

Site: Dickson Co
Borehole: 2.7
VI

DSWM
NEAC

NASHVILLE ENVIRONMENTAL
RECEIVED
FEB 2 1995
TENNESSEE DEPARTMENT
OF ENVIRONMENT
AND CONSERVATION
FIELD OFFICE

GEOTECHNICAL AND
HYDROGEOLOGIC INVESTIGATION
Proposed Landfill Site
for Dickson County
Dickson County, Tennessee



Dickson County Sanitary Landfill
100 Virgil Bellar Drive
Dickson, Tennessee 37055

Prepared By:

ATEC Associates, Inc.
624 Grassmere Park Road
Suite 1
Nashville, Tennessee 37211

May 13, 1992

ATEC Associates, Inc.



624 Grassmere Park Road, Suite 1
Nashville, Tennessee 37211-3662
[615] 331-5016, FAX # [615] 331-5032

May 13, 1992

Mr. Virgil Bellar
Dickson County Sanitary Landfill
100 Virgil Bellar Drive
Dickson, Tennessee 37055

RE: Geotechnical and Hydrogeologic Investigation
Proposed Landfill Site
Dickson County, Tennessee
ATEC File Number: 24-03-92-00010

Dear Mr. Bellar:

In compliance with your recent request, we have completed a geotechnical and hydrogeologic investigation for the above referenced project. It is our pleasure to transmit herewith two (2) copies of our written report of the results of this investigation.

This report contains the results of our findings and an engineering interpretation of these findings with respect to the available project characteristics. We will store the samples for 60 days after which time they will be discarded unless you request otherwise.

If you should have any questions concerning this or any other matter, please feel free to contact us at your convenience. It has been a pleasure working with you on this project.

Respectfully Submitted,

ATEC ASSOCIATES, INC.

L. Greg Stephenson, R.G.
Project Geologist

Timothy G. LaGrow, P.E. SP
Tennessee District Manager

LGS/TGL/da

Enclosure

cc: Mr. Bob Gardner (2)

TABLE OF CONTENTS

SECTION	PAGE
1.0 EXECUTIVE SUMMARY	1
2.0 INTRODUCTION	3
3.0 SITE AND PROJECT CHARACTERISTICS	4
4.0 GENERAL SUBSURFACE CONDITIONS	5
4.1 Soil Profile	5
4.2 Groundwater Conditions	8
5.0 HYDROGEOLOGIC ASSESSMENT	9
6.0 SUMMARY AND CONCLUSIONS	12
7.0 LIMITATIONS OF STUDY	14

GEOTECHNICAL AND HYDROGEOLOGIC INVESTIGATION
PROPOSED LANDFILL SITE FOR
DICKSON COUNTY, TENNESSEE
ATEC FILE NUMBER 24-3-92-00010

1.0 EXECUTIVE SUMMARY

An exploration and evaluation of the subsurface conditions have been conducted at the site of a proposed landfill for Dickson County, Tennessee. The purpose of the investigation was to determine the depth and types of subsoils present throughout the site, to evaluate the suitability of these soils for use as landfill liner and buffer materials, and to provide the required Hydrogeologic Report outlined in the Tennessee Department of Health and Environment (TDHE), Division of Solid Waste Regulations Chapter 1200-1-7-.04(9)(a).

Six (6) exploratory borings have been performed throughout a 35 acre site shown on the enclosed Boring Location Plan. The results of these borings have identified one (1) distinct soil stratum consisting of red, moderate to highly plastic silty clay with varying amounts of chert. This stratum extends to the parent bedrock at depths of 64 feet or greater. The results of our investigation indicate that this stratum is suitable for use as the landfill buffer zone. Laboratory testing indicates that the permeability of the stratum is typically 1.0×10^{-6} centimeters per second (cm/s) or lower.

Hydrogeologic information available for this area indicates that the uppermost aquifer occurs within the Warsaw limestone, approximately 20 to 50 feet below the bedrock surface at this site. The three (3) existing wells at the landfill are suitable to monitor the water moving through the overburden and recharging the underlying aquifer within the bedrock. Additional monitoring points should include the small tributary to Worley Furnace Branch immediately west of the site, and either the two existing private wells south of the landfill or Baker Branch.

2.0 INTRODUCTION

This report presents the results of a geotechnical investigation and hydrogeologic evaluation of the proposed sanitary landfill site in Dickson County, Tennessee. This study was performed for the client, Dickson County Sanitary Landfill, in accordance with our signed proposal dated October 22, 1991.

The scope of this investigation included a review of available geologic data for the project area, an engineering reconnaissance of the project location, a subsurface investigation consisting of six (6) soil test borings located as shown on the attached Boring Location Plan, field and laboratory soil testing, and an engineering analysis and evaluation of the subsurface materials encountered.

The purpose of the investigation was to determine the types of subsoils present throughout the site, to evaluate the suitability of these soils for use as landfill liner and buffer materials, and to provide the required Hydrogeologic Report outlined in the Tennessee Department of Health and Environment (TDHE), Division of Solid Waste Regulations Chapter 1200-1-7-.04(9)(a).

3.0 SITE AND PROJECT CHARACTERISTICS

The proposed landfill site is located on a 40 acre tract of land on the north side of Eno Road, just east of Adcock Road, in Dickson County. The site is approximately 1.5 miles east of Dickson, Tennessee and 4.5 miles north of Interstate 40. Figure 1 in Appendix A depicts the location of the property. The site is bordered to the north and west by wooded areas, Worley Furnace Branch and its tributaries. The property to the east is also partially wooded and partially developed.

Five (5) acres of the property on the east side of the site are currently being used as a landfill under the old regulations. This section of the landfill will be closed while the remaining 35 acres will be permitted under the new regulations. Current operations consist of excavating approximately 20 feet of overburden and placing bailed refuse above the natural undisturbed soil. It is expected that the newly permitted landfill design will require excavation of the residual overburden to a predetermined depth on which to construct a landfill liner system in accordance with Tennessee Division of Waste Management regulations. Conversations with the client and Mr. Bob Gardner (project designer) indicate that a synthetic liner will be used to meet the minimum liner design standard outlined in Section 1200-1-7-.04(4)(a)

The topography of the 35 acres proposed as landfill is partially wooded. This property can best be described as gently rolling. A topographic survey of the property is included on the Boring Location Plan (Figure 2) in Appendix A.

Boring No.	1	3	5	6
Depth (ft)	25.0-26.5	30.0-32.0	18.5-20.0	15.0-15.6
Density (pcf)	109.6	97.3	104.0	118.8
Moisture Content (%)	18.3	25.4	19.1	11.9
Rate of Permeability (cm/sec)	3.4×10^{-7}	6.5×10^{-8}	1.5×10^{-6}	1.5×10^{-7}

All borings were extended to a depth of auger refusal between 23.0 to 45.0 feet below the present ground surface. Based on past drilling at the site, we believe that refusal occurred on dense chert beds within the soil. Limestone bedrock is expected to be approximately 65 to 90 feet below the present ground surface.

Published geologic information indicates that the underlying bedrock is the St. Louis Limestone of the Mississippian Period. This bedrock consists of a pale to dark yellowish brown, fine to very coarse grained, thin to very thick bedded limestone. Local beds of extremely cherty, olive gray, calcareous siltstone or very silty limestone exist, especially near the base of the formation. Bedrock exposures are rare in this area. In most cases, the bedrock has weathered to a thick stratum of reddish clay soil and angular blocks of chert, similar to that described in our borings.

It should be noted that the St. Louis Limestone is a formation highly susceptible to dissolution along joints and bedding planes in the rock mass. This weathering can result in soil piping and other forms of internal soil erosion which can result in ground subsidence. These features are not prominent in the Dickson area. No sinkholes were observed on the Dickson 7.5 minute quadrangle map within a 1.5 mile radius of the site.

5.0 HYDROGEOLOGIC ASSESSMENT

Four monitoring wells currently exist at the site, one of which has been dry since installation. The location of the three (3) active wells is shown on the Boring Location Plan. The construction of the three active wells is reported to consist of 4 inch PVC pipe, screened from 10 to 20 feet above the bedrock surface. The screened interval is surrounded by pea gravel to approximately 5 feet above the top of the screen with a 2 to 5 foot thick bentonite seal above the gravel. The remainder of the riser pipe is surrounded by cement.

Groundwater elevation readings taken on March 16, 1992 revealed the following data.

WELL	SURFACE ELEV.	BOTTOM WELL EL.	DEPTH TO WATER (ft)	WATER ELEV.
1	861.9	772.9	78.0	783.9
2	830.9	766.4	19.2	811.7
4	831.2	747.2	35.2	796.0

The results of these readings indicate that the groundwater being monitored by these wells is perched within the overburden immediately above the bedrock surface. The placement of the screened interval within the relatively impermeable clays immediately above the bedrock will allow for the groundwater to mound at the well points. This has resulted in an undefinable groundwater flow direction in the overburden using these three wells.

A review of the report "Groundwater in the Dickson Area of the Western Highland Rim of Tennessee", published in 1984, reveals that the groundwater in this area occurs primarily in the Warsaw Limestone, the top of which is near Elev. 720 to 750. Figure 3 in Appendix A shows the location of 20 known wells within a 1 mile radius

Materials excavated from the site should be adequate for use as temporary and final cover material. Final confirmation should be made on remolded permeabilities of representative samples taken from the borrow source. At this time, we expect that the soil removed during excavation will be used. The soil should be compacted to at least 95 percent of the standard Proctor maximum dry density within a moisture range of zero (0) to three (3) percent above optimum. Final recommendations can be made after testing of the soil.

