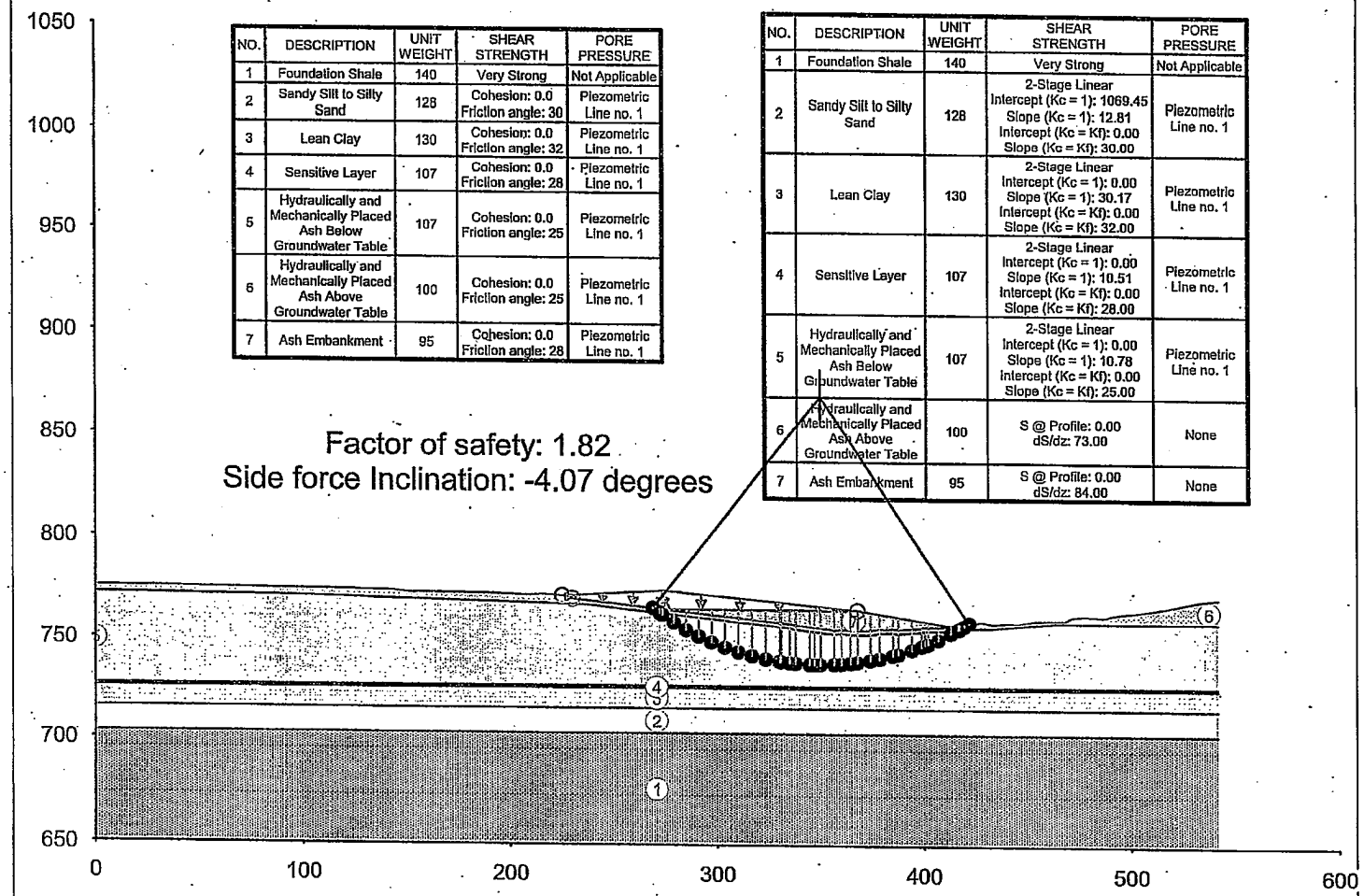
Date: Tue Feb 23 2010 Filename: Valley Parallel to Dike D - Farther North - Stage 1.UT4 Time: 10:11:09

