TENNESSEE VALLEY AUTHORITY

DIVISION OF NUCLEAR ENGINEERING

MATERIALS TECHNOLOGY BRANCH

SINGLETON MATERIALS ENGINEERING LABORATORY

KINGSTON STEAM PLANT
GROUND WATER ASSESSMENT

SME-SOI-88-006

July 6, 1988

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All work contained in this report was conducted under Singleton Materials Engineering Laboratory's (SME) Quality Assurance program as described by MTB-SI 24.1 through 24.14. SME is a TVA approved vendor of laboratory services.

A27149.1

KINGSTON STEAM PLANT

GROUND WATER ASSESSMENT

The soils investigation requested in the attached Internal Service Agreement has been completed. The purpose of the investigation was to delineate the local attenuation zone, identify different lithology groups, determine depths to bedrock and establish water table elevations. The field exploration was completed between April 4 and 12, 1988. A total of 454.2 lin ft was drilled and sampled from fifteen locations. Standard Penetration Tests (SPT) were used at each location to determine lithology and provide samples for laboratory testing. Borings were advanced by a CME-55 drill using 3-3/8-in. id hollow stem augers. AW drill rods were used to drive the 2 in. split-spoon sampler. Boring locations, water and rock elevations are summarized in table 1.

Site Conditions

Overburden on-site ranged from 10.3 ft to 52.0 ft with an average of 30 ft. Field classification revealed four basic groups of material. Most of the site materials consisted of clays ranging from fat to silty with colors from dark brown to red to light yellow. Layers of silty clay chert along with seams of sandy clay were also encountered. The predominant overburden soils were red, medium to fat clays, yellow medium silty clays with weathered chert gravel, and yellow medium to fat clay. Topsoil covered 90 percent of the site and varied from 1.0 to 5.0 ft in depth. SPT N valued averaged 8 to 16 blows.

Ground Water

Ground water was encountered in seven of the fifteen holes at elevations ranging from 732.7 to 833.8 with an average elevation of 759.1.

Laboratory Testing

Two split-spoon samples (3W and 4W) of boring 2 were tested for moisture content (ASTM D 2216), grain-size analysis (ASTM D 422), specific gravity (ASTM D 854), unit weight (SLP-2), loss on ignition (ASTM C 311), and permeability (SLP-3). In addition, particle-size analysis was also performed on the bottom portion of sample 4W which was visually classified as weathered chert containing a large amount of gravel. The soil sample of this portion was disintegrated after removal of paraffin, therefore no permeablity test was performed.

Test results are summarized in table 2. Soil samples 3W and 4W (top portion) were classified as fine-grained soils containing about 63 percent fines while soil sample 4W (bottom portion) was classified as a coarse-grained soil containing 70 percent coarse materials. The coefficient of permeability of the fine-grained soils is in the order of magnitude of 10^{-8} cm/sec.

Summary

In this soil investigation, fifteen split-spoon borings were completed. Depths of bedrock ranged from 10.3 to 52.0 ft with an average of 30 ft. Ground water was encountered at seven out of fifteen boring locations at elevations ranging from 732.7 to 833.8 with an average of 759.1. Generally, the soils were classified as fine-grained soils with some weathered chert. The coefficient of permeability of the fine-grained soils is in the order of magnitude of 10^{-8} cm/sec.

A28188.1

Table 1

KINGSTON STEAM PLANT

GROUND WATER ASSESSMENT

COORDINATES AND GROUND WATER ELEVATIONS OF BORINGS

Boring	Surface El	Coordinates		Refusal		Water Table			
						1 h		24 h	
		Station	Range	Depth	El	Depth	El	Depth	El
1	765.7	29+00	1000' lt	29.0	736.0			27.5	738.2
2	763.9	23+00	800' lt	52.0	711.9	27.5	736.4	26.0	737.9
3	750.7	17+00	800' lt	41.5	709.2	13.2	737.5	13.0	737.7
4	783.5	11+00	400' lt	21.5	762.0	Dry		--	
5	795.8	17+00	Base line	49.3	746.5	Dry		--	
6	Omit								
7	815.3	23+00	200' rt	44.0	771.3	22.7	792.6	20.2	795.1
8	764.0	35+00	100' lt	33.5	730.5	Dry		31.3	732.7
9	770.0	45+00	550' rt	13.0	757.0	Dry			
10	767.5	49+00	1050' rt	41.5	726.0			29.0	738.5
11	844.0	45+00	1050' rt	11.5	832.5	Dry			
12	869.5	35+00	600' rt	39.1	830.4			35.7	833.8
13	760.4	35+00	88' lt	25.5	734.9	Dry			
14	795.2	5+00	1350' rt	20.5	774.7	Dry			
15	817.5	5+00	750' rt	21.5	796.0	Dry			
16	811.5	0+00	959' rt	10.3	801.2	Dry			