Our review of the available hydrogeologic information indicates that the existing well placement at the site intersects the groundwater recharging the underlying aquifer in the Warsaw limestone. Based on the site topography, Well No. 1 is up gradient and Well Nos. 2 and 4 are down gradient. These wells have a good chance of intersecting any contaminated groundwater moving through the overburden before it reaches the aquifer. To properly use these wells, it will be necessary to bail them on a monthly basis before sampling to insure proper recharge and groundwater movement to the wells because of mounding effects.

In addition to the three (3) existing monitoring well points, it is recommended that monitoring occur in the small tributary to Worley Furnace Branch immediately west of the site, and the private wells owned by J. Pickett and R. Buchannan south of the site. If these wells are unavailable to monitor, then a monitoring point should be set up at Baker Branch.

APPENDIX A

Figure 1 - Site Location Map

Figure 2 - Boring Location Plan

Figure 3 - Water Well Location Map

Figure 4 - Potentiometric Contour Map of Dickson Area

Table No. 1 - Water Well Location Information

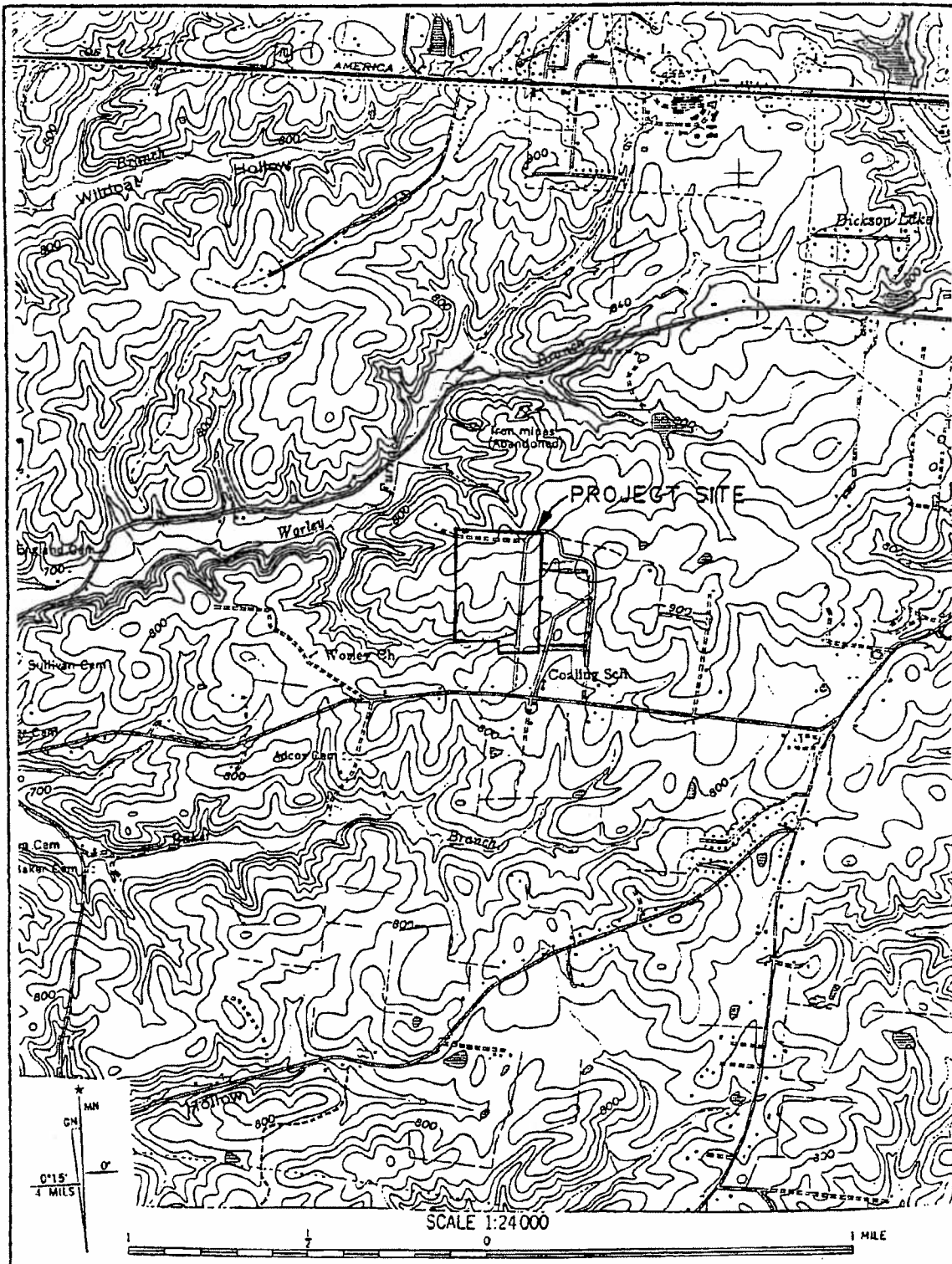
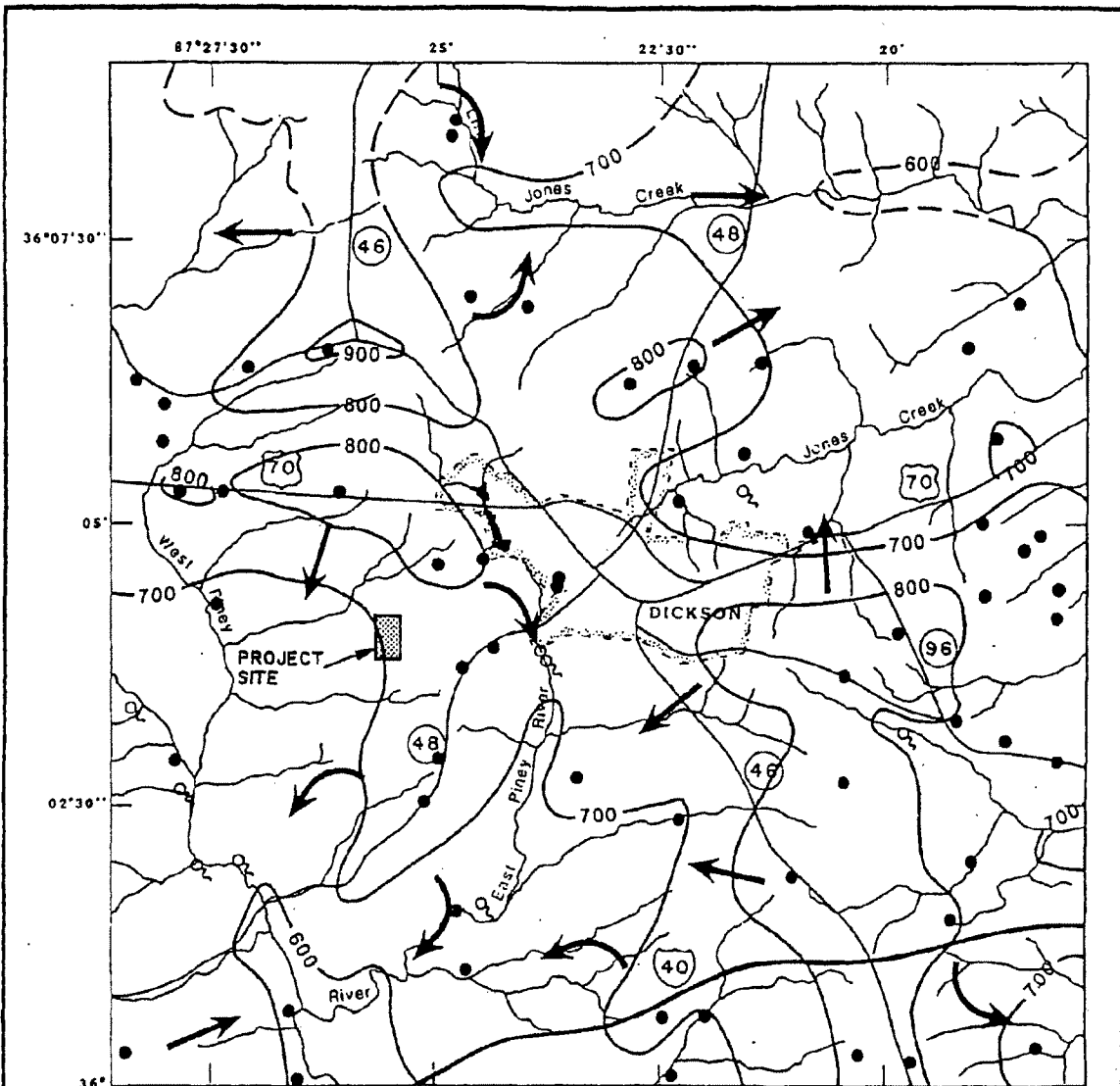


FIGURE I-SITE LOCATION MAP				DICKSON, TENNESSEE 7.5 MINUTE TOPOGRAPHIC MAP	
PROJECT NAME DICKSON LANDFILL DICKSON, TENNESSEE				PROJECT NO. 24-03-92-00010	DATE APRIL 6, 1991



36°07'30"
05'
02'30"
36°

87°27'30" 25° 22'30" 20"

Base from U.S. Geological Survey, 1:24,000 quadrangles: Burnet (1953), Charlotte (1958), Dickson (1953), and Van Lear (1958)

4000 0 4000 8000 FEET
1000 0 1000 2000 METERS

Hydrology modified from Marcher, Bingham, and Lounsbury (1984)

