REPORT OF GEOTECHNICAL EXPLORATION

MONITORING WELL INSTALLATION
ASH DISPOSAL AREA
KINGSTON FOSSIL PLANT
KINGSTON, TENNESSEE

Prepared For:

TENNESSEE VALLEY AUTHORITY

Chattanooga, Tennessee

Prepared By:

MACTEC ENGINEERING AND CONSULTING, INC.

Knoxville, Tennessee

MACTEC Project 3043041063/01

February 23, 2005

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February 23, 2005

Mr. Ron Purkey
Tennessee Valley Authority
1101 Market Street, LP-2G
Chattanooga, TN 37402

Subject: **Report of Geotechnical Exploration**
Monitoring Well Installation
Ash Disposal Area
TVA Kingston Fossil Plant
Kingston, Tennessee
MACTEC Project 3043041063/01

Dear Mr. Purkey:

We at MACTEC Engineering and Consulting, Inc., (MACTEC) are pleased to submit this Report of Geotechnical Exploration for your project. Our services, as authorized through TAO No. MAC-0710-RPT0710 were provided in general accordance with our proposal number Prop04Knox/399 dated December 16, 2004.

This report reviews the information provided to us, discusses the site and subsurface conditions, and presents the results of our field and laboratory testing for the materials at the existing ash disposal area. The Appendices contain a brief description of the Field Exploratory Procedures, a Key Sheet and Test Boring Records, Monitoring Well Installation Logs, the Laboratory Test Procedures, and the Laboratory Test Results.

We anticipate further dialog and interaction with the designers as the design proceeds and will be happy to provide any additional information or interpretation of the data presented here in which may be necessary.

We will be pleased to discuss our data with you and would welcome the opportunity to provide any additional engineering and material testing services needed to successfully complete your project.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

Hussein A. Benkhayal
Senior Professional

Carl D. Tockstein, P.E.
Chief Engineer - Tennessee Operations

HAB/CDT:sjm

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EXECUTIVE SUMMARY

MACTEC was selected by the Tennessee Valley Authority (TVA) to perform a geotechnical exploration and to install monitoring wells in the Ash Disposal Area at the Kingston Fossil Plant in Kingston, Tennessee. The objectives of our exploration were to determine general subsurface conditions and to install monitoring wells.

The scope of work consisted of drilling 7 test borings, installing 13 monitoring wells in the vicinity of the test borings, and performing well development for all the installed monitoring wells. All test borings were drilled to refusal. The major findings of our geotechnical exploration are as follows:

- The test borings drilled in the ash pond area typically encountered ash, fill, alluvium, and residuum. The ash, which was encountered in all test borings, ranged in relative density from very loose to very dense. The fill soils, which were encountered only in boring B-4, had a very stiff consistency. The underlying alluvium ranged in consistency from soft to very hard (or very loose to very dense relative density). Residuum was encountered in boring B-4 only and consisted of hard to very hard weathered shale.

- Ground water was encountered in all test borings at the time of drilling. Long-term measurements to establish ground-water levels were not obtained during this exploration.

- Thirteen monitoring wells were installed to total depths ranging from about 9.2 to 101 feet. Each well consisted of schedule 40, two-inch PVC pipe with 5-foot, double-density, slotted, 0.010-inch screen.

- Laboratory tests were performed on selected ash and soil samples. The tests and test results are summarized in Section 8. The test results are presented in Appendix D.

This summary is only an overview and should not be used as a separate document or in place of reading the entire report, including the appendices.

1.0 INTRODUCTION

This report presents the findings of our subsurface exploration and laboratory testing recently performed for the Monitoring Well Installation in the Ash Disposal Area at the TVA Kingston Fossil Plant. Type I Piezometer (monitoring well) Installation Records are also provided. Our services were authorized by Mr. Ron Purkey of TVA.

2.0 OBJECTIVES OF EXPLORATION

The objectives of our exploration were to determine general subsurface conditions and, based on the information obtained, to install monitoring wells. An assessment of site environmental conditions, or an assessment for the presence or absence of pollutants in the soil, bedrock, surface water, or ground water of the site was beyond the proposed objectives of our exploration.

3.0 SCOPE OF EXPLORATION

The scope of our exploration was based on our proposal number Prop04Knox/399 dated December 16, 2004, the geotechnical scope of work prepared by Geosyntec and Parsons E&C, and additional work assigned by Parsons E&C and Geosyntec during a teleconference on January 13, 2005. It includes the following:

- Reconnaissance of the immediate site
- Drilling seven test borings to refusal depths which ranged from about 43.0 to 111.2 feet
- Installing 13 monitoring wells to depths ranging from 9.2 to 101.0.
- Performing well development for each of the 13 installed wells.
- Conducting laboratory testing on selected ash and on-site soil samples
- Preparing a geotechnical report summarizing the field and laboratory test results and the Type I Piezometer (monitoring well) Installation Records

The drilling and sampling were performed in general accordance with ASTM procedures included in Appendix A. The drilling was performed during the period from January 4 to 19, 2005. The equipment used consisted of a CME Model 55 ATV (all-terrain-vehicle) mounted drill rig equipped

with a manual hammer and a CME Model 75 truck-mounted drill rig equipped with an automatic hammer.

Standard penetration tests (SPTs) were performed in all test borings at 5-foot vertical intervals. Ground-water levels were measured during drilling in each boring. Thirteen monitoring wells were installed at locations and to depths assigned by Parsons E&C and Geosyntec.

Upon completion of drilling, the test borings were plugged and abandoned by backfilling with cement grout.

All samples were transported to our laboratories in Knoxville, Tennessee, where ash and soil samples were selected for laboratory testing. The testing program for this project consisted of the following:

- 5 Plasticity Index (Atterberg Limits) Tests
- 18 Grain Size Distribution Tests
- 72 Natural Moisture Content Tests
- 9 Specific Gravity Tests

Subsurface conditions encountered in the borings are presented on the Test Boring Records in Appendix B. The Type I Piezometer Installation Logs are presented in Appendix C. The laboratory testing results are presented in Appendix D.

4.0 PROJECT INFORMATION AND SITE CONDITIONS

Project information was provided to us by TVA and Parsons E&C in the form of a Subsurface Exploration document and a boring location plan. The existing Ash Disposal Area consists of an upstream method of construction ash disposal facility with various cells, existing ash pond, and stilling pond. The site is located just north of the Kingston Fossil Plant. The ground surface elevation varies by as much as about 47 feet in the areas of our exploration program.

5.0 AREA AND SITE GEOLOGY

Kingston, Tennessee, is located in the Appalachian Valley and Ridge Physiographic Province. This province extends as a continuous belt from Central Alabama, through Georgia and Tennessee, northward into Pennsylvania. The formations that underlie this province consist primarily of limestone, dolostone, shale, and sandstone, which have been folded and faulted in the geologic past. These formations range in age from Cambrian to Pennsylvanian and have been subject to at least one extensive period of erosion since their structural deformation. The erosion has produced a series of subparallel, alternating ridges and valleys. The valleys are formed over more soluble bedrock (limestone and interbedded limestone and shale), whereas bedrock more resistant to solution weathering forms ridges (sandstone, shale, and cherty dolostone).

The site and vicinity are blanketed with alluvial (water-transported) soils that have been deposited over time by the near Emory River. The alluvial soils typically consist of heterogeneous mixtures of clay, silt, sand, and gravel. The alluvial soils typically grade coarser with depth and may contain rock fragments ranging up to cobble and boulder size. The published geologic map of this area shows that this site is underlain by bedrock of the Conasauga Shale. The Conasauga Shale is mainly composed of blue-gray shale with many lenses of limestone, conglomerate, and siltstone. The proportion of shale to other materials is about 4 to 1. The lenses of limestone typically range in thickness from about 1 inch to several feet.

6.0 SUBSURFACE CONDITIONS

Subsurface conditions in the ash disposal area were explored with seven test borings (B-3 through B-9). The locations for the borings were proposed by others. The locations were established in the field by Parsons personnel. The boring locations were not surveyed. However, the locations of the monitoring wells were surveyed and we were provided with the surveyed locations and elevations of all wells.

Subsurface conditions encountered at each boring location are shown on the Soil Test Boring Records and Auger Boring Records in Appendix B. The Test Boring Records represent our interpretation of the subsurface conditions, based on the field logs and visual examination of the samples by one of our geotechnical engineers. The lines designating the interfaces between various strata on the Test Boring Records represent the approximate interface locations.

The test borings performed at this site typically encountered fill, ash, alluvial, and residual materials. Fill soils are soils which have been transported to their current location by man. Alluvial soils are soils that have been transported to their present location by running water. Residual soils are soils that have developed from the in-place weathering of the underlying parent bedrock. All test borings were advanced to refusal. A summary of the boring depths is presented in Table 1.

Table 1
Test Boring Summary

Boring Number	Ground Elevation msl (Feet)**	Auger Refusal Depth (Feet)	Refusal Elevation msl (Feet)	Boring Termination Depth (Feet)	Boring Termination Elevation msl (Feet)
B-3	810.7	103.5	707.2	103.6*	707.1
B-4	766.7	43.0	723.7	43.0	723.7
B-4A	775.0***	73.0	702.0	73.0	702.0
B-5	804.2	93.2	711.0	93.2	711.0
B-6	808.1	103.0	705.1	103.0	705.1
B-7	811.8	111.2	700.6	111.2	700.6
B-8	785.3	78.5	706.8	78.5	706.8
B-9	764.9	58.0	706.9	58.0	706.9

*A split spoon was driven to this depth to determine auger refusal material.

**Ground surface elevation was based on the surveyed ground surface at adjacent monitoring wells.

***Ground surface elevation was based on the topographic contour lines.

Prepared/Date: HAB 2/23/05
Checked/Date: CDT 2/23/05

6.1 ASH

Ash material was encountered in all test borings. The ash interval extended from the existing ground surface to depths ranging from about 27.0 to 83.0 feet. The majority of the ash encountered consisted of gray and dark gray sandy silt / silty sand-sized particles with coal fragments. The standard penetration test (SPT) resistance values in the ash ranged from 0 (weight of hammer) to over 50 blows per foot (bpf); indicating very loose to very dense relative densities.

6.2 FILL

Fill soils were encountered only in test boring B-4. The fill was encountered at a depth of about 12 feet and extended to a depth of about 17 feet. The fill consisted of red-brown, silty clay with chert fragments. The SPT value obtained in the fill was 19 blows per foot (bpf), indicating a very stiff consistency.

6.3 ALLUVIUM

Alluvial soils were encountered in all test borings below the fly/bottom ash and extended to the refusal depths in all test borings except for boring B-4. The alluvial soils consisted primarily of brown, gray, olive-gray, and orange-brown sandy silty, clayey silt, silty sand, and sand with gravel. The SPT resistance values in the alluvium ranged from 4 to over 50 bpf, indicating soft to very hard consistencies and very loose to very dense relative densities.

6.4 RESIDUUM

Residual materials were encountered only in test boring B-4. The residuum consisted of grayish brown and olive-brown, weathered shale. The SPT values in the weathered shale ranged from 35 to 64 bpf, indicating hard to very hard consistencies.

7.0 TYPE I PIEZOMETER (MONITORING WELL) INSTALLATION

Thirteen monitoring wells were installed at the site. Two monitoring wells were installed at the locations of test borings B-4 through B-9. One monitoring well was installed at the location of test boring B-3. Each monitoring well consisted of a 2-inch I.D., schedule 40 PVC pipe with a 5-foot screen length. The screens were double-density and slotted at 0.010-inch. The total depth of the wells installed ranged from 9.2 to 101.0 feet. The depth of the screens ranged from 4.0 to 9.0 feet to as much as 95.8 to 100.8 feet. The Type I Piezometer Installation Logs are included in Appendix C. A summary of this well installation is presented in Table 2.

Table 2
Monitoring Well Summary

Well Number	Ground Surface Elevation (feet msl)	Total Depth (feet)	Screen Depth		Screen Elevation	
			Top (feet)	Bottom (feet)	Top(feet msl)	Bottom (feet msl)
MW-3B	810.7	101.0	95.8	100.8	714.9	709.9
MW-4A	766.8	9.2	4.0	9.0	762.8	757.8
MW-4B	766.6	24.0	18.8	23.8	747.8	742.8
MW-5A	804.1	48.0	42.8	47.8	761.3	756.3
MW-5B	804.4	68.0	62.8	67.8	741.6	736.6
MW-6A	808.3	55.6	50.4	55.4	757.9	752.9
MW-6B	807.9	76.5	71.3	76.3	736.6	731.6
MW-7A	811.7	45.2	40.0	45.0	771.7	766.7
MW-7B	811.9	65.2	60.0	65.0	751.9	746.9
MW-8A	784.8	25.2	20.0	25.0	764.8	759.8
MW-8B	785.7	40.2	35.0	40.0	750.7	745.7
MW-9A	764.7	15.2	10.0	15.0	754.7	749.7
MW-9B	765.1	25.2	20.0	25.0	745.1	740.1

Prepared/Date: HAB 2/23/05
Checked/Date: CDT 2/23/05

8.0 LABORATORY TESTING AND DISCUSSION OF TEST RESULTS

This section describes the geotechnical laboratory testing program and summarizes the test results. The laboratory testing procedures and laboratory test results are included in Appendix D. The laboratory tests were performed on SPT ash and soil samples obtained during drilling from the ash pond. The following paragraphs provide a short discussion of the general types of testing conducted and the test results.

Natural moisture content tests were performed on many of the split-spoon soil samples. Liquid limit, plastic limit, and plasticity index tests (collectively referred to herein as Atterberg limits); specific gravity tests; and grain size distributions with and without hydrometer analyses were performed on selected split-spoon samples. These tests were used to confirm our visual-manual classifications.

The plasticity tests were performed only on the alluvial soils. Liquid limits for three of the soil samples tested ranged from 20 to 24; plastic limits were 16 for all samples; and plasticity indices ranged from 4 to 11. Two of the samples tested were non-plastic. The tested soils were classified

as CL, ML, SM, and CL-ML soils in accordance with the Unified Soil Classification System (USCS).

Natural moisture contents for the ash ranged from 13.4 percent (boring B-5) to 56.3 percent (boring B-5). However, the majority of the moisture contents in the ash varied from about 20 to 45 percent. The natural moisture content of the alluvium and residuum ranged from 10.8 percent (boring B-4) to 30.9 percent (boring B-8). The majority of the alluvium and residuum samples tested had a natural moisture content ranging from about 18.0 to 22.0 percent. The fill soils tested had a moisture content of 23.0 percent (boring B-4).

Specific gravities of the fly ash ranged from 2.28 to 2.33. The specific gravities for the bottom ash ranged from 2.37 to 2.54. Finally, the specific gravity of an alluvium sample was 2.7.

9.0 GROUND-WATER CONDITIONS

Ground-water levels were observed in all test borings at the time of drilling. The recorded ground-water levels are presented in Table 2. For safety reasons, the borings were backfilled promptly; consequently, long-term measurements of ground-water levels were not obtained in the borings.

Fluctuations in the ground-water level occur because of variation in rainfall, evaporation, construction activity, surface run-off, and other site-specific factors.

Table 3
Ground-Water Data

Boring Number	Ground Elevation (Feet msl)	Depth to Ground Water at Time of Drilling (Feet)	Ground-Water Elevation at Time of Drilling (Feet msl)
B-3	810.7	30.9	779.8
B-4	766.7	6.5	760.2
B-4A	775.0	7.5	767.5
B-5	804.2	7.5	796.7
B-6	808.1	22.5	785.6
B-7	811.8	30.0	781.8
B-8	785.3	17.5	767.8

Table 3
Ground-Water Data

Boring Number	Ground Elevation (Feet msl)	Depth to Ground Water at Time of Drilling (Feet)	Ground-Water Elevation at Time of Drilling (Feet msl)
B-9	764.9	7.0	757.9

Prepared/Date: HAB 2/23/05
Checked/Date: CDT 2/23/05

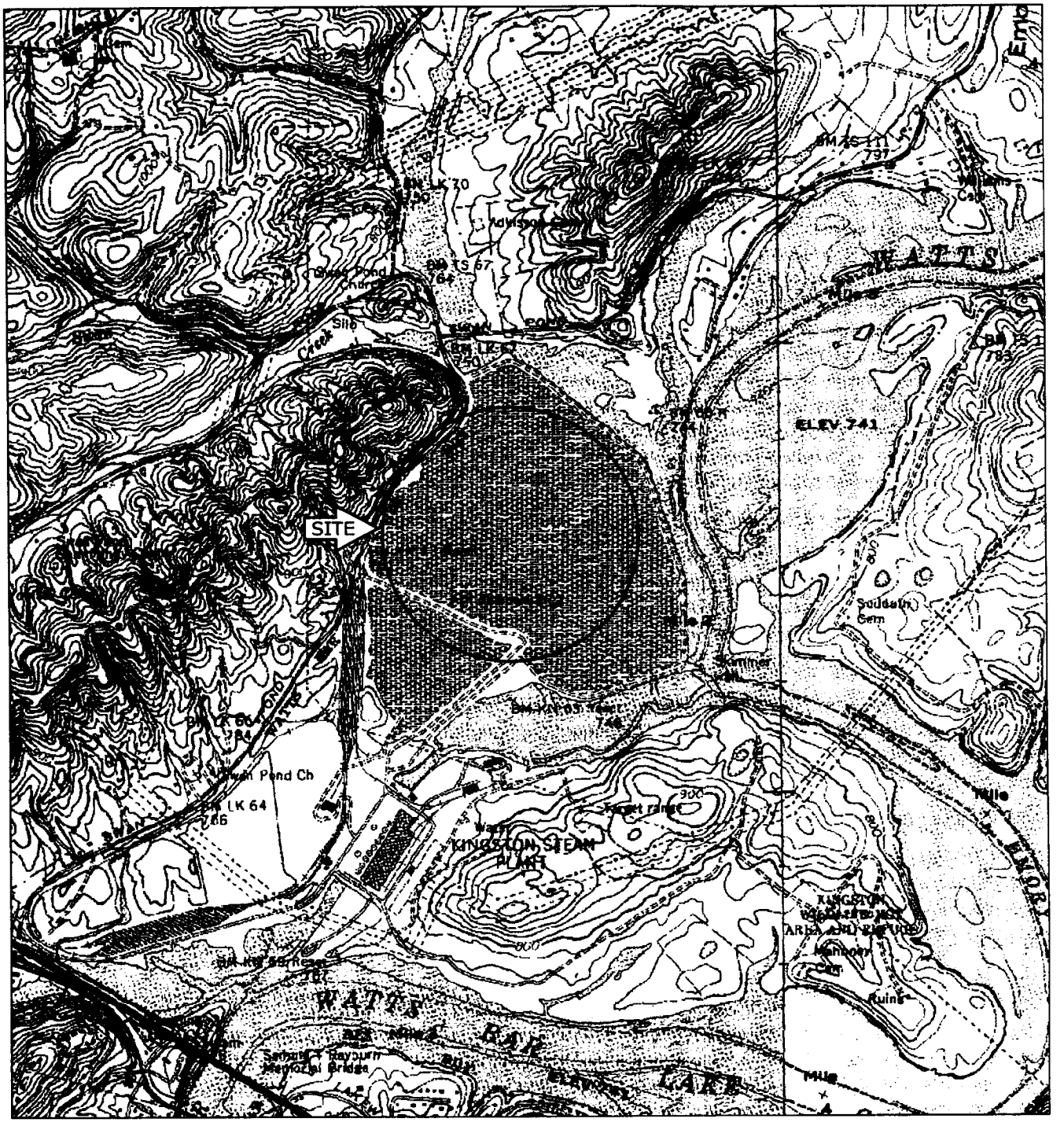
10.0 BASIS OF RESULTS

The results provided herein are based on the encountered subsurface conditions related to the specific project and site discussed in this report.

Regardless of the thoroughness of a field exploration, there is always a possibility that conditions between test locations will differ from those at specific test locations, and that conditions may not be anticipated. In addition, interpretation of the data is critical to the intended design and/or analysis. Therefore, experienced geotechnical engineer should interpret the field data and review any site-specific analysis or design that incorporates the field data. We recommend that TVA retain MACTEC to provide this service, based upon our familiarity with the subsurface conditions, the field and laboratory data, and our geotechnical experience.

Our exploration services include storing the collected samples and making them available for inspection for a period of 30 days. The samples are then discarded unless you request otherwise.

FIGURES



SOURCE: USGS TOPOGRAPHIC MAPS OF HARRIMAN AND ELVERTON, TN QUADRANGLES

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1725 Louisville Drive
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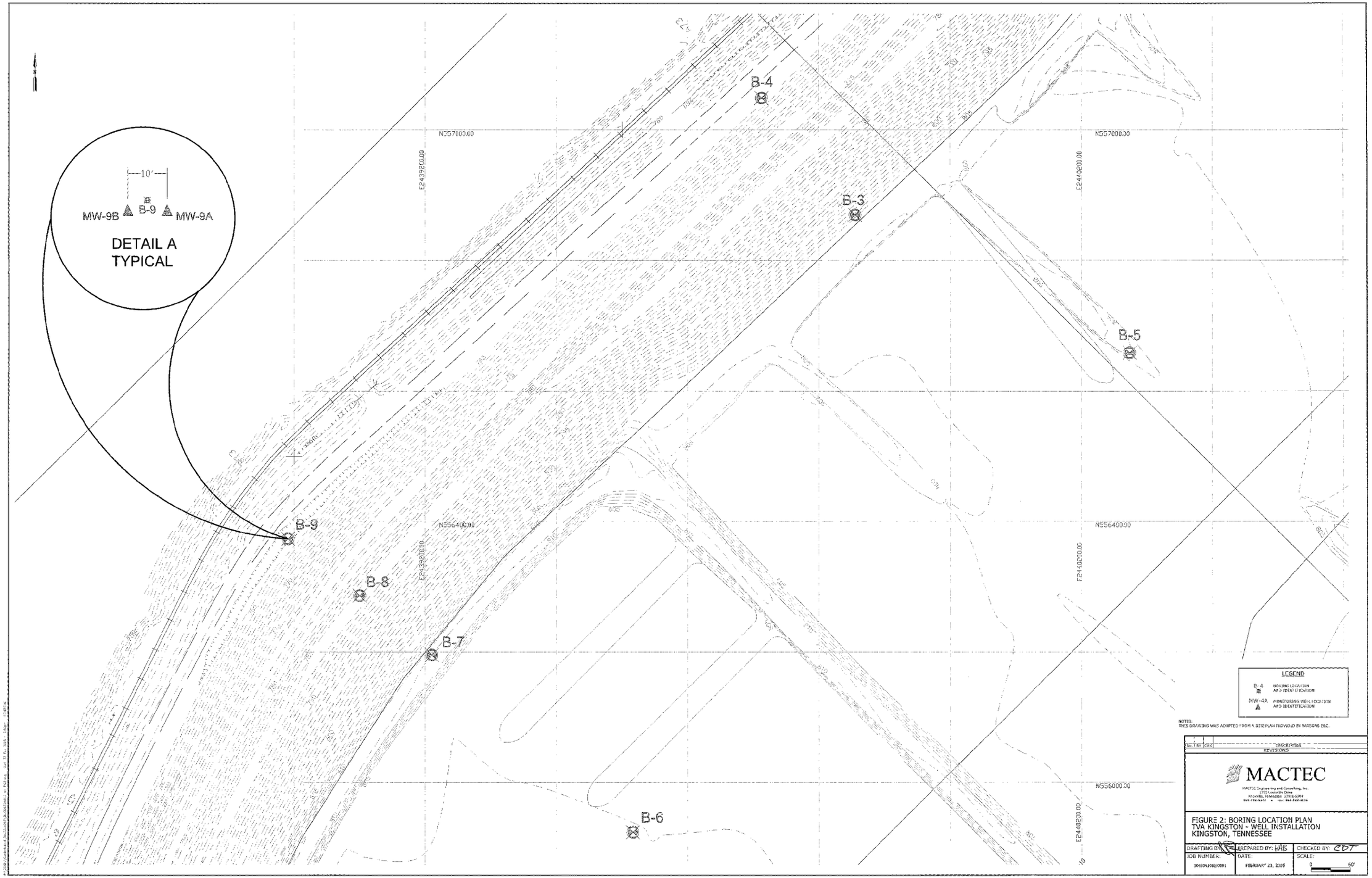
FIGURE 1: SITE LOCATION MAP
TENNESSEE VALLEY AUTHORITY
KINGSTON FOSSIL PLANT - ASH DISPOSAL AREA
KINGSTON, TENNESSEE

DRAFTING BY:	PREPARED BY: HAB	CHECKED BY: CNT
JOB NUMBER: 3043041063/0001	DATE: JANUARY 14, 2005	SCALE: 0 2000'

COORDINATES: N XX°XX'XX" W XX°XX'XX"

3043041009_01_FIG1.dwg Fri, 14 Jan 2005 - 3:34pm reverenc


10'
MW-9B
B-9
MW-9A
DETAIL A
TYPICAL
B-4
B-3
B-5
B-9
B-8
B-7
B-6
N557000.00
N556400.00
N556000.00
E2439600.00
E2439200.00
E2440200.00
E2440600.00
E2440800.00
LEGEND
B-4 BORING LOCATION AND IDENTIFICATION
MW-4A MONITORING WELL LOCATION AND IDENTIFICATION
NOTES:
THIS DRAWING WAS ADAPTED FROM A SITE PLAN PROVIDED BY PARSONS E&C.
NO. BY CHK DESCRIPTION
REVISIONS
MACTEC
MACTEC Engineering and Consulting, Inc.
5715 Lousville Drive
Knoxville, Tennessee 37918-6304
FIGURE 2: BORING LOCATION PLAN
TVA KINGSTON - WELL INSTALLATION
KINGSTON, TENNESSEE
DRAFTING BY:
PREPARED BY: WAS
CHECKED BY: CDT
JOB NUMBER: 3693941053/0001
DATE: FEBRUARY 23, 2005
SCALE: 0 60'

APPENDIX A

FIELD EXPLORATORY PROCEDURES

FIELD EXPLORATORY PROCEDURES

Soil Test Boring

All boring and sampling operations were conducted in general accordance with ASTM D 1586. The borings were advanced using either steel hollow-stem augers or fluid-rotary drilling techniques.

At regular intervals, soil samples were obtained with a standard 1.4-inch I.D., 2-inch O.D., split-tube sampler. The sampler was first seated six inches to penetrate any loose cuttings and then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot of penetration was recorded and is designated the "standard penetration resistance (SPT)". Proper evaluation of the penetration resistance provides an index to the soil's strength, density, and ability to support foundations.

Representative portions of the soil samples obtained from the split-tube sampler were sealed in glass jars and transported to our laboratory, where they were examined by our engineer to verify the driller's field classifications. Test Boring Records are attached, graphically showing the soil descriptions and penetration resistances.

Boring Backfill

The borings were backfilled with cement grout in the alluvium/residuum interval and then with ash cuttings to the ground surface. The owner is advised that, even with this backfill technique, there is the possibility of future borehole subsidence depending on actual subsurface conditions, surface drainage, etc. The property owner should monitor the boring locations over time to discover subsidence and make the necessary repairs.

APPENDIX B

KEY TO SYMBOLS AND DESCRIPTIONS

TEST BORING RECORDS

GROUP SYMBOLS	TYPICAL NAMES	GROUP SYMBOLS	TYPICAL NAMES
	TOPSOIL		**CONCRETE**
	ASPHALT		**DOLOMITE**
	COAL		**LIMESTONE**
	FILL		**SHALE**
	SUBSOIL		**LIMESTONE/SHALE**- Limestone with shale interbeds
	ALLUVIUM		**SANDSTONE**
	ASH		**SILTSTONE**
	RESIDUUM- Soft to firm		**AUGER BORING**
	RESIDUUM- Stiff to very hard		**UNDISTURBED SAMPLE ATTEMPT**

	Undisturbed Sample 1.5-2.0 = Recovered (ft) / Pushed (ft)		
	Split Spoon Sample		Auger Cuttings
	Rock Core 60-100 = RQD / Recovery		Dilatometer
	No Sample		Crandall Sampler
	Rotary Drill		Pressure Meter
▽	Water Table at time of drilling	○	No Recovery
		▼	Water Table after 24 hours

Correlation of Penetration Resistance with Relative Density and Consistency

SAND & GRAVEL		SILT & CLAY	
No. of Blows	Relative Density	No. of Blows	Consistency
0 - 4	Very Loose	0 - 2	Very Soft
5 - 10	Loose	3 - 4	Soft
11 - 20	Firm	5 - 8	Firm
21 - 30	Very Firm	9 - 15	Stiff
31 - 50	Dense	16 - 30	Very Stiff
Over 50	Very Dense	31 - 50	Hard
		Over 50	Very Hard

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

No.200 No.40 No.10 No.4 3/4" 3" 12"

U.S. STANDARD SIEVE SIZE

Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

KEY TO SYMBOLS AND DESCRIPTIONS

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DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	LEGEND	ELEV (ft)	SAMPLES IDENT	SAMPLES TYPE	SAMPLES N-COUNT 1st 6" 2nd 6" 3rd 6"	PL (%) NM (%) LL (%) ▲ FINES (%) ● SPT (bpf) 10 20 30 40 50 60 70 80 90 100
0	SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.		810.7				
	FLUID ROTARY DRILLING FROM 0.0' TO 69.0'; BEGAN SPLIT-SPOON SAMPLING AT 69.0'						
5			805.7				
10			800.7				
15			795.7				
20			790.7				
25			785.7				
30	NOTE: DRILLER REPORTED FLUID LOSS AT ABOUT 30.0'		780.7				
35			775.7				
40			770.7				
45			765.7				0 10 20 30 40 50 60 70 80 90 100

SOIL 3043041063 01.GPJ LAW_GIBB.GDT 2/15/05

REMARKS: Standard Penetration Resistance testing performed using a manual hammer. The ground surface elevation was based on the ground surface elevation of adjacent monitoring wells as provided by Parsons, E&C. The soil description (clay, silt, an sand) given to the ash samples was based on particle size.

