Waste Management of Carolinas, Inc.

Report For The Design Hydrogeologic Investigation

Piedmont Landfill And Recycling Center

Kernersville, North Carolina

Carmen Johnson
Fac/Perm/Co ID # 34-06
Date 8/9/13
Doc ID#
DIN

April 1994

RUST ENVIRONMENT & INFRASTRUCTURE

RUST ENVIRONMENT & INFRASTRUCTURE

Formerly SEC Donohue

RUST Environment & Infrastructure Inc.
15 Brendan Way • Greenville, SC 29615
P.O. Box 24000 • Greenville, SC 29616
Tel. (803) 234-3000 • FAX (803) 234-3069

April 13, 1994

Mr. Ed Gibson, P.E.
Piedmont Landfill and Recycling Center
9900 Freeman Road
Kernersville, NC 27284

Subject: Design Hydrogeologic Report
Piedmont Landfill and Recycling Center
Kernersville, North Carolina
RUST Job 87221.700

Dear Mr. Gibson:

This report represents the work performed for the design hydrogeologic investigation in support of the permitted landfill development area. The report fulfills the requirements of the new state regulations.

We have appreciated the opportunity of working with you on this project and if we can assist you further do not hesitate to call.

Sincerely,

RUST ENVIRONMENT & INFRASTRUCTURE

Peter J. Walls, PG, PE
Senior Geological Engineer

RESPONSE TO DEHNR COMMENTS
DATED JUNE 15, 1994
(DESIGN HYDROGEOLOGIC INVESTIGATION)

1. **The report has been signed by a Professional Geologist, however a copy of the Temporary Registration letter of N.C. Professional Geologist Certification should be included in the Design Hydrogeologic Report.**

   A copy of the letter granting temporary Professional Geologist registration in North Carolina is included in Attachment A.

2. **What is the acreage of the new area to be developed?**

   The landfill development area will cover an area of approximately 38 acres.

3. **What is the design of Phase I, Modules 3 and 4? (Page 1-2)**

   Modules 3 and 4 of Phase I from the original development plan have now been incorporated into the new landfill development area.

4. **When will the remaining onsite water supply well be abandoned? (Page 2-6)**

   A specific date has not been established for the abandonment. The well, however, will definitely be abandoned prior to landfill development in the area.

5. **What is the average monthly rainfall for the months of January, February, and March, 1994, when the recent hydrogeologic investigation took place? (Figure 2-2)**

   The monthly rainfall for January, February, and March, 1994 (with 30-year averages) was 3.22 (3.50), 2.54 (3.35), and 5.98 (3.85) inches, respectively, according to records obtained from the landfill.

6. **Site maps and plans should be supplied at a size and scale that will permit meaningful interpretation of information. (Figures 2-3 and 2-4)**

   Full size versions of Figures 2-3 and 2-4 are provided in Attachment B.

7. **What is the source of the ranges of hydraulic conductivity values? They do not appear to match the values in Appendix D. (Page 3-5)**

   The ranges provided on Page 3-5 are in error while the data presented in Appendix D and Table 5-3 are correct. The text is changed to: "Hydraulic conductivity values in saprolite and residuum strata range from 1.3×10^{-3} centimeters per second (cm/sec)

to $7.8x10^{-6}$ cm/sec. Hydraulic conductivity values in the partially weathered rock range from $1.9x10^{-4}$ cm/sec to $4.9x10^{-6}$ cm/sec and in bedrock range from $4.2x10^{-4}$ cm/sec to $3.8x10^{-7}$ cm/sec."

8. **Site maps and plans should be supplied at a size and scale that will permit meaningful interpretation of information. (Figure 3-1, Boring Location Plan)**

A full size version of Figure 3-1 is provided in Attachment B.

9. **It is not clear why "A quartzitic unit is ... assumed to be oriented in a northeast-southwest direction around P-16". (Page 4-4)**

The assumed orientation of the quartzitic unit was based on similar soil and rock types being encountered at boring locations P-9 and P-16 and the trends observed in the top of bedrock map (Figure 4-2) as well as regional geologic trends. The top of bedrock ridgeline exhibited in Figure 4-2, would indicate the orientation of the quartzitic unit which would be more resistant to weathering than other units.

10. **Boring P-2D does not appear to be plotted correctly on Geologic Section D-D'. (Figure 4-1D)**

Attachment C contains a revised Figure 4-1D with boring P-2D plotted at the correct elevation and stratigraphy.

11. **Site maps and plans should be supplied at a size and scale that will permit meaningful interpretation of information. (Figure 4-2, Top of Bedrock Map)**

A full size version of Figure 4-2 is provided in Attachment B.

12. **Why is the top of bedrock data for boring P-16 plotted at an elevation of 776, when according to the boring log for P-16 rock was encountered 17 feet below the ground surface at an elevation of approximately 794? (Figure 4-2)**

The original location for P-16 was drilled to a depth of 17 feet where auger refusal occurred. The boring was then moved approximately 80 feet east-northeast of the initial borehole in order to be closer to the initially proposed location. At this location, auger refusal occurred at a depth of about 35 feet (elevation 776) and the natural soils were similar to those encountered within the initial boring. The soil boring log for P-16 has been revised for clarification and is included in Attachment D.

13. **According to the boring log, rock was encountered at an elevation of approximately 781.5 for boring GP-1DD rather than an elevation of 780. (Figure 4-2)**

Acknowledged. The enlarged Figure 4-2 contained in Attachment B has been revised and rounded off accordingly. The noted change in bedrock elevation, however, does not affect the top of rock contours on the figure.

14. **How were the ranges for the hydraulic conductivity values determined? They do not appear to match the values reported in Appendix D. (Page 5-4)**

The ranges provided on Page 5-4 were approximate and considered typical. The text should read: "The results indicate that hydraulic conductivities at the site range predominantly from 10^{-3} to 10^{-5} cm/sec in saprolite, 10^{-4} to 10^{-6} cm/sec in partially weathered rock, and from 10^{-5} to 10^{-7} cm/sec in rock."

15. **What are the average hydraulic conductivities and average hydraulic gradients used in the average velocity calculations, and how were these values determined? (Page 5-4)**

The average hydraulic conductivity values used in the calculations were those presented above in the response to Comment No. 14 which represent typical values. The average hydraulic gradients were determined from the potentiometric maps that were generated (Figures 5-1 and 5-3).

16. **How were the porosity values determined that are used in the average ground water velocity calculations? Is porosity test data available for each lithologic unit of the uppermost aquifer? (Page 5-4)**

Porosity values were calculated from the available testing information for the lithologic units of the uppermost aquifer. Calculations showing how porosities were determined are included in Attachment E. The porosity values were subsequently reduced to obtain effective porosity values that are typically used for similar types of soil. These typical effective porosity values are shown on page 5-4.

17. **Please provide the ground water flow velocity calculations. (Page 5-4)**

The flow velocity calculations are presented in Attachment F.

18. **Please correct or clarify the following statement: "The ground water then tends to flow from the southeast corner radiating out from the west to the north with an approximate horizontal gradient of . . .". (Page 5-4).**

The intent of the statement is to describe the ground water flow patterns as interpreted from the potentiometric map of March 18, 1994 (Figure 5-1). The map shows that ground water flows radially outward from the potentiometric high located near the southeast corner of the site.

19. **Site maps and plans should be supplied at a size and scale that will permit meaningful interpretation of information. (Figure 5-1, Potentiometric Map)**

A full size version of Figure 5-1 is included in Attachment B.

20. **The vertical gradient data was variable. What data was used to prepare the Hydrogeologic Sections? The potentiometric data used to prepare the cross-sections should be shown and the equipotential lines should be labeled with potentiometric levels on the Hydrogeologic Sections. (Figures 5-2)**

Revised Figures 5-2 containing the requested information are included in Attachment G.

21. **Site maps and plans should be supplied at a size and scale that will permit meaningful interpretation of information. Also the boring locations should be plotted on the map, along with any data used in the preparation of the potentiometric map. (Figure 5-3, Seasonal High Potentiometric Map)**

An updated version of Figure 5-3 has been revised to show the requested information. A full size version of revised Figure 5-3 is included in Attachment B.

22. **The Seasonal High Potentiometric Map was updated in the Water Quality Monitoring Plan. This revised potentiometric map should be submitted in the Design Hydrogeologic Report. (Figure 5-3)**

The updated potentiometric map is included in Attachment B.

23. **How was the Vertical Separation data determined for Table 5-2? It does not appear to match the piezometer construction records. The vertical gradient data was variable. What vertical gradient data was used to prepare the Table 5-2? Please provide these gradient calculations. (Table 5-2)**

Vertical gradient calculations showing the requested information is provided in Attachment H.

24. **Comparing the piezometer construction records and the boring logs leads to the following comments on the Screened Zone designations in Table 5-3. The screen for piezometer P-5 appears to be in the bedrock, however the screened interval (sand filter pack) bridges the partially weathered rock and the bedrock which would influence hydraulic conductivity measurements. The screen for P-6-S appears to be in the residual soil. The screens for P-12-S and P-13 appear to be in the partially weathered rock.**

Acknowledged. A revised Table 5-3 is included in Attachment I.

25. **What is the correct piezometer designation for GP-6 that is referenced in the next to last statement of the Conclusions? (Page 6-1).**

The statement should have referenced piezometer GP-1 instead of GP-6 because ground water flows through the rock formation only. A reduced flow was only determined in P-9.

26. **Appendix A: Why is no soils information reported for boring P-3 until a depth of 39 feet and for boring P-4 until 49 feet? Is the RQD value of 0.5 correct for P-12 at depth 59 feet? Why was the coring location for boring P-16 moved approximately 80 feet from the original boring location?**

Boring locations P-3, P-4, and P-5 were located in areas containing a large quantity of fill. The boreholes were therefore augered down to the estimated bottom of fill prior to the commencement of sampling. The first sheets of the boring logs for locations P-3, P-4, and P-5 have been revised for clarification and are included in Attachment D.

The referenced RQD for P-12 should be 50 instead of 0.5.

See response to Comment No. 12 for an explanation for the movement of P-16.

27. **Appendix B: For boring P-8-D the boring completion date is reported as 3/8/94, yet the piezometer completion date as evidenced by the placement of the bentonite seal is reported as 3/4/94? For boring P-10 the total boring depth is reported as 39 feet but the piezometer is reported to be to a depth of 46 feet?**

The piezometer construction summary for P-8-D contains typographic errors. The placement of the filter and the bentonite seal occurred on 3/8/94 and not 3/4/94.

The total depth of the borehole at location P-10 is 46 feet. Sheet 3 of the boring log for P-10 has been revised accordingly and is contained in Attachment D.

28. **Appendix E: For the soils analysis, most of the soils tested for grain size analysis were not tested for Atterberg Limits, and most of the soils tested for Atterberg Limits were not tested for grain size analysis. This lack of coordination of soils analysis data makes it difficult to determine the soil classifications and to make other interpretations based on the soils data.**

Prior to assigning laboratory tests, the soil samples were first visually classified in the field and in the office by an experienced geologist or geotechnical engineer. Tests were assigned to samples that were difficult to visually classify. Atterberg Limits were only run on selected samples that exhibited some degree of plasticity and a significant percentage of fines when visually classified. Sieve analyses were generally

performed on selected samples that did not consist predominantly of fines. Through the combination of visual classification and laboratory testing, the soil classifications shown in the boring logs (Appendix A) and on Table 3-2 are considered accurate.

29. **The Subgrade Plan (Drawing No. 2) should plot the locations of the borings in order to determine if the vertical separation requirements have been met.**

A working copy of drawing No. 2 is provided in Attachment B with the boring locations to help facilitate the evaluation of vertical separation requirements.

ATTACHMENT E

POROSITY CALCULATIONS

RUST ENVIRONMENT & INFRASTRUCTURE

CALCULATION SHEET

PAGE 1 OF 2

PROJECT NO. _____

CLIENT WMC

PROJECT Piedmont Landfil Hydrogeologic Investigation

SUBJECT Porosity Calculations

Prepared By _____ Date _____

Reviewed By _____ Date _____

Approved By _____ Date _____

Calculate In-situ Porosity of Soils from Data Obtained from Hydraulic Conductivity and UU Triaxial Tests.

Derivation: $\text{Porosity} = n = \frac{V_v}{V_T} \times 100\ (\%)$ where: V_v = Volume of voids, V_T = Total volume of soil sample

From test results, we have dry unit weight, γ_d, of samples and initial moisture content, m_c.

Assume 1- cubic foot volume of soil, ∴ weight of solids, $W_s = \gamma_d\ (lb/ft^3)\ (1\ ft^3) = lb$

Assume specific gravity of = 2.65 (quartz)
∴ density of solids = $2.65\ (62.4\ lb/ft^3) = 165.36\ lb/ft^3 = \rho_s$

$$\text{Volume of solids} = \frac{W_s}{\rho_s} = \frac{lb}{lb/ft^3} = ft^3 = V_s = \frac{\gamma_d}{165.36}$$

$$\text{Volume of voids} = V_v = V_T - V_s = 1\ ft^3 - \frac{\gamma_d}{165.36}$$

$$\therefore \text{Porosity} = n = \frac{V_v}{V_T}(100\%) = \frac{1 - \frac{\gamma_d}{165.36}(100\%)}{1} = \underline{\underline{1 - \frac{\gamma_d}{165.36}(100\%)}}$$

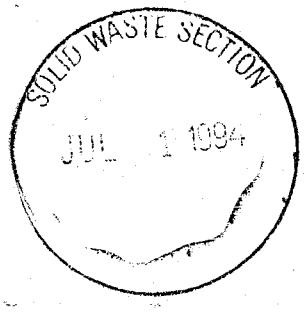
Summary of Porosities

Sample	Depth (ft)	Soil	γ_d (pcf)	n(%)
P-6D UD-1	4-6	Residual Soil (SC)	92.9	44
P-2D UD-2	4-6	Fill (sm)	110.0	33
P-2D UD-4	22-24	Saprolite (sm)	78.5	53
P-3 UD-1	58-59.5	Saprolite (sm)	99.7	40
P-8D UD-2	20-22	Saprolite (sm)	97.0	41
P-15D UD-2	14-16	Saprolite (sm)	108.3	35

As shown above, porosities exhibit a general trend to decrease with depth due primarily to greater overburden pressures and decreases in the degree of weathering.

ATTACHMENT F

GROUND WATER FLOW VELOCITY CALCULATIONS



FLOW VELOCITY $\bar{v} = \frac{ki}{\phi}$

$\bar{v}$ = flow velocity
k = hydraulic gradient
i = hydraulic gradient
ϕ = effective porosity

effective porosity is the percentage voids that tends to allow for ground water flow through it

FOR SAPROLITE / RESIDUUM

$\bar{v}_{max} = \frac{ki}{\phi}$

$k = 10^{-3}$ cm/sec $i = 0.038$
$K = 10^{-5}$ cm/sec $i = 0.015$
$\phi = 0.25$

$= \frac{10^{-3}\ cm/sec \times 0.038}{.25}$

$= 0.43$ ft/day (157 ft/yr)

$v_{min} = \frac{ki}{\phi}$

$= \frac{10^{-5}\ cm/sec \times 0.015}{.25}$

$= 0.0017$ ft/day (0.62 ft/yr)

Average Value $\bar{k} = 3.2 \times 10^{-4}$ cm/sec

$\bar{v}_{avg} = \frac{\bar{k}i}{\phi} = \frac{3.2 \times 10^{-4} \times 0.015}{.25} = 0.054$ ft/day (20 ft/year)

$= \frac{3.2 \times 10^{-4} \times 0.038}{.25} = 0.137$ ft/day (50 ft/yr)

FOR PARTIALLY WEATHERED ROCK

$v_{max} = \frac{ki}{\phi}$

$= \frac{10^{-4} \times 0.038}{0.15}$

$K = 10^{-4}$ cm/sec $i = 0.038$

$K = 10^{-6}$ cm/sec $i = 0.015$

$\phi = 0.15$

$= 0.072$ ft/day (26 ft/yr)

$v_{min} = \frac{ki}{\phi}$

$= \frac{10^{-6} \text{cm/sec} \times 0.015}{.15}$

$= 0.00028$ ft/day (0.1 ft/yr)

Average Value $\bar{k} = 5.0 \times 10^{-5}$ cm/sec

$v_{avg} = \frac{ki}{\phi} = \frac{5.0 \times 10^{-5} \times 0.015}{.15} = 0.014$ feet/day

(5.2 feet/yr)

$= \frac{5.0 \times 10^{-5} \times 0.038}{.15} = 0.036$ feet/day

(13.1 feet/yr)

For BEDROCK

$\bar{v}_{max} = \frac{ki}{\phi}$

$= \frac{10^{-5}\text{cm/sec} \times 0.038}{0.05}$

$= 0.022$ ft/day (7.9 ft/yr)

$k = 10^{-5}$ cm/sec $i = 0.038$
$k = 10^{-7}$ cm/sec $i = 0.015$
$\phi = 0.05$

$\bar{v}_{min} = \frac{ki}{\phi}$

$= \frac{10^{-7}\text{cm/sec} \times 0.015}{0.05}$

$= 0.000085$ ft/day (0.031 ft/yr)

Average Value $\bar{k} = 7.9 \times 10^{-5}$ cm/sec

$v_{avg} = \frac{ki}{\phi} = \frac{7.9 \times 10^{-5} \times 0.015}{0.05} = 0.067$ feet/day

(24.5 ft/yr)

$= \frac{7.9 \times 10^{-5} \times 0.038}{0.05} = 0.170$ ft/day

(62.1 ft/yr)

These numbers are specifically squewed because of the value at P-9S, and the fact that near rock surface is more permeable, and permeability reduces with depth.

Please note the effective porosities are anticipated typical values for these type units. The saprolite and residuum porosities are higher than the specified effective porosity. If these soils have a slightly higher porosity (effective) then this would only slightly reduce the velocity. To probably between 10 to 30 feet/yr.

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Formerly SEC Donohue

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April 13, 1994

Mr. Ed Gibson, P.E.
Piedmont Landfill and Recycling Center
9900 Freeman Road
Kernersville, NC 27284

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Piedmont Landfill and Recycling Center
Kernersville, North Carolina
RUST Job 87221.700

Dear Mr. Gibson:

This report represents the work performed for the design hydrogeologic investigation in support of the permitted landfill development area. The report fulfills the requirements of the new state regulations.

We have appreciated the opportunity of working with you on this project and if we can assist you further do not hesitate to call.

Sincerely,

RUST ENVIRONMENT & INFRASTRUCTURE

Peter J. Walls, PG, PE
Senior Geological Engineer

ATTACHMENT A

LETTER OF TEMPORARY REGISTRATION

State of North Carolina
North Carolina Board for Licensing of Geologists
P.O. Box 27402 • Raleigh, North Carolina 27611
(919) 850-9669 • Fax (919) ~~872-1598~~

February 24, 1994

Peter J. Walls
RUST Environment & Infrastructure
15 Brendan Way
Greenville, SC 29615

Dear Mr.Walls:

Your request for a temporary permit for geological work in North Carolina has been received.

The material seems to be in order and you are granted a temporary registration not to exceed 90 days of work within a calendar year.

Sincerely,

Robert M. Upton
Administrator

cc: Arthur Mouberry
Dept. Environment, Health
& Natural Resources

DESIGN HYDROGEOLOGIC INVESTIGATION

FOR THE

PIEDMONT LANDFILL AND RECYCLING CENTER

APRIL 1994

RUST ENVIRONMENT & INFRASTRUCTURE INC.
GREENVILLE, SOUTH CAROLINA

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to describe, and present the findings of, the Design Hydrogeologic Investigation for the proposed landfill development area of the Piedmont Landfill and Recycling Center (PLRC), near Kernersville, North Carolina. The landfill development area is located east of the existing landfill area. The goal of this investigation is to provide a detailed characterization of the hydrogeology of the landfill development area that fulfills the requirements of Department of Environment Health, and Natural Resources' (DEHNR) new regulations. This information, in turn, will be used to design an effective water quality monitoring system and to verify that the vertical ground water separation requirements and the foundation standards for the proposed landfill expansion into the development area are met. This investigation is not intended to address the hydrogeologic characteristics of the existing landfill area. The hydrogeology of the existing landfill area and the general site suitability was documented by Golder Associates, Inc. [1987, 1988]. A Water Quality Monitoring Plan for the development area, which will incorporate the findings of this investigation, will be provided under separate cover.

This Design Hydrogeologic Investigation has been developed to meet the new North Carolina solid waste management rules (codified as T15A: 13B.1600-.1680) which became effective on October 9, 1993 for this area.

The site location, operational history, and surrounding land use are discussed in the remaining portions of this section. Section 2.0 of this document summarizes the regional physical setting (i.e., climate, topography, geology, and hydrogeology) of the facility. Section 3.0 describes the various components of the Design Hydrogeologic Investigation. Sections 4.0 and 5.0 provide detailed discussions of the site geology and hydrogeology, respectively, based on the findings of this investigation. Section 6.0 contains conclusions and recommendations. Section 7.0 contains professional certification that all exploratory borings at the site will be properly abandoned and Section 8.0 contains references.

1.2 LOCATION

The PLRC is located approximately ten miles north of Kernersville, North Carolina, in the northeast corner of Forsyth County. Access to the site is by Goodwill Church-Freeman Road. A vicinity map illustrating the regional location of the site is included as Figure 1-1. A smaller scale map showing the geographic location of the facility is included as Figure 1-2.

1.3 OPERATIONAL HISTORY

Waste Management of Carolinas, Inc. (WMC) acquired the PLRC property from Beulah C. Barrow in 1988. The site was formerly agricultural land with five residences located within its boundaries. The residences have since been abandoned. The landfill accepts both domestic and commercial non-hazardous waste.

The permitted landfill occupies a footprint of approximately 68 acres. Phase 1 of the landfill began operation in June 1990 while Phase 2 of the landfill began operation early in 1993. Both Phase 1 and Phase 2 represent the existing landfill area and are currently accepting waste. Phase 3 represents the landfill development area which encompasses the additional unconstructed landfill cells located east of these existing phases. A design upgrade for Phase 3 of the landfill has been submitted under a permit renewal application in December 1993.

Phase 3 ≈ 38 acres

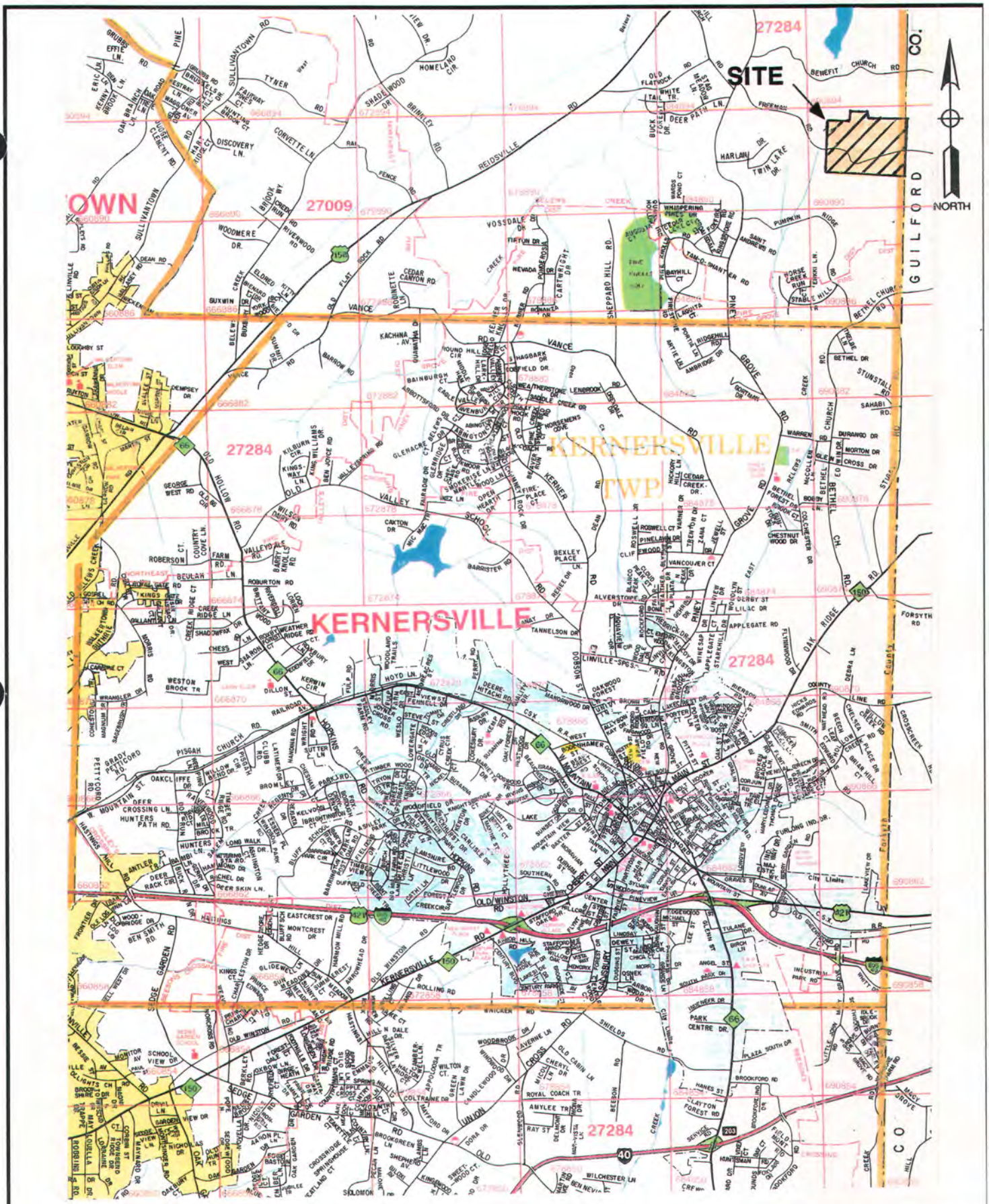
The first two modules of the landfill (Phase 1, Modules 1 and 2) were constructed with a composite liner consisting of a 60 mil high density polyethylene (HDPE) geomembrane underlain by 18 inches of clay with a specified maximum hydraulic conductivity of $1x10^{-7}$ cm/sec. Modules 5 and 6 of Phase 1 and Modules 1, 2, and 3 of Phase 2 were constructed with a double geomembrane liner (60 mil HDPE) with a geosynthetic clay liner (GCL) situated between the two geomembranes.

The PLRC currently operates under the State of North Carolina Solid Waste Permit Number 34-06.

1.4 SURROUNDING LAND USE

The surrounding land use is primarily residential and agricultural. The area is currently zoned A-6, suburban residential, but is sparsely settled. Eleven residences lie within 3,000 feet of the site of which 6 are located in the Hiram Hill subdivision which is about 1/2 mile southeast of the site [Waste Management, Inc., 1993]. The closed Kernersville Municipal Landfill lies along the eastern half of the site's southern border.

Belews Lake, operated by Duke Power, lies to the north of the site, with the lake shore being about 3,000 feet from the site. Duke Power is currently working to reestablish sport fishing in the lake to increase recreational use. No state parks, scenic areas, recreational facilities, state nature, or state historical preserves have been identified near the site.



Scale in Miles

0 .5 1 2

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FIGURE 1-1
SITE VICINITY MAP

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

RUST E&I Project No. 87221.700

0 30 60

SCALE IN MILES

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FIGURE 1-2
SITE LOCATION MAP

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

RUST E&I Project No. 87221.700

2.0 REGIONAL PHYSICAL SETTING

2.1 CLIMATE

The climate at the PLRC and the Kernersville area is warm and humid with a mean annual temperature of 59.5° F and an average annual rainfall of approximately 42.4 inches. Figure 2-1 illustrates the 30-year average precipitation levels from 1951 through 1980 for the Greensboro, North Carolina area. As shown by the figure, rainfall is rather evenly distributed throughout the year. However, there are slightly higher levels of precipitation during June through September. The monthly averages range from a high of 4.27 inches in July to a low of 2.59 inches in November.

Figure 2-2 compares the 30-year average rainfall amounts to monthly totals recorded during 1988 through 1993. A comparison of the 30-year average annual precipitation and the total annual precipitation for each year is also shown below each graph. As illustrated by the figure, the Greensboro, North Carolina area received 35.2 inches of precipitation in 1988 which is seven inches below the average annual precipitation. Substantially lower than normal rainfall was received during the winter and spring months. The total annual precipitation received in 1989 was 50.6 inches. This was 8 inches greater than the 30-year average. Higher amounts were recorded during the early spring, early summer, and early fall months. Total precipitation recorded for the subsequent years of 1990, 1991, 1992, and 1993 was approximately average with up to 1.5 inches above the annual average. Above average amounts were usually recorded during the spring and/or fall months.

Mean monthly temperatures from the 30-year average range from 37°F in January to 77°F in July. Snow cover, which averages 2 inches in depth, is present approximately nine days of the year. Winds average 8 mph and are primarily out of the northeast during the fall months and from the southwest during the remainder of the year (RUST E&I, 1994).

2.2 TOPOGRAPHY

The PLRC is located in the Piedmont physiographic province. This province is characterized by gently rolling to hilly terrain with a dense surface water drainage network, moderately steep stream valleys, and broad ridge crests. Total relief is not usually great, but

slopes can often be steep. Elevations range from approximately 800 to 1000 feet msl (Golder, 1988).

200' relief

The regional mountain system formed during the late Paleozoic period was still active during the Triassic period and was eroded to near sea level during the Triassic period. The flat surface was then uplifted. The resulting plateau was again eroded, producing the topography of dense drainage networks, steep valleys, and near equal ridge crest elevations which characterize the Piedmont province today.

The pre-landfill development topography of the PLRC site is illustrated in Figure 2-3. The topography was determined from an aerial photograph of the site dated March 21, 1987. The present landfill topography is illustrated in Figure 2-4 which was based on an aerial survey dated July 1, 1993. It should be noted, however, that landfilling has been continuing within the existing landfill area. Although the development area has had significant material stockpiled, earth moving operations have been taking place for daily cover since the date of the aerial survey and during most of this investigation. The present topography of the site varies from what is shown in Figure 2-4.

2.3 REGIONAL GEOLOGY

The following discussion of regional geology is taken primarily from Golder (1988) and Butler and Secor (1991).

2.3.1 Geologic Belts

The PLRC site is located primarily within what has been previously mapped as the Charlotte Belt, close to the boundary of the Charlotte and Milton belts (Figure 2-5). Some authors consider the Milton Belt to be a continuation of the Charlotte Belt.

The Milton Belt is characterized by strongly foliated, metamorphic rocks. Mineralogy indicates that most of the Milton Belt has been subjected to moderate to high temperature/high pressure regional metamorphism. Some evidence suggests that rocks of the Milton belt are mainly Precambrian in age and were metamorphosed and deformed

during the early to middle Paleozoic. The Charlotte Belt is defined as dominantly plutonic with intrusive igneous rock bodies.

2.3.2 Lithology

The Milton Belt is characterized by metamorphic rocks (Figure 2-6). In the Milton Belt, the rock types typically include strongly foliated gneiss and schist, commonly with compositional layering and felsic composition. In the region close to the PLRC site, the boundary between the Milton and Charlotte belts is indicated where gneiss and schist units of the Milton are found adjacent to the dominantly non-layered mafic and felsic intrusives of the Charlotte Belt.

The Charlotte Belt is composed of igneous and metamorphic rock (Figure 2-6). The oldest rocks are mafic igneous rocks, which are generally characterized as dense, dark colored rocks high in magnesium and iron content. These were later intruded by silicious granitic igneous rock. At approximately the same geologic time, the rocks were metamorphosed. The mafic igneous rocks were metamorphosed into amphibolite and the granitic rocks into gneiss. Blocks of amphibolite may be found within the gneiss, indicating that it is older than the gneiss. Veins of pegmatite, composed of primarily coarse-grained quartz and feldspar, cross cut both the amphibolite and gneiss. The pegmatite veins were formed during the late stages of igneous intrusion and metamorphism (Golder, 1988).

2.3.3 Structure

Three major peaks of plutonic activity within the Charlotte Belt occurred within the late Precambrian and the Paleozoic Eras: 1) Late Proterozoic-Cambrian, 734 to 495 Ma (million years ago); 2) Silurian-Devonian, 436 to 375 Ma; and 3) Carboniferous-Permian, 340 to 285 Ma.

The Charlotte Belt was formed in the roots of an ancient mountain system which was produced by compression of the earth's crust.

During the Triassic period, the region was subjected to tensile forces. As a result, rift valleys and diabase dikes, oriented northwest to southeast, were formed. Rift valleys are

a major structural feature of the North Carolina Piedmont province. The rift valley nearest to the PLRC site is the Dan River Basin. The Dan River Basin is located approximately ten miles northwest of the PLRC site and extends northeast into Virginia. The basin was produced by normal faulting when the southeastern fault block shifted downward and tilted to the northwest. There is no evidence of the fault extending closer than ten miles to the site nor of other major faults in the immediate vicinity of the PLRC site.

Diabase dikes are thin, nearly vertical sheets of fine-grained mafic rock. They may act as a barrier or a conduit for horizontal ground water flow. Diabase dikes are common in the Charlotte Belt but have not been identified at the PLRC site.

Geologic lineaments located within and near the PLRC site are illustrated in Figure 2-7. The major lineaments are shown to occur predominantly in the northeast-southwest and northwest-southeast directions. A few are shown in the north-south direction. Lineaments are generally the result of preferential weathering caused along deeper, longer, and more numerous parallel fractures that occur within the underlying bedrock.

2.3.4 Soils

The major soil types present near the PLRC site are classified as the Wilkes-Enon association, which represent the residuum. In this landscape, the Enon soils typically occur on the ridges, the Wilkes soils are on the steep side slopes, and the Congaree and Chewacla soils are in the drainage ways (USDA, 1976).

The surface layer of Enon and Wilkes soils is a well-drained loam, sandy loam, or fine sandy loam. The subsoil is generally a clay. The Congaree soil series consists of well-drained soils located on stream flood plains. These soils are formed in recent alluvium and are classified as a loam or fine sandy loam. Chewacla soils consist of nearly level, somewhat poorly drained soils of stream flood plains. They are also formed in recent alluvium. Chewacla soils are classified as a loam or clay loam (USDA, 1976).

2.4 REGIONAL HYDROGEOLOGY

The following discussion of regional hydrogeology is adapted from Golder (1988) and RUST E&I (1994).

2.4.1 Surface Water Hydrology

Surface water discharges from the site drains into two unnamed tributaries of East Belews Creek. East Belews Creek drains into Duke Power Company's Belews Lake and then into the Dan River. One of the tributaries crosses near the southwest corner of the site. The other tributary is located immediately north of the property (RUST E&I, 1994).

Prior to landfill development, the site was divided into two separate watersheds with the dividing line roughly running from the northwest corner to the southeast corner of the site. The pre-development surface water flow patterns can be inferred from the contours shown on Figure 2-3. The northern watershed occupied about one-third of the site area and drained north and northeast. The southern watershed drained southwest and south. Portions of the site that were within the 100-year flood plain include a small (less than five acres) area on the northeastern property line and an area of about 15 acres in the southwestern corner of the site (RUST E&I, 1994).

Since landfill development, the surface water flow across the site has been diverted to a series of three onsite sedimentation ponds by means of berms and drainage ditches. The ponds provide for the removal of suspended solids from the runoff prior to offsite release. Surface water which comes into contact with waste is considered to be leachate and is collected and transported off site for treatment as leachate (RUST E&I, 1994).

2.4.2 Ground Water Hydrology

Ground water in the Piedmont province is obtained from either soils composed of residual and/or saprolitic materials or from the underlying crystalline or metamorphic rocks. The ground water yield of soils is dependent on the thickness of the saturated zone, degree and depth of weathering, topographic setting, vegetative cover, and the permeability of the soil.

Ground water within the crystalline and metamorphic rocks occurs in joints, fractures, fault zones, and other secondary porosity features. The amount of ground water yield is influenced by the degree of interconnection between these features (Golder, 1988).

The aquifers in the Piedmont province are recharged by infiltration of precipitation. Water infiltrates through the residual material into the saturated soil zone. Ground water may eventually flow into crystalline or metamorphic rock via fractures or by flowing directly into openings in exposed rock. Upon reaching the saturated zone, ground water generally flows laterally and downgradient to discharge areas in topographic lows.

Flow of ground water within the shallow water table is usually controlled by the trend of the surface topography. Ground water within surficial aquifers generally flows downgradient to discharge into streams or rivers.

Water levels within surficial aquifers in residual soils fluctuate as a function of precipitation and evapotranspiration. Water levels will rise quickly during wet periods and decline slowly during dry periods.

Ground water levels within deeper crystalline aquifers are affected primarily by seasonal precipitation and less by evapotranspiration. Ground water levels are usually highest in the spring and lowest in the autumn months (Golder, 1988).

2.4.3 Local Water Use

Ground water was formerly withdrawn from the Piedmont province largely by means of wells advanced into the saturated zone or by wells set into near-surface fractured rock. Currently, most domestic water supply wells in the region are drilled into the Piedmont bedrock. The quantity of water that can be withdrawn from these wells depends upon the extent to which the bedrock openings are interconnected (RUST E&I, 1994).

A visual well inventory was conducted by Golder (1988) to identify supply wells located within approximately 2,000 feet of the PLRC site. Five of these wells were within the property boundary. WMI (1993) indicated that four of the five onsite wells have been properly abandoned and that only one well remains to be abandoned. This latter well is

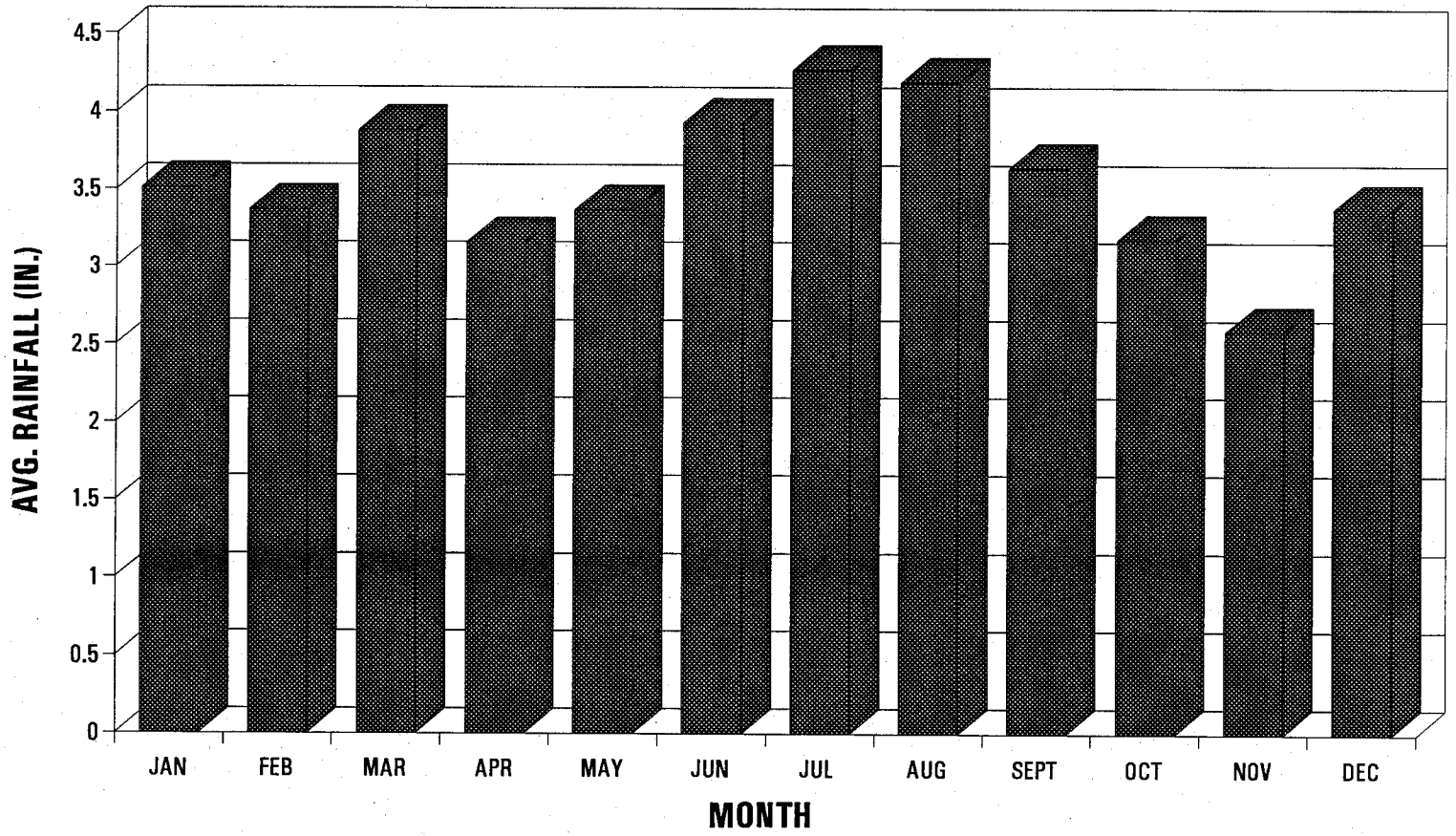
upgradient to the existing landfill area and will be properly abandoned prior to landfill construction in the specific area.

An updating well inventory was conducted as part of the Design Hydrogeologic Investigation. The inventory included a review of state and county records in order to identify private and public supply wells located within approximately one mile of the PLRC property boundaries. Private and public supply records were reviewed for both Forsyth and Guilford Counties.

Figure 2-8 illustrates the approximate locations of the wells identified during both the recent inventory and the inventory conducted by Golder (1988). Table 2-1 contains specific information about the wells identified on Figure 2-8.

Figure 2-8 shows that each of the identified offsite wells are located either upgradient from the site or are situated across a hydrogeologic divide. It is therefore improbable that activities within the PLRC could affect water quality or quantity at the identified locations.

30 YEAR AVERAGE MONTHLY RAINFALL
GREENSBORO, NC AIRPORT



PLOTTED DATA REPRESENTS A 30 YEAR AVERAGE FROM 1951 THROUGH 1980.
30 YEAR AVERAGE = 42.47 INCHES.

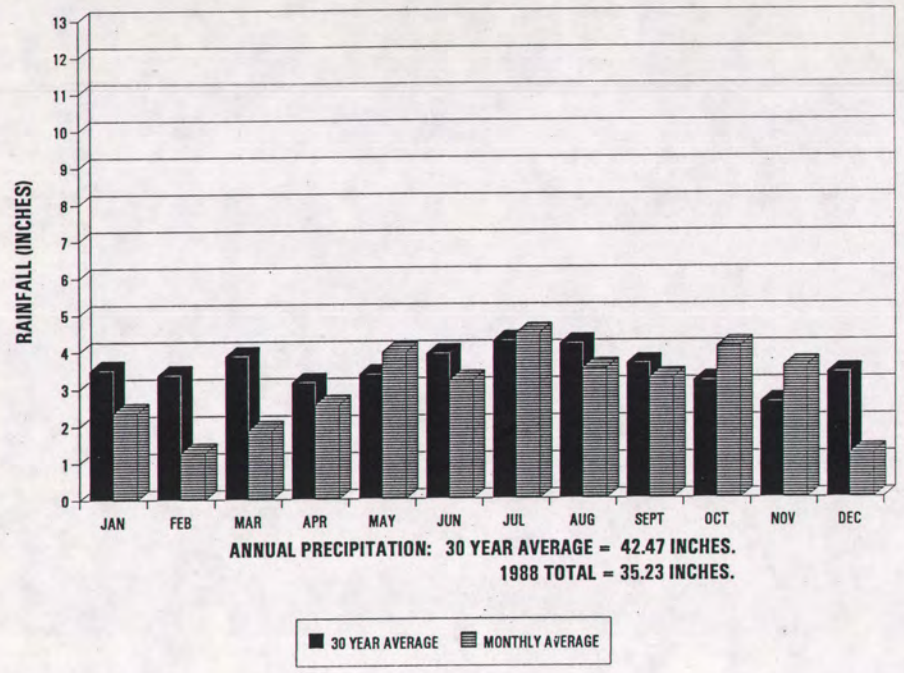
RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-1
30-YEAR AVERAGE MONTHLY RAINFALL

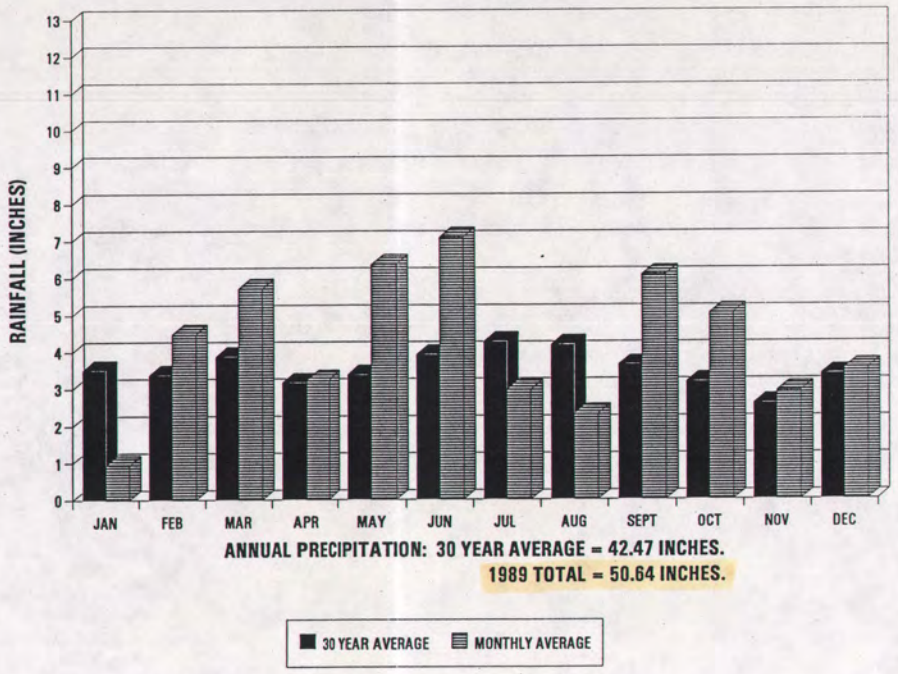
Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

RUST E&I Project No. 87221.700

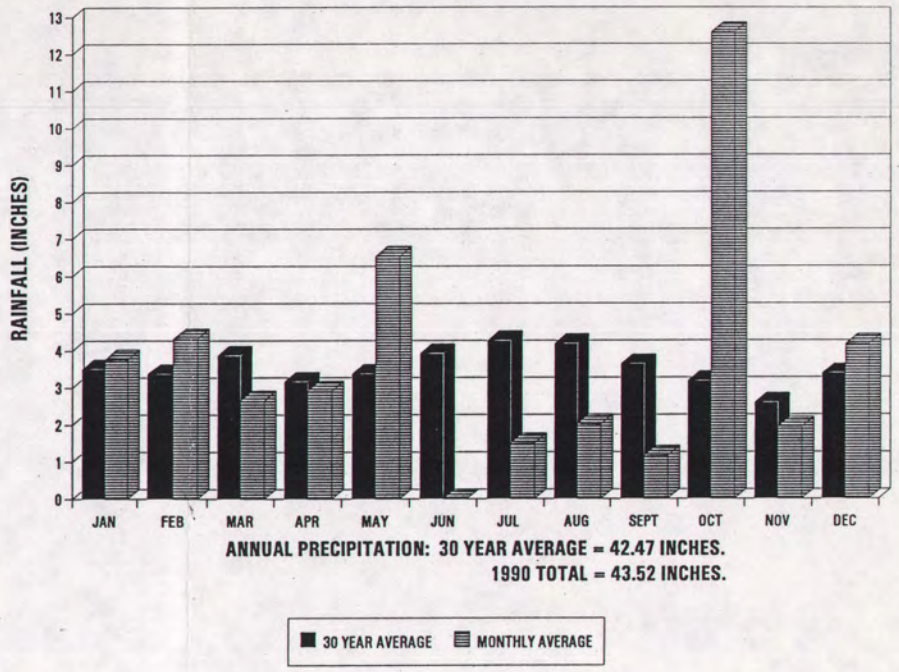
30 YEAR AVERAGE MONTHLY RAINFALL VS. 1988 MONTHLY RAINFALL



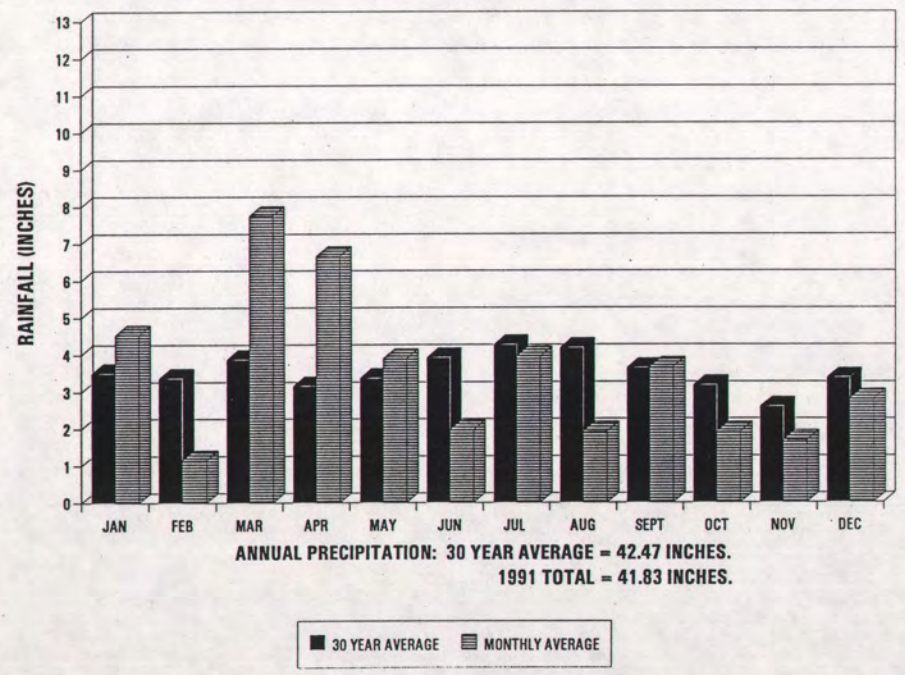
30 YEAR AVERAGE MONTHLY RAINFALL VS. 1989 MONTHLY RAINFALL



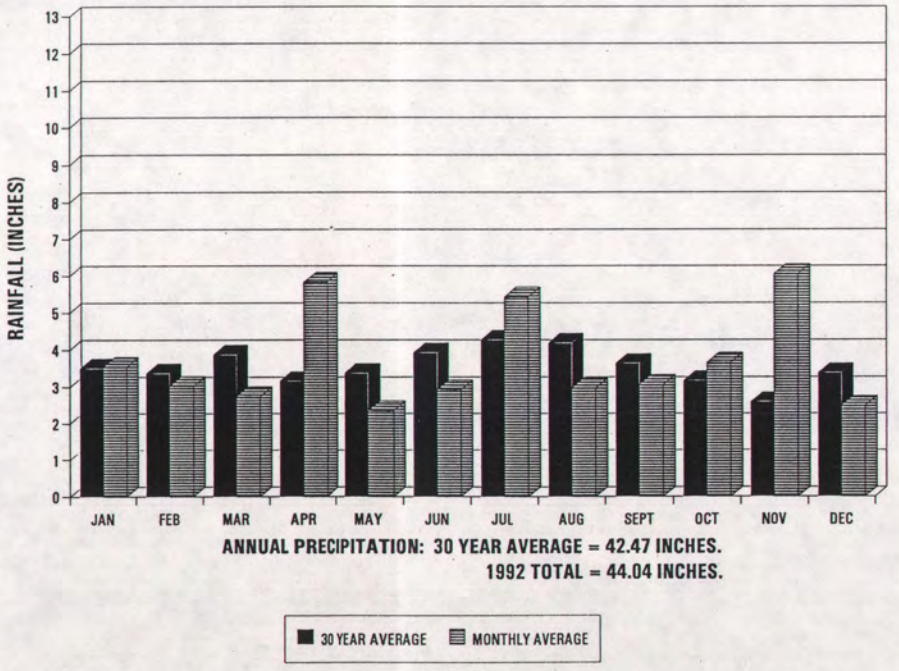
30 YEAR MONTHLY RAINFALL VS. 1990 MONTHLY RAINFALL



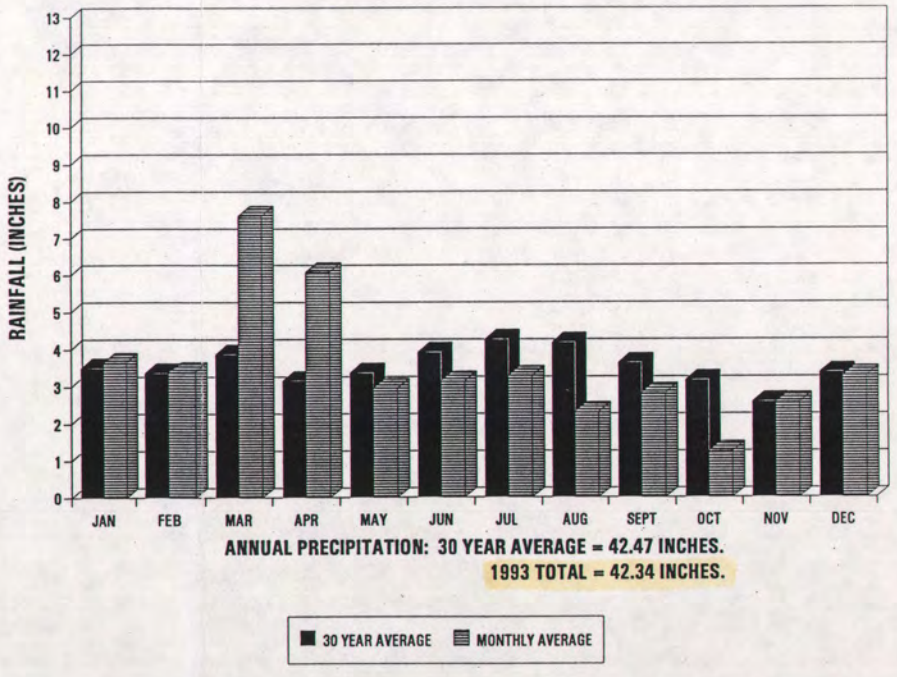
30 YEAR AVERAGE MONTHLY RAINFALL VS. 1991 MONTHLY RAINFALL



30 YEAR AVERAGE MONTHLY RAINFALL VS. 1992 MONTHLY RAINFALL



30 YEAR AVERAGE MONTHLY RAINFALL VS. 1993 MONTHLY RAINFALL

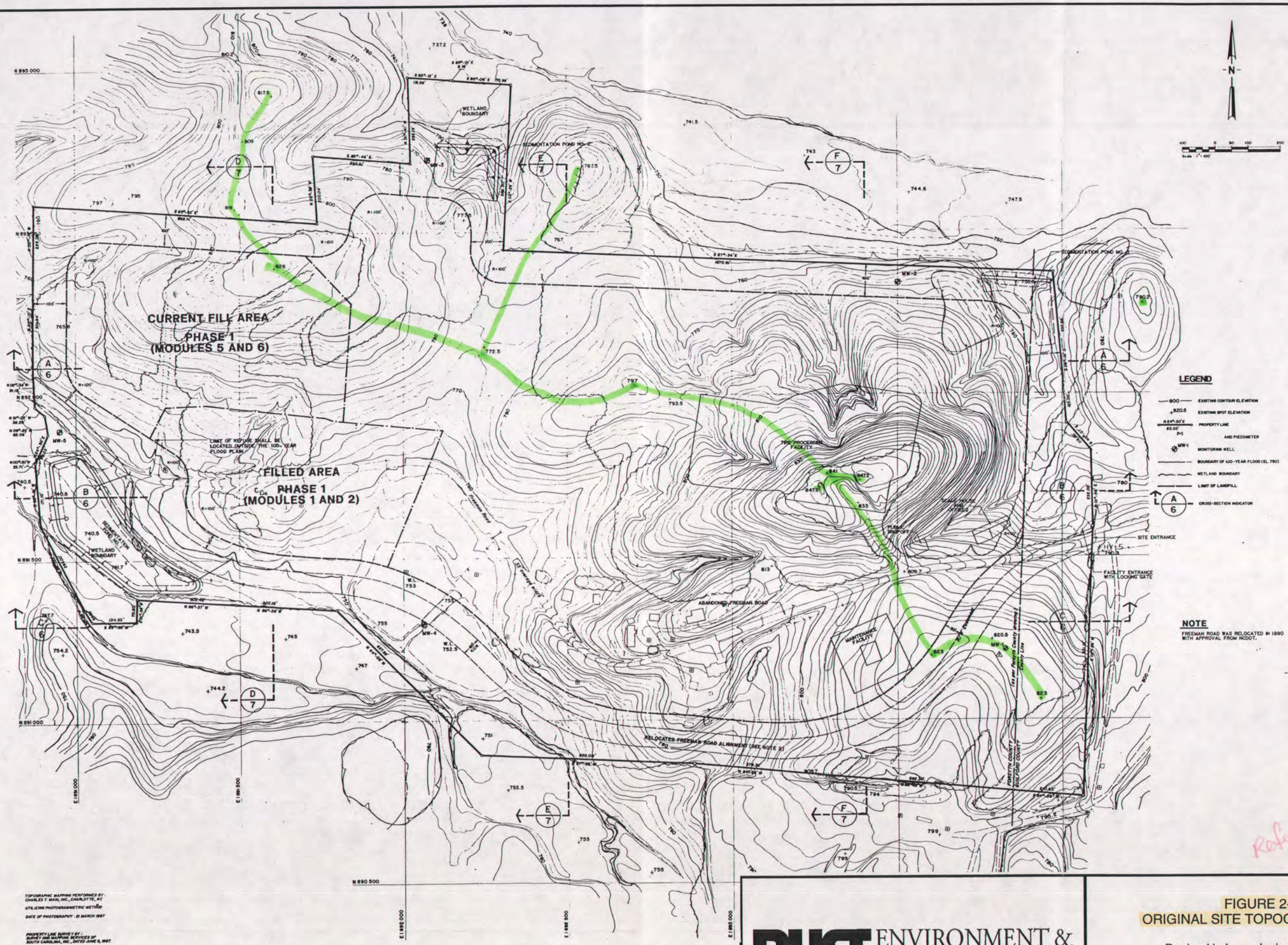


RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-2
ANNUAL PRECIPITATION FOR 1988 THROUGH 1993 VERSUS 30-YEAR AVERAGE

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

RUST E&I Project No. 87221.700



Refer to larger scale copy

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-3
ORIGINAL SITE TOPOGRAPHIC MAP

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Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

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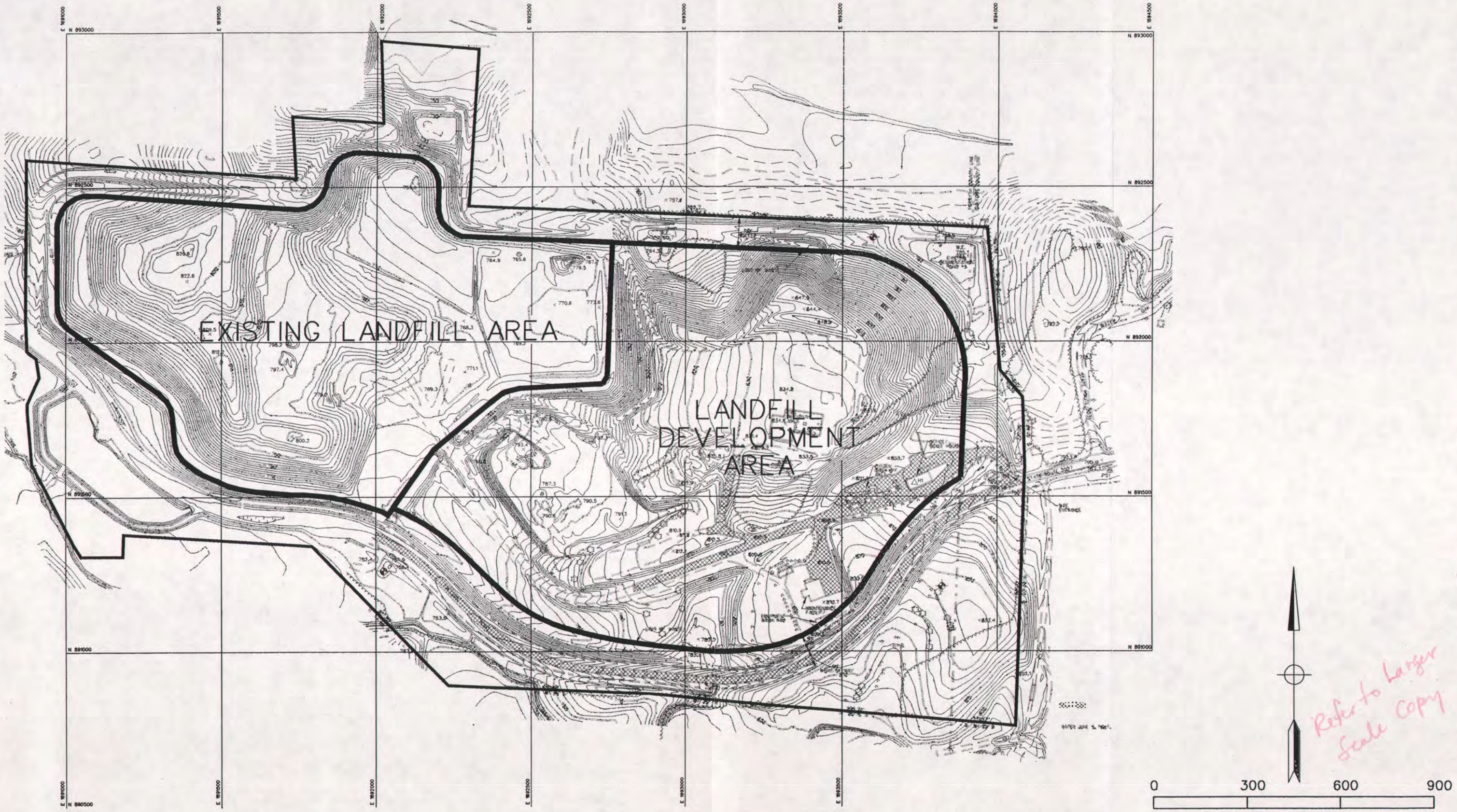

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-4
PRESENT SITE TOPOGRAPHY MAP

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Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

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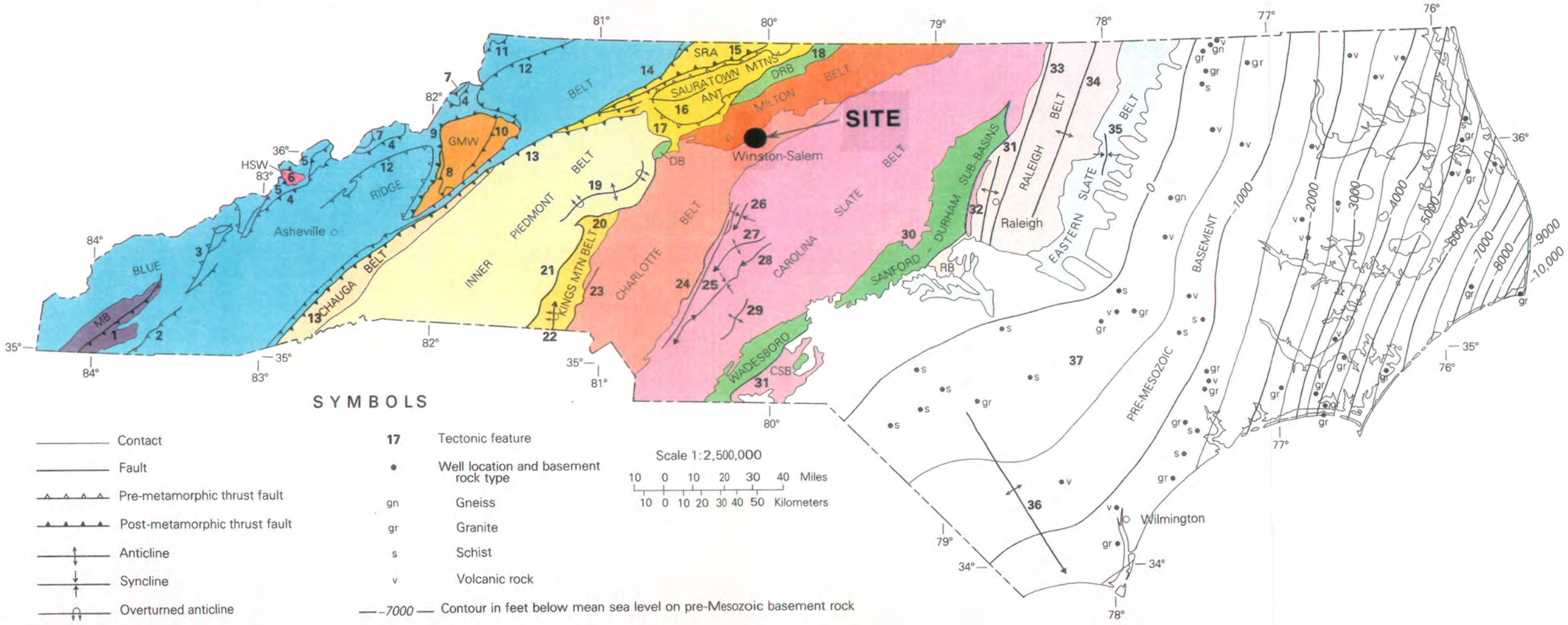
N:/87221/7221EXTP.DGN

EXPLANATION

- MB — MURPHY BELT
- HSW — HOT SPRINGS WINDOW
- GMW — GRANDFATHER MOUNTAIN WINDOW
- SRA — SMITH RIVER ALLOCHTHON
- BLUE RIDGE BELT
- CHAUGA BELT
- INNER PIEDMONT BELT
- KINGS MOUNTAIN BELT
- SAURATOWN MOUNTAINS ANTICLINORIUM
- CHARLOTTE BELT
- MILTON BELT
- CSB — CAROLINA SLATE BELT
- TRIASSIC BASINS
  - DURHAM, SANFORD } SUB-BASINS
  - WADESBORO BASIN
  - DAN RIVER BASIN (DRB)
  - DAVIE BASIN (DB)
- RB — RALEIGH BELT
- EASTERN SLATE BELT



SYMBOLS

- Contact
- Fault
- Pre-metamorphic thrust fault
- Post-metamorphic thrust fault
- Anticline
- Syncline
- Overturned anticline
- Direction of plunge

- 17 — Tectonic feature
- • — Well location and basement rock type
- gn — Gneiss
- gr — Granite
- s — Schist
- v — Volcanic rock
- —7000— Contour in feet below mean sea level on pre-Mesozoic basement rock

Scale 1:2,500,000

10 0 10 20 30 40 Miles

10 0 10 20 30 40 50 Kilometers

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-5
REGIONAL STRUCTURE AND LITHOLOGIC ZONES

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

RUST E&I Project No. 87221.700

CHARLOTTE AND MILTON BELTS

METAMORPHIC ROCKS

- €Zbf — FINE-GRAINED BIOTITE GNEISS — Massive to strongly foliated; minor layers of amphibolite and muscovite schist
- €Zfg — FELSIC MICA GNEISS — Interlayered with biotite and hornblende gneiss and schist
- €Zbg — BIOTITE GNEISS AND SCHIST — Inequigranular and megacrystic; abundant potassic feldspar and garnet; interlayered and gradational with calc-silicate rock, sillimanite-mica schist, mica schist, and amphibolite. Contains small masses of granitic rock
- €Zv — METAVOLCANIC ROCK — Interbedded felsic to mafic tuffs and flowrock
- €Zmv — MAFIC METAVOLCANIC ROCK — Metamorphosed basaltic to andesitic tuffs and flows, grayish green to black. Locally includes hypabyssal intrusives and minor felsic metavolcanic rock
- €Zfv — FELSIC METAVOLCANIC ROCK — Metamorphosed dacitic to rhyolitic flows and tuffs, light gray to greenish gray; minor mafic and intermediate metavolcanic rock
- €Zq — QUARTZITE — Massive to well foliated; contains andalusite, kyanite, or sillimanite, chloritoid, and pyrite
- €Zph — PHYLLITE AND SCHIST — Minor biotite, pyrite, and sillimanite; includes minor quartzite

INTRUSIVE ROCKS

- Jd — DIABASE — Dikes, gray to black
- PIPg — GRANITIC ROCK (Pennsylvanian to Permian, 265-325 my; 11,9) — Megacrystic to equigranular. Churchland Plutonic Suite (Western group) - Churchland, Landis, and Mooresville intrusives
- DSg — GRANITE OF SALISBURY PLUTONIC SUITE (Devonian to Silurian, 385-415 my; 5) — Pink, massive to weakly foliated. Gold Hill, Kannapolis, Salisbury, Southmont, and Yadkin intrusives
- DSs — SYENITE OF CONCORD PLUTONIC SUITE (Silurian, 404 my; 9) — Includes the Concord ring dike
- DOgb — GABBRO OF CONCORD PLUTONIC SUITE (Devonian to Ordovician, 399-479 my; 24) — Barber, Concord, Farmington, Mecklenburg, and Weddington intrusives
- DOg — GRANITIC ROCK — Locally pinkish gray, massive to weakly foliated; contains hornblende
- Sg — SHELTON GRANITE GNEISS (Silurian, 429 my; 21) — Poorly foliated, lineated granitic to quartz monzonitic gneiss
- PzZg — METAMORPHOSED QUARTZ DIORITE — Foliated to massive
- PzZg — METAMORPHOSED GABBRO AND DIORITE — Foliated to massive
- PzZm — METAMORPHOSED MAFIC ROCK — Metagabbro, metadiorite, and mafic plutonic-volcanic complexes
- PzZu — META-ULTRAMAFIC ROCK — Metamorphosed dunite and peridotite; serpentinite, soapstone, and other altered ultramafic rock. Only larger bodies shown
- €Zg — METAMORPHOSED GRANITIC ROCK — Megacrystic, well foliated; locally contains hornblende

SYMBOLS

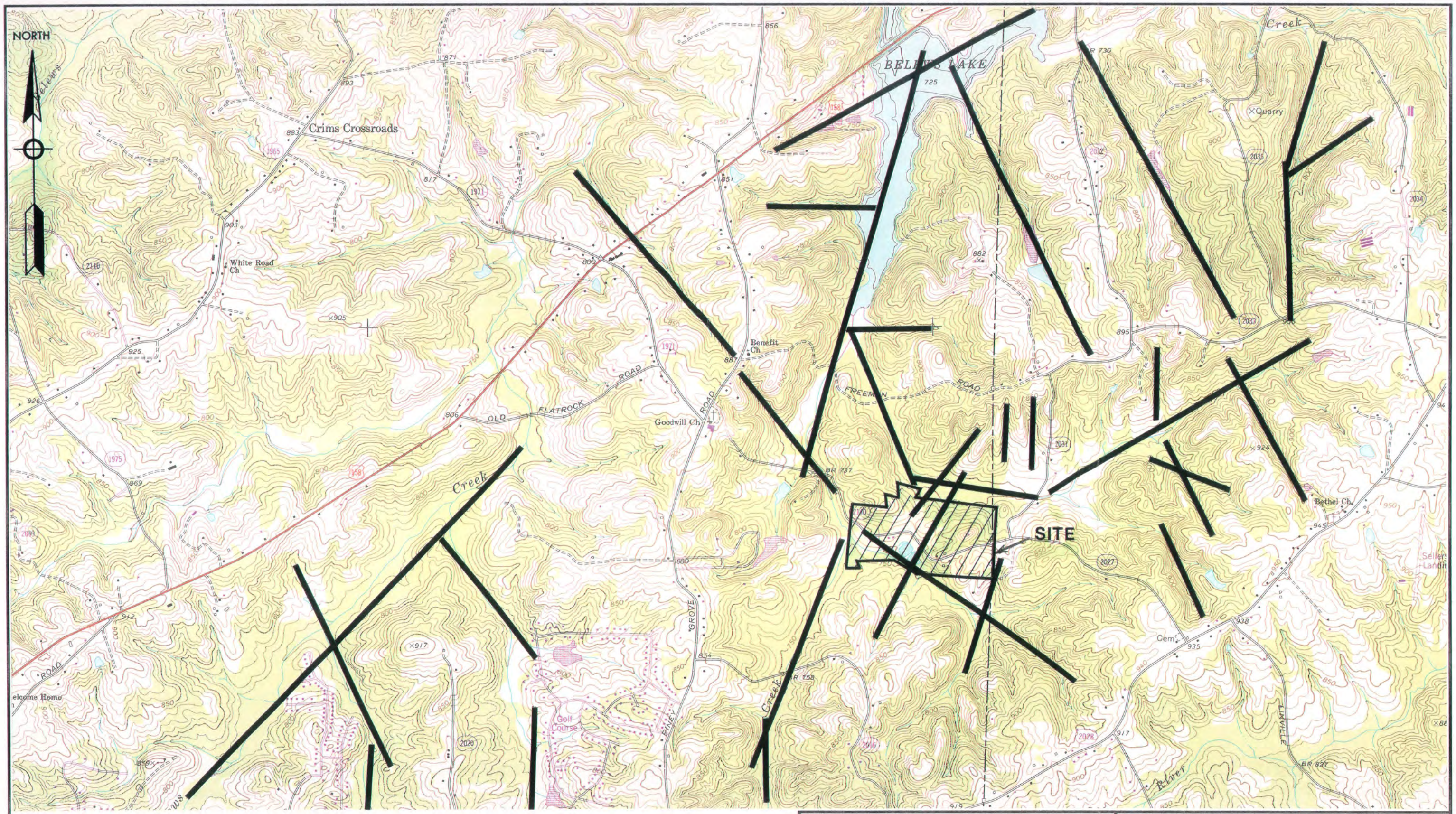
- Contact
- Fault
- Fault — Showing relative horizontal movement
- Normal fault — Bar and ball on downthrown side
- Overturned normal fault
- Thrust fault — Sawteeth on upper plate
- Overturned thrust fault
- Anticline — Showing direction of plunge
- Overturned anticline — Showing direction of dip of limbs
- Syncline — Showing direction of plunge
- Dike — Dashed where inferred from aeromagnetic data
- Scarp — Hachured on downslope side
- Zone of mylonitization

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-6
REGIONAL GEOLOGIC MAP

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

RUST E&I Project No. 87221.700



Scale in Feet

0 2000 4000

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-7
GEOLOGIC LINEAMENT MAP

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

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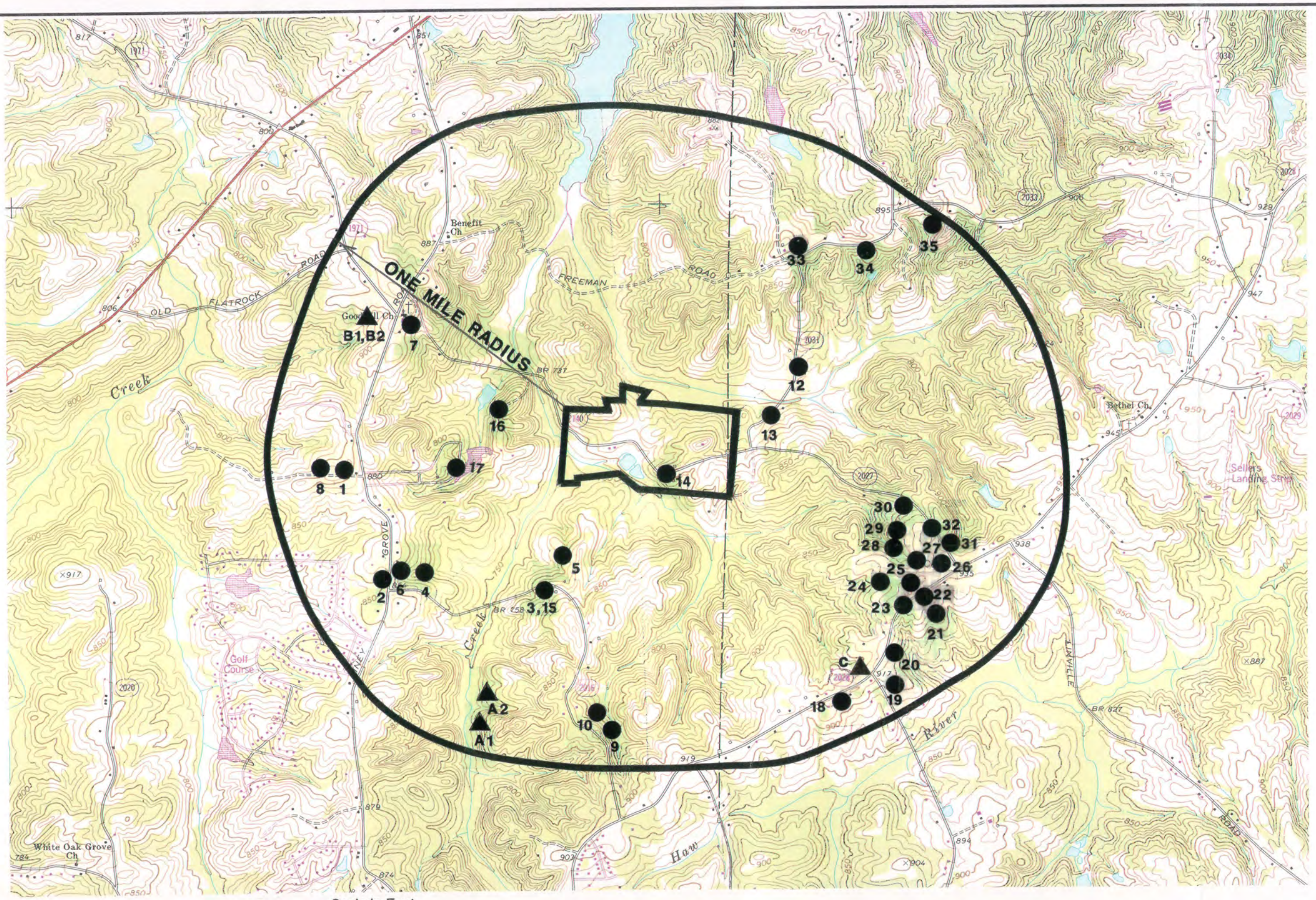


Note:
Well locations were determined through search of private and public water supply records of Forsyth County and Guilford County. Figure includes well locations identified by Golder [1988].

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-8
WELL INVENTORY

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

RUST E&I Project No. 87221.700

TABLE 2-1

WELL INVENTORY
Design Hydrogeologic Investigation
Piedmont Landfill & Recycling Center
Forsyth County, North Carolina

PRIVATE WELLS

Map* Location	Permit No. or Owner	Diameter (inches)	Total Depth (feet)	Casing Depth (feet)	Static Water Level (feet)	Yield (gpm)
1	803235	6.25	505	21	60	0.5-0.75
2	NA	6	445	160	40	2
3	802209	NA	NA	NA	31	NA
4	803837	18	48	48	36	NA
5	802656	6.25	165	36	NA	35
6	800340	6.25	205	67	8	15
7	NA	6.25	240	NA	20	15
8	800760	6.25	285	37	NA	5
9	800713	NA	245	63	NA	75
10	801279	NA	145	36	NA	20
11	802563	6.25	185	125	NA	NA
12	Clyde Lowe	24	NA	NA	24.8	NA
13	NA	24	NA	NA	16	NA
14	WMI	24	NA	NA	NA	NA
15	Tom Beeson	24	42	NA	38.5	NA
16	Unidentified Residence	NA	NA	NA	NA	NA
17	Hiram Hills	NA	NA	NA	NA	NA
31	George Custer	NA	NA	NA	NA	NA
32	Tony Clayton	NA	295	55	30	50
32	Mack Peoples	NA	NA	NA	NA	NA
30	Sidney Owens	NA	100	25	15	30
35	Autumn Williams	2	505	43	38	1
27	Barbara Melton	12	120	22	30	8
28	M.J. Developers	12	120	41	10	6
25	Keith Zazzaro	NA	345	49	20	5
26	Cynthia Maple	NA	NA	NA	NA	NA
25	NA	NA	NA	NA	NA	NA
29	Julie Stowe	NA	NA	NA	NA	NA
25	James Lehman	NA	NA	NA	NA	NA
25	Lisa Blackmon	NA	NA	NA	NA	NA
24	E.C. Morris	NA	NA	NA	NA	NA
33	Larry Valentine	NA	NA	NA	NA	NA
34	Fred Mounce	1.5	175	69	31	7
21	Ryan Haywood	NA	NA	NA	NA	NA
21	Wade Welch	NA	NA	NA	NA	NA
21	Steven Randolph	NA	NA	NA	NA	NA
21	Kurt Barlow	NA	NA	NA	NA	NA
26	Joe Bigham	2	265	48	22	5

TABLE 2-1
(CONTINUED)

Map* Location	Permit No. or Owner	Diameter (inches)	Total Depth (feet)	Casing Depth (feet)	Static Water Level (feet)	Yield (gpm)
26	Alicia Flowers	NA	NA	NA	NA	NA
25	Bonnie Frostle	NA	NA	NA	NA	NA
22	Don Galloway	NA	NA	NA	NA	NA
22	Triad Properties	3	225	45	40	30
23	Larry Pachena	NA	NA	NA	NA	NA
23	Jeffery Davis	NA	NA	NA	NA	NA
20	Lamb & Peeples	NA	365	128	40	15
20	Lamb & Peeples	NA	365	91	40	8
20	Melvin Osborne	NA	NA	NA	NA	NA
18	Eunice Peancan	NA	NA	NA	NA	NA
18	Steve Feanrian	NA	NA	NA	NA	NA
18	Steve Feanrian	NA	NA	NA	NA	NA
19	Dewey Carlile	NA	NA	NA	NA	NA
19	Beth Simone	NA	NA	NA	NA	NA
19	Piedmont Triad Builders	NA	125	49	40	20

PUBLIC WELLS

Map Location	Permit No. or Owner	Diameter (inches)	Total Depth (feet)	Casing Depth (feet)	Static Water Level (feet)	Yield (gpm)
A1	Mikkola Downs Subdivision	8	300	40	NA	NA
A2		8	300	40	NA	NA
B1	Deerpath Subdivision	6.25	300	29	NA	NA
B2		6.25	300	29	NA	NA
C	Smoke View Subdivision	NA	NA	NA	NA	NA

NA = information not available
*see Figure 2-8 for approximate well locations

3.0 DESIGN HYDROGEOLOGIC INVESTIGATION

3.1 SUBSURFACE EXPLORATIONS

A total of twenty-six piezometers were installed at the PLRC site between February 15 and March 16, 1994. Ten of these piezometers were installed as nested well pairs, and six were installed as single piezometers. Technical oversight for all piezometer installations was provided by an experienced RUST E&I geologist. Drilling and installations were conducted by Environmental Construction Services and Graham & Currie.

3.1.1 Soil Borings

A total of sixteen soil borings were drilled and logged during the PLRC Design Hydrogeologic Investigation. The borings were drilled with a CME-45 and a CME-75 drill rig using either 4.25-inch I.D. (8.3-inch O.D.) or 2.25-inch I.D. (5.3-inch O.D.) hollow stem augers. The borings were advanced to the targeted depths.

Subsurface soil and sediment samples were collected utilizing standard 24-inch long, 1.5-inch I.D. (2.0-inch O.D.) stainless steel split spoons. The soil samples were collected for lithologic classification and geotechnical laboratory analyses.

RUST E&I geologists prepared field logs describing subsurface conditions encountered in each sampled boring. Soils and sediments were classified in the field in accordance with the Unified Soils Classification System (USCS) and procedures described in ASTM D 2488 (Standard Practice for Description and Identification of Soils, Visual - Manual Procedure).

WMI-supplied Field Log - Soil Borehole forms were prepared at each boring location. Soil Borehole Logs prepared as part of this investigation are presented in Appendix A.

3.1.2 Rock Coring

A total of nine borings were cored into bedrock. The corehole locations include P-1D, -4D, -5, -9S, -9D, -12D, -14D, -15D, and -16. The bedrock was cored and sampled utilizing a 94 mm wireline, NQ size coring system. Upon retrieval, core lengths were measured and

classified in accordance with ASTM D 2488 procedures and stored in labeled cardboard core boxes. Each core box was labeled with the following information: project name, boring number, run number, sample depth range, recovery length, and percent recovered. Upon completion of each corehole, the core samples were photographed as part of the field records.

3.1.3 Piezometer Installation

A total of 26 piezometers were constructed during this investigation to evaluate various water-bearing strata underlying the site. Piezometer locations are illustrated on Figure 3-1. A summary of piezometer construction data is presented in Table 3-1. Detailed Piezometer Construction Summaries are included in Appendix B.

All piezometer screen and riser pipe consisted of 2.0-inch I.D., flush thread, Schedule 40 polyvinyl chloride (PVC). Screen lengths were 5 feet (except for P-14D which was 10 feet) with 0.010-inch machined slots. All piezometer screen and riser lengths were measured to the nearest 0.01 foot and recorded on Piezometer Construction Summaries prior to installation.

Due to the stable nature of the underlying materials, augers were removed from the borings and the piezometers installed in open boreholes. Filter pack material consisted of washed, medium silica filter sand and was installed to approximately 1 to 10 feet above the top of the screen. A bentonite slurry was then installed from the top of the filter pack to the ground surface in all piezometers, except P-13. The bentonite slurry consisted of Baroid bentonite chips and clean potable water.

All piezometers, except P-13, were secured at the surface with 4.0-inch I.D., locking steel surface casings and concrete pads. No protective posts were installed.

The construction of piezometer P-13 consisted of a washed, medium silica filter sand installed to approximately 1.6 feet above the top of the screen. A 3.8-foot thick bentonite seal constructed of bentonite chips was then emplaced on top of the filter pack sand. A 1.5-foot thick layer of medium silica sand was installed above the bentonite seal. The remaining annular space was then tremie grouted to the ground surface using a cement/bentonite

grout mix. The surface completion of P-13 included installation of a 4.0-inch I.D., locking anodized aluminum casing and a concrete pad.

All piezometers were developed by surge pumping using a filtered air pneumatic pump. All piezometers were pumped continuously until ground water parameters stabilized. Ground water parameters (pH, specific conductivity and temperature) were measured using a Hydac ground water meter. The parameters were recorded in the piezometer construction summaries presented in Appendix B for all piezometers except P-5, P-9D and P-9S. During development of these piezometers, the ground water meter was malfunctioning. The piezometers, however, were continuously pumped until a clear, non-turbid discharge was achieved.

Appendix C contains a listing of the water levels recorded at each of the newly installed piezometers during the hydrogeologic investigation.

3.1.4 In-Situ Hydraulic Conductivity Testing

Slug tests (falling and rising head permeability tests) were performed to evaluate the hydraulic characteristics of the saprolite and bedrock aquifers beneath the PLRC site. All slug tests were performed and analyzed using the techniques described by Bouwer and Rice (1976) and Bouwer (1989).

Rising head tests were only considered for piezometers screened across the water table to avoid the effects of flow into the unsaturated materials above the test zone. For these tests, a closed cylinder of known volume was lowered into the piezometer after the pressure transducer was installed, and the static water level had been recorded. Once the water level returned to static or equilibrium conditions, the cylinder was rapidly removed from the piezometer, simulating the removal of a "slug" of water. The recovery of water in the piezometer was then monitored and recorded using a transducer and a Hermit environmental data logger (Model SE 1000B).

Where water levels extended above the top of the screened or open corehole test zone, both falling head and rising head tests were performed. The falling head tests provide confirmation of the rising head test data.

Falling head tests are performed in the same general manner as the rising head tests. However, during falling head tests, the water levels are also monitored as they "fall" back to static or equilibrium conditions after introduction of the slug. When the falling head test segment was completed at each location, the rising head test was then performed.

The data recorded by the Hermit data logger was later downloaded into a computer where it could be manipulated into a usable format. The data was used to generate semi-logarithmic plots of recovery versus time. Hydraulic conductivity values were calculated using the following equation (Bouwer and Rice, 1976; Bouwer, 1989):

$$K = \frac{(r'_c)^2 \ln(R_e/r_w)}{2L_e} \; x \; \frac{1}{t} \; x \; \ln(y_0/y_t)$$

where:

r'_c = radius of inside piezometer casing (corrected for unsaturated gravel pack response as shown in Bouwer, 1989) (feet)

r_w = radial distance between piezometer center and undisturbed aquifer (r_c plus thickness of gravel envelope or developed zone outside casing, plus casing thickness) (feet)

L_e = effective length of perforated, screened, uncased, or otherwise open section of piezometer through which ground water actually enters (feet)

L_w = depth from water table to bottom of screened interval (feet)

y_0 = hydraulic head at time zero (feet)

y_t = hydraulic head at time t (feet)

t = time difference associated with y_0 and y_t (seconds)

R_e = effective radial distance over which the head difference, y, is dissipated (feet)

K = hydraulic conductivity (feet per second)

$\ln(R_e/r_w)$ = dimensionless ratio used to evaluate R_e for various system geometries (See Bouwer and Rice, 1976)

Calculation sheets and semi-logarithmic plots of time versus recovery are included in Appendix D. Hydraulic conductivity values in the saprolite and partially weathered rock strata range from 1.25 x 10^{-3} centimeters per second (cm/sec) to 8.29 x 10^{-6} cm/sec. Hydraulic conductivity values in the bedrock ranged from 2.04 x 10^{-3} cm/sec to 3.96 x 10^{-6} cm/sec. * Corrected in response to comments

3.2 GEOTECHNICAL TESTING

Laboratory soil testing was performed by GeoSyntec Consultants' Geomechanics and Environmental Laboratory in Atlanta, Georgia. Soil samples which were submitted to the laboratory were in the form of disturbed (bag) samples and relatively undisturbed Shelby tube samples. The laboratory testing program consisted of classification tests, hydraulic conductivity tests, a consolidation test, and shear strength tests. All testing was performed in general accordance with ASTM standards. Testing results are summarized in Table 3-2. Additional information concerning testing procedures and conditions are included in Appendix E.

3.2.1 Classification Testing

Classification tests were performed on selected soil samples obtained from the test borings to verify classification. A total of eight Atterberg limits (liquid and plastic) tests were performed to quantify the plasticity of the onsite soils in accordance with ASTM D 4318. A total of ten moisture content determinations were performed in order to assess the in-situ moisture content of selected soils in accordance with ASTM D 2216. Twenty-one full sieve with hydrometer analyses were performed to assess the grain size characteristics of the soils in accordance with ASTM D 422. Table 3-2 contains the results of the Atterberg limits and moisture content determinations and selected sieve analysis data. The sieve analysis data includes the percent fines (percent finer by weight than the standard No. 200 sieve) and the D_{10}, D_{30}, and D_{60} diameters (grain size diameters at which 10, 30, and 60 percent of the sample are finer by weight). Grain size analysis curves are included in Appendix E.

3.3.2 Hydraulic Conductivity Testing

A total of six flexible wall falling head hydraulic conductivity tests (ASTM D 5084) were performed on selected Shelby tube samples in order to assess the in-situ vertical hydraulic conductivity of the various soils encountered during the field investigation.

Following extrusion from the Shelby tube, a representative portion of the sample was carefully cut to size and placed within a flexible membrane. Each test specimen was placed inside a triaxial-type permeameter and saturated with deaired tap water. After saturation, the test specimens were incrementally consolidated to an effective consolidation stress that approximated the in-situ stress conditions. Upon completion of primary consolidation, permeation of the specimens was commenced using falling head gradients ranging from 9 to 1 until consistent values of hydraulic conductivity were obtained and the pore fluid inflow and outflow rates were approximately equivalent. The resultant hydraulic conductivity values are contained in Table 3-2. A detailed description of the hydraulic conductivity testing procedures and testing conditions is included in Appendix E.

3.2.3 Consolidation Testing

A one-dimensional consolidation test (ASTM D 2435) was performed on a portion of the Shelby tube sample obtained at boring location P-2D from a depth of 22 to 24 feet.

After being extruded from the Shelby tube and cut to size, the test specimen was placed inside the consolidation ring and successive load increments of 1/4, 1/2, 1, 2, 4, and 8 tsf were applied. Each load increment was left in place until primary consolidation was determined to be essentially complete before another load increment was applied. Following primary consolidation of the 8 tsf load increment, an unloading cycle was initiated by reducing the applied stress to 2 tsf and measuring the rebound of the test specimen.

The consolidation test results are summarized in the void ratio versus logarithm of time plot contained in Appendix E. From this plot it is possible to estimate the maximum preconsolidation pressure (σ'_p) using the Casagrande construction, the compression index (C_c), and the recompression index (C_r) of the test specimen. In turn, it is possible to calculate the overconsolidation ratio (OCR) from σ'_p and the estimated in-situ effective

stress of the test specimen. Based on the test results, the following values for the above defined parameters are obtained:

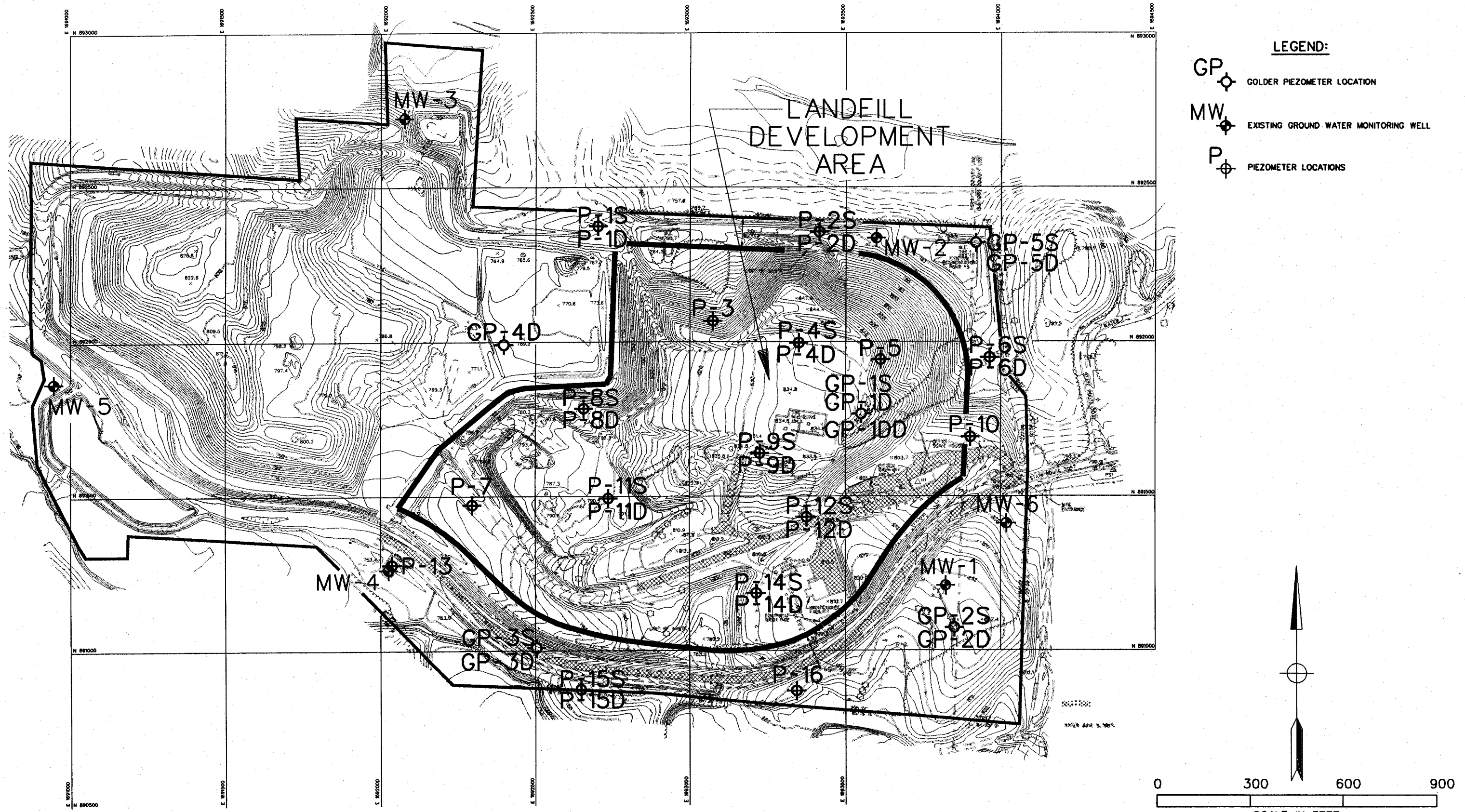
$\sigma'_p \approx 2700$ psf,
$C_c \approx 0.1721$,
$C_r \approx 0.0085$, and
OCR ≈ 1.4.

3.2.4 Shear Strength Testing

A total of three Shear strength tests were performed on selected Shelby tube samples in order to characterize the undrained shear strength of the various soils encountered during the field investigation. All strength tests were performed using the unconsolidated, undrained (UU) triaxial test method (ASTM D 2850).

Test specimens were cut to size from extruded Shelby tube samples and placed within flexible membranes. An effective confining stress approximately equal to the in-situ stress conditions experienced by the test specimen was applied to the specimens within a triaxial testing apparatus. The specimen was then subjected to an axial deviator stress that was applied at a constant strain rate of approximately 0.0390 in/min. The drainage lines to the triaxial cell were closed prior to the application of the confining and deviator stresses so that unconsolidated, undrained conditions would develop. Sheaving of each test specimen continued until at least 15 percent axial strain was achieved.

Table 3-2 lists the ultimate deviator stress (σ) and the corresponding axial strain (ϵ) for each UU test. Plots of σ versus ϵ are included in Appendix E for each of the tests.



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-1
BORING LOCATION PLAN

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.700

N:/87221/7221BRNG.DGN

TABLE 3-1

SUMMARY OF MONITORING WELL & PIEZOMETER CONSTRUCTION DETAILS
Design Hydrogeologic Investigation
Piedmont Landfill & Recycling Center
Forsyth County, North Carolina

Monitoring Well / Piezometer	State Coordinates	Ground Elevation	TOC Elevation	Screen Elevation (Depth)	Sand Pack Elevation (Depth)	Top of Bentonite Seal Elevation (Depth)
P-1-D	N892358 E1692725	775.80	779.59	696.35 - 691.35 (79.45 - 84.45)	706.35 - 691.10 (69.45 - 84.70)	775.80 (0)
P-1-S	N892374 E1692703	777.20	780.21	741.75 - 736.75 (35.45 - 40.45)	746.20 - 736.50 (31.00 - 40.70)	777.20 (0.00)
P-2-D	N892353 E1693426	769.20	772.03	718.41 - 713.41 (50.79 - 55.79)	719.30 - 712.20 (49.90 - 57.00)	769.20 (0.00)
P-2-S	N892356 E1693415	768.80	771.53	748.05 - 743.05 (20.75 - 25.75)	749.20 - 742.80 (19.60 - 26.00)	768.80 (0.00)
P-3	N892067 E1693073	807.90	811.06	747.38 - 742.38 (60.52 - 65.52)	758.00 - 742.05 (49.90 - 65.85)	807.90 (0.00)
P-4-D	N891996 E1693350	836.40	840.48	706.86 - 701.86 (129.54 - 134.54)	707.40 - 701.40 (129.00 - 135.00)	836.40 (0.00)
P-4-S	N892012 E1693355	837.00	839.81	731.25 - 726.25 (105.75 - 110.75)	738.30 - 725.90 (98.70 - 111.10)	837.00 (0.00)
P-5	N891940 E1693448	812.90	816.80	755.50 - 750.50 (57.40 - 62.40)	760.79 - 749.90 (52.11 - 63.00)	812.90 (0.00)
P-6-D	N891948 E1693966	766.60	769.16	712.10 - 707.10 (54.50 - 59.50)	715.00 - 706.60 (51.60 - 60.00)	766.60 (0.00)
P-6-S	N891931 E1693975	767.50	770.70	761.83 - 756.83 (5.67 - 10.67)	763.52 - 756.50 (3.98 - 11.00)	767.50 (0.00)
P-7	N891472 E1692296	763.80	766.88	742.80 - 737.80 (21.00 - 26.00)	745.20 - 736.80 (18.60 - 27.00)	763.80 (0.00)
P-8-D	N891784 E1692657	777.90	780.79	709.40 - 704.40 (68.50 - 73.50)	713.40 - 701.40 (64.50 - 76.50)	777.90 (0.00)

TABLE 3-1

SUMMARY OF MONITORING WELL & PIEZOMETER CONSTRUCTION DETAILS
Design Hydrogeologic Investigation
Piedmont Landfill & Recycling Center
Forsyth County, North Carolina

Monitoring Well / Piezometer	State Coordinates	Ground Elevation	TOC Elevation	Screen Elevation (Depth)	Sand Pack Elevation (Depth)	Top of Bentonite Seal Elevation (Depth)
P-8-S	N891788 E1692645	776.50	779.43	750.75 - 745.75 (25.75 - 30.75)	754.10 - 744.50 (22.40 - 32.00)	776.50 (0.00)
P-9-D	N891639 E1693228	828.00	831.25	729.00 - 724.00 (99.00 - 104.00)	731.00 - 723.70 (97.00 - 104.30)	828.00 (0.00)
P-9-S	N891636 E1693239	827.60	831.57	756.90 - 751.90 (70.70 - 75.70)	761.90 - 751.60 (65.70 - 76.00)	827.60 (0.00)
P-10	N891691 E1693905	797.50	800.30	758.50 - 753.50 (39.00 - 44.00)	763.00 - 751.50 (34.50 - 46.00)	797.50 (0.00)
P-11-D	N891493 E1692739	791.40	795.50	702.15 - 697.15 (89.25 - 94.25)	702.40 - 695.40 (89.00 - 96.00)	791.40 (0.00)
P-11-S	N891501 E1692729	791.50	794.44	746.10 - 741.10 (45.40 - 50.40)	748.80 - 740.50 (42.70 - 51.00)	791.50 (0.00)
P-12-D	N891432 E1693376	809.80	813.15	739.88 - 734.88 (69.92 - 74.92)	741.70 - 733.80 (68.10 - 76.00)	809.80 (0.00)
P-12-S	N891424 E1693358	811.10	814.27	760.68 - 755.68 (50.42 - 55.42)	762.80 - 755.10 (48.30 - 56.00)	811.10 (0.00)
P-13	N891278 E1692036	754.30	757.33	701.05 - 696.05 (53.25 - 58.25)	702.70 - 692.30 (51.60 - 62.00)	706.50 (47.80)
P-14-D	N891186 E1693214	805.80	808.65	735.80 - 725.85 (70.00 - 79.95)	740.80 - 725.40 (65.00 - 80.40)	805.80 (0.00)
P-14-S	N891161 E1693214	805.80	808.43	770.72 - 765.72 (35.08 - 40.08)	773.40 - 765.39 (32.40 - 40.41)	805.80 (0.00)
P-15-D	N890875 E1692649	766.20	768.23	718.70 - 713.70 (47.50 - 52.50)	719.90 - 713.60 (46.30 - 52.60)	766.20 (0.00)

TABLE 3-1

SUMMARY OF MONITORING WELL & PIEZOMETER CONSTRUCTION DETAILS
Design Hydrogeologic Investigation
Piedmont Landfill & Recycling Center
Forsyth County, North Carolina

Monitoring Well / Piezometer	State Coordinates	Ground Elevation	TOC Elevation	Screen Elevation (Depth)	Sand Pack Elevation (Depth)	Top of Bentonite Seal Elevation (Depth)
P-15-S	N890873 E1692661	766.90	769.77	751.82 - 746.82 (15.08 - 20.08)	754.60 - 745.90 (12.30 - 21.00)	766.90 (0.00)
P-16	N890870 E1693344	811.20	814.25	771.79 - 766.79 (39.41 - 44.41)	776.40 - 766.70 (34.80 - 44.50)	811.20 (0.00)
MW-1	N891210 E1693821	821.40	823.93	777.40 - 772.40 (44.00 - 49.00)	780.90 - 772.40 (40.50 - 49.00)	783.70 (37.70)
MW-2	N892336 E1693597	767.34	770.16	747.14 - 742.14 (20.20 - 25.20)	749.84 - 741.84 (17.50 - 25.50)	752.84 (14.50)
MW-3	N892723 E1692075	767.30	770.08	734.80 - 729.80 (32.50 - 37.50)	737.70 - 729.30 (29.60 - 38.00)	740.30 (27.00)
MW-4	N891261 E1693597	754.46	756.92	734.50 - 729.50 (19.96 - 24.96)	737.76 - 727.46 (16.70 - 27.00)	740.46 (14.00)
MW-5	N891866 E1690947	740.37	743.17	725.95 - 720.95 (14.42 - 19.42)	728.37 - 719.87 (12.00 - 20.50)	730.57 (9.80)
MW-6	N891410 E1694018	798.00	800.82	776.92 - 771.92 (20.90 - 25.90)	778.30 - 771.20 (19.70 - 26.80)	782.40 (15.60)

TABLE 3-2

SUMMARY OF GEOTECHNICAL TESTING RESULTS
Design Hydrogeologic Investigation
Piedmont Landfill & Recycling Center
Forsyth County, North Carolina

	Sample Location	Sample No.	Sample Depth (feet)	Moisture Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Sieve Analyses				ASTM Class.	UU Triaxial		Hyd. Cond. (cm/sec)
						LL	PI	D_{10}	D_{30}	D_{60}	-200		σ(psi)	ϵ(%)	
Silt	P-1D	S5	23-25	-	-	-	-	0..005	0.023	0.150	47.1	SM	-	-	-
Sand	P-1D	S12	55-57	-	-	-	-	0.008	0.058	0.180	34.0	SM	-	-	-
Sand	P-2D	UD-2	4-6	15.5	110	-	-	0.001	0.040	0.250	34.0	SM	13.0	15.9	$1.6x10^{-5}$
A-5	P-2D	S3	9-11	-	-	42	6	<0.001	0.004	0.080	59.2	ML	-	-	-
A-4	P-2D	UD-4	22-24	40.1	78.5	34	3	0.004	0.025	0.210	45.3	SM	14.5	16.0	$2.7x10^{-4}$
Sand	P-2D	S11	49-51	-	-	-	-	0.007	0.060	0.250	31.5	SM	-	-	-
Sand	P-3	S4	54-56	-	-	-	-	0.008	0.070	0.410	30.5	SM	-	-	-
(Sand)	P-3	UD-1	58-59.5	21.0	99.7	-	-	-	-	-	-	SM	-	-	$1.3x10^{-4}$
Sand	P-4D	S5	74-76	-	-	-	-	0.011	0.090	0.400	27.6	SM	-	-	-
Sand	P-5	S2	34-35.5	-	-	-	-	0.050	0.220	0.850	13.5	SM	-	-	-
A-2-4	P-6D	UD-1	4-6	28.0	92.9	38	3	-	-	-	-	SC	-	-	$3.6x10^{-6}$
	P-6D	S4	6-8	-	-	-	-	0.002	0.050	0.250	35.0	SC	-	-	-
Silt	P-6D	S13	45-47	-	-	-	-	0.007	0.032	0.420	43.3	SM	-	-	-
Sand	P-7	S4	6-8	-	-	-	-	0.002	0.050	0.360	34.1	SM	-	-	-

TABLE 3-2
(CONTINUED)

	Sample Location	Sample No.	Sample Depth (feet)	Moisture Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Sieve Analyses				ASTM Class.	UU Triaxial		Hyd. Cond. (cm/sec)
						LL	PI	D_{10}	D_{30}	D_{60}	-200		σ(psi)	ϵ(%)	
Silty Sand	P-8	UD-2	20-22	21.3	97.0	-	-	0.006	0.050	0.400	35.0	SM	27.3	16.0	4.3×10^{-5}
Sand	P-8	S13	59-61	-	-	-	-	0.018	0.110	0.470	22.5	SM	-	-	-
A-4	P-10	S3	14-16	16.0	-	28	5	-	-	-	-	ML	-	-	-
A-5	P-10	S10	37-39	44.2	-	43	7	-	-	-	-	ML	-	-	-
Sand	P-11D	S3	15-17	-	-	-	-	0.022	0.075	0.200	29.4	SM	-	-	-
Sand	P-11D	S7	45-47	-	-	-	-	0.050	0.310	1.00.	11.8	SW-SM	-	-	-
A-4	P-12D	S6	29-31	-	-	28	5	0.006	0.022	0.150	50.4	ML	-	-	-
A-4	P-13	S3	8-10	29.2	-	33	8	-	-	-	-	ML	-	-	-
Sand	P-13	S5	18-20	-	-	-	-	0.011	0.110	0.425	24.3	SM	-	-	-
Sand	P-14	S6	18-20	-	-	-	-	0.021	0.140	0.430	19.0	SM	-	-	-
A-7	P-15	S2	2-4	26.2	-	48	19	-	-	-	-	ML	-	-	-
Sand	P-15	S5	9-11	-	-	-	-	0.001	0.150	0.850	24.3	SM	-	-	-
(Sand)	P-15	UD-2	14-16	16.1	108.3	-	-	-	-	-	-	SM	-	-	1.1×10^{-5}
Sand	P-16	S3	4-6	-	-	-	-	0.020	0.110	0.350	23.9	SM	-	-	-

4.0 SITE GEOLOGY

The site has been described as being underlain by metamorphic rocks of the Charlotte Belt, a major subdivision of the Piedmont physiographic province. These rocks include biotite gneiss, biotite schist, granite gneiss, granite schist, hornblende gneiss, hornblende schist, quartz schist and quartzite (Price 1989). These metamorphic rocks are the result of several events of regional folding, metamorphism and igneous intrusion. The orientation of the predominant structural features of this belt appear to coincide with the prevalent northeast-southwest trend of the Appalachian Mountains.