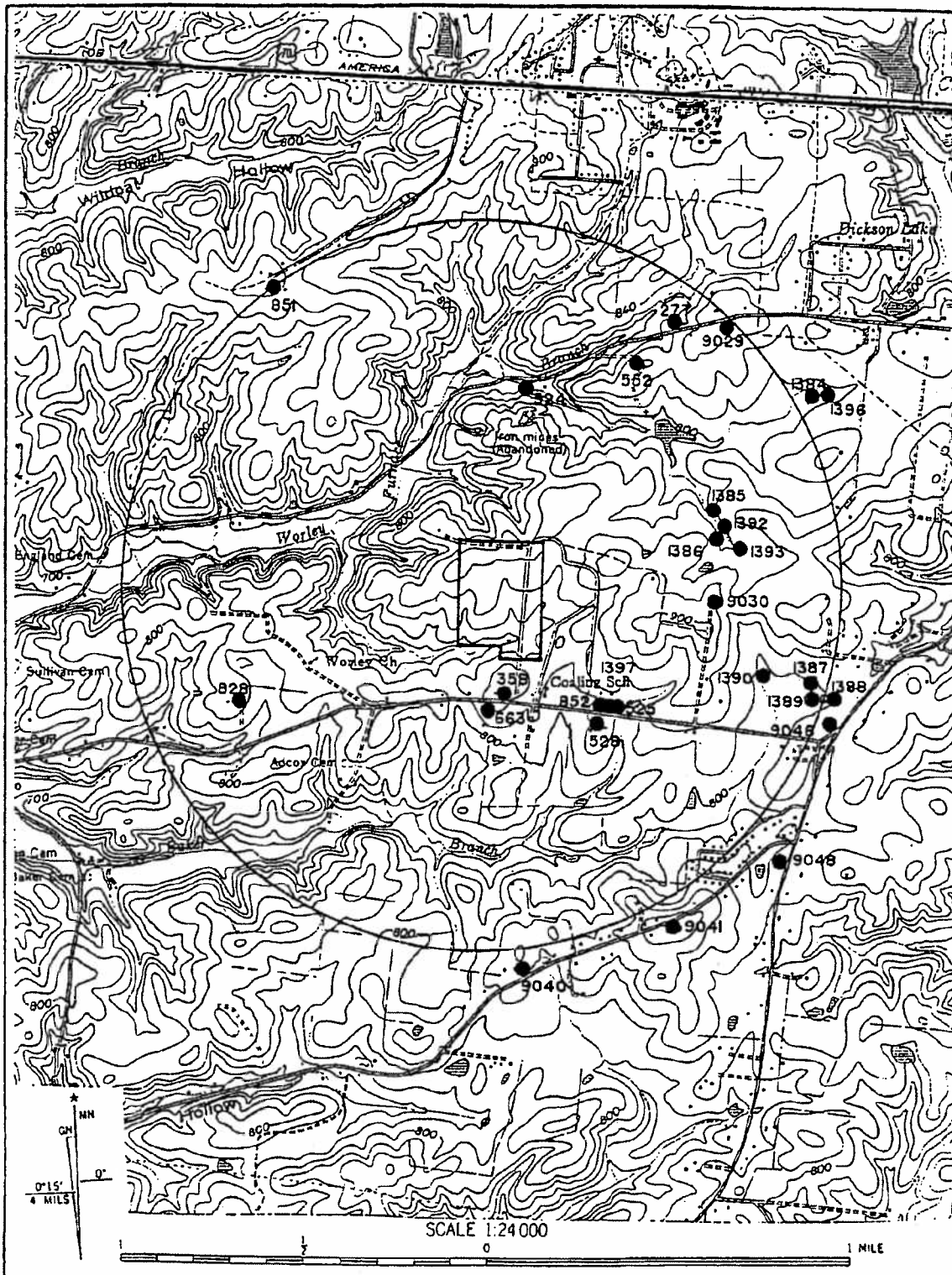
EXPLANATION

- 600 --- POTENTIOMETRIC CONTOUR ---
Shows altitude of water table, March 1960. Dashed lines are approximately located. Contour interval 100 feet. National Geodetic Vertical Datum of 1929
- Wells with water levels measured March, 1960
- Springs
- Direction of ground-water flow

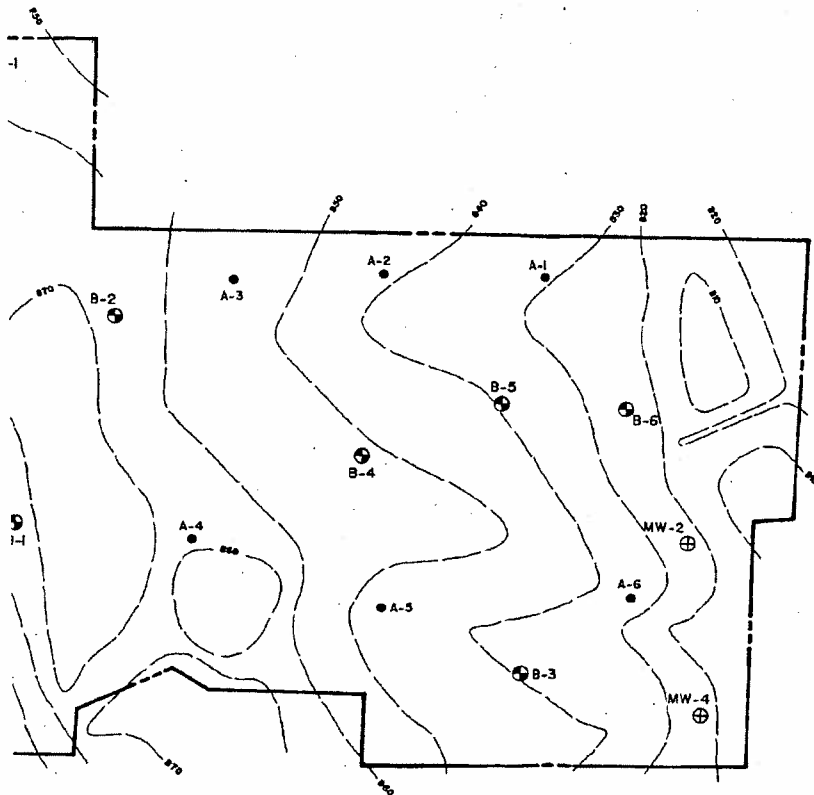
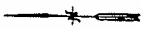
FIGURE 4			GROUND-WATER LEVELS AND DIRECTION OF FLOW	
PROJECT NAME DICKSON LANDFILL DICKSON, TENNESSEE			PROJECT NO. 24-03-92-00010	DATE APRIL 6, 1991

TABLE NO. 1
DICKSON COUNTY SANITARY LANDFILL
WATER WELL INFORMATION

WELL NO.	OWNER	DATE COMPLETED	TOTAL DEPTH	TOTAL YIELD	WATER		USE
					BOTTOM CASING	BEARING ZONE	
277	C. Bradford	4/18/67	100	5	87	85	Home
358	J. Puckett	7/12/68	160	3	79	220	Home
521	J. Holt	3/25/64	129	4	128	125	Home
525	R. Holt	7/16/70	300	2	98	260	Home
528	A. Harris	8/31/70	360		71	120	Home
552	G. Donegan	2/24/70	105	50	100	100	Home
663	R. Buchanan	7/30/71	130	10	127	130	
828	E. Lovelace	4/28/73	200	2	47		Home
851	J. Horner	6/18/73	160	5			Home
852	H. Holt	6/25/73	340		160		Home
1384	City of Dickson	12/1/80	300	4	136	220	Municipal
1385	City of Dickson	10/20/80	160	400	106	143	Municipal
1386	City of Dickson	10/6/80	250	20	106	116	Municipal
1387	City of Dickson	10/4/80	300	8	103	252	Municipal
1388	City of Dickson	10/2/80	250	150	181	197	Municipal
1389	City of Dickson	8/4/80	300	150	144	180	Municipal
1390	City of Dickson	7/24/80	350	14	115	307	Municipal
1392	City of Dickson	7/14/81	280	165	127	145	Municipal
1393	City of Dickson		320	12	162	245	Municipal
1396	City of Dickson	7/7/80	280	110	127	130	Municipal
1397	City of Dickson	7/2/80	340	175	318	330	Municipal
9029	K. Walker		75		75		Home
9030	J. Robinson		212		107		Home
9040	D. Sanders		110		100		Home
9041	D. Sanders		138				Home
9046	D. Donegan		125				Home
9048	W. R Street		155		155		Home




<p>FIGURE 3 - WATER WELL LOCATION</p>			<p>DICKSON, TENNESSEE 7.5 MINUTE TOPOGRAPHIC MAP</p>	
<p>PROJECT NAME DICKSON LANDFILL DICKSON, TENNESSEE</p>			<p>PROJECT NO. 24-03-92-00010</p>	<p>DATE APRIL 6, 1991</p>



LEGEND:

- ⊕ ATEC TEST BORING LOCATION
- LAW ENGINEERING BORING
- ⊕ EXISTING MONITORING WELL LOCATION

CLIENT DICKSON COUNTY SANITARY LANDFILL	
PROJECT DICKSON COUNTY SANITARY LANDFILL DICKSON COUNTY, TENNESSEE	
PROJECT NO. 24-03-92-00010	FIGURE NO. 2
SCALE 1" = 200'	DATE APRIL

