B65 011207 256

MASTER FILE

December 12, 2001

Earl L. Deskins, KFP 1A-KST

KINGSTON FOSSIL PLANT (KIF) - ANNUAL ASH POND DIKE STABILITY INSPECTION

Attached is the latest dike stability inspection for your plant. The report was prepared by John Albright of our Civil Engineering section and the inspection was performed on October 24, 2001, by John and Jim Settles of KIF. While the ash pond complex is generally in excellent condition, the report includes recommendations for repairs and corrective actions. I concur with those recommendations.

If you have questions of comments, please call me at Chattanooga extension 4820, or John Albright at Chattanooga extension 3981.

James G. Adair, Manager
Engineering Design Services
LP 2G-C

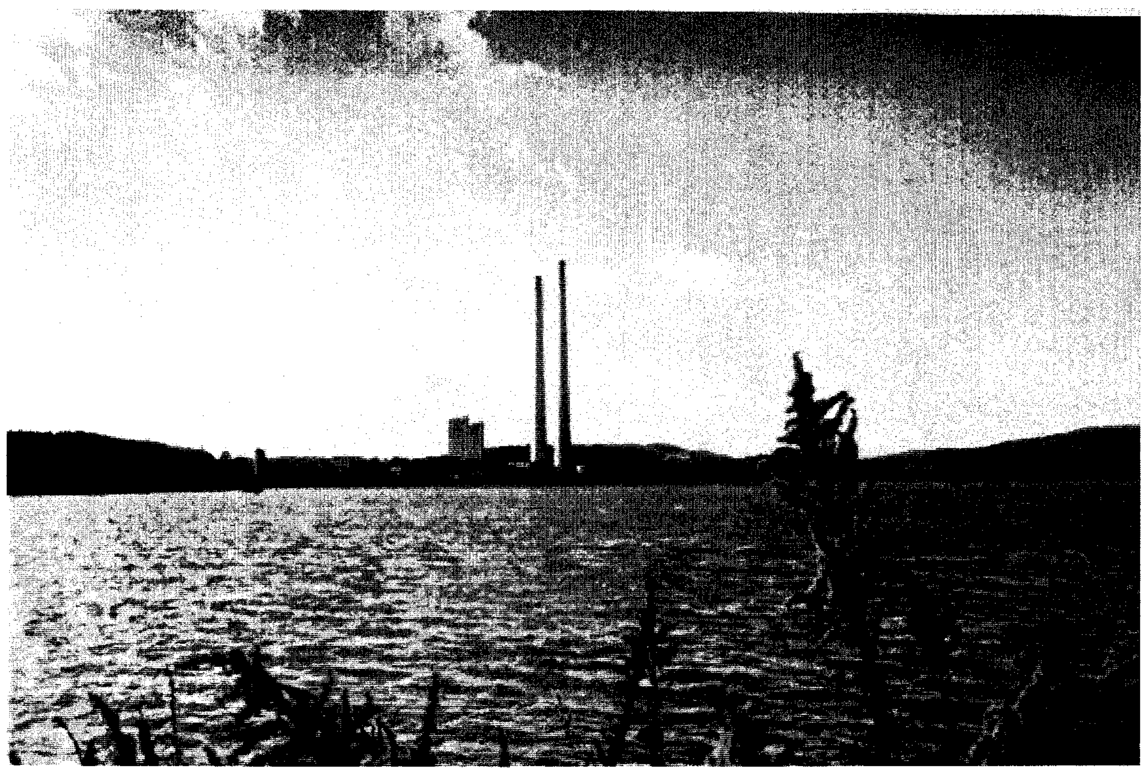
REP:JGA:LMV
Attachment
cc (w/attachment):
L. F. Campbell, KFP 1A-KST
J. H. Catlett, KFP 1A-KST
M. Cones, Dam Safety Files, LP 1H-C
R. Johnson, LP 2L-C
B. C. Morris, LP 5E-C
EDMS, EB 5G-C

j:/fossil eng/proj eng/civil/kif ash pond insp cover 2001.doc

TENNESSEE VALLEY AUTHORITY

KINGSTON FOSSIL PLANT

ANNUAL ASH POND DIKE STABILITY INSPECTION



Prepared by: John Albright
Date: November 9, 2001

KINGSTON FOSSIL PLANT
ANNUAL ASH POND DIKE STABILITY INSPECTION—2002

General

The waste disposal areas at Kingston Fossil Plant were inspected for dike structural stability on October 24, 2001. The inspection was performed by John Albright of TVA Engineering Design Services, Civil Engineering, and JamesT. Settles of Kingston Fossil Plant.

The previous annual inspection was performed on Novembe21, 2000.

The results of the annual stability inspection are listed below according to location within the ash disposal area.

Active Ash Disposal Area

Plant operations continues to manage this area the same as during the last inspection. Bottom ash is sluiced into a channel southwest of the disposal area where it settles out and is removed by drag line, approximately once a week, to be used for dike construction. Fly ash is sluiced into a channel northwest of the bottom ash channel. Both channels flow northeast into the active ash pond where the fly ash settles out and accumulates. The fly ash is periodically dredged into one of two cells located in the western half of the disposal area. The dikes of these cells are raised using fly ash and bottom ash to provide more capacity for dredged fly ash as needed. Note: the dredge cell dikes were reanalyzed during the summer of 2001 for stability using only fly ash for construction. The factor of safety was acceptable and the dikes above elevation 805 feet may be constructed without bottom ash. See Appendix.