Except for alluvial soils associated with surface drainage features, soils in the Piedmont are formed primarily by chemical weathering of the bedrock. The extent of the weathering is heavily dependent upon the original rock type, its chemical composition and its susceptibility to weathering. The depth of weathering is quite variable within this belt. Soil depths up to 140 feet have been recorded (Bloxham et al., 1970).

4.1 LITHOLOGY

This exploration program for the PLRC landfill development area confirmed that the site lithology consists primarily of micaceous silts, poorly graded micaceous sands, lean sandy clays, saprolite and highly weathered rock. These soil strata were underlain by bedrock which was first encountered from 32 feet to 130 feet below existing ground surface. A detailed discussion of soil and rock conditions encountered during this investigation is presented in the following sections. Figures 4-1 contain the geologic sections which depict the geology at the site.

4.1.1 Soil

Soils at the site consist of both fill soils and soils formed by in-place weathering of the underlying rock. The latter soils can be divided into two types, residual soil and saprolite. The fill soils are mainly disturbed variations of these. The fill soils are soils which were excavated from the active landfill area and placed in the development area in the past. The distinguishing factor between residual soils and saprolite is that saprolite retains the original fabric and structure of the parent bedrock. Residual soils, however, are the product of more

intense weathering which causes the soil to lose whatever fabric or structure it may have had. Residual soils generally overly the saprolite. The residual soil thickness encountered in the borings drilled at the site generally ranged from approximately 0 feet to 14 feet. Saprolite thickness ranged up to 48 feet at the site, and partially weathered rock thickness varied up to 73 feet.

The fill soils observed south of MW-2 were placed on the original north slope of the ridge. This fill is a result of earth moving activities associated with the existing landfill's construction. The thickness of this fill stratum is illustrated on Figures 4-1A and 4-1D. Additional fill soils are observed between P-7, P-8, and P-11 which is an active stockpile area for daily cover for the existing landfill. This area is shown on Figures 4-1B and 4-1C. It is noted that the ground surface on these sections depict a previous condition. A major earth moving project for daily cover is on-going at the site. The existing ridge is being lowered for this development. The fill material encountered in the drilling program was light brown, yellowish brown, yellowish orange, yellowish green and black silty sand containing some wood fragments.

The residual soil encountered at the site was generally comprised of light brown, yellowish orange, greenish gray and black, dry to moist, micaceous silt with varying degrees of fine to coarse sand and clay. At RUST piezometer location P-6D, a greenish gray, lean sandy clay was encountered from 4 feet to 6 feet. Standard penetration tests resulted in N-values which ranged from 5 to 38 but averaged around 10 within the residual soil.

The observed saprolite stratum was composed primarily of light brown, yellowish brown, yellowish orange, light red, greenish gray, or black and white; moist to wet, foliated, micaceous, silt or sand with varying degrees of clay, silt and fine to medium sand. Standard penetration tests resulted in N-values which ranged from 5 to 100 but averaged around 20 within the saprolite.

The weathered rock encountered in the borings was predominantly orange pink, yellowish orange, yellowish brown, grayish orange, light brown, or white; moist to wet, either poorly graded sand or a foliated, micaceous, silty sand with varying degrees of fine to coarse particles. This soil unit exhibits standard penetration test N- values that exceed 100.

A more detailed discussion of the geotechnical engineering properties of the on site soils is presented in Section 3.2.

4.1.2 Rock

Granite gneiss was the predominant rock type encountered in the nine core holes drilled on the site. Biotite, feldspar quartz and hornblende are the major constituents. Other primary rock types encountered were granite schist, hornblende schist, biotite schist, quartz schist and chlorite schist. The top of bedrock map is shown in Figure 4-2. The foliated inter-banding of these rock units observed in the core samples have dips ranging from 0° to 50°. Although there was banding, there were no dikes encountered during this investigation. Actual joint fractures vary in frequency and spacing.

Of the 26 core runs made, 12 had recoveries at 90-100 percent. Corresponding rock quality designation (RQD) values were between 58% to 100% for these high recovery runs. In Runs 1 and 2 of rock core P-1D, the recoveries were 19% and 43% with RQD values of 0% and 25%, respectively. Run 1 of rock core P-5 had a 35% recovery and a RQD value of 0%. Run 1 of rock core P-9S had a 79% recovery and a RQD value of 43%. In rock core P-12D, Run 1 had a recovery of 83% and a RQD of 50%. Run 1 of rock core P-14D had a recovery of 86% and a RQD value of 75%. In Runs 2 and 1 of rock cores P-15D and P-16, the recoveries were 60% and 83% with RQD values of 34% and 80%, respectively.

As indicated in the discussion above, all of the poorer recoveries and low RQDs were in the upper two runs of the core holes. This trend is due to the fact that fractures within the rocks tend to become less frequent and tighter (less open) with depth, because of overburden/confining pressures.

Soil and rock borehole logs are presented in Appendix A and more detailed rock descriptions are found in Appendix F.

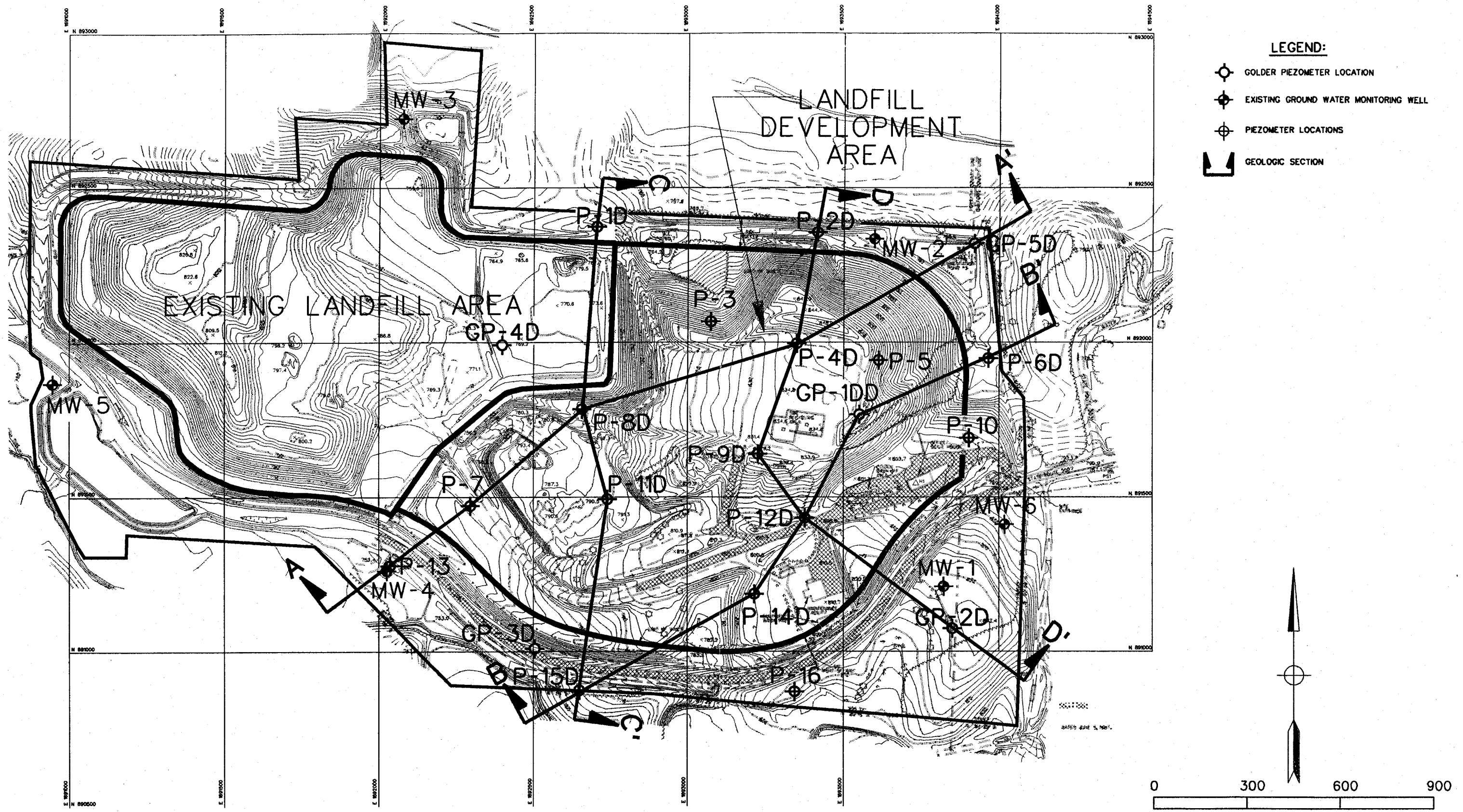
4.2 STRUCTURE

There are four lineaments which were identified during this investigation. Two north-south lineaments were investigated. One is the draw on the east property boundary parallel to

boring locations GP-5 and P-6 and the other is the fill covered draw parallel to boring locations P-2 and P-4. The other two lineaments noted in this area are in a northeast-southwest orientation parallel to boring locations P-6, P-12, P-14 and P-7, P-11. The orientation of the onsite lineaments and other lineaments in the vicinity have been illustrated in Figure 2-7 and described in Section 2.3.3.

The lineaments generally have more fractures within the underlying rock which tends to result in deeper weathering. The rock observed at the highest topographic location (boring location P-9) had fewer fractures and was generally more quartzitic than rock encountered elsewhere at the site. This explains the greater resistance to weathering in the vicinity of boring location P-9. The saddle area near boring locations P-12 and P-14 had more fractures but the degree of weathering is not as intense as was observed at boring location P-9.

The foliation orientation exhibited some variability in the core samples but the general trend is considered to be in the northeast-southwest regional orientation. No diabase or pegmatic veins were observed during this investigation. The topographic high located near boring location P-9 appears to exhibit trends and rock types similar to those encountered at boring location P-16. A quartzitic unit is therefore assumed to be oriented in a northeast-southwest direction around P-16.



LEGEND:

- GOLDER PIEZOMETER LOCATION
- EXISTING GROUND WATER MONITORING WELL
- PIEZOMETER LOCATIONS
- GEOLOGIC SECTION

0 300 600 900

SCALE IN FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4-1
GEOLOGIC SECTIONS

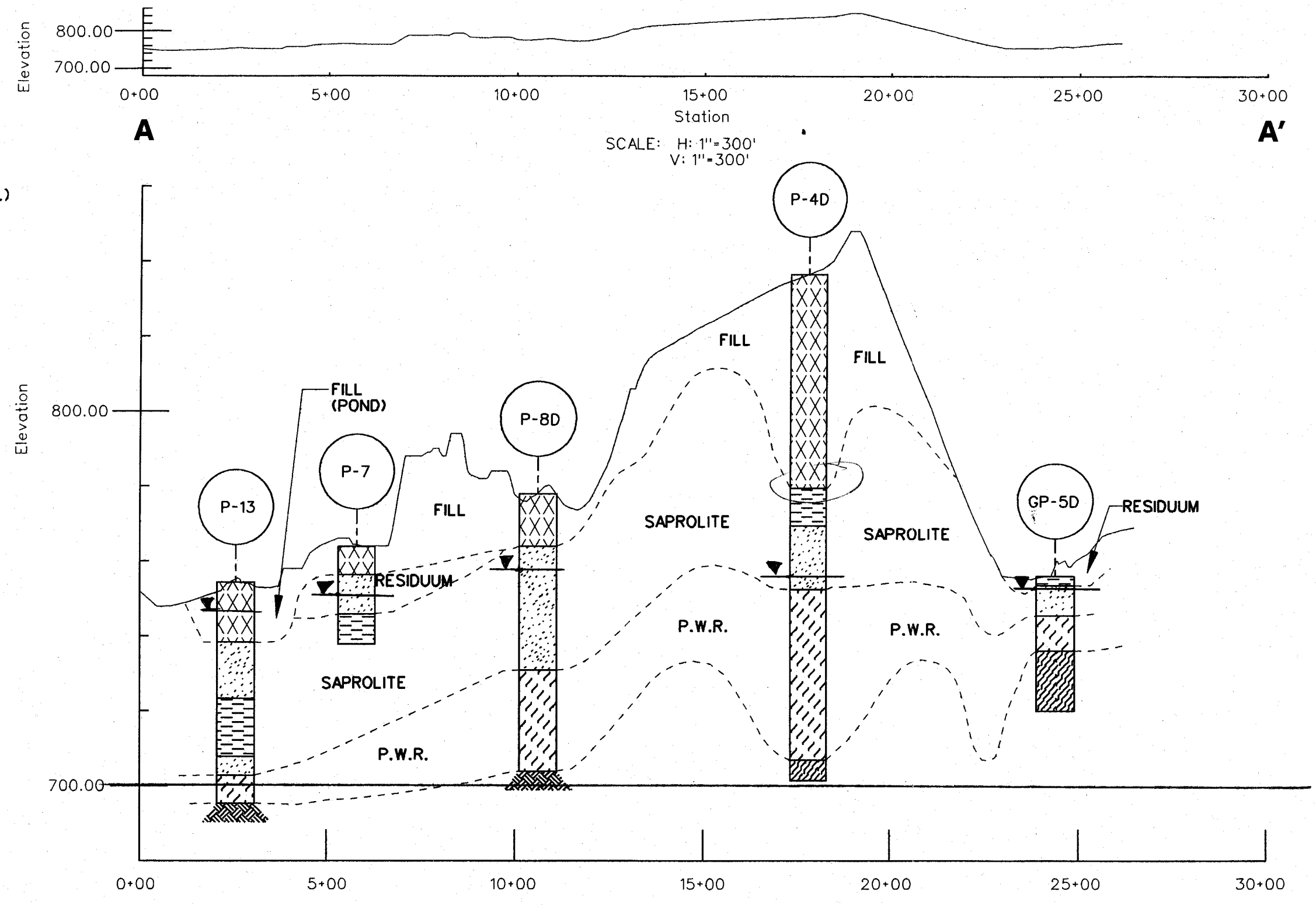
Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

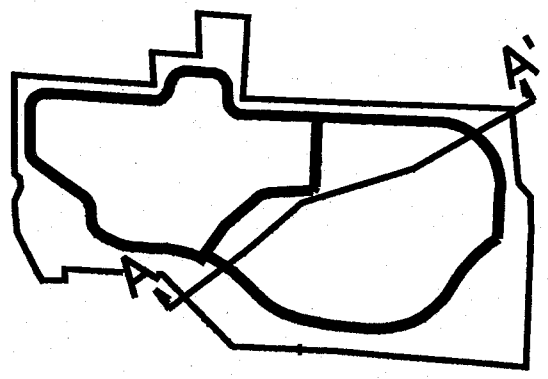
Project No. 87221.700

N:/87221/7221SECT.DGN

LEGEND

- FILL
- PREDOMINANTLY SANDY RESIDUAL SOILS OR SAPROLITE
- PREDOMINANTLY SILTY RESIDUAL SOILS OR SAPROLITE
- PARTIALLY WEATHERED ROCK (P.W.R.)
- COMPETENT BEDROCK





RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4-1A
GEOLOGIC SECTION A-A'

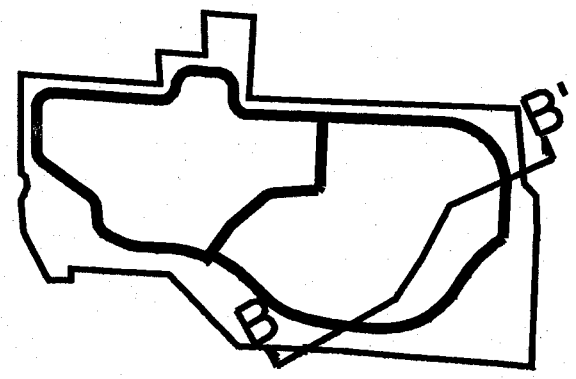
Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

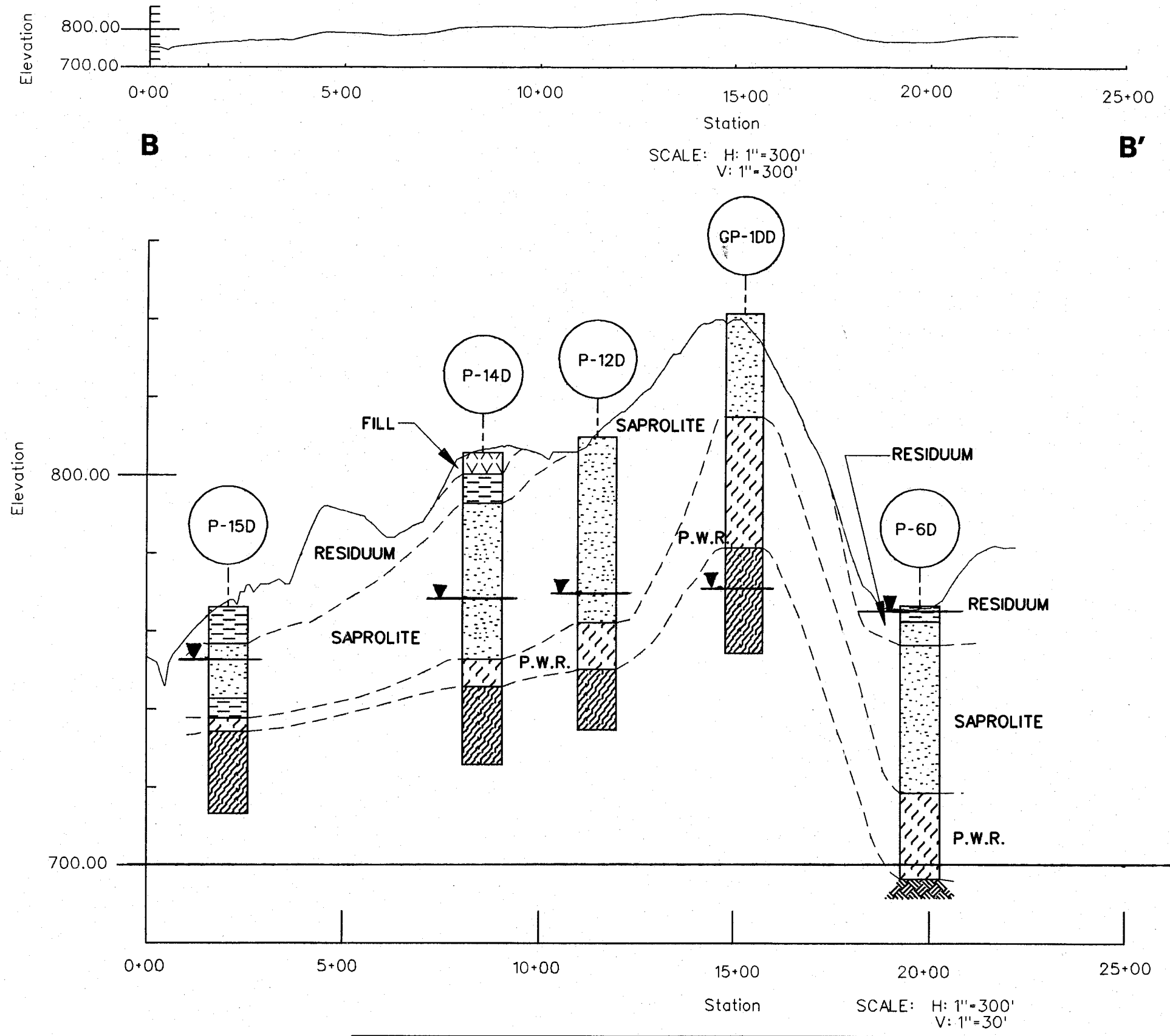
Project No. 87221.700

N:/87221/7221ND01.DGN

LEGEND

- FILL
- PREDOMINANTLY SANDY RESIDUAL SOILS OR SAPROLITE
- PREDOMINANTLY SILTY RESIDUAL SOILS OR SAPROLITE
- PARTIALLY WEATHERED ROCK (P.W.R.)
- COMPETENT BEDROCK





RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4-1B
GEOLOGIC SECTION B-B'

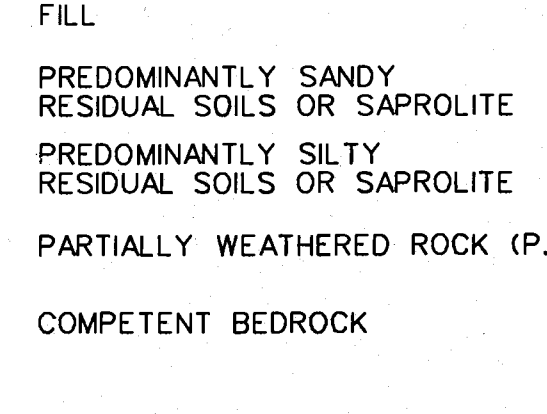
Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

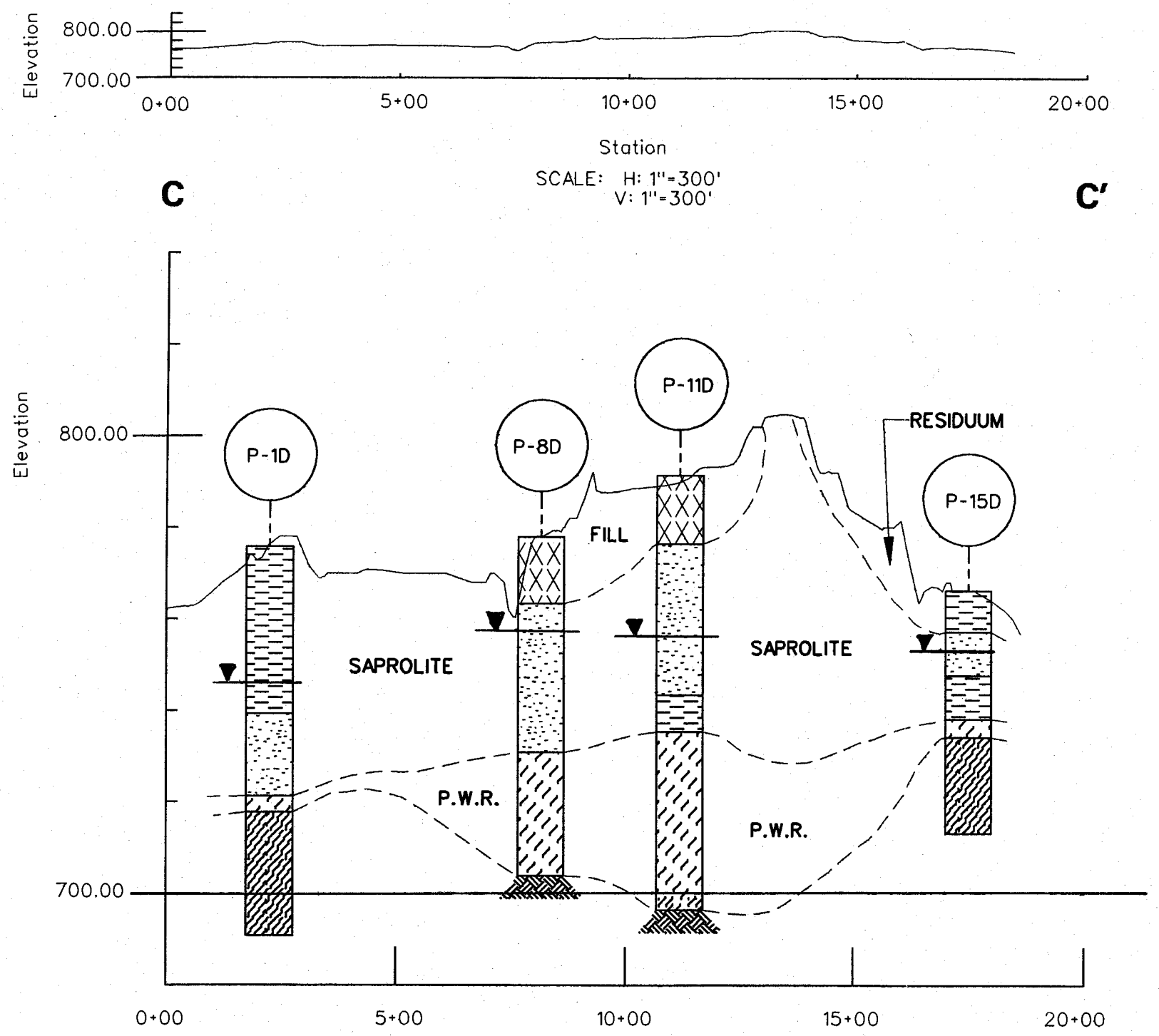
Project No. 87221.700

N:/87221/7221ND02.DGN

LEGEND

- FILL
- PREDOMINANTLY SANDY RESIDUAL SOILS OR SAPROLITE
- PREDOMINANTLY SILTY RESIDUAL SOILS OR SAPROLITE
- PARTIALLY WEATHERED ROCK (P.W.R.)
- COMPETENT BEDROCK





RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4-1C
GEOLOGIC SECTION C-C'

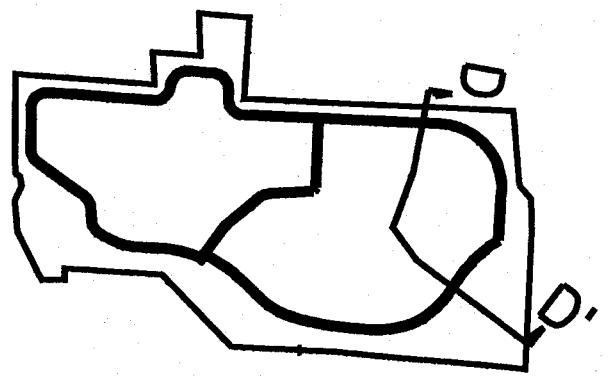
Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

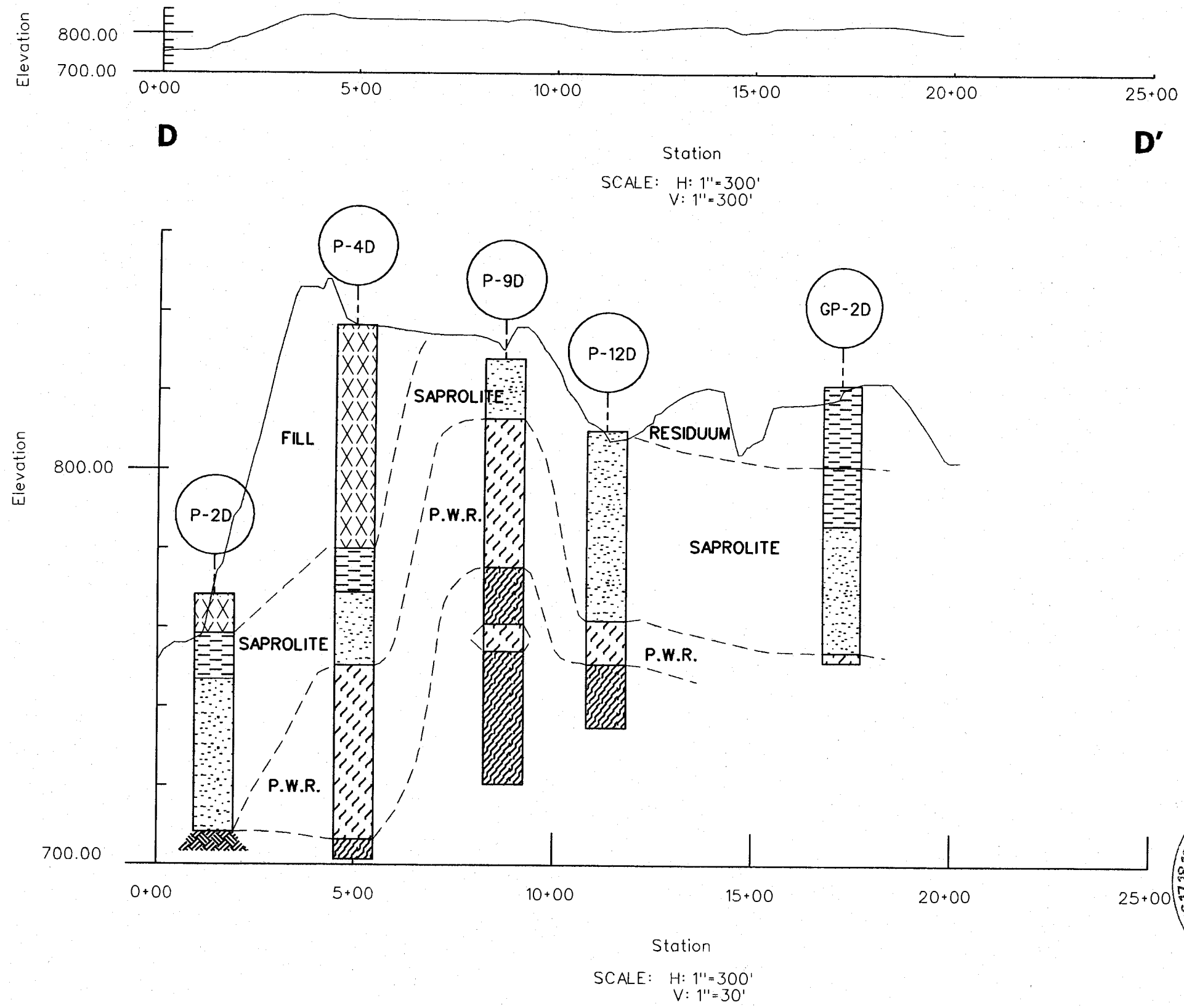
Project No. 87221.700

N:/87221/7221ND03.DGN

LEGEND

- FILL
- PREDOMINANTLY SANDY RESIDUAL SOILS OR SAPROLITE
- PREDOMINANTLY SILTY RESIDUAL SOILS OR SAPROLITE
- PARTIALLY WEATHERED ROCK (P.W.R.)
- COMPETENT BEDROCK





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RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4-1D
GEOLOGIC SECTION D-D'

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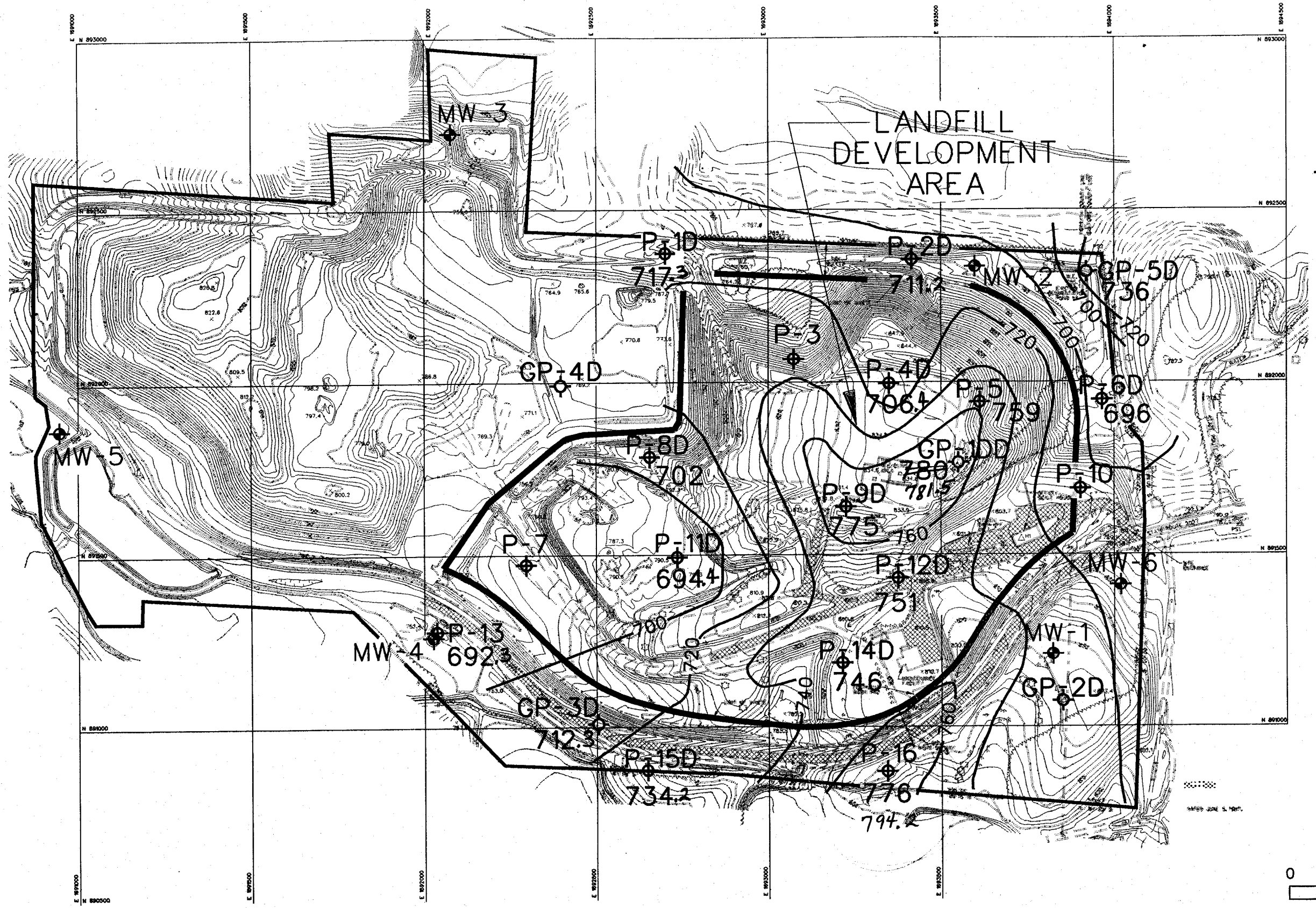


LEGEND:

- GOLDER PIEZOMETER LOCATION
- EXISTING GROUND WATER MONITORING WELL
- PIEZOMETER LOCATIONS
- —750— AUGER REFUSAL (TOP OF BEDROCK) CONTOUR (20 FT. ELEVATION INTERVAL)

0 300 600 900

SCALE IN FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4-2
TOP OF BEDROCK

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.700

N:/87221/7221ROCK.DGN

5.0 SITE HYDROGEOLOGY

5.1 SURFACE WATER HYDROLOGY

The site lies within the Piedmont province which is characterized by flat to rolling upland surfaces with a dense drainage network, moderately steep stream valleys, and a few scattered monadnock hills (Mundorff, 1948). General site topography consists of gentle rolling slopes with elevations ranging from 850 to 740 feet above mean sea level. It should be noted, however, that a considerable amount of earthwork was being performed at the site during the time at which field work was being conducted and continues to be performed at the time of report submittal. Site topography is shown in Figure 5-1.

The site is separated into two watersheds with the dividing line running from the northwest corner of the site to the southeast corner of the site which can be seen in Figure 5-1. The northern watershed drains the north and east slopes. The southern watershed drains the south and west slopes.

These two watersheds are drained by two tributaries of East Belews Creek which empty into Belews Lake and subsequently into the Dan River (Golder, 1987). These tributaries are located at the southwest corner of the site and immediately north of the site.

The spring shown by Golder (1988) to be located below piezometer location P-10 was not specifically identified during this investigation. There was water in the swale but it appeared to be fed more from surface runoff and road drainage structures than from groundwater. There is, however, probably a groundwater component that is helping to fill the swale with water.

5.1.1 Flood Prone Areas

Flood prone areas (areas lying within the 100-year flood plain) for the Kernersville Region have been identified on maps prepared by the United States Geologic Survey (USGS). Flood prone areas are found in the flood plains of both unnamed creeks. Areas on the site which are classified as flood prone areas include a small (less than five acres) area on the

northeastern property line and an area estimated at about 15 acres in the southwestern corner of the property (Golder, 1987).

5.1.2 Wetlands

In response to a request from Waste Management, Inc., the U.S. Army corps of Engineers (COE) performed a wetlands determination for the PLRC site. As outlined in a letter dated March 9, 1988, the COE determined that the entire landfill project would be constructed on high ground with the exception of Sedimentation Pond No. 3, located in the northeast corner of the site. All work restricted to high ground does not require COE permit authorization. Although Sedimentation Pond No. 3 was determined to impact headwaters to an unnamed tributary to Belews Creek, the COE determined that its construction was authorized by nationwide permit since it impacted less than one acre of "waters of the United States".

Site reconnaissance performed by Golder Associates in 1987 found the flood plain of the creek in the southwestern corner of the site to be flat and boggy and supporting bottom land hardwoods such as sycamores and sweetgums. Ponded water was also found in much of the area, however, it is unclear as to whether or not this was a result of a recent rain event.

Areas such as these may, from a hydrological perspective, be reasonably described as wetlands. Such areas only occur along flood plains of creeks and within the areas mapped by the USGS as flood prone areas. Elsewhere, the slopes are moderate to steep and the soils are well drained. As the COE letter implied, these areas are not considered wetlands.

5.2 GROUND WATER HYDROLOGY

Site specific hydrogeology is interpreted from data obtained by Golder Associates during a previous hydrogeologic investigation performed in 1987 as well as from data obtained during the recent hydrogeologic investigation performed at the site during the months of January, February, and March of 1994.

5.2.1 Uppermost Aquifer

The subsurface investigations and hydrologic data suggest that the zone of saturation predominantly occurs within residual soils and extends down into the upper bedrock. Occasionally, the saturated zone is found in bedrock highs (e.g. near boring locations P-9 and GP-1). Upon review of soil logs and hydrogeologic information, the uppermost aquifer on site is considered to be unconfined. Residual materials and saprolite that comprise the uppermost aquifer at the site predominantly consist of micaceous sands, although saturated silty soils and some sandy silts are also present. The vertical hydraulic conductivities of these soils as obtained from laboratory testing of undisturbed samples ranged from 3×10^{-4} to 4×10^{-6} cm/sec. The saprolite grades into a partially weathered rock as the degree of weathering reduces.

A representative potentiometric map for this investigation is shown in Figure 5-1. This represents the water table condition across the landfill development area based on March 18, 1994 water level readings. Table 5-1 lists ground water levels measured during this investigation.

Hydrogeologic cross-sections (Figures 5-2) illustrate the distribution of the zone of saturation into the various geologic units. These figures show that the zone of saturation is primarily associated with the saprolite (geologic unit 4, Golder Associates) which consists of micaceous sands derived from highly to partially weathered rock. The cross-sections also depict where the water table intersects competent rock near the hilltops at piezometer locations GP-1 and P-9. The ground water flows from the top of the ridge down towards the creeks. Ground water generally exhibits a downward gradient on the ridge tops and on the slopes. The ground water exhibits an upward gradient at the creeks.

5.2.2 Ground Water Flow

The ground water flow pattern is depicted on Figures 5-1 and 5-2. Vertical gradients are portrayed on Figures 5-2 and listed on Table 5-2. Horizontal gradients are determined to range from 0.015 to .04 based on the flow lines of Figure 5-1.

In-situ permeability tests were performed at every piezometer and well location. A summary of the test results are shown in Table 5-3. The results indicate hydraulic conductivities at the site range predominantly from 10^{-3} to 10^{-5} cm/sec in saprolite, 10^{-5} cm/sec in partially weathered rock, and 10^{-5} to 10^{-7} cm/sec in rock. Hydraulic conductivities generally decrease with depth within the rock.

* See response to comments

Using the observed average hydraulic conductivities and average hydraulic gradients for the saprolite and bedrock piezometers and monitoring wells and using the Darcy equation:

$$\bar{v} = \frac{Ki}{\phi}$$

where:

$\bar{v}$	=	average ground water flow velocity
K	=	average hydraulic conductivity
i	=	average hydraulic gradient
ϕ	=	effective porosity ($\approx$0.25 saprolite) ($\approx$0.15 P.W.R.) ($\approx$0.05 Rock)

The estimated average ground water flow velocity in saprolite is 0.03 ft/day (10 ft/year), in partially weathered rock is 0.005 ft/day (2 ft/year), and in bedrock ranges from 0.01 ft/day (5 ft/year) to 0.0001 ft/day (0.05 ft/year).

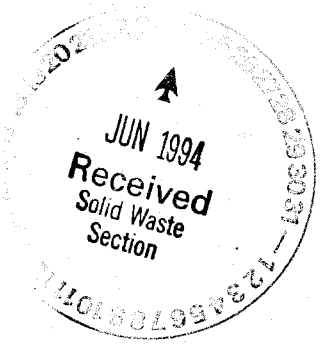
The interpretation of the ground water flow, as shown on Figures 5-2, depicts an upward gradient beneath the site potentiometric high which is located near the abandoned Golder piezometer GP-2. It is not certain whether this is a long term vertical gradient or whether it reverses like the observed gradients at piezometer locations P-4 and P-14. The likely explanation for this gradient is that it may be the result of a regional recharge area for water flowing from the ridge to the east of the site. The ground water then tends to flow from the southeast corner radiating out from the west to the north with an approximate horizontal gradient of 0.040 and vertical gradient of 0.020.

See response to comments

The ground water flow then reduces slightly and bends on either side of the hydrologic divide that crosses the site. The ground water slows with a smaller horizontal gradient of 0.015 and a vertical gradient range of 0.002 to 0.009 downward. Due to lower hydraulic conductivities in rock, there are some minor vertical gradient reversals at piezometer locations P-4 and P-14 as the flow is balanced out between the two conductivity zones. The ground water flows onward until it reaches the creek where there is an approximate upward gradient of 0.020.

5.3 SEASONAL HIGH POTENTIOMETRIC SURFACE

The seasonal high potentiometric surface for the site is shown on Figure 5-3. The contours represent the seasonal high water levels determined from the semi-annual monitoring of the monitoring wells (Table 5-4). The maximum observed water levels, which occurred during 1989-90, correspond with above average monthly precipitation which in 1989 was eight inches above the annual average (Table 2-2). Monthly precipitation had been consistently high prior to and during these readings. RUST E&I recommends that these levels be considered the seasonal high levels for the site and that the contours drawn on Figure 5-3 be considered the seasonal high potentiometric surface. These contours were drawn based on these high levels and following the general orientation of the potentiometric contours of Figure 5-1.



ATTACHMENT E

POROSITY CALCULATIONS

RUST ENVIRONMENT & INFRASTRUCTURE

CALCULATION SHEET

PAGE 1 OF 2

PROJECT NO. _____

CLIENT WMC

PROJECT Piedmont Landfill Hydrogeologic Investigation

SUBJECT Porosity Calculations

Prepared By _____ Date _____

Reviewed By _____ Date _____

Approved By _____ Date _____

Calculate In-situ Porosity of Soils from Data Obtained from Hydraulic Conductivity and UU Triaxial Tests.

Derivation: $\text{Porosity} = n = \frac{V_v}{V_T} \times 100\,(\%)$ where: V_v = Volume of voids, V_T = Total volume of soil sample

From test results, we have dry unit weight, γ_d, of samples and initial moisture content, m_c.

Assume 1-cubic foot volume of soil, ∴ weight of solids, $W_s = \gamma_d\,(lb/ft^3)\,(1\,ft^3) = lb$

Assume specific gravity of = 2.65 (quartz)
∴ density of solids = $2.65\,(62.4\,lb/ft^3) = 165.36\,lb/ft^3 = \rho_s$

$$\text{Volume of solids} = \frac{W_s}{\rho_s} = \frac{lb}{lb/ft^3} = ft^3 = V_s = \frac{\gamma_d}{165.36}$$

$$\text{Volume of voids} = V_v = V_T - V_s = 1\,ft^3 - \frac{\gamma_d}{165.36}$$

$$\therefore \text{Porosity} = n = \frac{V_v}{V_T}(100\%) = \frac{1 - \frac{\gamma_d}{165.36}(100\%)}{1} = \underline{\underline{1 - \frac{\gamma_d}{165.36}(100\%)}}$$

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Summary of Porosities

Sample	Depth (ft)	Soil	γ_d (pcf)	n (%)
P-6D UD-1	4-6	Residual Soil (SC)	92.9	44
P-2D UD-2	4-6	Fill (sm)	110.0	33
P-2D UD-4	22-24	Saprolite (sm)	78.5	53
P-3 UD-1	58-59.5	Saprolite (sm)	99.7	40
P-8D UD-2	20-22	Saprolite (sm)	97.0	41
P-15D UD-2	14-16	Saprolite (sm)	108.3	35

As shown above, porosities exhibit a general trend to decrease with depth due primarily to greater overburden pressures and decreases in the degree of weathering.

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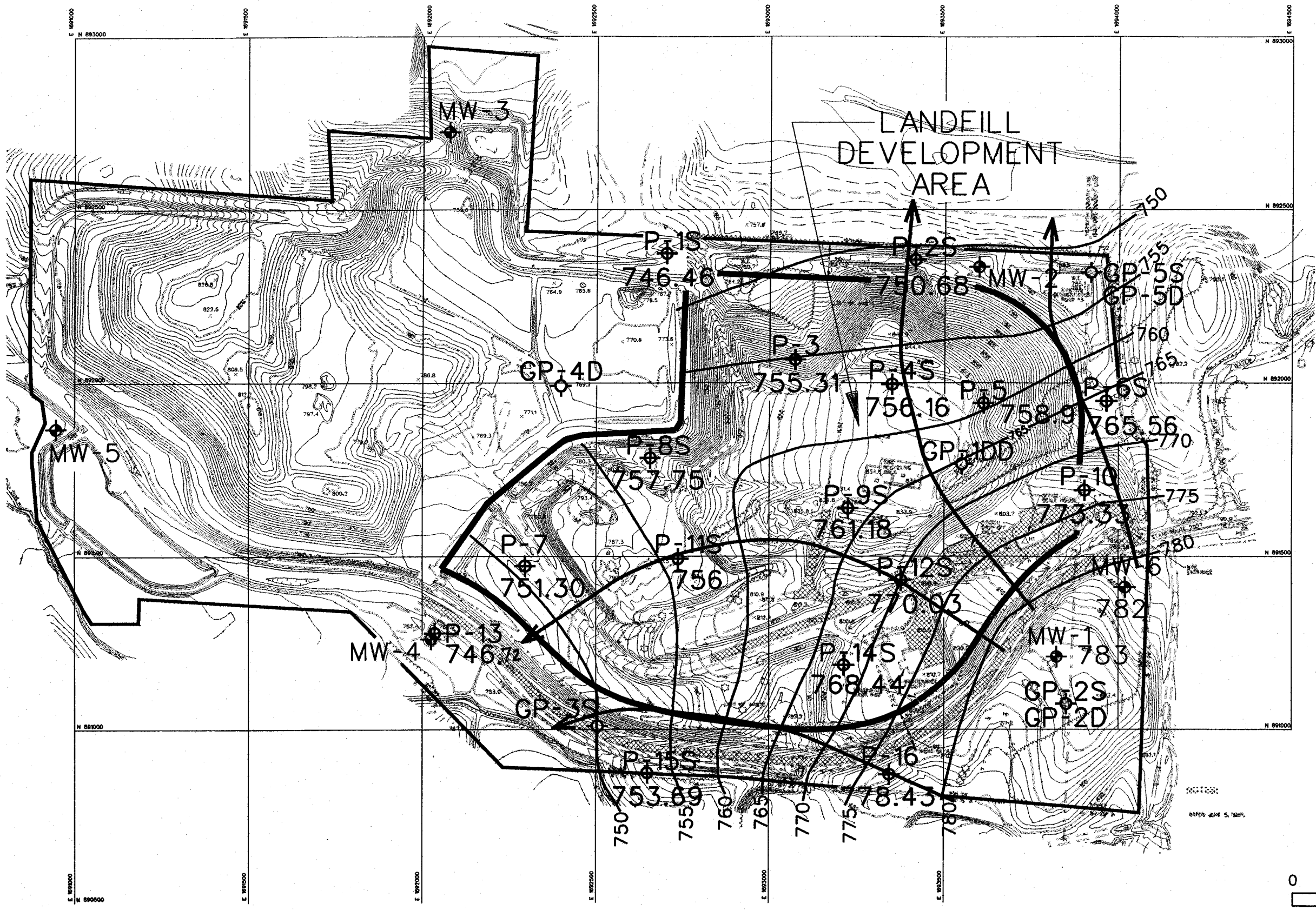


RUST ENVIRONMENT & INFRASTRUCTURE

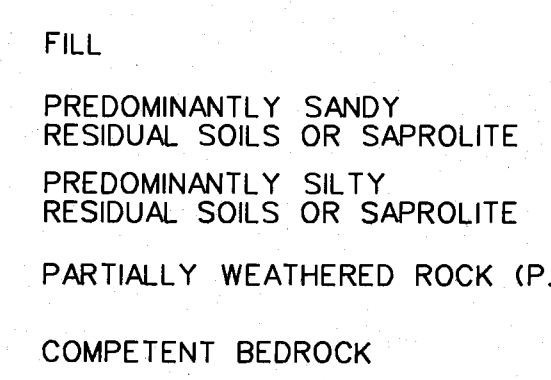
FIGURE 5-1
POTENTIOMETRIC MAP
(MARCH 18, 1994)
Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

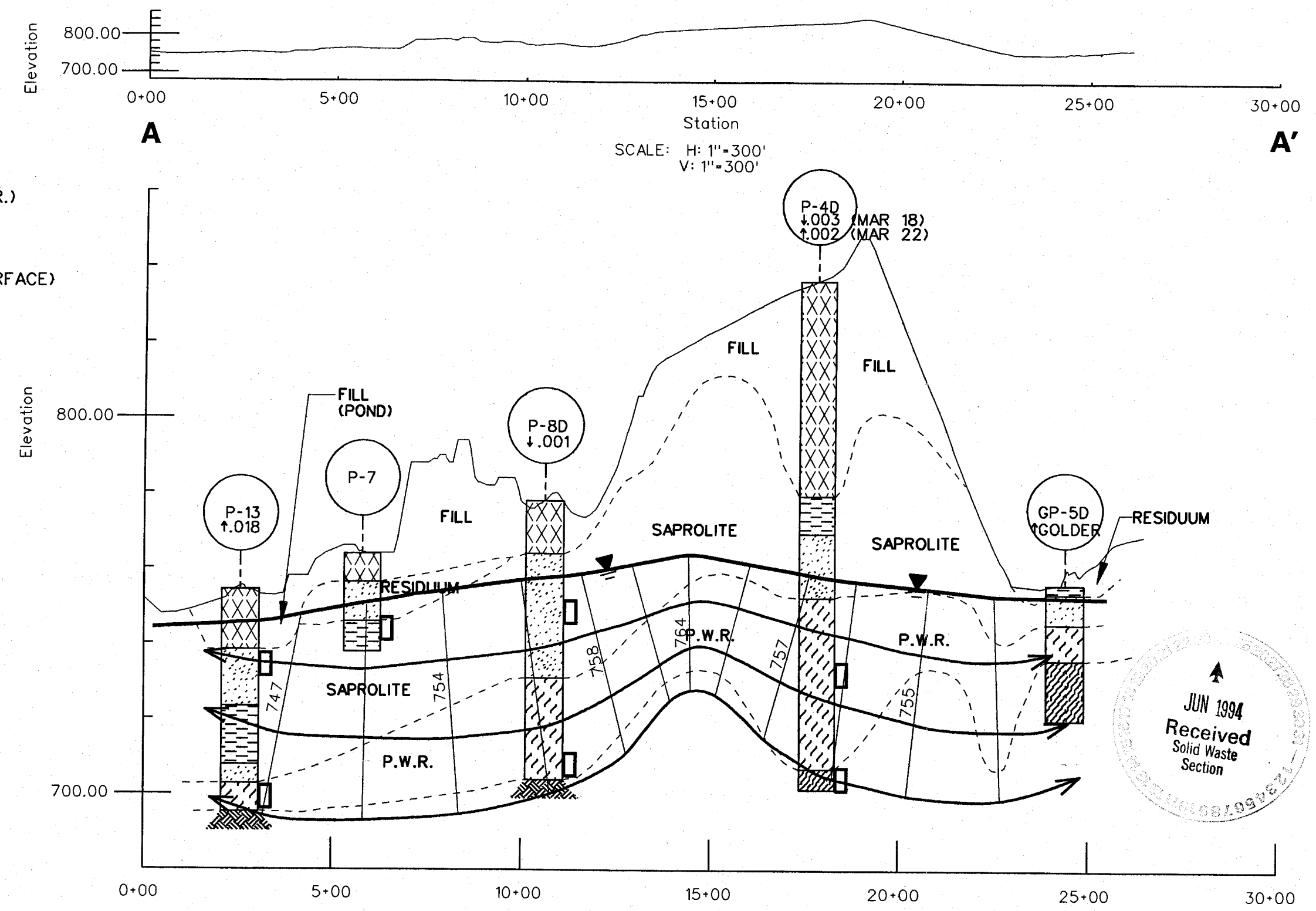
Project No. 87221.700

N:/87221/7221WATR.DGN

LEGEND

- FILL
- PREDOMINANTLY SANDY RESIDUAL SOILS OR SAPROLITE
- PREDOMINANTLY SILTY RESIDUAL SOILS OR SAPROLITE
- PARTIALLY WEATHERED ROCK (P.W.R.)
- COMPETENT BEDROCK
- WATER TABLE (POTENTIOMETRIC SURFACE) (MARCH 22,23 1994)
- FLOW LINES
- 757 EQUIPOTENTIAL LINES FOR POTENTIOMETRIC HEAD
- SCREEN LOCATIONS
- ↑.018 VERTICAL GRADIENT





RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-5A
HYDROGEOLOGIC SECTION A-A'

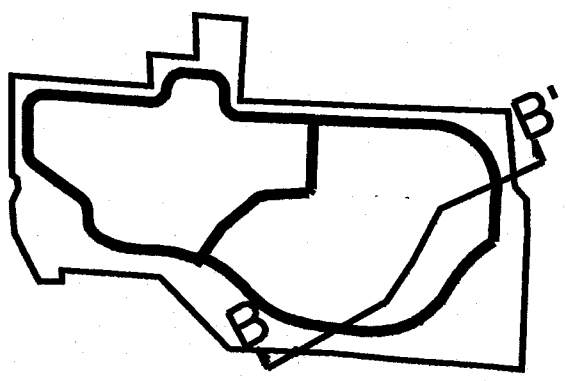
Water Quality Monitoring Plan/Unconstructed Portion
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

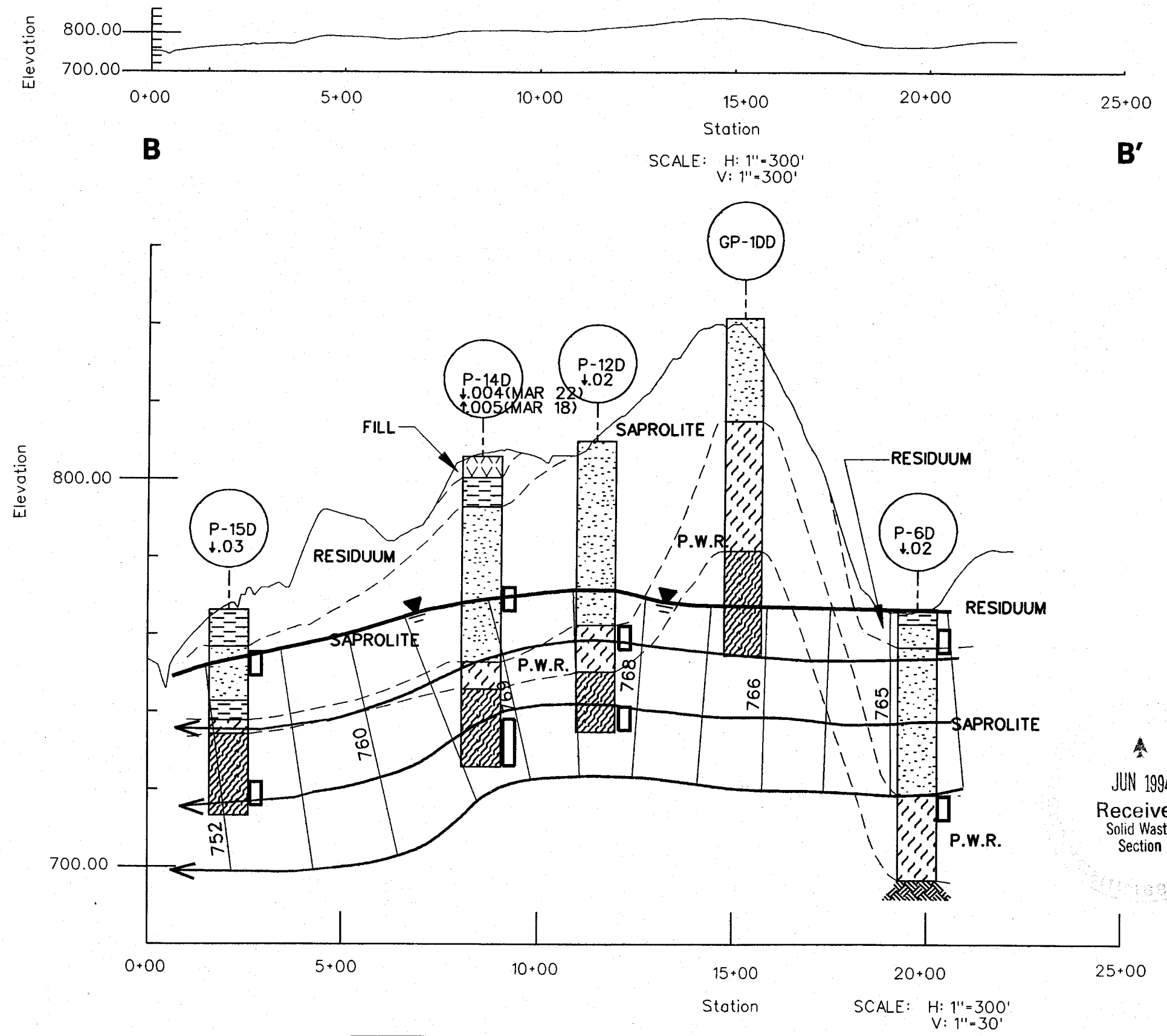
Project No. 87221.800

N:/87221/7221ND1A.DGN

LEGEND

- FILL
- PREDOMINANTLY SANDY RESIDUAL SOILS OR SAPROLITE
- PREDOMINANTLY SILTY RESIDUAL SOILS OR SAPROLITE
- PARTIALLY WEATHERED ROCK (P.W.R.)
- COMPETENT BEDROCK
- WATER TABLE (POTENTIOMETRIC SURFACE) (MARCH 22,23 1994)
- FLOW LINES
- 752 EQUIPOTENTIAL LINES FOR POTENTIOMETRIC HEAD
- SCREEN LOCATIONS
- ↑.018 VERTICAL GRADIENT





RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-5B
HYDROGEOLOGIC SECTION B-B'

Water Quality Monitoring Plan/Unconstructed Portion
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

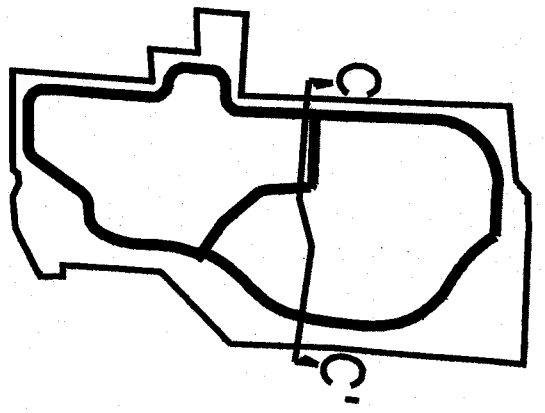
Project No. 87221.800

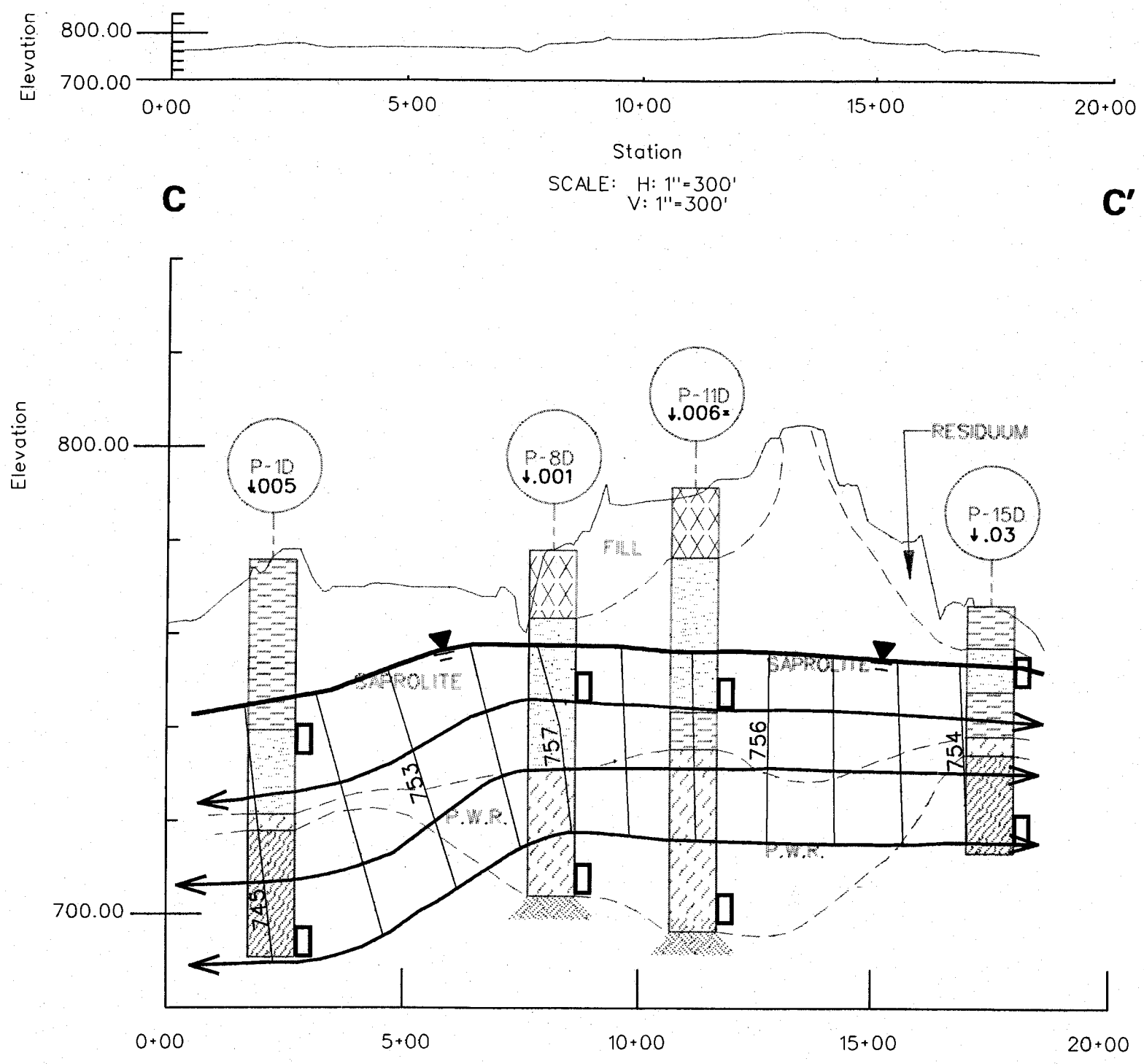
N:/87221/7221ND2A.DGN

LEGEND

- FILL
- PREDOMINANTLY SANDY RESIDUAL SOILS OR SAPROLITE
- PREDOMINANTLY SILTY RESIDUAL SOILS OR SAPROLITE
- PARTIALLY WEATHERED ROCK (P.W.R.)
- COMPETENT BEDROCK
- WATER TABLE (POTENTIOMETRIC SURFACE) (MARCH 22,23 1994)
- FLOW LINES
- 745 EQUIPOTENTIAL LINES FOR POTENTIOMETRIC HEAD
- SCREEN LOCATIONS
- ↑.018 VERTICAL GRADIENT

* THIS MAY BE A MOUNDED CONDITION AND A MORE APPROPRIATE VALUE MAY BE ↑.01





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RUST ENVIRONMENT & INFRASTRUCTURE

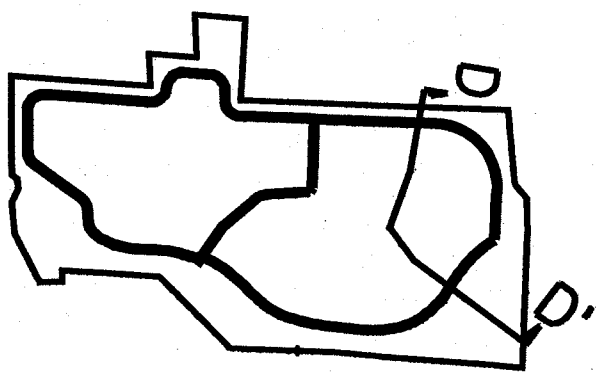
FIGURE 2-5C
HYDROGEOLOGIC SECTION C-C'

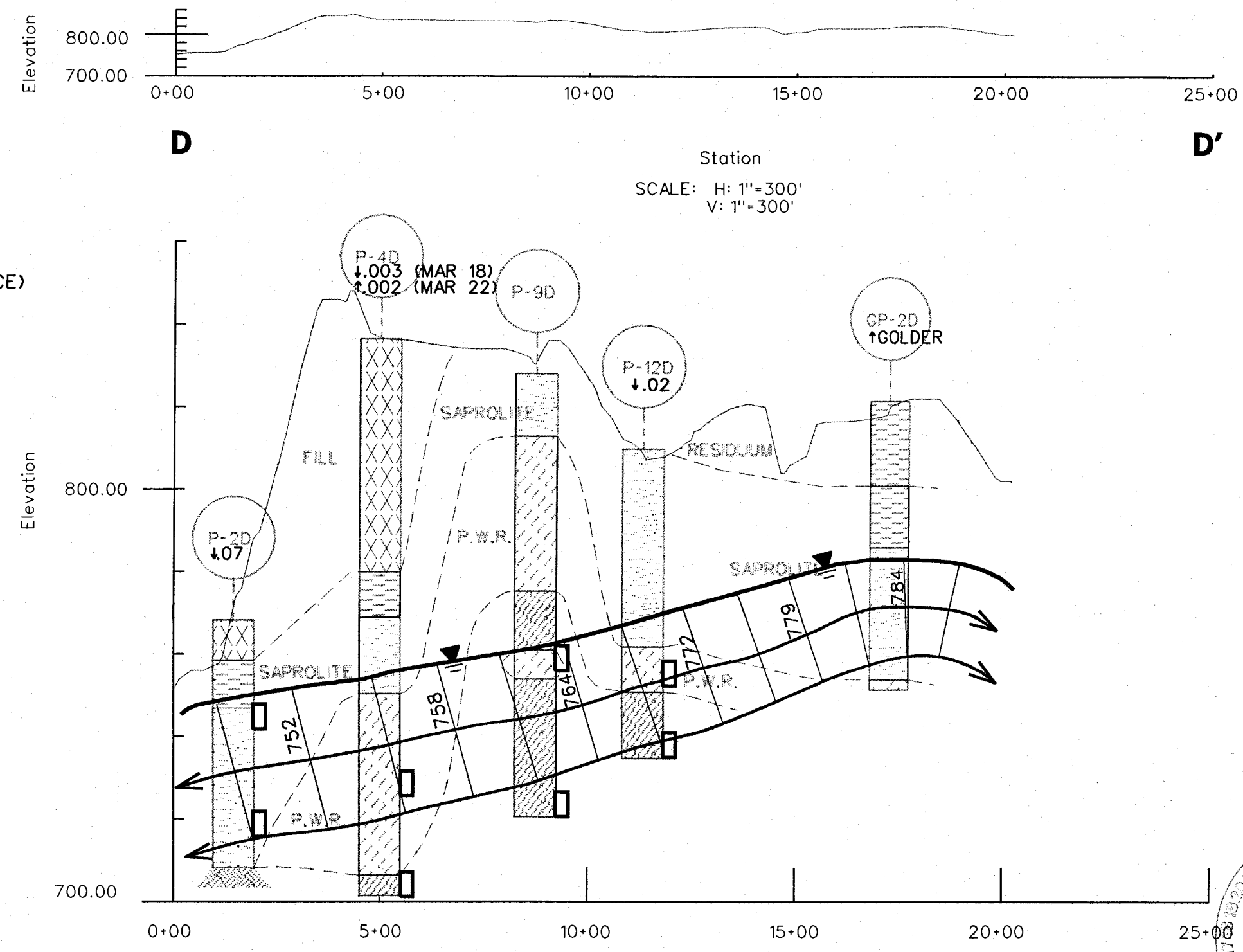
Water Quality Monitoring Plan/Unconstructed Portion
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.800

LEGEND

- FILL
- PREDOMINANTLY SANDY RESIDUAL SOILS OR SAPROLITE
- PREDOMINANTLY SILTY RESIDUAL SOILS OR SAPROLITE
- PARTIALLY WEATHERED ROCK (P.W.R.)
- COMPETENT BEDROCK
- WATER TABLE (POTENTIOMETRIC SURFACE) (MARCH 22,23 1994)
- FLOW LINES
- 745 EQUIPOTENTIAL LINES FOR POTENTIOMETRIC HEAD
- SCREEN LOCATIONS
- ↑.018 VERTICAL GRADIENT





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RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-5D
HYDROGEOLOGIC SECTION D-D'

Water Quality Monitoring Plan/Unconstructed Portion
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.800

N:/87221/7221ND4A.DGN

LANDFILL DEVELOPMENT AREA

MW-3
751.41

MW-2
754.21

MW-5
739.57

MW-4
748.12

MW-5

MW-1
787.59

750
755
760
765
770
775
780

LEGEND:

EXISTING GROUND WATER MONITORING WELL

—750— POTENTIOMETRIC CONTOUR SEASONAL HIGH (5 FT. INTERVAL)

NOTE: CONTOURS BASED ON SEASONAL HIGH LEVELS AS DETERMINED FROM MONITORING WELL RECORDS (TABLE 5-4) AND CONTOURS ARE INTERPRETED FROM THE CURRENT POTENTIOMETRIC MAP (FIGURE 5-1).

0 300 600 900

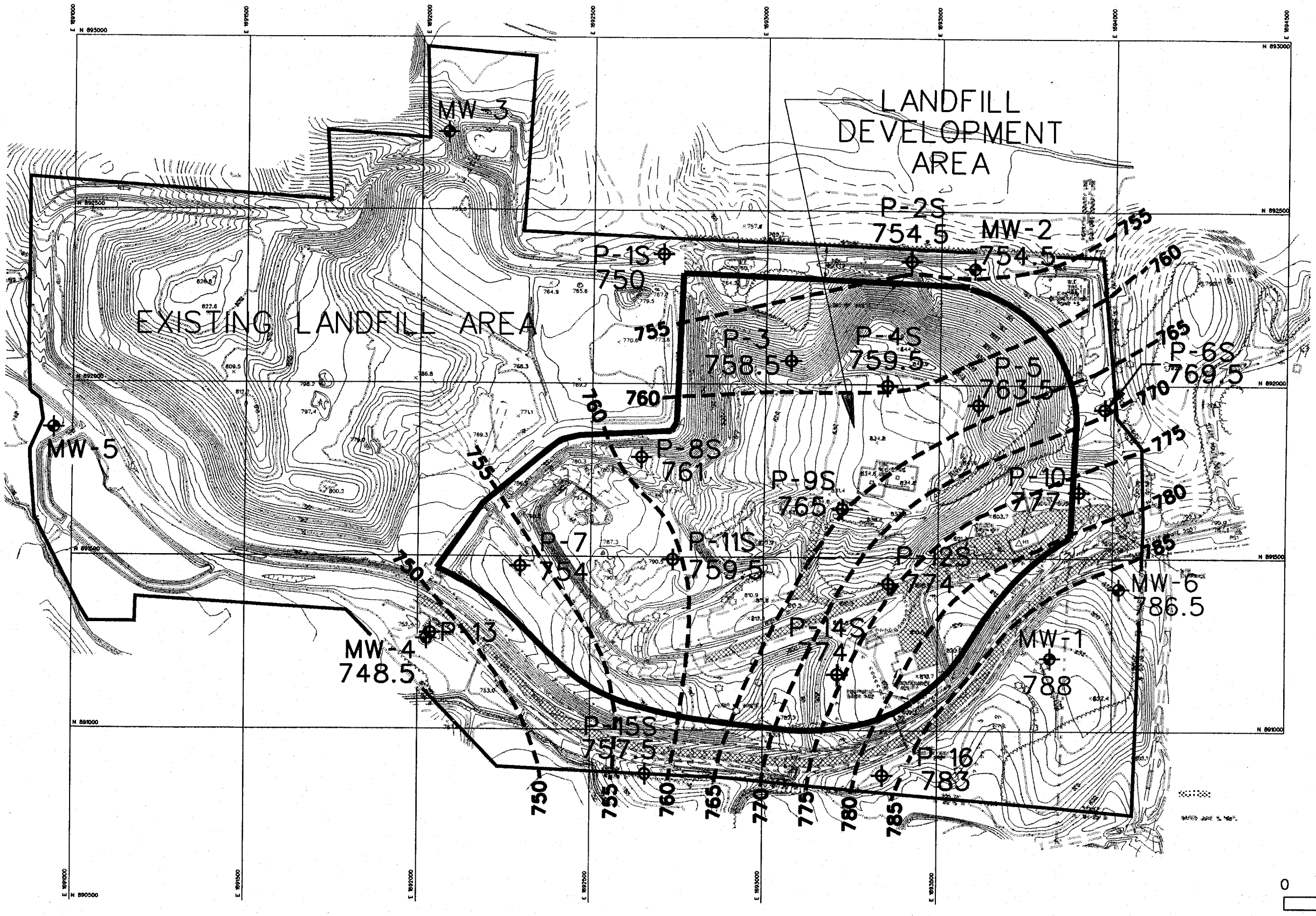
SCALE IN FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 5-3
SEASONAL HIGH
POTENTIOMETRIC MAP
Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.700

N:/87221/7221HWTR.DGN



LEGEND:

- EXISTING GROUND WATER MONITORING WELL
- PIEZOMETER LOCATIONS
- —750— POTENTIONMETRIC CONTOUR SEASONAL HIGH (5 FT. INTERVAL)

NOTE:

SEASONAL HIGH LEVELS ARE TAKEN FROM DESIGN HYDROGEOLOGIC INVESTIGATION. NCDEHNR HAS DESIGNATED THESE LEVELS AS APPROPRIATE SEASONAL HIGH LEVELS FOR THE DEVELOPMENT AREA. CONTOURS ARE INTERPOLATED FROM THESE LEVELS.

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0 300 600 900

SCALE IN FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 5-3
SEASONAL HIGH
POTENTIOMETRIC MAP
Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.800

Table 5-1
SUMMARY OF MEASURED GROUND WATER ELEVATIONS
Design Hydrogeologic Investigation
Forsyth County, North Carolina

PIEZOMETER/ WELL NUMBER	GROUND WATER ELEVATION ON												
	2/24/94	3/2/94	3/3/94	3/5/94	3/8/94	3/11/94	3/12/94	3/14/94	3/16/94	3/17/94	3/18/94	3/22/94	3/23/94
P-1-D	748.02	746.87	746.95	746.93	746.22	746.30	746.29	746.28	746.28	746.23	746.26	746.11	---
P-1-S	746.05	746.12	746.15	746.20	746.25	746.37	746.39	746.44	746.44	746.42	746.46	746.32	---
P-2-D	---	---	---	746.96	750.64	750.71	750.61	750.59	750.60	750.27	750.46	750.43	---
P-2-S	---	---	---	750.83	750.82	750.87	750.87	750.85	750.78	750.60	750.68	750.61	---
P-3	---	---	---	---	---	755.21	755.18	755.25	755.28	755.16	755.31	755.31	---
P-4-D	---	761.14		---	756.24	756.07	755.93	756.11	756.06	755.73	756.08	756.02	---
P-4-S	---	756.47	756.27	756.03	756.17	755.95	755.92	756.12	756.00	755.91	756.16	755.96	---
P-5	---	---	---	---	---	---	811.70	760.40	758.88	758.77	758.90	758.75	---
P-6-D	764.68	765.18	---	764.84	762.05	764.77	764.67	764.77	764.65	---	764.67	764.40	---
P-6-S	765.68	765.83	---	765.55	765.53	765.55	765.49	765.61	765.51	---	765.56	765.34	---
P-7	749.76	750.26	750.22	750.01	749.88	749.97	750.07	748.75	750.73	750.24	751.30	751.00	---
P-8-D	---	---	---	---	---	757.57	757.53	757.50	757.44	---	757.66	757.42	---
P-8-S	756.07	757.10	756.73	756.89	757.00	757.36	757.40	757.59	757.61	---	757.75	757.46	---
P-9-D	---	---	---	---	---	---	---	---	---	---	736.21	746.53	---
P-9-S	---	---	---	---	---	760.39	---	---	---	---	761.18	760.89	---
P-10	773.12	773.30	---	773.15	773.19	773.15	773.11	773.31	773.26	773.25	773.33	773.12	---
P-11-D	---	---	---	---	754.49	---	---	---	---	756.13	---	756.73	---
P-11-S	754.02	754.60	754.43	754.50	753.85	---	---	---	---	755.84	---	756.44	---
P-12-D	769.79	769.77	768.63	769.51	769.57	769.34	769.40	769.62	769.49	769.55	769.66	769.45	---
P-12-S	770.08	769.98	769.84	769.75	769.87	769.68	769.79	769.95	769.88	769.89	770.03	769.82	---
P-13	746.90	746.90	---	746.78	746.36	746.74	746.60	746.73	746.66	746.66	746.72	746.52	---
P-14-D	770.31	770.27	770.20	770.01	769.32	769.39	769.27	769.33	768.90	768.58	768.63	768.76	---
P-14-S	770.62	770.59	770.54	770.32	769.47	769.43	769.32	769.35	768.81	768.44	768.44	768.94	---
P-15-D	---	---	---	---	---	---	---	751.84	752.71	752.64	752.73	752.44	---
P-15-S	---	754.38	---	753.99	753.74	753.89	753.90	753.88	753.66	753.57	753.69	753.34	---
P-16	---	---	---	---	---	---	---	776.58	777.78	778.35	778.43	778.43	---
MW-1	---	---	---	782.77	---	---	782.92	---	---	---	---	---	783.46
MW-2	---	---	---	751.49	---	---	751.41	---	---	---	---	---	750.97
MW-3	---	---	---	745.03	---	---	745.03	---	---	---	---	---	745.16
MW-4	---	---	---	746.07	---	---	746.02	---	---	---	---	---	745.88
MW-5	---	---	---	737.30	---	---	737.17	---	---	---	---	---	736.75
MW-6	---	---	---	781.58	---	---	781.77	---	---	---	---	---	781.99

TABLE 5-2R

VERTICAL HYDRAULIC GRADIENTS
Design Hydrogeologic Investigation
Piedmont Landfill & Recycling Center
Forsyth County, North Carolina

Piezometer/Monitoring Well Couple	Vertical Separation (feet)	Gradient
P-1S & P-1D	42.65	0.005 Downward to 0.019 Upward
P-2S & P-2D	30.25	0.011 to 0.005 Downward
P-4S & P-4D	27.70	0.004 Upward To 0.006 Downward
P-6S & P-6D	49.25	0.020 to 0.013 Downward
P-8S & P-8D	41.90	0.004 Downward to 0.005 Upward
P-11S & P-11D	45.75	0.006 Upward
P-12S & P-12D	46.75	0.016 to 0.018 Downward
MW-4 & P-13	21.20	0.016 to 0.018 Upward
P-14S & P-14D	36.30	0.005 Upward to 0.009 Downward
P-15S & P-15D	33.50	0.030 Downward

Note: Gradients are determined over the duration of this investigation. Unable to calculate vertical gradients at P-9 couple because water levels had not stabilized in piezometer P-9D.

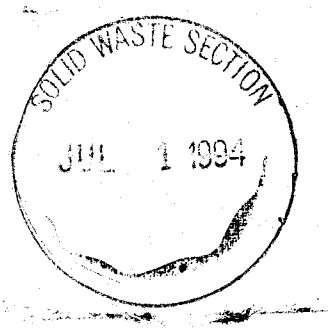

TABLE 5-2

Vertical separation was calculated from mid point of sand pack to mid point of sand pack. The vertical gradient data was determined depending on the range of stabilized data for each couple.

P-1 Couple $77.1' - 34.45' = 42.65'$ separation

$746.46 - 746.26 = 0.20'$ ↓ head difference.
this ranges to $0.80'$ ↑ head difference.

gradient $i = \frac{\Delta h}{L} = 0.005$ ↓ to 0.019 ↑

Some variability but consistently down with time.

P-2 Couple $53.45' - 23.2' = 30.25'$ separation.

vertical head differences $0.16'$ ↓
$0.33'$ ↓

gradient $i = \frac{\Delta h}{L} = 0.005$ ↓ to 0.011 ↓

P-4 Couple $132' - 104.3' = 27.7'$ separation

vertical head differences: $0.12'$ ↑
$0.18'$ ↓

gradient $i = \frac{\Delta h}{L} = 0.006$ ↓ to 0.004 ↑

P-6 Couple 55.8' - 6.55' = 49.25' separation

vertical head differences 0.65↓
1.00↓

gradient $i = \frac{\Delta h}{L}$ = 0.013↓ to 0.020↓

P-8 Couple 70.5' - 28.6' = 41.9' separation

vertical head differences 0.17↓
0.21↑

gradient $i = \frac{\Delta h}{L}$ = 0.004↓ to 0.005↑

P-11 Couple. 92.5' - 46.75' = 45.75' separation

vertical head differences. 0.29↑

gradient $i = \frac{\Delta h}{L}$ = 0.006↑

P-12 Couple 72.05' - 50.85' = 21.2' separation

vertical head differences 0.21↓
0.39↓

gradient $i = \frac{\Delta h}{L}$ = 0.010↓ to 0.018↓

P-13 & MW-4 Couple 56.8' - 20.65 = 36.15' separation

vertical head differences 0.58 ↑
0.71 ↑

gradient $i = \frac{\Delta h}{L}$ = 0.016 ↑ to 0.020 ↑

P-14 Couple. 72.7' - 36.4' = 36.3' separation

vertical head differences 0.34 ↓
0.19 ↑

gradient $i = \frac{\Delta h}{L}$ = 0.009 ↓ to 0.005 ↑

P-15 Couple 49.45' - 15.95' = 33.50' separation

vertical head difference = 0.90 ↓ 0.96 ↓

gradient $i = \frac{\Delta h}{L}$ = 0.03 ↓

NOTE: Variations in results are based on the choice in the table of what were interpreted representative values.

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TABLE 5-3R

SUMMARY OF IN SITU HYDRAULIC CONDUCTIVITY TESTING RESULTS
Design Hydrogeologic Investigation
Piedmont Landfill & Recycling Center
Forsyth County, North Carolina

Piezometer/Well Number	Screened Zone	K ft/sec	K ft/day	K cm/sec
MW-1	Saprolite/Bedrock	4.3E-05	3.7	1.3E-03
MW-2	Saprolite	1.2E-05	1.1	3.8E-04
MW-3	Saprolite	9.9E-06	0.9	3.0E-04
MW-4	Saprolite	2.1E-05	1.8	6.4E-04
MW-5	Saprolite	1.4E-05	1.2	4.3E-04
MW-6	Saprolite	3.7E-06	0.3	1.1E-04
P-1-D	Bedrock	1.9E-06	0.2	5.9E-05
P-1-S	Saprolite	1.7E-06	0.1	5.1E-05
P-2-D	Saprolite	2.6E-07	0.02	7.8E-06
P-2-S	Saprolite	1.5E-05	1.3	4.7E-04
P-3	Saprolite	8.0E-06	0.7	2.4E-04
P-4-D	Bedrock/PWR	8.0E-07	0.1	2.5E-05
P-4-S	Partially Weathered Rock	3.4E-06	0.3	1.0E-04
P-5	Bedrock/PWR	6.2E-06	0.5	1.9E-04
P-6-D	Partially Weathered Rock	2.5E-07	0.02	7.5E-06
P-6-S	Residuum	1.4E-05	1.2	4.2E-04
P-7	Saprolite	2.5E-06	0.2	7.6E-05
P-8-D	Partially Weathered Rock	1.6E-07	0.01	4.9E-06
P-8-S	Saprolite	5.5E-06	0.5	1.7E-04
P-9-D	Bedrock	1.2E-08	0.001	3.8E-07
P-9-S	Bedrock	1.4E-05	1.2	4.2E-04
P-10	Saprolite	7.3E-06	0.6	2.2E-04
P-11-D	Partially Weathered Rock	9.8E-07	0.08	3.0E-05
P-11-S	Saprolite	5.0E-07	0.04	1.5E-05
P-12-D	Bedrock	1.8E-06	0.2	5.6E-05
P-12-S	Partially Weathered Rock	8.2E-07	0.07	2.5E-05
P-13	Partially Weathered Rock	4.7E-07	0.04	1.4E-05
P-14-D	Bedrock	3.3E-07	0.03	9.9E-06
P-14-S	Saprolite	***	***	***
P-15-D	Bedrock	2.6E-06	0.2	7.8E-05
P-15-S	Residuum	9.5E-06	0.8	2.9E-04
P-16	Bedrock	8.1E-07	0.07	2.5E-05

Note: Above conductivity values calculated using rising head slug test data only.
*** Not enough water for a meaningful test.

TABLE 5-4

HISTORIC MONITORING WELL GROUND WATER ELEVATIONS
Design Hydrogeologic Investigation
Piedmont Landfill & Recycling Center
Forsyth County, North Carolina

Date Measured	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
Oct-89	784.23	753.56	748.38	748.12	739.57	n/a
May-90	787.59	754.21	751.41	746.97	737.86	n/a
Nov-90	785.40	753.36	748.39	746.17	737.37	n/a
May-91	786.51	752.48	747.20	747.23	739.21	n/a
Nov-91	784.26	751.06	745.83	744.85	736.95	n/a
Feb-92	783.06	750.99	745.31	745.23	737.41	n/a
Aug-92	783.28	751.06	745.34	745.60	737.17	n/a
Feb-93	783.85	751.60	744.75	746.32	737.85	n/a
Jul-93	786.11	751.08	746.61	744.44	737.07	n/a
2/19/94	782.51	752.28	744.76	745.57	736.95	781.20
3/5/94	782.77	751.49	745.03	746.07	737.30	781.58
3/12/94	782.92	751.41	745.03	746.02	737.17	781.77
Seasonal High Reading	787.59	754.21	751.41	748.12	739.57	n/a

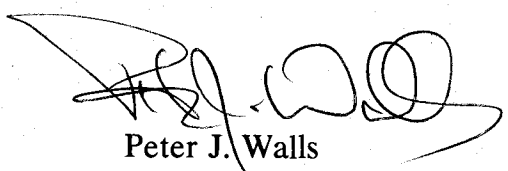
6.0 CONCLUSIONS

The following are conclusions that have been derived from this investigation:

- the site lies at the Charlotte Belt and Milton Belt geologic boundary;
- the site soils are predominantly silty sands, sandy silts, and poorly sorted sands;
- the bedrock units are metamorphic gradations of granite gneiss, granite schist, hornblende schist, and chlorite schist;
- no diabase or pegmatite dikes were encountered;
- structural lineaments were identified approximately parallel to boring locations P-2 to P-4, GP-5 to P-6, P-13 to P-11, and P-12 to P-6;
- no significant preferential flow paths were identified that are associated with the lineaments although a deeper weathered horizon may be present;
- the ground water flow pattern depicted on Figure 5-1 indicates that flow is generally from the potentiometric high in the southeast corner of the site to the hydrologic divide and then continues down to either creek;
- most flow is through saprolite with some reduced flows through bedrock (i.e. the area around boring locations P-9 and ~~GP-6~~ GP-1); and
- Figure 5-3 reasonably depicts the seasonal high for the ground water levels at this site.

7.0 CERTIFICATION

The undersigned hereby certifies that all borings that have been performed at the PLRC as part of this Design Hydrogeologic Investigation, and will not be converted to permanent monitoring wells, will be properly abandoned in accordance with the procedures for permanent abandonment of wells, as delineated in 15A NCAC 2C Rule .0113(a)(2).



Peter J. Walls
N.C. Professional Geologist
Temporary Registration - Letter dated 2/24/94

8.0 REFERENCES

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APPENDIX A

SOIL AND ROCK BORING LOGS

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA		BORING NO. P-1D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D/2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 10
			DRILLING START / FINISH
	WATER LEVEL		TIME 1100 / TIME 1700
	TIME		DATE 2/20/94 / DATE 2/20/94
	DATE		
DATUM NGVD ELEVATION 776 (775.80)	CASING DEPTH		
DRILL RIG CME-45	SURFACE CONDITIONS Grassed area along northern central property boundary.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Environmental Construction Services

LOGGED BY J. Terry SL

DATE 2/20/94 CHK'D BY R. Paulling

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0											
1											
2											
3	5 6 7 5 (100%)		**SANDY SILT (ML)** Stiff, light brown and moderate brown, with black inclusions, moist to dry, some fine sand, little medium sand, trace clay. **- SAPROLITE -**								
4											
5											
6											
7											
8	3 4 4 5 (100%)		**SANDY SILT (ML)** Similar to above, except medium stiff, trace mica, sample highly foliated due to mica partings. **- SAPROLITE -**								
9											
10											
11											
12											
13	2 4 4 3 (100%)		**SANDY SILT (ML)** **- SAPROLITE -** (Upper 12") Similar to above. **SILT WITH SAND (ML)** (Lower 12") Similar to above, except white with dark yellowish brown and black inclusions, little fine and coarse sand and little mica.								
14											
15											

SOIL BORING LOG

BORING NO. P-1D

SHEET 2 OF 10

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15											
16											
17											
18	3 4 4 5 (100%)		**SILT WITH SAND (ML)** Similar to above, except trace to few lean clay partings. **- SAPROLITE -**								
19											
20											
21											
22											
23	3 4 5 8 (100%)		**SILTY SAND (SM)** Loose, light brown and moderate brown, with black inclusions, moist to dry, mostly medium to fine sand, some silt, trace clay. **- SAPROLITE -**								-200 =47
24											
25			**UNDISTURBED SAMPLE-1** (25 to 27 Feet) Pushed 24", Recovered 24"								
26											
27											
28	9 10 6 8 (100%)		**SILTY SAND (SM)** (Upper 12") Medium dense, dark yellowish brown with white, black and light red inclusions, dry to moist, mostly fine to coarse sand, some silt, trace clay. **SILT WITH SAND (ML)** (Lower "12) Similar to 23-25. **- SAPROLITE -**								
29											
30											
31											
32											
33	12 24 36 13 (67%)		**SANDY SILT (ML)** Hard, dark yellowish brown, with white and black inclusions changing to very pale orange with dark yellowish brown and black inclusions with depth, moist, mostly silt, some fine to coarse sand, little to some lean clay, trace mica. **- SAPROLITE -**								
34											
35											

DRILLING CONTR Environmental Construction Services

LOGGED BY J. Terry SL

DATE 2/20/94 CHK'D BY R. Paulling

SOIL BORING LOG

BORING NO. P-1D

SHEET 3 OF 10

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35											
36											
37											
38	5 11 21 31 (75%)		**SILTY SAND (SM)** Dense, dark yellowish brown with moderate orange pink and black inclusions, wet, mostly fine to coarse sand, some silt, trace clay and mica, micaceous sand lense at 38.1' depth ~ 2" thick. **- SAPROLITE -**								
39											
40											
41											
42											
43	12 24 36 13 (67%)		**SILTY SAND (SM)** Similar to above, except very dense, white to very pale orange with dark yellowish brown and grayish black inclusions, little silt. **- SAPROLITE -**								
44											
45											
46											
47											
48	24 26 50 50 (100%)		**SILTY SAND (SM)** Similar to above, except mostly fine sand, little silt. **- SAPROLITE -**								
49											
50											
51											
52											
53	12 28 40 40 (67%)		**SILTY SAND (SM)** Similar to above, except white to moderate orange pink with dark yellowish brown and black inclusions, moist, mostly coarse opaque quartzitic sand, little silt, trace clay. **- SAPROLITE -**								
54											
55											

DRILLING CONTR Environmental Construction Services

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SOIL BORING LOG

BORING NO. P-1D

SHEET 4 OF 10

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
55	18 50/5" (100%)		**SILTY SAND (SM)** Very dense, speckled black and white, moist, mostly fine to medium sand, some silt, trace mica, highly foliated with 1" thick dark yellowish brown band.								-200 =34
56											
57			**SILTY SAND (SM)** - PARTIALLY WEATHERED ROCK - Similar to above.								
58	50/5"		- PARTIALLY WEATHERED ROCK -								
59			**ENCOUNTERED BEDROCK AT 58.5'** BEGAN CORING								
60											
61											
62											
63											
64											
65											
66											
67											
68											
69											
70											
71											
72											
73											
74											
75											

DRILLING CONTR Environmental Construction Services

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ROCK BOREHOLE LOG

SITE NAME AND LOCATION

DRILLING METHOD: 94 mm wireline coring

SAMPLING METHOD: NQ2 Coring

BORING NO. P-1D

SHEET 5 OF 10

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					0815	1800
DATE					DATE	DATE
CASING DEPTH					2/21/94	2/21/94

DATUM ELEVATION

DRILL RIG CME-75

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
58						TOP OF BEDROCK								
.25														
.50		1	>15	19	0	**HORNBLENDE SCHIST** Hard, slightly weathered, moderately fractured, black and white, medium to coarse-grained.		Very close, tight joints, moderately dipping fracture (50°), horizontal foliations, black-hornblende, white-feldspar.						
.75														
59														
.25														
.50														
.75														
60						**HORNBLENDE SCHIST** Moderately hard to soft, moderately to severely weathered, extremely fractured, black and white, light brown and pink, medium to coarse grained.		Moderately close fractures filled with pink feldspar, moderately dipping fracture (50°), horizontal foliations.						
.25														
.50														
.75														
61														
.25														
.50														
.75														

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DATE 2/23/94 CHK'D BY R. Paulling

ROCK BOREHOLE LOG

BORING NO. P-1D

SHEET 6 OF 10

DEPTH IN FE (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
62						**HORNBLENDE SCHIST**								
.25														
.50														
.75														
63														
.25														
.50														
.75														
64														
.25														
.50														
.75														
65		2	>5	43	25	**HORNBLENDE SCHIST** Moderately hard, moderately severe weathering, black and white, medium grained.		Feldspar, fracture @ 65' filled with fine grained granite rock, 3 mm. (50°)						
.25			5			**GRANITE SCHIST** Medium, severe weathering, white, pink, brown, medium grained quartz, feldspar, severely weathered biotite.								
.50			7			**CHLORITE SCHIST** Moderately hard, very slight weathering, moderately fractured, green, white, schistose, chlorite, feldspar, quartz.		Fracture at 65.6', 1 mm, filled with feldspar, fracture at 66', 2 mm filled with granitic rock.						
.75														
66														
.25														
.50			>5			**GRANITE SCHIST** Soft, severely weathered, extremely fractured, pink, brown, schistose, feldspar, weathered biotite, quartz.								
.75														
67														

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Rock Borehole

ROCK BOREHOLE LOG

BORING NO. P-1D

SHEET 7 OF 10

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
67						**CHLORITE SCHIST** Moderately hard, very severely weathered, continuous, green/white, schistose, chlorite, quartz, feldspar.								
.25														
.5						**GRANITE SCHIST** Hard, very severely weathered, moderate fracture, continuous, white, pink, black, schistose, pitted, quartz, feldspar, slightly weathered biotite.								
.75														
68														
.25														
.5														
.75								Lower 0.2' extremely fractured and weatherred.						
69														
.25														
.5														
.75														
70		3	>10	91	58	**GRANITE SCHIST** Medium, moderate, moderately fractured, pink, brown, schistose, medium grained, highly weathered biotite, potassium feldspar, quartz.								
.25														
.5			4			**GRANITE GNEISS** Hard, very slight to moderately fractured, pink, white, brown staining on joints and foliation, gneissic, medium grained, potassium feldspar, quartz, moderately weathered biotite.								
.75			3			Similar to 69.8 and 70.4								
71			5			Hard, fresh, slightly fractured, gray, white, black, gneissic, fine grained with "phenocrysts" (1 cm) of feldspar, feldspar biotite, quartz.		Vertical fracture at 72' and fracture at 72.2' filled with potassium feldspar.							
.25														
.5														
.75														

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ROCK BOREHOLE LOG

BORING NO. P-1D

SHEET 8 OF 10

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
72						**GRANITE GNEISS**								
.25			3			Similar to 70.95 to 72.2 with increasing biotite and darker gray color, fractured at 72.6 filled with potassium feldspar.								
.5														
.75														
73														
.25						**GRANITE SCHIST** Hard, fresh, continuous, pink, white, black, schistose, fine to medium grained. Hard, slightly weathered, moderately fractured, pink, brown, and white, medium to coarse grained, open, shallow to steep fractures.								
.5														
.75														
74														
.25														
.5														
.75														
75														
.25														
.5														
.75														
76														
.25														
.5														
.75														

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Rock Borehole

ROCK BOREHOLE LOG

BORING NO. P-1D

SHEET 9 OF 10

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
77						**GRANITE SCHIST**		2						
.25														
.5														
.75														
78														
.25														
.5														
.75						**GRANITE GNEISS**									
79														
.25														
.5														
.75		4	5	100	100	**GRANITE GNEISS** Hard, slightly weathered, sound, gray, white, and pink, medium to coarse grained, moderately close, tight, steep joints (75°), quartz and feldspar filling.								
80														
.25														
.5														
.75														
81														
.25														
.5														
.75														

DRILLING CONTR Environmental Construction Services

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Rock Borehole

ROCK BOREHOLE LOG

BORING NO. P-1D

SHEET 10 OF 10

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
82						**GRANITE GNEISS**								
.25														
.5														
.75														
83														
.25														
.5														
.75														
84			1			**HORNBLENDE SCHIST** Hard, slightly weathered, sound, black, white, and pink, medium to coarse grained, very close, tight, smooth, shallow to vertical joints, with quartz and feldspar fillings.								
.25														
.5														
.75						**TERMINATION OF BORING**								
85														
.25														

DRILLING CONTR Environmental Construction Services

RL

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DATE 2/23/94 CHK'D BY R. Paulling

Rock Borehole

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 2.25" I.D. HSA		BORING NO. P-2D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D./2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 4
			DRILLING START / FINISH
	WATER LEVEL 18.45'		TIME 1030 / TIME 1820
	TIME 1140		
	DATE 3/4/94		DATE 3/4/94 / DATE 3/4/94
DATUM NGVD ELEVATION 769 .20	CASING DEPTH		
DRILL RIG CME-45	SURFACE CONDITIONS Area immediately north of perimeter road, benched into slope by Morgan bulldozer.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0	6 6 12 12 (100%)		**SILTY SAND (SM)** (Upper 5") Medium dense, dark yellowish brown, moist, mostly fine sand, some silt. (Lower 19") Medium dense, moderate yellowish brown with medium dark gray mottling, moist, mostly fine sand, little medium sand and silt, few coarse sand and fine gravel. **- FILL -**								
1											
2											
3			**UNDISTURBED SAMPLE-1** (0 to 2 Feet) Pushed 24', Recovered 24" T=0.45 TSF, PP=4.25 TSF								
4	3 3 4 3 (75%)		**SILTY SAND (SM)** Loose, moderate yellowish brown with dark yellowish orange mottling, moist, mostly fine to medium sand, some silt, few coarse sand and trace of fine gravel.					15.5			-200 =34
5											
6			**UNDISTURBED SAMPLE-2** (4 to 6 Feet) Pushed 24", Recovered 24" PP = 0.5 TSF **- FILL -**								
7											
8											
9	6 4 6 6 (100%)		**SILTY SAND (SM)** (Upper 9") Similar to above. **- FILL -** **SILT (ML)** (Lower 15") Stiff, light brown with black biotite flakes and dark yellowish orange foliations, moist, mostly silt, some fine to medium sand, trace coarse sand. **- SAPROLITE -**					42	36		-200 =59
10											
11											
12			**UNDISTURBED SAMPLE-3** (10 to 12 Feet) Pushed 24", Recovered 24" T=0.35TSF, PP = 3.75 TSF								
13											
14	2 4 3 3 (100%)		**SILT (ML)** Similar to above except medium stiff with black and grayish yellow partings, moist to wet. **- SAPROLITE -**								

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DATE 3/28/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

BORING NO. P-2D

SHEET 2 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15											
16											
17			**UNDISTURBED SAMPLE-4** (17 to 19 Feet) No Recovery								
18											
19	3 3 5 10 (100%)		**SILT (ML)** Similar to above except highly foliated black, light brown and grayish yellow partings, wet, one quartz vein dipping at 45° ~ 1/4" thick. **- SAPROLITE -**								
20											
21											
22			**UNDISTURBED SAMPLE-4A** (22 to 24 Feet) Pushed 24" Recovered 24" T = 0.35 TSF PP = 3.5 TSF				40.1	34	32		-200 =45
23											
24	4 7 8 10 (100%)		**SILTY SAND (SM)** Medium dense, light brown with black biotite flakes, highly foliated black, light brown and grayish yellow partings, wet, mostly fine to medium sand, some silt, upper 5" of spoon contains two 1/2" thick white medium sand lenses bordered with mica. **- SAPROLITE -**								
25											
26											
27											
28											
29	3 7 27 27 (79.2%)		**SILTY SAND (SM)** (Upper 11") Similar to above **SILTY SAND (SM)** (Lower 8") Very dense, dark yellowish orange and white, wet, mostly fine sand, little medium sand and silt, few coarse sand. **- SAPROLITE -** **-SEVERELY WEATHERED GRANITE SCHIST -**								
30											
31											
32											
33											

DRILLING CONTR Environmental Construction Services

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SOIL BORING LOG

BORING NO. P-2D

SHEET 3 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
34	19 21 22 11 (62.5%)		**SILTY SAND (SM)** Similar to lower 8" above, except dense with more gravel size quartz, better defined light brown foliations in lower 6" of spoon. - SAPROLITE -								
36											
37											
38											
39	4 9 13 15 (42%)		**SILTY SAND (SM)** Medium dense, black, dark yellowish orange and white, wet, mostly fine to medium sand, some silt, highly foliated. - SAPROLITE -								-200 =31.5
41											
42											
43											
44	30 19 21 22 (37.5%)		(Upper 8") Similar to 34' - 36'. (Lower 1") Similar to 39' - 41', except dense. - SAPROLITE -								
46											
47											
48											
49	11 15 20 20 (100%)		**SILTY SAND (SM)** Similar to 39' - 41', except dense, black, white and grayish yellow foliations. -SAPROLITE -								
51											
52											
53											

DRILLING CONTR Environmental Construction Services

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SOIL BORING LOG

BORING NO. P-2D

SHEET 4 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
54	15 25 24 32 (100%)		**SILTY SAND (SM)** Similar to above, except with light brown foliations. - SAPROLITE -								
55											
56											
57											
58			**ENCOUNTERED BEDROCK AT 58'.** **TERMINATION OF BORING**								
59											
60											
61											

DRILLING CONTR Environmental Construction Services

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SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA		BORING NO. P-3
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D/2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 2
			DRILLING START / FINISH
	WATER LEVEL	57.72	TIME 1115 / TIME 1350
	TIME	0916	
	DATE	3/5/94	DATE 2/20/94 / DATE 2/20/94
DATUM NGVD ELEVATION 808	CASING DEPTH	--	
DRILL RIG CME-75	SURFACE CONDITIONS Area cleared and excavated by Morgan.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

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DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
39	6 5 6 11 (100%)		**SILT WITH SAND (ML)** Stiff, white with dark yellowish orange, dry, mostly silt, little coarse sand, highly foliated, foliations nearly vertical.								
40			**- SAPROLITE -**								
41			**- SEVERELY WEATHERED GRANITE SCHIST -**								
42											
43											
44	8 9 10 12 (100%)		**SILT WITH SAND (ML)** Very stiff, dark yellowish orange, white, moderately yellowish brown, moist, mostly silt, little coarse and medium sand, highly foliated vertically, mica along foliations.								
45			**- SAPROLITE -**								
46			**- SEVERELY WEATHERED GRANITE SCHIST -**								
47											
48											
49	6 9 12 10 (100%)		**SILTY SAND (SM)** Medium dense, top 12" light brown, white, lower 12" moderate yellowish brown, white, moist, mostly fine to medium sand, some silt, few coarse sand, foliated.								
50			**- SAPROLITE -**								
51			**- SEVERELY WEATHERED GRANITE SCHIST -**								
52											
53											

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Solid Waste
Section

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA					BORING NO. P-3
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D/2.0" O.D. by 2.0' Split Spoon with Plastic Retainer					SHEET 1 OF 2
						DRILLING START / FINISH
	WATER LEVEL	57.72				TIME 1115 / TIME 1350
	TIME	0916				
	DATE	3/5/94				DATE 2/20/94 / DATE 2/20/94
DATUM NGVD ELEVATION 808	CASING DEPTH	–				
DRILL RIG CME-75	SURFACE CONDITIONS Area cleared and excavated by Morgan.					
ANGLE Vertical BEARING						
SAMPLE HAMMER TORQUE FT.-LBS						

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
39	6 5 6 11 (100%)		BORING LOCATED IN FILL THAT WILL BE EXCAVATED SO AUGERED TO 39 FEET. STARTED SAMPLING IN SAPROLITE. **SILT WITH SAND (ML)** Stiff, white with dark yellowish orange, dry, mostly silt, little coarse sand, highly foliated, foliations nearly vertical. - SAPROLITE - - SEVERELY WEATHERED GRANITE SCHIST -								
44	8 9 10 12 (100%)		**SILT WITH SAND (ML)** Very stiff, dark yellowish orange, white, moderately yellowish brown, moist, mostly silt, little coarse and medium sand, highly foliated vertically, mica along foliations. - SAPROLITE - - SEVERELY WEATHERED GRANITE SCHIST -								
49	6 9 12 10 (100%)		**SILTY SAND (SM)** Medium dense, top 12" light brown, white, lower 12" moderate yellowish brown, white, moist, mostly fine to medium sand, some silt, few coarse sand, foliated. - SAPROLITE - - SEVERELY WEATHERED GRANITE SCHIST -								
53											

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SOIL BORING LOG

BORING NO. P-3

SHEET 2 OF 2

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
54	9 9 12 12 (100%)		**SILTY SAND (SM)** Similar to above, except wet. **- SAPROLITE -**								-200 =30.5
56											
57											
58			**UNDISTURBED SAMPLE-1** (58 to 59.5 Feet) Pushed 24", Recovered 24" T = 0.27 TSF PP = 4.0 TSF				21.0				
59	7 13 17 22 (62.5%)		**SANDY SILT (ML)** Very stiff, moderate yellowish brown, light brown, white mottled, wet, mostly silt, some coarse sand, little mica, moderately foliated. **- SAPROLITE -** **- SEVERELY WEATHERED GRANITE SCHIST -**								
61											
62											
63											
64	11 16 20 24 (75%)		**SANDY SILT (ML)** Similar to above except hard. **- SAPROLITE -**								
66			**TERMINATION OF BORING**								
67											
68											
69											
70											
71											
72											
73											

DRILLING CONTR Environmental Construction Services

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DATE 3/28/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA		BORING NO. P-4D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D/2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 4
			DRILLING START / FINISH
	WATER LEVEL 77.34		TIME 0910 / TIME 1430
	TIME 0910		DATE 3/3/94 / DATE 3/4/94
DATUM NGVD ELEVATION 836.40	DATE 3/3/94		DATE 2/24/94 / DATE 3/4/94
	CASING DEPTH 130'		
DRILL RIG CME-75	SURFACE CONDITIONS Top of fill mound north of tire recycling pad.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
49	4		Augered to 49 feet and began sampling.								
50	5 6 7 (100%)		**SILTY SAND (SM)** Medium dense, dark yellowish orange to light brown, dark greenish gray seam in lower 3" of spoon, moist, mostly fine sand, some silt, trace of medium and coarse sand. **- FILL -**								
51											
52											
53											
54											
55											
56											
57											
58											
59	8		**SANDY SILT (ML)** Very stiff, white with medium yellowish brown mottling, moist, mostly silt, some coarse grained angular sand (quartz), little mica. **- SAPROLITE -** **- SEVERELY WEATHERED GRANITE SCHIST -**								
60	10 12 13 (100%)										
61											
62											
63											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

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SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA					BORING NO.	P-4D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D/2.0" O.D. by 2.0' Split Spoon with Plastic Retainer					SHEET	1 OF 4
						DRILLING START	DRILLING FINISH
	WATER LEVEL	77.34				TIME	TIME
	TIME	0910				0910	1430
	DATE	3/3/94				DATE	DATE
DATUM NGVD ELEVATION 836	CASING DEPTH	130'				2/24/94	3/4/94
DRILL RIG CME-75	SURFACE CONDITIONS Top of fill mound north of tire recycling pad.						
ANGLE Vertical BEARING							
SAMPLE HAMMER TORQUE FT.-LBS							

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
49	4		BORING LOCATED IN FILL THAT WILL BE EXCAVATED SO AUGERED TO 49 FEET AND BEGAN SAMPLING.								
50	5 6		**SILTY SAND (SM)** Medium dense, dark yellowish orange to light brown, dark greenish gray seam in lower 3" of spoon, moist, mostly fine sand, some silt, trace of medium and coarse sand.								
51	7 (100%)		- FILL -								
52											
53											
54											
55											
56											
57											
58											
59	8		**SANDY SILT (ML)** Very stiff, white with medium yellowish brown mottling, moist, mostly silt, some coarse grained angular sand (quartz), little mica.								
60	10 12		- SAPROLITE -								
61	13 (100%)		- SEVERELY WEATHERED GRANITE SCHIST -								
62											
63											

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SOIL BORING LOG

BORING NO. P-4D

SHEET 2 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
64	8 18 19 16 (100%)		**SANDY SILT (ML)** Similar to above except hard. - SAPROLITE -								
66											
67											
68											
69	11 18 18 21 (100%)		**SILTY SAND (SM)** Dense, grayish orange with white and very pale orange mottling, moist to dry, mostly fine to medium sand, little silt, few coarse sand, few mica. - SAPROLITE - - SEVERELY WEATHERED QUARTZ SCHIST -								
71											
72											
73											
74	14 23 33 36 (100%)		**SILTY SAND (SM)** Similar to above except very dense. - SAPROLITE -								-200 =28
76											
77											
78											
79	26 41 50 50 (100%)		**SILTY SAND (SM)** Similar to above. -SAPROLITE -								
81											
82											
83											

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SOIL BORING LOG

BORING NO. P-4D

SHEET 3 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
84	7 22 50/5" (100%)		**SILTY SAND (SM)** Similar to above. **-PARTIALLY WEATHERED ROCK -**								
85											
86											
87											
88											
89											
90	50/4 (100%)		**SILTY SAND (SM)** Similar to above. **- PARTIALLY WEATHERED ROCK -**								
91											
92			Formation becoming too hard to collect spoons. Drillers augered to 130' where they encountered bedrock. Drillers then began to core.								