Section 2 - Valley Area, North End, Parallel to Dike D, Stage 2

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	Cohesion: 0.0 Friction angle: 30	Piezometric Line no. 1
3	Lean Clay	130	Cohesion: 0.0 Friction angle: 32	Piezometric Line no. 1
4	Sensitive Layer	107	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater Table	107	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater Table	100	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
7	Ash Embankment	95	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	2-Stage Linear Intercept (Kc = 1): 1069.45 Slope (Kc = 1): 12.81 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 30.00	Piezometric Line no. 1
3	Lean Clay	130	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 30.17 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 32.00	Piezometric Line no. 1
4	Sensitive Layer	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.51 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 28.00	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater Table	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.78 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 25.00	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater Table	100	S @ Profile: 0.00 dS/dz: 73.00	None
7	Ash Embankment	95	S @ Profile: 0.00 dS/dz: 84.00	None

Factor of safety: 1.82
Side force Inclination: -4.07 degrees



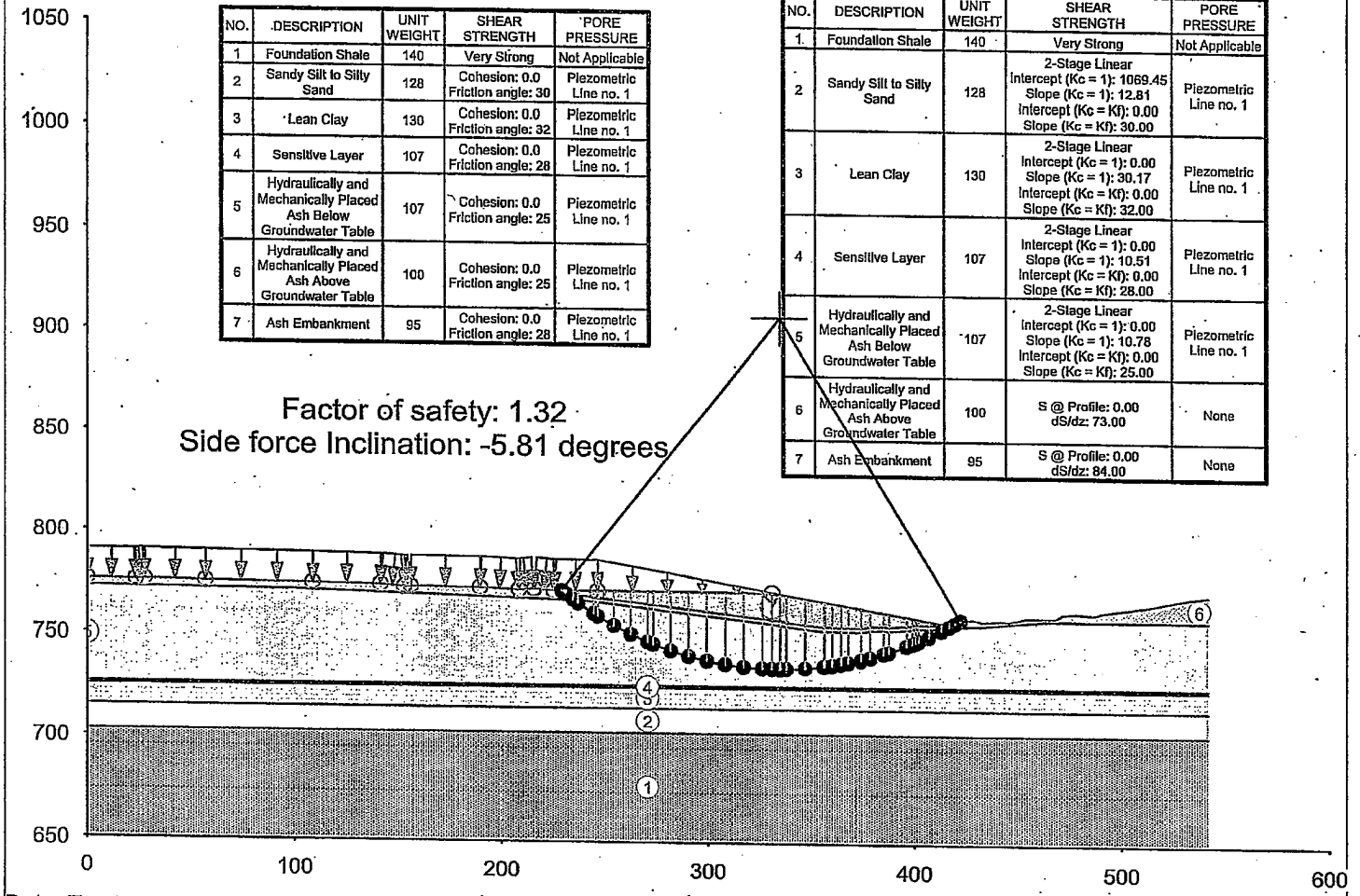
Date: Tue Feb 23 2010 Filename: Valley Parallel to Dike D - Farther North - Stage 2.UT4 Time: 10:18:30