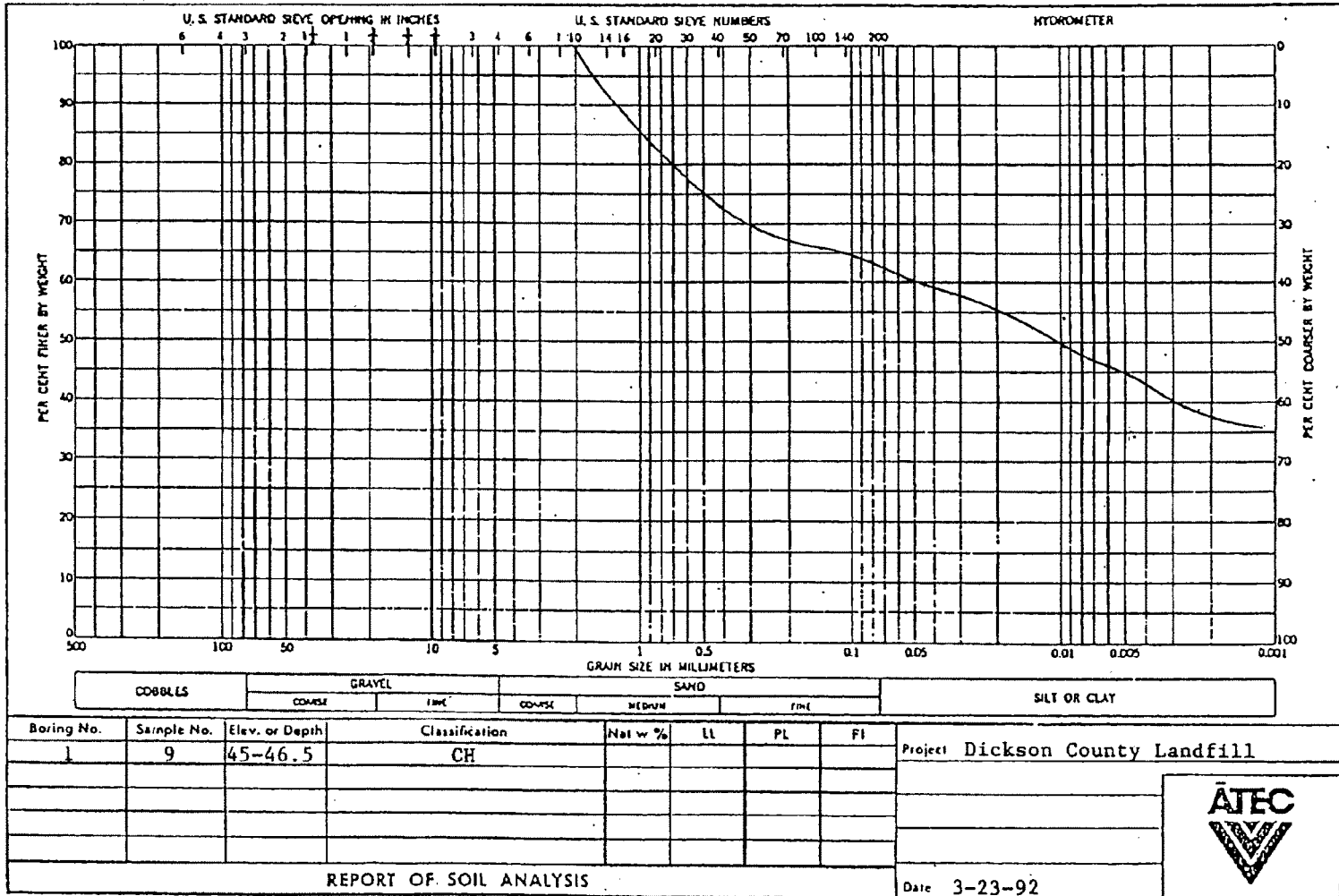


DICKSON COUNTY SANITARY LANDFILL
LABORATORY TEST RESULTS SUMMARY

<u>BORING</u>	<u>SAMPLE</u>	<u>DEPTH</u>	<u>SAMPLE</u>		<u>ATTERBERG LIMITS</u>				<u>HYDROM</u>	<u>PERM. (cm/sec)</u>
			<u>TYPE</u>	<u>CLASS.</u>	<u>LL</u>	<u>PL</u>	<u>PI</u>	<u>SIEVE</u>		
1	1	6.0-6.5	SS							
	2	10-11.5	SS	CL	34	21	13			
	3	15-16.5	SS							
	4	20-21.5	SS	CL	37	17	20			
	5	25-26.5	SS							3.4E-07
	6	30-31.5	SS	GP						
	7	35-36.5	SS							
	8	40-41.5	CS	CH	54	22	42			
	9	45-46.5	SS							
	10	50-51.5	SS							
2	1	1.0-2.5	SS							
	2	3.5-5.0	SS	CL	48	20	25			
	3	6.0-7.5	SS	GP						
	4	8.5-10	SS							
	5	13.5-15	SS	CL	35	18	20			
	6	18.5-20	SS							
	7	23.5-25	SS	GP						
	8	28.5-30	SS							
	9	33.5-35	SS							
3	1	15-16.5	SS	GP						
	2	20-21.5	CS							
	3	25-26.5	SS							
	4	30-32	CS							0.5E-06
	5	35-36.5	SS	CH	58	21	35			
	6	40-41.5	SS							
	7	45-46.5	SS							
4	1	6.0-8.5	SS	GP						
	2	10-11.5	SS	CH	56	24	32			
	3	15-16.5	CS							
	4	20-21.5	SS							
	5	25-26.5	SS							
	6	30-31.5	SS	GP						
	7	35-36.5	SS							
	8	40-41.5	SS	CL	47	18	29			

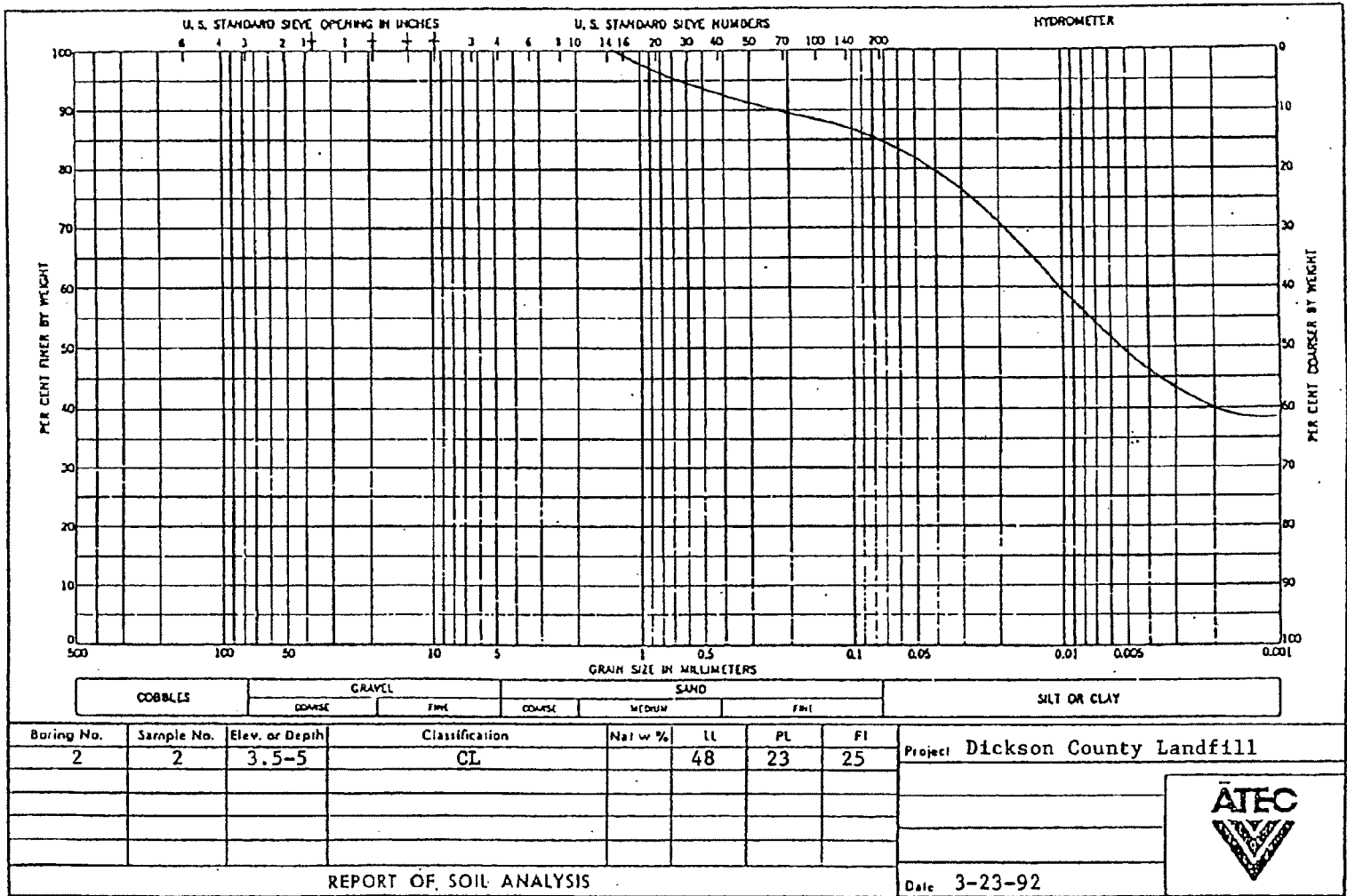
<u>BORING</u>	<u>SAMPLE</u>	<u>DEPTH</u>	<u>SAMPLE</u>		<u>ATTERBERG LIMITS</u>				<u>HYDROM</u>	<u>PERM.</u>
			<u>TYPE</u>	<u>CLASS.</u>	<u>LL</u>	<u>PL</u>	<u>PI</u>	<u>SIEVE</u>		
5	1	6.0-8.6	SS	GP						
	2	10-11.6	SS							
	3	13-15	ST							
	4	20-22	GT							1.5E-06
	5	25-27	CS							
	6	35-38.6	SS							
	7	40-42	ST							
8	1	15-16.6	CS							1.5E-07
	2	20-21.6	SS							
	3	25-26.6	SS	?						
	4	30-31.6	SS	CL	41	21	20			
	5	35-36.6	SS	GP						
	6	40-41.6	SS							
AVERAGE					42	17	24			