A28188.2

Table 2

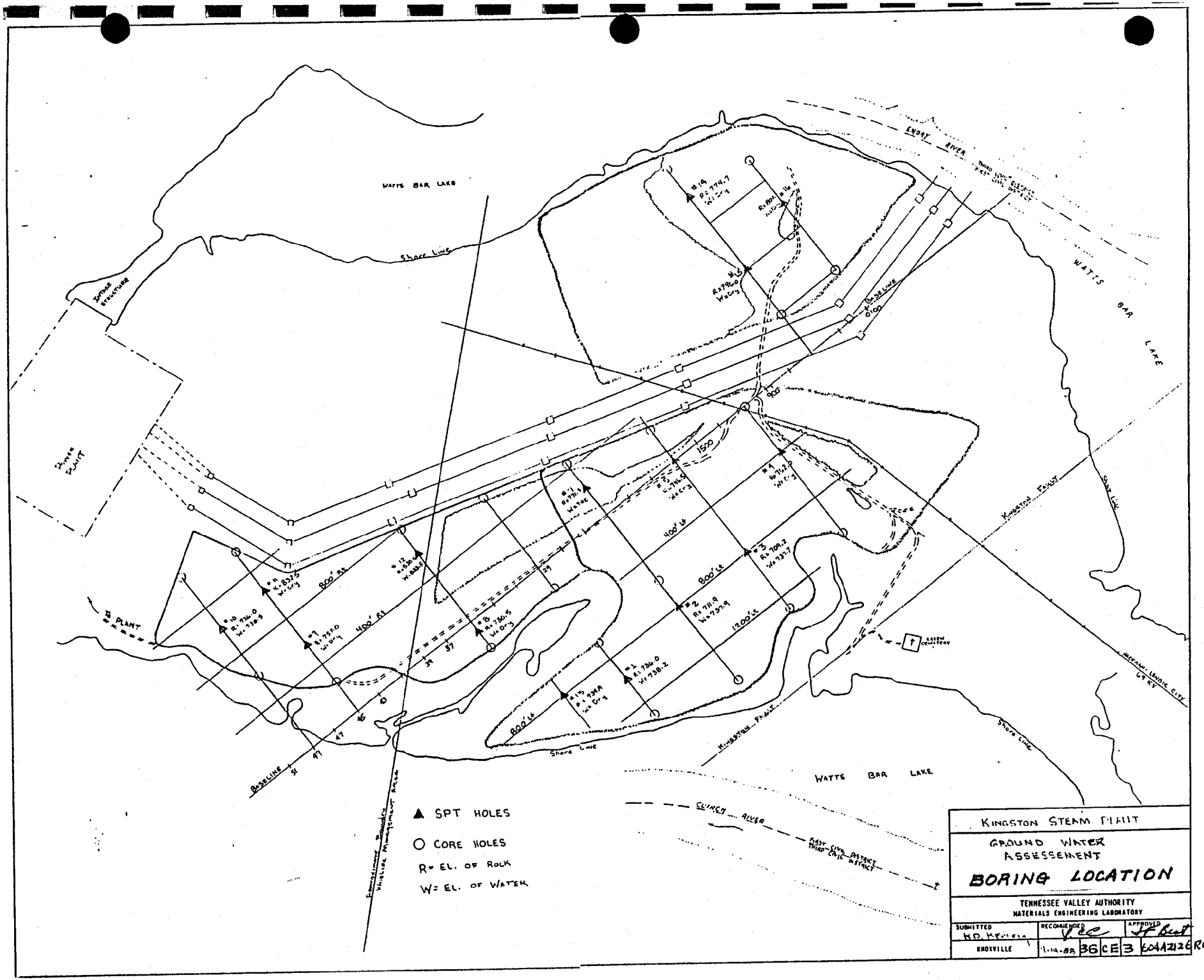
KINGSTON STEAM PLANT

GROUND WATER ASSESSMENT

SUMMARY OF LABORATORY TEST DATA

Elevation	Sample	Nat Moist %	Nat Moist % Sat	Gravel-Size Analysis Gravel %	Sand %	Silt %	Clay %	D_{10} mm	Liq Limit %	Plas Index %	Dry Dens pcf	Porosity	Loss on Ignition %	Coefficient of Permeability K_v cm/sec
Boring US-2, Station 23+99, 800' Lt, Surface El 763.9														
753.4-752.4	3W	21.5	83.8	0	37	24	39	--	--	--	99.8	0.410	4.02	3.5×10^{-8}
748.4-748.1	4W	24.6	83.9	0	38	16	46	--	--	--	94.2	0.443	3.59	8.6×10^{-8}
747.7-747.4	4W	24.6	--	36	34	11	19	--	--	--	--	--	--	--

A28188.3



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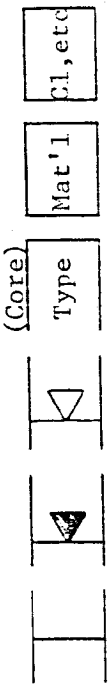
SINGLETON MATERIALS ENGINEERING LABORATORY

SOIL PROFILE LEGEND AND SYMBOLS

Depth 1"=5'	El	SPT (N)	Log*	W	LL	PI	Gr	Description or Test Results
Boring Depth and Scale	Elevation	Blows Per Foot (SS Boring)	Lab Soil Type	Moisture Content	Liquid Limit	Plasticity Index	Soil Group Number	

Legend



Soil Type (Unified Classification)

Notation of Soil Not Sampled (SS, PAH, HAH Logs)

Bedrock (Note core if cored)

Initial Water Table Reading

24 h Water Table Reading

Explanation of US Sampling Limits if Applicable

Boring Symbols

SS - 2-in. od Split Spoon Boring

SPT - Standard Penetration Test Blows Per Foot With 2-in. Split Spoon

CPT - Cone Penetration Test

US - Undisturbed Sample Boring

PAH - Power Auger Hole

HAH - Hand Auger Hole

TP - Test Pit or Trench

V - Vane Shear

P - Piezometer

Under Description or Test Results		
Test	Engineering Test Results	
Q, R, $\bar{R}$, S	Friction Angle (degrees)	Cohesion (tsf)
UC	Unconfined Compressive Strength (tsf)	Sensitivity Ratio
C	Compression Index	Preconsolidation Pressure (tsf)
k	Coefficient of Permeability (cm/sec)	

Example:

Q 12.0 0.62 R 19.6 0.21 S 34.0 0
UC 4.0 2.6 C 0.72 2.0 k 5.6

Soil Test Symbols

Q - Unconsolidated-Undrained Triaxial Compression

R - Consolidated-Undrained Triaxial Compression (Saturated)

$\bar{R}$ - Effective Consolidated-Undrained Triaxial Compression

R nat - Consolidated-Undrained Triaxial Compression (Natural Moisture)