Section 2 - Valley Area, North End, Parallel to Dike D, Final Stage

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	Cohesion: 0.0 Friction angle: 30	Piezometric Line no. 1
3	Lean Clay	130	Cohesion: 0.0 Friction angle: 32	Piezometric Line no. 1
4	Sensitive Layer	107	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater Table	107	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater Table	100	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
7	Ash Embankment	95	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	2-Stage Linear Intercept (Kc = 1): 1069.45 Slope (Kc = 1): 12.81 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 30.00	Piezometric Line no. 1
3	Lean Clay	130	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 30.17 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 32.00	Piezometric Line no. 1
4	Sensitive Layer	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.51 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 28.00	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater Table	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.78 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 25.00	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater Table	100	S @ Profile: 0.00 dS/dz: 73.00	None
7	Ash Embankment	95	S @ Profile: 0.00 dS/dz: 84.00	None

Factor of safety: 1.32
Side force Inclination: -5.81 degrees



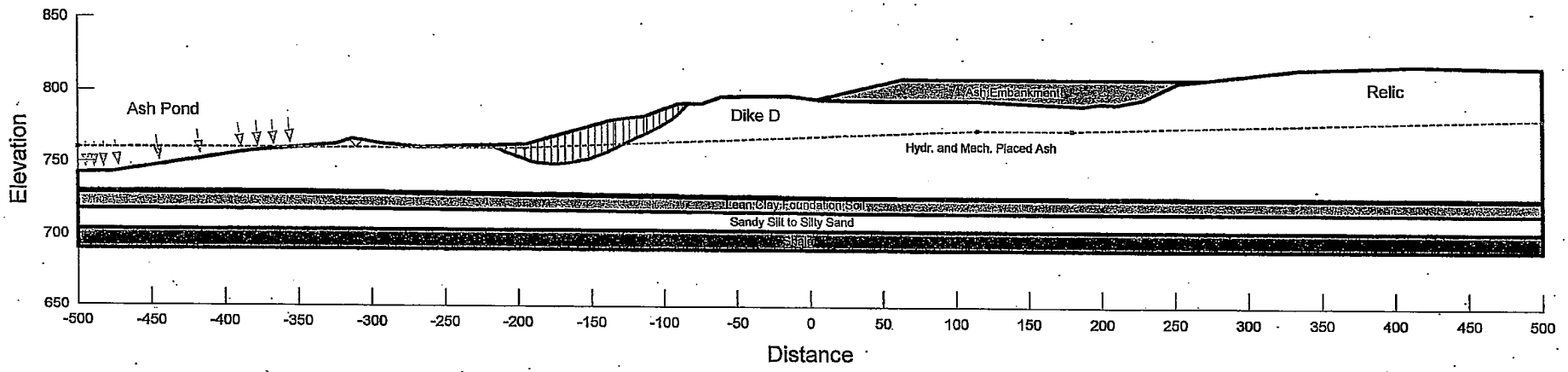
Date: Tue Feb 23 2010 Filename: Valley Parallel to Dike D - Farther North - Final Stage - 10ft Load.UT4 Time: 13:02:59