* See enclosed graph sheet



Boring No.	Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	FI	Project
1	9	45-46.5	CH					Dickson County Landfill
REPORT OF SOIL ANALYSIS								Date 3-23-92



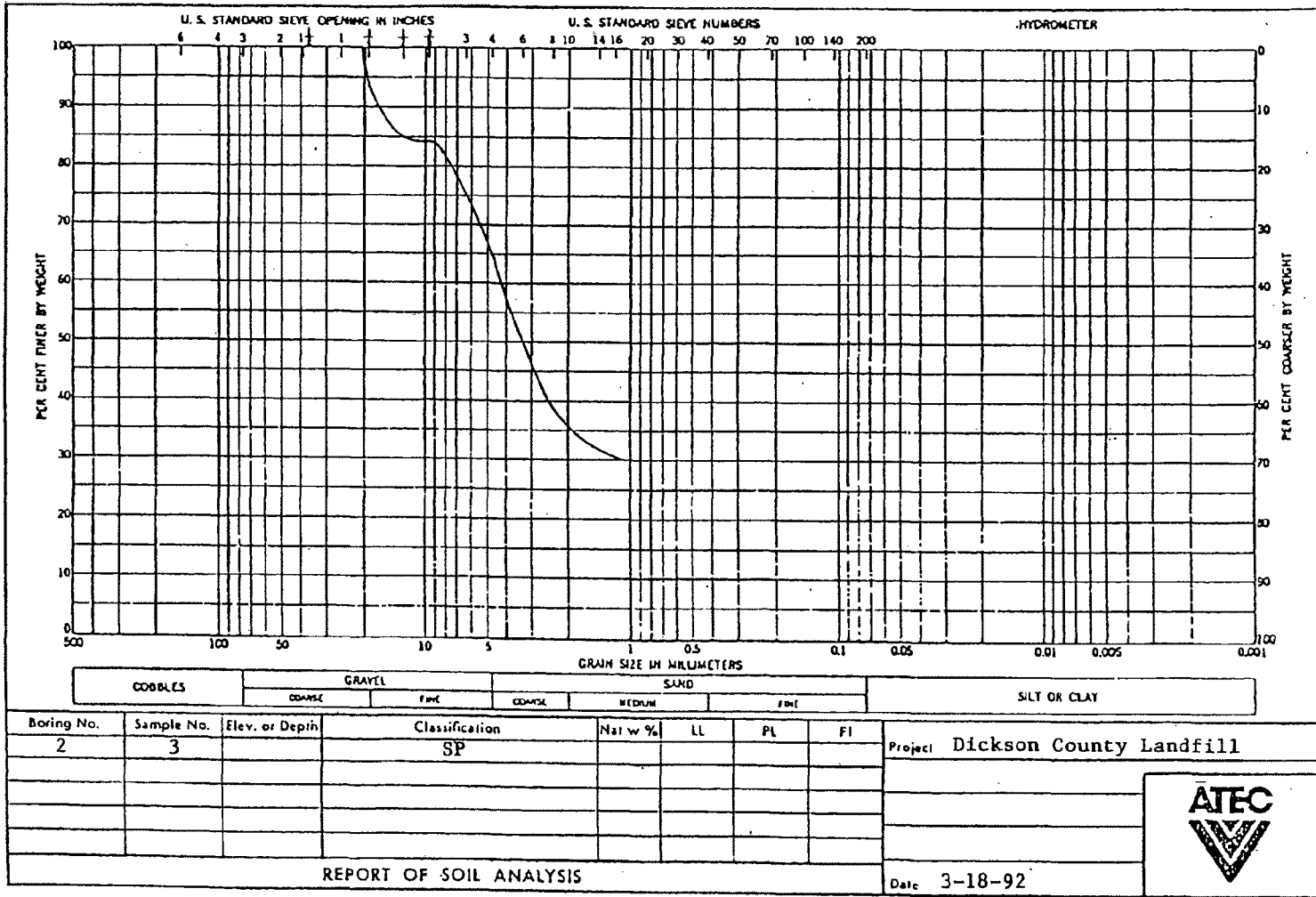


Project Dickson County Landfill



REPORT OF SOIL ANALYSIS

Date 3-23-92



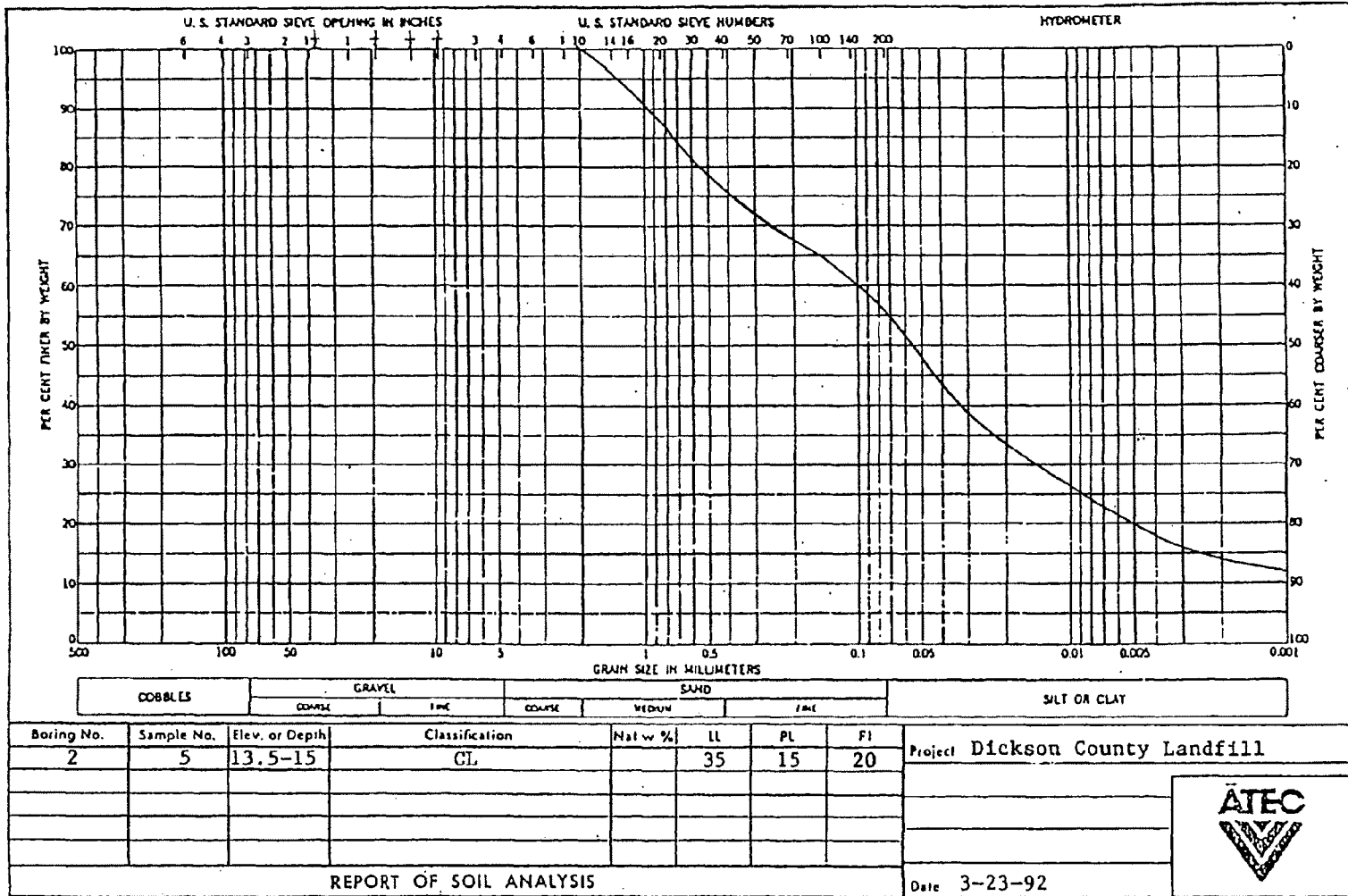
COBBLES	GRAYEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