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : R. Banks
Prepared By: Justice
Checked By:H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 14, 2005 **BORING NO.:** B-3

PROJ. NO.: 3043041063/0001 **PAGE 1 OF 3**

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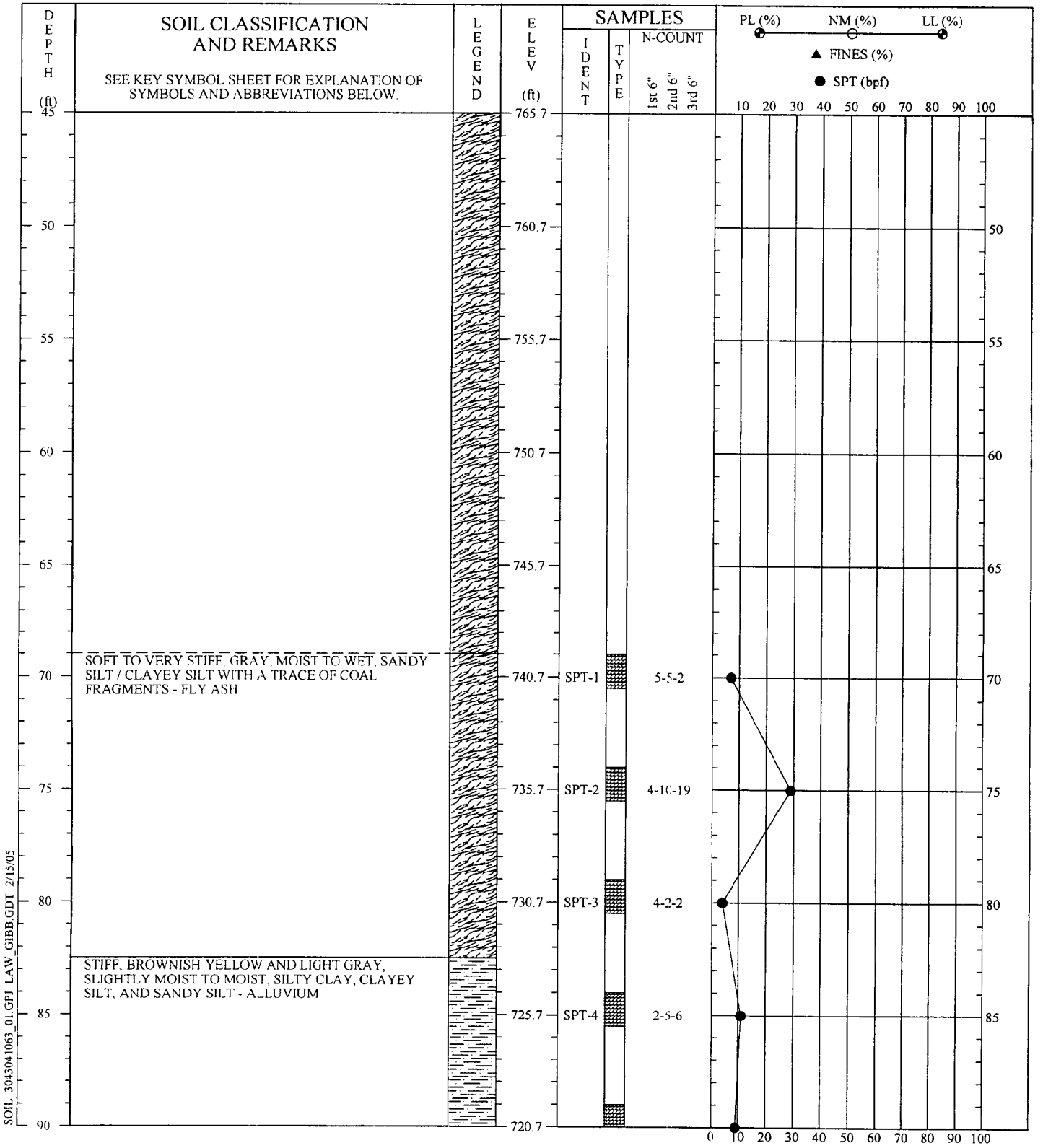

REMARKS: Standard Penetration Resistance testing performed using a manual hammer. The ground surface elevation was based on the ground surface elevation of adjacent monitoring wells as provided by Parsons, E&C. The soil description (clay, silt, an sand) given to the ash samples was based on particle size.

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Driller : R. Banks	
Prepared By: Justice	
Checked By:H.A.B.	

SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 14, 2005 **BORING NO.:** B-3

PROJ. NO.: 3043041063/0001 **PAGE** 2 **OF** 3

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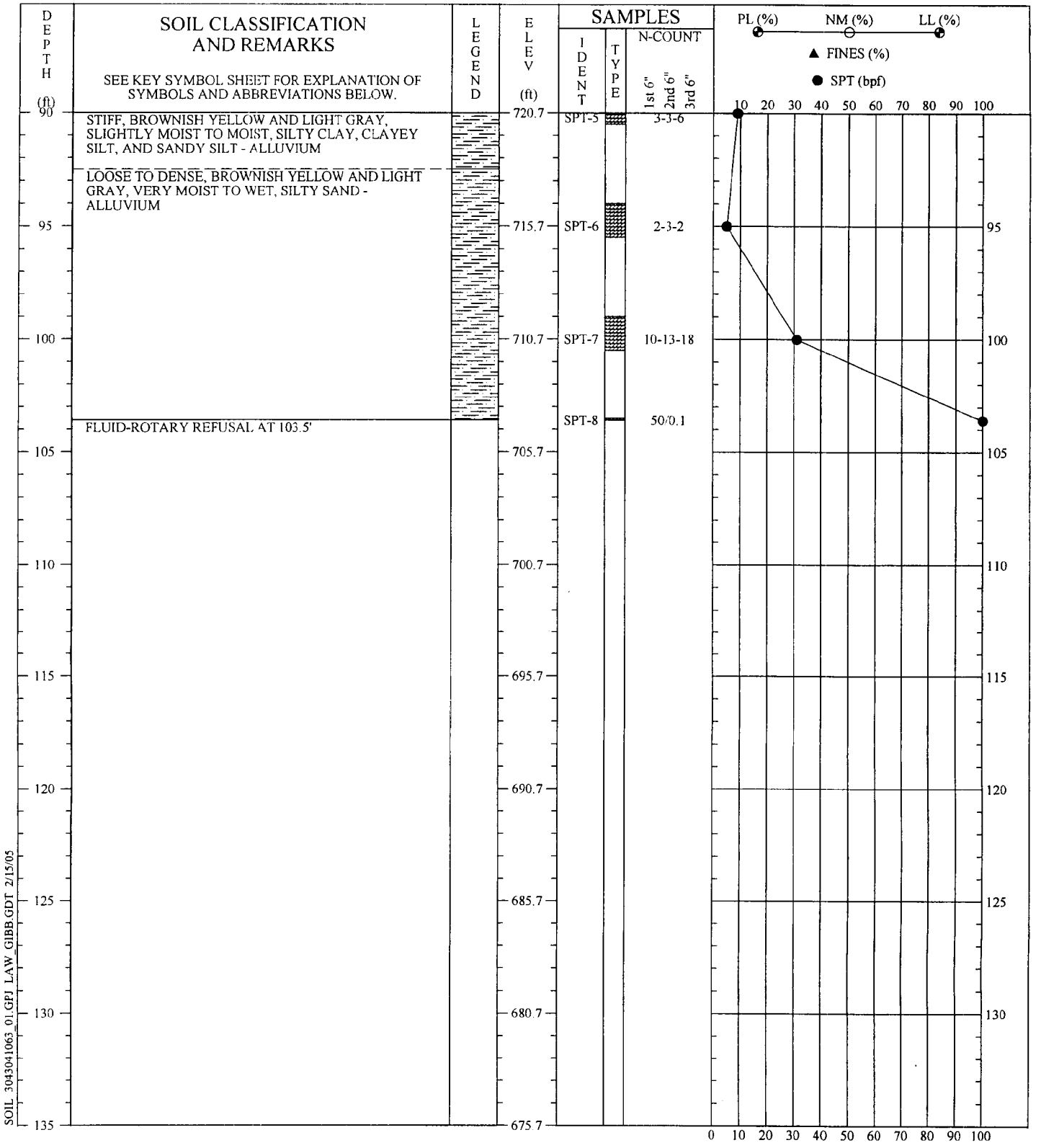

SOIL 3043041063_01.GPJ LAW_GIBB.GDT 2/15/05

REMARKS: Standard Penetration Resistance testing performed using a manual hammer. The ground surface elevation was based on the ground surface elevation of adjacent monitoring wells as provided by Parsons, E&C. The soil description (clay, silt, an sand) given to the ash samples was based on particle size.

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Driller :	R. Banks
Prepared By:	Justice
Checked By:	H.A.B.

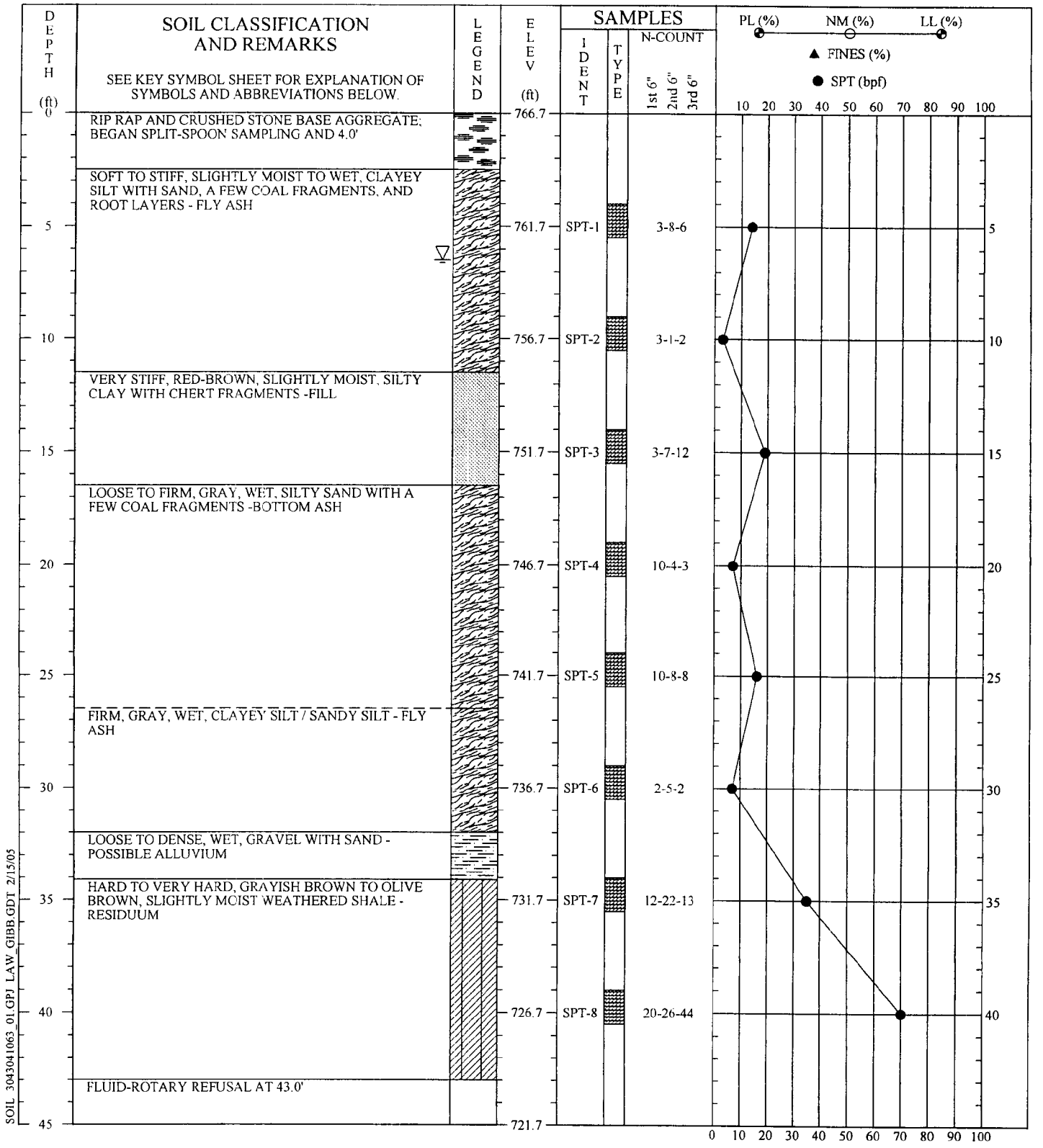
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 14, 2005 **BORING NO.:** B-3

PROJ. NO.: 3043041063/0001 **PAGE 3 OF 3**

MACTEC



REMARKS: Standard penetration resistance testing performed using a manual hammer. The ground surface elevation was based on the ground surface elevation of adjacent monitoring wells as provided by Parsons, E&C. The soil description (clay, silt, an sand) given to the ash samples was based on particle size.

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Driller : R. Banks	
Prepared By: Justice	
Checked By:H.A.B.	

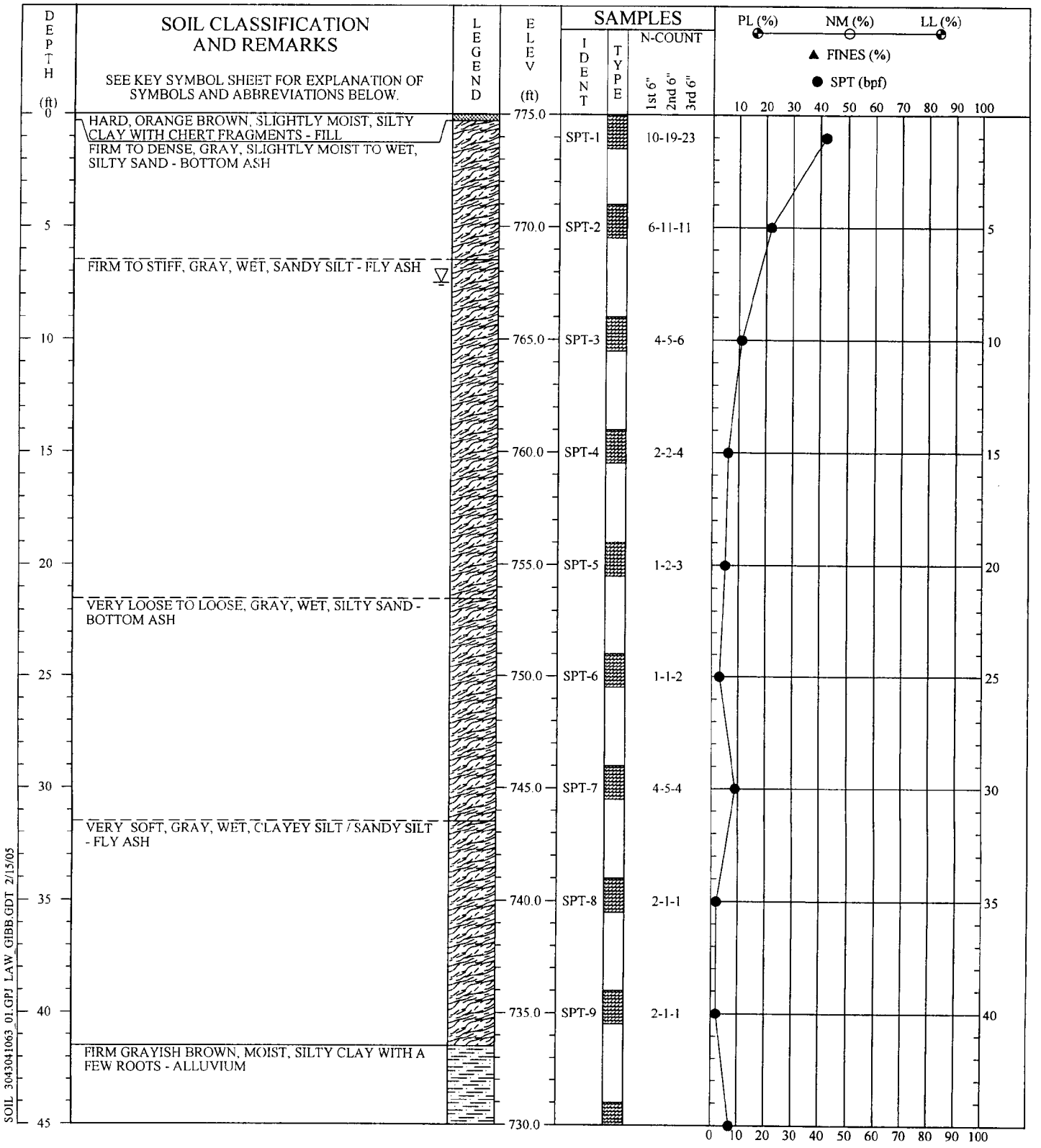
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 17, 2005 **BORING NO.:** B-4

PROJ. NO.: 3043041063/0001 **PAGE** 1 **OF** 1

MACTEC



SOIL 3043041063_01.GPJ LAW_GIBB.GDT 2/15/05

REMARKS: Standard penetration resistance testing performed using a manual hammer. The ground surface elevation was estimated based on the contour line intervals. The soil description (clay, silt, an sand) given to the ash samples was based on particle size.

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Driller : R. Banks
Prepared By: Justice
Checked By:H.A.B.

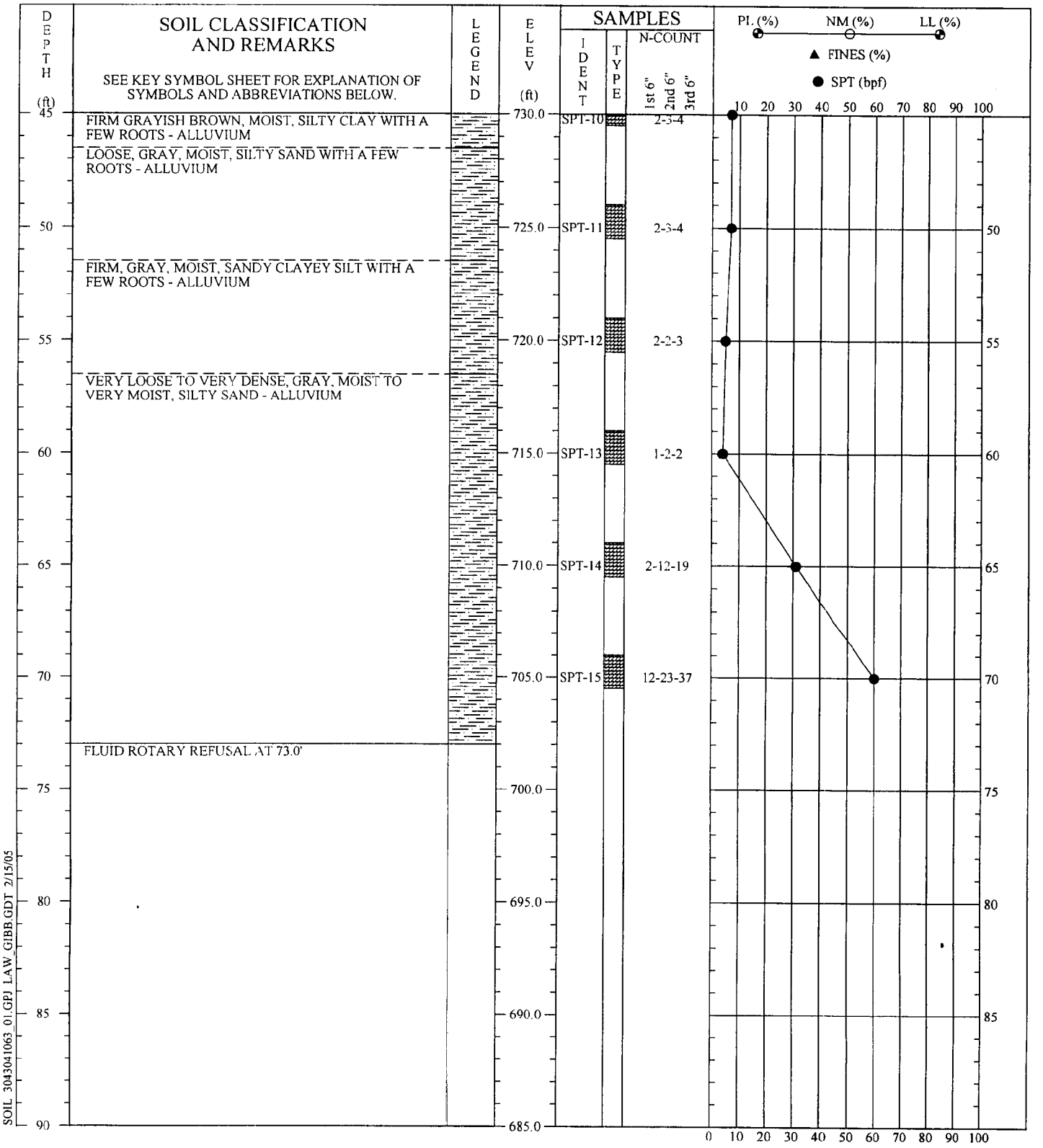
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 12, 2005 **BORING NO.:** B-4A

PROJ. NO.: 3043041063/0001 **PAGE** 1 **OF** 2

MACTEC



SOIL_3043041063_01.GPJ LAW_GIBB.GDT 2/15/05

REMARKS: Standard penetration resistance testing performed using a manual hammer. The ground surface elevation was estimated based on the contour line intervals. The soil description (clay, silt, an sand) given to the ash samples was based on particle size.

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Driller :	R. Banks
Prepared By:	Justice
Checked By:	H.A.B.

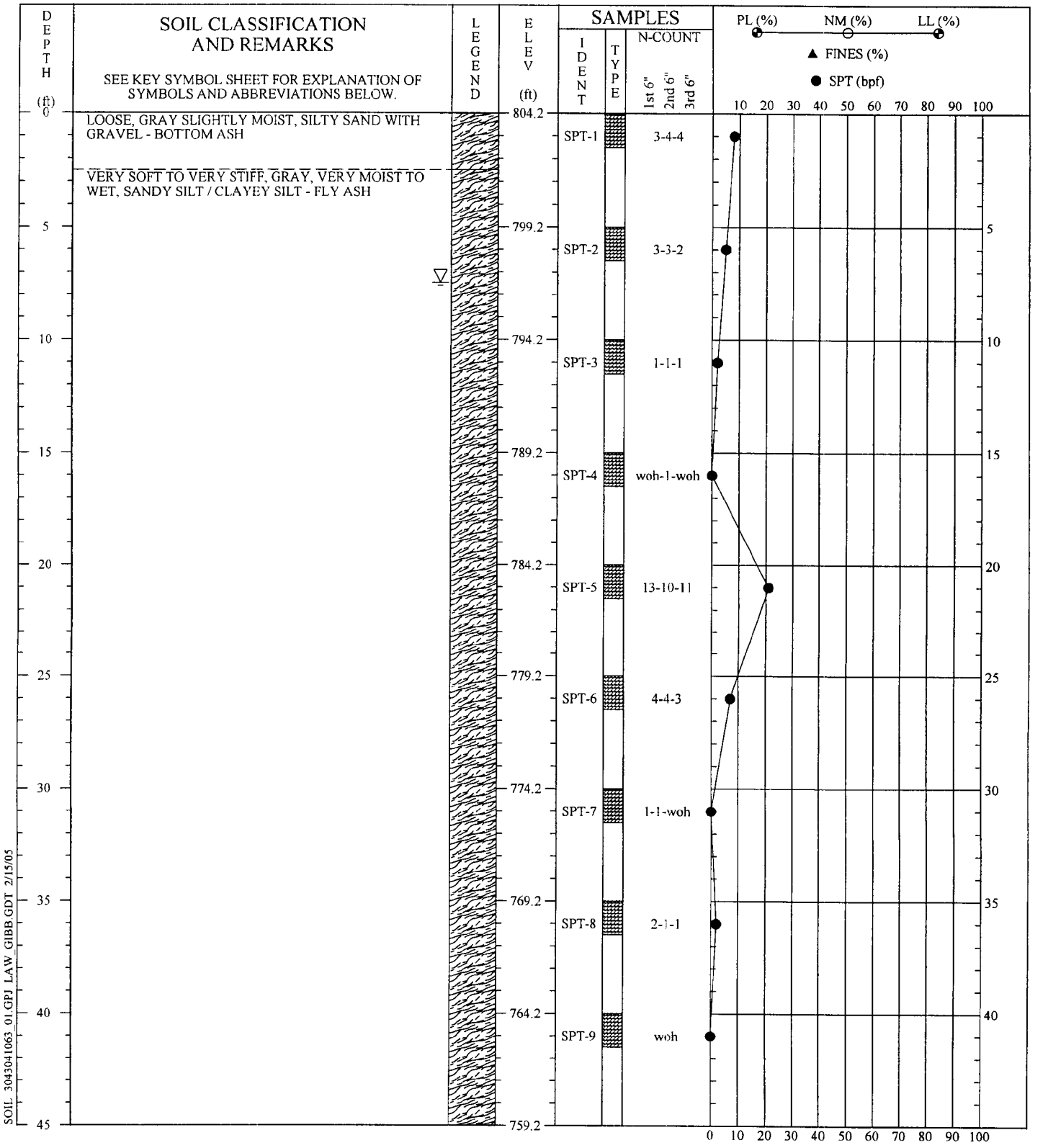
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 12, 2005 **BORING NO.:** B-4A

PROJ. NO.: 3043041063/0001 **PAGE** 2 **OF** 2

MACTEC



REMARKS: Standard penetration resistance testing performed using an automatic hammer. The ground surface elevation was based on the ground surface elevation of adjacent monitoring wells as provided by Parsons, E&C. The soil description (clay, silt, an sand) given to the ash samples was based on particle size.

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Driller :	Warren
Prepared By:	Justice
Checked By:	H.A.B.

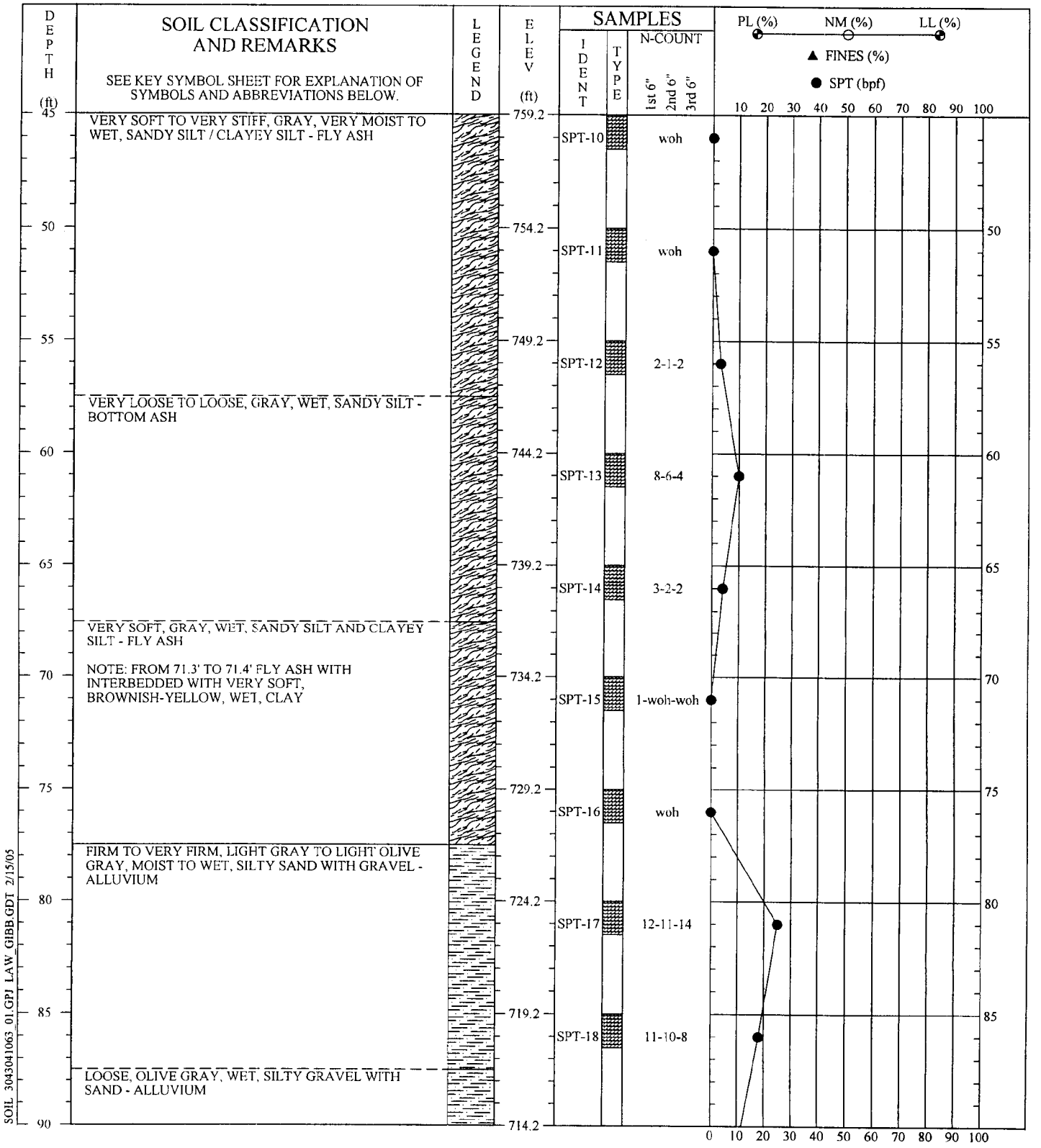
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 6, 2005 **BORING NO.:** B-5

PROJ. NO.: 3043041063/0001 **PAGE 1 OF 3**

MACTEC



REMARKS: Standard penetration resistance testing performed using an automatic hammer. The ground surface elevation was based on the ground surface elevation of adjacent monitoring wells as provided by Parsons, E&C. The soil description (clay, silt, an sand) given to the ash samples was based on particle size

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Driller :	Warren
Prepared By:	Justice
Checked By:	H.A.B.