S - Consolidated-Drained Direct Shear

UC - Unconfined Compression

C - Consolidation

k - Permeability

FLA

SINGLETON MATERIALS ENGINEERING LABORATORY

FIELD LOG ABBREVIATIONS

Typical Name	Abbreviation
Sandy gravel	sd gv
Silty gravel	si gv
Clayey gravel	cl gv
Sand	sd
Silty sand	si sd
Clayey sand	cl sd
Sandy silt	sd si
Clayey silt	cl si
Fat silt	ft si
Sandy clay	sd cl
Silty clay	si cl
Medium clay	md cl
Fat clay	ft cl
Cobble	cob
Blouder	bldr
Riprap	rr
Topsoil	ts

Name Modifiers

Clean	cln
Coarse	crs
Dirty	dty
Fine	fn
Organic	org
Poorly graded	pgd
Well graded	wgd
Degraded	degd

Gravel Shape

Angular	ang
Platy	plty
Round/Rounded	rd
Subangular	sb ang
Subrounded	sb rd

Lithology and Mineralogy	Abbreviation
Bedrock	br
Chert	cht
Dolomite	dol
Limestone	ls
Manganese	mn
Micaceous	mic
Pyrite	py
Quartz	qtz
Sandstone	ss
Shale	sh
Bentonite	bent
Hematite	hem

Color

Black	blk
Blue	blu
Brown	brn
Cream	crm
Dark	dk
Gray	gy
Green	grn
Light	lt
Maroon	mrn
Mottled	mott
Olive	olv
Pink	pk
Purple	pur
Red	r
Rust	rst
Tan	tn
White	wht
Yellow	yel

Structure	Abbreviation	Consistency	Abbreviation
Blocky	blky	Dense	dns
Fissured	fis	Firm	f
Homogeneous	homo	Hard	hd
Laminated	lam	Loose	lse
Saprolitic	sapr	Soft	s
Shaly	shly	Stiff	stf
Slickensided	slsid	Very Stiff	v stf
Stratified	strat		

Origin		Moisture	
Alluvial	all	Dry	d
Colluvial	coll	Moist	mst
Loess	lss	V Moist	v mst
Residual	resd	Wet	w

General Modifiers

Alternate/Alternating	alt	Layers	lyrs
Angle	∠	Low	l
Augering	augg	Material	mtl
Bottom Ash	ba	Medium	md
Coal	col	Mud	mud
Contaminated	cont	Original	orig
Dip	dp	Partings	prtgs
Disturbed	dstrb	Plastic	plstc
Debris	dbr	River	rvr
Discontinued	disc	Roots	rts
Drive	dr	Rough	rou
Dust	dst	Slow	sl
Elevation	el	Small	sm
Feet	ft	Spoil	sp
Fill	fl	Terraced	ter
Fiber	fbr	Thick	thk
Fly Ash	fa	Thin	thn
High/highly	h	Trace	tr
Horizontal	hor	Variable	var
Hydraulic	hyd	Vegetation	veg
Inch	in	Vertical	vert
Inclusion	inc	Weathered	wth
Incomplete Recovery	IR	With	w/
Interface	infa	Wood	wd

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: 1 STATION: 29+00 RANGE: 1000'LT SURFACE EL: 765.7
DATE DRILLED: 4/4/88 TO PREPARED BY: MHD CHECKED BY: CDG

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	765	8						TOPSOIL SI CL (TS), BRN, V MST
5	760	15						SI MED CL TR WTH CHT, YEL BRN, MST, RESD
10	755	10						FT CL TR WTH CHT, R, MST, RESD
15	750	5						MED CL W/WTH CHT, BRN, MST, RESD
20	745	5						STRAT, MED CL, PK-YEL-BRN, MST, ALL
25	740	9						GV CL, WTH CHT DEGDD BY DR, BRN-WHT, MST, ALL
30	735							REFUSAL ON ROCK WATERTABLE 24h: 27.5'
35								

1''=5'

*Lab. Classif.

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SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: 2 STATION: 23+00 RANGE: 800'LT SURFACE EL: 763.9
DATE DRILLED: 4/5/88 TO PREPARED BY: MHD CHECKED BY: CBL

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
		6						SI CL TR ORG VEG, BRN, MST, RESD, TS
	760							
5		14						SI CL TR MIC, R BRN, MST, RESD
	755							
10		12						CL SI TR MIC, R BRN-YEL, MST, ALL
	750							
15		9						FN SD CL SI TR W/SS, YEL BRN, MST, ALL
	745							
20		7						IR; CL SI, YEL BRN, MST, ALL
	740							CL, GV CL INTERFACE APPROX 25.2'
25		11						GV SI CL, YEL-WHT, WTH CHT&LG GV DEGDD BY DR, MST, ALL (RIVER GV DEGDD BY DRI)
	735							
30		9						SI CL W/WTH CHT GV, YEL BRN, MST, ALL
	730							
35								

1''=5'

* Lab. Classif.

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SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: 2 STATION: 23+00 RANGE: 800'LT SURFACE EL: 763.9
DATE DRILLED: 4/5/88 TO PREPARED BY: MHD CHECKED BY: CBE

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
		9						SI CL, MOTT YEL R-BLK W/MN, MST, ALL
	725							WATER 41'
40		7						LAM FN CLN SD & FN CL SI, DK BRN-YEL, V MST, ALL
	720							
45		4						FT CL, R-BRN, MST, ALL
	715							
50		19						90% CLN FN SD, 10% FT CL, TN-BRN MST, ALL, SD&CL LYING ON VERT LAM
	710							REFUSAL ON ROCK
55								WATERTABLE 1h: 27.5'; 24h: 26.0'
	705							
60								
	700							
65								
	695							
70								

1''=5'

*Lab. Classif.