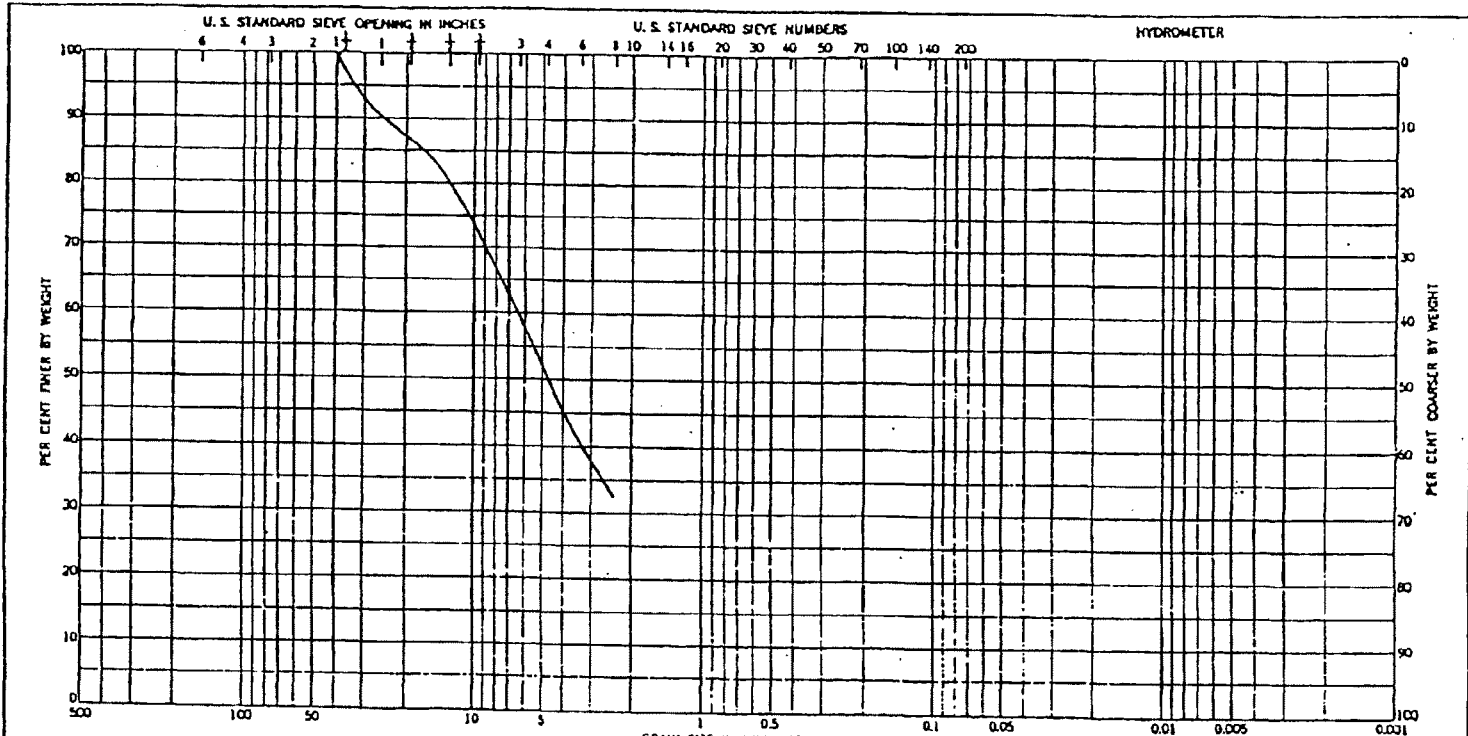
Boring No.	Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	FI	Project
2	3		SP					Dickson County Landfill

REPORT OF SOIL ANALYSIS

Date 3-18-92



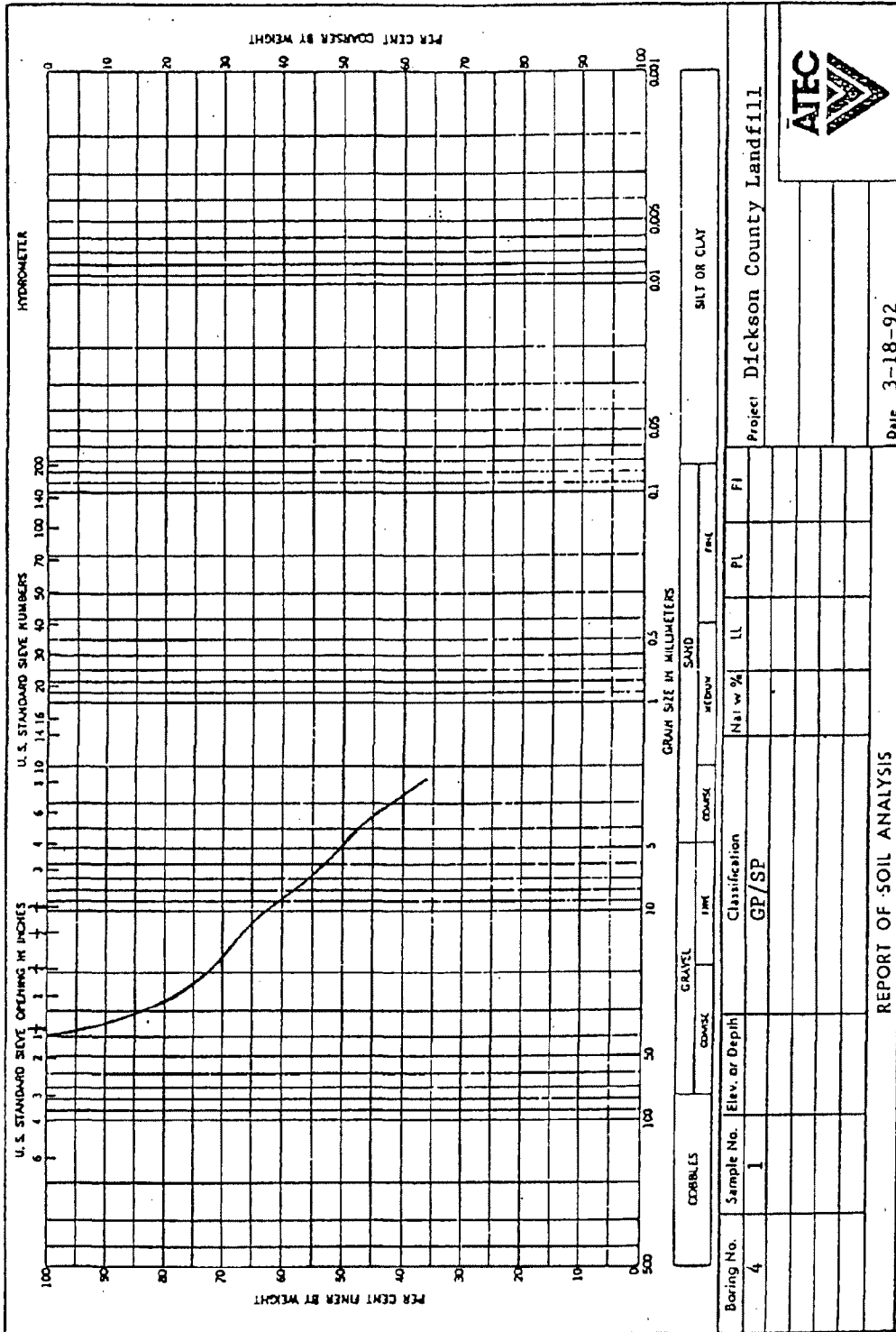




COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Boring No.	Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	FI	Project
3	1		GP/SP					Dickson County Landfill
REPORT OF SOIL ANALYSIS								Date 3-18-92



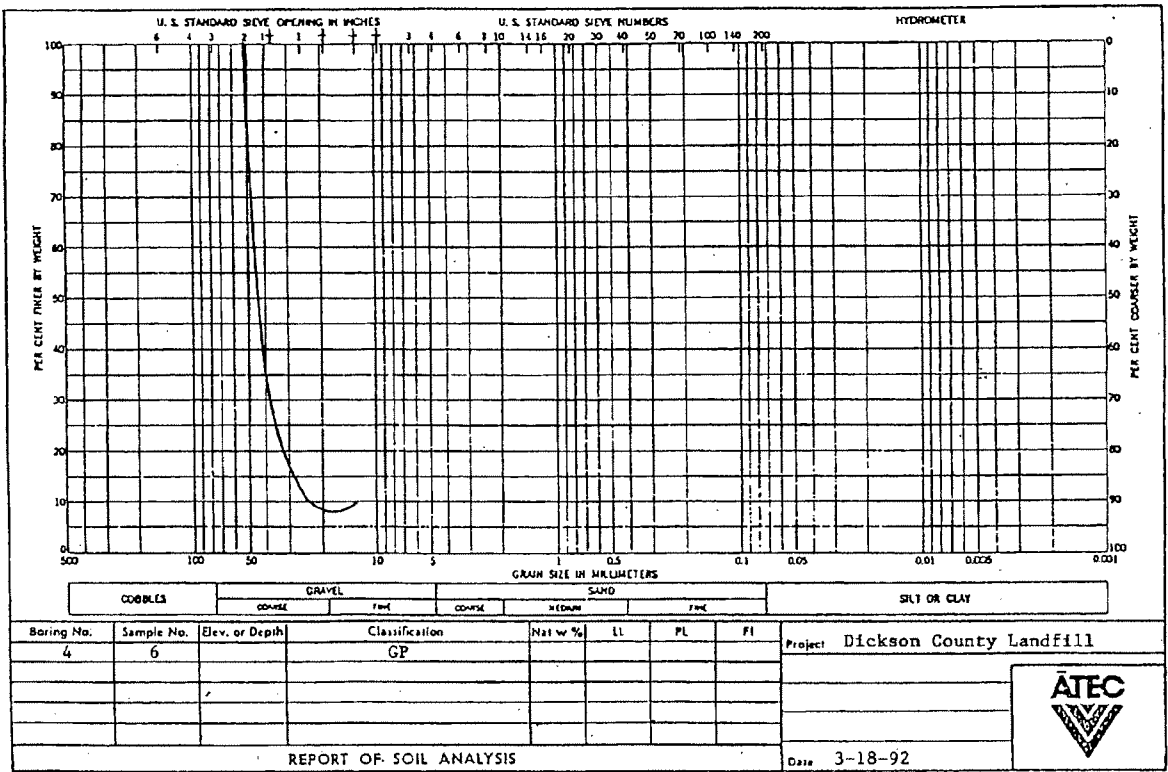


Project: Dickson County Landfill

Date: 3-18-92

COBBLES		GRAVEL		FINE SAND		SILT OR CLAY	
Sample No.	Elev. or Depth	Classification	LL	PL	PI		
4	1	GP/SP					