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ROCK BOREHOLE LOG

ITE NAME AND LOCATION

DRILLING METHOD: 94 mm wireline coring

BORING NO. P-4D

SHEET 4 OF 4

SAMPLING METHOD: NQ2 Coring

					DRILLING START	DRILLING FINISH
WATER LEVEL	77.34				TIME	TIME
TIME	0910				0910	1430
DATE	3/3/94				DATE	DATE
CASING DEPTH	130				2/24/94	3/4/94

DATUM ELEVATION

DRILL RIG CME-75

SURFACE CONDITIONS

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
130		1	7	88	60	**GRANITE SCHIST** Hard, slightly weathered, slightly fractured, gray and white, medium to coarse grained.		Close, open, rough, joints. The open joints have biotite on surfaces and are moderately dipping. (30°-50° orientation)						
.5														
131														
.5														
132														
.5			16			**QUARTZ-BIOTITE SCHIST** Moderately hard, moderately severe weathering, moderately fractured, brown and white, medium to coarse grained.		Close, open, moderately dipping joints.						
133														
.5			4			**GRANITE SCHIST** Hard, slightly weathered, slightly fractured, gray, white, and brown, medium to coarse grained.		Close, open, moderately dipping joints with moderately severe weathered surfaces. (50° orientation)						
134														
.5														
135						**TERMINATION OF BORING**								
.5														
136														
.5														
137														
.5														

LOGGED BY R. Paulling RL

DATE 3/28/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA		BORING NO. P-5
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" ID/2.0" O.D. by 2.0'		SHEET 1 OF 3
	Split Spoon with Plastic Retainer		DRILLING
		START	FINISH
	WATER LEVEL	TIME	TIME
	TIME	1015	0800
	DATE	DATE	DATE
DATUM NGVD ELEVATION 813	CASING DEPTH	3/7/94	3/10/94
DRILL RIG CME-75	SURFACE CONDITIONS Loose sandy fill material being cut by		
ANGLE Vertical BEARING	earthwork contractor.		
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
29	7		Due to thick stratum of fill, drillers augered to 29' depth and began sampling.								
30	20 47 50		(Upper 10") **SANDY SILT (ML)** Hard, moderate yellowish brown, dark yellowish orange, dry, mostly silt, some fine sand, little wood chips.								
31	(100%)		**- FILL -**								
32			(Lower 14") **SILTY SAND (SM)** Very dense, white, grayish orange, moderate yellowish brown, mottled, dry, mostly fine to medium sand, few fine gravel, few silt, foliations, gravel is feldspar or quartz, few mica.								
33			**- SAPROLITE -**								
34			**- WEATHERED GRANITE SCHIST -**								-200 =14
35	7 50/5"		**SILTY SAND (SM)** Similar to above.								
36	(64%)		**- PARTIALLY WEATHERED ROCK -**								
37			**- WEATHERED GRANITE SCHIST -**								
38											
39			**GRAVELLY SILT (ML)** Similar to above.								
40	50/3"		**- PARTIALLY WEATHERED ROCK -**								
41	(100%)		**- WEATHERED GRANITE SCHIST -**								
42											
43											
(770)											

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SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA	BORING NO.	P-5
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC		SHEET	1 OF 3
	SAMPLING METHOD: 1.5" ID/2.0" O.D. by 2.0' Split Spoon with Plastic Retainer	DRILLING START TIME	DRILLING FINISH TIME
	WATER LEVEL / TIME / DATE / CASING DEPTH	1015 / DATE 3/7/94	0800 / DATE 3/10/94
DATUM NGVD ELEVATION 813			
DRILL RIG CME-75	SURFACE CONDITIONS Loose sandy fill material being cut by earthwork contractor.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
29	7		BORING LOCATION IN FILL THAT WILL BE EXCAVATED SO AUGERED TO 29' DEPTH AND BEGAN SAMPLING.								
30	20 47 50		(Upper 10") **SANDY SILT (ML)** Hard, moderate yellowish brown, dark yellowish orange, dry, mostly silt, some fine sand, little wood chips.								
31	(100%)		- FILL -								
32			(Lower 14") **SILTY SAND (SM)** Very dense, white, grayish orange, moderate yellowish brown, mottled, dry, mostly fine to medium sand, few fine gravel, few silt, foliations, gravel is feldspar or quartz, few mica.								
33			- SAPROLITE -								
34			- WEATHERED GRANITE SCHIST -								-200 =14
34	7		**SILTY SAND (SM)** Similar to above.								
35	50/5"		- PARTIALLY WEATHERED ROCK -								
36	(64%)		- WEATHERED GRANITE SCHIST -								
37											
38											
39			**GRAVELLY SILT (ML)** Similar to above.								
40	50/3"		- PARTIALLY WEATHERED ROCK -								
41	(100%)		- WEATHERED GRANITE SCHIST -								
42											
43 (770)											

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DATE 3/29/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

BORING NO. P-5

SHEET 2 OF 3

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
44											
45	50/1"		**SILT WITH SAND (ML)** Hard, white, grayish black, moderate yellowish brown mottled, dry, mostly silt, little sand, schistose.								
46	(100%)		**- PARTIALLY WEATHERED ROCK -** **- WEATHERED BIOTITE SCHIST -**								
47											
48			Formation becoming too hard to spoon. Drillers augered to 54' where bedrock was encountered.								
49											
50											
51											
52											
53											
54			**ENCOUNTERED BEDROCK AT 54'** **BEGAN CORING**								

DRILLING CONTR Environmental Construction Services

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DATE 3/29/94 CHK'D BY T. Yanoschak

ROCK BOREHOLE LOG

SITE NAME AND LOCATION: PIEDMONT LANDFILL AND RECYCLING CENTER, KERNERSVILLE, NC

DRILLING METHOD: 94 mm wireline coring

SAMPLING METHOD: NQ2 Coring

BORING NO. P-5

SHEET 3 OF 3

DRILLING: START TIME 0545 DATE 3/11/94; FINISH TIME 0750 DATE 3/11/94

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DATUM NGVD ELEVATION 813

DRILL RIG CME-75

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS: Loose sandy fill material being cut by earthwork contractor.

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
54 (754)		1	>24	38	0	**GRANITE GNEISS** Moderately hard, moderately severe weathering, extremely fractured, white, brown, and pink, coarse grained, quartz and plagioclase crystals in a matrix of iron stained biotite with minor potassium feldspar.		Very close, open, rough, moderately dipping joints.						
55														
56														
57														
58														
59														
60														
61														
62														
63 (750)						**TERMINATION OF BORING**								
64														
65														
66														
67														
68														
69														

LOGGED BY M. Taylor RL

DATE 3/29/94 CHK'D BY T. Yanoschak

Rock Borehole

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA	BORING NO. P-6D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D/2.0" O.D. by 2.0' Split Spoon with Plastic Retainer	SHEET 1 OF 4
		DRILLING START / FINISH
	WATER LEVEL / TIME / DATE / CASING DEPTH	TIME 1115 / DATE 2/20/94 — TIME 1350 / DATE 2/20/94
DATUM NGVD ELEVATION 767 (766.60)		
DRILL RIG CME-45	SURFACE CONDITIONS Grassed low lying area on eastern border of property next to a spring.	
ANGLE Vertical BEARING		
SAMPLE HAMMER TORQUE FT.-LBS		

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0	WOH 3 4 6 (100%)		**SILT WITH SAND (ML)** Medium stiff, dark yellowish brown with dark yellowish orange mottling, moist, mostly silt, little fine sand, few medium sand, roots and mica, trace coarse sand. - RESIDUAL SOIL -								
2	2 3 4 4 (29%)		**SILT WITH SAND (ML)** Similar to above. - RESIDUAL SOIL -								
4	2 4 2 2 (21%)		**LEAN CLAY WITH SAND (CL)** Medium stiff, greenish gray, wet, mostly lean clay, little fine and medium sand. - RESIDUAL SOIL - **UNDISTURBED SAMPLE-1** (4 to 6 Feet) Pushed 24", Recovered 22" PP=0.75 TSF				28.0	38	35		
6	2 3 7 9 (42%)		**CLAYEY SAND (SC)** Loose, white with greenish gray mottling, wet, mostly fine to medium sand, some clay, few coarse sand and fine gravel, trace mica. - RESIDUAL SOIL -								-200 =35
8	2 6 9 9 (50%)		**CLAYEY SAND (SC)** Similar to above except medium dense, mostly medium sand, some coarse moderate orange pink quartz fragments (lower 2") becoming dark yellowish orange. - RESIDUAL SOIL -								
10	3 4 6 7 (46%)		**SILTY SAND (SM)** Loose, moderate orange pink with dark yellowish orange banding, wet, mostly fine sand, some coarse quartz fragments, little silt and mica. - RESIDUAL SOIL -								
13 (754)											
14											

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SOIL BORING LOG

BORING NO. P-6D

SHEET 2 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	4 4 8 10 (100%)		**SILT WITH SAND (ML)** Stiff, moderate orange pink with dark yellowish orange mottling, wet to moist, mostly silt, little fine sand and mica, trace medium sand. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
16											
17											
18											
19											
20	7 9 16 10 (54%)		**SILT WITH SAND (ML)** Similar to above, except very stiff, moderate yellowish brown horizontal mica partings, few coarse quartz fragments. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
21											
22											
23											
24											
25	4 8 16 16 (100%)		**SILT WITH SAND (ML)** Similar to above. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
26											
27											
28											
29											
30	12 13 25 21 (100%)		**SILT WITH SAND (ML)** Similar to above, except hard. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
31											
32											
33											
34											

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SOIL BORING LOG

BORING NO. P-6D

SHEET 3 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35	21 50 31 35 (63%)		**SILT WITH SAND (ML)** Similar to above. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
40	16 24 27 14 (58%)		**SILT WITH SAND (ML)** Similar to above. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
45	16 34 36 38 (58%)		**SILTY SAND (SM)** Very dense, moderate orange pink with dark yellowish orange mottling, with dusky yellowish brown biotite partings, wet to moist, mostly fine to medium sand, some silt, few coarse sand, trace fine gravel. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								-200 =43
50	16 50/4" (100%)		**SILTY SAND (SM)** Similar to above, shattered quartz fragments in bottom of spoon. **- PARTIALLY WEATHERED ROCK -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								

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DATE 3/28/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

BORING NO. P-6D

SHEET 4 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
55											
56	50/2"		**NO RECOVERY** Formation becoming too hard to spoon. Drillers augered to 71 feet depth where bedrock was encountered. **- PARTIALLY WEATHERED ROCK -**								
57											
58											
59											
60											
61											
62											
63											
64											
65											
66											
67											
68											
69											
70											
71			**ENCOUNTERED BEDROCK AT 71'** **TERMINATION OF BORING**								
72											
73											
74											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/28/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

SITE NAME AND LOCATION: PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC

763.80

DATUM NGVD ELEVATION 764

DRILL RIG CME-45

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING METHOD: 2.25" I.D. HSA

SAMPLING METHOD: 1.5" I.D/2.0" O.D. by 2.0' Split Spoon with Plastic Retainer

WATER LEVEL	16.9'				
TIME	1000				
DATE	2/17/94				
CASING DEPTH					

BORING NO. P-7

SHEET 1 OF 2

DRILLING

START	FINISH
TIME 0810	TIME 0930
DATE 2/17/94	DATE 2/17/94

SURFACE CONDITIONS: Area leveled by WM bulldozer east of active Landfill (Phase 2 - Modules 1and 2).

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0	6 7 7 9 (100%)		**SILT WITH SAND (ML)** Stiff, dark yellowish orange, dusky yellowish green and black, moist, mostly silt, little fine sand and mica, few medium sand. - FILL -								
3	8 6 8 10 (100%)		**SILT WITH SAND (ML)** Similar to above, except lower 7 inch becoming light brown with decreasing sand content. - FILL -								
4	6 7 9 10 (100%)		(Upper 6") **SILT WITH SAND (ML)** Similar to above, except grayish green and some to little medium sand. (Lower 18") **SILTY SAND (SM)** Medium dense, grayish green and black, moist, mostly fine to medium sand, some silt, few roots and coarse sand, trace fine gravel.								
(757) 7	8 6 5 5 (88%)		(Upper 8") **SILTY SAND (SM)** Similar to above. - FILL - (Lower 13") **CLAYEY SAND (SC)** Loose, grayish orange with dark yellowish orange mottling, moist, mostly fine sand, little medium sand and lean clay. - RESIDUAL SOIL -								-200 =34.1
9	6 6 7 8 (100%)		**CLAYEY SAND (SC)** Similar to above, except medium dense with dusky brown inclusions and wet. - RESIDUAL SOIL -								
11	3 3 4 6 (46%)		**CLAYEY SAND (SC)** Similar to above, except loose. - RESIDUAL SOIL -								
13	7 7 8 10 (100%)		**CLAYEY SAND (SC)** Similar to above, except medium dense light gray mottling, and few coarse sand and fibrous roots. - RESIDUAL SOIL -								

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BORING NO. P-7

SHEET 2 OF 2

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	10 11 12 10 (100%)		**CLAYEY SAND (SC)** Similar to above, except with quartz vein 1-1/2 inch thick. **- RESIDUAL SOIL -**								
16											
17											
18 (746)											
19	3 3 4 4 (100%)		**SANDY SILT (ML)** Medium stiff, dark yellowish orange with moderate orange pink quartz fragments, wet, mostly silt, some fine sand, little medium to coarse subangular quartz fragments and grayish brown mica partings. **- SAPROLITE -**								
20											
21			**- SEVERELY WEATHERED QUARTZ SCHIST -**								
22			**UNDISTURBED SAMPLE-1 (22 to 24)** Pushed 24", recovered 14". Large quartz fragments in bottom of sample prevented performance of Torvane and Pocket penetrometer analyses.								
23											
24	2 4 3 4 (100%)		**SANDY SILT (ML)** Similar to above, except upper 6" contained pale red partings. **- SAPROLITE -**								
25											
26 (738)			**- SEVERELY WEATHERED QUARTZ SCHIST -** **TERMINATION OF BORING**								
27											
28											
29											
30											
31											
32											
33											
34											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 2.25" I.D. HSA 0' - 66'		BORING NO. P-8D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	4.25" I.D. 66' to 76'		SHEET 1 OF 5
	SAMPLING METHOD: 1.5" ID/2.0" OD by 2.0' Split Spoon with Plastic Retainer		DRILLING START TIME 0950 DATE 2/22/94 / FINISH TIME 1550 DATE 3/8/94
DATUM NGVD ELEVATION 778 (777.90)	WATER LEVEL 28.10 / TIME 1110 / DATE 2/22/94 / CASING DEPTH		
DRILL RIG CME-45	SURFACE CONDITIONS Grassed area sloping west with erosion netting placed.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0	WOH		**SILT WITH SAND (ML)** Medium stiff, grayish orange, moist, mostly silt, little fine to medium sand, few mica and roots. (Lower 8") Becoming dusky yellowish brown. Medium sand seam (≈1" thick). - FILL -								
1	2 3 8										
2	(100%)										
3											
4											
5	2 3 3 8		**SILT WITH SAND (ML)** Medium stiff, light brown with dark yellowish orange mottling, moist, mostly silt, little medium sand and mica, few fine sand to coarse sand. - FILL -								
6											
7	(100%)										
8											
9											
10	3 4 4 3		**SILT WITH SAND (ML)** (Upper 11") Similar to above. (Middle 9") **POORLY GRADED SAND WITH SILT (SP-SM)** Loose, light brown, moist, mostly medium sand, little fine sand, coarse sand, few silt, trace fine gravel. (Lower 4") **SILT WITH SAND (ML)** Medium stiff, very pale orange with pale yellowish orange banding, moist, mostly silt, little fine sand. - FILL -								
11											
12	(100%)										
13											
14 (764)											

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

BORING NO. P-8D

SHEET 2 OF 5

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	2 3 4 5 (83%)		**SILTY SAND (SM)** Loose, pale yellowish orange with very pale yellowish orange mottling and dusky yellowish brown partings, moist, mostly fine to medium sand, some silt, few coarse sand.								
16			**- SAPROLITE -**								
17			**- SEVERELY WEATHERED QUARTZ SCHIST -**								
18			**UNDISTURBED SAMPLE-1** (18 to 20 Feet) No Recovery.								
19											
20	3 5 6 7 (100%)		**SILTY SAND (SM)** Similar to above, except medium dense.				21.3				-200 =35
21			**- SAPROLITE -** **UNDISTURBED SAMPLE-2** (20 to 22 Feet) Pushed 24", Recovered 24" PP = 2.75 TSF T = 0.22 TSF								
22											
23											
24	3 6 8 10 (100%)		**SILTY SAND (SM)** Similar to above, except moist to wet and saprolite vein ≈1" thick.								
25			**- SAPROLITE -**								
26			**- SEVERELY WEATHERED QUARTZ SCHIST -**								
27											
28											
29											
30											
31	3 5 6 10 (100%)		**SILTY SAND (SM)** Similar to above except loose with silt increasing from little to some downward. (Lower 5") **SILT WITH SAND (ML)** Very stiff, dark yellowish orange with white, pale yellowish orange and dusky yellowish brown foliations, moist to wet, mostly silt, little medium and coarse sand.								
32											
33											
34			**- SAPROLITE -**								
			- SEVERELY WEATHERED QUARTZ SCHIST -								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

BORING NO. P-8D

SHEET 3 OF 5

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35	4 7 13 15 (42%)		**SILTY SAND (SM)** Medium dense, pale yellowish orange with very pale yellowish orange mottling and dusky yellowish brown partings, wet, mostly fine to medium sand, little silt, few coarse sand, trace fine gravel. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
36											
37											
38											
39	5 14 20 21 (67%)		**SILTY SAND (SM)** Similar to above, except dense. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
40											
41											
42											
43											
44	17 31 50 46 (50%)		**SILTY SAND (SM)** Similar to above, except very dense. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
45											
46											
47											
48											
49	40 42 50/2" (79%)		**SILTY SAND (SM)** Similar to above, except with dusky yellowish brown foliations between 85° and 90°. **- PARTIALLY WEATHERED ROCK -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
50											
51											
52											
53											
54	31 50		**SILTY SAND (SM)** Similar to above except with few light brown partings. **- PARTIALLY WEATHERED ROCK -**								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-8D

SHEET 4 OF 5

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
55											
56	(67%)										
57											
58											
59	40		**SILTY SAND (SM)**								
	50/3"		Same as above.								-200
60			**- PARTIALLY WEATHERED ROCK -**								=23
	(89%)		**- SEVERELY WEATHERED QUARTZ SCHIST -**								
61											
62											
63											
64	35		No Recovery.								
	50/3"										
65											
66	(0%)										
67											
68											
69	47		**SILTY SAND (SM)**								
	50/1"		Similar to above except wet.								
70			**- PARTIALLY WEATHERED ROCK -**								
	(43%)		**- SEVERELY WEATHERED QUARTZ SCHIST -**								
71											
72											
73											
74	50/2"		**SILTY SAND (SM)**								
			Similar to above.								
			- PARTIALLY WEATHERED ROCK -								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-8D

SHEET 5 OF 5

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
75											
76			ENCOUNTERED BEDROCK AT 76.0'								
			TERMINATION OF BORING								
77											
78											
79											
80											
81											
82											
83											
84											
85											
86											
87											
88											
89											
90											
91											
92											
93											
94											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

PIEDMONT LANDFILL AND RECYCLING CENTER
KERNERSVILLE, NC

DRILLING METHOD: 94 mm wireline coring

SAMPLING METHOD: NQ2 Coring

BORING NO. P-9S

SHEET 1 OF 2

	DRILLING START	DRILLING FINISH
WATER LEVEL		
TIME	0900	1830
DATE	3/15/94	3/15/94

DATUM NGVD ELEVATION 828

DRILL RIG CME-75

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS Cleared area where WM had been excavating soil for daily cover.

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
64						TOP OF BEDROCK								
.5		1	> 12	79	43	**GRANITE GNEISS** Hard, slightly weathered, extremely fractured, black and white, medium to coarse grained, large grains of quartz and plagioclase..		Close, healed, shallow to moderately dipping joints. (30° - 50° orientation)						
65														
.5														
66														
.5														
67			13			**BIOTITE SCHIST** Hard, fresh, moderately fractured, black, brown and white, medium to coarse grained with large grains of plagioclase and minor epidote.		Moderately dipping joints. (30° - 50° orientation)						
.5														
68														
.5														
69														
.5														
70		2	16	95	83	**BIOTITE SCHIST** Similar to above.								
.5														
71														
.5														

LOGGED BY RL

DATE 4/5/94 CHK'D BY T. Yanoschak

M. Taylor

ROCK BOREHOLE LOG

BORING NO. P-9S

SHEET 2 OF 2

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
72						**BIOTITE SCHIST** Similar to above.								
.5														
73														
.5														
74														
.5														
75														
.5														
76														
.5														
77														
.5						**TERMINATION OF BORING**								
78														
.5														
79														
.5														
80														
.5														
81														
.5														
82														

DRILLING CONTR Environmental Construction Services

LOGGED BY M. Taylor RL

DATE 2/23/94 CHK'D BY T. Yanoschak

Rock Borehole

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 2.25" I.D. HSA		BORING NO. P-9D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D./2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 7
			DRILLING
	WATER LEVEL		START: TIME 1730, DATE 3/3/94
	TIME		FINISH: TIME 1930, DATE 3/16/94
	DATE		
DATUM NGVD ELEVATION 828	CASING DEPTH		
DRILL RIG CME-45	SURFACE CONDITIONS Cleared area where WM had been excavating soil for daily cover.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0											
1											
2											
3											
4											
5	9		**SILTY SAND (SM)** Very dense, moderate orange pink with light brown mottling, moist, mostly fine sand, little medium sand and silt, trace coarse sand.								
6	50/12"										
7	(83%)		- SAPROLITE - - SEVERELY WEATHERED QUARTZ SCHIST -								
8											
9											
10	16		**POORLY GRADED SAND (SP)** Dense, dark yellowish brown and white, moist to dry, mostly fine sand, little medium sand.								
11	18 17										
12	(39%)		- SAPROLITE - - SEVERELY WEATHERED QUARTZ SCHIST -								
13											
14											

LOGGED BY R. Paulling SL

DATE 3/30/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-9D

SHEET 2 OF 7

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	50/5" (100%)		**POORLY GRADED SAND (SP)** Similar to above except very dense. **- PARTIALLY WEATHERED ROCK -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
20	62/3" (0%)		No Recovery.								
25	50/2" (0%)		No Recovery.								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/30/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-9D

SHEET 3 OF 7

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35	50/1"		No Recovery.								
36											
37	(0%)										
38											
39											
40											
41											
42											
43											
44											
45	50/2"		No Recovery.								
46											
47	(0%)										
48			Formation too hard to spoon. Drillers augered to bedrock which was encountered at 53.0 ft. depth.								
49											
50											
51											
52											
53 (775)			ENCOUNTERED BEDROCK AT 53.0'								
54			BEGAN CORING								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/30/94 CHK'D BY T. Yanoschak

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

PIEDMONT LANDFILL AND
RECYCLING CENTER
KERNERSVILLE, NC

DRILLING METHOD: 94 mm wireline coring 53' to 65.7', Air rotary 65.7' to 91.5', 94 mm wireline coring 91.5' to 106'

SAMPLING METHOD: NQ Coring

BORING NO. P-9D

SHEET 4 OF 7

					DRILLING START	DRILLING FINISH
WATER LEVEL						
TIME					0900	1930
DATE					3/16/94	3/16/94
CASING DEPTH						

DATUM ELEVATION

DRILL RIG

SURFACE CONDITIONS

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling RL

DATE 4/5/94 CHK'D BY T. Yanoschak

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
53						TOP OF BEDROCK								
.5														
54		1	5	92	88	**GRANITE GNEISS** Hard, fresh, moderately fractured, white and black, medium to coarse grained.		Close healed, shallow to moderately dipping joints, open fracture at 54.17' with black biotite and gold mica on faces.						
.5														
55														
.5														
56		2	5	93	70									
.5						**QUARTZ BIOTITE SCHIST** Moderately hard, moderately severe weathering, extremely fractured, white and black, medium grained.		Fracture at 56.0'. Close, healed, shallow joints, thin foliations.						
57			2											
.5			8			**GRANITE GNEISS** Hard, fresh, moderately fractured, white and black, medium to coarse grained.		Close, healed, shallow to moderately dipping joints.						
58														
.5														
59														
.5														
60														
.5														

ROCK BOREHOLE LOG

BORING NO. P-9D

SHEET 5 OF 7

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
61 .5 62 .5 63 .5 64 .5 65 .5 66 .5 67 .5 68 .5 69 .5 70 .5 71			2			**GRANITE GNEISS**								
						QUARTZ BIOTITE SCHIST as above.								
			9			**GRANITE GNEISS** as above.		Highly fractured zone, black biotite and gold mica forming clevage planes, rock becoming soft.						
						Air Hammered to 91.5' depth.								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling RL

DATE 4/5/94 CHK'D BY T. Yanoschak

Rock Borehole

ROCK BOREHOLE LOG

BORING NO. P-9D

SHEET 6 OF 7

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
91						Air Hammer Terminated Coring Began								
.5		3	2	92	90	**GRANITE GNEISS** Hard, fresh, moderately fractured, white and black, medium to coarse grained.		Close, tight, moderately dipping, smooth joints with quartz and feldspar.						
92														
.5						**BIOTITE SCHIST** Hard, fresh, moderately fractured, (numerous mechanical fractures) white and black, medium grained.		Close, tight, moderately dipping joints, very thin foliations with translucent plagioclase crystals.						
93			38											
.5														
94														
.5														
95														
.5														
96														
.5														
97														
.5														
98			7			**QUARTZITE** Hard, fresh, white.		Moderately fractured (numerous mechanical fractures), close.						
.5														
99														
.5														
100														
.5		3	13	83	80	**GRANITE GNEISS** Hard, fresh, white, black and pink, medium to coarse grained.		Moderately fractured, (numerous mechanical fractures).						
101														

DRILLING CONTR Environmental Construction Services

LOGGED BY M. Taylor RL

DATE 4/5/94 CHK'D BY T. Yanoschak

ROCK BOREHOLE LOG

BORING NO. P-9D

SHEET 7 OF 7

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
102								Close, tight, moderately dipping, joints with very thin foliations.						
.5														
103														
.5														
104														
.5														
105														
.5														
106 (722)						TERMINATION OF BORING								
.5														
107														
.5														
108														
.5														
109														
.5														
110														
.5														
111														
.5														
112														

DRILLING CONTR Environmental Construction Services

LOGGED BY M. Taylor RL

DATE 4/5/94 CHK'D BY T. Yanoschak

Rock Borehole

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 2.25" I.D. HSA		BORING NO. P-10
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D./2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 3
			DRILLING START / FINISH
	WATER LEVEL: 25.0' / 24.91'		TIME: 1515 / 1645
	TIME: 15:15 / 17:30		
	DATE: 2/15/94 / 2/16/94		DATE: 2/15/94 / 2/15/94
DATUM NGVD ELEVATION 798 (797.50)	CASING DEPTH		
DRILL RIG CME-45	SURFACE CONDITIONS Grassed surface sloping to the north.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0											
1											
2											
3											
4	2 4 4 6 (100%)		**SANDY SILT (ML)** Medium stiff, grayish green, moist, mostly silt, some fine to medium sand. - FILL -								
5											
6											
7											
8											
9	4 4 5 6 (100%)		**SANDY SILT (ML)** Stiff, grayish green, grayish olive green, moist, mostly silt, some fine to medium sand, few coarse subangular sand, few wood chips. - FILL -								
10											
11											
12											
13											
14											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/28/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-10

SHEET 2 OF 3

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	3 4 5 8 (100%)		**SANDY SILT (ML)** (Upper 17") Similar to above, except medium stiff. (Lower 7") Similar to above, except dark yellowish orange, mostly silt, some medium sand, little fine to coarse sand, few wood fragments. **- FILL -**				16.0	28	23		
16											
17											
18											
19											
20	4 4 5 8 (100%)		**SANDY SILT (ML)** Similar to above. **- FILL -**								
21											
22											
23											
24 (773)	2 2 3 3 (100%)		**SANDY SILT (ML)** (Upper 10") Similar to above.								
25			**SILT (ML)** (Lower 14") Medium stiff, greenish gray with black banding, wet, mostly silt, some fiberous roots with moderate organic odor. **- RESIDUAL SOIL -**								
26											
27 (771)											
28											
29	2 2 3 7 (100%)		**SANDY SILT (ML)** Medium stiff, light gray with dark yellowish orange inclusions, wet, mostly silt, some medium sand, few fine to coarse sand. **- SAPROLITE -**								
30											
31	4 5 6 5 (100%)		**SANDY SILT (ML)** (Upper 22") Similar to above, except stiff and becoming pale yellowish green. **SILT (ML)** (Lower 2") Medium stiff, dark yellowish orange with black and white banding, very wet, mostly silt, few fine sand, moderate organic odor. **- SAPROLITE -**								
32											
33	2 2 3 3		**SILT (ML)** Similar to above. **- SAPROLITE -**								
34											

DRILLING CONTR Environmental Construction Services

LOGGED BY Ron Paulling SL

DATE 3/28/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-10

SHEET 3 OF 3

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35	(58%) 2 3 4 4		**SILT (ML)** Similar to above, except medium stiff, little mica. - SAPROLITE -								
36											
37	(71%) 5 5 5 5		**SILT (ML)** Similar to above, except stiff. - SAPROLITE -				44.2	43	36		
38											
39	(50%) (75%)		TERMINATION OF BORING								
40											
41											
42											
43											
44											
45											
46											
47											
48											
49											
50											
51											
52											
53											
54											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/28/94 CHK'D BY T. Yanoschak

JUN 1994
Received
Solid Waste
Section

SOIL BORING LOG

BORING NO. P-10

SHEET 3 OF 3

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35	(58%) 2 3 4 4		**SILT (ML)** Similar to above, except medium stiff, little mica.								
			- SAPROLITE -								
37	(71%) 5 5 5 5		**SILT (ML)** Similar to above, except stiff.				44.2	43	36		
			- SAPROLITE -								
39	(50%) (75%)		**SILT (ML)** Similar to above.								
46			**TERMINATION OF BORING**								

DRILLING CONTR Environmental Construction Services

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DATE 3/28/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 2.25" I.D. HSA	BORING NO. P-11D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D./2.0" O.D. by 2.0' Split Spoon with Plastic Retainer	SHEET 1 OF 4
DATUM NGVD ELEVATION 791.40	WATER LEVEL / TIME / DATE / CASING DEPTH	DRILLING START TIME 1440 DATE 2/22/94; FINISH TIME 1730 DATE 2/22/94
DRILL RIG CME-45	SURFACE CONDITIONS Area cut by earth work contractor.	
ANGLE Vertical BEARING		
SAMPLE HAMMER TORQUE FT.-LBS		

DRILLING CONTR Environmental Construction Services

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DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0–2	2 2 3 5 (100%)		**SILTY SAND (SM)** Loose, dark yellowish orange and pale yellowish brown, moist, mostly fine sand, little medium sand and silt and mica. **- FILL -**								
5–7	6 8 9 7 (100%)		**SILTY SAND (SM)** Medium dense, pale yellowish brown with black biotite partings, moist, mostly fine sand, little silt, few medium sand. (Lower 2") Lean clay seams ≈ 1/4" thick. **- FILL -**								
10–12	3 5 5 3 (0%)		**No Recovery**								

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-11D

SHEET 2 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	27		**SILTY SAND (SM)** Very dense, black with dark yellowish orange foliations, moist, mostly fine to medium sand, some silt, few mica.								-200 =29
16	26										
	50/5"		**- SAPROLITE -**								
17	(100%)										
18											
19											
20	16		**SILTY SAND (SM)** Similar to above.								
21	50/5"		**- SAPROLITE -**								
	(100%)										
22											
23											
24											
25	24		**SILTY SAND (SM)** (Upper 11") Similar to above except dense.								
(765)	18										
26	50/5"		**SILTY SAND (SM)** (Lower 4") Very dense, dark yellowish orange with white horizontal foliations, moist to dry, mostly fine sand, some silt, few coarse sand.								
27	(88%)		**- SAPROLITE -**								
28			**- SEVERELY WEATHERED QUARTZ SCHIST -**								
29											
30	40/0"		No Recovery								
31											
	(0%)										
32											
33											
34											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/28/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

BORING NO. P-11D

SHEET 3 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35	19/2"		**SILTY SAND (SM)** Very dense, dark yellowish orange and white, dry to moist, mostly fine sand, some silt, little medium sand.								
36											
37	(100%)		- SAPROLITE - - SEVERELY WEATHERED QUARTZ SCHIST -								
38											
39											
40											
41											
42											
43											
44											
45	12		**WELL GRADED SAND WITH SILT (SW-SM)** Very dense, dark yellowish orange, wet, mostly fine to medium sand, little coarse sand, few silt and fine gravel. (Lower 2") Foliations of mica.								-200 =12
46	15 50/4"										
47	(100%)		- SAPROLITE - - SEVERELY WEATHERED QUARTZ SCHIST -								
48											
49											
50	10		**SILT (ML)** (Upper 8") Hard, pale yellowish green with moderate orange pink mottling and dusky yellowish brown partings.								
(740) 51	31 37 50/5"		(Lower 16") Similar to above, except moderate brown with white and dusky yellowish brown mottling. Entire sample moist, mostly silt.								
52	(96%)		- SAPROLITE -								
53											
54											

DRILLING CONTR Environmental Construction Services

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DATE 3/28/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

BORING NO. P-11D

SHEET 4 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
55	25		**SANDY SILT (ML)** (Upper 5") Hard, greenish black with white mottling. (Lower 10") Similar to above except dark yellowish orange with white and dusky yellowish green mottling. Entire sample moist, mostly silt, some coarse angular quartz grains.								
56	35										
57	50/3" (100%)										
58			**- SAPROLITE -**								
59 (732)			**- SEVERELY WEATHERED SAPROLITE -**								
60	50/3"		**POORLY GRADED SAND WITH SILT (SP-SM)** Very dense, moderate reddish orange, moist, mostly medium sand, few silt, few coarse sand and mica.								
61			**- PARTIALLY WEATHERED ROCK -**								
62	(100%)		**- SEVERELY WEATHERED QUARTZ SCHIST -**								
63			**Formation becoming too hard to spoon. Drillers augered to bedrock which was encountered at 97.0 ft.**								
64											
65											
66											
67											
68											
69											
70											
71											
72											
73											
74											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/28/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA		BORING NO. P-12D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D./2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 8
			DRILLING
	WATER LEVEL		START / FINISH
	TIME		1545 / 1615
	DATE		DATE / DATE
DATUM NGVD ELEVATION 810 (809.80)	CASING DEPTH		2/18/94 / 2/19/94
DRILL RIG CME-45	SURFACE CONDITIONS 30° incline near access roadway		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0											
1											
2											
3											
4	4 7 9 11 (100%)		**SILTY SAND(SM)** Medium dense, moderate orange pink with white foliations, moist to dry, mostly coarse and medium sand, some silt, little mica and fine sand. - SAPROLITE -								
5											
6											
7											
8											
9	4 4 7 10 (100%)		**SILTY SAND (SM)** Similar to above, except moderate yellowish brown with black inclusions, mostly fine sand, little to some mica, little coarse and medium sand, highly foliated. - SAPROLITE -								
10											
11											
12											
13											
14	4 5		**SILTY SAND (SM)** Similar to above, except dark yellowish brown with white, black and dark greenish yellow inclusions. - SAPROLITE -								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY I. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-12D

SHEET 2 OF 8

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	7 10 (100%)										
16											
17											
18											
19	5 7 7 11 (100%)		**SILTY SAND (SM)** (Upper 12") Similar to above, except dark yellowish orange with white inclusions and little mica. - SAPROLITE -								
20											
21			**SANDY SILT (ML)** (Lower 12") Very stiff, dark yellowish brown with white and black inclusions, mostly silt, some fine to medium sand, trace coarse sand and mica, highly foliated.								
22			- SAPROLITE -								
23											
24	3 5 7 10 (100%)		**UNDISTURBED SAMPLE-1 (22 to 24 Feet)** Pushed 24". Recovered 24". **SANDY SILT (ML)** Similar to above except stiff. - SAPROLITE -								
25											
26											
27											
28											
29	9 8 1 1 (100%)		**SANDY SILT (ML)** (Upper 3") Similar to above. (Middle 3") **SILTY SAND (SM)** Loose, very pale orange with dark yellowish brown inclusions, moist to dry, mostly fine sand, some coarse sand, some silt, little medium sand and mica. (Lower 18") **SILTY SAND (SM)** Similar to Upper 3" except loose. - SAPROLITE -								-200 =50
30											
31											
32											
33											
34	3 6		**SILTY SAND (SM)** Medium dense, dark yellowish brown with white and black inclusions, moist to dry, mostly fine sand, some medium sand, some silt. - SAPROLITE -								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-12D

SHEET 3 OF 8

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35	8 9 (100%)		**SILTY SAND (SM)** Medium dense, dark yellowish brown with white and black inclusions, moist to dry, mostly fine sand, some medium sand, some silt. **- SAPROLITE -**								
36											
37											
38											
39	11 23 41 48 (100%)		**SILTY SAND (SM)** Similar to above except very dense, very pale orange with light brown inclusions, some coarse sand, little medium sand and silt. **- SAPROLITE -**								
40											
41											
42											
43											
44	8 14 20 26 (100%)		**SILTY SAND (SM)** Similar to 34 to 36' sample except dense. **- SAPROLITE -**								
45											
46											
47											
48											
49	50/3" (100%)		**SILTY SAND (SM)** Similar to above, except very dense and some medium and coarse sand. **- PARTIALLY WEATHERED ROCK -**								
50											
51											
52											
53											
54	35 35/3"		**SILTY SAND (SM)** Similar to above except wet. **- PARTIALLY WEATHERED ROCK -**								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-12D

SHEET 4 OF 8

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
55											
56	(100%)										
57											
58											
59			ENCOUNTERED BEDROCK AT 59'. BEGAN CORING.								
60											
61											
62											
63											
64											
65											
66											
67											
68											
69											
70											
71											
72											
73											
74											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY I Yanoschak

CWM Soil Bor

ROCK BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 94 mm wireline coring		BORING NO. P-12D
			SHEET 5 OF 8
	SAMPLING METHOD: NQ2 Coring		DRILLING
			START / FINISH
	WATER LEVEL		TIME / TIME
	TIME		0930 / 1810
	DATE		DATE / DATE
DATUM ELEVATION	CASING DEPTH		2/19/94 / 2/19/94

DRILL RIG CME-75 | SURFACE CONDITIONS

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling RL

DATE 3/29/94 CHK'D BY T. Yanoschak

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
59		1	4	83	0.5 (50)	**BIOTITE GNEISS** Moderately hard, slightly weathered, moderately fractured, dark green, white and light brown, medium to coarse grained.		Close fractures, open, moderately dipping (35°), vertically parallel quartz veins.						
.25														
.5			>100											
.75						Soft, serverely weathered, extremely fractured, black, white, and light brown, medium to coarse grained.		Very close fractures, open, vertically parallel quartz veins.						
60														
.25			2											
.5						Hard, slightly weathered, sound (Upper 1.0 ft.), black, white, (Lower 0.2"), green, white, pink, medium to coarse grained.		Joints filled with chlorite and feldspar.						
.75														
61														
.25														
.5														
.75														
62														
.25								Filled joints, vertically close, steeply dipping (70°).						
.5														

ROCK BOREHOLE LOG

BORING NO. P-12D

SHEET 6 OF 8

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
62.75			4			**QUARTZ MICA SCHIST** Soft, severe weathering, extremely fractured, pink and light brown, medium to coarse grained.		Very close fractures, shear, striations on quartz crystals, horizontal orientation to irregular, mica filling voids between quartz crystals.						
63														
.25														
.5														
.75			13			**QUARTZ-CHLORITE SCHIST** Hard, slightly weathered, sound, white and green, medium to coarse grained.		Close shears, moderately dipping, mottled appearance, chlorite filled fractures.						
64														
.25														
.5						**GRANITE SCHIST** Hard, slightly weathered, sound, white, dark green and pink, medium to coarse grained.		Close, open shallow, joints, quartz (white) and feldspar (pink) veins vertically parallel, edges of cores pitted.						
.75														
65														
.25														
.5														
.75														
66														
.25														
.5														
.75														
67		1												
.25		2	1	90	80	**QUARTZ SCHIST** Hard, slight weathering, sound, white and green, medium to coarse grained, chlorite dispensed throughout, vertically parallel foliations.								
.5			3											

DRILLING CONTR Environmental Construction Services

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DATE 3/29/94 CHK'D BY T. Yanoschak

Rock Borehole

ROCK BOREHOLE LOG

BORING NO. P-12D

SHEET 7 OF 8

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
67.75						**QUARTZ SCHIST WITH CHLORITE INTRUSION** (Upper 6.45") Hard, slight weathering, sound, white and dark green, medium to coarse grained, roughly 50% quartz/50% chlorite, vertical portion 190° (Lower 0.69') Chlorite vein at 30° to 60°.								
68			4			**GRANITE SCHIST** Hard, slight weathering, sound, dark green, white and pink, medium to coarse grained, close, tight, smooth joints, filled with feldspar. Fractures located at 69.05' and at 69.5' depth.								
69			2			**CHLORITE SCHIST** Hard, slightly weathered, sound, dark green and white, pink, medium to coarse grained, close, tight joints, filled with feldspar at steep angle (85°).								
71			1			**GRANITE SCHIST** Hard, slightly weathered, sound, white and pink, medium to coarse grained, vertical feldspar vein.								
72			6			**CHLORITE SCHIST** Hard, slightly weathered, extremely fractured, dark green and pink, medium to coarse grained vein, close to close, open fractures at moderate angle (40°).								

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Rock Borehole

ROCK BOREHOLE LOG

BORING NO. P-12D

SHEET 8 OF 8

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
72.75			8			**CHLORITE SCHIST**								
73			2			**BIOTITE SCHIST** Medium, moderately severe weathering, extremely fractured, white and black, medium to coarse grained.		Very close, open fractures.						
.25														
.5						**CHLORITE SCHIST** Hard, slightly weathered, sound, dark green, white and pink, medium to coarse grained.		Close, tight and dipping joints (55°) filled with feldspar.						
.75														
74														
.25														
.5														
.75														
75														
.25														
.5														
.75						**TERMINATION OF BORING**									
76														
.25														
.5														
.75														
77														
.25														
.5														

DRILLING CONTR Environmental Construction Services

LOGGED BY M. Taylor RL

DATE 3/29/94 CHK'D BY T. Yanoschak

Rock Borehole

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 2.25" I.D. HSA		BORING NO. P-13
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D./2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 4
DATUM NGVD ELEVATION 754.30			DRILLING START / FINISH

					START	FINISH
WATER LEVEL	25.85'	13.96'			TIME	TIME
TIME	1120	0800			0840	1410
DATE	2/18/94	2/19/94			DATE	DATE
CASING DEPTH					2/18/94	2/18/94

DRILL RIG CME-45 SURFACE CONDITIONS Grassed area adjacent to MW-4.

ANGLE BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR Environmental Construction Services

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0	1		(Upper 7") **SANDY SILT (ML)** Soft, grayish brown, moist, mostly silt, some fine sand, little roots.								
1	2		(Lower 17") **SANDY SILT (ML)** Similar to above, except light brown and dark yellowish orange, little mica.								
2	2 (100%)		- FILL -								
3	1		(Upper 4") **SANDY SILT (ML)** Similar to above.								
4	2		(Lower 17") **SILTY SAND (SM)** Very loose, grayish brown with dark yellowish orange mottling, moist, mostly fine sand, little medium sand and silt, trace coarse sand.								
5	2 (88%)		- FILL -								
6											
7											
8	WOH		(Upper 6") **SILTY SAND (SM)** Similar to above, except wet and sand fining downward.				29.2	33	25		
9	WOH		**SILT (ML)** Soft, grayish green with dark yellowish brown mottling, moist, mostly silt, few fine sand.								
10	3		- FILL -								
11	4 (100%)										
12											
13	2		(Upper 7") **SILT (ML)** Similar to above.								
14	3		(Lower 17") **SILTY SAND (SM)** Loose, greenish gray with white mottling, wet, mostly medium sand, some silt, little fine sand and mica, few coarse sand.								
	3		- FILL -								
	2 (100%)										

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-13

SHEET 2 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15											
16											
17											
18	4 5 6 9 (100%)		**SILTY SAND (SM)** Medium dense, light brown to moderately brown, wet, mostly fine to medium sand, little silt, few coarse sand and mica. **- SAPROLITE -**								- 200 = 24
19											
20											
21											
22											
23	2 4 7 8 (50%)		**SILTY SAND (SM)** Similar to above. **- SAPROLITE -**								
24											
25											
26											
27											
28	7 9 12 15 (100%)		(Upper 12") **POORLY GRADED SAND (SP)** Medium dense, dark yellowish orange, wet, mostly medium sand, some coarse sand and little fine sand. (Mid 3") **SANDY SILT (ML)** Very stiff, moderate orange pink with white banding, wet, mostly silt, some fine to medium sand, little mica. **- SAPROLITE-** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
29											
30											
31											
32											
33	2 3 9 28 (54%)		(Lower 9") **SILT WITH SAND (ML)** Very stiff, white with dark yellowish orange banding, wet, mostly silt, little fine sand, trace coarse sand. **- SAPROLITE -** **- SEVERELY WEATHERED MUSCOVITE SCHIST -** **SILT WITH SAND (ML)** Similar to above, except stiff. **- SAPROLITE -** **- SEVERELY WEATHERED MUSCOVITE SCHIST -**								
34											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-13

SHEET 3 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35											
36											
37											
38	5 4 23 40 (42%)		**SILT WITH SAND (ML)** Similar to above, except very stiff. **- SAPROLITE -** **- SEVERELY WEATHERED MUSCOVITE SCHIST -**								
39											
40											
41											
42											
43	2 29 33 50/4" (46%)		**SILT WITH SAND (ML)** Similar to above, except hard. **- SAPROLITE -** **- SEVERELY WEATHERED MUSCOVITE SCHIST -**								
44											
45											
46											
47											
48	11 16 28 50/5" (21%)		**SILTY SAND (SM)** Dense, light brown with moderate orange pink partings, wet, mostly fine sand, little medium sand, silt and mica. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
49											
50											
51											
52											
53	50/4" (100%)		**SILTY SAND (SM)** Very dense, white with moderate yellowish brown banding, wet, mostly fine sand, some medium sand, little silt and mica. **- PARTIALLY WEATHERED ROCK -** **- SEVERELY WEATHERED MICA SCHIST -**								
54											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

BORING NO. P-13

SHEET 4 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
55											
56											
57											
58			**SILTY SAND (SM)**								
			Similar to above.								
59	50/3"		**- PARTIALLY WEATHERED ROCK -**								
			Formation becoming to hard to collect spoon drillers to augered to bedrock.								
60	(67%)										
61											
62			**ENCOUNTERED BEDROCK AT 62.0'**								
			TERMINATION OF BORING								
63											
64											
65											
66											
67											
68											
69											
70											
71											
72											
73											
74											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA		BORING NO. P-14D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D./2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 9
			DRILLING START / FINISH
	WATER LEVEL 38.4'		TIME 1130 / TIME 1440
	TIME 1450		DATE 2/17/94 / DATE 2/17/94
	DATE 2/17/94		
DATUM NGVD ELEVATION 806 (805.80)	CASING DEPTH		
DRILL RIG CME-45	SURFACE CONDITIONS Grassed area west of maintenance shed.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Environmental Construction Services

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DATE 3/29/94 CHK'D BY T. Yanoschak

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0			Post Holed to 2 feet.								
1											
2	3 5 6 8 (100%)		**SILTY SAND (SM)** Medium dense, dark yellowish orange, moist, mostly fine sand, little silt and medium sand little mica, trace roots. (Lower 10") Becoming dark greenish gray.								
3											
4	3 4 6 8 (100%)		- FILL - (Upper 10") Similar to above except loose. (Lower 14") **SILT (ML)** Stiff, dark yellowish brown, moist, mostly silt, little mica, few fine sand and roots. - RESIDUAL SOIL -								
5											
6											
7	9 8 9 10 (100%)		**SILT (ML)** Similar to above, except very stiff and light brown. - RESIDUAL SOIL -								
8											
9	3 4 5 6 (100%)		**SILT (ML)** Similar to above except stiff. - RESIDUAL SOIL -								
10											
11											
12											
13			**SILTY SAND (SM)** Loose, moderate yellowish brown and white, moist to dry, mostly fine to medium sand, little silt, few coarse sand and mica, trace fine gravel. - SAPROLITE - - SEVERELY WEATHERED QUARTZ SCHIST -								
14	2 3										

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-14D

SHEET 2 OF 9

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	2 2 (100%)										
16											
17											
18	3 6 8 10 (75%)		**SILTY SAND (SM)** Similar to above, except medium dense and with dark yellowish brown and dusky brown inclusions and little coarse quartz fragments. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								-200 =19
19											
20											
21											
22											
23											
24	9 10 10 8 (92%)		**SILTY SAND (SM)** Similar to above. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
25											
26											
27											
28	11 12 15 17 (100%)		**SILTY SAND (SM)** Similar to above. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
29											
30											
31											
32											
33			**SILTY SAND (SM)** Loose, white with dark yellowish orange and black inclusions, wet, mostly fine sand, some silt. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
34	2 3										

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-14D

SHEET 3 OF 9

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
35	4 5 (100%)										
36											
37											
38	11 10 9 10 (67%)		**SILTY SAND (SM)** Similar to above except medium dense. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
39											
40											
41											
42											
43											
44	11 17 15 15 (75%)		**SILTY SAND (SM)** Similar to above, except dense, and white fine sand, dusky yellowish brown and black banding at 30° angle. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -** Quartz crystals in lower 2" of spoon.								
45											
46											
47											
48	10 14 19 50		**SILTY SAND (SM)** Similar to above. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
49											
50											
51											
52											
53											
54	50/3"		**SILTY SAND (SM)** Similar to above, except very dense and coarse quartz fragments in shoe of spoon.								

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

BORING NO. P-14D

SHEET 4 OF 9

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
55			- PARTIALLY WEATHERED ROCK -								
56	(0%)										
57											
58											
59											
60			ENCOUNTERED BEDROCK AT 60' BEGAN CORING								
61											
62											
63											
64											
65											
66											
67											
68											
69											
70											
71											
72											
73											
74											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

DRILLING METHOD: 94 mm wireline coring

SAMPLING METHOD: NQ2 Coring

BORING NO. P-14D

SHEET 5 OF 9

WATER LEVEL					DRILLING START	DRILLING FINISH
TIME					0815	1800
DATE					2/21/94	2/21/94
CASING DEPTH						

DATUM ELEVATION

DRILL RIG CME-75

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS

DRILLING CONTR Environmental Construction Services

LOGGED BY M. Taylor RL

DATE 3/29/94 CHK'D BY I. Yanoschak

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
60														
.25						TOP OF BEDROCK								
.50		1	2	86	75	**GRANITE GNEISS** Hard, fresh, continuous, green, white, and pink, medium to coarse grained, chlorite, quartz, placioclase feldspar, minor biotite, epidote-amphiblolite facies.								
.75														
61														
.25														
.50			1			Hard, fresh, continuous, white and black, medium to coarse grained, quartz biotite, feldspar, some chlorite.								
.75														
62														
.25						**BIOTITE SCHIST** Medium, moderately weathered, moderately fractured, black, white, and brown, medium grained, quartz, plagioclase, some limonitic staining.		Horizontal joints; 30° dip foliation.						
.50														
.75			2			**QUARTZ SCHIST** Soft, moderately severe weathering, moderately fractured, brown and white, medium grained, quartz, plagioclase, pervasive limonitic staining.								
63														
.25			2			**GRANITE GNEISS** Hard, fresh, continuous, green, black, and white, medium to coarse grained, quartz, plagioclase, chlorite, biotite, epidote, potassium feldspar.		Two 70° joints						
.50			2											
.75														

ROCK BOREHOLE LOG

BORING NO. P-14D

SHEET 6 OF 9

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
64								Filled fractures at 63.8'. Highly weathered potassium feldspar filled fractures at 65.2', concentration of potassium feldspar in vicinity of fractures.						
.25														
.50														
.75														
65						**BIOTITE SCHIST** Soft, moderately severe weathering, extremely fractured, green and white, medium quartz and plagioclase.								
.25			5											
.50			5			**CHLORITE SCHIST** Hard, fresh, continuous, green and white, medium to coarse grained, green schist gneiss, chlorite, quartz, plagioclase epidote, minor biotite and potassium feldspar.								
.75														
66														
.25								30° joint						
.50														
.75														
67														
.25														
.50														
.75														
68														
.25								30° joint						
.50						**BIOTITE SCHIST** Soft, moderately severe weathering, extremely fractured, green and white, medium grained, quartz and plagioclase.								
.75			>10											

DRILLING CONTR Environmental Construction Services

LOGGED BY M. Taylor RL

DATE 3/29/94 CHK'D BY T. Yanoschak

Rock Borehole

ROCK BOREHOLE LOG

BORING NO. P-14D

SHEET 7 OF 9

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
69.25						**BIOTITE SCHIST**								
.5		2	8	96	88	**CHLORITE SCHIST** Hard, fresh, continuous, green and white, medium to coarse grained, quartz, plagioclase biotite, epidote, minor potassium feldspar.		Horizonal foliation; fracture to 74.65' filled with potassium feldspar, <1 mm thick. Fracture at 74.93' displays schistose appearance.						
.75														
71.25						Fracture at 75.45, 6 mm quartz vein at 75.95.		Fracture at 75.45', 6 mm quartz vein at 75.95'.						
.5														
.75														
72.25														
.5														
.75														
73.25														
.5														
.75														

DRILLING CONTR Environmental Construction Services

LOGGED BY M. Taylor RL

DATE 3/29/94 CHK'D BY T. Yanoschak

ROCK BOREHOLE LOG

BORING NO. P-14D

SHEET 8 OF 9

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
74						CHLORITE SCHIST								
.25														
.5														
.75														
74														
.25														
.5														
.75														
75														
.25														
.5														
.75														
76														
.25														
.5														
.75						GARNET CHLORITE SCHIST Hard, fresh, continuous, white, green, and pink, coarse, some almandine garnet, quartz, albite twinning and almondine, contact alteration.									
77														
.25						BIOTITE SCHIST Soft to medium, severe to moderately weathered, moderately fractured, white, pink, and brown, medium to coarse grained, weathered biotite chlorite, quartz, plagioclase and abundant iron staining, ground feldspar 4 mm thick along fault fracture at 77.7'.		60° joint weathered filling.						
.5		1												
.75		5												

DRILLING CONTR Environmental Construction Services

LOGGED BY M. Taylor RL

DATE 3/29/94 CHK'D BY T. Yanoschak

ROCK BOREHOLE LOG

BORING NO. P-14D

SHEET 9 OF 9

DEPTH IN FT (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
78						**BIOTITE SCHIST**		45° joint						
.25														
.5														
.75			2			**CHLORITE SCHIST** Hard, fresh, continuous, white, orange, and black, medium to coarse grained, quartz, chlorite, feldspar, biotite.								
79														
.25														
.5														
.75														
80														
.25								30° joint						
.5						**TERMINATION OF BORING**									
.75														
81														
.25														
.5														
.75														
82														
.25														
.5														
.75														

DRILLING CONTR Environmental Construction Services

LOGGED BY M. Taylor RL

DATE 3/29/94 CHK'D BY T. Yanoschak

Rock Borehole

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 4.25" I.D. HSA		BORING NO. P-15D
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D./2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 5
DATUM NGVD ELEVATION 766.20	WATER LEVEL 13.31 / TIME 1340 / DATE 2/16/94 / CASING DEPTH		DRILLING START TIME 0940 DATE 2/16/94 / FINISH TIME 1300 DATE 2/16/94
DRILL RIG CME-45	SURFACE CONDITIONS Grassed surface bordering wooded area east of Freeman Road.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0	1 2 3 3 (100%)		**SILT (ML)** Medium stiff, dark yellowish brown, moist, mostly silt, some roots. (Lower 14") Similar to above, except becoming dark yellowish orange and few medium sand. **- RESIDUAL SOIL -**								
2	6 8 14 19 (100%)		**SILT (ML)** Similar to above, except very stiff, light gray with dark yellowish orange mottling, little roots. (Lower 2") Micaceous schist **- RESIDUAL SOIL -**				26.2	48	29		
4	14 17 18 18 (100%)		**SILT (ML)** (Upper 5") Similar to above. (Lower 19") **SILTY SAND (SM)** Dense, dark yellowish orange with light gray mottling, moist, mostly medium and some fine sand, little silt and few coarse sand. **- RESIDUAL SOIL -**								
6	5 9 8 9 (29%)		**UNDISTURBED SAMPLE-1** (5 to 7 Feet) Pushed 24", Recovered 24" T = 0.38 TSF, PP = 2.5 TSF **SILT (ML)** Similar to 2 to 4' Sample above. **- RESIDUAL SOIL -**								
9	3 6 6 7 (100%)		**SILTY SAND (SM)** Medium dense, dark yellowish orange, moist, mostly fine to medium sand, little silt, few coarse sand and fine gravel. **- SAPROLITE - - SEVERELY WEATHERED QUARTZ SCHIST -**								-200 = 24
11	6 8 10 12 (100%)		**SILTY SAND (SM)** Similar to above, except with little to some horizontal quartz banding. **- SAPROLITE - - SEVERELY WEATHERED QUARTZ SCHIST -**								
13	6 8 8 8 (100%)		**SILTY SAND (SM)** Similar to above, except becoming more mafic with black saprolitic vertical banding, little golden mica. **- SAPROLITE - - SEVERELY WEATHERED QUARTZ SCHIST -**								

SOIL BORING LOG

BORING NO. P-15D

SHEET 2 OF 5

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	2 4 8 10 (100%)		**UNDISTURBED SAMPLE-2** (14 to 16 Feet) Pushed 24", Recovered 19" T = 0.44 TSF, PP = 4.5 TSF				16.1				
16			**SILTY SAND (SM)** Similar to above. **- SAPROLITE -** **- SEVERELY WEATHERED QUARTZ SCHIST -**								
17	11 31 25 23 (100%)		**SILTY SAND (SM)** (Upper 8") Similar to above. (Mid 11") Transitional material - black banding becoming horizontal.								
18			**SILT (ML)** (Lower 5") Hard, dark yellowish orange, black and white, moist to wet, mostly silt, little medium sand, few fine sand.								
19			**- SAPROLITE -**								
20											
21											
22											
23											
24	11 17 33 24 (54%)		**SILT (ML)** Similar to above, except wet and with quartz vein 2-1/2" thick.								
25			**- SAPROLITE -**								
26											
27											
28											
29	1 12 50/4" (50%)		**SILT (ML)** Similar to above.								
30			**- P.W.R. -**								
31											
32			**ENCOUNTERED BEDROCK AT 32.0'** **BEGAN CORING**								
33											
34											

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

CWM Soil Bor

ROCK BOREHOLE LOG

SITE NAME AND LOCATION	DRILLING METHOD: 94 mm wireline coring	BORING NO. P-15D	
		SHEET 3 OF 5	
	SAMPLING METHOD: NQ2 Coring	DRILLING START / FINISH	
	WATER LEVEL / TIME / DATE / CASING DEPTH	TIME 0800 / DATE 3/11/94	TIME 1840 / DATE 3/11/94
DATUM ELEVATION			
DRILL RIG CME-75	SURFACE CONDITIONS		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling RL

DATE 3/29/94 CHK'D BY T. Yanoschak

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
31														
.5														
32						Top of Bedrock								
		1	13	92	90	**CHLORITE SCHIST** Hard, very slightly weathered, slightly fractured, green and white, medium to coarse grained.		Moderately close, tight, moderately dipping to shallow filled joints.						
.5														
33														
.5														
34														
.5														
35														
.5						White foliations becoming pink, feldspar - 1/16" to 1/8" thick.		20° foliations						
36														
.5						Few to little mica crystals evident.								
37														
.5		2	2	60	34	**CHLORITE SCHIST** Hard, very slightly weathered, slightly fractured, green and white, medium to coarse grained.		Moderately close, tight, moderately dipping to shallow filled joints.						
38														
			9			Same rock more weathered.								

ROCK BOREHOLE LOG

BORING NO. P-15D

SHEET 4 OF 5

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
39 .5 40 .5 41 .5 42						Very soft becoming soft, severely weathered, moderately fractured, brown and white medium to coarse grained. Becoming moderately hard with depth.		Very close to close, open, steep joints. Core loss in this zone.						
.5 43 .5 44 .5 45 .5 46 .5 47 .5 48 .5		3	3	99	99	**CHLORITE SCHIST** Hard, very slightly weathered, slightly fractured, green and white, medium to coarse grained.		Moderately close, tight, moderately dipping to shallow filled joints.						

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling RL

DATE 3/29/94 CHK'D BY T. Yanoschak

Rock Borehole

ROCK BOREHOLE LOG

BORING NO. P-15D

SHEET 5 OF 5

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
49		4	4	100	100	**CHLORITE SCHIST** Hard, slightly weathered, sound, green and white, medium to coarse grained.		Moderately close, tight and heeled, shallow to moderately dipping joints.						
.5														
50														
.5														
51														
.5														
52														
.5						Quartz vein moderately dipping with cavities and crystal growth, quartz tetrahedrals evident.		Horizontal Banding						
53						**TERMINATION OF BORING**								
.5														
54														
.5														
55														
.5														
56														
.5														
57														
.5														
58														
.5														

DRILLING CONTR Environmental Construction Services

LOGGED BY R. Paulling RL

DATE 3/29/94 CHK'D BY T. Yanoschak

Rock Borehole

SOIL BORING LOG

SITE NAME AND LOCATION	DRILLING METHOD: 2.25" I.D. HSA		BORING NO. P-16
PIEDMONT LANDFILL AND RECYCLING CENTER KERNERSVILLE, NC	SAMPLING METHOD: 1.5" I.D./2.0" O.D. by 2.0' Split Spoon with Plastic Retainer		SHEET 1 OF 4
			DRILLING START / FINISH
	WATER LEVEL		TIME 1545 / TIME 1705
	TIME		
	DATE		DATE 2/16/94 / DATE 2/16/94
DATUM NGVD ELEVATION 811.20	CASING DEPTH		
DRILL RIG CME-45	SURFACE CONDITIONS Grassed surface on ridge south of Freeman Road.		
ANGLE Vertical BEARING			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR Graham and Currie

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
0	2		**SILT (ML)**								
	2		(Upper 6") Soft dark yellowish brown, moist, mostly silt, some roots. **- RESIDUAL SOIL -**								
1	5		(Lower 16") **SILTY SAND (SM)**								
	6		Loose, dark yellowish orange, moist, mostly fine to medium sand, little silt, few mica and coarse sand, few roots.								
2	(92%)		**- RESIDUAL SOIL -**								
	6		**SILTY SAND (SM)**								
	15		Similar to above, except dense, few coarse sand and mica flakes, black and gold.								
3	22		**- RESIDUAL SOIL -**								
	28										
4	(100%)		**SILTY SAND (SM)**								
	14		Similar to above.								
	14		**- RESIDUAL SOIL -**								
5	24										-200 = 24
	23										
6	(100%)		**SILTY SAND (SM)**								
	14		Similar to above, except with shattered quartz in end of spoon.								
	23		**- RESIDUAL SOIL -**								
7	14										
	14										
8	(100%)										
	13		(Upper 5") Similar to above.								
	14		(Lower 19") **SILTY SAND (SM)**								
	17		Dense, dark yellowish orange, and grayish orange with black partings, moist, mostly fine sand, some silt, little mica, few medium sand.								
9	19		**- SAPROLITE -**								
10	(100%)		**SILTY SAND (SM)**								
	20		(Upper 17") Similar to above.								
	18		(Lower 7") Similar to above, except medium dense, pale yellowish orange, medium yellowish brown and dark yellowish orange, moist to wet, mostly medium sand, some silt and fine sand, little coarse sand.								
	18		**- SAPROLITE -**								
11	14										
12	(100%)										
13											
14			**SILTY SAND (SM)**								
	16		Very dense, white with dusky yellowish brown micaceous partings, moist, mostly fine sand, some medium sand, little silt and mica.								
	33		**- SAPROLITE -**								

CWM Soil Bor

SOIL BORING LOG

BORING NO. P-16

SHEET 2 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	54 50 (100%)		**SILTY SAND (SM)** Very dense, white with dusky yellowish brown micaceous partings, moist, mostly fine sand, some medium sand, little silt and mica. **- SAPROLITE -**								
16											
17			**ENCOUNTERED BEDROCK AT 17'** **MOVED APPROXIMATELY 80 FEET EAST-NORTHEAST OF BORING LOCATION TO BEGIN CORING** ?								
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											

DRILLING CONTR Graham and Currie

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

SOIL BORING LOG

JUN 1994
Received
Solid Waste
Section

BORING NO. P-16
SHEET 2 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
15	54 50 (100%)		**SILTY SAND (SM)** Very dense, white with dusky yellowish brown micaceous partings, moist, mostly fine sand, some medium sand, little silt and mica. **- SAPROLITE -**								
16											
17			**ENCOUNTERED BEDROCK AT 17'**								
18			**MOVED APPROXIMATELY 80 FEET EAST-NORTHEAST OF BORING LOCATION AND AUGERED THROUGH SIMILAR SOILS TO BEDROCK (35 FEET) AND BEGAN CORING**								
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											

DRILLING CONTR Graham and Currie

LOGGED BY R. Paulling SL

DATE 3/29/94 CHK'D BY T. Yanoschak

ROCK BOREHOLE LOG

SITE NAME AND LOCATION

DRILLING METHOD: 94 mm wireline coring

BORING NO. P-16

SHEET 3 OF 4

SAMPLING METHOD: NQ2 coring

	DRILLING START	DRILLING FINISH
WATER LEVEL		
TIME	TIME 0840	TIME
DATE	DATE 3/12/94	DATE
CASING DEPTH		

DATUM ELEVATION

DRILL RIG CME-75

SURFACE CONDITIONS

ANGLE Vertical BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR Graham and Currie

LOGGED BY R. Paulling RL

DATE 3/29/94 CHK'D BY T. Yanoschak

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
35		1	>50	83	80	**GRANITE SCHIST** Soft to medium, moderately severe weathering, extremely fractured, white, pink and brown, medium to coarse grained.		Augered down to 35.0 feet where bedrock was encountered. Set casing and began to core. Close, open, shallow joints, feldspars dull pink. At 36.58 ft. depth, becoming hard and sound with moderate weathering.						
.5														
36														
.5														
37														
.5														
38														
.5														
39														
.5		2	2	98	90									
40														
.5														
41			7			**CHLORITE SCHIST** Hard, slightly weathered, moderately fractured, green, white and pink, medium to coarse grained.		Moderately close, steep, tight joints filled with feldspar.						
42														
.5														

ROCK BOREHOLE LOG

BORING NO. P-16

SHEET 4 OF 4

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	CORES: RUN NO.	CORES: NO. AND SIZE OF CORE PIECES	CORES: % RECOVERY	CORES: RQD	SOIL DESCRIPTION OR ROCK LITHOLOGY	SYMBOL	ROCK STRUCTURE	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: DEPTH IN FEET FROM	TEST RESULTS: DEPTH IN FEET TO	TEST RESULTS: PERMEABILITY CM./SEC.
43						CHLORITE SCHIST								
.5								Weathered zone						
44														
.5						TERMINATION OF BORING								
45														

DRILLING CONTR Graham and Currie

LOGGED BY M. Taylor RL

DATE 3/29/94 CHK'D BY T. Yanoschak

Rock Borehole

APPENDIX B

PIEZOMETER CONSTRUCTION DETAILS

Well No.: P-1-D

Boring No. X-Ref: P-1-D

PIEZOMETER CONSTRUCTION SUMMARY

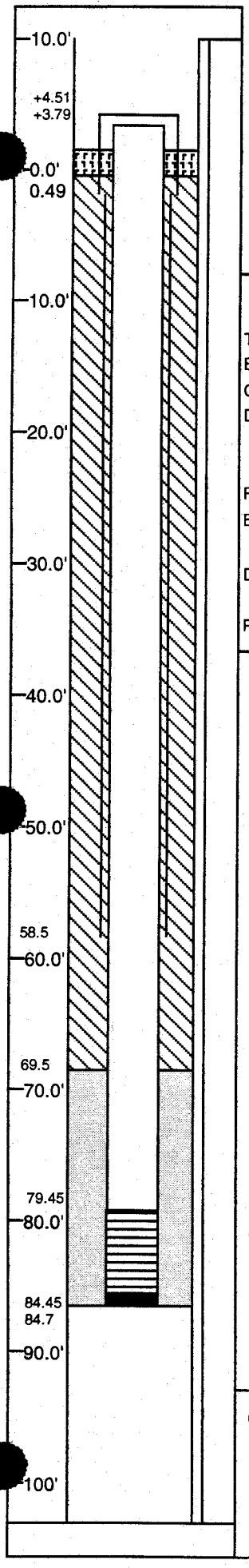
Survey Coords: N 892358, E 1692725

Elevation Ground Level: 775.8

Top of Casing: 779.59

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.



Drilling Summary:

Total Depth: 84.7'

Borehole Diameter: HSA-9" / NQ2 - 3"

Casing Stick-up Height: +3.79

Driller: Environmental Const. Services
Charlotte, N.C.

Rig: CME 75

Bit(s): 8.75" Finger Bit - HSA
3.0" Diamond Bit - NQ2

Drilling Fluid: HSA - None, NQ2 - Water

Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+4.51 - 0.49	C1	780.31 - 775.31
0.49 - 58.50	C2	775.31 - 717.30
+3.79 - 79.45	C3	779.59 - 696.35
79.45 - 84.45	S1	696.35 - 691.35
84.45 - 84.70	P1	691.35 - 691.10

Casing: C1 4" X 4" X 5' steel casing
C2 4" dia. Wheelabrator Eng. Sys. Sch 40 PVC
C3 2" diameter Wheelabrator

Screen: S1 Engineered Systems Sch 40 PVC.
S2 2" dia. Wheelabrator Engineered Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 69.5' to 84.7' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 69.5' Baroid Bentonite Chips.

Construction Time Log: 2)

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/20/94	11:00	2/20/94	17:00
NQ2	2/21/94	09:20	2/21/94	18:00
Geophys. Logging:				
Casing:				
C1	3/5/94	18:35	3/5/94	18:50
C2	2/20/94	17:00	2/20/94	17:50
C3	2/21/94	18:20	2/21/94	18:25
Filter Placement:	2/21/94	18:25	2/21/94	18:30
Bentonite Seal:	2/21/94	18:30	2/21/94	18:50
Cementing:	n/a	n/a	n/a	n/a
Development:	3/5/94	17:50	3/5/94	18:35

Well Development:

3/5/94: 1750 - 1835
Surge pumping. Total volume removed ~ 27 gallons.

Stabilization Test Data: xxxxxxxxxxxxxxxxx

Time	pH	Spec. Cond.	Temp (C)
17:55	5.32	157	13.33
18:10	5.38	156	12.22
18:25	5.36	130	11.11
18:35	5.37	128	11.67

Recovery Data:

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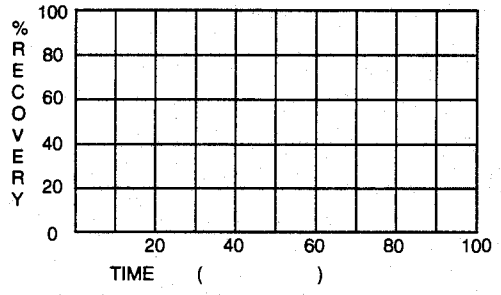


SUPERVISED BY: Jason Terry

DATE: February 21, 1994

Comments:

Well No.: P-1-S

Boring No. X-Ref: P-1-D

PIEZOMETER CONSTRUCTION SUMMARY

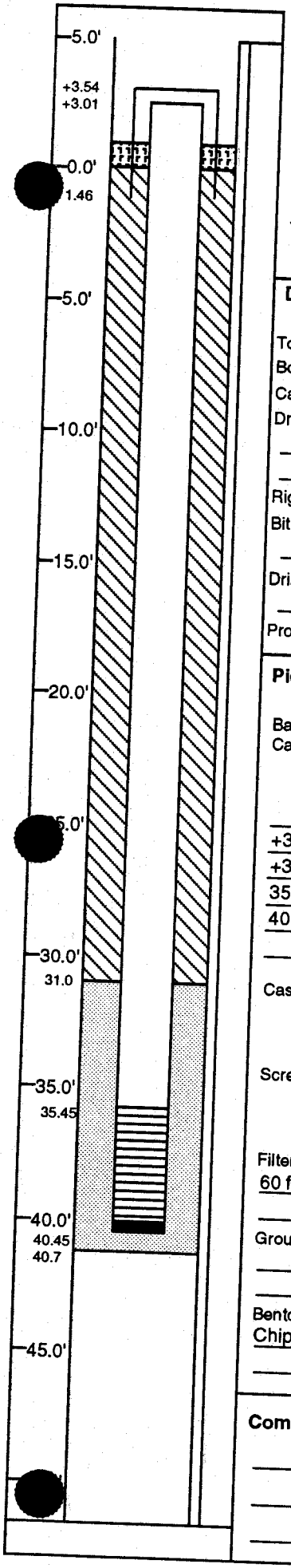
Survey Coords: N 892374, E1692703

Elevation Ground Level: 777.2

Top of Casing: 780.21

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.



Drilling Summary:

Total Depth: 40.7'

Borehole Diameter: 6" nominal

Casing Stick-up Height: +3.01'

Driller: Environmental Const. Services
Charlotte, N.C.

Rig: CME 45

Bit(s): 5.75" Finger Bit

Drilling Fluid: None.

Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/21/94	09:00	2/21/94	11:00
Geophys. Logging:				
Casing:				
C1	2/21/94	11:30	2/21/94	11:45
C2	2/21/94	11:10	2/21/94	11:15
Filter Placement:	2/21/94	11:15	2/21/94	11:20
Bentonite Seal:	2/21/94	11:20	2/21/94	11:30
Cementing:	N/A	N/A	N/A	N/A
Development:	3/6/94	10:10	3/6/94	10:45

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ___

Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.54 - 1.46	C1	780.74 - 775.74
+3.01 - 35.45	C2	780.21 - 741.75
35.45 - 40.45	S1	741.75 - 736.75
40.45 - 40.70	P1	736.75 - 736.50
-		-

Casing: C1 4" X 4" X 5' steel casing

C2 2" diameter Wheelabrator Engineered Systems Sch 40 PVC.

Screen: S1 2" dia. Wheelabrator Engineered Sys. Sch 40 PVC w/ 0.010" slots

S2

Filter Pack: 31.0' to 40.7' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 31.0' Baroid Bentonite Chips.

Well Development:

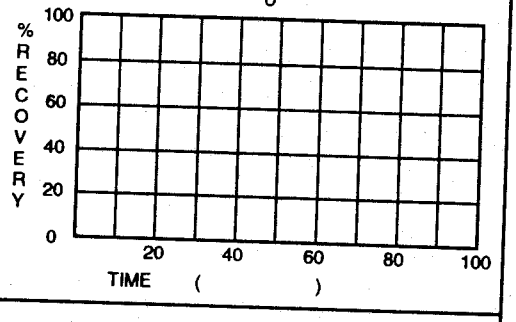
3/6/94: 10:10-10:45
Surge pumping. Total volume removed ~ 17 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
10:14	8.92	138	13.33
10:23	5.27	116	12.78
10:38	5.51	100	12.78
10:45	5.53	88	11.11

Recovery Data:

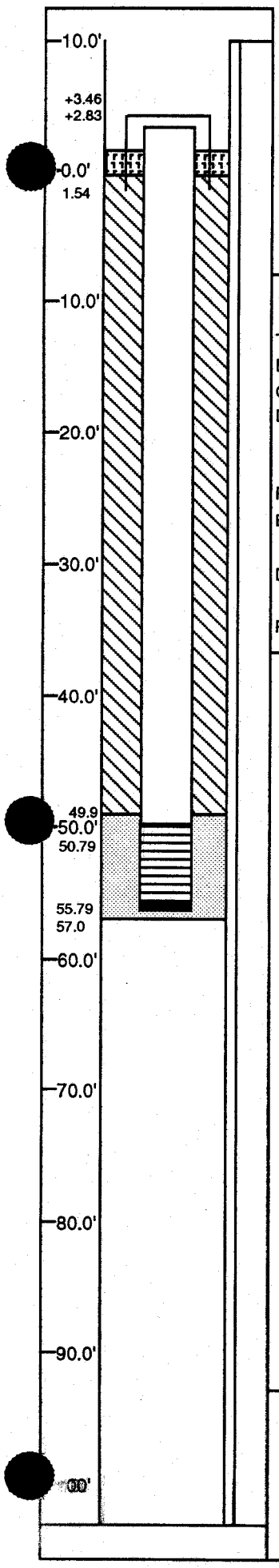
Q= S_o =



SUPERVISED BY: Jason Terry

DATE: February 21, 1994

Comments:



Well No.: P-2-D

Boring No. X-Ref: P-2-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 892353, E 1693426

Elevation Ground Level: 769.2

Top of Casing: 772.03

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

Drilling Summary:

Total Depth: 57.0'
Borehole Diameter: 6" Nominal
Casing Stick-up Height: +2.83
Driller: Environmental Const. Services
Charlotte, N.C.
Rig: CME 45
Bit(s): 5.75" Finger Bit - HSA
Drilling Fluid: None.
Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	3/4/94	10:30	3/4/94	18:20
Geophys. Logging:				
Casing:				
C1	3/4/94	19:50	3/4/94	20:00
C2	3/4/94	18:40	3/4/94	19:20
Filter Placement:	3/4/94	19:20	3/4/94	19:35
Bentonite Seal:	3/4/94	19:35	3/4/94	19:50
Cementing:	n/a	n/a	n/a	n/a
Development:	3/5/94	16:45	3/5/94	17:10

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.46 - 1.54	C1	772.66 - 767.46
+2.83 - 50.79	C2	772.03 - 718.41
50.79 - 55.79	S1	718.41 - 713.41
55.79 - 56.04	P1	713.41 - 713.16
____ - ____		____ - ____

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator
Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 49.9' to 57.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 49.9' Baroid Bentonite Chips.

Well Development:

3/5/94: 1645 - 1710
Surge pumping. Total volume removed ~ 20 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
16:50	5.69	123	15.00
17:00	5.71	122	13.89
17:08	5.70	117	12.78

Recovery Data:

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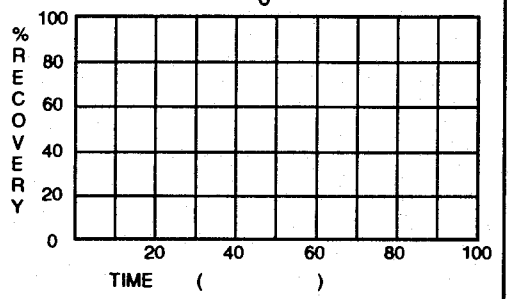
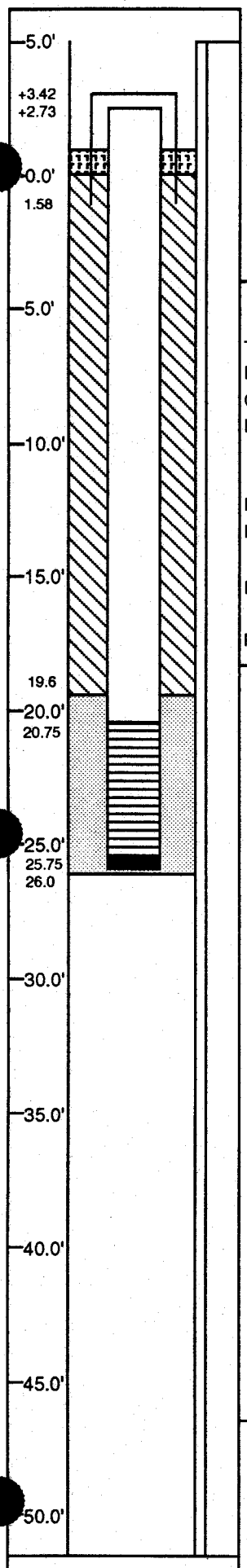


SUPERVISED BY: Ron Paulling

DATE: March 4, 1994

Comments:



Well No.: P-2-S

Boring No. X-Ref: P-2-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 892356, E1693415

Elevation Ground Level: 768.8

Top of Casing: 771.53

SITE NAME: Piedmont Landfill & Recycling Center

LOCATION: Kernersville, N.C.

Drilling Summary:

Total Depth: 26.0'
Borehole Diameter: 6" nominal
Casing Stick-up Height: +2.73'
Driller: Environmental Const. Services
Charlotte, N.C.
Rig: CME 45
Bit(s): 5.75" Finger Bit
Drilling Fluid: None.
Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	3/4/94	10:30	3/4/94	11:30
Geophys. Logging:				
Casing:				
C1	3/4/94	12:40	3/4/94	12:55
C2	3/4/94	12:10	3/4/94	12:20
Filter Placement:	3/4/94	12:20	3/4/94	12:30
Bentonite Seal:	3/4/94	12:30	3/4/94	12:40
Cementing:	n/a	n/a	n/a	n/a
Development:	3/5/94	17:15	3/5/94	17:40

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.42 - 1.58	C1	772.22 - 767.22
+2.73 - 20.75	C2	771.53 - 748.05
20.75 - 25.75	S1	748.05 - 743.05
25.75 - 26.00	P1	743.05 - 742.80
-		-

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator Engineered Systems Sch 40 PVC.

Screen: S1 2" dia. Wheelabrator Engineered Sys. Sch 40 PVC w/ 0.010" slots
S2

Filter Pack: 19.6' to 26.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 19.6' Baroid Bentonite Chips.

Well Development:

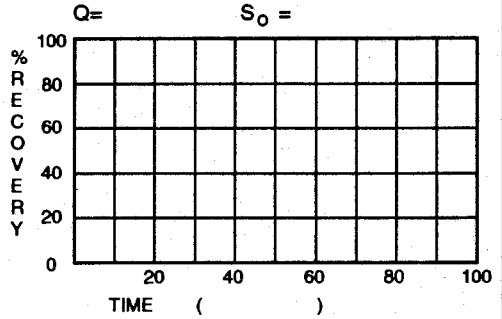
3/5/94: 1715 - 1740
Surge pumping. Total volume removed ~ 15 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
17:15	5.85	123	13.33
17:20	5.70	128	13.33
17:30	5.59	111	12.78
17:40	5.63	118	13.33

Recovery Data:

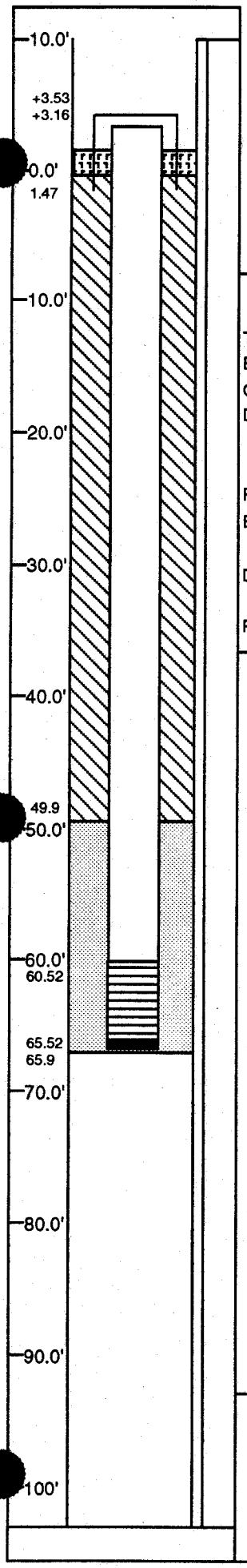
Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: March 4, 1994

Comments:



Well No.: P-3

Boring No. X-Ref: P-3

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 892067, E 1693073

Elevation Ground Level: 807.9

Top of Casing: 811.06

SITE NAME: Piedmont Landfill & Recycling Center

LOCATION: Kernersville, N.C.

Drilling Summary:

Total Depth: 65.9'
Borehole Diameter: 9" Nominal
Casing Stick-up Height: +3.16
Driller: Environmental Const. Services
Charlotte, N.C.
Rig: CME 75
Bit(s): 8.75" Finger Bit - HSA
Drilling Fluid: None.
Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.53 - 1.47	C1	811.43 - 806.43
+3.16 - 60.52	C2	811.06 - 747.38
60.52 - 65.52	S1	747.38 - 742.38
65.52 - 65.85	P1	742.38 - 742.05
____ - ____		____ - ____

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator

Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 49.9' to 65.9' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 49.9' Baroid Bentonite Chips.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	3/4/94	15:30	3/5/94	09:15
Geophys. Logging:				
Casing:				
C1	3/5/94	10:50	3/5/94	11:05
C2	3/5/94	09:50	3/5/94	09:55
Filter Placement:	3/5/94	10:00	3/5/94	10:10
Bentonite Seal:	3/4/94	10:10	3/5/94	10:40
Cementing:	n/a	n/a	n/a	n/a
Development:	3/6/94	11:40	3/6/94	12:15

Well Development:

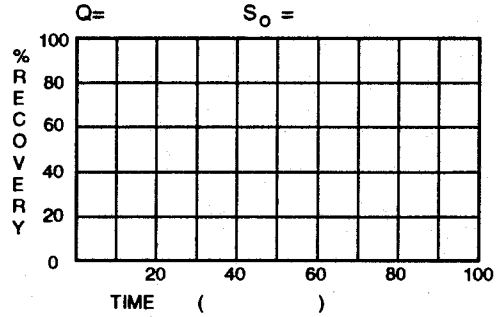
3/6/94: 1140 - 1215
Surge pumping. Total volume removed ~ 22 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
11:45	5.90	115	18.33
11:54	5.96	88	17.78
12:06	6.09	96	15.56
12:15	6.16	72	16.67

Recovery Data:

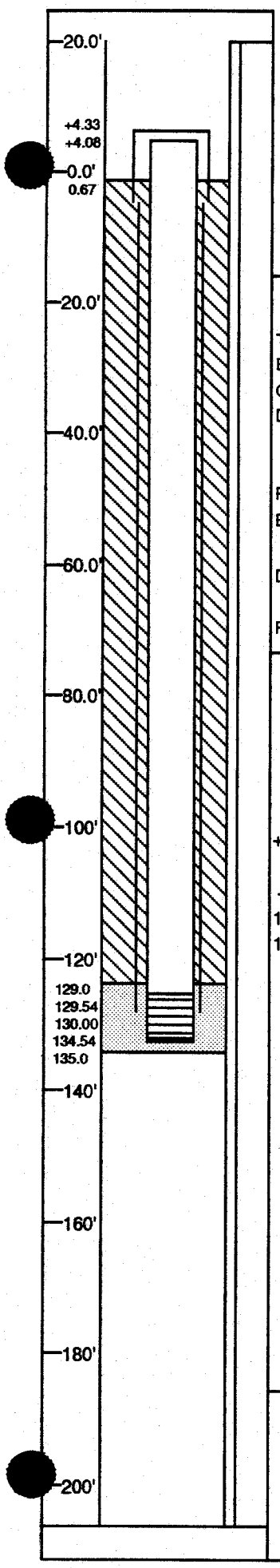
Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: March 5, 1994

Comments:



Well No.: P-4-D

Boring No. X-Ref: P-4-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891996, E 1693350

Elevation Ground Level: 836.4

Top of Casing: 840.48

SITE NAME: Piedmont Landfill & Recycling Center

LOCATION: Kernersville, N. C.

Drilling Summary:

Total Depth: 135.0'

Borehole Diameter: 9" Nominal 3" NQ

Casing Stick-up Height: +4.08

Driller: Environmental Const. Services
Charlotte, N.C.

Rig: CME 75

Bit(s): 8.75" Finger Bit - HSA

Drilling Fluid: None

Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/24/94	0950	2/28/94	1500
Geophys. Logging:				
Casing:				
C1	3/6/94	1540	3/6/94	1555
C2	3/1/94	1020	3/1/94	1730
C3	3/4/94	1505	3/4/94	1525
Filter Placement:	3/4/94	15:25	3/4/94	15:40
Bentonite Seal:	3/4/94	15:40	3/4/94	15:55
Cementing:	n/a	n/a	n/a	n/a
Development:	3/6/94	1610	3/6/94	1640

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____

Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+4.33 - 0.67	C1	840.73 - 835.73
0.67 - 130.00	C2	835.74 - 705.74
+4.08 - 129.54	C3	840.48 - 706.86
129.54 - 134.54	S1	706.86 - 701.86
134.54 - 134.79	P1	701.86 - 701.61

Casing: C1 4" X 4" X 5' steel casing
C2 4" diaWheelabrator Eng. Sys. Sch 40 PVC
C3 2" diameter Wheelabrator

Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 129.0' to 135.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 129.0' Baroid Bentonite Chips.

Well Development:

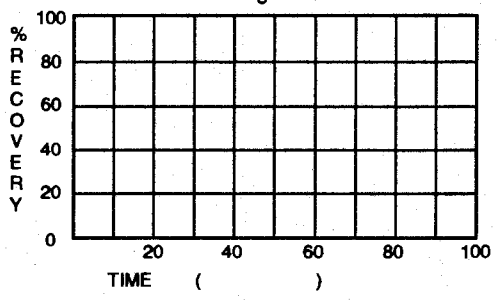
3-6-94: 1610 - 1640
Surge pumping. Total volume removed ~ 20 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
16:15	6.42	225	15.00
16:26	6.90	218	13.89
16:40	6.91	177	13.89

Recovery Data:

Q= S_o =



SUPERVISED BY: Ron Paulling

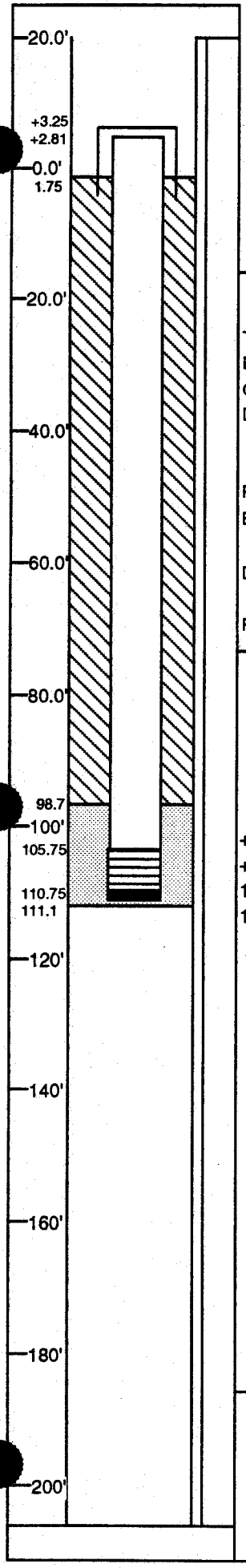
DATE: March 4, 1994

Comments:

Well No.: P-4-S

Boring No. X-Ref: P-4-D

PIEZOMETER CONSTRUCTION SUMMARY



Survey Coords: N 892012, E 1693355

Elevation Ground Level: 837.0

Top of Casing: 839.81

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N. C.

Drilling Summary:

Total Depth: 111.1'
Borehole Diameter: 9" Nominal
Casing Stick-up Height: +2.81
Driller: Environmental Const. Services
Charlotte, N.C.
Rig: CME 75
Bit(s): 8.75" Finger Bit - HSA
Drilling Fluid: None
Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/24/94	10:00	2/25/94	11:15
Geophys. Logging:				
Casing:				
C1	3/1/94	10:00	3/1/94	10:10
C2	3/1/94	08:30	3/1/94	08:45
Filter Placement:	3/1/94	08:45	3/1/94	09:30
Bentonite Seal:	3/1/94	09:30	3/1/94	09:55
Cementing:	n/a	n/a	n/a	n/a
Development:	3/6/94	13:40	3/6/94	14:15

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.25 - 1.75	C1	840.25 - 835.25
+2.81 - 105.75	C2	839.81 - 731.25
105.75 - 110.75	S1	731.25 - 726.25
110.75 - 111.06	P1	726.25 - 725.94
____ - ____		____ - ____

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator
Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 98.7' to 111.1' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 98.7' Baroid Bentonite Pellets.

Well Development:

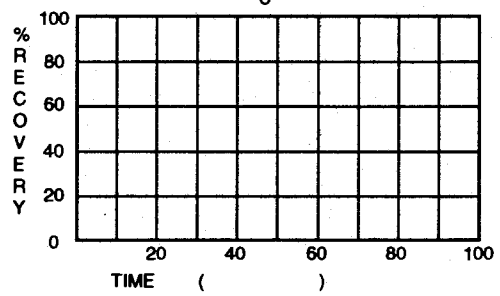
3/6/94: 1340 - 1415
Surge pumping. Total volume removed ~ 30 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
13:44	6.37	194	16.67
13:55	6.44	155	13.89
14:05	6.12	171	13.33
14:15	6.39	151	13.89

Recovery Data:

Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: March 1, 1994

Comments:

Well No.: P-5

Boring No. X-Ref: P-5

PIEZOMETER CONSTRUCTION SUMMARY

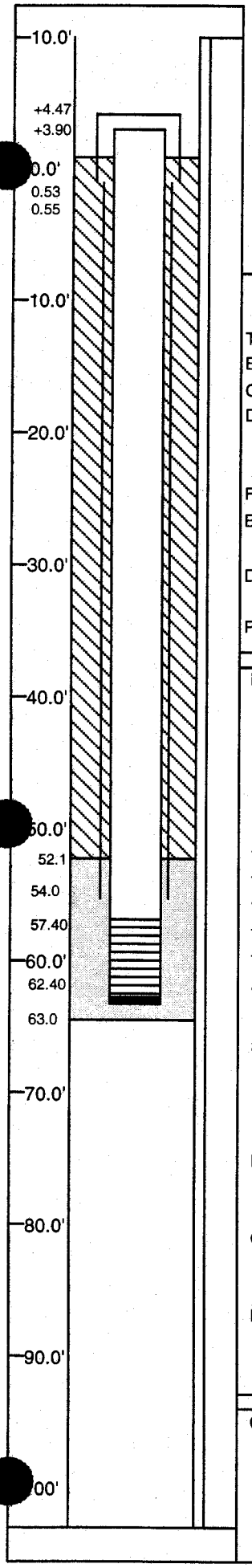
SITE NAME: Piedmont Landfill & Recycling Center

LOCATION: Kernersville, N.C.

Survey Coords: N 891940 E 1693448

Elevation Ground Level: 812.9

Top of Casing: 816.80



Drilling Summary:

Total Depth: 63.0'

Borehole Diameter: HSA-9" Nominal/NQ2-3" Nominal

Casing Stick-up Height: +3.90'

Driller: Environmental Const. Services Charlotte, N.C.

Rig: CME 75

Bit(s): 8.75" Finger Bit - HSA/3.0" Diamond Bit - NQ2

Drilling Fluid: HSA-None/ NQ2-Water..

Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	3/7/94	10:15	3/7/94	12:13
Coring	3/11/94	05:45	3/11/94	07:50
Geophys. Logging:				
Casing:				
C1	3/14/94	1315	3/14/94	1330
C2	3/7/94	1350	3/7/94	1430
C3	3/11/94	1230	3/11/94	1235
Filter Placement:	3/14/94	1235	3/14/94	1250
Cementing:	n/a	n/a	n/a	n/a
Development:	3/14/94	1548	3/14/94	1620
Bentonite Seal:	3/14/94	1250	3/14/93	1305

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____

Casing String (s): C = Casing S = Screen P= Plug

Depth	String(s)	Elevation
+4.47 - 0.53	C1	817.37 - 812.37
0.55 - 54.00	C2	812.35 - 758.90
+3.90 - 57.40	C3	816.71 - 755.50
57.40 - 62.40	S1	755.50 - 750.50
62.40 - 62.70	P1	750.50 - 750.20

Casing: C1 4" X 4" X 5' steel casing
C2 Wheel. Eng. Sys.. 4" dia. Sch. 40 PVC
C3 Wheel. Eng. Sys. 2" dia. Sch. 40 PVC

Screen: S1 Wheel. Eng. Sys. 2" dia. Sch. 40 PVC
S1 w/ 0.010 " slots

Filter Pack: 52.1' - 63.0' BH & JH Inc. 20-60 Filter Sand

Grout Seal: n/a

Bentonite Seal: 0.0' to 52.1' Baroid Bentonite Chips.

Well Development:

3/14/94: 15:48 - 16:20

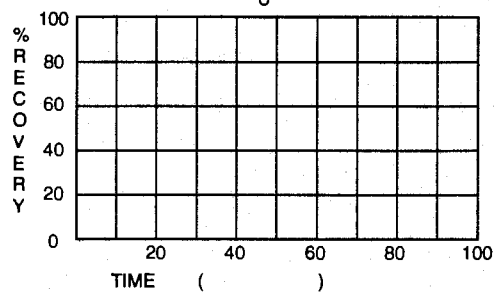
Surge pumping. Total volume removed ~ 25 gallons.

Stabilization Test Data: *

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o =



SUPERVISED BY: Mike Taylor

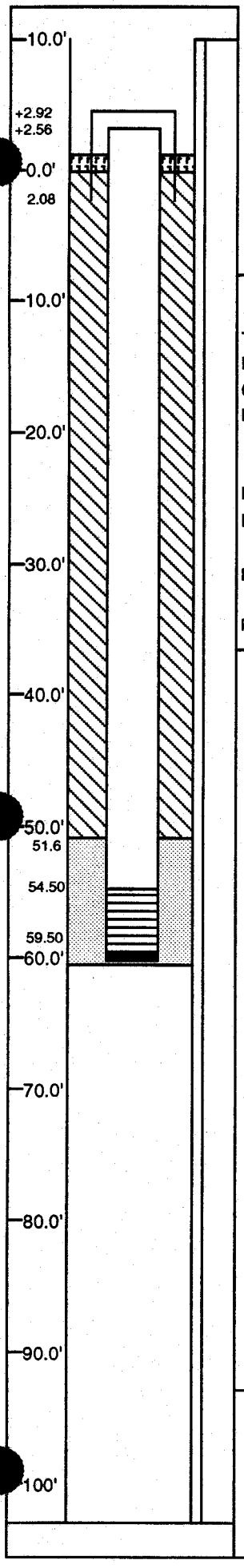
DATE: March 14, 1994

Comments: * Hydac groundwater meter malfunctioning, therefore, well was developed until water was non-turbid.

Well No.: P-6-D

Boring No. X-Ref: P-6-D

PIEZOMETER CONSTRUCTION SUMMARY



Survey Coords: N891948, E 1693966

Elevation Ground Level: 766.6

Top of Casing: 769.16

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

SUPERVISED BY: Ron Paulling

DATE: February 20, 1994

Drilling Summary:

Total Depth: 60.0'

Borehole Diameter: 6" nominal

Casing Stick-up Height: +2.56'

Driller: Environmental Const. Services
Charlotte, N.C.

Rig: CME 45

Bit(s): 5.75" Finger Bit

Drilling Fluid: None

Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+2.92 - 2.08	C1	769.52 - 764.52
+2.56 - 54.50	C2	769.16 - 712.10
54.50 - 59.50	S1	712.10 - 707.10
59.50 - 59.75	P1	707.10 - 706.85
-		-

Casing: C1 4" X 4" X 5' steel casing

C2 2" diameter Wheelabrator Engineered Systems Sch 40 PVC.

Screen: S1 2" dia. Wheelabrator Engineered Sys. Sch 40 PVC w/ 0.010" slots

S2

Filter Pack: 51.6' to 60.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 51.6' Baroid Bentonite Chips.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/20/94	11:15	2/20/94	13:50
Geophys. Logging:				
Casing:				
C1	2/20/94	14:55	2/20/94	15:15
C2	2/20/94	14:15	2/20/94	14:20
Filter Placement:	2/20/94	14:20	2/20/94	14:45
Bentonite Seal:	2/20/94	14:45	2/20/94	14:55
Cementing:	n/a	n/a	n/a	n/a
Development:	3/6/94	1715	3/6/94	1745

Well Development:

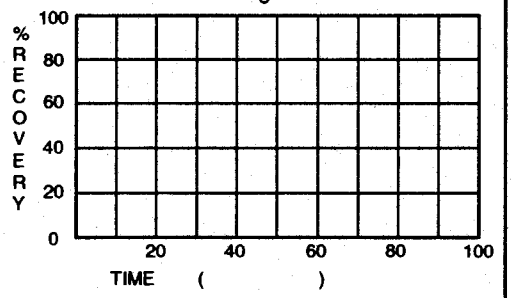
3/6/94: 1715 - 1745
Surge pumping. Total volume removed ~19 gallons.