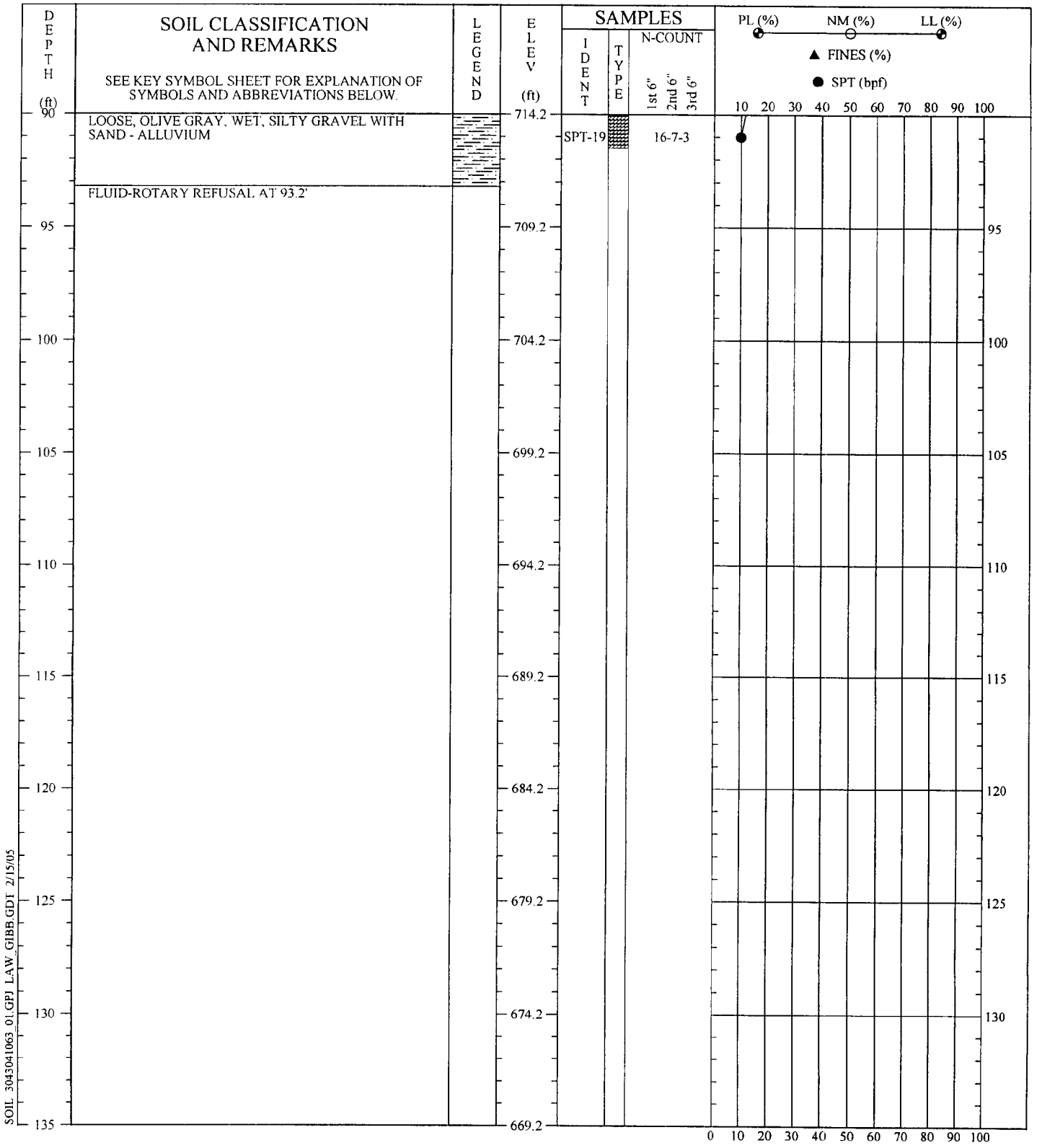
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 6, 2005 **BORING NO.:** B-5

PROJ. NO.: 3043041063/0001 **PAGE 2 OF 3**

MACTEC



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Driller :	Warren
Prepared By:	Justice
Checked By:	H.A.B.

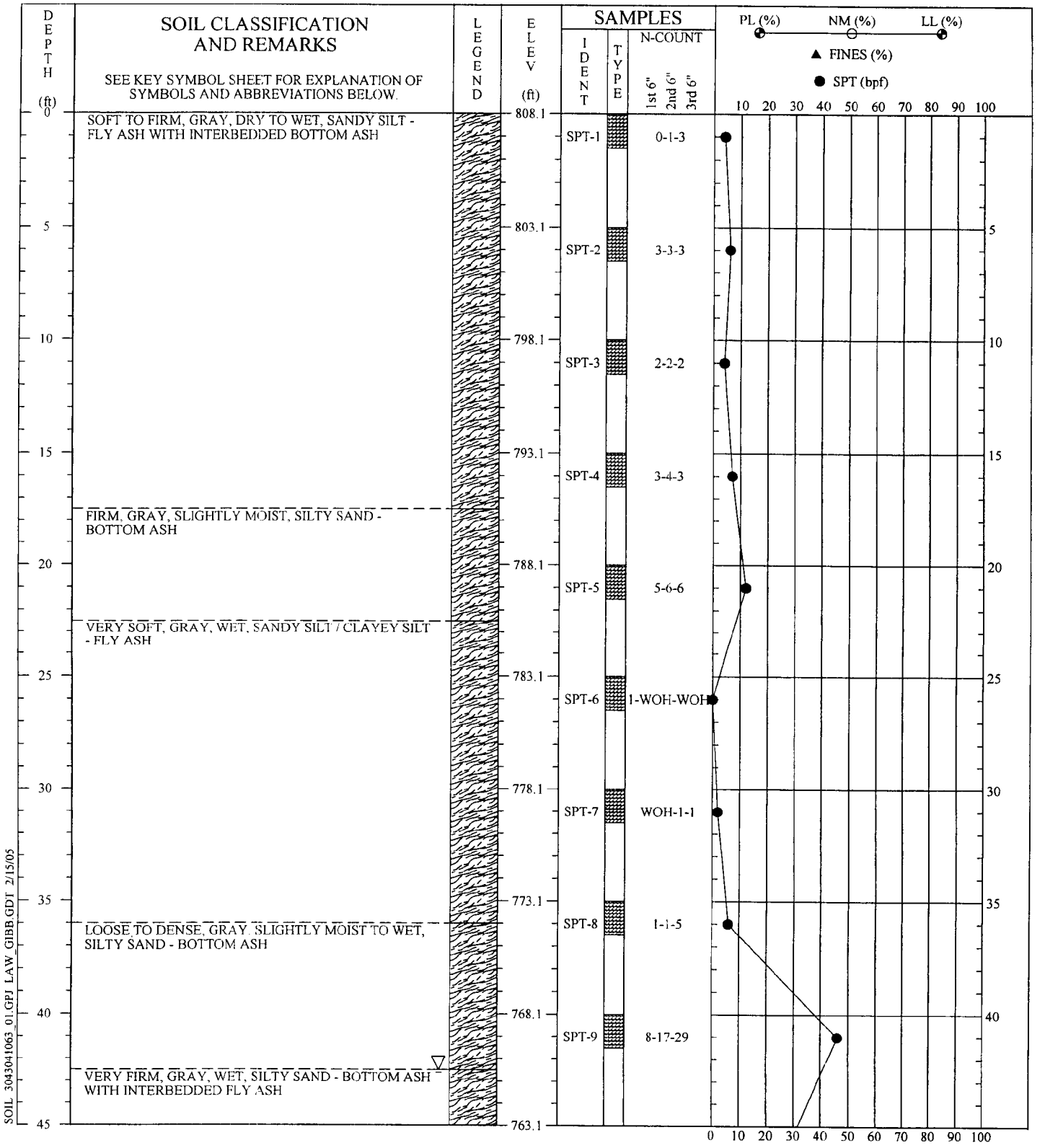
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 6, 2005 **BORING NO.:** B-5

PROJ. NO.: 3043041063/0001 **PAGE** 3 **OF** 3

MACTEC



SOIL 3043041063_01.GPJ LAW_GIBB.GDT 2/15/05

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Driller :	Warren
Prepared By:	Justice
Checked By:	H.A.B.

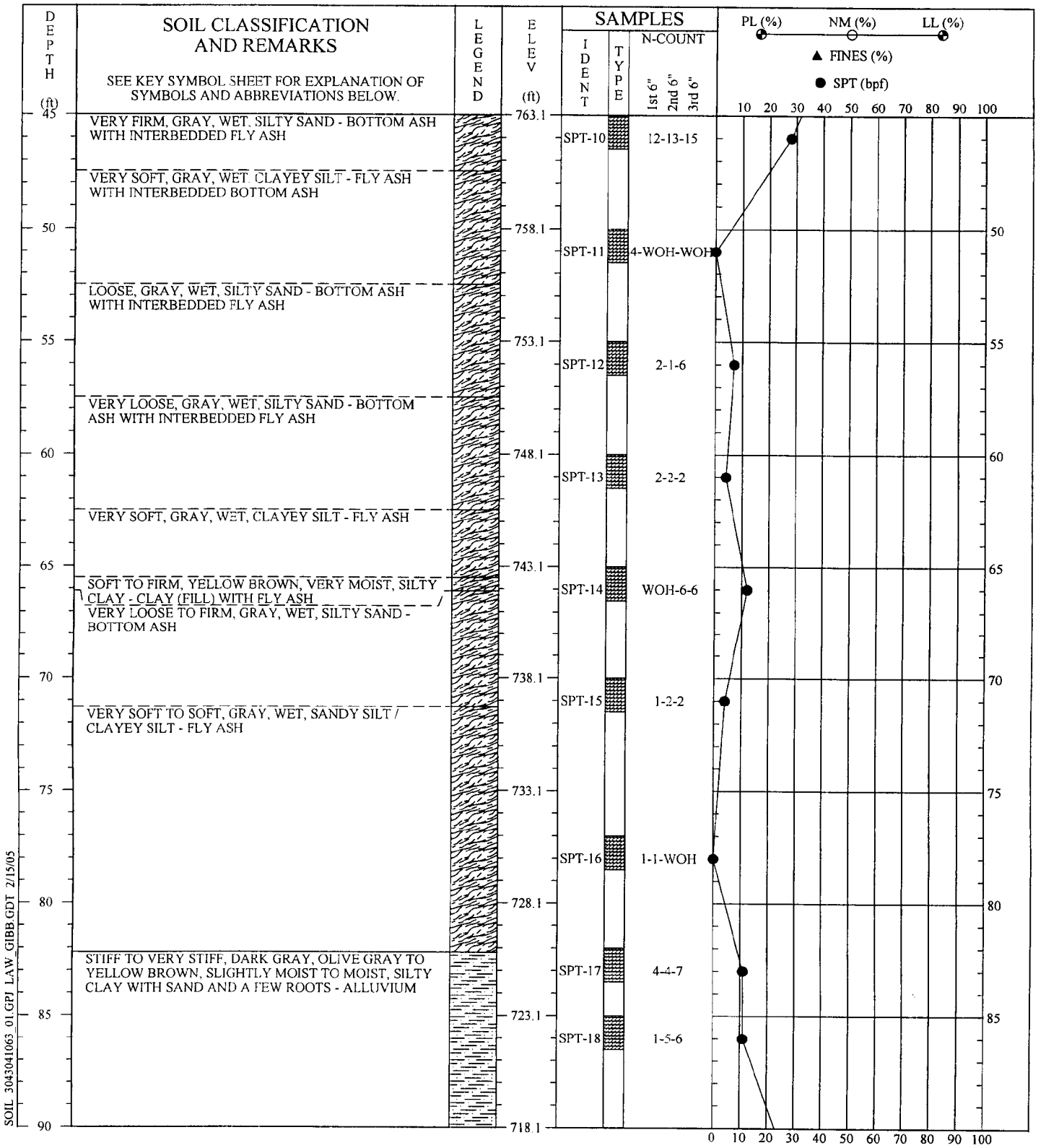
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 10, 2005 **BORING NO.:** B-6

PROJ. NO.: 3043041063/0001 **PAGE** 1 **OF** 3

MACTEC



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Driller :	Warren
Prepared By:	Justice
Checked By:	H.A.B.

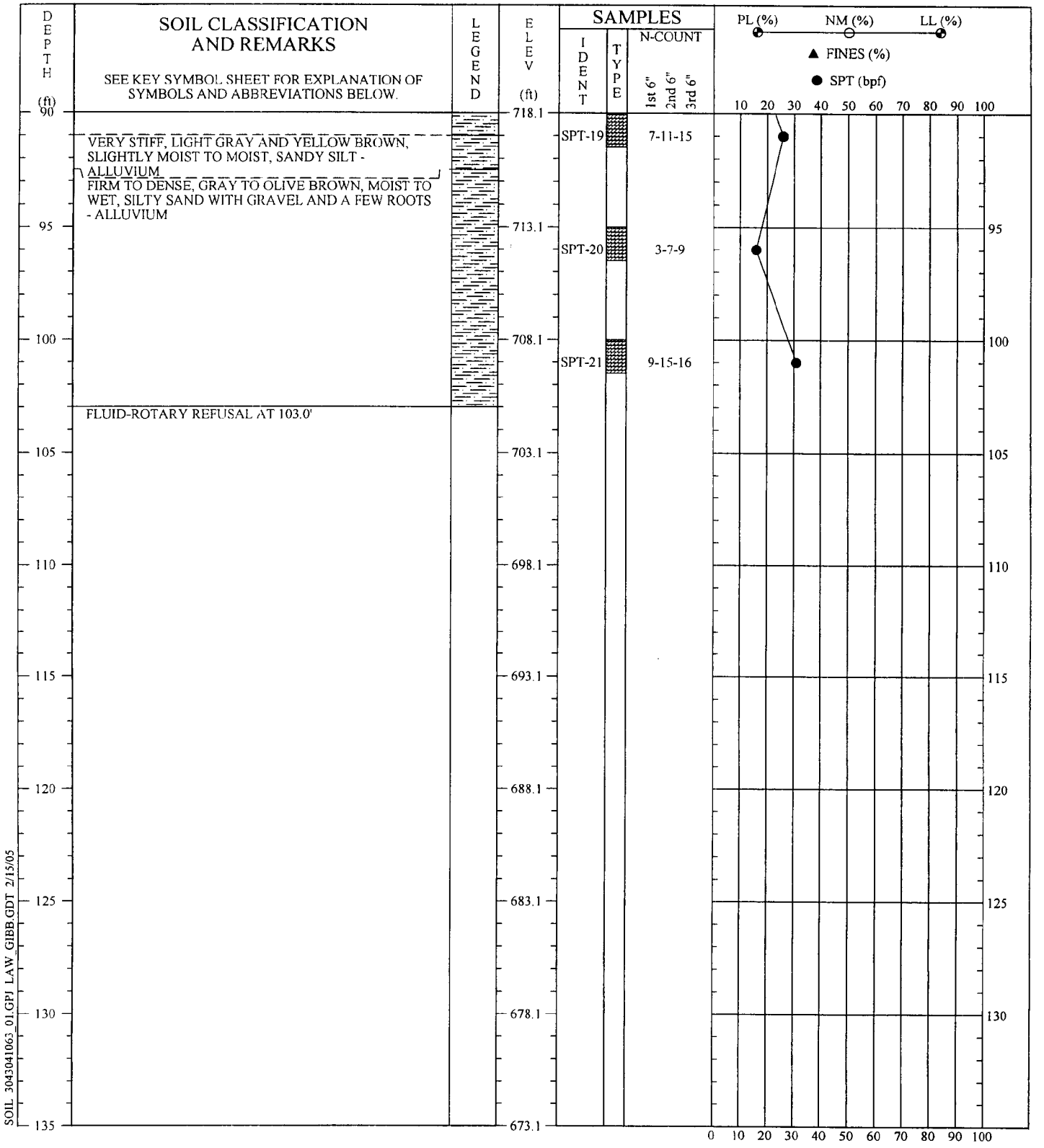
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 10, 2005 **BORING NO.:** B-6

PROJ. NO.: 3043041063/0001 **PAGE** 2 **OF** 3

MACTEC



SOIL 3043041063_01.GPJ LAW_GIBB.GDT 2/15/05

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Driller :	Warren
Prepared By:	Justice
Checked By:	H.A.B.

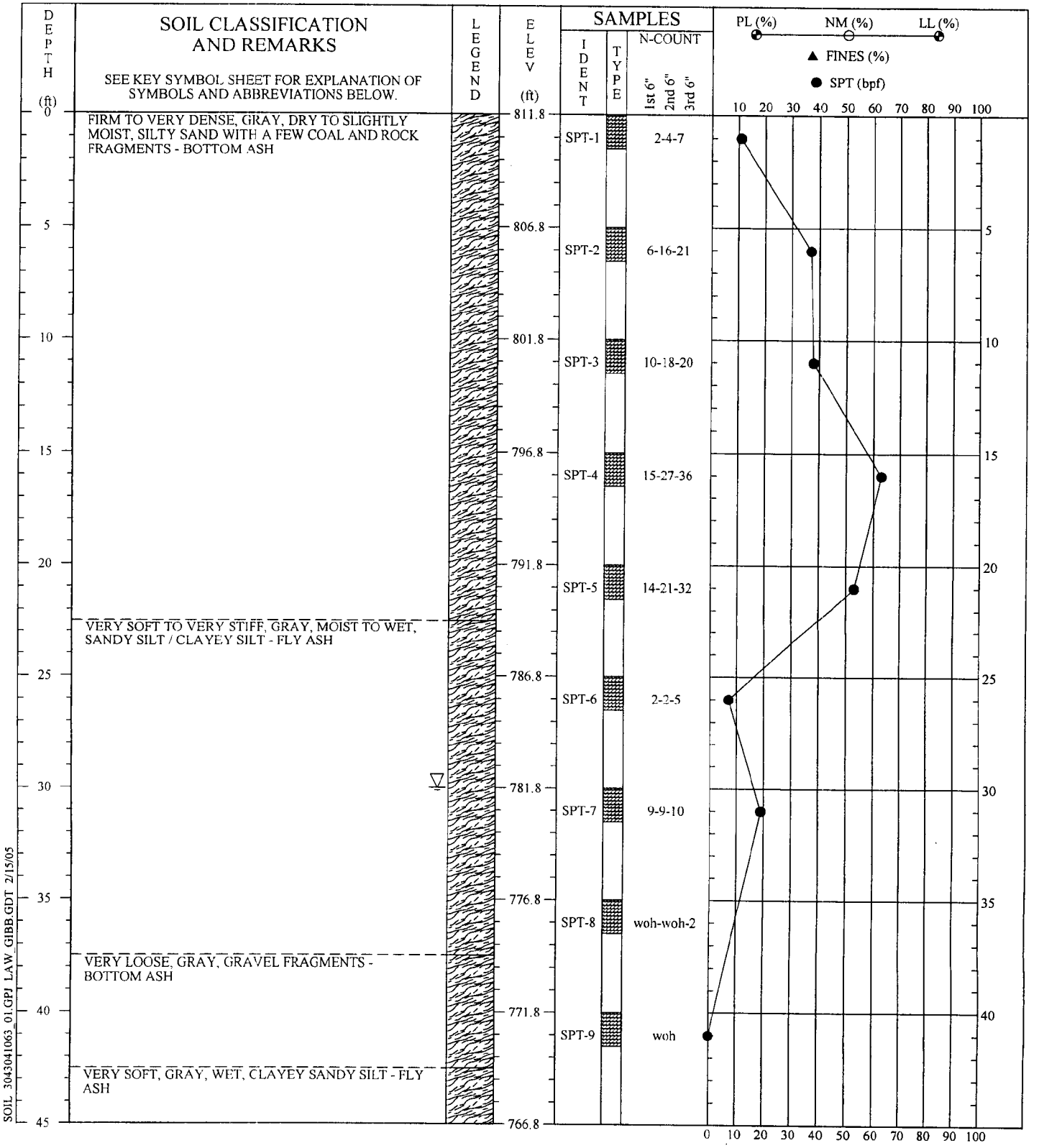
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 10, 2005 **BORING NO.:** B-6

PROJ. NO.: 3043041063/0001 **PAGE** 3 **OF** 3

MACTEC



SOIL 3043041063_01.GPJ LAW_GIBB.GDT 2/15/05

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Driller :	Warren
Prepared By:	Justice
Checked By:	H.A.B.

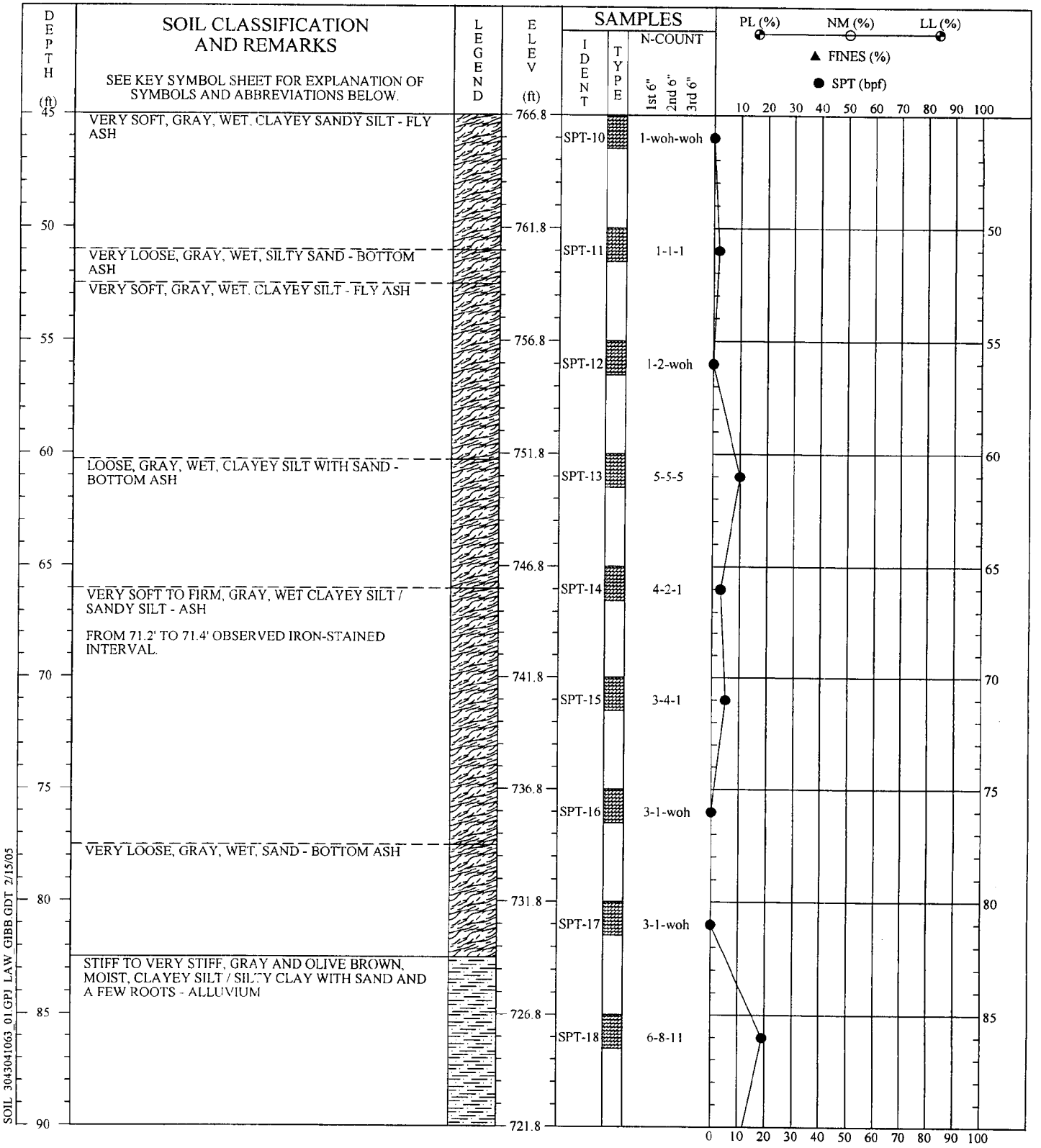
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 4, 2005 **BORING NO.:** B-7

PROJ. NO.: 3043041063/0001 **PAGE** 1 **OF** 3

MACTEC



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Driller : Warren
Prepared By: Justice
Checked By:H.A.B.

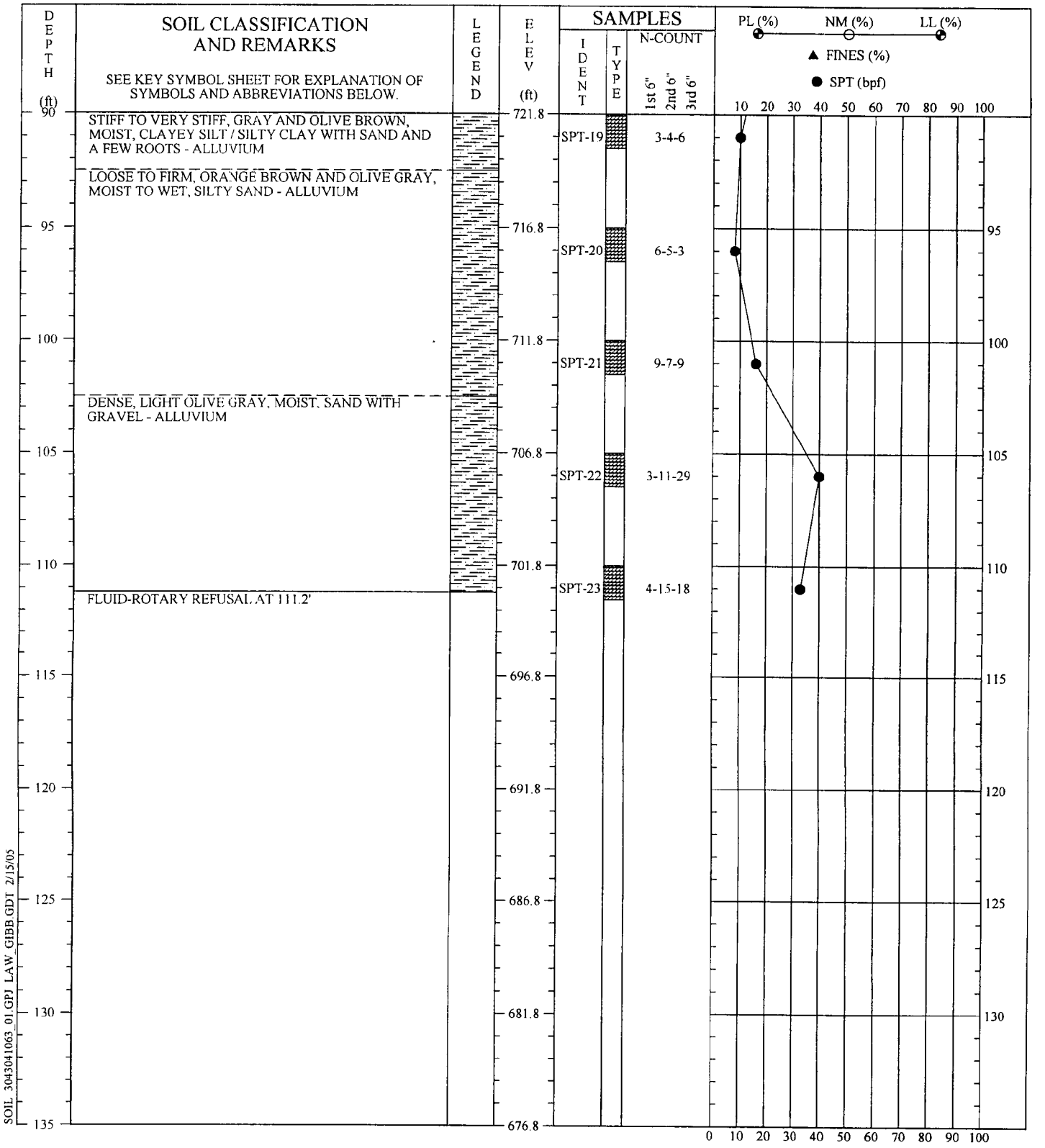
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 4, 2005 **BORING NO.:** B-7

PROJ. NO.: 3043041063/0001 **PAGE 2 OF 3**

MACTEC



SOIL 3043041063_01.GPJ LAW_GIBB.GDT 2/15/05

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Driller :	Warren
Prepared By:	Justice
Checked By:	H.A.B.

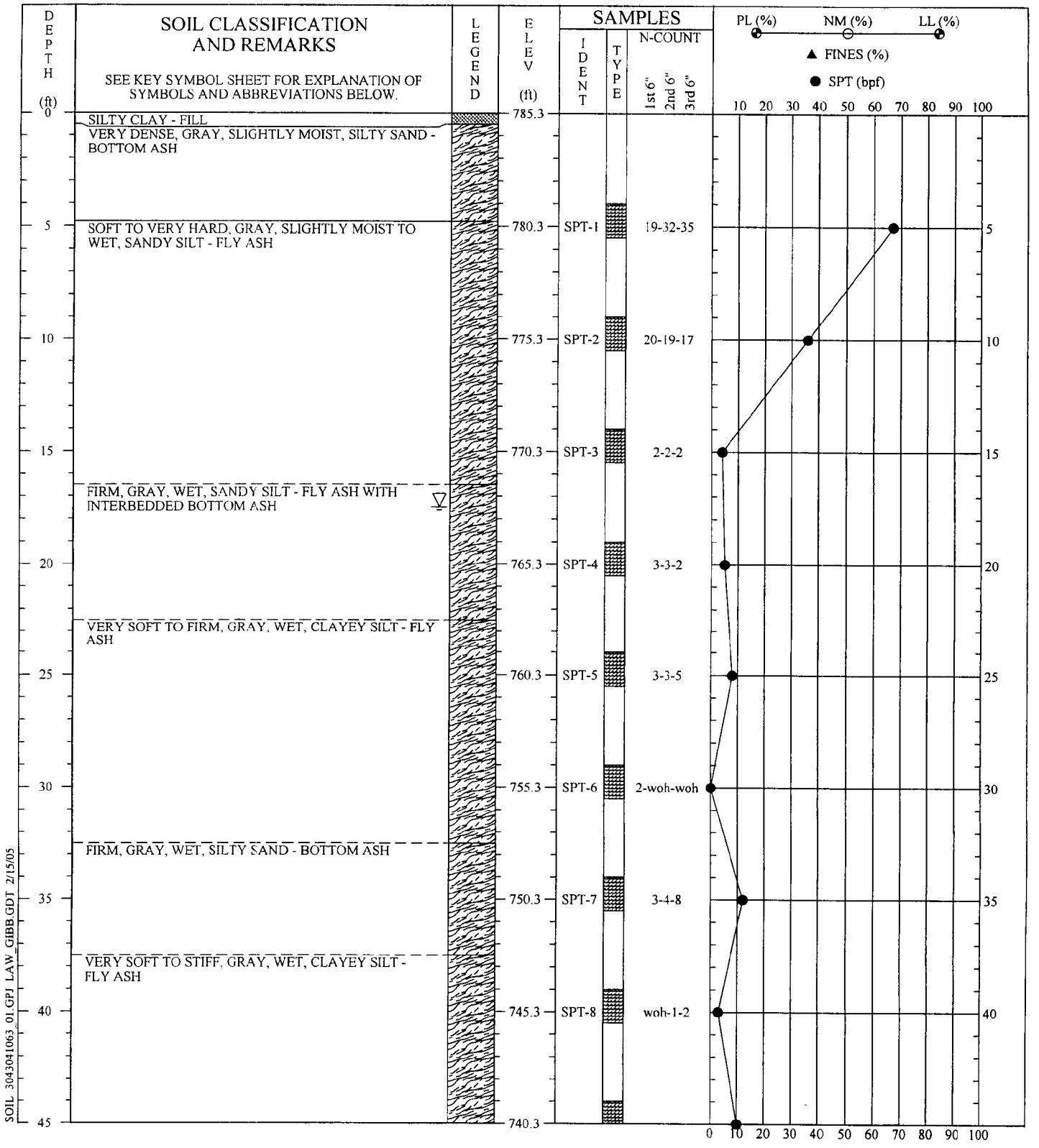
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 4, 2005 **BORING NO.:** B-7

PROJ. NO.: 3043041063/0001 **PAGE** 3 **OF** 3

MACTEC



SOIL 3043041063_01.GPJ LAW_GIBB.GDT 2/15/05

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Driller : R. Banks	
Prepared By: Mason	
Checked By:H.A.B.	