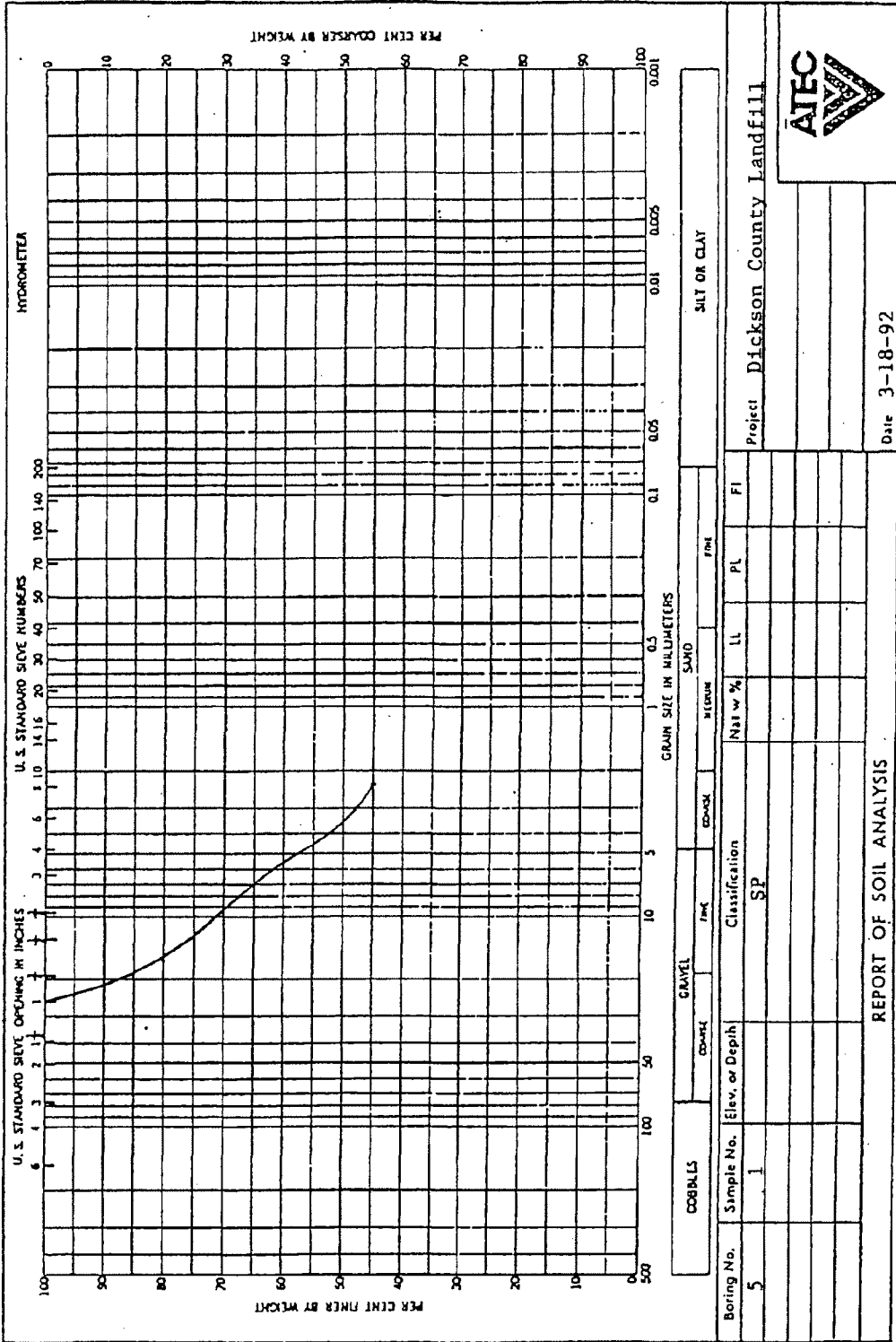
REPORT OF SOIL ANALYSIS



REPORT OF SOIL ANALYSIS

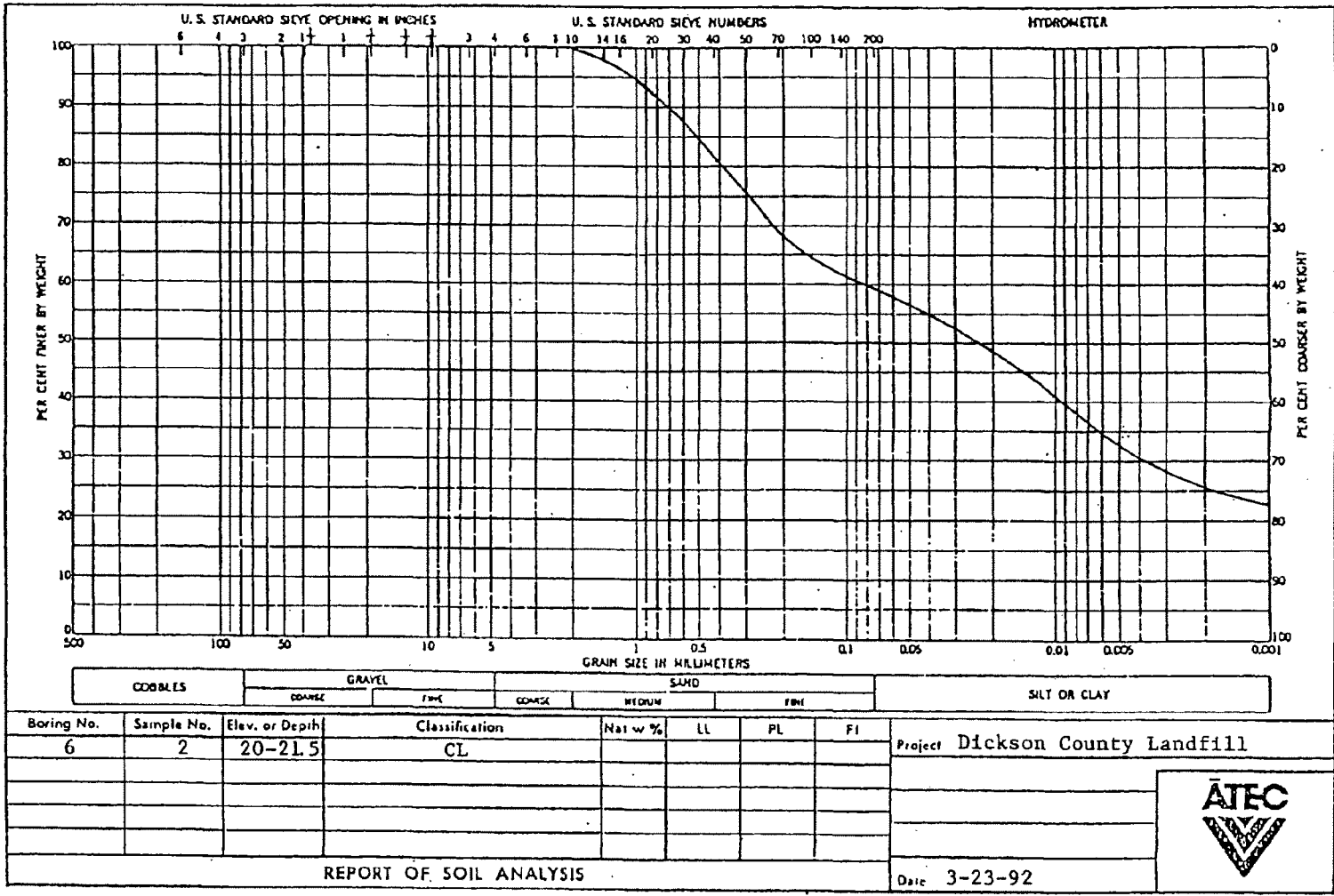
Date 3-18-92





COBBLES		GRAVEL		FINE SAND		MEDIUM SAND		FINE SILT OR CLAY	
Boring No.	Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	FI	Project	
5	1		SP					Dickson County Landfill	
REPORT OF SOIL ANALYSIS								Date	
								3-18-92	