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SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P.
BORING: HOLE 3 STATION: 17+00
DATE DRILLED: 4/5/88 TO

FEATURE: GROUNDWATER ASSESSMENT
RANGE: 800' LT SURFACE EL: 750.7
PREPARED BY: MHD CHECKED BY: CBE

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	750	7						SI CL TR ORG VEG, DK BRN, MST, RESD, ALL TS
5	745	2						SI CL TR ORG VEG, DK BRN, V MST, ALL
10	740	7						MED CL, YEL-R, MST, RESD
15	735	10						CL SI W/MIC TR MN, R-YEL MOTT, MST, ALL
								INTRFAC APROX 20.4';WATER 20.5'
20	730	9						FN SD GV CL SI, BRN, MST, ALL
								DK BRN W MATL ENCTRD APPROX 23'
25	725	8						GV SI CL, R-BLK, V MST, ALL
30	720	10						SI CL, WTH CHT W/GV, BRN, V MST, RESD
35								

1''=5'

* Lab. Classif.

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SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 3 STATION: 17+00 RANGE: 800' LT SURFACE EL: 750.7
DATE DRILLED: 4/5/88 TO PREPARED BY: MHD CHECKED BY: CBG

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	715	9						CL SI TR WTH GV, BRN, V MST, ALL
40	710	6						NO RECOVERY
								REFUSAL.
45	705							WATERTABLE: 1h-13.2'; 24h-13.0'
50	700							
55	695							
60	690							
65	685							
70								

1''=5'

*Lab. Classif.

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SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

SHEET 1 OF 1

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 4 STATION: 11+00 RANGE: 400' LT SURFACE EL: 753.5
DATE DRILLED: 4/7/88 TO PREPARED BY: MHD CHECKED BY: CBE

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
		14						SI CL TR CHT, F, MST, R, RESD
	750							
5		12						SI CL TR CHT, F, MST, R, RESD
								7" LYR CHT APPROX 7'
	745							
10		13						SI CL, CHT, F, MST, R, RESD
	740							
15		42						LSE CHT, D W/CL GV, R, RESD
	735							
20		7						SI CL, LSE, R MST, W/LG LSE CHT, ALL
	730							AUGER REFUSAL AT 21.5' NO WATER ENCOUNTER 1h, 24h
25								
	725							
30								
	720							
35								

1''=5'

*Lab. Classif.

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 5 STATION: 17+00 RANGE: SURFACE EL: 795.8
DATE DRILLED: 4/11/88 TO PREPARED BY: MHD CHECKED BY: CBG

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	795	11 9						TS TS LSE W/VEG, MST, BRN-R, TR QTZ
5	790	14						SI CL, R, MST, LSE, ALL
10	785	14						SI CL, DK R, MST, BLKY, TR WTH CHT, ALL
15	780	15						SI CL, DK R, MST, BLKY, TR WTH CHT, ALL
20	775	13						SI CL, BRN, MST, F, TR WTH CHT, ALL
25	770							SI CL, TN, MST, BLKY, TR WTH CHT ALL SI CL, TN, MST, BLKY, TR WTH CHT ALL
30	765							MED CL, MST, F, BRN, TR FN SD, TR WTH CHT, ALL
35								

1''=5'

*Lab. Classif.

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SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 5 STATION: 17+00 RANGE: SURFACE EL: 795.8
DATE DRILLED: 4/11/88 TO PREPARED BY: MHD CHECKED BY: CBG

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	760							MED CL, LSE, MST, BRN, TR FN SD, TR WTH CHT, ALL
40	755							MED CL, F, BRN-R, MST, TR WTH CHT, ALL
45	750							NO RECOVERY
50	745							REFUSAL NO WATER ENCOUNTERED.
55	740							
60	735							
65	730							
70								

1''=5'

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SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 7 STATION: 23+00 RANGE: 200' RT SURFACE EL: 815.3
DATE DRILLED: 4/8/88 TO PREPARED BY: MHD CHECKED BY: CBL

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	815							TOPSOIL
		5						MED CL, R-BRN, MST, LSE, ALL
5	810	21						MED CL, R-BRN, MST, V F, POCKET OF CHT APPROX 5.5'-6', ALL
10	805	20						FT CL, R-BRN, MST, V F, POCKET CHT APPROX 11'-11.5'; ALL
15	800	14						SI CL, R-BLK, MST, F, ALL, CHT LYR APPROX 16'-16.5'
20	795	12						FT CL, R-BRN, MST, V F, TR CHT, ALL
25	790	11						MED CL, BRN, MST, V F, TR FN SD, ALL
30	785	11						SI CL, BRN, MST, LSE, TR FN SD, ALL, CHT APPROX 30' TO 31.5'
35								

1''=5'

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SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 7 STATION: 23+00 RANGE: 200' RT SURFACE EL: 815.3
DATE DRILLED: 4/8/88 TO PREPARED BY: MHD CHECKED BY: CBL

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	780	13						SI CL, R-BRN, V MST, LSE, WTH CHT, ALL
40	775	0						SI CL, R-BRN, V MST, V S, CHT LYR 40.5' TO 41.5', ALL
45	770							AUGER REFUSAL 44.0' WATERTABLE: 1h 22.7'; 24h 20.2'
50	765							
55	760							
60	755							
65	750							
70								

1''=5'

*Lab. Classif.

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SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

SHEET 1 OF 1

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 8 STATION: 35+00 RANGE: 100' LT SURFACE EL: 764.0
DATE DRILLED: 4/4/88 TO PREPARED BY: MHD CHECKED BY: UBG

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
		4						TS SI CL TR ORG VEG, R BRN, MST, RESD (TS)
	760							
5		5						MED CL, R, MST, RESD
	755							
10		14						MED CL, R-YEL, MST, RESD
	750							
15		10						MED CL, BLKY, YEL-R, MST, RESD
	745							
20		12						MED CL, STRATA, R-YEL-BLK, F, MST, RESD
	740							
25		6						SD CL, BRN, MST, S, ALL
	735							
30		10						SD SI, LT BRN, MST, YEL-BRN, ALL
		50+						SD SI, LT BRN, MST, R-BRN, SB RD
	730							~~SS~~
35								AUGER REFUSAL 33.5' WATERTABLE: 1h 0, 24h 31.3'

1''=5'

*Lab. Classif.