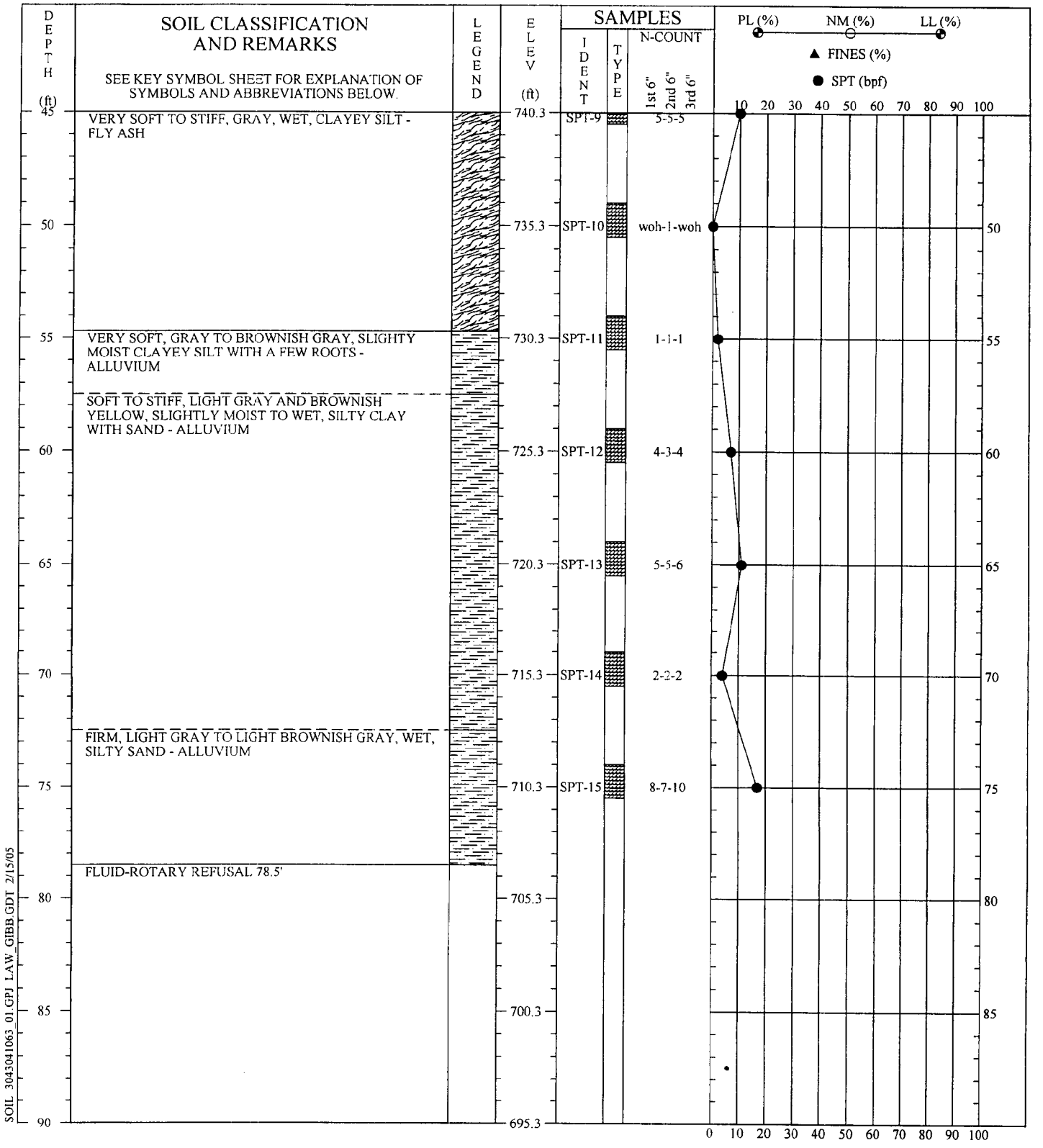
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 11, 2005 **BORING NO.:** B-8

PROJ. NO.: 3043041063/0001 **PAGE** 1 **OF** 2

MACTEC



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Driller :	R. Banks
Prepared By:	Mason
Checked By:	H.A.B.

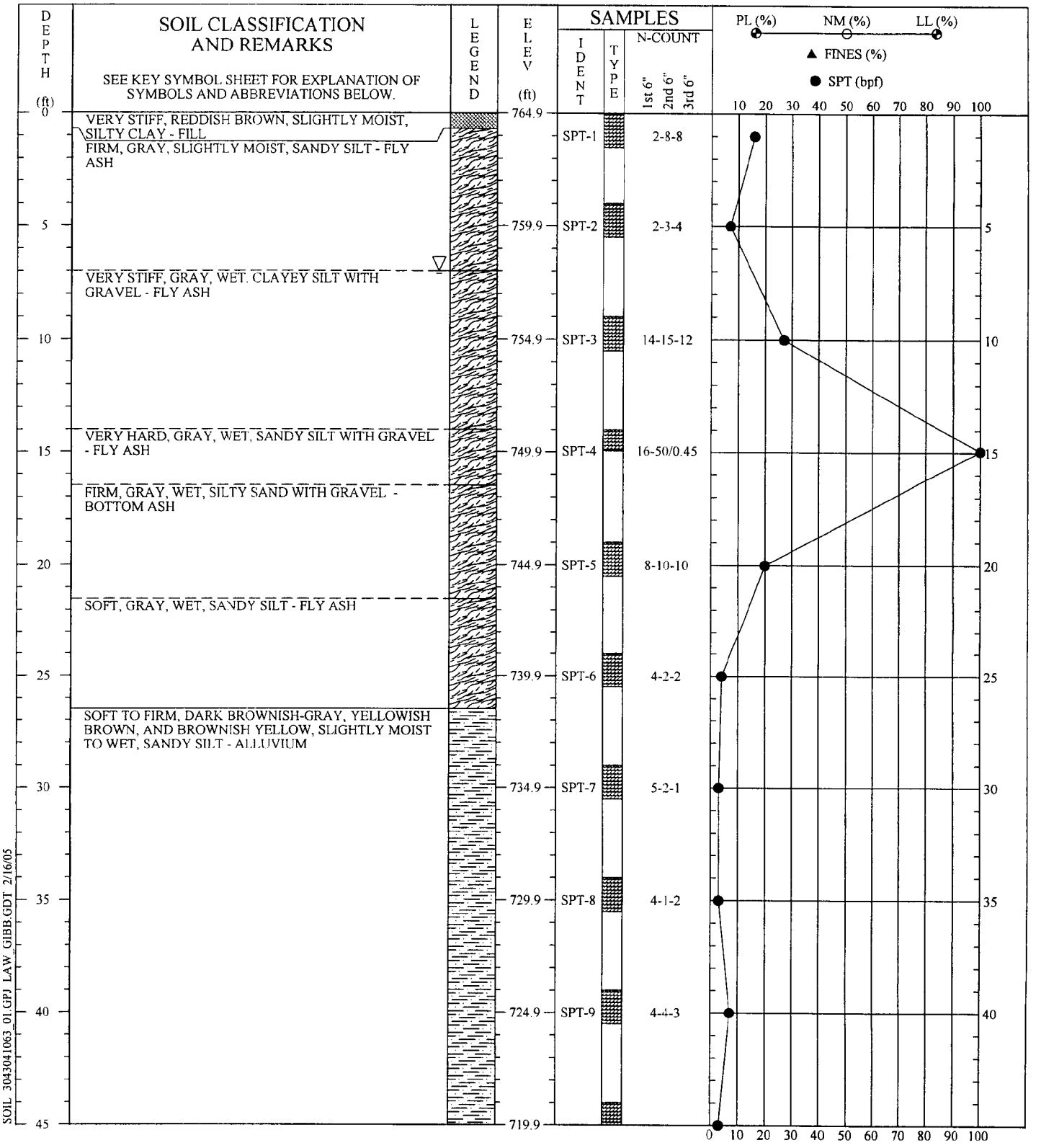
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 11, 2005 **BORING NO.:** B-8

PROJ. NO.: 3043041063/0001 **PAGE 2 OF 2**

MACTEC



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Driller :	R. Banks
Prepared By:	Mason
Checked By:	H.A.B.

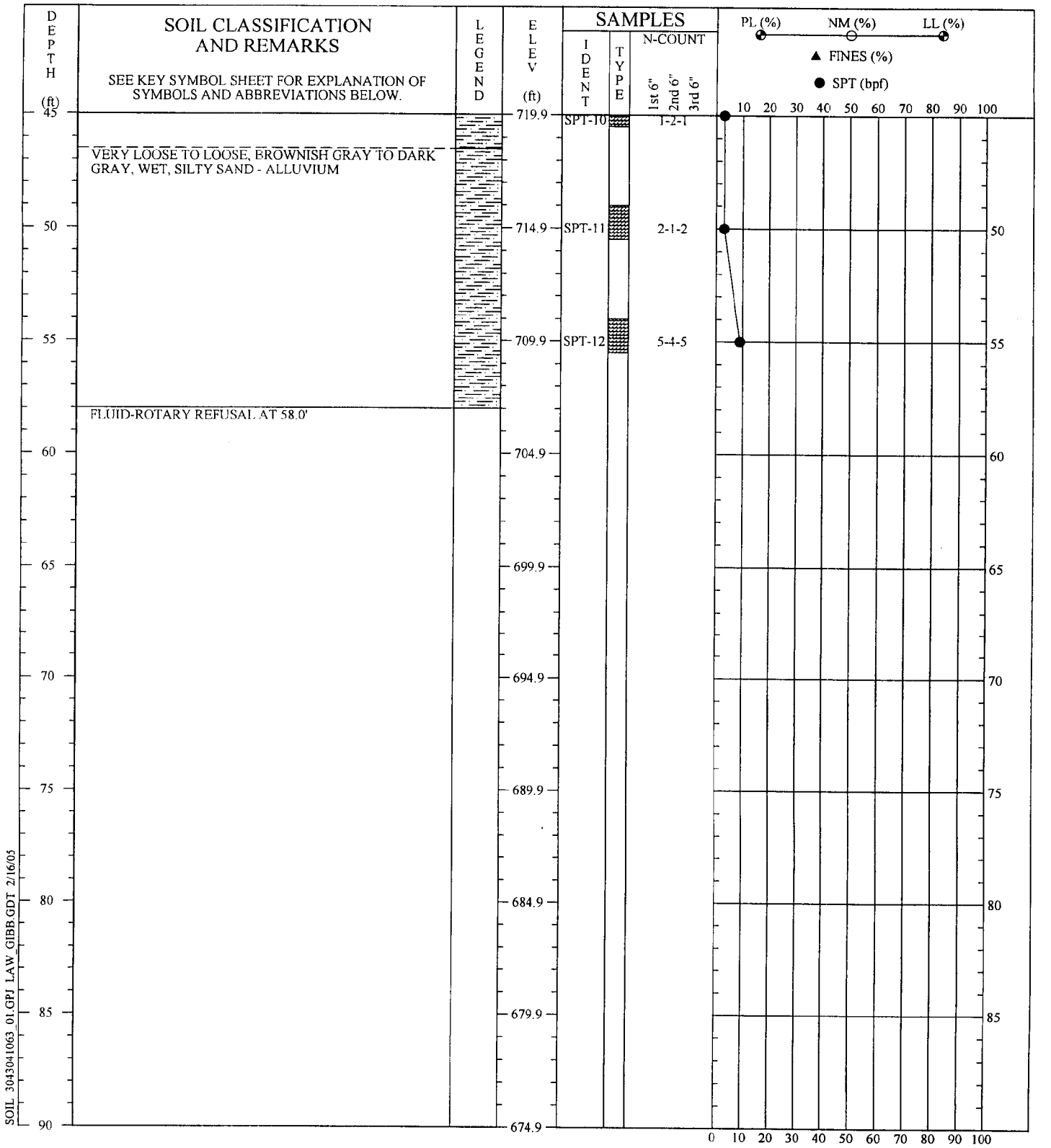
SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 12, 2005 **BORING NO.:** B-9

PROJ. NO.: 3043041063/0001 **PAGE** 1 **OF** 2

MACTEC



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Driller : R. Banks
Prepared By: Mason
Checked By:H.A.B.

SOIL TEST BORING RECORD

PROJECT: TVA - Kingston Well Installation

DRILLED: January 12, 2005 **BORING NO.:** B-9

PROJ. NO.: 3043041063/0001 **PAGE 2 OF 2**

MACTEC

APPENDIX C

TYPE I PIEZOMETER (MONITORING WELL) INSTALLATION LOGS

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-3B

INSTALLATION DATE: 01/18/2005

BIT DIAMETER: 3 7/8"

DRILLED BY: R. BANKS

TOTAL DEPTH: 101.0'

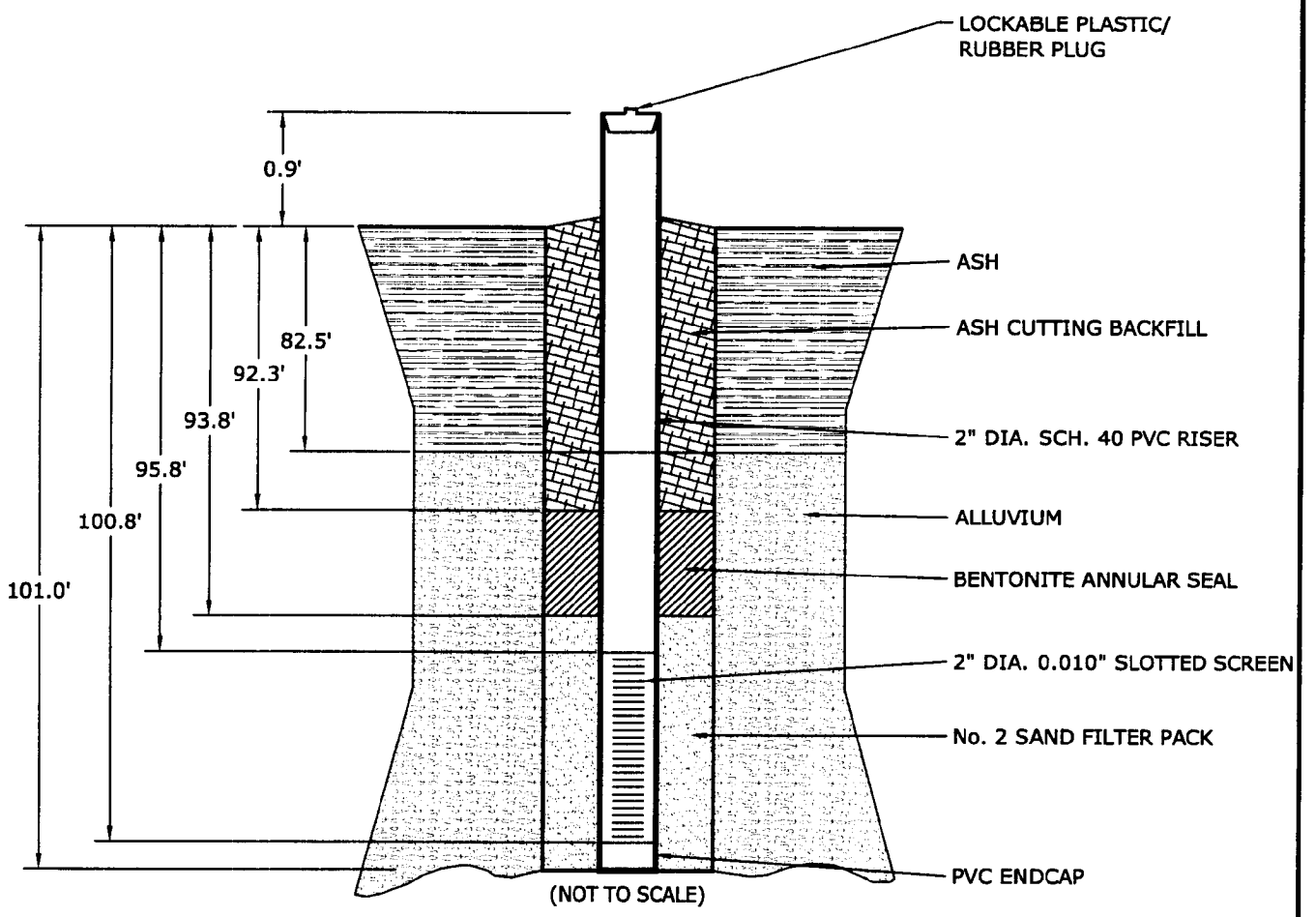
RISER/SCREEN

FIELD REPRESENTATIVE: TODD JUSTICE

MATERIAL: SCHEDULE 40 PVC

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-4A

INSTALLATION DATE: 01/19/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: R. BANKS

TOTAL DEPTH: 9.2'

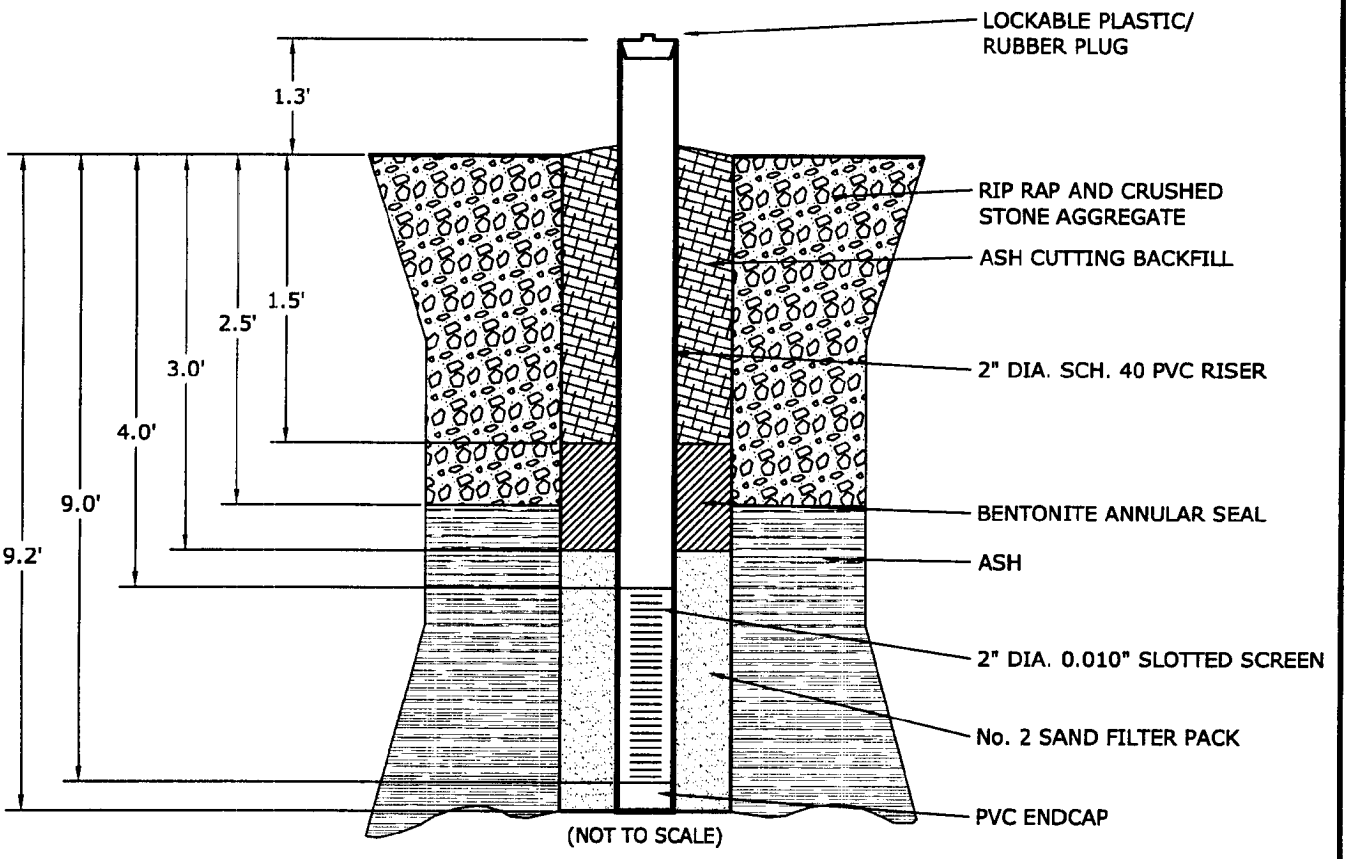
RISER/SCREEN

FIELD REPRESENTATIVE: TODD JUSTICE

MATERIAL: SCHEDULE 40 PVC

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-4B

INSTALLATION DATE: 01/19/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: R. BANKS

TOTAL DEPTH: 24.0'

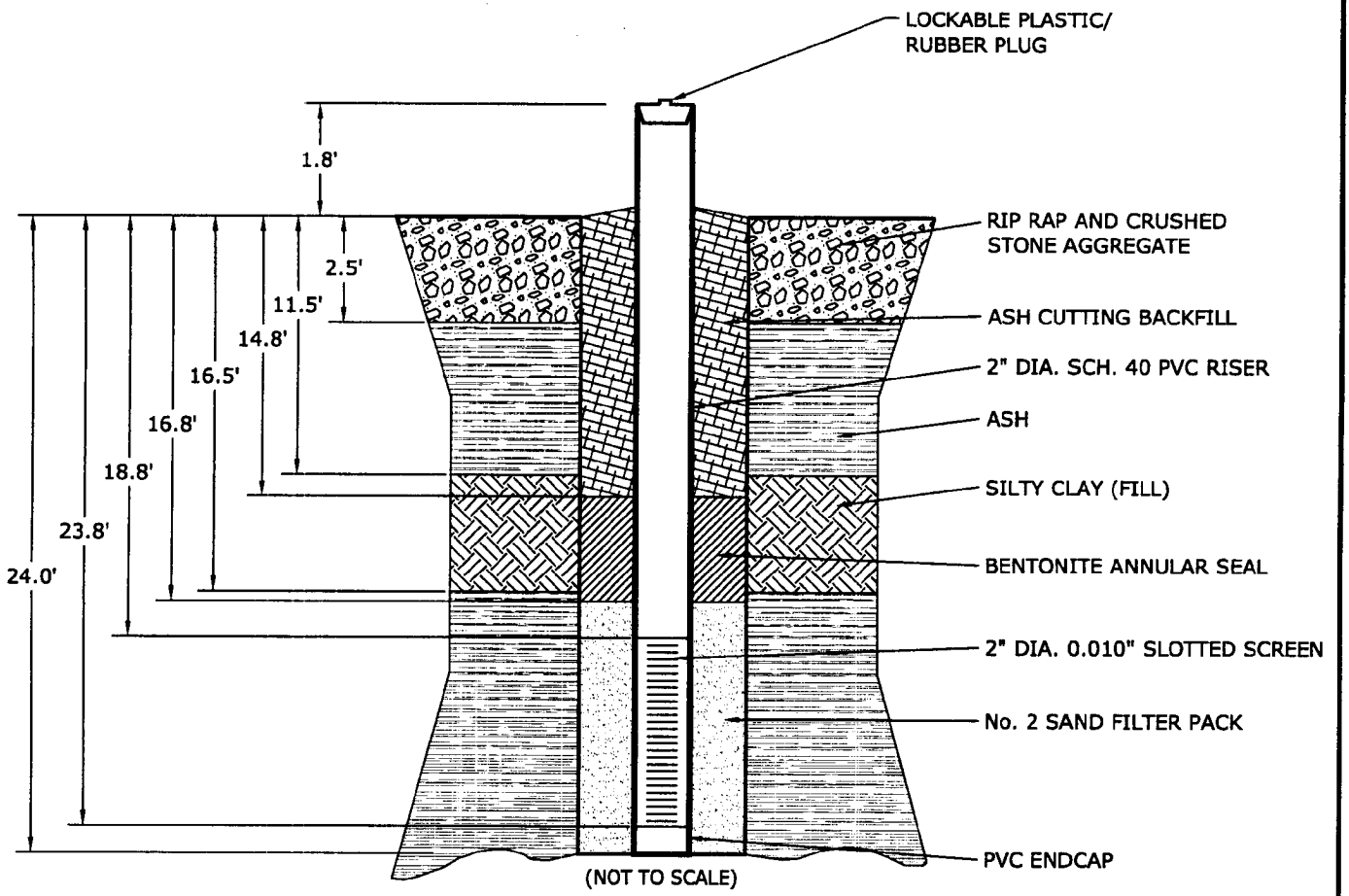
RISER/SCREEN

FIELD REPRESENTATIVE: TODD JUSTICE

MATERIAL: SCHEDULE 40 PVC

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-5A

INSTALLATION DATE: 01/11/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: J. WARREN

TOTAL DEPTH: 48.0'

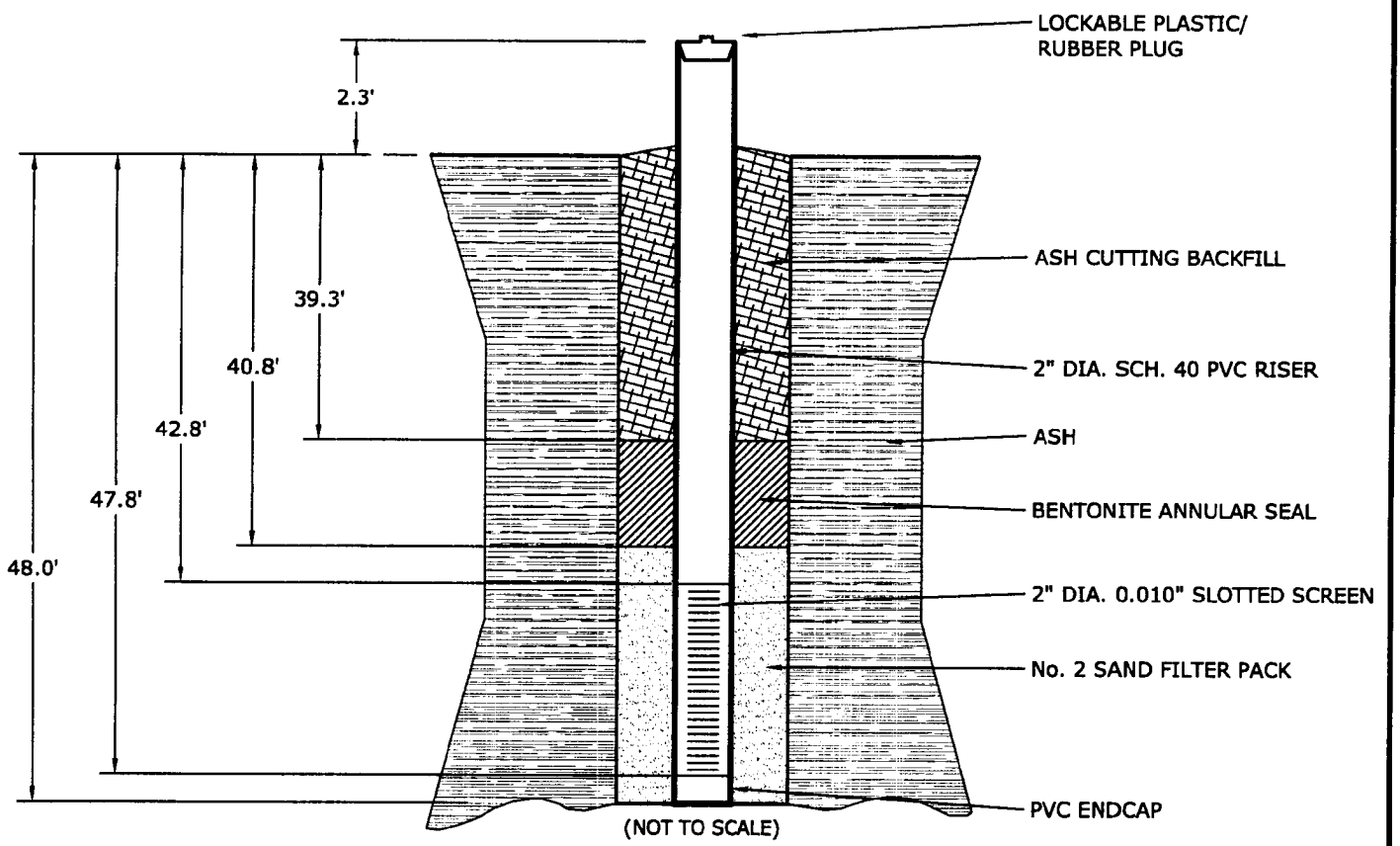
RISER/SCREEN

FIELD REPRESENTATIVE: TODD JUSTICE

MATERIAL: SCHEDULE 40 PVC

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-5B

INSTALLATION DATE: 01/12/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: J. WARREN

TOTAL DEPTH: 68.0'