The sluice water flows into the stilling pool through one of two plant constructed spillways. From the stilling pool the water discharges into the plant intake channel via six standard spillways. At the time of the inspection, five of the six spillways were operating. The western spillway was raised above the level of the other five and was not discharging.

All exterior dike slopes around this area were in sound condition with excellent vegetative cover. No animal activity was observed in the active pond, however, there was a beaver den in the bottom ash sluice trench. On the eastern side of the dikes, extending to the area of Swan Pond Road, the vegetation along both the upper and lower portions of the slope had not been mowed since the spring. The dikes were in need of mowing as several small trees had grown to a height of 3 to 5 feet (see photo 1). No sloughs orseepages were detected. In fact, two areas outside the stilling pool that were active seeps in years past no longer seeped. Those areas are detectable only from the sparse vegetation probably due to the low pH in the soil caused by the seeps. The divider dike between the active pond and the stilling pool had some areas of rill erosion and gullies, but appeared stable otherwise. Some clay material had been added on the dike, but there are some areas where no vegetation is present, and erosion continues to persist. The riprap placed on the inside slopes of the stilling pool is effective in preventing erosion of the slopes. However, there are additional areas that would benefit from riprap on the slopes. The plant has bought rip-rap and placed it on the divider dike in preparation for placement on the pond side of the divider dike (see photo 2). The divider dike road will then be sloped to turn storm water into the ash pond and down the rip-rapped slope.

All dike roads were in good condition with a good ash or crushed stone surface except for the lower dike road along the east side of the pond (Dike C). The lower road has grown up with vegetation (see photo 1). There were two areas of the lower dike road that were rutted and held water making vehicle passage difficult.

The ash pond discharge spillways are in good condition with no noticeable erosion (see photo 5).

Engineered Redwater Wetland

The engineered wetland along the southeast dike receives seepage that collects in the anoxic limestone drain at the toe of the slope. The wetland appeared to be functioning, at least partially, though the discharged is still pumped to the ash pond.

Dredge Cells

Dredge cells No. 2 and 3 were combined last year. The top of dike elevation for Cell 2/3 is now elevation 805. The dike for Cell No. 1 is also at elevation 805. Cell 1 was being dredged into at the time of inspection. Cell 2/3 was dry, but a combination of sparse vegetation and a crust on the ash was preventing dusting.

The dike slopes around this area were all stable with some rill erosion in places. Most of the Stage C2 lift has a vegetative cover; however, there are some areas where minor erosion is occurring and reseeding will need to be done as in Photo 4. Photo 6 shows the typical condition of the lower lifts of the dredge cell dikes. Lift C2 is complete except for a short section adjacent to the main pond. This section needs to be covered with soil. At completion of Lift C2, plant operations will seed and mulch Lift C2 to establish vegetation. Dike slopes with sparse vegetation should continue to be reseeded and mulched until a good vegetative cover is apparent. Plant operations continue to do a commendable job of mowing the slopes.

Chemical Treatment Ponds

The chemical treatment ponds are located southwest of the active ash pond. Both ponds were excavated and have no exterior slopes. The internal dike slopes are covered with riprap. These slopes were in good condition.

Coal Yard Drainage Basin

The coal yard drainage basin is located at the southwest corner of the coal pile. This basin was excavated below grade; therefore, there are no exterior dikes. All discharge from this basin is pumped into the fly ash discharge ditch which flows to the active ash disposal area. At the time of inspection, water in the pond was at a low level. The slopes appeared to be in satisfactory condition. (see Photo 3)

Actions on Recommendations of Last Inspection

- Rutted areas at the southeastern end of the ditch adjacent to Cell 1 have been repaired by placing riprap in eroded areas.
- The ditch along Swan Pond Road has been improved and maintained, preventing erosion from occurring.

Recommendations

- Dredge cell dike slopes with sparse vegetation should continue to be reseeded and mulched until a good vegetative cover is present.
- Place additional riprap along slopes of stilling pool and divider dike. Estimated to be approximately 2,000cy of riprap with minimum thickness of 6" and 50% of the stone with a nominal diameter of 4" or greater. Slope the top of the divider dike to direct runoff into the ash pond; 1% is enough and repair eroded areas and grade the stilling pool side of the divider dike to a uniform slope of 2H:1V.
- Remove trees and other growth along the eastern slopes of Dike C. At this point the trees are small enough to be mowed. Any trees larger than 3" in diameter at the base must be pulled from the dikes, roots and all and the damage repaired.
- Fill should be added and riprap placed to prevent further erosion at a few outlet drains on the eastern slope of the dredge cell dike.
- Plant maintenance should continue to periodically mow grass and vegetation on all dike slopes.
- Plant personnel should monitor the limestone drain area and all exterior dike slopes for seepages, soft wet spots, animal burrowing, sloughing, etc., and notify Fossil Engineering Services of any changes.
- Repair the ruts in the lower dike along the stilling pool and Dike C by filling with soil, compacting it, grading the road to turn water to the outside, and covering the repairs with ¾" crushed stone. It is estimated the length of both repairs is 30 feet, requiring about 3 yards of soil to fill the ruts and 12 tons of stone for cover.