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SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

SHEET 1 OF 1

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 9 STATION: 45+00 RANGE: 550' RT SURFACE EL: 770.0
DATE DRILLED: 4/4/88 TO PREPARED BY: MHD CHECKED BY: CBL

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	770							
		11						MED CL TR CHT GV, MST, RESD
5	765	11						MED CL TR CHT GV, MST, RESD
10	760	10						SI CL TR MIC, YEL-R, MST, RESD
								CHT BLDR APPROX 12.0'
15	755							AUGER REFUSAL 24h WATERTABLE DRY
20	750							
25	745							
30	740							
35	735							

1''=5'

*Lab. Classif.

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SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 10 STATION: 49+00 RANGE: 1050'RT SURFACE EL: 767.5
DATE DRILLED: 4/4/88 TO PREPARED BY: MHD CHECKED BY: [illegible]

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
								TS
	765	8						MED CL TR CHT GV, R, MST, RESD
5		18						MED-SI CL, --YEL, MST, RESD
	760							
10		20						SI CL TR WTH GV, YEL-R, MST, RESD
	755							
15		8						FT CL, BLKY, TR LS GV W/MN, R-BLK, MST, RESD, ALL
	750							
20		7						SI CL T R GV, F, R-BRN, MST, ALL
	745							
25		7						CL SI, VERT S TRATA SD, R-BRN, MST, ALL
	740							
30		0						CL SI, V S, V MST, R, TR WTH SS, ALL WATER AT 31.5'
	735							
35								

1''=5'

* Lab. Classif.

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 10 STATION: 49+00 RANGE: 1050'RT SURFACE EL: 767.5
DATE DRILLED: 4/4/88 TO PREPARED BY: MHD CHECKED BY: CDE

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	730	0						NO RECOVERY, SAMPLE TUBE. SUNK TO 39.3' W/NO RESISTANCE
40		4						CL SI, V MST, BRN, TR WTH SS, ALL
	725							AUGER REFUSAL 41.5'
45								WATERTABLE 24h 29.0'
	720							
50								
	715							
55								
	710							
60								
	705							
65								
	700							
70								

1''=5'

*Lab. Classif.

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

SHEET 1 OF 1

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 11 STATION: 45+00 RANGE: 1050' RT SURFACE EL: 844.0
DATE DRILLED: 4/11/88 TO PREPARED BY: MHD CHECKED BY: CBG

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
								TS
		6						FT CL, V S, R, MST, TR CHT, ALL
	840							
5		22						FT SI, V S, R, MST, ALL LIMESTONE LYR 6.0:6.5'
	835							
10		6						LIMESTONE LYR 10.0:10.5' FT SI, BRN-R, LSE, MST, ALL
	830							AUGER REFUSAL 11.5' WATERTABLE: 24h DRY
15								
	825							
20								
	820							
25								
	815							
30								
	810							
35								

1''=5'

*Lab. Classif.

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 12 STATION: 35+00 RANGE: 600'RT SURFACE EL: 869.5
DATE DRILLED: 4/8/88 TO PREPARED BY: MHD CHECKED BY: CBL

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
		13						MED CL, R, MST, BLKY W/CHT, ALL
5	865	27						MED CL, R, MST, BLKY W/VERT LYR CHT AT 6.0'-6.5', ALL
10	860	14						MED CL, R, MST, F, IR; CHT IN HD
15	855	11						MED CL, BLKY, R, MST, TR CHT, ALL
20	850	11						MED CL, BLKY, R, MST, TR CHT, ALL
25	845	16						FT CL, DK BRN, MST, CHT LYR AT 25.5'-26.0', ALL
30	840	15						FT CL, R-BRN, MST, ALL, SS AT 30.5'-31.0', CHT AT 31'-31.5'
35	835							

1''=5'

*Lab. Classif.

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 12 STATION: 35+00 RANGE: 600'RT SURFACE EL: 869.5
DATE DRILLED: 4/8/88 TO PREPARED BY: MHD CHECKED BY: CBY

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
		13						FT CL, R, MST, WTH CHT & QTZ AT 36.0':36.5', ALL WTH SS
40	830							AUGER REFUSAL 39.1' WATERTABLE: 24h 35.7'
45	825							
50	820							
55	815							
60	810							
65	805							
70	800							

1''=5'

*Lab. Classif.

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 13 STATION: 35+00 RANGE: 800' LT SURFACE EL: 760.4
DATE DRILLED: 4/4/88 TO PREPARED BY: MHD CHECKED BY: CBG

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	760	18						MED CL, R, MST, RESD
5	755	18						MED CL, YEL-BRN, MST, VEG, RESD
10	750	16						CL GV, WTH CHT DEGD BY DR, R-WHT, MST, RESD
15	745	5						IR; WTH GV, BLOCKED SPOON
20	740	3						IR; SI CL W/GV, BRN, MST, ALL
25	735							AUGER REFUSAL 25.5'
								WATERTABLE: 24h DRY
30	730							
35								

1''=5'

*Lab. Classif.

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

SHEET 1 OF 1

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 14 STATION: 5+00 RANGE: 1350'RT SURFACE EL: 795.2
DATE DRILLED: 4/12/88 TO PREPARED BY: MHD CHECKED BY: CBE

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	795							TS SI CL, MST, YEL-BRN, WTH CHT, ALL
		15						
5	790	7						SI CL, F, MST, VEG, MOTT, TR WTH CHT, ALL
10	785	6						SI CL, S, MST, R-GY, WTH CHT AT 11.0' TO 11.5' CL SI, V MST, V S, BRN, ALL
15	780							CL SI, V MST, V S, BRN, ALL
20	775							AUGER REFUSAL AT 20.5' (WTH SH) NO WATER ENCOUNTERED.
25	770							
30	765							
35								

1''=5'

* Lab. Classif.

