PART 1 – SITE SUITABILITY APPLICATION

HYDROGEOLOGY AND FACILITY PLAN REPORT

Rutherford County Central MSW Landfill
Rutherfordton, North Carolina

Prepared for

Rutherford County
County Manager and the Department of Solid Waste

Fac/Perm/Co ID# 81-05
Date 6/10/13
Doc ID#
DIN

January - February 2001

APPROVED
DIVISION OF WASTE MANAGEMENT
SOLID WASTE SECTION
DATE 3/24/2004 BY SLC

David Garrett, P.G., P.E.
Engineering and Geology

1408 Rock Drive, Raleigh, North Carolina 27610 **Telephone/Fax (919) 231-1818**

David Garrett, P.G., P.E.
Engineering and Geology

November 1, 2001

Mr. Jim Coffey, Acting Director
NC DENR Division of Waste Management
Solid Waste Section
401 Oberlin Road
Raleigh, North Carolina, 27611

Carmen Johnson
Fac/Perm/Co ID# 81-05
Date 6/10/13
Doc ID#
DIN

RE: Letter of Transmittal
Site Suitability Application
Rutherford County MSW Landfill

Dear Mr. Coffey:

On behalf of the Rutherford County Solid Waste Department, I am pleased to submit this site suitability application for a Subtitle-D landfill. The site is located south of the Town of Rutherford, adjacent to the closed Central Landfill, within a facility boundary that includes a transfer station and an active C&D landfill (Permit No. 81-03).

This report includes work completed from mid-1999 to present, including ground water level observations within this period. This project has received local government approval, and a public information meeting and public hearing was held after being duly advertised.

Please contact me or Mr. Baynard if we can answer any questions or be of any assistance.

Sincerely,

G. David Garrett, P.G., P.E.

NOV 2001
Received
Solid Waste
Section

cc: Don Baynard, Director
Rutherford County Solid Waste Department

1408 Rock Drive, Raleigh, North Carolina 27610
E-mail: david_garrett_pg@mindspring.com **919-231-1818** (Office and Fax) **919-418-4375** (Mobile)

Part 1 – Site Suitability Application Report

Hydrogeology and Facility Plan

Rutherford County Central Landfill
Rutherfordton, North Carolina

Prepared for:

Rutherford County Solid Waste Department
656 Laurel Hill Drive
Rutherfordton, North Carolina 28139

To the Attention of:

Mr. Don Baynard
Director

This report was prepared by me or under my supervision and represents an accurate and factual depiction of site conditions as understood from the investigations.

G. David Garrett, P.G., P.E.
Project Geologist

NORTH CAROLINA LICENSED SEAL 983 GEOLOGIST G. DAVID GARRETT

3/15/01

March 2001

David Garrett, P.G., P.E.
Engineering and Geology

1408 Rock Drive, Raleigh, North Carolina 27610 **Telephone/Fax (919) 231-1818**

Part 1 – Site Suitability Application
Hydrogeological and Facility Plan Report

Rutherford County Central MSW Landfill
Rutherfordton, North Carolina

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Section 1

1.0 EXECUTIVE SUMMARY

The proposed facility is a new lined MSWLF unit, located adjacent to and within the facility boundary of an inactive landfill (closed prior to January 1, 1998), an active Transfer Station, and an active C&D Landfill (Permit #81-03), and other solid waste handling facilities. The proposed landfill site is owned by Rutherford County and has been the site of the County's solid waste management activities since the early 1950's. This site suitability application is made on behalf of the Rutherford County Board of Commissioners. The facility will be designated for use by the citizens of Rutherford County, and others, should the Commissioners and citizens so desire. The service area is a 100-mile radius.

This site suitability application is made in accordance with the Solid Waste Rules and guidelines promulgated under15A NCAC 13B .1600 *et. seq.*, which govern the two-part permitting process:

Part 1 is the "Permit to Construct" application, which in turn is typically submitted in two stages:

> **Part 1-A** (this document) is the Site Suitability and Facility Plan, which characterizes the geology and land use of the site and its environs, providing a general facility plan description (size, basic layout, waste type and service area). The submittal requires local government approval, in the form of a vote of support by the County Commissioners at a public meeting, which indicates that the project conforms all local land use and the County's long-term solid waste planning, as well as an indication that the project meets the will of the citizens. This report will be reviewed by the North Carolina Division of Waste Management, Solid Waste Section, and upon completion said review the Division will issue a "Site Suitability" letter, indicating that the site has been adequately characterized for permitting.
>
> **Part 1-B** is the Detailed Hydrogeological Investigation and Design (yet to be completed), which provides a confirmatory site investigation of the initial disposal area (Phase 1), which is typically performed after the "Site Suitability" stage. The Detailed report will include construction plans and specifications, engineering calculations, an Operations Plan, a Construction Quality Assurance (CQA) Plan, and a Water Quality Monitoring Plan. Upon review of that submittal, the Division will issue a "Permit to Construct."

Part 2 is the Permit to Operate, granted after the first phase of the facility is built and appropriate CQA documentation is provided. The Permit to Operate is granted in 5-year intervals – each successive phase will be investigated, designed, and constructed under a permit renewal process. Typically, the project construction scheduling is staged to coincide with the permitting interval. This process allows construction or operational plans to be upgraded periodically to accommodate future Rule changes and technological innovations.

The facility boundary contains approximately 240 acres, a portion of which was previously used as a soil borrow site. The site is located on a north-south oriented ridge, surrounded by regional streams (ground water receptors) on either side. All active and proposed waste management facilities are located north of an east-west oriented electric power line that bisects the property. The site of the closed MSWLF in the south end of the facility was not characterized as part of this suitability investigation. Future property acquisitions within the facility boundary were included in this study.

The site is accessible by paved public roads but is out of view from roads and residential areas. No public waste-transportation route modifications are planned. Alternative access routes may be considered in the future to accommodate regional transportation planning.

The facility will meet all vertical and horizontal setback requirements. The proposed lined landfill will be separated from the existing C&D landfill and closed MSW landfill by at least 300 feet, to allow for separate ground water monitoring. The new landfill site is hydraulically up-gradient of the older facilities, hence the presence of the other facilities will not influence the ground water monitoring program for the new facility. The lined landfill will be constructed with "state-of-the-art" technology, to provide the community with a secure and environmentally responsible disposal facility.

Current plans are to initially develop the west side of the site, where prior soil borrow activities were conducted. Based on the conceptual design that accompanies this report, the new landfill will provide an estimated 40 years, or more (20+ years in the western side alone), at today's waste tonnages. Existing infrastructure (scales, office, other buildings) will remain in service for at least 20 years. The plans include a cost-effective alternative liner design, for which adequate quantities of suitable soils exist on site. Bioreactor technology (leachate recirculation) is under consideration.

Geological and geotechnical conditions at the site are typical of the North Carolina western Piedmont. Soils consist of stiff to very hard sandy and clayey silt, with variable mica content, weathered from the underlying mica gneiss bedrock. Moderately plastic clay occurs in variably thick pockets, mostly within the eastern side of the site.

The bedrock is an early Paleozoic age, eastward dipping, cross-bedded meta-sedimentary sequence, which exhibits a differential weathering pattern (ledges of harder and softer materials) below the surface. Based on the drilling data, the condition of "auger refusal" does not necessarily denote hard bedrock. Instead, auger refusal conditions are typically encountered within the saprolite or partially weathered rock. The borings were advanced relatively deep (as much as 100 feet) with rotary-air and rock coring techniques to characterize the bedrock. Exposures of weathered rock exist within the former soil borrow site in the west side of the site, but these materials have been demonstrated to be "rippable" with conventional earthwork equipment.

The on-site soils will provide excellent structural fill and periodic cover soils. There are sufficient quantities of suitable soils for constructing an alternative liner design with a geocomposite clay layer (GCL) barrier. There are no unusual man-made or natural features present that would restrict the intended use of the site. Bedrock and ground water depths are such that planned excavations and site grading can be performed while meeting vertical separation requirements.

Site hydrogeology is characterized as a short-segmented, "closed-loop" hydrologic cycle. Ground water generally occurs along the transitional interface between the soil overburden and the upper bedrock. The ground water is fairly deep, generally in excess of 20 feet in the proposed waste area footprint. Recharge occurs within the higher elevations over a majority of the site, with ground water discharge occurring at on-site springs and along the perimeter streams. The County controls all the land to the nearest ground water discharge points, and no ground water users are located between the landfill and the discharge points. Public water is available in the area.

Three on-site seasonal springs and adjacent perennial streams provide ground water discharge points, which is favorable from a water quality monitoring standpoint. Minor wetlands areas have been delineated in the east side of the project, along the seasonal streams, but these areas will not be impacted for at least 20 years and will not affect the development of Phases 1 – 3 on the west side of the site. A wetlands and stream mitigation plan will be required at some future time, prior to developing the east side of the project site.

This report was prepared under the general direction and overview of David Garrett, P.G., P.E., Inc., with input from G.N. Richardson & Associates, Inc. Relevant sections of this report were prepared by the respective parties. The timing of the project is intended to coincide with the anticipated expiration of the County's current contract for hauling and out-of-county disposal at a private facility. The tentative schedule for Phase 1 of the project is as follows:

Decision to Build	**June 2002**
Start Construction	**September 2002**
Target Completion	**September 2003**
Commence Operations	**January 2004.**

The valuable input of many individuals and organizations contributed to this report, including the Isothermal Planning and Development Commission, Rutherford County Department of Solid Waste, the Rutherford County Commissioners, the County Manager and administrative staff.

Section 2

Rutherford County Central MSW Landfill
Rutherfordton, North Carolina

Section 2.0 Site Study - *.1618(c)*

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2.0 SITE AND FACILITY DESCRIPTION

2.1 Regional Characterization Study - *.1618(c)(1)(A-F)*

Drawing S1 shows the site vicinity and 2-mile radius on the USGS Rutherfordton North and South topographic quadrangle sheets (1 inch = 2000 feet). The facility is located approximately three-quarters miles south of downtown Rutherfordton, accessible from either US74A via Laurel Hill Drive (the landfill is located at the end of this road) or US221 via Industrial Park Drive and Laurel Hill Drive. The site encompasses 240 acres, bound on all sides by private property and isolated on three sides (east, south and west) by perennial streams and heavily wooded areas.

The two-mile radius includes the down town commercial and industrial districts of the towns of Rutherfordton and Spindale. Development in the immediate vicinity consists of mixed residential, commercial and/or industrial use. Scattered houses and businesses exist along the main roads. Some houses are located on Laurel Hill Road and Industrial Park Drive, north of the landfill, which area appears to be undergoing industrial redevelopment. The local industries include a tool-and-die facility, a paper packing manufacturer and several textiles-related manufacturing plants.

Most of the residential development in the area is located east of the site (accessible from US 74A) and to the west (accessible from US 221). There are also relatively large tracts of agricultural and/or undeveloped land south of the landfill, along Thunder Road (SR 2201), along with scattered dwellings. No dwellings exist within 500 feet of the proposed landfill, except for an inset tract surrounded on four sides by the subject property (negotiations are underway to acquire this property).

Within the facility boundary are the County's solid waste transfer station, a C&D debris landfill, wood/yard waste stockpiles, white goods recycling stockpiles and a tire recycling collections center. A closed landfill exists south of the study site, which served the community since the early 1950's. Traffic to the disposal facilities has been routed down Laurel Hill Drive since that time. The old landfill was closed in 1998 under NC Division of Waste Management guidelines, and a post-closure water quality monitoring program is in place. No changes to existing traffic patterns are currently proposed, but regional transportation planning may someday result in a more favorable egress route.

The current facilities (and proposed landfill will) serve Rutherford County exclusively, with a County ordinance in place banning outside waste. The County operates ten solid waste convenience centers, and there are one or more private haulers in the County, plus "drive-ins." The larger incorporated municipalities provide their own collections and hauling to the site. Municipal water is available throughout in the study area, although a handful of potable wells were identified (none are down gradient of the facility). There are no known public water supply wells or surface water intakes for several miles from the landfill.

2.2 Local Characterization Study - *.1618(c)(2)(A-G)*

Drawings S2 and S3 are a local area map and photo, respectively, that show the permitted facility and local features within a 2000-foot radius, at a scale of 1 inch = 400 feet (1 inch = 300 feet on S2). Existing land use within the 2000-foot radius is mixed residential and business (described in Section 2.1). The facility is located within the County, outside any incorporated limits or extra-territorial jurisdictions. There is no zoning in effect within Rutherford County. The 2000-foot radius extends into the incorporated limits of Rutherfordton and Spindale. There are no schools located within the 2000-foot radius. There are no significant ground water users within the planning area. The site is not located within 2000 feet of a public water supply intake.

Commercial and/or industrial buildings which represent potential sources of ground or surface water contamination have been identified on the regional map (Drawing S1). These include various textile mills and other manufacturing facilities, auto garages, car washes, gasoline stations (former and operating), a farm/heavy equipment sales and service facility, a public street maintenance facility and other commercial/industrial facilities. On-site the transfer station and the C&D landfill are potential sources of contamination, but these facilities are down-gradient of the proposed landfill. None of these facilities has been evaluated with regard to actual or potential contamination as a part of this study. No implications or allegations regarding these facilities should be construed from this work.

A potable well survey conducted in May 2000 identified 15 potable wells within a 2000 foot radius of the site. None of the area wells are down gradient of the landfill. The landfill site is separated from all surrounding areas (except further up the ridge to the north) by large perennial streams, Stonecutter Creek and a large south-flowing tributary to the east, Cleghorn Creek and a large south-flowing tributary to the west, which serve as regional ground and surface water divides. No potable wells are located between the landfill and the unnamed tributaries nearest the site. No potable wells were identified north of the landfill along Laurel Hill Drive or Industrial Park Drive (fire plugs are visible on both streets). One potable well was located up-gradient of the site on US 74A. The nearest wells west of the site are located across the unnamed tributary to Cleghorn Creek. The nearest wells to the south are located across Stonecutter Creek. All area wells are more than 500 feet from the proposed waste boundary.

No historic sites were identified within the 2000-foot radius. The Rutherford-Spindale Middle School building is a historical site, but this building is outside the 2000-radius to the north and will not be affected by activities at the site. General drainage patterns in the vicinity of the landfill are to the south toward Cleghorn and Stonecutter Creeks, which flow southeast toward the Broad River (several miles to the south). There are no FEMA-designated 100-year flood plains present within the site boundary or along either tributary adjacent to the site.

2.3 Site Studies - *.1618(c)(3) ⇒ .1623(a)*

A Site Hydrogeologic Report has been prepared in accordance with Rule .1623 (a) and can be found in Section 4.0 of this document. Prior studies that were available to augment this work include ground water monitoring wells and water quality records (collected by others) for the closed MSW, landfill located within another portion of the permitted boundary. The authors of this document have first-hand knowledge of site conditions based on the closure of the old landfill, including borrow site evaluations, and a recent characterization study for the C&D landfill.

2.4 Location Restrictions - *.1618(c)(4) ⇒ .1622(1-10)*

2.4.1 Airport Safety - *.1622(1)*

Based on FAA aeronautical charts (Appendix B.1), the landfill is not located within 5,000 feet of an airport used by piston-powered aircraft, nor is the landfill located within 10,000 feet of an airport used by turbine-powered aircraft. The nearest airport is the Rutherford County Municipal Airport, located 4.7± miles due north of the landfill (See Drawing S1). This airport does not have regularly scheduled commercial air service. The airport is oriented such that the landfill is on the direct flight paths for take off or landing. The FAA maintains a NDB (Non-Directional Beacon) radio antenna on the landfill premises. Local airport officials stated that the NDB technology is gradually being replaced by GPS (global positioning satellite) technology as a navigational aid. Eventually, the antenna will become obsolete, but the facility development plan will not affect the antenna for a minimum of 20 years. The proposed landfill is not anticipated to be an aviation safety hazard.

2.4.2 Flood plain - *.1622(2)*

The main drainage features on the site are unnamed tributaries to Stonecutter Creek and Cleghorn Creek, which flow in turn to Broad River. These tributaries make the east and west boundaries of the site, respectively. The banks of the unnamed tributaries adjacent to the site boundary are steep and do not exhibit a well developed flood plain. FEMA mapping available on the Internet (Appendix B.2) indicates that relatively narrow 100-year flood plain exists along Cleghorn Creek, far to the west of the site, but no areas of the site exist within designated 100-year flood limits. Design grades will be set such that no restriction to the flow of the unnamed tributaries will occur and that the risk of exposure of the waste due to flooding or scouring will be minimal.

2.4.3 Wetlands - *.1622(3)*

A survey for wetlands has been conducted and certified by the U.S. Army Corps of Engineers (Appendix B.3). Three small areas of wetlands, with a cumulative total less than 0.25 acres, were

identified on the site. Two of these areas exist within the waste footprint on the eastern half of the site, located within proposed Phases 4 and 7 (refer to the phasing diagrams in the project drawings). There is no practical alternative for developing the eastern portion of the site, other than by impacting these two areas. Within the western portion of the site, the wetland area is outside the proposed footprint, and no development or disturbance to wetlands or streams are planned.

Disturbing the wetlands will further require permitting from the US Army Corps of Engineers and the NC DENR Division of Water Quality. However, construction within these portions of the site will not occur for an estimated 20 years after the landfill commences operation. North Carolina Solid Waste Regulation .1618 (3)(a)(iii) requires the following demonstrations, presumed to pertain to the downstream water courses and wetlands adjacent to the MSWLF unit.

The MSWLF uinit will not cause or contribute to significant degradation of wetlands. The Owner or operator shall demonstrate the integrity of the MSWLF unit and its ability to protect ecological resources by addressing the following factors:

A. Wetlands soil deposits will not be used to support the MSWLF unit. An inspection of foundation subgrade soils during the construction will identify unsuitable soils for foundation support; such soils, if encountered, will be excavated and replaced with suitable soil fill.

B. The soil fill materials used to support the landfill, where (and if) fill sections are required, will be compacted to appropriate engineering standards and tested; reports of these activities will be documented as part of the Construction Quality Assurance program.

C. The volume and chemical nature of the proposed landfill is not known; however, the MSWLF unit will contain a liner and leachate collection system to prevent the release of solid waste constituents into water courses and land areas downhill of the MSWLF.

D. Fish, wildlife, and other aquatic life and their habitats adjacent to the MSWLF unit will be protected by the liner and leachate collection systems, and through sound protocols for design, construction, and operations. This will include detailed attention to Sedimentation and Erosion Control measures, which are requirements of other regulatory agencies.

E. The MSWLF unit will be designed and constructed to minimize the potential for a catastrophic release of solid waste constituents (i.e., due to landfill failure) into the wetlands and/or water courses that may exist near the MSWLF. Foundation conditions are anticipated to be stable under all anticipated conditions. Waste placement criteria will be placed into the Operations Plan that will promote stability.

Mitigation of wetlands impacted due to Phases 4 and 7 of the MSWLF unit may not be required, due to the minimal area of wetlands that will be impacted. No mitigation plans is anticipated to be required for the initial three phases (Phases 1 through 3), whereas the landfill was designed to avoid this area. A sediment basin will be required for Phase 1, located uphill of one of the wetlands areas. This basin and other sediment and erosion control structures will be prepared to meet NC Division of Land Quality regulations and Division of Water Quality regulations (i.e., riparian buffer rules) as might become applicable. Future stream and wetlands mitigation plans that might be required for the east side of the site will be prepared in accordance with applicable State and Federal rules during the future permit to construct studies for these areas.

2.4.4 Fault Areas - *.1622(4)*

There are no Holocene age fault zones within 200 feet of the site based on published mapping (Appendix B.4). The nearest mapped faults include a north-northwest oriented thrust fault located in eastern Rutherford county, which passes near the community of Hopewell and extends toward Boiling Springs community in Cleveland County. A short segmented northeast-southwest oriented normal fault has been mapped in the community of Hollis. Both faults are about 16 miles east of the site. An undifferentiated fault (not classified as normal or thrust) passes to the north of Rutherfordton (6 miles from the site at its nearest), extending along the South Mountains toward Morganton. These faults, as others within the NC Piedmont, are not active fault zones. [1, 2]

A well known fault zone with associated seismicity is the Brevard zone, which passes through the towns of Brevard and Old Fort, at its nearest about 24 miles from the site. Some seismicity has been associated with the Brevard zone in historic times, believed to be due to isostatic rebound, rather than active tectonic activity. The nearest minor earthquakes felt in historical times (recorded in 1981-83) were centered near Old Fort and Hendersonville, about 16 to 24 miles distant, respectively, with Modified Mercalli intensities of V to VI and Richter magnitudes varying from 2.0 to 3.2. [3]

2.4.5 Seismic Impact - *.1622(5)*

Based on USGS Map MF-2120 (Appendix B.4), the site is located along the 0.15g isograd of maximum horizontal bedrock acceleration (90% probability of not being exceeded in 250 years). This indicates that the site is located within a seismic impact zone, as defined by Rule .1622. However, many Subtitle-D landfills have been located in western North Carolina, all of which is

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[1]Goldberg, Steven A., University of North Carolina, Chapel Hill, personal comm., 1995.

[2]North Carolina Geological Survey, Geology Note #7, on-line at www.geology.enr.state.nc.us/haz/quake.

[3]Seismicity of North Carolina, US Geological Survey Map MF-1988 (1987).

within the seismic impact zone. Devastating seismic activity is not characteristic in North Carolina. Deep foundation subgrade failures and/or liquefaction are not of concern within the Piedmont.

However, State and Federal guidelines require that lined landfill facilities be designed for potential earthquake loading, which primarily affects veneer stability along exterior slopes and potential sliding along or within internal liner surfaces. Future stability evaluations, to be completed in the final design for the initial landfill phase, will include seismic impact for the maximum anticipated ground accelerations based on the mapping, in accordance with current standard of care practices. US-EPA guidance for seismic design guidance for municipal solid waste landfills [4] indicates that maximum acceleration within the waste is typically half the peak bedrock accelerations within a given region due to dampening and attenuation within the waste and foundation soils.

2.4.6 Unstable Ground - *.1622(6)*

The recently completed geotechnical investigation indicates no areas of soft ground, mines, voids or other unstable areas within the site boundary that could potentially damage or disrupt structural components of the proposed landfill, with respect to slope stability or excess settlement. Detailed stability and settlement analyses will be performed as a part of the future engineering design studies, based on geotechnical laboratory test results.

2.4.7 Cultural Resources - *.1622(7)*

The proposed landfill is not located on the site of an archaeological or historical property. The North Carolina Department of Cultural Resources has furnished a letter response (Appendix B.5) to a request for information regarding the potential for sites of archaeological or cultural significance in the vicinity of the proposed site. The letter states, "Since.....previous ground disturbance has occurred, it is unlikely that archaeological resources will be affected." The Department recommended no further investigative work.

2.4.8 State Nature and Historic Preserve - *.1622(8)*

The proposed landfill will not adversely affect any lands designated significant by the North Carolina Natural Heritage program. A letter from the North Carolina Division of Parks and Recreation (Appendix B.6) indicates no known areas of rare species, high quality natural communities, state

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[4] Richardson, G.N., E. Kavazanjian, Jr., and N. Matasovic, RCRA Subtitle D (258) Seismic Design Guidance for Municipal Solid Waste Landfill Facilities, US EPA Risk Reduction Engineering Laboratory, (EPA/600/R-95/051), April 1995.

park or recreation areas are known within one mile of the site. The letter states that it is not definitive on endangered species (see Section 2.4.10).

2.4.9 Water Supply Watersheds - *.1622(9)*

The landfill is not located in the critical area of a water supply watershed (within one-half mile of a water supply intake) or in the watershed of a stream segment classified as a WS-I in accordance with 15A NCAC 2B .0200. The landfill is located in the drainage basin of an unnamed tributaries to Stonecutter Creek and Cleghorn Creek, which converge just south of the site (see Drawing S2). The combined flow (Cleghorn Creek) is a tributary to Broad River; the confluence is located about 3.8 map miles south of the site. The County water system intake is located at a reservoir on Green River, above the confluence with Broad River, located another mile downstream. The landfill is not within the water shed of the County water system.

2.4.10 Endangered and Threatened Species - *.1622(10)*

The proposed landfill will not adversely affect any known rare and endangered species habitats. The North Carolina Division of Parks and Recreation (Appendix B.6) furnished a list of rare species known to exist in Rutherford County. A survey of endangered species was performed by Appalachian Ecological Services (see Appendix B.7). The report states, "No Federal or State Threatened or Endangered Species were observed in the project area." The survey included both the east and west sides of the proposed landfill site, with emphasis on the streams and wet areas, though not to the exclusion of higher ground. It should also be noted that much of the site has undergone recent ground disturbing activities, especially in the western side.

2.5 Local Government Approval - *.1618(c)(5)*

The proposed Subtitle-D landfill is located entirely within Rutherford County's jurisdictional area. The landfill will be owned and operated by the County for its own use. The Board of County Commissioners makes this application on behalf of the citizens of Rutherford County. Supporting documentation for local government approval (Appendix I) consists of the following:

- Copy of the legal advertisement of public notice and documentation of the advertisement. The advertisement ran July 6, 2001 in the appropriate public media.
- Tape recordings of the public hearing of August 6, 2001, which explained the project to the community and heard their comments (provided under separate cover).
- Minutes of the August 6, 2001 meeting of the Rutherford County Board of Commissioners, in which approval for special use permitting for development of a MSWLF were approved.

- Copy of the Facility Plan (Site Development Plan) displayed at the hearings, showing the long-range site development plan. A copy of this site report was available for inspection before, during, and after the public meeting.

- A letter from the Rutherford County Planning Department stating that the intended development of the landfill meets the local zoning requirement. This is also documented by the Special Use Permit.

- A letter from the Rutherford County Department of Public Services stating that the operation of the proposed MSWLF is consistent with the County's solid waste management plan.

Pursuant to General Statute 160A-325, the "Toby Fitch bill," which requires that local governments shall consider alternative sites and socio-economic data when siting a new sanitary landfill within one mile of an existing landfill (defined as an operating landfill or one which was closed within five years prior to the application), a socio-economic study of the landfill surroundings was performed. This study, performed by the Isothermal Planning and Development Commission (see Appendix B.8), shows that the neighborhood in the surrounding one-mile radius and two-mile radius is consistent with County-wide ethnicity, age, and economic characteristics.

Several earlier studies to evaluate solid waste disposal alternatives were completed during the mid-1990's. The studied alternatives include development of the existing site as a regional landfill, for which proposals from various firms were solicited. Another alternative included a privatized regional landfill in the northern portion of the County, in the Golden Valley area, for which one firm submitted a proposal. Neither of the these alternatives were deemed suitable to the needs of the County. In December 1997 the County decided by a vote of the County Commissioners to build a transfer station at the site of the old landfill (the transfer station is in operation today). This action provided the County an opportunity to further consider long-term solid waste management options.

This site application is part of the ongoing evaluation of Rutherford County's best utilization of resources and solid waste management practices. Economic studies performed for the county have shown that the landfill will be a valuable resource to the County for decades to come. The subject site will be the most cost effective alternative to other sites because of the existing infrastructure and proximity to the population centers of the county.

Other Considerations – Regarding the Solid Waste Rule requirements that the MSWLF unit be separated by a distance of 500 feet from an existing residence, the County is in negotiations to purchase a private residence (shown in the site plans), located on a half-acre of land within the facility boundary. A 500-foot buffer will be established until the purchase has been completed.

Section 3

Proposed Facility Plan

Rutherford County MSW Landfill
Rutherfordton, North Carolina

Prepared for:
David Garrett, P.G., P.E.
Raleigh, North Carolina
and
Rutherford County Solid Waste Department
Rutherfordton, North Carolina

To the Attention of:
Mr. David Garrett, P.G., P.E., Project Manager

GNRA Project No. RUTHERFORD-1

NORTH CAROLINA PROFESSIONAL SEAL 021666 ENGINEER PIETER K. SCHEER

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January 2001

PERMIT ISSUE DOCUMENTS

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RUTHERFORD COUNTY
RUTHERFORD COUNTY MSW LANDFILL

PROPOSED FACILITY PLAN

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See Appendix J Facility Plan Calculations

1.0 Landfill Life Expectancy
2.0 Earthwork Quantities

SECTION 1.0
INTRODUCTION

1.1 OVERVIEW

This Proposed Facility Plan is a part of the Site Permit Application submitted on behalf of Rutherford County for demonstrating the suitability of property at the County's existing landfill facility to support a Subtitle D landfill. This plan has been prepared in accordance with the requirements of Rule .1618(c)(6) of the North Carolina Solid Waste Management Regulations.

This section gives a brief overview of this report and a description of the site. **Section 2.0** gives a description of the development and provides a conceptual design for the proposed landfill.

1.2 SITE DESCRIPTION

The project site is located on a portion of the existing Rutherford County Landfill facility on Laurel Hill Drive off of the Highway 74 Bypass in Rutherfordton. Existing conditions are shown on **Drawing S2** of the Project Drawings.

The site is approximately 240 acres, and currently contains a construction and demolition debris (C&D) landfill which is currently accepting waste, an operating municipal solid waste (MSW) transfer station, and a closed unlined MSW landfill. In accordance with North Carolina Solid Waste Regulations as administered by the Division of Waste Management (DWM), the unlined MSW landfill stopped receiving waste prior to January 1, 1998 and closure for this area was completed in 1999.

The proposed Subtitle D landfill is located on the northern portion of the site and will occupy approximately 50 acres (lined). At the projected gate rates described in **Section 2.0** (Facility Report), Phases 1 through 7 of the proposed landfill have been designed for approximately 40 years of disposal volume. The proposed landfill has been designed to meet current DWM setback and horizontal buffer requirements: 300 feet from property lines, 500 feet from residences or active water wells.

SECTION 2.0
FACILITY REPORT

2.1 OVERVIEW

This section presents a plan for the development of the proposed Rutherford County MSW Landfill. This report has been prepared in accordance with the requirements of Rule .1619(d)(1), (d)(2), (e)(1), (e)(2), (e)(3), and (e)(5) of the North Carolina Solid Waste Management Regulations.

2.2 FACILITY SERVICES AND WASTE STREAM

2.2.1 Facility Services

Currently, the following activities or services are provided at the Rutherford County Landfill facility:

- Scales and scalehouse facilities
- Administrative offices
- Municipal solid waste (MSW) transfer station (NC Permit No. 81-04T)
- Construction and demolition debris (C&D) landfill (NC Permit No. 81-03)
- White goods area
- Tire area.

The following facilities are proposed for the facility:

- Lined MSW landfill (Phases 1 through 7).

2.2.2 Types of Waste

The proposed Rutherford County MSW Landfill will accept mixed municipal solid waste (MSW) originating from residential, commercial, and industrial sources. Other wastes (i.e. C&D, and yard waste) will be segregated and directed to on-site facilities for disposal as described below.

2.2.3 Disposal Rates and Estimated Variances

Based on the 1998-1999 Solid Waste Management Annual Report information provided by the State, the County sent 47,158 tons of MSW to the Palmetto Landfill in South Carolina from 7/1/98 to 6/30/99 (average 168 tons per day based on 280 operating days per year). Note that 46,532 tons of this was processed through the County transfer station. The population served during this time period was given as 59,568 which translates to 0.79 tons/person/year being disposed of at the Palmetto Landfill which would be taken to the proposed facility. Based on the anticipated population increases from 1999 to 2019 from the NC Office of State Planning (NCOSP) and the current per capita disposal rate, the following table gives the projected tonnage to be disposed per year in the

proposed landfill. Population figures after 2019 are based on an assumed constant percentage increase from 2019 onward. Note that fluctuations up to about 500 tons/day could be anticipated depending on waste acceptance from surrounding areas.

Year	Population	Projected MSW Tonnage	Year	Population	Projected MSW Tonnage
1999	59,568	47,158	2025	66,205	52,302
2000	60,198	47,556	2026	66,483	52,522
2001	60,440	47,748	2027	66,762	52,742
2002	60,687	47,943	2028	67,043	52,964
2003	60,914	48,122	2029	67,324	53,186
2004	61,133	48,295	2030	67,607	53,409
2005	61,349	48,466	2031	67,891	53,634
2006	61,571	48,641	2032	68,176	53,859
2007	61,819	48,837	2033	68,462	54,085
2008	62,078	49,042	2034	68,750	54,312
2009	62,357	49,262	2035	69,038	54,540
2010	62,621	49,471	2036	69,328	54,769
2011	62,814	49,623	2037	69,620	54,999
2012	63,017	49,783	2038	69,912	55,230
2013	63,207	49,934	2039	70,206	55,462
2014	63,407	50,092	2040	70,500	55,695
2015	63,609	50,251	2041	70,796	55,929
2016	63,810	50,410	2042	71,094	56,164
2017	64,045	50,596	2043	71,392	56,400
2018	64,291	50,790	2044	71,692	56,637
2019	64,561	51,003	2045	71,993	56,875
2020	64,832	51,217	2046	72,296	57,114
2021	65,104	51,432	2047	72,599	57,353
2022	65,378	51,648	2048	72,904	57,594
2023	65,652	51,865	2049	73,210	57,836
2024	65,928	52,083	2050	73,518	58,079

2.2.4 Service Area

The landfill will serve Rutherford County and additional areas as approved by the County.

2.2.5 Procedures for Waste Segregation

Procedures for waste segregation at the proposed landfill will be similar to existing operations except that MSW waste will be directed to the proposed landfill instead of the transfer station. A brief description of current procedures is as follows.

Wastes are segregated at the scales. Operators at the scalehouse are trained to classify and segregate the waste stream. White goods are stockpiled temporarily on an area at the top of the C&D landfill for disposal by a private recycling facility. C&D, inert debris, and yard wastes are directed to the C&D landfill.

Employees at the landfill are trained in the safety procedures for the handling and detection of illegal waste. The screening of unacceptable waste is done through the random checking of incoming loads by a County employee at the scalehouse and at the tipping area. When unacceptable waste is detected at the scalehouse, the load is rejected and not permitted into the facility. If hazardous waste is found at the tipping area, identification of the truck or persons is made (if possible) and documented, then the hazardous waste is identified and placed in a hazardous waste container and taken to a designated hazardous waste staging area for proper disposal. If this occurs, the event is reported to the appropriate authorities.

2.2.6 Equipment Requirements

The equipment requirements for operation and maintenance of the proposed landfill are anticipated to require the equipment listed in the following table. Equipment which is yet to be purchased is identified separately from existing equipment.

Description	Number
Existing Equipment:	
1) Track Loader	1
2) Bulldozer	1
3) Scraper	1
New Equipment:	
1) Waste Compactors	1 (Min.) 2 (Desired)

2.3 LANDFILL CAPACITY

2.3.1 Total Operating Capacity and Life Expectancy

Drawings P1 - P3 (Phasing Plan), identify the phasing of Phases 1 through 7. The exterior side slopes of each phase will be at a 4H to 1V slope and then transition at a slope of 8 percent to the highest elevations.

The estimated total gross and net operating capacities, life expectancies, and lined areas of Phases 1 through 7 are as shown below. Accounting for leachate collection media, protective cover, and daily and intermediate cover, the net capacity for waste is also shown below. The life expectancy, calculated using the anticipated waste tonnages discussed above starting with Year 2004 data, is shown below. (Note that volumes were calculated from base grades (top of compacted soil liner) to top of intermediate cover grades.)

Phase	Area (Acres)	Total Gross Capacity (CY)	Net Capacity (CY/Tons)	Life Expectancy (Years)
1	7.5	402,180	321,744/193,046	4.0
2	6.6	497,067	397,654/238,592	4.8
3	9.6	3A - 618,913 3B - 272,534	3A - 495,130/297,078 3B - 218,027/130,816	3A - 5.9 3B - 2.6
4	9.5	582,274	465,819/279,491	5.4
5	7.0	600,509	480,407/288,244	5.4
6	4.6	625,183	500,147/300,088	5.5
7	3.9	7A - 593,160 7B - 212,179	7A - 474,528/284,717 7B - 169,743/101,846	7A - 5.1 7B - 1.8
Total:	48.7	4,403,999	3,523,199/2,113,918	40.5

2.3.2 In-Place Ratio of Waste to Soil and Compaction Factor

The capacities obtained above were based on a 20 percent periodic cover ratio and a compaction factor of 1,200 pounds per cubic yard. The assumed 20 percent periodic cover ratio is typical for the facilities placing 6 inches of daily cover soil. The assumed compaction factor is conservative for typical landfill operational practices for compaction of the waste. Note that should the County utilize an alternative daily cover (demonstration required), the periodic cover ratio is expected to be less.

2.4 AVAILABLE SOIL RESOURCES AND REQUIRED SOIL QUANTITIES

2.4.1 Earthwork Quantities

The soils required to construct Phases 1 through 7 will be removed from on-site borrow sources or will be imported from off-site. The soils removed during excavation of Phases 1 through 7 may be used for structural fill, compacted soil liner, protective cover, and general fill. These excavation (cut) and structural fill (fill) volumes are as follows:

Phase	Cut (CY)	Fill (CY)
1	92,006	116,698
2	56,756	21,568
3	87,655	25,681
4	417,591	15,091
5	156,131	27,994
6	102,600	18,396
7	86,987	15,597
Total:	999,726	241,025

2.4.2 Compacted Soil Liner

The material required for the compacted soil liner of Phases 1 through 7 will be on-site or imported soils. For the purpose of these calculations, an alternative liner system is assumed which will include a 1.5 foot thick layer of 1×10^{-5} cm/sec compacted soil.

PHASE	REQUIRED VOLUME (CY)
1	18,150
2	15,972
3	23,232
4	22,990
5	16,940
6	11,132
7	9,438
Total:	117,854

2.4.3 Leachate Collection and Recovery (LCR) System

The natural drainage media used in the LCR system will be imported from off-site sources. The estimated total volume of this drainage media for Phases 1 through 7 is as follows:

PHASE	REQUIRED VOLUME (CY)
1	7,099
2	6,453
3	10,809
4	9,035
5	6,292
6	5,485
7	2,904
Total:	48,077

2.4.4 Protective Cover

Overlying the leachate collection system in Phases 1 through 7 is the protective cover. In general, this layer is 12 inches thick on the landfill base and 24 inches thick on the side slopes. The required volume of protective cover is as follows:

PHASE	REQUIRED VOLUME (CY)
1	17,101
2	14,843
3	20,167
4	21,619
5	16,295
6	9,357
7	9,680
Total:	109,062

2.4.5 Daily and Intermediate Cover

Assuming the previously mentioned periodic cover ratio of 20 percent, the following volumes of soil will be required for use as daily and intermediate cover during operations of Phases 1 through 7:

PHASE	REQUIRED VOLUME (CY)
1	80,436
2	99,413
3	3A - 123,783 3B - 54,507
4	116,455
5	120,102
6	125,037
7	7A - 118,632 7B - 42,436
Total:	880,801

2.4.6 Vegetative Soil Layer

On the basis of the 2 foot thick vegetative soil layer over 48.7 acres required for Phases 1 through 7, the required volume of vegetative soil layer is 157,139 cubic yards.

2.4.7 Soil Summary

The above on-site and off-site soil quantities are summarized below. Note that, based on the proposed base grades, long-term there is a soil deficit of on-site soil which will be needed from on or off-site borrow sources outside of the Phases 1 through 7 footprint.

MATERIAL	QUANTITY (CY)
On-Site[1]:	
Excavation	999,726
Structural Fill	(241,025)
Compacted Soil Liner	(117,854)
Protective Cover	(109,062)
Daily/Intermediate Cover	(880,801)
Vegetative Soil Layer	(157,139)
On-Site Total:	(506,155)
Off-Site:	
Collection Media (Stone)	(48,077)

Notes:

1. On-site material refers to materials available and used within the proposed footprint of Phases 1 through 7 only.

2.5 FACILITY DESIGN CRITERIA

The base liner and final cover systems will be constructed in accordance with Section .1624 (b)(8)(9) of the North Carolina Administrative Code, Title 15A, Chapter 13, Subchapter 13B including the following requirements.

2.5.1 Horizontal Separation Requirements

The horizontal separation requirement between the disposal boundary (edge of waste) and

the property lines is a minimum of 300 feet, the minimum buffer between private residences and wells and the disposal boundary is 500 feet, and the minimum buffer between any surface water (stream, river, creek) and the disposal boundary is 50 feet. The proposed design satisfies all buffer requirements.

2.5.2 Vertical Separation Requirements

The post-settlement bottom elevation of the base liner system will meet the minimum requirement of four feet above the seasonal high groundwater table and bedrock.

2.6 CONTAINMENT AND ENVIRONMENTAL CONTROL SYSTEMS

The following is an overview of the proposed containment and environmental control system. Detailed design of these components will be prepared and submitted later as part of the Permit to Construct application submitted for each phase.

2.6.1 Landfill Subgrade and Perimeter Berms

The landfill subgrade elevations have been designed for minimum post-settlement slopes of 2 percent (NCAC .1624(b)(7)). The subgrade elevations will be achieved by excavation or placement of compacted structural fill (embankment). During excavation, a determination of unsuitable soils (i.e. soils which are too soft, wet, or organic) will be made. Where unsuitable soils are found, the soils will be undercut and backfilled with structural fill.

In addition to providing the liner foundation in fill areas, structural fill will be used for berm and roadway construction. Structural fill will consist of on-site soils removed during excavation of the landfill units or imported borrow soils, except that no CH, OL, or OH soils will be allowed.

2.6.2 Base Liner System

The base liner area for Phases 1 through 7 is approximately 48.7 acres and is shown on **Drawing S4** (Site Development Plan - Base Grades). The base liner will consist of either a standard composite liner system or an alternative liner system as allowed under North Carolina regulations. The components of this liner system will consist of the following components (bottom-up):

Standard Liner System:

- a 24 inch thick compacted soil liner with a permeability of no more than 1 x 10^{-7} cm/sec.;
- a 60 mil HDPE geomembrane liner; and
- a leachate collection and recovery (LCR) system.

OR

Alternative Liner System:

- an 18 inch thick compacted soil liner with a permeability of no more than 1 x 10^{-5} cm/sec.;
- geosynthetic clay liner (GCL);
- a 60 mil HDPE geomembrane liner; and
- a LCR system.

The compacted soil liner will consist of compacted on-site or imported borrow soils. The compacted soil liner will be placed in 6 inch lifts and compacted to achieve the required permeability and strength requirements.

The GCL will consist of a layer of sodium bentonite bonded between two geotextiles. The GCL will provide a maximum hydrated permeability of 5 x 10^{-9} cm/sec.

The geomembrane component of the liner system will consist of a 60 mil thick High Density Polyethylene (HDPE) synthetic liner (primary geomembrane). This geomembrane will be installed by an experienced specialty contractor.

For the purposes of this report and the calculations of volumes, an alternative liner has been assumed. A demonstration of the proposed alternative liner system will be made in the Permit to Construct application for the first phase.

2.6.3 Leachate Collection and Recovery (LCR) System

The LCR system will be constructed directly above the geomembrane on both the base and side slopes of the landfill. The LCR system functions to collect leachate as quickly as is practical and to conduct the fluid out of the landfill via the sump areas. The goal of the LCR system is to minimize the hydraulic head acting on the liner, thereby reducing the leak potential.

On the base of the landfill, the LCR system will consist of 12 inches of collection media (typically NCDOT No. 78 stone) having a permeability of at least 1 x 10^{-1} cm/sec and a series of perforated collection pipes. Collection pipes within each cell as well as the main headers will have coarse aggregate (typically NCDOT No. 57 stone) placed over and around them and are referred to as "gravel columns". These gravel columns provide a significant amount of storage, provide primary leachate removal capacity, and are designed to be resistant to biological clogging. Since the gravel column aggregate extends through the protective cover and is in direct contact with the waste (no geotextile is placed between the waste and gravel), the long-term clogging potential is significantly reduced. Cleanout ports will be provided, where possible, at the end of leachate collection piping along the perimeter berms to allow periodic hydro-washing of the piping when necessary.

In order to provide protection of the base geomembrane against damage due to the granular leachate collection media, a cushion (Type GT-C) geotextile will be placed

between the between the base geomembrane and collection media.

The LCR system on the landfill side slopes will consist of geonet drainage media (GDM). The GDM is made from a geonet bonded on both sides with a separator (Type GT-S) geotextile.

The collection piping of the LCR system conducts the leachate to the sump areas for the removal from the landfill by gravity or force main to either a leachate storage lagoon or tanks. Note that a potential location for leachate storage is shown on **Drawing S4** (Site Development Plan - Base Grades). The actual location and type of storage facility will be finalized as part of the Permit to Construct application for the first phase.

2.6.4 Protective Cover

A soil protective cover layer will be placed over the LCR system as part of the stormwater-leachate separation system described below. In order to prevent the intrusion of soil from the protective cover into the leachate collection media, a separator (Type GT-S) geotextile will be placed between collection media and the overlying protective cover.