Photo 1 - Dike C and Lower Dike Road

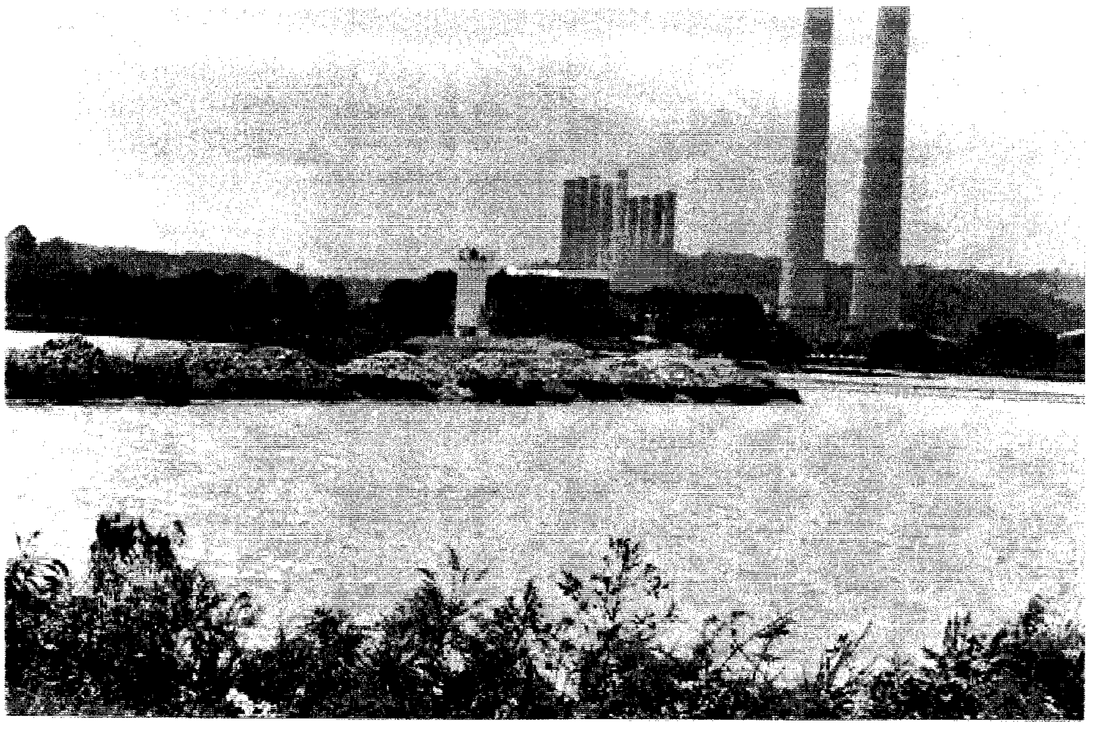


Photo 2 - Riprap on Stilling Pool Divider Dike

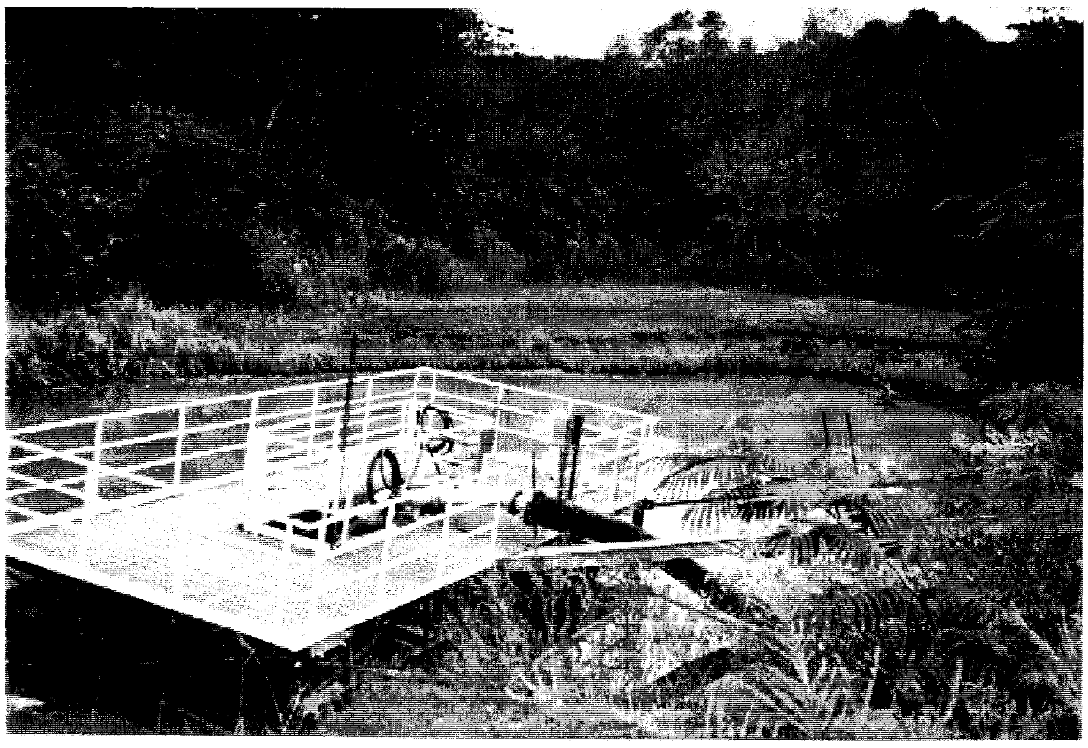