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

SHEET 1 OF 1

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 15 STATION: 5+00 RANGE: 750' RT SURFACE EL: 817.5
DATE DRILLED: 4/12/88 TO PREPARED BY: MHD CHECKED BY: CBG

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
0	815	10						ROADBED, GV SI CL, BRN, MST, TR WTH CHT, ALL
5	810	12						SI CL, BRN, MST, TR WTH CHT, ALL
10	805	24						SI CL, BRN, MST, TR WTH CHT, ALL SI CL, BRN, MST, WTH SH
15	800							SI CL, BRN, MST, WTH SH
20	795							AUGER REFUSAL 21.5' NO WATER ENCOUNTERED
25	790							
30	785							
35								

1''=5'

*Lab. Classif.

TENNESSEE VALLEY AUTHORITY

SINGLETON MATERIALS ENGINEERING LABORATORY
SOIL PROFILE (POWER AUGER HOLE)

SHEET 1 OF 1

PROJECT: KINGSTON S.P. FEATURE: GROUNDWATER ASSESSMENT
BORING: HOLE 16 STATION: 0+00 RANGE: 950'' RT SURFACE EL: 811.5
DATE DRILLED: 4/12/88 TO PREPARED BY: MHD CHECKED BY: CBE

DEPTH ft.	EL	SPT (N)	* LOG	W	LL	PI	GR	FIELD DESCRIPTION
	810	17						TS SI CL, F, MST, R-BRN, WTH CHT AT 2.0'-2.5', ALL
5	805	14						SI CL, F, MST, BRN, TR WTH CHT STRATA CHANGE R TO BRN 6.5'
10	800							LIMESTONE ROCK AT 10.3' REFUSAL NO WATER ENCOUNTERED
15	795							
20	790							
25	785							
30	780							
35								

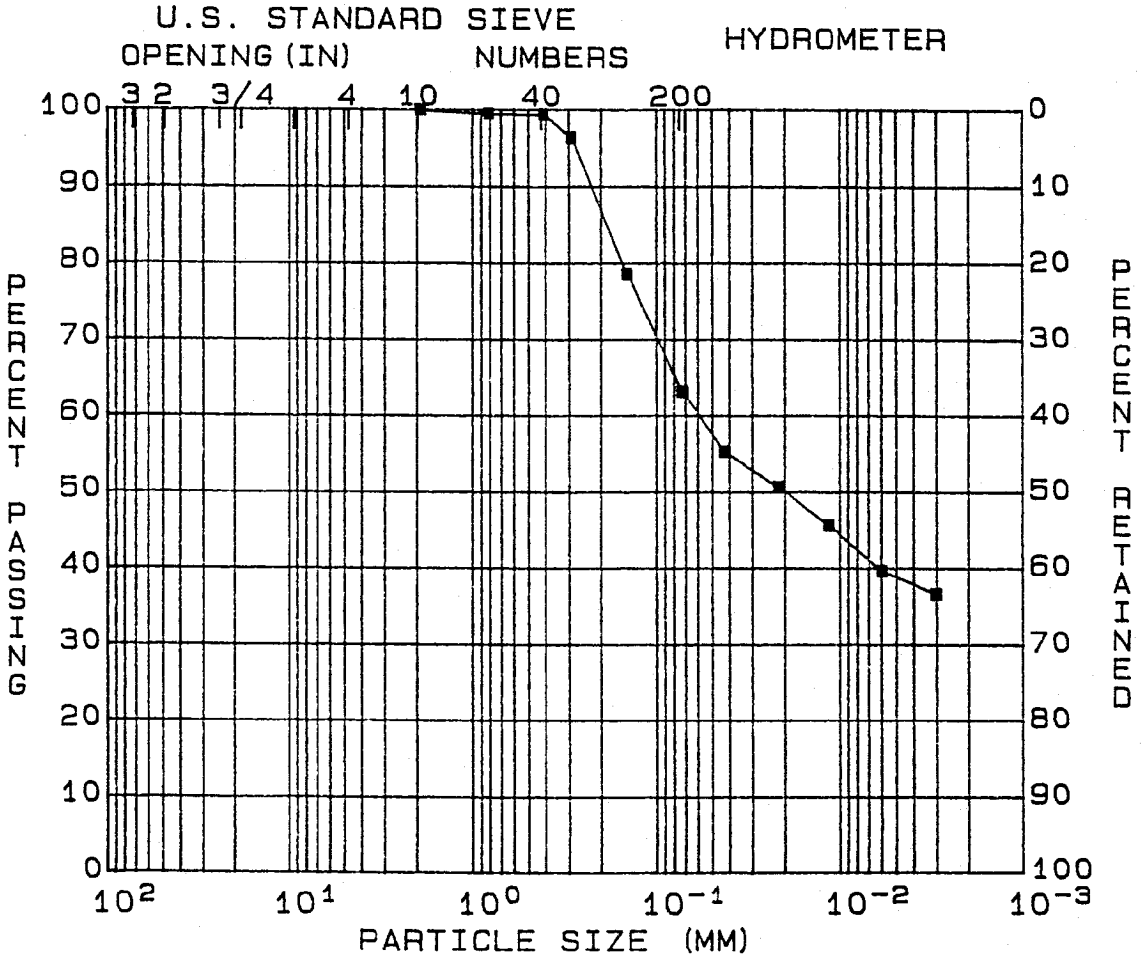
1''=5'

*Lab. Classif.