Stabilization Test Data: xxxxxxxxxxxxxxxxx

Time	pH	Spec. Cond.	Temp (C)
1720	7.13	261	15.1
1730	6.79	223	12.8
1740	6.94	205	12.5

Recovery Data:

Q= S_o =

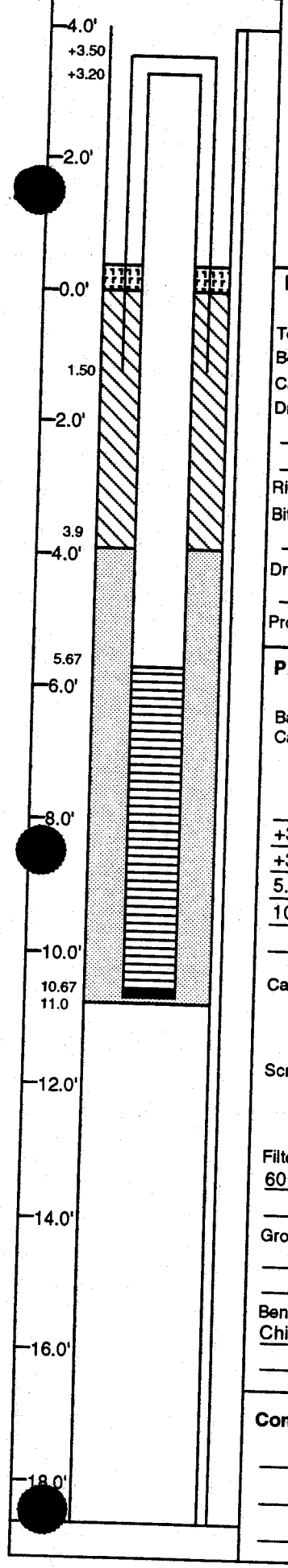


Comments:

Well No.: P-6-S

Boring No. X-Ref: P-6-D

PIEZOMETER CONSTRUCTION SUMMARY



Survey Coords: N 891931, E 1693975

Elevation Ground Level: 767.5

Top of Casing: 770.70

SITE NAME: Piedmont Landfill & Recycling Center

LOCATION: Kernersville, N.C.

Drilling Summary:

Total Depth: 11.0'
Borehole Diameter: 6" nominal
Casing Stick-up Height: +3.20
Driller: Environmental Cons. Services
Charlotte, N.C.
Rig: CME 45
Bit(s): 5.75" Finger Bit - HSA
Drilling Fluid: None
Protective Casing: Extension of C1

Construction Time Log: 2)

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/20/94	15:05	2/20/94	15:25
Geophys. Logging:				
Casing:				
C1	2/20/94	15:40	2/20/94	15:50
C2	2/20/94	15:25	2/20/94	15:30
Filter Placement:	2/20/94	15:30	2/20/94	15:40
Bentonite Seal:	2/20/94	15:40	2/20/94	15:50
Cementing:	n/a	n/a	n/a	n/a
Development:	3/6/94	1755	3/6/94	1830

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ___
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.50 - 1.50	C1	771.00 - 766.00
+3.20 - 5.67	C2	770.70 - 761.83
5.67 - 10.67	S1	761.83 - 756.83
10.67 - 10.92	P1	756.83 - 756.58
-		-

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator
Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 3.9' to 11.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 3.9' Baroid Bentonite Chips.

Well Development:

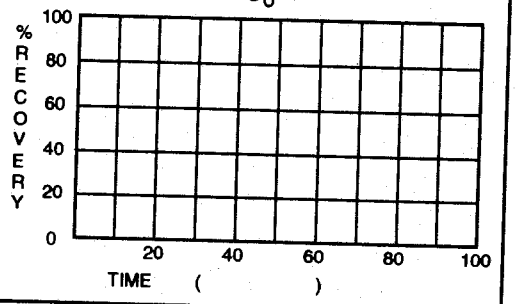
3/6/94: 1755 - 1830
Surge pumping. Total volume removed ~18 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1755	6.05	121	10.00
1810	6.30	95	9.44
1820	6.21	99	8.89
1830	6.11	94	9.44

Recovery Data:

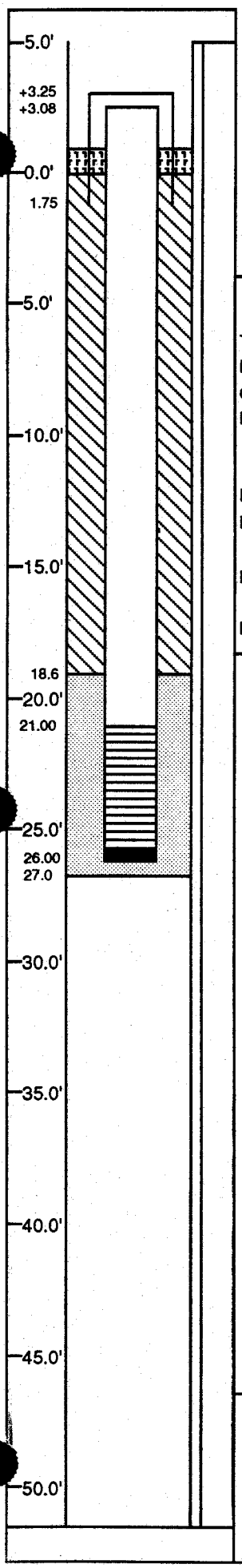
Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: February 20,1994

Comments:



Well No.: P-7

Boring No. X-Ref: P-7

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891472, E 1692296

Elevation Ground Level: 763.8

Top of Casing: 766.88

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

Drilling Summary:

Total Depth: 27.0'
Borehole Diameter: 6" nominal
Casing Stick-up Height: +3.08'
Driller: Environmental Const. Services
Charlotte, N.C.
Rig: CME 45
Bit(s): 5.75" Finger Bit
Drilling Fluid: None.
Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/17/94	08:10	2/17/94	09:30
Geophys. Logging:				
Casing:				
C1	2/17/94	10:25	2/17/94	10:40
C2	2/17/94	09:35	2/17/94	09:40
Filter Placement:	2/17/94	09:40	2/17/94	09:45
Bentonite Seal:	2/17/94	10:15	2/17/94	10:20
Cementing:	n/a	n/a	n/a	n/a
Development:	3/8/94	18:15	3/8/94	18:45

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.25 - 1.75	C1	767.05 - 762.05
+3.08 - 21.00	C2	766.88 - 742.80
21.00 - 26.00	S1	742.80 - 737.80
26.00 - 26.25	P1	737.80 - 737.55
____ - ____		____ - ____

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator Engineered Systems Sch 40 PVC.
Screen: S1 2" dia. Wheelabrator Engineered Sys. Sch 40 PVC w/ 0.010" slots
S2
Filter Pack: 18.6' to 27.0' BH & JH, Inc. 20-60 filter sand.
Grout Seal: n/a
Bentonite Seal: 0.0' to 18.6' Baroid Bentonite Chips.

Well Development:

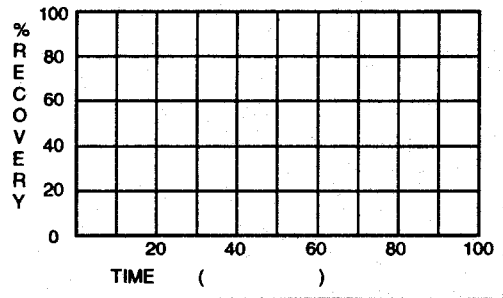
3/8/94: 1815 - 1845.
Surge pumping. Total volume removed ~ 19 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1815	7.41	156	64.2
1820	6.92	95	63.0
1830	6.45	76	60.7
1845	6.46	75	59.7

Recovery Data:

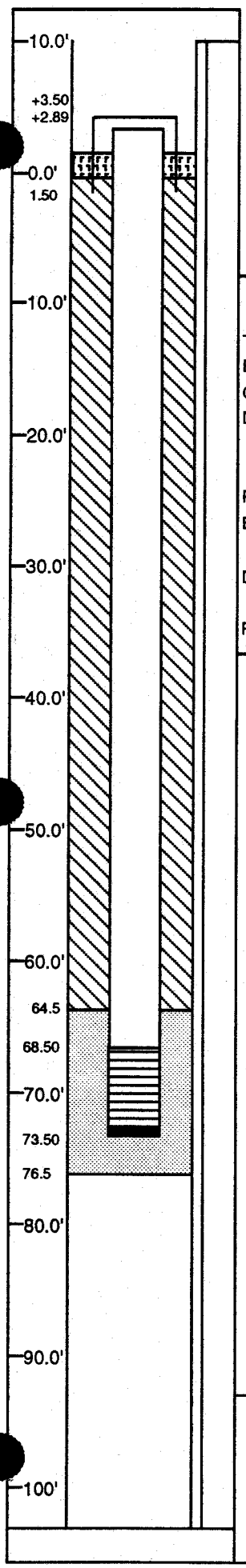
Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: February 17, 1994

Comments:



Well No.: P-8-D

Boring No. X-Ref: P-8-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891784, E 1692657

Elevation Ground Level: 777.9

Top of Casing: 780.79

Drilling Summary:

Total Depth: 76.5'
Borehole Diameter: 9" Nominal
Casing Stick-up Height: +2.89
Driller: Environmental Const. Services
Charlotte, N.C.
Rig: CME 75
Bit(s): 8.75" Finger Bit
Drilling Fluid: None.
Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.50 - 1.50	C1	781.40 - 776.40
+2.89 - 68.50	C2	780.79 - 709.40
68.50 - 73.50	S1	709.40 - 704.40
73.50 - 73.75	P1	704.40 - 704.15
-		-

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator
Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 64.5' to 76.5' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 64.5' Baroid Bentonite Chips.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	3/8/94	09:15	3/8/94	15:38
Geophys. Logging:				
Casing:				
C1	3/8/94	18:00	3/8/94	18:20
C2	3/8/94	15:40	3/8/94	16:55
			3/8	
Filter Placement:	3/4/94	16:55	~~3/4/94~~	17:20
Bentonite Seal:	3/4/94	17:20	~~3/4/94~~	17:30
Cementing:	n/a	n/a	n/a	n/a
Development:	3/9/94	15:40	3/9/94	16:15

Well Development:

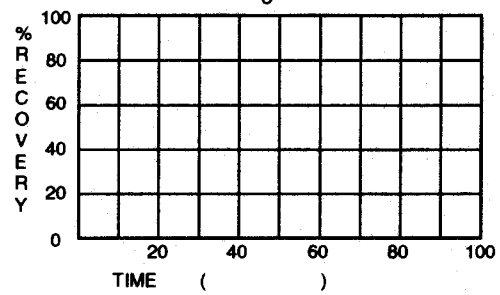
3/9/94: 1540 - 1615.
Surge pump. Total volume removed ~ 28 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1545	7.16	130	12.22
1555	6.83	110	8.89
1608	6.78	103	7.30
1615	6.65	99	5.56

Recovery Data:

Q= S_o =



Comments:

SITE NAME Piedmont Landfill & Recycling Center
LOCATION Kernersville, N.C.

SUPERVISED BY: Mike Taylor
DATE: March 8, 1994

Well No.: P-8-S

Boring No. X-Ref: P-8-D

PIEZOMETER CONSTRUCTION SUMMARY

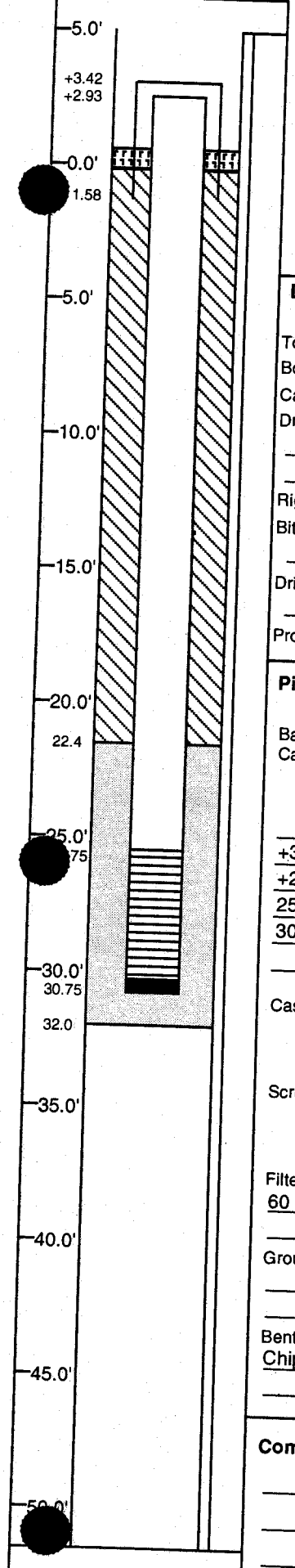
Survey Coords: N 891788, E 1692645

Elevation Ground Level: 776.5

Top of Casing: 779.43

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.



Drilling Summary:

Total Depth: 32.0 '

Borehole Diameter: 6" nominal

Casing Stick-up Height: +2.93'

Driller: Environmental Const. Services
Charlotte, N.C.

Rig: CME 45

Bit(s): 5.75" Finger Bit

Drilling Fluid: None.

Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____

Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.42 - 1.58	C1	779.92 - 774.92
+2.93 - 25.75	C2	779.43 - 750.75
25.75 - 30.75	S1	750.75 - 745.75
30.75 - 31.00	P1	745.75 - 745.50
____ - ____		____ - ____

Casing: C1 4" X 4" X 5' steel casing

C2 2" diameter Wheelabrator

Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered

S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 22.4' to 32.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 22.4' Baroid Bentonite Chips.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/22/94	09:50	2/22/94	11:15
Geophys. Logging:				
Casing:				
C1	2/22/94	12:30	2/22/94	12:40
C2	2/22/94	12:00	2/22/94	12:05
Filter Placement:	2/22/94	12:05	2/22/94	12:20
Bentonite Seal:	2/22/94	12:20	2/22/94	12:30
Cementing:	n/a	n/a	n/a	n/a
Development:	3/8/94	1715	3/8/94	1745

Well Development:

3/8/94: 1715 - 1745

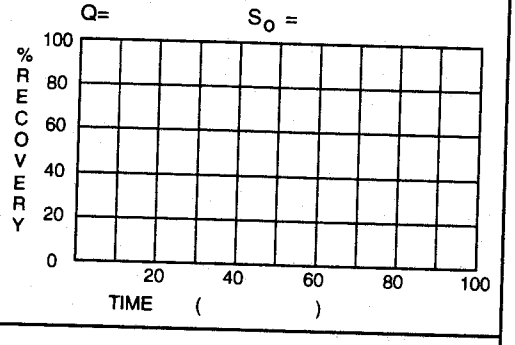
Surge pumping. Total volume removed ~ 15 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1715	8.84	131	17.22
1720	7.15	109	17.15
1730	6.87	48	17.18
1745	6.61	41	15.56

Recovery Data:

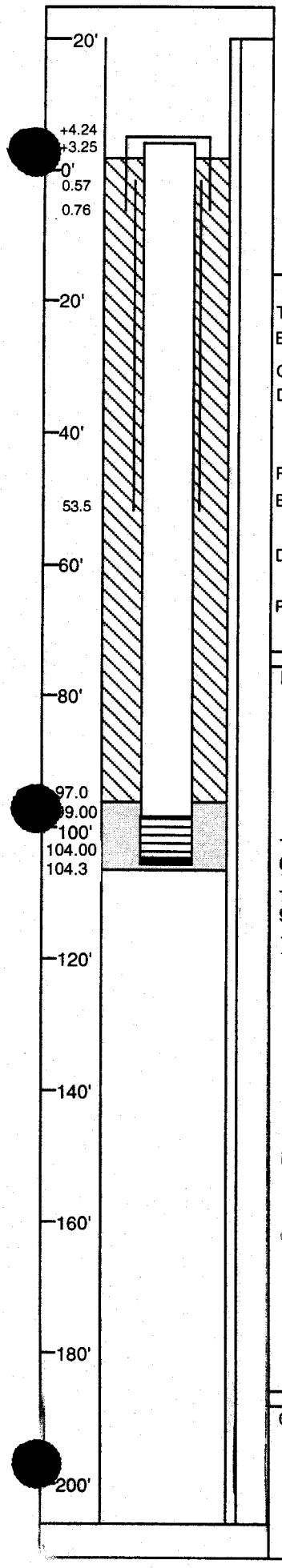
Q= S_o =



Comments:

SUPERVISED BY: Ron Paulling

DATE: February 22, 1994



Well No.: P-9-D

Boring No. X-Ref: P-9-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891639
E 1693228

Elevation Ground Level: 828.0

Top of Casing: 831.25

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

Drilling Summary:

Total Depth: 104.3'

Borehole Diameter: HSA-9" Nominal/ Air rotary- 4" Nominal/ NQ2- 3" Nominal

Casing Stick-up Height: +3.25

Driller: Environmental Const. Services
Charlotte, N.C.

Rig: CME 75

Bit(s): 8.75" finger bit-HSA/ 3.875" hammer-air rotary/ 3.0" Diamond bit- NQ2

Drilling Fluid: HSA-None/ Air rotary- None/ NQ2- Water

Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling HSA	3/3/94	1830	3/3/94	2120
Coring	3/5/94	1650	3/16/94	1820
Air Hammer	3/9/94	1110	3/14/94	1655
Coring	3/16/94	0955	3/16/94	1030
Geophys. Logging:				
Casing:				
C1	3/17/94	1540	3/17/94	1555
C2	3/4/94	0800	3/4/94	1100
C3	3/17/94	0905	3/17/94	0910
Filter Placement:	3/17/94	0915	3/17/94	0920
Cementing:	n/a	n/a	n/a	n/a
Development:	3/17/94	1635	3/17/94	1710
Bentonite Seal:	3/17/94	1500	3/17/94	1540

Piezometer Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____

Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+4.24 - 0.76	C1	832.24 - 827.24
0.57 - 53.50	C2	827.43 - 774.50
+3.25 - 99.00	C3	831.25 - 729.00
99.00 - 104.00	S1	729.00 - 724.00
104.00 - 104.30	P1	724.00 - 723.70

Casing: C1 4" X 4"X 5' steel casing
C2 Wheel. Eng. Sys. 4" dia. Sch. 40 PVC
C3 Wheel Eng. Sys. 2" dia. Sch. 40 PVC

Screen: S1 Wheel Eng. Sup. 2" dia. Sch. 40 PVC
S1 w/ 0.010" slots

Filter Pack: 97.0' - 104.3' BH & JH Inc. 20-60 Filter Sand

Grout Seal: n/a

Bentonite Seal: 0.0' to 97.0' Baroid Benseal and Water

Well Development:

3/17/94: 16:35 - 17:10

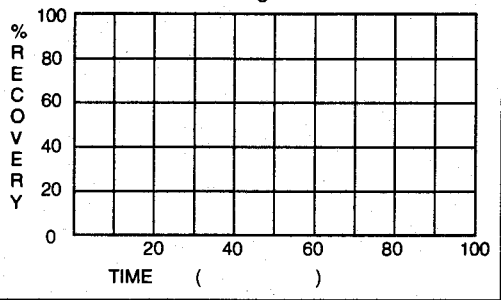
Surge pumping. Total volume removed ~ 30 gallons.

Stabilization Test Data: *

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

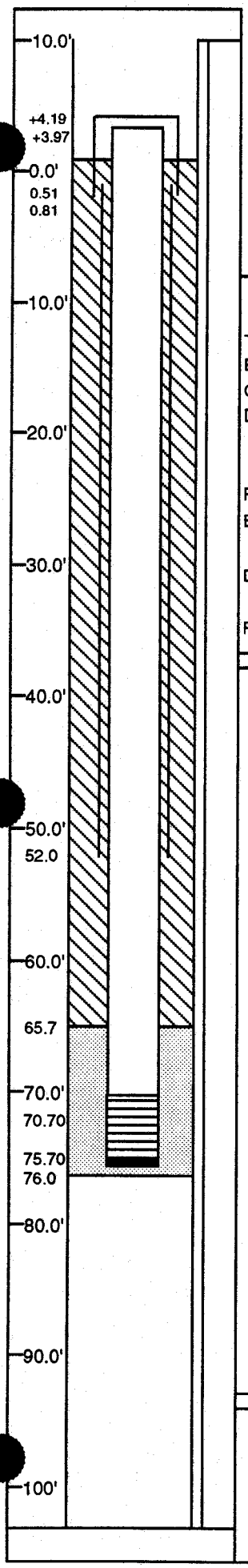
Q= S_o =



SUPERVISED BY: Mike Taylor

DATE: March 17, 1994

Comments: * Hydac groundwater meter was malfunctioning, therefore, well was developed until water was non-turbid.



Well No.: P-9-S

Boring No. X-Ref: P-9-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891636
E 1693239

Elevation Ground Level: 827.6

Top of Casing: 831.57

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

Drilling Summary:

Total Depth: 76.0'
Borehole Diameter: HSA-9" Nominal/ Air rotary- 4" Nominal/ NQ2- 3" Nominal
Casing Stick-up Height: +3.97
Driller: Environmental Const. Services
Charlotte, N.C.
Rig: CME 75
Bit(s): 8.75" finger bit-HSA/ 3.875" hammer-air rotary/ 3.0" Diamond bit- NQ2
Drilling Fluid: HSA-None/ Air rotary-None/ NQ2- Water
Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
Air Hammer	3/15/94	0920	3/15/94	1320
Coring	3/15/94	1535	3/15/94	1835
Geophys. Logging:				
Casing:				
C1	3/17/94	1450	3/17/94	1500
C2	3/4/94	1115	3/4/94	1430
C3	3/17/94	0900	3/17/94	0905
Filter Placement:	3/17/94	0905	3/17/94	0910
Cementing:	n/a	n/a	n/a	n/a
Development:	3/17/94	1155	3/17/94	1230
Bentonite Seal:	3/17/94	0910	3/17/94	0925

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen P= Plug

Depth	String(s)	Elevation
+4.19 - 0.81	C1	831.79 - 826.79
0.51 - 52.00	C2	827.09 - 775.60
+3.97 - 70.70	C3	831.57 - 756.90
70.70 - 75.70	S1	756.90 - 751.90
75.70 - 76.00	P1	751.90 - 751.60

Casing: C1 4" X 4" X 5' steel casing
C2 Wheel. Eng. Sys. 4" dia. Sch. 40 PVC
C3 Wheel. Eng. Sys. 2" dia. Sch. 40 PVC
Screen: S1 Wheel. Eng. Sys. 2" dia. Sch. 40 PVC
S1 w/ 0.010 "slots

Filter Pack: 65.7' to 76.0' BH & JH Inc. 20-60 Filter Sand

Grout Seal: n/a

Bentonite Seal: 0.0' to 65.7' Baroid Benseal and Water

Well Development:

3/17/94: 11:55 - 12:30

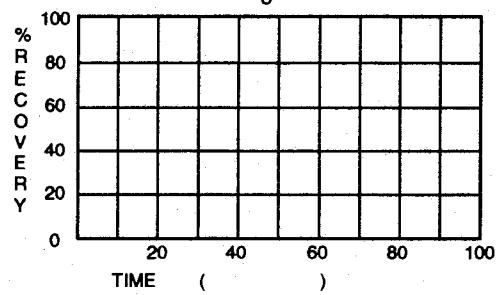
Surge pumping. Total volume removed ~ 27 gallons.

Stabilization Test Data: *

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o =



SUPERVISED BY: Mike Taylor

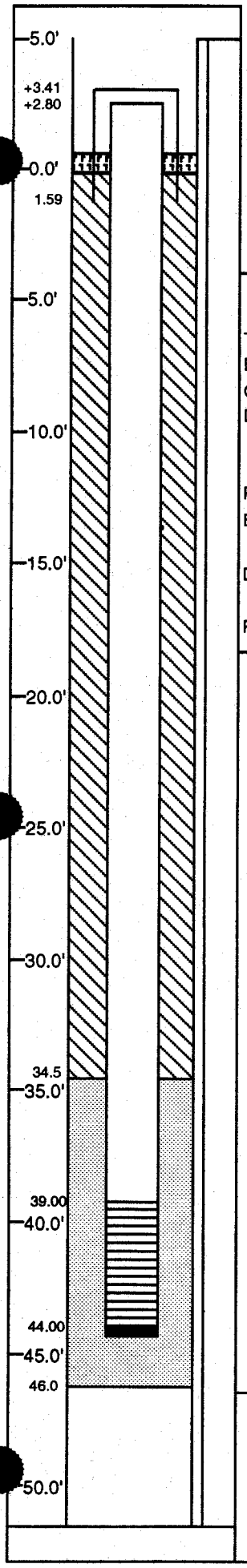
DATE: March 17, 1994

Comments: * Hydac groundwater meter was malfunctioning, therefore, well was developed until water was non-turbid.

Well No.: P-10

Boring No. X-Ref: P-10

PIEZOMETER CONSTRUCTION SUMMARY



Survey Coords: N 891691, E 1693905

Elevation Ground Level: 797.5

Top of Casing: 800.30

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

Drilling Summary:

Total Depth: 46.0 '

Borehole Diameter: 6" nominal

Casing Stick-up Height: +2.80

Driller: Environmental Const. Services
Charlotte, North Carolina

Rig: CME 45

Bit(s): 5.75" Finger Bit - HSA

Drilling Fluid: None.

Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.41 - 1.59	C1	800.91 - 795.91
+2.80 - 39.00	C2	800.30 - 758.50
39.00 - 44.00	S1	758.50 - 753.50
44.00 - 44.25	P1	753.50 - 753.25
-		-

Casing: C1 4" X 4" X 5' steel casing

C2 2" diameter Wheelabrator Engineered Systems Sch 40 PVC.

Screen: S1 2" dia. Wheelabrator Engineered Sys. Sch 40 PVC w/ 0.010" slots

S2

Filter Pack: 34.5' to 46.0' BH & JH, Inc. sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 34.5' Baroid bentonite chips.

Construction Time Log: 2)

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/15/94	1515	2/15/94	1645
Geophys. Logging:				
Casing:				
C1	2/16/94	1710	2/16/94	1715
C2	2/15/94	1650	2/15/94	1655
Filter Placement:	2/15/94	1700	2/15/94	1725
Bentonite Seal:	2/16/94	1715	2/16/94	1730
Cementing:	n/a	n/a	n/a	n/a
Development:	3/8/94	1405	3/8/94	1430

Well Development:

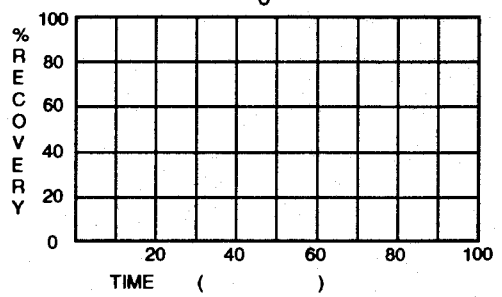
3/8/94: 1405 - 1430.
Surge pump. Total volume removed ~ 18 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1410	6.86	90	20.56
1415	6.22	80	17.78
1420	6.17	89	17.60
1430	6.02	85	17.35

Recovery Data:

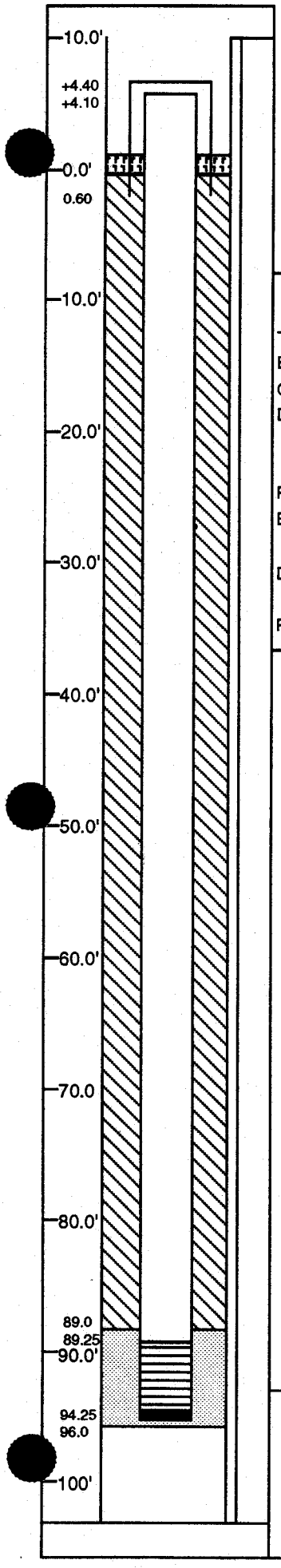
Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: February 16, 1994

Comments:



Well No.: P-11-D

Boring No. X-Ref: P-11-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891493, E 1692739

Elevation Ground Level: 791.4

Top of Casing: 795.50

Drilling Summary:

Total Depth: 96.0'
Borehole Diameter: 9" nominal
Casing Stick-up Height: +4.10
Driller: Environmental Const. Services
Charlotte,N.C.
Rig: CME 75
Bit(s): 8.75" Finger Bit - HSA
Drilling Fluid: HSA - None/ Coring - water
Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+4.40 - 0.60	C1	795.80 - 790.80
+4.10 - 89.25	C2	795.50 - 702.15
89.25 - 94.25	S1	702.15 - 697.15
94.25 - 94.50	P1	697.15 - 696.90
-		-

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator
Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 89.0' to 96.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 89.0' Baroid Bentonite Chips.

Construction Time Log: 2)

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/22/94	0945	2/22/94	1630
Geophys. Logging:				
Casing:				
C1	2/22/94	18:00	2/22/94	18:15
C2	2/22/94	1705	2/22/94	17:25
Filter Placement:	2/22/94	1725	2/22/94	1740
Bentonite Seal:	2/22/94	17:40	2/22/94	18:00
Cementing:	n/a	n/a	n/a	n/a
Development:	3/8/94	1015	3/8/94	1055

Well Development:

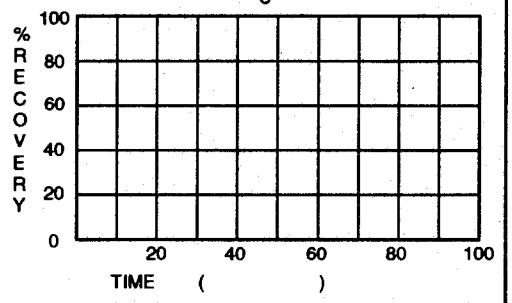
3/8/94: 1015 - 1055
Surge pump. Total volume removed ~ 30.0 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1025	8.12	126	16.7
1040	6.21	125	15.1
1045	6.05	121	14.5
1055	5.86	117	14.7

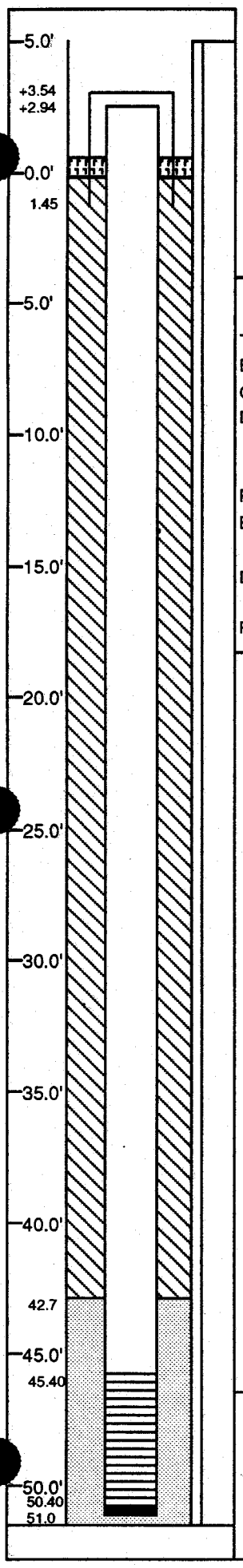
Recovery Data:

Q= S_o =



Comments:

SITE NAME: Piedmont Landfill & Recycling Center
LOCATION: Kernersville, N.C.
SUPERVISED BY: Ron Paulling
DATE: February 22, 1994



Well No.: P-11-S

Boring No. X-Ref: P-11-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891501, E 1692729

Elevation Ground Level: 791.50

Top of Casing: 794.44

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

Drilling Summary:

Total Depth: 51.0 '

Borehole Diameter: 6" nominal

Casing Stick-up Height: +2.94'

Driller: Environmental Const. Services
Charlotte, N.C.

Rig: CME 45

Bit(s): 5.75" Finger Bit

Drilling Fluid: None.

Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: X Geophysical Log: -

Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.54 - 1.45	C1	795.04 - 790.05
+2.94 - 45.40	C2	794.44 - 746.10
45.40 - 50.40	S1	746.10 - 741.10
50.40 - 50.65	P1	741.10 - 740.85
-		-

Casing: C1 4" X 4" X 5' steel casing

C2 2" diameter Wheelabrator

Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered

S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 42.7' to 51.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 42.7' Baroid Bentonite Chips.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/21/94	14:40	2/21/94	17:50
Geophys. Logging:				
Casing:				
C1	2/21/94	18:30	2/21/94	18:40
C2	2/21/94	18:00	2/21/94	18:10
Filter Placement:	2/21/94	18:10	2/21/94	18:20
Bentonite Seal:	2/21/94	18:20	2/21/94	18:30
Cementing:	n/a	n/a	n/a	n/a
Development:	3/8/94	1100	3/8/94	1135

Well Development:

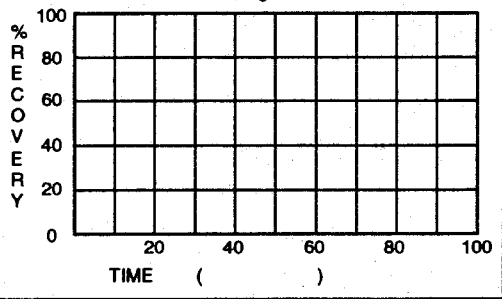
3/8/94: 1100 - 1135
Surge pumping. Total volume removed ~ 20 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1105	8.73	354	15.61
1120	7.19	338	16.88
1135	6.94	368	17.27

Recovery Data:

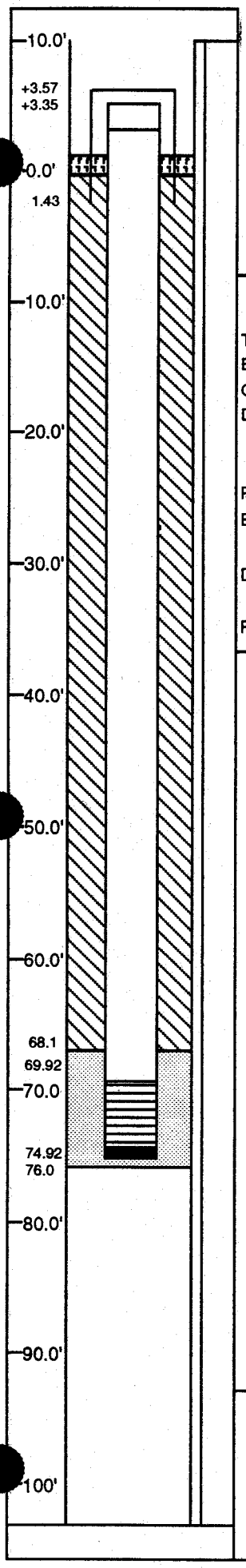
Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: February 21, 1994

Comments:



Well No.: P-12-D

Boring No. X-Ref: P-12-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891432, E 1693376

Elevation Ground Level: 809.8

Top of Casing: 813.15

SITE NAME: Piedmont Landfill & Recycling Center

LOCATION: Kernersville, N.C.

Drilling Summary:

Total Depth: 76.0'
Borehole Diameter: HSA - 9"/Coring - 3" NQ
Casing Stick-up Height: +3.35'
Driller: Environmental Const. Services Charlotte,N.C.
Rig: CME 75
Bit(s): 8.75" Finger Bit - HSA 3.0" - Coring (NQ2)
Drilling Fluid: HSA - None/ Coring - water
Protective Casing: Extension of C1

Construction Time Log: 2)

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/18/94	1545	2/18/94	1815
Coring (NQ2)	2/19/94	0930	2/19/94	1715
Geophys. Logging:				
Casing:				
C1	2/19/94	18:25	2/19/94	18:40
C2	2/19/94	1730	2/19/94	17:40
Filter Placement:	2/19/94	1740	2/19/94	1810
Bentonite Seal:	2/19/94	18:10	2/19/94	18:25
Cementing:	n/a	n/a	n/a	n/a
Development:	3/8/94	1545	3/8/94	1615

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ___
Casing String (s): C = Casing S = Screen P= Plug

Depth	String(s)	Elevation
+3.57 - 1.43	C1	813.37 - 808.37
+3.35 - 69.92	C2	813.15 - 739.88
69.92 - 74.92	S1	739.88 - 734.88
74.92 - 75.17	P1	734.88 - 734.63
-		-

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator
Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 68.1' to 76.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 68.1' Baroid Bentonite Chips.

Well Development:

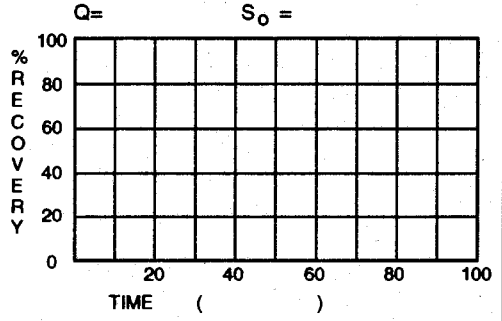
3/8/94: 1545 - 1615
Surge pump. Total volume removed ~ 23.0 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1545	6.64	153	17.0
1600	6.58	168	18.5
1625	6.54	167	17.8

Recovery Data:

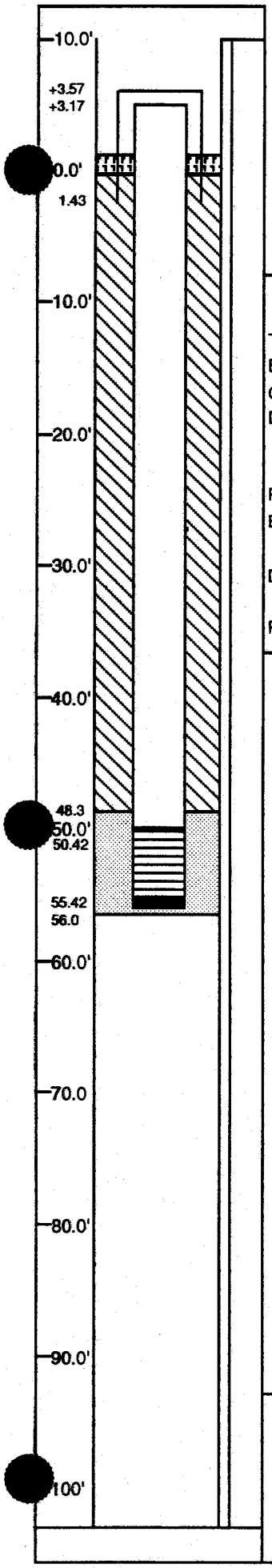
Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: February 19,1994

Comments:



Well No.: P-12-S

Boring No. X-Ref: P-12-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891424, E 1693358

Elevation Ground Level: 811.1

Top of Casing: 814.27

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

Drilling Summary:

Total Depth: 56.0'
Borehole Diameter: 6" nominal
Casing Stick-up Height: +3.17'
Driller: Environmental Const. Services
Charlotte,N.C.
Rig: CME 45
Bit(s): 5.75" Finger Bit - HSA
Drilling Fluid: None.
Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.57 - 1.43	C1	814.67 - 809.67
+3.17 - 50.42	C2	814.27 - 760.68
50.42 - 55.42	S1	760.68 - 755.68
55.42 - 55.67	P1	755.68 - 755.43
-		-

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator
Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 48.3' to 56.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 48.3' Baroid Bentonite Chips.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/19/94	1330	2/19/94	1600
Geophys. Logging:				
Casing:				
C1	2/19/94	16:50	2/19/94	1700
C2	2/19/94	1600	2/19/94	1615
Filter Placement:	2/19/94	1615	2/19/94	1640
Bentonite Seal:	2/19/94	16:40	2/19/94	16:50
Cementing:	n/a	n/a	n/a	n/a
Development:	3/8/94	1620	3/8/94	1645

Well Development:

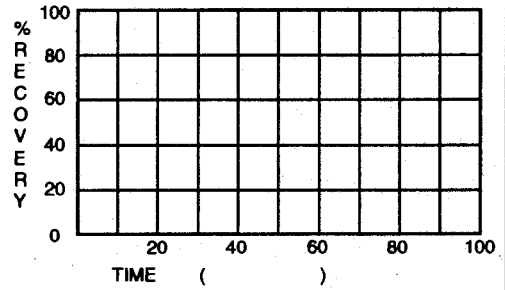
3/8/94: 1620 - 1645
Surge pump. Total volume removed ~18.5 gallons.

Stabilization Test Data:

Time	pH .	Spec. Cond.	Temp (C)
1620	6.67	136	20.5
1630	6.57	153	17.0
1640	6.60	159	17.4
1645	6.49	151	16.5

Recovery Data:

Q= S_o =



SUPERVISED BY: Ron Paulling

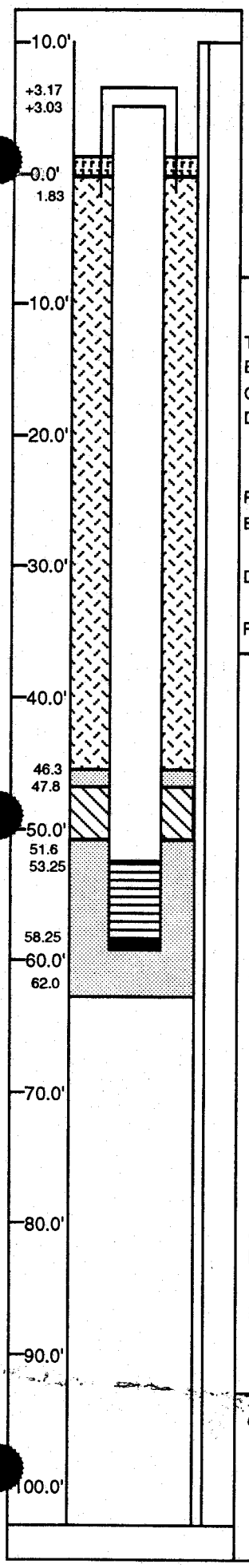
DATE: February 19,1994

Comments:

Well No.: P-13

Boring No. X-Ref: P-13

PIEZOMETER CONSTRUCTION SUMMARY



Survey Coords: N 891278, E 1692036

Elevation Ground Level: 754.3

Top of Casing: 757.33

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

SUPERVISED BY: Ron Paulling

DATE: February 18, 1994

Drilling Summary:

Total Depth: 62.0 '

Borehole Diameter: 9" nominal

Casing Stick-up Height: +3.03'

Driller: Environmental Const. Services
Charlotte, N.C

Rig: CME 75

Bit(s): 8.75" Finger Bit - HSA

Drilling Fluid: None

Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/18/94	08:40	2/18/94	14:15
Geophys. Logging:				
Casing:				
C1	2/18/94	20:10	2/18/94	20:20
C2	2/18/94	18:15	2/18/94	19:10
Filter Placement:	2/18/94	19:10	2/18/94	19:30
Bentonite Seal:	2/18/94	19:40	2/18/94	20:00
Cementing:	2/18/94	20:00	2/18/94	20:10
Development:	3/5/94	1505	3/5/94	1540

Piezometer Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____

Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.17 - 1.83	C1	757.47 - 752.47
+3.03 - 53.25	C2	757.33 - 701.05
53.25 - 58.25	S1	701.05 - 696.05
58.25 - 58.50	P1	696.05 - 695.80
-		-

Casing: C1 4" X 4" X 5' anodized aluminum casing

C2 2" diameter Wheelabrator

Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered

S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 51.6' to 62.0' BH & JH, Inc. 20-60 filter sand.
Secondary 46.3' to 47.8'

Grout Seal: 0.0' to 46.3' Giant Portland Type I Cement.

Bentonite Seal: 47.8' to 51.6' Baroid Bentonite Chips.

Well Development:

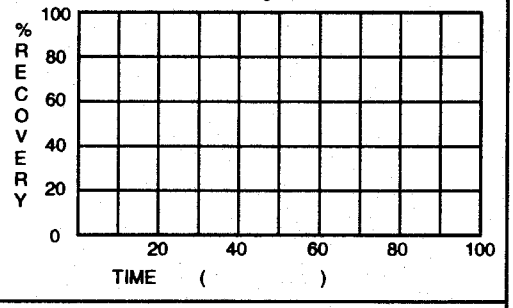
3/5/94: 1505 - 1540
Surge pumping. Total volume removed ~ 21 gallons.

Stabilization Test Data:

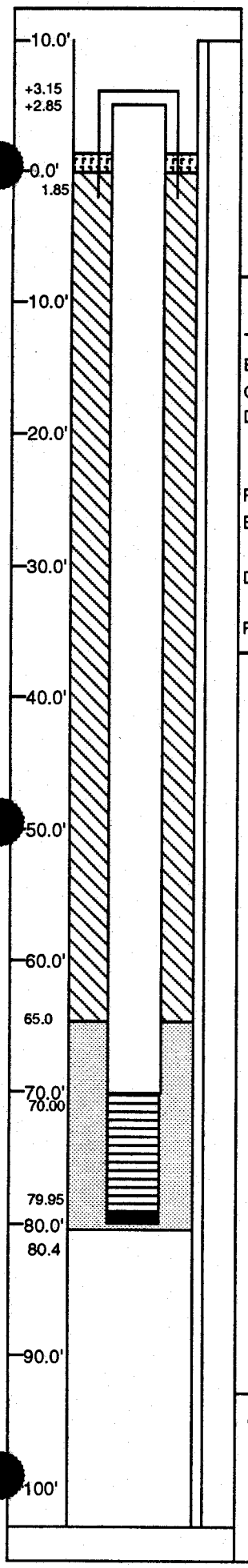
Time	pH	Spec. Cond.	Temp (C)
1510	8.88	204	18.5
1520	8.49	174	17.7
1530	7.30	176	16.3
1540	6.67	165	16.7

Recovery Data:

Q= S_o =



Comments:



Well No.: P-14-D

Boring No. X-Ref: P-14-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891186, E 1693214

Elevation Ground Level: 805.8

Top of Casing: 808.65

SITE NAME: Piedmont Landfill & Recycling Center

LOCATION: Kernersville, N.C.

Drilling Summary:

Total Depth: 80.4'

Borehole Diameter: HSA -9" / Coring -3" NQ

Casing Stick-up Height: +2.85'

Driller: Environmental Const. Services
Charlotte, N.C.

Rig: CME 75

Bit(s): 8.75" Finger Bit - HSA
3.0" Diamond Core (NQ2) Coring

Drilling Fluid: HSA - None/Core - water

Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/17/94	11:30	2/17/94	14:40
Coring NQ2	2/17/94	17:00	2/17/94	18:40
Coring NQ2	2/18/94	08:43	2/18/94	09:55
Geophys. Logging:				
Casing:				
C1	2/18/94	12:45	2/18/94	13:00
C2	2/18/94	10:40	2/18/94	10:45
Filter Placement:	2/18/94	11:25	2/18/94	11:30
Bentonite Seal:	2/18/94	12:00	2/18/94	12:45
Cementing:	n/a	n/a	n/a	n/a
Development:	3/8/94	1145	3/8/94	1220

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.15 - 1.85	C1	808.95 - 803.95
+2.85 - 70.00	C2	808.65 - 735.80
70.00 - 79.95	S1	735.80 - 725.85
79.95 - 80.02	P1	725.85 - 725.78
____ - ____		____ - ____

Casing: C1 4" X 4" X 5' anodized aluminum casing
C2 2" diameter Wheelabrator Engineered Systems Sch 40 PVC.

Screen: S1 2" dia. Wheelabrator Engineered Sys. Sch 40 PVC w/ 0.010" slots
S2

Filter Pack: 65.0' to 80.4' BH & JH, Inc. 20-60 filter sand.

Grout Seal: N/A

Bentonite Seal: 0.0' to 65.0' Baroid Bentonite Chips.

Well Development:

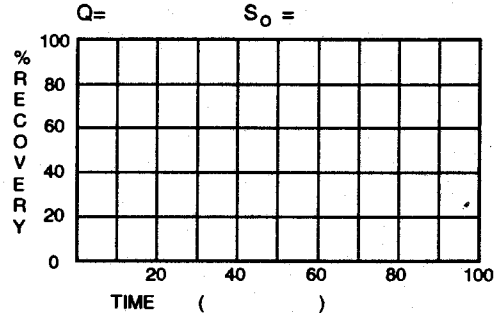
3/8/94: 1145 - 1220
Surge pumping. Total volume removed ~ 23 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1150	8.28	189	18.1
1205	6.87	179	17.2
1210	6.40	207	18.4
1220	6.07	134	16.8

Recovery Data:

Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: February 17, 1994

Comments:

Well No.: P-14-S

Boring No. X-Ref: P-14-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 891161, E 1693214

Elevation Ground Level: 805.8

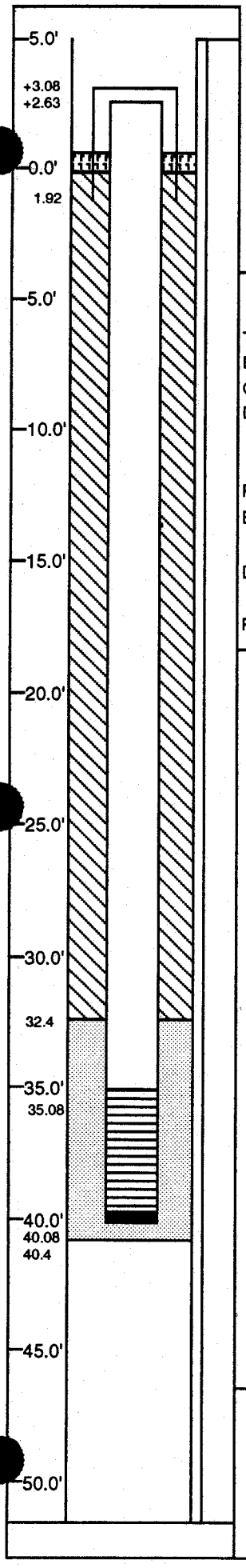
Top of Casing: 808.43

SITE NAME Piedmont Landfill & Recycling Center

LOCATION Kernersville, N.C.

SUPERVISED BY: Ron Paulling

DATE: February 17, 1994



Drilling Summary:

Total Depth: 40.4 '

Borehole Diameter: 6" nominal

Casing Stick-up Height: +2.63'

Driller: Environmental Const. Services
Charlotte, N.C.

Rig: CME 45

Bit(s): 5.75" Finger Bit

Drilling Fluid: None.

Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____

Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.08 - 1.92	C1	808.88 - 803.88
+2.63 - 35.08	C2	808.43 - 770.72
35.08 - 40.08	S1	770.72 - 765.72
40.08 - 40.38	P1	765.72 - 765.42
____ - ____		____ - ____

Casing: C1 4" X 4" X 5' steel casing

C2 2" diameter Wheelabrator Engineered Systems Sch 40 PVC.

Screen: S1 2" dia. Wheelabrator Engineered Sys. Sch 40 PVC w/ 0.010" slots

S2 ____

Filter Pack: 32.4' to 40.4' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 32.4' Baroid Bentonite Chips.

Construction Time Log: 2)

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/17/94	15:00	2/17/94	15:30
Geophys. Logging:				
Casing:				
C1	2/17/94	16:00	2/17/94	16:15
C2	2/17/94	15:35	2/17/94	15:40
Filter Placement:	2/17/94	15:40	2/17/94	15:50
Bentonite Seal:	2/17/94	15:50	2/17/94	16:00
Cementing:	n/a	n/a	n/a	n/a
Development:	3/8/94	1330	3/8/94	1400

Well Development:

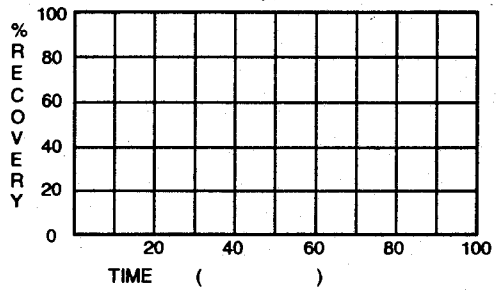
3/8/94: 1330 - 1400
Surge pumping. Total volume removed ~ 15 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1330	8.80	293	16.8
1340	6.03	245	14.7
1350	5.94	220	15.2
1400	5.87	199	15.6

Recovery Data:

Q= S_o =

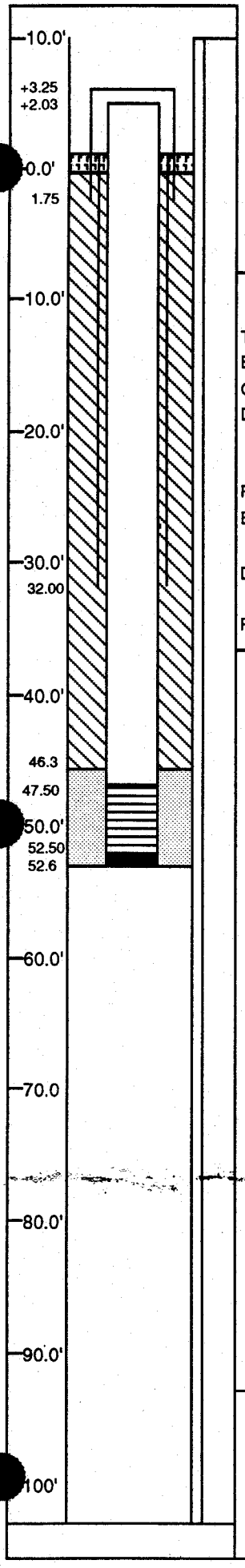


Comments:

Well No.: P-15-D

Boring No. X-Ref: P-15-D

PIEZOMETER CONSTRUCTION SUMMARY



Survey Coords: N 890875, E 1692649

Elevation Ground Level: 766.2

Top of Casing: 768.23

SITE NAME: Piedmont Landfill & Recycling Center

LOCATION: Kernersville, N.C.

Drilling Summary:

Total Depth: 52.6'
Borehole Diameter: 9" nominal
Casing Stick-up Height: +2.03'
Driller: Graham & Currie
West End, N.C.
Rig: CME 75
Bit(s): 8.75" Finger Bit - HSA
3.0" - Coring (NQ2)
Drilling Fluid: HSA - None/ Coring - Bentonite Quick Gel & water.
Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.25 - 1.75	C1	769.45 - 764.45
+0.50 - 32.00	C2	765.70 - 734.20
2.03 - 47.50	C3	768.23 - 718.70
47.50 - 52.50	S1	718.70 - 713.70
52.50 - 52.60	P1	713.70 - 713.60

Casing: C1 4" X 4" X 5' steel casing
C3 Wheelabrator Eng Sys 4" dia. Sch 40 PVC
C2 2" dia. Fuergueson Enterprises Sch 40 PVC.
Screen: S1 2" dia. Fuergueson Enterprises Sch 40 PVC w/ 0.010" slots
S2 ____

Filter Pack: 46.3' to 52.6' Hoffman silica sand - Torpedo #2.

Grout Seal: n/a

Bentonite Seal: 0.0' to 46.3' DSI Sheer Plug Bentonite Chips.

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/16/94	09:15	2/16/94	13:00
Coring (NQ2)	3/11/94	0930	3/11/94	18:40
Geophys. Logging:				
Casing:				
C1	3/11/94	19:25	3/11/94	19:50
C2	3/7/94	16:00	3/7/94	18:00
C3	3/11/94	18:40	3/11/94	18:45
Filter Placement:	3/11/94	18:45	3/11/94	18:55
Bentonite Seal:	3/11/94	18:55	3/11/94	19:25
Cementing:	n/a	n/a	n/a	n/a
Development:	3/12/94	16:55	3/12/94	17:30

Well Development:

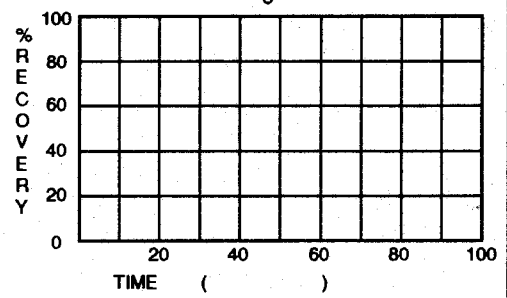
3/12/94: 16:55 - 17:30
Surge pump. Total volume removed ~ 23.0 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1655	8.21	260	14.8
1710	7.43	175	12.8
1720	7.12	197	12.4
1730	7.38	202	12.1

Recovery Data:

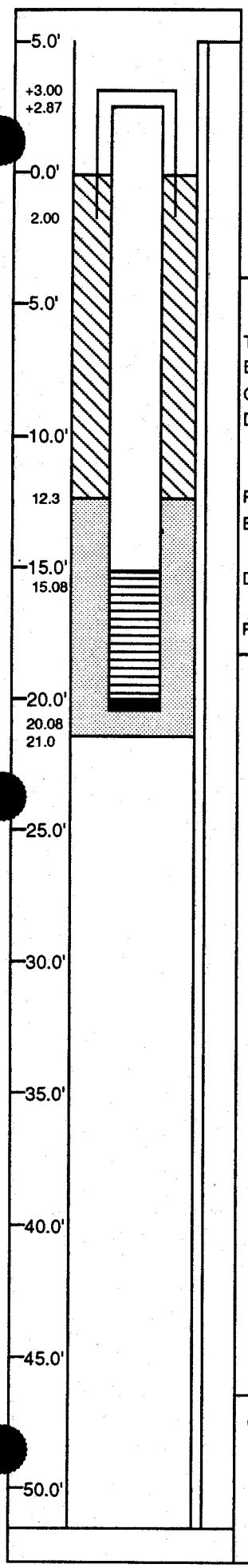
Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: February 16,1994

Comments:



Well No.: P-15-S

Boring No. X-Ref: P-15-D

PIEZOMETER CONSTRUCTION SUMMARY

Survey Coords: N 890873, E 1692661

Elevation Ground Level: 766.9

Top of Casing: 769.77

Drilling Summary:

Total Depth: 21.0 '
Borehole Diameter: 6" nominal
Casing Stick-up Height: +2.87'
Driller: Environmental Const. Services
Charlotte, N.C.
Rig: CME 45
Bit(s): 5.75" Finger Bit - HSA
Drilling Fluid: None.
Protective Casing: Extension of C1

Piezometer Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.00 - 2.00	C1	769.90 - 764.90
+2.87 - 15.08	C2	769.77 - 751.82
15.08 - 20.08	S1	751.82 - 746.82
20.08 - 20.33	P1	746.82 - 746.57
-		-

Casing: C1 4" X 4" X 5' steel casing
C2 2" diameter Wheelabrator
Screen: S1 Engineered Systems Sch 40 PVC. 2" dia. Wheelabrator Engineered
S2 Sys. Sch 40 PVC w/ 0.010" slots

Filter Pack: 12.3' to 21.0' BH & JH, Inc. 20-60 filter sand.

Grout Seal: n/a

Bentonite Seal: 0.0' to 12.3' Baroid Bentonite Chips.

Construction Time Log: 2)

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA	2/16/94	09:40	2/16/94	13:00
Geophys. Logging:				
Casing:				
C1	2/16/94	13:40	2/16/94	13:45
C2	2/16/94	13:05	2/16/94	13:10
Filter Placement:	2/16/94	13:15	2/16/94	13:20
Bentonite Seal:	2/16/94	13:35	2/16/94	13:40
Cementing:	n/a	n/a	n/a	n/a
Development:	3/5/94	1555	3/5/94	1630

Well Development:

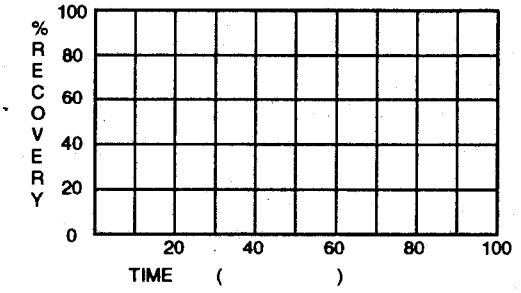
3/5/94: 1555 - 1630
Surge pumping. Total volume removed ~ 12 gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
1558	6.40	140	16.7
1610	6.29	112	17.7
1620	6.21	138	16.6
1630	5.95	134	14.6

Recovery Data:

Q= S_o =



Comments:

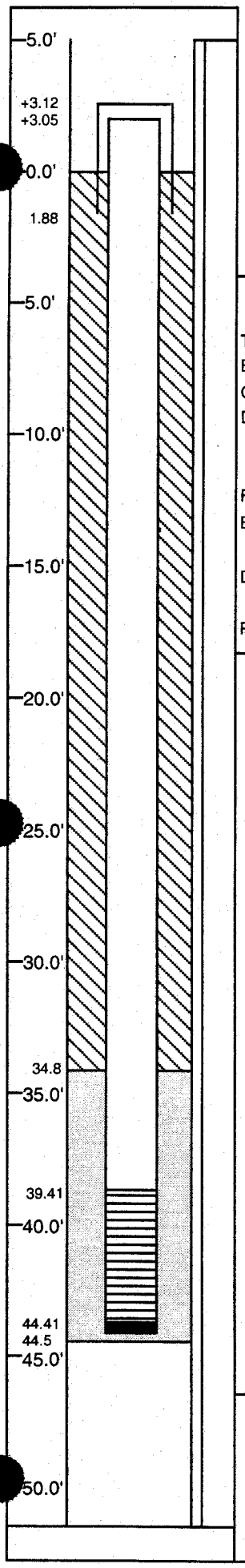
SITE NAME Piedmont Landfill & Recycling Center
LOCATION Kernersville, N.C.

SUPERVISED BY: Ron Paulling
DATE: February 16, 1994

Well No.: P-16

Boring No. X-Ref: P-16

PIEZOMETER CONSTRUCTION SUMMARY



Survey Coords: N 890870, E 1693344

Elevation Ground Level: 811.2

Top of Casing: 814.25

SITE NAME: Piedmont Landfill & Recycling Center

LOCATION: Kernersville, N.C.

Drilling Summary:

Total Depth: 44.5 '

Borehole Diameter: 9" nominal HSA/3" NQ

Casing Stick-up Height: +3.05'

Driller: Graham & Currie
West End, N.C.

Rig: CME 75

Bit(s): 8.75" Finger Bit - HSA to 0 - 35'
35' to 44.5' 3" diamond core bit

Drilling Fluid: None.

Protective Casing: Extension of C1

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
HSA				
Coring (NQ2)	3/12/94	1030	3/12/94	1640
Geophys. Logging:				
Casing:				
C1	3/13/94	09:00	3/13/94	09:20
C2	3/12/94	1645	3/12/94	1655
Filter Placement:	3/12/94	1655	3/12/94	1745
Bentonite Seal:	3/12/94	17:45	3/12/94	18:00
Cementing:	n/a	n/a	n/a	n/a
Development:	3/17/94	12:50	3/17/94	13:25

Piezometer Design & Specifications

Basis: Geologic Log: x Geophysical Log: ____
Casing String (s): C = Casing S = Screen
P= Plug

Depth	String(s)	Elevation
+3.12 - 1.88	C1	814.32 - 809.32
+3.05 - 39.41	C2	814.25 - 771.79
39.41 - 44.41	S1	771.79 - 766.79
44.41 - 44.50	P1	766.79 - 766.70
-		-

Casing: C1 4" round X 5' steel casing

C2 2" diameter Fuergeson Enterprises Sch 40 PVC.

Screen: S1 2" dia. Fuergeson Enterprises Sch 40 PVC w/ 0.010" slots

S2

Filter Pack: 34.8' to 44.5' Hoffman Silica Sand - Torpedo #2.

Grout Seal: n/a

Bentonite Seal: 0.0' to 34.8' DSI Sheer Plug Bentonite Chips.

Well Development:

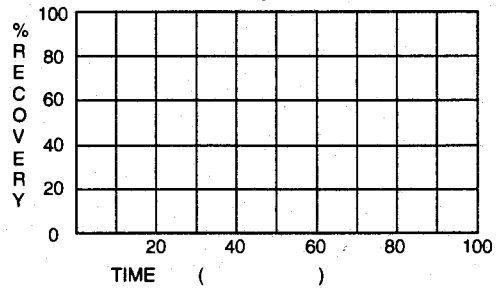
3/194:
Surge pumping. Total gallons removed ~ gallons.

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)

Recovery Data:

Q= S_o =



SUPERVISED BY: Ron Paulling

DATE: March 12, 1994

Comments:

APPENDIX C

GROUND WATER ELEVATION RECORDS

MEASURED GROUND WATER ELEVATIONS FOR EACH PIEZOMETER
Design Hydrogeologic Investigation
Forsyth County, North Carolina

Date	Piezometer/Well Number	Measuring Point		Depth To Water	Elevation Of Water	Comments
		Description	Elevation			
2/24/94	P-1-D	TOC	779.59	31.57	748.02	
3/2/94	P-1-D	TOC	779.59	32.72	746.87	
3/3/94	P-1-D	TOC	779.59	32.64	746.95	
3/5/94	P-1-D	TOC	779.59	32.66	746.93	
3/8/94	P-1-D	TOC	779.59	33.37	746.22	
3/11/94	P-1-D	TOC	779.59	33.29	746.3	
3/12/94	P-1-D	TOC	779.59	33.3	746.29	
3/14/94	P-1-D	TOC	779.59	33.31	746.28	
3/16/94	P-1-D	TOC	779.59	33.31	746.28	
3/17/94	P-1-D	TOC	779.59	33.36	746.23	
3/18/94	P-1-D	TOC	779.59	33.33	746.26	
3/22/94	P-1-D	TOC	779.59	33.48	746.11	
2/24/94	P-1-S	TOC	780.21	34.16	746.05	
3/2/94	P-1-S	TOC	780.21	34.09	746.12	
3/3/94	P-1-S	TOC	780.21	34.06	746.15	
3/5/94	P-1-S	TOC	780.21	34.01	746.2	
3/8/94	P-1-S	TOC	780.21	33.96	746.25	
3/11/94	P-1-S	TOC	780.21	33.84	746.37	
3/12/94	P-1-S	TOC	780.21	33.82	746.39	
3/14/94	P-1-S	TOC	780.21	33.77	746.44	
3/16/94	P-1-S	TOC	780.21	33.77	746.44	
3/17/94	P-1-S	TOC	780.21	33.79	746.42	
3/18/94	P-1-S	TOC	780.21	33.75	746.46	
3/22/94	P-1-S	TOC	780.21	33.89	746.32	
2/24/94	P-2-D	TOC	772.03	---------	---------	Not installed at this time.
3/2/94	P-2-D	TOC	772.03	---------	---------	Not installed at this time.
3/3/94	P-2-D	TOC	772.03	---------	---------	Not installed at this time.
3/5/94	P-2-D	TOC	772.03	25.07	746.96	
3/8/94	P-2-D	TOC	772.03	21.39	750.64	
3/11/94	P-2-D	TOC	772.03	21.32	750.71	
3/12/94	P-2-D	TOC	772.03	21.42	750.61	
3/14/94	P-2-D	TOC	772.03	21.44	750.59	
3/16/94	P-2-D	TOC	772.03	21.43	750.6	
3/17/94	P-2-D	TOC	772.03	21.76	750.27	
3/18/94	P-2-D	TOC	772.03	21.57	750.46	
3/22/94	P-2-D	TOC	772.03	21.6	750.43	
2/24/94	P-2-S	TOC	771.53	---------	---------	Not installed at this time.
3/2/94	P-2-S	TOC	771.53	---------	---------	Not installed at this time.
3/3/94	P-2-S	TOC	771.53	---------	---------	Not installed at this time.
3/5/94	P-2-S	TOC	771.53	20.7	750.83	
3/8/94	P-2-S	TOC	771.53	20.71	750.82	
3/11/94	P-2-S	TOC	771.53	20.66	750.87	
3/12/94	P-2-S	TOC	771.53	20.66	750.87	
3/14/94	P-2-S	TOC	771.53	20.68	750.85	
3/16/94	P-2-S	TOC	771.53	20.75	750.78	
3/17/94	P-2-S	TOC	771.53	20.93	750.6	
3/18/94	P-2-S	TOC	771.53	20.85	750.68	
3/22/94	P-2-S	TOC	771.53	20.92	750.61	

MEASURED GROUND WATER ELEVATIONS FOR EACH PIEZOMETER
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Date	Piezometer/Well Number	Measuring Point		Depth To Water	Elevation Of Water	Comments
		Description	Elevation			
2/24/94	P-3	TOC	811.06	---------	---------	Not installed at this time.
3/2/94	P-3	TOC	811.06	---------	---------	Not installed at this time.
3/3/94	P-3	TOC	811.06	---------	---------	Not installed at this time.
3/5/94	P-3	TOC	811.06	---------	---------	Being drilled } ?
3/8/94	P-3	TOC	811.06	---------	---------	Being drilled }
3/11/94	P-3	TOC	811.06	55.85	755.21	
3/12/94	P-3	TOC	811.06	55.88	755.18	
3/14/94	P-3	TOC	811.06	55.81	755.25	
3/16/94	P-3	TOC	811.06	55.78	755.28	
3/17/94	P-3	TOC	811.06	55.9	755.16	
3/18/94	P-3	TOC	811.06	55.75	755.31	
3/22/94	P-3	TOC	811.06	55.75	755.31	
2/24/94	P-4-D	TOC	840.48	---------	---------	Not installed at this time.
3/2/94	P-4-D	TOC	840.48	79.34	~~761.14~~	Taken through surface casing
3/3/94	P-4-D	TOC	840.48			Being cored.
3/5/94	P-4-D	TOC	840.48	---------	---------	Well not finished.
3/8/94	P-4-D	TOC	840.48	84.24	756.24	
3/11/94	P-4-D	TOC	840.48	84.41	756.07	
3/12/94	P-4-D	TOC	840.48	84.55	755.93	
3/14/94	P-4-D	TOC	840.48	84.37	756.11	
3/16/94	P-4-D	TOC	840.48	84.42	756.06	
3/17/94	P-4-D	TOC	840.48	84.75	755.73	
3/18/94	P-4-D	TOC	840.48	84.4	756.08	
3/22/94	P-4-D	TOC	840.48	84.46	756.02	
2/24/94	P-4-S	TOC	839.81	---------	---------	Not installed at this time.
3/2/94	P-4-S	TOC	839.81	83.34	756.47	
3/3/94	P-4-S	TOC	839.81	83.54	756.27	
3/5/94	P-4-S	TOC	839.81	83.78	756.03	
3/8/94	P-4-S	TOC	839.81	83.64	756.17	
3/11/94	P-4-S	TOC	839.81	83.86	755.95	
3/12/94	P-4-S	TOC	839.81	83.89	755.92	
3/14/94	P-4-S	TOC	839.81	83.69	756.12	
3/16/94	P-4-S	TOC	839.81	83.81	756	
3/17/94	P-4-S	TOC	839.81	83.9	755.91	
3/18/94	P-4-S	TOC	839.81	83.65	756.16	
3/22/94	P-4-S	TOC	839.81	83.85	755.96	
2/24/94	P-5	TOC	816.8	---------	---------	Not installed at this time.
3/2/94	P-5	TOC	816.8	---------	---------	Not installed at this time.
3/3/94	P-5	TOC	816.8	---------	---------	Not installed at this time.
3/5/94	P-5	TOC	816.8	---------	---------	Not installed at this time.
3/8/94	P-5	TOC	816.8	---------	---------	Not installed at this time.
3/11/94	P-5	TOC	816.8	---------	---------	Not installed at this time.
3/12/94	P-5	TOC	816.8	5.1	~~811.7~~	Well not completed.
3/14/94	P-5	TOC	816.8	56.4	760.4	
3/16/94	P-5	TOC	816.8	57.92	758.88	
3/17/94	P-5	TOC	816.8	58.03	758.77	
3/18/94	P-5	TOC	816.8	57.9	758.9	
3/22/94	P-5	TOC	816.8	58.05	758.75	

MEASURED GROUND WATER ELEVATIONS FOR EACH PIEZOMETER
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Date	Piezometer/Well Number	Measuring Point		Depth To Water	Elevation Of Water	Comments
		Description	Elevation			
2/24/94	P-6-D	TOC	769.16	4.48	764.68	
3/2/94	P-6-D	TOC	769.16	3.98	765.18	
3/3/94	P-6-D	TOC	769.16	Not read.	---------	
3/5/94	P-6-D	TOC	769.16	4.32	764.84	
3/8/94	P-6-D	TOC	769.16	7.11	762.05	
3/11/94	P-6-D	TOC	769.16	4.39	764.77	
3/12/94	P-6-D	TOC	769.16	4.49	764.67	
3/14/94	P-6-D	TOC	769.16	4.39	764.77	
3/16/94	P-6-D	TOC	769.16	4.51	764.65	
3/17/94	P-6-D	TOC	769.16	---------	---------	Not read.
3/18/94	P-6-D	TOC	769.16	4.49	764.67	
3/22/94	P-6-D	TOC	769.16	4.76	764.4	
2/24/94	P-6-S	TOC	770.7	5.02	765.68	
3/2/94	P-6-S	TOC	770.7	4.87	765.83	
3/3/94	P-6-S	TOC	770.7	Not read.	---------	
3/5/94	P-6-S	TOC	770.7	5.15	765.55	
3/8/94	P-6-S	TOC	770.7	5.17	765.53	
3/11/94	P-6-S	TOC	770.7	5.15	765.55	
3/12/94	P-6-S	TOC	770.7	5.21	765.49	
3/14/94	P-6-S	TOC	770.7	5.09	765.61	
3/16/94	P-6-S	TOC	770.7	5.19	765.51	
3/17/94	P-6-S	TOC	770.7	---------	---------	Not read.
3/18/94	P-6-S	TOC	770.7	5.14	765.56	
3/22/94	P-6-S	TOC	770.7	5.36	765.34	
2/24/94	P-7	TOC	766.88	17.12	749.76	
3/2/94	P-7	TOC	766.88	16.62	750.26	
3/3/94	P-7	TOC	766.88	16.66	750.22	
3/5/94	P-7	TOC	766.88	16.87	750.01	
3/8/94	P-7	TOC	766.88	17	749.88	
3/11/94	P-7	TOC	766.88	16.91	749.97	
3/12/94	P-7	TOC	766.88	16.81	750.07	
3/14/94	P-7	TOC	766.88	18.13	748.75	
3/16/94	P-7	TOC	766.88	16.15	750.73	
3/17/94	P-7	TOC	766.88	16.64	750.24	
3/18/94	P-7	TOC	766.88	15.58	751.3	
3/22/94	P-7	TOC	766.88	15.88	751	
2/24/94	P-8-D	TOC	780.79	---------	---------	Not installed at this time.
3/2/94	P-8-D	TOC	780.79	---------	---------	Not installed at this time.
3/3/94	P-8-D	TOC	780.79	---------	---------	Not installed at this time.
3/5/94	P-8-D	TOC	780.79	---------	---------	Not installed at this time.
3/8/94	P-8-D	TOC	780.79	---------	---------	Not installed at this time.
3/11/94	P-8-D	TOC	780.79	23.22	757.57	
3/12/94	P-8-D	TOC	780.79	23.26	757.53	
3/14/94	P-8-D	TOC	780.79	23.29	757.5	
3/16/94	P-8-D	TOC	780.79	23.35	757.44	
3/17/94	P-8-D	TOC	780.79	---------	---------	Not read.
3/18/94	P-8-D	TOC	780.79	23.13	757.66	
3/22/94	P-8-D	TOC	780.79	23.37	757.42	

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Date	Piezometer/Well Number	Measuring Point		Depth To Water	Elevation Of Water	Comments
		Description	Elevation			
2/24/94	P-8-S	TOC	779.43	23.36	756.07	
3/2/94	P-8-S	TOC	779.43	22.33	757.1	
3/3/94	P-8-S	TOC	779.43	22.7	756.73	
3/5/94	P-8-S	TOC	779.43	22.54	756.89	
3/8/94	P-8-S	TOC	779.43	22.43	757	
3/11/94	P-8-S	TOC	779.43	22.07	757.36	
3/12/94	P-8-S	TOC	779.43	22.03	757.4	
3/14/94	P-8-S	TOC	779.43	21.84	757.59	
3/16/94	P-8-S	TOC	779.43	21.82	757.61	
3/17/94	P-8-S	TOC	779.43	---------	---------	Not read.
3/18/94	P-8-S	TOC	779.43	21.68	757.75	
3/22/94	P-8-S	TOC	779.43	21.97	757.46	
2/24/94	P-9-D	TOC	831.25	---------	---------	Not installed at this time.
3/2/94	P-9-D	TOC	831.25	---------	---------	Not installed at this time.
3/3/94	P-9-D	TOC	831.25	---------	---------	Not installed at this time.
3/5/94	P-9-D	TOC	831.25	---------	---------	Not installed at this time.
3/8/94	P-9-D	TOC	831.25	---------	---------	Not installed at this time.
3/11/94	P-9-D	TOC	831.25	---------	---------	Not installed at this time.
3/12/94	P-9-D	TOC	831.25	---------	---------	Could not access (placement of rig)
3/14/94	P-9-D	TOC	831.25	---------	---------	Could not access (placement of rig)
3/16/94	P-9-D	TOC	831.25	---------	---------	Could not access (placement of rig)
3/17/94	P-9-D	TOC	831.25	---------	---------	Could not access (placement of rig)
3/18/94	P-9-D	TOC	831.25	95.04	736.21	Well developed < 24 hrs ago.
3/22/94	P-9-D	TOC	831.25	84.72	746.53	
2/24/94	P-9-S	TOC	831.57	---------	---------	Not installed at this time.
3/2/94	P-9-S	TOC	831.57	---------	---------	Not installed at this time.
3/3/94	P-9-S	TOC	831.57	---------	---------	Not installed at this time.
3/5/94	P-9-S	TOC	831.57	---------	---------	Not installed at this time.
3/8/94	P-9-S	TOC	831.57	---------	---------	Not installed at this time.
3/11/94	P-9-S	TOC	831.57	71.18	~~760.39~~	Taken through casing.
3/12/94	P-9-S	TOC	831.57	---------	---------	Could not access (placement of rig)
3/14/94	P-9-S	TOC	831.57	---------	---------	Could not access (placement of rig)
3/16/94	P-9-S	TOC	831.57	---------	---------	Could not access (placement of rig)
3/17/94	P-9-S	TOC	831.57	---------	---------	Could not access (placement of rig)
3/18/94	P-9-S	TOC	831.57	70.39	761.18	Wells were developed less than
3/22/94	P-9-S	TOC	831.57	70.68	760.89	
2/24/94	P-10	TOC	800.3	27.18	773.12	
3/2/94	P-10	TOC	800.3	27	773.3	
3/3/94	P-10	TOC	800.3	Not read.	---------	
3/5/94	P-10	TOC	800.3	27.15	773.15	
3/8/94	P-10	TOC	800.3	27.11	773.19	
3/11/94	P-10	TOC	800.3	27.15	773.15	
3/12/94	P-10	TOC	800.3	27.19	773.11	
3/14/94	P-10	TOC	800.3	26.99	773.31	
3/16/94	P-10	TOC	800.3	27.04	773.26	
3/17/94	P-10	TOC	800.3	27.05	773.25	
3/18/94	P-10	TOC	800.3	26.97	773.33	
3/22/94	P-10	TOC	800.3	27.18	773.12	

MEASURED GROUND WATER ELEVATIONS FOR EACH PIEZOMETER
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Date	Piezometer/Well Number	Measuring Point		Depth To Water	Elevation Of Water	Comments
		Description	Elevation			
2/24/94	P-11-D	TOC	795.5	---------	---------	Bentonite bridge at 18.47' below grade.
3/2/94	P-11-D	TOC	795.5	---------	---------	Bentonite plug in piezometer.
3/3/94	P-11-D	TOC	795.5	---------	---------	Bentonite plug in piezometer.
3/5/94	P-11-D	TOC	795.5	---------	---------	Crew clearing bentonite blockage.
3/8/94	P-11-D	TOC	795.5	41.01	754.49	
3/11/94	P-11-D	TOC	795.5	---------	---------	Not read.
3/12/94	P-11-D	TOC	795.5	---------	---------	Could not access (ponded water)
3/14/94	P-11-D	TOC	795.5	---------	---------	Could not access (ponded water)
3/16/94	P-11-D	TOC	795.5	---------	---------	Could not access (ponded water)
3/17/94	P-11-D	TOC	795.5	39.37	756.13	
3/18/94	P-11-D	TOC	795.5	---------	---------	Could not access (ponded water)
3/22/94	P-11-D	TOC	795.5	38.77	756.73	
2/24/94	P-11-S	TOC	794.44	40.42	754.02	
3/2/94	P-11-S	TOC	794.44	39.84	754.6	
3/3/94	P-11-S	TOC	794.44	40.01	754.43	
3/5/94	P-11-S	TOC	794.44	39.94	754.5	
3/8/94	P-11-S	TOC	794.44	40.59	753.85	
3/11/94	P-11-S	TOC	794.44	---------	---------	Not read.
3/12/94	P-11-S	TOC	794.44	---------	---------	Could not access (ponded water)
3/14/94	P-11-S	TOC	794.44	---------	---------	Could not access (ponded water)
3/16/94	P-11-S	TOC	794.44	---------	---------	Could not access (ponded water)
3/17/94	P-11-S	TOC	794.44	38.6	755.84	Could not access (ponded water)
3/18/94	P-11-S	TOC	794.44	---------	---------	Could not access (ponded water)
3/22/94	P-11-S	TOC	794.44	38	756.44	
2/24/94	P-12-D	TOC	812.97	43.18	769.79	
3/2/94	P-12-D	TOC	812.97	43.2	769.77	
3/3/94	P-12-D	TOC	812.97	44.34	768.63	
3/5/94	P-12-D	TOC	812.97	43.46	769.51	
3/8/94	P-12-D	TOC	812.97	43.4	769.57	
3/11/94	P-12-D	TOC	812.97	43.63	769.34	
3/12/94	P-12-D	TOC	812.97	43.57	769.4	
3/14/94	P-12-D	TOC	812.97	43.35	769.62	
3/16/94	P-12-D	TOC	812.97	43.48	769.49	
3/17/94	P-12-D	TOC	812.97	43.42	769.55	
3/18/94	P-12-D	TOC	812.97	43.31	769.66	
3/22/94	P-12-D	TOC	812.97	43.52	769.45	
2/24/94	P-12-S	TOC	814.2	44.12	770.08	
3/2/94	P-12-S	TOC	814.2	44.22	769.98	
3/3/94	P-12-S	TOC	814.2	44.36	769.84	
3/5/94	P-12-S	TOC	814.2	44.45	769.75	
3/8/94	P-12-S	TOC	814.2	44.33	769.87	
3/11/94	P-12-S	TOC	814.2	44.52	769.68	
3/12/94	P-12-S	TOC	814.2	44.41	769.79	
3/14/94	P-12-S	TOC	814.2	44.25	769.95	
3/16/94	P-12-S	TOC	814.2	44.32	769.88	
3/17/94	P-12-S	TOC	814.2	44.31	769.89	
3/18/94	P-12-S	TOC	814.2	44.17	770.03	
3/22/94	P-12-S	TOC	814.2	44.38	769.82	

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Date	Piezometer/Well Number	Measuring Point		Depth To Water	Elevation Of Water	Comments
		Description	Elevation			
2/24/94	P-13	TOC	757.33	10.43	746.9	
3/2/94	P-13	TOC	757.33	10.43	746.9	
3/3/94	P-13	TOC	757.33	Not read.	---------	
3/5/94	P-13	TOC	757.33	10.55	746.78	
3/8/94	P-13	TOC	757.33	10.97	746.36	
3/11/94	P-13	TOC	757.33	10.59	746.74	
3/12/94	P-13	TOC	757.33	10.73	746.6	
3/14/94	P-13	TOC	757.33	10.6	746.73	
3/16/94	P-13	TOC	757.33	10.67	746.66	
3/17/94	P-13	TOC	757.33	10.67	746.66	
3/18/94	P-13	TOC	757.33	10.61	746.72	
3/22/94	P-13	TOC	757.33	10.81	746.52	
2/24/94	P-14-D	TOC	808.65	38.34	770.31	
3/2/94	P-14-D	TOC	808.65	38.38	770.27	
3/3/94	P-14-D	TOC	808.65	38.45	770.2	
3/5/94	P-14-D	TOC	808.65	38.64	770.01	
3/8/94	P-14-D	TOC	808.65	39.33	769.32	
3/11/94	P-14-D	TOC	808.65	39.26	769.39	
3/12/94	P-14-D	TOC	808.65	39.38	769.27	
3/14/94	P-14-D	TOC	808.65	39.32	769.33	
3/16/94	P-14-D	TOC	808.65	39.75	768.9	
3/17/94	P-14-D	TOC	808.65	40.07	768.58	
3/18/94	P-14-D	TOC	808.65	40.02	768.63	
3/22/94	P-14-D	TOC	808.65	39.89	768.76	
2/24/94	P-14-S	TOC	808.43	37.81	770.62	
3/2/94	P-14-S	TOC	808.43	37.84	770.59	
3/3/94	P-14-S	TOC	808.43	37.89	770.54	
3/5/94	P-14-S	TOC	808.43	38.11	770.32	
3/8/94	P-14-S	TOC	808.43	38.96	769.47	
3/11/94	P-14-S	TOC	808.43	39	769.43	
3/12/94	P-14-S	TOC	808.43	39.11	769.32	
3/14/94	P-14-S	TOC	808.43	39.08	769.35	
3/16/94	P-14-S	TOC	808.43	39.62	768.81	
3/17/94	P-14-S	TOC	808.43	39.99	768.44	
3/18/94	P-14-S	TOC	808.43	39.99	768.44	
3/22/94	P-14-S	TOC	808.43	39.49	768.94	
2/24/94	P-15-D	TOC	768.23	---------	---------	Not installed at this time.
3/2/94	P-15-D	TOC	768.23	---------	---------	Not installed at this time.
3/3/94	P-15-D	TOC	768.23	---------	---------	Not installed at this time.
3/5/94	P-15-D	TOC	768.23	---------	---------	Not installed at this time.
3/8/94	P-15-D	TOC	768.23	---------	---------	Not installed at this time.
3/11/94	P-15-D	TOC	768.23	---------	---------	Not installed at this time.
3/12/94	P-15-D	TOC	768.23	---------	---------	Well not completed.
3/14/94	P-15-D	TOC	768.23	16.39	751.84	
3/16/94	P-15-D	TOC	768.23	15.52	752.71	
3/17/94	P-15-D	TOC	768.23	15.59	752.64	
3/18/94	P-15-D	TOC	768.23	15.5	752.73	
3/22/94	P-15-D	TOC	768.23	15.79	752.44	

MEASURED GROUND WATER ELEVATIONS FOR EACH PIEZOMETER
Design Hydrogeologic Investigation
Forsyth County, North Carolina

Date	Piezometer/Well Number	Measuring Point		Depth To Water	Elevation Of Water	Comments
		Description	Elevation			
2/24/94	P-15-S	TOC	769.77	---------	---------	Not installed at this time. ?
3/2/94	P-15-S	TOC	769.77	15.39	754.38	
3/3/94	P-15-S	TOC	769.77	Not read.	---------	
3/5/94	P-15-S	TOC	769.77	15.78	753.99	
3/8/94	P-15-S	TOC	769.77	16.03	753.74	
3/11/94	P-15-S	TOC	769.77	15.88	753.89	
3/12/94	P-15-S	TOC	769.77	15.87	753.9	
3/14/94	P-15-S	TOC	769.77	15.89	753.88	
3/16/94	P-15-S	TOC	769.77	16.11	753.66	
3/17/94	P-15-S	TOC	769.77	16.2	753.57	
3/18/94	P-15-S	TOC	769.77	16.08	753.69	
3/22/94	P-15-S	TOC	769.77	16.43	753.34	
2/24/94	P-16	TOC	814.25	---------	---------	Not installed at this time.
3/2/94	P-16	TOC	814.25	---------	---------	Not installed at this time.
3/3/94	P-16	TOC	814.25	---------	---------	Not installed at this time.
3/5/94	P-16	TOC	814.25	---------	---------	Not installed at this time.
3/8/94	P-16	TOC	814.25	---------	---------	Not installed at this time.
3/11/94	P-16	TOC	814.25	---------	---------	Not installed at this time.
3/12/94	P-16	TOC	814.25	---------	---------	Well not completed.
3/14/94	P-16	TOC	814.25	37.67	776.58	
3/16/94	P-16	TOC	814.25	36.47	777.78	
3/17/94	P-16	TOC	814.25	35.9	778.35	
3/18/94	P-16	TOC	814.25	35.82	778.43	
3/22/94	P-16	TOC	814.25	35.82	778.43	

APPENDIX D

IN-SITU HYDRAULIC CONDUCTIVITY

SUMMARY OF IN SITU HYDRAULIC CONDUCTIVITY TESTING RESULTS
SLUG TEST ANALYSIS - MODIFIED BOUWER-RICE METHOD

Client: Waste Management of The Piedmont
Location: Piedmont Landfill - Kernersvile, NC
Job Number: 87221.700
Analysis Date: March 8 - 18, 1994
Assumed porosity of the sand pack: 0.3

Piezometer Number	rc feet	rc' feet	Le feet	rw feet	Le/rw	Lw feet	H feet	A	B	C	yo feet	yt feet	t sec	K ft/sec	K ft/day	K cm/sec	T gpd/ft	ln(H-Lw) rw	ln(re/rw)	Lw<H	Lw=H	ln(H-Lw) rw
MW-1FH	0.083	0.083	5.00	0.250	20.00	7.99	51.00	2.10	0.30	1.70	2.10	0.01	170	4.37E-05	3.777	1.33E-03	1,441	5.148	2.001	2.0	2.48	5.15
MW-1RH	0.083	0.083	5.00	0.250	20.00	7.99	51.00	2.10	0.30	1.70	1.95	0.01	170	4.31E-05	3.724	1.31E-03	1,421	5.148	2.001	2.0	2.48	5.15
MW-2FH	0.083	0.083	5.00	0.417	12.00	6.45	43.00	1.90	0.25	1.30	2.83	0.01	322	1.86E-05	1.611	5.68E-04	518	4.474	1.531	1.5	1.96	4.47
MW-2RH	0.083	0.083	5.00	0.417	12.00	6.45	43.00	1.90	0.25	1.30	1.70	0.01	440	1.24E-05	1.072	3.78E-04	345	4.474	1.531	1.5	1.96	4.47
MW-3FH	0.083	0.083	5.00	0.417	12.00	12.45	23.00	1.90	0.25	1.30	2.00	0.01	660	1.01E-05	0.877	3.09E-04	151	3.232	1.820	1.8	2.31	3.23
MW-3RH	0.083	0.083	5.00	0.417	12.00	12.45	23.00	1.90	0.25	1.30	1.87	0.02	580	9.89E-06	0.854	3.01E-04	147	3.232	1.820	1.8	2.31	3.23
MW-4FH	0.083	0.083	5.00	0.417	12.00	14.10	54.00	1.90	0.25	1.30	0.54	0.01	249	1.97E-05	1.699	5.99E-04	686	4.562	1.768	1.8	2.38	4.56
MW-4RH	0.083	0.083	5.00	0.417	12.00	14.10	54.00	1.90	0.25	1.30	0.68	0.01	245	2.11E-05	1.827	6.44E-04	738	4.562	1.768	1.8	2.38	4.56
MW-5FH	0.083	0.083	5.00	0.417	12.00	13.45	54.00	1.90	0.25	1.30	1.97	0.01	440	1.46E-05	1.263	4.46E-04	510	4.578	1.753	1.8	2.35	4.58
MW-5RH	0.083	0.083	5.00	0.417	12.00	13.45	54.00	1.90	0.25	1.30	1.77	0.01	450	1.40E-05	1.210	4.27E-04	489	4.578	1.753	1.8	2.35	4.58
MW-6FH	0.083	0.083	5.00	0.333	15.00	6.85	67.00	2.00	0.25	1.50	2.09	0.30	615	3.75E-06	0.324	1.14E-04	163	5.195	1.713	1.7	2.16	5.20
MW-6RH	0.083	0.083	5.00	0.333	15.00	6.85	67.00	2.00	0.25	1.50	1.83	0.10	935	3.70E-06	0.320	1.13E-04	160	5.195	1.713	1.7	2.16	5.20
P-1-DFH	0.083	0.083	5.00	0.125	40.00	54.90	1.00	2.70	0.40	2.40	2.00	1.00	630	3.17E-06	0.274	9.67E-05	2		4.153	4.0	4.15	
P-1-DRH	0.083	0.083	5.00	0.125	40.00	54.90	1.00	2.70	0.40	2.40	2.20	1.20	900	1.94E-06	0.168	5.92E-05	1		4.153	4.0	4.15	
P-1-SFH	0.083	0.083	5.00	0.250	20.00	9.20	25.00	2.10	0.30	1.70	1.90	0.70	360	4.08E-06	0.352	1.24E-04	66	4.146	2.117	2.1	2.56	4.15
P-1-SRH	0.083	0.083	5.00	0.250	20.00	9.20	25.00	2.10	0.30	1.70	1.90	1.00	570	1.66E-06	0.143	5.05E-05	27	4.146	2.117	2.1	2.56	4.15
P-2-DFH	0.083	0.083	5.00	0.250	20.00	38.47	39.00	2.10	0.30	1.70	2.10	0.01	550	2.02E-05	1.743	6.15E-04	508	0.751	2.988	3.0	3.30	0.75
P-2-DRH	0.083	0.083	5.00	0.250	20.00	38.47	39.00	2.10	0.30	1.70	2.08	1.73	1500	2.55E-07	0.022	7.77E-06	6	0.751	2.988	3.0	3.30	0.75
P-2-SFH	0.083	0.083	5.00	0.250	20.00	8.27	39.00	2.10	0.30	1.70	1.90	0.02	490	1.31E-05	1.134	4.00E-04	331	4.812	2.034	2.0	2.50	4.81
P-2-SRH	0.083	0.083	5.00	0.250	20.00	8.27	39.00	2.10	0.30	1.70	1.90	0.01	480	1.54E-05	1.334	4.71E-04	389	4.812	2.034	2.0	2.50	4.81
P-3-FH	0.083	0.083	5.00	0.250	20.00	13.00	20.00	2.10	0.30	1.70	1.87	0.50	240	8.81E-06	0.761	2.68E-04	114	3.332	2.307	2.3	2.75	3.33

Rock

Not a good test.
*** Not enough water for a meaningful test.

SUMMARY OF IN SITU HYDRAULIC CONDUCTIVITY TESTING RESULTS
SLUG TEST ANALYSIS - MODIFIED BOUWER-RICE METHOD

Client: Waste Management of The Piedmont
Location: Piedmont Landfill - Kernersvile, NC
Job Number: 87221.700
Analysis Date: March 8 - 18, 1994
Assumed porosity of the sand pack: 0.3

Piezometer Number	rc feet	rc' feet	Le feet	rw feet	Le/rw	Lw feet	H feet	A	B	C	yo feet	yt feet	t sec	K ft/sec	K ft/day	K cm/sec	T gpd/ft	ln(H-Lw) rw	ln(re/rw)	Lw<H	Lw=H	ln(H-Lw) rw
P-3-RH	0.083	0.083	5.00	0.250	20.00	13.00	20.00	2.10	0.30	1.70	1.95	0.10	595	8.00E-06	0.691	2.44E-04	103	3.332	2.307	2.3	2.75	3.33
P-4-DFH	0.083	0.083	5.00	0.375	13.33	54.45	5.00	1.95	0.25	1.40	2.00	1.00	785	1.88E-06	0.163	5.73E-05	6		3.068	2.7	3.07	
P-4-DRH	0.083	0.083	5.00	0.375	13.33	54.45	5.00	1.95	0.25	1.40	2.00	1.00	1840	8.03E-07	0.069	2.45E-05	3		3.068	2.7	3.07	
P-4-SFH	0.083	0.083	5.00	0.250	20.00	30.19	49.00	2.10	0.30	1.70	1.95	1.00	290	4.01E-06	0.346	1.22E-04	127	4.321	2.505	2.5	3.18	4.32
P-4-SRH	0.083	0.083	5.00	0.250	20.00	30.19	49.00	2.10	0.30	1.70	2.00	0.20	1180	3.39E-06	0.293	1.03E-04	107	4.321	2.505	2.5	3.18	4.32
P-5FH	0.083	0.083	4.50	0.125	36.00	4.50	5.00	2.55	0.35	2.20	2.90	1.00	510	4.12E-06	0.356	1.25E-04	13	1.386	2.556	2.6	2.72	1.39
P-5RH	0.083	0.083	4.50	0.125	36.00	4.50	5.00	2.55	0.35	2.20	3.10	0.40	650	6.21E-06	0.537	1.89E-04	20	1.386	2.556	2.6	2.72	1.39
P-6-DFH	0.083	0.083	5.00	0.375	13.33	52.64	69.00	1.95	0.25	1.40	2.10	0.65	1320	1.40E-06	0.121	4.28E-05	63	3.776	2.275	2.3	3.05	3.78
P-6-DRH	0.083	0.083	5.00	0.375	13.33	52.64	69.00	1.95	0.25	1.40	2.10	1.60	1740	2.47E-07	0.021	7.53E-06	11	3.776	2.275	2.3	3.05	3.78
P-6-SFH	0.083	0.083	5.00	0.375	13.33	8.92	69.00	1.95	0.25	1.40	1.77	0.12	210	1.51E-05	1.307	4.61E-04	674	5.077	1.699	1.7	2.21	5.08
P-6-SRH	0.083	0.083	5.00	0.375	13.33	8.92	69.00	1.95	0.25	1.40	1.47	0.01	430	1.37E-05	1.183	4.17E-04	611	5.077	1.699	1.7	2.21	5.08
P-7-FH	0.083	0.083	5.00	0.375	13.33	9.25	55.00	1.95	0.25	1.40	2.14	0.10	280	1.31E-05	1.133	4.00E-04	466	4.804	1.726	1.7	2.23	4.80
P-7-RH	0.083	0.083	5.00	0.375	13.33	9.25	55.00	1.95	0.25	1.40	2.00	0.10	1440	2.49E-06	0.215	7.60E-05	89	4.804	1.726	1.7	2.23	4.80
P-8-DFH	0.083	0.083	5.00	0.375	13.33	59.50	60.00	1.95	0.25	1.40	2.16	1.00	720	2.01E-06	0.174	6.14E-05	78	0.288	2.712	2.7	3.10	0.29
P-8-DRH	0.083	0.083	5.00	0.375	13.33	59.50	60.00	1.95	0.25	1.40	2.05	1.88	1020	1.60E-07	0.014	4.87E-06	6	0.288	2.712	2.7	3.10	0.29
P-8-SFH	0.083	0.083	5.00	0.250	20.00	11.57	60.00	2.10	0.30	1.70	1.20	0.60	150	6.82E-06	0.589	2.08E-04	264	5.266	2.124	2.1	2.69	5.27
P-8-SRH	0.083	0.083	5.00	0.250	20.00	11.57	60.00	2.10	0.30	1.70	1.60	0.10	745	5.49E-06	0.474	1.67E-04	213	5.266	2.124	2.1	2.69	5.27
P-9DFH	0.083	###	5.00	0.146	34.29	33.61	0.30	2.55	0.35	2.20	###	###	###	###	###	###	###		3.754	3.6	3.75	
P-9DRH	0.083	0.083	5.00	0.146	34.29	33.61	0.30	2.55	0.35	2.20	15.79	15.70	1200	1.24E-08	0.001	3.79E-07	0		3.754	3.6	3.75	
P-9SFH	0.083	0.083	5.00	0.146	34.29	5.31	5.00	2.55	0.35	2.20	3.36	1.00	385	5.91E-06	0.510	1.80E-04	19		2.702	2.6	2.70	
P-9SRH	0.083	0.083	5.00	0.146	34.29	5.31	5.00	2.55	0.35	2.20	1.67	0.01	690	1.39E-05	1.202	4.24E-04	45		2.702	2.6	2.70	
P-10-FH	0.083	0.083	5.00	0.250	20.00	20.04	63.00	2.10	0.30	1.70	2.00	0.40	270	9.56E-06	0.826	2.91E-04	389	5.147	2.309	2.3	2.98	5.15

ROCK
ROCK
ROCK

Not a good test.
*** Not enough water for a meaningful test.

SUMMARY OF IN SITU HYDRAULIC CONDUCTIVITY TESTING RESULTS
SLUG TEST ANALYSIS - MODIFIED BOUWER-RICE METHOD

Client: Waste Management of The Piedmont
Location: Piedmont Landfill - Kernersvile, NC
Job Number: 87221.700
Analysis Date: March 8 - 18, 1994
Assumed porosity of the sand pack: 0.3

Piezometer Number	rc feet	rc' feet	Le feet	rw feet	Le/rw	Lw feet	H feet	A	B	C	yo feet	yt feet	t sec	K ft/sec	K ft/day	K cm/sec	T gpd/ft	ln(H-Lw) rw	ln(re/rw)	Lw<H	Lw=H	ln(H-Lw) rw
P-10-RH	0.083	0.083	5.00	0.250	20.00	20.04	63.00	2.10	0.30	1.70	2.00	0.10	660	7.28E-06	0.629	2.22E-04	296	5.147	2.309	2.3	2.98	5.15
P-11-DFH	0.083	0.083	5.00	0.375	13.33	57.59	60.00	1.95	0.25	1.40	2.18	1.00	630	2.15E-06	0.186	6.55E-05	83	1.860	2.502	2.5	3.09	1.86
P-11-DRH	0.083	0.083	5.00	0.375	13.33	57.59	60.00	1.95	0.25	1.40	2.14	1.20	1030	9.76E-07	0.084	2.97E-05	38	1.860	2.502	2.5	3.09	1.86
P-11-SFH	0.083	0.083	5.00	0.250	20.00	13.16	60.00	2.10	0.30	1.70	1.87	1.67	150	1.14E-06	0.098	3.46E-05	44	5.233	2.169	2.2	2.76	5.23
P-11-SRH	0.083	0.083	5.00	0.250	20.00	13.16	60.00	2.10	0.30	1.70	2.14	1.65	780	5.02E-07	0.043	1.53E-05	19	5.233	2.169	2.2	2.76	5.23
P-12-DFH	0.083	0.083	5.00	0.125	40.00	35.03	5.00	2.70	0.40	2.40	2.18	0.80	540	5.05E-06	0.436	1.54E-04	16		3.919	3.8	3.92	
P-12-DRH	0.083	0.083	5.00	0.125	40.00	35.03	5.00	2.70	0.40	2.40	2.20	1.59	480	1.84E-06	0.159	5.61E-05	6		3.919	3.8	3.92	
P-12-SFH	0.083	0.083	5.00	0.250	20.00	14.49	20.00	2.10	0.30	1.70	2.06	1.00	308	3.86E-06	0.333	1.18E-04	50	3.093	2.368	2.4	2.81	3.09
P-12-SRH	0.083	0.083	5.00	0.250	20.00	14.49	20.00	2.10	0.30	1.70	2.00	1.28	900	8.15E-07	0.070	2.49E-05	11	3.093	2.368	2.4	2.81	3.09
P-13FH	0.083	0.083	5.00	0.250	20.00	50.56	51.00	2.10	0.30	1.70	2.00	1.00	430	3.49E-06	0.302	1.06E-04	115	0.565	3.119	3.1	3.42	0.57
P-13RH	0.083	0.083	5.00	0.250	20.00	50.56	51.00	2.10	0.30	1.70	2.04	1.57	1200	4.73E-07	0.041	1.44E-05	16	0.565	3.119	3.1	3.42	0.57
P-14-DFH	0.083	0.083	9.95	0.125	79.60	43.88	2.00	3.90	0.60	3.65	2.14	1.59	780	5.69E-07	0.049	1.73E-05	1		4.282	4.2	4.28	
P-14-DRH	0.083	0.083	9.95	0.125	79.60	43.88	2.00	3.90	0.60	3.65	2.14	2.00	310	3.26E-07	0.028	9.94E-06	0		4.282	4.2	4.28	
P-14-SFH	0.083	***	1.24	0.250	4.96	1.24	21.00	2.10	0.30	1.70	***	***	***	***	***	***	***	4.370	0.727	0.7	0.97	4.37
P-14-SRH	0.083	***	1.24	0.250	4.96	1.24	21.00	2.10	0.30	1.70	***	***	***	***	***	***	***	4.370	0.727	0.7	0.97	4.37
P-15DFH	0.083	0.083	5.00	0.125	40.00	37.00	5.00	2.70	0.40	2.40	2.17	0.50	890	4.52E-06	0.391	1.38E-04	15		3.948	3.8	3.95	
P-15DRH	0.083	0.083	5.00	0.125	40.00	37.00	5.00	2.70	0.40	2.40	2.16	0.70	1210	2.55E-06	0.221	7.78E-05	8		3.948	3.8	3.95	
P-15SFH	0.083	0.083	4.00	0.250	16.00	4.00	16.00	2.00	0.25	1.55	1.90	0.10	480	9.15E-06	0.790	2.79E-04	95	3.871	1.718	1.7	2.03	3.87
P-15SRH	0.083	0.083	4.00	0.250	16.00	4.00	16.00	2.00	0.25	1.55	2.00	0.10	470	9.50E-06	0.821	2.90E-04	98	3.871	1.718	1.7	2.03	3.87
P-16FH	0.083	0.083	5.00	0.125	40.00	8.59	5.00	2.70	0.40	2.40	2.16	1.00	660	2.53E-06	0.219	7.72E-05	8		3.125	3.1	3.12	
P-16RH	0.083	0.083	5.00	0.125	40.00	8.59	5.00	2.70	0.40	2.40	4.80	4.00	490	8.07E-07	0.070	2.46E-05	3		3.125	3.1	3.12	

ROCK

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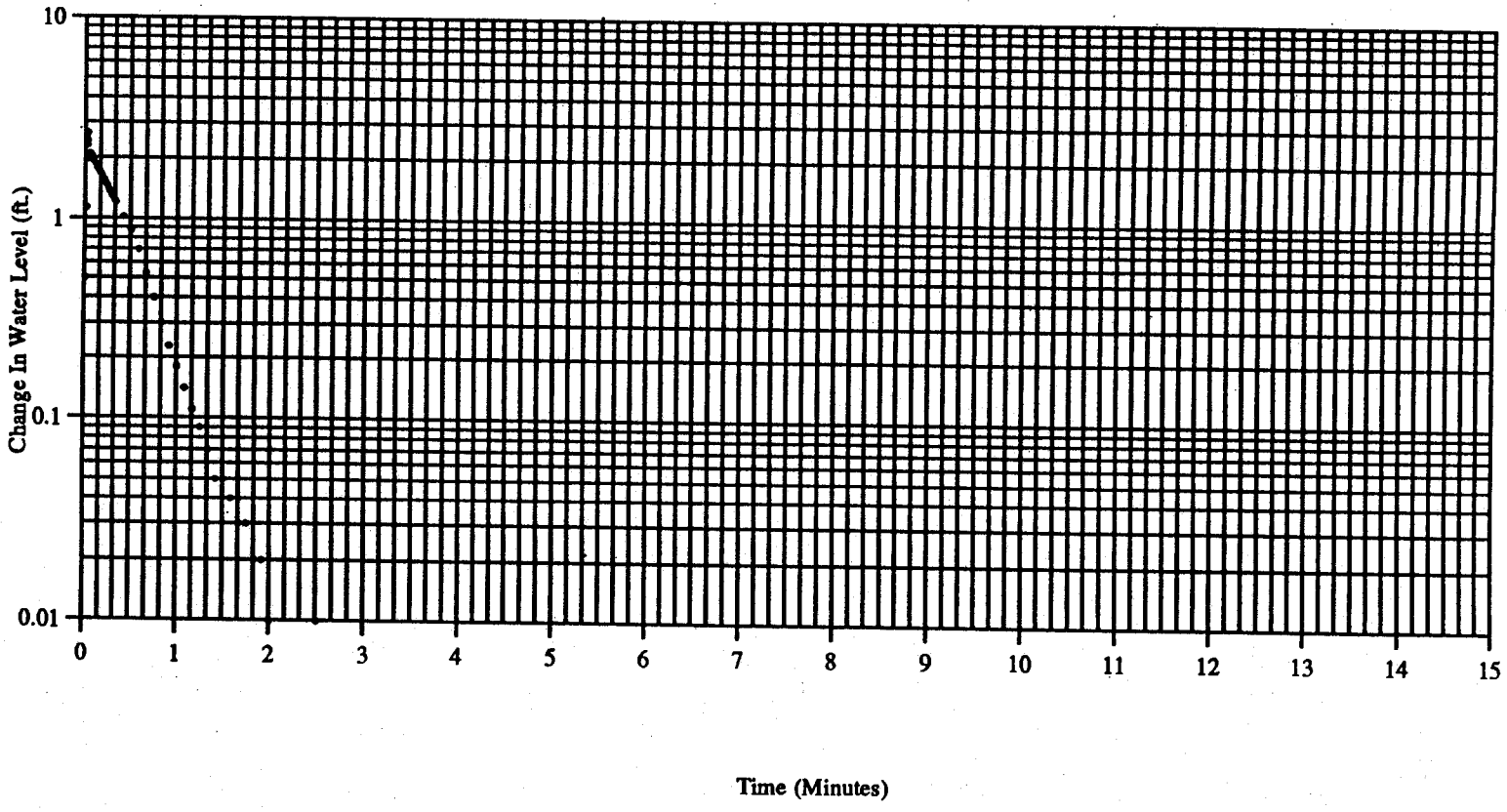
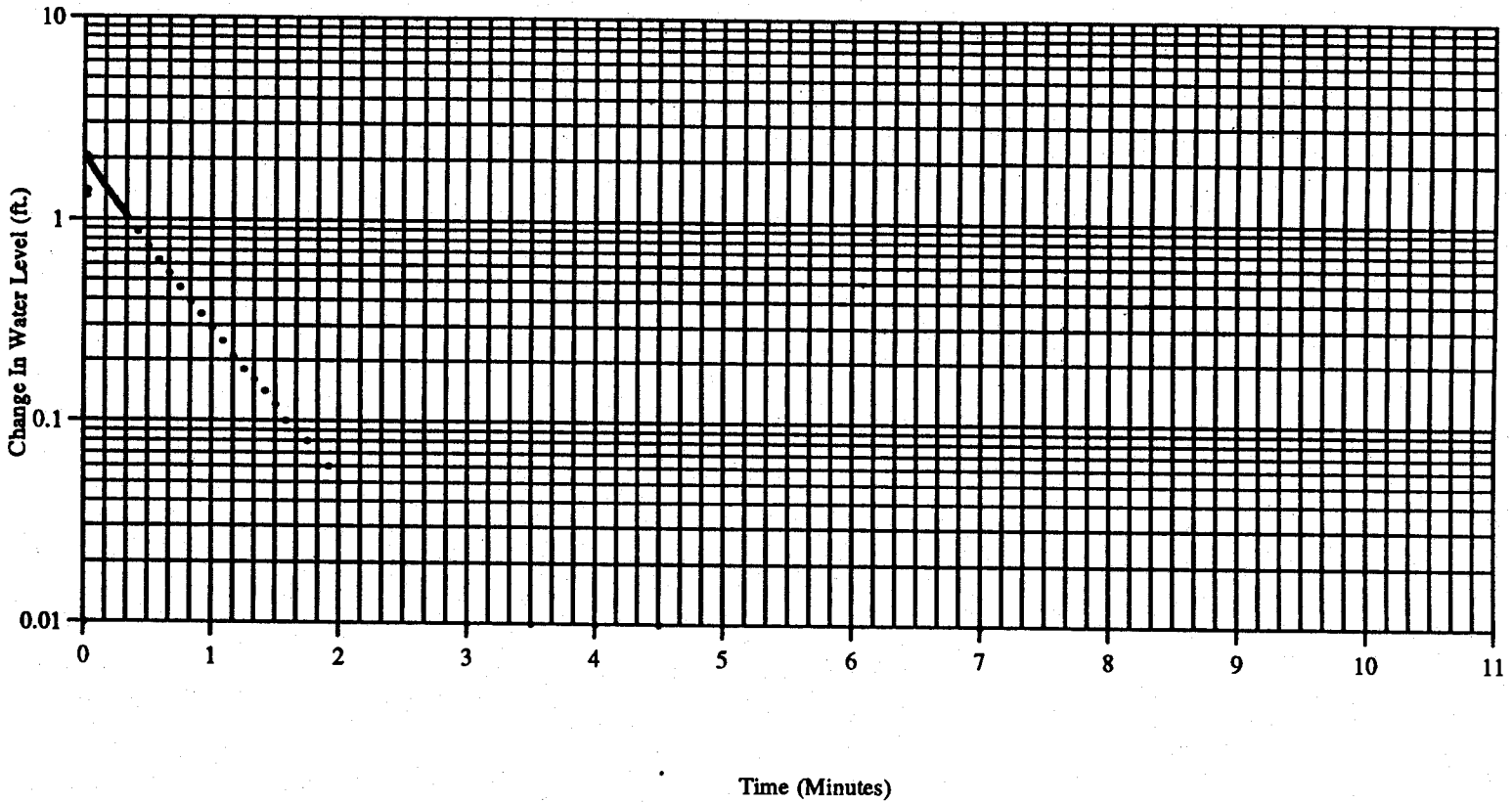
Not a good test.
*** Not enough water for a meaningful test.