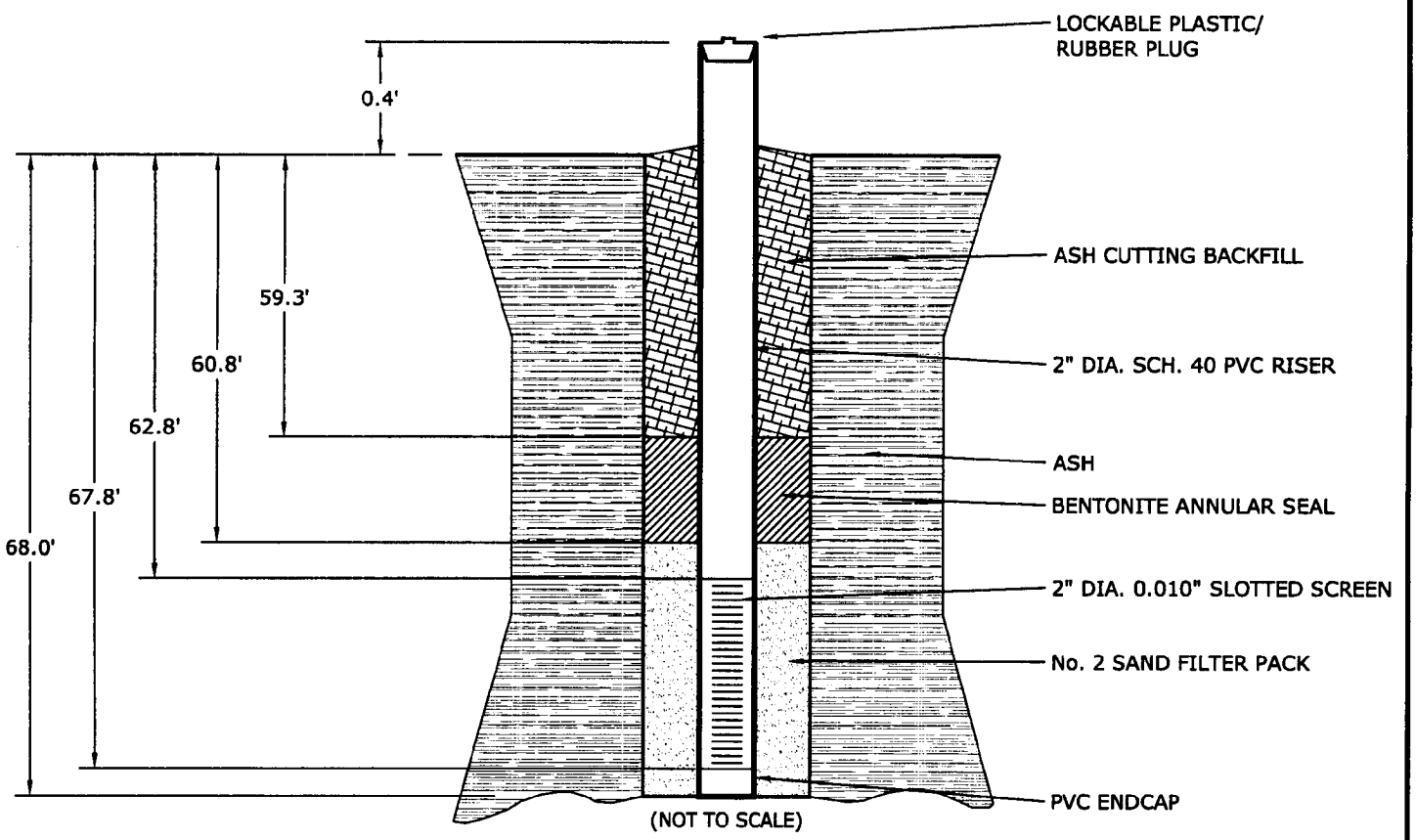
RISER/SCREEN

MATERIAL: SCHEDULE 40 PVC

FIELD REPRESENTATIVE: TODD JUSTICE

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-6A

INSTALLATION DATE: 01/13/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: J. WARREN

TOTAL DEPTH: 55.6'

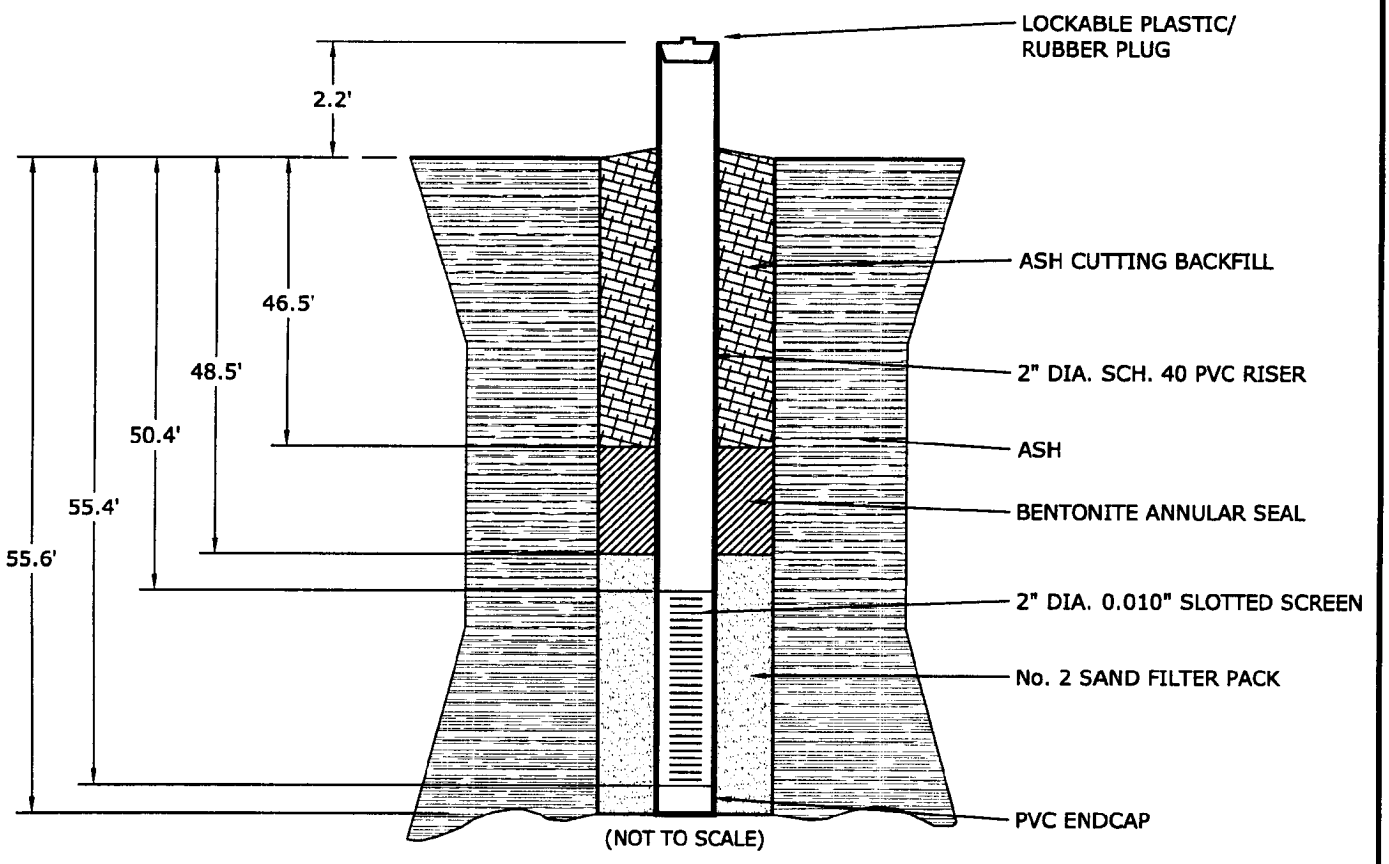
RISER/SCREEN

FIELD REPRESENTATIVE: JOHN MASON

MATERIAL: SCHEDULE 40 PVC

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-6B

INSTALLATION DATE: 01/13/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: J. WARREN

TOTAL DEPTH: 75.5'

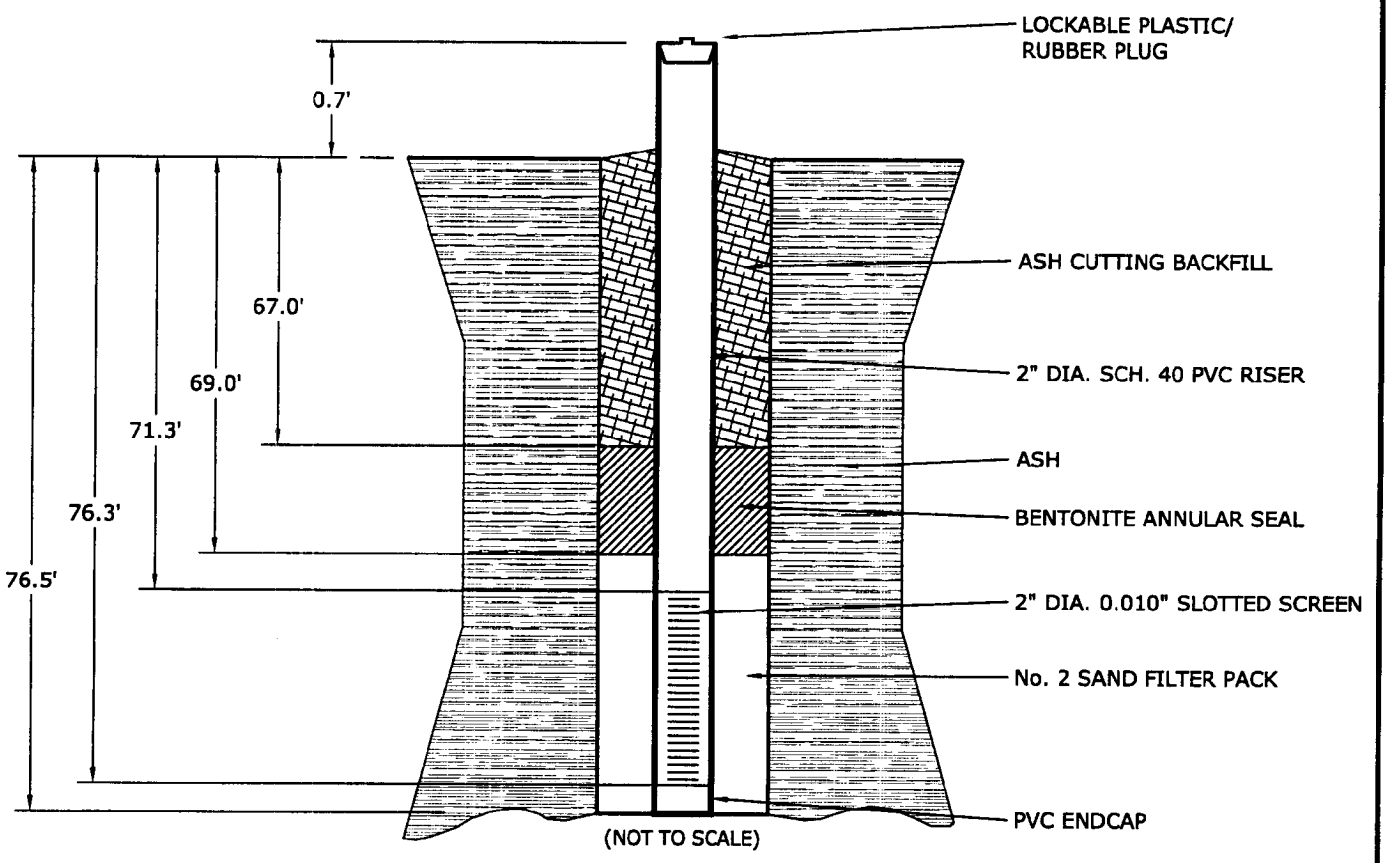
RISER/SCREEN

FIELD REPRESENTATIVE: JOHN MASON

MATERIAL: SCHEDULE 40 PVC

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-7A

INSTALLATION DATE: 01/14/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: J. WARREN

TOTAL DEPTH: 45.2'

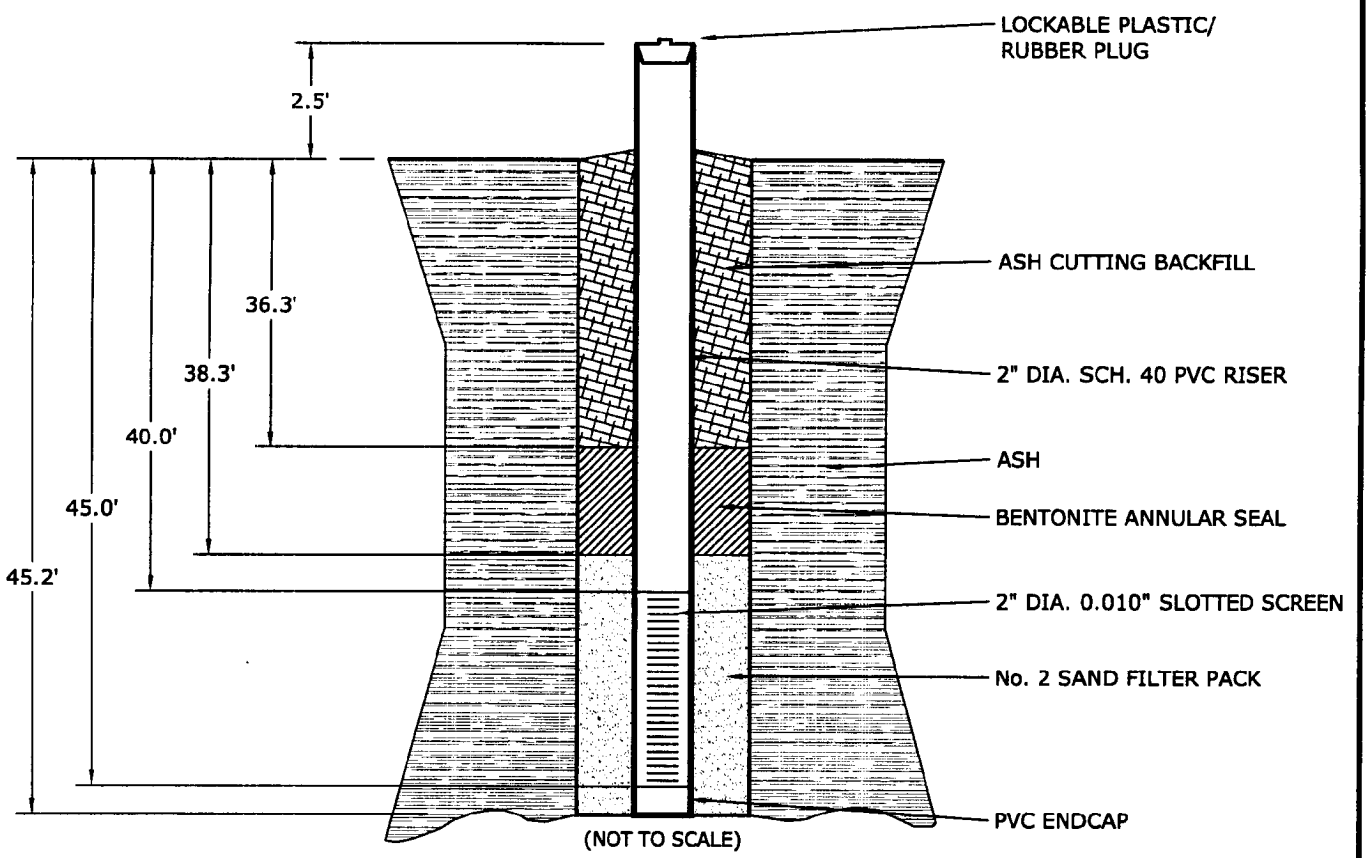
RISER/SCREEN

MATERIAL: SCHEDULE 40 PVC

DIAMETER: 2.0"

SLOT SIZE: 0.010"

FIELD REPRESENTATIVE: JOHN MASON



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-7B

INSTALLATION DATE: 01/13/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: J. WARREN

TOTAL DEPTH: 65.2'

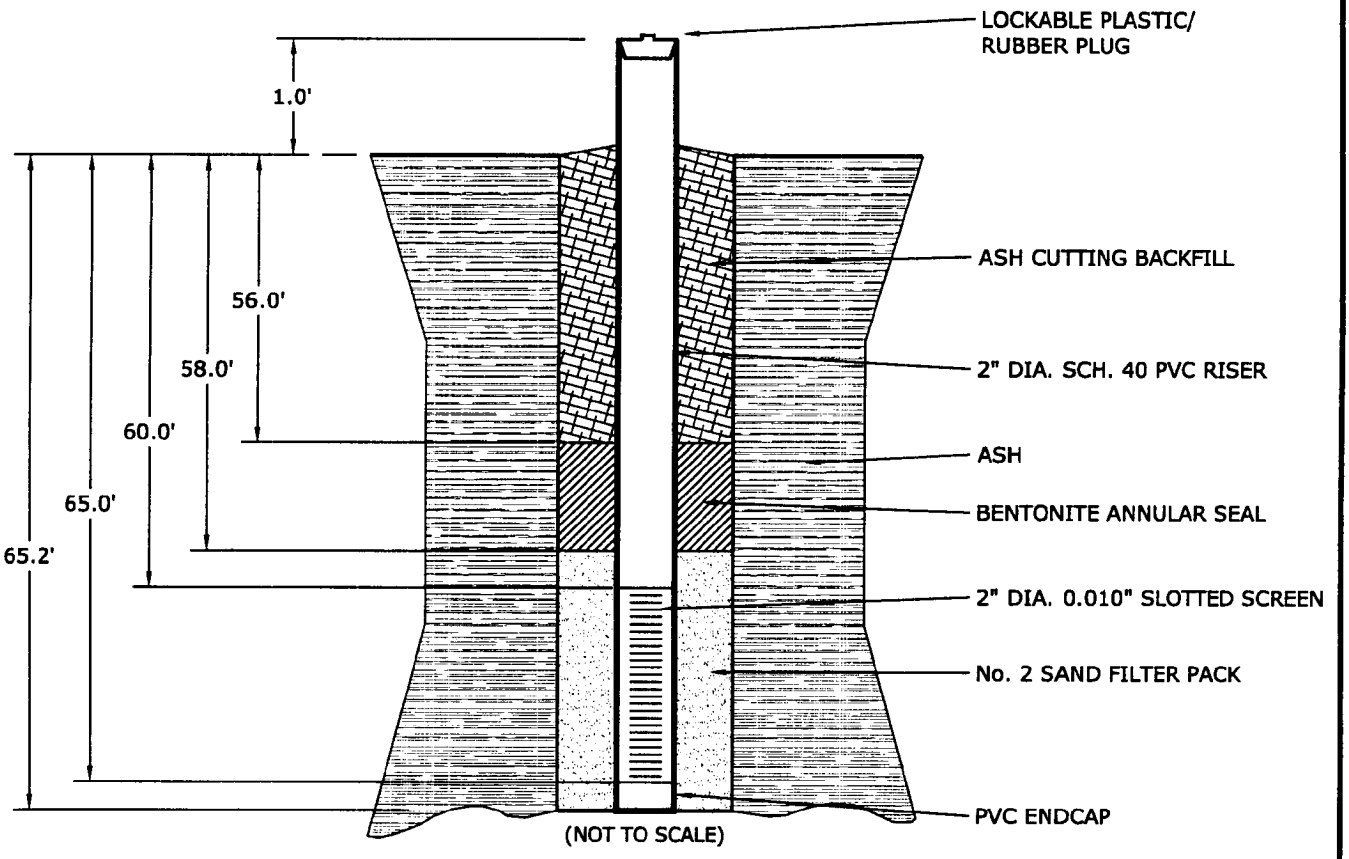
RISER/SCREEN

MATERIAL: SCHEDULE 40 PVC

DIAMETER: 2.0"

SLOT SIZE: 0.010"

FIELD REPRESENTATIVE: JOHN MASON



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-8A

INSTALLATION DATE: 01/14/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: R. BANKS

TOTAL DEPTH: 25.2'

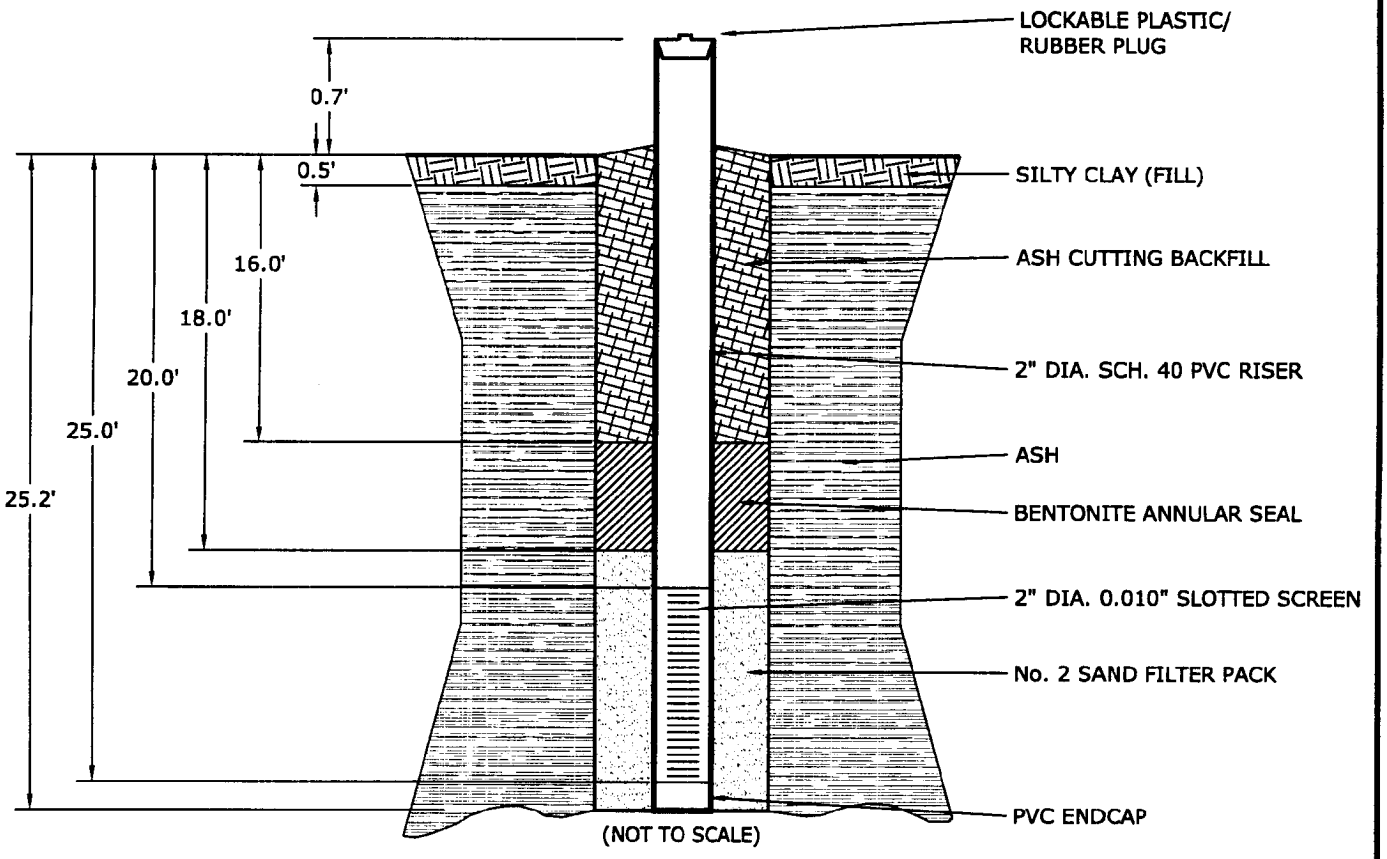
RISER/SCREEN

MATERIAL: SCHEDULE 40 PVC

FIELD REPRESENTATIVE: TODD JUSTICE

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-8B

INSTALLATION DATE: 01/13/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: R. BANKS

TOTAL DEPTH: 40.2'

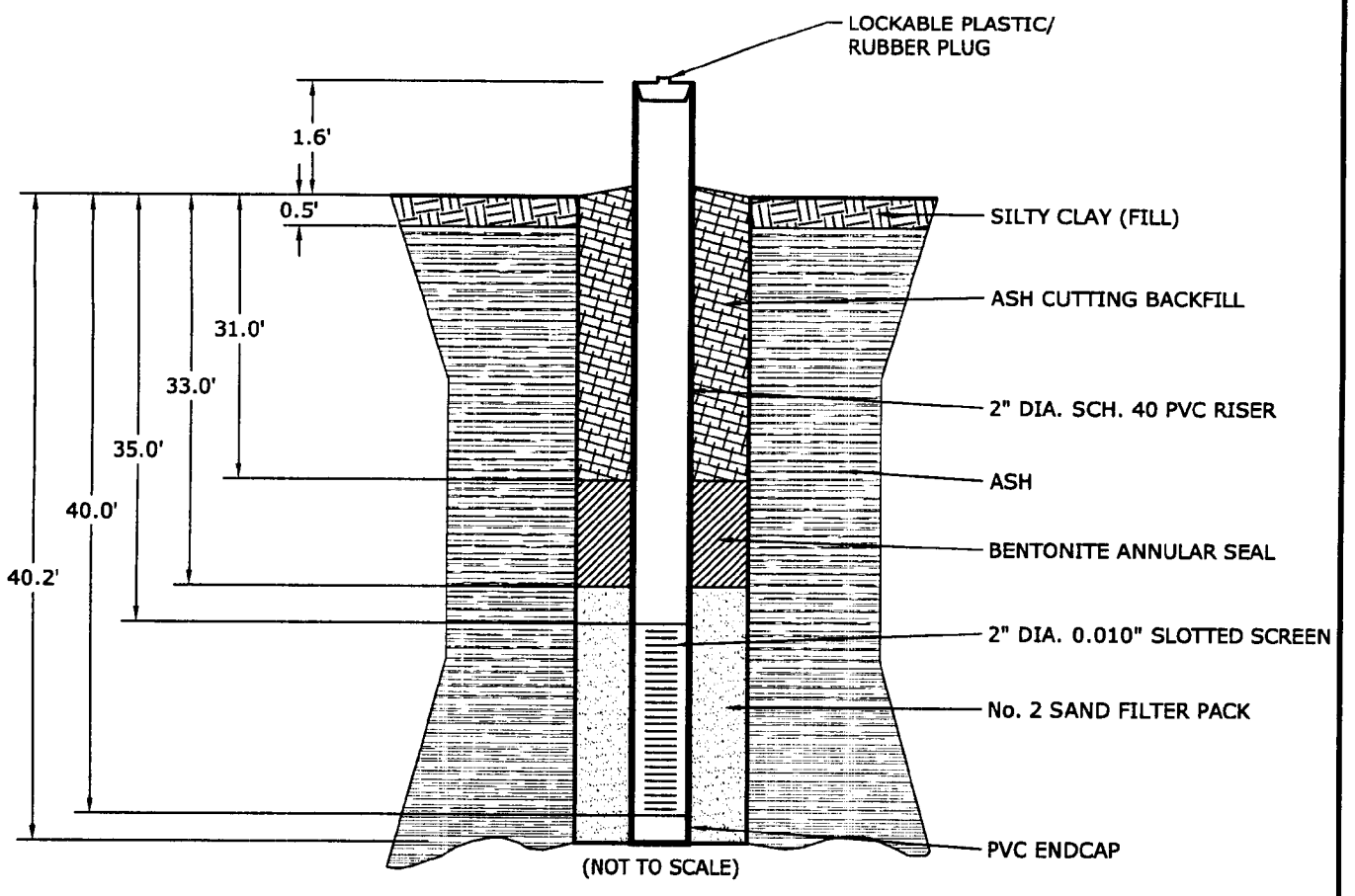
RISER/SCREEN

FIELD REPRESENTATIVE: TODD JUSTICE

MATERIAL: SCHEDULE 40 PVC

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-9A

INSTALLATION DATE: 01/13/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: R. BANKS

TOTAL DEPTH: 15.2'

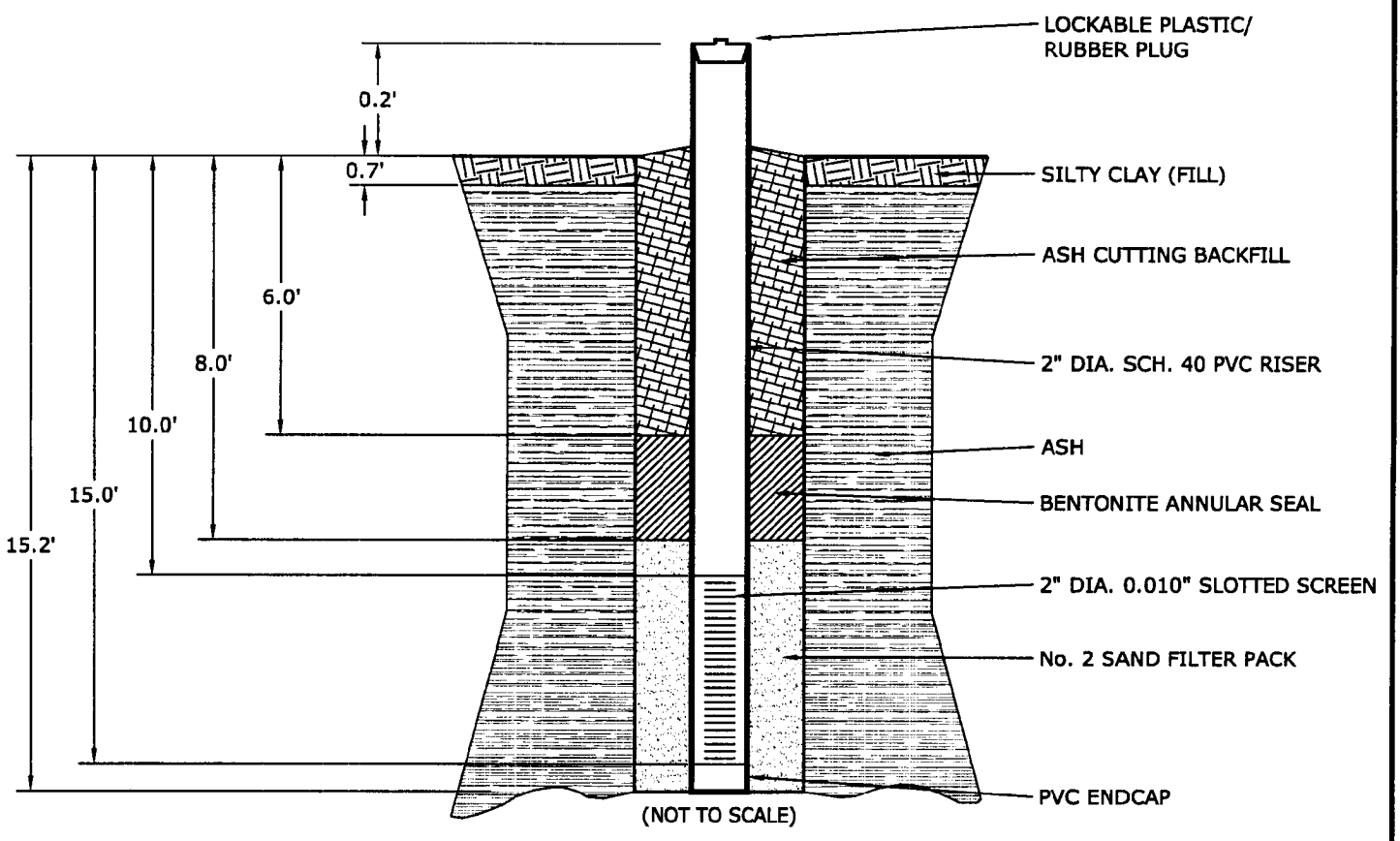
RISER/SCREEN

MATERIAL: SCHEDULE 40 PVC

FIELD REPRESENTATIVE: TODD JUSTICE

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

TYPE I PIEZOMETER INSTALLATION RECORD

JOB NAME: TVA KINGSTON WELL INSTALLATION

JOB NUMBER: 3043041063/0001

TVA WELL NUMBER: MW-9B

INSTALLATION DATE: 01/13/2005

AUGER DIAMETER: 3 1/4" (I.D.), 6 1/4" (O.D.)