On-site soils or imported borrow soils will be used for protective cover. The thickness of this layer is 12 inches for the base of the landfill and 24 inches for the side slopes. Compaction of the protective cover to 90% maximum dry density (ASTM D 698) is required on the landfill bottom. Protective cover on side slopes is compacted by tracking the final lift. Protective cover will be vegetated to aid in preventing erosion prior to the placement of waste.

2.6.5 Stormwater/Leachate Separation System

In order to increase facility operating efficiency by reducing the leachate treatment quantities, stormwater/leachate separation is planned for Phases 1 through 7. Leachate is considered to be any precipitation or fluid that comes in direct contact with the waste. This liquid will be collected by the LCR system and conveyed to the leachate storage lagoon. Precipitation that falls in areas where it does not contact waste, such as within inactive areas, does not have to be treated as leachate. This fraction of the precipitation is treated as stormwater - that is, treated for removal of sediment only.

The stormwater/leachate separation is accomplished by the use of protective cover, soil divider berms, and a geosynthetic rain cover (GRC) (thin geomembrane) placed over gravel columns. Phases 1 through 7 will be divided into distinct cells by means of the base contours and soil divider berms. For cells that have waste placed in them, precipitation is allowed to percolate or run-off into the LCR system. For cells that have no waste, the precipitation is allowed to run off of the protective cover. Eventually the clean run-off reaches the sump area where a temporary stormwater discharge pipe or alternatively a pump conducts the water to a sedimentation basin. This runoff does not contact waste or leachate.

The gravel columns are free-draining and would allow much of the clean stormwater contacting inactive cells to percolate into the LCR system. In order to minimize this condition, a GRC will be placed over the gravel columns and in the sump area in all non-active cells of Phases 1 through 7. This will allow a high percentage of clean run-off to remain above the LCR system and leave the landfill. Any water that percolates through the GRC (through seams, tears, etc.) will enter the LCR system and be treated as leachate.

The GRC will be removed and discarded as each cell is placed into active operation.

2.6.6 Final Cover System

As a minimum, the components of the final cover system (bottom up) will consist of a 6 to 12 inch foundation layer (daily or intermediate cover), 30 mil textured LLDPE geomembrane, geonet drainage media (pore pressure reduction), and a 24 inch thick vegetative soil layer which includes a 6 inch thick topsoil layer. This system differs from the standard regulatory final cover in that an 18 inch layer of 1×10^{-5} cm/sec soil below the geomembrane is removed and a geonet layer is added above the geomembrane. The addition of the geonet layer reduces head on the geomembrane for both reduced infiltration through the geomembrane and increased stability of the overlying soil veneer. A demonstration of this final cover system will be presented as part of the Permit to Construct application for the first phase.

2.6.7 Erosion and Sedimentation Control

The erosion and sedimentation control structures provided will be designed and maintained to manage the run-off generated by the 24-hour, 25-year storm event, and conform to the requirements of the Sedimentation Pollution Control Law (15A, NCAC, 4). Note that potential sediment basin locations are shown on **Drawing S4** (Site Development Plan - Base Grades).

2.6.8 Landfill Gas Control

Landfill gas control for Phases 1 through 7 will consist of a series of surficial collection trenches placed beneath the final cover and/or vertical/horizontal wells which are connected to passive vents or utility flares or to an active gas extraction system. The selected system will be designed to limit the gas pressures on the final cover geosynthetics.

At sometime during the active life of the proposed landfill, the volume of MSW waste at the facility will exceed 2.75 million tons and will, thus, require a Title V air quality permit. The timetable for this will be further evaluated in the Permit to Construct application for Phase 1.

2.6.9 Access and Roadways

The site will be designed to provide all-weather access to active cells as well as cells under intermediate cover. Access ramps into the lined areas will be provided where necessary.

2.7 SLOPE STABILITY AND SETTLEMENT

The slope stability of the overall waste mass and perimeter berms, the protective cover veneer, and the final cover veneer, as well as estimates of foundation settlement will be addressed in the Permit to Construct application for each phase.

2.8 LEACHATE MANAGEMENT

The general leachate management system includes the collection, storage, treatment (if required), and disposal of the leachate generated. The collection and transmission of leachate to the on-site storage lagoon or tanks will be as described above. From the storage lagoon or tanks, the leachate will be pumped on a regular basis via force main to the Town of Rutherfordton and/or the Town of Spindale Wastewater Treatment Plant (WWTP) for disposal. Pretreatment, if required, will be employed on-site to meet the standards for disposal into the WWTP. Alternatively, the County may employ a pump and haul operation on a full or part time basis if capacity at the Rutherfordton and/or Spindale WWTP becomes limited.

2.9 SPECIAL ENGINEERING FEATURES

Special engineering features proposed for Phases 1 through 7 include an alternative liner system and wetlands mitigation.

2.9.1 Alternative Liner

An alternative liner as described above is proposed for use in Phases 1 through 7 due to the lack of 1×10^{-7} cm/sec soil on-site.

2.9.2 Wetlands Mitigation

Several areas of Phases 1 through 7 appear to contain wetlands and may require mitigation. Permitting of these areas, as necessary, will take place through the Army Corps of Engineers and the North Carolina Division of Water Quality.

Section 4

Rutherford County Central MSW Landfill
Rutherfordton, North Carolina

Section 4.0 Hydrogeological Report - *.1623(a)(1-13)*

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4.0 HYDROGEOLOGICAL REPORT

4.1 Local and Regional Geology - *.1623 (a)(1)*

The site is located in the western Piedmont physiographic and geologic province of North Carolina. Available geologic mapping[1] places the site within the Inner Piedmont Belt, approximately twenty miles from the boundary with the Blue Ridge Belt to the west. The Inner Piedmont comprises mixed medium- to high-grade metamorphic rocks (many of sedimentary origin) and plutonic igneous rocks of Late Proterozoic to Ordovician age. The region has a complex geologic history, with several episodes of thermo-tectonic activity, including sillimanite-grade metamorphism and retrograde metamorphism. Representative formations mapped near the site, defined as the following rock units for this discussion, were detected in the drilling program and observed in the scattered outcrops:

Unit 1 – layered, inequigranular biotite gneiss and schist with locally abundant garnet;
Unit 2 – weakly foliated biotite gneiss with plagioclase phenocrysts;
Unit 3 – foliated granitic gneiss; and
Unit 4 – interlayered amphibolite and biotite gneiss.

These units are discussed in detail in Section 4.2. Outcrops within the region and on-site are not abundant. Observed rock exposures (often road cuts) typically exhibit a pronounced northeast regional strike and southeast dip, which has influenced the topography. The local rocks are massive to foliated and exhibit a distinct steeply dipping bedding and joint pattern. An axial plane cleavage is present, developed along the pronounced northeast strike of bedding planes, dipping to the east. Other jointing is described in the following fracture trace analysis performed for this site.

4.1.1 Fracture Trace Analysis – Generalized bedrock fracture trends are presented on the Cumulative Length Distribution diagrams for two-mile, one-mile, and half-mile study areas, as measured from the facility boundary (see Appendix G). Similar to rosette diagrams, these plots show the statistical trends for "blue-line" stream development as the summary length and orientation of major fracture systems. Topographic "blue-lines" were targeted since they represent the predominant fracture systems without the background "noise" or clutter introduced by counting all the drainage features. Some of the major fracture systems can be traced in the on-site bedrock through outcrop measurements (strike and dip of bedding and jointing), but bedrock exposures at the site are infrequent and highly weathered. The strata are cross-bedded, which complicates the correlation to topographic trends. Topographic orientations described below are given in azimuth rather than coordinates, and the orientations of the plotted data reflect the actual stream flow directions.

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[1] North Carolina Geological Map, Scale 1:62,500, NC Geological Survey, 1985.

The Cumulative Length plots show a pronounced lineation oriented approximately N0°E (Az. 180°), which is distinct on the half-mile plot, and another lineation at N20°E to N30°E (Az. 200° to 210°). These lineations are consistent with bedding, measured on-site at N34°E with a 37° SE average dip. The bedding trends are consistent with the regional trend of the southern Appalachian mountains.

Another topographic lineation occurs at N50°E to N70°E (Az. 230° to 250°). This lineament appears to correlate to a predominant outcrop joint system (S1) measured on-site at N75°-80°E, dipping 78°NW. An conjugate joint set was measured at the outcrop as N19°W, dipping 61°NE, which coincides with a pronounced topographic lineament at N20°W (Az. 340°).

Yet another poorly defined joint set (S2), oriented E-W and NW-SE (another conjugate set), corresponds to topographic lineations at N80°W (Az. 280°) and between N40° to 60°W (Az. 300° to 320°). Other joints and fractures exhibit strong overprinting (multiple tectonic events), secondary mineralization (remobilized quartz, aplite, and minor epidote), and a granite-like exfoliation.

Given the good correlation between the outcrop data and the topographic lineations, it can be concluded that the regional bedding and jointing orientations exert structural controls on the development of surface water and (ostensibly) ground water flow patterns. Two large creeks on either side of the site occur along the predominant Az. 180° to 190° orientation, with south-southwest flow. On-site drainage features follow regional joint orientations:

N60° to 70°E	(Az. 247°)	flowing southwest along S1 jointing, with on-site spring (Most prominent drainage direction, includes C&D vicinity)
N41°E	(Az. 221°)	flowing southwest along bedding strike (Parallel to adjacent streams west of central ridge)
N12°W	(Az. 348°)	flowing southeast along S1 conjugate joint, with on-site spring (Drains below transfer station, across the ridge from C&D).

Other minor drainage features are formed along the S2 joint system at these orientations:

N25°W	(Az. 335°)	flowing southeast below fire training ground, includes a spring
N32°W	(Az. 328°)	draining southeast

N54°W	(Az. 306°)	draining southeast, and
N82°W	(Az. 278°)	draining west-southwest.

It should also be noted that nearly all the creeks in the study area flow to the south or southwest – very few streams flow to the east. This appears to be controlled by a regional plunge to the southwest, which is apparent from high vantage points in the area. Very few creeks follow the regional dip to the southeast. Consequently, relatively little ground water flow is anticipated in the southeast direction, except within short-segmented basins that coincide with the surface topography.

4.2 Site Reconnaissance - *.1623 (a)(2)*

4.2.1 Topographic Setting and Drainage – Site mapping (Drawing S2) shows a central ridge line, oriented to the northeast, sloping abruptly to the east and west in the project area. The site exhibits moderately steep topography in places and contains numerous randomly oriented knolls within the project area. The central ridge slopes gently to the south and separates shallow drainage features to the west and east that lead to perennial streams, unnamed tributaries to Cleghorn and Stonecutter Creeks, respectively. The named creeks converge south of the site, giving a generally southward drainage pattern, albeit surface drainage is to the southwest within the west side of the site and to the southeast within the east side of the site.

Ground elevations vary from a maximum of El. 1046 along a broad knoll in the northern portion of the site, to minimums of El. 830 along the "west" unnamed tributary and El. 856 along the "east" unnamed tributary, both locations being along the power line right-of-way that defines the south end of the project area. The central ridge slopes from the maximum elevation in the north to approximately El. 978 in front of the transfer station, again at the power line. On both the west and east sides of the central ridge, a series of relatively shallow sub-parallel ridges and drainage features exist, two of which on the east side contain seasonal streams and associated minor wetlands areas.

The central ridge and adjacent unnamed tributaries are oriented with the local streams and ridges observed on the regional topographic map (Drawing S1). These topographic features bear a close alignment to the northeast regional strike of geologic formations observed on the NC Geologic Map. The topography is consistent with typical conditions in the western Piedmont.

4.2.2. Bedrock characteristics – Relatively few bedrock exposures were observed on the project site, but sufficient rock exposures are available on-site to confirm the geologic mapping. The NC Geologic Map shows a contact between the various units is mapped in close proximity to the site.

1. A large outcrop of mixed gneiss was observed in the southern end of the site, beneath the power line easement, with high-angle to near vertical jointing and bedding planes dipping to the southeast. Stratigraphy are not distinct, but the major mapping units (Units 1 - 4) identified in Section 4.1 are all represented at various exposures within a 100-foot radius.
2. A prominent man-made exposure of weathered rock (granitic gneiss) exists in a borrow pit within the center of the western side of the site.

3. A relatively poor natural outcrop was observed in the extreme northeast corner (outside of the proposed landfill footprint). This rock was weathered to the point that reliable strike and dip measurements were non-obtainable.

A site map modified to show the approximate boundaries between the observed lithologic units is presented in Appendix H. The exposures are generally to poor to clearly define contacts, but there is a correlation between the rock type and topographic characteristics. The rocks are easily distinguished by appearance to the practiced eye, thus between observation at the on-site exposures and the core boring recoveries, a rough delineation of the contacts is possible. The residual weathering products differ, although the units tend to exhibit "inter-fingering" contacts.

The distribution of bedrock types is often considered in developing the ground water monitoring program, because different rock types can exhibit varying concentrations of background constituents. Based on site reconnaissance, the **lithologic units** on the site are distinguished as follows:

Unit 1 – layered, inequigranular garnet-bearing biotite gneiss and schist was observed only in two of the core borings (B-24 and B-32) located in the north and northeast corner of the site; borings are located near a highly weathered outcrop (#3 above), in which garnets may be present but obliterated by weathering; difficult to distinguish from biotite gneiss (Unit 2).

Unit 2 – foliated biotite gneiss with plagioclase phenocrysts is the predominant rock type in the eastern side of the site; also occurs along the perennial stream along the west side; mostly black with white plagioclase, typically fine grained, sometimes migmatitic, often exhibits a "salt and pepper" separation of dark and light minerals; phenocrysts impart an "augen" texture (not to be confused with the Henderson granite gneiss); weathers to a dark orange clayey surficial soil (manganese stained along relict joints) with underlying brown-tan, "greasy" micaceous silt-sand; numerous aplite and pegmatite veins, free quartz stringers.

Unit 3 – foliated granitic gneiss is the predominant rock type of the central ridge, underlying the higher elevations of the site; forms a distinct band that aligns with topography; white and tan-black color with plagioclase and quartz, localized biotite, sometimes migmatitic;

sometimes exhibits a coarse grained "graphic" texture; locally appears to be a pegmatite (especially when found as an isolated layer within other rock units); weathers into a bright orange silty surficial soil with underlying light tan-gray-white sand; predominant free quartz veins; appears to have intruded the other gneiss.

Unit 4 – interlayered amphibolite and biotite gneiss, localized in the central swale west of office/shop buildings, distinguished by dark back color and massive appearance; mostly hornblende and biotite with minor plagioclase, evenly dispersed, often with aplite veins, many of which are offset by jointing; weathering products (seen near B-33) include dark orange silty soil and "chunky" rock fragments which show either red oxidation or green epidote alteration along joint surfaces (a sign of retrograde metamorphism, as the epidote has migrated in to the adjacent granitic gneiss).

Three of the mapping units (Units #2 - #4) were observed within an approximately 100-foot radius at the only bedrock exposure on the site, located just south and west of the C&D area, and within the core borings. The bedrock physically appears to consist of alternating hard ledges and soft layers, exhibiting a layered differential weathering profile in outcrop that was detected in the core borings. Relatively deep weathering occurs along joints and/or steeply inclined bedding. This pattern can be seen in occasional road cuts (practically the only bedrock exposures available) throughout the area.

4.2.3 Overall rock depths – The granitic gneiss is generally weathered in excess of 10 to 15 feet on the site, but the depth of weathering penetrates below "auger refusal" depths; the weathering depths in the biotite gneiss are generally in excess of 40 feet. The zone of shallow rock appears to be associated with one of the harder ledges (high quartz and potassic feldspar content), forming a subterranean "ridge" through the southwestern portion of the site beneath the central ridge. Scattered quartz veins and occasional cobbles of the harder bedrock have been observed around the site. Occasional rock ledges were observed along the larger unnamed tributaries, but the creek bottoms are typically obscured with a thin alluvium. The overall pattern observed in outcrop and in numerous test borings suggests that on-site excavations may encounter boulders and/or thin ledges of rock, but not hard bedrock, within the anticipated excavation depths.

4.2.4 Springs, Seeps and Ground Water Discharge Features – Three springs have been identified as shown on the ground water contour map (Drawing S6). One is located in the swale west of the office/shop building, near test boring B-15. Above this spring exists a wet season conveyance; below the spring is a running stream, believed to be seasonal but with associated wetlands. Occasional seepage has been observed in the wet season conveyance. This wet season feature is entirely within the buffer of the proposed landfill footprint and will not be modified.
In the eastern side of the site exist two springs with defined channels and associated wetlands

downstream. These are located within deep drainage features and appear to be perennial discharge features. Other discharge features for the uppermost aquifer include the perennial streams to the east and west of the site. These lead to larger creeks (Stonecutter and Cleghorn) south of the site, which are regional discharge features. These features were used to develop the ground water map.

4.3 Geotechnical Investigation - *.1623 (a)(3) and (4)*

4.3.1 Test Boring Program - *.1623 (a)(3) and (4)(A)*

Drawing S2 shows test boring locations performed for this site evaluation. A total of 44 test borings were completed at 38 different locations on the 153-acre site. Test boring locations were selected based on topographic features for the purpose of characterizing soil/rock depths and ground water conditions within the planned MSWLF footprint and buffers. The test boring locations represent conditions at ridge lines and knolls, stream and drainage bottoms and intermediate side slopes.

Test boring logs and piezometer completion records are presented in Appendix C. Table 1 presents a summary of test boring data, e.g. depths to weathered rock, bedrock (auger refusal) and termination depths, as well as piezometer screen intervals. Supplemental monitoring well data from the closed MSW landfill adjacent to the proposed MSW landfill are presented in Appendix E and summarized on Table 1B to demonstrate the consistency of conditions across the site.

Nearly all test borings were extended to "auger refusal" conditions or into rock. The borings extend to depths varying to 100 feet below the surface. All but one boring encountered ground water; those that did were converted to 2-inch diameter grouted piezometers for long-term ground water level observation. The piezometer screen intervals were selected to represent the various soil, weathered rock and competent bedrock formations. The test borings include eleven (11) relatively deep rock core borings, ten (10) rotary-air borings into bedrock, and six (6) shallow/deep piezometer couplets. The piezometers provide data that facilitate ground water flow directions and rates. The couplets provide vertical ground water gradient information within the proposed MSWLF footprint and in the up gradient, down gradient and cross gradient directions. Short-term and long-term ground water level observations are presented on Tables 4 and 5, respectively.

Soil borings were drilled with an all terrain vehicle-mounted drill rig (Mobile B-57), turning 5¼-inch O.D. hollow stem augers, except three hand auger borings located near running streams. All borings were sampled by the standard penetration test technique (ASTM D-1586) on 5-foot intervals, with exception of the hand augers. Samples were collected in glass jars for visual inspection and laboratory testing. A number of bulk samples and Shelby tubes were collected for laboratory analysis (see Section 4.3.2).

The rock core borings were advanced with a 2¾-inch rotary tri-cone bit and/or a diamond-tipped NQWL (wire line) core barrel. Rotary air borings were advanced with a 3⅞-inch drag bit and/or air hammer. All soil samples not submitted to the lab and rock core samples were archived on-site in a storage building. Rock core photographs are presented in Appendix H.

4.3.2 Laboratory Analysis - *.1623 (a)(4)(B) and (C)*

Table 2 presents a summary of laboratory test data for the recently completed test borings. The laboratory test program consists of the following:

Triaxial Shear Strength, CU - undisturbed	D4767-95	2
Triaxial Shear Strength, CU - remolded	D4767-95	2
Flexible wall permeability - undisturbed	D5084	4
Flexible wall permeability - remolded	D5084	4
Standard Proctor Compaction	D698	4
Grain Size w/Hydrometer	D422, D1140	18
Atterberg Limits	D4318	18
Natural Moisture	D2216	18
One-Dimensional Consolidation	D2435	1

The soils were classified in the laboratory according the Unified Soil Classification System (USCS). These descriptions were matched to the boring logs to verify the visual soil classifications. Laboratory data is presented in Appendix D.

Based on the laboratory data, a majority of the on-site soils generally classify as silty sands (SM) or dual classify as sand-silt (SM-ML). A relatively small portion of the near surface soils consist of low plasticity silty clay (CL). Remolded samples more abundant sand-silt exhibit laboratory hydraulic conductivity test values ranging from 1.27×10^{-6} cm/sec to 5.64×10^{-7} cm/sec. These soils are typically bright reddish orange and can be found above either the granitic gneiss or the biotite gneiss. The minor amount of silty clay was not sampled during this investigation.

The lower permeability soils, which are not present at all test boring locations, are generally confined to the higher elevations within the northern and eastern portions of the site. It does not appear that sufficient quantities of low permeability soils are present to construct a conventional 24-inch thick compacted soil liner (typically values lower than 1×10^{-8} cm/sec are required). However, there are sufficiently abundant soils present to construct an alternative liner using a minimum 1×10^{-5} cm/sec criteria. The in-situ soils exhibit laboratory hydraulic conductivity values varying from 2.22×10^{-4} cm/sec to 8.21×10^{-7} cm/sec, per Shelby tube samples.

Shear strength values are such that stable embankments can be constructed. The remolded soils exhibited effective internal friction angles in excess of 35 degrees and effective cohesion values in excess of 200 psf. In-situ soils (worst case saturated micaceous silt) exhibited effective internal friction angles in excess of 35 degrees and effective cohesion values in excess of 80 psf.

4.3.3 Formation Descriptions - *.1623 (a)(4)(D)*

Stratigraphic relationships shown on the generalized hydrogeological cross sections (Drawings HX1 – HX3) are based on weathering characteristics, owing to relative density of the formations. Such characterization is common within the Piedmont, where undifferentiated formations or facies changes may be present but not distinct stratigraphic horizons. The test borings indicate no voids, faults, compressible zone or other potentially unstable features. Soils encountered by the test borings comprise variably micaceous, clayey silt and silty sand weathered from the underlying bedrock.

The near surface soils exhibit SPT values generally ranging from 20 to 50 blows per foot (bpf). These soils transition with depth to dense saprolite, which exhibits a relict rock-like texture and SPT values of 50 to 100 bpf, and deeper still to "partially weathered rock" (very dense saprolite), defined as materials that exhibit SPT values in excess of 100 bpf but can still be penetrated by a hollow stem auger. Bedrock depths based on auger refusal conditions vary across the site, ranging from 1 to 5 feet at B-13 and B-21, respectively, to values in excess of 74 feet at B-12.

The upper rock surface is transitional, that is, the overlying soils grade into rock at variable depths, resulting in a differential weathering profile. Excavations will likely encounter ledges of dense saprolite, which can transition locally to rock-like materials that requires difficult excavation techniques but does not represent true bedrock. The soil horizons may contain veins of hard materials, termed "stringers," boulders, or occasional ledges of less weathered rock.

Below auger refusal depths, the rock is again variably weathered. Rock cores within the upper 5 to 10 feet below "refusal" depths indicate poor recovery and low rock quality determination (RQD) at several locations, owing to the transitional nature of the saprolite-bedrock boundary. The weathered nature of the upper bedrock suggests hydrogeologic characteristics that might be modeled as porous media, much like the overburden soils and weathered rock. At depths below which higher RQD values (60% and above) were encountered, fracture flow characteristics are likely to predominate.

These rock types are consistent with published mapping. The various rock types exhibit an irregular, "inter-fingering" contacts, typical of Piedmont areas throughout the southeastern United States. High angle jointing was observed in the rock cores, with deep weathering and secondary mineral staining present in the upper reaches of the cores. Based on cross-cutting relationships and consistent joint patterns, it appears that the granitic gneiss and associated pegmatite veins intruded

the pre-existing cross-bedded mica gneiss (more mafic in composition). High grade metamorphism occurred concurrent with regional shearing (hence the migmatitic textures), and aplite veins formed at some time prior to later brittle jointing and epidote alteration. The regional dip is associated with thrusting that culminated the southern Appalachian orogen during the late Paleozoic.

4.3.4 Field Hydrologic Testing - *.1623 (a)(4)(E)*

Table 3 presents a summary of field hydrogeological properties, based on falling head slug tests. Values of assumed total and effective porosity, aquifer thickness and descriptions of the various hydrogeological units based on the laboratory classification data are also presented in Table 3, along with calculated conductivity values. Each piezometer was developed prior to testing using a down hole pump or bailer until clear water was obtained. Static water level measurements were made at the beginning of each slug test. Table 7 presents hydraulic conductivity values, along with calculated ground water gradients and velocities at each piezometer.

The slug tests were conducted by placing a pressure transducer at the bottom of the piezometer and allowing a buoyant plastic "slug" of a known volume, placed below the water level in the bore hole casing, to come to equilibrium. The change in piezometric head in response to the "slug" was measured until static equilibrium was re-established. A Hermit 1000C data logger was used to measure the rate of influx until water level equilibrium was achieved. The slug test data was analyzed according to both the Hvorslev and the Bouwer-Rice procedures, using commercially available software. The slug test data and permeability calculations are presented in Appendix F.

On Table 7, the field hydraulic conductivity values are shown relative to the hydrogeologic units (see Section 4.4) defined for the site. Based on these data, the field hydraulic conductivity values relative to each **hydrogeologic unit** vary as follows:

Unit	Unit Description	Conductivity (cm/sec)	Conductivity (ft/day)
1	Saprolite <100 bpf	1.38E-05 to 1.71E-04 Average 7.47E-05	0.04 (B23) to 0.05 (B30s) Average 0.21
2	Saprolite >100 bpf	1.37E-05 to 4.69E-05 Average 2.65E-05	0.038 (B4) to 0.13 (B25) Average 0.07
3	Bedrock	1.39E-05 to 1.72E-04 Average 5.82E-05	0.04 (B6) to 0.48 (B30d) Average 0.16

From these data a decreasing trend with depth between Units 1 and 2 can be seen, likely due to increasing density (although these could be considered as contiguous units), with a slight increase to Unit 3. This is consistent with the rock coring data, which indicates that the upper reaches of the "bedrock" (as defined by auger refusal conditions) is typically highly weathered, i.e., the materials exhibit very low RQD values. Slug tests measure hydraulic properties within a relatively narrow zone of influence around the piezometer, and there is a possibility of sample bias.

4.4 Stratigraphic and Hydrogeologic Units - *.1623 (a)(6)*

Drawings HX1 through HX3 present generalized subsurface profiles prepared from the test boring and laboratory data, which indicate the hydrogeologic and lithologic units for this site. There is no clear stratigraphy present (i.e., named formations), but the major mapping units could be identified without distinct contacts (Section 4.2). In general, the **hydrogeologic units** were based on the relative density of the saturated residuum (saprolite) and underlying bedrock:

- **Unit 1** is defined as the variably dense saprolite existing beneath the water table that exhibits standard penetration resistance values less than 100 bpf.

- **Unit 2** is generally dense saprolite that exhibits standard penetration resistance values greater than 100 bpf but can be penetrated by a machine driven hollow stem auger.

- **Unit 3** is defined by materials that yield auger refusal and require rotary coring and/or air-hammer techniques to penetrate.

These units are characterized by differing degrees of weathering and corresponding ranges of field hydraulic conductivity values, described in Section 4.3.4. The soil and rock units exhibit differential weathering characteristics, often with gradational boundaries between the units. The subsurface profiles show irregular unit boundaries that generally conform to the surface topography (denser materials beneath the higher elevations). Units 1 and 2 could be considered as subunits of the same hydrogeologic unit based on similar hydraulic properties (Table 3).

Units 1 and 2 exhibit porous flow media, characteristic of an unconfined "water table" aquifer, which collectively are considered to be the uppermost aquifer on the site. Unit 1 is generally located within the higher elevations of the site (within the northern portions) based on the test borings. Unconsolidated soils exhibiting SPT values less than 100 bpf are present everywhere on the site, but the hydrogeologic unit designation considers the saturated zones only. Unit 3, the bedrock aquifer, typically represents a discrete fracture flow along relatively widely spaced, localized joint sets. However, the uppermost reaches of the bedrock are highly weathered and may exhibit porous flow

characteristics, more akin to the overburden units (i.e., a gradational contact exists).

Top-of-bedrock contours on Drawing S7 and the cross sections generally reflect a subdued expression of the surface topography. No faulting or other unusual geologic features were observed. Based on monitoring wells for the closed MSWLF, subsurface conditions are consistent throughout the site. These geologic features and ground water conditions are typical of the Piedmont region.

4.5 Water Table Information - *.1623 (a)(7)(A-D)*

4.5.1 Short-Term Water Levels - *.1623 (a)(7)(A)*

Table 4 presents a summary of short-term ground water levels observed at the end of drilling of the B-series piezometers and stabilized readings obtained after a period of one to fourteen days after completion of the piezometers. Typically, the relatively short-term stabilized water levels are the highest recorded. This is due, in part, to the relatively wet climate during the months preceding the investigation and elasticity effects (i.e., alleviation of non-recoverable pore pressures) near the piezometers soon after drilling. Many borings encountered discreet seams of water in isolated fractures, which took up to several days or weeks to establish equilibrium with atmospheric pressure.

4.5.2 Long-Term Water Levels - *.1623 (a)(7)(B)*

Table 5 presents a summary of long-term water level observations at the piezometers and nearby monitoring wells. Data for ten of the earliest B-series piezometers goes back to May 1999; the remaining B-series piezometers were installed during April through June 2000, with the first complete data set becoming available (Table 5) on June 2.

Water levels observations have been recorded at the B-series piezometers at least quarterly after June 2000. Table 5A presents a summary of semi-annual water level observations for seven of the monitoring wells extending back to August 1996; six more recent wells were installed just prior to September 1998. Ground water hydrographs for selected monitoring well locations follow Table 5A.

Historical water level variation at MW-2, located within the proposed footprint in the higher elevations of the site, was within a range of 2.5 feet, prior to mid-1998. Less variation has been observed at the other monitoring wells, located nearer the creeks. The highest water levels recorded at MW-2 occurred in the traditionally drier portion of the year (i.e., August 1996 and September 1998), obviously in response to localized climatic conditions.

In the lower elevations, the highest ground water levels occurred during the month of March. However, a gradual decrease in water levels in the existing monitoring well network can be seen

since mid-1998. At MW-2 water levels have decreased by 9 feet. At wells in lower elevations, a decrease of about 3 feet has been recorded.

The ground water trends can be correlated with historical climatic trends using regional climatic data from the National Weather Service.[2] Two key parameters of interest are the Palmer Modified Drought Severity Index (PMDI) and Palmer Z-Index (Z), compiled for 105 years of weather records.

The PMDI represents an overall moisture balance within a region. Rutherford County is located in Region 1 of North Carolina, which includes the western mountains. The PMDI is compiled from multiple weather stations for average precipitation, temperature (PET effects), leaf indices (growing season), wind velocities, and solar radiation. The cyclical data are shown on a time line (Appendix H), with times of drought shown as negative values and wet times shown as positive.

The relative duration of a drought or wet cycle correlates to the availability of moisture to recharge the ground water. The Z-Index shows a similar plot that represents the amount of precipitation in a time period relative to "normal" conditions. Relatively high rainfall can occur in short durations during times of drought. These relationships are useful in evaluating aquifer response times.

The PMDI indicates that climatic moisture conditions were near normal to slightly wet for several years prior to mid-1998. During the latter portion of 1996, when the higher ground water elevations were observed at MW-2, conditions were becoming generally wet. The wet conditions persisted through mid-1998, except for a brief dry spell during the latter third of 1997, leading to the well documented "El Nino" winter of 1997-98, when record warm temperatures and high rainfall was recorded throughout the southeastern United States.[3] Record high water levels were recorded at other monitored sites in North Carolina during the spring of 1998,[4] with high water conditions persisting into the autumn months, exacerbated by low PET due to poor vegetative cover and wilting.

The monitoring well network at Rutherford County Central Landfill did indeed show it highest water levels during the March 1998 semi-annual monitoring event (see Table 5A and hydrograph), except MW-2, which exhibited its second highest observed water level in September 1998. It should be noted that MW-2 is located in a different topographic setting from most of the other monitoring wells, and during the summer of 1998, grading activities in proximity to MW-2 associated with the closure of the old MSW landfill may have resulted in altered PET effects and/or localized aquifer

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[2]Time Bias Corrected Divisional Temperature-Precipitation-Drought Index, (TD-9640) March 1994, National Oceanic and Atmospheric Administration, periodic updates available at www.ncdc.noaa.gov.

[3]National Oceanic and Atmospheric Administration, NESDIS Press Release, March 9, 1998.

[4]Site Suitability Application Report, Kersey Valley MSW Landfill Phase 3, High Point, North Carolina, March 1999, reported by G.N. Richardson & Associates, Raleigh, NC.

relaxation that influence the water levels.

Since mid-1998, climatic conditions in Region 1 have been very dry based the PMDI. Negative values can be seen in the data throughout the period of August 1998 to the end of the currently available data in September 2000 (Appendix H). PMDI values vary from approximately -2.0 to -3.0, indicating moderate to severe drought conditions. Water levels in the on-site monitoring network have steadily declined in response to the dry conditions, as shown on Table 5A. Based on the climatic history, the water levels observed in March 1998 at most of the on-site monitoring wells (September 1996 at MW-2) represent the highest water levels likely to occur at the site.

4.5.3 Estimated Seasonal High Water Table - *.1623 (a)(7)(C)*

Table 5 shows the highest water levels observed at the earliest B-series piezometers occurred in May 1999, relatively soon after these piezometers were installed. Aquifer equilibrium may have not yet been achieved at this time. The ground water contour map, Drawing S6, is based on the full set of piezometer data available in June 2000. By this time, the on-site monitoring wells were already showing a decline in water levels in response to climatic trends (see Section 4.5.2).

MW-2 is considered representative of the higher elevations of the site, along the central ridge. In general, the water level at MW-2 in March 1999 was about 4 feet lower than the maximum level recorded in 1996, during near "normal" to wet climatic conditions. Assuming this trend is correct for the piezometers in proximity to MW-2, the maximum seasonal water levels can be extrapolated from the May 1999 and June 2000 data by adding a "maximum increase" value to the following:

Piezometer Number	Maximum Increase	Water Elev. May 1999	Water Elev. June 2000	Estimated Maximum Seasonal High Water Elev.
B-1	4 feet		982.81	986.81
B-2	4 feet	957.95		961.95
B-4	4 feet	927.96		931.96
B-6	4 feet		881.75	885.75
B-10	4 feet		955.58	959.58
B-11	4 feet	964.23		968.23
B-24	4 feet	978.59		982.59
B-31	4 feet	946.81		950.81

Based on topographic relationships, MW-9 is considered representative of mid-slope elevations within the western portion of the site. The water levels recorded in March 1998, after the "El Nino" winter, were approximately 3 feet higher than recorded in the spring of 1999 and 2000. Thus, the

"maximum increase" value required to extrapolate a maximum seasonal high water level from the May 1999 and June 2000 data applies to the following:

Piezometer Number	Maximum Increase	Water Elev. May 1999	Water Elev. June 2000	Estimated Maximum Seasonal High Water Elev.
B-3	3 feet		894.7	897.7
B-5	3 feet		912.66	915.66
B-7	3 feet		881.24	884.24
B-8	3 feet		879.61	882.61
B-25	3 feet		929.48	932.48
B-32	3 feet		919.48	922.48
B-37	3 feet		864.53	867.53

Likewise, MW-4 is considered representative of mid-slope elevations within the western portion of the site. The water levels recorded in March 1998, after the "El Nino" winter, were approximately 4 feet higher than recorded in the spring of 1999 and 2000. Thus, the "maximum increase" value required to extrapolate a maximum seasonal high water level from the May 1999 and June 2000 data applies to the following:

Piezometer Number	Maximum Increase	Water Elev. May 1999	Water Elev. June 2000	Estimated Maximum Seasonal High Water Elev.
B-12	4 feet	951.65		955.65
B-13	4 feet		923.02	927.02
B-17	4 feet	928.42		932.42
B-19	4 feet		939.79	943.79
B-20	4 feet		876.05	880.05
B-33	4 feet		905.01	909.01
B-36	4 feet		930.49	934.49

The preliminary conceptual plan (Drawing S4) was based on maintaining a minimum vertical separation from the estimated seasonal high ground water table. Future water level observations will confirm this trend, and an addendum report will be issued when appropriate. The ground water map and conceptual plan may require modification based on further ground water observation.

4.5.4 Factors That Influence Water Table - *.1623 (a)(7)(D)*

The site experiences little to no surface water "run-on" or migration of ground water from off-site.

Gently sloping topography along the ridge-top near B-24 and vast cleared areas within much of the western portion of the site might tend to increase surface water infiltration within these areas. Along the mid-slope areas, relatively steep topography promotes runoff, thus decreasing infiltration and ground water recharge, but flatter contours near B-12 locally reverse this. Minor man-made influences that tend to decrease ground water recharge include paved areas and buildings located within the higher elevations in the central portion of the site. In the lower elevations perennial streams serve as ground water discharge features, which tend to stabilize water levels.

4.6 Horizontal and Vertical Ground Water Flow Dimensions - *.1623 (a)(8)*

Drawings HX1 – HX3 present generalized hydrogeologic cross-sections that show the horizontal and vertical extent of the upper most aquifer and ground water flow characteristics. The residual soils and dense saprolite (Units 1 and 2) comprise a variably thick mantle of saprolite above the competent bedrock. Units 1 and 2, distinguished only by relative density, collectively serve as the uppermost aquifer beneath the Phase 3 site.

Ground water movement through this formation is a mixture of porous media and fracture flow. Based on the limited thickness and variable nature of the Units 1 and 2, it is not practical to represent ground water flow with a flow net, as one might attempt when boundary conditions were better defined and hydraulic conditions were more uniform, e.g. in sedimentary stratigraphy. Ground water appears to move within the upper few tens of feet beneath the surface, along relatively porous zones formed beneath the topographic swales. The bedrock beneath hills is frequently dry to slow making water based on several borings (i.e., B-18, B-14, respectively).

Based on observed water levels, and inferred pore pressure relationships, the upper saprolite aquifer (Units 1 and 2) are inter-connected hydraulically with the lower bedrock aquifer (Unit 3), with no discreet confining layers. Partial confinement is evident between Units 1 and 2 combined and Unit 3 at some locations, as seen by an upward vertical gradient at B-5, located within an interior low area (Table 6). These hydrostatic pressure differences could result from differences in conductivity.

The cross-sections show areas of recharge (downward ground water movement) occurring over a majority of the site. Discharge (upward ground water movement) occurs in the lower elevations leading toward the small tributaries and creeks. Limited recharge occurs along the steeper slopes, located along much of the areas flanking the central ridge. The cross sections indicate ground water divides and approximate locations of inflection points between recharge and discharge zones.

Table 6 presents vertical ground water gradients for piezometer couplets located at B-5s/5d, B-9s/9d, B-12s/12d, B-16s/16d, B-26s/26d, and B-30s/30d. The vertical calculations compare water levels between the deeper and shallower well screen intervals, which indicate whether a portion of the site

is experiencing recharge or discharge. Table 6 confirms that upward (negative) gradients, indicative of discharge conditions, exist near the B-5 couplet, B-9 couplet (part of the year), and the B-16 couplet, each located within or near drainage features.

A downward (positive) gradient, indicative of recharge conditions, exists near the B-12 couplet, located in the middle elevations along a linear drainage feature. Downward gradients were also observed within the investigated depths at the B-26 couplet and the B-30 couplet, each located along the upper reaches of the smaller tributaries. A change in vertical gradient (from negative to positive) was calculated at different times at B-9 due to fluctuating water levels. An upward vertical gradient was observed at B-9s/9d when the water levels were generally higher in June 2000. Downward gradients have been observed here since the water levels have declined. The vertical gradient change could be biased, relative to the sampling date, by attenuation or slow response of water level changes between the shallow porous aquifer and the deeper bedrock aquifer. The depths of the deeper wells at each couplet are 72 feet at MW-9d, 86 feet at MW-26d, and 72 feet at MW-30d.

However, the downward gradients along the drainage features (again within the investigated depths) were observed in the on-site monitoring well network at MW-10, where a boring depth of 66 feet (MW-10D) was required verify an upward vertical gradient relative to other wells constructed to depths of 16 feet (MW-10C) and 37 feet (MW-10B) within that portion of the site. Even at this location, the data show that the vertical gradient has reversed on occasion (March 1999). It should be noted that none of the couplets in this discussion are located within the respective creek "bottom," each set is located on a side slope several feet (or tens of feet) above the streams. Only the B-16s/16d couplet is located on relatively level ground near the elevation of the creek.

Table 7 presents horizontal ground water gradient data and velocity calculations for various piezometers, arranged according to Hydrogeologic Units. Calculated horizontal ground water flow velocities are based on field hydraulic conductivity data at the various piezometers (Appendix F) and the horizontal gradients developed from the potentiometric contours shown on Drawing S6. Ground water velocities vary somewhat within the various Hydrogeologic Units, as follows:

Hydrogeologic Unit	Average Horizontal Ground Water Velocity, ft/day
1	0.09
2	0.02
3	0.13

Please note that the velocities stated for Unit 3 (bedrock) represent the upper reaches of the unit, where the rock is highly weathered (as evidenced by low RQD values), not the entire unit. Deeper non-cased piezometers (B-14) and monitoring wells for the closed MSWLF indicate very slow recharge in the deeper reaches of the bedrock, indicating less fracturing and weathering.

Table 8 presents a correlation of hydrogeologic properties and ground water velocities with topographic areas (ridge or knoll, mid-slope, drainage bottom, etc,) and the major lithologic units (mica gneiss or granitic gneiss). Table 8A is a manipulation of Table 8, summarized below, which reveals trends in the ground water velocity, hydraulic conductivity and gradient relative to the hydrogeologic and lithologic units. These numbers represent averages that are not necessarily statistically significant, but generalized trends can be seen.

Topographic Position	Lithologic Unit	Hydro-geologic Unit	Average Conductivity ft/day	Average Gradient ft/ft	Average Velocity ft/day
Ridge or knoll	**Mica Gneiss**	2	0.059	0.073	0.03
		3	0.040	0.065	0.03
	Granitic Gneiss	1	0.038	0.057	0.01
		2	0.086	0.055	0.03
		3	0.043	0.040	0.02
Mid-slope	**Mica Gneiss**	1	0.102	0.107	0.05
		2	0.191	0.080	0.05
	Granitic Gneiss	2	0.085	0.067	0.04
		3	0.144	0.086	0.12
Near drainage feature	**Mica Gneiss**	1	0.280	0.084	0.12
		3	0.303	0.078	0.25
	Granitic Gneiss	1	0.212	0.070	0.07
		3	0.125	0.104	0.12

Further summarizing, these data show the following:

Within the **higher elevations**, generally higher ground water velocities are observed within the finer grained mica gneiss than the coarser granitic gneiss. In the granite gneiss, Unit 2 exhibits slightly faster velocities than either Unit 1 or 3 (based on these data), whereas no difference in ground water velocities is observed in the mica gneiss. The values for Unit 3 represent the top of the bedrock unit, which is highly weathered and exhibits a gradational

boundary with Unit 2 (these values are not representative of the deeper rock units).

Along the **mid-slope elevations**, slightly higher ground water velocities are again observed in the mica gneiss (again same in both units). An exception is Unit 3 of the granitic gneiss, but as stated above, the data indicate a gradational boundary between Units 2 and 3.

In the **lower elevations**, adjacent to running streams and within deep drainage features, the mica gneiss exhibits generally higher ground water velocities in both Units 1 and 3. Unit 2 was absent or very thin at the representative test borings. While a marked transition is apparent, the upper reaches of Unit 3 are again highly weathered. One would expect higher ground water flow velocities near the streams due to higher fracture density.

4.7 Ground Water Contour Mapping - *.1623 (a)(9)*

Drawing S6 shows ground water potentiometric contours based on water level observations made in June 2000. Ground water flow is generally toward the south, toward Stonecutter and Cleghorn Creeks and their tributaries that flank the central ridge. A local divide along the central ridge splits surface drainage and ground water flow between the southeast and southwest directions. The potentiometric contours reflect a subdued expression of the surface topography, characteristic of the Piedmont. The potentiometric contours make a smooth transition to the unnamed tributaries.

4.8 Investigation Records - *.1623 (a)(9) and (10) and (11)*

Appendix C contains test boring and piezometer installation records for this investigation. Relevant data from the earlier monitoring wells are presented in Appendix E.

4.9 Other Geologic/Hydrogeologic Considerations - *.1623 (a)(12)*

Other sections of this report address the presence of streams, springs/seeps, ground water recharge/discharge areas and the influence of regional fracture patterns on ground water flow. No unusual geologic features have been determined which would affect the ground water flow or the ability to effectively monitor the site, including faults, mines or dikes. Site conditions appear typical of the North Carolina Piedmont region, and somewhat similar to other landfills within the region.

One consideration regarding the ability to effectively monitor the site is the presence of the existing closed MSW landfill and the active C&D landfill. These units are monitored and, in the case of the closed MSW landfill, have shown a minor ground water impact. A detailed discussion of ground water quality at the closed MSW landfill is beyond the scope of this report, but a brief discussion of the data as it pertains to the study area is warranted. Appendix H contains a summary of ground

water monitoring data collected between August 1996 to September 1999.