Assessment of Temporary Ash Storage Embankment
Section 3 - Drained Conditions
Valley Area - South End Dike D - Station 23+75

Kingston Fossil Plant - Tennessee Valley Authority (TVA)

Material Name	Unit Weight (Saturated/Moist)	Effective Strength Parameters
Hydr. and Mech. Placed Ash	107 pcf, 100 pcf	c'=0 psf; phi'=25 °
Ash Embankment	N/A, 95 pcf	c'=0 psf; phi'=28 °
Sensitive Silt/Clay	107 pcf, N/A	c'=0 psf; phi'=28 °
Lean Clay Foundation Soil	130 pcf, N/A	c'=0 psf; phi'=32 °
Sandy Silt to Silty Sand	128 pcf, N/A	c'=0 psf; phi'=30 °

Factor of Safety = 1.79

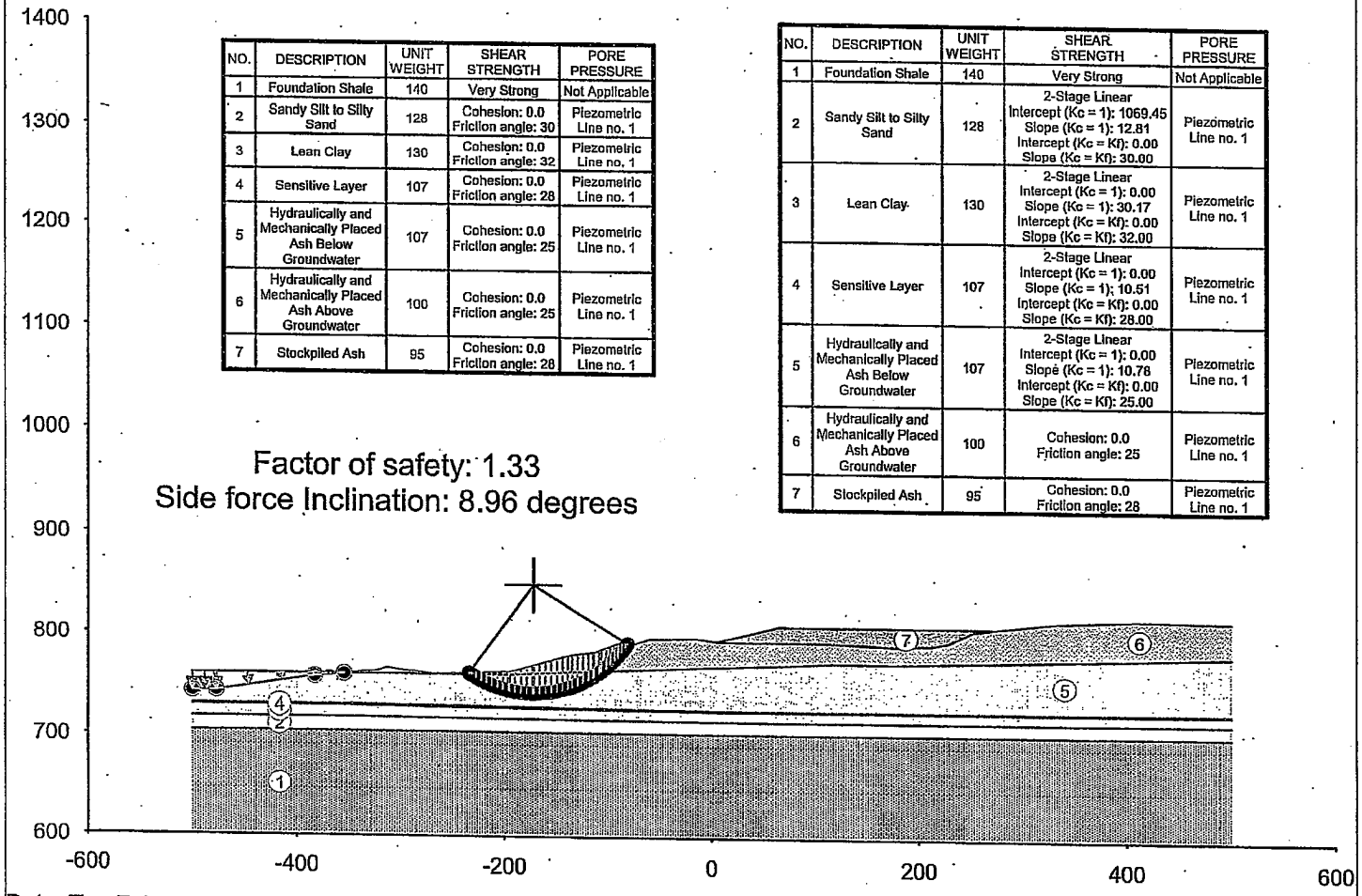


Section 3 - Valley Area, South End Dike D - Station 23+75

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	Cohesion: 0.0 Friction angle: 30	Piezometric Line no. 1
3	Lean Clay	130	Cohesion: 0.0 Friction angle: 32	Piezometric Line no. 1
4	Sensitive Layer	107	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater	107	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater	100	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
7	Stockpiled Ash	95	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1

NO.	DESCRIPTION	UNIT WEIGHT	SHEAR STRENGTH	PORE PRESSURE
1	Foundation Shale	140	Very Strong	Not Applicable
2	Sandy Silt to Silty Sand	128	2-Stage Linear Intercept (Kc = 1): 1069.45 Slope (Kc = 1): 12.81 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 30.00	Piezometric Line no. 1
3	Lean Clay	130	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 30.17 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 32.00	Piezometric Line no. 1
4	Sensitive Layer	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.51 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 28.00	Piezometric Line no. 1