DRILLED BY: R. BANKS

TOTAL DEPTH: 25.2'

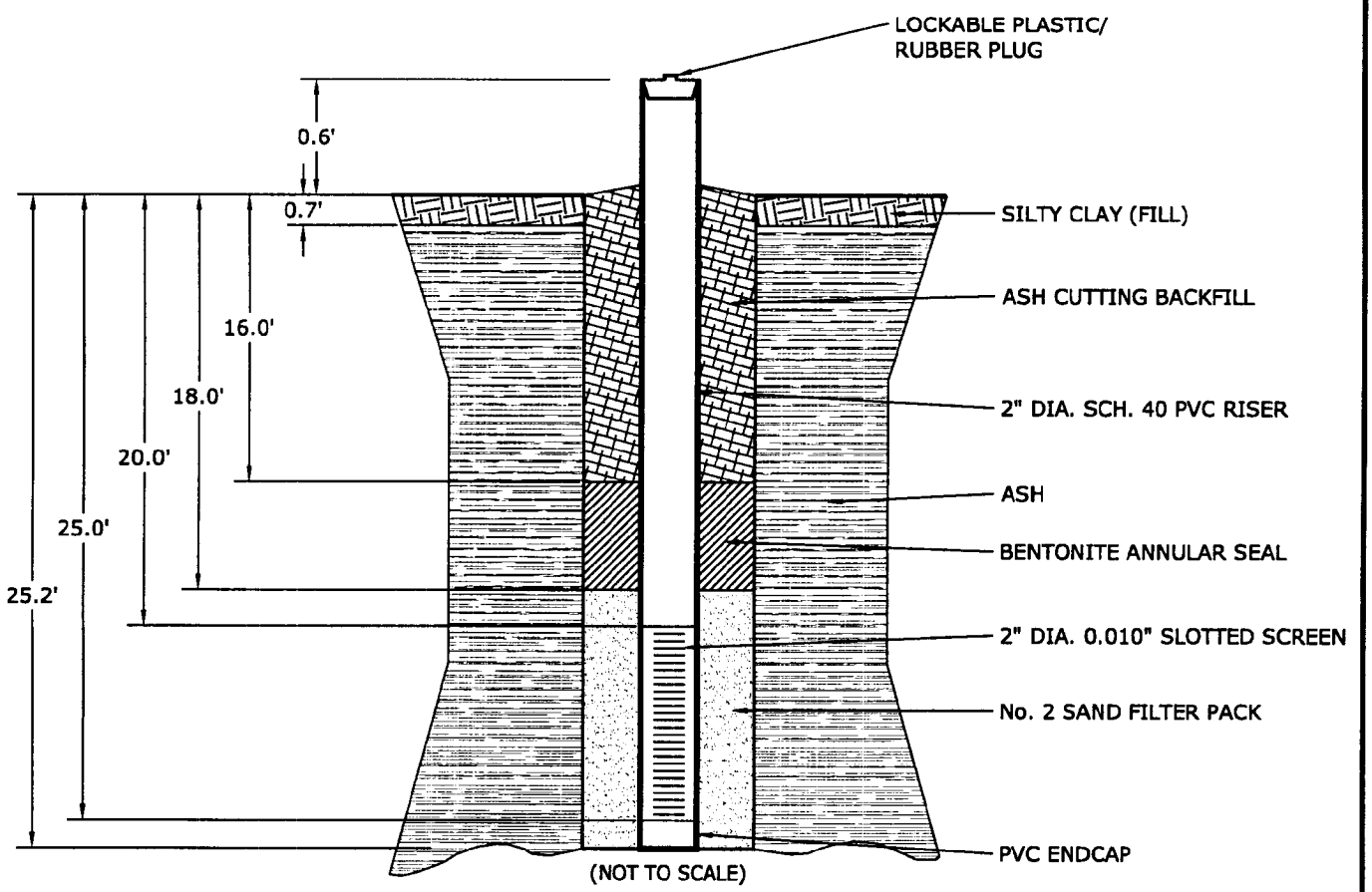
RISER/SCREEN

MATERIAL: SCHEDULE 40 PVC

FIELD REPRESENTATIVE: TODD JUSTICE

DIAMETER: 2.0"

SLOT SIZE: 0.010"



MACTEC

APPENDIX D

LABORATORY TEST PROCEDURES

LABORATORY TEST RESULTS

LABORATORY TEST PROCEDURES

Moisture Content

The moisture content in a given mass of soil is the ratio, expressed as a percentage, of the weight of the water to the weight of the solid particles. This test was conducted in accordance with ASTM D-2216.

Atterberg Limits (Plasticity Index)

Originally, the Atterberg Limits consisted of seven "limits of consistency" of fine-grained soils. In current engineering usage, the term usually refers only to the liquid limit (LL) and plastic limit (PL). The LL (between the liquid and plastic states) is the water content at which a trapezoidal groove of specified shape, cut in moist soil held in a special cup, is closed after 25 taps on a hard rubber plate. The PL (between plastic and semi-solid states) is the water content at which the soil crumbles when rolled into threads of 1/8-inch in diameter.

The LL has been found to be proportional to the compressibility of the normally consolidated soil. The Plasticity Index (PI) is the calculated difference in water contents between the LL and PL. Together the LL and PI are used to classify silts and clays according to the Unified Soils Classification System (ASTM D 2487). The PI is used to predict the potential for volume changes in confined soils beneath foundations or grade slabs. The LL, PL, and PI are determined in accordance with ASTM D 4318.

Grain Size Distribution

Grain size tests are performed to aid in determining the soil classification and the grain size distribution. The soil samples are prepared for testing according to ASTM D 421 (dry preparation) or ASTM D 2217 (wet preparation). If only the grain size distribution of soils coarser than a number 200 sieve (0.074-mm opening) is desired, the grain size distribution is determined by washing the sample over a number 200 sieve and, after drying, passing the samples through a standard set of nested sieves. If the grain size distribution of the soils finer than the number 200 sieve is also desired, the grain size distribution of the soils coarser than the number 10 sieve is determined by passing the sample through a set of nested sieves. These tests are performed in accordance with ASTM D 422-63. Materials passing the number 10 sieve are dispersed with a dispersing agent and suspended in water, and the

grain size distribution calculated from the measured settlement rate of the particles. These tests are conducted in accordance with T 27-99. The percentage of clay, silt, sand, and gravel which are given on the individual particle size analysis sheets presented later in this appendix, were obtained on particle size boundaries in accordance with ASTM D422-63.

Specific Gravity

The specific gravity of soil solids is the ratio of the mass of a unit volume of a soil solids to the mass of the same volume of gas-free distilled water at 20C. The test method for determining the specific gravity of soil solids that passes the 4.75-mm (No. 10) sieve is AASHTO T 100-03, "Specific Gravity of Soils".

Table D-1
Natural Moisture Content and Atterberg Limits Laboratory Test Results
Monitoring Well Installation
Ash Disposal Area
TVA Kingston Fossil Plant
MACTEC Project 3043041063/01

					Atterberg Limits		
Boring Number	Sample Number	Sample Type	Sample Depth (Feet)	Moisture Content ((%)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)
B-3	1	SPT	69 - 70.5	24.6	NT	NT	NT
B-3	2	SPT	74 - 75.5	34.8	NT	NT	NT
B-3	3	SPT	79 - 80.5	39.6	NT	NT	NT
B-3	4	SPT	84 - 85.5	21.7	27	16	11
B-3	5	SPT	89 - 90.4	20.5	NT	NT	NT
B-3	6	SPT	94 - 95.5	21.4	NT	NT	NT
B-4	1	SPT	4 - 5.5	24.8	NT	NT	NT
B-4	2	SPT	9 - 10.5	35.8	NT	NT	NT
B-4	3	SPT	14 - 15.5	23.0	NT	NT	NT
B-4	4	SPT	19 - 20.5	23.9	NT	NT	NT
B-4	5	SPT	24 - 25.5	14.0	NT	NT	NT
B-4	6	SPT	29 - 30.5	32.5	NT	NT	NT
B-4	7	SPT	34 - 35.5	10.8	NT	NT	NT
B-5	1	SPT	0 - 1.5	13.4	NT	NT	NT
B-5	2	SPT	5 - 6.5	34.6	NT	NT	NT
B-5	4	SPT	15 - 16.5	56.3	NT	NT	NT
B-5	6	SPT	25 - 26.5	39.6	NT	NT	NT
B-5	8	SPT	35 - 36.5	49.5	NT	NT	NT
B-5	10	SPT	45 - 46.5	36.9	NT	NT	NT
B-5	11	SPT	50 - 51.5	42.0	NT	NT	NT
B-5	13	SPT	60 - 61.5	43.0	NT	NT	NT
B-5	14	SPT	65 - 66.5	51.8	NT	NT	NT
B-5	15	SPT	70 - 71.5	48.7	NT	NT	NT
B-5	17	SPT	80 - 81.5	18.4	NV	NP	NP
B-5	19	SPT	90 - 91.5	19.1	NT	NT	NT
B-6	1	SPT	0 - 1.5	30.5	NT	NT	NT
B-6	2	SPT	5 - 6.5	31.6	NT	NT	NT
B-6	3	SPT	10 - 11.5	37.6	NT	NT	NT
B-6	4	SPT	15 - 16.5	27.7	NT	NT	NT
B-6	6	SPT	25 - 26.5	32.6	NT	NT	NT
B-6	8	SPT	35 - 36.5	35.4	NT	NT	NT
B-6	11	SPT	50 - 51.5	43.6	NT	NT	NT
B-6	12	SPT	55 - 56.5	45.1	NT	NT	NT
B-6	15	SPT	70 - 71.5	34.9	NT	NT	NT
B-6	16	SPT	77 - 78.5	31.8	NT	NT	NT
B-6	17	SPT	82 - 83.5	29.1	NT	NT	NT
B-6	19	SPT	90 - 91.5	18.6	20	16	4
B-6	21	SPT	100 - 101.5	18.0	NT	NT	NT
B-7	1	SPT	0 - 1.5	14.7	NT	NT	NT
B-7	2	SPT	5 - 6.5	17.9	NT	NT	NT
B-7	4	SPT	15 - 16.5	20.4	NT	NT	NT
B-7	6	SPT	25 - 26.5	36.9	NT	NT	NT
B-7	8	SPT	35 - 36.5	35.2	NT	NT	NT

Natural Moisture Content and Atterberg Limits Laboratory Test Results

Monitoring Well Installation
Ash Disposal Area
TVA Kingston Fossil Plant
MACTEC Project 3043041063/01

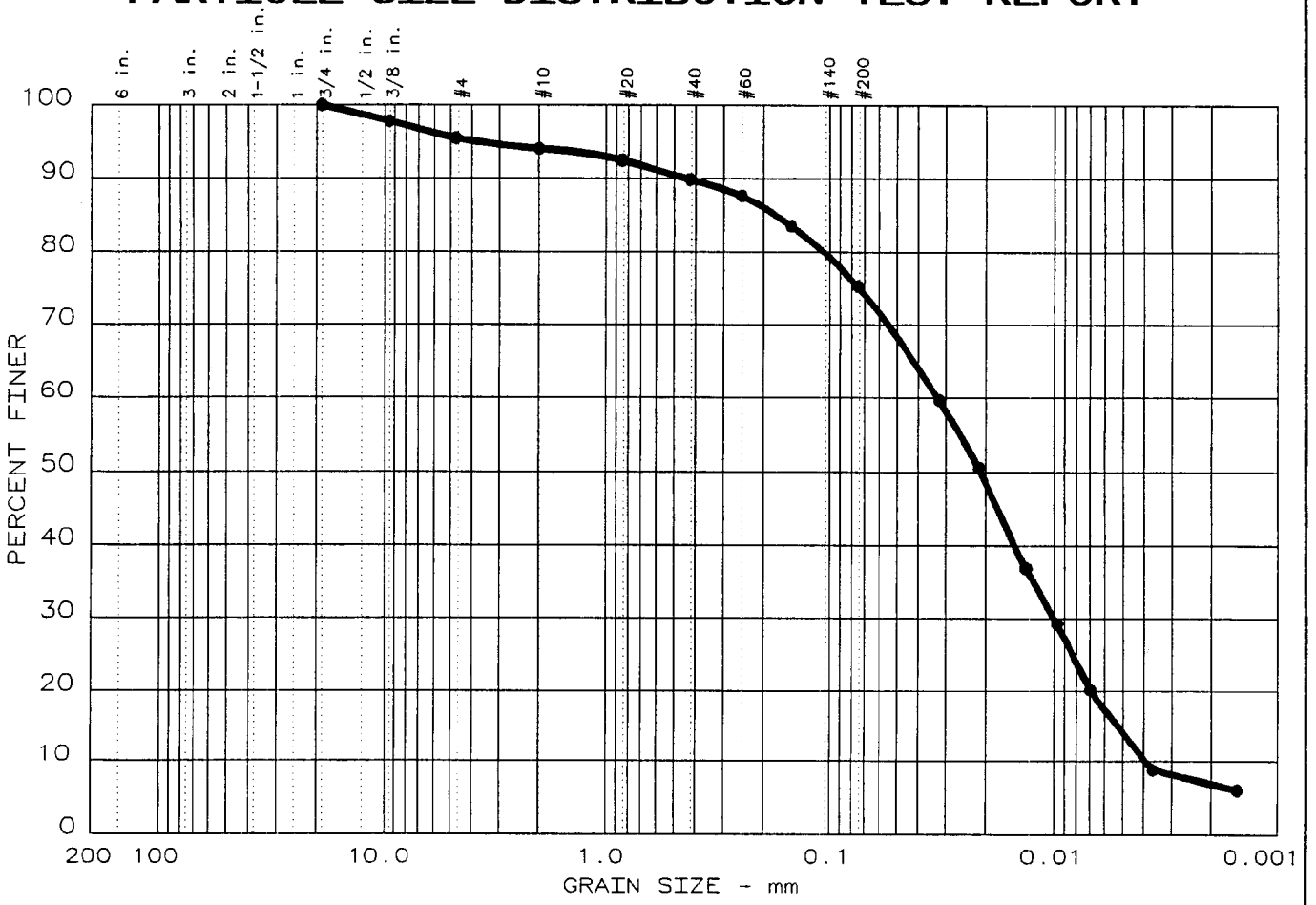
					Atterberg Limits		
Boring Number	Sample Number	Sample Type	Sample Depth (Feet)	Moisture Content (%)	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)
B-7	10	SPT	45 - 46.5	38.7	NT	NT	NT
B-7	13	SPT	60 - 61.5	42.7	NT	NT	NT
B-7	15	SPT	70 - 71.5	35.3	NT	NT	NT
B-7	17	SPT	80 - 81.5	34.5	NT	NT	NT
B-7	19	SPT	90 - 91.5	26.0	NT	NT	NT
B-7	21	SPT	100 - 101.5	22.3	NT	NT	NT
B-7	23	SPT	110 - 111.5	19.6	NT	NT	NT
B-8	2	SPT	4 - 5.5	30.6	NT	NT	NT
B-8	3	SPT	9 - 10.5	29.2	NT	NT	NT
B-8	4	SPT	14 - 15.5	30.5	NT	NT	NT
B-8	5	SPT	19 - 20.5	29.4	NT	NT	NT
B-8	6	SPT	24 - 25.5	33.1	NT	NT	NT
B-8	7	SPT	29 - 30.5	36.3	NT	NT	NT
B-8	8	SPT	34 - 35.5	53.0	NT	NT	NT
B-8	9	SPT	39 - 40.5	34.1	NT	NT	NT
B-8	11	SPT	49 - 50.5	30.9	NT	NT	NT
B-8	13	SPT	59 - 60.5	22.0	22	16	6
B-8	14	SPT	64 - 65.5	19.2	NT	NT	NT
B-8	15	SPT	69 - 70.5	21.3	NT	NT	NT
B-9	1	SPT	0 - 1.5	29.5	NT	NT	NT
B-9	2	SPT	4 - 5.5	39.5	NT	NT	NT
B-9	3	SPT	9 - 10.5	26.6	NT	NT	NT
B-9	4	SPT	14 - 15.5	16.9	NT	NT	NT
B-9	5	SPT	19 - 20.5	18.8	NT	NT	NT
B-9	6	SPT	24 - 25.5	30.7	NT	NT	NT
B-9	7	SPT	29 - 30.5	18.5	NT	NT	NT
B-9	8	SPT	34 - 35.5	16.8	NT	NT	NT
B-9	10	SPT	44 - 45.5	19.3	NV	NP	NP
B-9	12	SPT	54 - 55.5	20.3	NT	NT	NV

NT - Not Tested SPT - Standard Penetration Test
NP - Non-Plastic NV - Non-Viscous

Prepared/Date: HAB 2/17/05
Checked/Date: CDT 2/17/05

GRAIN SIZE FOR ASH SAMPLES

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	1	0.0	4.5	20.2	61.0	14.3	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
0.75	100.0		
0.375	97.8		
	GRAIN SIZE		
D_{60}	0.0327		
D_{30}			
D_{10}	0.0039		
	COEFFICIENTS		
C_c	0.79		
C_u	8.4		

SIEVE number size	PERCENT FINER ●		
4	95.5		
10	94.1		
20	92.5		
40	89.9		
60	87.7		
100	83.6		
200	75.3		

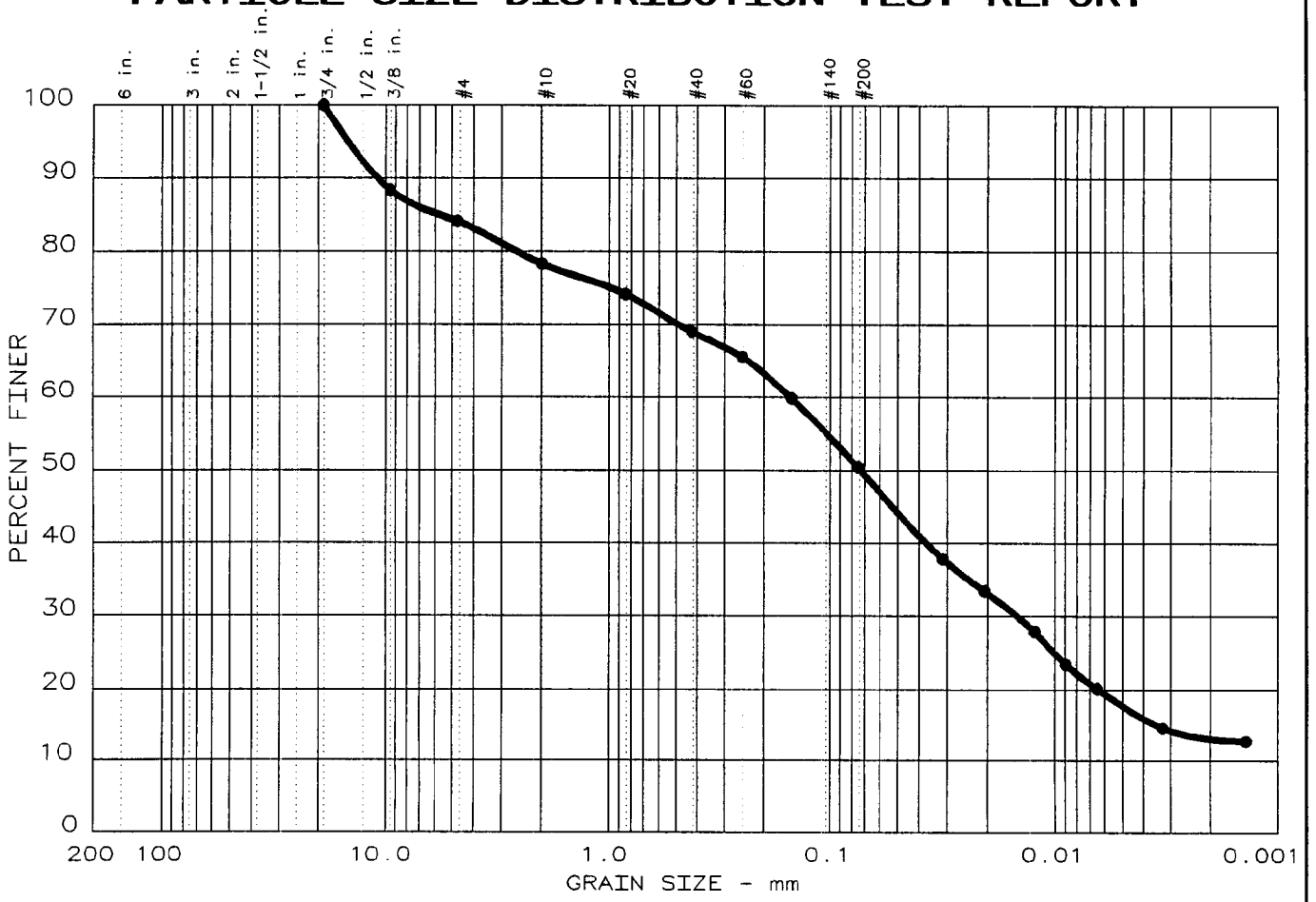
Sample information:
● Boring B-4, S-1, 4-5.5'
Gray fly ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Specific Gravity: 2.30

Project No.: 3043041063.0001
Project: TVA Kingston - Well Installation

Date: February 15, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	2	0.0	15.9	33.7	32.6	17.8	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
0.75	100.0		
0.375	88.4		
	GRAIN SIZE		
D_{60}	0.151		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ●		
4	84.1		
10	78.3		
20	74.2		
40	69.0		
60	65.6		
100	59.9		
200	50.4		

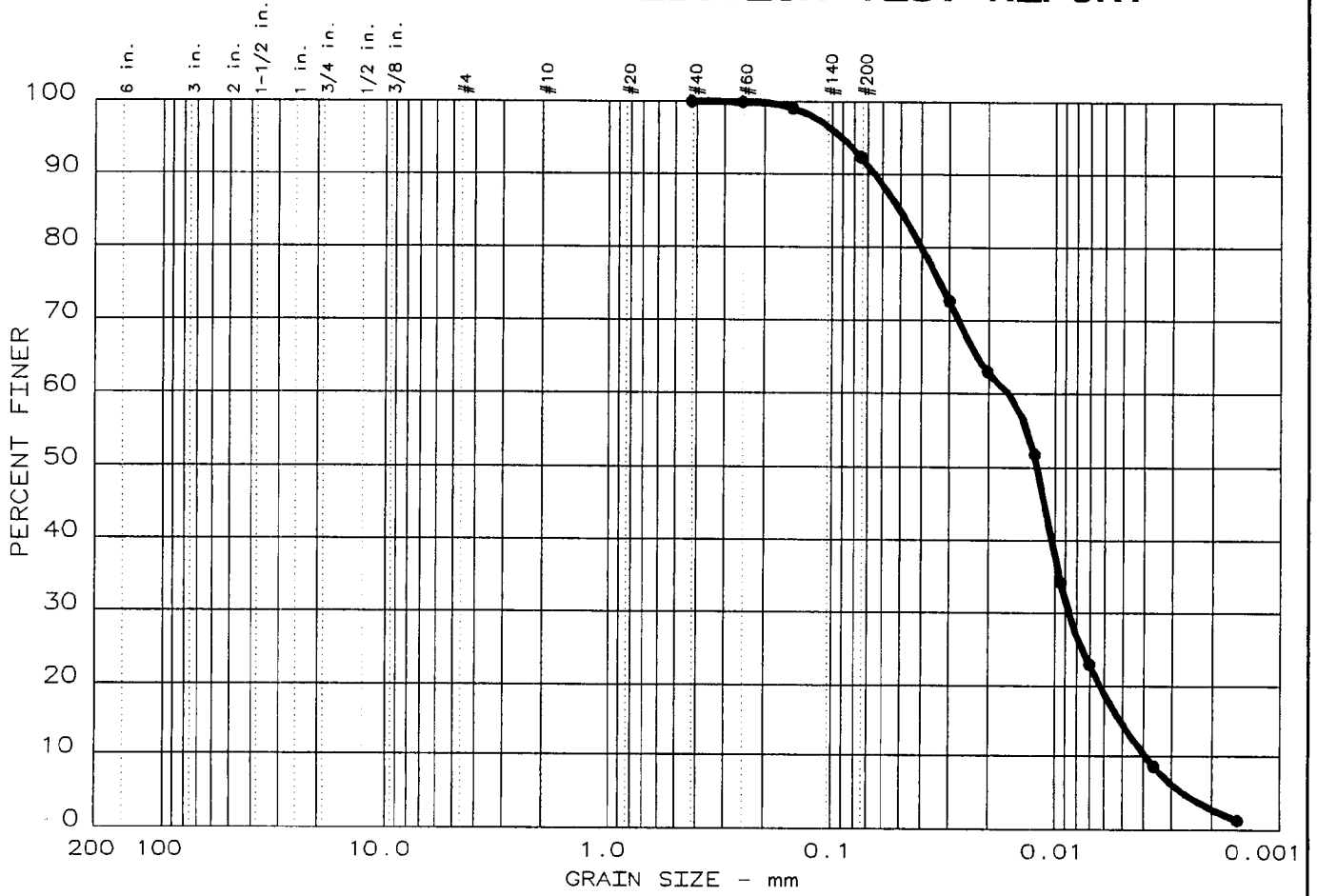
Sample information:
● Boring B-4,S-4,19-20.5'
Gray bottom ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Specific Gravity: 2.48

Project No.: 3043041063.0001
Project: TVA Kingston - Well Installation

Date: February 16, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	3	0.0	0.0	7.6	77.7	14.7	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
GRAIN SIZE			
D_{60}	0.0160		
D_{30}			
D_{10}	0.0039		
COEFFICIENTS			
C_c	1.22		
C_u	4.1		

SIEVE number size	PERCENT FINER ●		
40	100.0		
60	99.9		
100	99.1		
200	92.4		

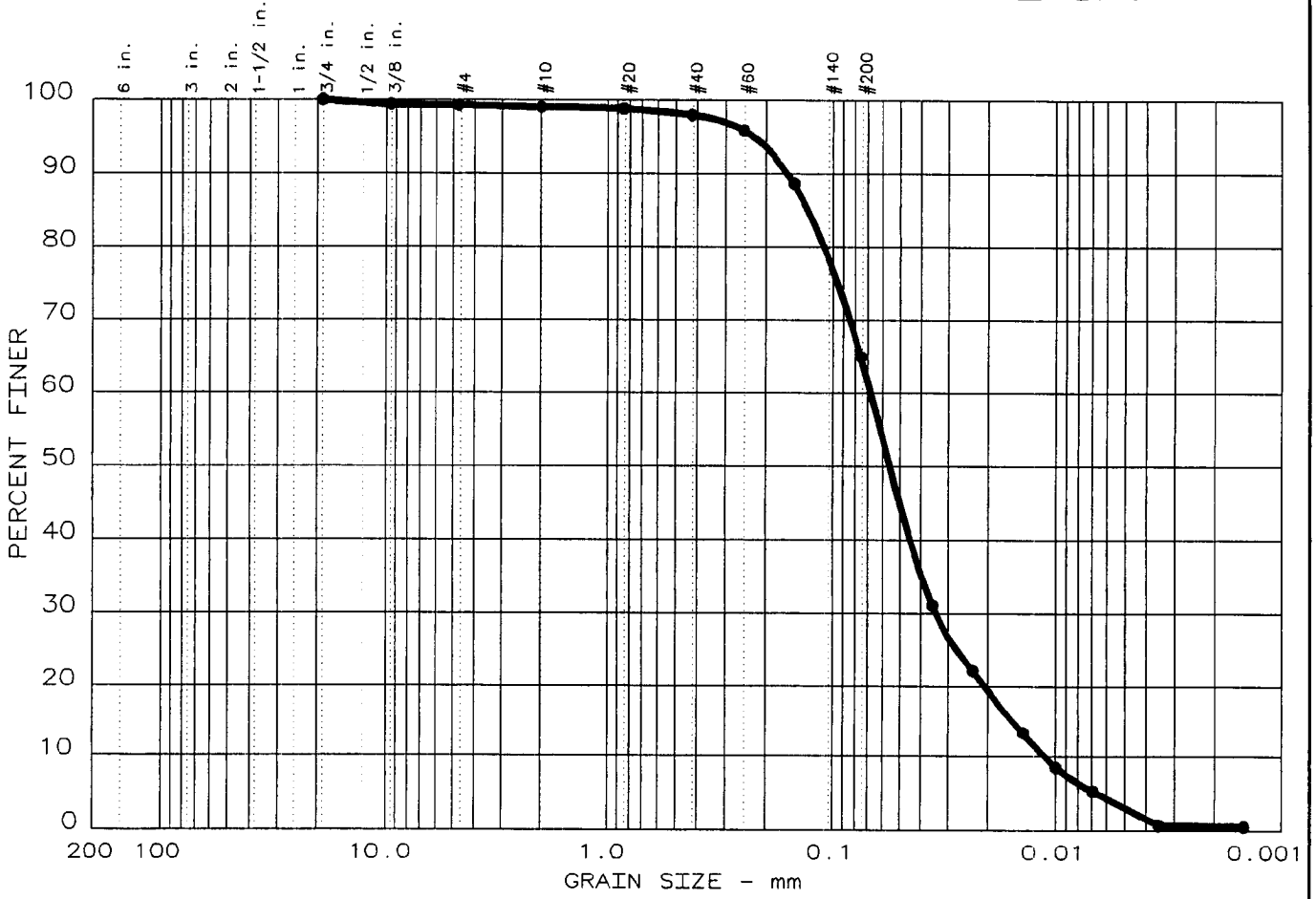
Sample information:
● Boring B-5,S10,45-46.5'
Gray fly ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Specific Gravity: 2.33

Project No.: 3043041063.0001
Project: TVA Kingston - Well Installation

Date: February 15, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	4	0.0	0.8	34.2	62.0	3.0	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
0.75	100.0		
0.375	99.4		
	GRAIN SIZE		
D_{60}	0.0675		
D_{30}			
D_{10}	0.0112		
	COEFFICIENTS		
C_c	1.54		
C_u	6.1		