The data show concentrations of various man-made organic constituents from the NC DWM Appendix I list of monitoring constituents for solid waste facilities at monitoring wells MW-4, MW-6, MW- 7, MW-8, MW-9, MW-10 B, C, and D, and MW-11 A and B. Several inorganic constituents (metals) from the Appendix I lists have been detected, as well. Based on the ground water potentiometric map (Drawing S6), none of these wells are down gradient of the project area. Wells MW-7 and the well nest at MW-10 are cross-gradient of future phases in the southeast side of the project area. The new landfill is entirely up-gradient of the existing solid waste units, with a minimum separation of 300 feet between the new MSW landfill and the existing units and monitoring wells.

The ground water monitoring data for MW-3, located closest to the project area down-gradient of the C&D landfill, show no detected organic constituents. Only one event conducted in March 1998 detected inorganic constituents (metals). Only four metals were detected in that event, three of which were barely above the practical quantization limit (PQL), and only one detected metal (nickel) exceeded the State's ground water protection standards (15A NCAC 2L .0200). It should be noted that field or lab errors could be responsible for low-level detection of metals.

Low concentrations of metals have been detected on occasion at the facility background well, MW-2, including cadmium, lead, and zinc. Background metals are common in soil, bedrock and ground water throughout North Carolina. This trend is prevalent in historical mining districts due to intense mineralization of metal-bearing ores. Rutherford County was the site of gold mining during the mid 19th century. Past work on other sites in the vicinity of historic gold mines (see Footnote 4) indicates many metals species can be found where gold mineralization took place. The historic gold mining activities were well to the north of the site, but the metal-bearing mineralization is often regional.

Published geochemistry studies of the area indicate notable concentrations of various metals in stream sediments and ground water samples in central and southern Rutherford County.[5] The data and guide maps are presented in Appendix H, annotated to call out the relevant data sets. Notably, key inorganic constituents on the Appendix I monitoring list were found in the background stream sediments within a few miles of the site, including:

beryllium (2 ppm)	cobalt (15 ppm)	chromium (32 ppm)	copper (14 ppm)
nickel (62 ppm)	lead (17 ppm)	zinc (60 ppm).	

[5]Carpenter, R.H., and J.C. Reid, Listing of Concentrations of Variables of Stream Sediment, Surface Water, and Groundwater for the Gastonia 30x60 Minute Quadrangle – National Uranium Resource Evaluation (NURE) Data Base, North Carolina Geological Survey Open-File Report 93-11, NCGS, Raleigh, NC, June 1993.

The presence of these elemental metals in detectable quantities within stream sediments indicates a background source in the regional bedrock. Most of these metals are "mobile" and could find their way into local ground water, as well. Traces of gold were detected at scattered sampling locations. The statewide NURE ground water sampling did not test for regulated metals.

4.10 Summary Report - *.1623 (a)(13)*

The Rutherford County Central Landfill site is viewed as a short segmented, closed-loop hydrologic cycle, with recharge occurring over a majority of the site. The residual saprolite that mantles the top of bedrock is the uppermost aquifer and serves as the primary ground water flow path. Based on lithologic relationships, the ground water flow regime consists of an unconfined "water table" aquifer existing within unconsolidated saprolite (Units 1 and 2, distinguished by relative density), underlain by a predominantly fracture-flow aquifer existing within indurated bedrock of igneous/metamorphic origin (Unit 3). Based on field conductivity data, more active aquifers within Units 1 and 2 appear to exist within or near deep topographic drainage features, formed along regional bedding and jointing, beneath which higher bedrock fracture densities are expected.

A ground water divide coincides with the topography that divides the flow toward steams located immediately east and west of the site. The ground water flow is generally to the south in a regional context; the on-site divide splits the flow into southeast and southwest components beneath the central ridge. The underlying bedrock exhibits a lower hydraulic conductivity and wells in the bedrock tend to recharge slowly. On-site streams serve as localized ground water discharge features for the uppermost aquifer(s), and the site border large regional streams. There are no ground water users within 1000 feet of the site, and those outside this radius are across the major streams. Institutional controls assure no new ground water users will locate within down-gradient areas.

Much of the recharge within the western portion of the site occurs within the sparsely vegetated areas, some of which have been altered from their natural state due to past grading activities. The buffer areas for the proposed landfill have undergone little to no grading. The eastern portion of the site may have been farmed or forested in past times, but relatively little ground disturbance has occurred that would alter the ground water recharge and flow characteristics. Relatively steep topography exists over much of the site that tends to promote high runoff and less ground water recharge. There is little to no "run-on" or ground water migration from off site within the uppermost aquifer, thus no significant up-gradient sources of contamination are present. There are no unusual natural or man-made features that would affect ground water flows or the ability to monitor the site.

Ground water flow characteristics are sufficiently well understood that an effective monitoring program can be developed to ensure early detection of a release of hazardous constituents into the uppermost aquifer, including the upper reaches of the bedrock aquifer. Existing ground water

monitoring programs for the adjacent closed MSW landfill show that the closed landfill is down-gradient of the proposed landfill. The active C&D landfill is down-gradient and has not exhibited any significant Appendix I organic or inorganic constituents. The new landfill will meet all applicable vertical and horizontal buffer requirements. As such, the site appears suitable for permitting and constructing a MSWLF unit under current NC DWM guidelines.

-Tables-

Table 1A
Test Boring/Piezometer Data

*Mud Rotary and core borings, if applicable (rotary-air refusal on B-14 and B-15)

Elevation Data				Test Boring Data								Piezometer Construction Data				
Boring Number	Boring Date	PVC Pipe Elev.	Ground Elev.	Drilling Method	Total Depth, ft.	PWR Depth, ft.	PWR Elev.	Auger Refusal Depth, ft.	Auger Refusal Elev.	Tricone Refusal* Depth, ft.	Tricone Refusal* Elev.	Top of Piez. Screen Depth, ft.	Top of Piez. Screen Elev.	Bot. of Piez. Screen Depth, ft.	Bot. of Piez. Screen Elev.	Stickup ft.
B-1	05/31/00	1049.56	1047.38	HSA/Air	78.0	11.0	1036.4	42.0	1005.4			68.0	979.4	78.0	969.4	2.18
B-2	05/12/99	1007.84	1005.62	HSA	65.0	13.5	992.1	—				55.0	950.6	65.0	940.6	2.22
B-3	06/01/00	964.99	961.74	HSA	68.5	41.0	920.7	68.5	893.2			58.0	903.7	68.0	893.7	3.25
B-4	05/12/99	989.58	987.89	HSA	75.0	48.5	939.4	—				65.0	922.9	75.0	912.9	1.69
B-5d	05/05/00	929.96	927.40	HSA/Core	51.0	26.5	900.9	34.0	893.4	36.0	891.4	41.0	886.4	51.0	876.4	2.56
B-5s	05/05/00	928.98	926.96	HSA	28.0	—		—				18.0	909.0	28.0	899.0	2.02
B-6	05/19/99	962.90	960.80	HSA/Air	88.0	39.0	921.8	65.0	895.8			73.0	887.8	88.0	872.8	2.10
B-7	04/06/00	929.94	927.41	HSA	65.0	53.5	873.9	65.0	862.4			57.0	870.4	67.0	860.4	2.53
B-8	04/11/00	918.95	916.46	HSA	74.0	68.0	848.5	74.0	842.5			58.0	858.5	68.0	848.5	2.49
B-9d	04/11/00	862.12	860.18	HSA/Core	72.0	43.0	817.2	43.5	816.7	57.0	803.2	61.0	799.2	71.0	789.2	1.94
B-9s	04/11/00	862.07	860.05	HSA	43.6	33.0	827.1	43.6	816.5			20.0	840.1	30.0	830.1	2.02
B-10	04/07/00	1021.30	1018.84	HSA/Air	80.0	43.0	975.8	48.5	970.3			70.0	948.8	80.0	938.8	2.46
B-11	05/12/99	1016.01	1015.07	HSA	60.0	38.5	976.6	—				50.0	965.1	60.0	955.1	0.94
B-12d	04/06/00	972.59	970.87	HSA/Core	104.0	47.0	923.9	74.0	896.9	89.0	881.9	94.0	876.9	104.0	866.9	1.72
B-12s	05/11/99	972.90	970.59	HSA	33.0	—		—				23.0	947.6	33.0	937.6	2.31
B-13	05/02/00	942.16	939.82	HSA/Core	31.0	0.0	939.8	1.0	938.8			21.0	918.8	31.0	908.8	2.34
B-14	05/18/99	972.50	971.17	HSA/Air	100.0	18.5	952.7	21.0	950.2	55.0	916.2	—		—		1.33
B-15	05/18/99	899.84	897.55	HSA/Air	34.0	4.5	893.1	11.0	886.6	15.0	882.6	24.0	873.6	34.0	863.6	2.29
B-16d	05/04/00	857.25	855.34	HSA/Core	52.0	23.5	831.8	34.0	821.3	37.0	818.3	42.0	813.3	52.0	803.3	1.91
B-16s	05/04/00	857.17	855.30	HSA	28.0	28.0	827.3	28.0	827.3			18.0	837.3	28.0	827.3	1.87
B-17	05/17/99	963.56	960.91	HSA/Core	50.0	28.5	932.4	34.0	926.9			40.0	920.9	50.0	910.9	2.65
B-18	04/14/00	—	958.47	HSA/Air	50.0	11.0	947.5	22.0	936.5			—		—		
B-19	05/02/00	962.41	960.65	HSA	65.0	58.0	902.7	65.0	895.7			48.0	912.7	58.0	902.7	1.76
B-20	04/14/00	899.95	897.89	HSA/Air	33.0	25.5	872.4	27.0	870.9			23.0	874.9	33.0	864.9	2.06
B-21	05/19/99	932.22	930.04	HSA/Air	50.0	5.0	925.0	5.0	925.0			40.0	890.0	50.0	880.0	2.18
B-22	05/14/99	875.33	873.35	HSA	45.5	37.0	836.4	45.5	827.9			35.5	837.9	45.5	827.9	1.98
B-23	04/07/00	1002.30	999.89	HSA	73.6	69.0	930.9	73.6	926.3			61.0	938.9	71.0	928.9	2.41
B-24	05/31/00	1047.64	1045.54	HSA/Core	71.0	38.0	1007.5	40.5	1005.0	41.0	1004.5	61.0	984.5	71.0	974.5	2.10
B-25	06/02/00	954.41	951.46	HSA	50.0	41.0	910.5	50.0	901.5			40.0	911.5	50.0	901.5	2.95
B-26d	04/27/00	949.94	947.96	HSA/Core	86.0	49.0	899.0	54.0	894.0	61.0	887.0	76.0	872.0	86.0	862.0	1.98
B-26s	04/27/00	950.28	947.96	HSA	35.0	—		—				25.0	923.0	35.0	913.0	2.32
B-27	06/02/00	929.27	927.96	Hand Auger	7.0	—		—				5.0	923.0	7.0	921.0	1.31
B-28	06/02/00	858.16	857.31	Hand Auger	4.0	—		—				2.0	855.3	4.0	853.3	0.85
B-29	05/25/00	889.54	887.58	HSA/Air	40.0	4.0	883.6	26.0	861.6			28.0	859.6	38.0	849.6	1.96
B-30d	04/11/00	896.54	894.69	HSA/Core	72.0	24.0	870.7	24.0	870.7	25.0	869.7	30.0	864.7	40.0	854.7	1.85
B-30s	04/13/00	896.62	894.78	HSA	23.0	—		—				13.0	881.8	23.0	871.8	1.84
B-31	04/13/00	1002.51	1000.71	HSA	72.0	38.5	962.2	40.0	960.7			61.0	939.7	71.0	929.7	1.80
B-32	04/25/00	978.51	975.98	HSA/Core	73.0	0.0	976.0	53.6	922.4	59.0	917.0	63.0	913.0	73.0	903.0	2.53
B-33	05/02/00	924.80	923.48	HSA	24.0	23.5	900.0	24.0	899.5			14.0	909.5	24.0	899.5	1.32
B-34	04/26/00	929.79	928.61	HSA/Core	67.0	6.5	922.1	40.0	888.6	52.0	876.6	57.0	871.6	67.0	861.6	1.18
B-35	04/28/00	958.74	957.72	HSA	60.0	48.5	909.2	60.0	897.7			50.0	907.7	60.0	897.7	1.02
B-36	05/23/00	948.52	945.67	HSA/Air	32.0	15.5	930.2	15.5	930.2			22.0	923.7	32.0	913.7	2.85
B-37	05/31/00	891.33	888.76	HSA	53.0	42.0	846.8	53.0	835.8			38.0	850.8	48.0	840.8	2.57
B-38	06/02/00	847.24	845.20	Hand Auger	6.5	—	845.2	—				4.5	840.7	6.5	838.7	2.04

Notes:
1. B-14 has a 4" casing to refusal depth (21.0') then an open borehole extends to 100 feet
2. B-18 was dry, thus no piezometer was installed
3. PWR is defined as saprolite that exhibits standard penetration resistance values in excess of 100 blows per foot (not a distinct hydrogeological unit)
4. Piez's B-23 and B-31 are original survey data

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Table 1B
Supplemental Test Boring/Monitoring Well Data

Elevation Data				Test Boring Data								Piezometer Construction Data				
Boring Number	Boring Date	PVC Pipe Elev.	Ground Elev.	Drilling Method	Total Depth, ft.	PWR Depth, ft.	PWR Elev.	Auger Refusal Depth, ft.	Auger Refusal Elev.	Tricone Refusal* Depth, ft.	Tricone Refusal* Elev.	Top of Piez. Screen Depth, ft.	Top of Piez. Screen Elev.	Bot. of Piez. Screen Depth, ft.	Bot. of Piez. Screen Elev.	Stickup ft.
MW-1	Unknown	1008.24	1006.43	Unknown	45.5	38.5	967.9	45.5	960.9			35.5	970.9	45.5	960.9	1.81
MW-2	Unknown	995.43	994.00	Unknown	60.0	—	—	—				50.0	944.0	60.0	934.0	1.43
MW-3	Unknown	860.27	859.62	Unknown	47.0	—	—	—				37.0	822.6	47.0	812.6	0.65
MW-4	Unknown	851.03	849.72	Unknown	50.0	—	—	—				40.0	809.7	50.0	799.7	1.31
MW-6	11/16/94	834.90	833.43	HSA	37.5	25.5	807.9	38.0	795.4			22.5	810.9	37.5	795.9	1.47
MW-7	11/16/94	892.70	890.51	Mud Rotary	54.0	26.5	864.0	30.0	860.5			39.0	851.5	54.0	836.5	2.19
MW-8	03/15/95	860.31	857.86	HSA	44.5	—		—				29.5	828.4	44.5	813.4	2.45
MW-9	03/16/95	867.25	864.97	HSA	38.0	—		—				22.5	842.5	37.5	827.5	2.28
MW-10a	08/05/98	837.23	834.73	HSA/Air	101.0	25.5	809.2	39.0	795.7			91.0	743.7	101.0	733.7	2.50
MW-10b	08/05/98	836.15	834.50	HSA	37.0	25.5	809.0	39.0	795.5			32.0	802.5	37.0	797.5	1.65
MW-10c	08/05/98	836.19	834.50	HSA	16.0	25.5	809.0	39.0	795.5			11.0	823.5	16.0	818.5	1.69
MW-10d	08/05/98	837.23	834.73	HSA/Air	66.0	25.5	809.2	39.0	795.7			56.0	778.7	66.0	768.7	2.50
MW-11a	08/08/98	817.18	815.39	HSA/Air	45.0	25.0	790.4	36.0	779.4			35.0	780.4	45.0	770.4	1.79
MW-11b	08/08/98	817.72	816.02	HSA	20.0	25.0	791.0	36.0	780.0			10.0	806.0	20.0	796.0	1.70

5 MW-10 drilled w/ 10.25" HSA to refusal at 39'; air-rotary to termination (four wells were nested into two pairs). PWR based on SPT sampling results
6 MW-11 drilled w/ 10.25" HSA to refusal at 36'; air-rotary tp termination. SPT sampling terminated at 22', PWR defined by driller's description

Table 2
Geotechnical Laboratory Data

Sample Types:
S = Split spoon sample
B = Bulk sample
U = Undisturbed (Shelby tube)

Grain Size Distributution and Soil Classification

Boring Number	Sample Number	Sample Depth, ft.	% >3" >75 mm	% Gravel 75 mm>	% Sand 4.5 mm>	% Silt 0.075 mm>	% Clay 0.005 mm>	Liquid Limit	Plasticity Limit	Plasticity Index	USCS Class.	Natural Moisture %	Hydrogeologic Description
B-7	S1	3.5-5.0	0	0	72	23	5	NP	NP	NP	SM	13.8	Micaceous Silty M-F SAND
B-7	S2	8.5-10.0	0	0	70	27	3	NP	NP	NP	SM	15.2	Micaceous Silty M-F SAND
B-7	S3	13.5-15.0	0	0	59	38	3	29	NP	29	SM-ML	23.0	Micaceous Silty M-F SAND
B-7	S4	18.5-20.0	0	0	58	39	3	32	NP	32	SM-ML	18.6	Micaceous Silty M-F SAND
B-7	S9	43.5-45.0	0	0	75	23	2	41	NP	41	SM	24.2	Micaceous Silty M-F SAND
B-8	B1	0.0-20.0	0	0	73	22	5	37	29	8	SM	27.4	Micaceous Silty M-F SAND
B-9d	U1	4.0-6.0	0	0	59	26	15	50	NP	50	SM-ML	31.0	Micaceous Silty M-F SAND
B-9d	U2	8.0-10.0	0	0	75	21	4	36	NP	36	SM	27.1	Micaceous Silty M-F SAND
B-10	B1	10.0-20.0	0	0	55	37	8	33	30	3	SM-ML	19.0	Micaceous Silty M-F SAND
B-18	S1	3.5-5.0	0	0	79	21	10	33	NP	33	SM-ML	26.7	Micaceous Silty M-F SAND
B-23	B1	0.0-20.0	0	0	52	32	16	36	32	4	SM-ML	21.5	Micaceous Silty M-F SAND
B-26s	U1	8.0-10.0	0	0	55	17	28	45	36	9	SM-ML	25.6	Micaceous Clayey Silty M-F SAND
B-26s	U2	13.0-15.0	0	15	63	16	6	NP	NP	NP	SM	19.2	Micaceous Silty C-F SAND w/Gravel
B-31	S1	3.5-5.0	0	0	68	20	12	28	NP	28	SM	19.1	Micaceous Sil. Clayey Silty M-F SAND
B-31	S2	8.5-10.0	0	0	75	22	3	30	NP	30	SM	11.2	Micaceous Silty M-F SAND
B-31	S3	13.5-15.0	0	0	78	19	3	28	NP	28	SM	13.3	Micaceous Silty M-F SAND
B-31	S4	18.5-20.0	0	0	85	14	1	NP	NP	NP	SM	6.5	Micaceous Silty M-F SAND
B-35	B1	0.0-20.0	0	0	59	31	10	28	NP	28	SM-ML	11.1	Micaceous Silty M-F SAND

Notes to Above:

Moisture Contents are Dry Unit Weight Based

Moisture data for bulk samples acquired from individual jar samples collected with the bulk sample. Samples were oven-dried.
These data are considered representative of in-situ moisture conditions for earth work considerations.

Samples tested by Geotechnologies. Inc., Raleigh, NC

Table 2 - Continued
Geotechnical Laboratory Data

Compaction Data – Bulk Samples

Boring Number	Sample Number	Sample Depth, ft.	Max. Dry Density, pcf	Optimum Moisture, %
B-8	B1	0.0-20.0	113.4	14.8%
B-10	B1	10.0-20.0	111.8	16.5%
B-23	B1	0.0-20.0	109.0	16.2%
B-35	B1	0.0-20.0	114.5	14.7%

Hydraulic Conductivity Data – Bulk Samples

Boring Number	Sample Number	Sample Depth, ft.	Porosity %	Compaction % MDD	Tested Moisture, %	K cm/sec	Porosity %
B-8	B1	0.0-20.0	33.7%	97.7%	17.6%	1.27E-06	33.7%
B-10	B1	10.0-20.0	36.3%	97.6%	19.0%	5.64E-07	36.3%
B-23	B1	0.0-20.0	36.7%	97.1%	21.5%	2.48E-07	36.7%
B-35	B1	0.0-20.0	32.8%	98.2%	16.6%	4.37E-07	32.8%

Hydraulic Conductivity Data – Undisturbed Samples

Boring Number	Sample Number	Sample Depth, ft.	Porosity %	Tested Density, pcf	Tested Moisture, %	K cm/sec	Porosity %
B-9d	U1	4.0-6.0		108.0	31.0%	9.78E-05	50.7%
B-9d	U2	8.0-10.0		124.0	27.1%	2.22E-04	41.7%
B-26s	U1	8.0-10.0		123.1	25.6%	8.21E-07	42.9%
B-26s	U2	13.0-15.0		115.0	19.2%	3.03E-05	43.8%

Triaxial Shear Strength Data

Boring Number	Sample Number	Sample Depth, ft.	Phi Degrees	Cohesion psf	Phi' Degrees	Cohesion' psf
B-9d	U1	4.0-6.0	30.4	40	34.8	80
B-9d	U2	8.0-10.0	21.9	660	45.1	80
B-8	B1	0.0-20.0	33.5	640	37.3	380
B-23	B1	0.0-20.0	31.9	880	36.0	200

Consolidation Test Data

			Past Pressure psf*	Compression Ratio**	Rebound Ratio	Consolidaton Coeffecient***
B-26s	U2	13.0-15.0	1070	0.91	0.01	1.757

Notes to Above:

* estimated as intersection of apparent virgin compression curve and recompression curve, sample exhibits smooth transition (sand-like behavior)

** based on less than one full log cycle, steepest part of virgin compression curve

*** value taken at 4000 psf, tangent to virgin compression curve

All Moisture Contants are Dry Unit Weight Based

Moisture data for bulk samples acquired from individual jar samples collected with the bulk sample.
These data are considered representative of in-situ moisture conditions for earth work considerations.

Table 3
Summary of Hydrogeological Properties

Conductivity Values Based on Falling Head Slug Tests, Evaluated by Two Methods (Appendix : Hvorslev Bouwer-Rice

Piezometer No.	Hydrological Unit	Hydrogeological Description *	Aquifer Thickness	Effective Porosity	Total Porosity	Conductivity k (cm/sec)	Conductivity k (cm/sec)	Representative Grain Size Distribution			
								% Gravel	% Sand	% Silt	% Clay
B-5s	1	Med. Dense to Very Dense	35	0.20		5.13E-05	1.16E-04	0	73	22	5
B-8	1	Variably Micaceous Mixture of	50	0.20		3.65E-05	9.87E-05				
B-9s	1	Silty Sand and Sandy Silt	35	0.20	0.42	1.59E-04	4.27E-04				
B-12s	1	(ML and SM-ML, Saprolite)	35	0.20		4.00E-05	9.27E-05				
B-16s	1		35	0.20		9.41E-05	2.32E-04				
B-19	1	Residual Overburden Soil	35	0.20		5.69E-05	1.93E-04				
B-23	1	Unconfined Aquifer	50	0.20		1.38E-05	3.05E-05	0	52	32	16
B-26s	1		50	0.20	0.43	7.10E-05	1.78E-04	0	55	17	28
B-30s	1		35	0.20		1.71E-04	4.30E-04				
B-33	1		35	0.20		1.13E-04	2.29E-04				
B-2	2		50	0.17		1.47E-05	3.15E-05				
B-4	2	Very Dense Residual Soil	50	0.15		1.37E-05	3.16E-05				
B-7	2	(Saprolite) with Standard	50	0.15		2.77E-05	6.88E-05	0	59	38	3
B-11	2	Penetration Test Values in	50	0.15		2.16E-05	3.93E-05				
B-22	2	Excess of 100 blows per foot	50	0.15		4.00E-05	7.61E-05				
B-25	2		50	0.15		4.69E-05	1.23E-04				
B-31	2	Partially Weathered Rock	50	0.15		1.54E-05	3.61E-05	0	75	22	3
B-35	2	Partly Confiner Aquifer	50	0.15		3.08E-05	7.93E-05	0	59	31	10
B-37	2		50	0.15		4.02E-05	1.00E-04				
B-1	3		150	0.10		1.45E-05	3.13E-05				
B-5d	3	Hard, Variably Weathered	150	0.10		5.60E-05	1.42E-04		Not Applicable		
B-6	3	Undifferentiated Gneiss	150	0.10		1.39E-05	2.73E-05				
B-9d	3		150	0.10		1.56E-04	4.42E-04				
B-10	3	Fractured Bedrock	50	0.10		1.55E-05	3.50E-05				
B-12d	3	Confined Aquifer	150	0.10		4.17E-05	1.18E-04				
B-13	3		150	0.10		5.83E-05	1.29E-04				
B-15	3		150	0.10		5.37E-05	1.04E-04				
B-16d	3		50	0.10		9.42E-05	2.46E-04				
B-17	3		150	0.12		3.34E-05	7.69E-05				
B-20	3		50	0.10		4.71E-05	8.66E-05				
B-21	3		150	0.13		4.93E-05	1.23E-04				
B-26d	3		150	0.10		6.59E-05	1.84E-04				
B-29	3		150	0.10		9.04E-05	1.81E-04				
B-30d	3		150	0.10		1.72E-04	4.52E-04				
B-32	3		150	0.10		1.48E-05	3.28E-05				
B-34	3		150	0.10		3.25E-05	8.03E-05				
B-36	3		150	0.10		3.92E-05	8.49E-05				

Effective and total porosity values taken from Groundwater and Wells (Driscoll, 1986), p. 67.

Aquifer thickness values assumed based on hydrogeologic cross sections

Table 4
Short-Term Ground Water Observations

All water levels referenced from ground elevations, bgs

Boring Number	Boring Date	PVC Pipe Elev.	Ground Elev.	Time of Boring Levels Depth, ft.	Time of Boring Levels Elev.	Stabilized Levels (24 hr) Depth, ft.	Stabilized Levels (24 hr) Elev.	Stabilized Levels (7+ day) Depth, ft.	Stabilized Levels (7+ day) Elev.	Date
B-1	05/31/00	1049.56	1047.38	63.2	984.2	64.8	982.6	64.8	982.6	06/02/00
B-2	05/12/99	1007.84	1005.62	52.0	953.6	47.5	958.1	47.7	957.9	05/24/99
B-3	06/01/00	964.99	961.74	dry	—	dry	—	67.0	894.7	06/06/00
B-4	05/12/99	989.58	987.89	73.0	914.9	59.7	928.2	59.9	928.0	05/24/99
B-5d	05/05/00	929.96	927.40	18.0	909.4	NA	—	15.0	912.4	06/01/00
B-5s	05/05/00	928.98	926.96	21.5	905.5	NA	—	15.5	911.5	06/01/00
B-6	05/24/00	962.90	960.80	81.0	879.8	NA	—	79.4	881.4	06/01/00
B-7	04/06/00	929.94	927.41	48.7	878.7	46.8	880.6	46.7	880.7	04/12/00
B-8	04/11/00	918.95	916.46	38.9	877.6	37.4	879.1	37.2	879.3	04/24/00
B-9d	04/11/00	862.12	860.18	6.1	854.1	NA	—	6.1	854.1	04/24/00
B-9s	04/11/00	862.07	860.05	8.5	851.6	5.8	854.3	5.8	854.3	04/24/00
B-10	04/07/00	1021.30	1018.84	64.0	954.8	NA	—	63.7	955.1	06/01/00
B-11	05/12/99	1016.01	1015.07	53.0	962.1	51.5	963.6	50.9	964.2	05/24/99
B-12d	04/06/00	972.59	970.87	28.8	942.1	28.9	942.0	29.1	941.8	04/24/00
B-12s	05/11/99	972.90	970.59	23.0	947.6	18.4	952.2	19.0	951.6	05/24/99
B-13	05/02/00	942.16	939.82	15.5	924.3	NA	—	16.0	923.8	05/05/00
B-14	05/18/99	972.50	971.17	dry	—	dry	—	92.0	879.2	05/24/99
B-15	05/18/99	899.84	897.55	32.0	865.6	29.6	868.0	29.6	868.0	05/24/99
B-16d	05/04/00	857.25	855.34	11.5	843.8	9.5	845.8	10.1	845.2	06/01/00
B-16s	05/04/00	857.17	855.30	12.5	842.8	9.5	845.8	10.2	845.1	06/01/00
B-17	05/17/99	963.56	960.91	dry	960.9	41.3	919.7	35.3	925.7	05/24/99
B-18	05/23/00	—	958.47	dry	—	dry	—	dry	958.5	06/01/00
B-19	05/02/00	962.41	960.65	41.0	919.7	NA	960.7	20.8	939.9	06/02/00
B-20	04/14/00	899.95	897.89	26.0	871.9	NA	—	22.0	875.9	06/01/00
B-21	05/13/99	932.22	930.04	dry	—	dry	—	19.4	910.6	05/24/99
B-22	05/14/99	875.33	873.35	45.0	828.4	39.5	833.9	38.3	835.1	05/24/00
B-23	04/07/00	1002.30	999.89	58.4	941.5	58.6	941.3	58.7	941.2	04/11/00
B-24	05/31/00	1047.64	1045.54	65.1	980.4	69.1	976.4	68.5	977.0	06/01/00
B-25	06/02/00	954.41	951.46	38.0	913.5	NA	—	24.6	926.9	06/06/00
B-26d	04/24/00	949.94	947.96	13.4	934.6	12.6	935.4	12.1	935.9	05/03/00
B-26s	04/27/00	950.28	947.96	24.2	923.8	10.3	937.7	11.2	936.8	05/03/00
B-27	06/02/00	929.27	927.96	2.0	926.0	NA	—	2.5	925.5	07/07/00
B-28	06/02/00	858.16	857.31	2.7	854.6	NA	—	3.3	854.0	07/07/00
B-29	05/25/00	889.54	887.58	31.7	855.9	31.8	855.8	31.8	855.8	06/01/00
B-30d	04/11/00	896.54	894.69	8.0	886.7	5.7	889.0	5.7	889.0	04/24/00
B-30s	04/13/00	896.62	894.78	8.0	886.8	5.5	889.3	5.2	889.6	04/24/00
B-31	04/13/00	1002.51	1000.71	60.0	940.7	NA	—	54.1	946.6	04/24/00
B-32	04/25/00	978.51	975.98	48.9	927.1	56.4	919.6	56.6	919.4	05/03/00
B-33	05/02/00	924.80	923.48	19.0	904.5	16.7	906.8	16.6	906.9	05/05/00
B-34	04/26/00	929.79	928.61	dry	—	38.5	890.1	38.1	890.5	05/03/00
B-35	04/28/00	958.74	957.72	56.8	900.9	38.5	919.2	30.3	927.4	05/03/00
B-36	05/02/00	948.52	945.67	25.0	920.7	NA	—	18.0	927.7	06/01/00
B-37	05/31/00	891.33	888.76	NA	—	26.8	862.0	29.4	859.4	06/06/00
B-38	06/02/00	847.24	845.20	4.0	841.2	NA	—	4.0	841.2	07/07/00

No piezometer was installed at B-18; borehole remained open and dry.
NA in depth column means water level was "Not Acquired."

B-6 was redrilled in May 2000 to encounter water.
Piez's B-23 and B-31 are original survey data

Table 5
Long-Term Ground Water Level Observations

All water levels referenced from top of casing (TOC), except as noted

Boring Number	PVC Pipe Elev.	Ground Elev.	May 24, 1999 Depth, ft.	May 24, 1999 Elev.	April 5, 2000 Depth, ft.	April 5, 2000 Elev.	June 1 and 2, 2000 Depth, ft.		June 1 and 2, 2000 Elev.	June 20 - 23, 2000 Depth, ft.	June 20 - 23, 2000 Elev.	October 18, 2000 Depth, ft.	October 18, 2000 Elev.	December 29 - 30, 2000 Depth, ft.	December 29 - 30, 2000 Elev.	March 3, 2001 Depth, ft.	March 3, 2001 Elev.
							See Notes										
B-1	1049.56	1047.38					66.75		982.81	66.94	982.62	67.60	982.62	70.28	981.96	68.29	979.28
B-2	1007.84	1005.62	49.89	957.95	53.39	954.45	53.34		954.50	53.62	954.22	54.72	954.22	55.35	953.12	55.85	952.49
B-3	964.99	961.74					67.0	5	894.7	dry	dry	72.55	964.99	71.75	892.44	71.90	893.24
B-4	989.58	987.89	61.62	927.96	65.79	923.79	66.05		923.53	66.10	923.48	66.94	923.48	67.74	922.64	68.40	921.84
B-5d	929.96	927.40					17.30		912.66	17.78	912.18	19.69	912.18	20.10	910.27	19.84	909.86
B-5s	928.98	926.96					17.46		911.52	17.64	911.34	19.56	911.34	19.90	909.42	19.51	909.08
B-6	962.90	960.80	dry	dry	dry	dry	81.30	1	881.60	81.15	881.75	82.22	881.75	82.71	880.68	83.04	880.19
B-7	929.94	927.41					48.70		881.24	49.31	880.63	50.42	880.63	50.81	879.52	50.95	879.13
B-8	918.95	916.46					39.34		879.61	39.72	879.23	41.15	879.23	41.49	877.80	41.66	877.46
B-9d	862.12	860.18					8.90		853.22	9.10	853.02	9.12	853.02	8.81	853.00	8.64	853.31
B-9s	862.07	860.05					8.96		853.11	9.05	853.02	8.98	853.02	8.68	853.09	8.46	853.39
B-10	1021.30	1018.84					65.72		955.58	65.88	955.42	66.28	955.42	66.82	955.02	67.34	954.48
B-11	1016.01	1015.07	51.78	964.23	55.83	960.18	56.12		959.89	56.30	959.71	56.77	959.71	57.30	959.24	57.71	958.71
B-12d	972.59	970.87					29.98		942.61	32.21	940.38	33.85	940.38	34.38	938.74	34.29	938.21
B-12s	972.90	970.59	21.25	951.65	25.85	947.05	23.68		949.22	24.64	948.26	28.00	948.26	28.79	944.90	28.98	944.11
B-13	942.16	939.82					19.14		923.02	19.84	922.32	20.31	922.32	20.02	921.85	20.72	922.14
B-14	972.50	971.17	92.00	880.50	66.96	905.54	84.38	2	888.12	68.35	904.15	67.42	904.15	67.85	905.08	67.81	904.65
B-15	899.84	897.55	31.86	867.98	31.75	868.09	31.90		867.94	32.62	867.22	33.30	867.22	32.93	866.54	33.28	866.91
B-16d	857.25	855.34					11.92		845.33	12.02	845.23	12.09	845.23	12.18	845.16	12.11	845.07
B-16s	857.17	855.30					11.90		845.27	12.03	845.14	12.08	845.14	12.20	845.09	12.09	844.97
B-17	963.56	960.91	35.25	928.31	36.01	927.55	35.20		928.36	35.14	928.42	35.70	928.42	36.19	927.86	36.34	927.37
B-18	—	958.47	Dry boring – no piezometer install				dry		dry	dry	dry	ND	ND	ND	ND	ND	ND
B-19	962.41	960.65					22.62		939.79	23.19	939.22	24.80	939.22	25.28	937.61	25.02	937.13
B-20	899.95	897.89					23.90		876.05	26.13	873.82	26.80	873.82	27.52	873.15	27.46	872.43
B-21	932.22	930.04	21.55	910.67	20.97	911.25	21.60		910.62	21.72	910.50	21.71	910.50	21.41	910.51	21.22	910.81
B-22	875.33	873.35	40.26	835.07	39.38	835.95	40.24		835.09	42.19	833.14	41.52	833.14	42.20	833.81	41.58	833.13
B-23	1001.91	1000.00					61.10	6	941.20	61.37	940.93	62.47	939.83	60.45	939.44	61.20	938.69
B-24	1047.64	1045.54					69.05		978.59	71.72	975.92	72.01	975.92	72.22	975.63	72.38	975.42
B-25	954.41	951.46					38.00	3	916.41	24.93	929.48	27.04	929.48	27.84	927.37	28.18	926.57
B-26d	949.94	947.96					15.52		934.42	16.18	933.76	16.70	933.76	16.60	933.24	16.10	933.34
B-26s	950.28	947.96					14.76		935.52	15.57	934.71	16.30	934.71	15.87	933.98	15.25	934.41
B-27	929.27	927.96					2.00		927.27	3.75	925.52	3.58	925.52	3.05	925.69	2.79	926.22
B-28	858.16	857.31					2.65		855.51	4.10	854.06	3.62	854.06	4.45	854.54	3.28	853.71
B-29	889.54	887.58					31.80		857.74	34.43	855.11	35.31	855.11	37.26	854.23	36.84	852.28
B-30d	896.54	894.69					8.75		887.79	8.91	887.63	9.07	887.63	8.75	887.47	8.50	887.79
B-30s	896.62	894.78					8.10		888.52	8.29	888.33	8.47	888.33	8.05	888.15	7.80	888.57
B-31	1003.10	1000.85					55.70	6	946.81	56.11	946.40	56.95	945.56	55.75	944.96	56.51	944.20
B-32	978.51	975.98					59.05		919.46	60.02	918.49	61.51	918.49	62.16	917.00	62.55	916.35
B-33	924.80	923.48					19.79		905.01	20.73	904.07	22.55	904.07	22.92	902.25	22.91	901.88
B-34	929.79	928.61					40.63		889.16	41.19	888.60	42.06	888.60	42.12	887.73	42.49	887.67
B-35	958.74	957.72					33.95		924.79	34.20	924.54	35.04	924.54	35.64	923.70	35.55	923.10
B-36	948.52	945.67					18.03		930.49	21.60	926.92	23.85	926.92	24.68	924.67	24.01	923.84
B-37	891.33	888.76					26.80	4	864.53	29.70	861.63	30.89	861.63	32.30	860.44	29.76	859.03
B-38	847.24	845.20					4.00		843.24	6.02	841.22	ND	ND	6.09	847.24	5.85	841.15

Notes:
1 B-6 was redrilled with air, extending into rock
2 Approximately 24 hours after pumping
3 Time of completion water level
4 24-hour water level, not necessarily stabilized
5 Referenced below ground surface
6 Piezometers B-23 and B-31 were damaged; water levels after April 2001 reference new survey data

B-3 piez. dry, water below this depth

Casing damaged, water referenced

Table 5 Continued
Long-Term Ground Water Level Observations

Boring Number	May 17, 2001 Depth, ft.	Elev.	July 4, 2001 Depth, ft.	Elev.	October 22, 2001 Depth, ft.	Elev.	March 8, 2002 Depth, ft.	Elev.	October 22, 2001 Depth, ft.	Elev.
B-1	68.68	1049.56	68.74	980.88	68.77	980.82	69.05	980.79	68.77	980.51
B-2	55.69	1007.84	55.95	952.15	56.25	951.89	55.92	951.59	56.25	951.92
B-3	72.92	964.99	70.96	892.07	70.41	894.03	70.40	894.58	70.41	894.59
B-4	68.95	989.58	69.04	920.63	68.12	920.54	69.43	921.46	68.12	920.15
B-5d	19.35	929.96	19.25	910.61	19.87	910.71	18.78	910.09	19.87	911.18
B-5s	19.24	928.98	18.97	909.74	19.80	910.01	18.55	909.18	19.80	910.43
B-6	82.55	962.90	82.03	880.35	NA	NA	81.36	NA	NA	NA
B-7	50.39	929.94	50.50	879.55	50.69	879.44	49.85	879.25	50.69	880.09
B-8	40.90	918.95	41.28	878.05	41.74	877.67	40.77	877.21	41.74	878.18
B-9d	8.88	862.12	8.55	853.24	8.72	853.57	8.51	853.40	8.72	853.61
B-9s	8.85	862.07	8.39	853.22	8.88	853.68	8.35	853.19	8.88	853.72
B-10	67.81	1021.30	67.41	953.49	67.23	953.89	68.06	954.07	67.23	953.24
B-11	58.14	1016.01	58.25	957.87	58.31	957.76	58.65	957.70	58.31	957.36
B-12d	33.25	972.59	33.73	939.34	33.28	938.86	33.85	939.31	33.28	938.74
B-12s	28.41	972.90	28.83	944.49	28.39	944.07	29.05	944.51	28.39	943.85
B-13	19.75	942.16	19.67	922.41	19.67	922.49	19.59	922.49	19.67	922.57
B-14	67.24	972.50	66.89	905.26	67.27	905.61	66.75	905.23	67.27	905.75
B-15	32.82	899.84	32.99	867.02	32.95	866.85	33.25	866.89	32.95	866.59
B-16d	12.13	857.25	12.09	845.12	11.96	845.16	11.91	845.29	11.96	845.34
B-16s	12.15	857.17	12.08	845.02	11.98	845.09	11.92	845.19	11.98	845.25
B-17	35.32	963.56	35.21	928.24	35.27	928.35	35.37	928.29	35.27	928.19
B-18	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
B-19	24.14	962.41	24.08	938.27	24.19	938.33	23.65	938.22	24.19	938.76
B-20	26.44	899.95	26.36	873.51	26.09	873.59	26.65	873.86	26.09	873.30
B-21	21.62	932.22	20.74	910.60	21.11	911.48	21.03	911.11	21.11	911.19
B-22	40.35	875.33	40.73	834.98	40.49	834.60	40.89	834.84	40.49	834.44
B-23	63.75	1001.91	63.97	938.16	63.96	939.83	64.38	939.83	63.96	939.83
B-24	72.40	1047.64	72.48	975.24	72.44	975.16	70.49	975.20	72.44	977.15
B-25	26.69	954.41	27.68	927.72	28.39	926.73	26.65	926.02	28.39	927.76
B-26d	16.08	949.94	16.40	933.86	16.55	933.54	15.34	933.39	16.55	934.60
B-26s	15.45	950.28	15.73	934.83	15.81	934.55	14.46	934.47	15.81	935.82
B-27	3.12	929.27	2.97	926.15	3.05	926.30	2.50	926.22	3.05	926.77
B-28	3.80	858.16	3.15	854.36	8.50	855.01	3.17	849.66	8.50	854.99
B-29	34.97	889.54	35.30	854.57	31.07	854.24	35.60	858.47	31.07	853.94
B-30d	8.89	896.54	8.40	887.65	8.84	888.14	8.41	887.70	8.84	888.13
B-30s	8.24	896.62	7.68	888.38	8.17	888.94	7.65	888.45	8.17	888.97
B-31	57.97	1003.10	58.15	945.13	57.81	945.56	57.98	945.56	57.81	945.56
B-32	61.32	978.51	61.80	917.19	62.09	916.71	61.33	916.42	62.09	917.18
B-33	21.20	924.80	20.04	903.60	20.96	904.76	21.59	903.84	20.96	903.21
B-34	41.85	929.79	41.90	887.94	41.75	887.89	42.13	888.04	41.75	887.66
B-35	34.42	958.74	34.42	924.32	34.30	924.32	34.10	924.44	34.30	924.64
B-36	21.65	948.52	22.20	926.87	21.77	926.32	22.12	926.75	21.77	926.40
B-37	29.82	891.33	29.64	861.51	29.93	861.69	28.93	861.40	29.93	862.40
B-38	5.94	847.24	5.85	841.30	5.87	841.39	5.82	841.37	5.87	841.42

Table 6
Vertical Ground Water Gradient Calculations

Selected Ground Water Observation Dates

Nested Piezometers: **B-5s** Unit 1 - Unconfined Saprolite (Water Table) Aquifer
B-5d Unit 3 - Fractured Bedrock Aquifer

Piezometer No.	Top of Screen, El.	Bottom of Screen, El.	delta-Screen Interval, ft *	06/02/00 W.T.E.	10/18/00 W.T.E.	12/30/00 W.T.E.	03/03/01 W.T.E.	05/17/01 W.T.E.	07/04/01 W.T.E.	10/23/01 W.T.E.
B-5s	909.0	899.0	12.6	911.52	909.42	909.08	909.47	909.74	910.01	909.18
B-5d	886.4	876.4		912.66	910.27	909.86	910.12	910.61	910.71	910.09
delta-W.T.E. (see Note 1)				-1.14	-0.85	-0.78	-0.65	-0.87	-0.7	-0.91
Vertical Gradient (see Note 2)				**-0.0905 Up**	**-0.0675 Up**	**-0.0619 Up**	**-0.0516 Up**	**-0.0690 Up**	**-0.0500 Up**	**-0.0650 Up**

Nested Piezometers: **B-9s** Unit 1 - Unconfined Saprolite (Water Table) Aquifer
B-9d Unit 3 - Fractured Bedrock Aquifer