Photo 3 - Coal Yard Drainage Basin

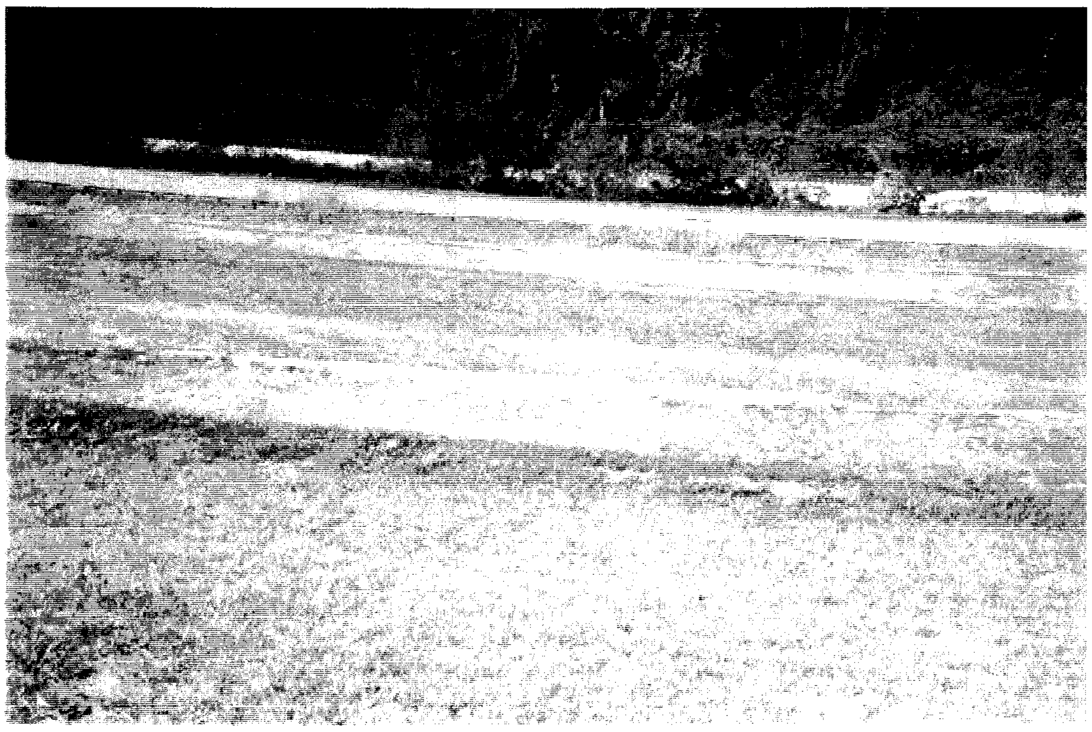


Photo 4 - Reseeding on Dredge Cell Dikes

Photo 5 - Ash Pond Spillway Discharge

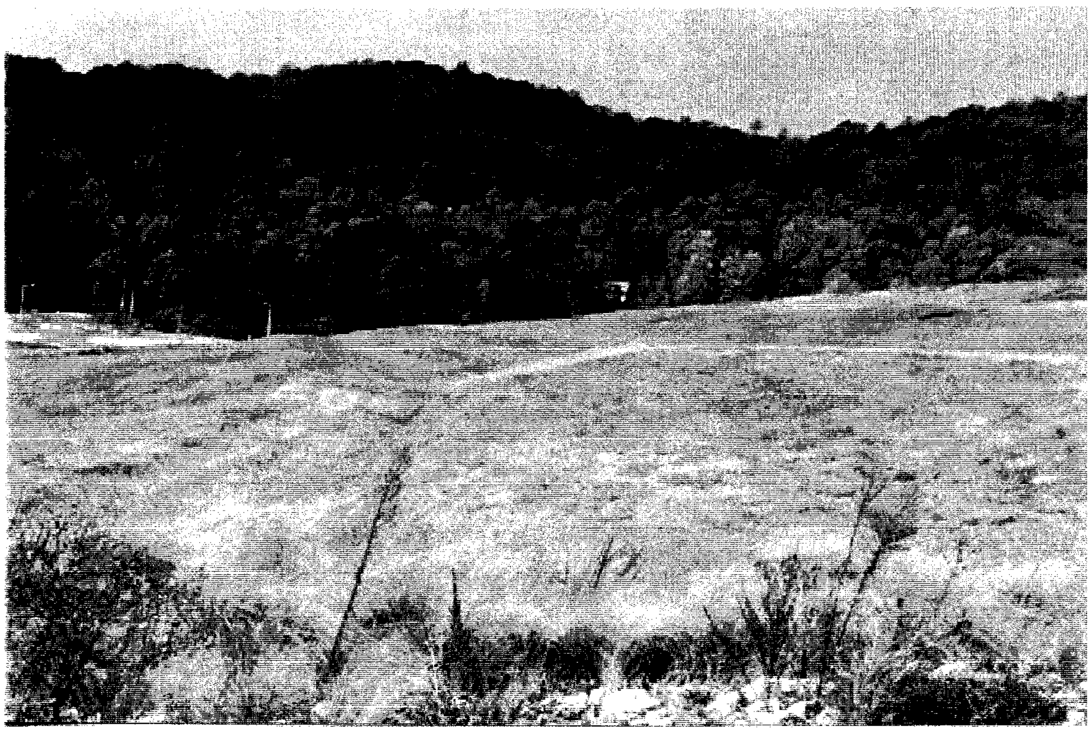