SIEVE number size	PERCENT FINER ●		
4	99.2		
10	99.0		
20	98.8		
40	97.9		
60	95.9		
100	88.7		
200	65.0		

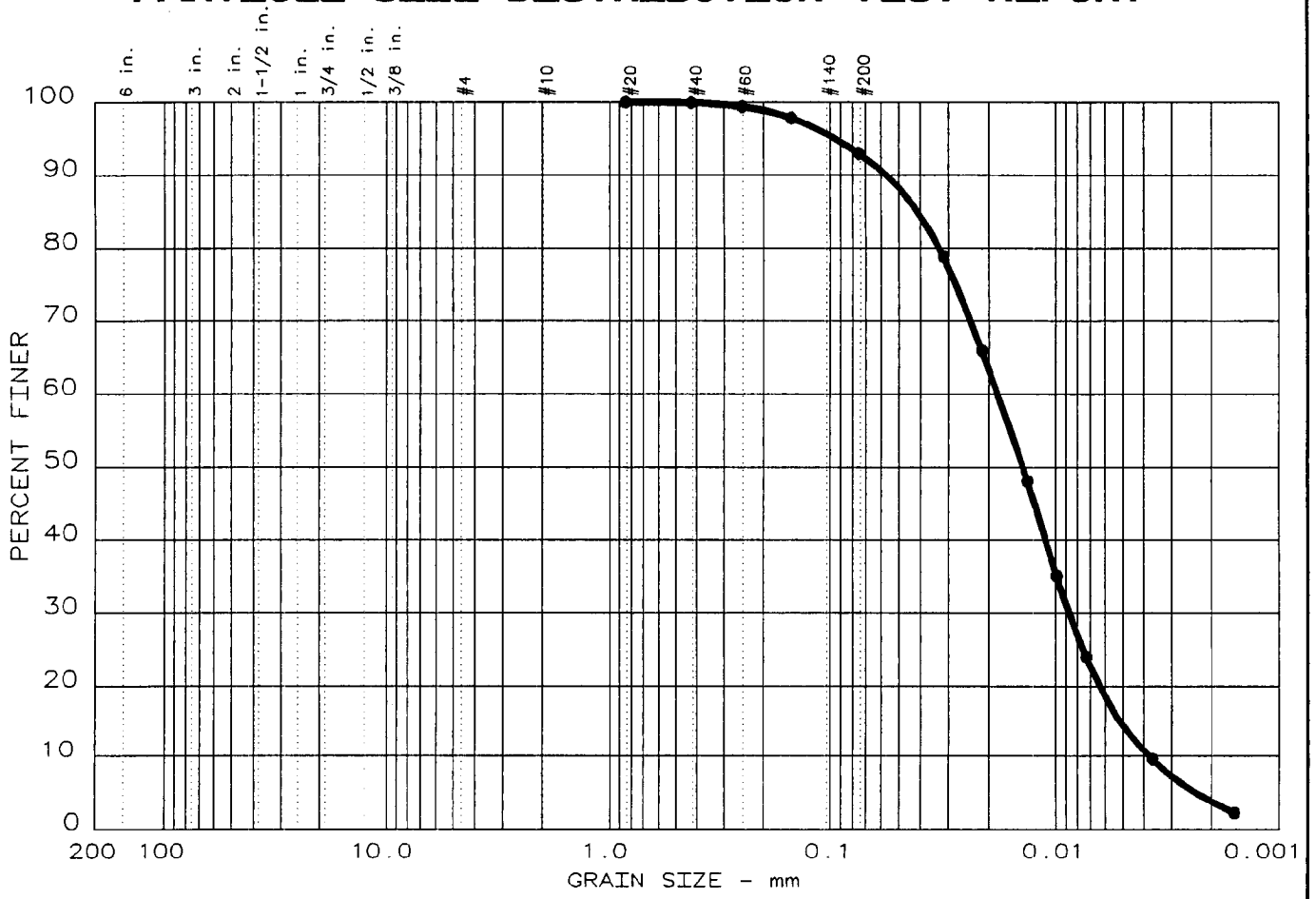
Sample information:
● Boring B-5, S14, 65-66.5'
Gray bottom ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200: ASTM D1140-00;
Assumed Spec. Grav.: 2.46

Project No.: 3043041063.0001
Project: TVA Kingston - Well Installation

Date: February 16, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	5	0.0	0.0	7.0	78.4	14.6	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.0182		
D_{30}			
D_{10}	0.0037		
	COEFFICIENTS		
C_c	1.11		
C_u	4.8		

SIEVE number size	PERCENT FINER ●		
20	100.0		
40	99.9		
60	99.4		
100	97.9		
200	93.0		

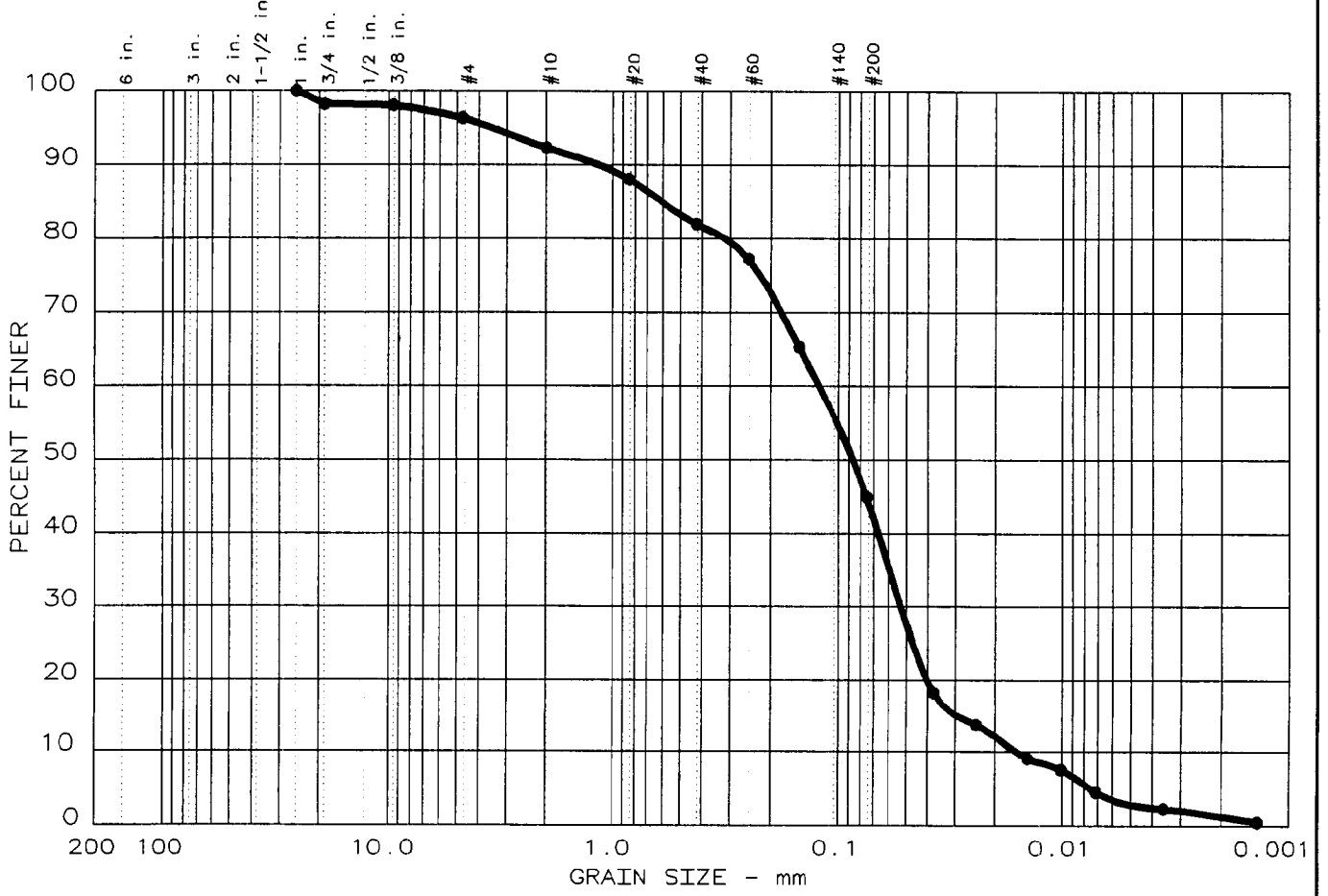
Sample information:
● Boring B-6,S11,50-51.5'
Gray fly ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Specific Gravity: 2.28

Project No.: 3043041063.0001
Project: TVA Kingston - Well Installation

Date: February 15, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	6	0.0	3.6	51.4	42.2	2.8	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
1	100.0		
0.75	98.2		
0.375	98.0		
GRAIN SIZE			
D_{60}	0.122		
D_{30}			
D_{10}	0.0160		
COEFFICIENTS			
C_c	1.44		
C_u	7.6		

SIEVE number size	PERCENT FINER ●		
4	96.4		
10	92.3		
20	88.0		
40	81.9		
60	77.3		
100	65.3		
200	45.0		

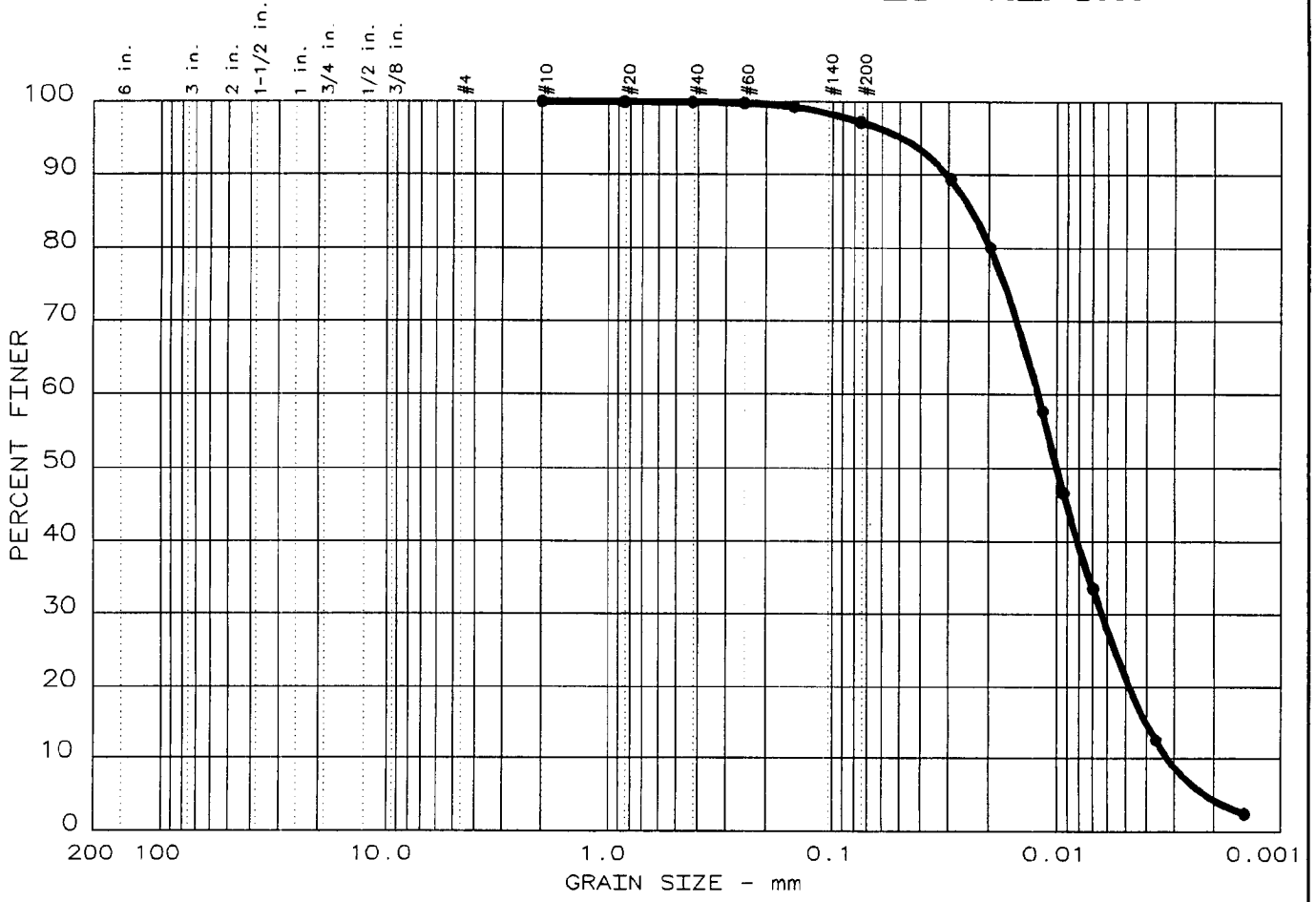
Sample information:
● Boring B-6,S15,70-71.5'
Gray bottom ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Assumed Spec. Grav.:2.46

Project No.: 3043041063.0001
Project: TVA Kingston - Well Installation

Date: February 16, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	7	0.0	0.0	2.8	75.8	21.4	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.0120		
D_{30}			
D_{10}	0.0032		
	COEFFICIENTS		
C_c	1.04		
C_u	3.7		

SIEVE number size	PERCENT FINER ●		
10	100.0		
20	99.9		
40	99.9		
60	99.8		
100	99.3		
200	97.2		

Sample information:
● Boring B-7, S-8, 35-36.5'
Gray fly ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200: ASTM D1140-00;
Specific Gravity: 2.32

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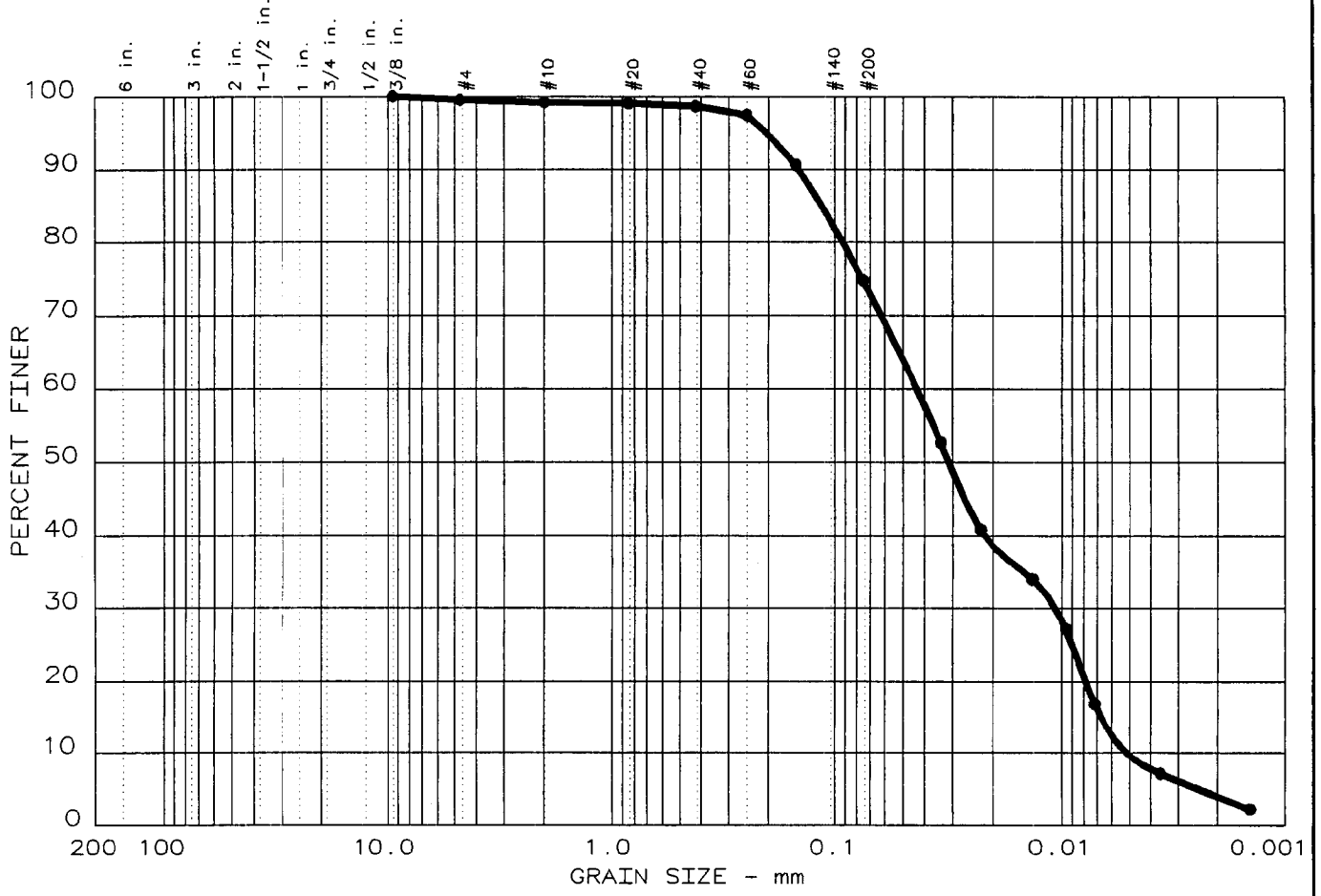
Project: TVA Kingston - Well Installation

Date: February 15, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	8	0.0	0.5	24.7	65.2	9.6	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
0.375	100.0		
	GRAIN SIZE		
D_{60}	0.0432		
D_{30}			
D_{10}	0.0051		
	COEFFICIENTS		
C_c	0.51		
C_u	8.4		

SIEVE number size	PERCENT FINER ●
4	99.5
10	99.2
20	99.1
40	98.6
60	97.4
100	90.6
200	74.8

Sample information:
● Boring B-7,S13,60-61.5'
Gray bottom ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Specific Gravity: 2.37

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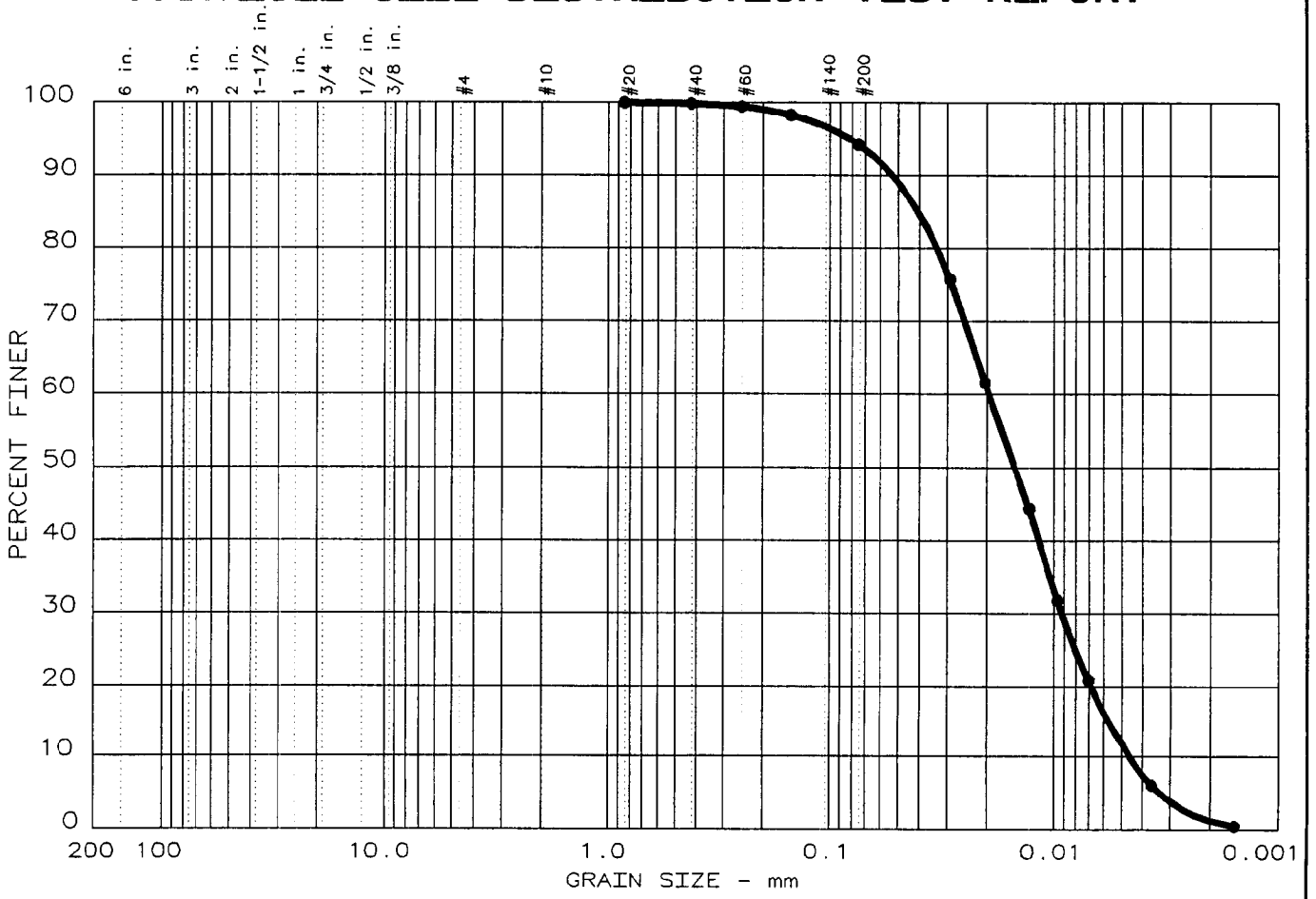
Project: TVA Kingston - Well Installation

Date: February 16, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	9	0.0	0.0	5.8	82.3	11.9	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
GRAIN SIZE			
D_{60}	0.0195		
D_{30}			
D_{10}	0.0046		
COEFFICIENTS			
C_c	0.96		
C_u	4.3		

SIEVE number size	PERCENT FINER ●		
20	100.0		
40	99.8		
60	99.4		
100	98.3		
200	94.2		

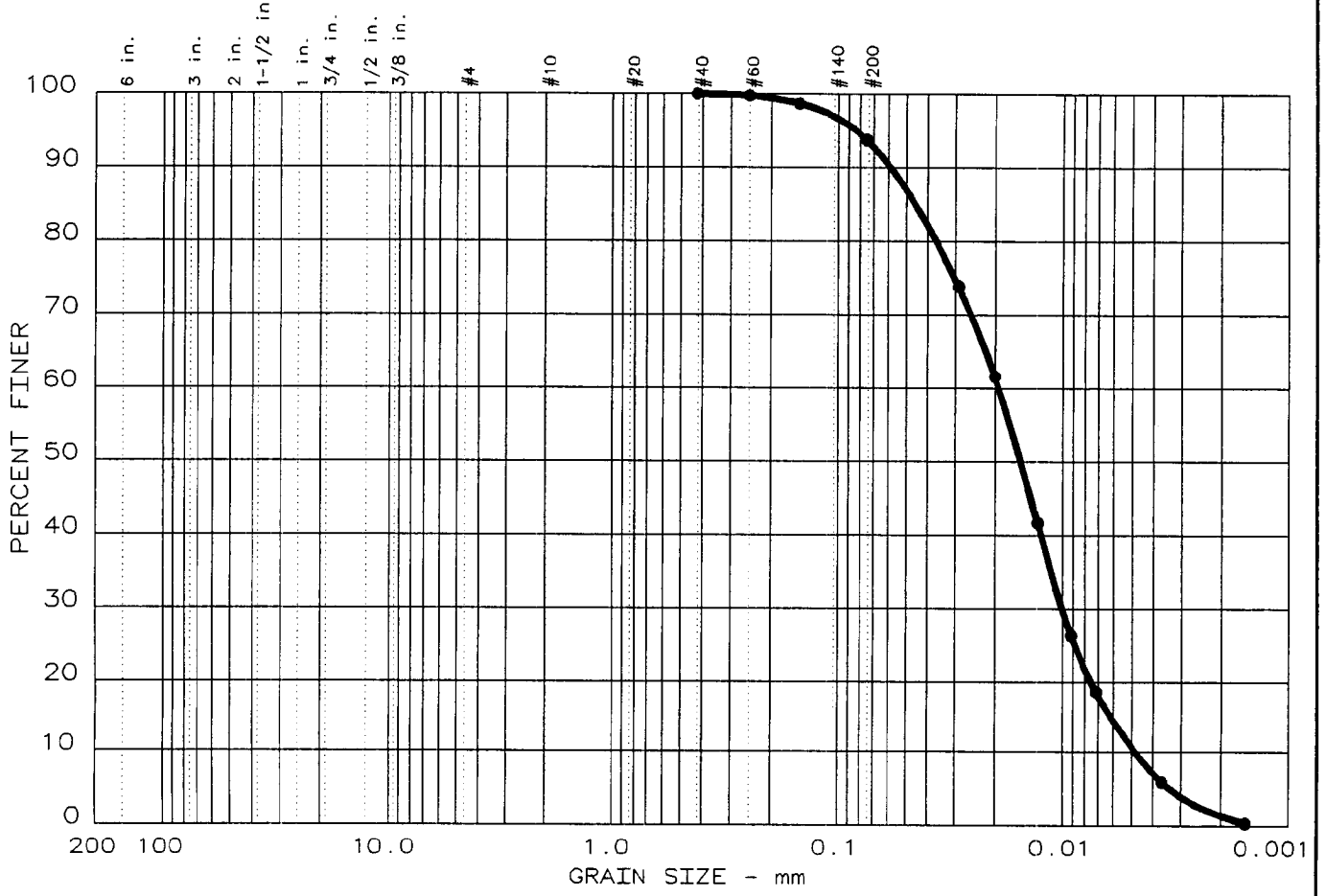
Sample information:
● Boring B-8,S-6,24-25.5'
Gray fly ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Assumed Spec. Gr.: 2.30

Project No.: 3043041063.0001
Project: TVA Kingston - Well Installation

Date: February 15, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	10	0.0	0.0	6.3	82.9	10.8	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
GRAIN SIZE			
D_{60}	0.0192		
D_{30}			
D_{10}	0.0048		
COEFFICIENTS			
C_c	1.11		
C_u	4.0		

SIEVE number size	PERCENT FINER ●		
40	100.0		
60	99.7		
100	98.6		
200	93.7		

Sample information:
● Boring B-8,S-9,39-40.5'
Gray fly ash

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Specific Gravity: 2.32

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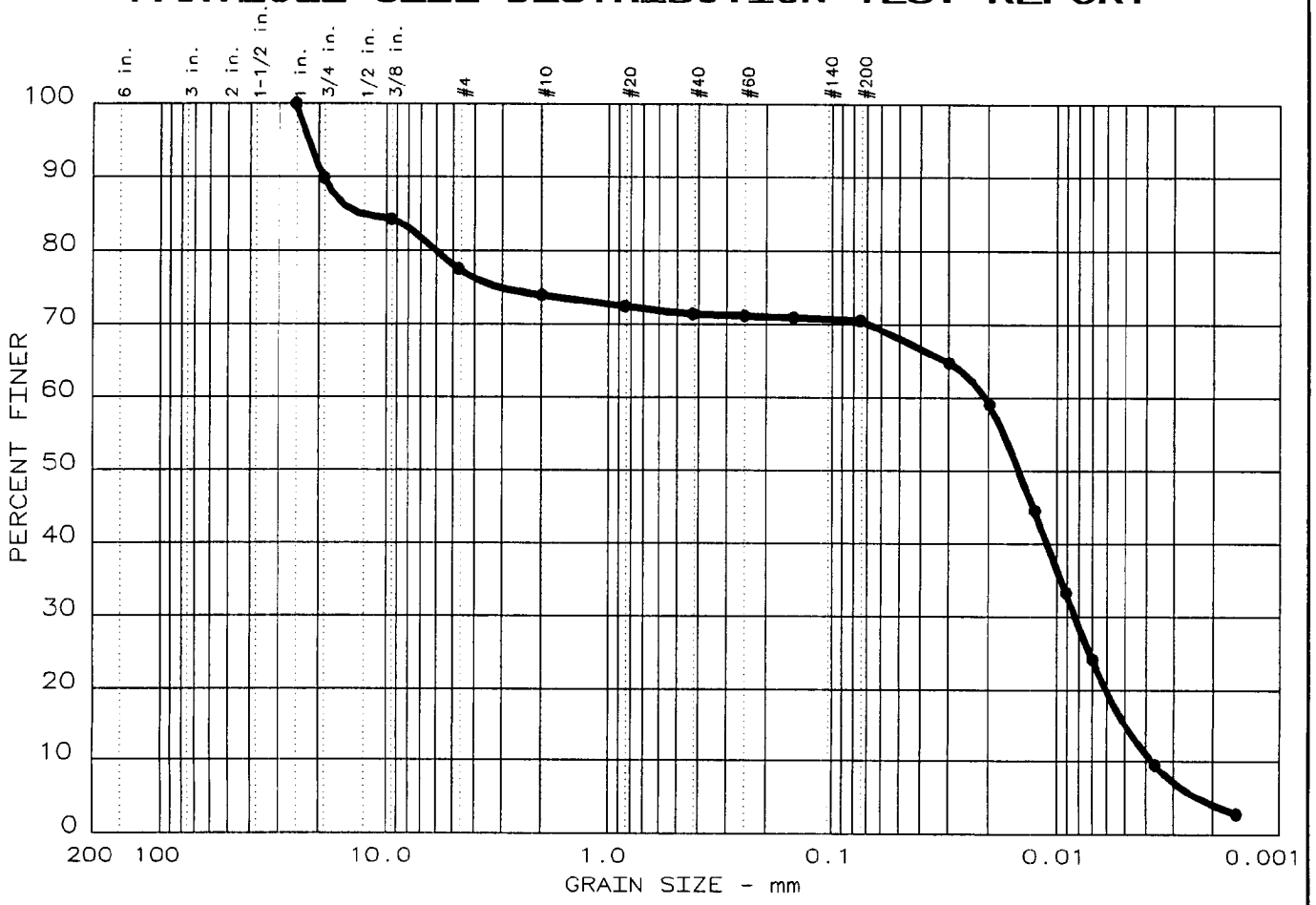
PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	11	0.0	22.4	7.0	55.3	15.3	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
1	100.0		
0.75	89.8		
0.375	84.2		
	GRAIN SIZE		
D_{60}	0.0204		
D_{30}			
D_{10}	0.0038		
	COEFFICIENTS		
C_c	0.90		
C_u	5.4		

SIEVE number size	PERCENT FINER ●		
4	77.6		
10	74.0		
20	72.5		
40	71.4		
60	71.2		
100	71.0		
200	70.6		