Piezometer No.	Top of Screen, El.	Bottom of Screen, El.	delta-Screen Interval, ft *	06/02/00 W.T.E.	10/18/00 W.T.E.	12/30/00 W.T.E.	03/03/01 W.T.E.	05/17/01 W.T.E.	07/04/01 W.T.E.	10/23/01 W.T.E.
B-9s	840.1	830.1	30.9	853.11	853.09	853.39	853.61	853.22	853.68	853.19
B-9d	799.2	789.2		853.22	853.00	853.31	853.48	853.24	853.57	853.40
delta-W.T.E. (see Note 1)				-0.11	0.09	0.08	0.13	-0.02	0.11	-0.21
Vertical Gradient (see Note 2)				**-0.0036 Up**	**0.0029 Down**	**0.0026 Down**	**0.0042 Down**	**-0.0006 Up**	**0.0079 Down**	**-0.0150 Up**

Nested Piezometers: **B-12s** Unit 1 - Unconfined Saprolite (Water Table) Aquifer
B-12d Unit 3 - Fractured Bedrock Aquifer

Piezometer No.	Top of Screen, El.	Bottom of Screen, El.	delta-Screen Interval, ft *	06/02/00 W.T.E.	10/18/00 W.T.E.	12/30/00 W.T.E.	03/03/01 W.T.E.	05/17/01 W.T.E.	07/04/01 W.T.E.	10/23/01 W.T.E.
B-12s	947.6	937.6	60.7	949.22	944.90	944.11	943.92	944.49	944.07	944.51
B-12d	876.9	866.9		942.61	938.74	938.21	938.30	939.34	938.86	939.31
delta-W.T.E. (see Note 1)				6.61	6.16	5.9	5.62	5.15	5.21	5.2
Vertical Gradient (see Note 2)				**0.1089 Down**	**0.1015 Down**	**0.0972 Down**	**0.0926 Down**	**0.0848 Down**	**0.3721 Down**	**0.3714 Down**

Nested Piezometers: **B-16s** Unit 1 - Unconfined Saprolite (Water Table) Aquifer
B-16d Unit 3 - Fractured Bedrock Aquifer

Piezometer No.	Top of Screen, El.	Bottom of Screen, El.	delta-Screen Interval, ft *	06/02/00 W.T.E.	10/18/00 W.T.E.	12/30/00 W.T.E.	03/03/01 W.T.E.	05/17/01 W.T.E.	07/04/01 W.T.E.	10/23/01 W.T.E.
B-16s	837.3	827.3	14	845.27	845.09	844.97	845.08	934.83	934.55	845.19
B-16d	813.3	803.3		845.33	845.16	845.07	845.14	933.86	933.54	845.29
delta-W.T.E. (see Note 1)				-0.06	-0.07	-0.1	-0.06	0.97	1.01	-0.1
Vertical Gradient (see Note 2)				**-0.0043 Up**	**-0.0050 Up**	**-0.0071 Up**	**-0.0043 Up**	**0.0693 Down**	**0.0721 Down**	**-0.0071 Up**

Nested Piezometers: **B-26s** Unit 1 - Unconfined Saprolite (Water Table) Aquifer
B-26d Unit 3 - Fractured Bedrock Aquifer

Piezometer No.	Top of Screen, El.	Bottom of Screen, El.	delta-Screen Interval, ft *	06/02/00 W.T.E.	10/18/00 W.T.E.	12/30/00 W.T.E.	03/03/01 W.T.E.	05/17/01 W.T.E.	07/04/01 W.T.E.	10/23/01 W.T.E.
B-26s	923.0	913.0	41	935.52	933.98	934.41	935.03	934.83	934.55	934.47
B-26d	872.0	862.0		934.42	933.24	933.34	933.84	933.86	933.54	933.39
delta-W.T.E. (see Note 1)				1.1	0.74	1.07	1.19	0.97	1.01	1.08
Vertical Gradient (see Note 2)				**0.0786 Down**	**0.0529 Down**	**0.0764 Down**	**0.0850 Down**	**0.0693 Down**	**0.0721 Down**	**0.0771 Down**

Nested Piezometers: **B-30s** Unit 1 - Unconfined Saprolite (Water Table) Aquifer
B-30d Unit 3 - Fractured Bedrock Aquifer

Piezometer No.	Top of Screen, El.	Bottom of Screen, El.	delta-Screen Interval, ft *	06/02/00 W.T.E.	10/18/00 W.T.E.	12/30/00 W.T.E.	03/03/01 W.T.E.	05/17/01 W.T.E.	07/04/01 W.T.E.	10/23/01 W.T.E.
B-30s	881.8	871.8	7.1	888.52	888.15	888.57	888.82	888.38	888.94	888.45
B-30d	864.7	854.7		887.79	887.47	887.79	888.04	887.65	888.14	887.70
delta-W.T.E. (see Note 1)				0.73	0.68	0.78	0.78	0.73	0.8	0.75
Vertical Gradient (see Note 2)				**0.0521 Down**	**0.0486 Down**	**0.0557 Down**	**0.0557 Down**	**0.0521 Down**	**0.0571 Down**	**0.0536 Down**

Notes to Above:

1 delta-W.T.E. = difference in water level (shallow well minus deep well)

2 Vertical Gradiant = delta-W.T.E / delta-Screen Interval

3 **Negative vertical gradients are upward, positive gradients are downward.**

The vertical gradients can change with time due to seasonal fluctuation of the potentiometric levels between the upper, unconfined saprolite aquifer and the deeper, partly confined bedrock acquifer

Table 7
Horizontal Ground Water Gradient and Velocity Calculations

Based on Hvorslev Solutions (Table 3)

Ground water elevations and reference potentiometric elevations are based on June 2, 2000 observations, except B-25 which is based on the June 20, 2000 observation due to slow recharge (see Drawing S6)

Hydr. Unit	Well / Piez. No.	Hydraulic Conductivity (k) cm/sec	Hydraulic Conductivity (k) ft/day	Ground Water El.	Reference Elevation	Vertical Change, ft.	Horizontal Change, ft.	Hydraulic Gradient (i)	Effective Porosity (n)	Ground Water Velocity (V), ft/day
1	B-5s	5.13E-05	0.143	911.52	920	8.48	115	0.074	0.20	0.05
1	B-8	3.65E-05	0.102	879.61	870	9.61	90	0.107	0.20	0.05
1	B-9s	1.59E-04	0.443	853.11	860	6.89	95	0.073	0.20	0.16
1	B-12s	4.00E-05	0.112	949.22	940	9.22	125	0.074	0.20	0.04
1	B-16s	9.41E-05	0.262	845.27	860	14.73	140	0.105	0.20	0.14
1	B-19	5.69E-05	0.159	939.79	930	9.79	85	0.115	0.20	0.09
1	B-23	1.38E-05	0.038	941.2	930	11.2	195	0.057	0.20	0.01
1	B-26s	7.10E-05	0.198	935.52	940	4.48	90	0.050	0.20	0.05
1	B-30s	1.71E-04	0.477	888.52	900	11.48	135	0.085	0.20	0.20
1	B-33	1.13E-04	0.314	905.01	910	4.99	75	0.067	0.20	0.10
2	B-2	1.47E-05	0.041	954.5	960	5.5	75	0.073	0.17	0.02
2	B-4	1.37E-05	0.038	923.53	930	6.47	85	0.076	0.15	0.02
2	B-7	2.77E-05	0.077	881.24	890	8.76	120	0.073	0.15	0.04
2	B-11	2.16E-05	0.060	959.89	950	9.89	175	0.057	0.15	0.02
2	B-22	4.00E-05	0.111	835.09	830	5.09	65	0.078	0.15	0.06
2	B-25	4.69E-05	0.131	929.48	920	9.48	65	0.146	0.15	0.13
2	B-31	1.54E-05	0.043	946.81	940	6.81	125	0.054	0.15	0.02
2	B-35	3.08E-05	0.086	924.79	930	5.21	95	0.055	0.15	0.03
2	B-37	4.02E-05	0.112	864.53	870	5.47	130	0.042	0.15	0.03
3	B-1	1.45E-05	0.040	982.81	980	2.81	120	0.023	0.10	0.01
3	B-5d	5.60E-05	0.156	912.66	920	7.34	115	0.064	0.10	0.10
3	B-6	1.39E-05	0.039	881.6	880	1.6	30	0.053	0.10	0.02
3	B-9d	1.56E-04	0.434	853.22	860	6.78	95	0.071	0.10	0.31
3	B-10	1.55E-05	0.043	955.58	960	4.42	110	0.040	0.10	0.02
3	B-12d	4.17E-05	0.116	942.61	940	2.61	125	0.021	0.10	0.02
3	B-13	5.83E-05	0.162	923.02	930	6.98	75	0.093	0.10	0.15
3	B-15	5.37E-05	0.150	867.94	870	2.06	25	0.082	0.10	0.12
3	B-16d	9.42E-05	0.262	845.33	860	14.67	140	0.105	0.10	0.28
3	B-17	3.34E-05	0.093	928.36	930	1.64	90	0.018	0.12	0.01
3	B-20	4.71E-05	0.131	876.05	870	6.05	70	0.086	0.10	0.11
3	B-21	4.93E-05	0.137	910.62	900	10.62	45	0.236	0.13	0.25
3	B-26d	6.59E-05	0.183	934.42	940	5.58	90	0.062	0.10	0.11
3	B-29	9.04E-05	0.252	857.74	850	7.74	110	0.070	0.10	0.18
3	B-30d	1.72E-04	0.478	887.79	900	12.21	135	0.090	0.10	0.43
3	B-32	1.48E-05	0.041	919.46	910	9.46	80	0.118	0.10	0.05
3	B-34	3.25E-05	0.090	889.16	890	0.84	90	0.009	0.10	0.01
3	B-36	3.92E-05	0.109	930.49	920	10.49	50	0.210	0.10	0.23

Notes: Ground Water Velocity Calculated from Equation:

$V=Ki/n$ where K = Hydraulic Conductivity in ft/day
i = Hydraulic Gradient in units of ft/ft
n = Effective Porosity is unitless
V = Ground Water Velocity in ft/day

Hydraulic Conductivity Conversion Factor: 1 ft/day = 3.59E-04 cm/sec

Effective Porosity values from published literature (see footnote on Table 3).

Table 8
Correlation of Hydrogeologic and Topographic Properties

Hydro-geologic Unit	Biotite-Plagioclase Gneiss				
	Boring No.	Conductivity ft/day	Gradient ft/ft	Velocity ft/day	Topographic Position
1	B-5s	0.143	0.074	0.05	Head of drainage feature
1	B-8	0.102	0.107	0.05	Midslope on ridge
1	B-9s	0.443	0.073	0.16	Adjacent to creek
1	B-16s	0.262	0.105	0.14	Adjacent to creek
1	B-19	0.159	0.115	0.09	Head of drainage feature
1	B-26s	0.198	0.050	0.05	Adjacent to creek
1	B-30s	0.477	0.085	0.20	Adjacent to creek
2	B-2	0.041	0.073	0.02	Knoll at crest of ridge
2	B-4	0.477	0.076	0.02	Midslope on ridge
2	B-7	0.077	0.073	0.04	Knoll at crest of ridge
2	B-25	0.131	0.146	0.13	Midslope above stream
2	B-31	0.043	0.054	0.02	Midslope on ridge
2	B-37	0.112	0.042	0.03	Midslope above stream
3	B-1	0.040	0.023	0.01	Near crest of ridge
3	B-5d	0.156	0.064	0.10	Head of drainage feature
3	B-6	0.039	0.053	0.02	Near crest of ridge
3	B-9d	0.434	0.071	0.31	Adjacent to creek
3	B-16d	0.262	0.105	0.28	Adjacent to creek
3	B-26d	0.183	0.062	0.11	Adjacent to creek
3	B-30d	0.478	0.090	0.43	Adjacent to creek
3	B-32	0.041	0.118	0.05	Knoll at crest of ridge

Hydro-geologic Unit	Granitic Gneiss and Aplitic Mica Gneiss				
	Boring No.	Conductivity ft/day	Gradient ft/ft	Velocity ft/day	Topographic Position
1	B-12s	0.112	0.074	0.04	Head of drainage feature
1	B-23	0.038	0.057	0.01	Near crest of ridge
1	B-33	0.314	0.067	0.10	Along dry drainage feature
2	B-11	0.060	0.057	0.02	Midslope of ridge
2	B-22	0.111	0.078	0.06	Midslope of ridge
2	B-35	0.086	0.055	0.03	Knoll at crest of ridge
3	B-10	0.043	0.040	0.02	Near crest of ridge
3	B-12d	0.116	0.021	0.02	Along dry drainage feature
3	B-13	0.162	0.093	0.15	Midslope of ridge
3	B-15	0.150	0.082	0.12	Midslope above stream
3	B-17	0.093	0.018	0.01	Midslope of ridge
3	B-20	0.131	0.086	0.11	Midslope of ridge
3	B-21	0.137	0.236	0.25	Midslope of ridge
3	B-29	0.252	0.070	0.18	Midslope of ridge
3	B-34*	0.090	0.009	0.01	Midslope of ridge
3	B-36	0.109	0.210	0.23	Along dry drainage feature

*B-34 encountered amphibolite in close proximity to the granitic gneiss area

Table 8A
Correlation of Hydrogeologic and Topographic Properties

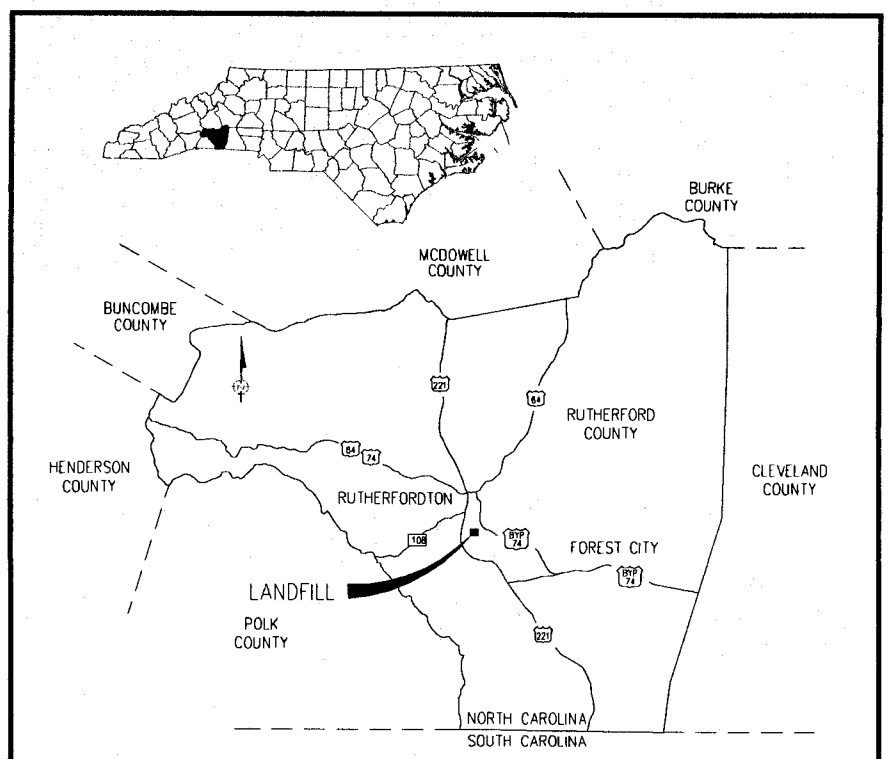
Topographic Position	Lithologic Unit	Hydro-geologic Unit	Boring No.	Hydraulic Conductivity ft/day	Hydraulic Gradient ft/day	Ground Water Velocity ft/ft
Ridge or knoll	**Mica Gneiss**	2	B-2	0.041	0.073	0.02
		2	B-7	0.077	0.073	0.04
	Average	2		**0.059**	**0.073**	**0.03**
		3	B-1	0.040	0.023	0.01
		3	B-6	0.039	0.053	0.02
		3	B-32	0.041	0.118	0.05
	Average	3		**0.040**	**0.065**	**0.03**
Ridge or knoll	**Granitic Gneiss**	1	B-23	**0.038**	**0.057**	**0.01**
		2	B-35	**0.086**	**0.055**	**0.03**
		3	B-10	**0.043**	**0.040**	**0.02**
Midslope	**Mica Gneiss**	1	B-8	**0.102**	**0.107**	**0.05**
		2	B-4	0.477	0.076	0.02
		2	B-25	0.131	0.146	0.13
		2	B-31	0.043	0.054	0.02
		2	B-37	0.112	0.042	0.03
	Average	2		**0.191**	**0.080**	**0.05**
Midslope	**Granitic Gneiss**	2	B-11	0.060	0.057	0.02
		2	B-22	0.111	0.078	0.06
	Average	2		**0.085**	**0.067**	**0.04**
		3	B-13	0.162	0.093	0.15
		3	B-17	0.093	0.018	0.01
		3	B-20	0.131	0.086	0.11
		3	B-21	0.137	0.236	0.25
		3	B-29	0.252	0.070	0.18
		3	B-34*	0.090	0.009	0.01
	Average	3		**0.144**	**0.086**	**0.12**
Near drainage feature	**Mica Gneiss**	1	B-5s	0.143	0.074	0.05
		1	B-9s	0.443	0.073	0.16
		1	B-16s	0.262	0.105	0.14
		1	B-19	0.159	0.115	0.09
		1	B-26s	0.198	0.050	0.05
		1	B-30s	0.477	0.085	0.20
	Average	1		**0.280**	**0.084**	**0.12**
		3	B-5d	0.156	0.064	0.10
		3	B-9d	0.434	0.071	0.31
		3	B-16d	0.262	0.105	0.28
		3	B-26d	0.183	0.062	0.11
		3	B-30d	0.478	0.090	0.43
	Average	3		**0.303**	**0.078**	**0.25**
Near drainage feature	**Granitic Gneiss**	1	B-12s	0.112	0.074	0.04
		1	B-33	0.314	0.067	0.10
	Average	1		**0.213**	**0.070**	**0.07**
		3	B-12d	0.116	0.021	0.02
		3	B-15	0.150	0.082	0.12
		3	B-36	0.109	0.210	0.23
	Average	3		**0.125**	**0.104**	**0.12**

-DRAWINGS-

RUTHERFORD COUNTY SOLID WASTE MANAGEMENT
RUTHERFORDTON, NORTH CAROLINA

MSW LANDFILL SITE STUDY AND PROPOSED FACILTY PLAN PERMIT DRAWINGS

JANUARY 2001



VICINITY MAP
N.T.S.

SHEET	DRAWING	TITLE
1	–	TITLE/COVER SHEET
2	S1	REGIONAL CHARACTERIZATION MAP
3	S2	LOCAL AREA MAP
4	S3	LOCAL AREA PHOTO
5	S4	SITE DEVELOPMENT PLAN – BASE GRADES
6	S5	SITE DEVELOPMENT PLAN – FINAL COVER GRADES
7	S6	GROUND WATER CONTOURS
8	S7	BEDROCK CONTOURS
9	HX1	HYDROGEOLOGIC CROSS SECTIONS (SHEET 1 OF 3)
10	HX2	HYDROGEOLOGIC CROSS SECTIONS (SHEET 2 OF 3)
11	HX3	HYDROGEOLOGIC CROSS SECTIONS (SHEET 3 OF 3)
12	EX1	ENGINEERING CROSS SECTIONS (SHEET 1 OF 2)
13	EX2	ENGINEERING CROSS SECTIONS (SHEET 2 OF 2)
14	P1	PHASING PLAN (SHEET 1 OF 3)
15	P2	PHASING PLAN (SHEET 2 OF 3)
16	P3	PHASING PLAN (SHEET 3 OF 3)

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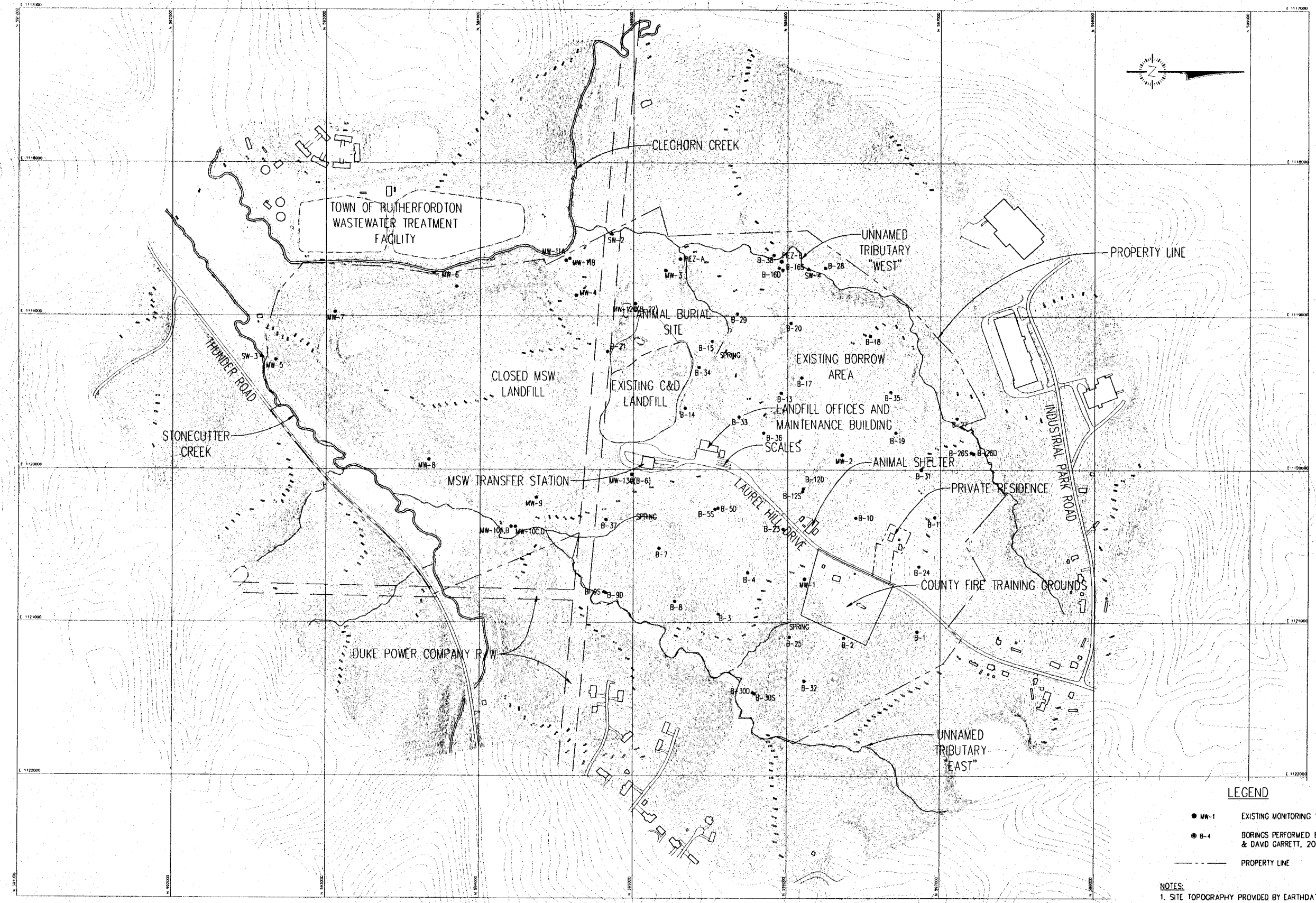
NORTH CAROLINA PROFESSIONAL SEAL 8895 ENGINEER GEORGE N. RICHARDSON 1-10-01

NORTH CAROLINA PROFESSIONAL SEAL 021668 ENGINEER PIETER K. SCHEER 1/10/01

NORTH CAROLINA PROFESSIONAL SEAL 983 GEOLOGIST G. DAVID GARRETT 1/17/01

FILE NAME RUTH-D0037



NOTES:

1. SITE TOPOGRAPHY PROVIDED BY EARTHDATA INTERNATIONAL FROM AERIAL PHOTOGRAPHY DATED MARCH 30, 1999. SUPPLEMENTAL TOPOGRAPHY AROUND SITE PERIMETER OBTAINED FROM USGS MAPPING WITH SOME ADJUSTMENTS MADE TO TIE INTO EARTHDATA TOPOGRAPHY.

DATE	NO.	REVISION

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SEAL: NORTH CAROLINA PROFESSIONAL SEAL 1365 GEOLOGIST G. DAVID GARRETT 1/17/01

PROJECT TITLE: RUTHERFORD COUNTY SOLID WASTE MANAGEMENT MSW LANDFILL SITE STUDY & PROPOSED FACILITY PLAN

DRAWING TITLE: LOCAL AREA MAP

DESIGNED BY: G.D.G.	DRAWN BY: C.T.J.
CHECKED BY: P.K.S.	PROJECT NO.: RUTH-1
SCALE: AS SHOWN	DATE: JAN. 2001
FILE NAME: RUTH-D0039	
SHEET NO. 3	DRAWING NO. S2

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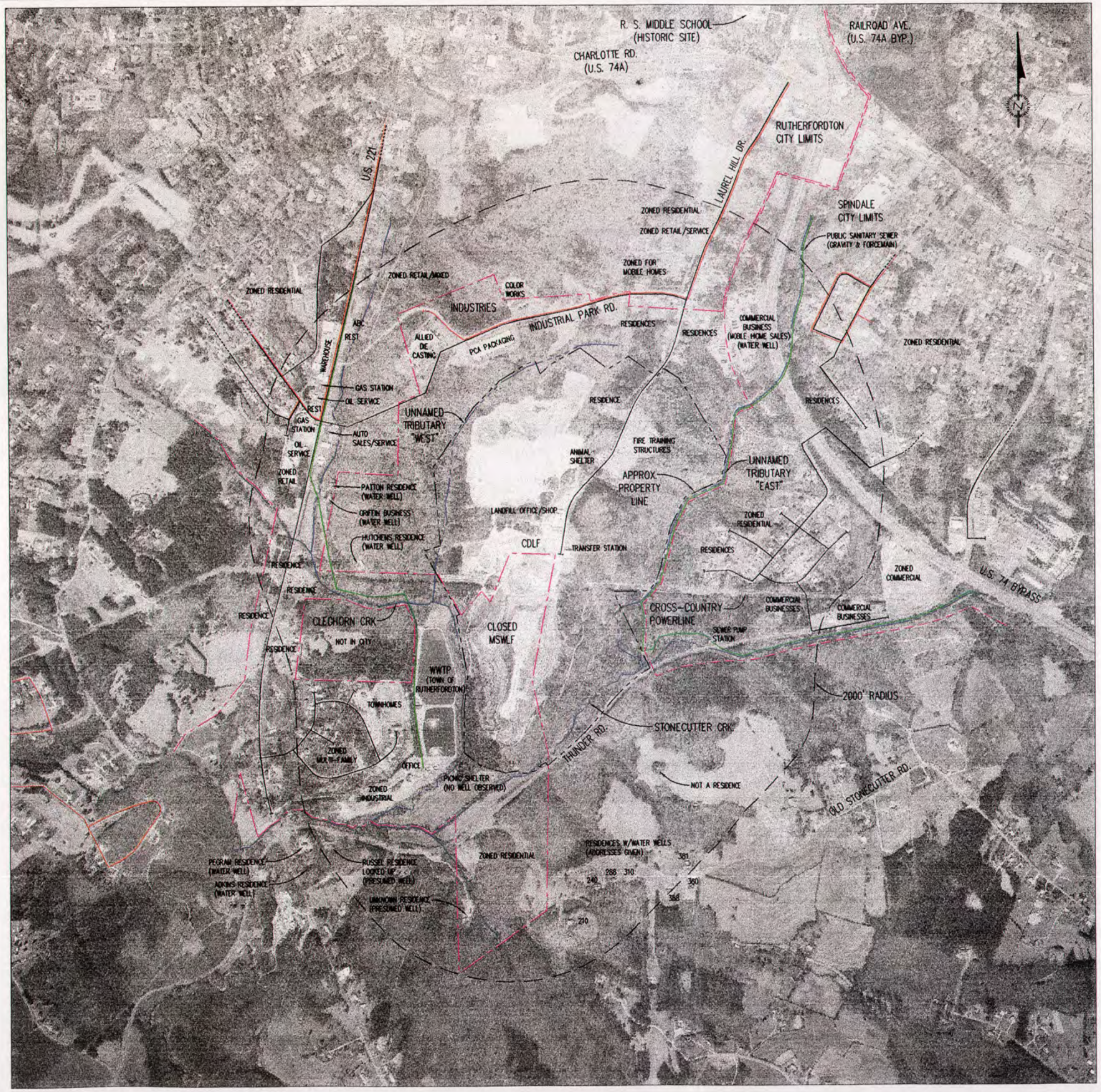

AERIAL PHOTO W/2000' RADIUS AND LOCAL WATER WELL SURVEY
SCALE 1"= 400'
PHOTOGRAPH DATE 3/30/99

WATER WELLS

1. PATTON (RES.)	ACTIVE
2. GRIFFIN (RES./BUS.)	ACTIVE
3. HUTCHENS (RES.)	ACTIVE
4. PEGRAM	OUTSIDE 2000'
5. ADKINS	OUTSIDE 2000'
6. RUSSELL (280 THUNDER RD.)	"SUMMER HOME"
7. UNKNOWN (THUNDER RD.)	ABANDONED?
8. 210 OLD STONECUTTER RD.	ACTIVE
9. 240 OLD STONECUTTER RD.	ACTIVE
10. 288 OLD STONECUTTER RD.	ACTIVE
11. 310 OLD STONECUTTER RD.	ACTIVE
12. 356 OLD STONECUTTER RD.	OUTSIDE 2000'
13. 360 OLD STONECUTTER RD.	OUTSIDE 2000'
14. 391 OLD STONECUTTER RD.	ACTIVE
15. HORTON HOMES (BUS.)	ACTIVE

LEGEND

- PROPERTY LINE
- CREEKS
- 2000' RADIUS
- RUTHERFORDTON CITY LIMITS
- SPINDALE CITY LIMITS
- SEWER LINES
- GAS LINES
- WATER LINES

REFERENCE:

1. GAS LINE LOCATIONS ARE FROM PUBLIC SERVICE OF NC IN FOREST CITY, NC, MAPS 332-29-32 AND 332-33-0
2. WATER LINE LOCATIONS ARE FROM DUKE POWER WATER DEPARTMENT IN FOREST CITY, NC MAPS 20-595, 20-600, 20-605, 15-595, 15-600, & 15-605.
3. ALL CITY LIMITS AND UTILITY LOCATIONS SHOWN ARE APPROXIMATE.
4. TOWN OF RUTHERFORDTON
   - DEPARTMENT OF PUBLIC UTILITIES
     HAL DAINS - DIRECTOR
   - DEPARTMENT OF PLANNING AND ZONING
     DONALD HUTCHING - DIRECTOR
5. TOWN OF SPINDALE
   - DEPARTMENT OF PUBLIC UTILITIES
     MIKE BROOKS - DIRECTOR
   - TIM BARTH - TOWN MANAGER
6. ISOTHERMAL PLANNING & DEVELOPMENT COMMISSIONER
   TRACEY WRIGHT - REG. PLANNER
7. RUTHERFORD COUNTY HISTORICAL SOCIETY
   JIM NOWARK - CHAIRMAN
8. RUTHERFORD COUNTY TAX DEPARTMENT
9. BASE PHOTO BY EARTHDATA INTERNATIONAL DATED 3-30-99.

NO.	DATE	REVISION
1		
2		
3		
4		
5		

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PROJECT TITLE: RUTHERFORD COUNTY SOLID WASTE MANAGEMENT MSW LANDFILL SITE STUDY & PROPOSED FACILITY PLAN

DRAWING TITLE: LOCAL AREA PHOTO

DESIGNED BY: G.E.D.	DRAWN BY: A.W.H.
CHECKED BY: P.K.S.	PROJECT NO: RUBI-1
SCALE: AS SHOWN	DATE: JAN. 2001
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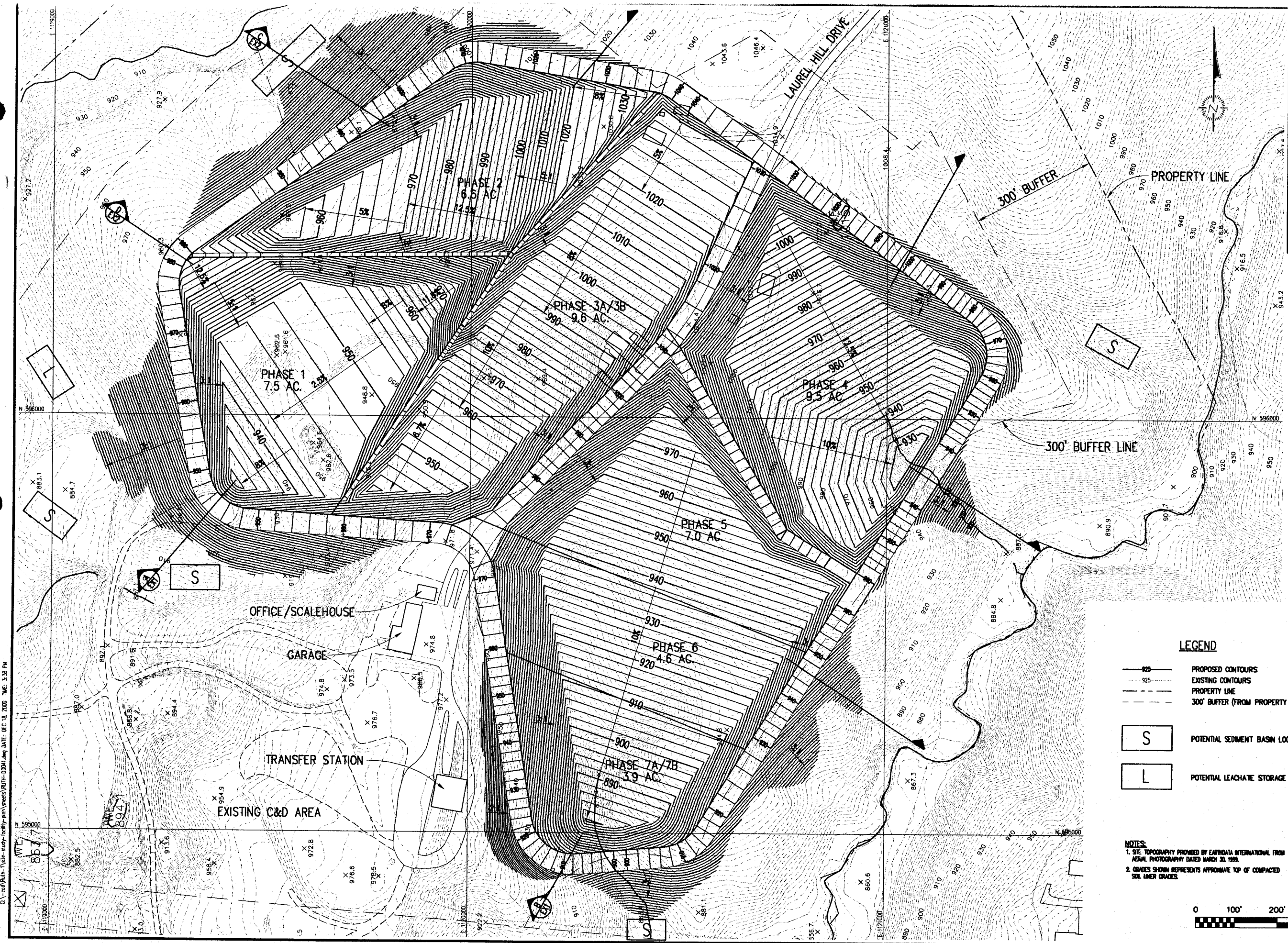

DATE	NO.	REVISION

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PROJECT TITLE: RUTHERFORD COUNTY SOLID WASTE MANAGEMENT MSW LANDFILL SITE STUDY & PROPOSED FACILITY PLAN

DRAWING TITLE: SITE DEVELOPMENT PLAN BASE GRADES

DESIGNED BY: P.K.S.	DRAWN BY: A.W.H.
CHECKED BY: C.N.R.	PROJECT NO.: RUTH-1
SCALE: AS SHOWN	DATE: JAN. 2001
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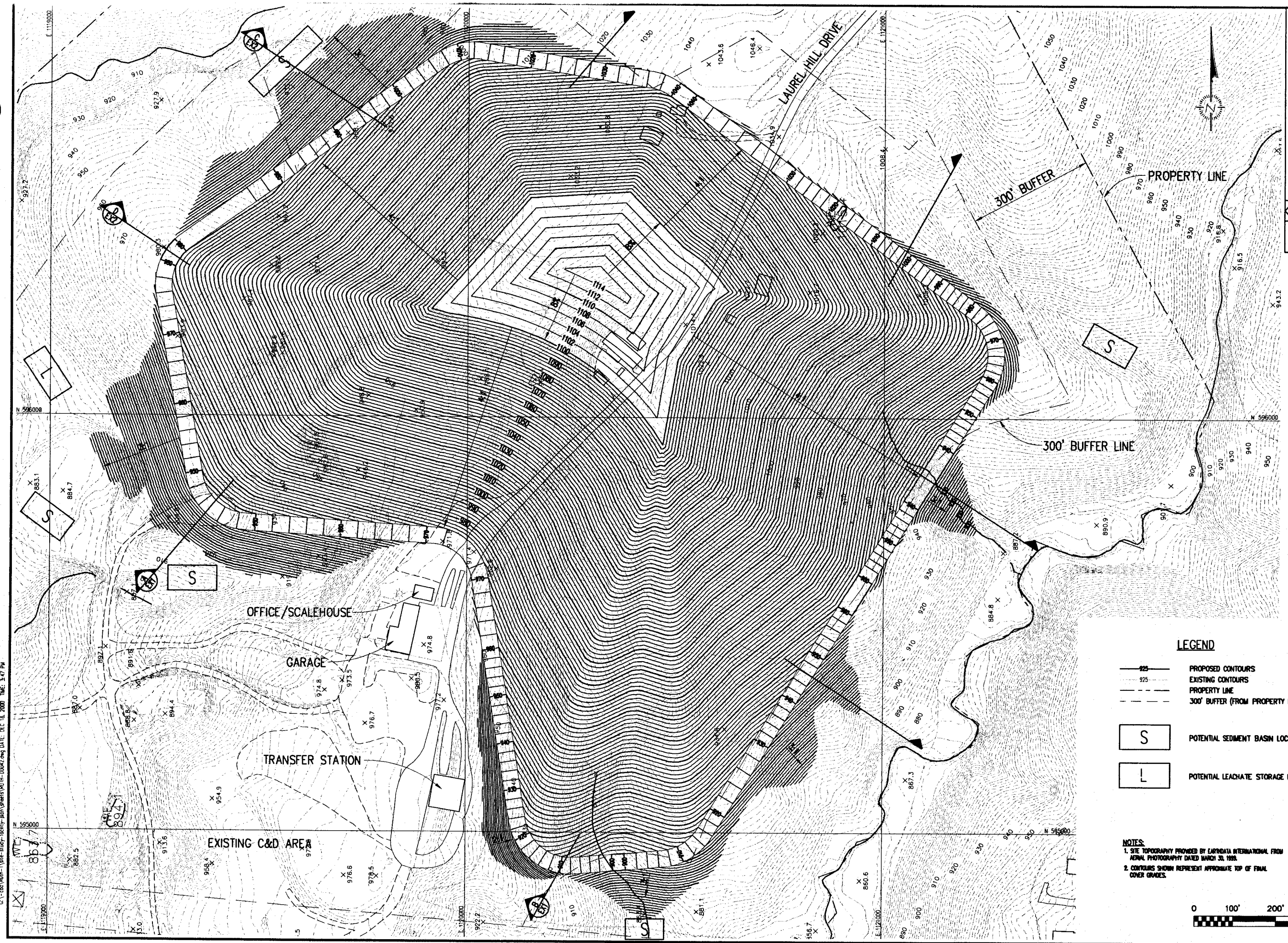
SHEET NO. 5	DRAWING NO. S4



LEGEND

925	PROPOSED CONTOURS
925	EXISTING CONTOURS
	PROPERTY LINE
	300' BUFFER (FROM PROPERTY LINE)
S	POTENTIAL SEDIMENT BASIN LOCATION
L	POTENTIAL LEACHATE STORAGE LOCATION

NOTES:
1. SITE TOPOGRAPHY PROVIDED BY EARTHDATA INTERNATIONAL FROM AERIAL PHOTOGRAPHY DATED MARCH 30, 1999.
2. CONTOURS SHOWN REPRESENT APPROXIMATE TOP OF FINAL COVER GRADES.

0 100' 200' 300'

DATE	NO.	REVISION

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SEAL: PIETER K. SCHEER 1/10/01

SEAL: GREGORY N. RICHARDSON 1-10-01

PROJECT TITLE:
RUTHERFORD COUNTY
SOLID WASTE MANAGEMENT
MSW LANDFILL SITE STUDY &
PROPOSED FACILITY PLAN

DRAWING TITLE:
SITE DEVELOPMENT PLAN
FINAL COVER GRADES

DESIGNED BY: P.K.S.	DRAWN BY: A.W.H.
CHECKED BY: G.N.R.	PROJECT NO.: RUTH-1
SCALE: AS SHOWN	DATE: JAN. 2001
FILE NAME: RUTH-D0042	
SHEET NO. 6	DRAWING NO. S5

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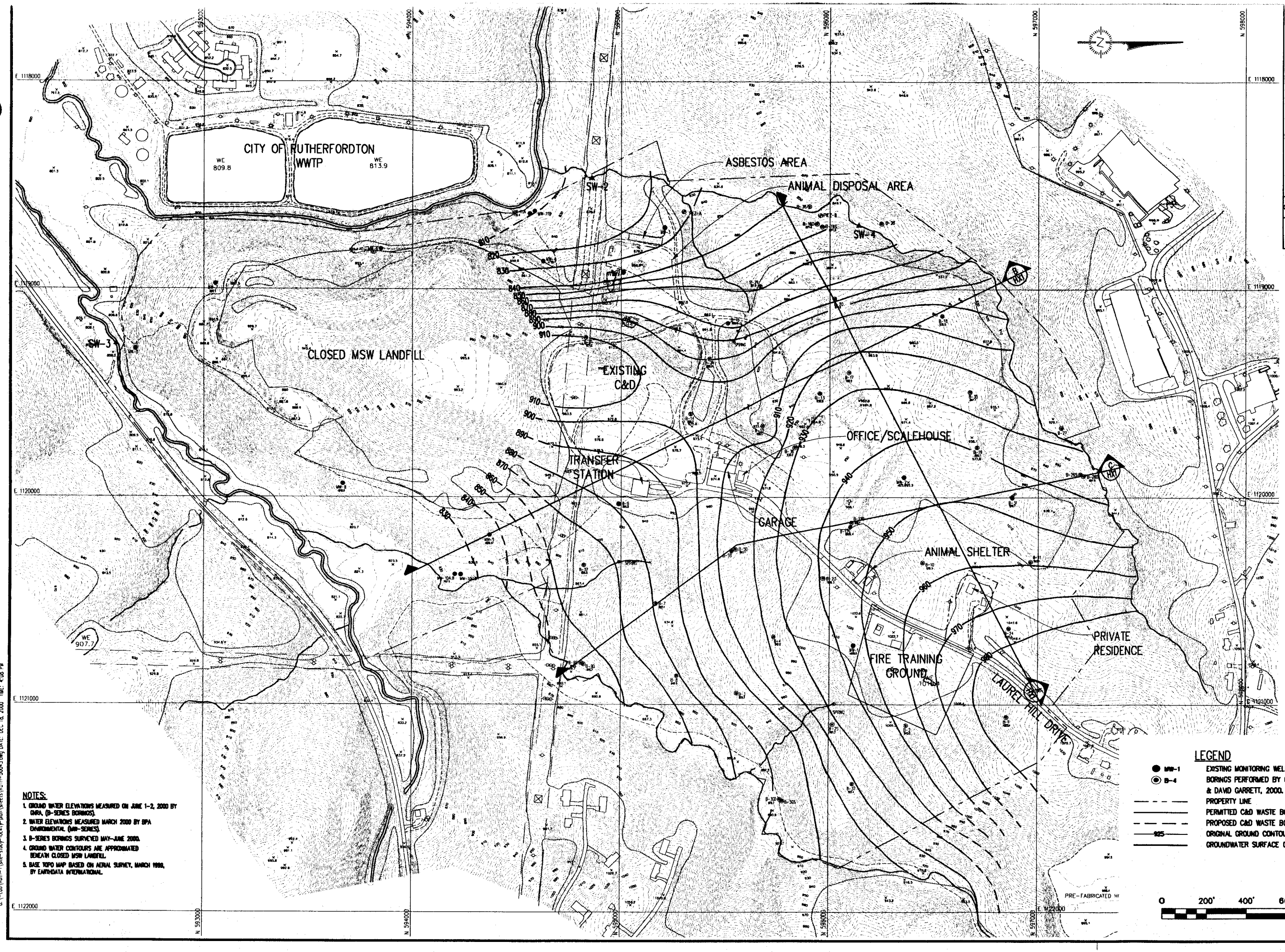

NOTES:

1. GROUND WATER ELEVATIONS MEASURED ON JUNE 1-2, 2000 BY GNRA, (B-SERIES BORINGS).
2. WATER ELEVATIONS MEASURED MARCH 2000 BY EPA ENVIRONMENTAL (MW-SERIES).
3. B-SERIES BORINGS SURVEYED MAY-JUNE 2000.
4. GROUND WATER CONTOURS ARE APPROXIMATED BENEATH CLOSED MSW LANDFILL.
5. BASE TOPO MAP BASED ON AERIAL SURVEY, MARCH 1999, BY EARTHDATA INTERNATIONAL.