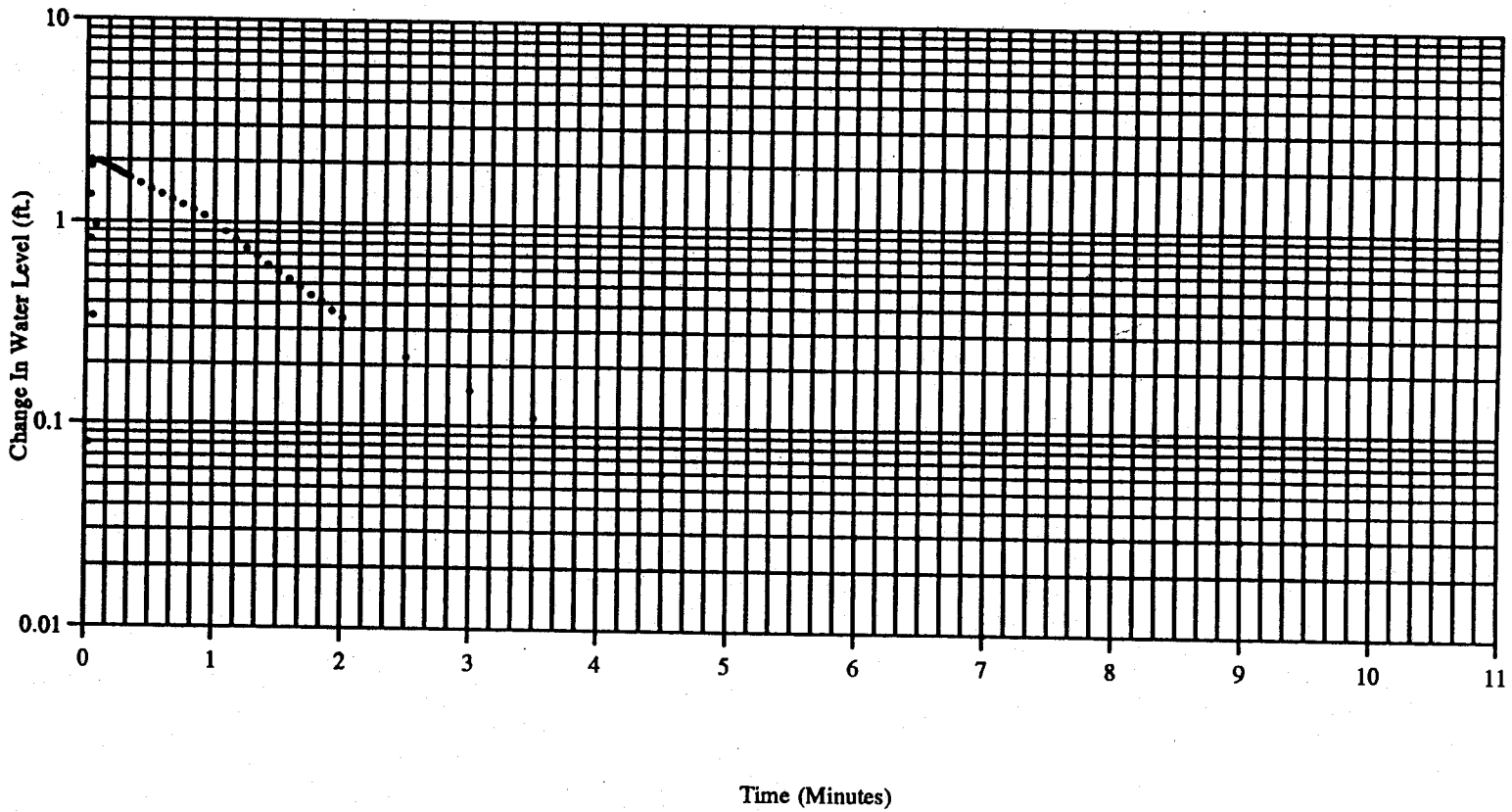
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-1(Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



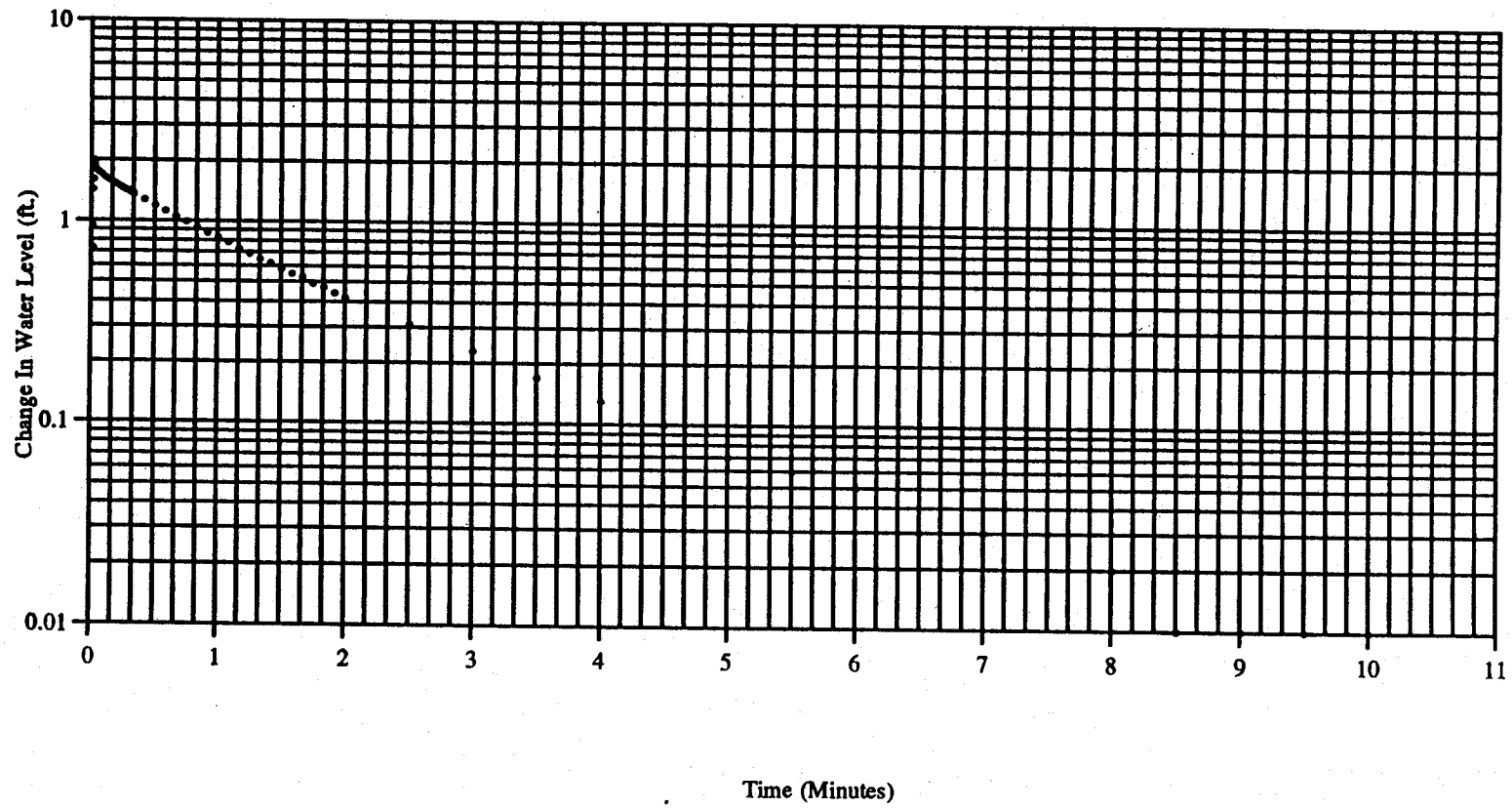
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-1 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



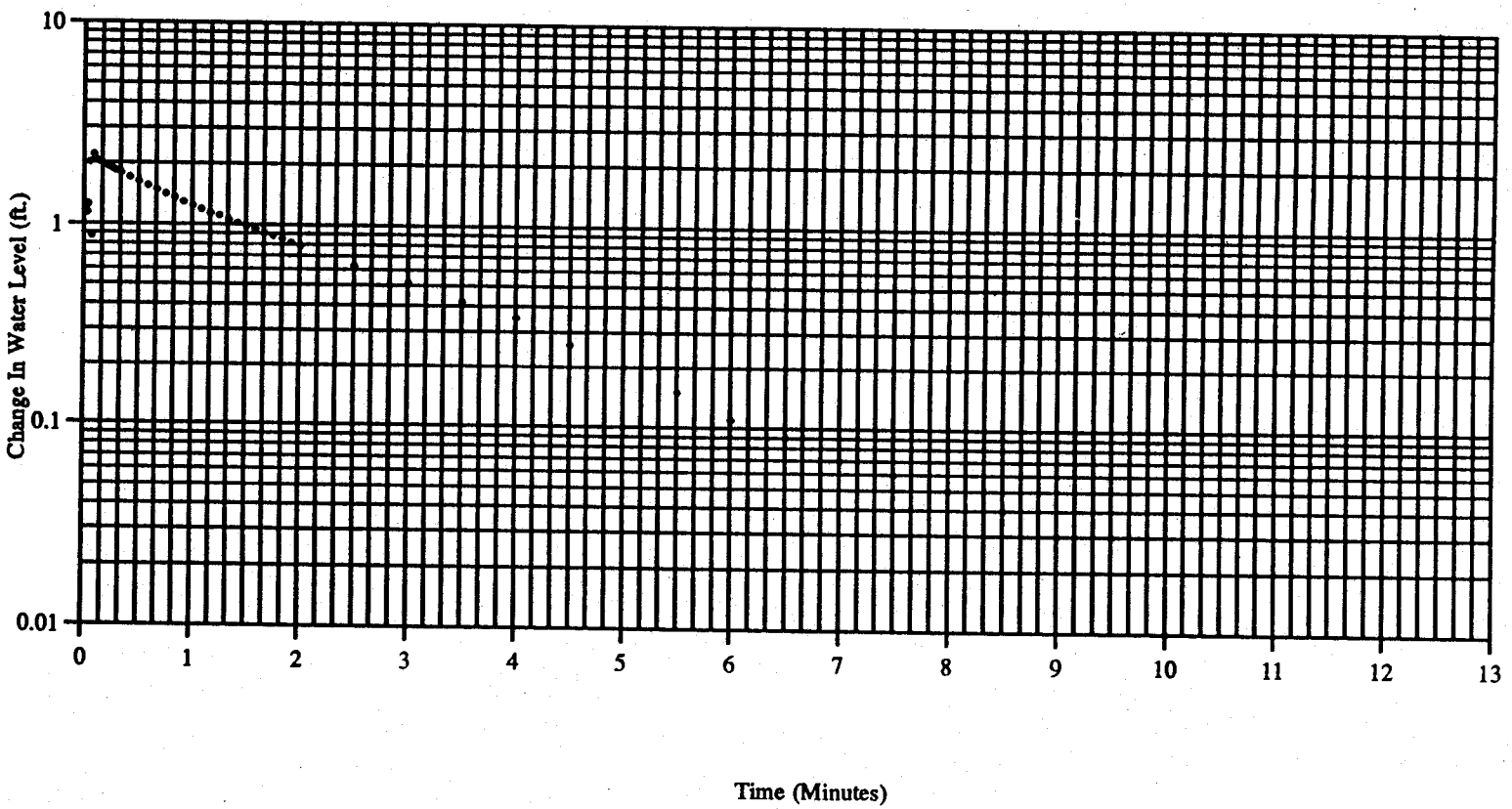
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-2 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



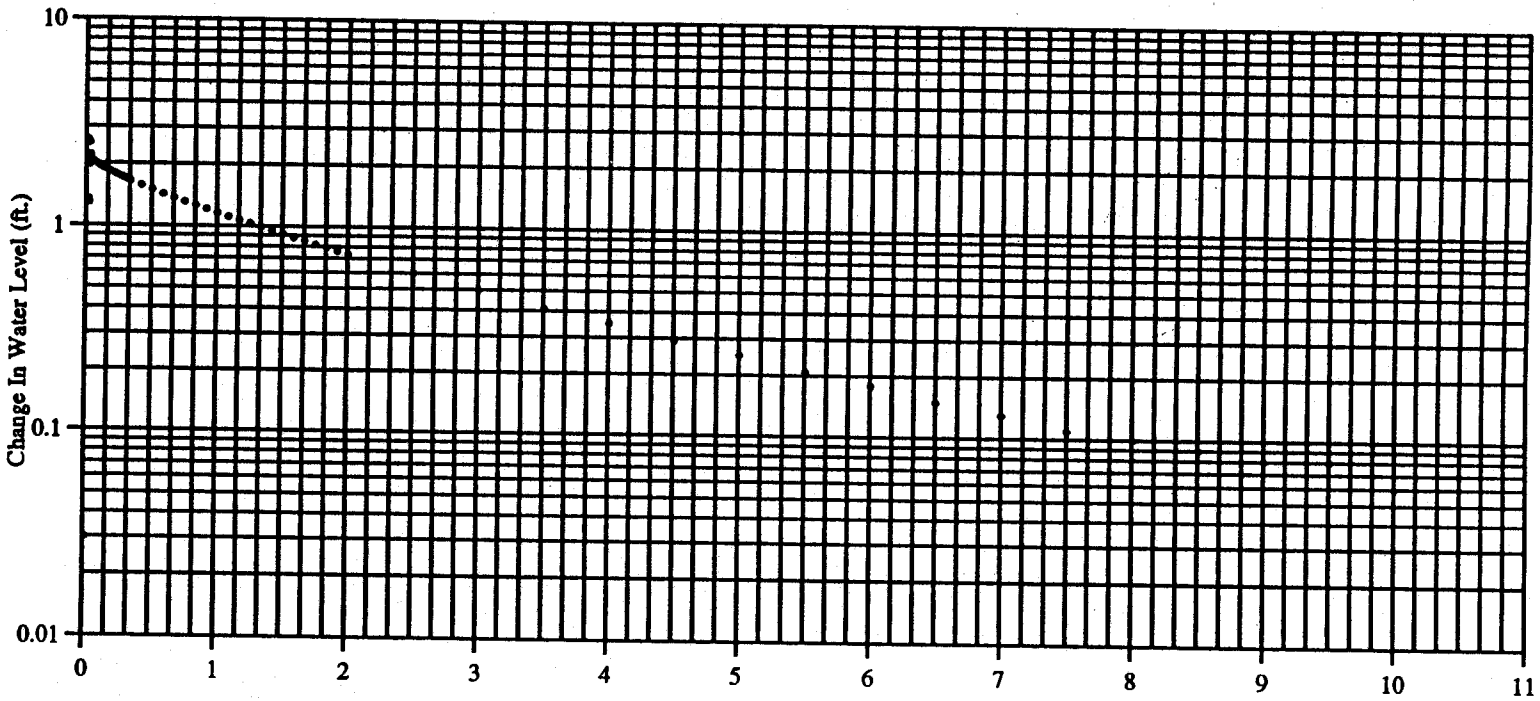
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-2 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



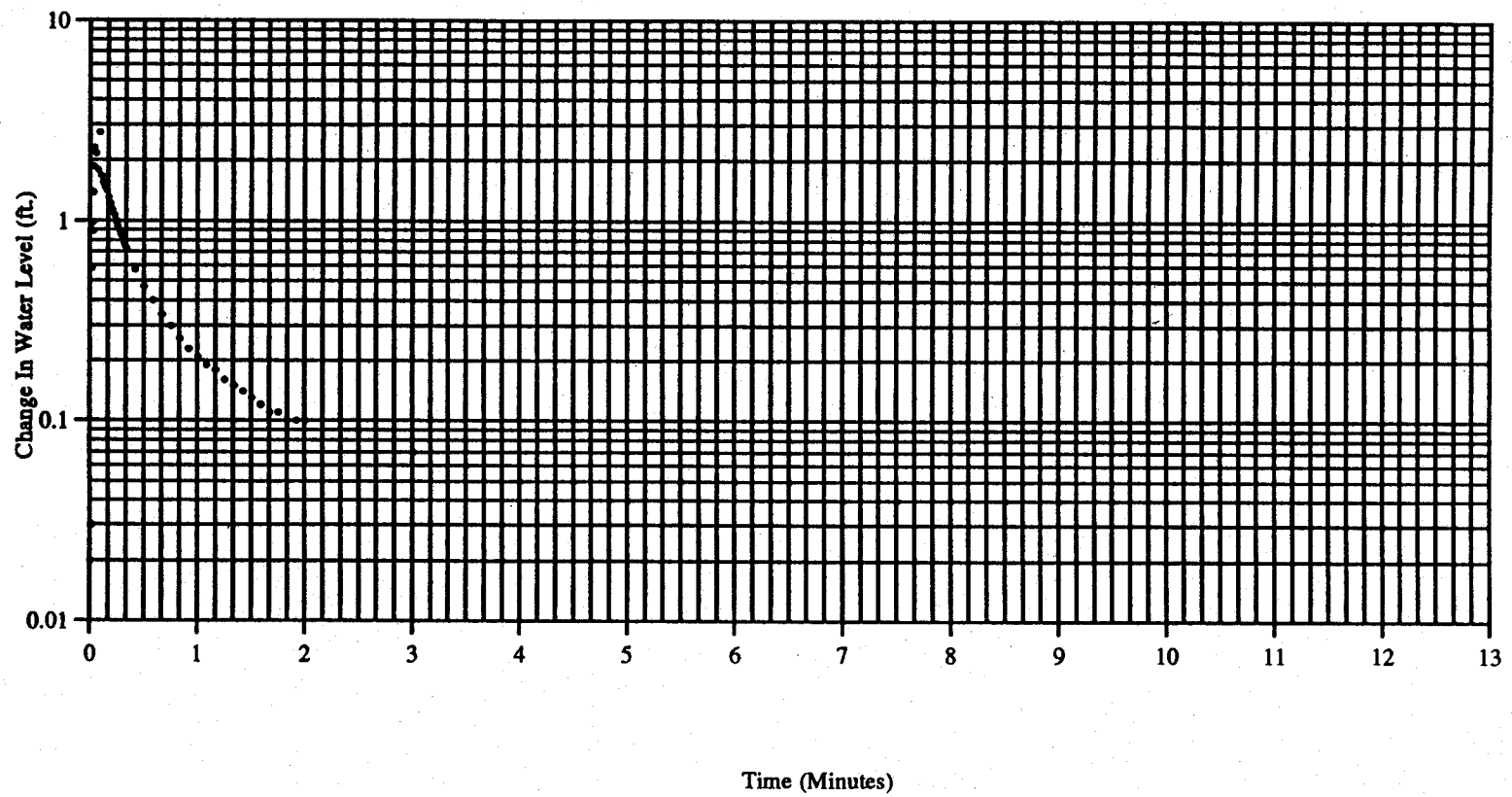
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-3 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



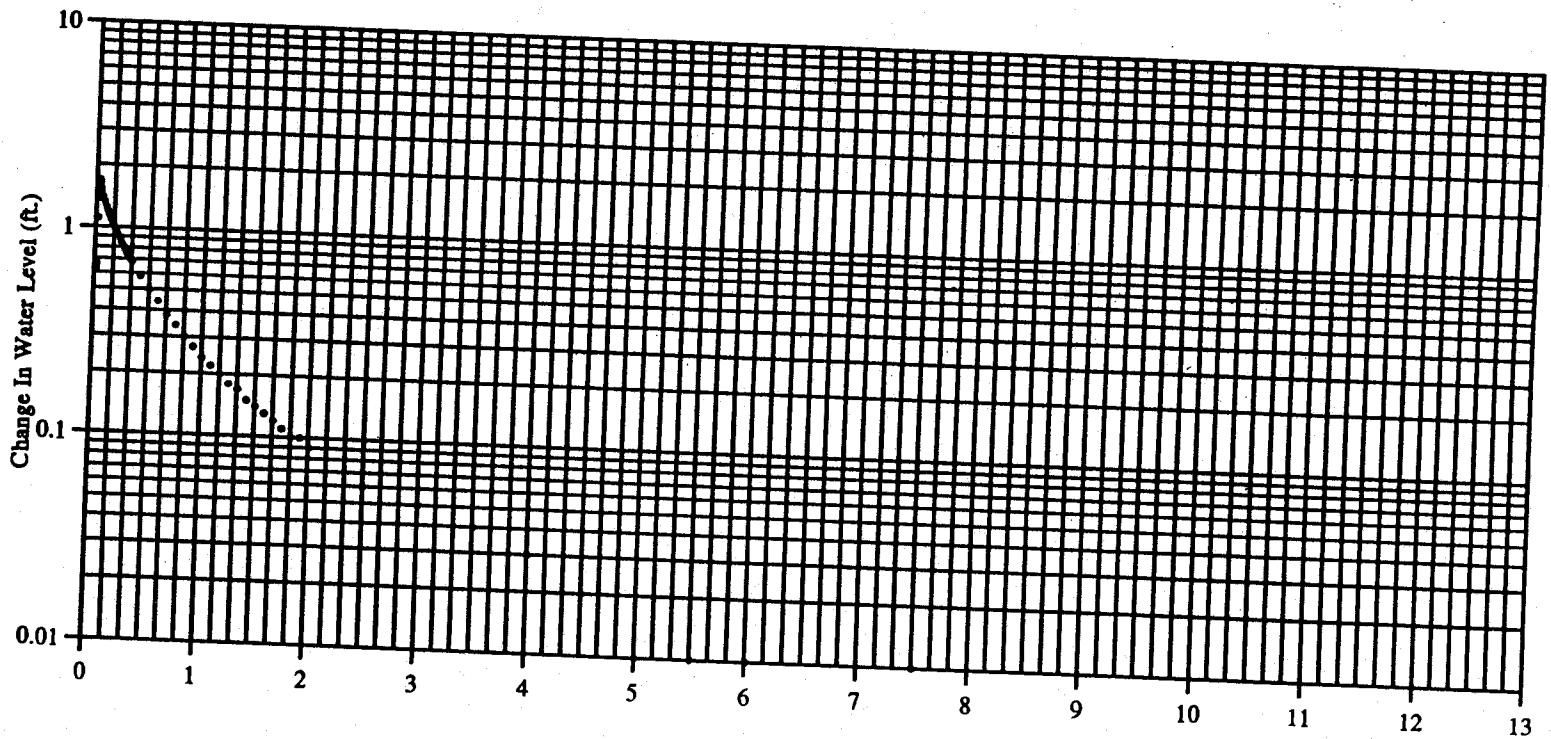
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-3 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



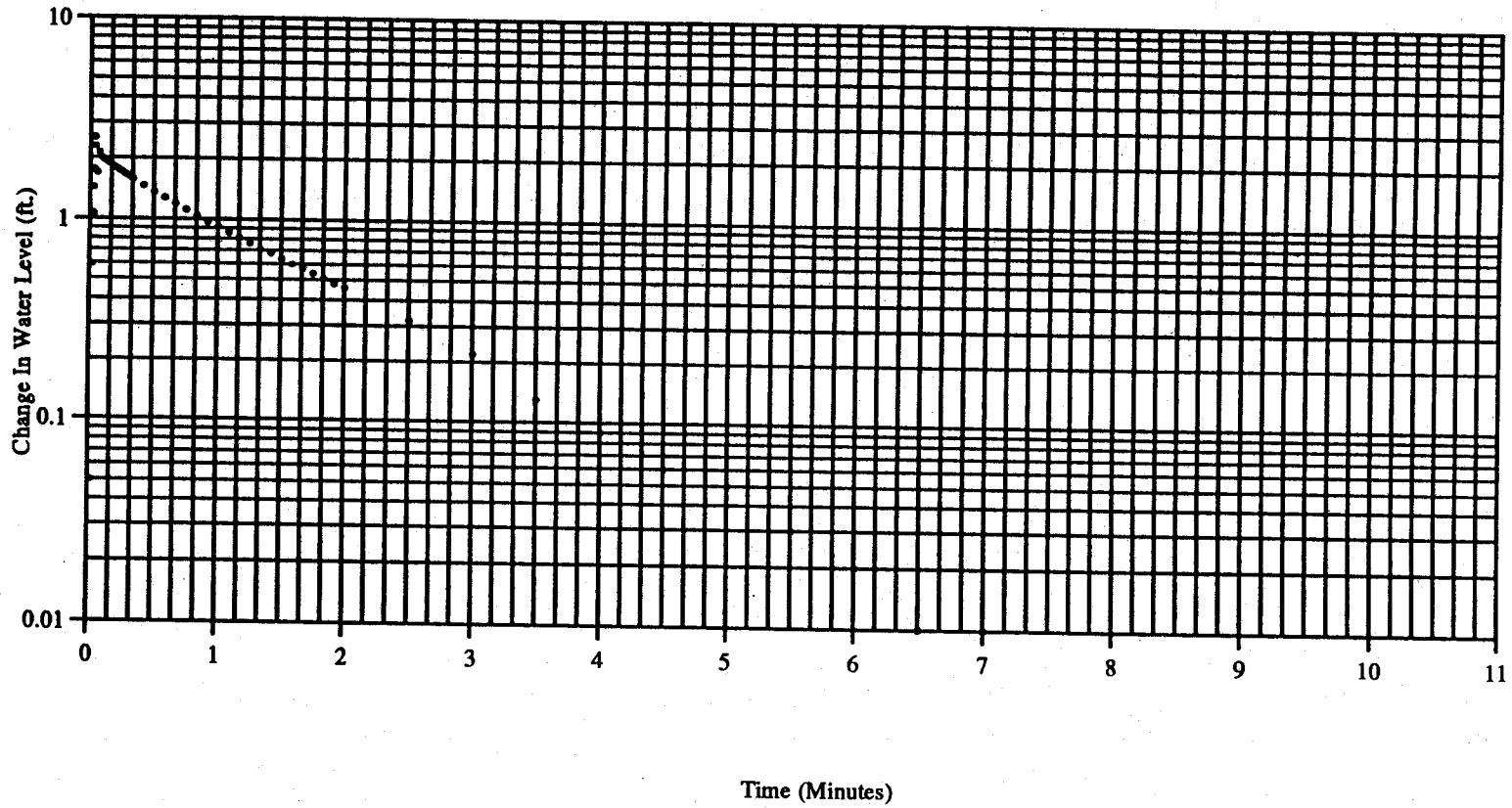
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-4 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



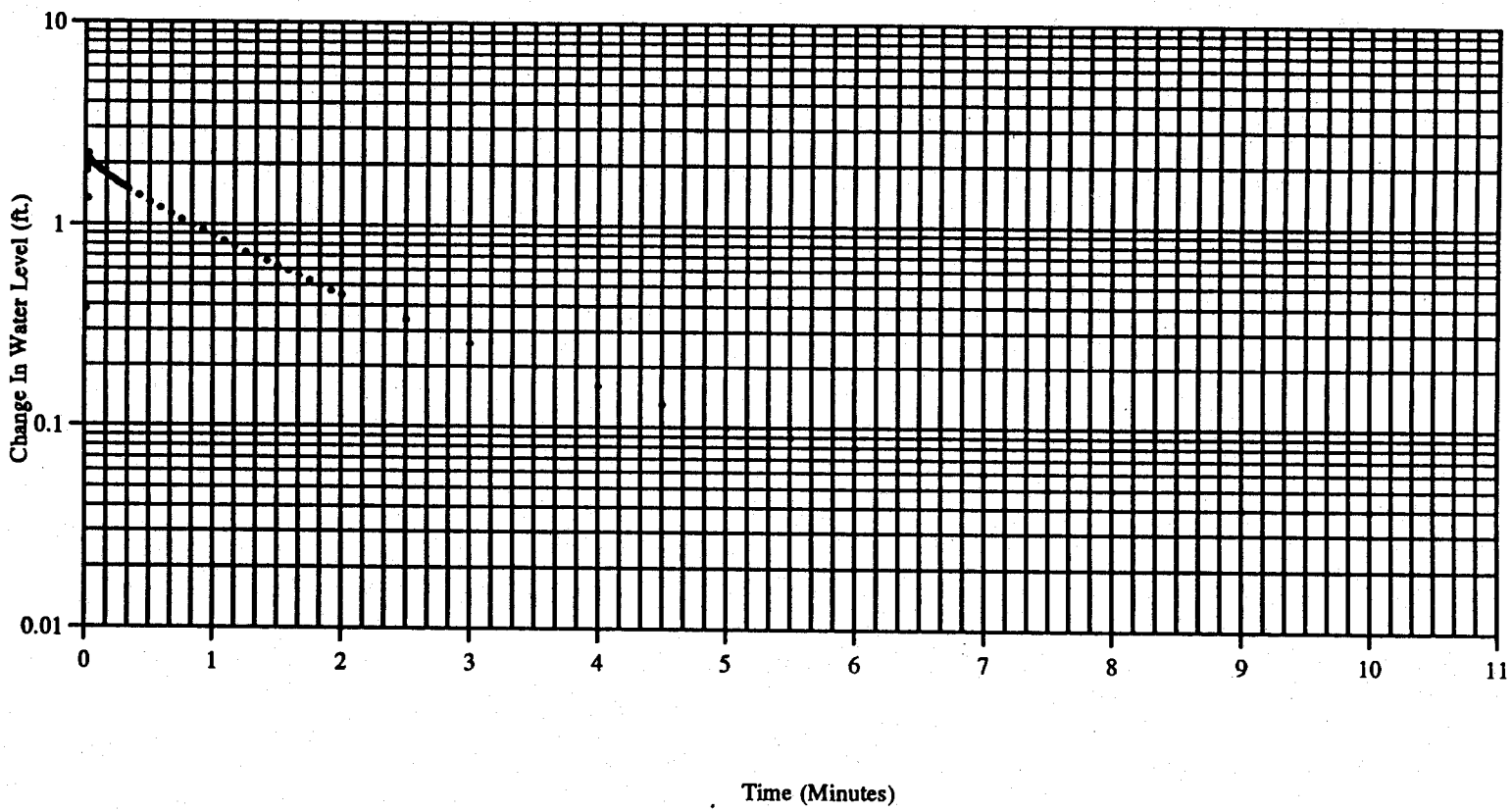
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-4 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



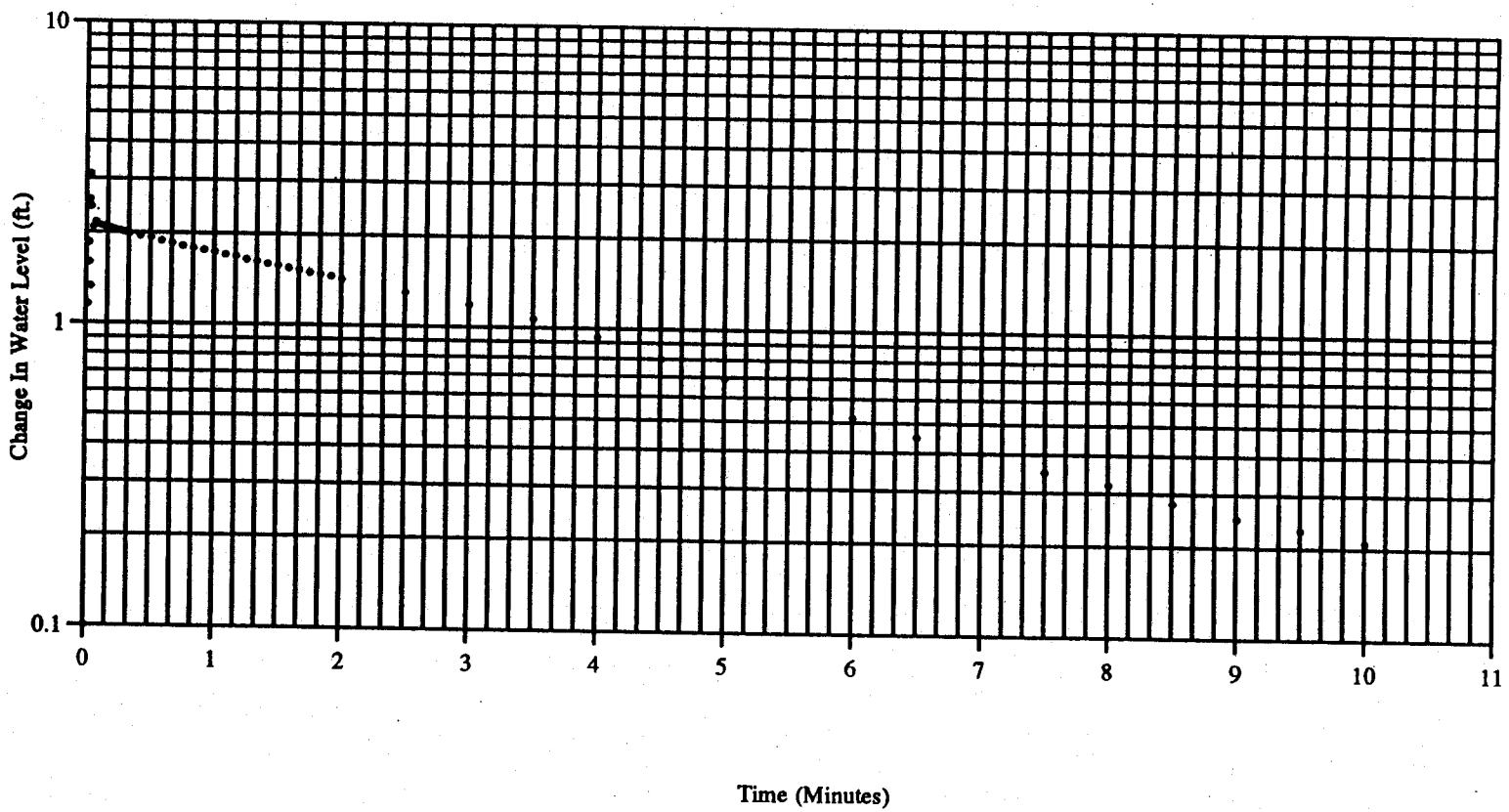
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-5 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



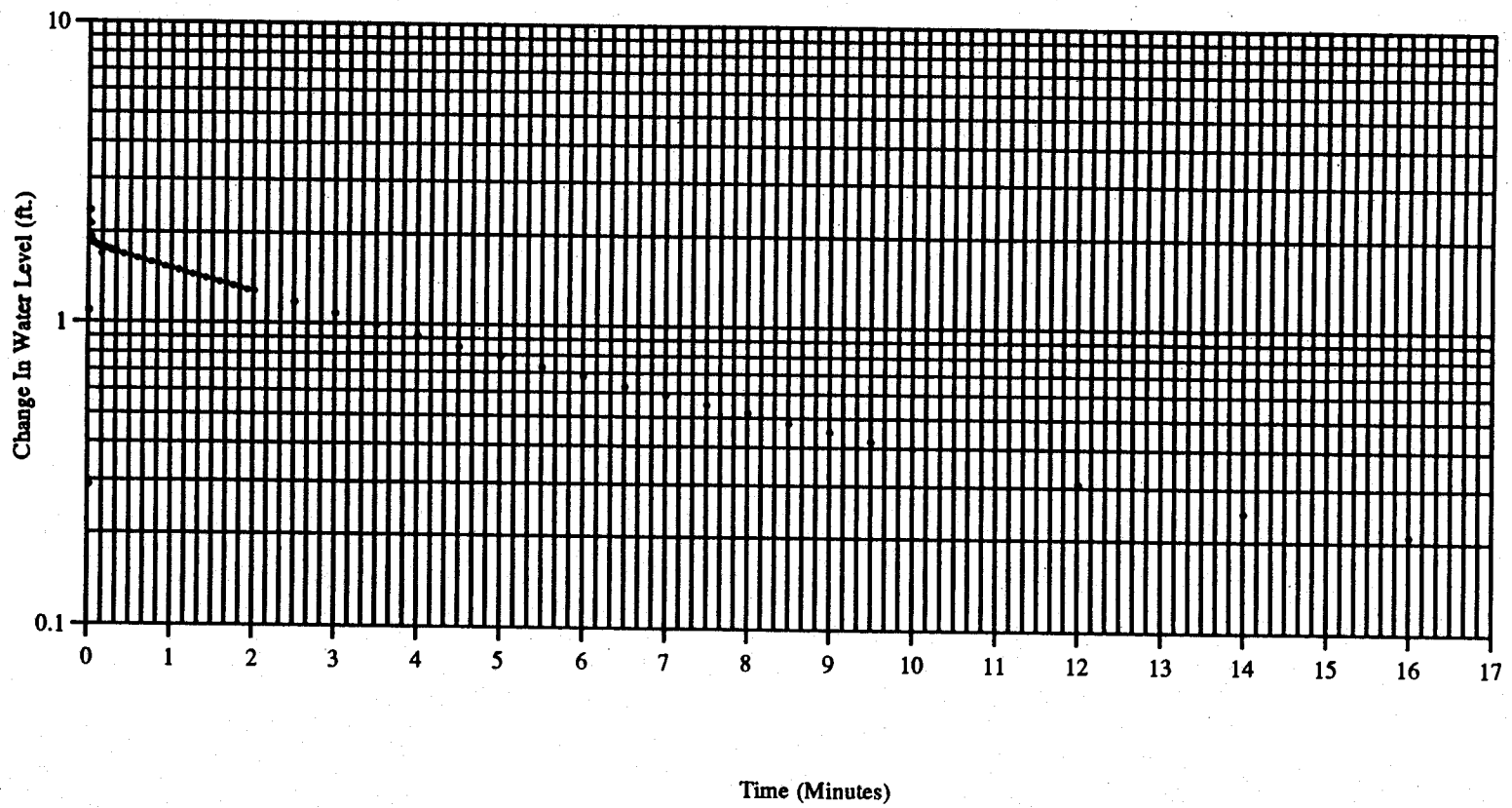
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-5 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



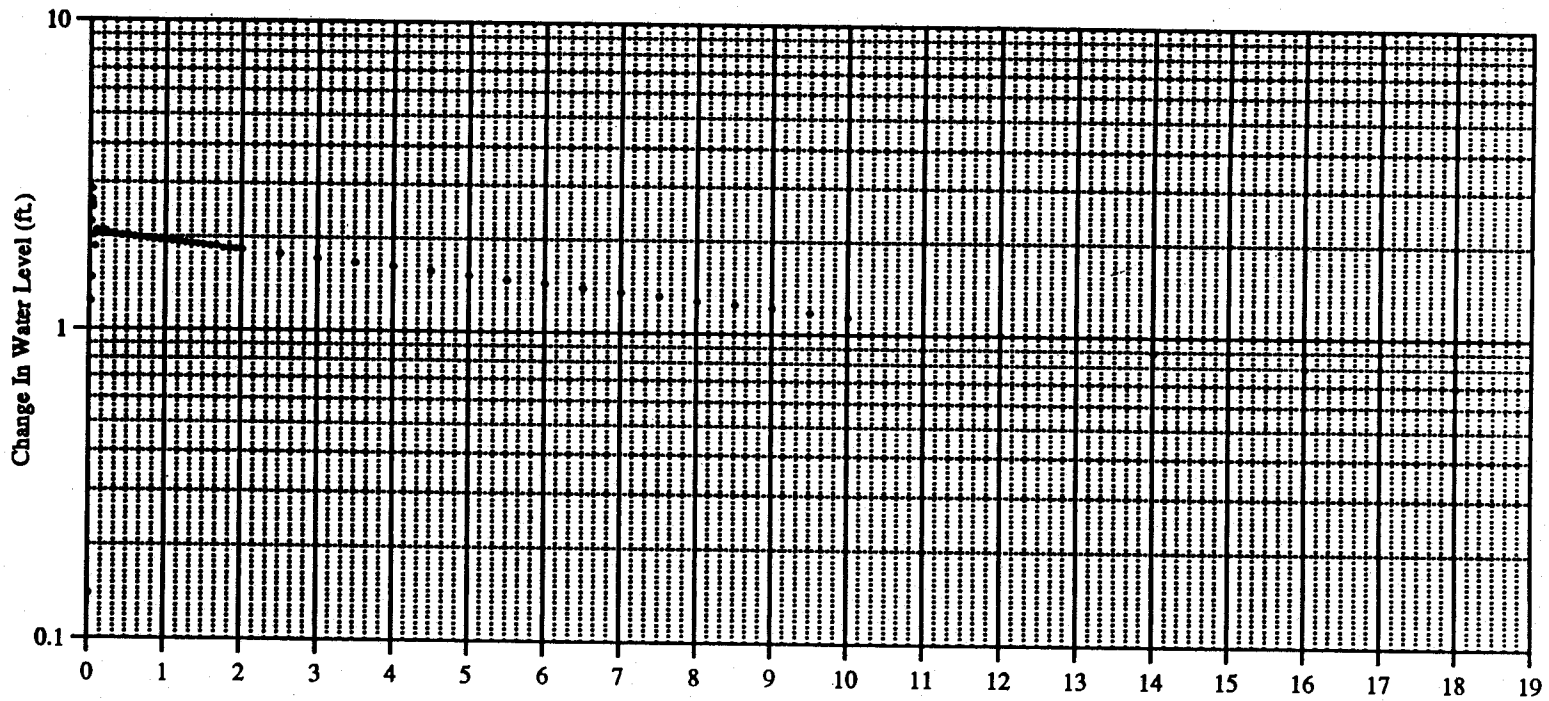
In-Situ Hydraulic Conductivity Test
Monitoring Well MW-6 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



In-Situ Hydraulic Conductivity Test
Monitoring Well MW-6 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700

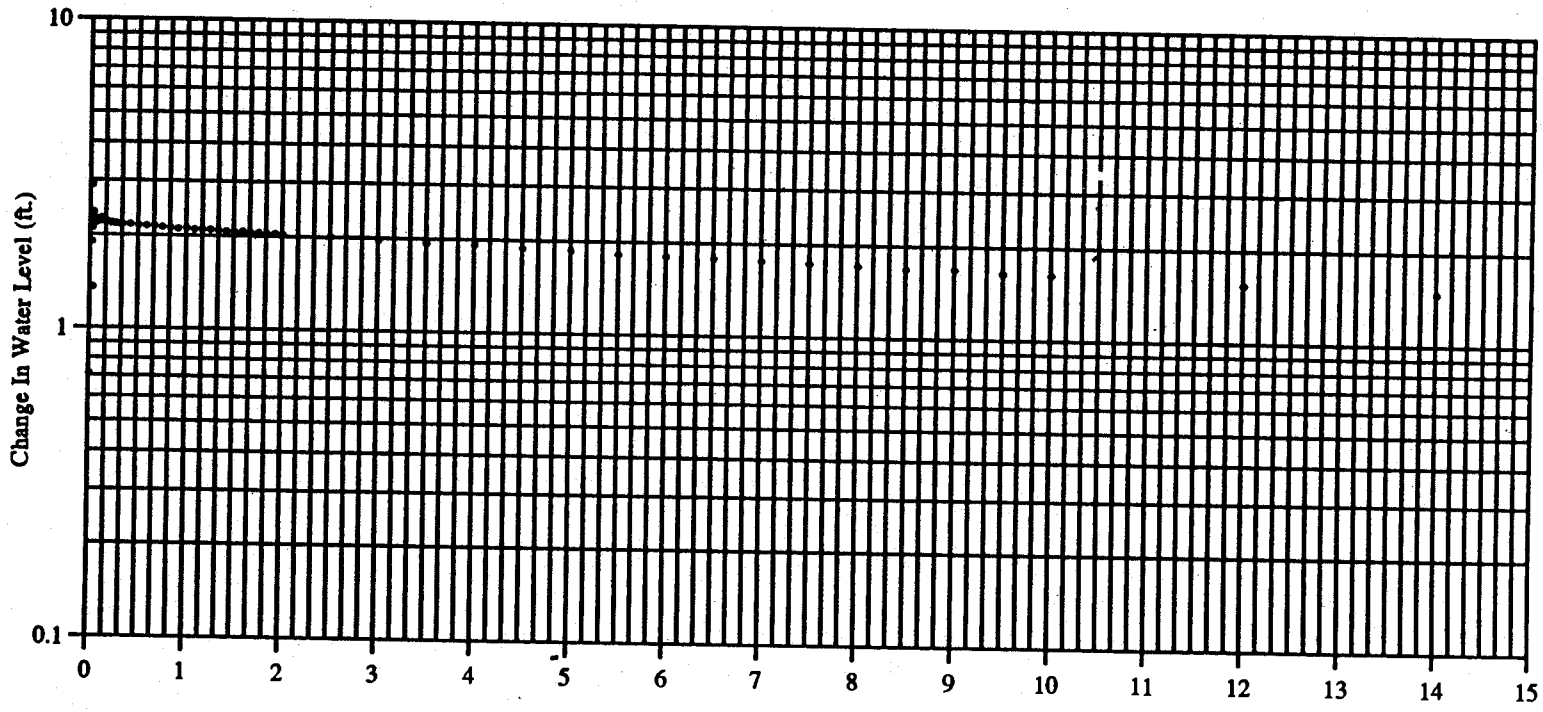


In-Situ Hydraulic Conductivity Test
Piezometer P-1-D (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000

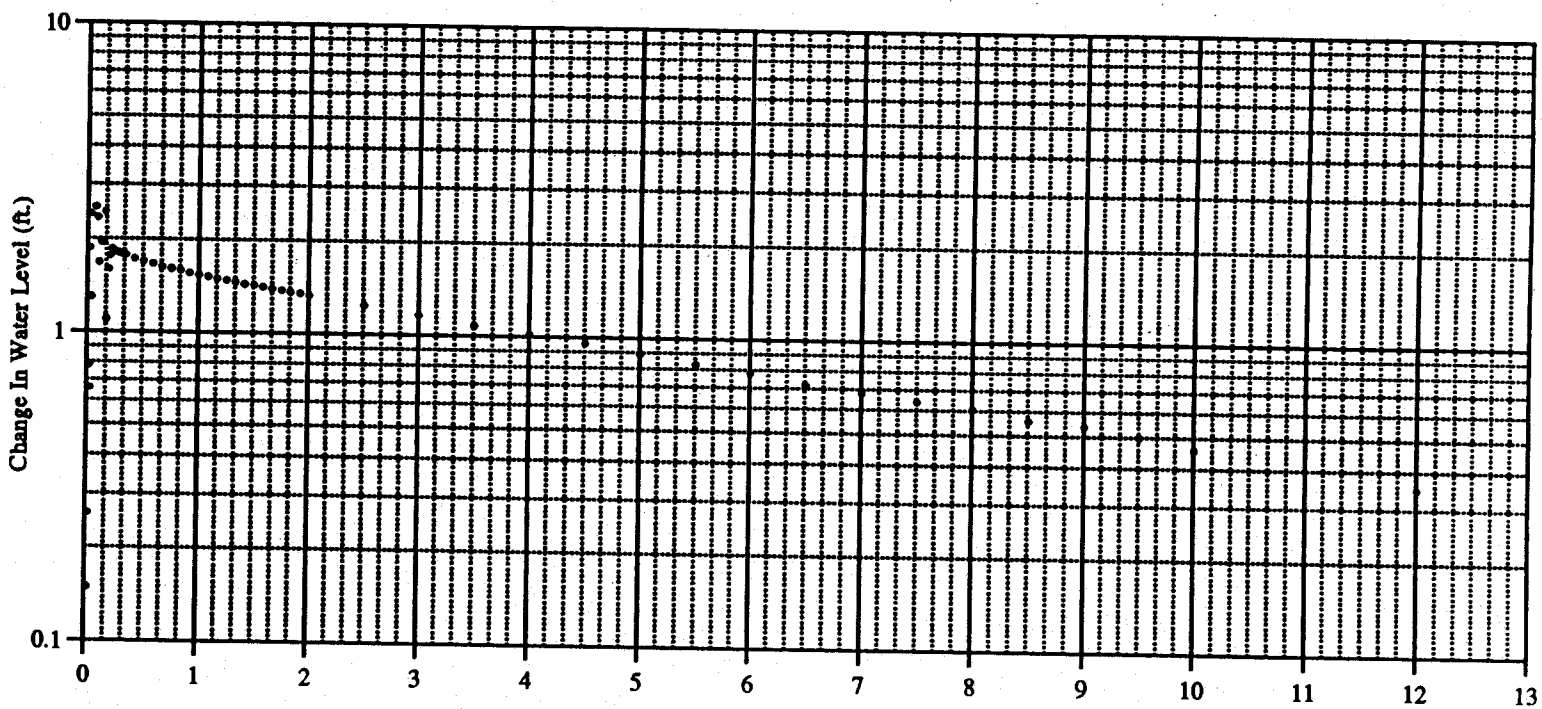


Column 1

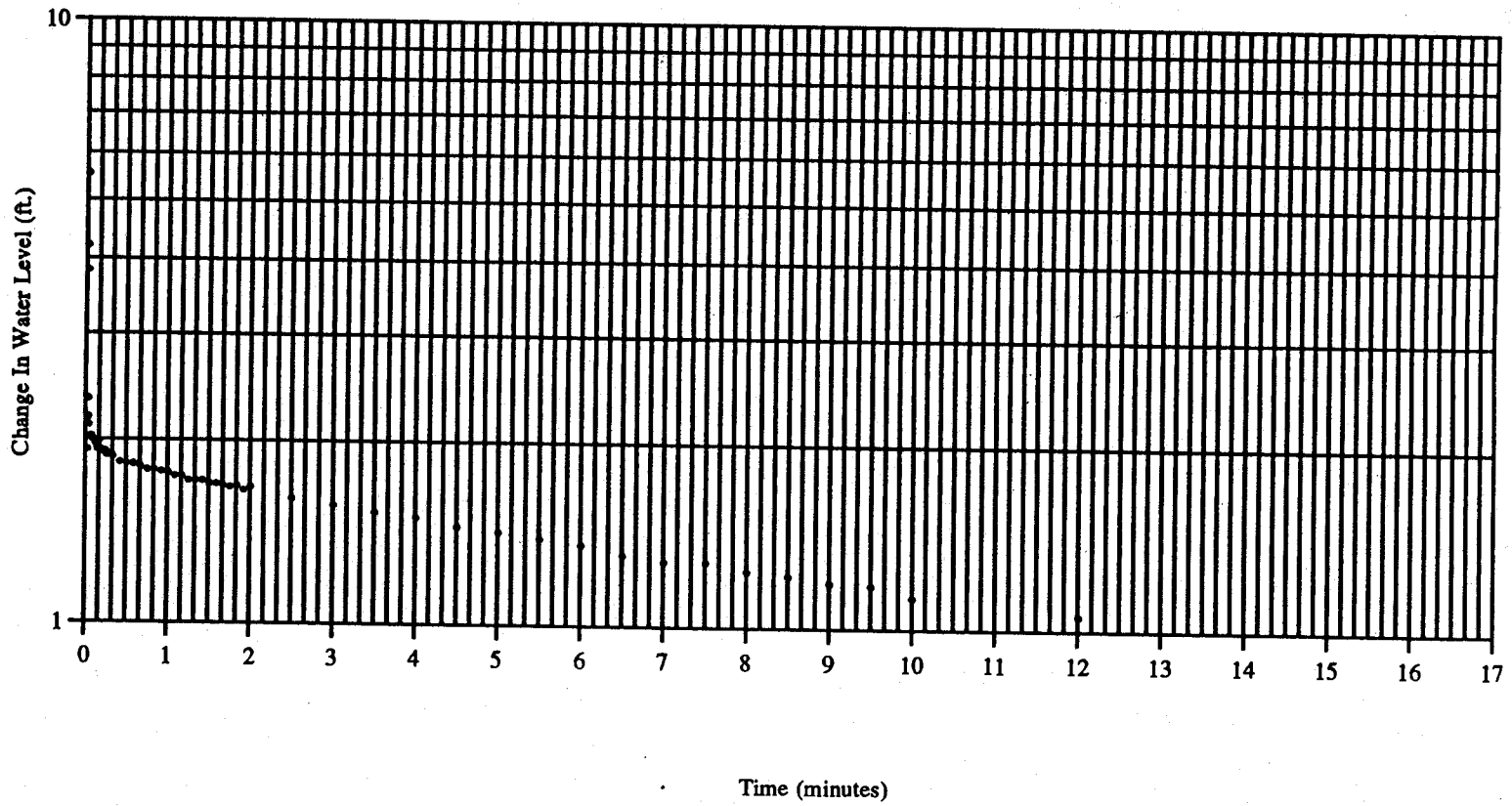
In-Situ Hydraulic Conductivity Test
Piezometer P-1-D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



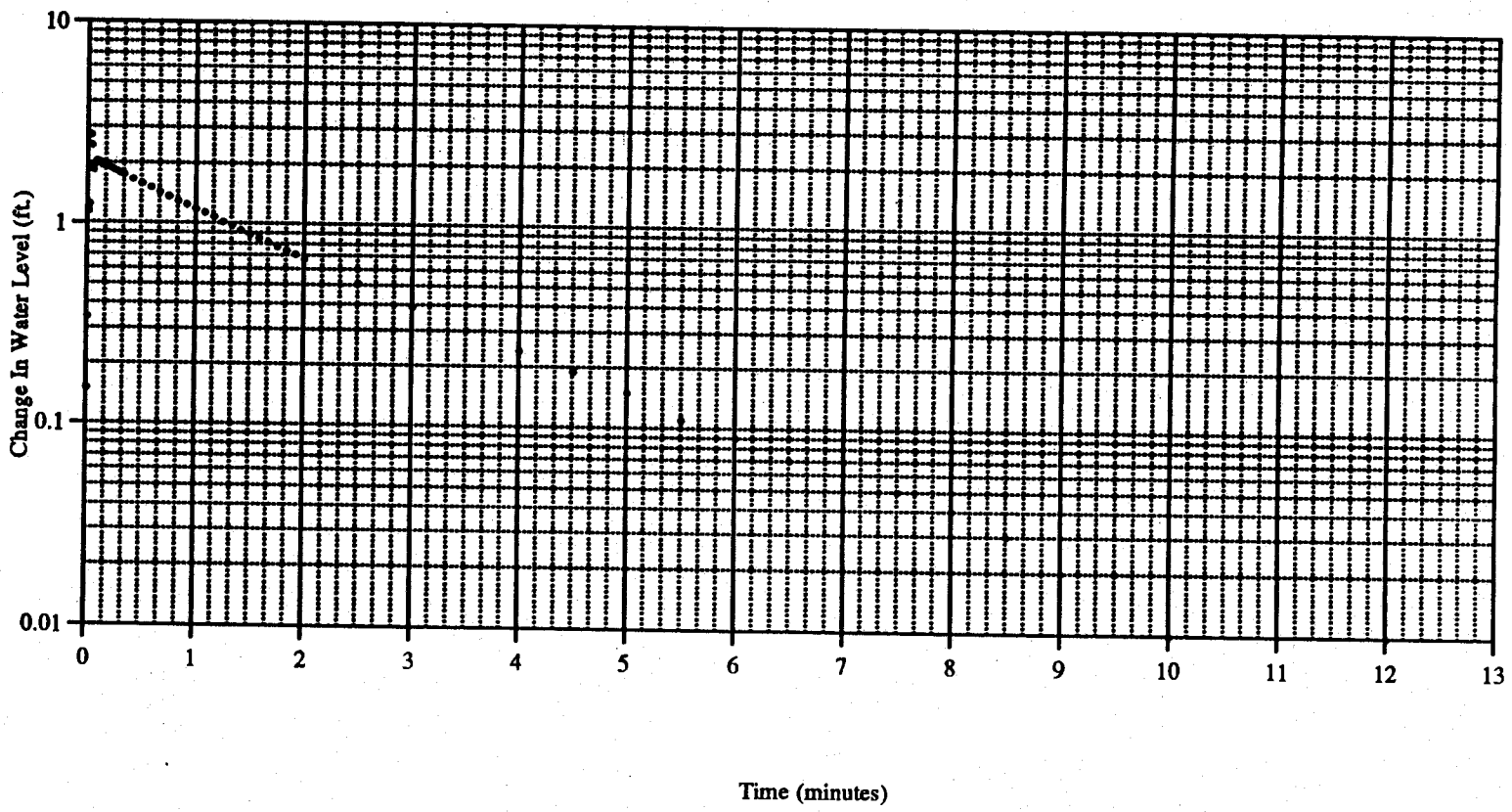
In-Situ Hydraulic Conductivity Test
Piezometer P-1-S (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



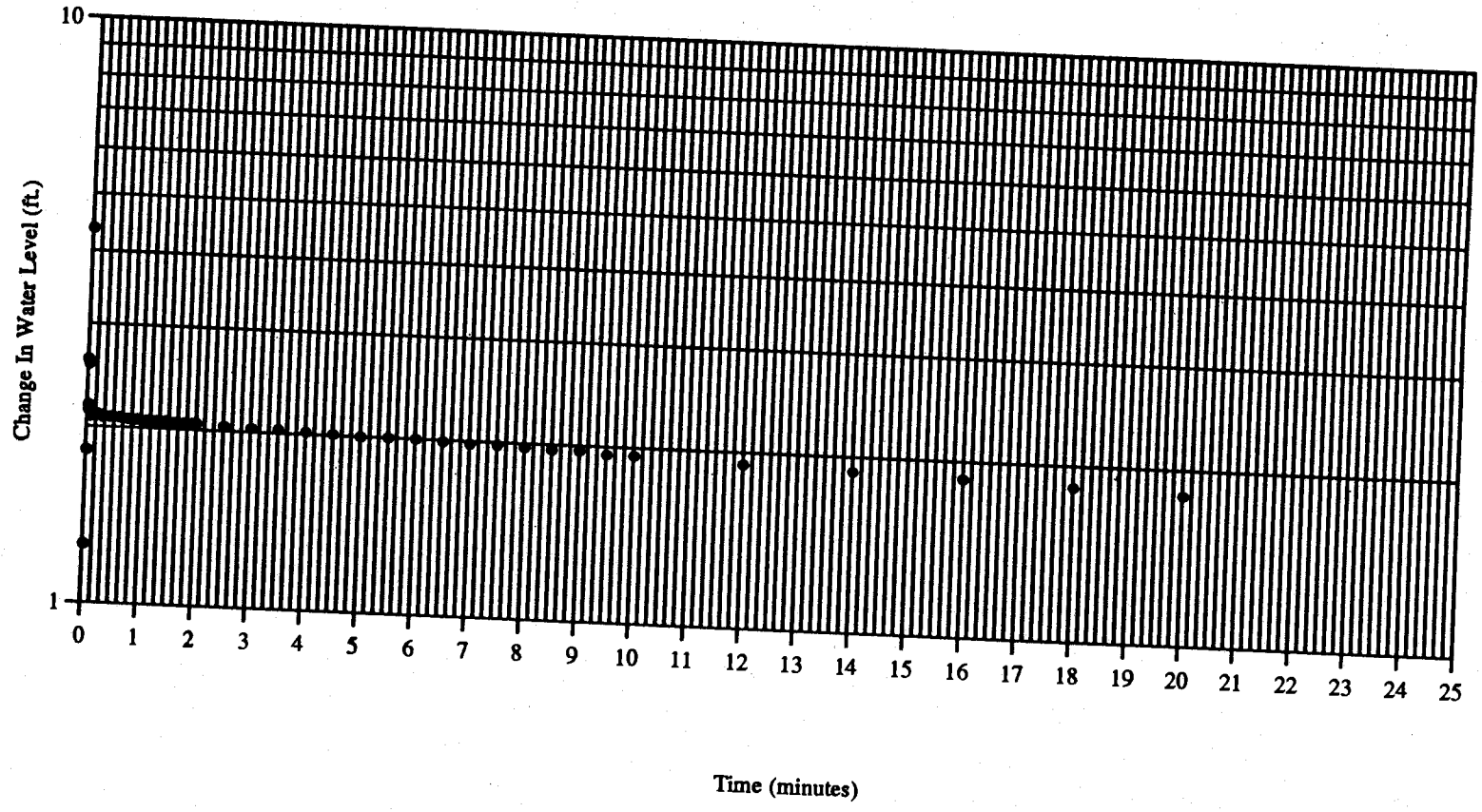
In-Situ Hydraulic Conductivity Test
Piezometer P-1-S (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



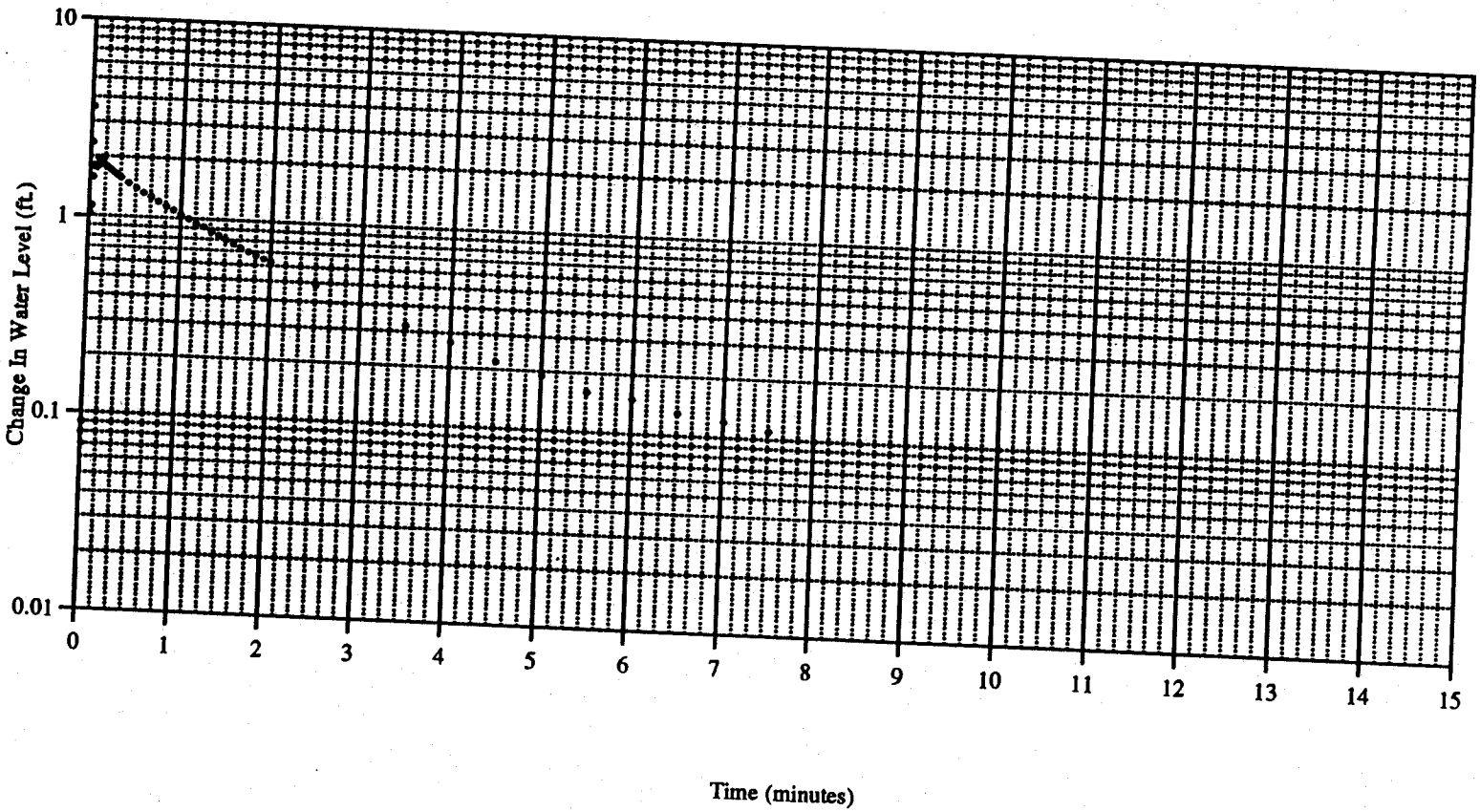
In-Situ Hydraulic Conductivity Test
Piezometer P-2-D (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



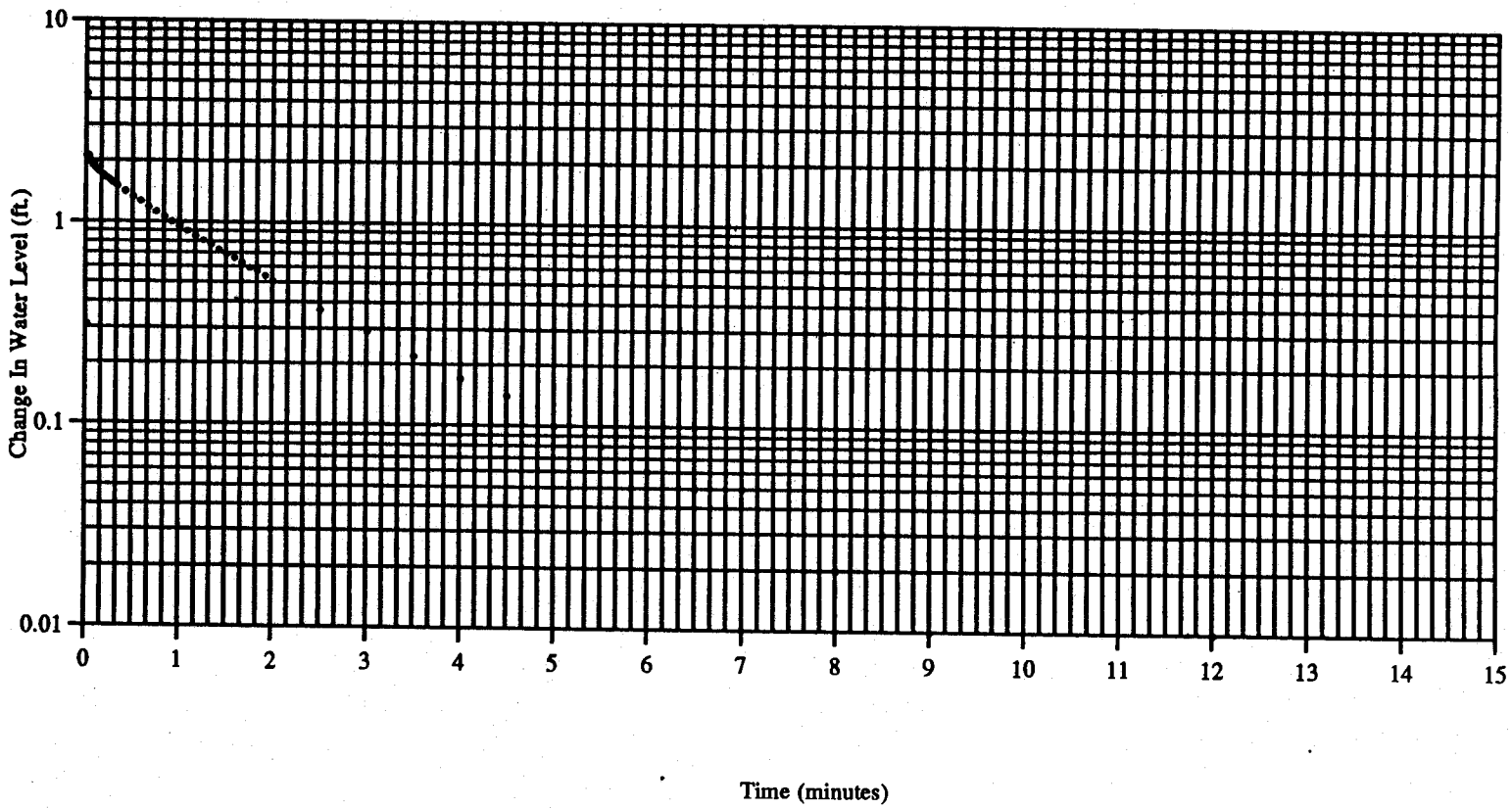
In-Situ Hydraulic Conductivity Test
Piezometer P-2-D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



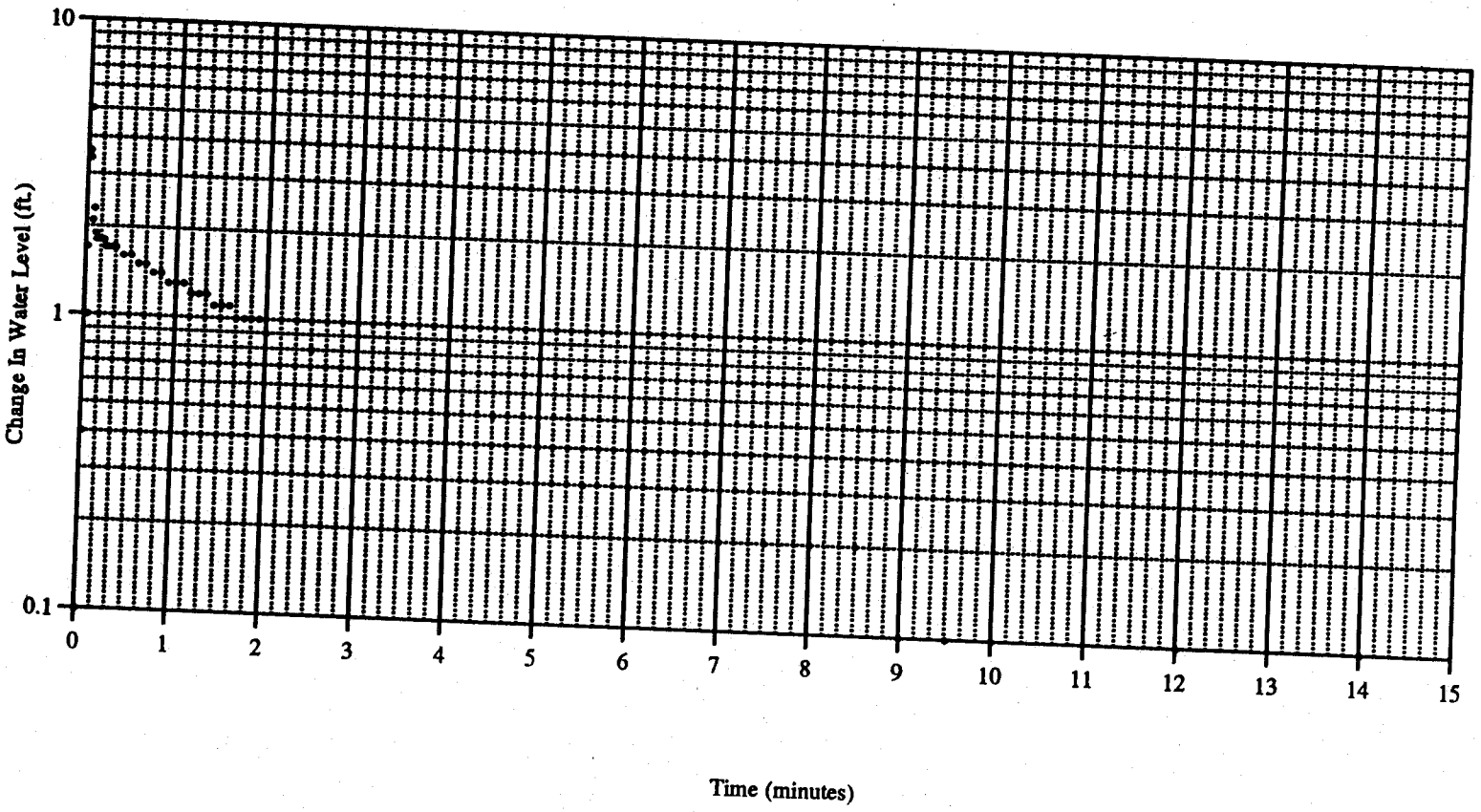
In-Situ Hydraulic Conductivity Test
Piezometer P-2-S (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



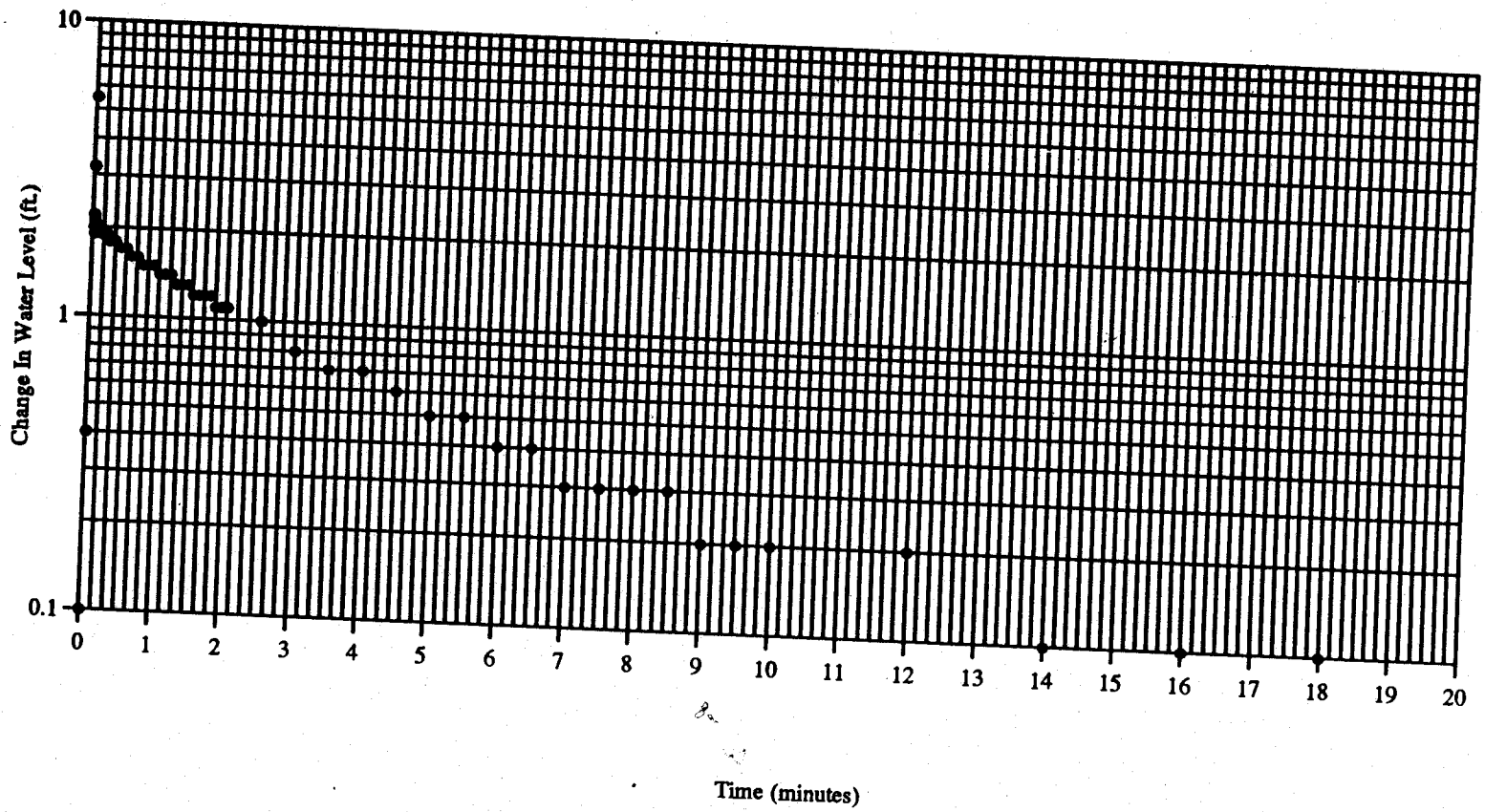
In-Situ Hydraulic Conductivity Test
Piezometer P-2-S (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



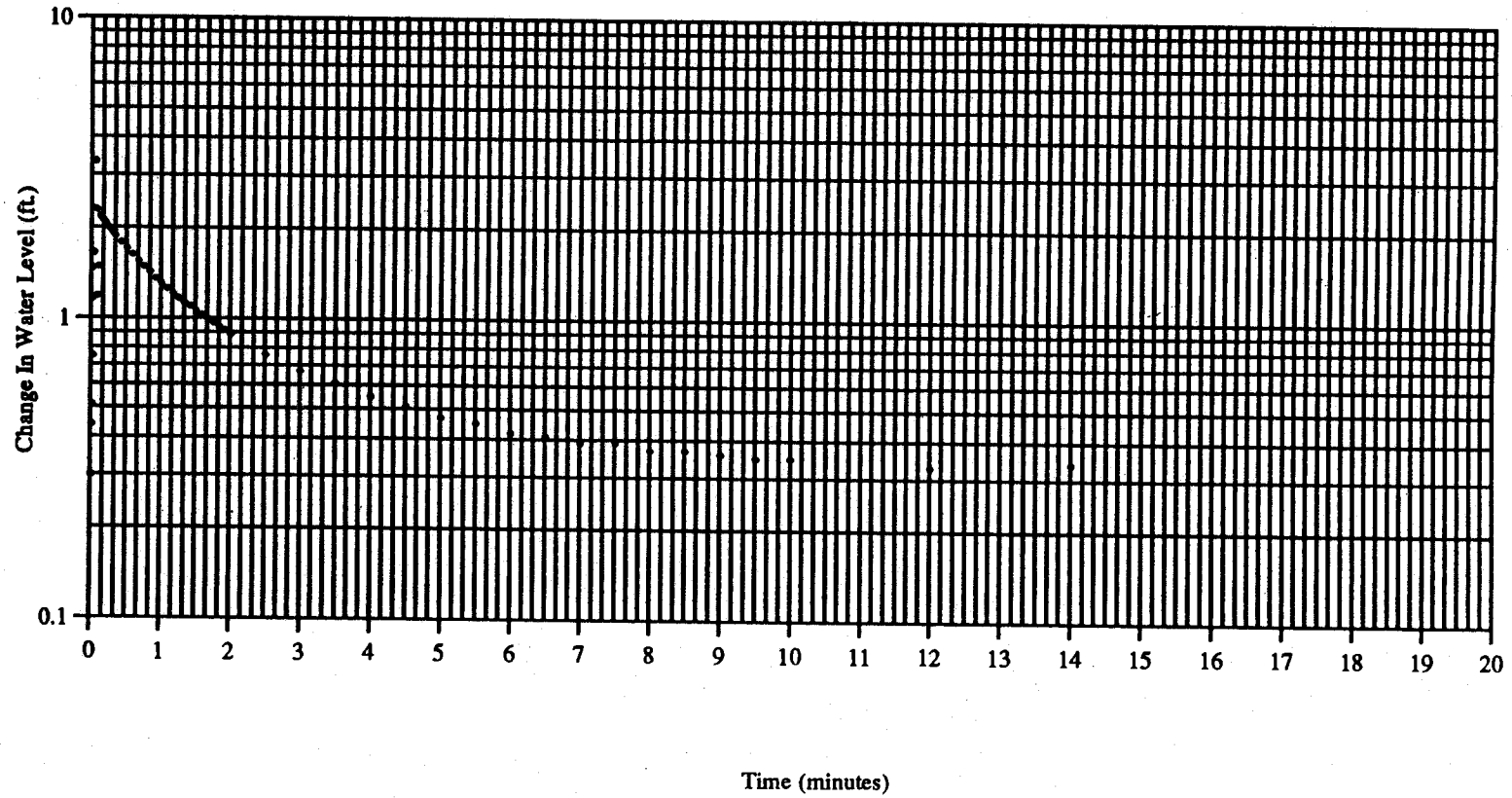
In-Situ Hydraulic Conductivity Test
Piezometer P-3 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



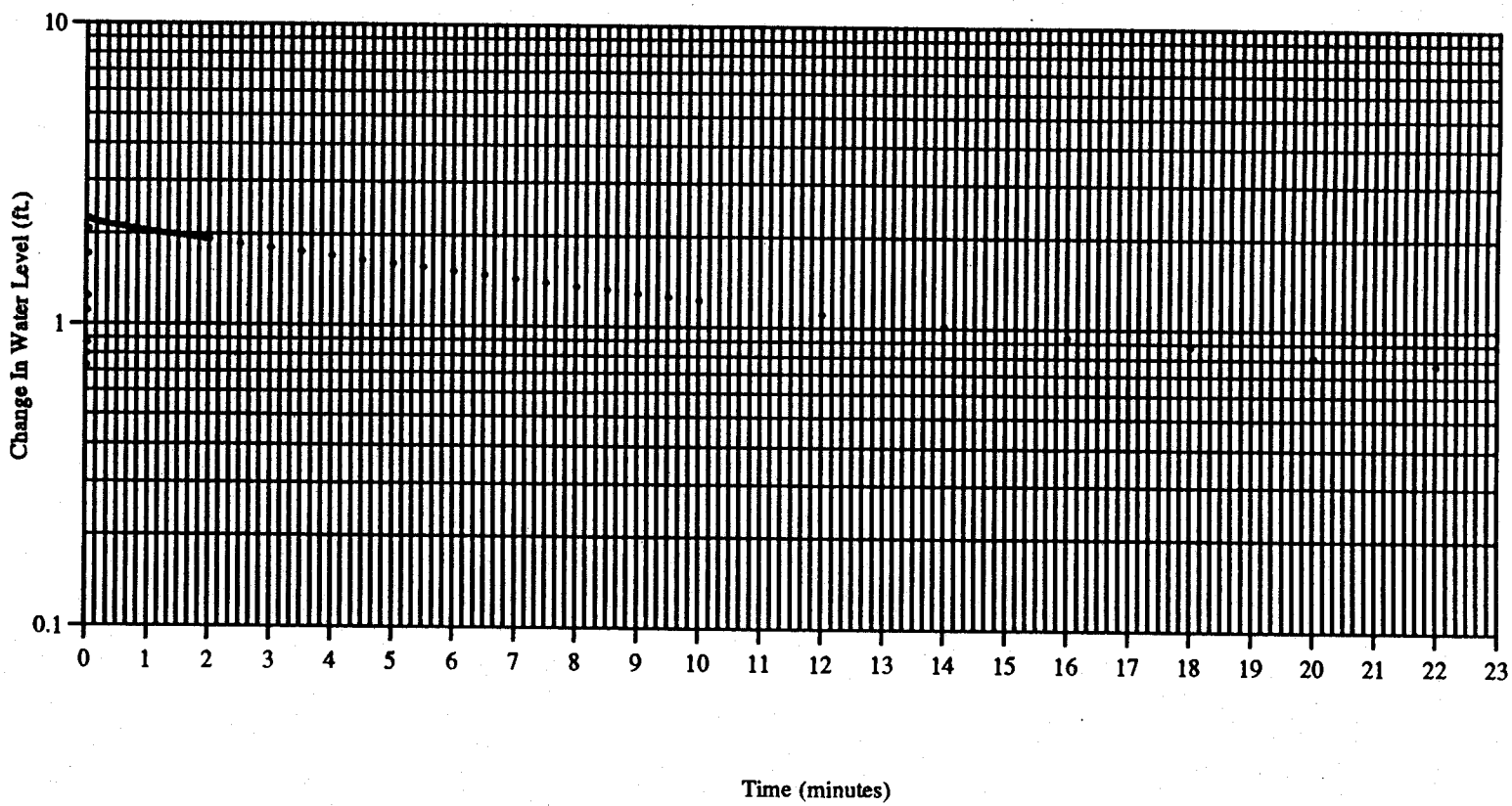
In-Situ Hydraulic Conductivity Test
Piezometer P-3 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



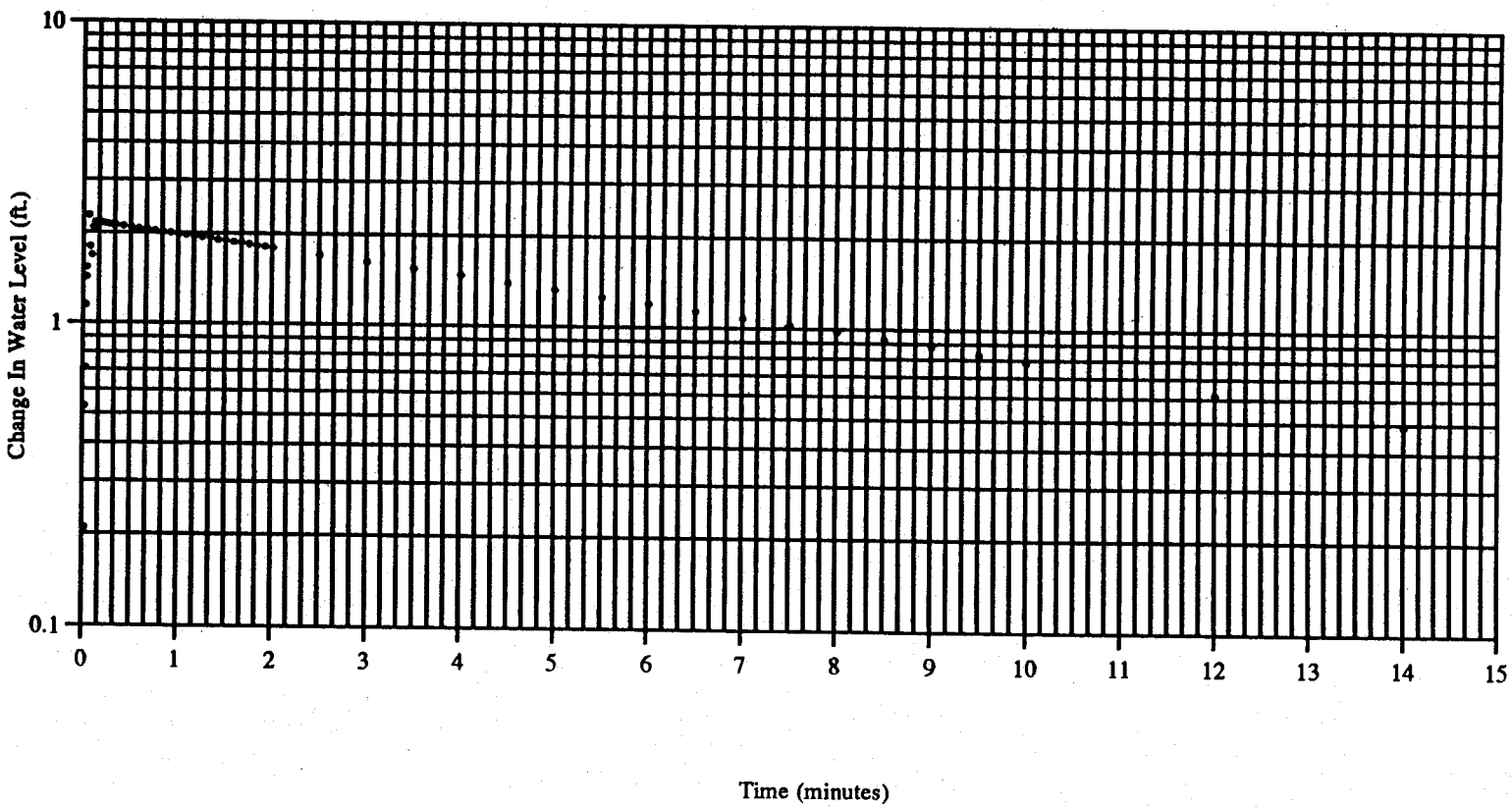
In-Situ Hydraulic Conductivity Test
Piezometer P-15S (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



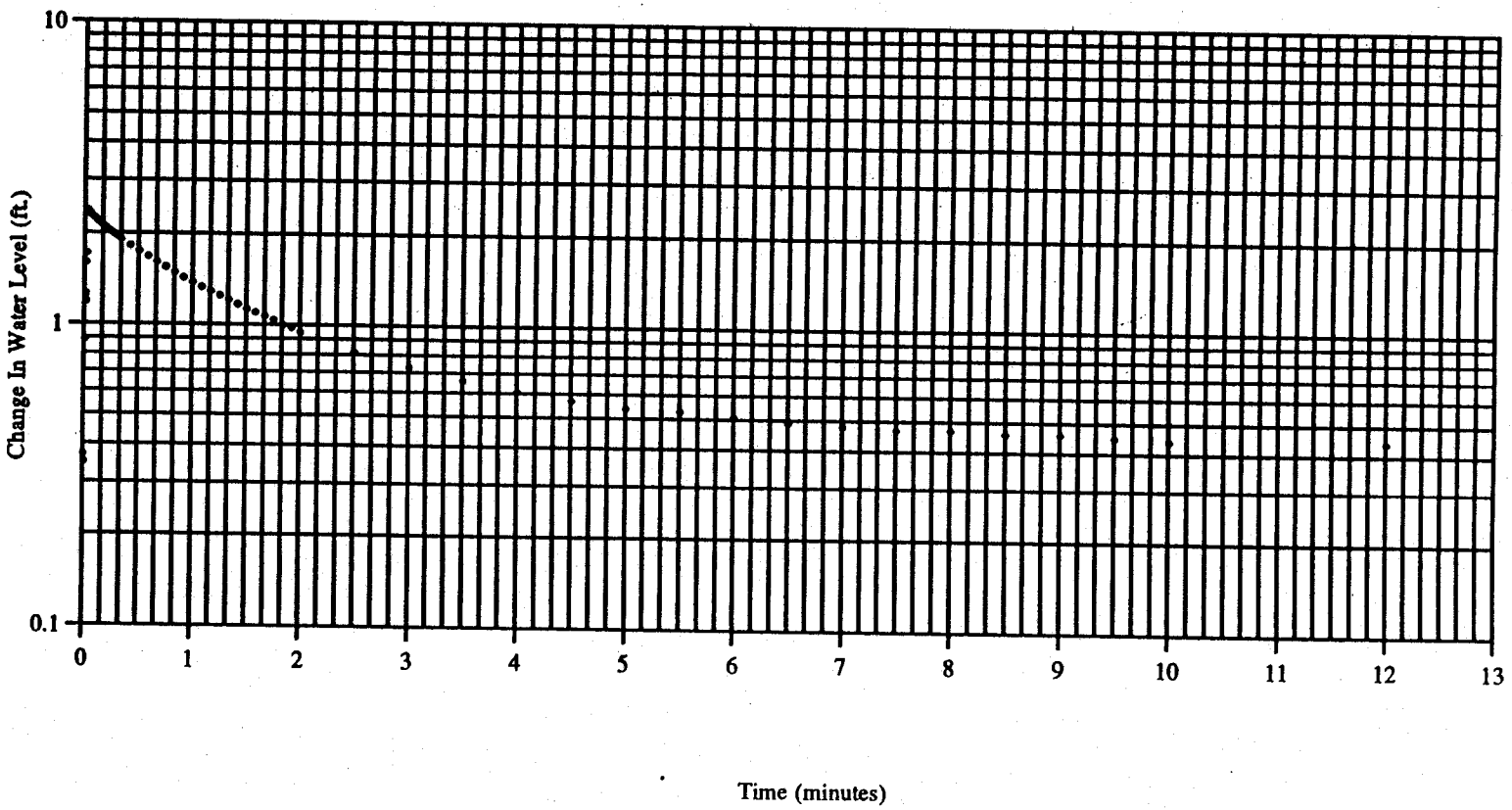
In-Situ Hydraulic Conductivity Test
Piezometer P-15D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



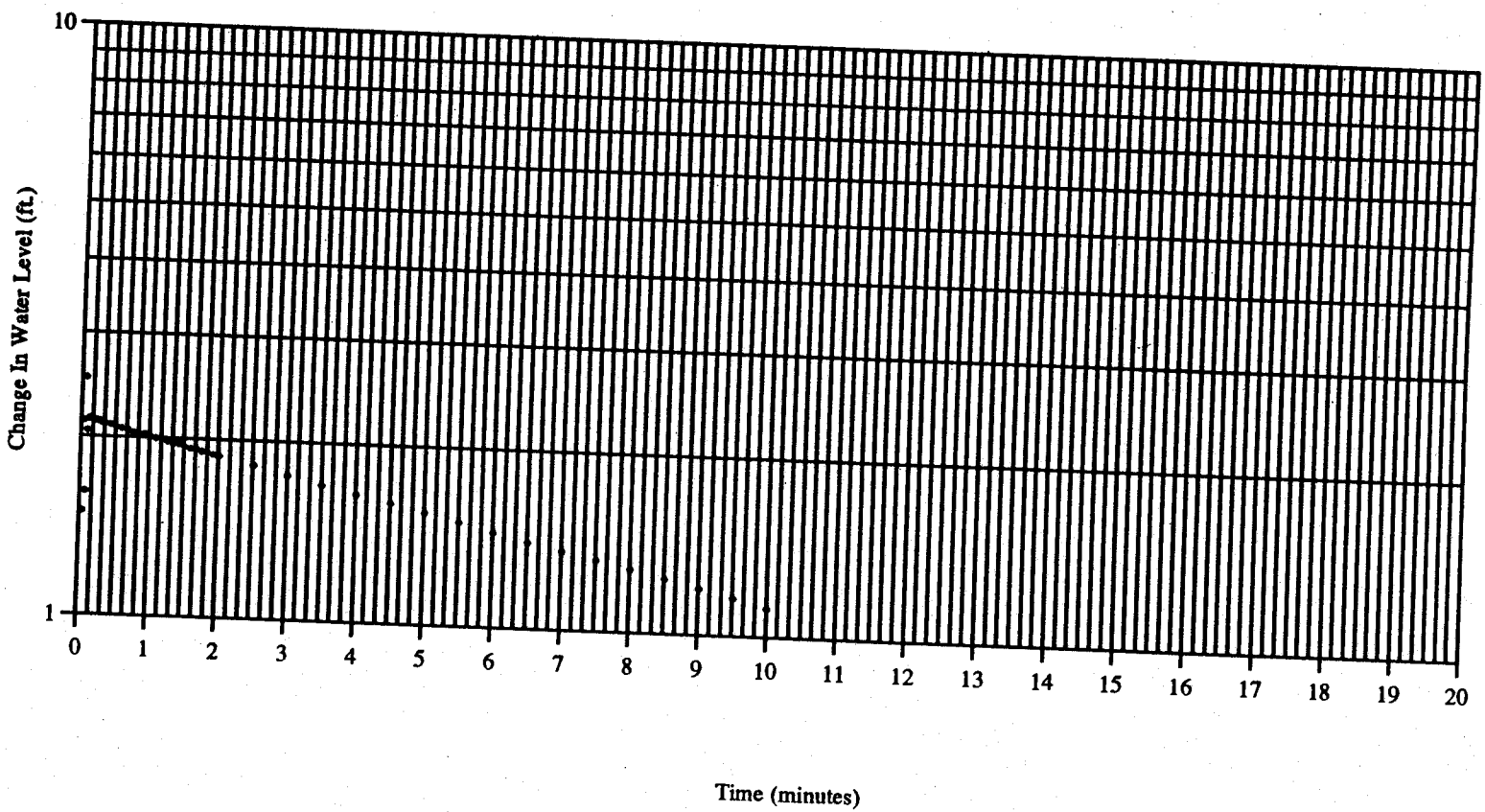
In-Situ Hydraulic Conductivity Test
Piezometer P-15D (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



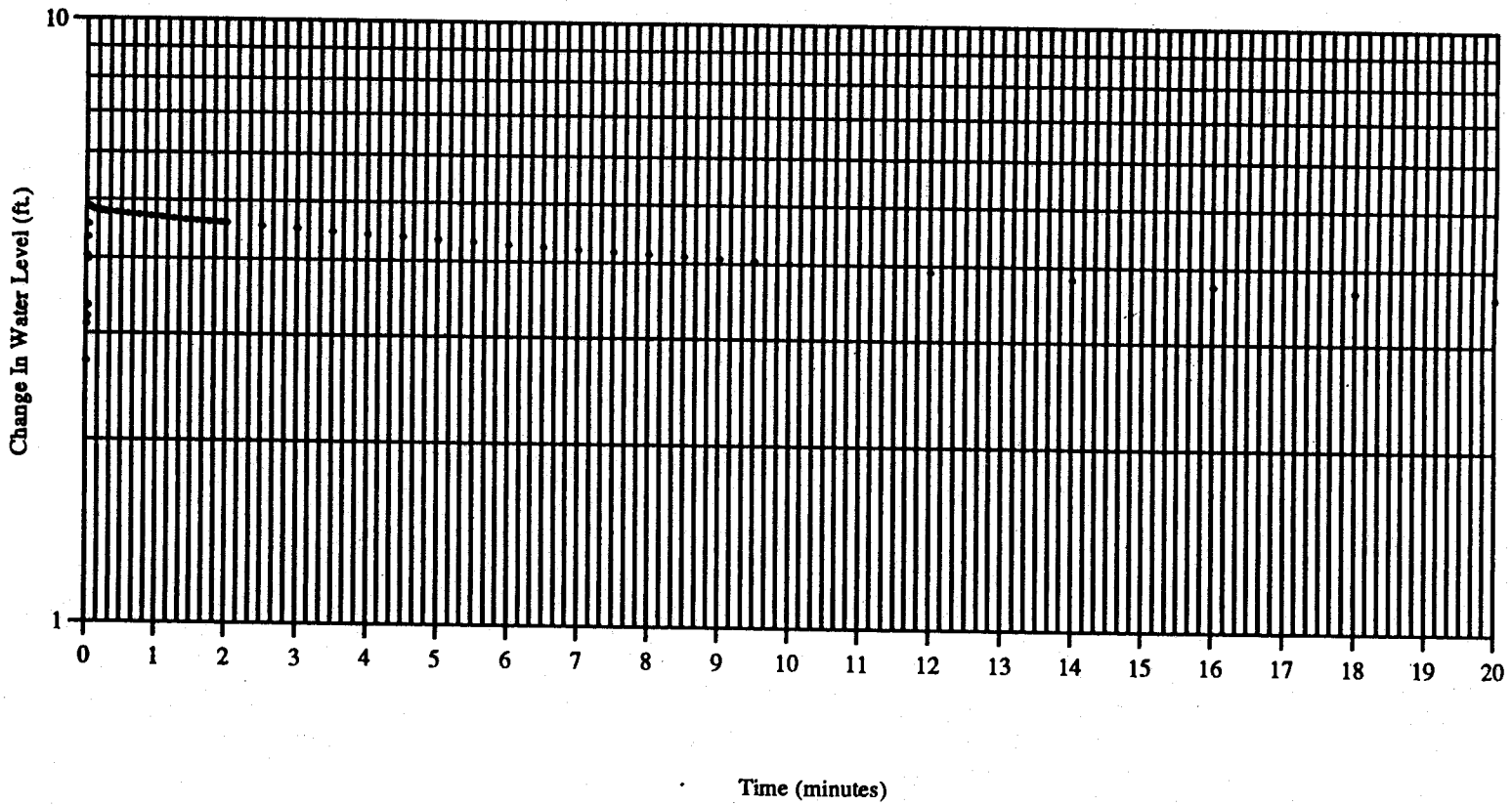
In-Situ Hydraulic Conductivity Test
Piezometer P-15S (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



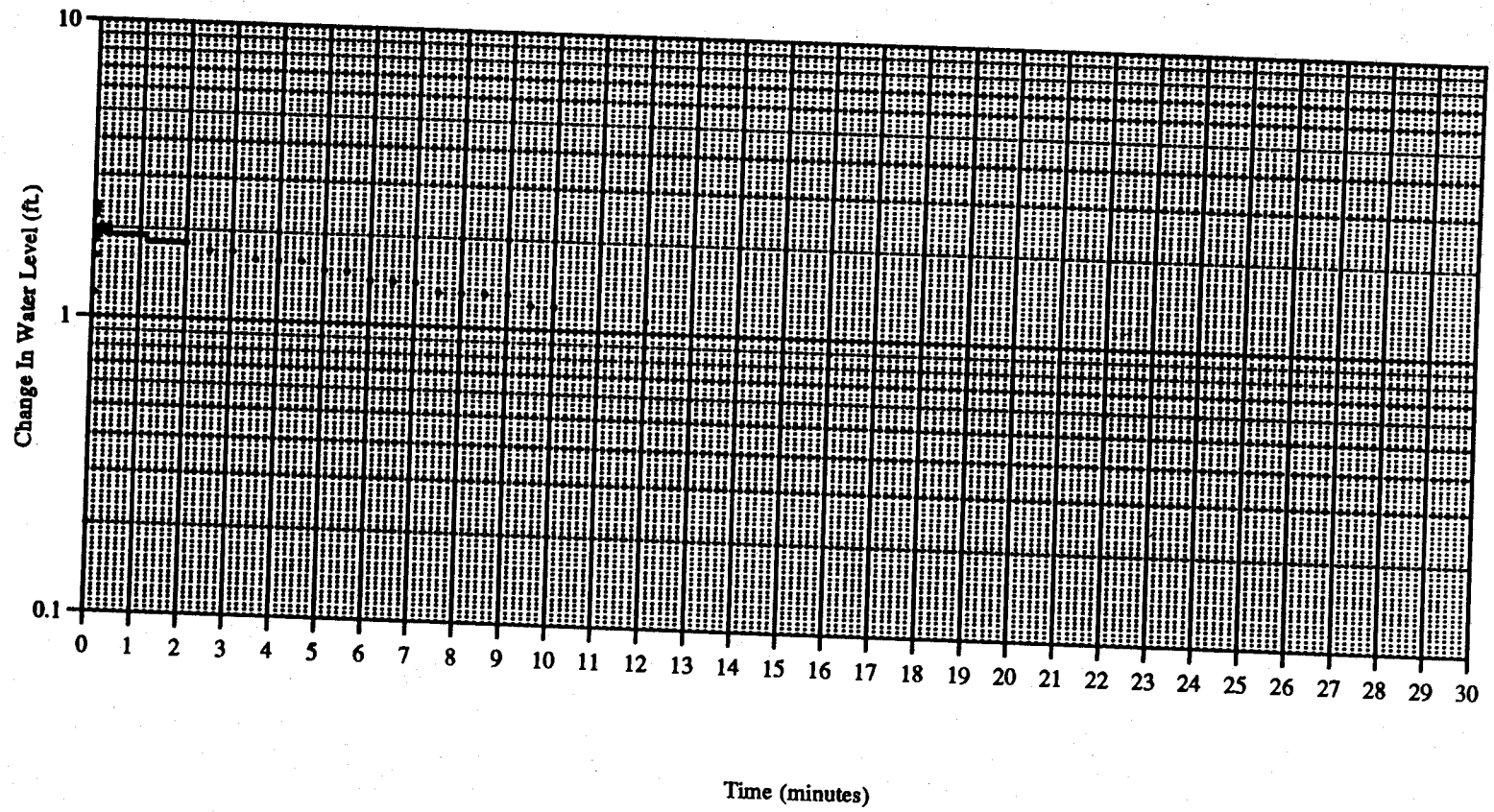
In-Situ Hydraulic Conductivity Test
Piezometer P-16 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