TVA SINGLETON MATERIALS ENGINEERING LABORATORY
PARTICLE SIZE ANALYSIS

PROJECT: KINGSTON S. P.
FEATURE: GROUNDWATER ASSESS
STATION: 23+00
RANGE :
PART :

BORING: 2
EL. : 10.5-11.5
SAMPLE: 3W
DATE : 04-20-88



GRAVEL (%)	= 0	D10 (MM)	= --
SAND (%)	= 37	D30 (MM)	= --
SILT (%)	= 24	D60 (MM)	= --
CLAY (%)	= 39	COEF UNIF	= --

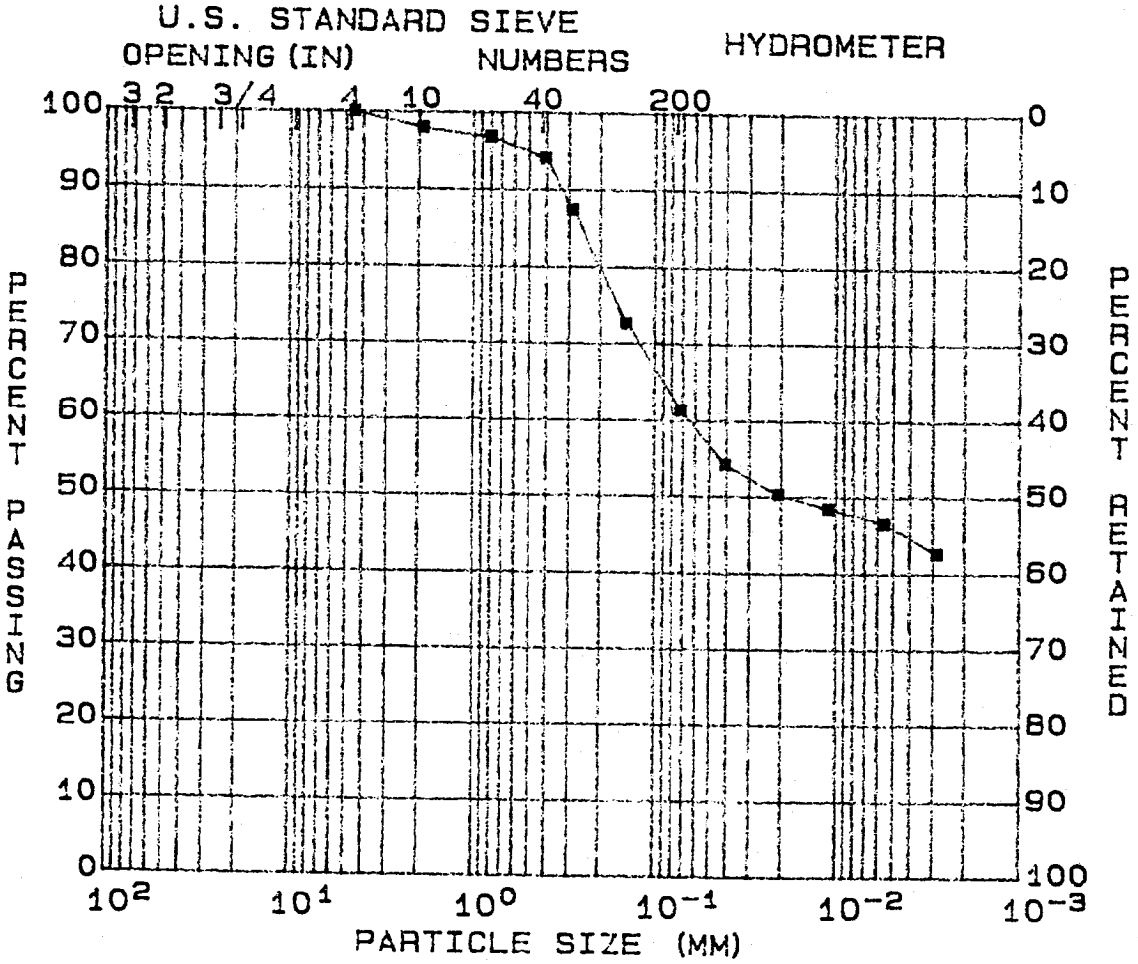
SOIL SYMBOL=	L.L. (%) = 0	DENSITY (pcf) = --
MOISTURE (%) = --	P.I. (%) = 0	SATURATION (%) = --
SP. GR. = 2.71		VOID RATIO = --

REMARKS:

TVA SINGLETON MATERIALS ENGINEERING LABORATORY
PARTICLE SIZE ANALYSIS

PROJECT: KINGSTON S. P.
FEATURE: GROUNDWATER ASSESMNT
STATION: 23+00
RANGE :
PART :