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DATE	NO.	REVISION

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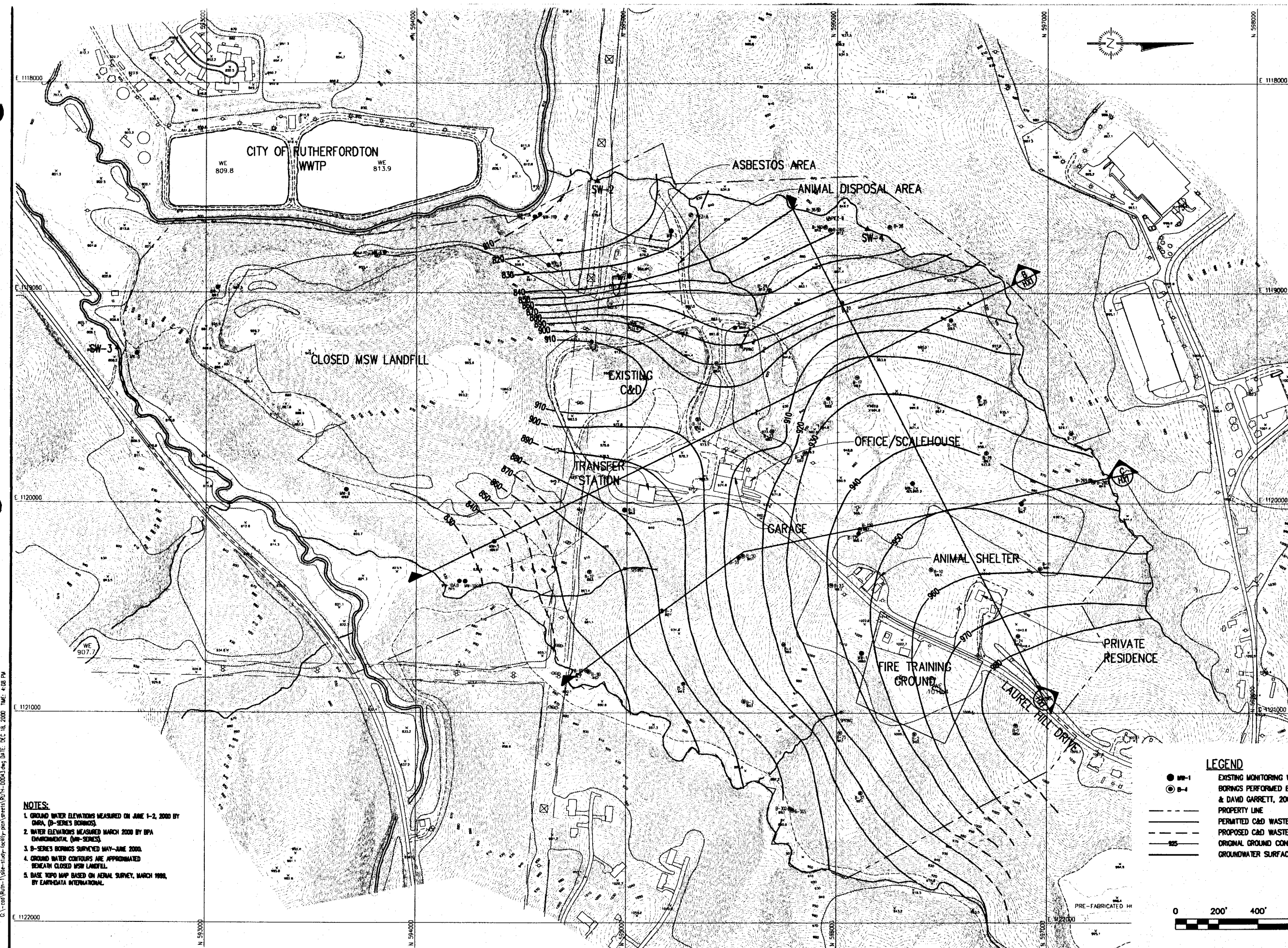
SEAL

PROJECT TITLE:
RUTHERFORD COUNTY
SOLID WASTE MANAGEMENT
MSW LANDFILL SITE STUDY &
PROPOSED FACILITY PLAN

DRAWING TITLE:
GROUND WATER CONTOURS

DESIGNED BY: G.D.G.	DRAWN BY: A.W.H.
CHECKED BY: P.K.S.	PROJECT NO.: RUTH-1
SCALE: AS SHOWN	DATE: JAN. 2001
FILE NAME: RUTH-00043	
SHEET NO. 7	DRAWING NO. S6



NOTES:

1. GROUND WATER ELEVATIONS MEASURED ON JUNE 1-2, 2000 BY GNRA, (B-SERIES BORINGS).
2. WATER ELEVATIONS MEASURED MARCH 2000 BY BPA ENVIRONMENTAL (MW-SERIES).
3. B-SERIES BORINGS SURVEYED MAY-JUNE 2000.
4. GROUND WATER CONTOURS ARE APPROXIMATED BENEATH CLOSED MSW LANDFILL.
5. BASE TOPO MAP BASED ON AERIAL SURVEY, MARCH 1999, BY EARTHDATA INTERNATIONAL.

G:\r-rot\Ruth-1\site-study-facility-plan\sheets\Ruth-00043.dwg DATE: DEC 18, 2000 TIME: 4:08 PM

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SEAL

SEAL

PROJECT TITLE:
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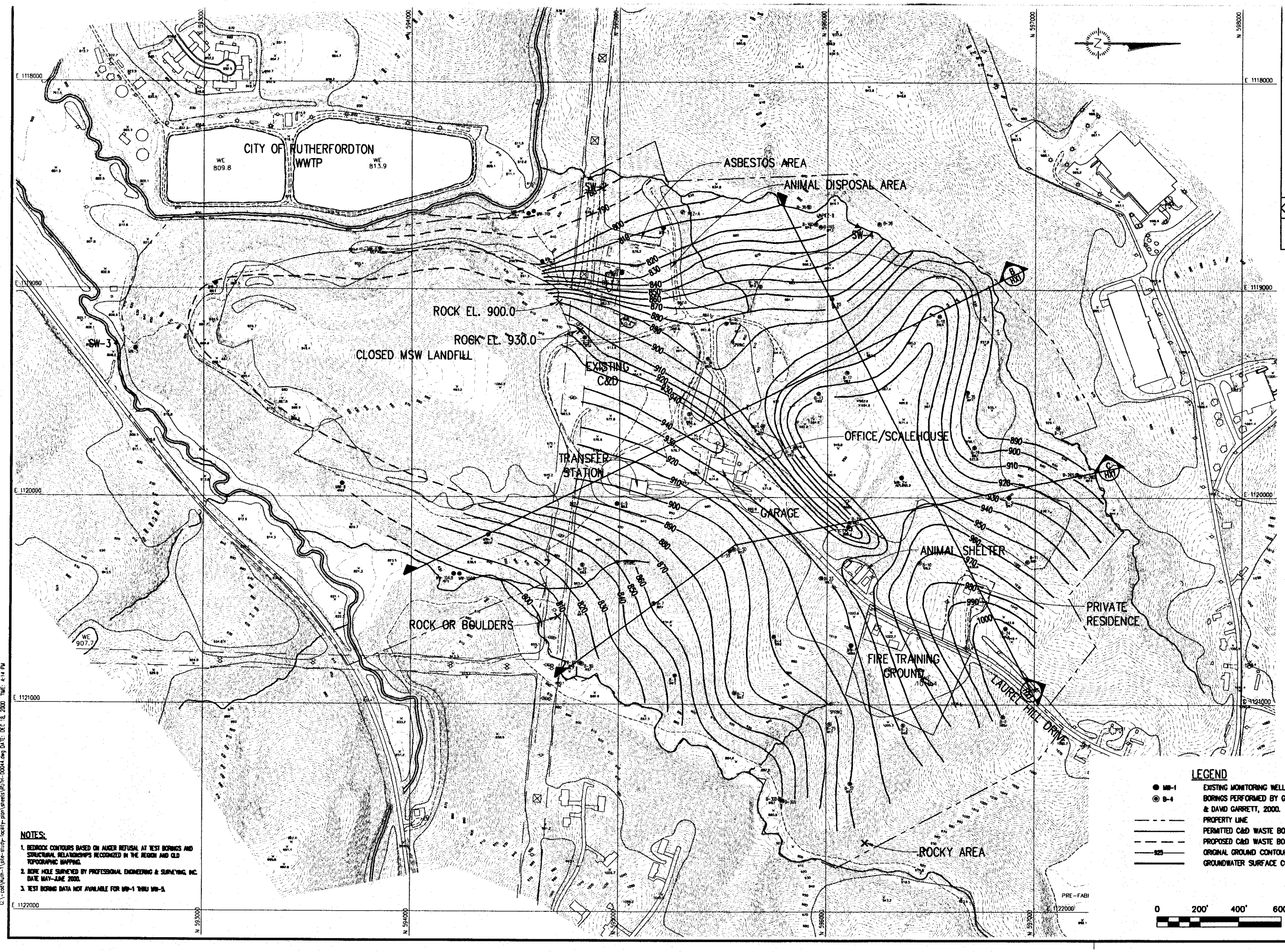
SOLID WASTE MANAGEMENT
MSW LANDFILL SITE STUDY &
PROPOSED FACILITY PLAN

DRAWING TITLE:
GROUND WATER CONTOURS

DESIGNED BY: G.D.G.	DRAWN BY: A.W.H.
CHECKED BY: P.K.S.	PROJECT NO.: RUTH-1
SCALE: AS SHOWN	DATE: JAN. 2001
FILE NAME: RUTH-00043	
SHEET NO. 7	DRAWING NO. S6



LEGEND

- MW-1 — EXISTING MONITORING WELLS
- B-4 — BORINGS PERFORMED BY GNRA, 1999 & DAVID GARRETT, 2000.
- PROPERTY LINE
- PERMITTED C&D WASTE BOUNDARY
- PROPOSED C&D WASTE BOUNDARY
- 925 — ORIGINAL GROUND CONTOURS
- GROUNDWATER SURFACE CONTOURS

NOTES:

1. BEDROCK CONTOURS BASED ON AUGER REFUSAL AT TEST BORINGS AND STRUCTURAL RELATIONSHIPS RECOGNIZED IN THE REGION AND OLD TOPOGRAPHIC MAPPING.
2. BORE HOLE SURVEYED BY PROFESSIONAL ENGINEERING & SURVEYING, INC. DATE MAY–JUNE 2000.
3. TEST BORING DATA NOT AVAILABLE FOR MW-1 THRU MW-5.

DATE	NO.	REVISION

DAVID GARRETT, P.G., P.E.
Engineering and Geology
1408 Rock Drive
Raleigh, North Carolina 27610

G.N. RICHARDSON & ASSOCIATES, INC.
CIVIL & ENVIRONMENTAL ENGINEERS, LAND SURVEYORS
405 N. SCOTLAND AVENUE, PAULDING, MS. 39425
PHONE: 601-649-4077 FAX: 601-649-4080

SEAL

PROJECT TITLE: RUTHERFORD COUNTY SOLID WASTE MANAGEMENT MSW LANDFILL SITE STUDY & PROPOSED FACILITY PLAN

DRAWING TITLE: BEDROCK CONTOURS

DESIGNED BY: G.D.G.	DRAWN BY: A.W.H.
CHECKED BY: P.K.S.	PROJECT NO.: RUTH-1
SCALE: AS SHOWN	DATE: JAN. 2001
FILE NAME: RUTH-D0044	
SHEET NO. 8	DRAWING NO. S7

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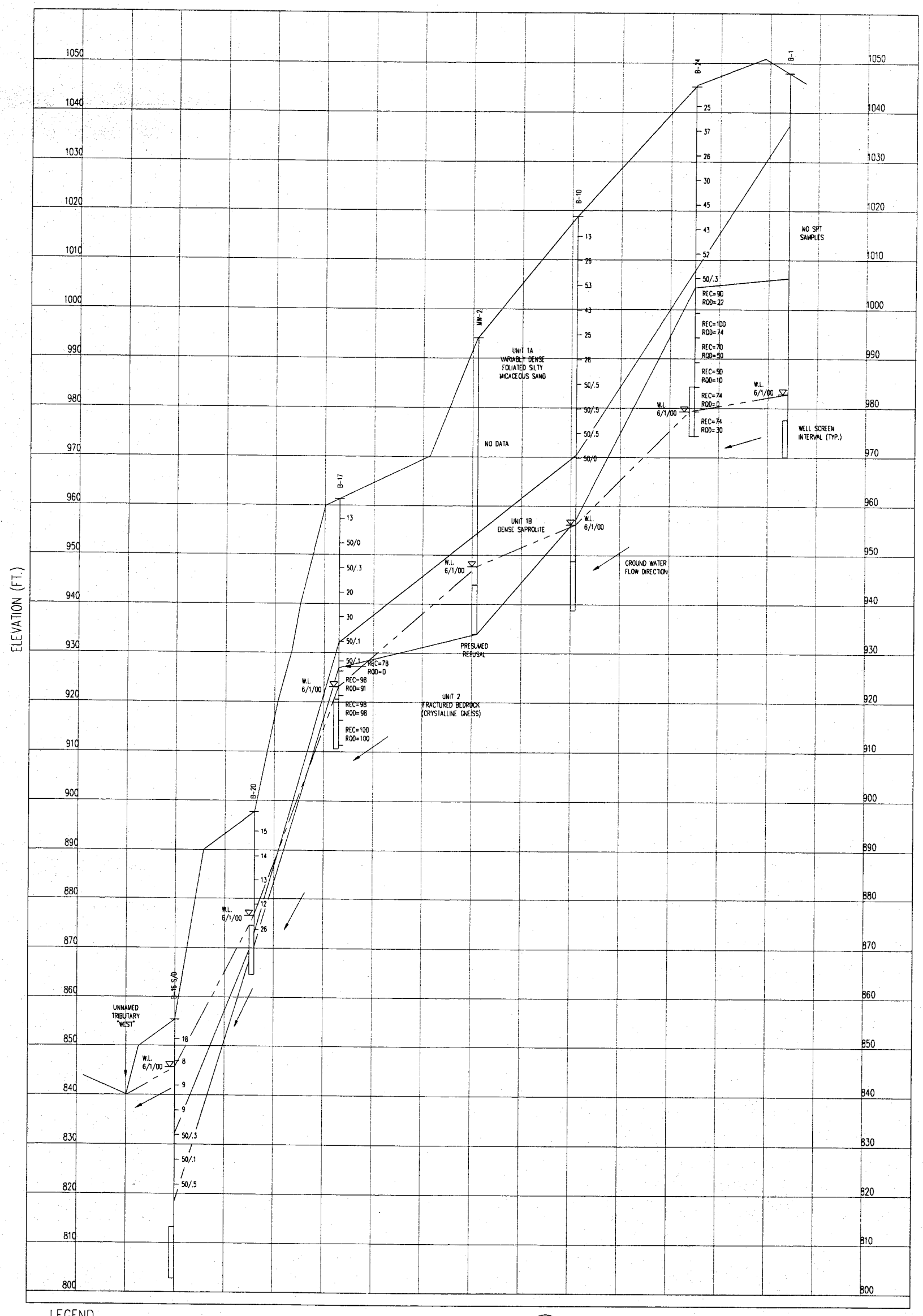

LEGEND

W.L. 4/5/00 — STABILIZED GROUND WATER OBSERVATION ON GIVEN DATE

34 — STANDARD PENETRATION RESISTANCE VALUE (BLOWS PER FOOT)

APPARENT GROUND WATER FLOW DIRECTION

PIEZOMETER SCREEN INTERVAL

SECTION A — A / HX1

DATE	NO.	REVISION

DRAWING TITLE: HYDROGEOLOGIC CROSS SECTIONS (SHEET 1 OF 3)

PROJECT TITLE: RUTHERFORD COUNTY SOLID WASTE MANAGEMENT MSW LANDFILL SITE STUDY & PROPOSED FACILITY PLAN

SEAL: NORTH CAROLINA PROFESSIONAL SEAL GEOLOGIST DAVID GARRETT 1/19/01

SEAL

G.N. RICHARDSON & ASSOCIATES, INC.
425 N. BOYLAN AVENUE RALEIGH, N.C. 27603
PHONE-919-828-0877 FAX-919-828-3889 WWW.GNRA.COM

DAVID GARRETT, P.G., P.E.
Engineering and Geology
1408 Rock Drive
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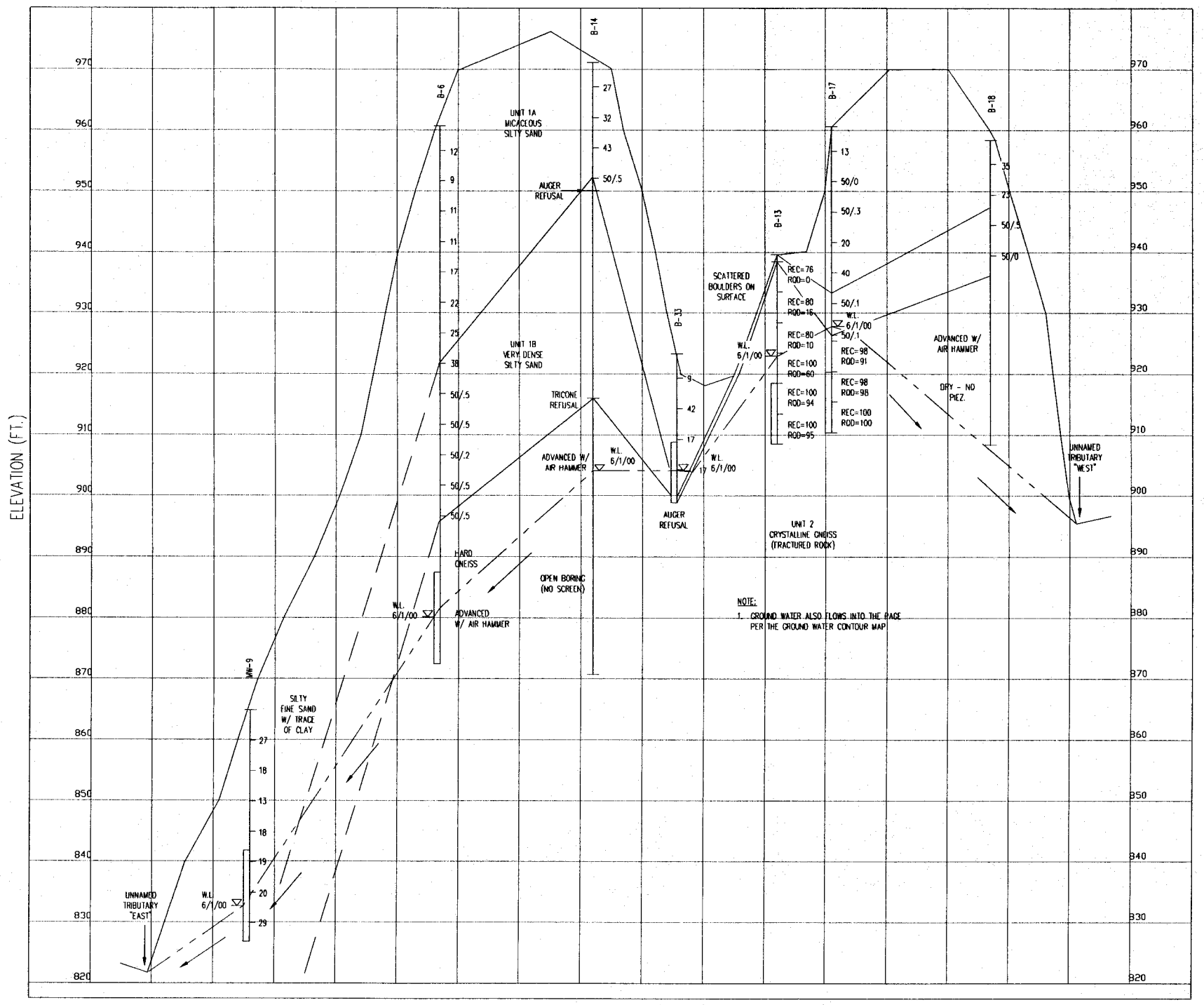
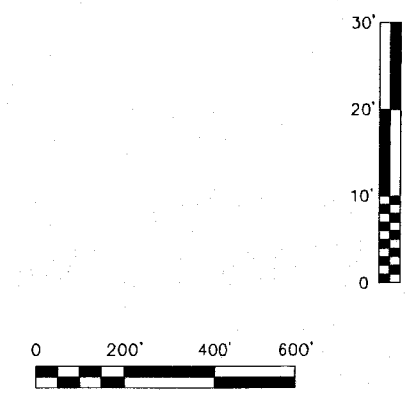
DESIGNED BY:	G.D.G.
DRAWN BY:	C.T.J.
CHECKED BY:	P.K.S.
PROJECT NO:	RUTH-1
SCALE:	AS SHOWN
DATE:	JAN. 2001
FILE NAME:	RUTH-D0045
SHEET NO.	9
DRAWING NO.	HX1



SECTION B

B
HX2



LEGEND

W.L. 4/5/00 — STABILIZED GROUND WATER OBSERVATION ON GIVEN DATE

34 — STANDARD PENETRATION RESISTANCE VALUE (BLOWS PER FOOT)

APPARENT GROUND WATER FLOW DIRECTION

PIEZOMETER SCREEN INTERVAL

NO.	DATE	REVISION

DAVID GARRETT, P.G., P.I
Engineering and Geology
1408 Rock Drive
Raleigh, North Carolina 27610

G.N. RICHARDSON & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING CONSULTANTS
435 N. BOYLAN AVENUE RALEIGH, N.C. 27603
PHONE:919-833-0577 FAX:919-833-3369 WWW.GRNA.COM

SEAL

SEAL

PROJECT TITLE:
RUTHERFORD COUNTY
SOLID WASTE MANAGEMENT
MSW LANDFILL SITE STUDY &
PROPOSED FACILITY PLAN

DRAWING TITLE:
HYDROGEOLOGIC
CROSS SECTIONS
(SHEET 2 OF 3)

DESIGNED BY: G.D.G.	DRAWN BY: C.T.J.
CHECKED BY: P.K.S.	PROJECT NO.: RUTH-1
SCALE: AS SHOWN	DATE: JAN. 2001
FILE NAME: RUTH-D0046	
SHEET NO. 10	DRAWING NO. HX2

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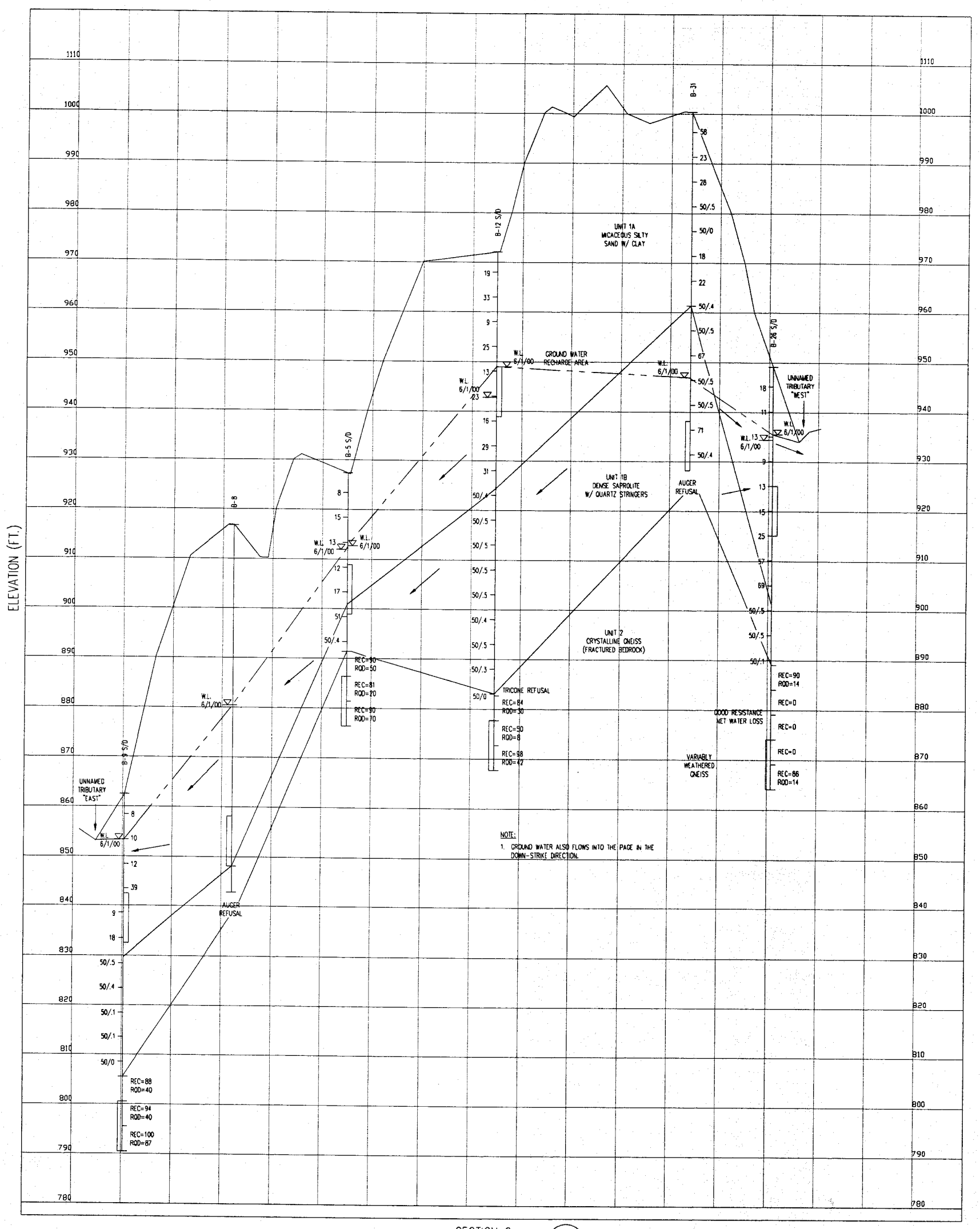

SECTION C

C
HX3

30'
20'
10'
0

0 200' 400' 600'

LEGEND

W.L. 4/5/00 — STABILIZED GROUND WATER OBSERVATION ON GIVEN DATE

34 — STANDARD PENETRATION RESISTANCE VALUE (BLOWS PER FOOT)

APPARENT GROUND WATER FLOW DIRECTION

PIEZOMETER SCREEN INTERVAL

DATE	NO.	REVISION

DRAWING TITLE: HYDROGEOLOGIC CROSS SECTIONS (SHEET 3 OF 3)

PROJECT TITLE: RUTHERFORD COUNTY SOLID WASTE MANAGEMENT MSW LANDFILL SITE STUDY & PROPOSED FACILITY PLAN

SEAL: NORTH CAROLINA LICENSED GEOLOGIST DAVID GARRETT 1/19/01

SEAL

G.N. RICHARDSON & ASSOCIATES, INC.
425 N. BOYLAN AVENUE RALEIGH, N.C. 27603
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Raleigh, North Carolina 27610

DESIGNED BY:	C.D.G.
DRAWN BY:	C.T.J.
CHECKED BY:	P.K.S.
PROJECT NO:	RUTH-1
SCALE:	AS SHOWN
DATE:	JAN. 2001
FILE NAME	RUTH-D0051
SHEET NO	11
DRAWING NO:	HX3

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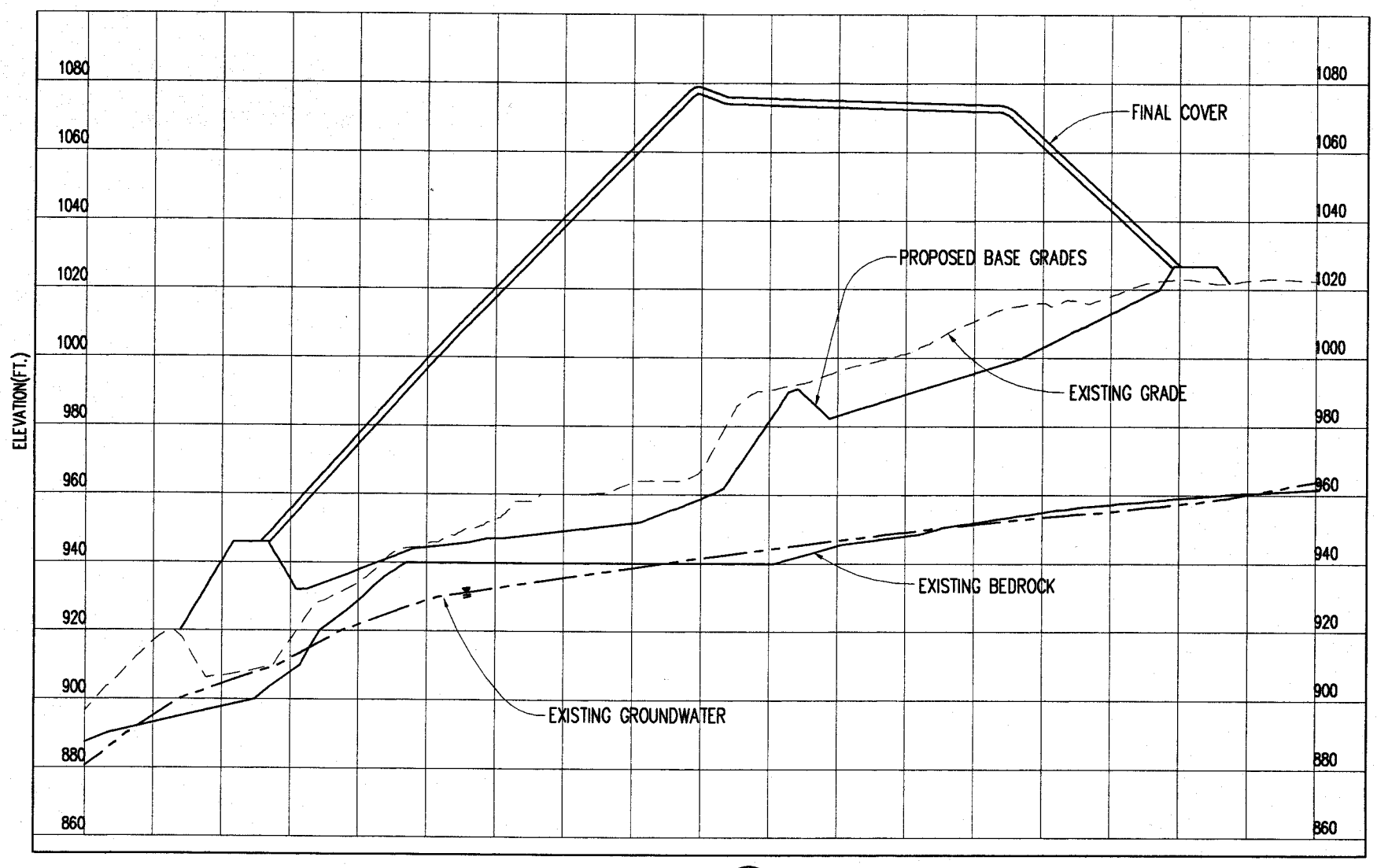
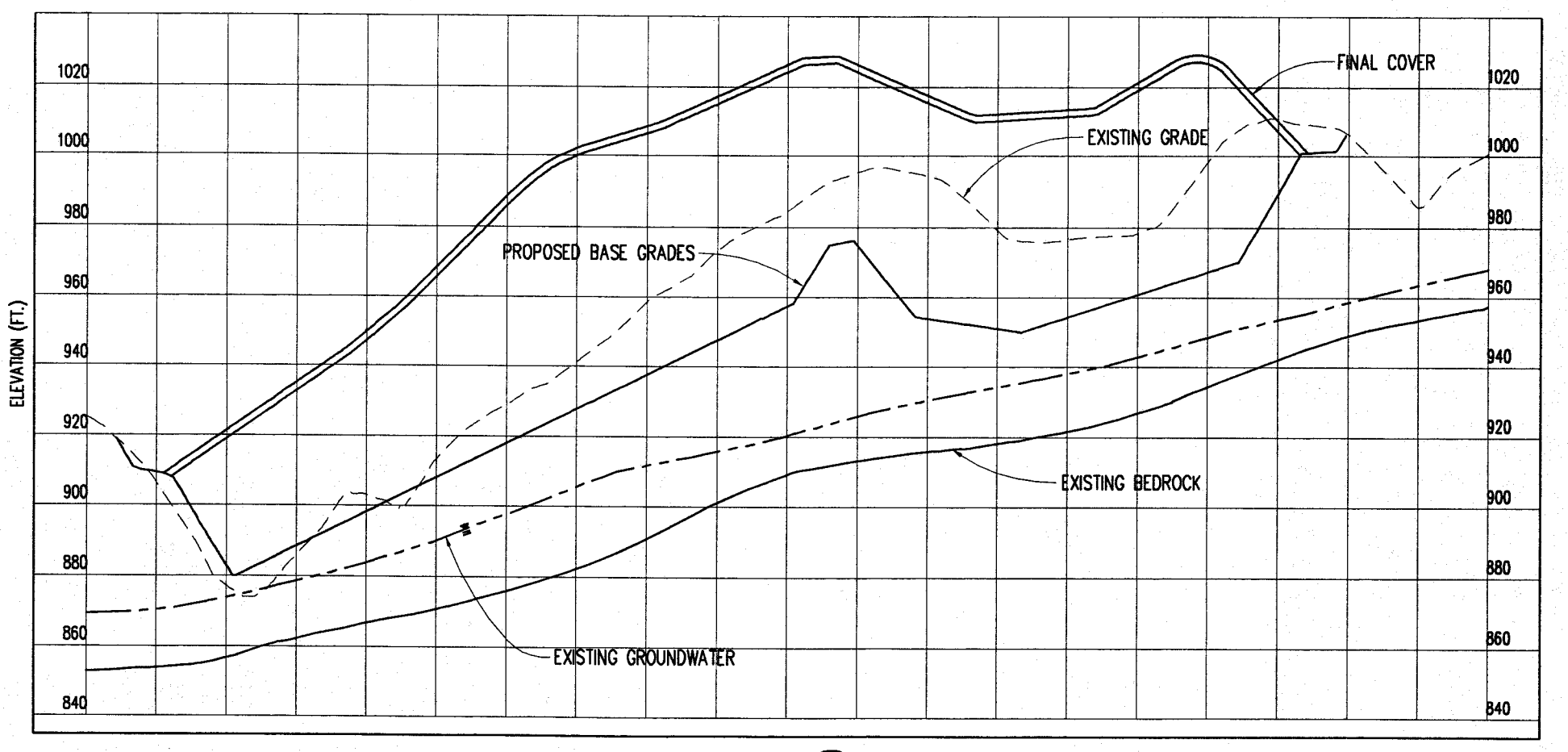
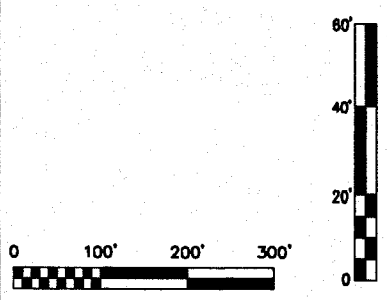


SECTION A / EX1



SECTION B / EX1



DATE	NO.	REVISION

DRAWING TITLE:

ENGINEERING CROSS SECTIONS
(SHEET 1 OF 2)

PROJECT TITLE:

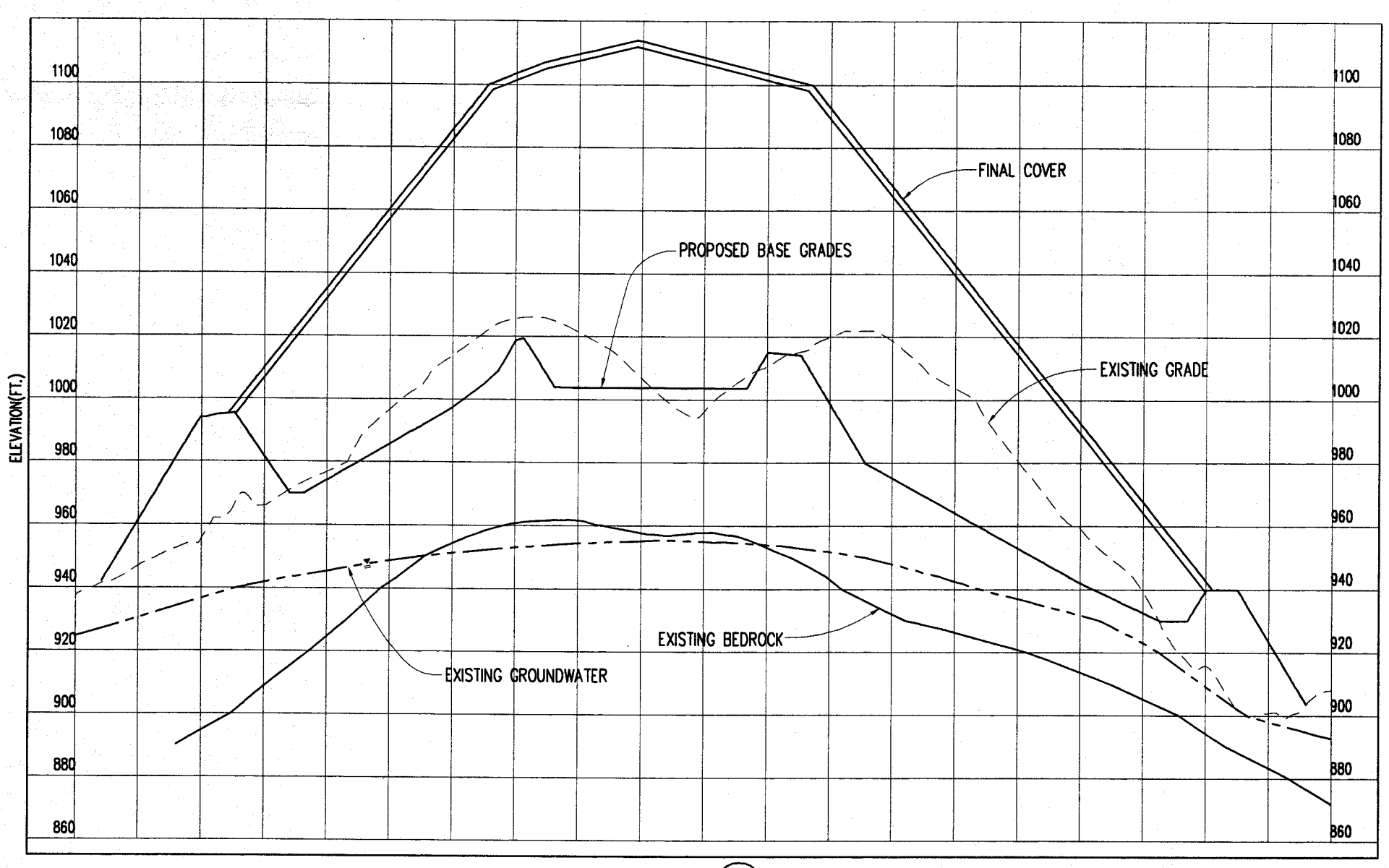
RUTHERFORD COUNTY
SOLID WASTE MANAGEMENT
MSW LANDFILL SITE STUDY &
PROPOSED FACILITY PLAN

SEAL 6695 ENGINEER GREGORY N. RICHARDSON 1-10-01

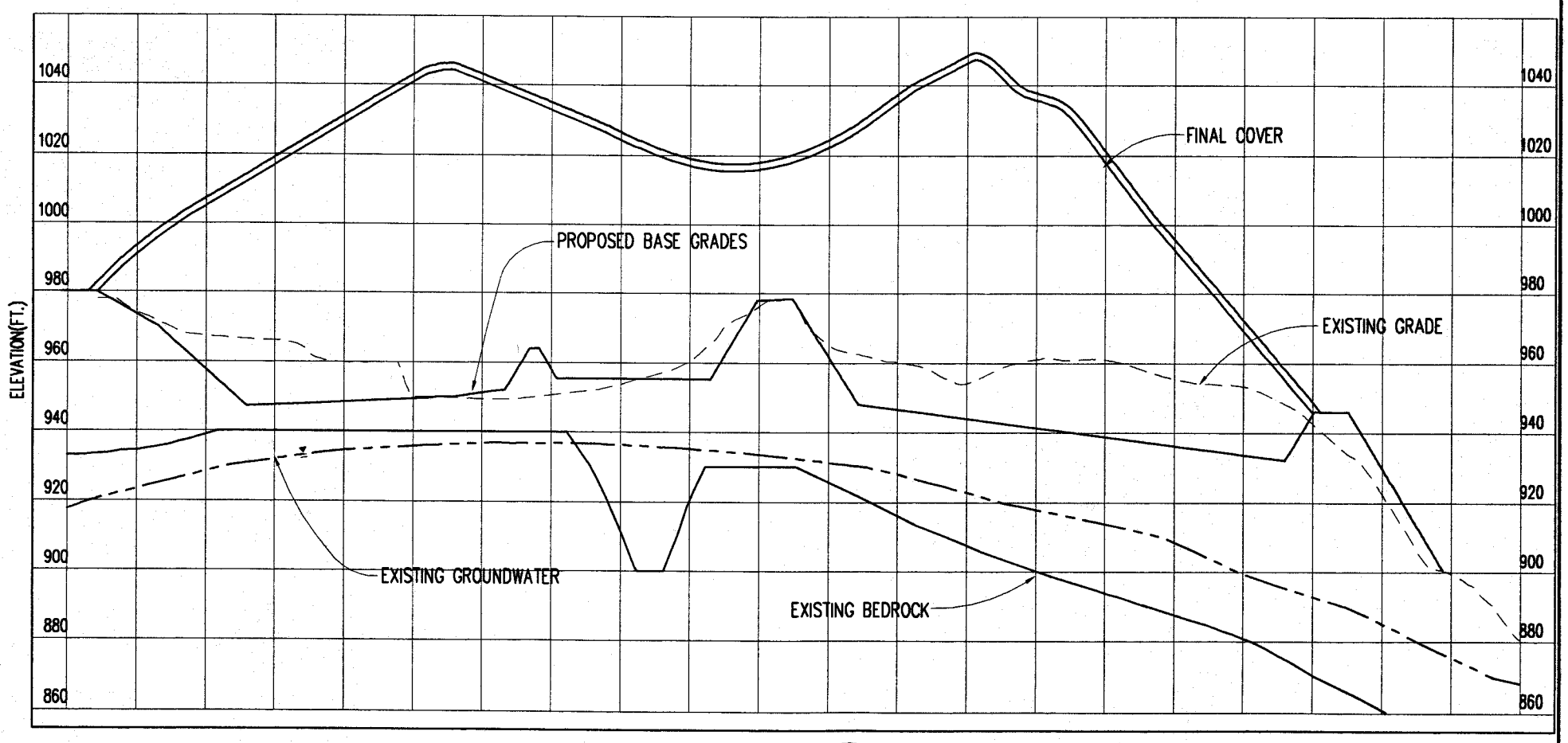
SEAL 021668 ENGINEER PETER K. SCHEER 1/10/01

G.N. RICHARDSON & ASSOCIATES, INC.
Engineering and Geological Services
425 N. BOYLAN AVENUE RALEIGH, N.C. 27603
PHONE-919-828-0577 FAX-919-828-3899 WWW.GNRA.COM

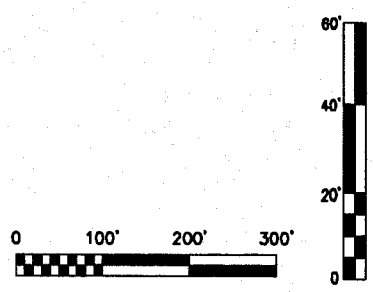
DESIGNED BY:	P.K.S.
DRAWN BY:	A.W.H.
CHECKED BY:	G.N.R.
PROJECT NO:	RUTH-1
SCALE:	AS SHOWN
DATE:	JAN. 2001
FILE NAME	RUTH-00057
SHEET NO.	12
DRAWING NO.	EX1



SECTION C / EX2



SECTION D / EX2



DATE	NO.	REVISION

DRAWING TITLE: ENGINEERING CROSS SECTIONS (SHTEET 2 OF 2)