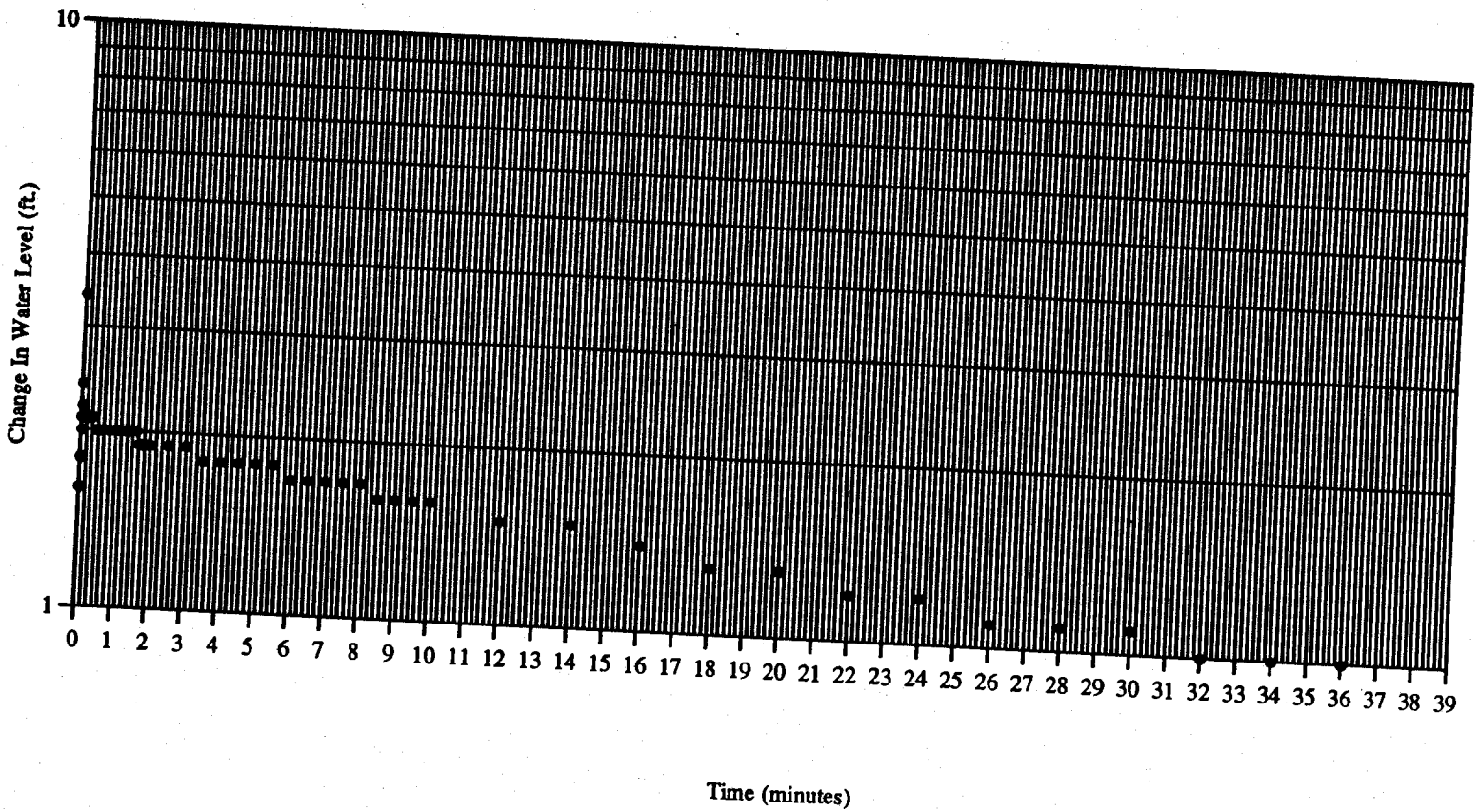
In-Situ Hydraulic Conductivity Test
Piezometer P-16 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



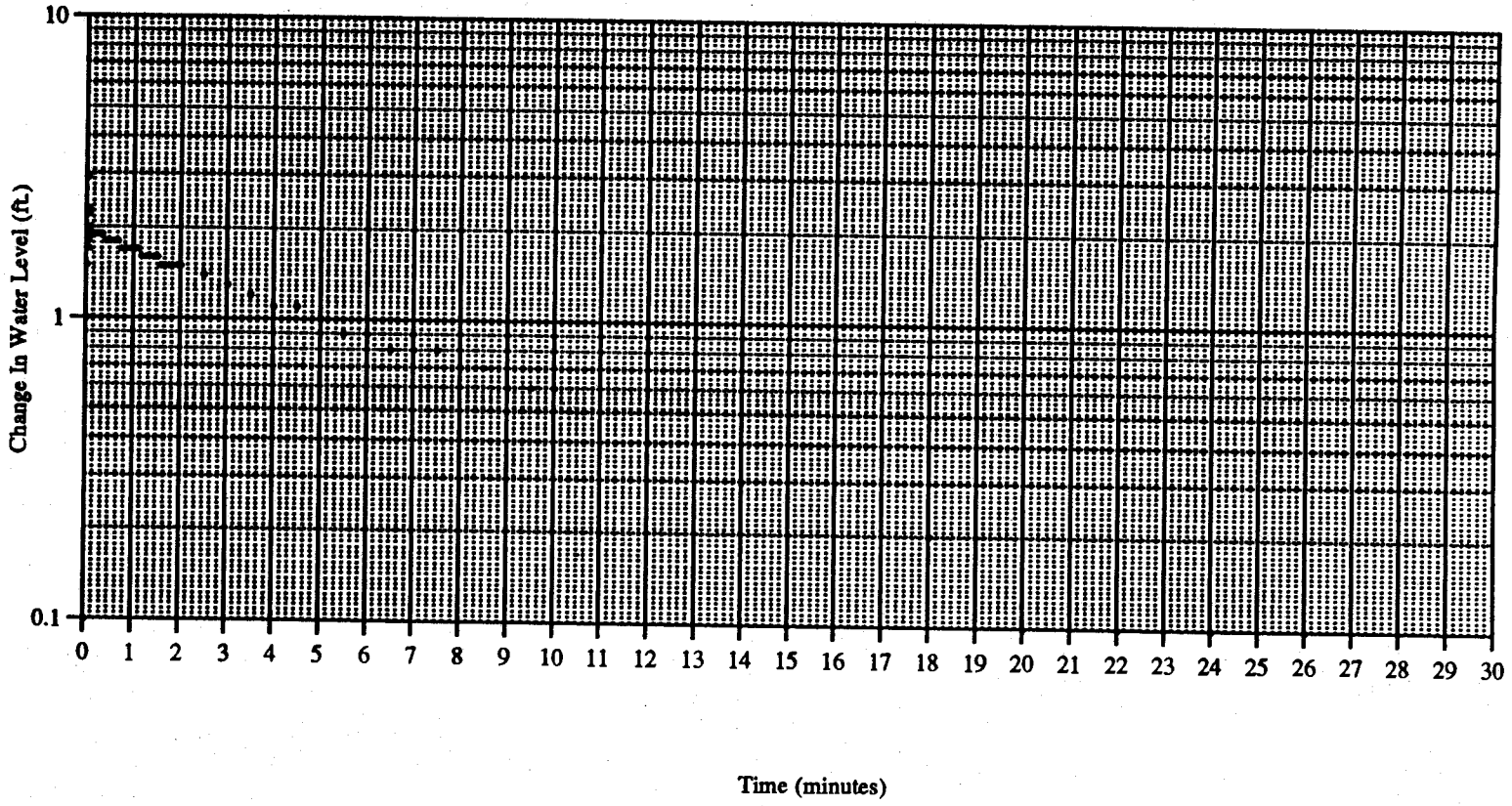
In-Situ Hydraulic Conductivity Test
Piezometer P-4-D (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



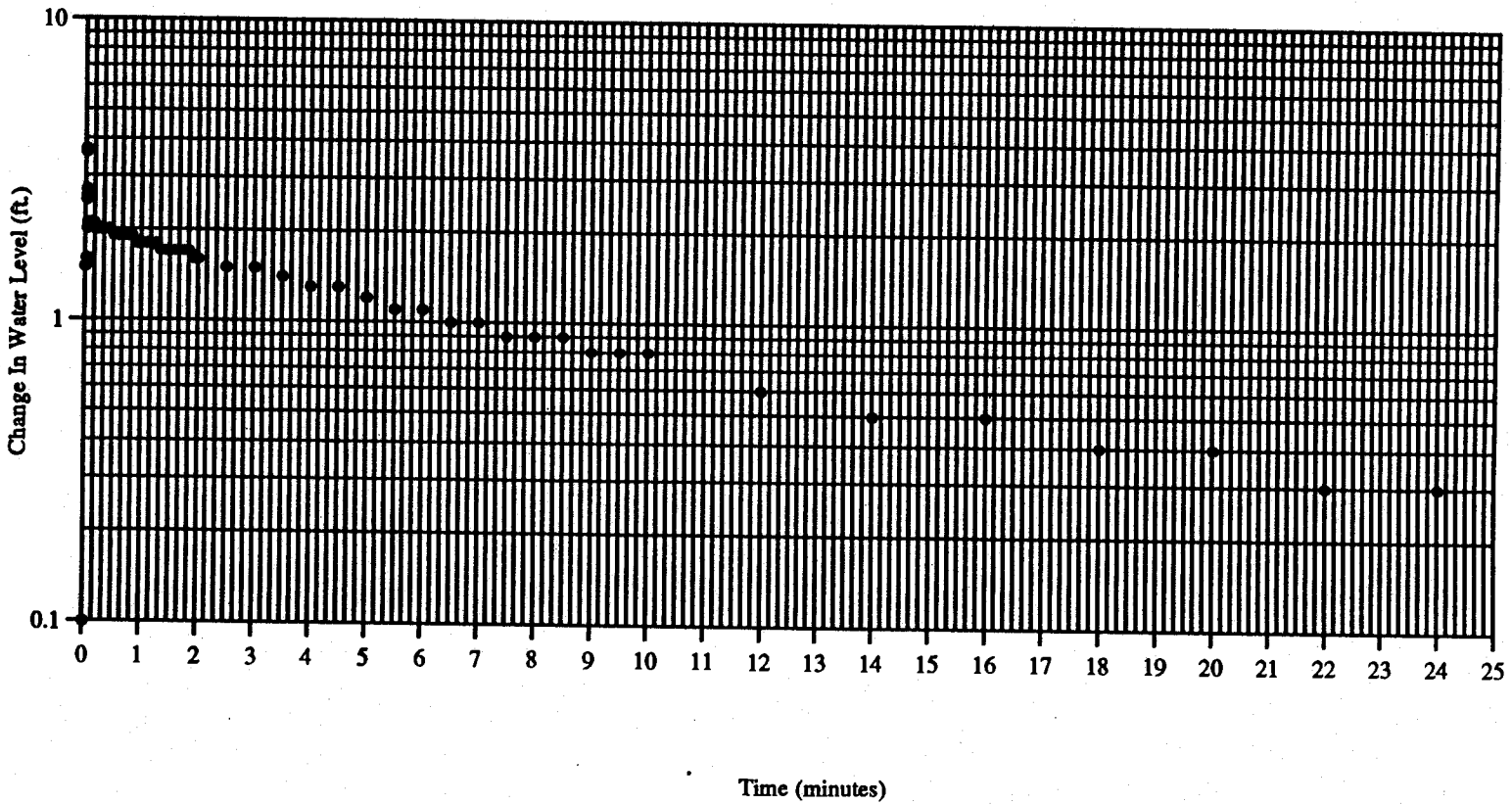
In-Situ Hydraulic Conductivity Test
Piezometer P-4-D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



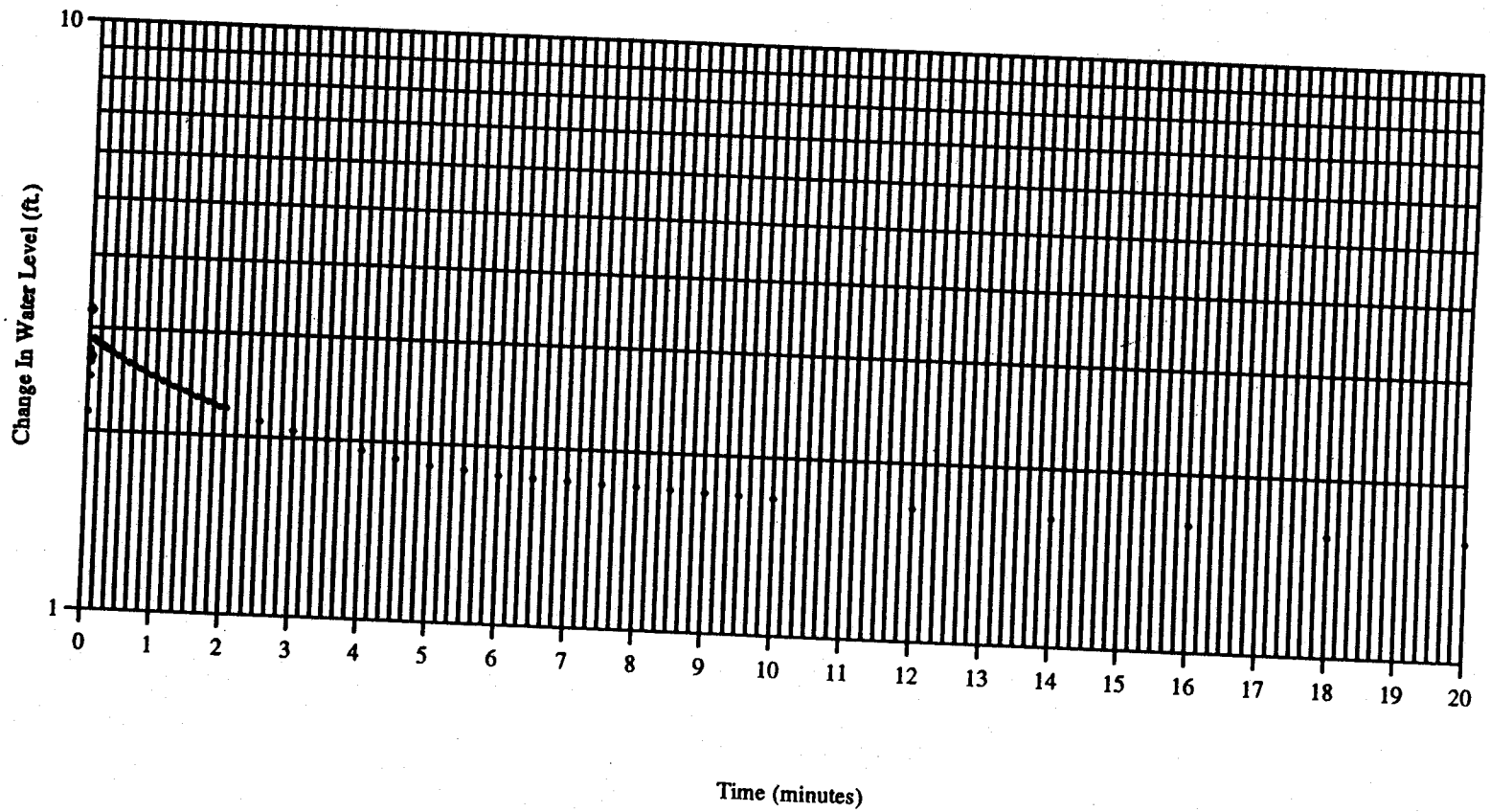
In-Situ Hydraulic Conductivity Test
Piezometer P-4-S (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



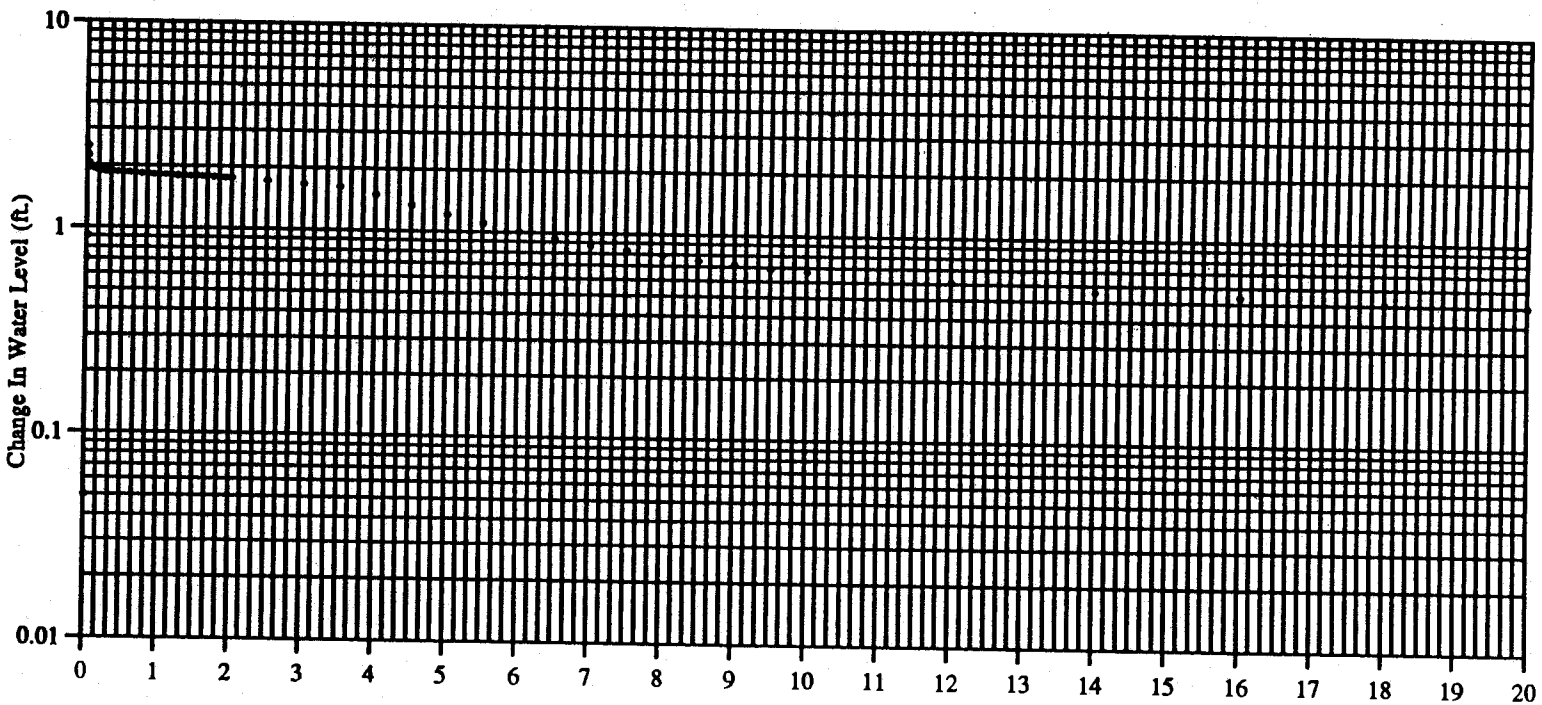
In-Situ Hydraulic Conductivity Test
Piezometer P-4-S (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



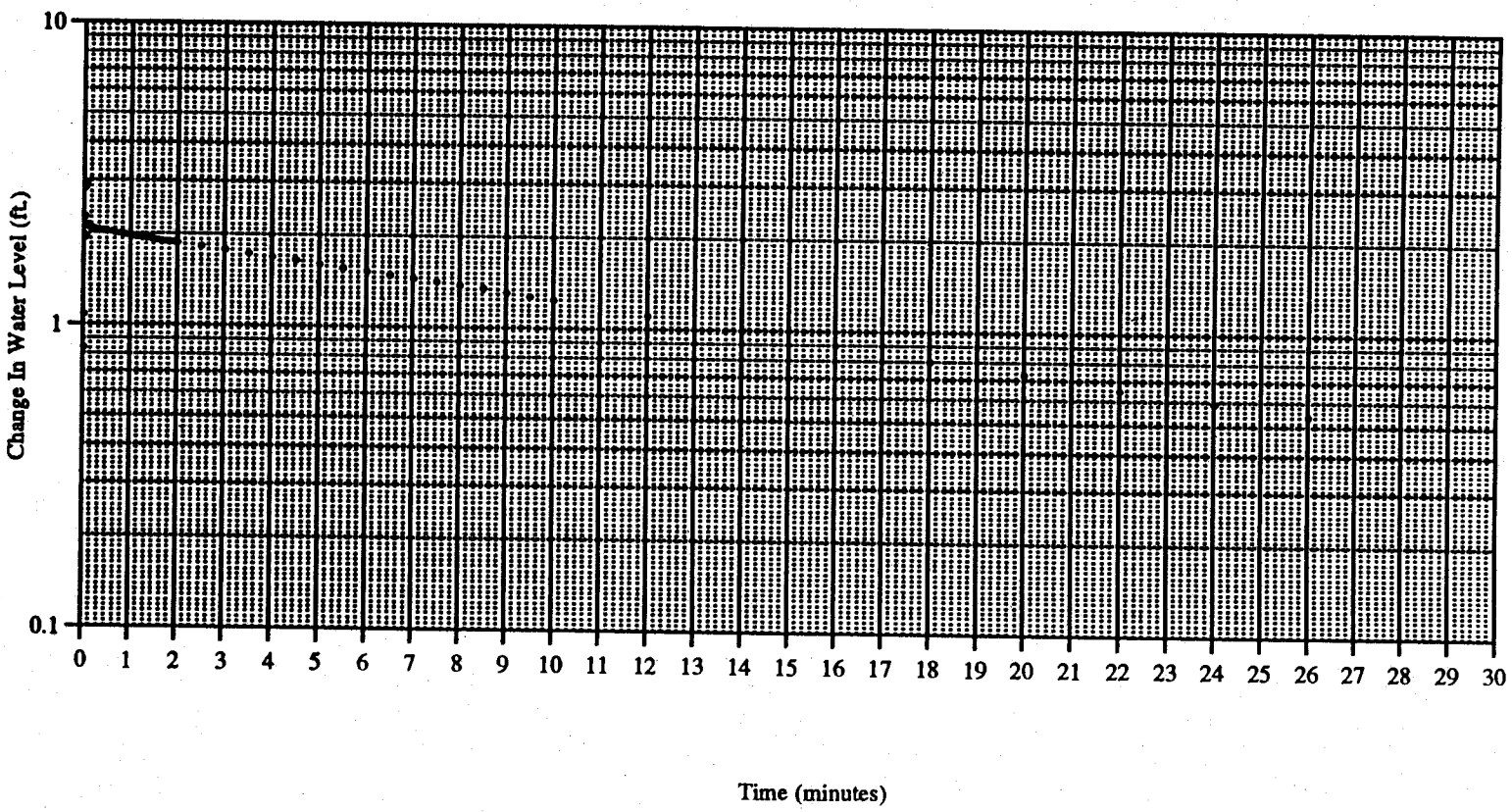
In-Situ Hydraulic Conductivity Test
Piezometer P-5 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



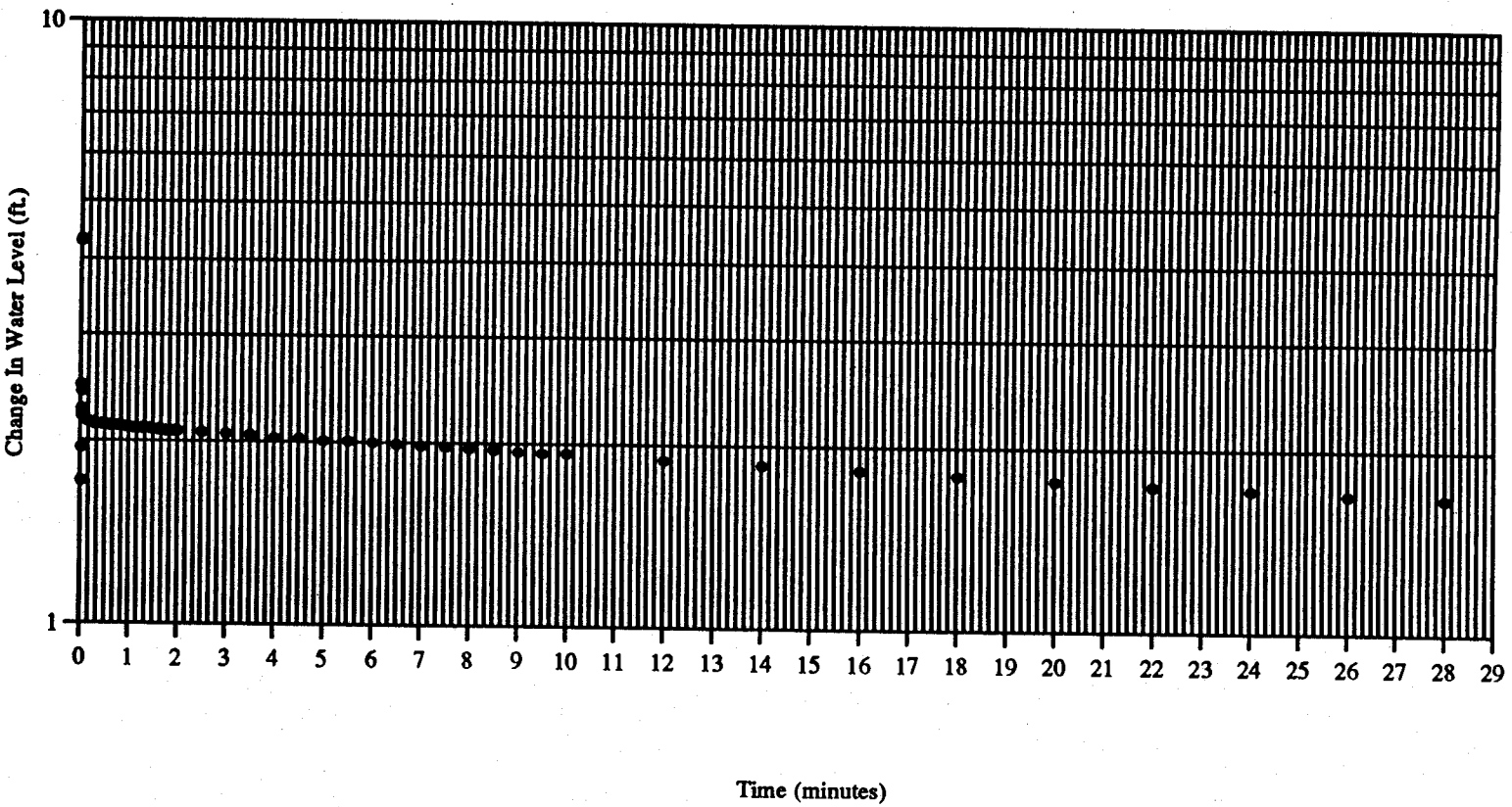
In-Situ Hydraulic Conductivity Test
Piezometer P-5 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



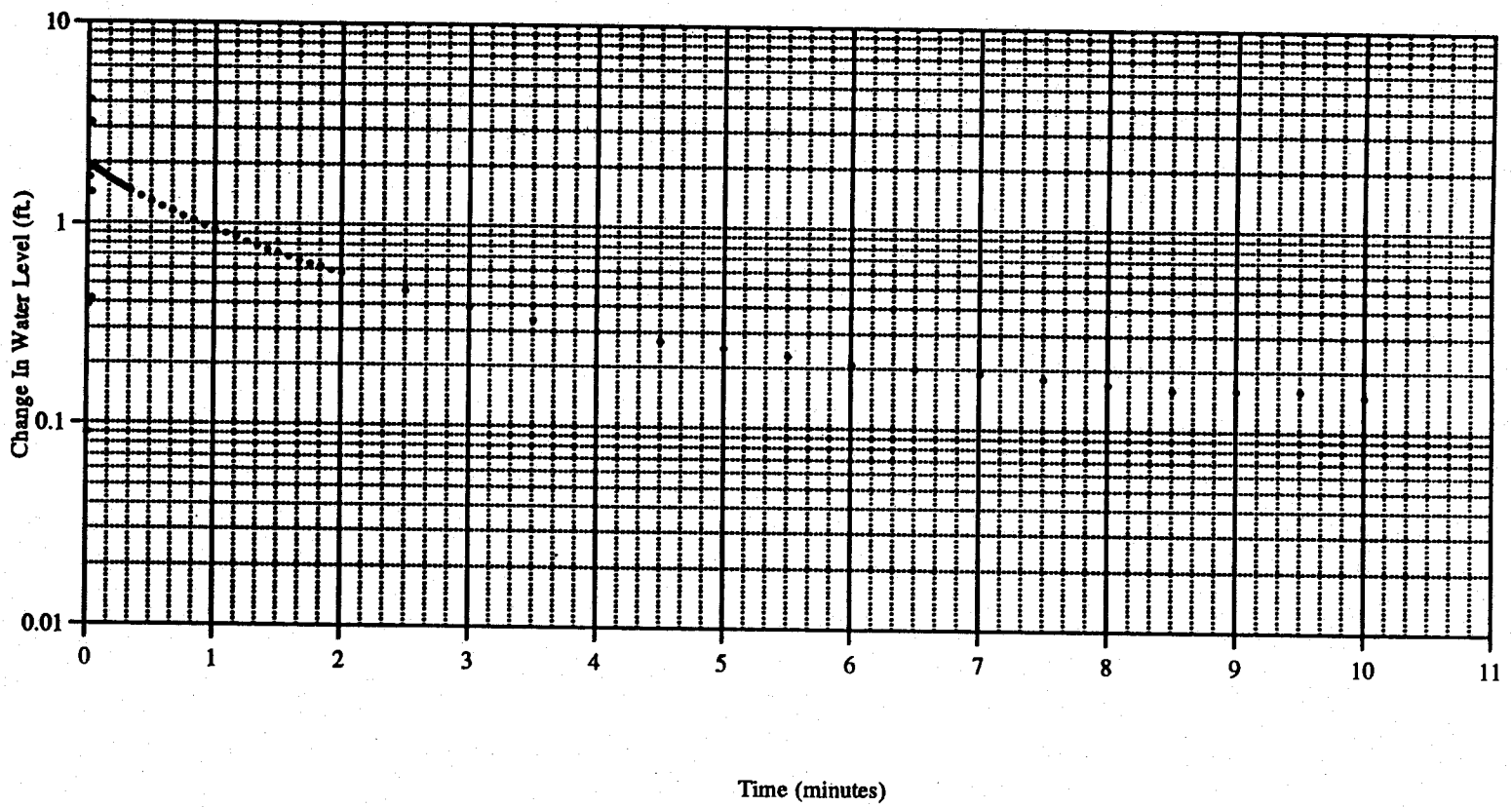
In-Situ Hydraulic Conductivity Test
Piezometer P-6-D (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



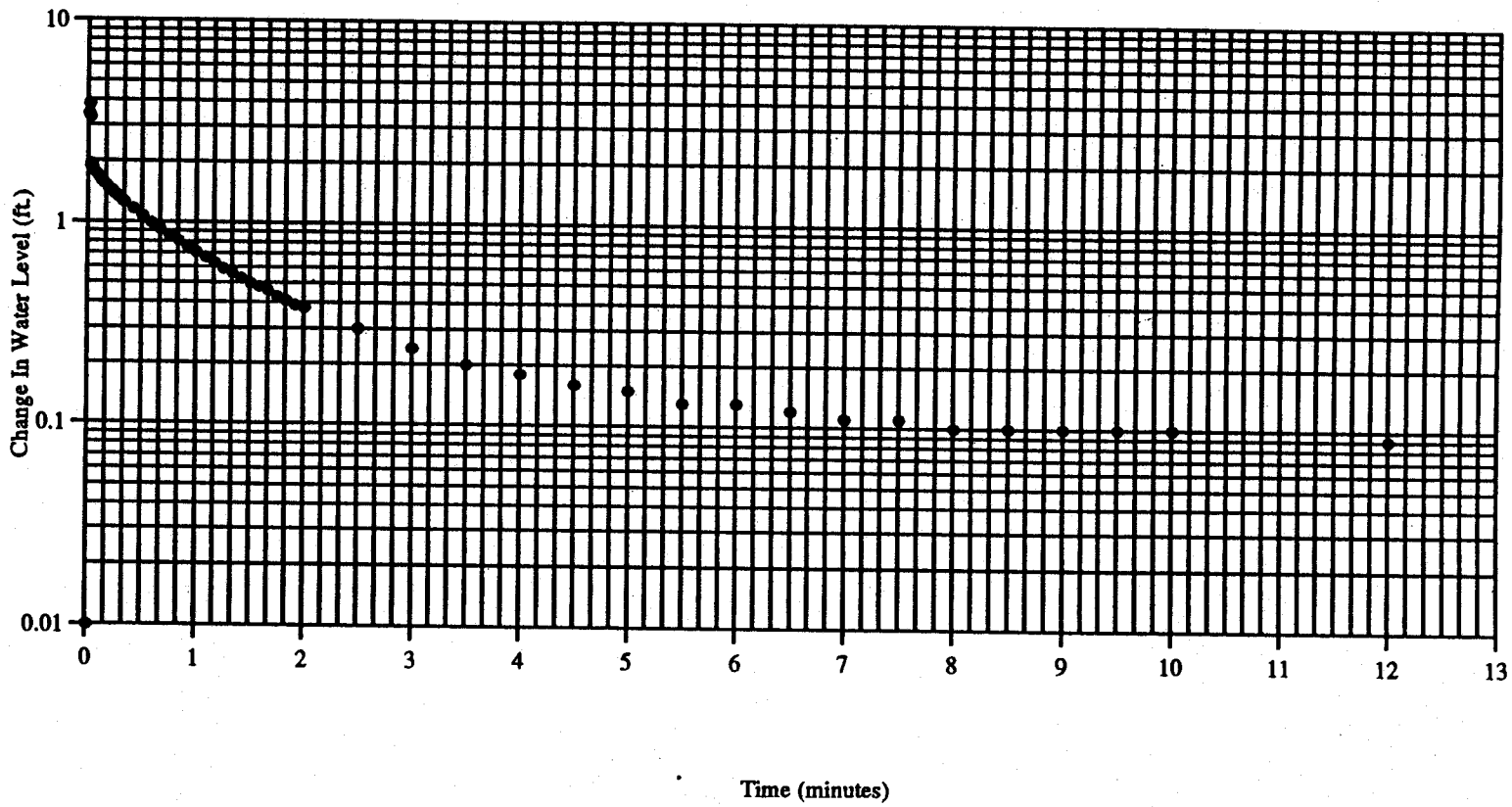
In-Situ Hydraulic Conductivity Test
Piezometer P-6-D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



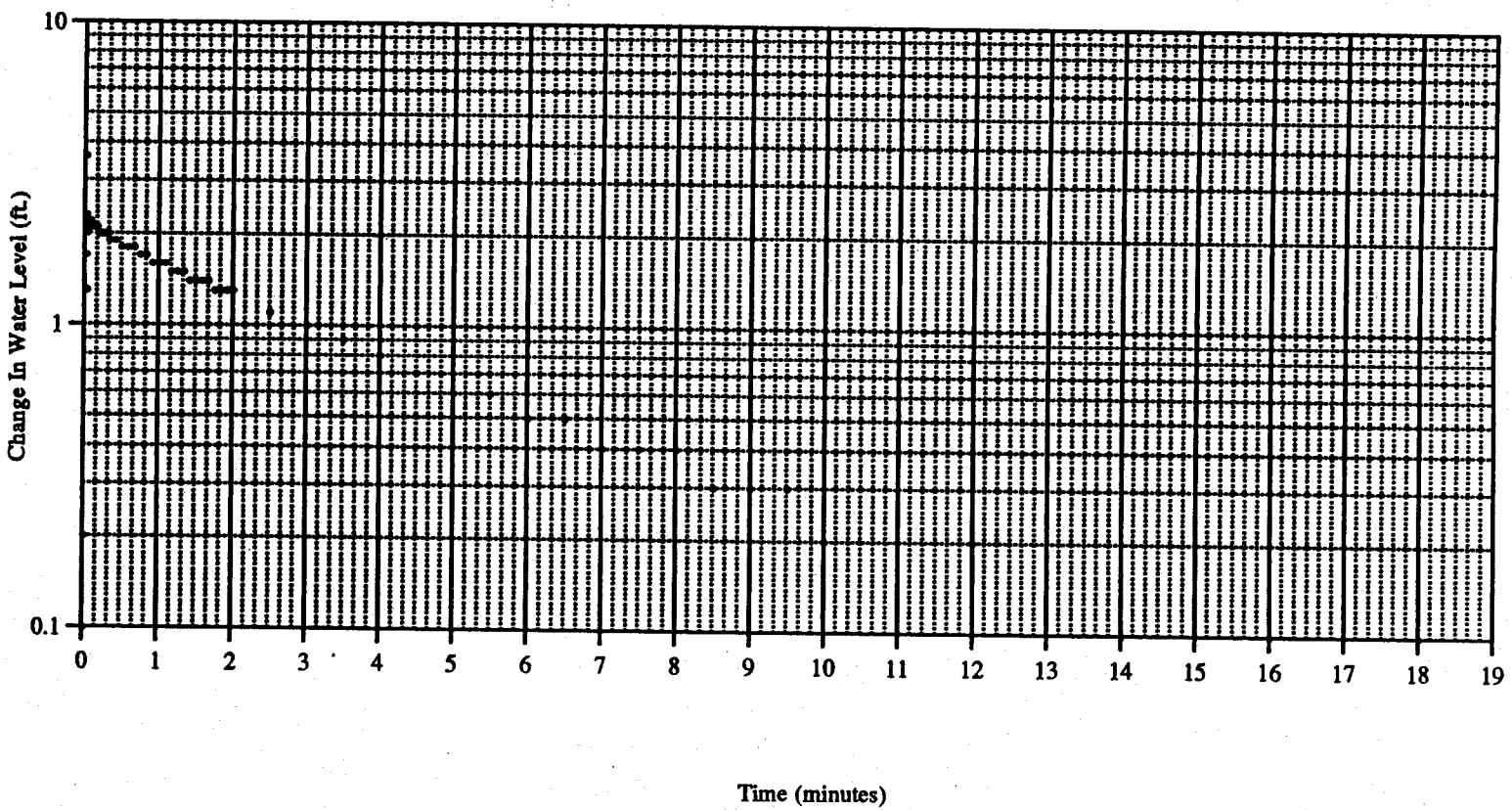
In-Situ Hydraulic Conductivity Test
Piezometer P-6-S (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



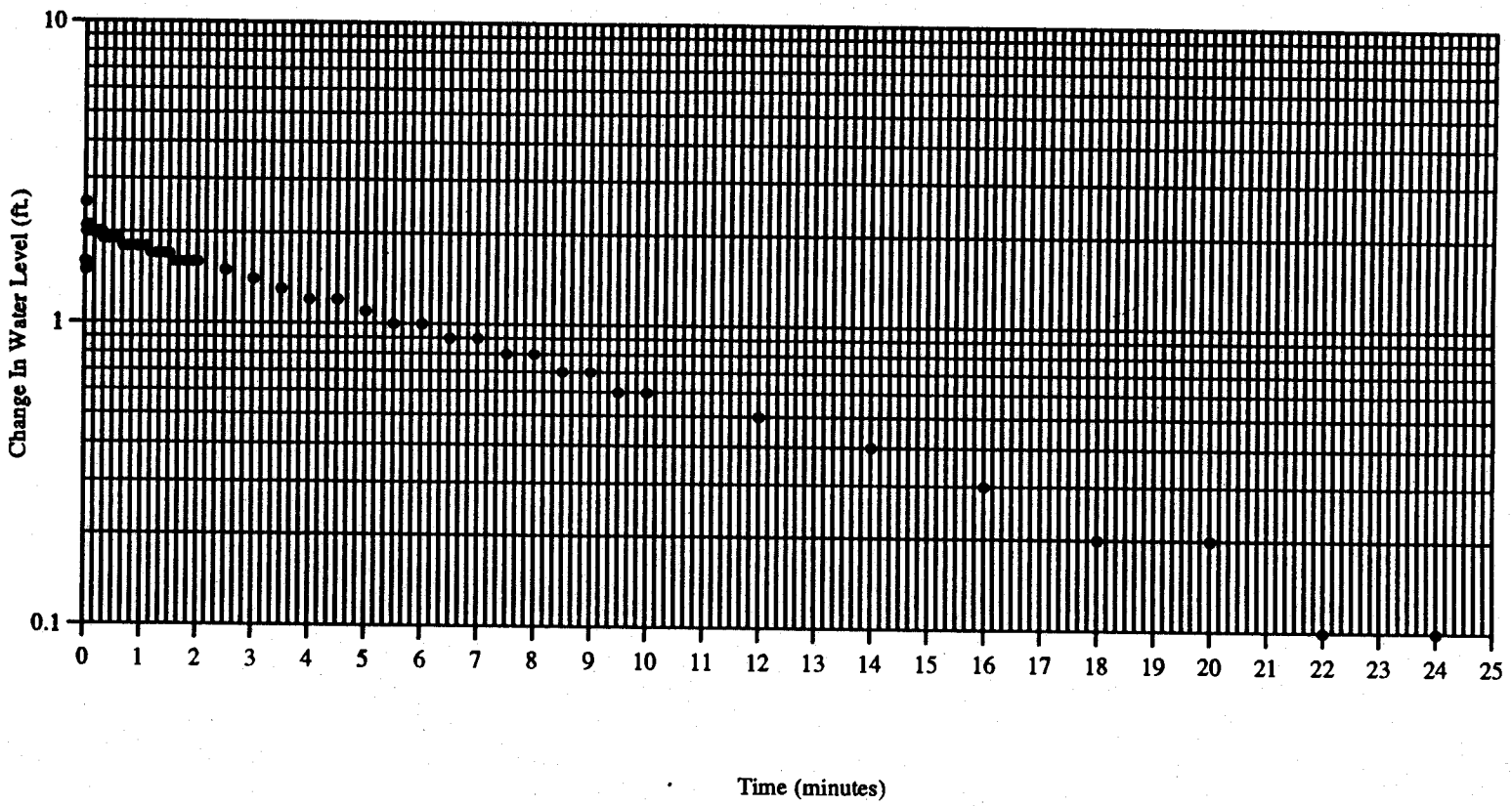
In-Situ Hydraulic Conductivity Test
Piezometer P-6-S (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



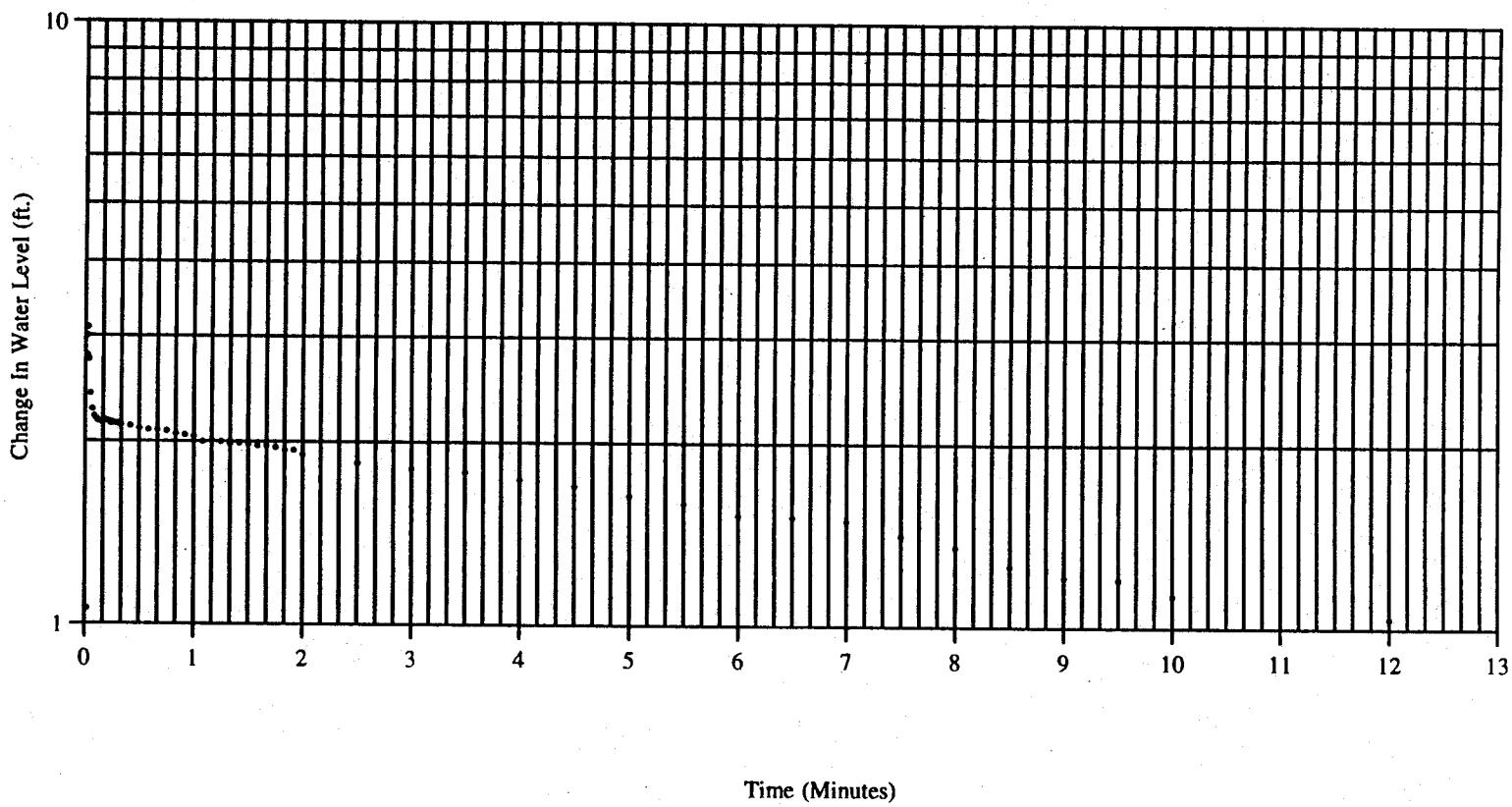
In-Situ Hydraulic Conductivity Test
Piezometer P-7 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



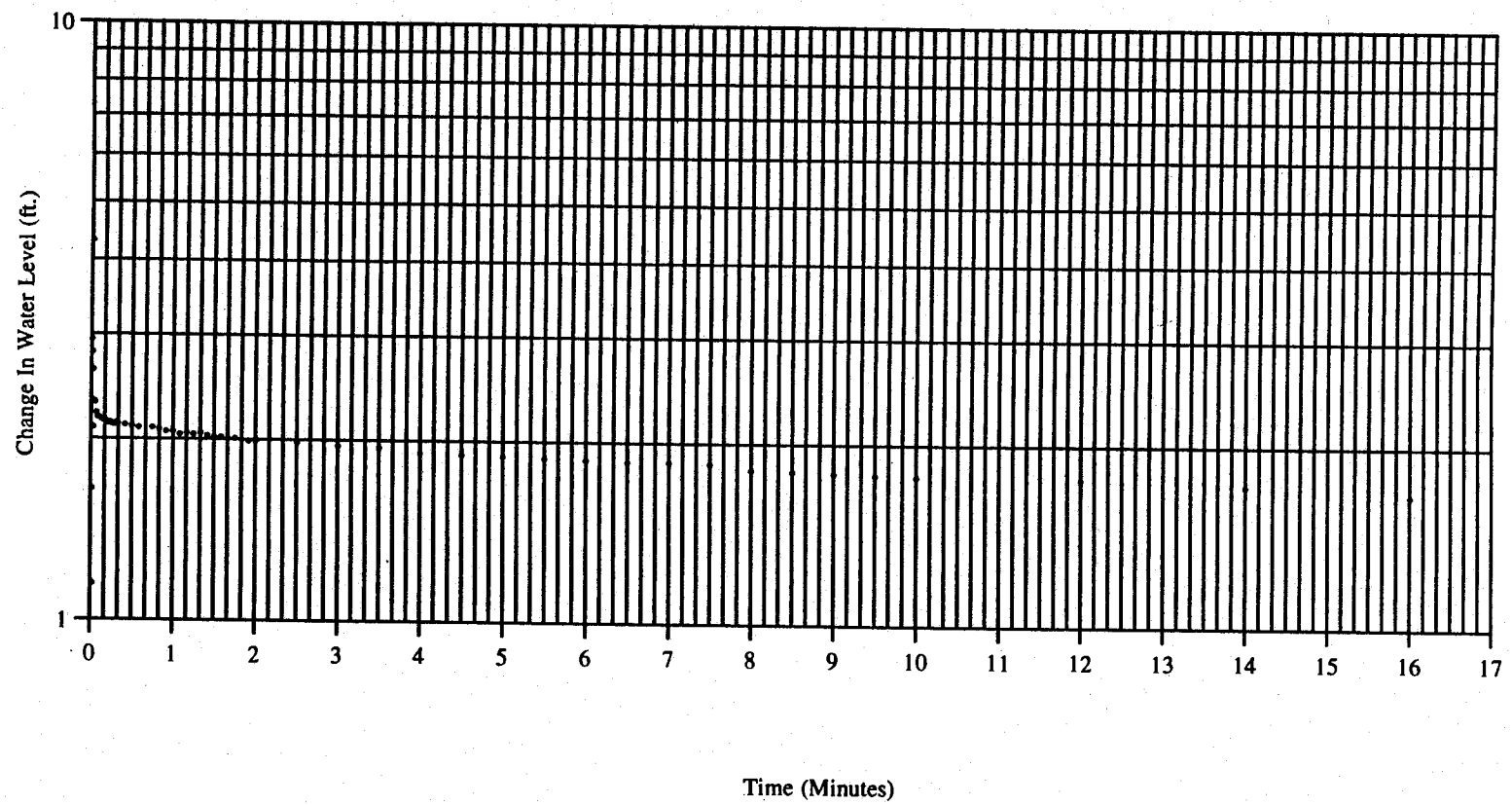
In-Situ Hydraulic Conductivity Test
Piezometer P-7 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



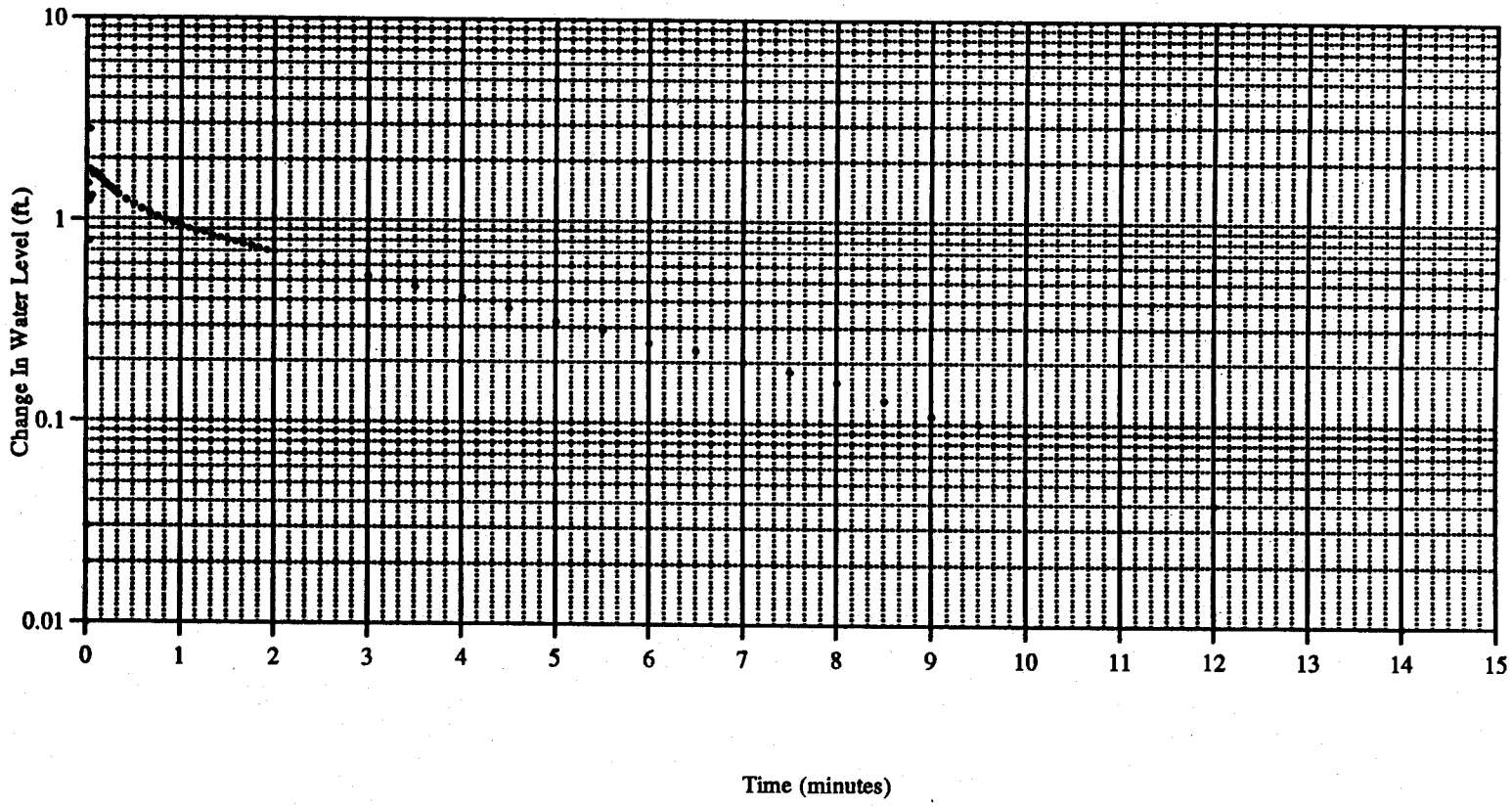
In-Situ Hydraulic Conductivity Test
Piezometer P-8-D (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



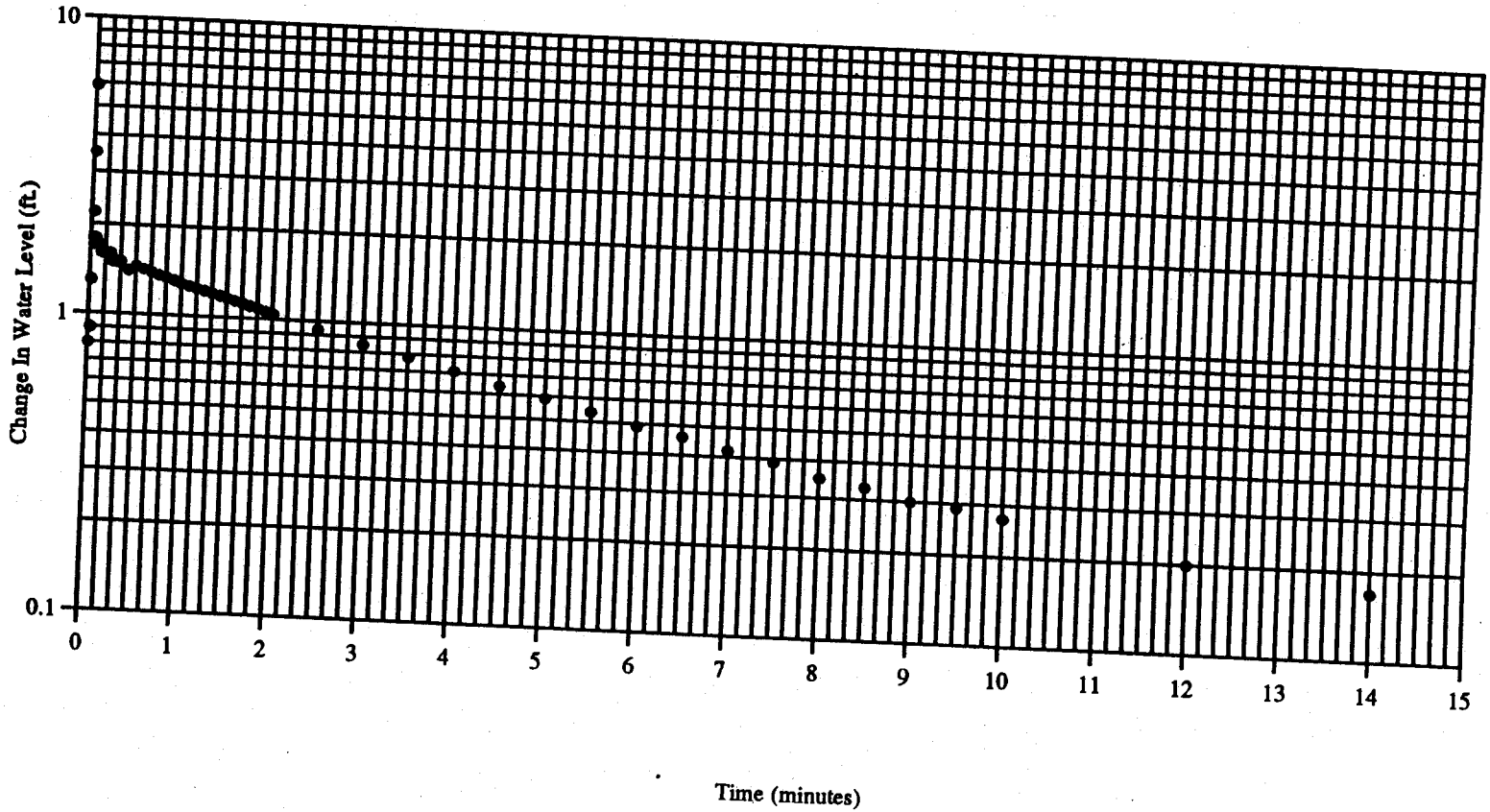
In-Situ Hydraulic Conductivity Test
Piezometer P-8-D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



In-Situ Hydraulic Conductivity Test
Piezometer P-8-S (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



In-Situ Hydraulic Conductivity Test
Piezometer P-8-S (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



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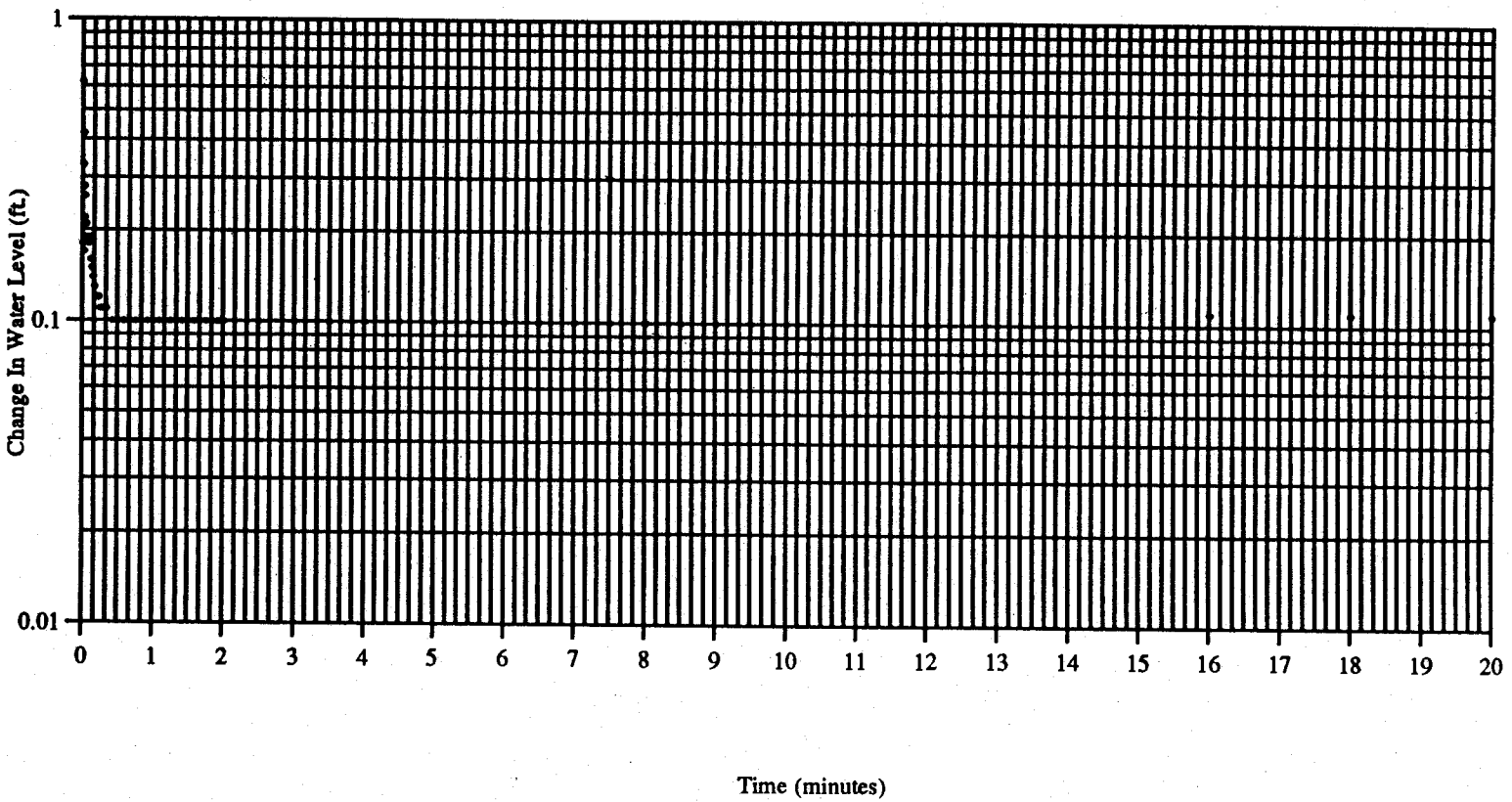
Piezometer P-9D (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



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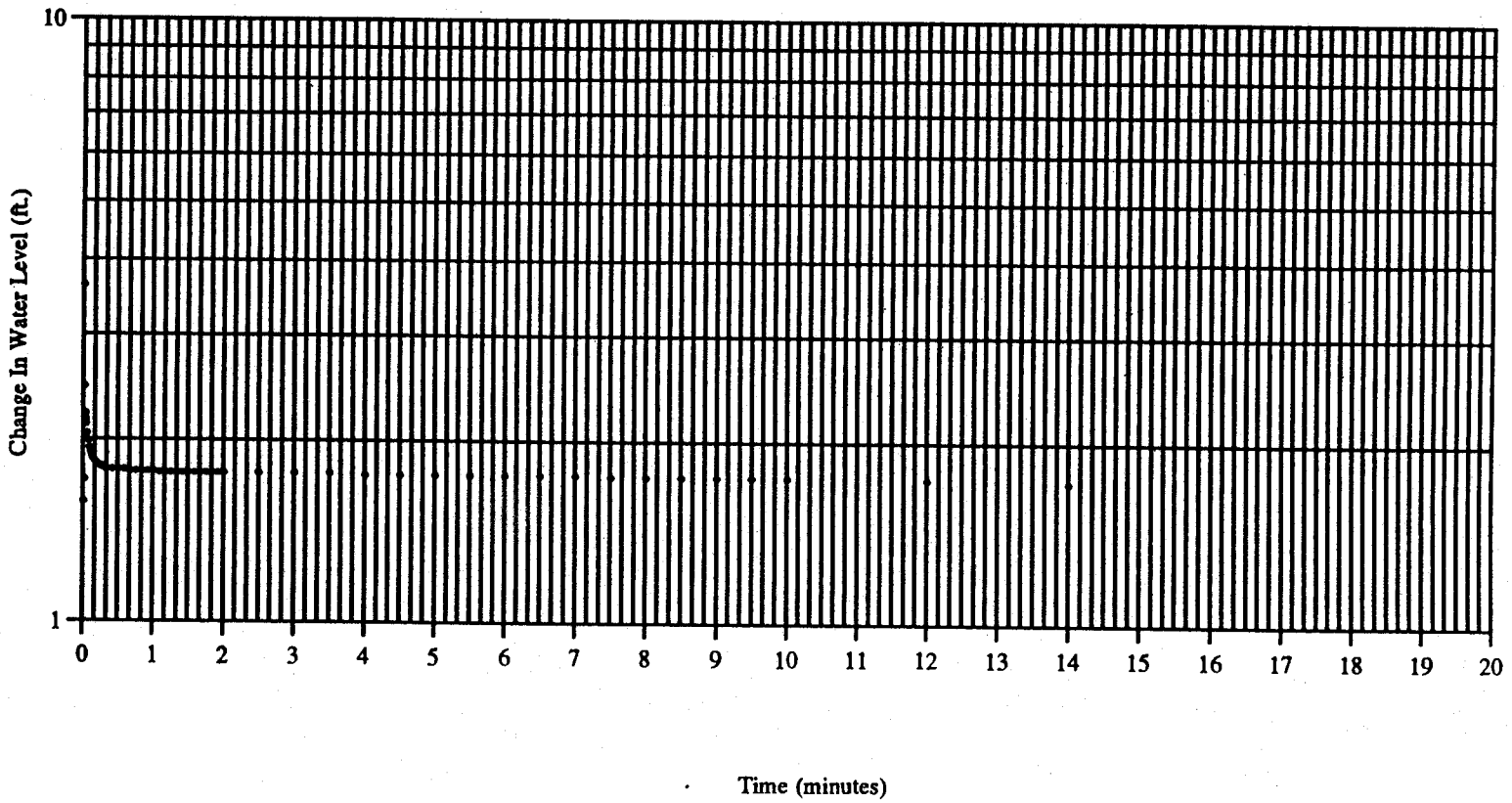
Piezometer P-9D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



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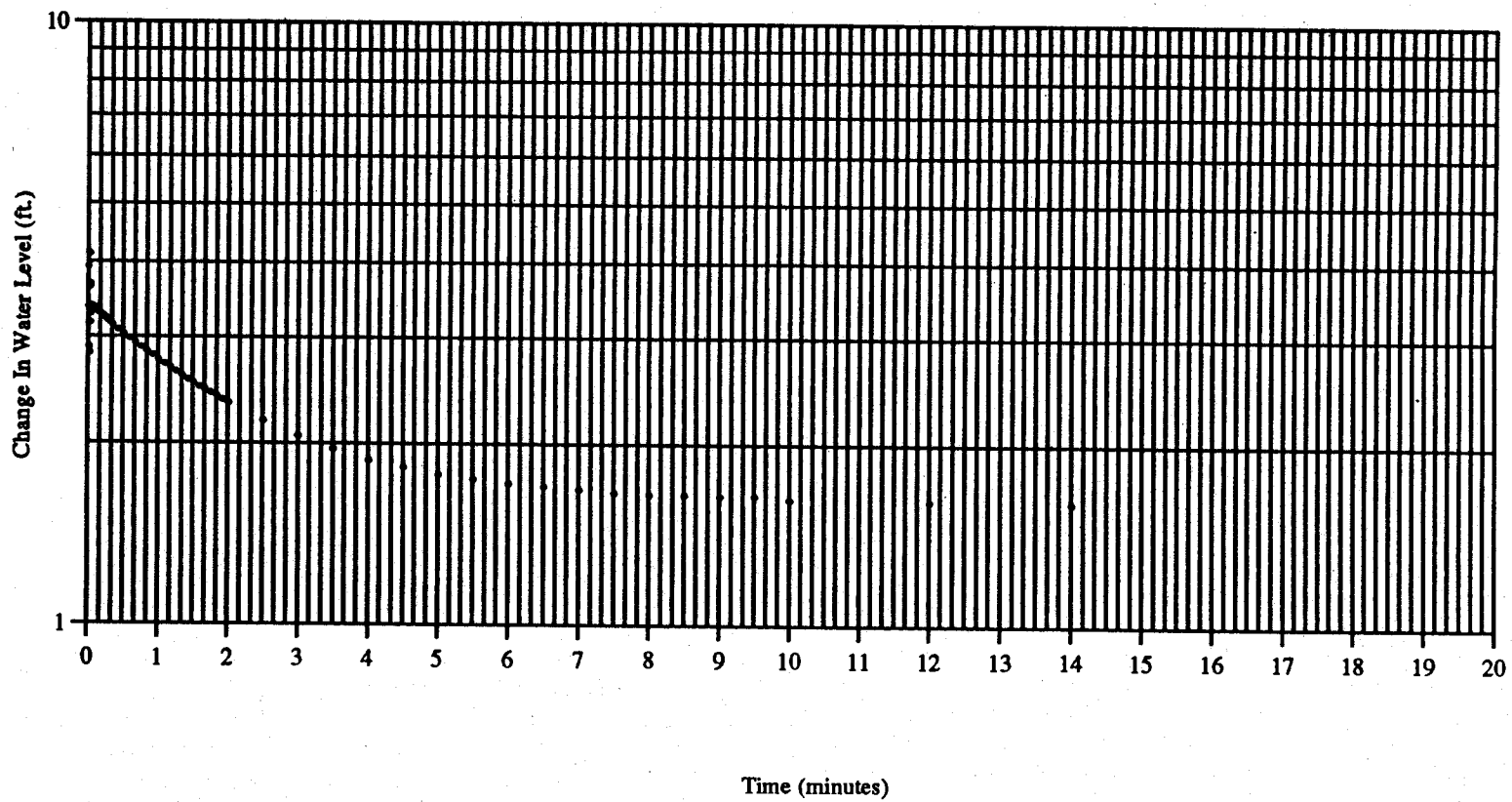
Kernersville, North Carolina
RUST E & I Job 87221.700



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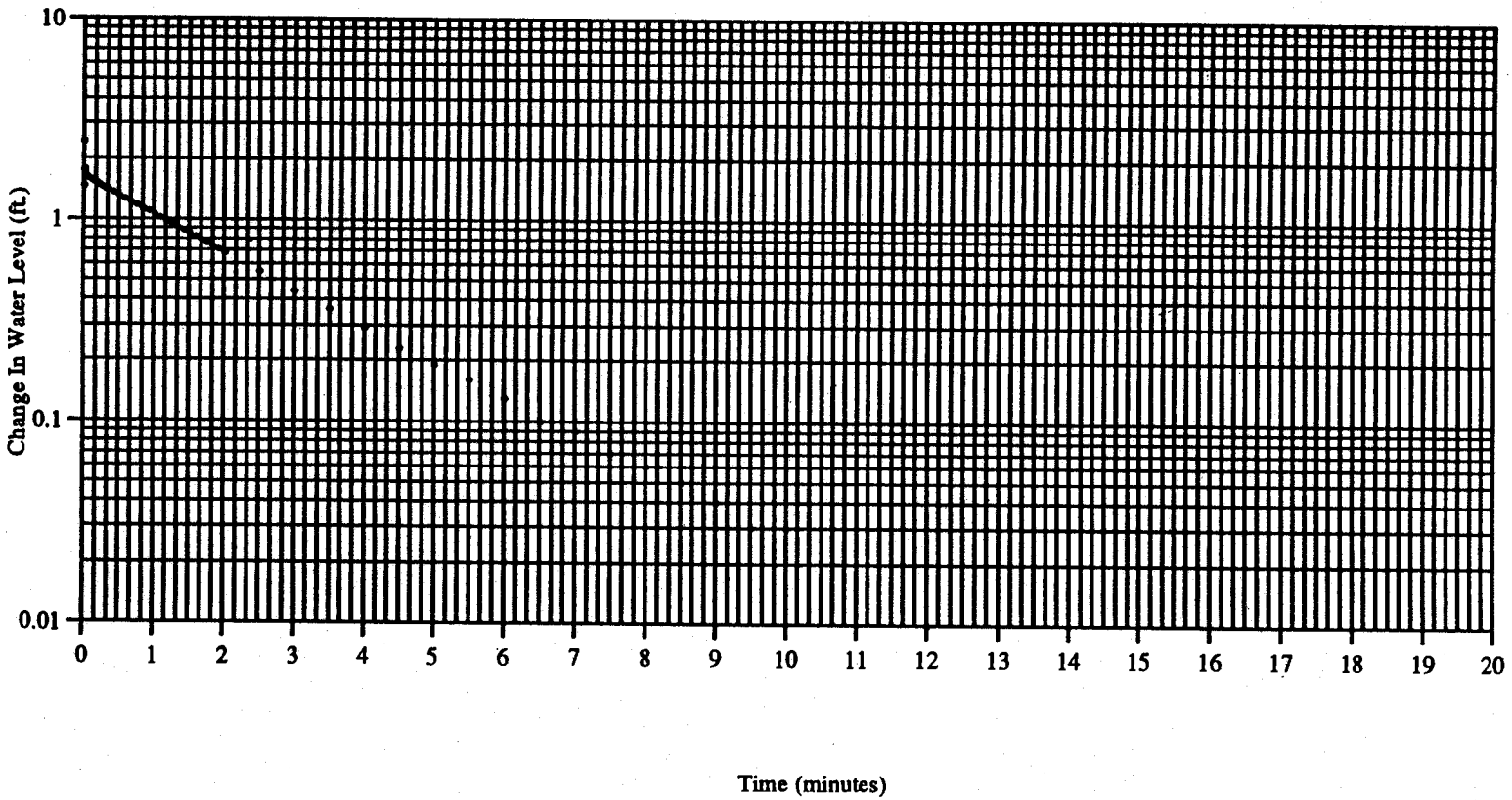

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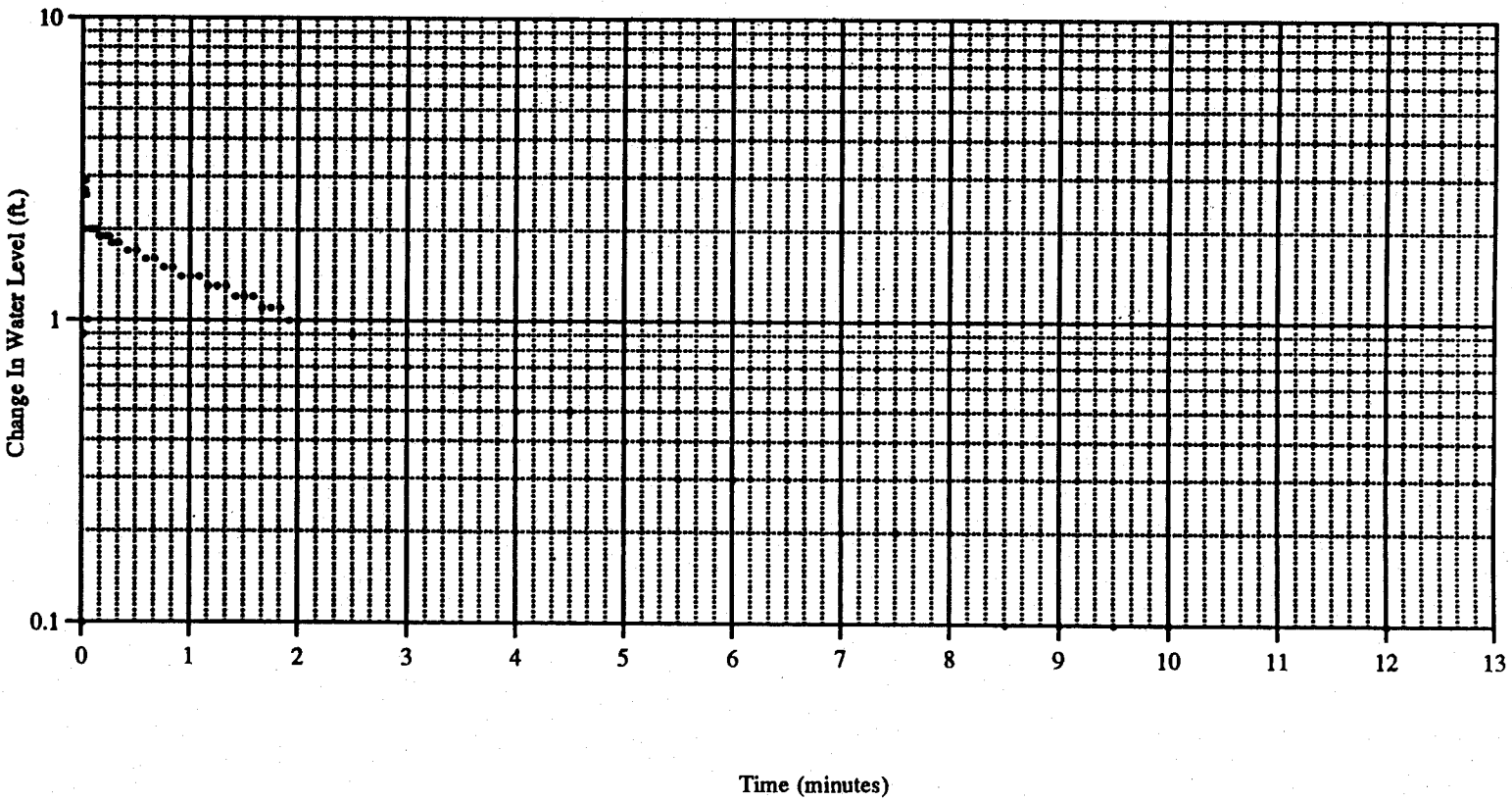
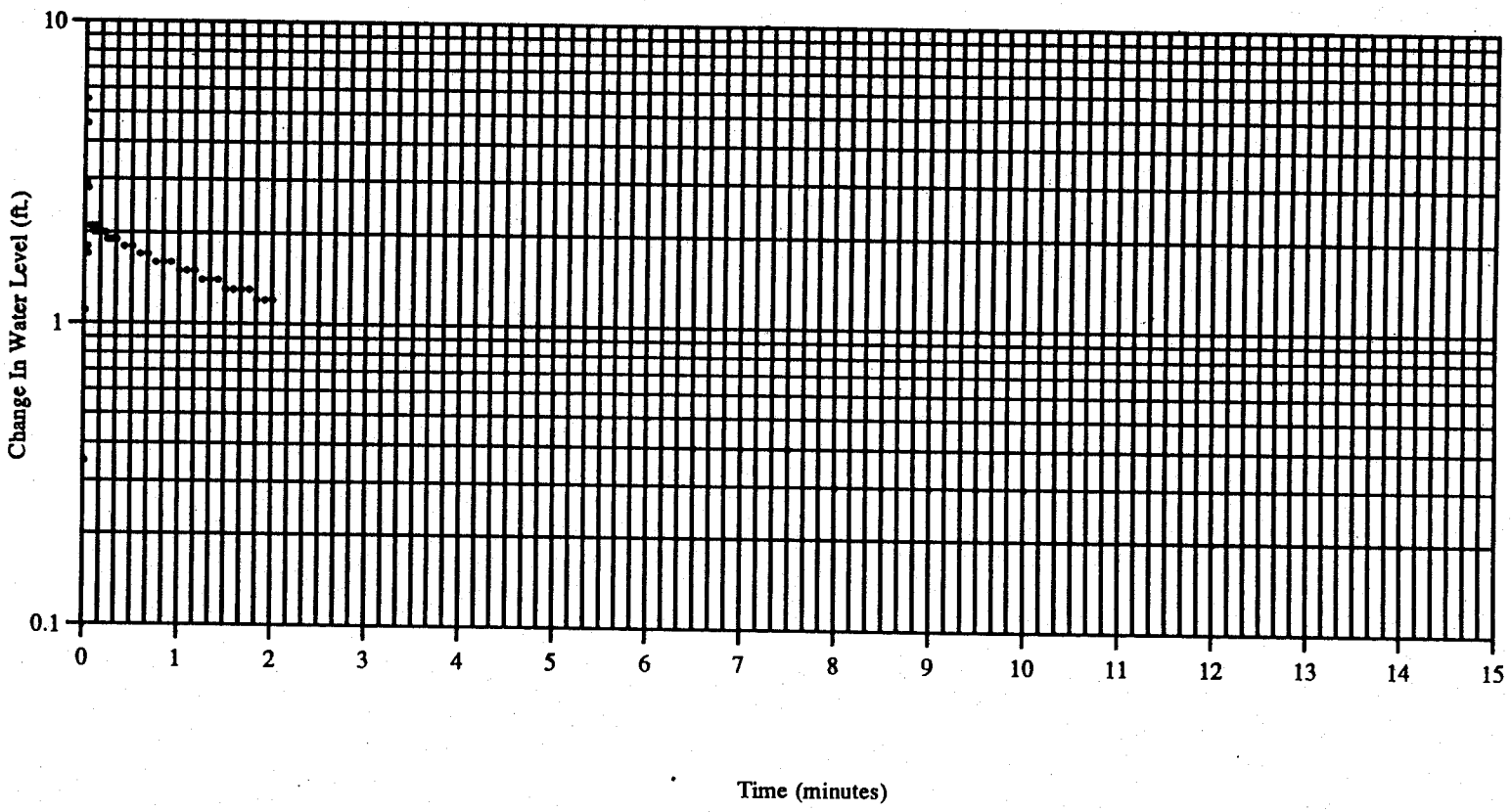
RUST E & I Job 87221.000



In-Situ Hydraulic Conductivity Test
Piezometer P-10 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



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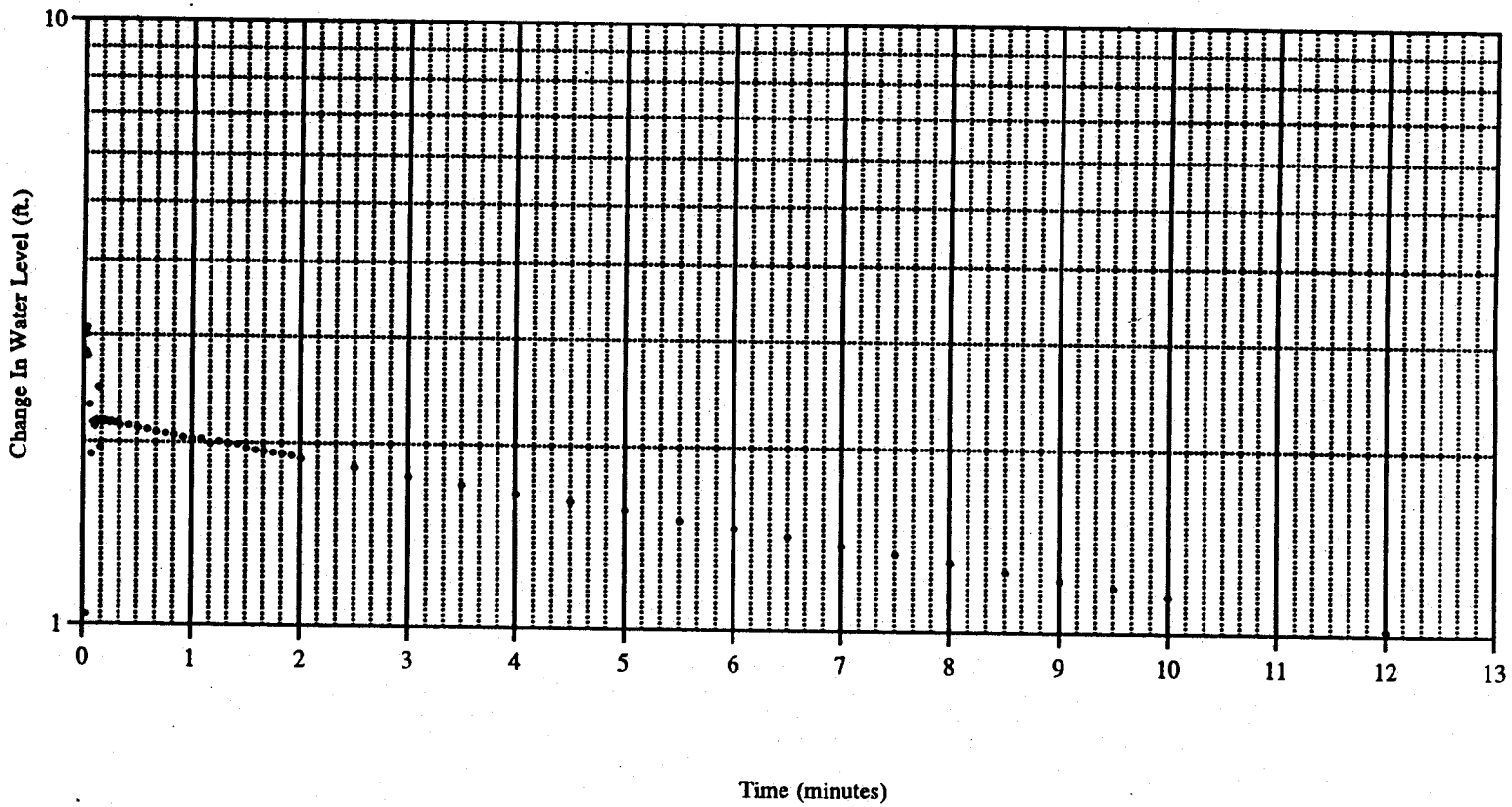
Piezometer P-11-D (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



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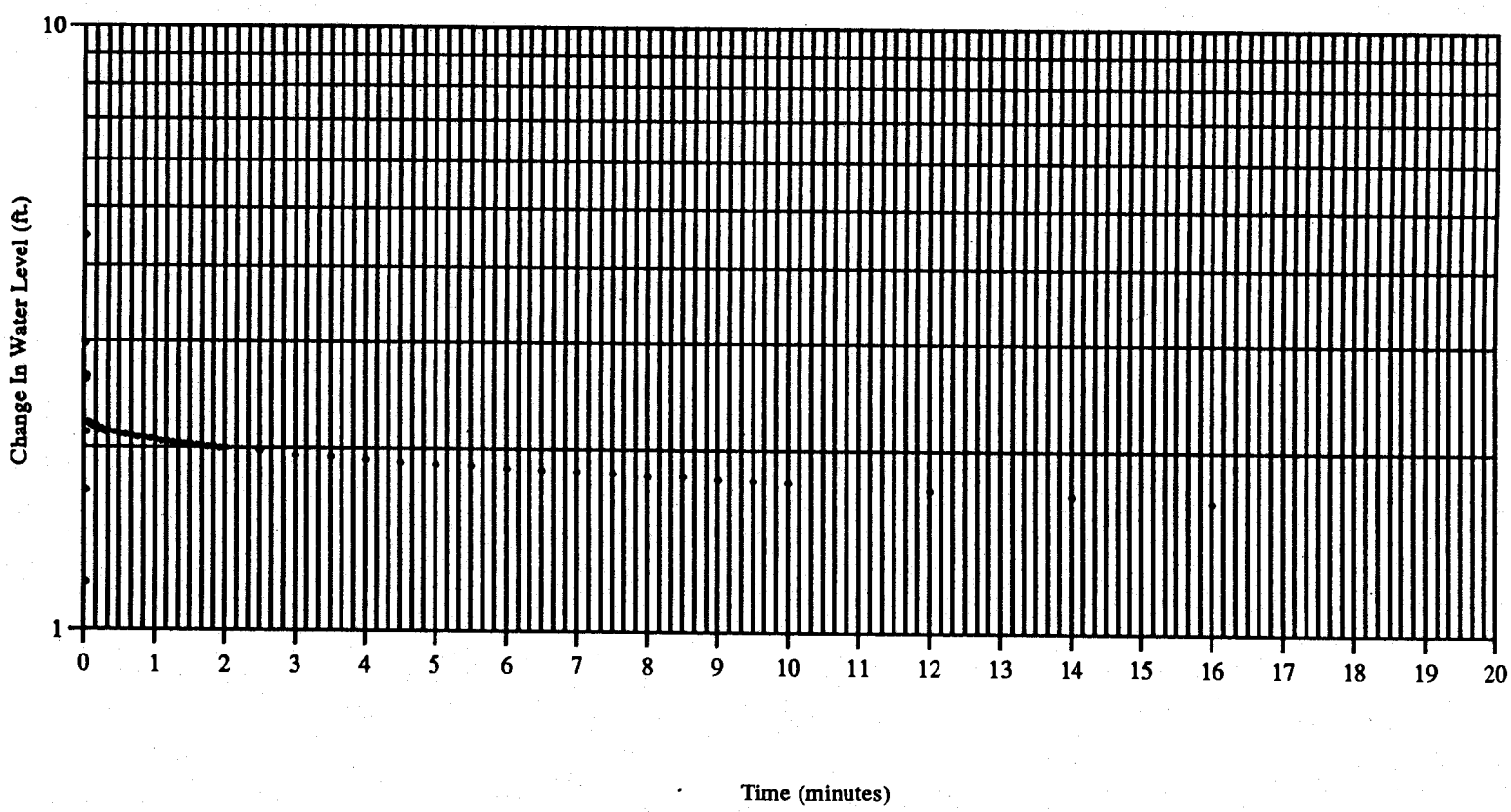
Piezometer P-11-D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



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Piezometer P-11-S (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
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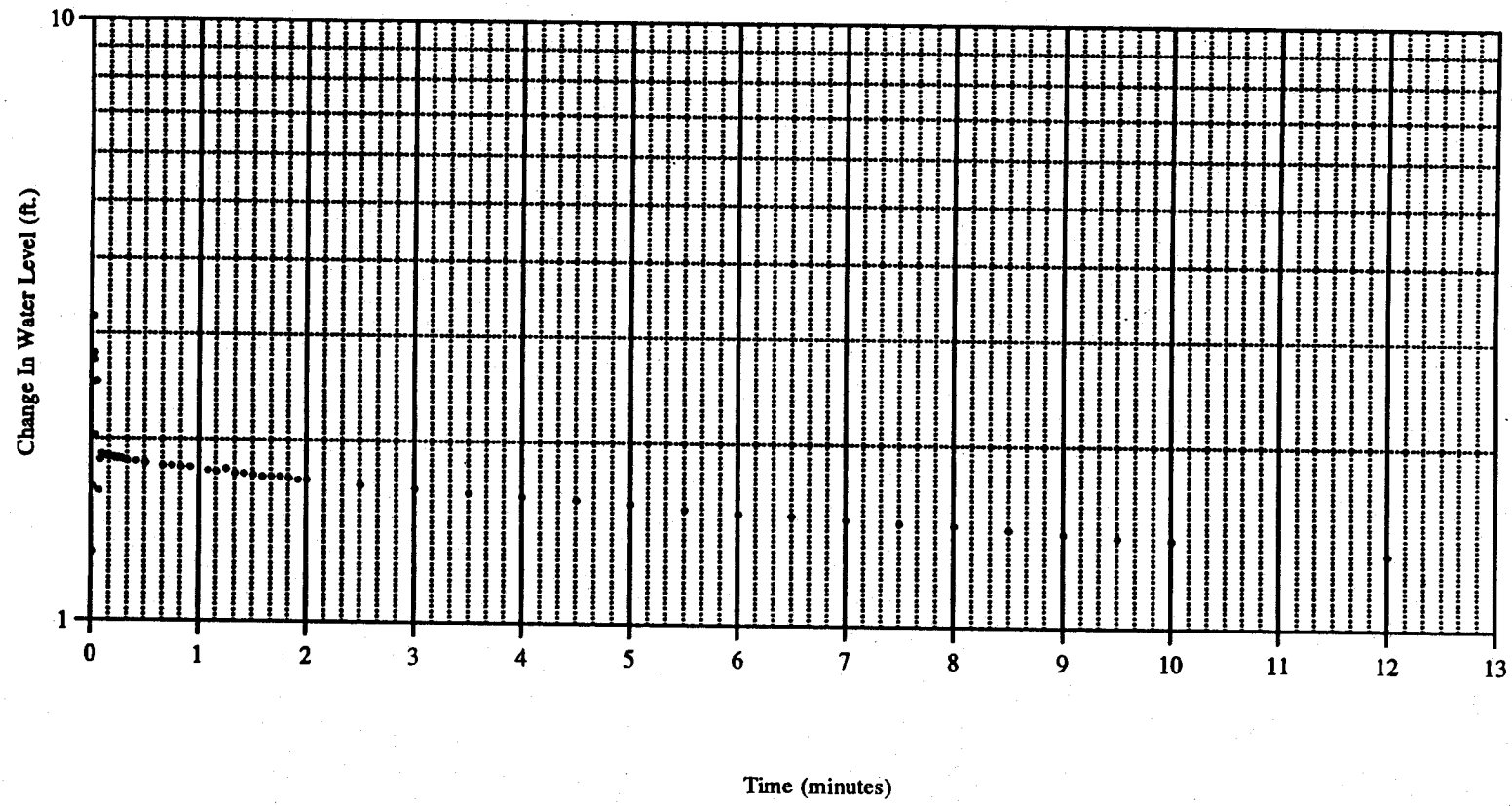

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Piezometer P-11-S (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
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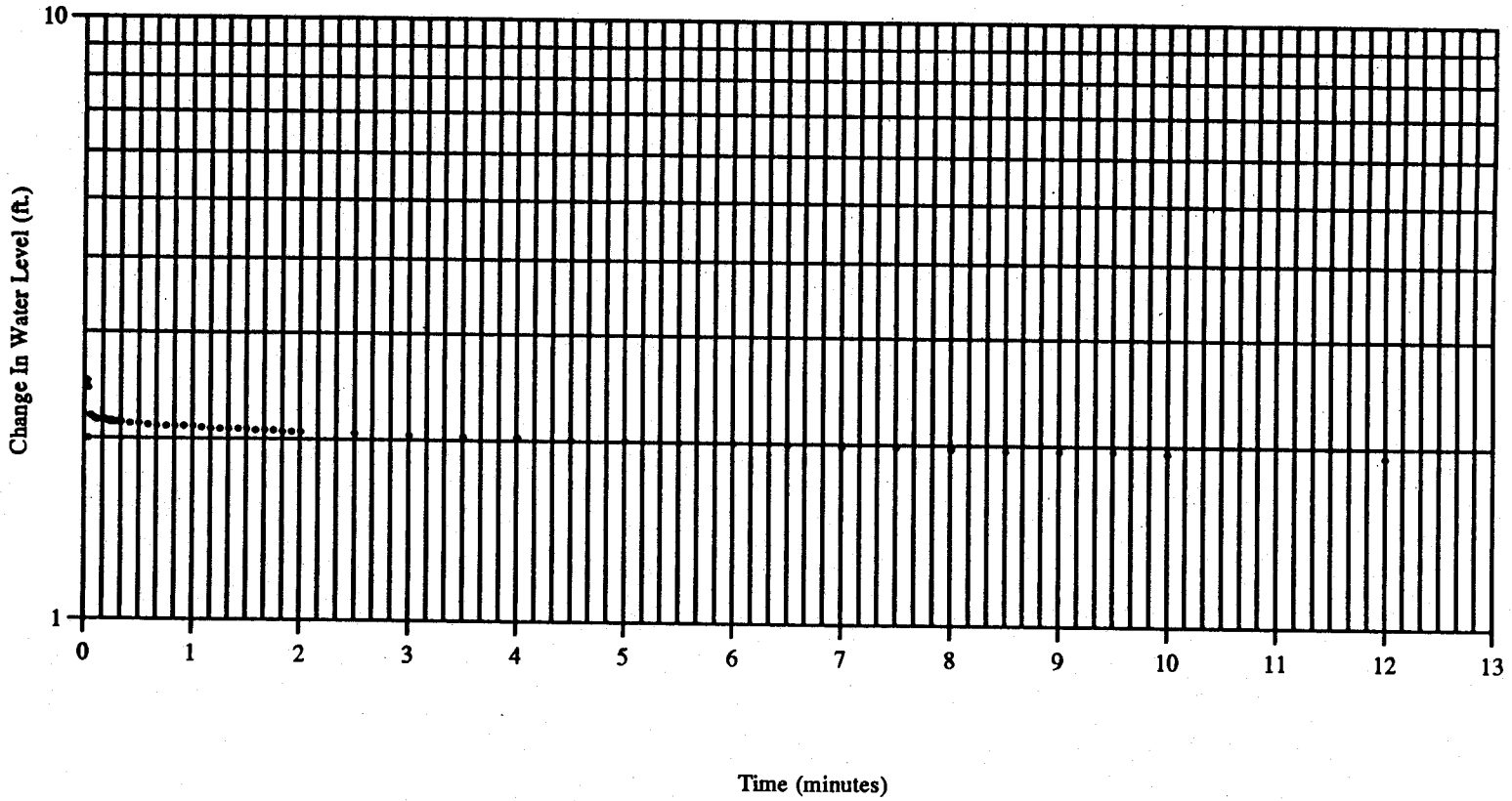

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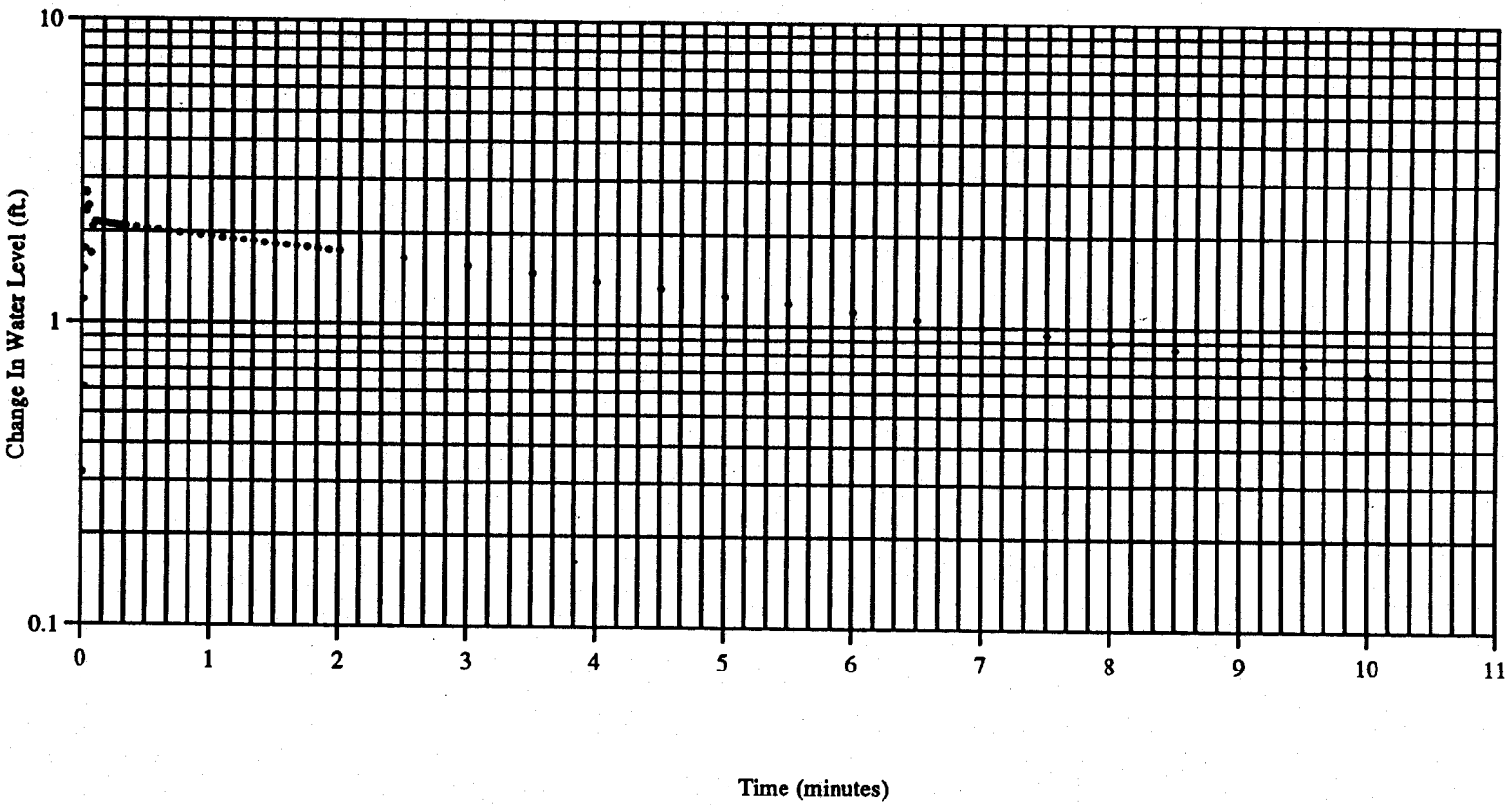
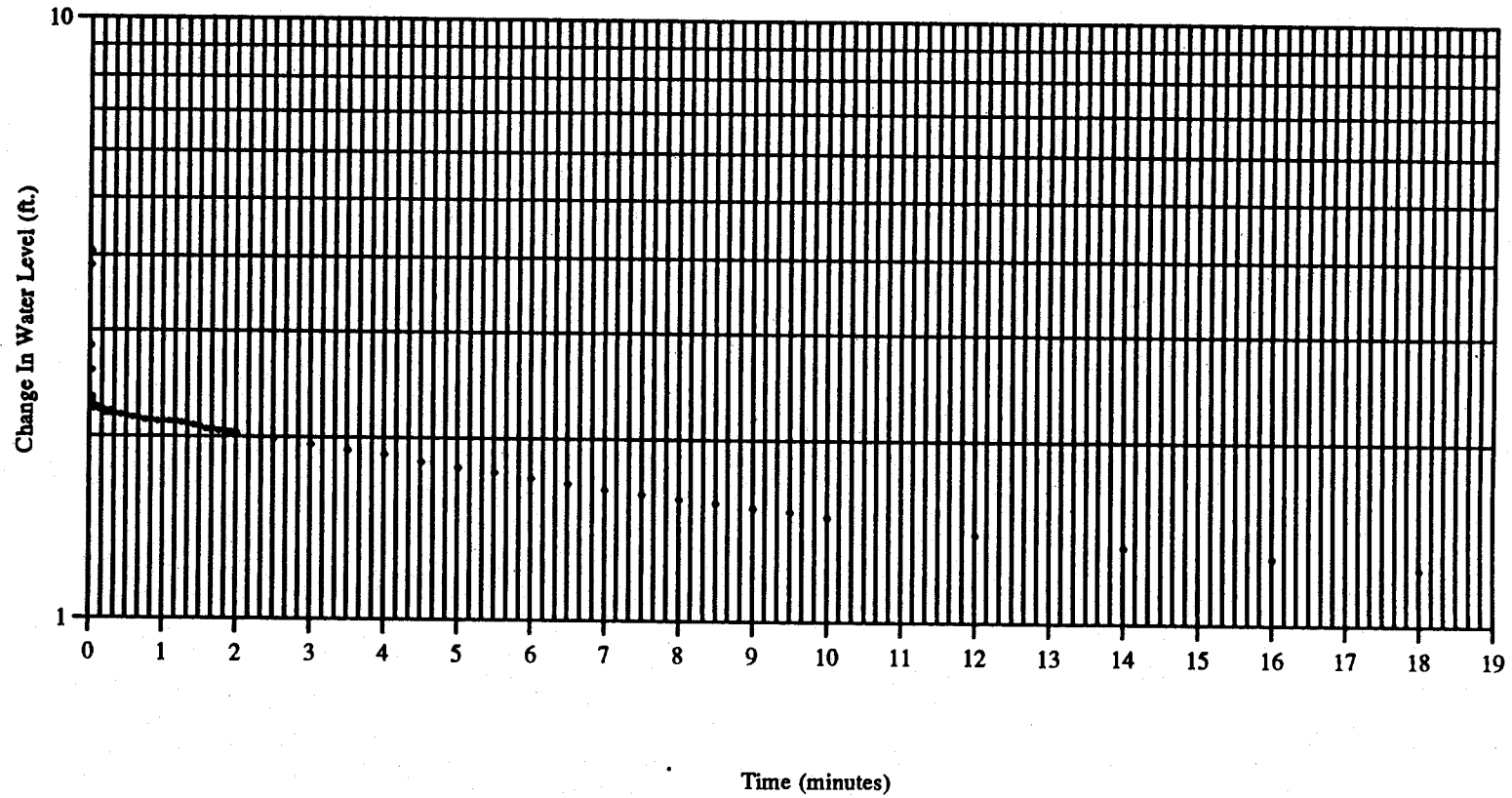
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.700



In-Situ Hydraulic Conductivity Test
Piezometer P-12-D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



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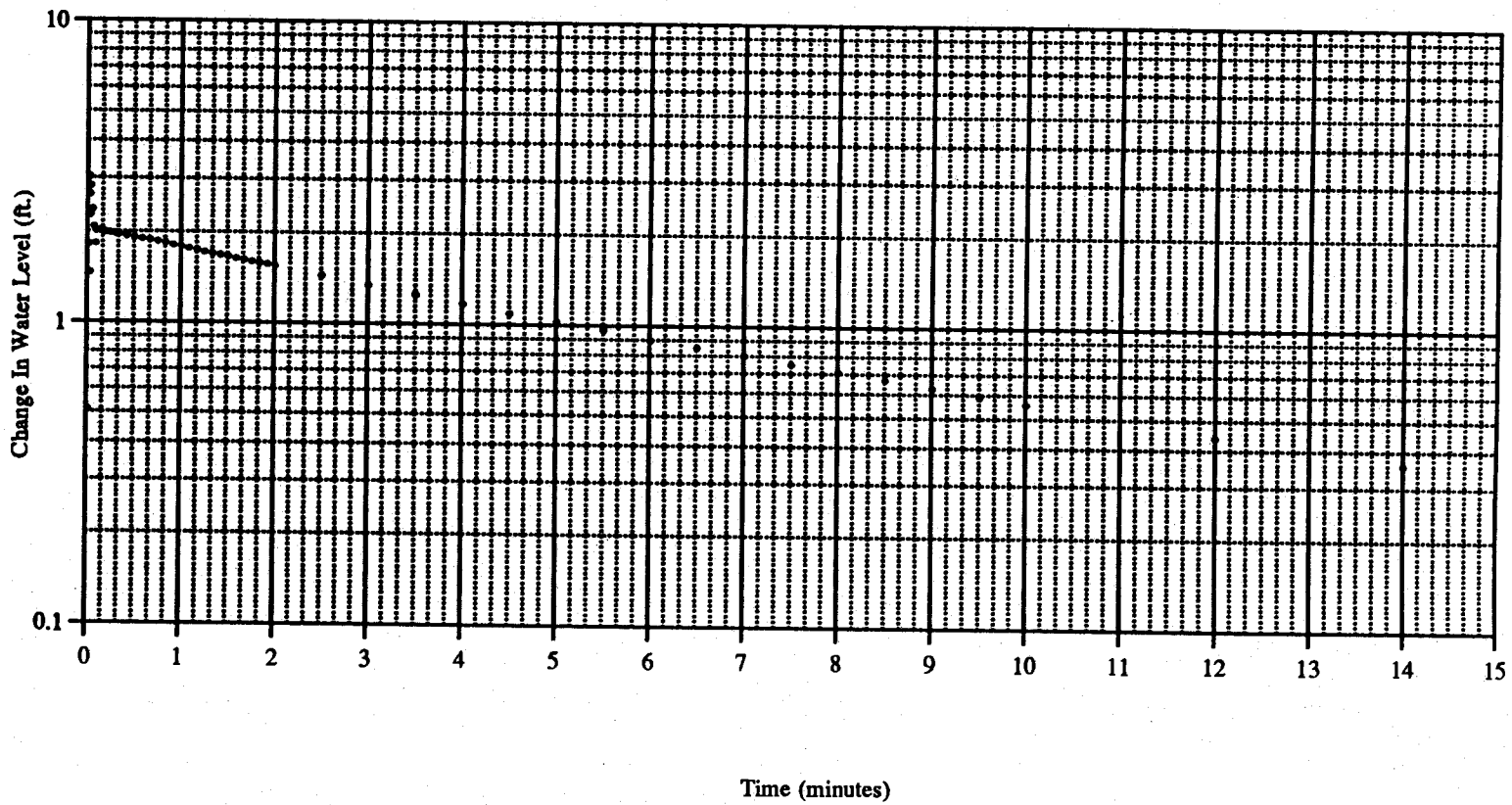
Piezometer P-12-S (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