BORING:
EL. : 15.5 TO 16.5
SAMPLE: 4W
DATE : 05-18-88



GRAVEL (%)	= 0	D10 (MM)	= ---
SAND (%)	= 0	D30 (MM)	= ---
SILT (%)	= 0	D60 (MM)	= ---
CLAY (%)	= 0	COEF UNIF	= ---

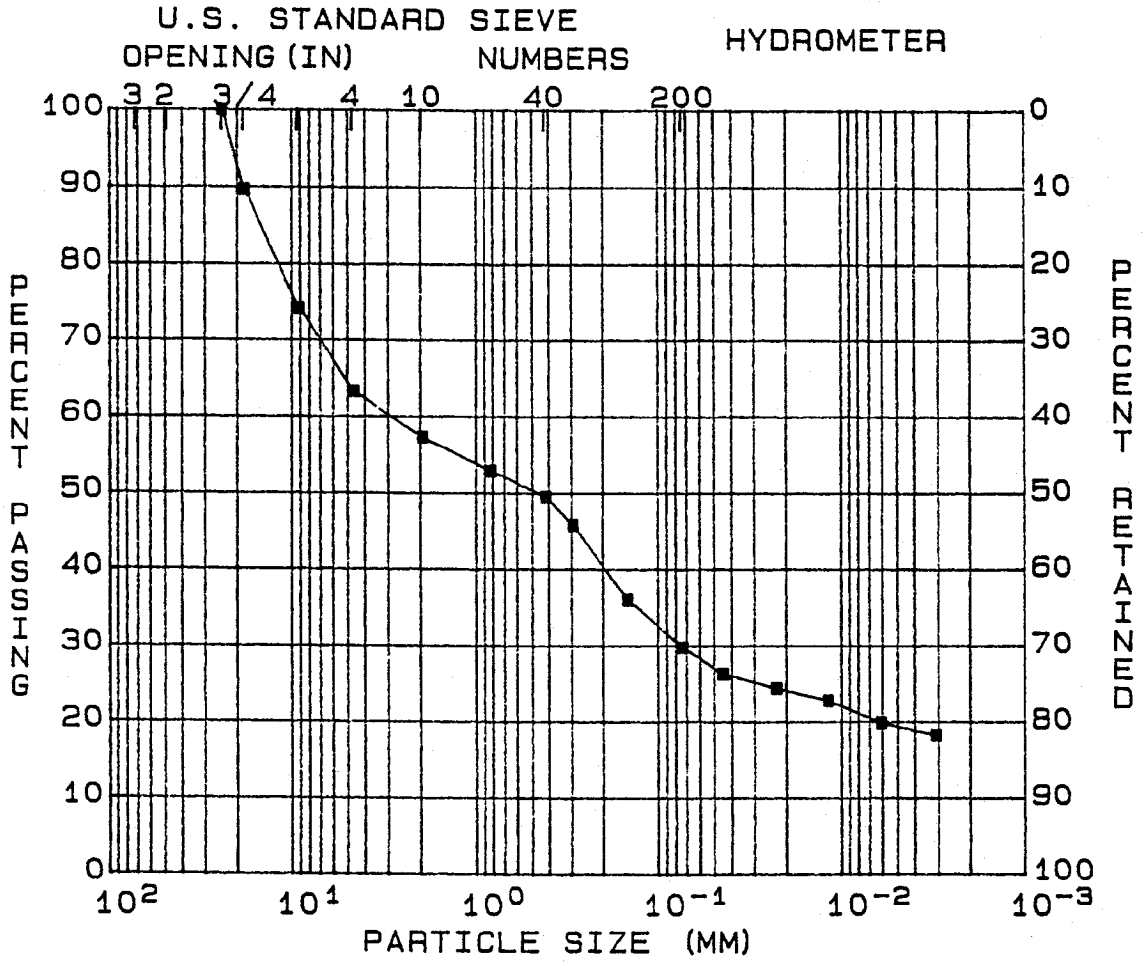
SOIL SYMBOL=	L.L. (%) = 0	DENSITY (pcf) = ---
MOISTURE (%) = ---	P.I. (%) = 0	SATURATION (%) = ---
SP. GR. = 2.71		VOID RATIO = ---

REMARKS:

TVA SINGLETON MATERIALS ENGINEERING LABORATORY
PARTICLE SIZE ANALYSIS

PROJECT: KINGSTON S. P.
FEATURE: GROUNDWATER ASSESS
STATION: 23+00
RANGE :
PART :

BORING: 2
EL. : 15.5-16.5
SAMPLE: 4W
DATE : 04-20-88



GRAVEL (%)	= 36	D10 (MM)	= 0.0000
SAND (%)	= 34	D30 (MM)	= 0.0000
SILT (%)	= 11	D60 (MM)	= 0.0000
CLAY (%)	= 19	COEF UNIF	= 0.0

SOIL SYMBOL=	L.L. (%) = 0	DENSITY (pcf) = --
MOISTURE (%) = --	P.I. (%) = 0	SATURATION (%) = --
SP. GR. = 2.71		VOID RATIO = --

REMARKS:

Tennessee Valley Authority
Singleton Materials Engineering Laboratory

EQUIPMENT USAGE LOG

Report: SME-SOI-88-006
Date: 07/06/88

Item	ID	Calibrated	Due Recalibration
CALIPER,DIGITAL	E10531	01/29/88	07/29/88
BALANCE,TRIPLE BEAM	332599	02/29/88	08/29/88
BALANCE,METTLER	361395	05/19/88	11/19/88
OVEN	E07462	03/01/88	09/01/88
TRANSDUCER SYSTEM,PORE PRESSURE	329299	02/26/88	08/26/88
TRANSDUCER SYSTEM, LOAD	E07248	02/26/88	08/26/88
SIEVE 10	E08488	02/26/88	08/26/88
SIEVE 4	E07211	04/05/88	10/05/88
SIEVE 1	SO/SI-40	04/06/88	10/06/88
SIEVE 3/8	SO/SI-125	04/06/88	10/06/88
SIEVE 3/4	SO/SI-127	04/06/88	10/06/88
HYDROMETER (SN 51984)	SO/HY-1	10/15/87	10/15/88
THERMOMETER,GLASS (0-30 C)	E07352	03/02/88	03/02/89
SIEVE 200	E07233	05/11/88	11/11/88
SIEVE 20	E08462	03/16/88	09/16/88
SIEVE 40	E08463	03/17/88	09/17/88
SIEVE 50	E07204	03/16/88	09/16/88
SIEVE 100	E08469	02/24/88	08/24/88
SIEVE 200	E08471	03/17/88	09/17/88
SPLIT BARREL SAMPLER	SO/SS-39	07/17/87	07/17/88
DRIVING SHOE	SO/DS-114	03/16/88	06/16/88

TVA 8295 (FD-1-82)

INTERNAL SERVICE AGREEMENT

BR

HF3

Agreement Number ~~P0168~~

Agreement between F&H PR (Requesting Organization) and DNE-Material Test Branch (Performing Organization)

Description of work to be performed: Soil and mineralogy testing and report will be performed at Kingston Fossil Plant.

Estimated costs (Detail as desired): $8,000.00

Projected completion date: 9/88

	Requesting Organization	Performing Organization
Account Number:	5212-544045-20921	30XX-999100-168
Principal contact:		
Name	Craig Schand	Floyd Best
Address	BR 2S 101B-C	SME-K
Telephone No.	3553	
Organization Budget Officer:		
Signature	[signature] for D. G. Holden	[signature] U. E. Kress
Date	3-14-88	
Approved for Division Director:		
Signature by:	[signature] Joe L. Currie	[signature] Acting J. A. Kirkebo
Date	3/16/88	

Distribution of copies:

1 Accounting branch of performing organization
2 Accounting branch of requesting organization - Joel Hicks, SP 4N 69A-C
3 Performing organization - R. T. Black - W4 D210 C-K
4 Requesting organization
5 Chattanooga Acctg. Br. (for fixed asset accounting purposes, if appropriate)