5	Hydraulically and Mechanically Placed Ash Below Groundwater	107	2-Stage Linear Intercept (Kc = 1): 0.00 Slope (Kc = 1): 10.78 Intercept (Kc = Kf): 0.00 Slope (Kc = Kf): 25.00	Piezometric Line no. 1
6	Hydraulically and Mechanically Placed Ash Above Groundwater	100	Cohesion: 0.0 Friction angle: 25	Piezometric Line no. 1
7	Stockpiled Ash	95	Cohesion: 0.0 Friction angle: 28	Piezometric Line no. 1

Factor of safety: 1.33
Side force Inclination: 8.96 degrees



Date: Tue Feb 23 2010 Filename: Valey Perpendicular to Dike D - South End - Existing.UT4 Time: 10:56:16

Parton, Franklin M Jr

From: Steele, Mike (Lexington) [Mike.Steele@stantec.com]
Sent: Friday, March 05, 2010 8:32 AM
To: Parton, Franklin M Jr
Cc: Howard, Jack L; Fuller, Don; Lindquist, Kyle; Wu, Yong; Jones, Mark
Subject: RE: Valley Area # 2
Attachments: Valley Area 2 Temp Storage R1.pdf

Butch:

Stantec concurs with the attached work plan inclusive with our recommendations outlined in a letter titled "Stability Evaluation of Temporary Ash Storage, Dredge Cell Valley Area" dated February 23, 2010. It is understood that TVA safety professionals will evaluate working conditions at the site and develop appropriate protocols to meet stated objectives outlined in Section 6 of the work plan.

Michael J. Steele, PE
Associate
Stantec Consulting Services Inc.
1409 North Forbes Road
Lexington KY 40511-2050
Ph: (859) 422-3091
Fx: (859) 422-3100
Cell: (859) 494-0889
Mike.Steele@stantec.com
stantec.com

From: Parton, Franklin M Jr [mailto:fmparton@tva.gov]
Sent: Friday, March 05, 2010 8:07 AM
To: Steele, Mike (Lexington)
Cc: Howard, Jack L
Subject: Valley Area # 2

Mike,

Please concur with the attached work plan.

Butch

<<Valley Area 2 Temp Storage R1.pdf>>