In-Situ Hydraulic Conductivity Test
Piezometer P-12-S (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
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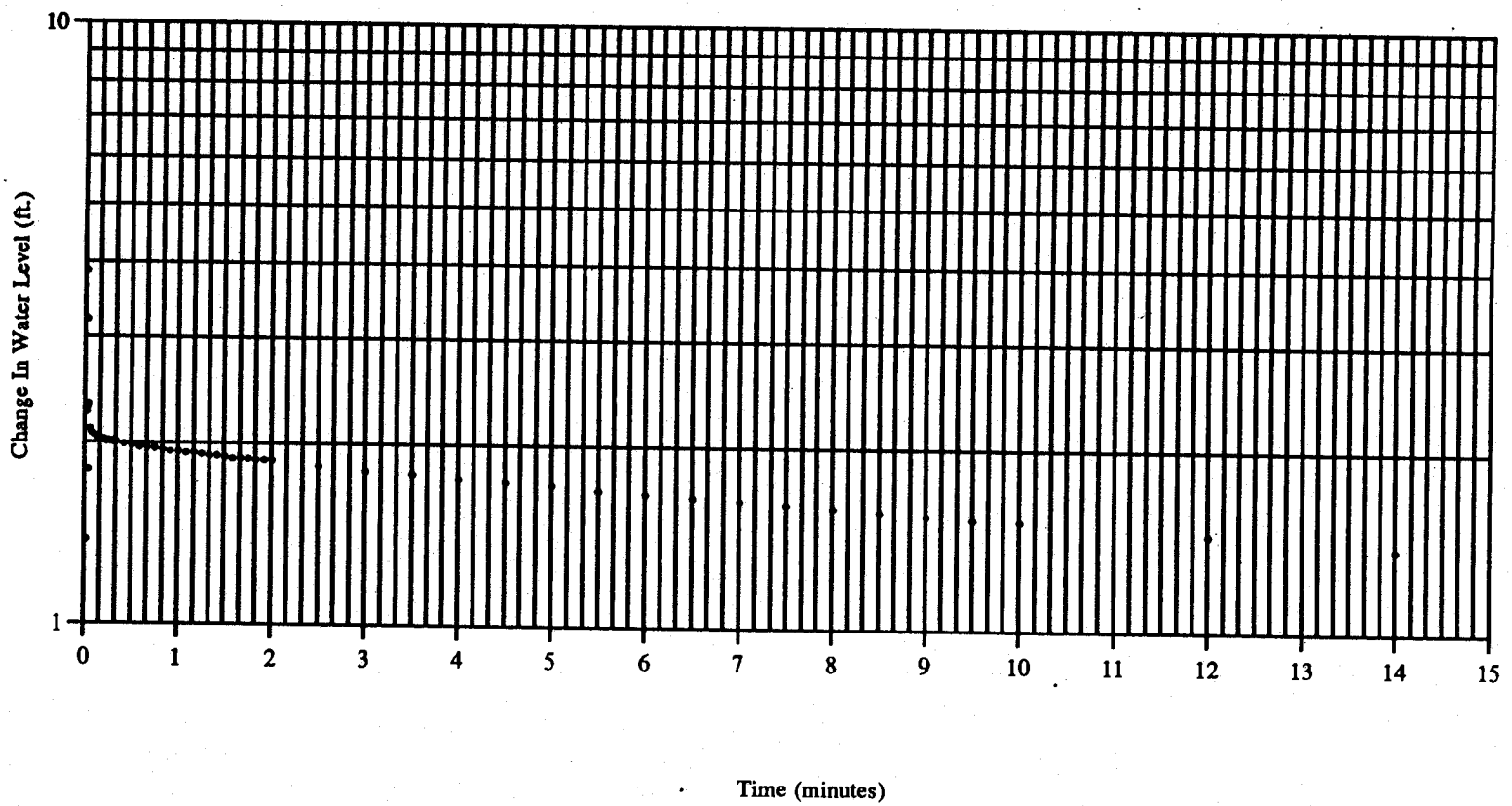
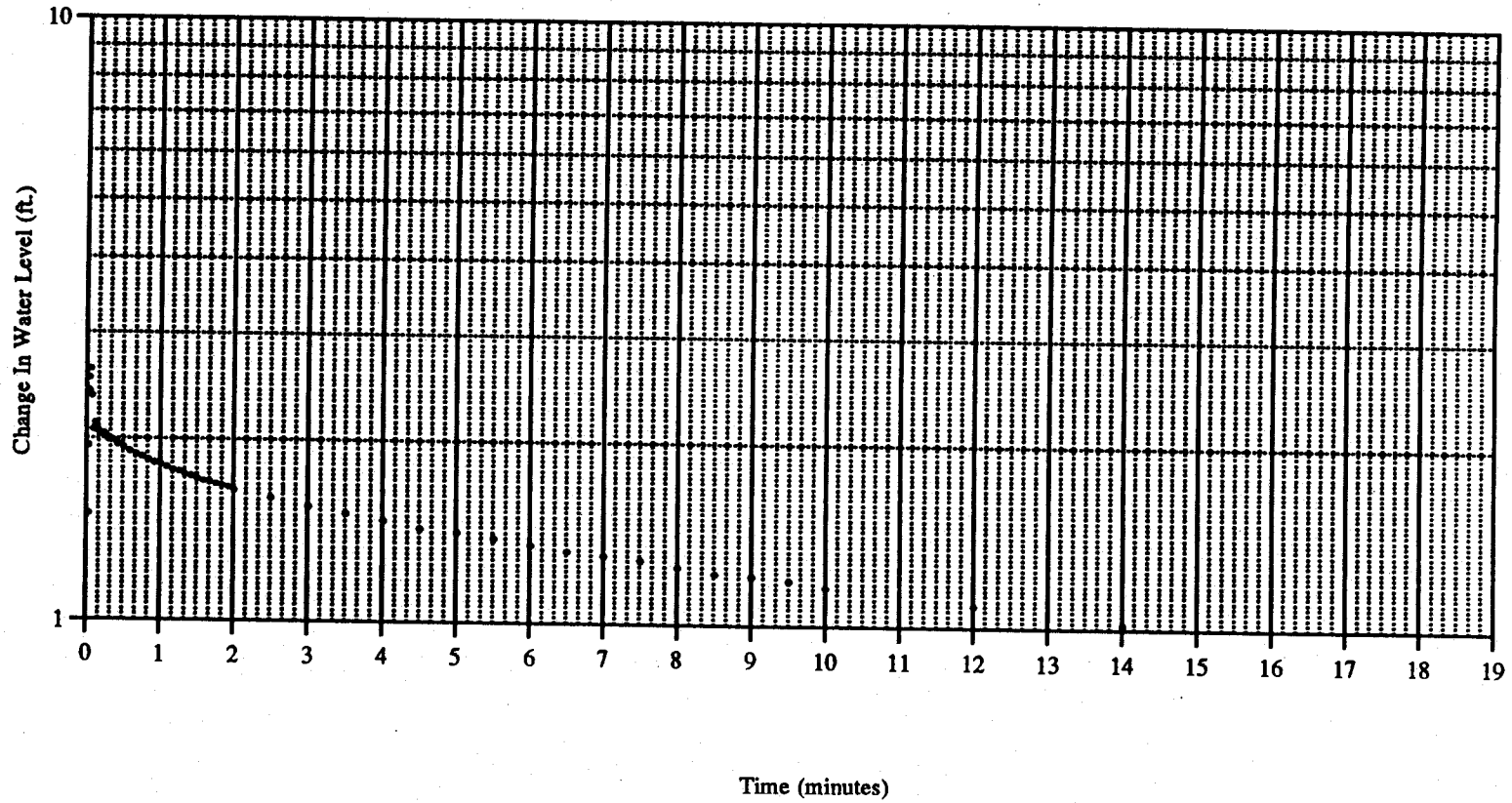
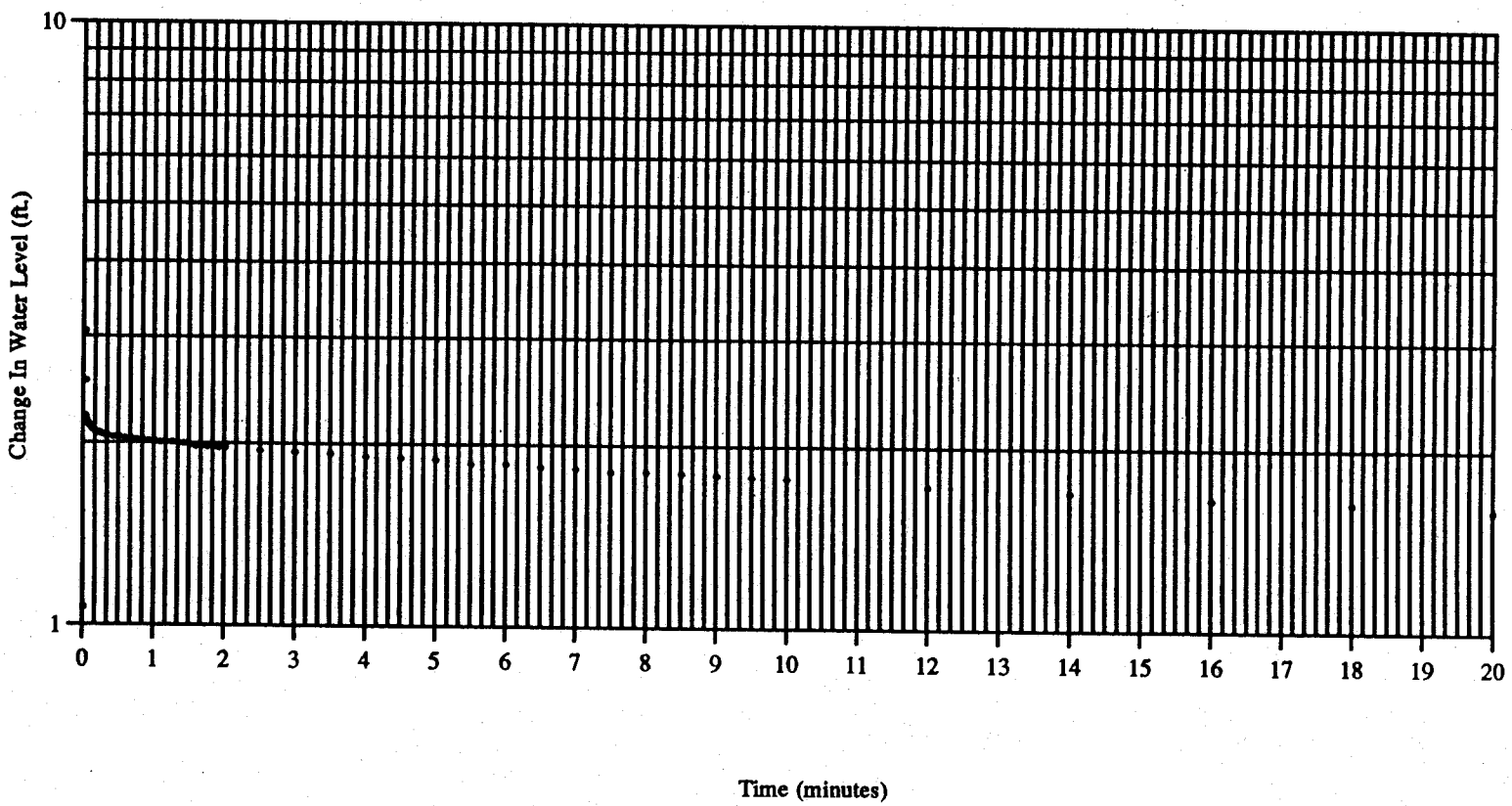


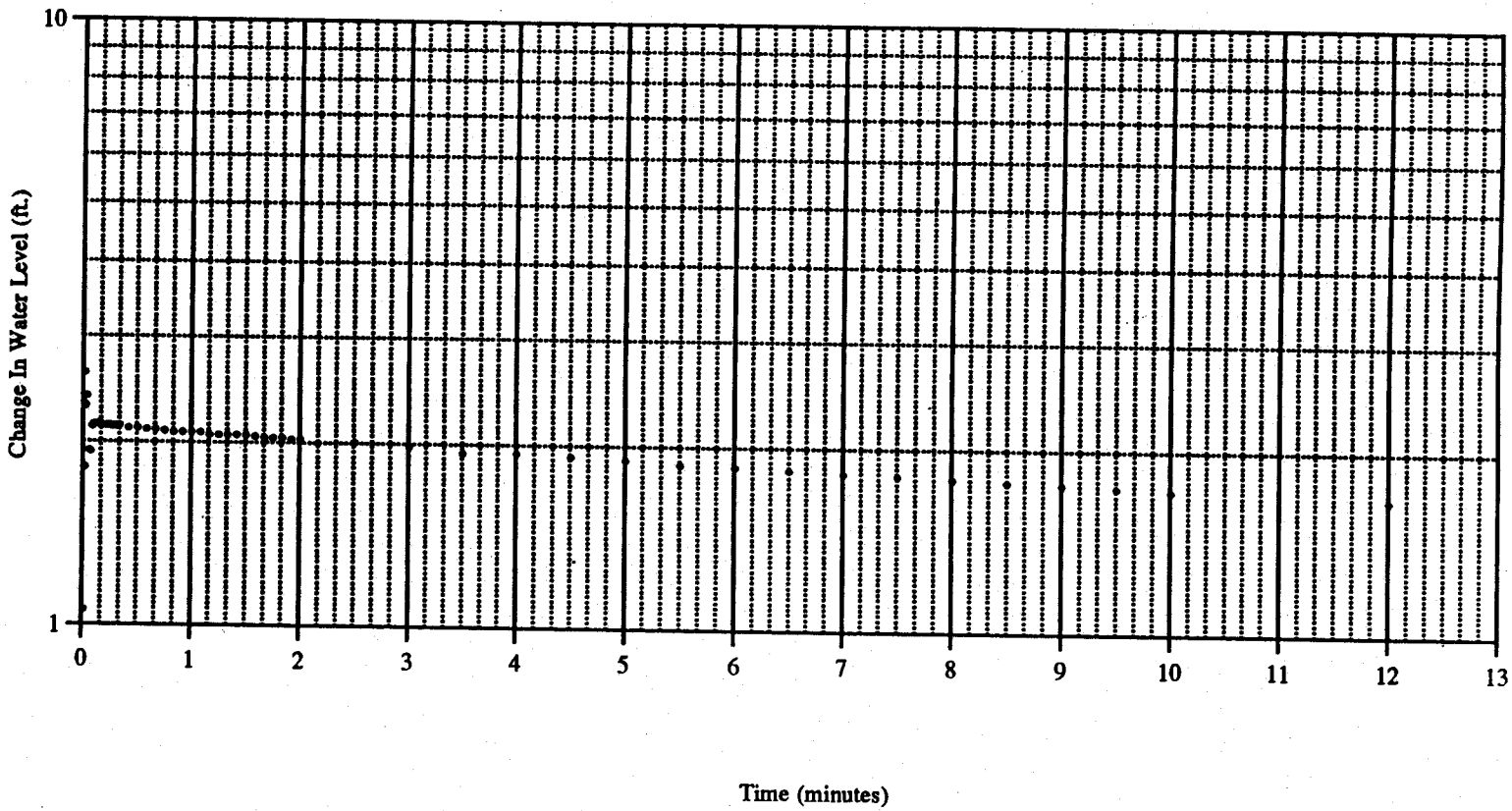
In-Situ Hydraulic Conductivity Test
Piezometer P-13 (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



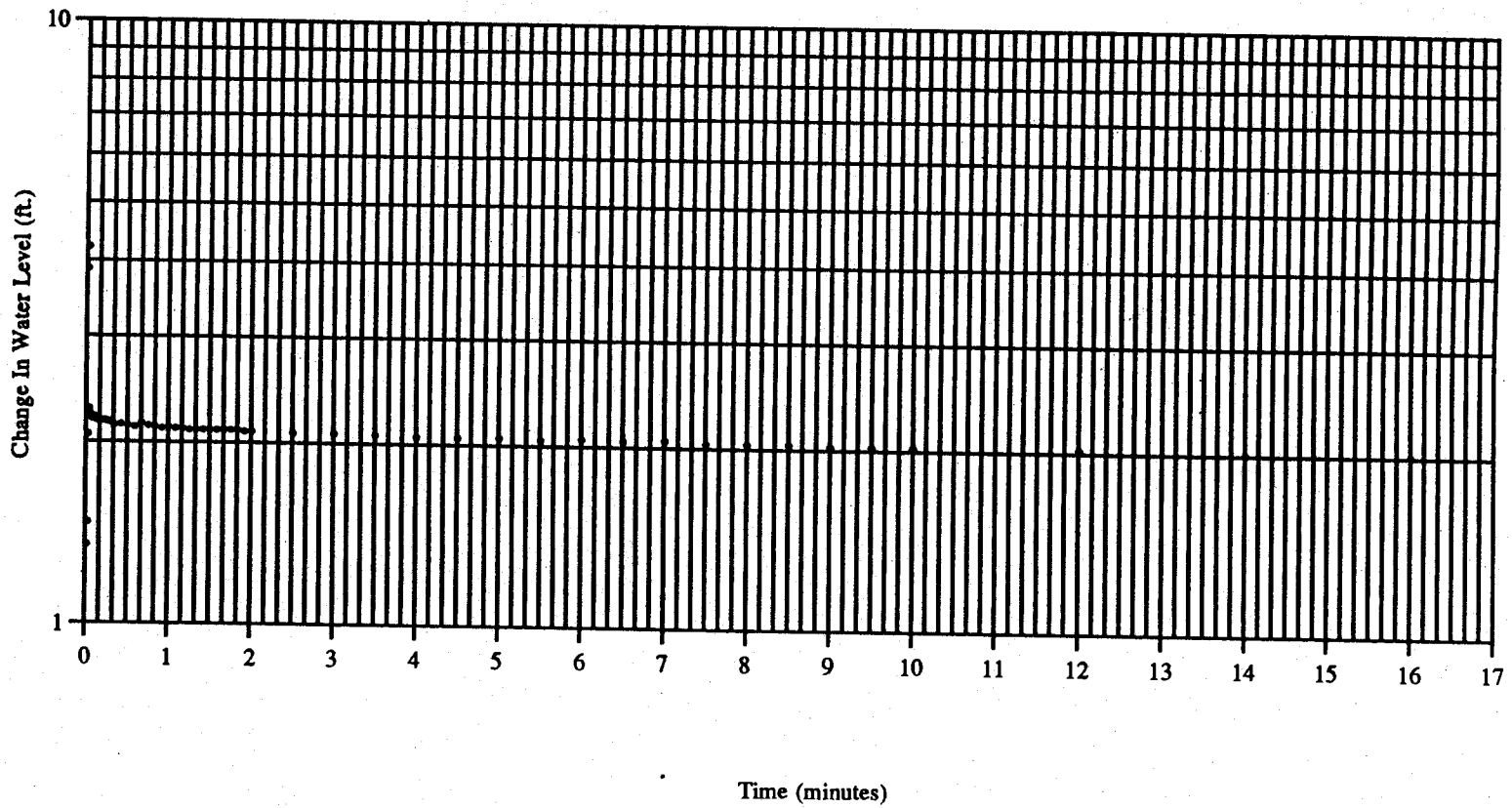
In-Situ Hydraulic Conductivity Test
Piezometer P-13 (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



In-Situ Hydraulic Conductivity Test
Piezometer P-14-D (Falling Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



In-Situ Hydraulic Conductivity Test
Piezometer P-14-D (Rising Head)
Waste Management Piedmont Landfill
Kernersville, North Carolina
RUST E & I Job 87221.000



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Piezometer P-14-S (Falling Head)
Waste Management Piedmont Landfill
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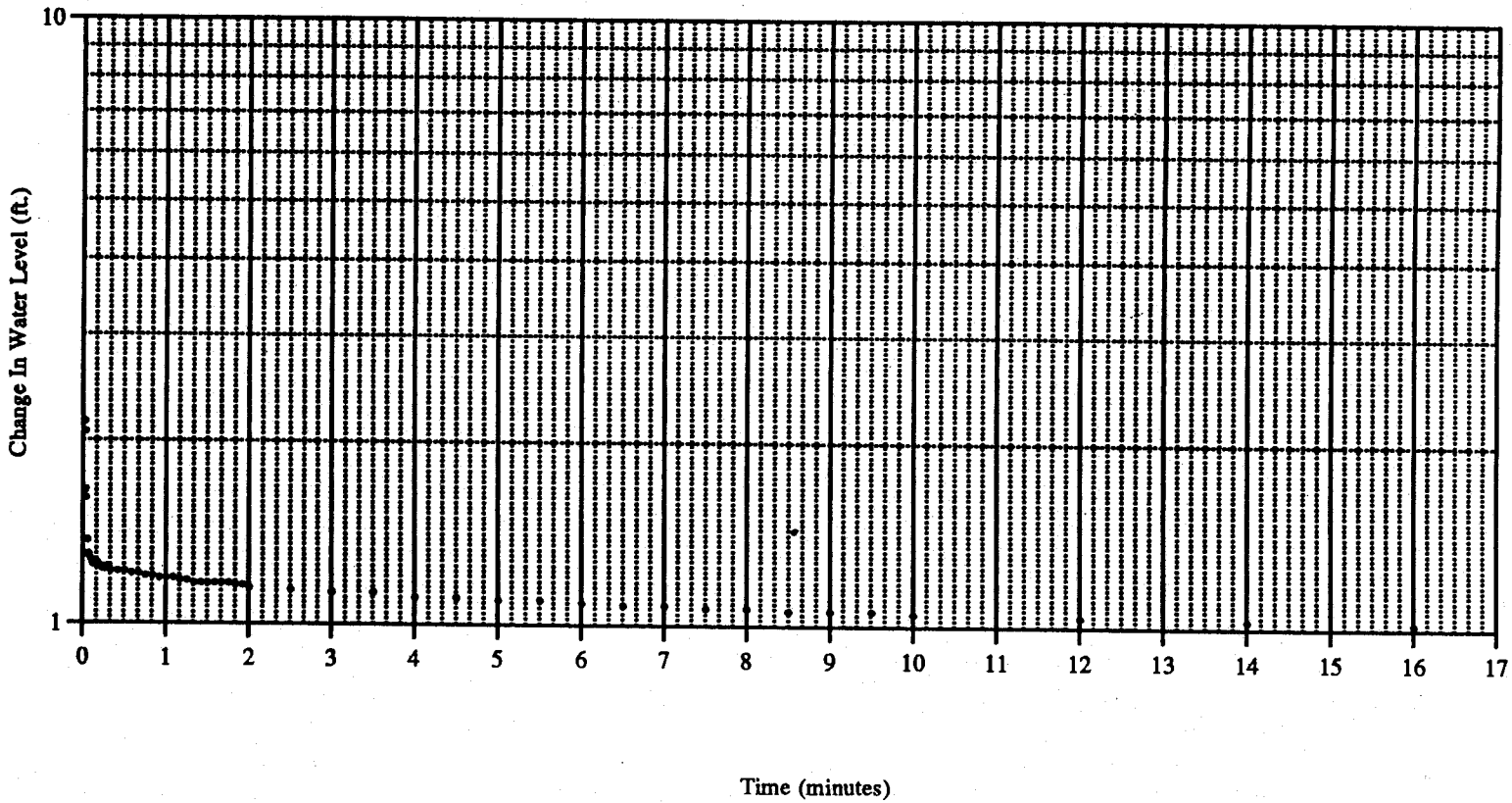

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Piezometer P-14-S (Rising Head)
Waste Management Piedmont Landfill
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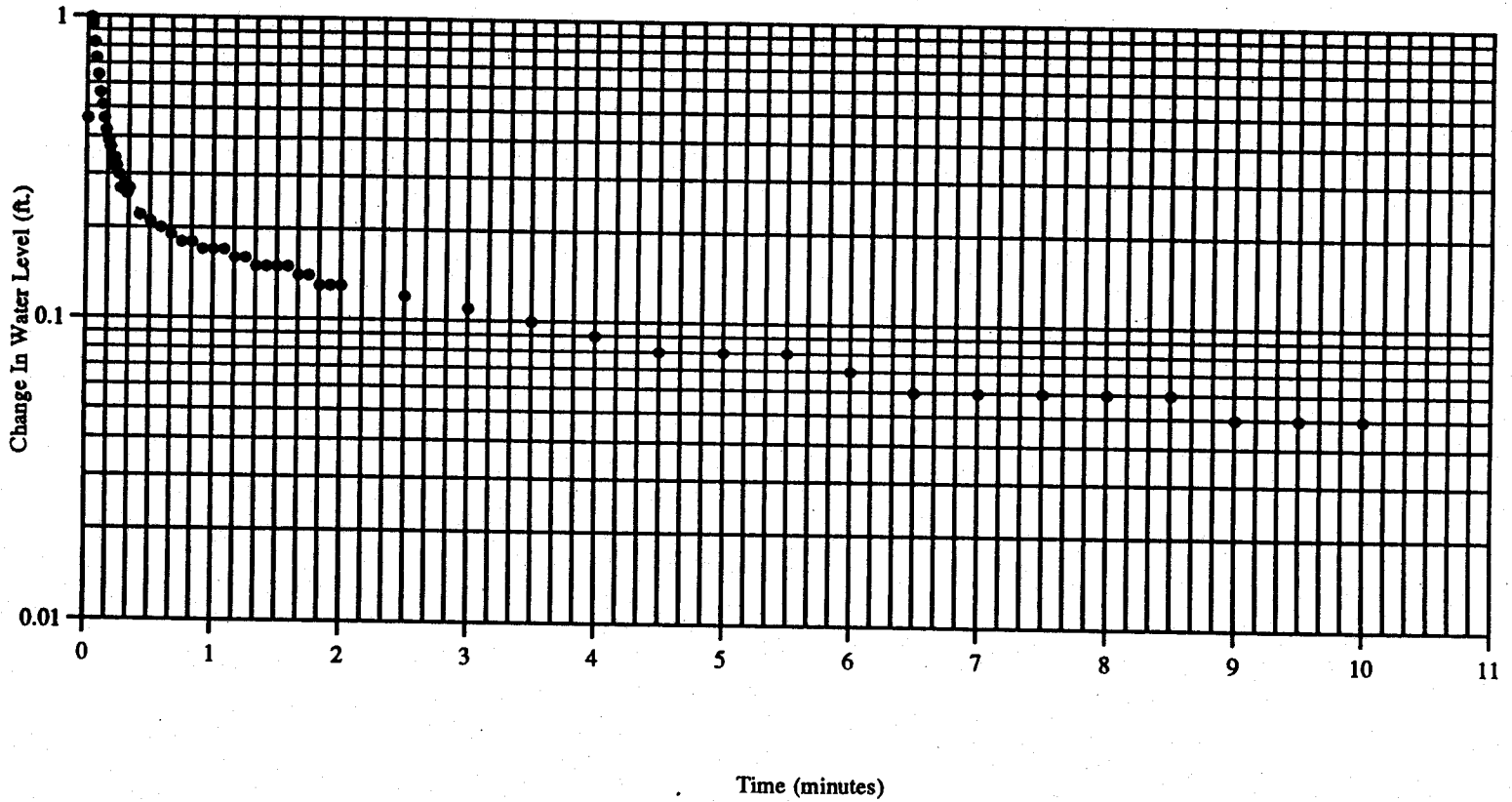
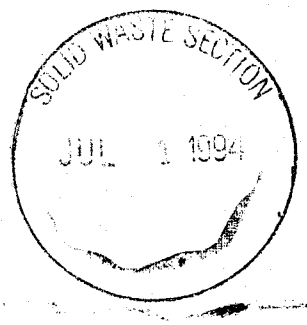


ATTACHMENT F

GROUND WATER FLOW VELOCITY CALCULATIONS



FLOW VELOCITY $\bar{v} = \frac{ki}{\phi}$

$\bar{v}$ = flow velocity
k = hydraulic gradient
i = hydraulic gradient
ϕ = effective porosity

effective porosity is the percentage voids that tends to allow for ground water flow through it

FOR SAPROLITE / RESIDUUM

$\bar{v}_{max} = \frac{ki}{\phi}$

$k = 10^{-3}$ cm/sec $i = 0.038$
$K = 10^{-5}$ cm/sec $i = 0.015$
$\phi = 0.25$

$= \frac{10^{-3} \text{ cm/sec} \times 0.038}{.25}$

$= 0.43$ ft/day (157 ft/yr)

$v_{min} = \frac{ki}{\phi}$

$= \frac{10^{-5} \text{ cm/sec} \times 0.015}{.25}$

$= 0.0017$ ft/day (0.62 ft/yr)

Average Value $\bar{k} = 3.2 \times 10^{-4}$ cm/sec

$\bar{v}_{avg} = \frac{ki}{\phi} = \frac{3.2 \times 10^{-4} \times 0.015}{.25} = 0.054$ ft/day (20 ft/year)

$= \frac{3.2 \times 10^{-4} \times 0.038}{.25} = 0.137$ ft/day (50 ft/yr)

FOR PARTIALLY WEATHERED ROCK

$\bar{v}_{max} = \frac{ki}{\phi}$

$K = 10^{-4}$ cm/sec $i = 0.038$

$K = 10^{-6}$ cm/sec $i = 0.015$

$\phi = 0.15$

$= \frac{10^{-4} \times 0.038}{0.15}$

$= 0.072$ ft/day (26 ft/yr)

$\bar{v}_{min} = \frac{ki}{\phi}$

$= \frac{10^{-6}\text{cm/sec} \times 0.015}{.15}$

$= 0.00028$ ft/day (0.1 ft/yr)

Average Value $\bar{k} = 5.0 \times 10^{-5}$ cm/sec

$v_{avg} = \frac{ki}{\phi} = \frac{5.0 \times 10^{-5} \times 0.015}{.15} = 0.014$ feet/day

(5.2 feet/yr)

$= \frac{5.0 \times 10^{-5} \times 0.038}{.15} = 0.036$ feet/day

(13.1 feet/yr)

FOR BEDROCK

$$\bar{v}_{max} = \frac{ki}{\phi}$$

$k = 10^{-5}$ cm/sec $i = 0.038$
$k = 10^{-7}$ cm/sec $i = 0.015$
$\phi = 0.05$

$$= \frac{10^{-5}\text{cm/sec} \times 0.038}{0.05}$$

$$= 0.022 \text{ ft/day} \quad (7.9 \text{ ft/yr})$$

$$\bar{v}_{min} = \frac{ki}{\phi}$$

$$= \frac{10^{-7}\text{cm/sec} \times 0.015}{0.05}$$

$$= 0.000085 \text{ ft/day} \quad (0.031 \text{ ft/yr})$$

Average Value $\bar{k} = 7.9 \times 10^{-5}$ cm/sec

$$v_{avg} = \frac{ki}{\phi} = \frac{7.9 \times 10^{-5} \times 0.015}{0.05} = 0.067 \text{ feet/day}$$

(24.5 ft/yr)

$$= \frac{7.9 \times 10^{-5} \times 0.038}{0.05} = 0.170 \text{ ft/day}$$

(62.1 ft/yr)

These numbers are specifically squared because of the value at P-9S, and the fact that near rock surface is more permeable, and permeability reduces with depth.

Please note the effective porosities are anticipated typical values for these type units. The saprolite and residuum porosities are higher than the specified effective porosity. If these soils have a slightly higher porosity (effective) then this would only slightly reduce the velocity. To probably between 10 to 30 feet/yr.

APPENDIX E

GEOTECHNICAL TESTING RESULTS

Prepared for

RUST Environment & Infrastructure
15 Brendan Way
Greenville, South Carolina 29615

FINAL REPORT
LABORATORY TEST RESULTS

PIEDMONT LANDFILL
KERNERSVILLE, NORTH CAROLINA

Prepared by

GeoSyntec Consultants
Geomechanics and Environmental Laboratory
5775 Peachtree Dunwoody Road, Suite 10D
Atlanta, Georgia 30342

Project Number GLG3564
April 1994

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1. INTRODUCTION

1.1 Terms of Reference

This report was prepared by Mr. James M. Stalculp, E.I.T., and Mr. Barry E. Sigmon of GeoSyntec Consultants (GeoSyntec). The report was reviewed by Dr. Nader S. Rad, P.E., also of GeoSyntec, in accordance with the firm's internal peer review policy. The laboratory testing program was conducted under the direction of Dr. Rad at the request and authorization of Mr. Thomas M. Yanoschak, P.E., of RUST Environment & Infrastructure (RUST), Greenville, South Carolina. The laboratory testing program was performed at GeoSyntec's Geomechanics and Environmental Laboratory in Atlanta, Georgia.

1.2 Organization

The remainder of this report is organized as follows:

- *Section 2, Scope of Work*, presents the scope of the requested laboratory testing program and includes a description of: (i) the samples received and the method employed to identify the samples, (ii) the procedures used for handling, storage and disposal of the samples, and (iii) the testing procedures and conditions used during the testing program;

- *Section 3, Test Results*, presents the results obtained during the laboratory testing program; and

- *Section 4, Closure*, presents GeoSyntec's policy regarding the limitations of and the use of the information obtained during the performance of the laboratory testing program.

2. SCOPE OF WORK

2.1 Overview

GeoSyntec's Geomechanics and Environmental Laboratory was requested to conduct laboratory testing as part of the design hydrogeologic investigation for the Piedmont Landfill project. The testing program included the following tests:

- soil classification;
- moisture content;
- percent passing No. 200 sieve;
- grain size analysis;
- Atterberg limits;
- standard Proctor compaction;
- flexible wall falling head hydraulic conductivity;
- unconsolidated undrained triaxial compression (UU triaxial compression) testing; and
- one-dimensional consolidation.

2.2 Testing Materials and Sample Identification

Soil samples were submitted for laboratory testing from 3 to 11 March 1994. The samples received from the site were identified and labeled by RUST's on-site personnel. Upon being received at the laboratory, each

sample was assigned a laboratory sample number to facilitate tracking and documentation.

2.3 Sample Handling, Storage and Disposal

GeoSyntec understands that the materials sent to the laboratory for testing were not contaminated. Thus, no unusual protection measures were taken while handling or testing these materials. Additionally, the samples were stored in a general storage area in the laboratory.

GeoSyntec's Geomechanics and Environmental Laboratory will continue storing the samples for a period of 30 days from the date of this report. Thereafter, the samples will be discarded unless long-term storage arrangements are specifically made with GeoSyntec's Geomechanics and Environmental Laboratory.

2.4 Testing Procedures and Conditions

At the request of RUST, the laboratory tests were performed utilizing the guidelines set forth in the following test standards:

- soil classification - American Society for Testing and Materials (ASTM) D 2487, *"Standard Test Method for Classification of Soils for Engineering Purposes"*;
- moisture content - ASTM D 2216, *"Standard Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixture"*;
- percent passing No. 200 sieve - ASTM D 1140, *"Standard Test Method for Amount of Material in Soil Finer Than No. 200 (75 microns)" sieve*;

- grain size analysis - ASTM D 422, *"Standard Method for Particle-Size Analysis of Soils"*;

- Atterberg limits - ASTM D 4318, *"Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"*;

- standard Proctor compaction - ASTM D 698, *"Standard Test Method for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop"*;

- flexible wall falling head hydraulic conductivity - ASTM D 5084, *"Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter"*;

- UU triaxial compression test - ASTM D 2850, *"Standard Test Method for Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression"*; and

- one-dimensional consolidation - ASTM D 2435, *"Standard Test Method for One-Dimensional Consolidation Properties of Soil"*.

When appropriate, testing procedures and conditions were established in general accordance with the aforementioned test standards. Some of the tests, however, required project-specific testing procedures and conditions which are identified in the following subsections.

2.4.1 Flexible Wall Falling Head Hydraulic Conductivity Tests

The flexible wall falling head hydraulic conductivity tests required the following project-specific testing conditions:

- remolded or undisturbed test specimens were prepared utilizing the following procedures:

- remolded specimens - bulk samples of the test materials were prepared at the required moisture contents; the test specimens were formed by placing and hand tamping the prepared materials into either a 2.8-in. (71-mm) or 4.0-in. (102-mm) diameter mold, to selected dry unit weights, in five equal layers; each layer was approximately 0.5 in. (12 mm) high; and

- undisturbed specimens - the test specimens were extruded from the 2.8-in. (71-mm) diameter thin-walled tube samplers sent to the laboratory and carefully trimmed to a height ranging from approximately 2.0 in. (51 mm) to 2.6 in. (65 mm);

- the test configuration was as follows (from top to bottom):

  - top platen/porous stone/filter paper/test specimen/filter paper/porous stone/base platen;

- saturation of each test specimen was accomplished using deaired tap water at an effective confining stress of approximately 0.7 psi (5 kPa); saturation was confirmed in accordance with the procedures outlined in ASTM D 5084;

- each test specimen was consolidated using a consolidation pressure of either 3.0 psi (21 kPa), 11.0 psi (76 kPa), 15.0 psi (103 kPa), 16.0 psi (110 kPa), or 44 psi (303 kPa); pore-water displacement was monitored until primary consolidation was complete;

- each test specimen was then permeated with deaired tap water using falling head hydraulic gradients ranging from approximately 9 to 1; and

- permeation continued until consistent hydraulic conductivity values were obtained and the pore fluid inflow and outflow rates were approximately equivalent.

2.4.2 UU Triaxial Compression Testing

The UU triaxial compression tests were performed on undisturbed specimens utilizing the following test procedures and conditions:

- the test specimens were extruded from the 2.8-in. (71-mm) diameter thin-walled tube samplers sent to the laboratory and carefully trimmed to a height ranging from approximately 5.7 in. (39 mm) to 6.5 in. (45 mm);

- each test specimen was encapsulated in a latex membrane and placed in a triaxial cell;

- the test configuration was as follows (from top to bottom):
  - top platen/acrylic disk/test specimen/acrylic disk/base platen;

- the test specimen was confined using a confining pressure of 3 psi (21 kPa), 15.0 psi (103 kPa), or 16.0 psi (110 kPa);

- each test specimen was sheared using a constant rate of strain of approximately 0.0390 in./min (0.991 mm/min);and

- shearing of each test specimen continued until at least 15 percent axial strain was achieved.

2.4.3 One-Dimensional Consolidation Testing

One one-dimensional consolidation test was conducted using the following test conditions:

- the test specimen was obtained from a 2.8-in. (71-mm) diameter thin-walled tube sampler;
- the test specimen was formed by carefully extruding the soil from the thin-walled tube sampler and simultaneously trimming the soil into a consolidometer ring; the consolidometer ring was 2.5 in. (64 mm) in diameter and 1.0 in. (25 mm) in height;
- the test configuration was as follows (from top to bottom):
  - top platen/porous stone/filter paper/test specimen/filter paper/porous stone/base platen;
- a seating load of 50 psf (2 kPa) was applied on the test specimen prior to inundating the specimen;;
- constant vertical stresses of 500, 1000, 2000, 4000, 8000, 16000, 4000, and 16000 psf (24, 48, 96, 192, 383, 767, 192, and 767 kPa) were applied on the test specimen following the procedures outlined in ASTM D 2435.

3. TEST RESULTS

The test results are presented in Tables 1 through 5 and, when appropriate, are graphically presented in Figures 1 through 27. Additionally, time-displacement information about each loading/unloading cycle for the one-dimensional consolidation test is provided in Appendix A. A blank shown on any of the tables or the figures indicates that the test was not performed, the parameter is not applicable, or that the test resulted in insufficient data to report the designated parameter.

4. CLOSURE

This report applies only to the materials tested and does not necessarily indicate the quality or condition of apparently identical or similar materials. The testing was performed in accordance with the general engineering standards and conditions reported. The test results are related to the testing conditions used during the testing program. As a mutual protection to RUST, the public, and GeoSyntec, this report is submitted and accepted for the exclusive use of RUST and upon the condition that this report is not used, in whole or in part, in any advertising or publicity matter without prior written authorization from GeoSyntec.

TABLES

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

PIEDMONT LANDFILL
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT: Piedmont Landfill PROJECT NO: GLG3564

SOURCE: _____ MATERIAL TYPE: _____

GEOSYNTEC CONSULTANTS
GEOMECHANICS AND ENVIRONMENTAL
LABORATORY

Client Sample ID	Lab Sample No.	As-Received Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Compaction ASTM D 698			Hydraulic Conductivity ASTM D 5084	UU Triaxial Compression ASTM D 2850	One-Dimensional Consolidation ASTM D 2435
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422		LL (%)	PL (%)	PI ( )		Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Figure No.			
				Sieve Figure No.	Hydrom. Figure No.										
P-6-D UD-1	94C17					38	35	3					Table 2	Tables 3 and 4	
P-7 UD-1[1]	94C18														
P-6 S-4	94C33		35.0	1	1										
P-6 S-13	94C35		43.3	2	2										
P-7 S-4	94C36		34.1	3	3										
P-10 S-3	94C39	16.0				28	23	5							

Note:

1. Not enough specimen for testing.

TABLE 1 (Continued)

SUMMARY OF LABORATORY TEST RESULTS

PIEDMONT LANDFILL
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT: Piedmont Landfill PROJECT NO: GLG3564

SOURCE: _____ MATERIAL TYPE: _____

GEOSYNTEC CONSULTANTS
GEOMECHANICS AND ENVIRONMENTAL LABORATORY

Client Sample ID	Lab Sample No.	As-Received Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Compaction ASTM D 698			Hydraulic Conductivity ASTM D 5084	UU Triaxial Compression ASTM D 2850	One-Dimensional Consolidation ASTM D 2435
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422		LL (%)	PL (%)	PI ( )		Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Figure No.			
				Sieve Figure No.	Hydrom. Figure No.										
P-10 S-10	94C41	44.2				43	36	7							
P-13 S-3	94C42	29.2				33	25	8							
P-13 S-5	94C43		24.3	4	4										
P-14 S-6	94C46		19.0	5	5										
P-15 S-2	94C48	26.2				48	29	19							
P-15 S-5	94C49		24.3	6	6										

TABLE 1 (Continued)

SUMMARY OF LABORATORY TEST RESULTS

PIEDMONT LANDFILL
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT: Piedmont Landfill PROJECT NO: GLG3564

SOURCE: _____ MATERIAL TYPE: _____

GEOSYNTEC CONSULTANTS
GEOMECHANICS AND ENVIRONMENTAL LABORATORY

Client Sample ID	Lab Sample No.	As-Received Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Compaction ASTM D 698			Hydraulic Conductivity ASTM D 5084	UU Triaxial Compression ASTM D 2850	One-Dimensional Consolidation ASTM D 2435
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422		LL (%)	PL (%)	PI ( )		Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Figure No.			
				Sieve Figure No.	Hydrom. Figure No.										
P-16 S-3	94C51		23.9	7	7										
P-2-D UD-2	94C54		34.0	8	8								Table 2	Tables 3 and 4	
P-2-D UD-4	94C56		45.3	9	9	34	31	3	SM ~ Silty Sand				Table 2	Tables 3 and 4	Table 5
P-3 UD-1	94C57												Table 2		
P-8-D UD-2	94C59		35.0	10	10								Table 2	Tables 3 and 4	
P-15-D UD-2	94C61												Table 2	Tables 3 and 4	

TABLE 1 (Continued)

SUMMARY OF LABORATORY TEST RESULTS

PIEDMONT LANDFILL
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT: Piedmont Landfill PROJECT NO: GLG3564

SOURCE: _____ MATERIAL TYPE: _____

GEOSYNTEC CONSULTANTS
GEOMECHANICS AND ENVIRONMENTAL LABORATORY

Client Sample ID	Lab Sample No.	As-Received Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Compaction ASTM D 698			Hydraulic Conductivity ASTM D 5084	UU Triaxial Compression ASTM D 2850	One-Dimensional Consolidation ASTM D 2435
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422		LL (%)	PL (%)	PI ( )		Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Figure No.			
				Sieve Figure No.	Hydrom. Figure No.										
STD-1	94C62		19.0	11	11	NP	NP	NP	SM - Silty Sand	123.3	11.6	12	Table 2		
P-1-D #5	94C77		47.1	13	13										
P-1-D #12	94C78		34.0	14	14										
P-2 S-3	94C79		59.2	15	15	42	36	6	ML - Sandy Silt						
P-2-D S-11	94C80		31.5	16	16										
P-3 S-4	94C81		30.5	17	17										

TABLE 1 (Continued)

SUMMARY OF LABORATORY TEST RESULTS

PIEDMONT LANDFILL
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT: Piedmont Landfill PROJECT NO: GLG3564

SOURCE: MATERIAL TYPE:

GEOSYNTEC CONSULTANTS
GEOMECHANICS AND ENVIRONMENTAL LABORATORY

Client Sample ID	Lab Sample No.	As-Received Moisture Content ASTM D 2216 (%)	Grain Size			Atterberg Limits ASTM D 4318			Soil Classification ASTM D 2487	Compaction ASTM D 698			Hydraulic Conductivity ASTM D 5084	UU Triaxial Compression ASTM D 2850	One-Dimensional Consolidation ASTM D 2435
			Percent Passing #200 Sieve ASTM D 1140 (%)	ASTM D 422		LL (%)	PL (%)	PI ( )		Max. Dry Unit Weight (pcf)	Optimum Moisture Content (%)	Figure No.			
				Sieve Figure No.	Hydrom. Figure No.										
P-4-D S-5	94C82		27.6	18	18										
P-5 S-2	94C83		13.5	19	19										
P-8 S-13	94C84		22.5	20	20										
P-11 S-3	94C85		29.4	21	21										
P-11 S-7	94C86		11.8	22	22										
P-12-D #6	94C87		50.4	23	23	28	23	5							

TABLE 2

FLEXIBLE WALL FALLING HEAD HYDRAULIC CONDUCTIVITY TEST RESULTS

PIEDMONT LANDFILL
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT: Piedmont Landfill PROJECT NUMBER: GLG3564

SOURCE: _____ MATERIAL TYPE: _____

GEOSYNTEC CONSULTANTS
GEOMECHANICS AND ENVIRONMENTAL
LABORATORY

Client Sample ID	Lab Sample No.	Specimen Type	Test Specimen Initial Conditions		Consolidation Pressure (psi)	Hydraulic[1] Conductivity (cm/s)
			Dry Unit Weight (pcf)	Moisture Content (%)		
P-6-D UD-1	94C17	Undisturbed	92.9	28.0	3.0	3.6E-6
P-2-D UD-2	94C54	Undisturbed	110.0	15.5	3.0	1.6E-5
P-2-D UD-4	94C56	Undisturbed	78.5	40.1	16.0	2.7E-4
P-3 UD-1	94C57	Undisturbed	99.7	21.0	44.0	1.3E-4
P-8-D UD-2	94C59	Undisturbed	97.0	21.3	15.0	4.3E-5
P-15-D UD-2	94C61	Undisturbed	108.3	16.1	11.0	1.1E-5
STD-1	94C62.A[2]	Remold	116.8	14.2	15.0	1.1E-7
	94C62.1	Remold	117.8	13.4	15.0	2.0E-5

Notes:

1. The hydraulic conductivity values were determined using falling head hydraulic gradients ranging from 9 to 1.
2. The soil was passed through the #4 sieve prior to remolding.

TABLE 3

UU TRIAXIAL COMPRESSION TEST SPECIMEN PHYSICAL CONDITIONS

PIEDMONT LANDFILL
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT: Piedmont Landfill PROJECT NO: GLG3564

SOURCE: MATERIAL TYPE:

GEOSYNTEC CONSULTANTS
GEOMECHANICS AND ENVIRONMENTAL
LABORATORY

Site Sample ID	Lab Sample No.	Depth (ft)	Height (in.)		Diameter (in.)		Moisture Content (%)		Dry Unit Weight (pcf)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
P-6-D UD-1[1]	94C17	4 to 6								
P-2-D UD-2	94C54	4 to 6	6.5	5.4	2.9	3.1	18.4	18.4	106.1	107.9
P-2-D UD-4	94C56	22 to 24	6.5	5.8	2.9	3.1	38.4	40.6	84.5	81.2
P-8-D UD-2	94C59	20 to 22	5.7	4.9	2.9	3.0	24.1	23.8	94.2	99.4
P-15-D UD-2[1]	94C61	14 to 16								

Note:

1. Due to sample disturbance unable to obtain a test specimen.

TABLE 4

UU TRIAXIAL COMPRESSION TEST RESULTS

PIEDMONT LANDFILL
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT: Piedmont Landfill PROJECT NO: GLG3564

SOURCE: _____ MATERIAL TYPE: _____

GEOSYNTEC CONSULTANTS
GEOMECHANICS AND ENVIRONMENTAL
LABORATORY

Site Sample ID	Lab Sample No.	σ_c (psi)	Peak		Ultimate		Figure No.
			Deviator Stress (psi)	ϵ_a (%)	Deviator Stress (psi)	ϵ_a (%)	
P-6-D UD-1(1)	94C17						
P-2-D UD-2	94C54	3.0			13.0	15.9	24
P-2-D UD-4	94C56	16.0			14.5	16.0	25
P-8-D UD-2	94C59	15.0			27.3	16.0	26
P-15-D UD-2(1)	94C61						

Notes:

1. Due to sample disturbance unable to obtain a test specimen.

σ_c = Confining pressure, (psi)

ϵ_a = Axial strain, (%)

TABLE 5

ONE DIMENSIONAL CONSOLIDATION TEST RESULTS

PIEDMONT LANDFILL
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT: Piedmont Landfill PROJECT NO: GLG3564

SOURCE: MATERIAL TYPE:

GEOSYNTEC CONSULTANTS
GEOMECHANICS AND ENVIRONMENTAL
LABORATORY

Site Sample ID	Lab Sample No.	Depth (ft)	Height (in.)		Diameter (in.)		Moisture Content (%)		Dry Unit Weight (pcf)		Figure No.
			Initial	Final	Initial	Final	Initial	Final	Initial	Final	
P-2-D UD-4	94C56	22-24	1.0	0.8	2.5	2.5	33.9	26.0	84.5	106.6	27

FIGURES

GEOSYNTEC CONSULTANTS
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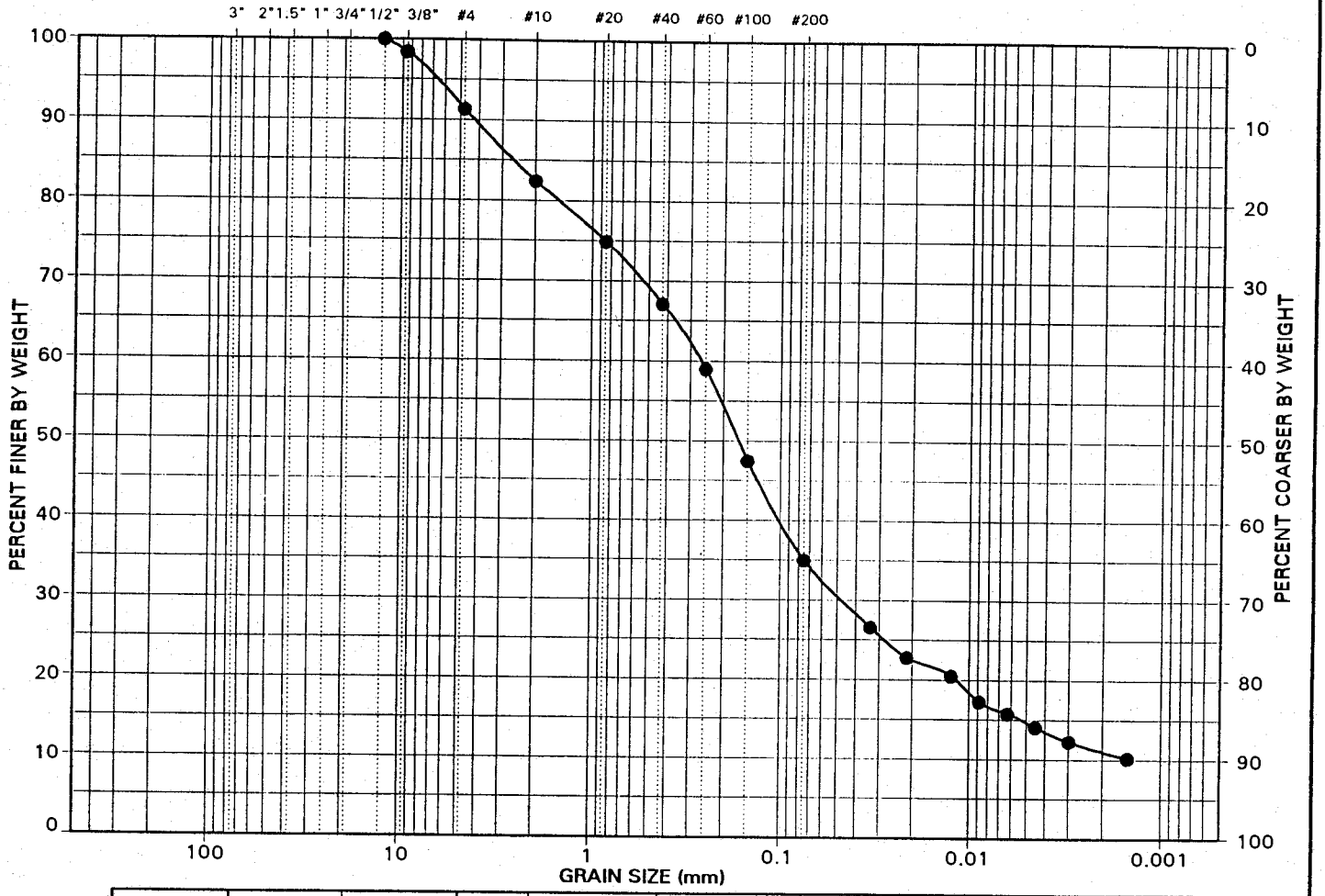
Atlanta, Georgia

FIGURE 1
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION 94C33	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%) 8.7
SAMPLE DEPTH (FT)	LIQUID LIMIT (%)		SAND (%) 56.3
SITE SAMPLE ID P-6 S-4	PLASTIC LIMIT (%)		FINES (%) 35.0
LAB. SAMPLE NO. 94C33	PLASTICITY INDEX		SILT (%) 23.9
	DRY DENSITY (pcf)		CLAY(%) 11.1
	SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu	
	VOID RATIO (%)	COEFF. CURVATURE Cc	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	98	91	82	75	67	59	48	35	31	22	15	11	

SOIL CLASSIFICATION: Silty Sand

24 March 1994 13:03

GEOSYNTEC CONSULTANTS
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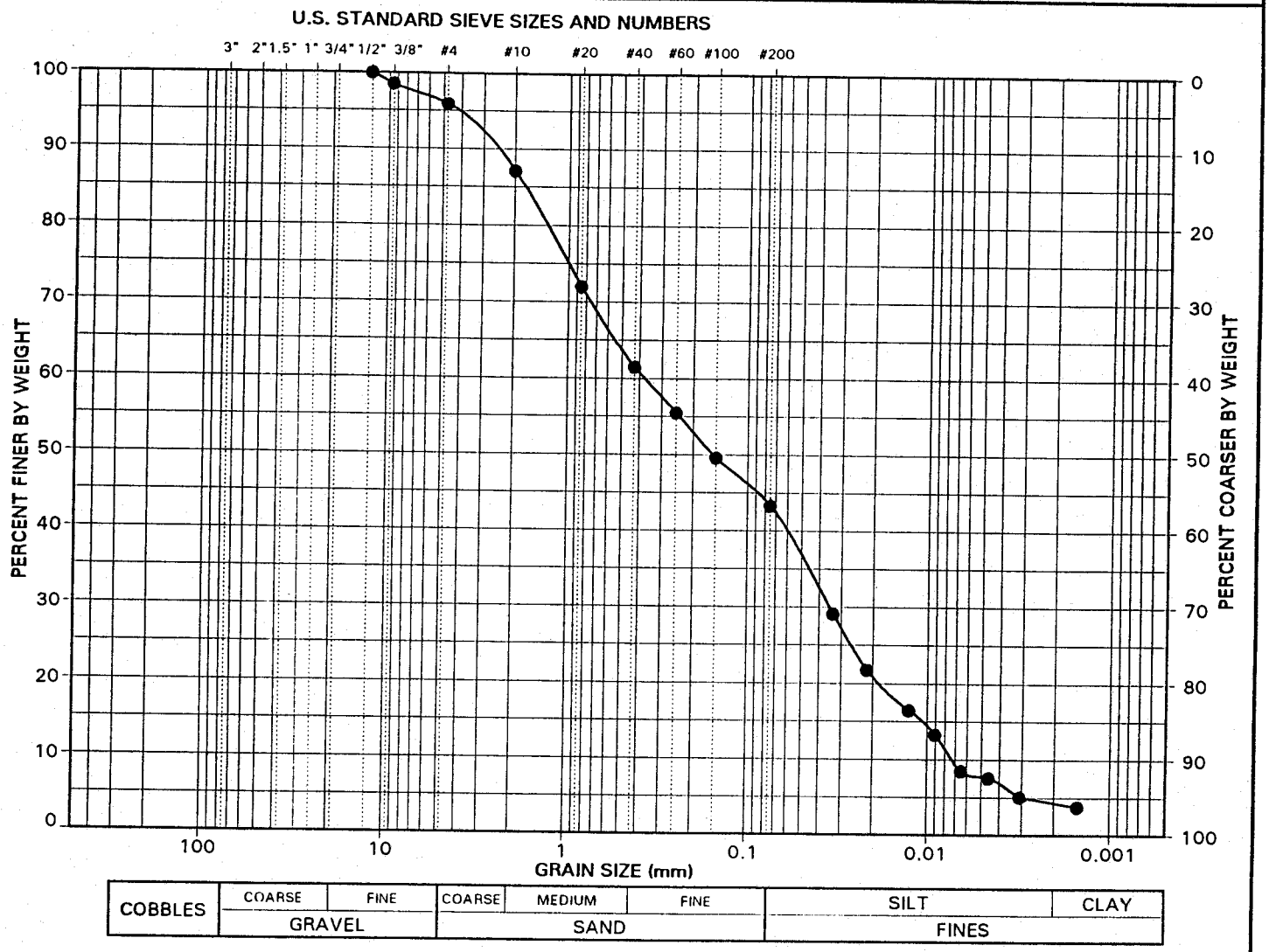
Atlanta, Georgia

FIGURE 2
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C35	MOISTURE CONTENT (%)	GRAVEL (%) 4.1
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 52.6
SITE SAMPLE ID	P-6 S-13	PLASTIC LIMIT (%)	FINES (%) 43.3
LAB. SAMPLE NO.	94C35	PLASTICITY INDEX	SILT (%) 39.0
		DRY DENSITY (pcf)	CLAY(%) 4.3
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

SOIL FRACTIONS

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS													PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200				
PERCENT PASSING SIEVE SIZES (mm)																	
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	99	96	87	72	62	56	50	43	36	21	8	4	

SOIL CLASSIFICATION:

USCS silty Sand

Sandy Silt

24 March 1994 13:00

GEOSYNTEC CONSULTANTS
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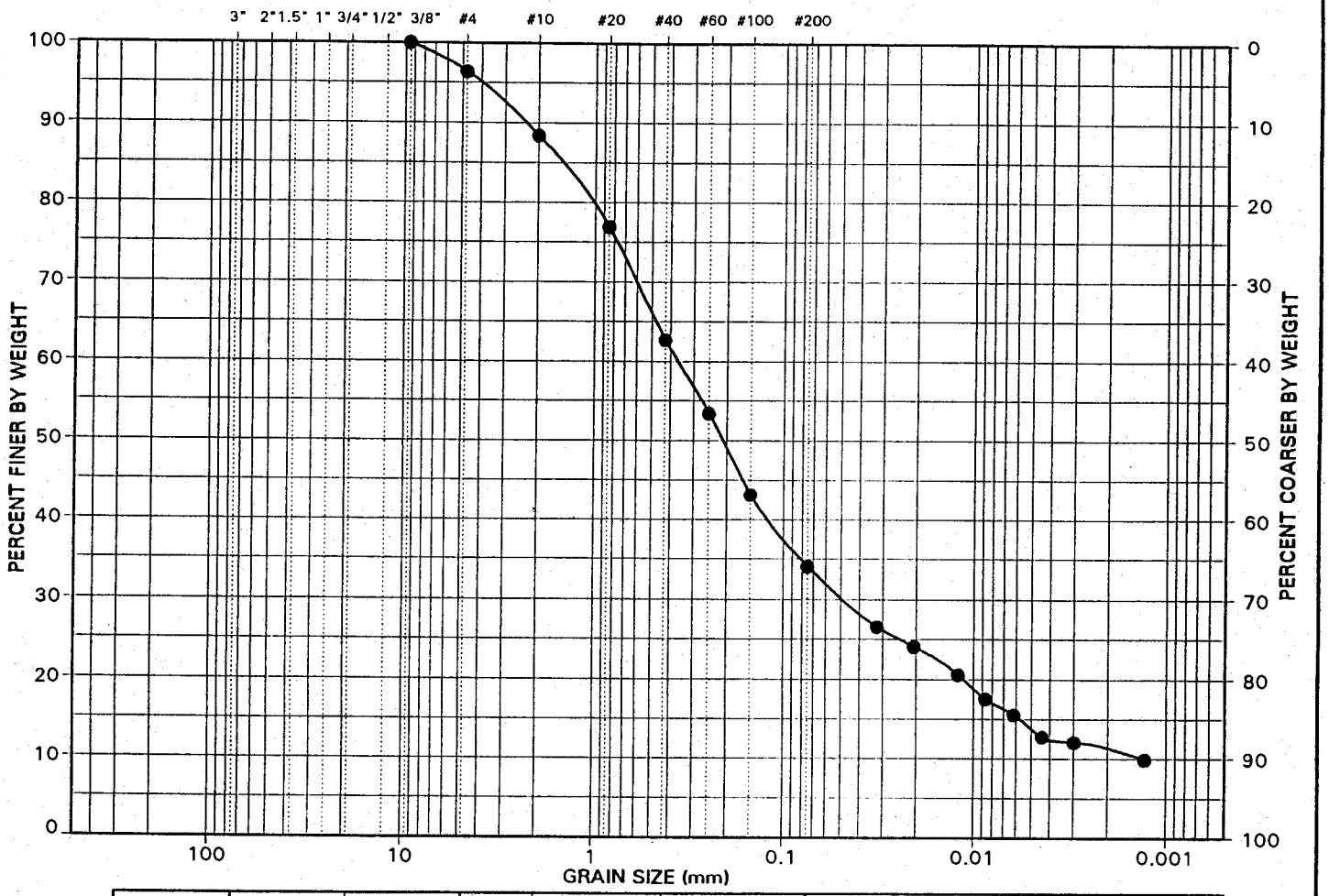
Atlanta, Georgia

FIGURE 3
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C36	MOISTURE CONTENT (%)	GRAVEL (%) 3.6
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 62.3
SITE SAMPLE ID	P-7 S-4	PLASTIC LIMIT (%)	FINES (%) 34.1
LAB. SAMPLE NO.	94C36	PLASTICITY INDEX	SILT (%) 23.1
		DRY DENSITY (pcf)	CLAY(%) 11.0
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

SOIL FRACTIONS

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	96	88	77	63	53	43	34	30	24	14	11	

SOIL CLASSIFICATION: -

Silty Sand

29 March 1994 12:52

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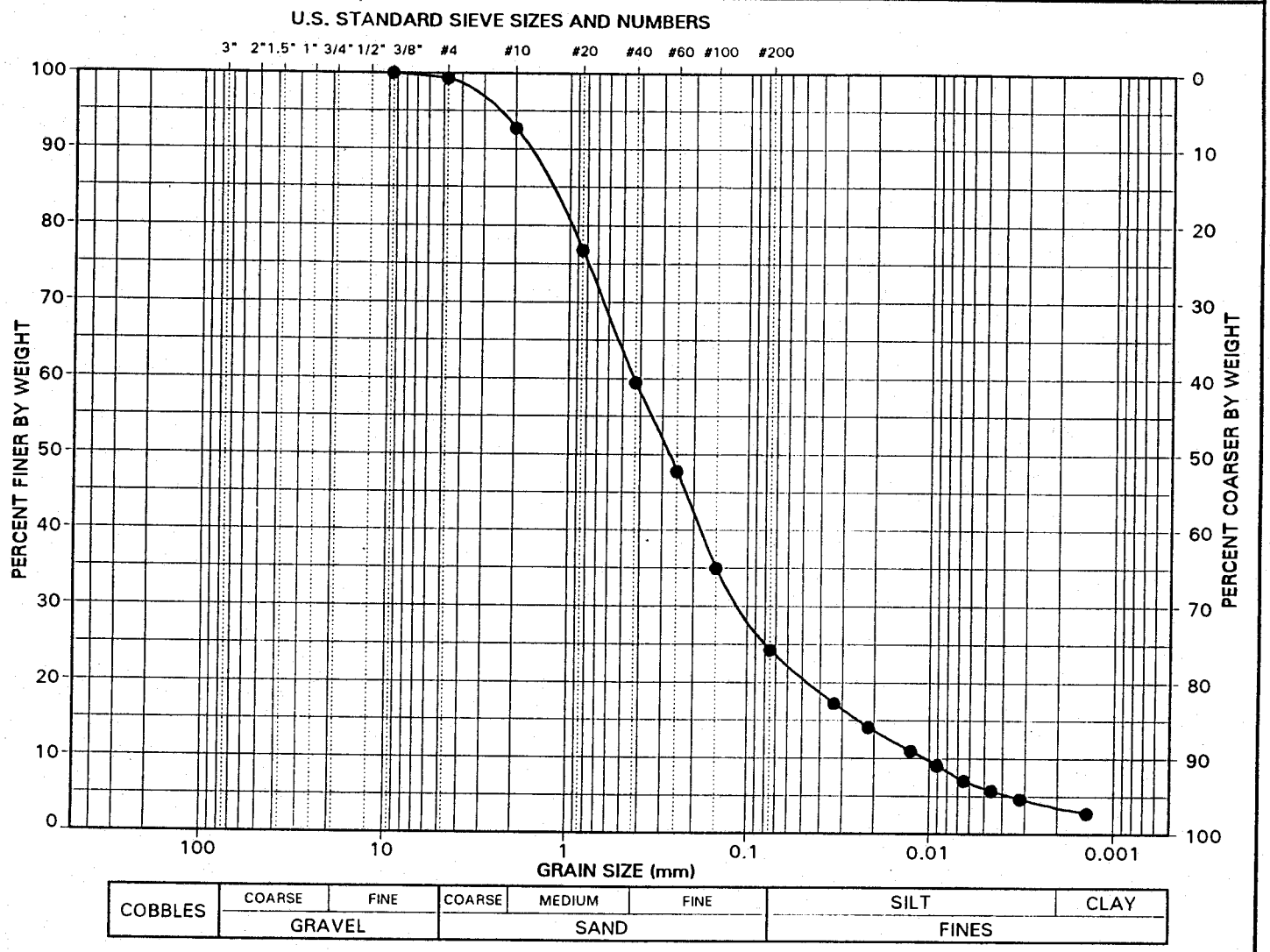
Atlanta, Georgia

FIGURE 4
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C43	MOISTURE CONTENT (%)	SOIL FRACTIONS: GRAVEL (%) 0.7
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 75.0
SITE SAMPLE ID	P-13 S-5	PLASTIC LIMIT (%)	FINES (%) 24.3
LAB. SAMPLE NO.	94C43	PLASTICITY INDEX	SILT (%) 20.7
		DRY DENSITY (pcf)	CLAY(%) 3.6
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	99	93	77	60	48	35	24	21	14	6	4	

SOIL CLASSIFICATION: Silty Sand

24 March 1994 11:07

GEOSYNTEC CONSULTANTS
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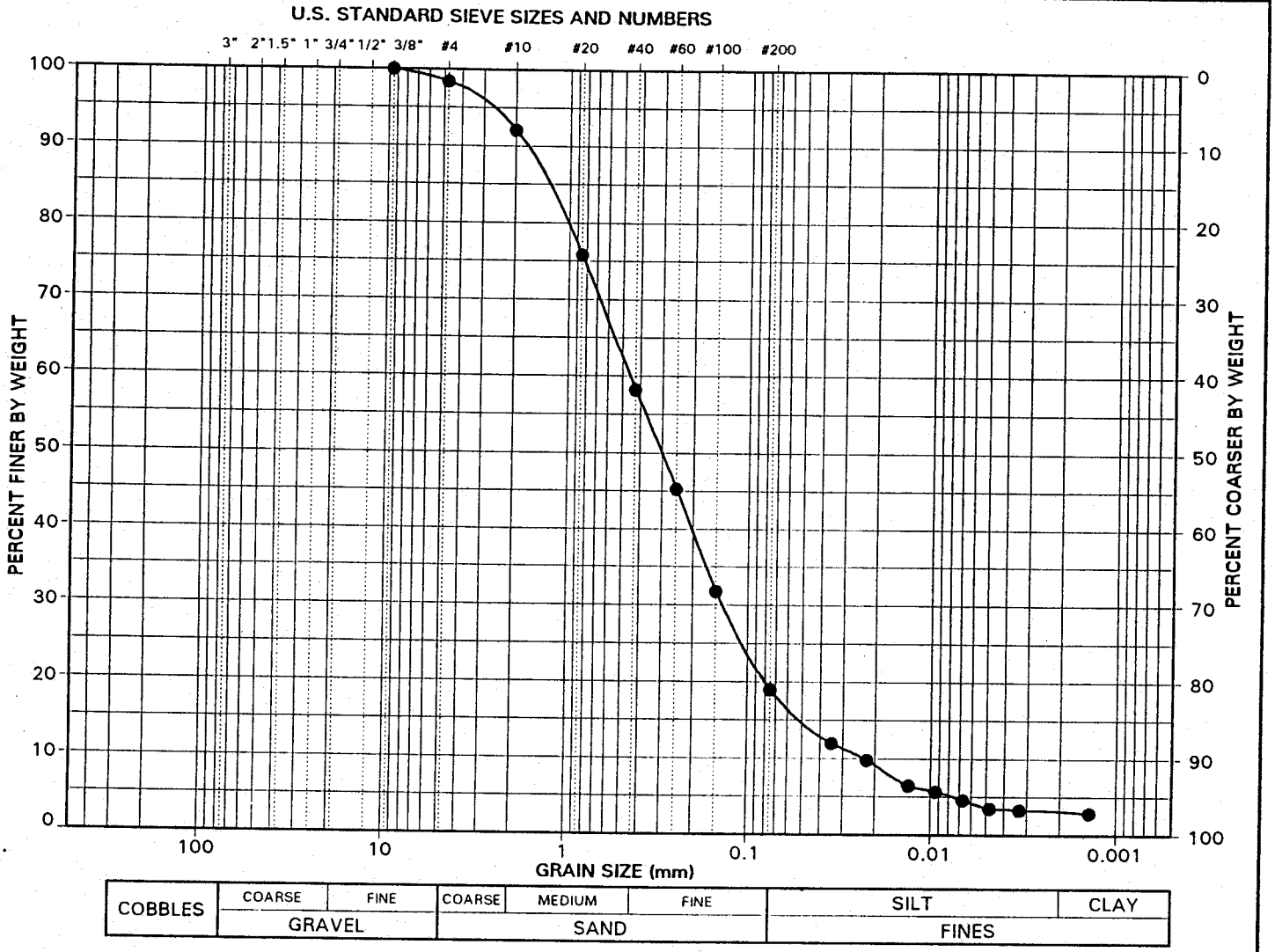
Atlanta, Georgia

FIGURE 5
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C46
SAMPLE DEPTH (FT)	
SITE SAMPLE ID	P-14 S-6
LAB. SAMPLE NO.	94C46

MOISTURE CONTENT (%)
LIQUID LIMIT (%)
PLASTIC LIMIT (%)
PLASTICITY INDEX
DRY DENSITY (pcf)
SPECIFIC GRAVITY
VOID RATIO (%)

SOIL FRACTIONS	
GRAVEL (%)	1.6
SAND (%)	79.4
FINES (%)	19.0
SILT (%)	15.9
CLAY(%)	3.1
COEFF. UNIFORMITY Cu	
COEFF. CURVATURE Cc	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200

PERCENT PASSING SIEVE SIZES (mm)

75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075
100	100	100	100	100	100	100	98	92	76	58	45	32	19

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001
15	9	4	3	

SOIL CLASSIFICATION: -

Silty Sand

26 March 1994 13:53

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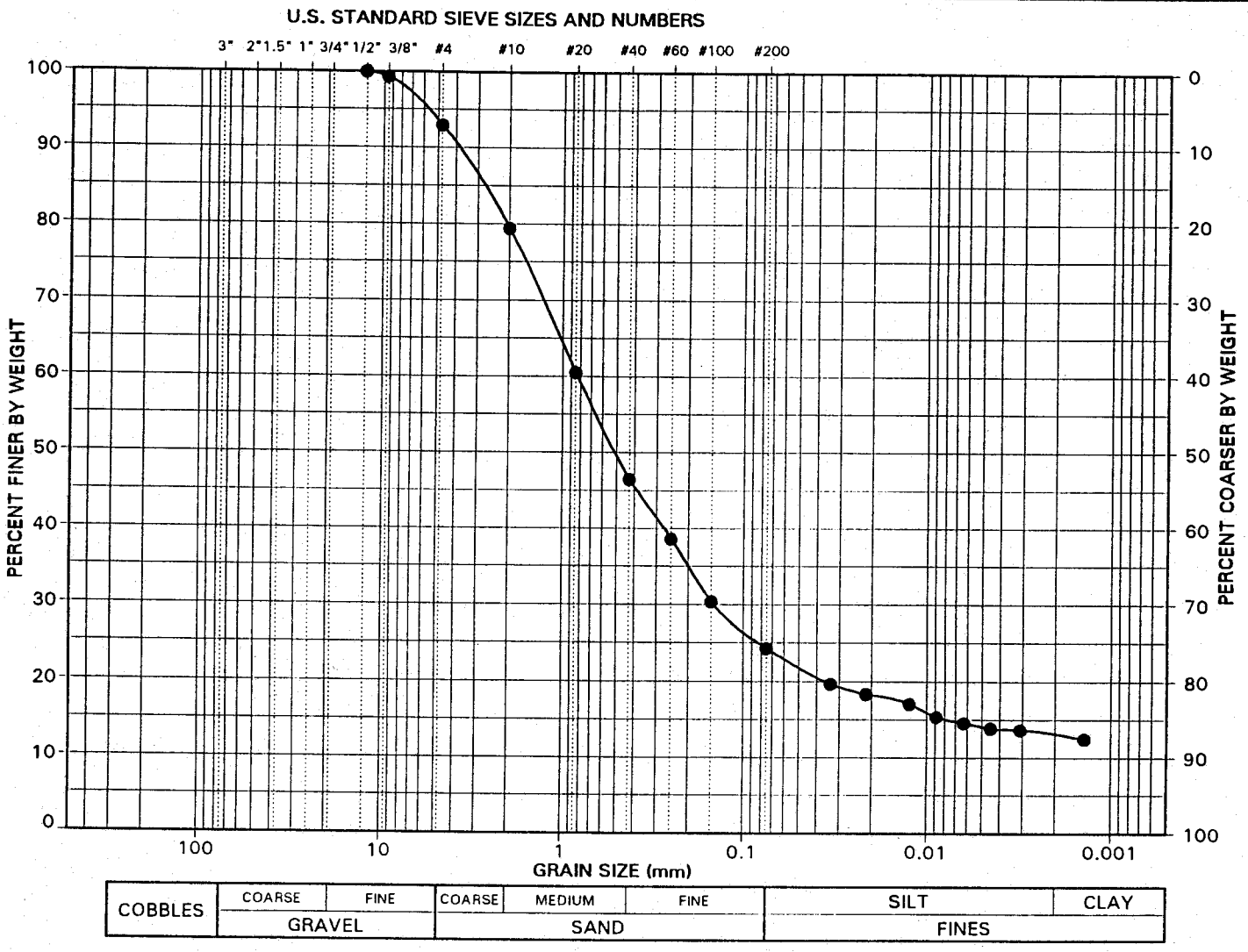
Atlanta, Georgia

FIGURE 6
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION 94C49	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%) 7.1
SAMPLE DEPTH (FT)	LIQUID LIMIT (%)		SAND (%) 68.6
SITE SAMPLE ID P-15 S-5	PLASTIC LIMIT (%)		FINES (%) 24.3
LAB. SAMPLE NO. 94C49	PLASTICITY INDEX		SILT (%) 11.3
	DRY DENSITY (pcf)		CLAY(%) 13.0
	SPECIFIC GRAVITY		COEFF. UNIFORMITY Cu
	VOID RATIO (%)		COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200
PERCENT PASSING SIEVE SIZES (mm)													
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075
100	100	100	100	100	100	99	93	79	61	47	39	30	24

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001
22	18	14	13	

SOIL CLASSIFICATION: - Silty Sand

25 March 1994 14:31

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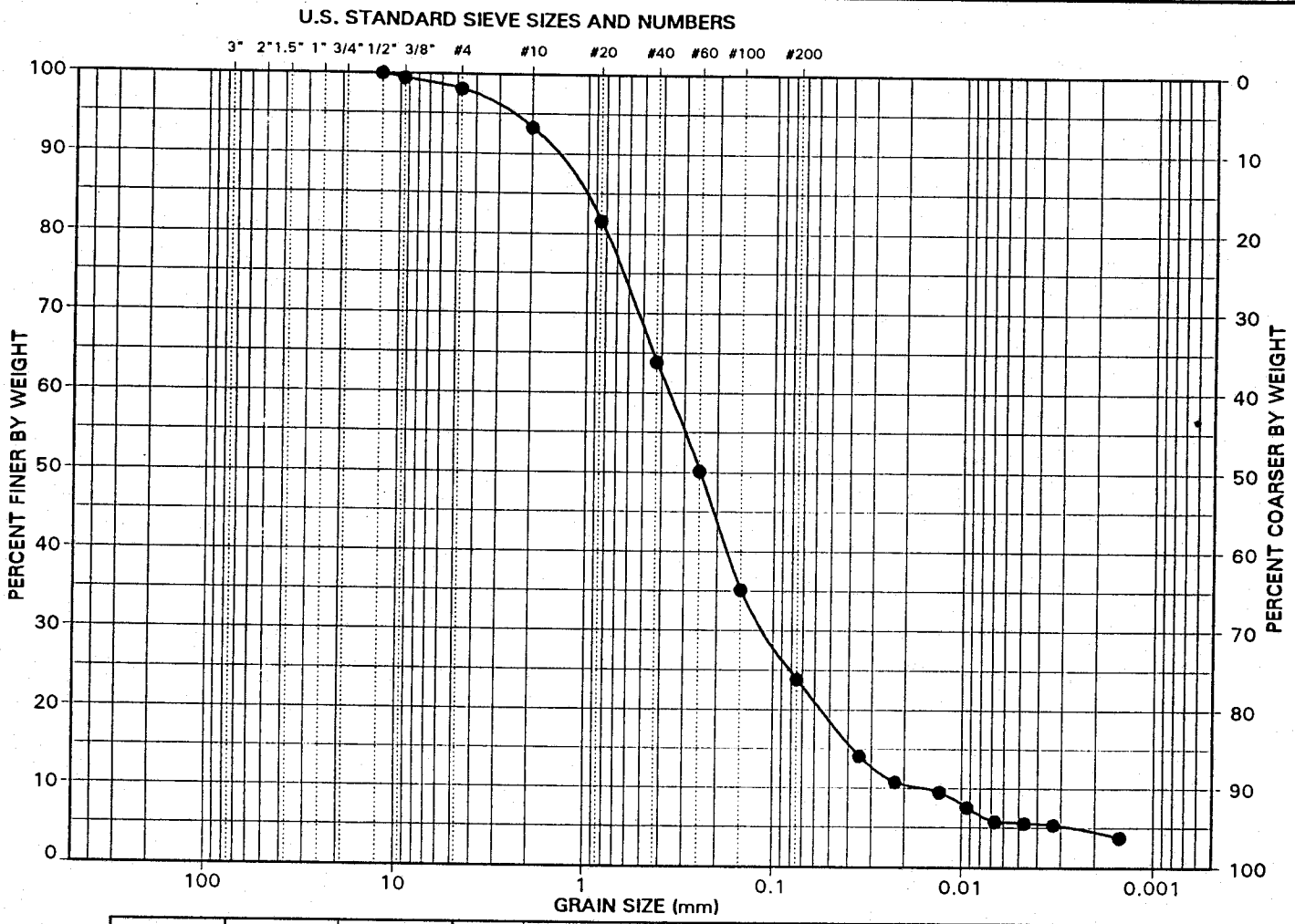
Atlanta, Georgia

FIGURE 7
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C51	MOISTURE CONTENT (%)	SOIL FRACTIONS: GRAVEL (%) 1.9
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 74.2
SITE SAMPLE ID	P-16 S-3	PLASTIC LIMIT (%)	FINES (%) 23.9
LAB. SAMPLE NO.	94C51	PLASTICITY INDEX	SILT (%) 19.5
		DRY DENSITY (pcf)	CLAY(%) 4.4
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS													PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200				
PERCENT PASSING SIEVE SIZES (mm)																	
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	99	98	93	82	64	50	35	24	19	11	6	4	

SOIL CLASSIFICATION: -

Silty Sand

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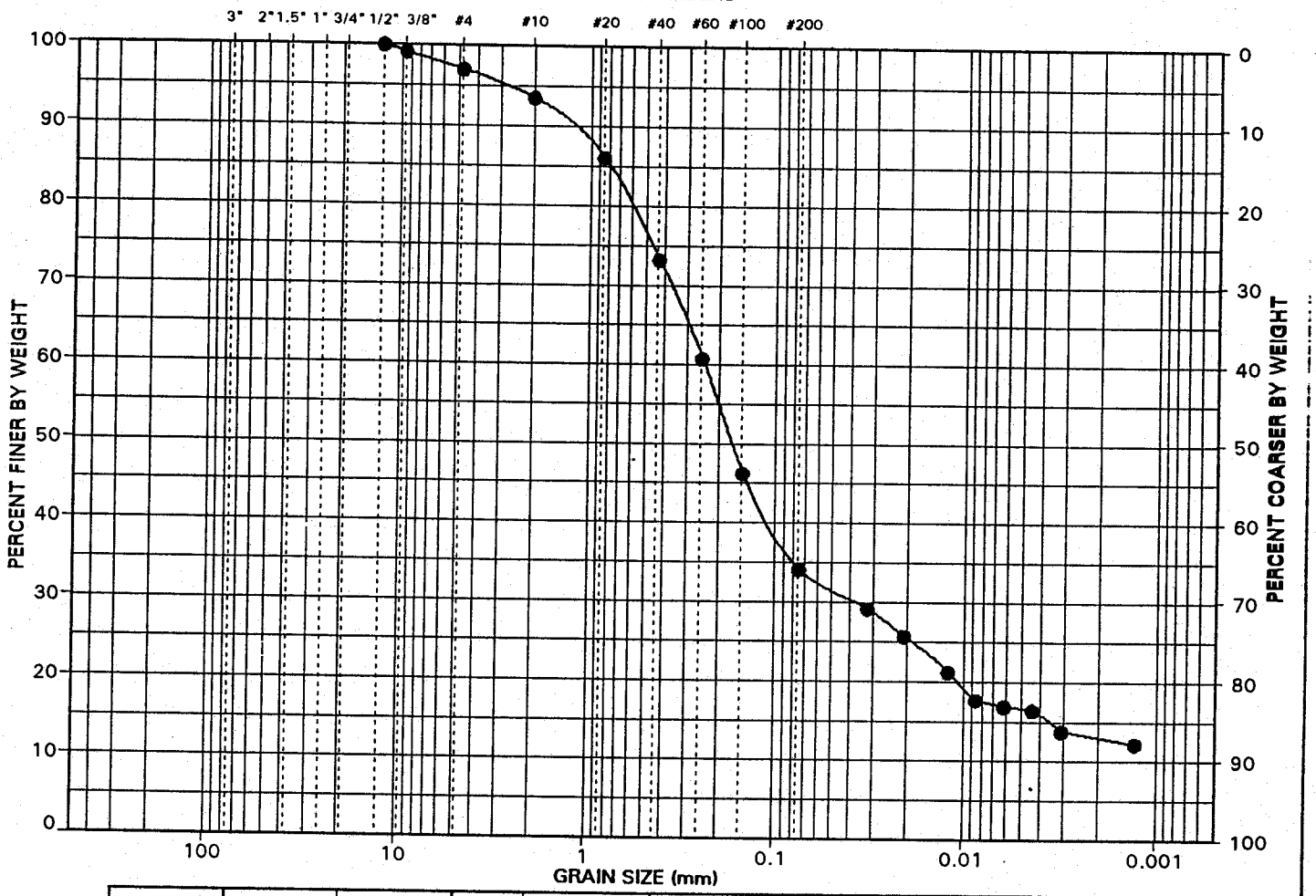
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 8
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION 94C54	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%) 3.0
SAMPLE DEPTH (FT)	LIQUID LIMIT (%)		SAND (%) 63.0
SITE SAMPLE ID *	PLASTIC LIMIT (%)		FINES (%) 34.0
LAB. SAMPLE NO. 94C54	PLASTICITY INDEX		SILT (%) 21.0
	DRY DENSITY (pcf)		CLAY(%) 13.0
* P-2-D UD-2	SPECIFIC GRAVITY		COEFF. UNIFORMITY Cu
	VOID RATIO (%)		COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS													PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200				
PERCENT PASSING SIEVE SIZES (mm)																	
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	99	97	94	86	73	61	46	34	32	25	17	13	

SOIL CLASSIFICATION: -

Silty Sand

7 April 1994 16:41

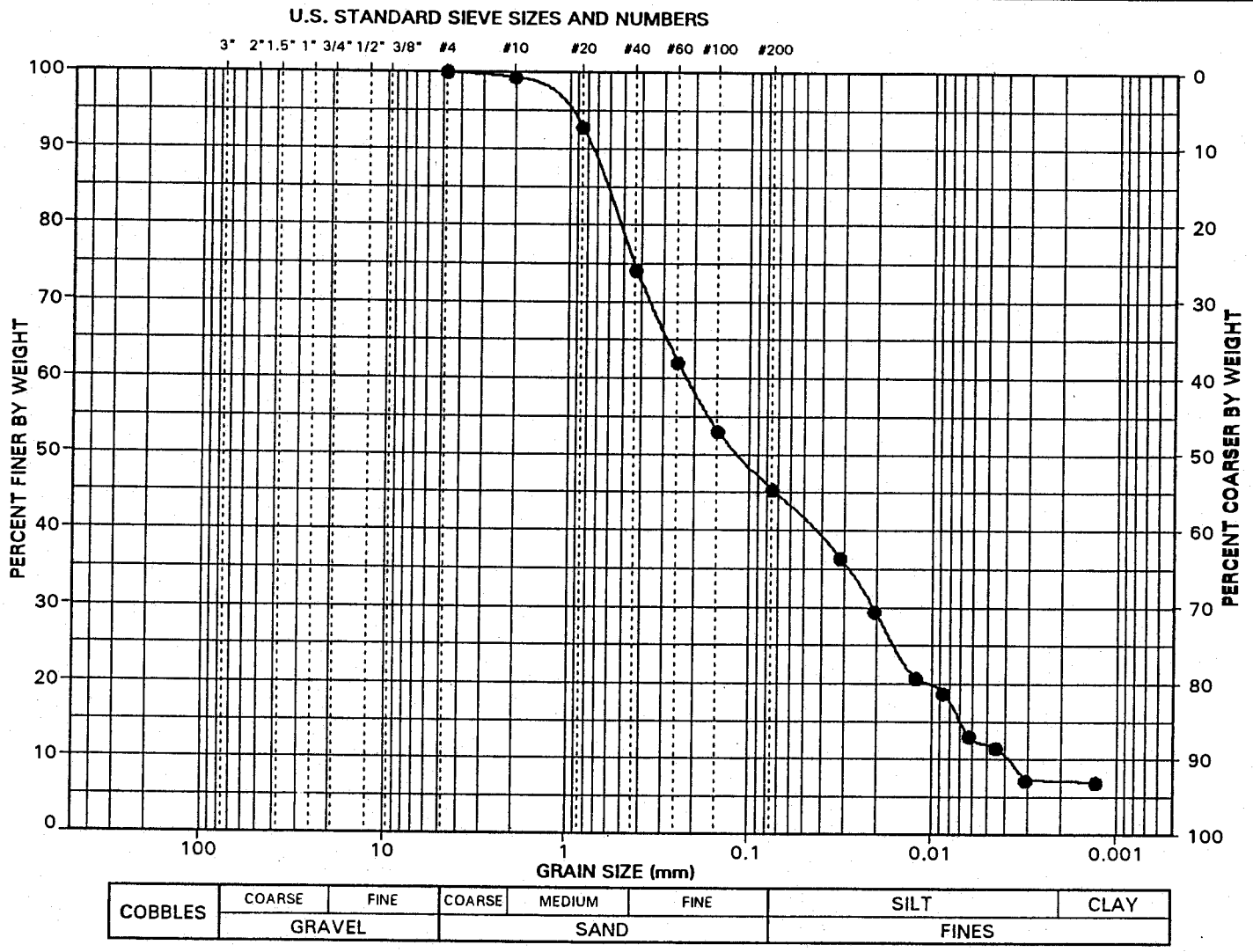
GEOSYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 9
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION 94C56	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%) 0.0
SAMPLE DEPTH (FT)	LIQUID LIMIT (%) 34		SAND (%) 54.7
SITE SAMPLE ID *	PLASTIC LIMIT (%) 31		FINES (%) 45.3
LAB. SAMPLE NO. 94C56	PLASTICITY INDEX 3		SILT (%) 38.3
	DRY DENSITY (pcf)		CLAY(%) 7.0
* P-2-D UD-4	SPECIFIC GRAVITY		COEFF. UNIFORMITY Cu
	VOID RATIO (%)		COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	100	99	93	74	62	53	45	41	29	12	7	

SOIL CLASSIFICATION: SM - Silty Sand

USCS Silty Sand

Sandy Silt

7 April 1994 16:42

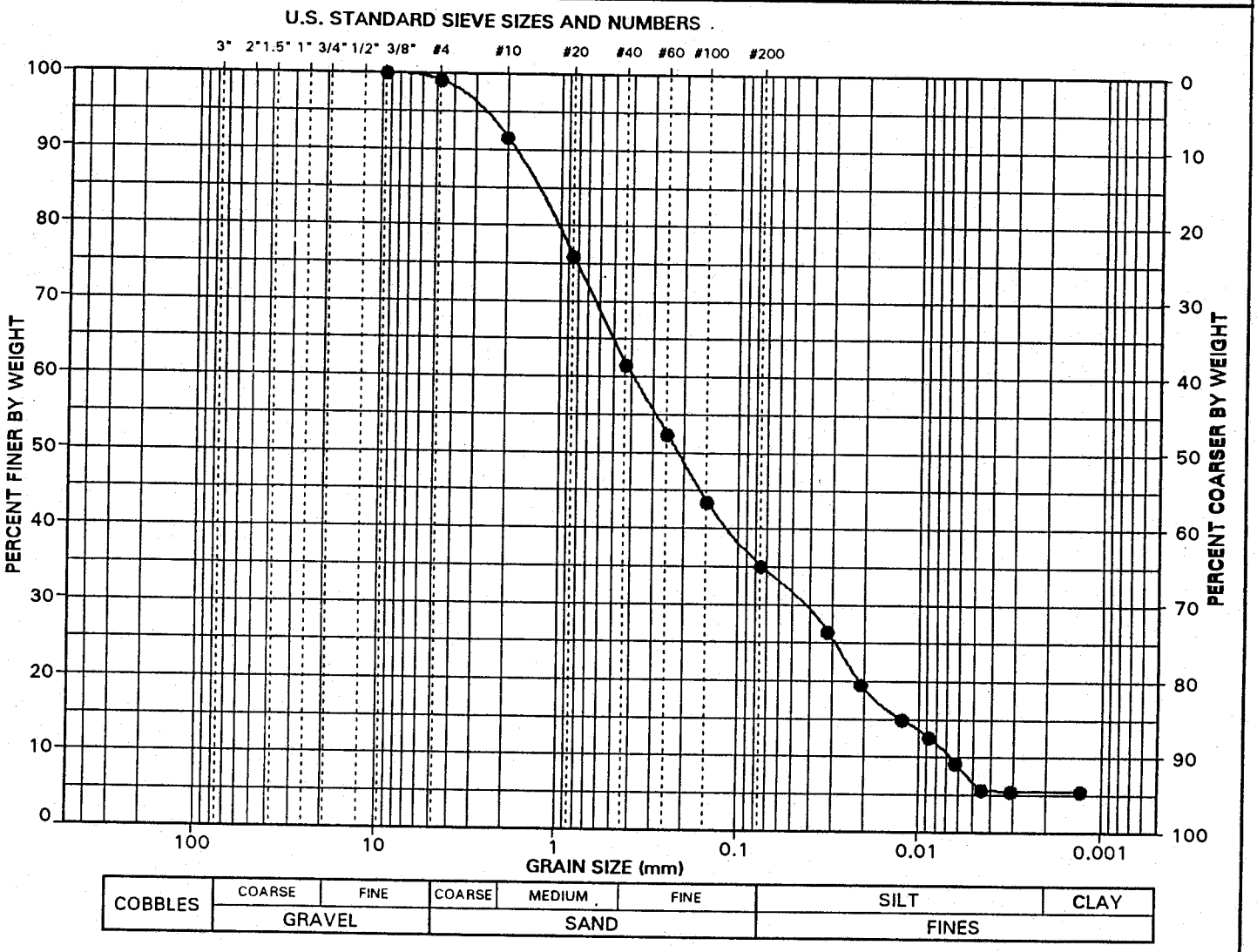
GEOSYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 10
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION 94C59	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%) 0.9
SAMPLE DEPTH (FT)	LIQUID LIMIT (%)		SAND (%) 64.1
SITE SAMPLE ID *	PLASTIC LIMIT (%)		FINES (%) 35.0
LAB. SAMPLE NO. 94C59	PLASTICITY INDEX		SILT (%) 29.5
	DRY DENSITY (pcf)		CLAY(%) 5.5
* P-8-D UD-2	SPECIFIC GRAVITY		COEFF. UNIFORMITY Cu
	VOID RATIO (%)		COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	99	92	76	62	52	43	35	31	19	7	6	

SOIL CLASSIFICATION: -

Silty Sand

7 April 1994 15:53

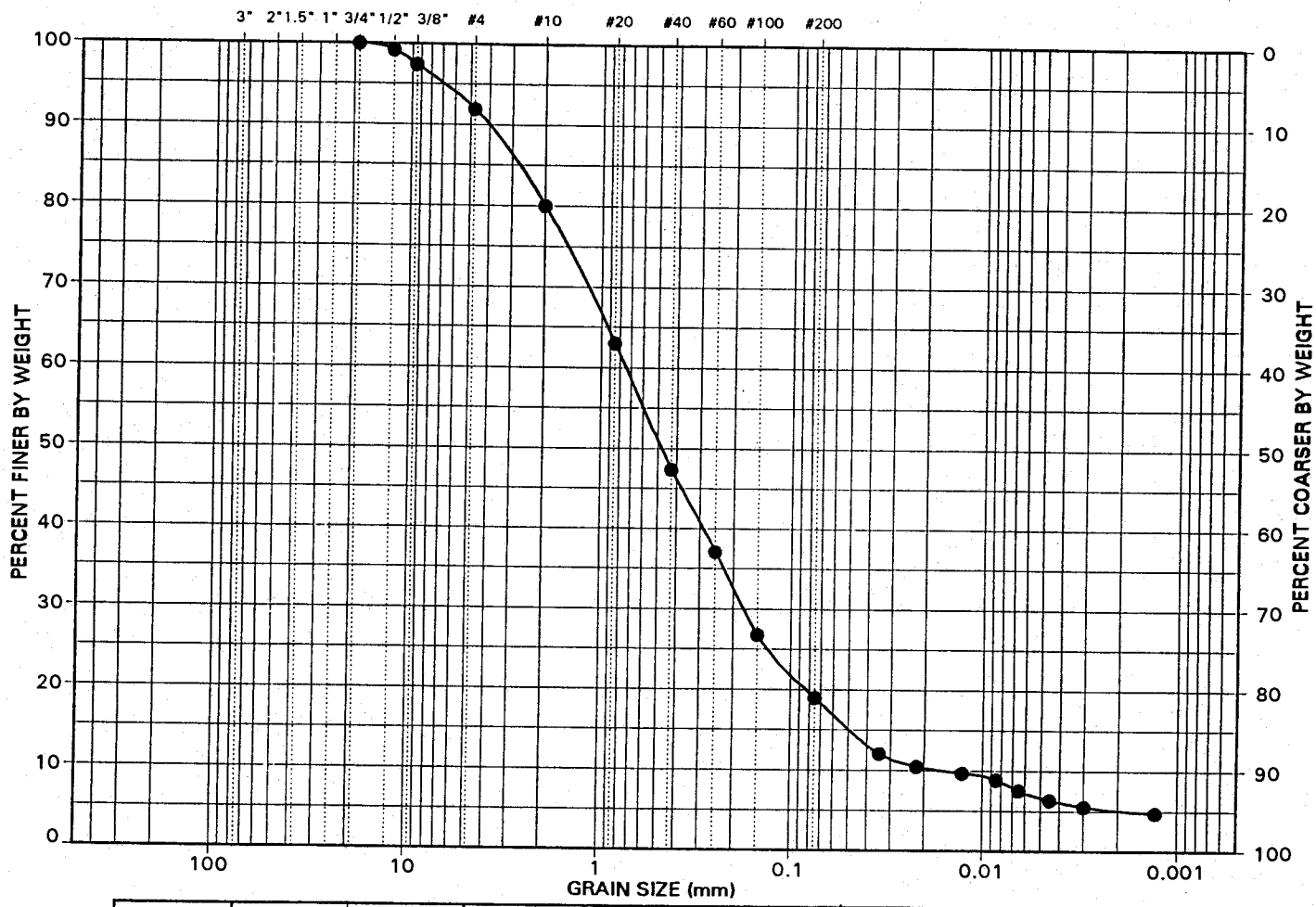
GEOSYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 11
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C62	MOISTURE CONTENT (%)	
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	NP
SITE SAMPLE ID	STD-1	PLASTIC LIMIT (%)	NP
LAB. SAMPLE NO.	94C62	PLASTICITY INDEX	NP
		DRY DENSITY (pcf)	
		SPECIFIC GRAVITY	
		VOID RATIO (%)	

SOIL FRACTIONS	
GRAVEL (%)	8.1
SAND (%)	72.9
FINES (%)	19.0
SILT (%)	13.8
CLAY(%)	5.2
COEFF. UNIFORMITY Cu	
COEFF. CURVATURE Cc	

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200
PERCENT PASSING SIEVE SIZES (mm)													
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075
100	100	100	100	100	99	97	92	80	63	47	37	27	19

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001
15	10	7	5	

SOIL CLASSIFICATION: SM - Silty Sand

Silty Sand

23 March 1994 12:47

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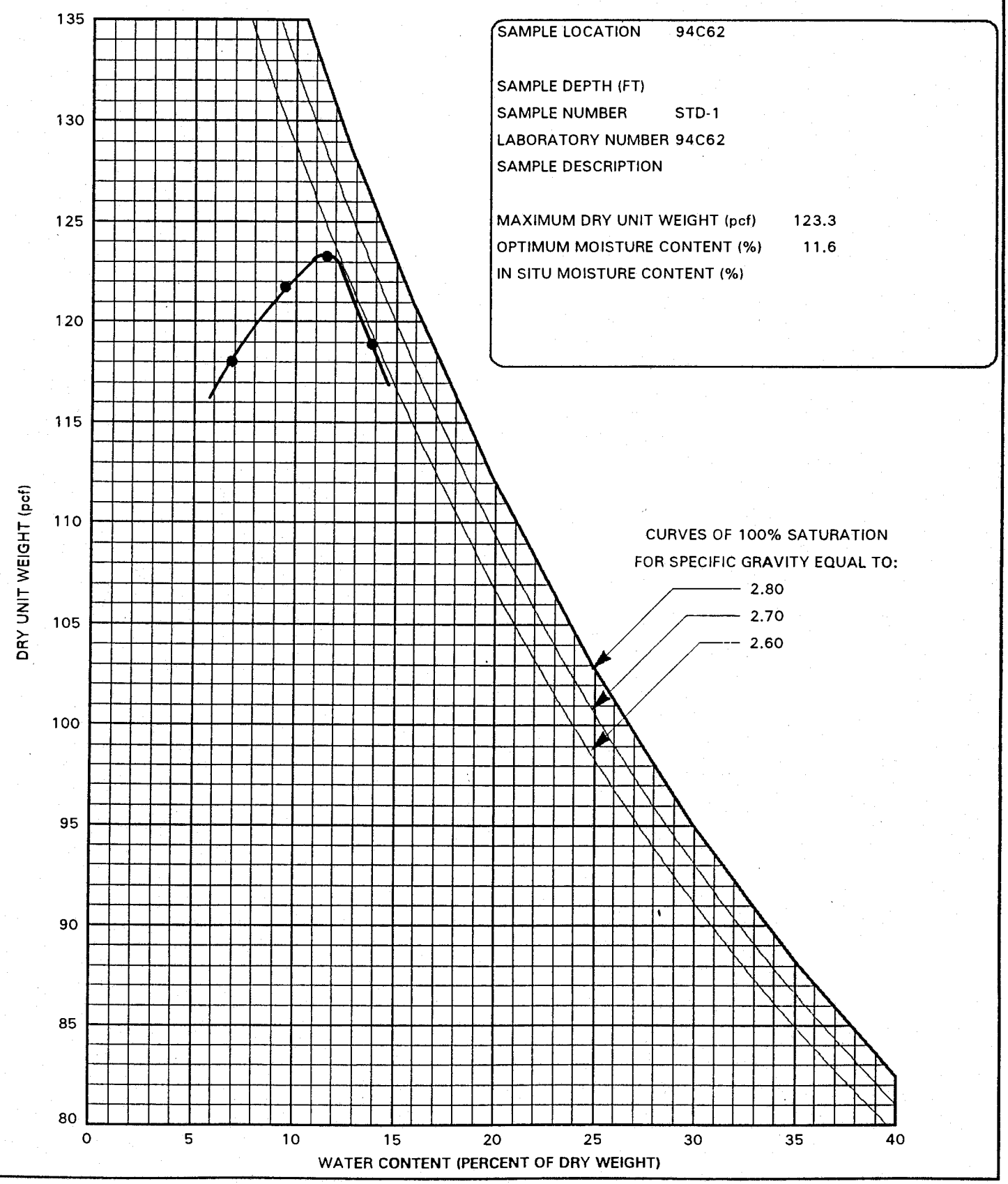
Atlanta, Georgia

FIGURE 12
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: MD1 8/90 11/93

MOISTURE-DENSITY RELATIONSHIP, COMPACTION TEST

TEST PROCEDURE: ASTM D-698



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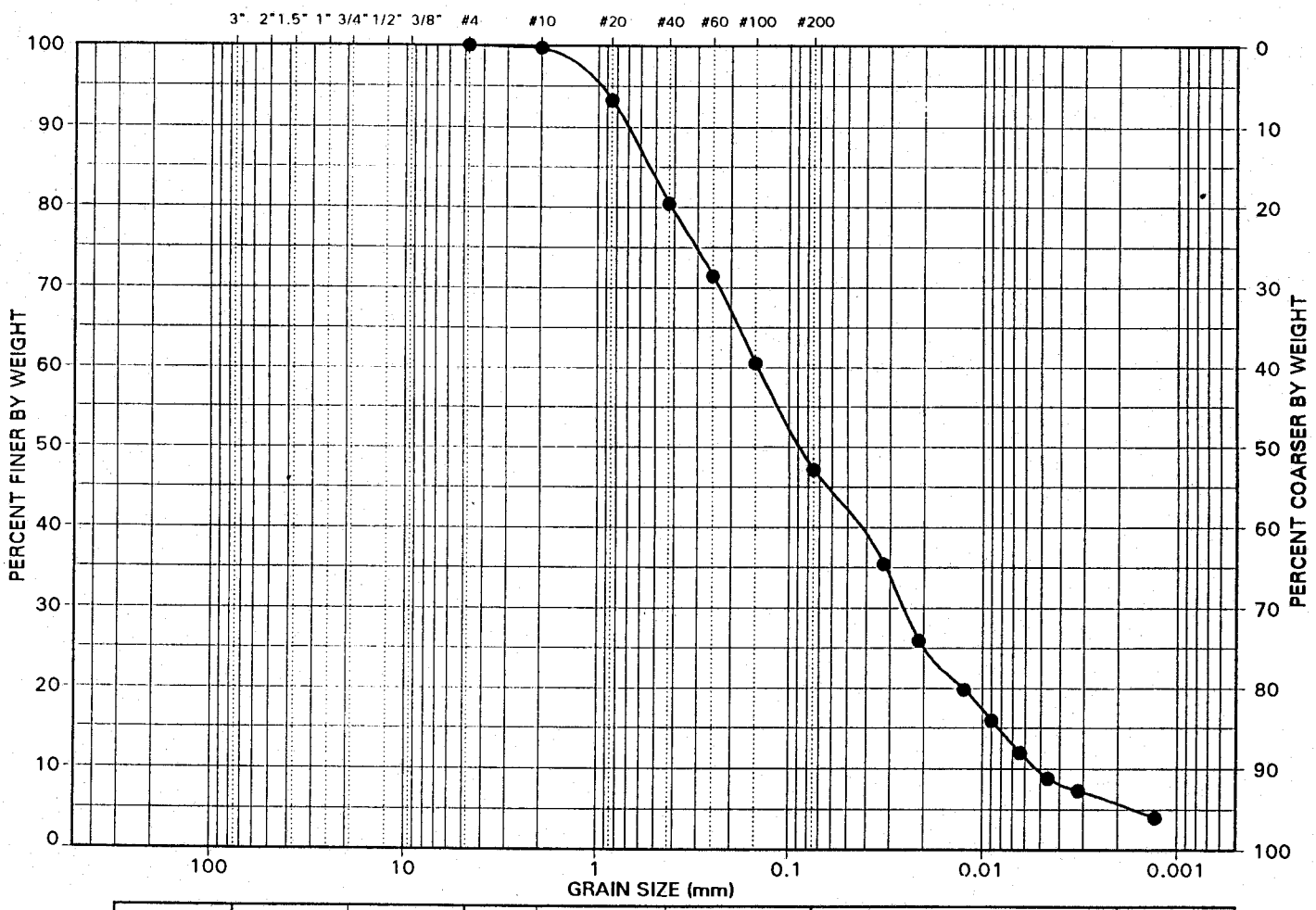
Atlanta, Georgia