Photo 6 - Excellent Vegetation on Cell 1 Dike

Photo 7 - Current Condition Of Cell 2/3

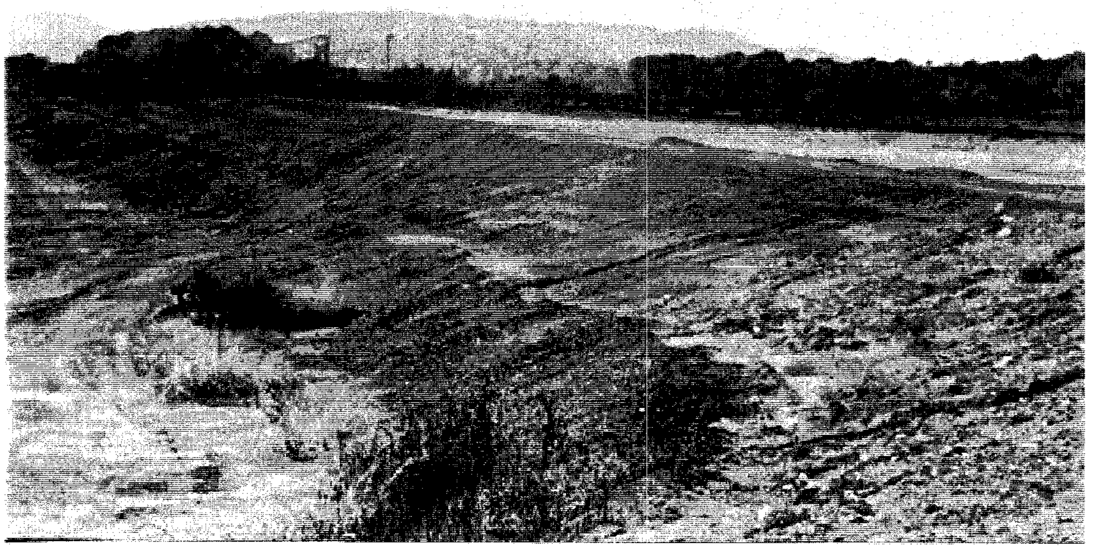
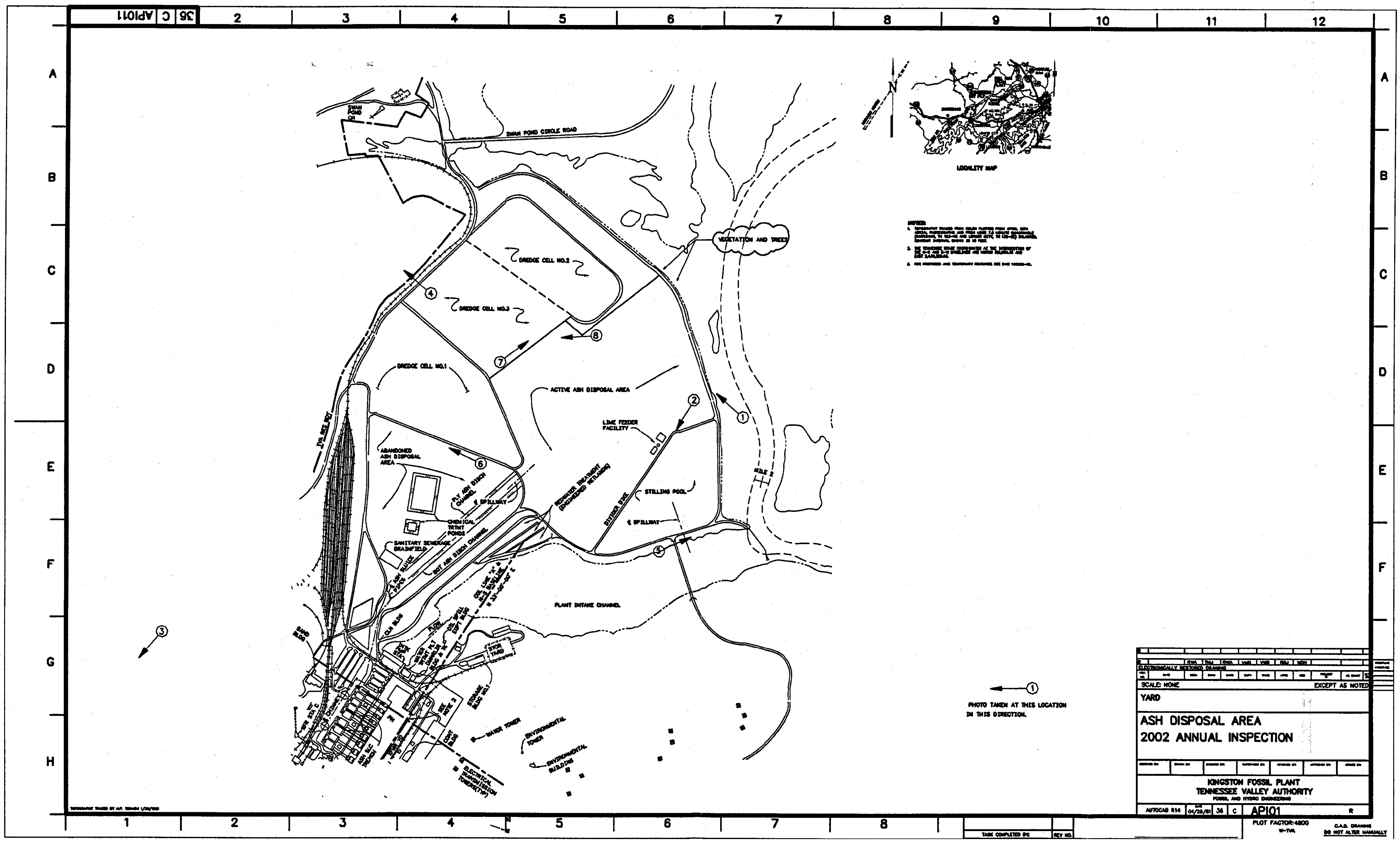