PROJECT TITLE: RUTHERFORD COUNTY SOLID WASTE MANAGEMENT MSW LANDFILL SITE STUDY & PROPOSED FACILITY PLAN

DESIGNED BY: P.K.S. | DRAWN BY: A.W.H. | CHECKED BY: G.N.R. | PROJECT NO.: RUTH-1 | SCALE: AS SHOWN | DATE: JAN. 2001 | FILE NAME: RUTH-D0058 | SHEET NO. 13 | DRAWING NO. EX2

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 5695 ENGINEER GEORGE N. RICHARDSON 1-8-01

SEAL — NORTH CAROLINA PROFESSIONAL SEAL 021668 ENGINEER PETER K. SCHEER 1/10/01

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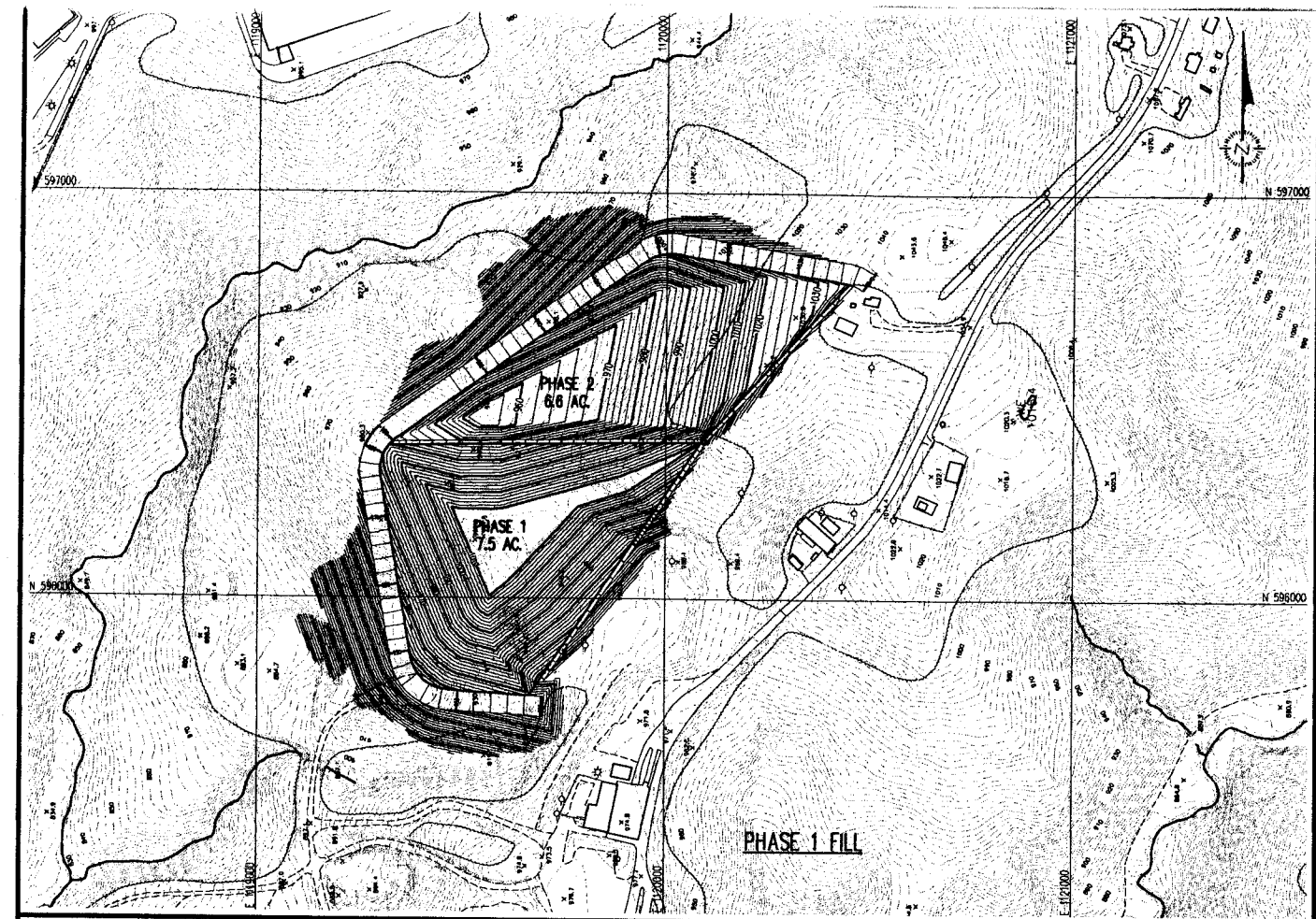
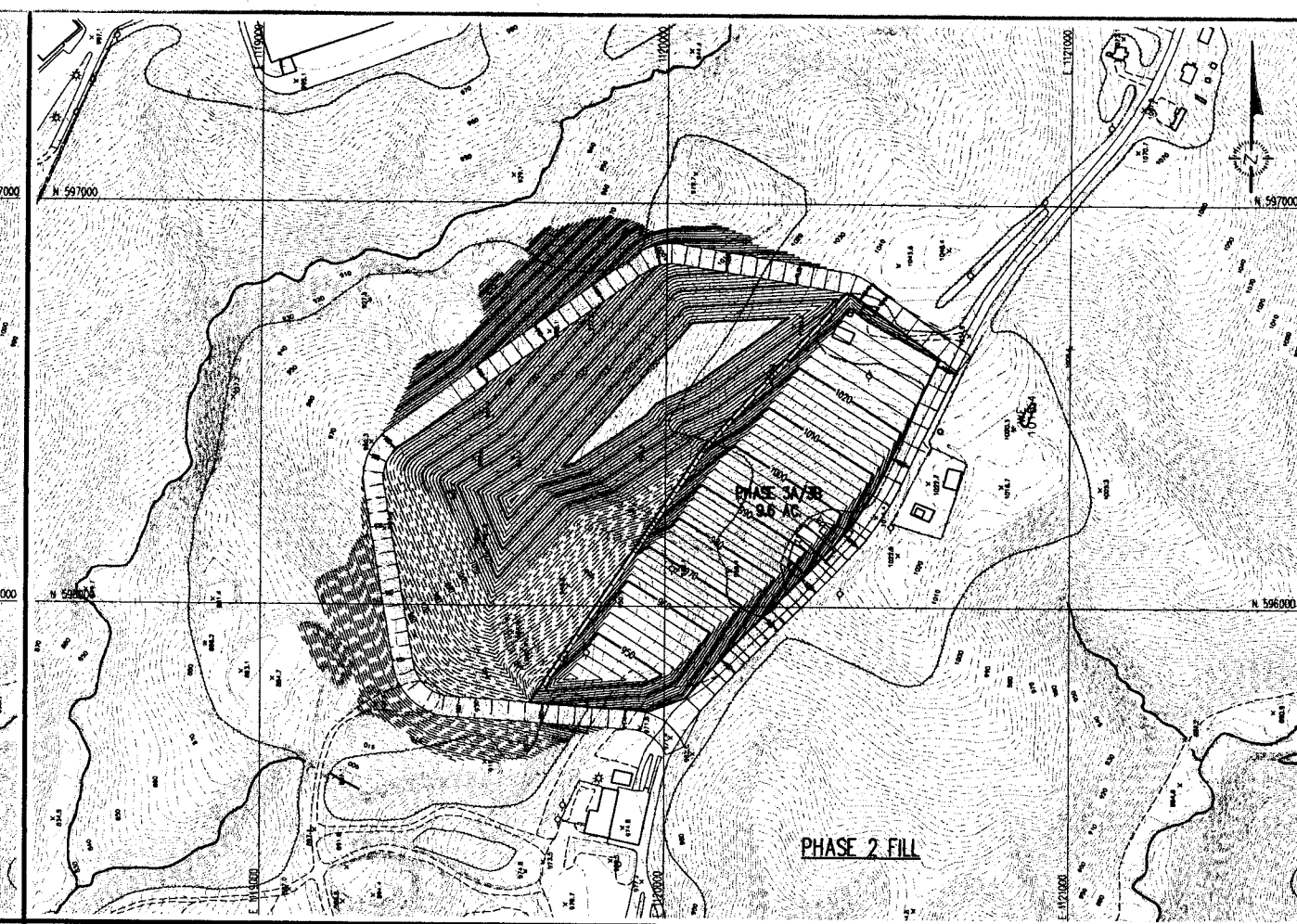
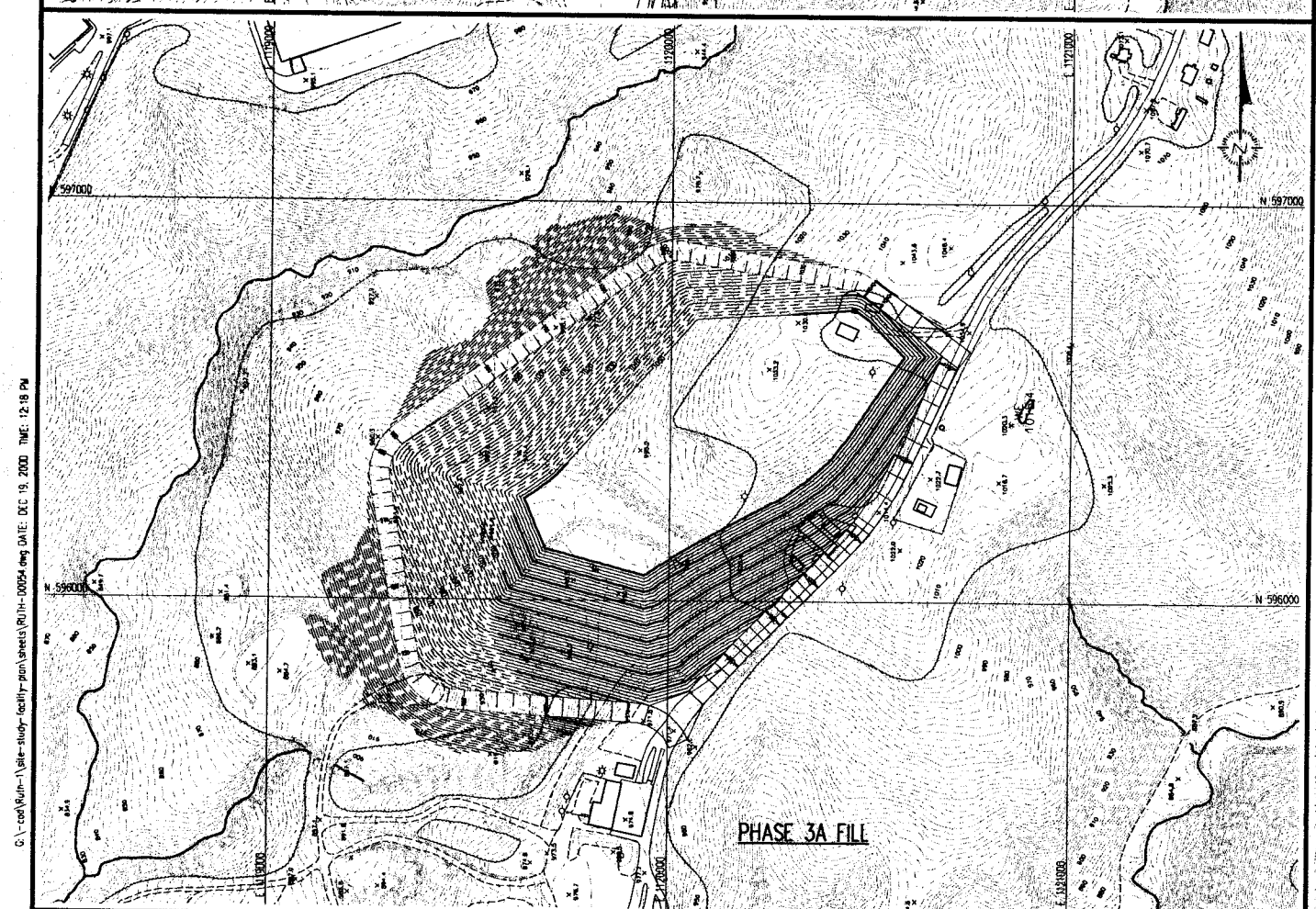
425 N. BOYLAN AVENUE RALEIGH, N.C. 27603
PHONE-919-828-0577 FAX-919-828-3899 WWW.GNRA.COM



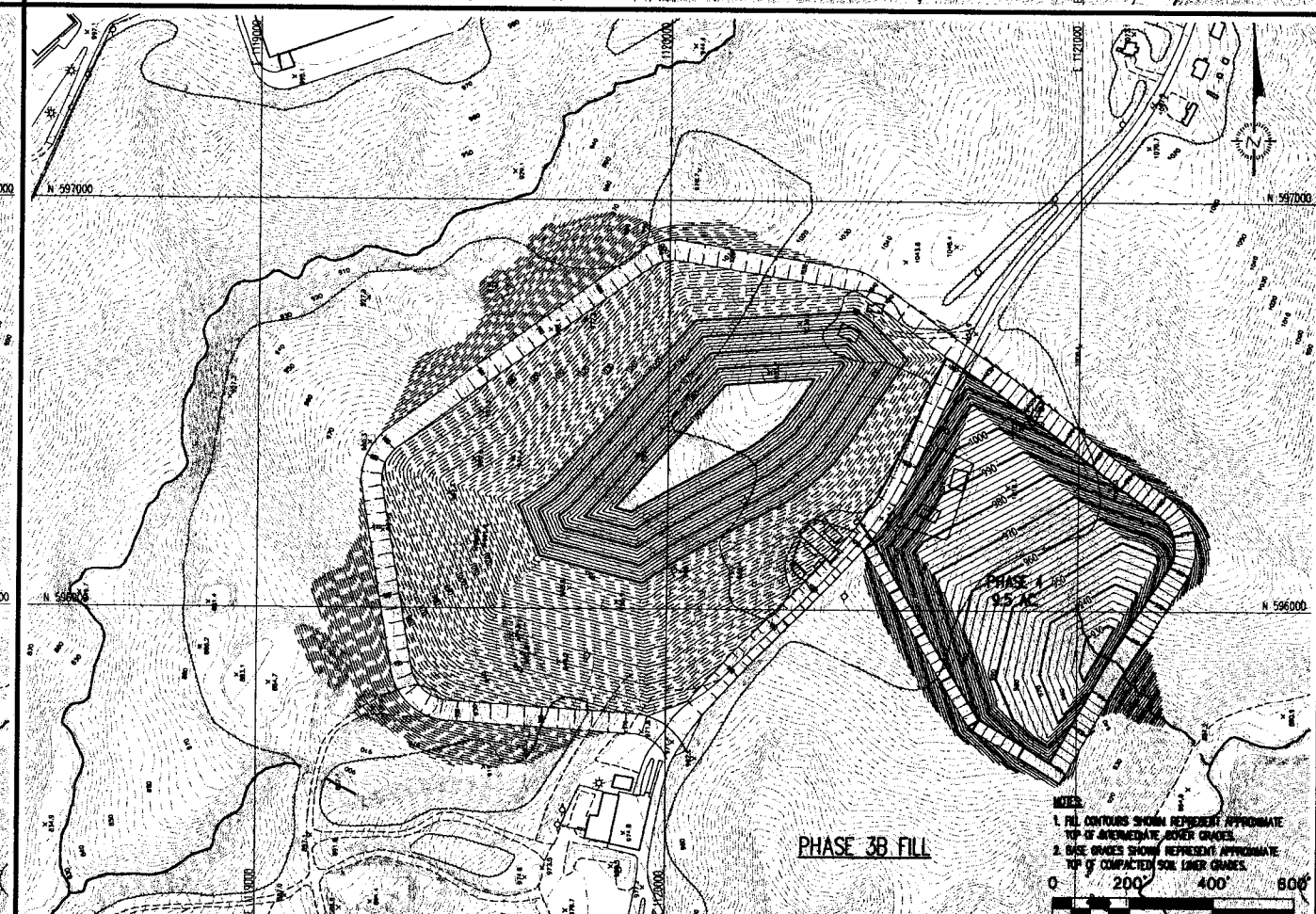
PHASE 1 FILL



PHASE 2 FILL



PHASE 3A FILL



PHASE 3B FILL

NOTES:
1. FILL CONTOURS SHOWN REPRESENT APPROXIMATE TOP OF INTERMEDIATE COVER GRADES.
2. SITE GRADES SHOWN REPRESENT APPROXIMATE TOP OF COMPACTED SOIL COVER GRADES.

0 200' 400' 800'

DAVID GARRETT, P.G., P.E.
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B.M. RICHARDSON & ASSOCIATES, INC.
ENGINEERS
485 N. BOYLAN AVENUE RALEIGH, N.C. 27603
PHONE:919-828-0577 FAX:919-828-3899 www.bmra.com

SEAL 021666 PETER K. SEMPRIT JR. 11-20-01

SEAL NORTH CAROLINA PROFESSIONAL SEAL 9 GEOLOGY DAVID N. GARRETT 10-20-01

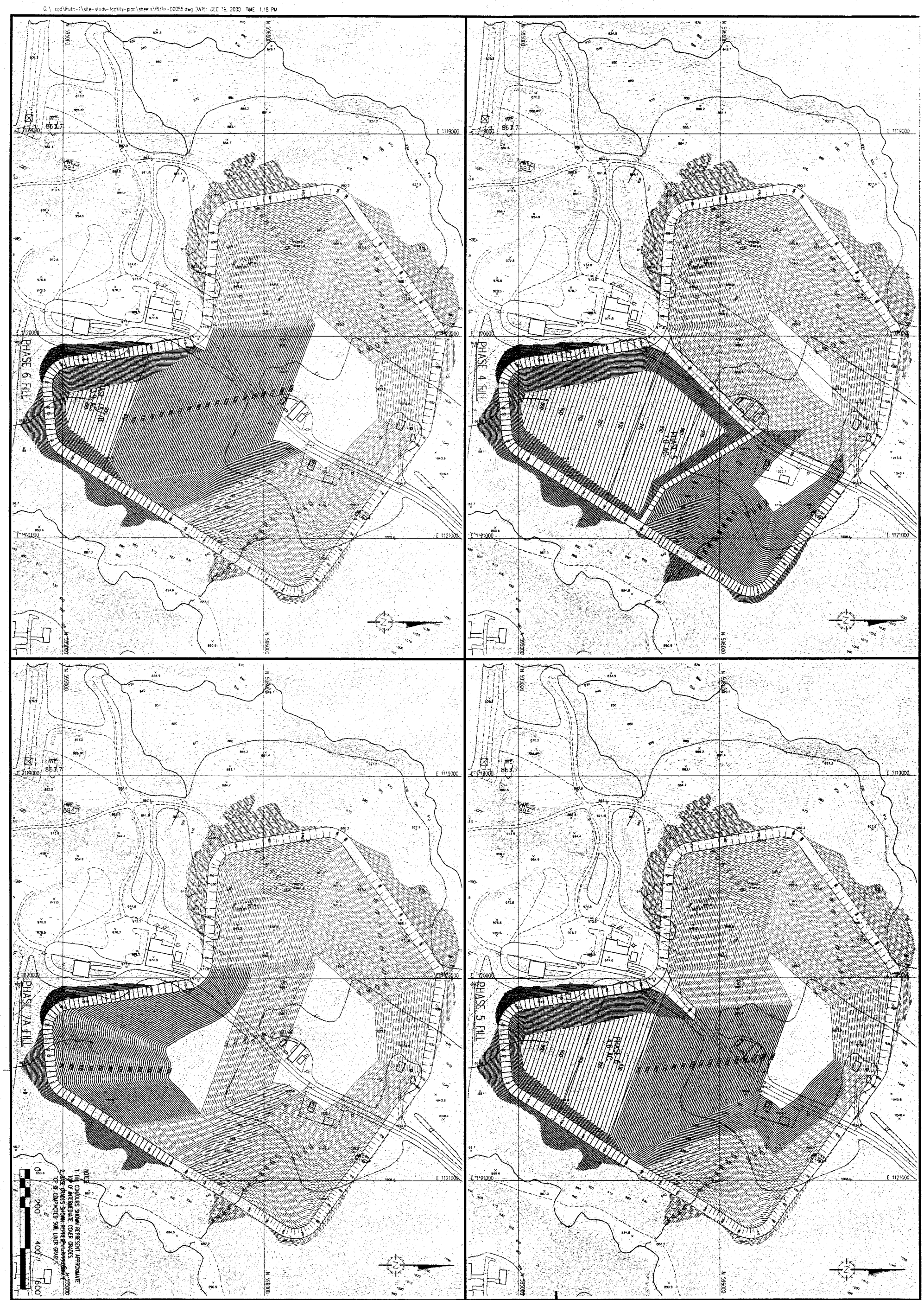
PROJECT TITLE:
RUTHERFORD COUNTY
SOLID WASTE MANAGEMENT
MSW LANDFILL SITE STUDY &
PROPOSED FACILITY PLAN

DRAWING TITLE:
PHASING PLAN
(SHEET 1 OF 3)

DESIGNED BY: P.K.S.	DRAWN BY: A.W.H.
CHECKED BY: G.N.R.	PROJECT NO.: RUTH-1
SCALE: AS SHOWN	DATE: JAN. 2001
FILE NAME: RUTH-D0054	
SHEET NO. 14	DRAWING NO. P1

G:\-cad\Ruth-1\site-study-facility-plan\sheets\Ruth-D0054.dwg DATE: DEC 19, 2000 TIME: 12:18 PM

G:\-cad\Ruth-1\site-study-facility-plan\sheets\RUTH-D0055.dwg DATE: DEC 15, 2000 TIME: 1:18 PM



DRAWING TITLE: PHASING PLAN (SHEET 2 OF 3)	DESIGNED BY: P.K.S.	DRAWN BY: A.W.H.	
	CHECKED BY: G.N.R.	PROJECT NO.: RUTH-1	
	SCALE: AS SHOWN	DATE: JAN. 2001	
	FILE NAME: RUTH-D0055	SHEET NO. 15	DRAWING NO. P2

PROJECT TITLE:
RUTHERFORD COUNTY
SOLID WASTE MANAGEMENT
MSW LANDFILL SITE STUDY &
PROPOSED FACILITY PLAN

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 6885 ENGINEER GREGORY N. RICHARDSON 1-10-01

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 021666 ENGINEER PIETER K. SCHEER 1/10/01

G.N. RICHARDSON & ASSOCIATES, INC.
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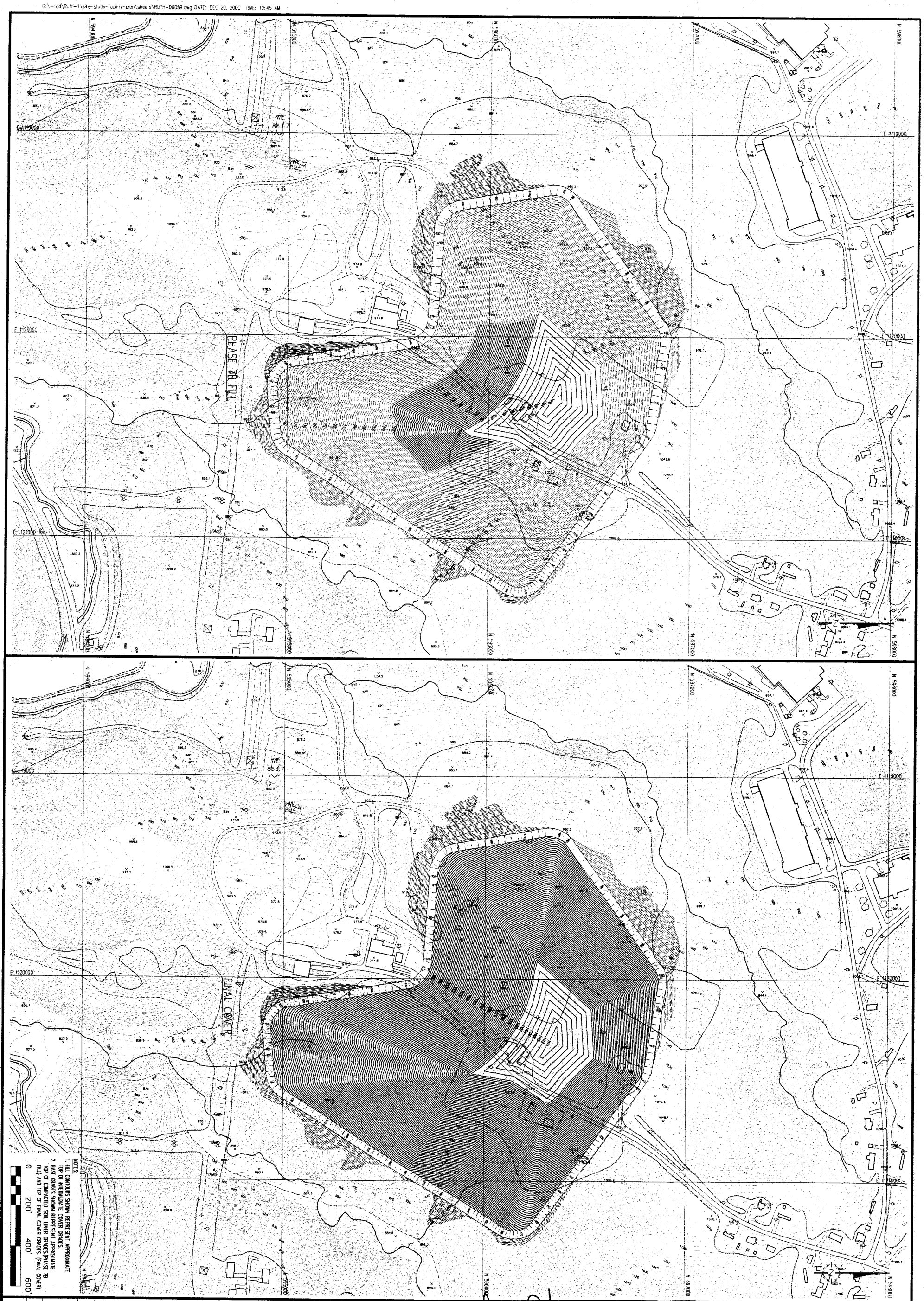
1408 Rock Drive
Raleigh, North Carolina 27610

G:\-cad\Ruth-1\site-study-facility-plan\sheets\RUTH-D0059.dwg DATE: DEC 20, 2000 TIME: 10:45 AM



NOTES:
1. FILL CONTOURS SHOWN REPRESENT APPROXIMATE TOP OF INTERMEDIATE COVER GRADES.
2. BASE GRADES SHOWN REPRESENT APPROXIMATE TOP OF COMPACTED SOIL LINER GRADES (PHASE 7B FILL) AND TOP OF FINAL COVER GRADES (FINAL COVER)

DRAWN BY:	A.W.H.
DESIGNED BY:	P.K.S.
PROJECT NO.:	RUTH-1
CHECKED BY:	G.N.R.
DATE:	JAN. 2001
SCALE:	AS SHOWN
FILE NAME	RUTH-D0059
SHEET NO.	16
DRAWING NO.	P3

DRAWING TITLE:
PHASING PLAN
(SHEET 3 OF 3)

PROJECT TITLE:
RUTHERFORD COUNTY
SOLID WASTE MANAGEMENT
MSW LANDFILL SITE STUDY &
PROPOSED FACILITY PLAN

SEAL: NORTH CAROLINA PROFESSIONAL SEAL 5895 ENGINEER GREGORY N. RICHARDSON — 1-5-01

SEAL: SEAL 021668 ENGINEER PIETER K. SCHEER — 1/18/01

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Engineering and Geology
1408 Rock Drive
Raleigh, North Carolina 27610

Appendix A

-DRAWING At End of FILE-

Appendix B

SOUTH

CHARLOTTE

NORTH

LEGEND

Airports having Control Towers are shown in Blue, all others in Magenta. Consult Airport/Facility Directory (A/FD) for details involving airport lighting, navigation aids, and services. For additional symbol information refer to the Chart User's Guide.

AIRPORTS

Other than hard-surfaced runways — Seaplane Base

d-surfaced runways 1500 ft. to 8069 ft. in length

ard-surfaced runways greater than 8069 ft. or some multiple runways less than 8069 ft.

Open dot within hard-surfaced runway configuration indicates approximate VOR, VOR-DME, or VORTAC location

ecognizable hard-surfaced runways, including those closed, are m for visual identification. Airports may be public or private.

ADDITIONAL AIRPORT INFORMATION

Private "(Pvt)" – Non-public use having emergency or landmark value.

Military – Other than hard-surfaced. All military airports are identified by abbreviations AFB, NAS, AAF, etc. For complete airport information consult DOD FLIP.

Unverified — Abandoned – paved, having landmark value, 3000 ft. or greater — Ultralight Flight Park Selected

ces–fuel available and field tended during normal working hours ted by use of ticks around basic airport symbol. (Normal working hours Mon thru Fri 10:00 A.M. to 4:00 P.M. local time.) Consult A/FD for e availability at airports with hard-surfaced runways greater than 8069 ft. tating airport beacon in operation Sunset to Sunrise.

AIRPORT DATA

Box indicates F.A.R. 93 Special Air Traffic Rules & Airport Traffic Patterns — FSS — F.A.R. 91 — Location Identifier — Airport Surveillance Radar

NO SVFR

NAME (NAM)

CT – 118.3* ATIS 123.8

285 L 72 122.95 — UNICOM

VFR Advsy 125.0

Airport of Entry

FSS – Flight Service Station

NO SVFR – Fixed-wing special VFR flight is prohibited.

CT – 118.3 – Control Tower (CT) – primary frequency

NFCT – Non-Federal Control Tower

★ – Star indicates operation part time (see tower frequencies tabulation for hours of operation).

Ⓑ – Indicates Common Traffic Advisory Frequencies (CTAF)

ATIS 123.8 – Automatic Terminal Information Service

ASOS/AWOS 135.42 – Automated Surface Weather Observing Systems. NDBs broadcasting ASOS/AWOS data may not be located at the airport.

UNICOM – Aeronautical advisory station

VFR Advsy – VFR Advisory Service shown where ATIS not available and frequency is other than primary CT frequency

285 – Elevation in feet

L – Lighting in operation Sunset to Sunrise

*L – Lighting limitations exist, refer to Airport/Facility Directory.

72 – Length of longest runway in hundreds of feet; usable length may be less.

When facility or information is lacking, the respective character is replaced by a dash. All lighting codes refer to runway lights. Lighted runway may not be the longest or lighted full length. All times are local.

RADIO AIDS TO NAVIGATION AND COMMUNICATION BOXES

VHF OMNI RANGE (VOR)

VORTAC

VOR-DME

Non-Directional Radiobeacon (NDB)

NDB–DME

Other facilities, i.e., Commercial B e Stations, FSS Outlets

122.1R 122.6 123.6

OAKDALE

382 *116.8 OAK

Underline indicates no voice on this freq

★ – Operates less than continuous or On-Request.

Ⓣ – TWEB ■ – HIWAS

R – Receive only

122.1R

CHICAGO CHI

Heavy line box indicates Flight Service Station (FSS). Freqs. 121.5, 122.2, 243.0, and 255.4 (Canada – 121.5, 126.7 and 243.0) are normally available at all FSSs and are not shown above boxes. All other freqs. are shown.

For Local Airport Advisory use FSS freq 123.6.

122.1R

MIAMI

Controlling FSS

Frequencies above thin line box are remoted to NAVAID site. Other freqs. at controlling FSS may be available as determined by altitude and terrain. Consult Airport/Facility Directory for complete information.

RPORT TRAFFIC SERVICE AND AIRSPACE INFORMATION

the controlled and reserved airspace ive below 18,000 ft MSL are shown is chart. All times are local.

Class B Airspace

Class C Airspace (Mode C See F.A.R. 91.215/AIM.)

Class D Airspace

Ceiling of Class D Airspace in hundreds of feet. (A mines ceiling value indicates surface up to but not including that value.)

Class E Airspace

Class E Airspace with floor 700 ft. above surface

Class E Airspace with floor 1200 ft. or greater above surface that abuts Class G Airspace.

0 MSL — Differentiates floors of Class E Airspace greater than 700 ft. above surface

0 MSL

E Airspace low altitude Federal Airways dicated by center line.

ection – Arrows are directed towards ins which establish intersection.

V-63

169

mileage

en NAVAID's on direct Airways.

Prohibited, Restricted, Warning and Alert Areas Canadian Advisory and Restricted Areas

MOA – Military Operations Area

Special Airport Traffic Areas (See F.A.R. Part 93 for details.)

MODE C (See F.A.R. 91.215/AIM.)

National Security Area

Terminal Radar Service Area (TRSA)

IR241 MTR – Military Training Routes

OBSTRUCTIONS

1000 ft. and higher AGL

below 1000 ft. AGL

or Group Obstruction

or Obstruction with high-intensity lights May operate part-time

2049 Elevation of the top above mean sea level

(1149) Height above ground

UC Under construction or reported: position and elevation unverified

NOTICE: Guy wires may extend outward from structures.

MISCELLANEOUS

Isogonic Line (1995 VALUE)

Ultralight Activity — Fl Flashing Light

Hang Glider Activity — Marine Light

Glider Operations

NAME (Magenta, Blue, or Black) Visual Check Point

Parachute Jumping Area (See Airport/Facility Directory.)

TOPOGRAPHIC INFORMATION

Roads

Road Markers

Railroad

Bridges And Viaducts

Power Transmission Lines

Aerial Cable

Landmark Feature – stadium, factory, school, golf course, etc.

Outdoor Theatre

Lookout Tower P-17 (Site Number) 618 (Elevation Base of Tower)

CG Coast Guard Station

Race Track

Tank–water, oil or gas

Oil Well Water Well

Mines And Quarries

Mountain Pass

11823 (Elevation of Pass)

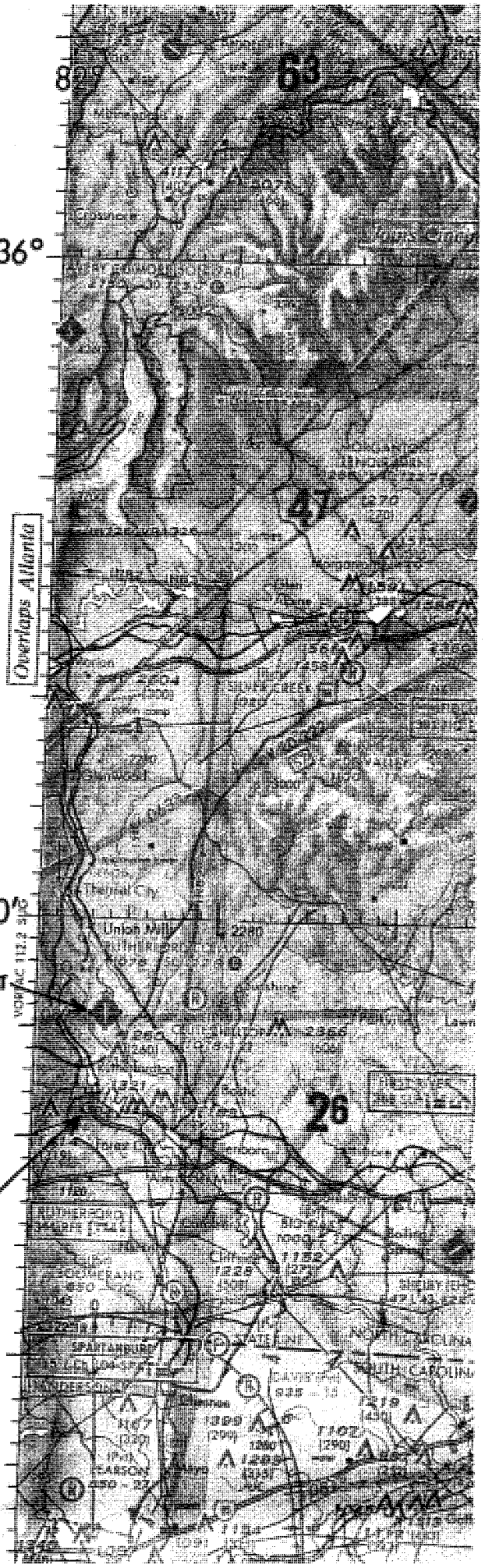
Rocks

Pier

Dams

Perennial Lake

Non-Perennial Lake



CHARLOTTE

David Garrett, P.G., P.E.
Engineering and Geology

March 18, 2004

Ms. Jill Robinson
Federal Aviation Administration Southern Region
P.O. Box 20636
Atlanta, Georgia 30320

RE: Notification of Site Application
Proposed Municipal Solid Waste Landfill
Rutherford County, North Carolina

Dear Ms. Robinson:

This letter has been prepared regarding Rutherford County's application for a proposed solid waste landfill. The application is under review by the North Carolina Division of Waste Management, Solid Waste Section, Raleigh, North Carolina. I am pleased to make this notification, pursuant to the North Carolina Solid Waste regulations, on behalf of Rutherford County.

A recent site evaluation has identified that the proposed landfill is located approximately 4.73 miles south of the Rutherford County airport. The airport's flight path does cross the landfill property. This notification is made pursuant to North Carolina Solid Waste regulations, 15A NCAC 13B .1622 (1) (a) and (b), which specify that solid waste landfills not be located within 5,000 feet of an airport serving piston-powered aircraft or within 10,000 feet of an airport serving turbine-powered aircraft, and that the airport authorities be notified prior to completing said application in the event that a landfill is to be located within 5 miles of an airport.

Rutherford County is located in western North Carolina, between the cities of Charlotte and Asheville. The proposed landfill is adjacent to a closed MSW landfill, which served the County for approximately 50 years. The site presently contains an active solid waste transfer station and an active C&D landfill. Current expectations are for the facility to accept 120 tons per day of municipal solid waste (this is small by comparison to other municipal landfills). The facility will be developed in multiple phases that will serve the County for more than 40 years.

The airport is a general aviation facility without regularly scheduled commercial service. The County has contacted Mr. Philip Robbins, Chairman of the Rutherford County Airport Authority, who offered verbal support for the landfill project. The Rutherford County Solid Waste Department Director, Mr. Don Baynard, has contacted the Airport Authority's engineering consultant, W.K. Dickson, Columbia, S.C. (Mr. Jimmy Varger), who reviewed the FAA Advisory Circular 150/5200-34 and offered an opinion that the airport does not appear to meet the criteria for the six-mile setback requirement.

5105 Harbour Towne Drive • Raleigh • North Carolina • 27604
919-231-1818 (Office and Fax) • 919-418-4375 (Mobile) • E-mail: david_garrett_pg@mindspring.com

The County's solid waste consultant (myself) met with officials from the North Carolina Department of Transportation, Division of Aviation, to review the findings of a site specific evaluation report, prepared on behalf of NC DOT by a US Fish and Wildlife Service biologist. That letter offered recommendations regarding the safe operation of the landfill in proximity to the airport. Pursuant to recommendations offered by the US Fish and Wildlife Service, Rutherford County will observe the following steps to promote safe landfill operations with respect to the airport:

1. Landfill officials shall maintain close communication with the Airport Authority concerning bird activity observed at the landfill,

2. Proper landfill management techniques will be employed to decrease the potential for problems with bird attraction, e.g., not placing animal carcasses in the working face, keeping the working face small, and use of proper waste covering,

3. Monitoring of the numbers and activities of birds that routinely use the landfill shall be performed and, if these numbers and activities become problematic,

4. Steps will be taken to discourage bird attraction to the landfill, e.g. use of harassment techniques and/or habitat alteration.

Operations at the landfill shall be conducted such that the facility will remain compliant with pertinent Solid Waste regulations. On behalf of the Rutherford County Solid Waste Department, I appreciate your attention to this matter.

Sincerely,

G. David Garrett, P.G., P.E.
Project Consultant

cc: Don Baynard, Director, Rutherford County Solid Waste Department
John Condrey, Rutherford County Manager

7004 0550 0000 5646 4998

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03/22/2004

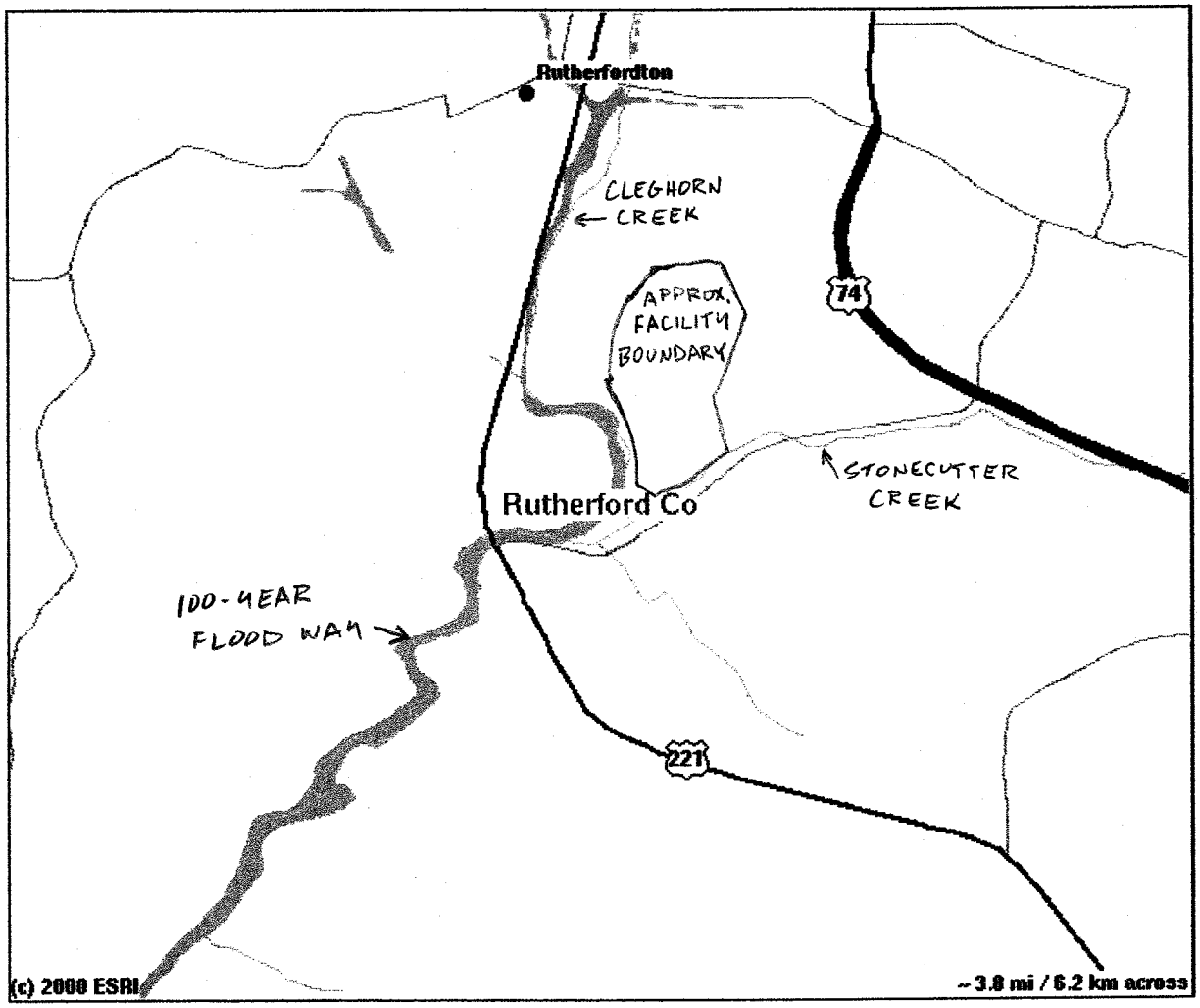
Sent To: JILL ROBINSON FAA
Street, Apt. No.; or PO Box No.: P.O. BOX 20636
City, State, ZIP+4: ATLANTA, GA 30320

PS Form 3800, June 2002 — See Reverse for Instructions

PROJECT IMPACT
ESRI and FEMA

PROJECT IMPACT
Hazard Information and Awareness

Flood Hazard Map



Map Centerpoint: -81.95694, 35.34253
Map Produced: Thu Sep 14 18:33:32 2000

ESRI/FEMA Project Impact
Hazard Information and Awareness Site
http://www.esri.com/hazards

G.N. RICHARDSON & ASSOCIATES
Engineering and Geological Services

June 27, 2000

Mr. G. David Garrett, P.G., P.E.
1408 Rock Drive
Raleigh, North Carolina 27610

RE: Wetland Delineation
Lined Landfill Site
Rutherford County Landfill
Rutherfordton, North Carolina

Dear David:

G. N. Richardson & Associates, Inc. has completed a wetlands field delineation of the proposed construction area for the lined landfill, and potential C&D site at the above referenced site. This delineation was performed per our proposal dated March 15, 2000 and authorized by you. The following report details the methods and findings of the wetlands delineation. Attached is a preliminary wetlands map for the site and supporting documentation.

A meeting with the U. S. Army Corps of Engineers (COE) representative, Mr. Steve Chapin, has been scheduled for July 27th, 2000 at 9:30 am in order to verify the delineated areas on site as jurisdictional wetlands under the Clean Water Act, Section 404. A final wetlands map, with surveyed flag locations will be needed prior to final authorization by the COE.