FIGURE 13
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C77	MOISTURE CONTENT (%)	GRAVEL (%) 0.0
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 52.9
SITE SAMPLE ID	P-1-D #5	PLASTIC LIMIT (%)	FINES (%) 47.1
LAB. SAMPLE NO.	94C77	PLASTICITY INDEX	SILT (%) 41.5
		DRY DENSITY (pcf)	CLAY(%) 5.6
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

SOIL FRACTIONS

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	100	100	93	80	71	61	47	41	25	10	6	

SOIL CLASSIFICATION: -

USCS Silty Sand

Sandy Silt

30 March 1994 12:57

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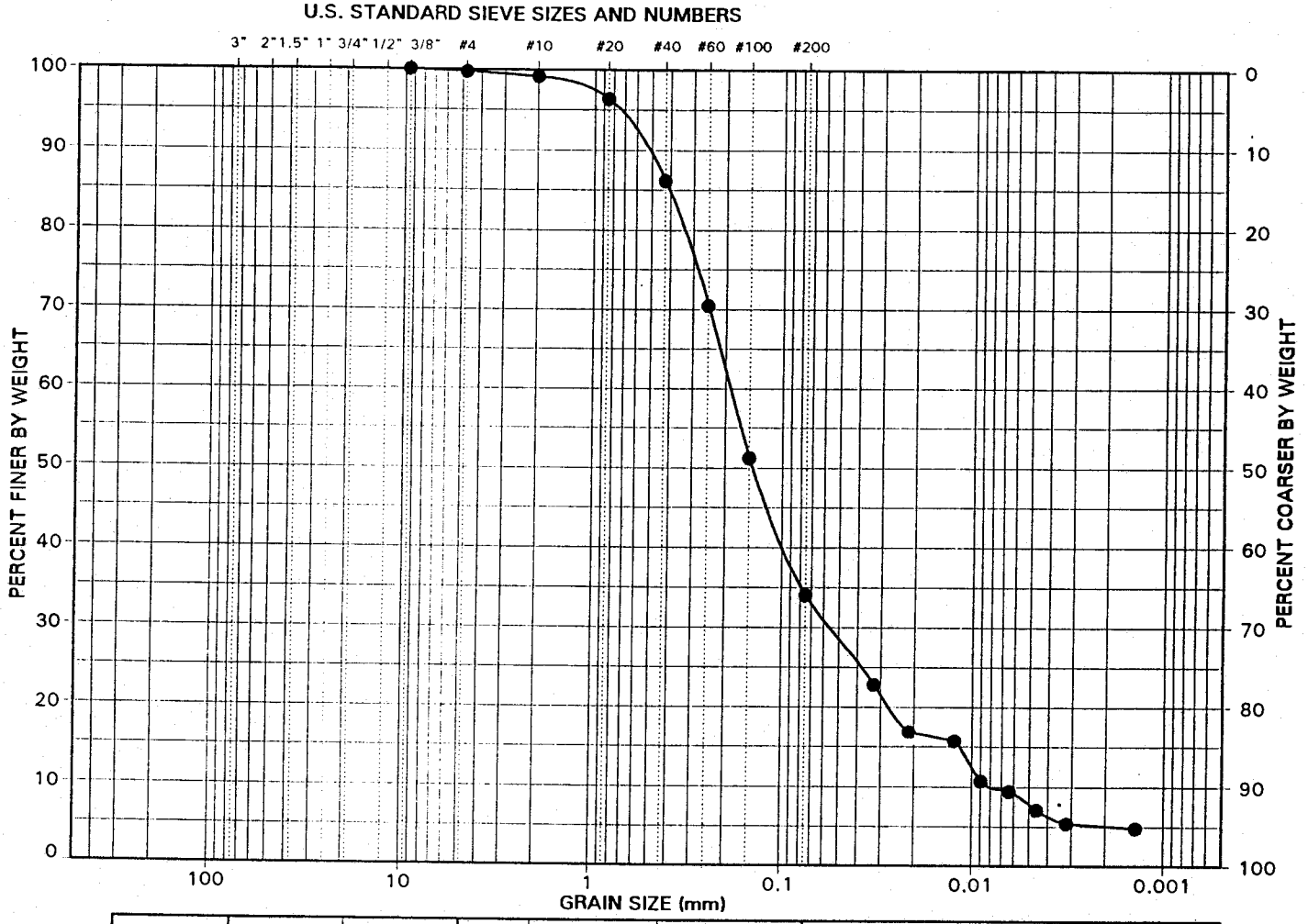
Atlanta, Georgia

FIGURE 14
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C78	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%)	0.3
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)		SAND (%)	65.7
SITE SAMPLE ID	P-1-D #12	PLASTIC LIMIT (%)		FINES (%)	34.0
LAB. SAMPLE NO.	94C78	PLASTICITY INDEX		SILT (%)	28.9
		DRY DENSITY (pcf)		CLAY(%)	5.1
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu		
		VOID RATIO (%)	COEFF. CURVATURE Cc		

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	100	99	96	86	70	51	34	29	17	8	5	

SOIL CLASSIFICATION: - Silty Sand

30 March 1994 12:30

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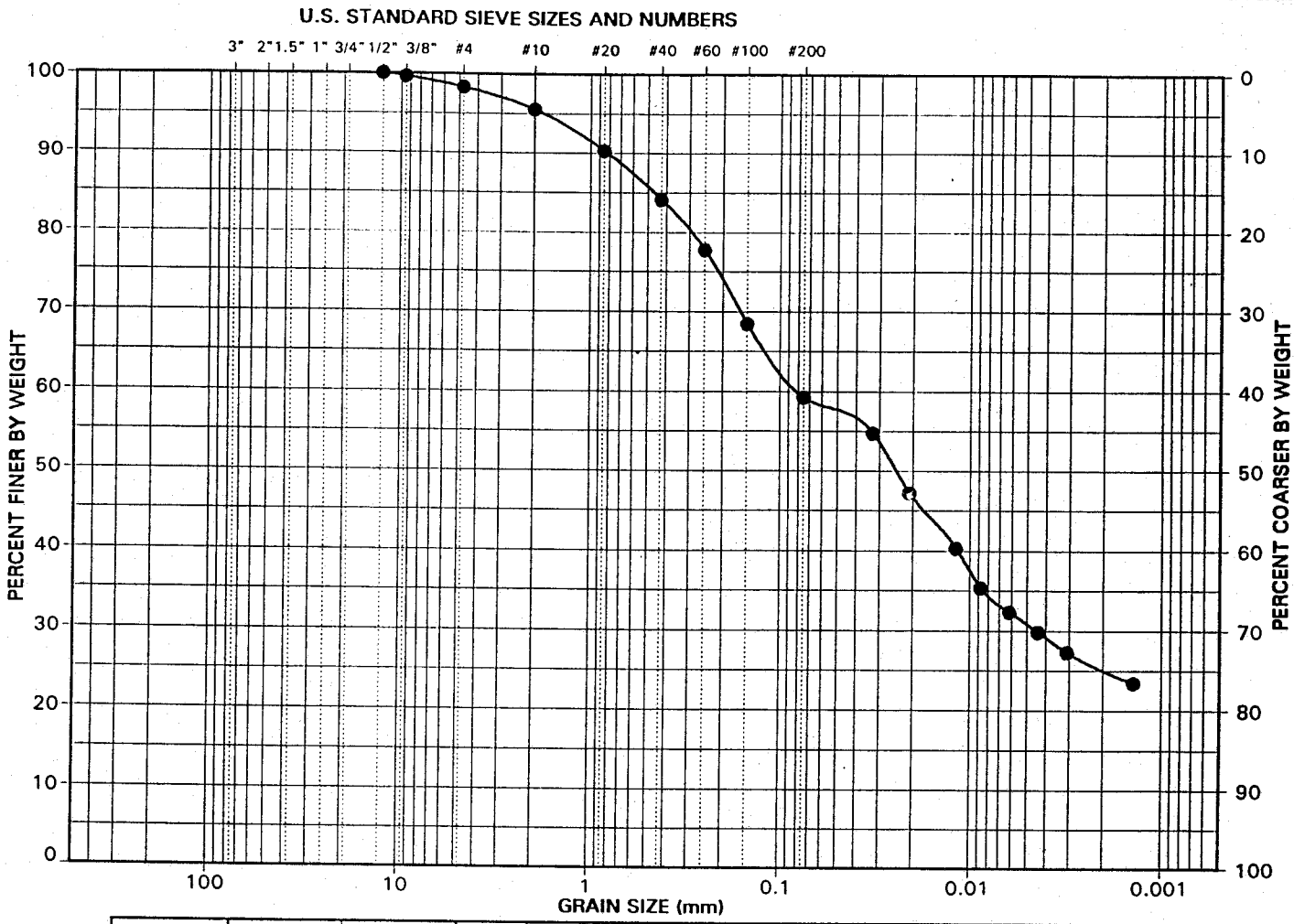
Atlanta, Georgia

FIGURE 15
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C79	MOISTURE CONTENT (%)	
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	42
SITE SAMPLE ID	P-2 S-3	PLASTIC LIMIT (%)	36
LAB. SAMPLE NO.	94C79	PLASTICITY INDEX	6
		DRY DENSITY (pcf)	
		SPECIFIC GRAVITY	
		VOID RATIO (%)	

SOIL FRACTIONS		
GRAVEL (%)	1.7	
SAND (%)	39.1	
FINES (%)	59.2	
SILT (%)	34.1	
CLAY(%)	25.1	
COEFF. UNIFORMITY Cu		
COEFF. CURVATURE Cc		

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200
PERCENT PASSING SIEVE SIZES (mm)													
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075
100	100	100	100	100	100	100	98	96	90	84	78	68	59

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001
57	47	31	25	

SOIL CLASSIFICATION: ML - Sandy Silt

ML

A-5

31 March 1994 11:15

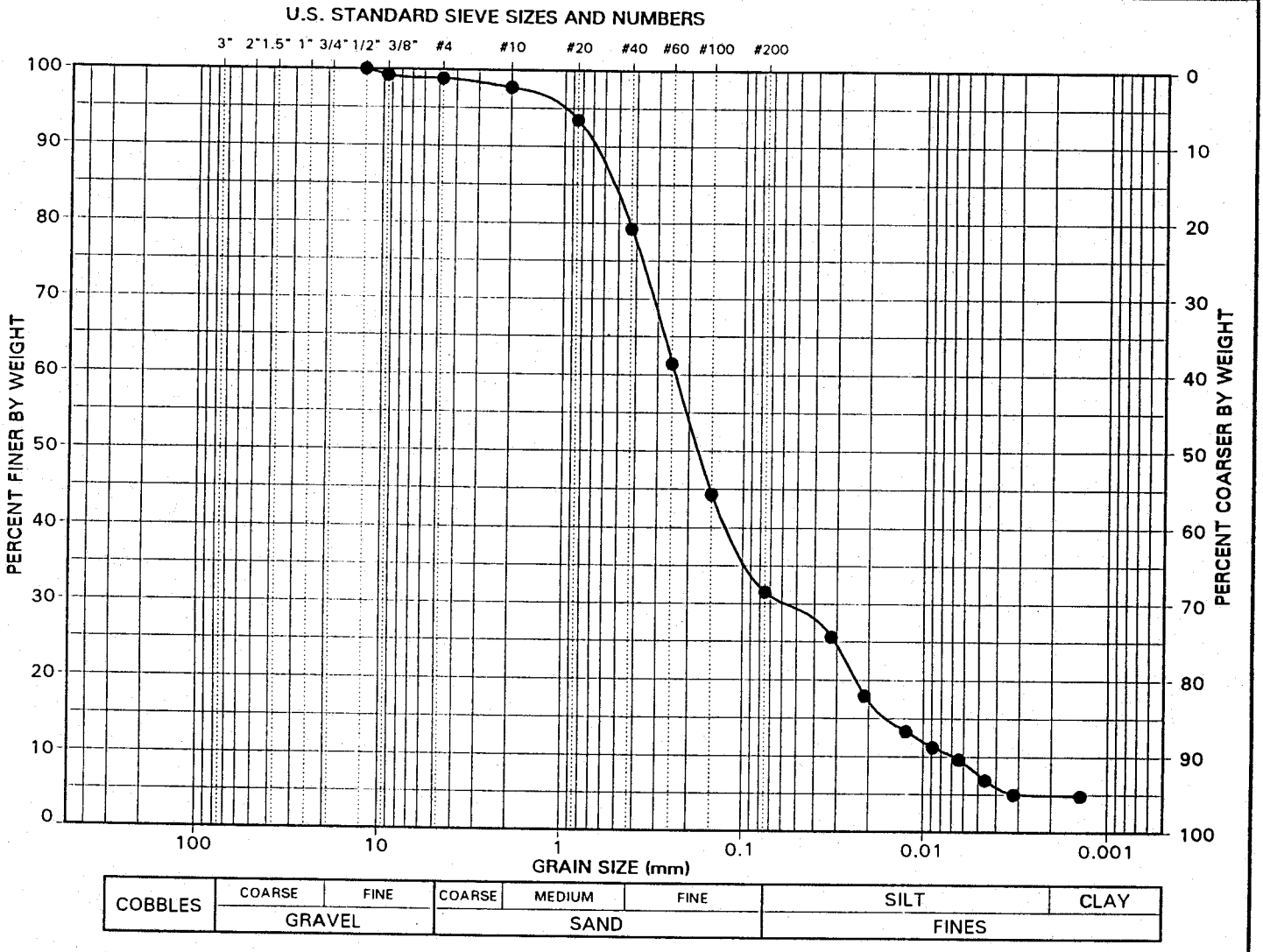
GEOSYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 16
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C80	MOISTURE CONTENT (%)	SOIL FRACTIONS: GRAVEL (%) 1.2
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 67.3
SITE SAMPLE ID	P-2-D S-11	PLASTIC LIMIT (%)	FINES (%) 31.5
LAB. SAMPLE NO.	94C80	PLASTICITY INDEX	SILT (%) 26.6
		DRY DENSITY (pcf)	CLAY(%) 4.9
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS

3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200
PERCENT PASSING SIEVE SIZES (mm)													
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075
100	100	100	100	100	100	99	99	98	93	79	61	44	32

PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)

0.050	0.020	0.005	0.002	0.001
29	17	8	5	

SOIL CLASSIFICATION: - Silty Sand

30 March 1994 12:34

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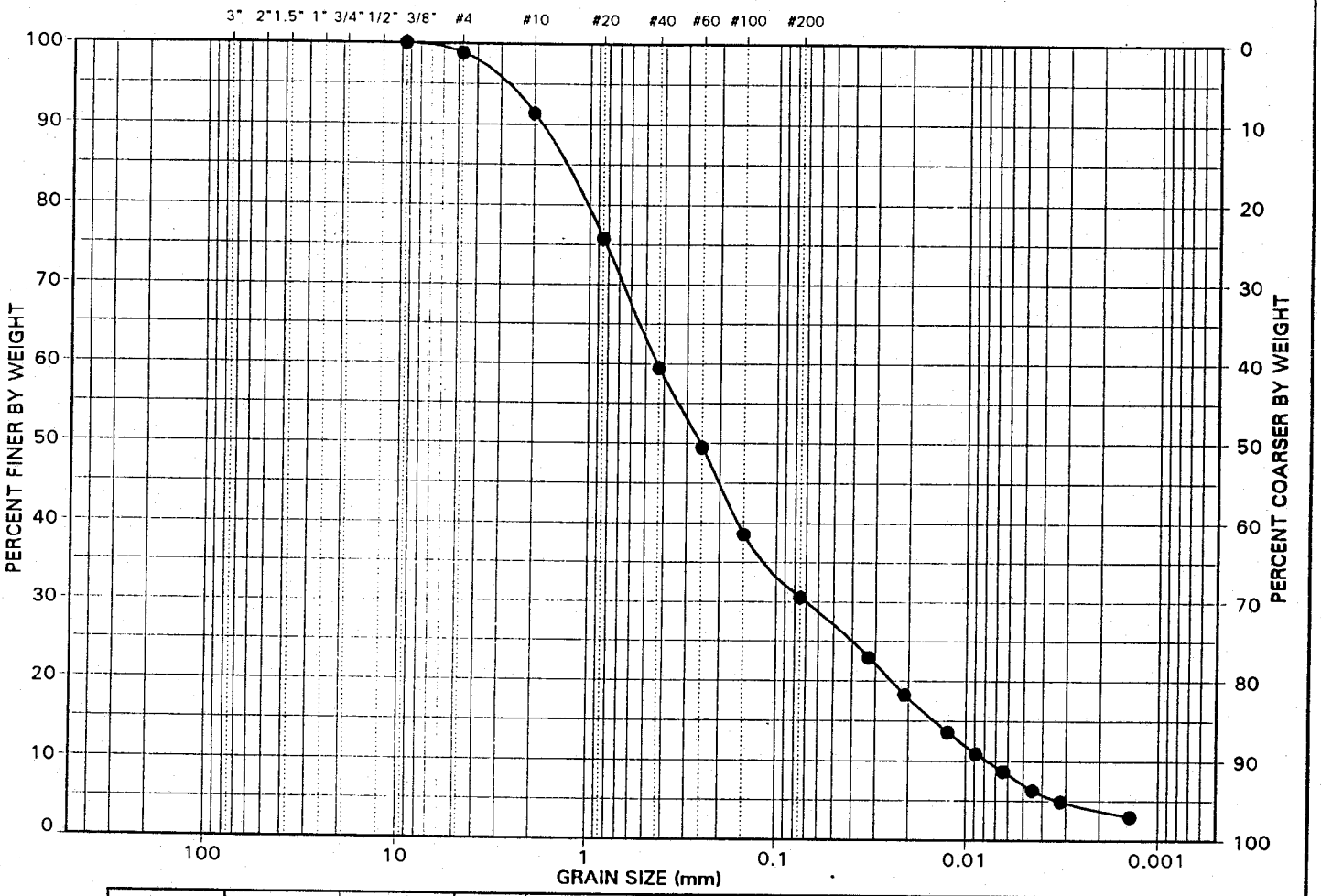
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 17
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C81	MOISTURE CONTENT (%)	SOIL FRACTIONS: GRAVEL (%) 1.2
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 68.3
SITE SAMPLE ID	P-3 S-4	PLASTIC LIMIT (%)	FINES (%) 30.5
LAB. SAMPLE NO.	94C81	PLASTICITY INDEX	SILT (%) 26.7
		DRY DENSITY (pcf)	CLAY(%) 3.8
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	99	91	76	59	49	39	31	27	18	7	4	

SOIL CLASSIFICATION: -

Silty Sand

30 March 1994 12:10

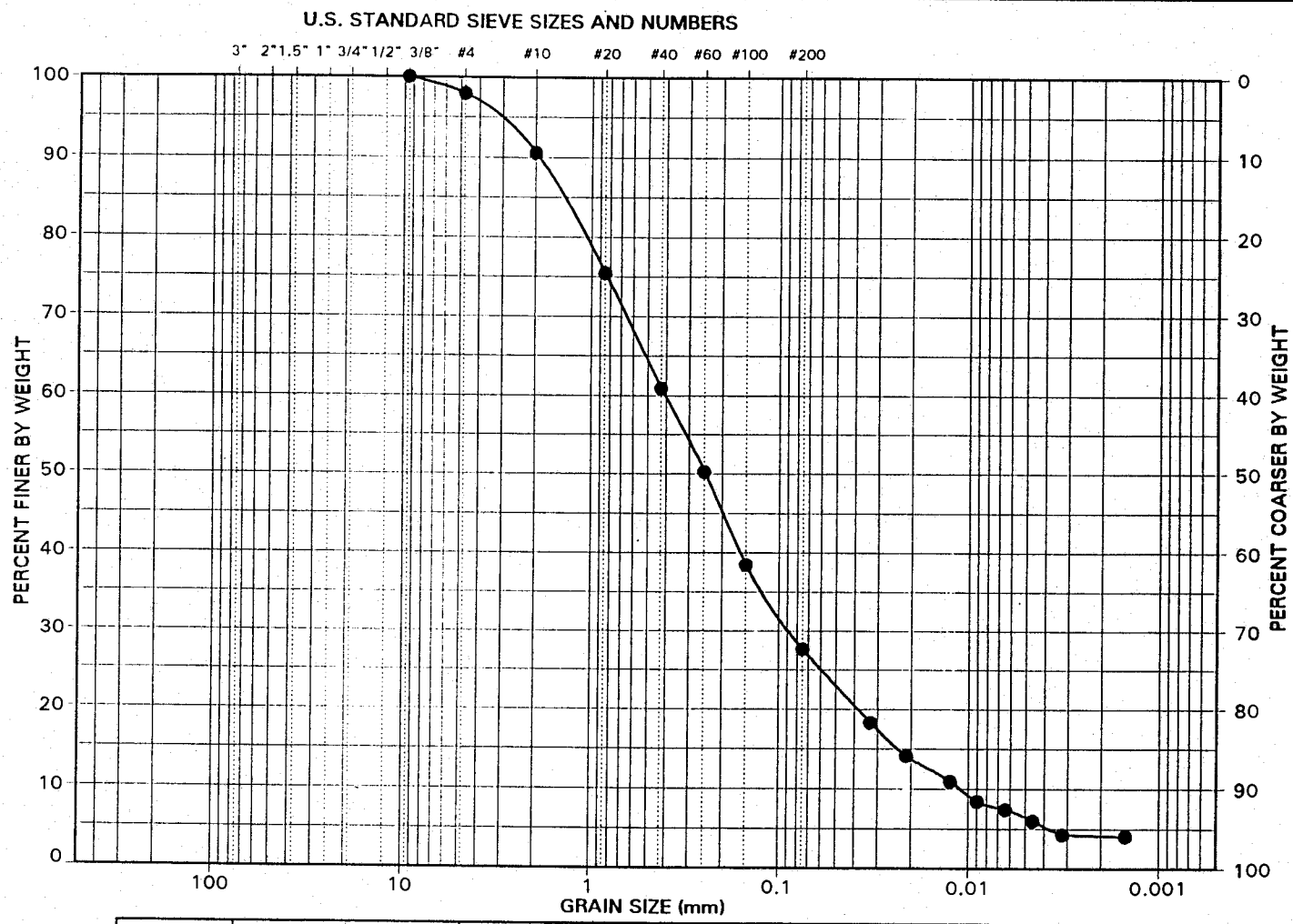
GEOSYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 18
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C82	MOISTURE CONTENT (%)	SOIL FRACTIONS: GRAVEL (%) 2.1
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 70.3
SITE SAMPLE ID	P-4-D S-5	PLASTIC LIMIT (%)	FINES (%) 27.6
LAB. SAMPLE NO.	94C82	PLASTICITY INDEX	SILT (%) 23.4
		DRY DENSITY (pcf)	CLAY(%) 4.2
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	98	91	75	61	50	38	28	23	14	6	4	

SOIL CLASSIFICATION: -

Silty Sand

30 March 1994 12:52

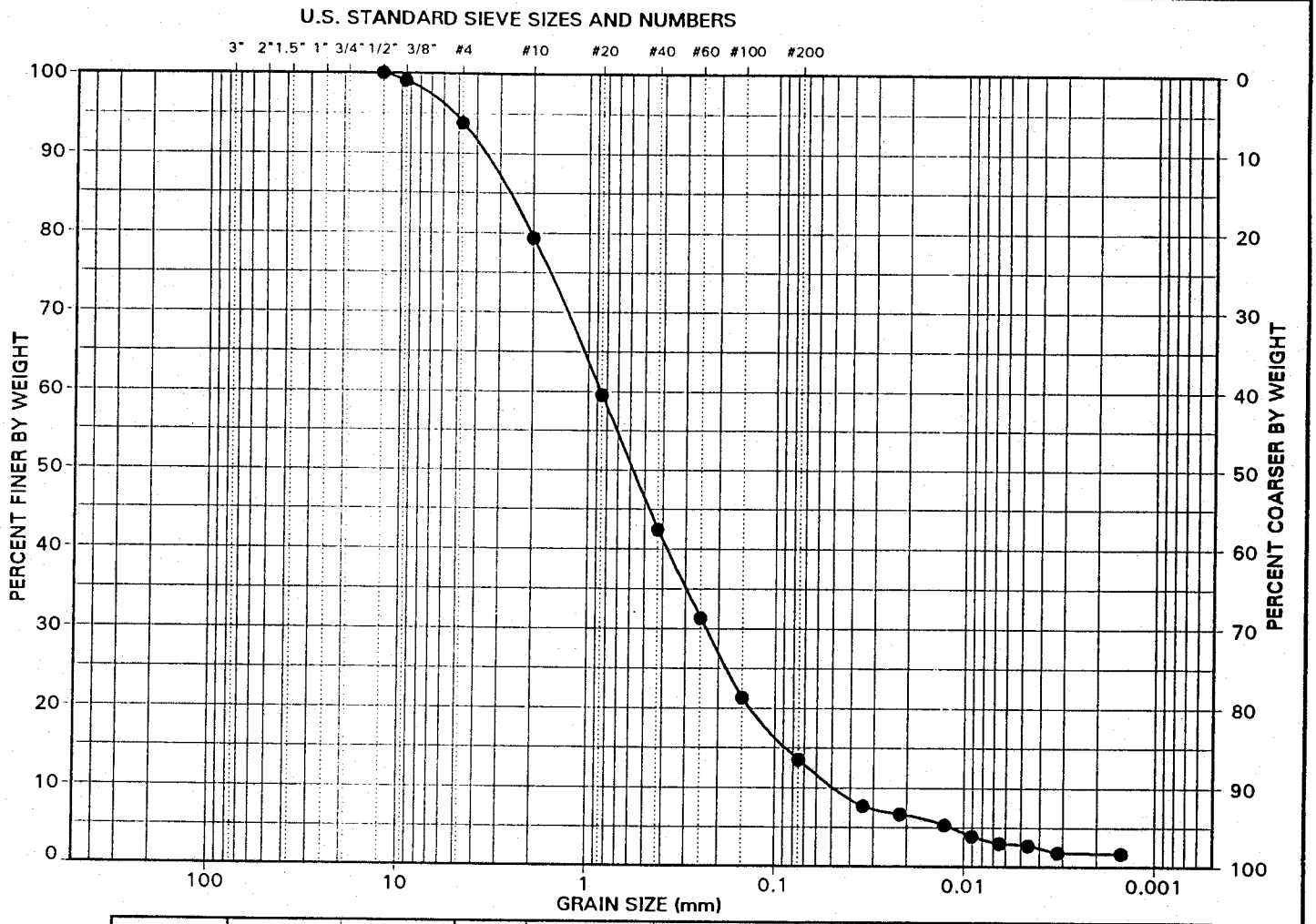
GEOSYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 19
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C83	MOISTURE CONTENT (%)	GRAVEL (%) 6.2
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 80.3
SITE SAMPLE ID	P-5 S-2	PLASTIC LIMIT (%)	FINES (%) 13.5
LAB. SAMPLE NO.	94C83	PLASTICITY INDEX	SILT (%) 11.8
		DRY DENSITY (pcf)	CLAY(%) 1.7
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

SOIL FRACTIONS

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	99	94	79	60	42	31	21	14	11	6	3	2	

SOIL CLASSIFICATION: -

Slightly Silty Sand

30 March 1994 13:06

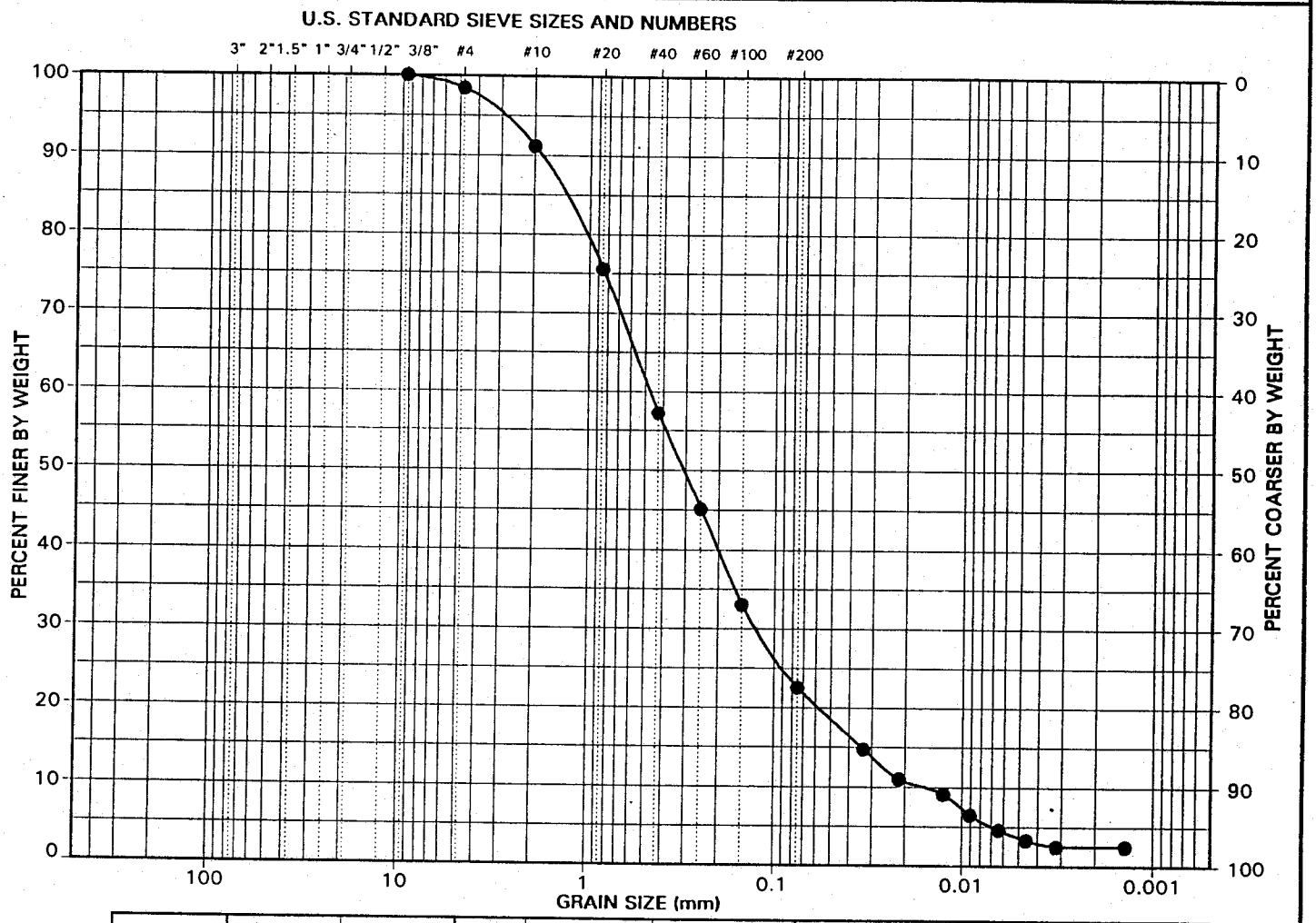
GEOSYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 20
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C84	MOISTURE CONTENT (%)	GRAVEL (%) 1.6
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 75.9
SITE SAMPLE ID	P-8 S-13	PLASTIC LIMIT (%)	FINES (%) 22.5
LAB. SAMPLE NO.	94C84	PLASTICITY INDEX	SILT (%) 20.0
		DRY DENSITY (pcf)	CLAY(%) 2.5
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

SOIL FRACTIONS

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	98	91	76	57	45	33	23	19	11	4	3	

SOIL CLASSIFICATION: - Silty Sand

31 March 1994 13:01

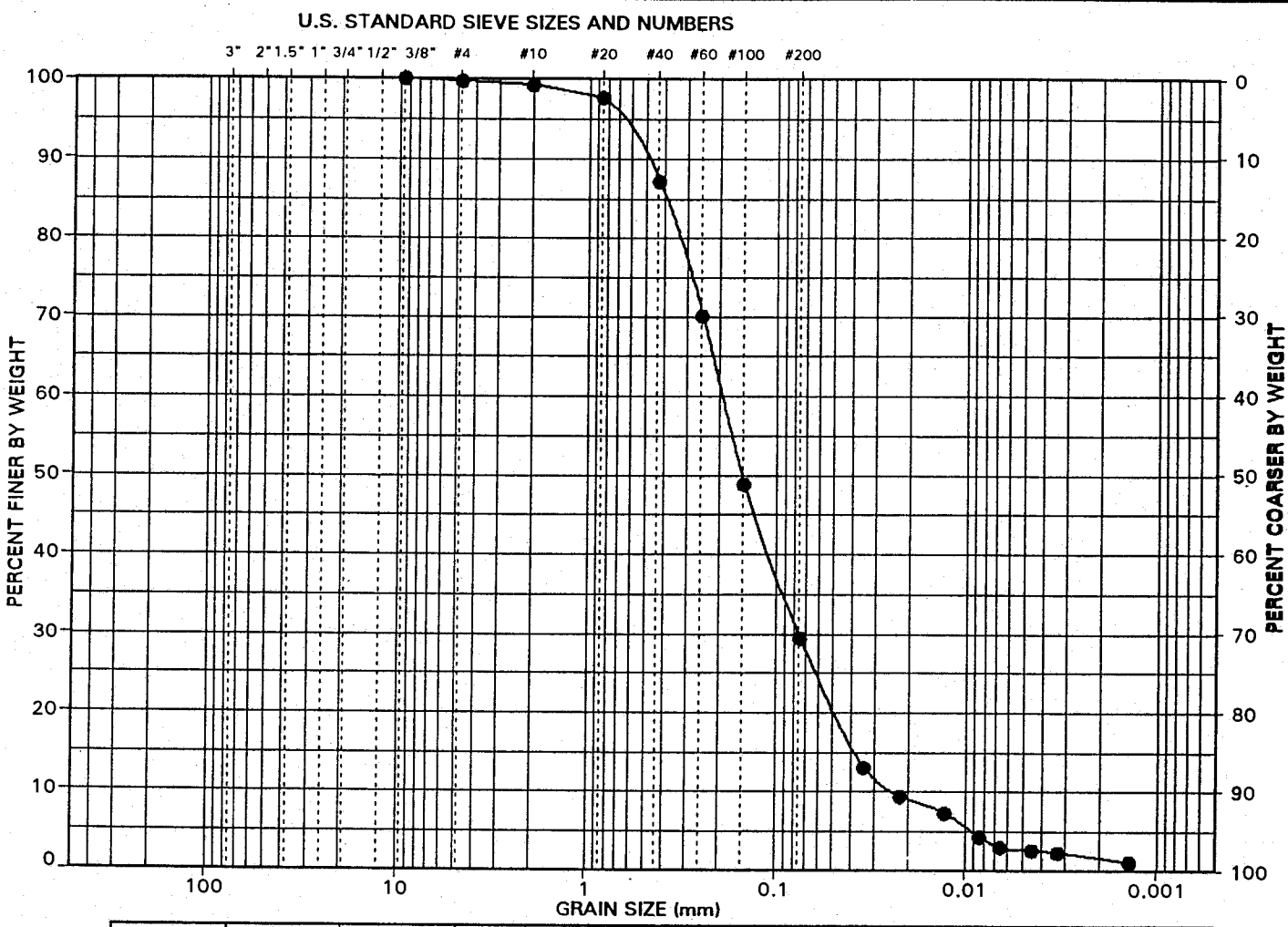
GEOSYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 21
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C85	MOISTURE CONTENT (%)	SOIL FRACTIONS: GRAVEL (%) 0.3
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 70.3
SITE SAMPLE ID	P-11 S-3	PLASTIC LIMIT (%)	FINES (%) 29.4
LAB. SAMPLE NO.	94C85	PLASTICITY INDEX	SILT (%) 27.8
		DRY DENSITY (pcf)	CLAY(%) 1.6
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	100	100	99	98	87	70	49	29	21	9	3	2	

SOIL CLASSIFICATION: -

Silty Sand

7 April 1994 15:58

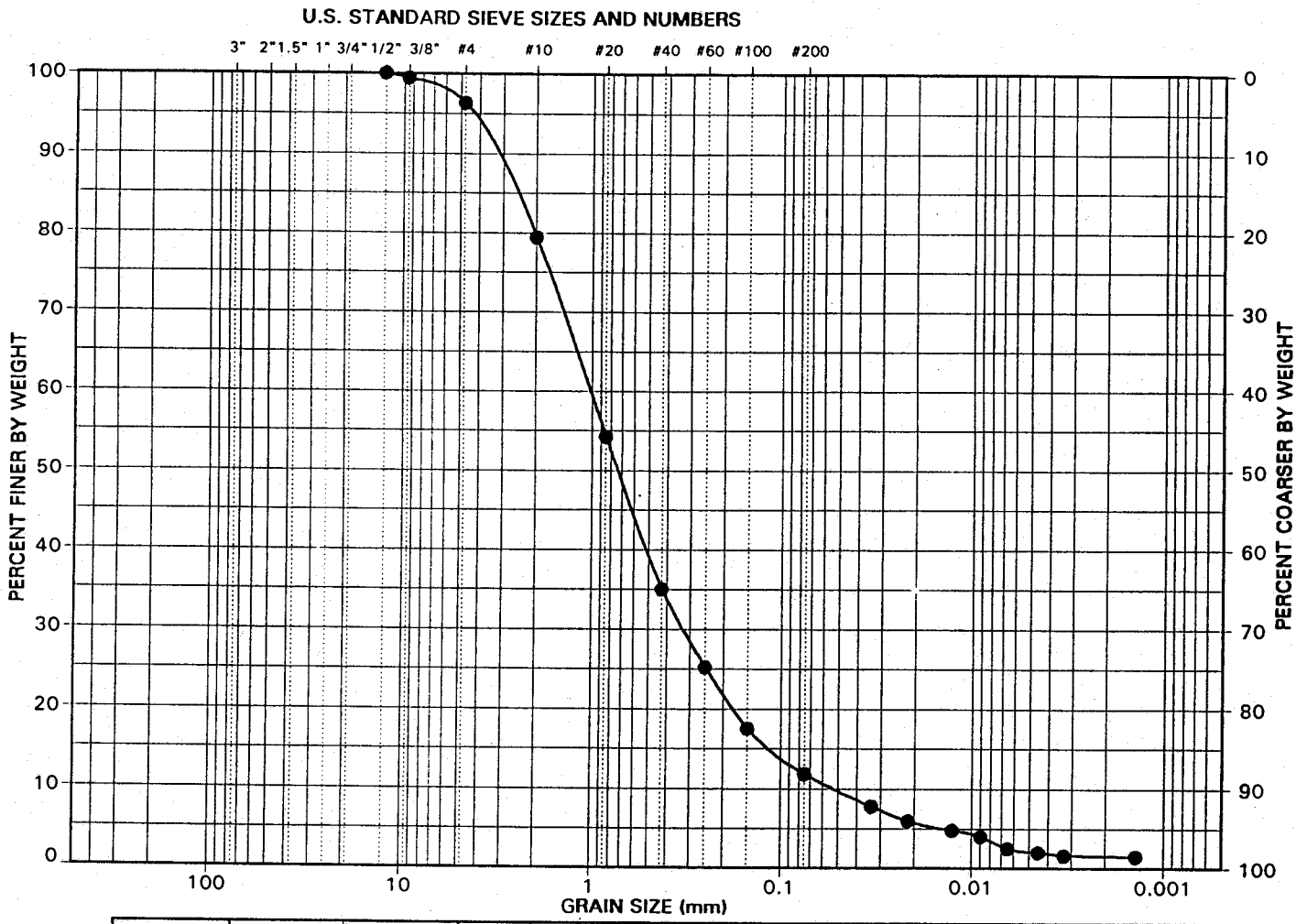
GeoSyntec Consultants
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 22
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C86	MOISTURE CONTENT (%)	SOIL FRACTIONS	GRAVEL (%)	3.7
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)		SAND (%)	84.5
SITE SAMPLE ID	P-11 S-7	PLASTIC LIMIT (%)		FINES (%)	11.8
LAB. SAMPLE NO.	94C86	PLASTICITY INDEX		SILT (%)	10.3
		DRY DENSITY (pcf)		CLAY(%)	1.5
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu		14.8
		VOID RATIO (%)	COEFF. CURVATURE Cc		1.45

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	99	96	79	54	35	25	18	12	10	6	2	2	

SOIL CLASSIFICATION: -

Slightly Silty Sand

31 March 1994 13:08

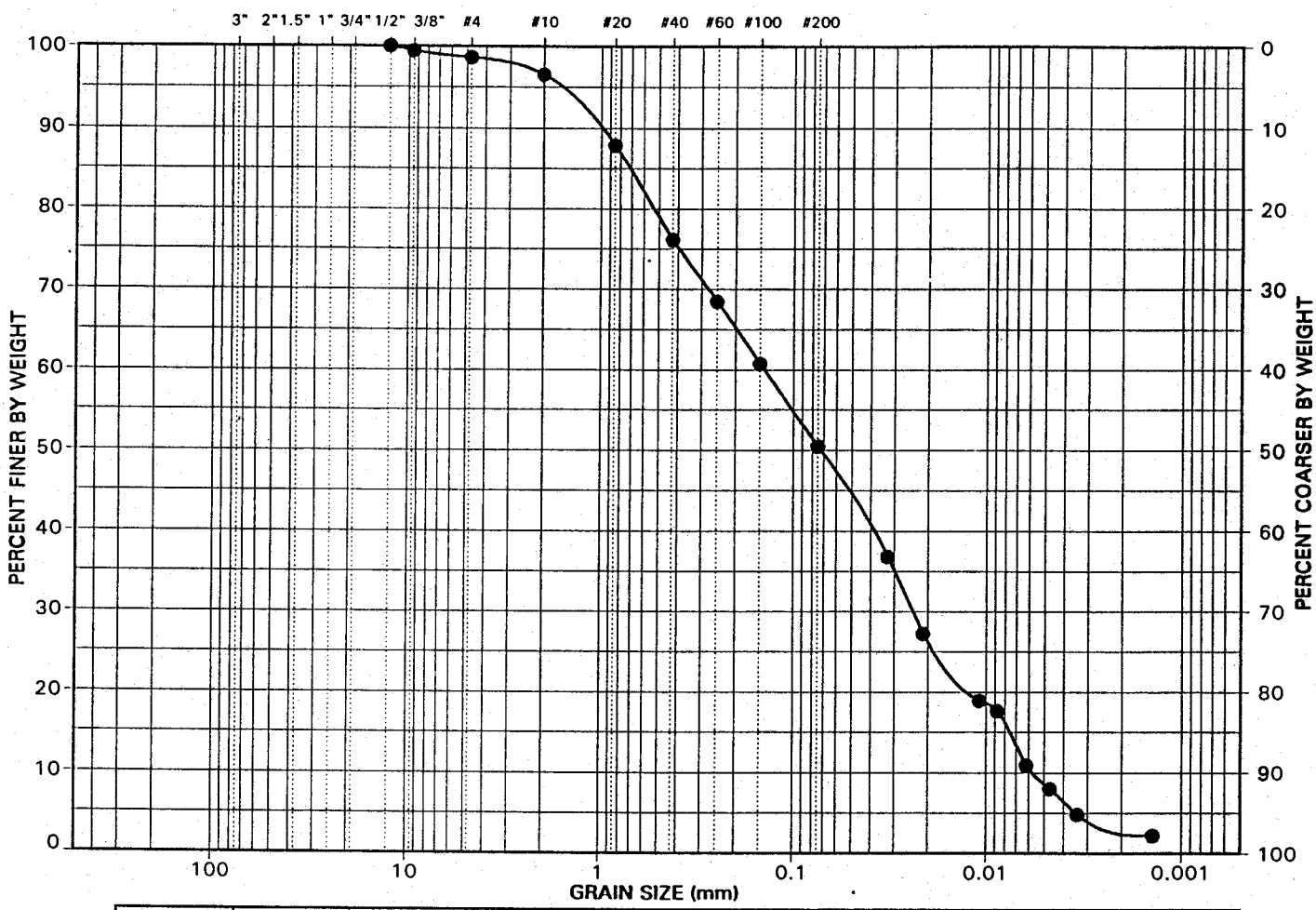
GEOSYNTEC CONSULTANTS
Geomechanics and Environmental Laboratory
Atlanta, Georgia

FIGURE 23
PROJECT PIEDMONT LANDFILL
LOCATION
NUMBER GLG3564

GS FORM: PS2 3/91 10/93

PARTICLE SIZE DISTRIBUTION AND PHYSICAL PROPERTIES

ASTM D 422, D 2216, D 2487 AND D 4318.



SAMPLE LOCATION	94C87	MOISTURE CONTENT (%)	GRAVEL (%) 1.4
SAMPLE DEPTH (FT)		LIQUID LIMIT (%)	SAND (%) 48.2
SITE SAMPLE ID	P-12-D #6	PLASTIC LIMIT (%)	FINES (%) 50.4
LAB. SAMPLE NO.	94C87	PLASTICITY INDEX	SILT (%) 47.2
		DRY DENSITY (pcf)	CLAY(%) 3.2
		SPECIFIC GRAVITY	COEFF. UNIFORMITY Cu
		VOID RATIO (%)	COEFF. CURVATURE Cc

SOIL FRACTIONS

PERCENT PASSING U.S. STANDARD SIEVE SIZES AND NUMBERS														PERCENT FINER THAN HYDROMETER PARTICLE DIAMETER (mm)				
3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200					
PERCENT PASSING SIEVE SIZES (mm)																		
75	50	37.5	25	19	12.5	9.5	4.75	2.00	0.850	0.425	0.250	0.150	0.075	0.050	0.020	0.005	0.002	0.001
100	100	100	100	100	100	99	99	97	88	76	68	61	50	44	26	9	3	

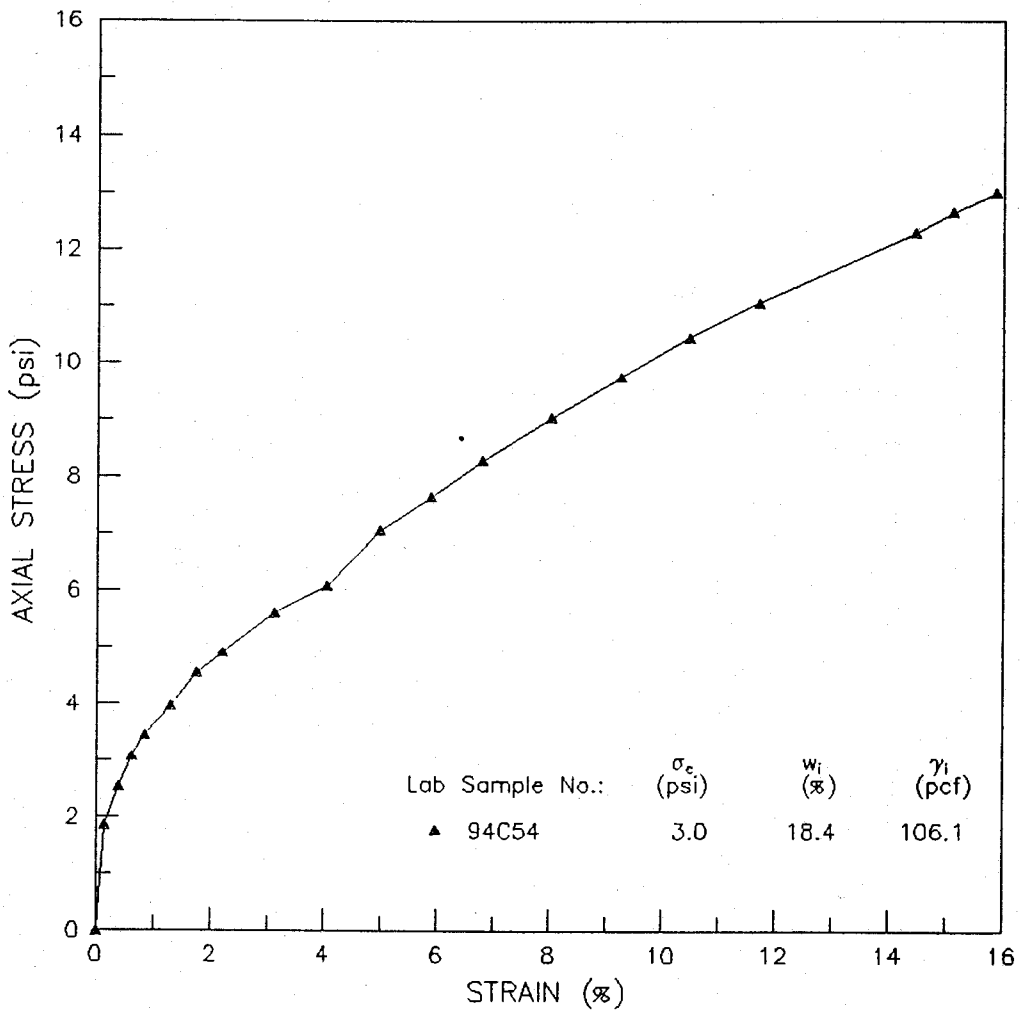
SOIL CLASSIFICATION: -

Sandy Silt

31 March 1994 13:11

UU TRIAXIAL COMPRESSION TESTING

RUST ENVIRONMENT & INFRASTRUCTURE
PIEDMONT LANDFILL



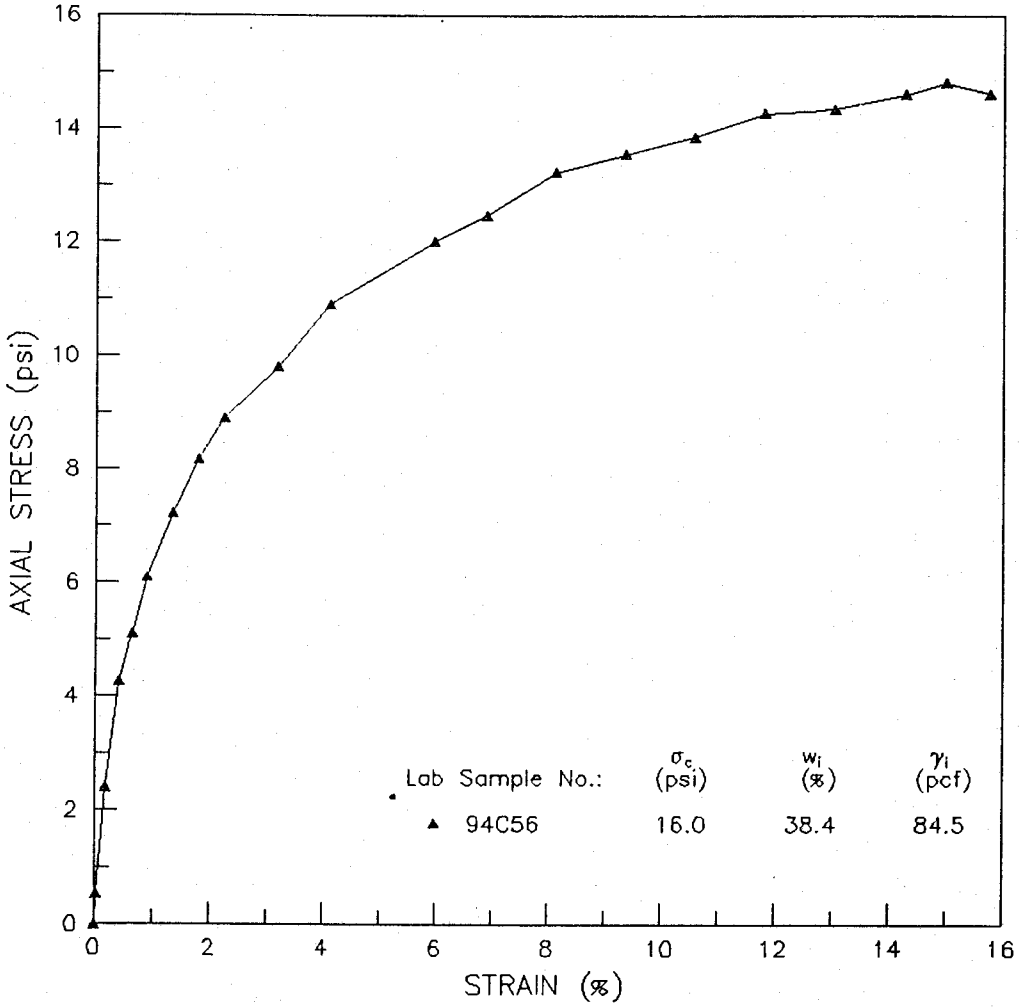
NOTES: Site Sample ID: P-2-D, UD-2, 4'-6'
Lab Sample No.: 94C54
σ_c – Confining Pressure
w_i – Initial Moisture Content
γ_i – Initial Dry Unit Weight
Test Starting Date: 17 March 1994

GeoSyntec Consultants
GEOMECHANICS AND ENVIRONMENTAL LABORATORY

FIGURE NO.	24
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

UU TRIAXIAL COMPRESSION TESTING

RUST ENVIRONMENT & INFRASTRUCTURE
PIEDMONT LANDFILL



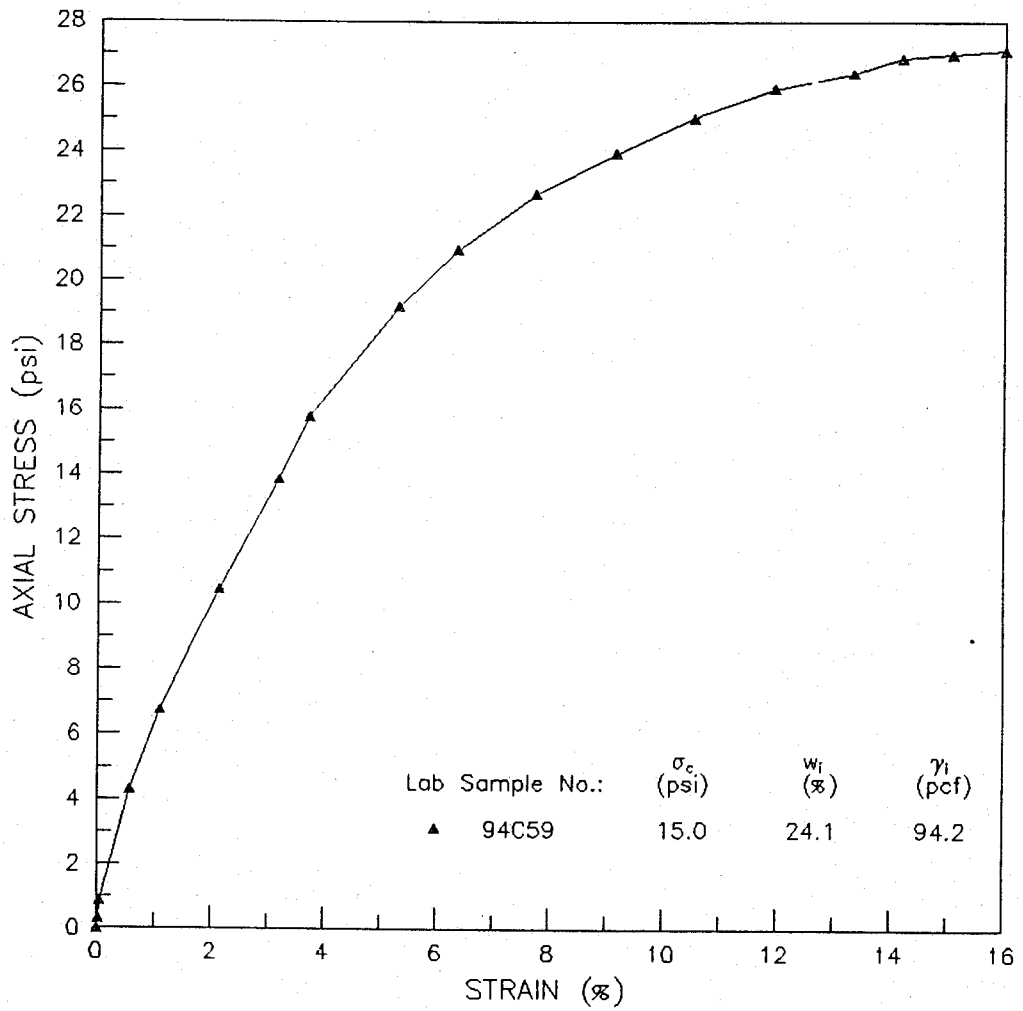
NOTES: Site Sample ID: P-2-D, UD-4, 22'-24'
Lab Sample No.: 94C56
σ_c – Confining Pressure
γ_i – Initial Dry Unit Weight
w_i – Initial Moisture Content
Test Starting Date: 17 March 1994

GeoSyntec Consultants
GEOMECHANICS AND ENVIRONMENTAL LABORATORY

FIGURE NO.	25
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

UU TRIAXIAL COMPRESSION TESTING

RUST ENVIRONMENT & INFRASTRUCTURE
PIEDMONT LANDFILL



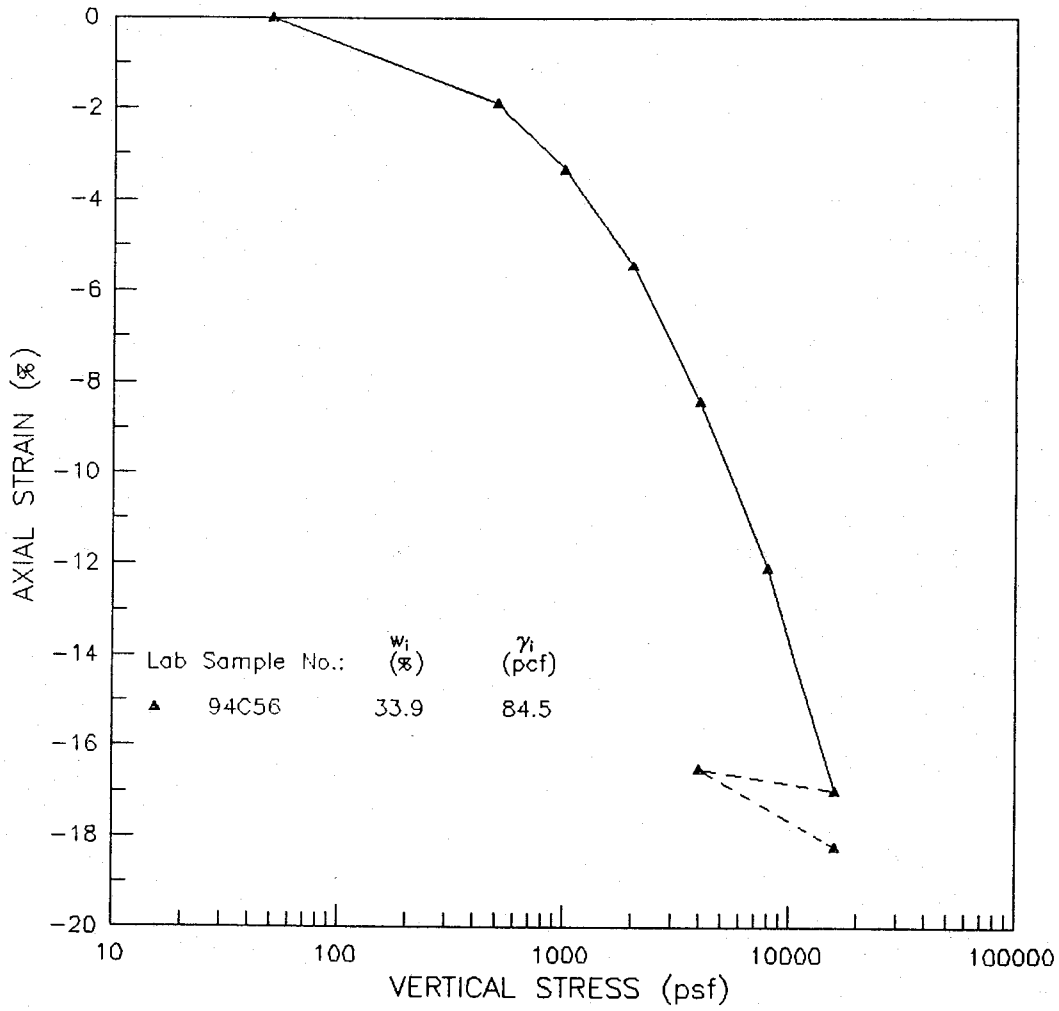
NOTES: Site Sample ID: P-8-D, UD-2, 20'-22'
Lab Sample No.: 94C59
σ_c – Confining Pressure
w_i – Initial Moisture Content
γ_i – Initial Dry Unit Weight
Test Starting Date: 21 March 1994

GeoSyntec Consultants
GEOMECHANICS AND ENVIRONMENTAL LABORATORY

FIGUHE NO.	26
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

ONE-DIMENSIONAL CONSOLIDATION TESTING

RUST ENVIRONMENT & INFRASTRUCTURE
PIEDMONT LANDFILL



NOTES: Site Sample ID: P-2-D, UD-4, 22'-24'
Lab Sample No.: 94C56
w_i – Initial Moisture Content
γ_i – Initial Dry Unit Weight
Test Starting Date: 17 March 1994

GeoSyntec Consultants
GEOMECHANICS AND ENVIRONMENTAL LABORATORY

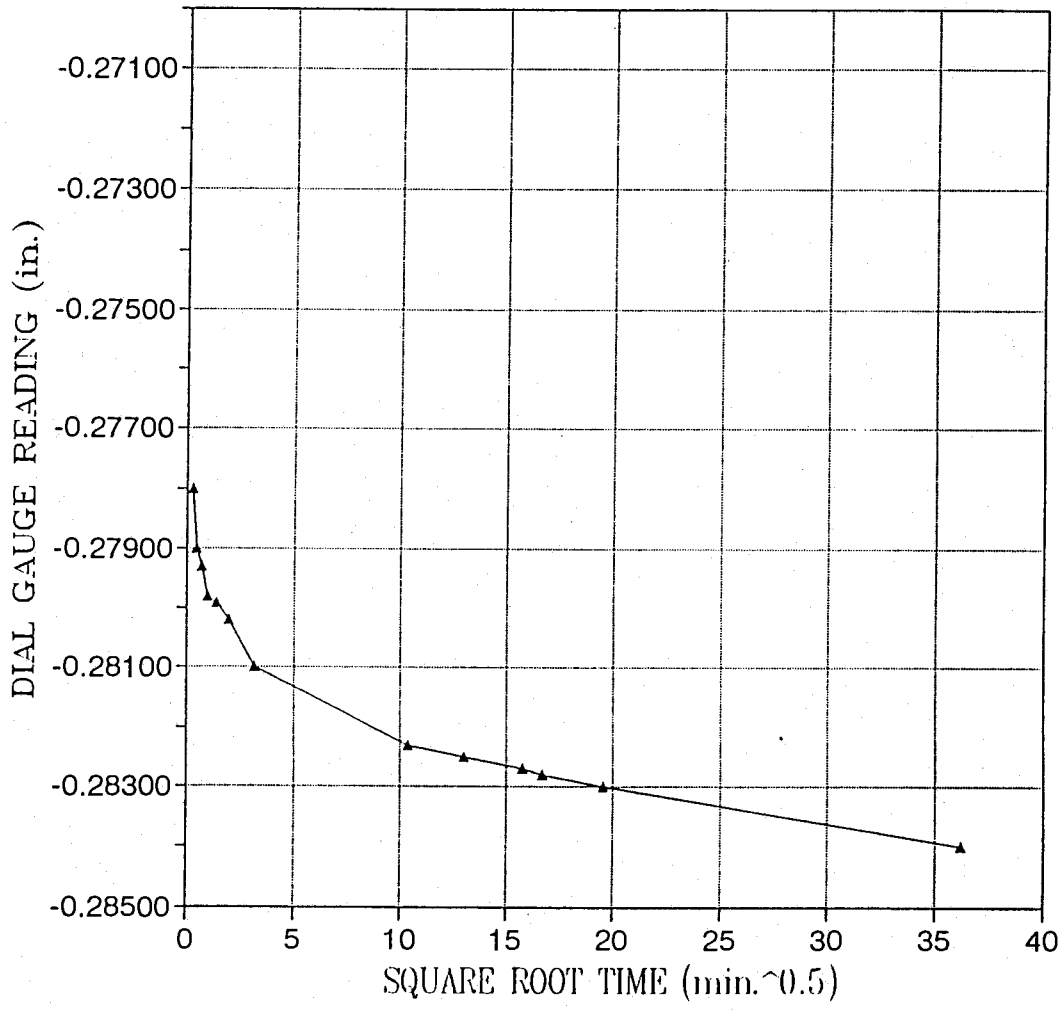
FIGURE NO.	27
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

APPENDIX A

ONE-DIMENSIONAL CONSOLIDATION TEST DATA

PIEDMONT L.F. GLG3564 94C56

500 psf LOAD CONSOLIDATION CURVE



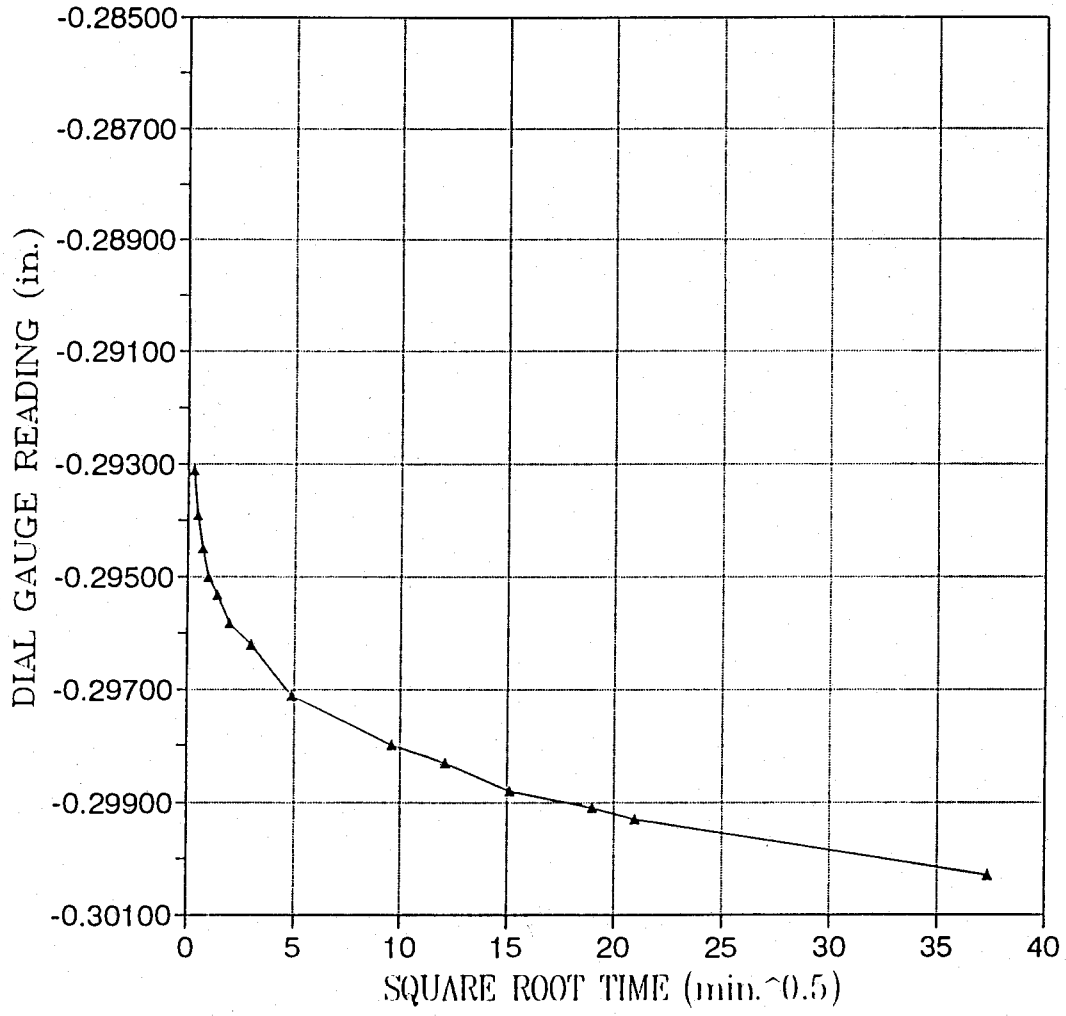
GeoSyntec Consultants

GEOMECHANICS AND ENVIRONMENTAL LABORATORY

FIGURE NO.	A1
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

PIEDMONT L.F. GLG3564 94C56

1000 psf LOAD CONSOLIDATION CURVE



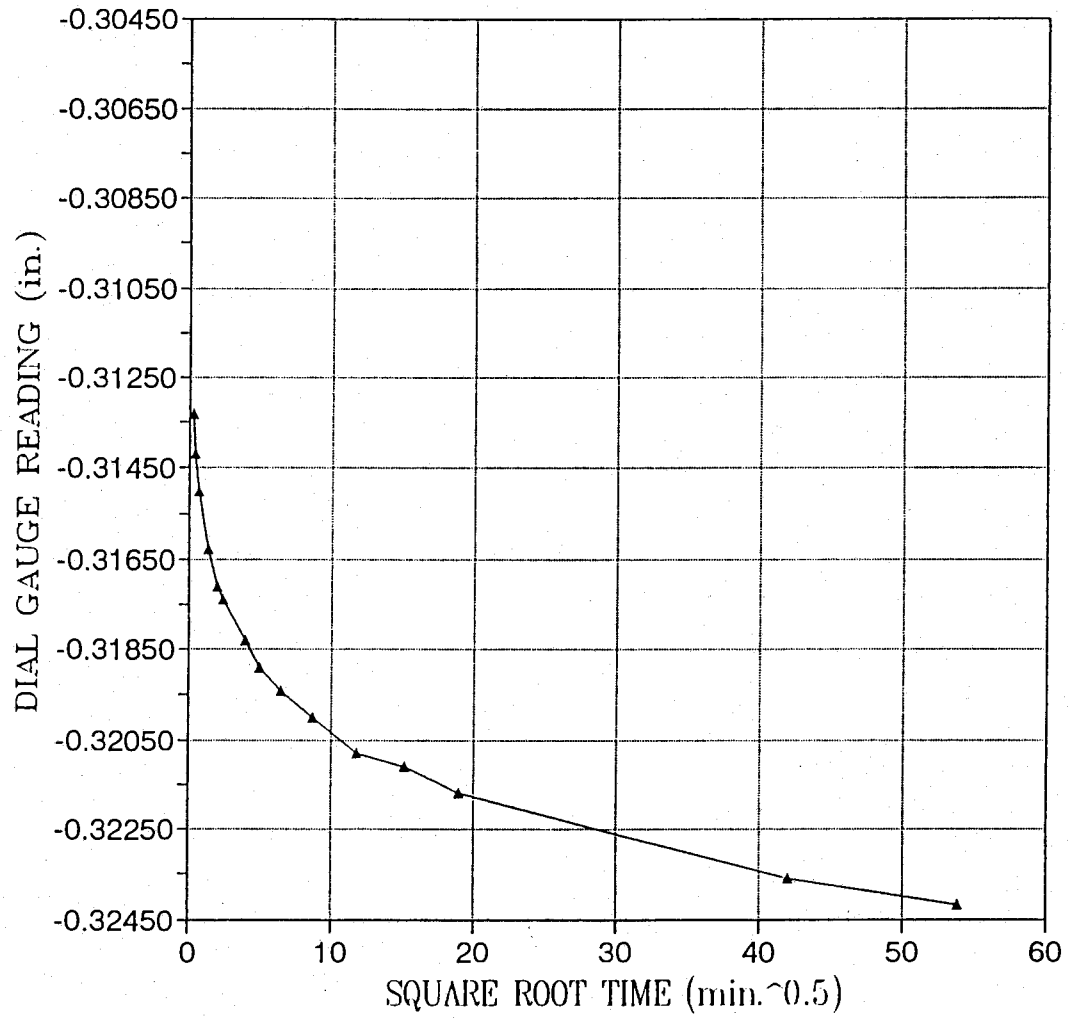
GeoSyntec Consultants

GEOMECHANICS AND ENVIRONMENTAL LABORATORY

FIGURE NO.	A2
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

PIEDMONT L.F. GLG3564 94C56

2000 psf LOAD CONSOLIDATION CURVE



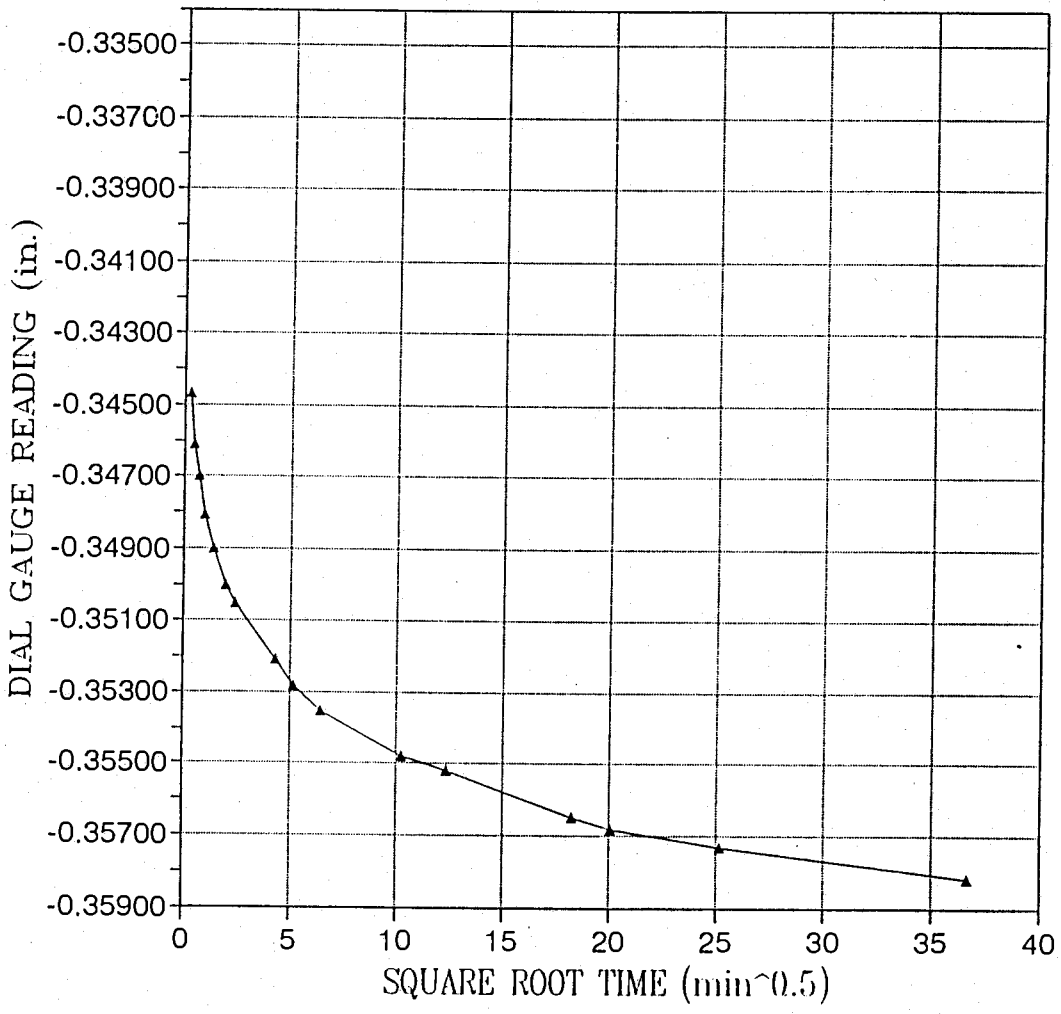
GeoSyntec Consultants

GEOMECHANICS AND ENVIRONMENTAL LABORATORY

FIGURE NO.	A3
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

PIEDMONT L.F. GL3564 94C56

4000 psf LOAD CONSOLIDATION CURVE



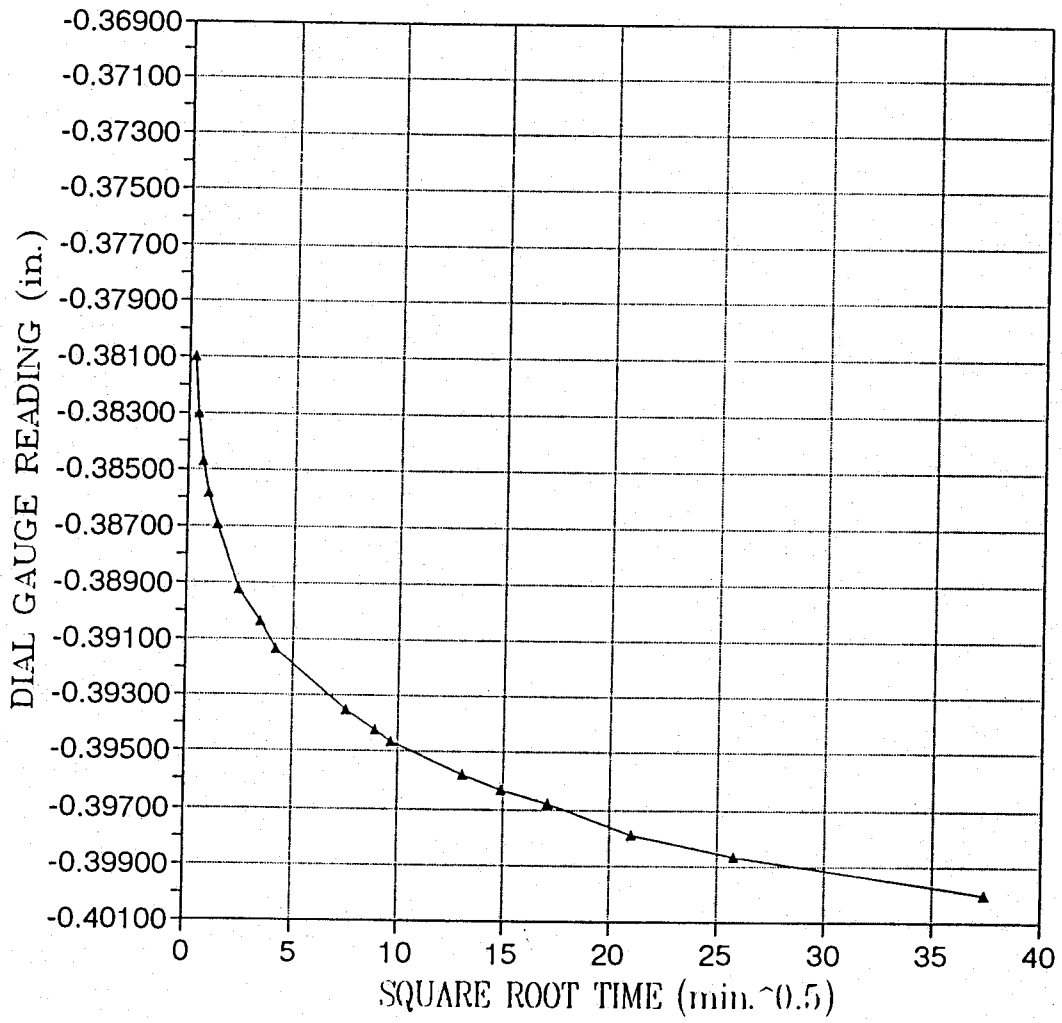
GeoSyntec Consultants

GEOMECHANICS AND ENVIRONMENTAL LABORATORY

FIGURE NO.	A4
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

PIEDMONT L.F. GL3564 94C56

8000 psf LOAD CONSOLIDATION CURVE



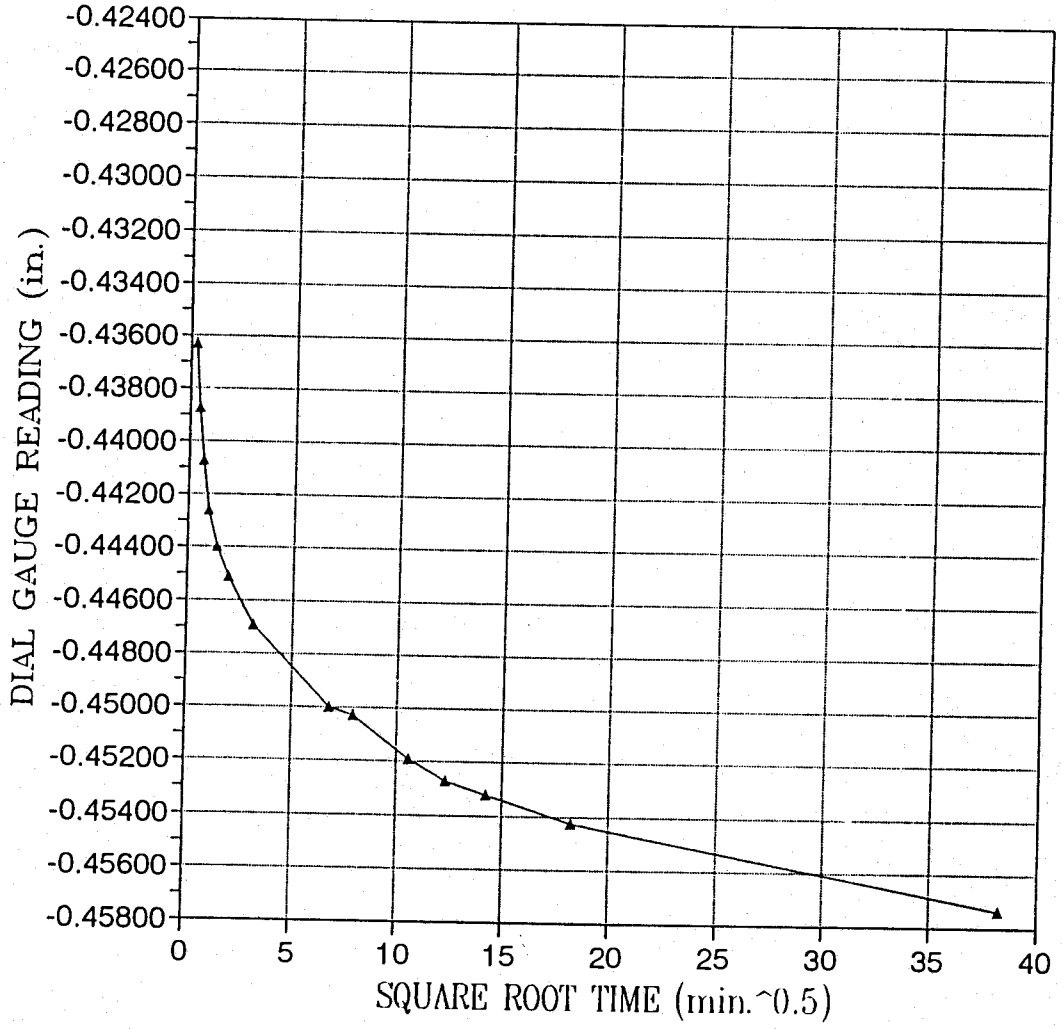
GeoSyntec Consultants

GEOMECHANICS AND ENVIRONMENTAL LABORATORY

FIGURE NO.	A5
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

PIEDMONT GLG3564 94C56

16000 psf LOAD CONSOLIDATION CURVE



GeoSyntec Consultants

GEOMECHANICS AND ENVIRONMENTAL LABORATORY

FIGURE NO.	A6
PROJECT NO.	GLG3564
DOCUMENT NO.	GEL94098
PAGE NO.	

APPENDIX F

ROCK CORE DESCRIPTIONS

P-1D

Bedrock was encountered at 58.5 feet below grade. The rock type was a hornblende schist that contained very close, tight, joints dripping approximately 50° with some horizontal foliations to 64.75 feet. A fracture filled with granite at 65 feet was then encountered in this schist. A fracture filled with feldspar was found at 65.6 feet, followed by a granite filled fracture at 66 feet. At 70.5 foot depth, granite gneiss contained iron staining on the joints with gneissic banding. Feldspar phenocrysts were found at 71.25 feet followed by vertical fractures at 72, 72.2 and 72.6 feet filled with potassium feldspar. At 80 feet, tight steep joints dipping approximately 75° filled with quartz and feldspar were encountered in granite schist. At 84 feet tight, smooth joints were observed dipping 35° to 85 ° with quartz and feldspar fillings. The corehole was terminated at 84.7 feet.

P-4D

Bedrock was encountered at 130 feet below grade, where a granite schist was found, containing moderately dipping (35° to 55 °) close, open, rough joints with biotite on the surfaces. At 132.7 feet, quartz-biotite schist was encountered that contained close, open, moderately dipping joints, followed by similar joints found in a granite schist at 133.7 feet. The corehole was terminated at 135.0 feet.

P-5

Bedrock was encountered at 54 feet below grade. Granite gneiss was observed containing very close, open, rough joints dipping between 35° to 55 ° with quartz and plagioclase crystals in an iron stained matrix from 54 to 60 feet. The corehole was terminated at 63 feet.

P-9D

Bedrock was encountered at 53 feet below grade. Granite gneiss was found containing close, healed joints dipping from 5° to 55°; an open fracture was observed with black biotite and gold mica on the surfaces at 54.17 feet. Another fracture was recorded at 56.0 feet, followed by a quartz-biotite schist with close, healed nearly horizontal joints with thin foliations to 56.2 feet. This was underlain by granite gneiss with close, healed joints dipping

5° to 55°. A highly fractured zone was encountered from 64.5 feet to 65.3 feet containing biotite forming cleavage planes; rock was becoming soft. At 65.5 feet, the drill rods got locked in the bedrock. The drillers sheared off a threaded joint of drill rod trying to remove the drill rod. The drill rod was welded together before it could be removed. It was then decided to air hammer to 91.5 feet, where a granite gneiss was encountered with close, tight, smooth, joints dipping 35° to 55°. At 92.5 feet, biotite schist was found with close, tight, smooth, moderately dipping joints with translucent plagioclase crystals. Quartzite was observed between 98 feet and 100.5 feet that contained close, tight, moderately dipping joints. Granite gneiss was then encountered with close, tight, joints dipping 35° to 55° with very thin foliations. The corehole was terminated at 106.5 feet.

P-9S

P-9S was air hammered from 53 feet to 64 feet. Granite gneiss was encountered that exhibited close, healed joints dipping from 5° to 55°. At 65 feet, a biotite schist was found containing moderately close, tight, near horizontal to 55° dipping joints with large grains of plagioclase in the matrix. This structure extended to the corehole termination depth at 77.6 feet.

P-12D

Bedrock was encountered at 59 feet; biotite gneiss was found with close, open joints dipping 35° with vertically parallel quartz veins. At 61.25 feet, the joints began to dip more steeply to approximately 70°. From 62.7 feet to 62.8 feet a quartz-mica schist was encountered that contained very close joints with shear striations on the quartz crystals. Below this a quartz-chlorite schist was found with close shears dipping from 35° to 55° between 62.8 feet to 63.7 feet. A granite schist was then encountered with close, open joints dipping 5° to 35°. The edges of the core was pitted. At 66.5 feet, biotite crystals became prevalent in the granite schist. At 67.0 feet a quartz schist was encountered that contained a vertical chlorite partition; at 68.04 feet the chlorite vein began to dip between 30° and 60°. This was underlain by a granite schist that contained open fractures at 69.05 feet and 69.5 feet. Chlorite schist with close, tight joints filled with feldspar dipping 85° was found from 70.25 to 71.15 feet. At 72.0 feet, an open fracture was found dipping at 40° in the chlorite schist. From 72.75 feet to 73.0 feet, biotite schist was encountered with very close, open fractures,

followed by chlorite schist with close, tight joints dipping 55° to the termination depth of 75.75 feet.

P-14D

Bedrock was encountered at 60.3 feet below grade; sound granite gneiss was found to 62.7 feet. Biotite schist was then encountered with near horizontal joints between 62.7 feet to 63.25 feet.

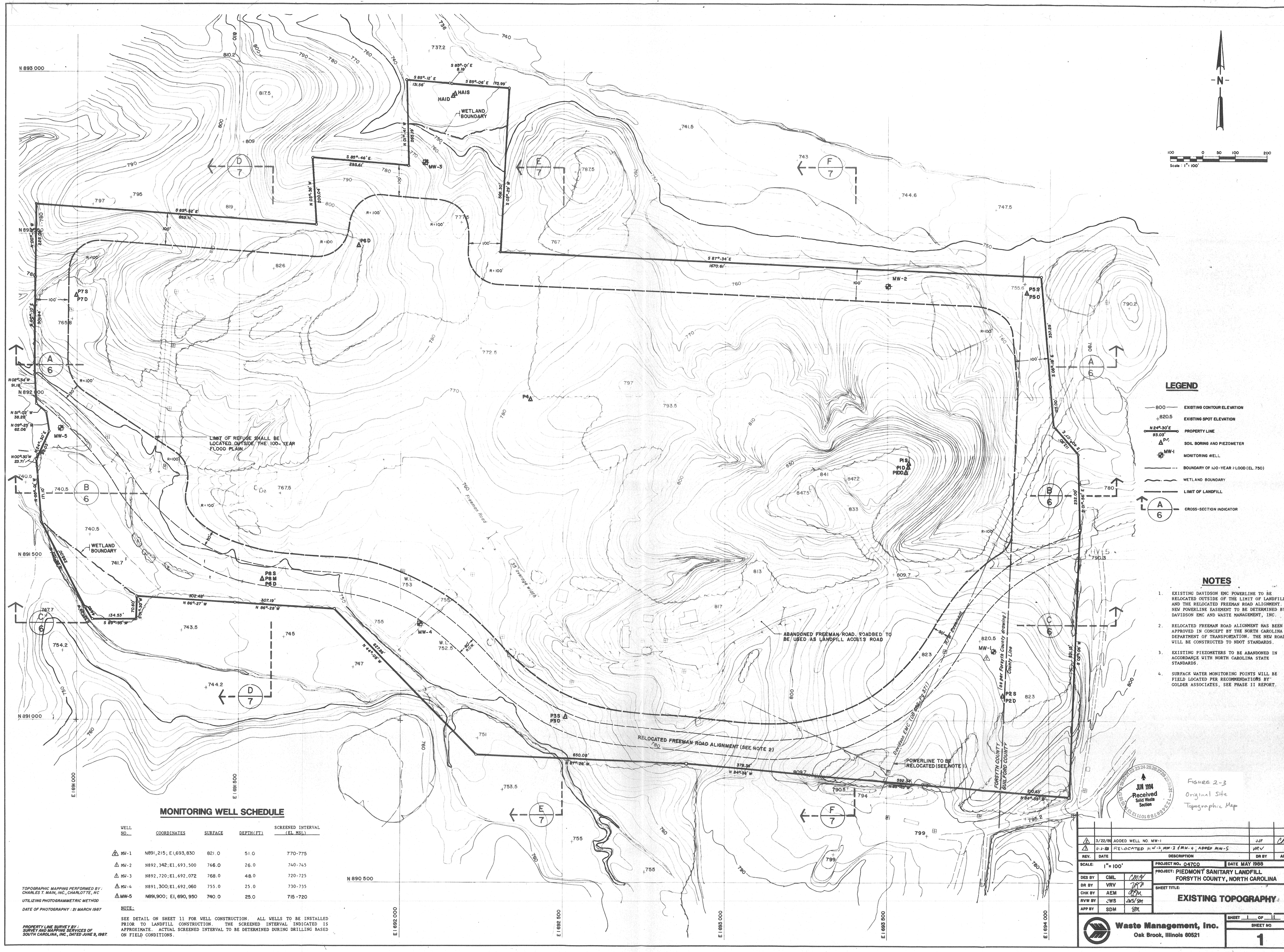
At 63.8 feet and 65.2 feet horizontal, fractures filled with potassium feldspar were found in granite gneiss. At 74.65 feet and 74.95 feet, horizontal fractures were observed in chlorite schist filled with potassium feldspar. Healed fracture at 75.45 feet was observed along with a quartz vein at 75.95 feet in chlorite schist. At 77.7 feet underlying chlorite schist, contact alteration was evident along fault fracture, dipping 75°; quartz, albedo twins and almandine were on the upside, and ground feldspar vein about 4 mm thick was on the downside. Near horizontal fracture found at 78.8 feet in chlorite schist; corehole terminated at 80.4 feet.

P-15D

Bedrock was encountered at 32 feet below grade. Chlorite schist contained close, tight joints dipping from 5° to 55° which extended to 38 feet. Saprolite was then found with close, open joints dipping 80°. Chloride schist was encountered at 42 feet containing close, tight joints dipping 5° to 55°. Between 52.3 feet and 52.4 feet, horizontal banding was evident in the chlorite schist; at 53.8 feet a quartz vein dipping 50° with cavities and quartz tetrahedrals lining the edges was encountered. the corehole was terminated at 53.0 feet.

P-16

Bedrock was encountered at 35 feet below grade. Granite schist was found with close, open joints dipping 5° to 35°. The core became hard and sound at 36.58 feet. At 40.9 feet, was encountered; the contact between the chlorite schist and overlying granite schist was an open fracture dipping 80° with the edges highly weathered and soft. At 43.5 feet, an open fracture approximately 2 inches thick containing fine to coarse subangular gravel dipping 55° was encountered. The corehole was terminated at 44.5 feet.



MONITORING WELL SCHEDULE

WELL NO.	COORDINATES	SURFACE	DEPTH (FT)	SCREENED INTERVAL (EL MSL)
⚠2 MW-1	N891,215; E1,693,830	821.0	51.0	770-775
⚠1 MW-2	N892,342; E1,693,500	766.0	26.0	740-745
⚠1 MW-3	N892,720; E1,692,072	768.0	48.0	720-725
⚠1 MW-4	N891,300; E1,692,060	755.0	25.0	730-735
⚠1 MW-5	N891,900; E1, 690, 950	740.0	25.0	715-720

NOTE:

SEE DETAIL ON SHEET 11 FOR WELL CONSTRUCTION. ALL WELLS TO BE INSTALLED PRIOR TO LANDFILL CONSTRUCTION. THE SCREENED INTERVAL INDICATED IS APPROXIMATE. ACTUAL SCREENED INTERVAL TO BE DETERMINED DURING DRILLING BASED ON FIELD CONDITIONS.

TOPOGRAPHIC MAPPING PERFORMED BY: CHARLES T. MAIN, INC., CHARLOTTE, NC

UTILIZING PHOTOGRAMMETRIC METHOD

DATE OF PHOTOGRAPHY: 21 MARCH 1987

PROPERTY LINE SURVEY BY: SURVEY AND MAPPING SERVICES OF SOUTH CAROLINA, INC., DATED JUNE 9, 1987.

NOTES

1. EXISTING DAVIDSON EMC POWERLINE TO BE RELOCATED OUTSIDE OF THE LIMIT OF LANDFILL AND THE RELOCATED FREEMAN ROAD ALIGNMENT. NEW POWERLINE EASEMENT TO BE DETERMINED BY DAVIDSON EMC AND WASTE MANAGEMENT, INC.
2. RELOCATED FREEMAN ROAD ALIGNMENT HAS BEEN APPROVED IN CONCEPT BY THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION. THE NEW ROAD WILL BE CONSTRUCTED TO NDOT STANDARDS.
3. EXISTING PIEZOMETERS TO BE ABANDONED IN ACCORDANCE WITH NORTH CAROLINA STATE STANDARDS.
4. SURFACE WATER MONITORING POINTS WILL BE FIELD LOCATED PER RECOMMENDATIONS BY GOLDER ASSOCIATES, SEE PHASE II REPORT.

JUN 1994
Received
Solid Waste
Section

Figure 2-3
Original Site
Topographic Map

REV.	DATE	DESCRIPTION	DR BY	APP BY
⚠2	3/22/88	ADDED WELL NO. MW-1	JJF	CMS
⚠1	11-2-88	RELOCATED MW-2, MW-3 & MW-4 / ADDED MW-5	VRV	

SCALE: 1"= 100'
PROJECT NO. 047C0
DATE MAY 1988
PROJECT: PIEDMONT SANITARY LANDFILL
FORSYTH COUNTY, NORTH CAROLINA
SHEET TITLE: EXISTING TOPOGRAPHY

DES BY	CML	CMS
DR BY	VRV	VRV
CHK BY	AEM	AEM
RVW BY	JWS	JWS/SDM
APP BY	SDM	SDM

Waste Management, Inc.
Oak Brook, Illinois 60521

SHEET 1 OF 11
SHEET NO. 1

EXISTING LANDFILL AREA

LANDFILL DEVELOPMENT AREA

E 1690000 E 1690500 E 1691000 E 1691500 E 1692000 E 1692500 E 1693000 E 1693500 E 1694000 E 1694500

N 893000 N 892500 N 892000 N 891500 N 891000 N 890500

NOTES:

Figure 2-4

0 300 600 900

SCALE IN FEET

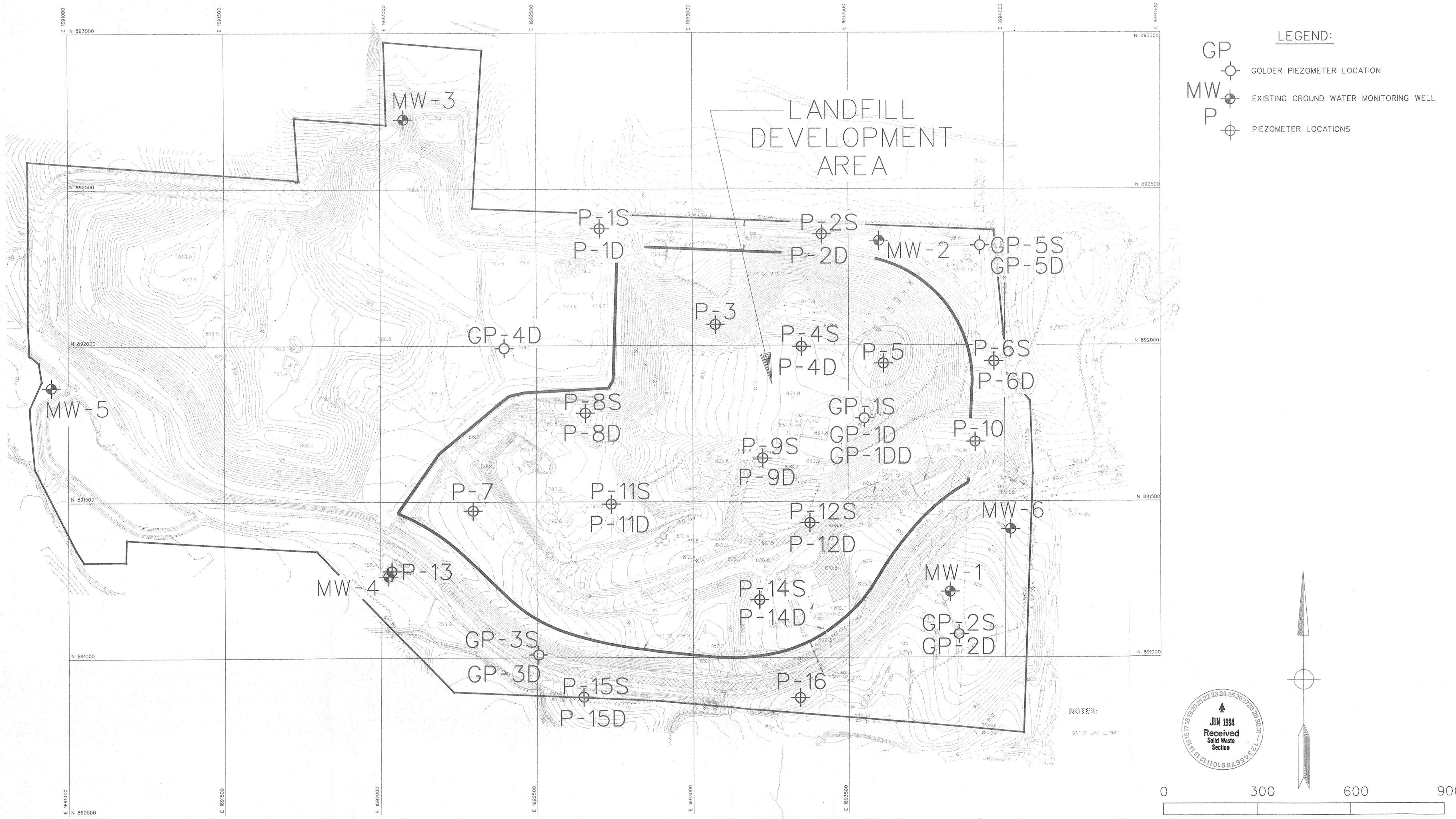
RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE ~~2-2~~ 2-4
PRESENT SITE TOPOGRAPHIC MAP

Water Quality Monitoring Plan/Unconstructed Portion
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.800

N:/87221/7221EXTP.DGN



LEGEND:

GP — GOLDER PIEZOMETER LOCATION

MW — EXISTING GROUND WATER MONITORING WELL

P — PIEZOMETER LOCATIONS

NOTES:

JUN 1994
Received
Solid Waste
Section

0 300 600 900

SCALE IN FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-1
BORING LOCATION PLAN

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.700

N:/87221/7221BRLP.DGN

LEGEND:

- GOLDER PIEZOMETER LOCATION
- EXISTING GROUND WATER MONITORING WELL
- PIEZOMETER LOCATIONS
- 750 — AUGER REFUSAL (TOP OF BEDROCK) CONTOUR (20 FT. ELEVATION INTERVAL)

LANDFILL DEVELOPMENT AREA

MW-3
P-1D 717
P-2D 711
MW-2
GP-5D 736
P-3
GP-4D
P-4D 706
P-5 759
P-6D 696
MW-5
P-8D 702
GP-1DD 781
P-10
P-9D 775
P-7
P-11D 694
P-12D 751
MW-6
MW-4
P-13 692
P-14D 746
MW-1
GP-2D
GP-3D 712
P-15D 734
P-16 776

700 720 740 760

N 893000 N 892500 N 892000 N 891500 N 891000 N 890500
E 1691000 E 1691500 E 1692000 E 1692500 E 1693000 E 1693500 E 1694000 E 1694500

0 300 600 900
SCALE IN FEET

JUN 1994
Received
Solid Waste
Section

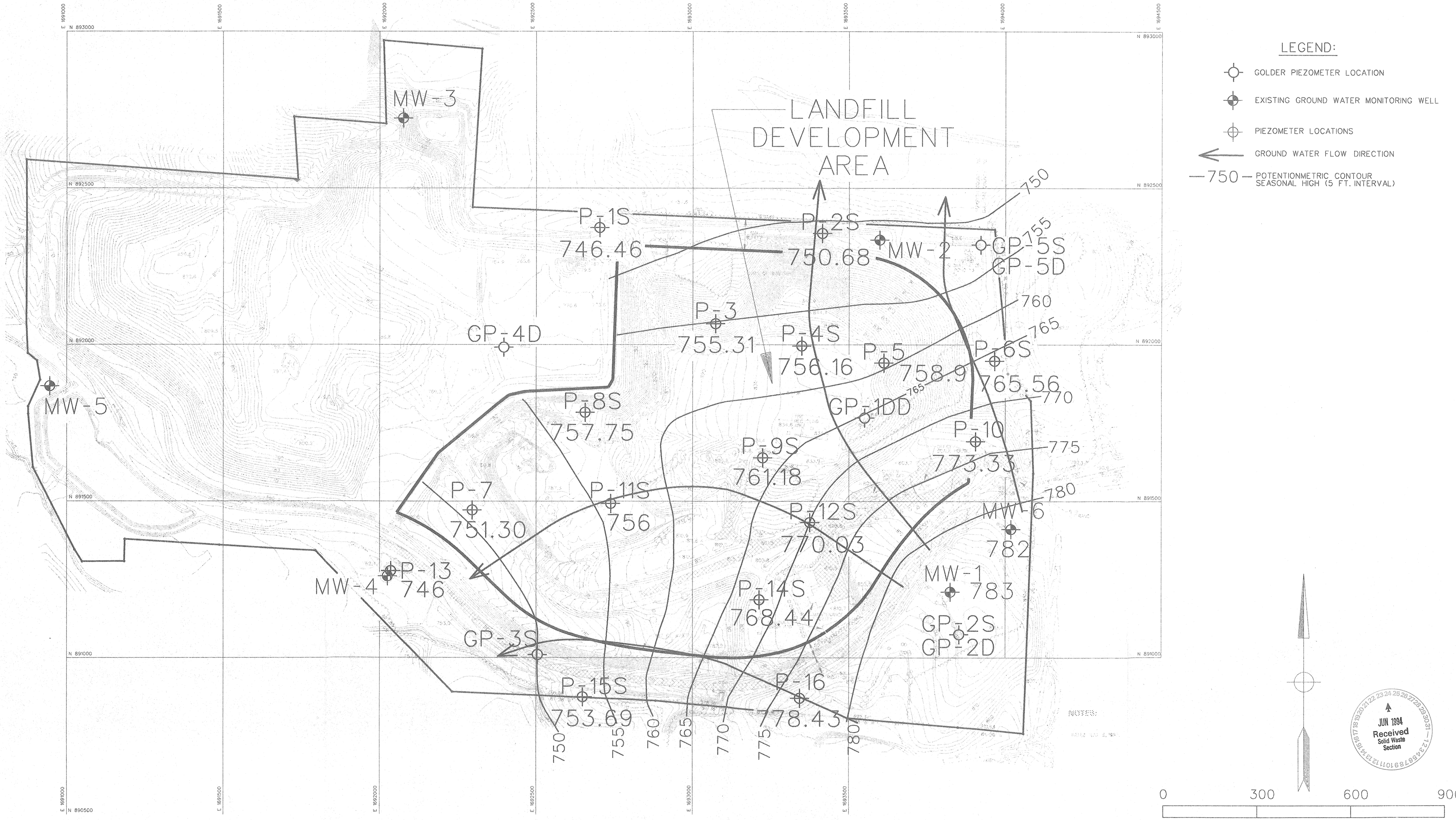
RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4-2
TOP OF BEDROCK

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.700

N:/87221/7221ROCK.DGN



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 5-1
POTENTIOMETRIC MAP
(MARCH 18, 1994)

Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

Project No. 87221.700

N:/87221/7221WATR.DGN

LANDFILL DEVELOPMENT AREA

EXISTING LANDFILL AREA

MW-3

P-1S 750

P-2S 754.5

MW-2 754.5

P-3 758.5

P-4S 759.5

P-5 763.5

P-6S 769.5

MW-5

P-8S 761

P-9S 765

P-10 777

P-7 754

P-11S 759.5

P-12S 774

MW-6 786.5

MW-4 748.5

P-13

P-14S 774

MW-1 788

P-15S 757.5

P-16 783

755 760 765 770 775 780 785

750

N 893000 N 892500 N 892000 N 891500 N 891000 N 890500

E 1691000 E 1691500 E 1692000 E 1692500 E 1693000 E 1693500 E 1694000 E 1694500

LEGEND:

- EXISTING GROUND WATER MONITORING WELL
- PIEZOMETER LOCATIONS
- —750— POTENTIONMETRIC CONTOUR SEASONAL HIGH (5 FT. INTERVAL)

NOTE:

SEASONAL HIGH LEVELS ARE TAKEN FROM DESIGN HYDROGEOLOGIC INVESTIGATION. NCDEHNR HAS DESIGNATED THESE LEVELS AS APPROPRIATE SEASONAL HIGH LEVELS FOR THE DEVELOPMENT AREA. CONTOURS ARE INTERPOLATED FROM THESE LEVELS.

NOTES:

0 300 600 900

SCALE IN FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 5-3
SEASONAL HIGH
POTENTIOMETRIC MAP
Design Hydrogeologic Investigation
Piedmont Landfill and Recycling Center
Forsyth County, North Carolina

JUN 1994
Received
Solid Waste
Section

Project No. 87221.800

N:/87221/7221HWTR.DGN