Photo 8 - Section of Lift C2 Without Soil Cover



ASH DISPOSAL AREA
2002 ANNUAL INSPECTION
YARD
SCALE: NONE
EXCEPT AS NOTED
KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING
AUTOCAD R14
04/28/81
36
C
API01
R
PLOT FACTOR:4800
W-TVA
C.A.D. DRAWING
DO NOT ALTER MANUALLY
36 C API011
PHOTO TAKEN AT THIS LOCATION
IN THIS DIRECTION.
LOCALITY MAP
SWAN POND CIRCLE ROAD
VEGETATION AND TREES
DREDGE CELL NO.2
DREDGE CELL NO.3
DREDGE CELL NO.1
ACTIVE ASH DISPOSAL AREA
LIME FEEDER FACILITY
ABANDONED ASH DISPOSAL AREA
FLY ASH DITCH CHANNEL
CHEMICAL TRTMT PONDS
SANITARY SEWERAGE DRAINFIELD
BOT ASH DITCH CHANNEL
STILLING POOL
DIVIDER DIKE
PLANT INTAKE CHANNEL
WATER TOWER
ENVIRONMENTAL TOWER
ENVIRONMENTAL BUILDING
ELECTRICAL TRANSMISSION TOWERS(TYP)
STORAGE BLDG NO.1
SAND BLDG
TVA RES 927
MILE 2

Appendix

SUMMARY - KINGSTON DREDGE CELL DIKE STABILITY
CONSTRUCION OF DIKES WITH 100% FLY ASH

We were asked to evaluate the stability of the dredge cell dikes should they be constructed with 100% fly ash. Construction to this date (el. 805.0) has been with a mixture of fly and bottom ash. An opportunity/need to market the bottom ash has been presented and the question asked of engineering "can this be done?"

Existing Plan:

Soil Parameters for the mixed dike material were obtained from undisturbed samples taken by Singleton in 1994 and used in developing the permit for the stack. These parameters are:

	Unit Weight (pcf)		Shear Strength						
			Q		R		Rbar		
	moist	sat	c (tsf)	(deg)	c (tsf)	(deg)	c (tsf)	(deg)	
Mixed bottom ash/ fly ash	109.9	114.8	0.0	37.4	0.95	15.9	0.49	29.1	

The factor of safety for long term stability using these parameters is 1.75. The earthquake factor of safety is 1.17. These were presented to the state in the permit. Figure 1 shows the failure plan for this condition as analyzed using UTexas3.

Proposed Plan:

It was not necessary to submit fly ash sample for lab testing. In 1994 we had Singleton perform tri-axle testing on samples of Kingston's fly ash.

	Unit Weight (pcf)		Shear Strength						
			Q		R		Rbar		
	moist	sat	c (tsf)	(deg)	c (tsf)	(deg)	c (tsf)	(deg)	
Fly ash (95% Standard Proctor)	99.9	106.8	1.04	23.7	0.19	17.9	0.27	28.3	25% moisture content

At face value the fly ash parameters are lighter in weight and weaker than the mixed ash. The analysis was performed by replacing these values for the previous values in the dike section above elevation 805.0, the current dike height. The factor of safety for long term stability using these parameters is 1.80. The earthquake factor of safety remains the same at 1.17. Figure 2 shows the failure plan for this condition as analyzed using UTexas3.