Methods

The wetlands delineation was performed according to protocol set forth in the COE 1987 Wetlands Delineation Manual (Wetlands Research Program Technical Report Y-87-1). The three required parameters for wetlands (hydrophytic vegetation, hydric soils, and wetland hydrology) were examined to determine the presence and boundaries of jurisdictional wetlands on the property.

As you are aware, initial work determining the potential wetland areas was performed during the first phase of the site assessment process in 1999. Based on this survey, limited office research was performed to determine the presence of wetlands on the site. Existing site maps, the USGS Rutherfordton South topographic map, field maps from the unpublished Rutherford County Soil Survey, and the National Wetland Inventory (NWI) Rutherfordton South map were used to establish the site conditions prior to the field work.

425 N. BOYLAN AVENUE • RALEIGH, NC 27603 • TEL. 919-828-0577 • FAX 919-828-3899 • WWW.GNRA.COM

Following the initial investigation, a full wetland delineation was performed. The study area outlined in **Figure 1** was reviewed for potential wetlands. The three areas (**Figure 2),** determined in 1999 to possess wetland characteristics, were examined in order to determine the extent of these characteristics. The wetland data sheets from the representative sample points are attached. Upon completion of the sampling, boundaries between the wetland and the adjacent upland areas were determined and flagged. The boundaries were adjusted to conform to the locations where at least one of the three wetland parameters was lacking.

Figure 2 presents the approximate wetland boundaries and representative data points. Please note that the map is based on field measurements, topography, and limited GPS data points (due to poor GPS coverage in the area). The wetland areas will need to be surveyed after the COE meeting, when any adjustments to the boundary have been completed. A final wetland map will need to be drafted according to the requirements of the COE, and sent to Steve Chapin at the Asheville field office for approval.

Results

The site topography consists of a ridge running along the main access road and slopes descending to stream valleys on either side of the landfill property (**Figure 1**). The study area can be characterized in two distinct sections: the old borrow area to the west of the main access road, and the recently undisturbed forest to the east of the access road. These areas will be addressed separately below.

Most of the borrow area has been previously graded and revegetated, and does not exhibit any wetland characteristics. The undisturbed valley between the borrow area and the current C&D expansion area consists of a stream channel and small headwater wetland area as shown in **Figure 2**. No wetland areas, except the small headwater wetland, are associated with this stream channel due to the rather steep and rocky terrain in this valley. The remaining drainage above the headwater wetland consists of a stormwater channel discharging from a sediment basin located behind the landfill offices at the edge of the borrow area. The stormwater channel lacked wetland soils and stream characteristics, and is not part of the jurisdictional areas on the site. This wetland and stream are outside of the projected impact area of the future Construction and Demolition landfill, based on your plans.

The forested area to the east of the access road contained two jurisdictional wetland areas. These areas are very similar to each other, consisting of a small headwater stream channel with associated riparian wetlands of limited size at the lower reaches near the sewer and power line utility corridors, prior to the confluences with the tributary of Stonecutter Creek.

The boundaries of these wetlands were generally determined by hydrologic and soil indicators. In most cases, the vegetation around and within the wetland areas was

dominated by facultative (FAC) species, which are often present in both wetland and upland areas, but do not prohibit an area being a wetland. The wetland areas did contain hydrophytic vegetation characteristic of a wetland, while the upland areas lacked these species. The existence of water near ground surface, and strong soil indicators of prolonged saturation were evident in the weltand areas. The soil characteristics, along with supporting hydrological indicators, determined where the upland - wetland boundaries were located.

The stream channels in the potential landfill impact area do not contain aquatic life, based on a limited survey, and show definite headwater cuts and springs where intermittent stream characteristics begin. All of the streams on **Figure 2** meet the criteria for streams from the Department of Water Quality (DWQ), but the COE will determine where the Section 404 jurisdiction begins.

These wetlands and streams form the entire jurisdictional areas that will need to be addressed during the site suitability and permitting phases of landfill development.

Permitting

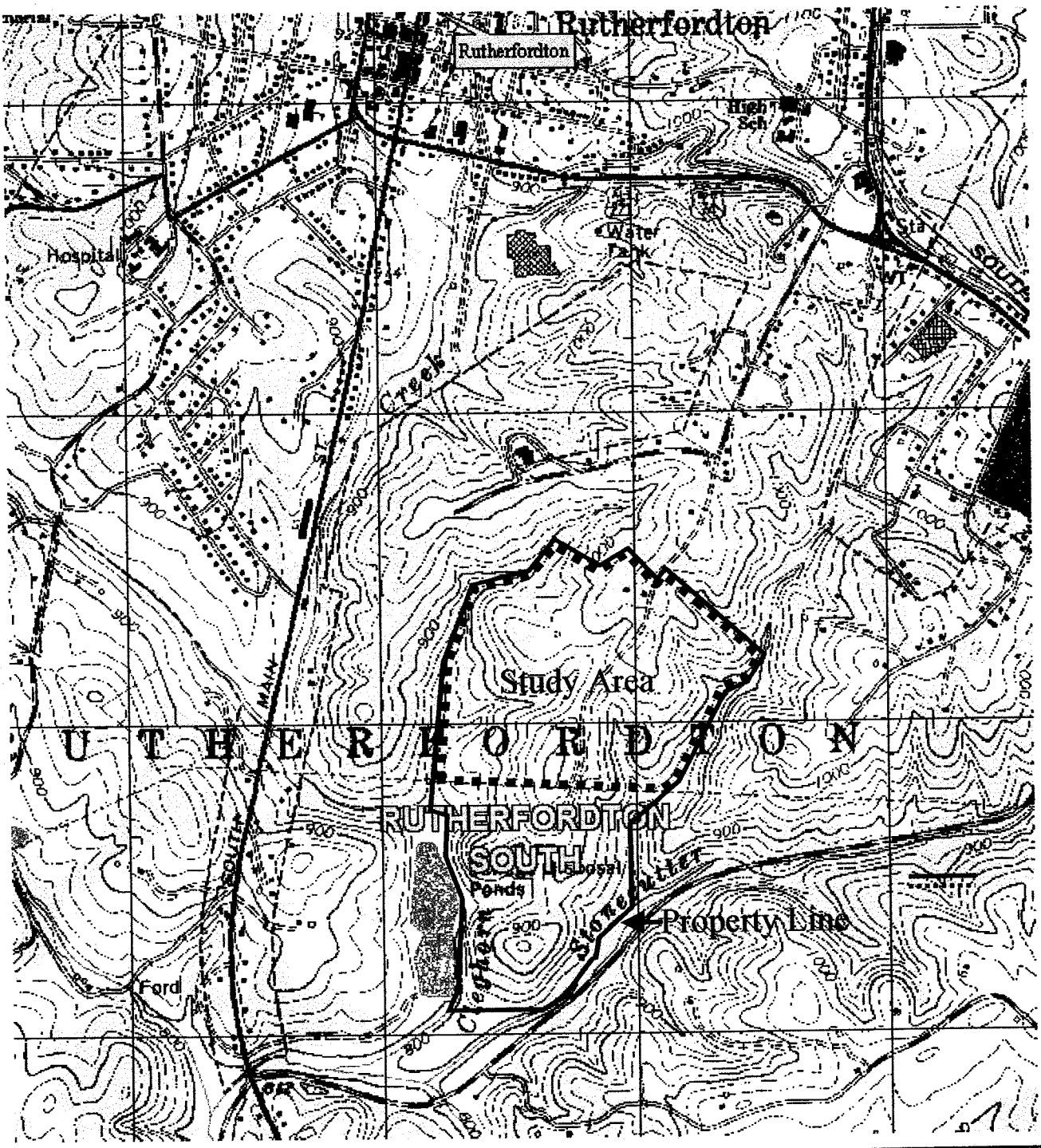
Permitting options are available for any impacts to the aforementioned wetlands. GNRA would be pleased to assist you in the wetland permitting process. After meeting with the COE on July 27, 2000, we can address the permitting issues with more clarity. The completed wetland map (after surveying the flag locations) will allow wetland impact areas to be calculated and determine what permitting options are available for the site development.

Please note that the final authority regarding the delineation and permitting of this site rests with the COE and DWQ. If you have any questions or comments, please call us at your earliest convenience.

Sincerely,
G. N. Richardson & Associates, Inc.

Philip May
Staff Scientist

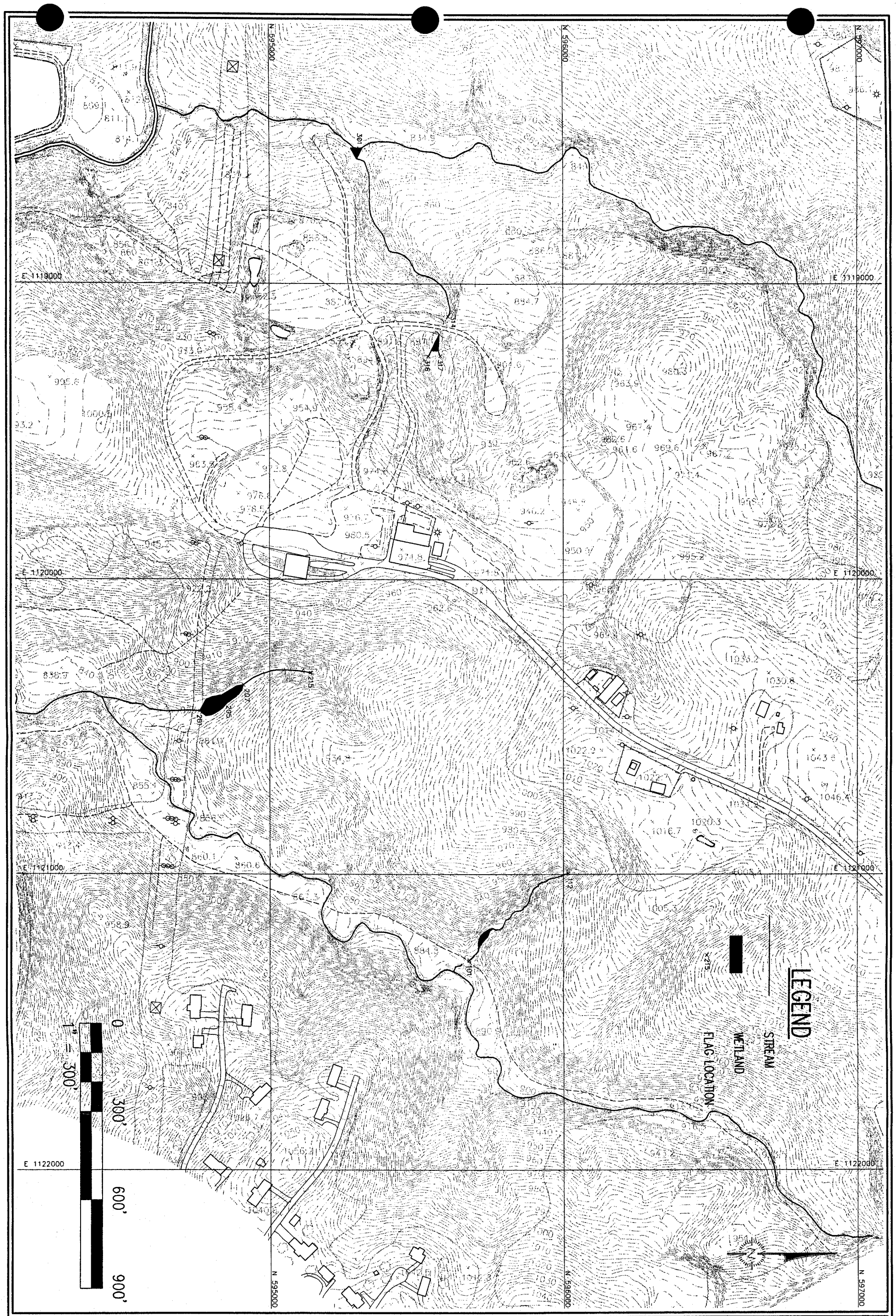
cc: Mr. Steve Chapin, US Army Corps of Engineers, Asheville Office



Site Map
Rutherford County Landfill
USGS Rutherfordton South Quadrangle

G.N. RICHARDSON & ASSOCIATES, INC.
Engineering and Geological Services
[illegible] Dover Avenue Raleigh, North Carolina
[illegible] www.gna.com

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.	FILE NAME
1"=1500'	PWM	PWM	06/26/00	gdgwetlands	1	ruthtopo.ppt



TITLE:	DRAWN BY:	CHECKED BY:	SCALE:	FIGURE NO.
RUTHERFORD COUNTY LANDFILL APPROXIMATE WETLAND/ STREAM LOCATION	A.W.H.	P.W.M.	1"= 300'	2
	DATE: 6/26/00	PROJECT NO. RUTH-2	FILE NAME RUTH-B0035	

G.N. RICHARDSON & ASSOCIATES, INC.

Engineering and Geological Services

425 N. Boylan Avenue Raleigh, North Carolina
(919)-828-0577 Fax-(919)-828-3899 www.gnra.com

G:\-cad\RUTH-4\SHEETS\RUTH-B0035.dwg DATE: JUN 27, 2000 TIME: 8:45 AM

G. N. Richardson & Associates, Inc., 425 N. Boylan Ave., Raleigh, NC, 27603, (919)828-0577

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Rutherford County Landfill
Applicant/Owner: Rutherford County
Investigator: Philip May, GNRA

Date: 5/1/00
County: Rutherford
State: NC

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID: WET
Transect ID: 2
Plot ID: 200W

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Acer rubrum	T	FAC
2. Liriodendron tulipifera	T	FAC
3. Platanus occidentalis	T	FACW
4. Acer rubrum	S	FAC
5. Salix nigra	S	OBL
6. Cornus florida	S	FACU
7. Acer rubrum	H	FAC
8. Trillium catesbaei	H	NI
9. Juncus effusus	H	FACW+
10. Carex sp.	H	-----
11. Lonicera japonica	V	FAC-
12. Parthenocissus quinqefolia	V	FAC
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 66%

Remarks:

Limited shrub layer at this location. Some upland uplands/invasive near wetland boundary.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
X No Recorded Data Available

Field Observations:

Depth of Surface Water: _____ (in.)
Depth to Free Water in Pit: 6 (in.)
Depth to Saturated Soil: 4 (in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
X Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
X Sediment Deposits
X Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
X Oxidized Root Channels in Upper 12 Inches
X Water-Stained Leaves
___ Local Soil Survey Data
X FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

Strong hydrology indicators.

Plot ID: 200W

SOILS

Map Unit Name (Series and Phase): Chewacla loam, 0 to 2 % slopes

Drainage Class: somewhat poorly

Taxonomy (Subgroup): Fluvaquentic dystrochrepts

Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure. etc
0	A1	10YR 2/3	NA	NA	Silty loam
2	A2	10YR 4/3	10YR 4/6	Medium/distinct	Silty loam
5	B	10YR 4/2	10YR 4/6	Medium/distinct	clay loam
12	C	Gley 4/10BG			gleyed muck

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- X Aquic Moisture Regime
- X Reducing Conditions
- X Gleyed or Low Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

Reacted to a-a-dipyridil test. Low chroma with mottles. NRCS field indicator: F3 (Depleted matrix).

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No

Wetland Hydrology Present? (Yes) No

Hydric Soils Present? (Yes) No

Is this Samplig Point Within a Wetland? (Yes) No

Remarks:

Riparian wetland representative of stream features on site. Data point adjacent to flag 205.

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: **Rutherford County Landfill**
Applicant/Owner: **Rutherford County**
Investigator: **Philip May, GNRA**

Date: **5/1/00**
County: **Rutherford**
State: **NC**

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID: **UPL**
Transect ID: **2**
Plot ID: **200U**

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Acer rubrum	T	FAC
2. Liriodendron tulipifera	T	FAC
3. Quercus bicolor	T	FacW+
4. Cornus florida	S	FACU
5. Acer rubrum	S	FAC
6. Lonicera japonica	H	FAC-
7. Athyrium asplenoides	H	NI
8. Asplenium rhizophyllum	H	NI
9. Chimaphila maculata	H	NI
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **44.4%**

Remarks:

Less than 50% hydrophytic vegetation.

HYDROLOGY

___ Recorded Data (Describe in Remarks):
___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
x No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: _____(in.)

Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:
Primary Indicators:
___ Inundated
___ Saturated in Upper 12 Inches
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands
Secondary Indicators (2 or more required):
___ Oxidized Root Channels in Upper 12 Inches
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

Steep slope with no hydrology indicators.

Plot ID: 200U

SOILS

Map Unit Name (Series and Phase): Pacolet sandy clay loam, 15 to 25 % slopes

Drainage Class: well drained

Taxonomy (Subgroup): Typic kanhapludults

Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc
0	A	10YR 3/4			Loam w/ roots
2	B	7.5YR 4/4			clay loam
12	C	7.5YR 4/4			sandy clay

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- ___ Gleyed or Low Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ___ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

No hydric soil indicators.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes (No)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? Yes (No)

Is this Samplig Point Within a Wetland? Yes (No)

Remarks:

Upland data point on slope adjacent to 200W.

Approved by HQUSACE 3/92

David Garrett, P.G., P.E.
Engineering and Geology

January 7, 2001

Mr. Steve Chapin
US Army Corps of Engineers
Asheville Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, North Carolina 28801-5006

RE: Wetlands Delineation and Survey
(Request for Certification)
Rutherford County, NC

Dear Mr. Chapin:

I am pleased to forward maps pertaining to a wetlands delineation performed during mid-2000 at the Rutherford County Landfill site in Rutherfordton, North Carolina. The delineation was performed at my request by my colleague at G.N. Richardson & Associates, Mr. Philip May. The delineated area was flagged in the field and surveyed by Don McEntire, RLS, of Professional Surveying, Inc., of Rutherfordton. Mr. McEntire's signature is affixed to the survey certification block.

Current plans are to develop the referenced site as a lined municipal solid waste disposal area. The initial development is planned in the western side of the property, which will not impact the stream delineated by points #315A and B and #316. Please note that the continuation of this stream to the north is also outside the proposed development area and will undergo no impacts. Based on the site development plan, two streams on the east side of the property, delineated by points #101 through 111 and points #210 through 215, respectively, will not be developed until 15 to 20 years into the future. At present, we anticipate no steam impacts within a minimum of 15 years.

Please feel free to contact me at your earliest convenience if you have any questions regarding the work or future plans. I respectfully request that the original signature map, so indicated in the provided set, be signed by you or your designee in the appropriate block and returned to my office at the address shown on the letterhead. I thank you, in advance, for your cooperation.

Very Truly Yours,

G. David Garrett, P.G., P.E.

Enclosure: Delineation Map (Original and Full-Size Copy)
Two 11x17" Reductions

1408 Rock Drive, Raleigh, North Carolina 27610
E-mail: david_garrett_pg@mindspring.com 919-231-1818 (Office and Fax) 919-418-4375 (Mobile)

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action ID: **20031141** County: **Rutherford**

Waters of the U.S. Survey/DelineationVerification

Property owner/Authorized Agent: **Rutherford County Landfill, c/o David Garrett, P.G.**

Address: **1408 Rock Drive**

Raleigh, NC 27610

Telephone Number:

Size and Location of Property (waterbody, Highway name/number, town, etc.):

"Study Area" as indicated on the submitted Wetland Delineation for Rutherford County Landfill located just south of Rutherfordton.

Indicate Which of the following apply:

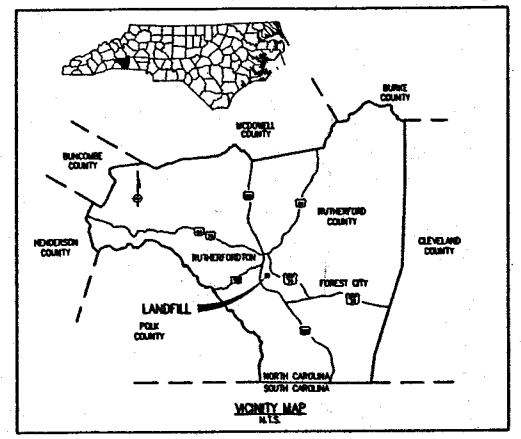
____ There are waters of the U.S. on the above described property which have been accurately flagged/delineated. We recommend that the delineated lines be surveyed. The surveyed lines must be verified by our staff before the Corps will make a final jurisdictional determination on your property.

__X__ The submitted survey plat dated **09/2000** for the above referenced property accurately reflects the limits of waters of the U.S. on the property. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed 5 years from the date of this notice.

Placement of dredged or fill material in waters othe U.S. on this property without a Department of the Army permit is in most cases a violation of Section 301 of the Clean Water Act (33 USC 1311). A permit is not required for work on the property restricted entirely to existing high ground. If you have any questions regarding the Corps of Engineers regulatory program, please contact:

Steve Chapin at **(828) 271-4014**

Project Manager Signature Steve Chapin Date **January 22, 2001**



VICINITY MAP
N.T.S.

DELINEATION COORDINATES			
NODE ID	NORTHING	EASTING	WIDTH (SEE NOTE 2)
101	595685.90	1121284.63	2'
102	595709.92	1121251.77	3'
103	595737.80	1121213.42	10'
104A	595765.06	1121184.30	
104B	595768.88	1121192.92	
105	595804.49	1121153.21	6'
106	595831.12	1121129.00	4'
107	595881.47	1121103.92	5'
108	595889.97	1121071.17	5'
109	595909.27	1121044.42	3'
110	595943.50	1121020.62	5'
111	596012.97	1121000.16	2'
201	594745.85	1120450.64	2'
202A	594768.31	1120422.54	
202B	594785.57	1120452.03	
203A	594825.72	1120434.09	
204A	594844.92	1120387.63	
204B	594854.54	1120412.02	
205A	594879.84	1120365.41	
205B	594888.71	1120388.86	
206A	594919.45	1120338.25	
206B	594922.74	1120354.74	
207	594957.04	1120330.99	6'
208	594969.74	1120308.75	3'
209	595003.07	1120316.77	5'
210	595052.07	1120302.56	3'
211	595092.74	1120304.84	4'
212	595127.62	1120312.88	4'
213	595153.27	1120307.66	5'
214	595179.49	1120308.43	5'
215	595213.02	1120298.44	2'
315A	595574.41	1119196.58	
315B	595566.04	1119194.69	
316	595547.87	1119262.79	3'

NOTES:

1. USACE DETERMINED THAT FLAGS #107 AND #213 BEGINNING OF "IMPORTANT STREAMS".
2. WIDTH MEASUREMENTS DENOTE CHANNEL WIDTH AT THAT POINT.
3. FLAG NUMBERS #201–#214 ARE BELOW AN OLD ROAD CROSSING IN A STEEP VALLEY. THESE POINTS WERE NOT SURVEYED, AND THERE WILL BE NO IMPACTS TO THE VALLEY BELOW THE ROAD.

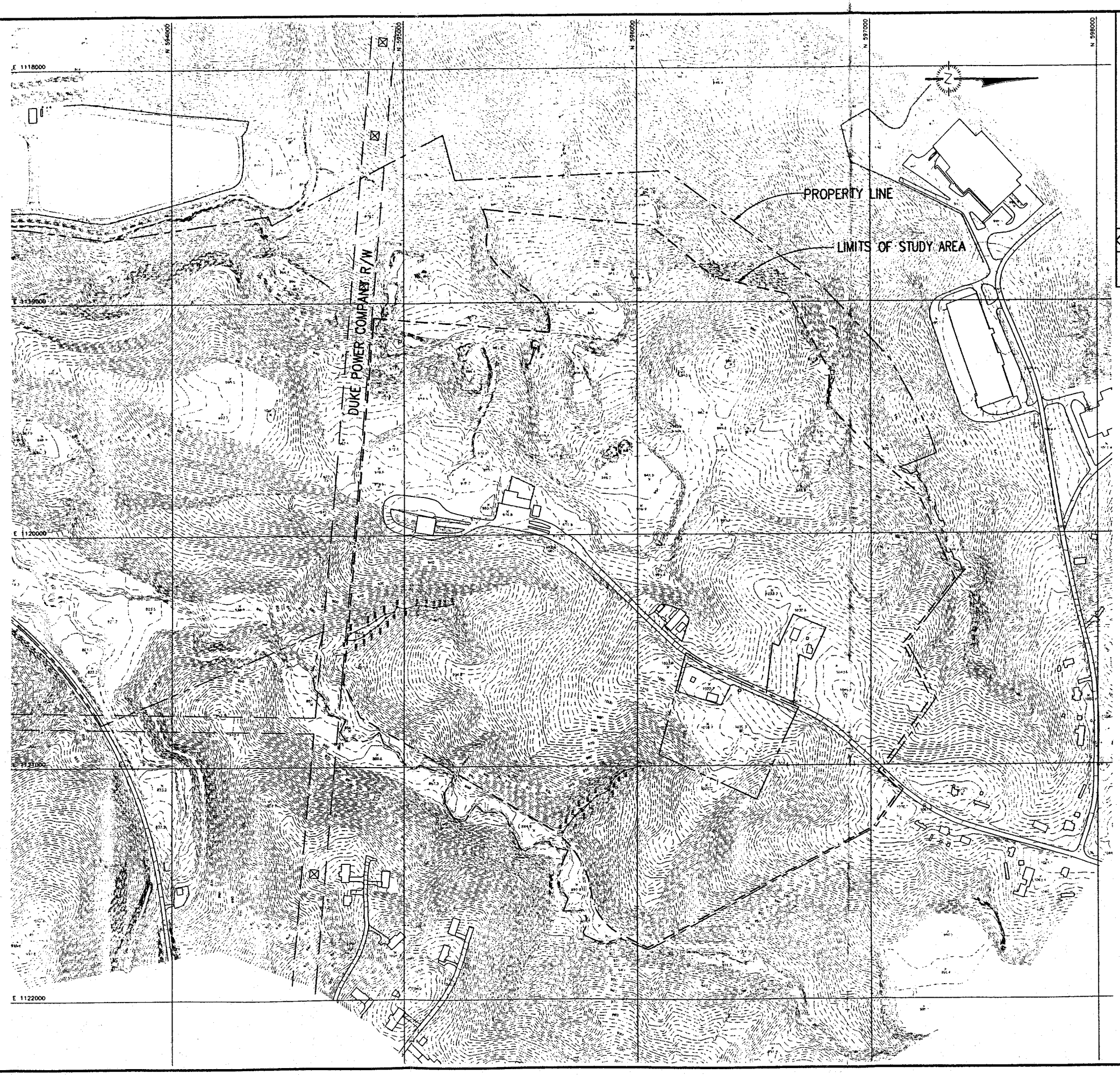
THIS CERTIFIES THAT THIS PLAT ACCURATELY DEPICTS THE BOUNDARY OF THE JURISDICTION OF SECTION 404 OF THE CLEAN WATER ACT AS DETERMINED BY THE UNDERSIGNED ON THIS DATE. UNLESS THERE IS A CHANGE IN THE LAW OR OUR PUBLISHED REGULATIONS, THIS DETERMINATION OF SECTION 404 JURISDICTION MAY BE RELIED UPON FOR A PERIOD NOT TO EXCEED FIVE YEARS FROM THIS DATE. THIS DETERMINATION WAS MADE UTILIZING THE 1987 CORPS OF ENGINEERS WETLANDS DELINEATION MANUAL.

NAME: Stephen D. Chapin
TITLE: Biologist
DATE: 11/22/01

I, Donald R. McClintock CERTIFY THAT THE POINTS INDICATED ON THIS MAP WERE PLOTTED ON THIS MAP FROM A FIELD SURVEY PERFORMED UNDER MY SUPERVISION IN AUGUST 2000 AND IS AN ACCURATE REPRESENTATION OF THE FLAGGING PROVIDED BY OTHERS FOR THE PURPOSE OF DELINEATION THE LIMITS OF WETLANDS AS PERFORMED BY G.N. RICHARDSON & ASSOC. IN MAY 2000.

FOR SURVEYOR: Donald R. McClintock
NC REGISTRATION NUMBER: L-4183
DATE OF CERTIFICATION: December 30, 2000

0 200' 400' 600'



NO	DATE	REVISION

G.N. RICHARDSON & ASSOCIATES, INC.
LAND SURVEYORS
1108 S. SCOTLAND AVENUE, PAULSBORO, N.J. 07066
MAIN OFFICE: 1000 PARK FORTY PLAZA, SUITE 100, CHERRY HILL, N.J. 08002
PHONE: 856-435-8300 FAX: 856-435-8301 WWW.GNRA.COM

DAVID GARRETT, P.G.
ENGINEERING GEOLOGIST
4000 Westchase Blvd., Suite 510
Raleigh, North Carolina 27610

SEAL

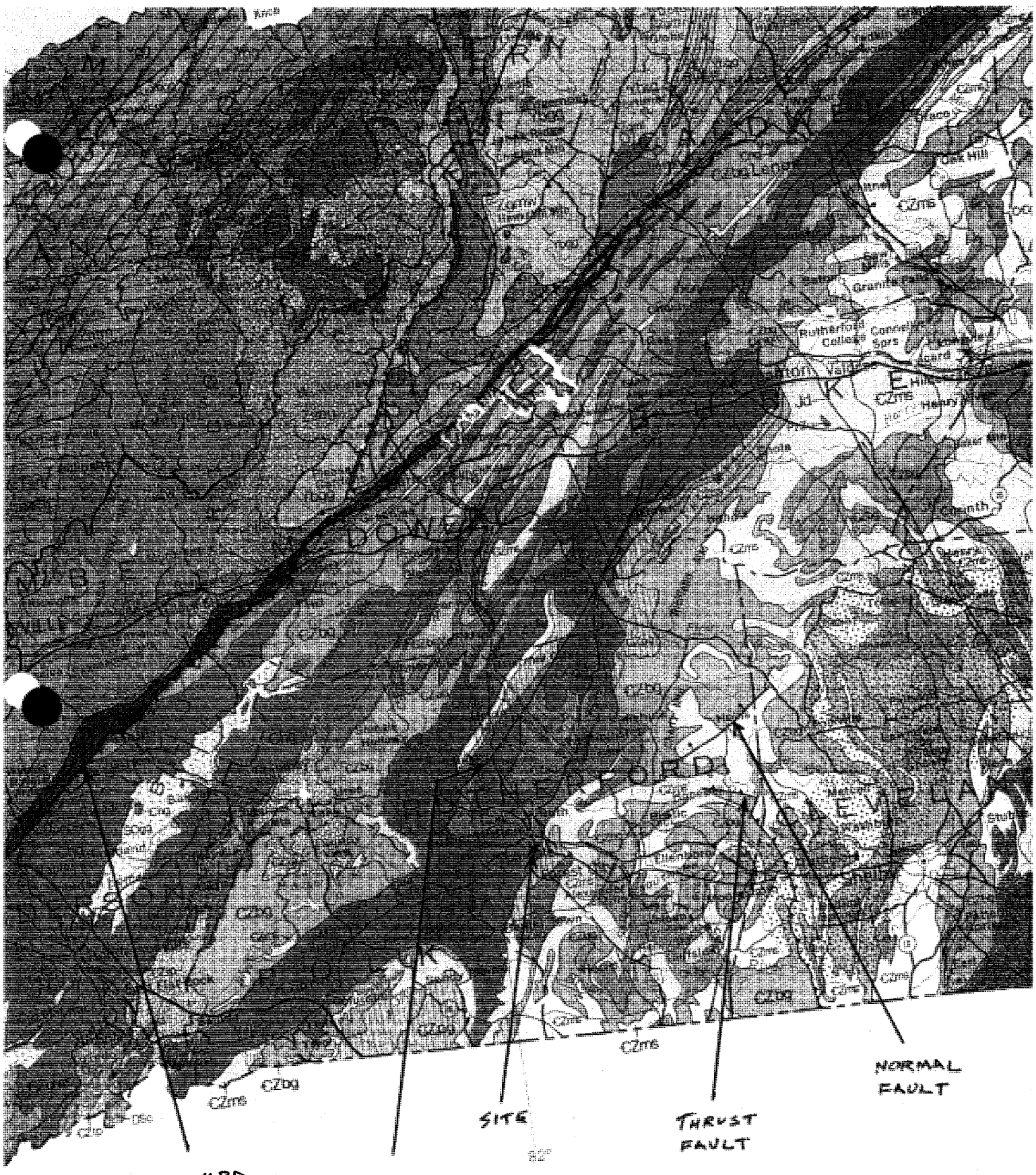
SEAL

PROJECT TITLE: RUTHERFORD COUNTY SOLID WASTE MANAGEMENT

DRAWING TITLE: WETLAND DELINEATION FOR RUTHERFORD COUNTY LANDFILL

DESIGNED BY: P.W.M.	DRAWN BY: A.W.H.
CHECKED BY: G.N.R.	PROJECT NO.: RUTH-1
SCALE: AS SHOWN	DATE: SEPT. 2000
FILE NAME: RUTH-D0053	
SHEET NO	DRAWING NO.

G:\-cad\Ruth-1\site-study-facility-plan\sheets\RUTH-D0053.dwg DATE: SEP 11, 2000 TIME: 4:32 PM



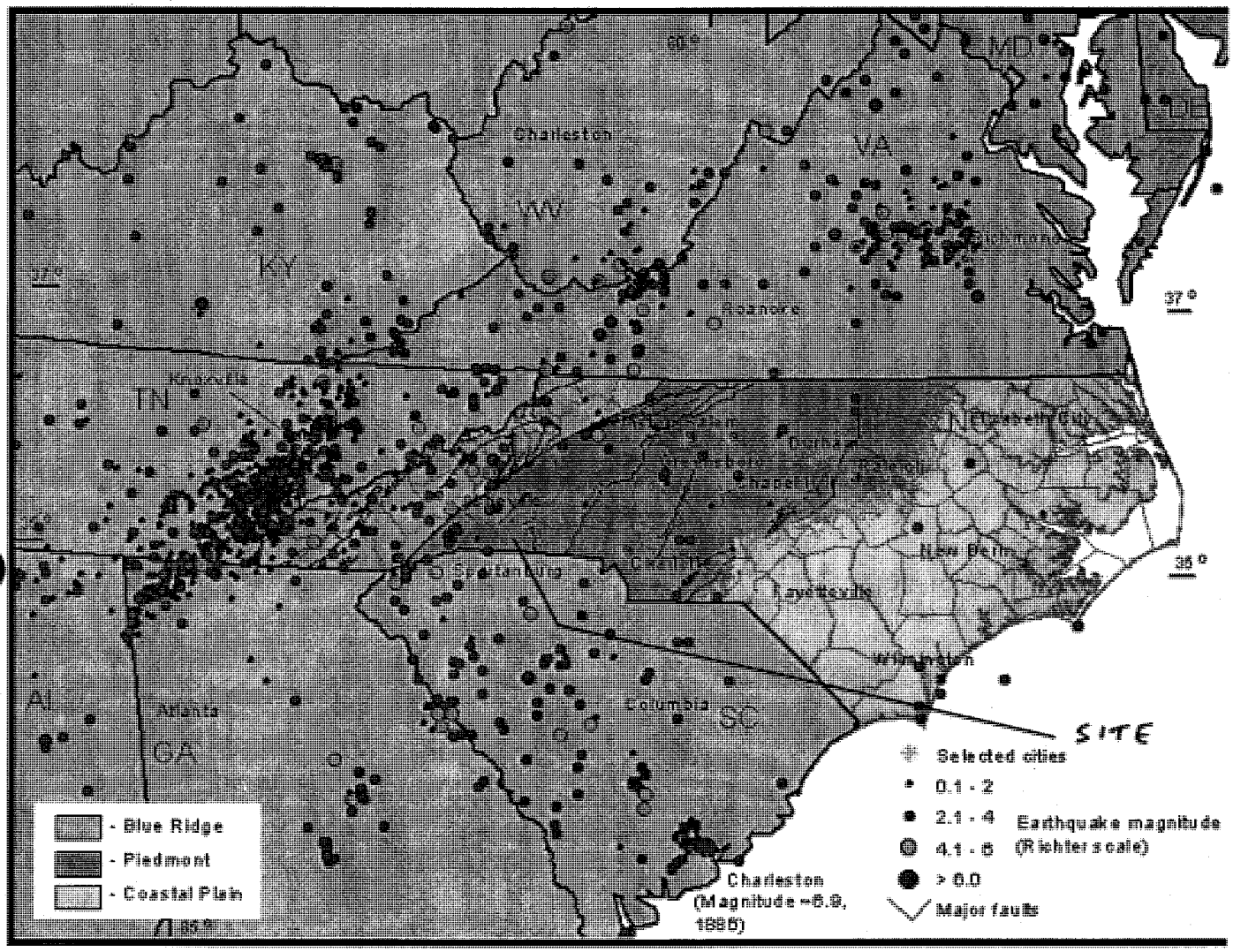
EXCERPT FROM N.C. GEOLOGIC MAP (1985)

S O

SCALE 1" = 8 MILES

EXCERPT FROM
NCGS GEOLOGY NOTE #7

Earthquake Epicenters in North Carolina and Portions of Adjacent States (1698-1997)



This is a map of earthquake epicenters recorded in North Carolina and portions of adjacent states between 1698 and 1997. Epicenters are shown only for labeled states. Major geologic provinces and known major faults exposed at the surface are shown for North Carolina. Faults identified to date in North Carolina are ancient and inactive. The lack of correspondence between the locations of earthquake epicenters and these faults indicates they are not responsible for earthquakes in North Carolina within historical times. The faults beneath the surface that generate earthquakes have yet to be positively identified.

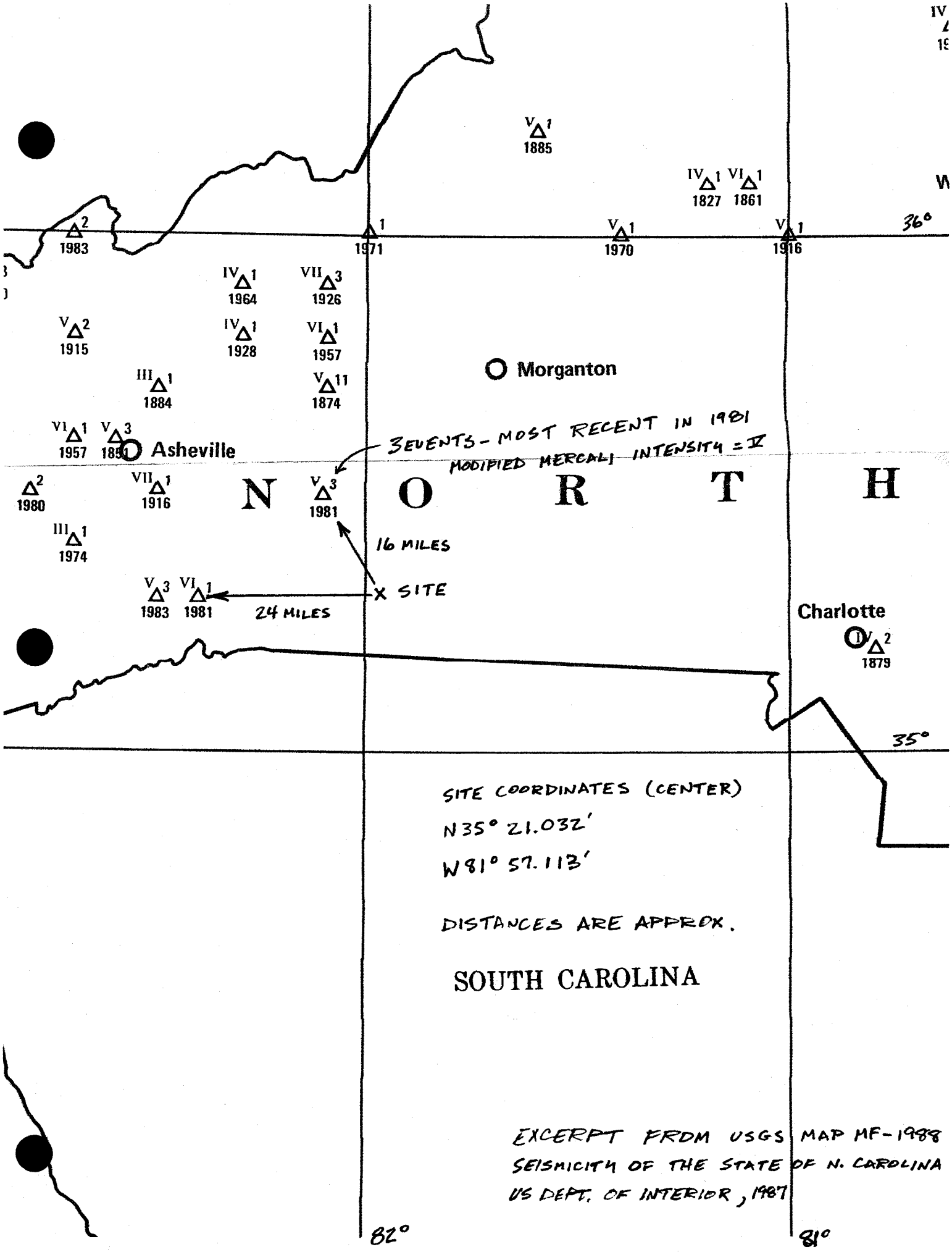
Earthquake data before 1886 are sparse. Seismic instruments were installed in the region in the late 1920's. Prior to that time earthquake data are based on historical records. The distribution of seismograph stations did not allow for location of earthquakes with magnitudes <4 until 1962-1963. Micro-earthquake networks began operating in the region in the mid-1970's.

Geology from North Carolina Geological Survey, 1985, Geologic Map of North Carolina (scale 1:500,000). Earthquake data from 1698-1992 are from Virginia Polytechnical and State University. Data from 1993-1997 are from the U. S. Geological Survey National Earthquake Information Center (http://wwwneic.cr.usgs.gov/).

The map and text above are modified from Geologic Note 7: Map of Earthquake Epicenters in North Carolina and Portions of Adjacent States (1698-1997)
To get a copy of Geological Note 7, contact our Sales Office.

NCGS HOME

Back to NCGS Main Page



EXCERPT FROM USGS MAP MF-1988
SEISMICITY OF THE STATE OF N. CAROLINA
US DEPT. OF INTERIOR, 1987

500,000 sq mi which included the states of North and South Carolina, Georgia, Alabama, Tennessee, Kentucky, Virginia, and West Virginia.

MODIFIED MERCALI INTENSITY

1916	AUG	26	19	36	..	36.0	N.	81.0	W.	..	G	71	..	..	.. ..	.. ...	V	71
1920	JAN	22	..	..	..	36.4	N.	80.3	W. x	..	G	71	..	..	.. ..	.. ...	---	..
1923	OCT	18	19	30	..	35.3	N.	82.5	W.	..	G	128	..	..	.. ..	.. ...	F	128
1926	JUL	08	09	50	..	35.9	N.	82.1	W.	..	G	71	..	..	.. ..	.. ...	VII	68

Southern part of Mitchell County, North Carolina. A sharp local earthquake threw down one chimney and cracked several others; house foundations were cracked; houses moved on their foundations; water pipes broke; and glassware was thrown from shelves and broken. The area of damage was about 0.5 mile long and 900 ft wide; but it was felt at least 6 mi from the epicenter.

1927	OCT	27	..	..	..	36.3	N.	76.2	W. *	..	G	71	..	..	.. ..	.. ...	IV*	71
1927	NOV	23	00	50	..	33.9	N.	78.0	W. *	..	G	71	..	..	.. ..	.. ...	IV*	71
1928	NOV	20	03	45	..	35.8	N.	82.3	W.	..	F	1	..	..	.. ..	.. ...	IV	68
1928	NOV	22	..	..	..	34.0	N.	78.0	W.	..	G	71	..	..	.. ..	.. ...	F	71
1928	DEC	23	02	30	..	35.3	N.	80.3	W.	..	G	71	..	..	.. ..	.. ...	IV*	71
1935	JAN	01	08	15	..	35.1	N.	83.6	W.	..	C	38	..	..	.. ..	.. ...	V	68
1936	JAN	01	08	..	..	35.1	N.	84.0	W. *	..	G	71	..	..	.. ..	.. ...	III	71
1936	SEP	06	..	..	..	35.3	N.	80.2	W. *	..	G	71	..	..	.. ..	.. ...	III*	71
1940	DEC	25	01	30	..	35.9	N.	82.9	W.	..	G	103	..	..	.. ..	.. ...	III	13
1940	DEC	25	06	50	..	35.9	N.	82.9	W.	..	H	103	..	..	.. ..	.. ...	IV	105
1940	DEC	26	..	..	..	35.9	N.	82.9	W.	..	H	103	..	..	.. ..	.. ...	III	103
1941	MAY	10	11	12	..	35.6	N.	82.6	W.	..	G	103	..	..	.. ..	.. ...	IV*	71
1957	MAY	13	14	24	51.1	35.799N.		82.142W.		005	C	349	..	..	4.1Mfa DG	.. ...	VI	132

Western North Carolina. Slight damage consisting mostly of cracked plaster at Micaville and Nebro. Felt area was estimated at 8,100 sq mi (Ref. 38).