Sample information:
● Boring B-9,S-3, 9-10.5'
Gray fly ash with
limestone gravel

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Assumed Spec. Grav.:2.30

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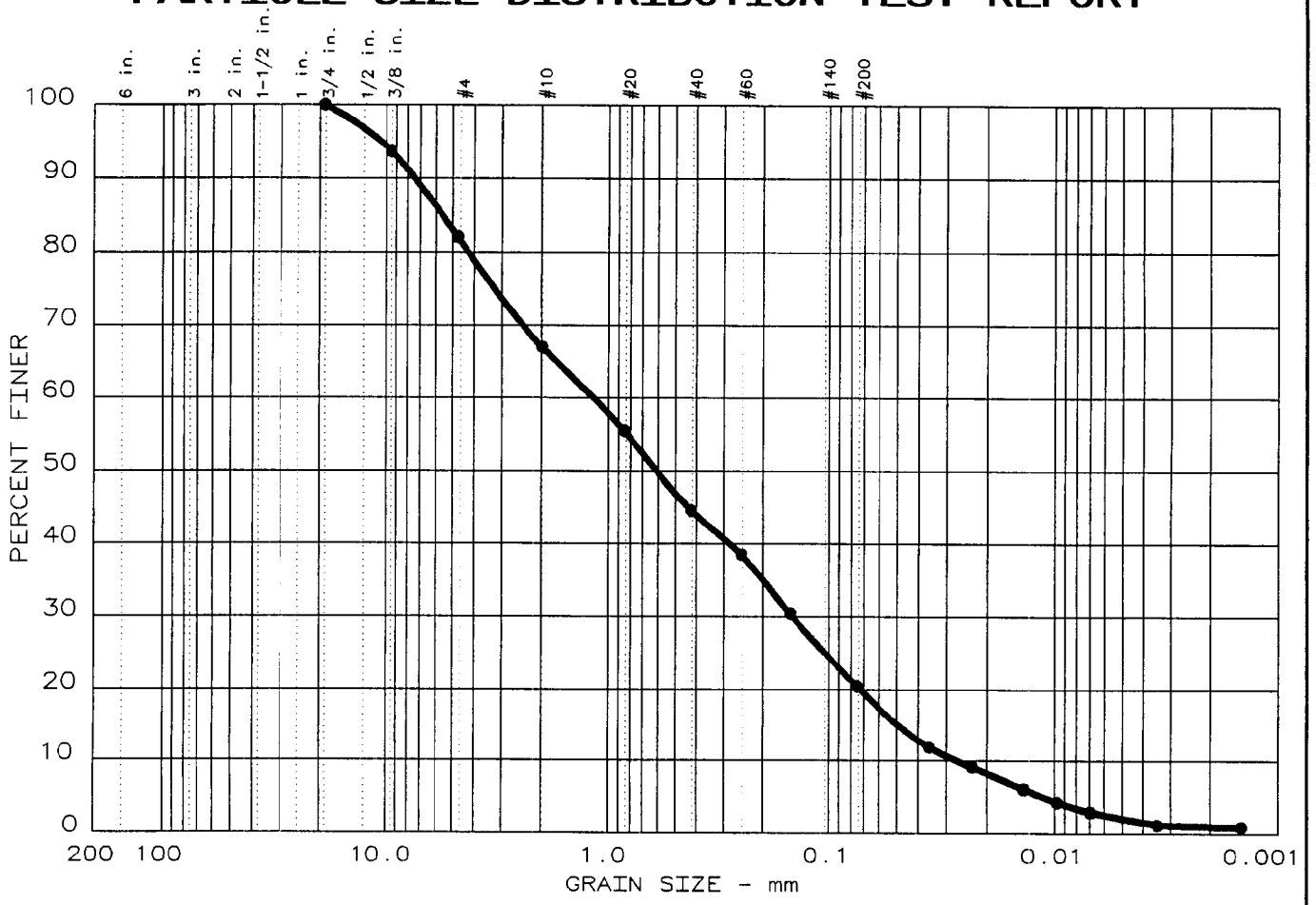
PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	12	0.0	17.9	61.6	18.4	2.1	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
0.75	100.0		
0.375	93.7		
	GRAIN SIZE		
D_{60}	1.16		
D_{30}			
D_{10}	0.0269		
	COEFFICIENTS		
C_c	0.67		
C_u	43.2		

SIEVE number size	PERCENT FINER ●		
4	82.1		
10	67.1		
20	55.6		
40	44.6		
60	38.5		
100	30.4		
200	20.5		

Sample information:
● Boring B-9, S-5, 19-20.5'
Black bottom ash
with gravel

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200: ASTM D1140-00;
Specific Gravity: 2.54

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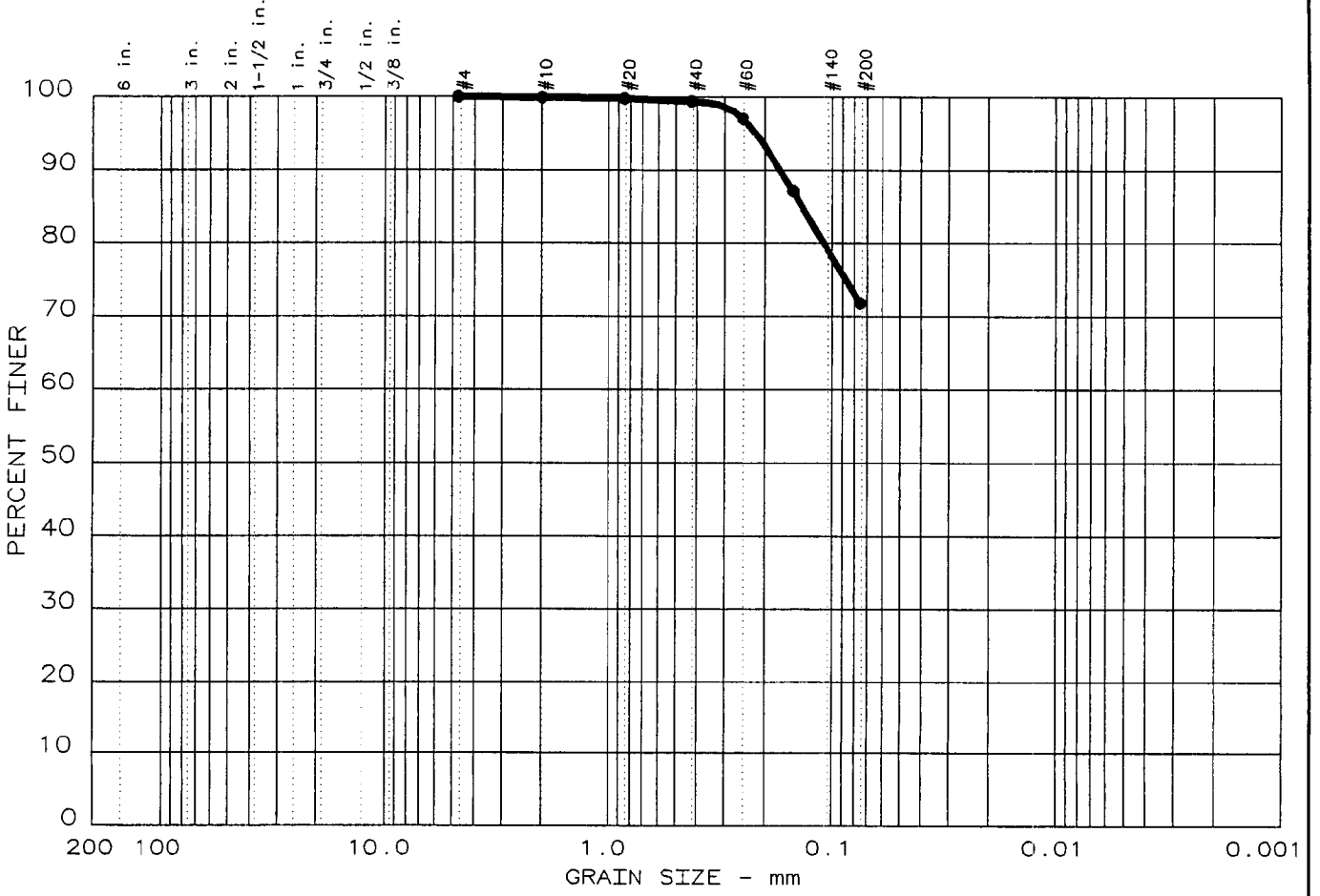
GRAIN SIZE FOR SOIL SAMPLES

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	16	0.0	0.0	28.2	71.8		NT	27	11

SIEVE inches size	PERCENT FINER ●		
GRAIN SIZE			
D_{60}			
D_{30}			
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ●
4	100.0
10	99.9
20	99.8
40	99.4
60	97.0
100	87.1
200	71.8

Sample information:
● Boring B-3,S-4,84-85.5'
Brown lean clay with sand

Remarks:
Methods: Particle Size: ASTM D 422-63(2002); %< No.200:ASTM D1140-00; Sieve Analysis: T 27-99

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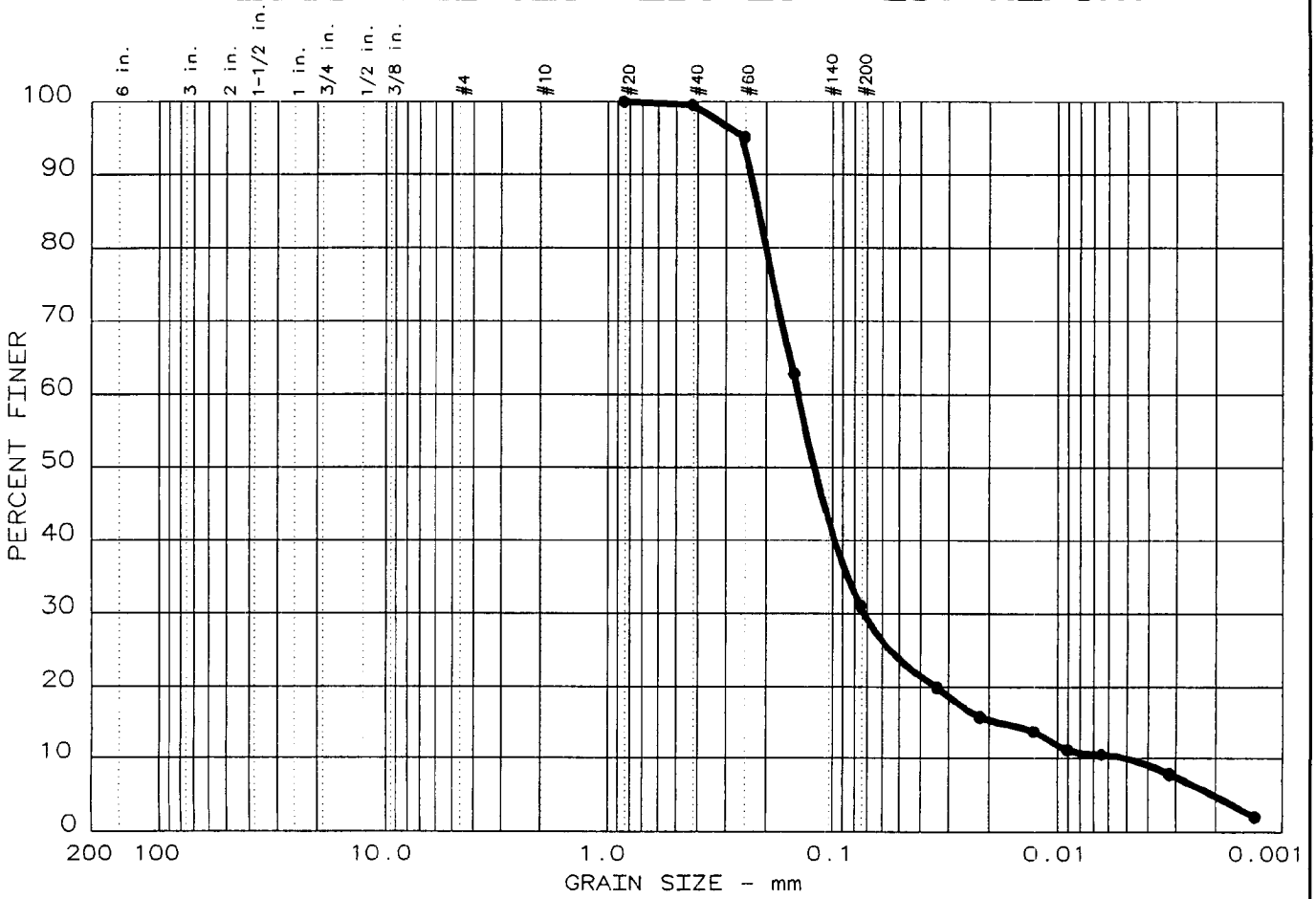
Date: February 9, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	20	0.0	0.0	69.0	21.1	9.9	NT	NT	NT

SIEVE inches size	PERCENT FINER ●		
	GRAIN SIZE		
D_{60}	0.144		
D_{30}			
D_{10}	0.0050		
	COEFFICIENTS		
C_c	7.16		
C_u	28.5		

SIEVE number size	PERCENT FINER ●		
20	100.0		
40	99.5		
60	95.1		
100	62.8		
200	31.0		

Sample information:
● Boring B-3,S-6,94-95.5' Brownish-Yellow silty sand

Remarks:
Methods: Particle Size: ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Specific Gravity: 2.70

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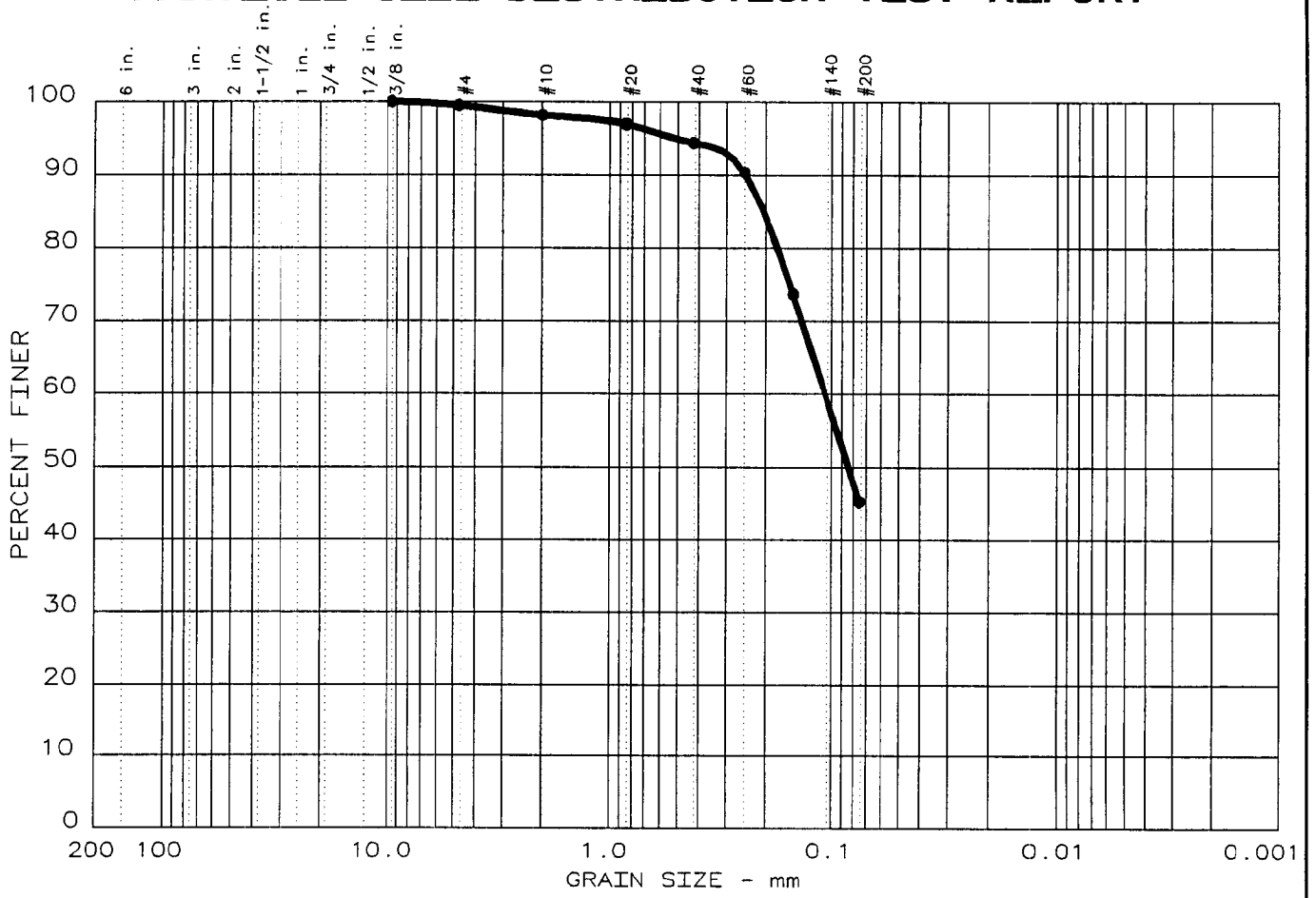
PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	13	0.0	0.5	54.3	45.2		NT	NP	NP

SIEVE inches size	PERCENT FINER ●
0.375	100.0

	GRAIN SIZE
D_{60}	0.107
D_{30}	
D_{10}	

	COEFFICIENTS
C_c	
C_u	

SIEVE number size	PERCENT FINER ●
4	99.5
10	98.2
20	97.0
40	94.4
60	90.4
100	73.7
200	45.2

Sample information:
● Boring B-5,S17,80-81.5'
Tan silty sand

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Sieve Analysis: T 27-99

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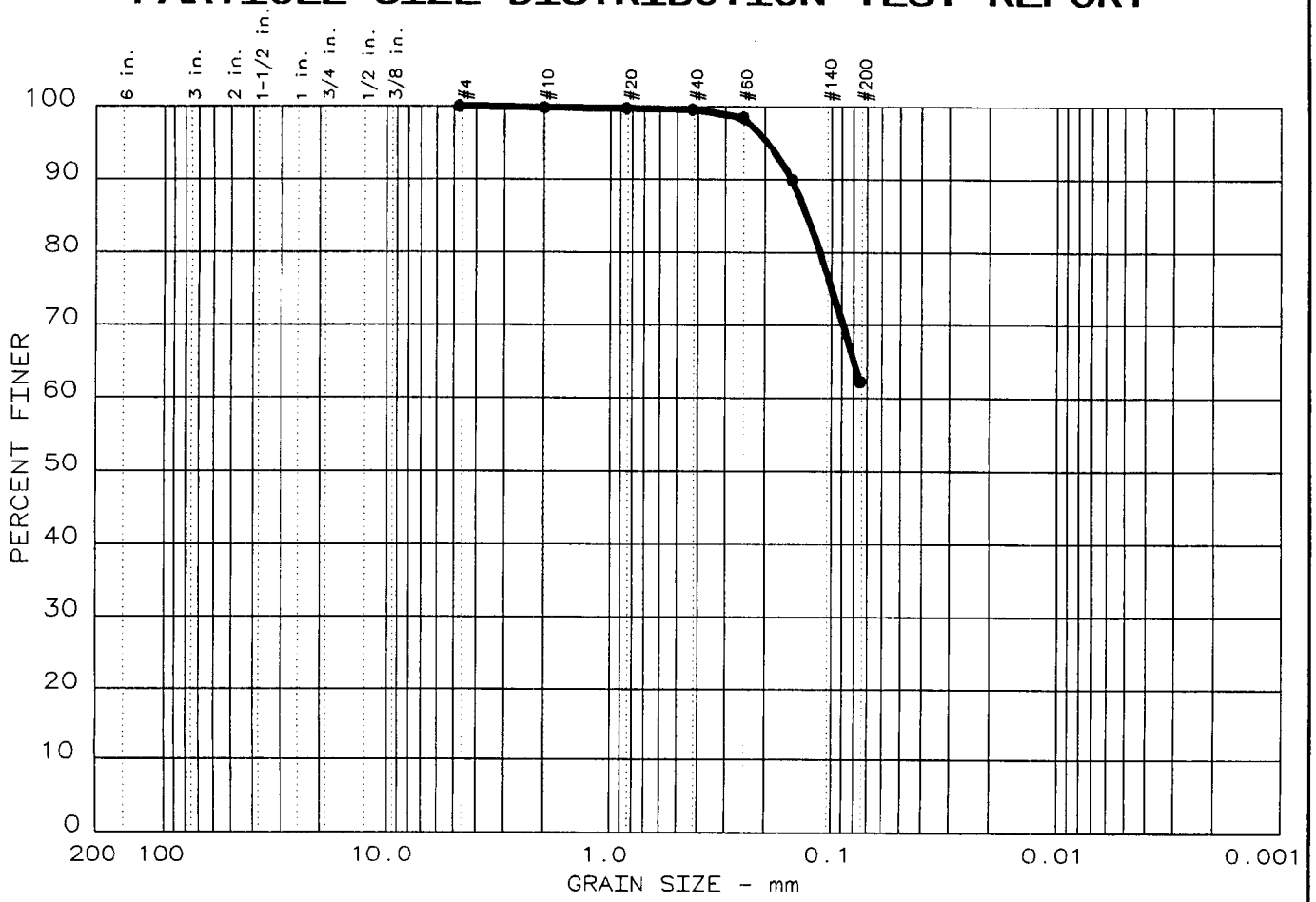
Project: TVA Kingston - Well Installation

Date: February 9, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	17	0.0	0.0	37.7	62.3		CL-ML	20	4

SIEVE inches size	PERCENT FINER ●		
GRAIN SIZE			
D_{60} D_{30} D_{10}			
COEFFICIENTS			
C_c C_u			

SIEVE number size	PERCENT FINER ●
4	100.0
10	99.8
20	99.7
40	99.6
60	98.4
100	89.9
200	62.3

Sample information:
● Boring B-6,S19,90-91.5'
Tan silty clay or
clayey silt with sand

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Sieve Analysis: T 27-99

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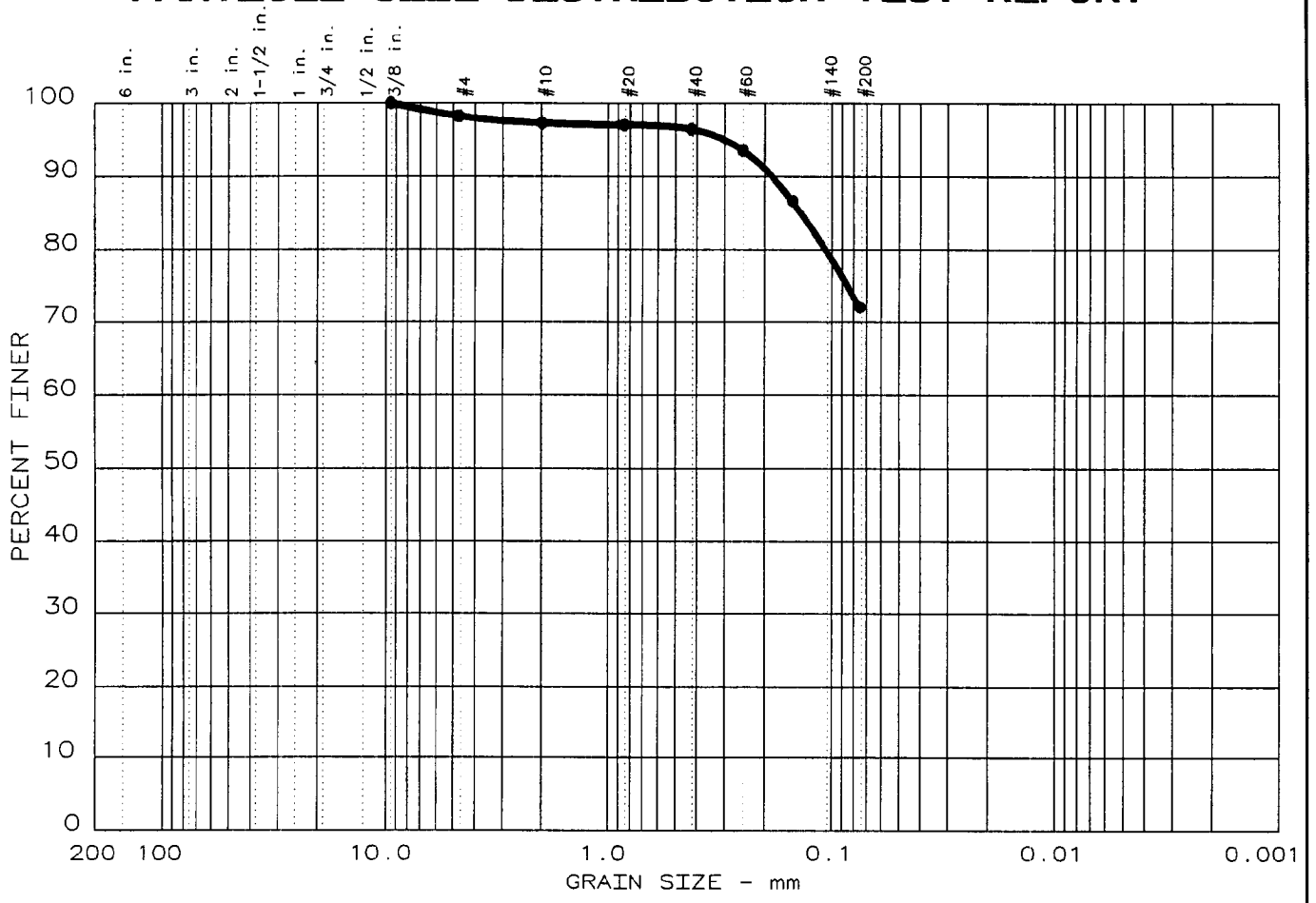
Date: February 14, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	15	0.0	1.8	26.1	72.1		NT	22	6

SIEVE inches size	PERCENT FINER ●		
0.375	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}			
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ●
4	98.2
10	97.3
20	97.0
40	96.5
60	93.6
100	86.7
200	72.1

Sample information:
● Boring B-8,S13,59-60.5'
Gray ash and brown
silty clay with sand

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Sieve Analysis: T 27-99

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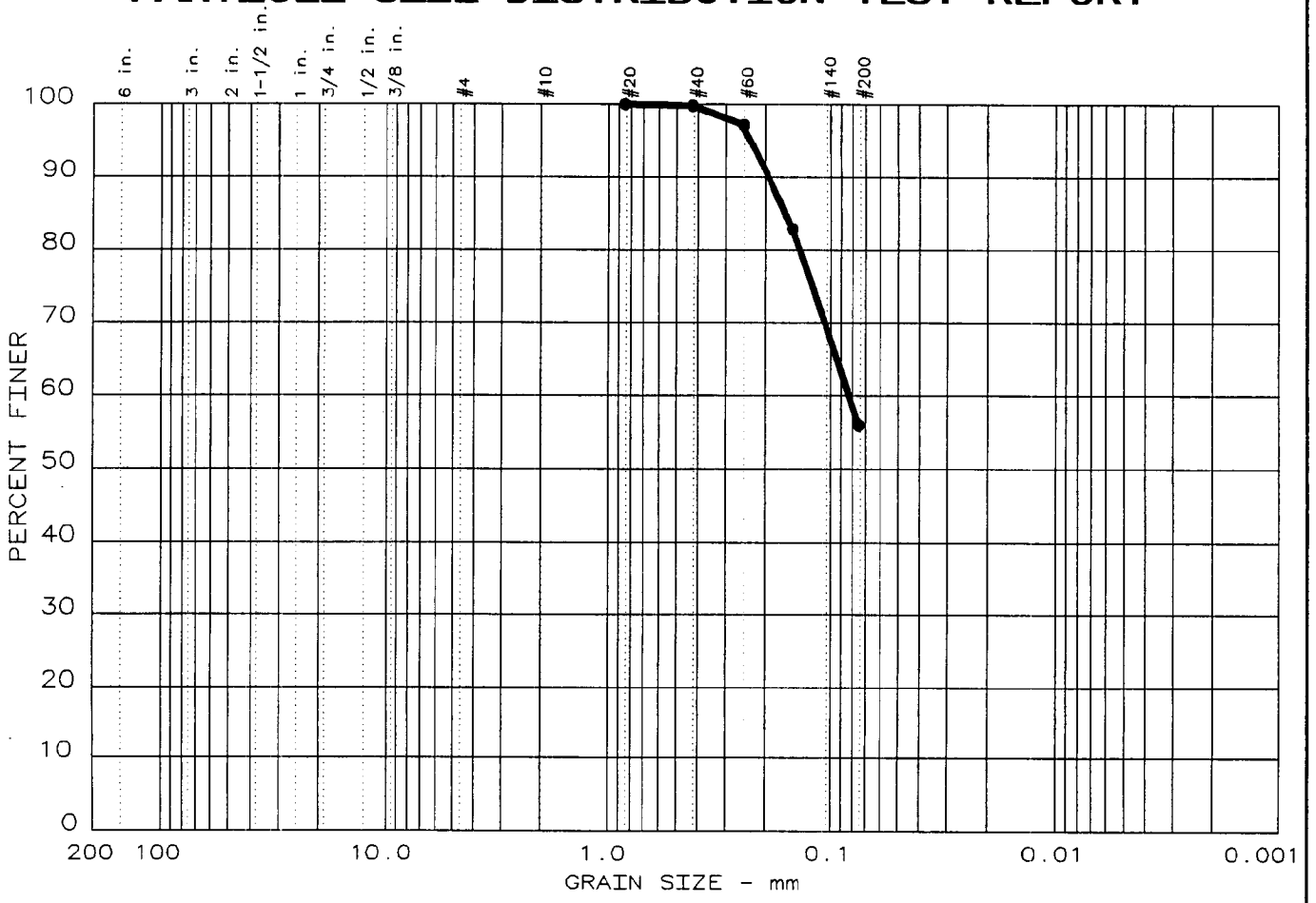
Project: TVA Kingston - Well Installation

Date: February 9, 2005

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PI
●	14	0.0	0.0	44.0	56.0		NT	NP	NP

SIEVE inches size	PERCENT FINER ●		
GRAIN SIZE			
D_{60}	0.0828		
D_{30}			
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ●
20	100.0
40	99.8
60	97.2
100	82.8
200	56.0

Sample information:
● Boring B-9,S10,44-45.5'
Tan sandy silt

Remarks:
Methods: Particle Size:
ASTM D 422-63(2002);
%< No.200:ASTM D1140-00;
Sieve Analysis: T 27-99

Project No.: 3043041063.0001
Project: TVA Kingston - Well Installation

Date: February 9, 2005