Studying the difference between Figures 1 and 2 shows how the factor of safety went up slightly after substituting the apparently weaker material in the dikes. The weakest failure plane remains thru the base of the stack. The reduction in the cohesion values (mixed ash to fly ash) does not play a significant role in the stack's long term Factor of Safety. The lighter weight of the material applied at the upper driving wedge of the failure circle has the most influence in the static force computations to increase factor of safety. Had pure fly ash been used at the lower levels of the dredge cell construction there could have been a dramatic reduction in the factor of safety.

Consequently, we concur that it is acceptable to construct the remaining lifts of the dredge cell using fly ash compacted to at least 95% Standard Proctor density.

An increase in localized sloughing of the dikes is likely to occur. We expect this to be tolerable and to best be handled by daily inspections and rapid attention to small rills before they expand.

We understand the field forces will add clay to the mix to help reduce dusting.

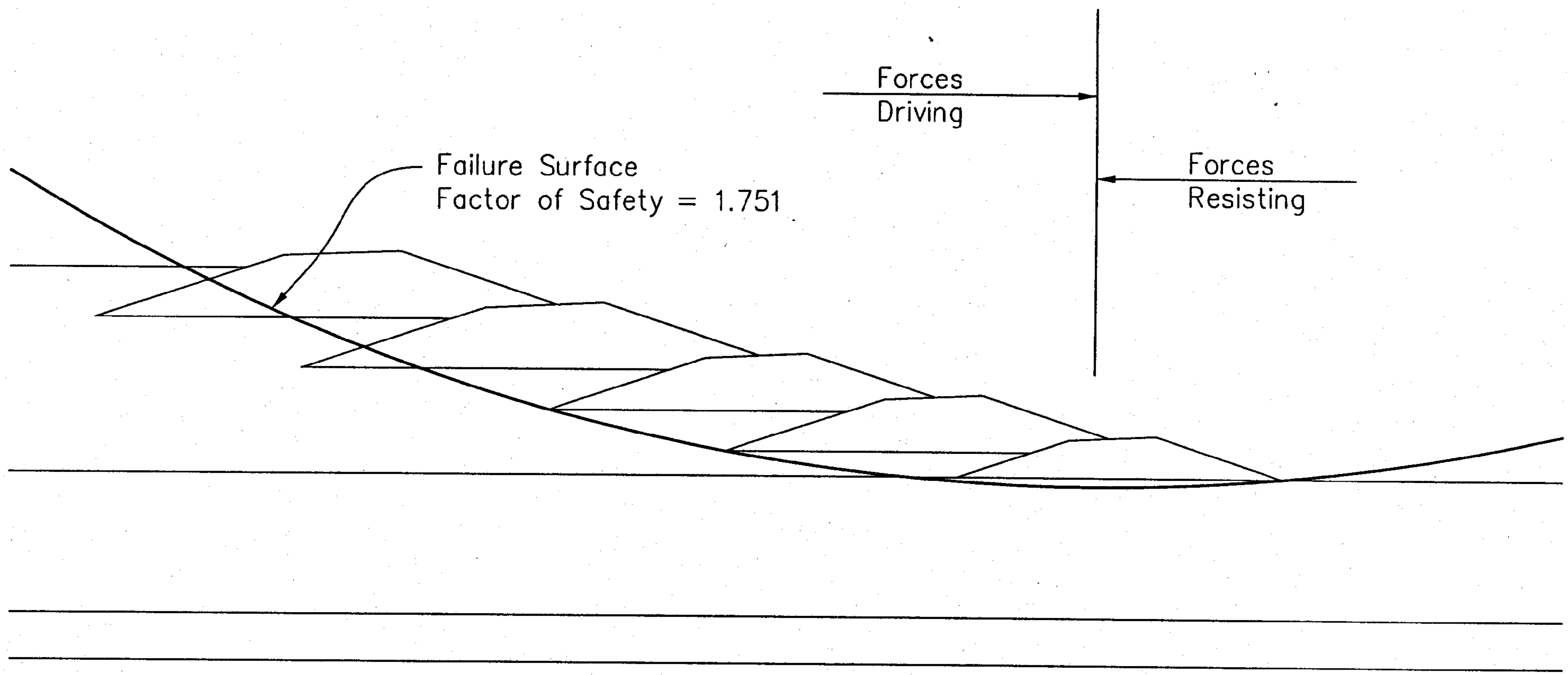


Figure 1 — Original Materials

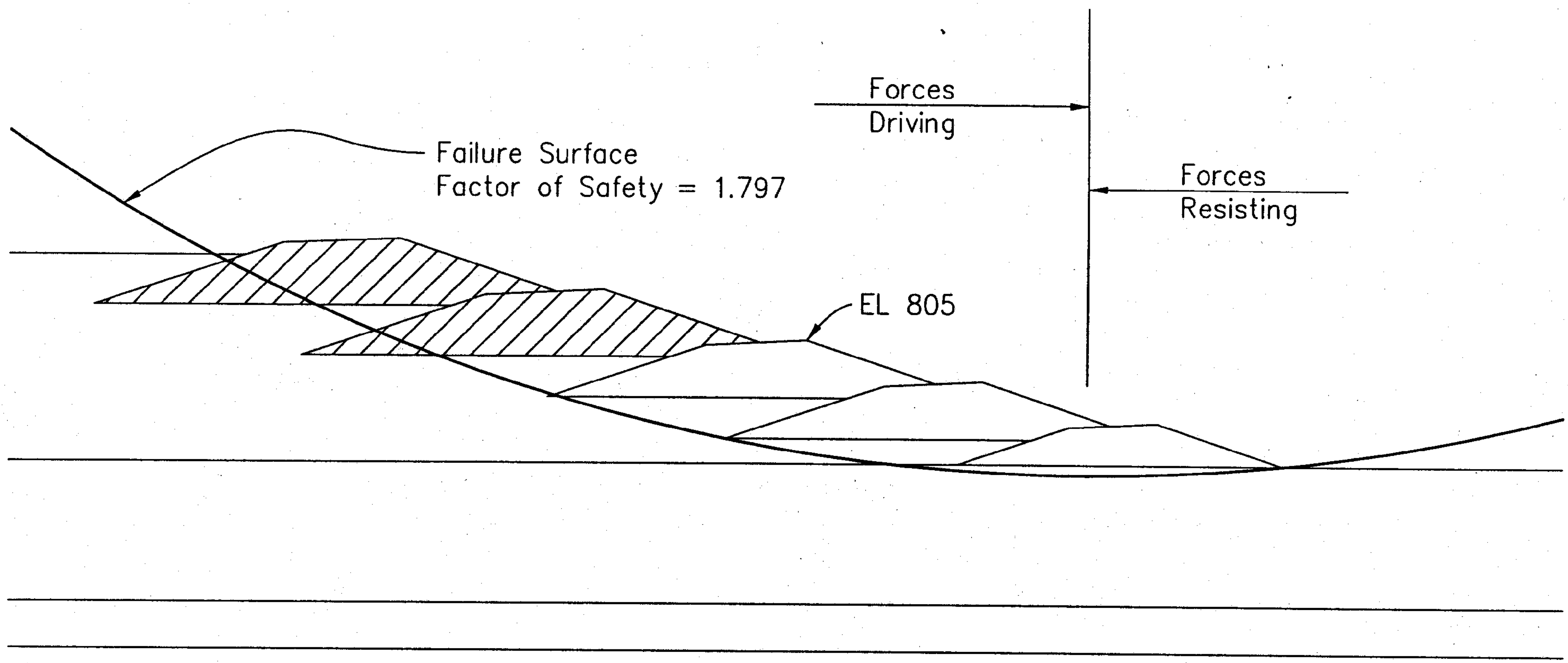


Figure 2 – Revised Materials

UTEXA3 Results

9-25-2001

HLP-KYR1.DAT

```
            Factor of Safety - - - - - - - -      1.002   FS FOR DISPLACEMENT COMPUTATIONS
            Side Force Inclination - - - - -     -14.98
            Number of Iterations - - - - - -      9
1           UTEXAS3 - VER. 1.200 - 12/16/92 - (C) 1985-1992 S. G. WRIGHT