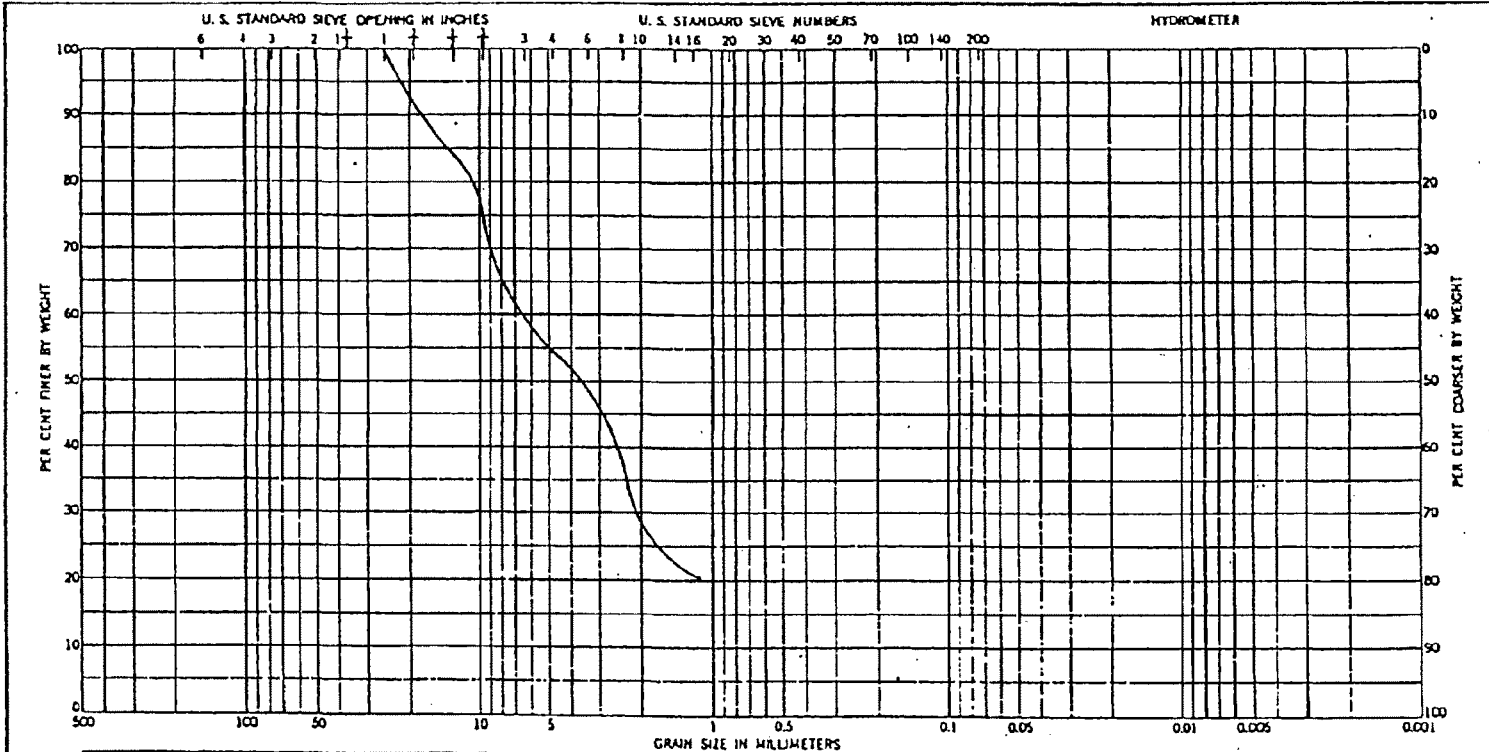




REPORT OF SOIL ANALYSIS

Date 3-23-92





COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		

Boring No.	Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	PI	Project
6	5		SP					Dickson County Landfill
REPORT OF SOIL ANALYSIS								Date 3-18-92



APPENDIX C

Logs of Boring

Field Classification System for Soil Exploration

Important Information About Your Geotechnical Engineering Report

Client Dickson County Sanitary Landfill Boring # B-1 Page 2 of 2
Architect Engineer Gardner Engineering Job # 24-03-92-00010
Project Name Dickson County Sanitary Landfill Drawn By JO
Project Location Dickson, Tennessee Approved By TL

TEST DATA

DRILLING AND SAMPLING INFORMATION

Date Started 03/03/92 Hammer Wt. 140 lbs.
Date Completed 03/03/92 Hammer Drop 30 in.
Drill Foreman DV Spoon Sampler O.D. 2 in.
Inspector JS Rock Core Dia. _____ in.
Boring Method HSA Shelby Tube O.D. _____ in.

SOIL CLASSIFICATION	STRATUM DEPTH	DEPTH SCALE	SAMPLE NO.	SAMPLE TYPE	% RECOVERY	GROUND WATER	Standard Penetration Test N, Blows/Ft.	Unconfined Compressive Strength q _u Tons/Ft. ²	Pocket Penetrometer q _p Tons/Ft. ²	Natural Dry Density lbs./cu. ft.	Water Content %	Atterberg Units LL - Liquid Limit PL - Plastic Limit
	29.0											
Orange to red moist stiff to hard silty clay (CH) and chert gravel with trace fine sand		30	6	SS	55		17					
some small chert below 35.0 feet		35	7	SS	100		31					
		40	8	CS	33							
			9	SS	30		50+					LL=64 PL=22
		45	10	SS	100		21					
		50										
	51.5		11	SS	100		21					
Boring discontinued at 51.5 feet												

SAMPLER TYPE
SS—DRIVEN SPLIT SPOON
ST—PRESSED SHELBY TUBE
CA—CONTINUOUS FLIGHT AUGER
RC—ROCK CORE

GROUND WATER DEPTH
▽ AT COMPLETION _____ FT.
▽ AFTER _____ FT.
WATER ON RODS _____ FT.

BORING METHOD
HSA—HOLLOW STEM AUGERS
CFA—CONTINUOUS FLIGHT AUGERS
DC—DRIVING CASING
MD—MUD DRILLING

Client Dickson County Sanitary Landfill Boring # B-2 Page 1 of 2
Architect Engineer Gardner Engineering Job # 24-03-92-00010
Project Name Dickson County Sanitary Landfill Drawn By JO
Project Location Dickson, Tennessee Approved By TT

TEST DATA

DRILLING AND SAMPLING INFORMATION

Date Started 02/14/92 Hammer Wt. 140 lbs.
Date Completed 02/20/92 Hammer Drop 30 in.
Drill Foreman DV Spoon Sampler O.D. 2 in.
Inspector JS Rock Core Dia. _____ in.
Boring Method HSA Shelby Tube O.D. _____ in.

SOIL CLASSIFICATION	STRATUM DEPTH	DEPTH SCALE	SAMPLE NO.	SAMPLE TYPE	% RECOVERY	GROUND WATER	Standard Penetration Test N ₆₀ Blows/Ft.	Unconfined Compressive Strength q _u tons/Ft. ²	Pocket Penetrometer q _p tons/Ft. ²	Natural Dry Density lbs./cu. ft.	Water Content %	Atterberg Units LL - Liquid Limit PL - Plastic Limit
Topsoil	0.5											
Brown moist stiff to very stiff silty clay (CL) with trace fine sand and trace small weathered chert.			1	SS	100		13					
			2	SS	100		19					LL=48 PL=23
Weathered chert gravel (GP) and silty clay with trace fine sand	5.5	5										
			3	SS	100		49					
Orange to red moist hard silty clay (CL) with trace fine sand and some weathered chert	8.0											
		10	4	SS	70		43					
			5	SS	70		50+					LL=35 PL=15
Very moist at 20.0 feet		20	6	SS	100		50+					
	22.5											
Weathered chert gravel (GP) and silty clay with trace fine sand		25	7	SS	100		41					
	26.0											
Orange to red moist silty clay (CL) with trace fine sand and some chert gravel												

SAMPLER TYPE
SS—DRIVEN SPLIT SPOON
ST—PRESSED SHELBY TUBE
CA—CONTINUOUS FLIGHT AUGER
RC—ROCK CORE

GROUND WATER DEPTH
▽ AT COMPLETION _____ FT.
▽ AFTER _____ FT.
WATER ON RODS _____ FT.

BORING METHOD
HSA—HOLLOW STEM AUGERS
CFA—CONTINUOUS FLIGHT AUGERS
DC—DRIVING CASING
MD—MUD DRILLING

ATEC Associates, Inc.

of Tennessee

624 Grassmere Park Road, Suite 1
Nashville, Tennessee 37211-3662
615-331-5016

LABORATORY REPORT OF SOIL EXPLORATION

Client Dickson County Sanitary Landfill Boring # B-3 Page 2 of 2
 Architect Engineer Gardner Engineering Job # 24-03-92-00010
 Project Name Dickson County Sanitary Landfill Drawn By JO
 Project Location Dickson, Tennessee Approved By TL

TEST DATA

DRILLING AND SAMPLING INFORMATION

Date Started 3/4/92 Hammer Wt. 140 lbs.
 Date Completed 3/4/92 Hammer Drop 30 in.
 Drill Foreman DV Spoon Sampler O.D. 2 in.
 Inspector JS Rock Core Dia. in.
 Boring Method CFA Shelby Tube O.D. in.

SOIL CLASSIFICATION	STRATUM DEPTH	DEPTH SCALE	SAMPLE NO.	SAMPLE TYPE	% RECOVERY	GROUND WATER	Standard Penetration Test N, Blows/Ft.	Unconfined Compressive Strength q _u Tons/Ft. ²	Pocket Penetrometer q _p Tons/Ft. ²	Natural Dry Density lbs./cu. ft.	Water Content %	Atterberg Units LL - Liquid Limit PL - Plastic Limit
SURFACE ELEVATION —												
		30										
			4	CS	70							
	33.0											
Tan to brown silty clay (CH) with some chert Very moist at 35.0 feet		35										
			5	SS	100		36					
		40										
Moist, orange below 40.0 feet												
		45										
	46.5											
Boring discontinued at 46.5 feet												
		50										

SAMPLER TYPE
 SS—DRIVEN SPLIT SPOON
 ST—PRESSED SHELBY TUBE
 CA—CONTINUOUS FLIGHT AUGER
 RC—ROCK CORE

GROUND WATER DEPTH
 ∇ AT COMPLETION _____ FT.
 ∇ AFTER _____ FT.
 WATER ON RODS _____ FT.

BORING METHOD
 HSA—HOLLOW STEM AUGERS
 CFA—CONTINUOUS FLIGHT AUGERS
 DC—DRIVING CASING
 MD—MUD DRILLING