            Date:  9:25:2001   Time: 13:54:38   Input file: HLP-KYR1.DAT
              KIF dredge cell design
              Spencer's Method
              Search for critical shear surface
```

*FOR HLP-TIC.DAT

```
            Factor of Safety - - - - - - - -      1.797   <- STATIC LONG TERM F.S.
            Side Force Inclination - - - - -     -9.97
            Number of Iterations - - - - - -      22
1           UTEXAS3 - VER. 1.200 - 12/16/92 - (C) 1985-1992 S. G. WRIGHT
            Date:  9:24:2001   Time: 16:21: 3   Input file: hlp-tic.dat
              KIF dredge cell design
              Spencer's Method
              Search for critical shear surface
```

FOR HLP-SHT1.DAT

```
            Factor of Safety - - - - - - - -      3.204   <- SHORT TERM FS
            Side Force Inclination - - - - -     -8.12
            Number of Iterations - - - - - -      17
1           UTEXAS3 - VER. 1.200 - 12/16/92 - (C) 1985-1992 S. G. WRIGHT
            Date:  9:25:2001   Time: 10:47:19   Input file: HLP-sht1.dat
              KIF dredge cell design
              Spencer's Method
              Search for critical shear surface
```

FOR HLP-MHEA.DAT

```
            Factor of Safety - - - - - - - -      1.167   <- EARTHQUAKE F.S.
            Side Force Inclination - - - - -     -12.92
            Number of Iterations - - - - - -      5
1           UTEXAS3 - VER. 1.200 - 12/16/92 - (C) 1985-1992 S. G. WRIGHT
            Date:  9:25:2001   Time: 11: 0:15   Input file: hlp-mhea.dat
              KIF dredge cell design
              Spencer's Method
              Search for critical shear surface
```