1957	JUL	02	09	33	01	35.6	N.	82.7	W.	007	G	155	..	..	.. ..	.. ...	VI	132

Centered in Buncombe County, North Carolina. Walls and plaster cracked at Asheville. A retaining wall cracked at Marshall. Plaster was cracked at Weaverville and Swannanoa and a few chimneys were damaged at Swannanoa (Ref. 38).

1957	NOV	24	20	06	17	35.	N.	83.5	W.	..	C	30	..	..	4.0Mfa BAR	.. ...	VI	132

Centered in northwestern Jackson County, North Carolina. The shock affected an area of about 3,500 sq mi in North and South Carolina, Tennessee, and possibly Georgia. At Hartford, Tenn., merchandise was thrown from the shelves and some houses were damaged.

STRONGEST EQ'S IN WESTERN NC NEAR ASHEVILLE

1958	MAR	05	11	53	43	34.2	N.	77.8	W.	..	G	103	..	..	.. ..	.. ...	V	103
1958	MAY	16	22	30	..	35.6	N.	82.6	W.	..	G	103	..	..	.. ..	.. ...	IV	132
1960	JAN	03	07	30	..	35.9	N.	82.1	W. *	..	G	132	..	..	.. ..	.. ...	IV	132
1960	JAN	04	..	..	..	35.9	N.	82.1	W. *	..	G	132	..	..	.. ..	.. ...	II*	132
1960	FEB	09	14	00	06.0	35.3	N.	82.5	W.	..	G	103	..	..	.. ..	.. ...	F	103
1964	JAN	20	13	37	52.0	35.9	N.	82.3	W. *	..	G	37	..	..	.. ..	.. ...	IV	132
1968	NOV	26	01	..	..	34.1	N.	77.8	W. *	..	G	41	..	..	.. ..	.. ...	IV	41
1970	SEP	10	01	41	05.2	36.020N.		81.421W.		001	B	349	..	..	3.1Mn GB	.. ...	V	132
1971	MAY	29	21	21	..	36.0	N.	82.0	W.	..	D	203	..	..	2.9Mnx JLM	.. ...	...	..
1974	MAY	16	..	..	..	35.4	N.	82.7	W. *	..	G	47	..	..	.. ..	.. ...	III*	47
1974	DEC	09	18	40	..	34.2	N.	77.2	W. *	..	F	47	..	..	.. ..	.. ...	III*	47
1977	SEP	25	06	22	37.8	36.004N.		82.678W.		005	B	339	..	..	2.5Mn BLA	.. ...	...	..
1978	FEB	25	03	53	27.2	36.152N.		79.318W.		021	B	339	..	..	2.2Mn BLA	.. ...	IV	240
1978	MAR	22	15	52	26.7	36.20 N.		81.73 W. x		001	C	339	..	..	2.9Mn BLA	.. ...	...	..
1978	JUL	09	07	03	35.6	35.505N.		82.798W.		010	B	339	..	..	2.8MD TAR	.. ...	...	..
1979	SEP	06	20	38	16.3	35.298N.		83.241W.		010	B	339	..	..	3.2MD GS	.. ...	...	..
1980	APR	09	20	47	24.0	34.848N.		79.941W.		..	C	339	..	..	2.8MD GS	.. ...	...	..
1980	APR	22	03	14	04.6	36.398N.		80.608W.		001	B	339	..	..	2.8Mn BLA	.. ...	IV	300
1980	JUN	10	23	47	32.2	35.457N.		82.809W.		001	A	349	..	..	3.0Mn BLA	.. ...	...	..
1981	MAR	04	20	44	43.8	35.810N.		79.737W.		001	C	339	..	..	2.8Mn BLA	.. ...	IV	325
1981	APR	09	07	10	31.2	35.514N.		82.051W.		001	B	339	..	..	3.0Mn GS	.. ...	V	325
1981	APR	09	12	02	37.4	35.50 N.		82.11 W.		007	C	339	..	..	2.5MD TEC	.. ...	...	..
1981	APR	10	06	04	59.8	35.51 N.		82.06 W.		001	C	339	..	..	2.0MD TEC	.. ...	...	..
1981	MAY	05	21	21	56.7	35.327N.		82.422W.		010	B	339	..	..	3.5Mn BLA	.. ...	VI	325

Hendersonville, North Carolina. A concrete patio was cracked, a sidewalk shifted 2 in, and a few windows were cracked. At Zirconia a foundation was cracked, plaster and drywall had small cracks, a few windows were cracked, and items were thrown from store shelves. Felt over an estimated area of 4,000 sq km of North and South Carolina, Tennessee, and Virginia. Wells were mudded at Dana, North Carolina.

1981	JUN	03	20	54	22.4	36.18 N.		81.67 W. x		001	C	339	..	..	3.0Mn BLA	.. ...	V	325
1983	MAR	25	02	47	10.9	35.344N.		82.454W.		011	B	360	..	..	3.2Mn BLA	.. ...	V	360
1983	NOV	29	19	30	28.1	36.027N.		82.653W.		007	A	360	..	..	2.7MD TEC	.. ...	...	..

RICHTER MAGNITUDE

SEISMIC ACTIVITY ALONG BREVARD ZONE

* LOCATED IN PROXIMITY TO RUTHERFORDTON, NC HENDERSONVILLE AREA

** OLD FORT AREA

MODIFIED MERCALLI INTENSITY SCALE OF 1931
Adapted from Sieberg's Mercalli-Cancani scale,
modified and condensed (Wood and Neumann, 1931)

I. Not felt - or, except rarely under especially favorable circumstances. Under certain conditions, at and outside the boundary of the area in which a great shock is felt: sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced; sometimes trees, structures, liquids, bodies of water, may sway--doors may swing, very slowly.

II. Felt indoors by few, especially on upper floors, or by sensitive or nervous persons. Also, as in grade I, but often more noticeably: sometimes hanging objects may swing, especially when delicately suspended; sometimes trees, structures, liquids, bodies of water, may sway, doors may swing, very slowly; sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced.

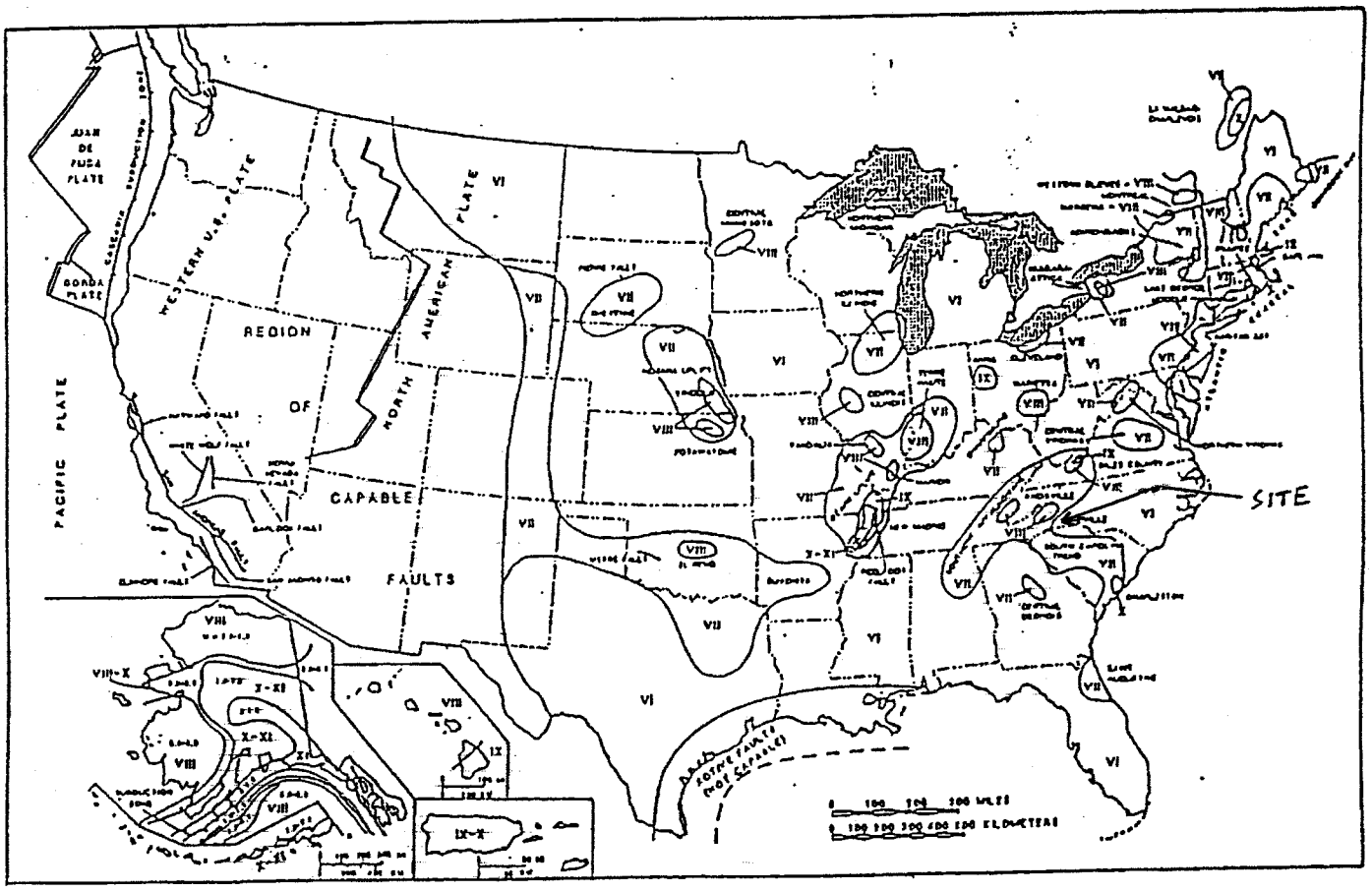
III. Felt indoors by several, motion usually rapid vibration. Sometimes not recognized to be an earthquake at first. Duration estimated in some cases. Vibration like that due to passing of light, or lightly loaded trucks, or heavy trucks some distance away. Hanging objects may swing slightly. Movements may be appreciable on upper levels of tall structures. Rocked standing motor cars slightly.

IV. Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive from previous experiences. Vibration like that due to passing of heavy or heavily loaded trucks. Sensation like heavy body striking building or falling of heavy objects inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash. Creaking of walls, frame, expecially in the upper range of this grade. Hanging objects swung, in numerous instances. Disturbed liquids in open vessels slightly. Rocked standing motor cars noticeably.

V. Felt indoors by practically all, outdoors by many or most: outdoors direction estimated. Awakened many, or most. Frightened few--slight excitement, a few ran outdoors. Buildings trembled throughout. Broke dishes, glassware to some extent. Cracked windows--in some cases, but not generally. Overturned vases, small or unstable objects, in many instances, with occasional fall. Hanging objects, doors, swing generally or considerably. Knocked pictures against walls, or swung them out of place. Opened, or closed, doors, shutters, abruptly. Pendulum clocks stopped, started, or ran fast or slow. Moved small objects, furnishings, the latter to slight extent. Spilled liquids in small amounts from well-filled open containers. Trees, bushes shaken slightly.

VI. Felt by all, indoors and outdoors. Frightened many, excitement general, some alarm, many ran outdoors. Awakened all. Persons made to move unsteadily. Trees, bushes, shaken slightly to moderately. Liquid set in strong motion. Small bells rang--church, chapel, school, etc. Damage slight in poorly built buildings. Fall of plaster in small amount. Cracked plaster somewhat, especially fine cracks, chimneys is some instances. Broke dishes, glassware, in considerable quantity, also some windows. Fall of knick-knacks, books, pictures. Overturned furniture in many instances. Moved furnishings of moderately heavy kind.

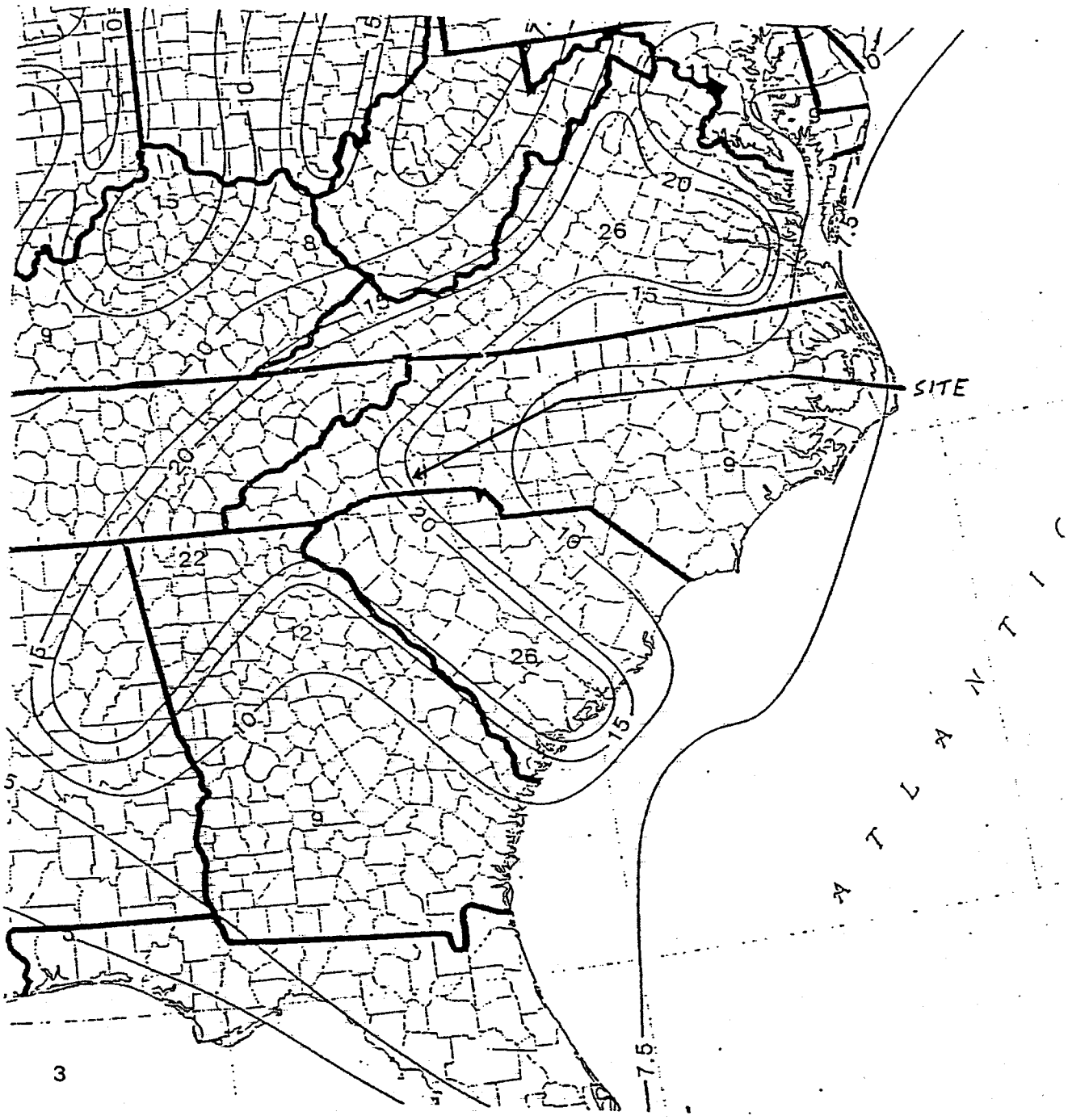
VII. Frightened all--general alarm, all ran outdoors. Some, or many, found it difficult to stand. Noticed by persons driving motor cars. Trees and bushes shaken moderately to strongly. Waves on ponds, lakes, and running water. Water turbid from mud stirred up. Incaving to some extent of sand or gravel stream banks. Rang large church bells, etc. Suspended objects made to quiver. Damage negligible in buildings of good design and construction, slight to moderate in well-built ordinary buildings, considerable in poorly built or badly designed buildings, adobe houses, old walls (especially where laid up without mortar), spires, etc. Cracked chimneys to considerable extent, walls to some extent. Fall of plaster in considerable to large amount, also some stucco. Broke numerous windows, furniture to some extent. Shook down loosened brickwork and tiles. Broke weak chimneys at the roof-line (sometimes damaging roofs). Fall of cornices from towers and high buildings. Dislodged bricks and stones. Overturned heavy furniture, with damage from breaking. Damage considerable to concrete irrigation ditches.



SEISMIC INTENSITY CAPABLE FAULTS MAP

G.N. RICHARDSON & ASSOCIATES, INC.
Engineering and Geological Services

417 N. Boylan Avenue Raleigh, North Carolina
(919) 828-0577 Fax 828-3899



PEAK BEDROCK
ACCELERATIONS MAP

G.N. RICHARDSON & ASSOCIATES, INC.
Engineering and Geological Services

417 N. Boylan Avenue Raleigh, North Carolina
(919) 828-0577 Fax 828-3899

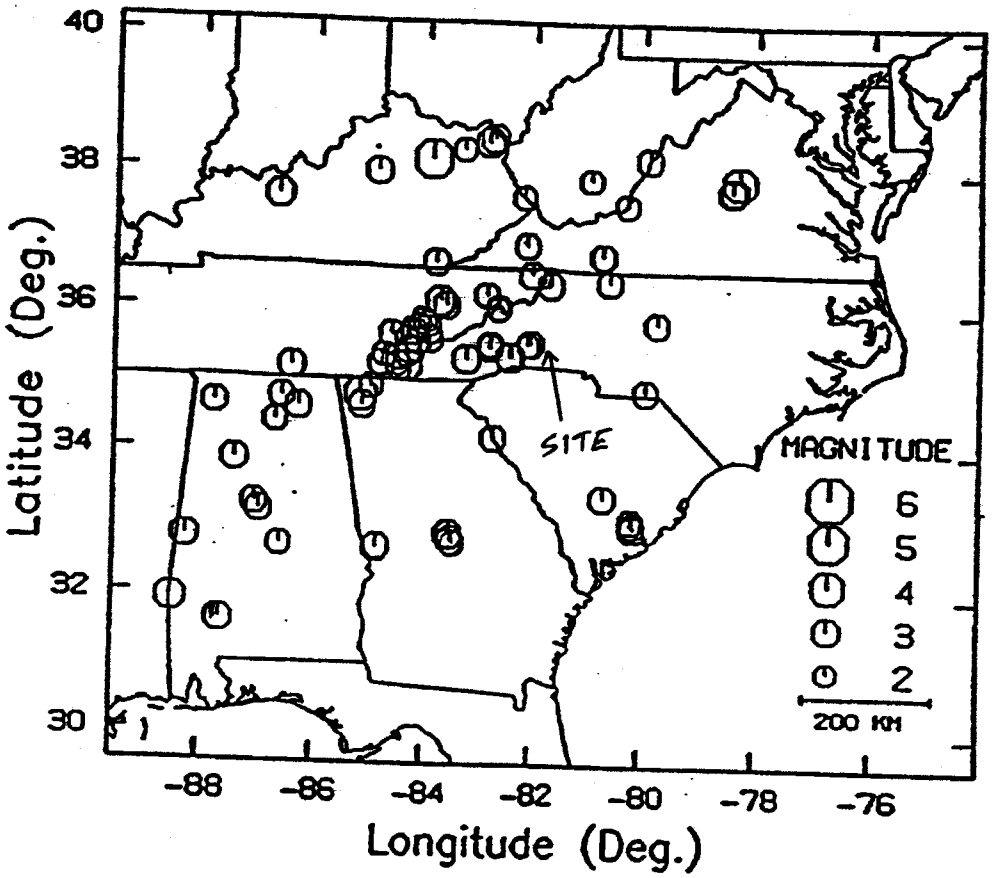
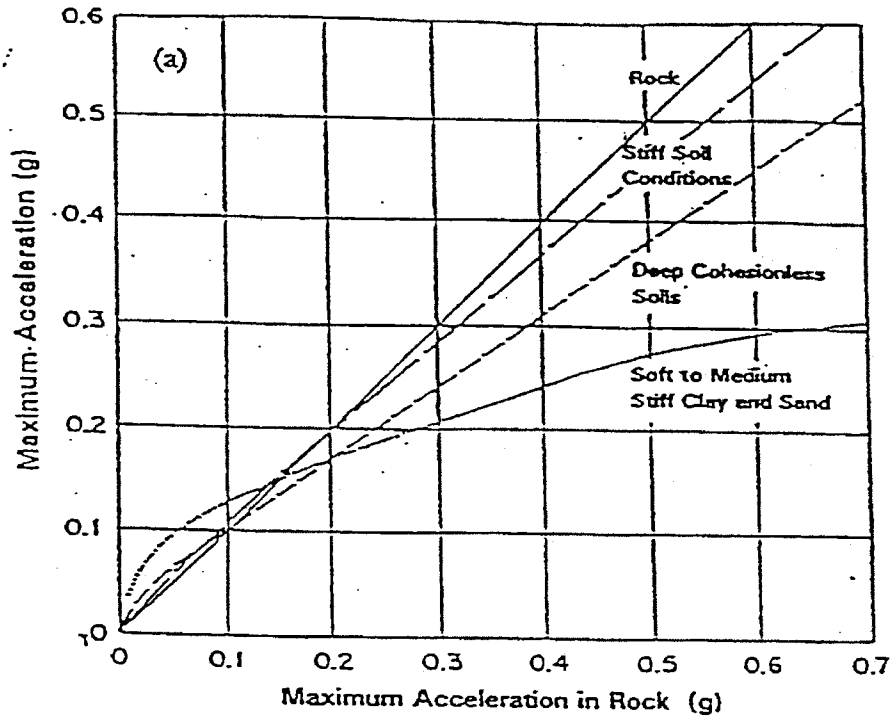


Figure 2.4 Epicenters for Earthquakes M ≥ 2.5 in the Southeastern United States (July 1977 - December 1984) (Sibol et al., 1984).



SITE AMPLIFICATION/
ATTENUATION RELATIONSHIPS

G.N. RICHARDSON & ASSOCIATES, INC.
Engineering and Geological Services

417 N. Boylan Avenue Raleigh, North Carolina
(919) 828-0577 Fax 828-3899

North Carolina Department of Cultural Resources

State Historic Preservation Office

David L. S. Brook, Administrator

James B. Hunt Jr., Governor
Betty Ray McCain, Secretary

Division of Archives and History
Jeffrey J. Crow, Director

June 27, 2000

David Garrett, PG, PE
1408 Rock Dr.
Raleigh, NC 27610

Re: Landfill Development Site, Rutherforton, Rutherford County, ER 99-9032

Dear Mr. Garrett:

Thank you for forwarding additional information concerning the above project. Since the proposed development is to take place in areas where previous ground disturbance has occurred, it is unlikely that archaeological resources will be affected. We, therefore, recommend that no archaeological investigation be conducted in connection with this project.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763.

Sincerely,

Renee Gledhill-Earley

for David Brook
Deputy State Historic Preservation Officer

DB:scb

cc: ACOE-Asheville
James Coffey-DENR Solid Waste

David Garrett, P.G., P.E.
Engineering and Geology

June 8, 2000

Ms. Renee Gledhill-Early
NC Department of Cultural Resources
Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

RE: Proposed Landfill Development Site
Rutherford County North Carolina **ER-99-9032**

Dear Ms. Gledhill-Early

This is a follow up letter to correspondence from your office (attached) dated June 17, 1999. Please find attached a map of the site, showing existing and potential ground disturbing activities. In this narrative, I wish to provide supplemental information that may help your determination.

The attached figure depicts the site topography, as well as existing and proposed development. The entrance road from the north is Laurel Hill Drive, which is the dashed road (now paved) coming into the project area on the USGS Rutherfordton South topo map (also attached). The north-south entrance road and the east-west power line serve as references for this discussion. All proposed development is north of the power line. The area south of the power line is a closed landfill that served the community since the 1950's, or before. There is an active construction and demolition debris landfill just north of the power line, west of the entrance road.

The proposed landfill will be developed within the delineated area on both sides of the entrance road. East of the road is wooded but appears to have been clear-cut about 30 to 40 years ago, possibly farmed prior to that, but a majority of the land is rather steep. There are no obvious structures or foundations present in the woods. A solid waste transfer station was constructed ca. 1997 near the power line. Another closed construction and demolition landfill existed at the site of the Fire Training Ground, and there is an FAA navigational antenna located just south of the fire ground.

West of the entrance road is a former soil borrow pit, where dirt was procured for the operation and closure of the various landfills within the property. The landfill office, maintenance and an unrelated County Animal Shelter exists west of the entrance road. There is one private dwelling, age unknown but estimated to be a 1940's style bungalow, with one outbuilding located west of the entrance road. During my reconnaissance of the County's property, I have noted no other structures or foundations. Prior to soil borrow activities, the west side of the entrance road may have been farmed, but this has not been verified. All areas of the site appear to have been disturbed at some time in the past.

1408 Rock Drive, Raleigh, North Carolina 27610
E-mail: david_garrett_pg@mindspring.com 919-231-1818 (Office and Fax) 919-418-4375 (Mobile)

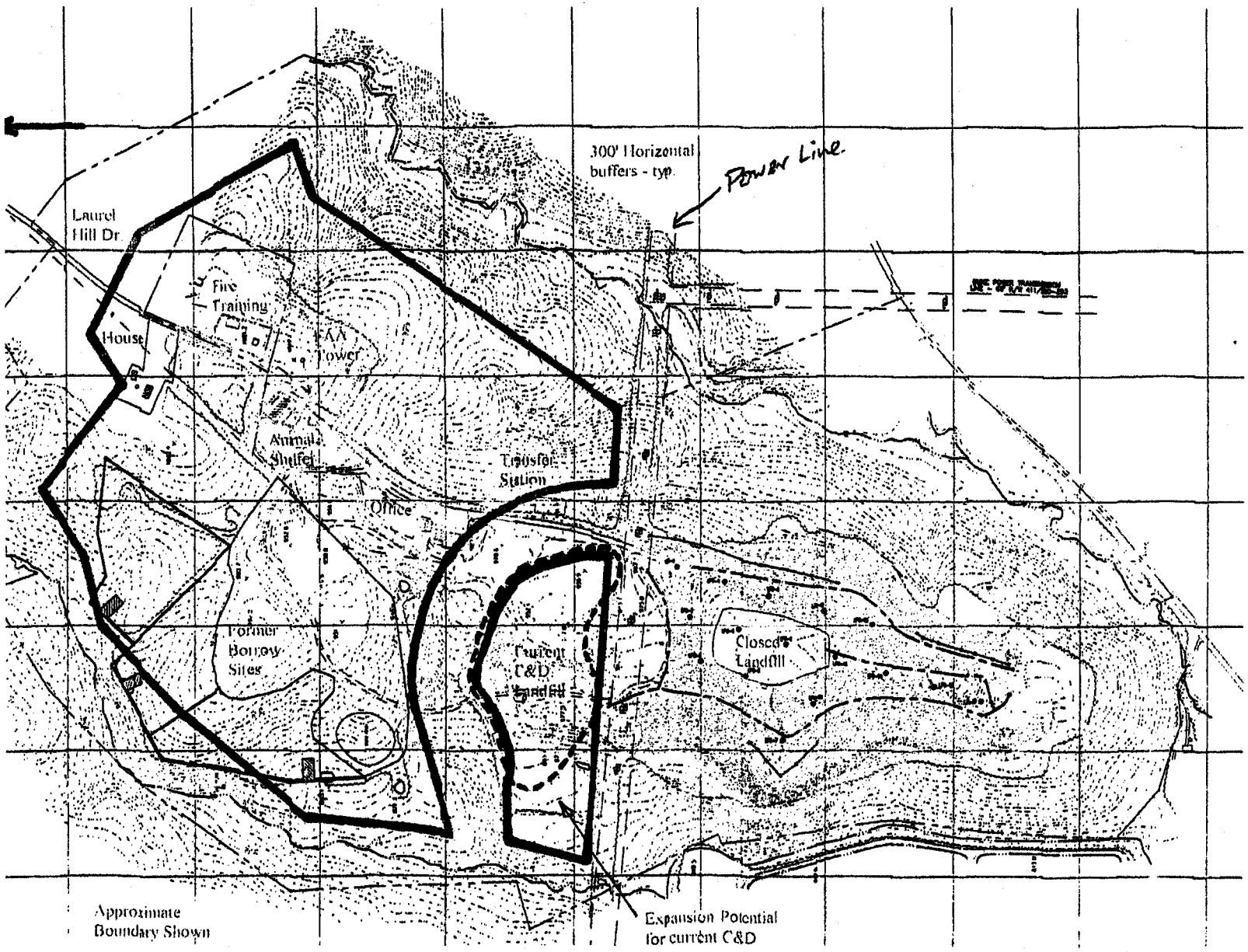
[illegible] be advised that the North Carolina DOT has examined the area for a possible highway realignment project (identified as R-2233, relocation of U.S. 221). I attended a meeting on October 5, 1999 at the NC DOT headquarters, which I believe was also attended by a Ms. April Alpern Montgomery of the State Historic Preservation Office, Architecture Section (?). Several sites of historical interest are present in Rutherfordton and within the County, which were discussed relative to various highway alignments. I have not spoken to Ms. Montgomery as of this writing to discuss her findings relative to the project site (one possible highway alignment came through the site), but I understand a school listed on the National Register of Historic Places exists at the north end of Laurel Hill Drive.

I confirmed the historic status of the school with Mr. Jim Womack, Chairman of the Rutherford County Historical Society, tel. 828-248-3512. Mr. Womack was not aware of any prior uses of the subject property, nor was he familiar with any historic structures in the immediate vicinity of the site. Based on my professional opinion, the school is located nearly one mile from the project site and should not be affected in any way by the proposed landfill development. I have a call into Ms. Montgomery to verify that her office's investigations did not indicate any past uses of the subject property that might be of historical significance.

I hope this provides sufficient information per your request of June 17. I would look forward to a letter from your office concluding that the project would have no impact on a site of historic significance, if that is appropriate. Please contact me if I can provide any further information.

Sincerely,

G. David Garrett



Alternative 1

Max. Lined MSWLF Footprint, ±77 AC

RECEIVED
JUN 22 1999
BY:

North Carolina Department of Cultural Resources

James B. Hunt Jr., Governor
Betty Ray McCain, Secretary

MAILING ADDRESS
4617 Mail Service Center
Raleigh, NC 27699-4617

Division of Archives and History
Jeffrey J. Crow, Director

LOCATION
507 North Blount Street
Raleigh, NC
State Courier 53-31-31

June 17, 1999

G. David Garrett, PG
G. N. Richardson & Associates
425 North Boylan Avenue
Raleigh NC 27603

Re: Proposed landfill development site, one mile south of Rutherfordton, Rutherford County, ER 99-9032

Dear Mr. Garrett:

Thank you for your letter of May 21, 1999, concerning the above project.

We are unable to comment on the potential effect of this project on archaeological resources until we receive further information. Please forward a map to this office clearly indicating the exact location of any ground disturbing activities associated with this project. Information concerning previous land use of the areas to be disturbed would also aid in the completion of our review. The USGS topographic map will suffice if the previously disturbed areas are clearly indicated.

We have conducted a search of our files and are aware of no structures of historical or architectural importance located within the planning area.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763.

Sincerely,

David Brook/w

David Brook
Deputy State Historic Preservation Officer

DB:slw

G.N. RICHARDSON & ASSOCIATES
Engineering and Geological Services

May 21, 1999

Ms. Renee Gledhill-Early
NC Department of Cultural Resources
Division of Archives and History
109 E. Jones Street
Raleigh, North Carolina 27601-2807

RE: Request for Information
Proposed Landfill Development Site
Rutherfordton, North Carolina

Dear Ms. Gledhill-Early:

G.N. Richardson & Associates respectfully requests information pertaining to cultural and/or archaeological sites which may affect plans to develop a lined landfill on the above referenced site.

The site is located on the Rutherfordton South, N.C. topographic map, about one mile south of downtown Rutherfordton. The site is approximately 250 acres in size and contains three existing solid waste management facilities: a closed municipal solid waste (MSW) landfill, an active construction and demolition (C&D) debris landfill, and a solid waste transfer station.

There is also an office building/garage on the site, and the western half of the property to the north of the east-west power line has recently undergone disturbance for the procurement of soil borrow associated with the closure of the MSW landfill. None of these features show on the vintage USGS topographic map. Most of the site has undergone extensive prior development and disturbance.

We look forward to receiving your reply at your earliest convenience. If we can provide any further information to assist you, please contact this office.

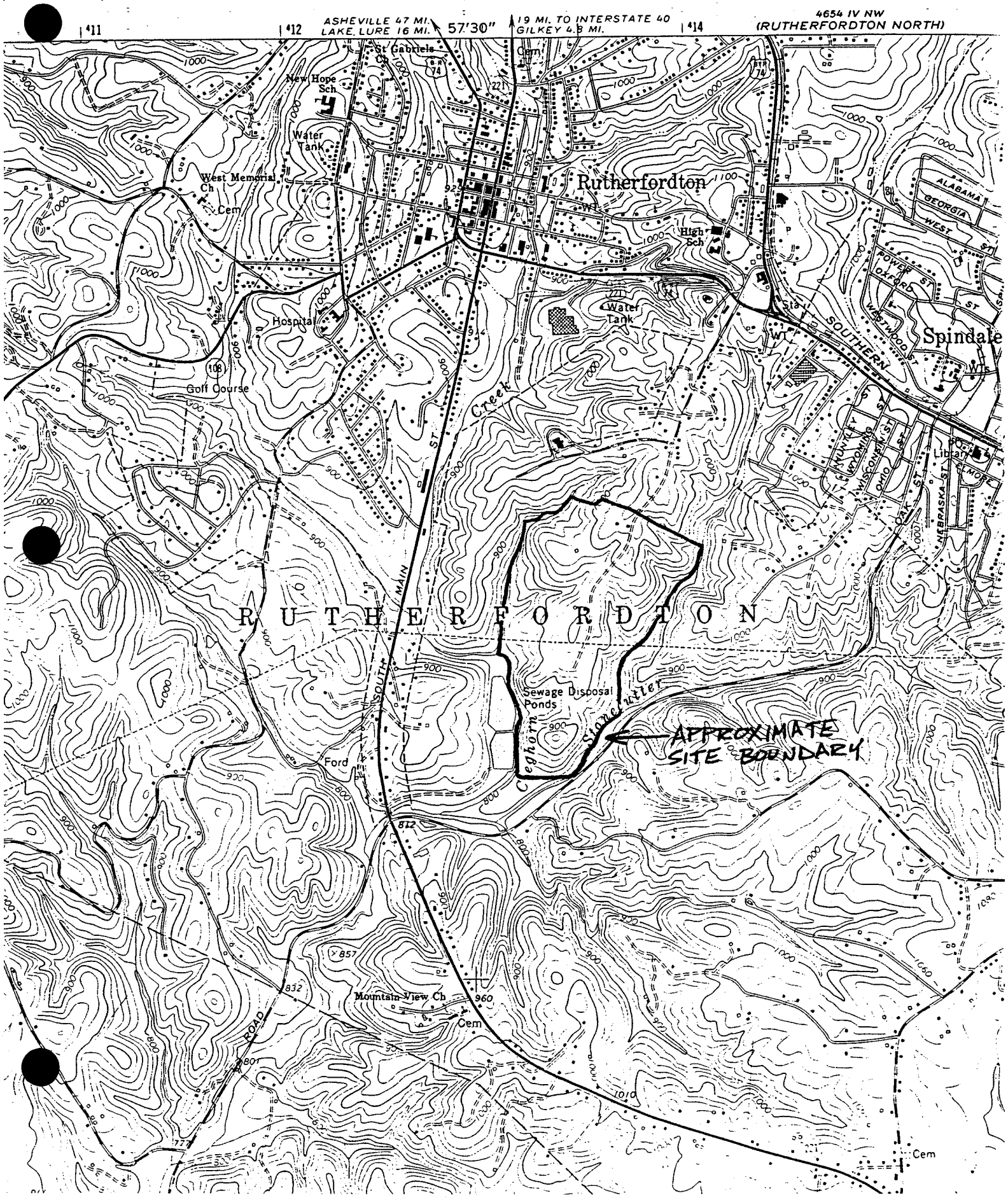
Sincerely,
G.N. Richardson & Associates

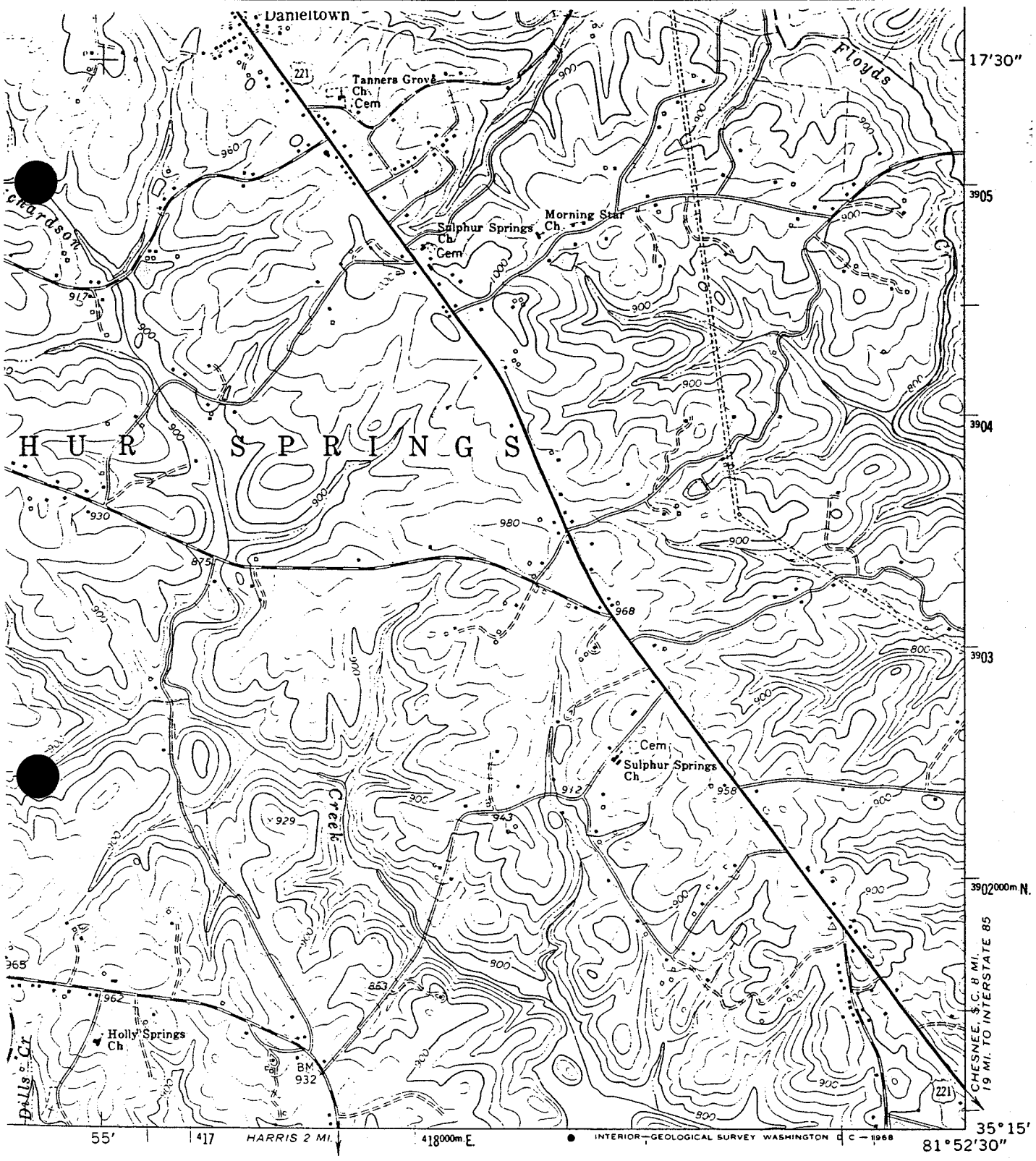
G. David Garrett, P.G.
Principal

Attachments

425 N. BOYLAN AVENUE • RALEIGH, NC 27603 • TEL. 919-828-0577 • FAX 919-838-3899 • WWW.GNRA.COM

ERIOR


ASHEVILLE 47 MI.
LAKE LURE 16 MI.
57'30"
19 MI. TO INTERSTATE 40
GILKEY 4.8 MI.
4654 IV NW
(RUTHERFORDTON NORTH)
St Gabriels Ch
Cem
New Hope Sch
Water Tank
West Memorial Ch
Cem
Rutherfordton
High Sch
Water Tank
Hospital
Golf Course
Spindale
SOUTHERN
ALABAMA
GEORGIA
WEST ST
POWER
OXFORD ST
WESTWOOD ST
WYOMING
WISCONSIN ST
OHIO
OAK ST
NEBRASKA ST
Library
Creek
MAIN ST
SOUTH
R U T H E R F O R D T O N
Sewage Disposal Ponds
Ceghorn
Stonewater
APPROXIMATE SITE BOUNDARY
Ford
Mountain View Ch
Cem
ROAD
Cem



1 MILE

ROAD CLASSIFICATION

Heavy-duty

Light-duty

Medium-duty

Unimproved dirt

U. S. Route

State Route

(COWPENS 1:62 500)
4654 III

QUADRANGLE LOCATION

RUTHERFORDTON SOUTH, N. C.

N3515—W8152.5/7.5

1966

AMS 4654 IV SW—SERIES V842

NCDENR

North Carolina Department of Environment and Natural Resources
Division of Parks and Recreation

Michael F. Easley, Governor William G. Ross, Jr., Secretary Philip K. McKnelly, Director

October 16, 2001

Mr. David Garrett
1408 Rock Drive
Raleigh, NC 27610

Subject: Rutherford County Landfill Site – Request for Review of EA Report; Rutherford County

Dear Mr. Garrett:

The Natural Heritage Program has no record of rare species, significant natural communities, or priority natural areas at the MSW landfill site nor within a mile of this site. In addition, the Natural Heritage Program has no record of rare species, significant natural communities, or priority natural areas at the C&D landfill site nor within a mile of this site.

You may wish to check the Natural Heritage Program database website at <www.ncsparks.net/nhp/search.html> for a listing of rare plants and animals and significant natural communities in the county and on the topographic quad map. Please do not hesitate to contact me at 919-715-8687 if you have questions or need further information.

Sincerely,

Harry E. LeGrand, Jr.

Harry E. LeGrand, Jr., Zoologist
Natural Heritage Program

HEL/hel

1615 Mail Service Center, Raleigh, North Carolina 27699-1615
Phone: 919-733-4181 \ Fax: 919-715-3085 \ Internet: www.ncsparks.net
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Appalachian Ecological Consultants
PO Box 352 Penrose, NC 28766 828-862-8103 ablc@citcom.net

Report of Findings
(Biological Components EA's / SEPA)

Final Report Date: 7/31/00

Client(s):
C/O David Garrett, P.G., P.E.
1408 Rock Drive
Raleigh, NC 27610

Site Location: Rutherford Co. MSW site

Project:
Location: Rutherford Co MSW
Objective: Federal and state Threatened and Endangered vertebrate and plant species review and on-site inventory of proposed landfill extension sites.

Site inventory dates:
June 17-18, and 26, 27. 2000

Methodology
Site analysis, review, and report format correspond to biological components of the Enviromental Assessment (EA) guidelines of the State Environmental Protection Act (SEPA) of North Carolina. (NCDENR, 2000). This analysis consists of review of rare species of Rutherford county as listed by the North Carolina Natural Heritage Program (NCNHP), site investigation for critical habitat(s) (if designated by USFWS), populations of these species (Table One), and general descriptions and listings of forest types and species present. A project area Element Occurrence (EO) request was verbally requested of NCNHP, June 15, 2000. Field inventory targeted areas on-site most likely to house Federal and State listed Threatened and Endangered vertebrate and plant species, in habitats listed by NCNHP. Vegetation inventory consisted of parallel meanders generally on cardinal directions with variance based on species presence and topography through forested, open, and ecotone areas.

The most recently updated Rutherford county rare list was printed from the North Carolina Natural Heritage Program (NCNHP) website: http://ils.unc.edu/parkproject/nhp/index.html. (Element Occurances Database. Rutherford County. Jan., 2000. Six Federal or State Endangered (E) or Threatened (T) species were noted and their habitats reviewed to determine if actual presence or critical habitats might be found on MSW site (Table 2; (Amoroso, LeGrand. 2000).

Summary of Findings:
- No Federal or State Threatened or Endangered species were observed in the project area.
- Three forest types exist on-site at present.

Analysis of Biological Components
I. Forest Resources: Forest Types & Conditions. [EA guidelines, SEPA: 2.D.(11).]
Dry Oak-Hickory Forest. (Hardwoods)
Mesic Oak Forest. (Hardwoods)
Virginia Pine stand. (Anthropogenic). (Pine forest)

II. Wildlife and Natural Vegetation. [EA guidelines, SEPA: 2.D.(13).]
Wildlife:
Wildlife noted directly or indirectly during surveys include:

Mammals: white-tail deer, groundhog, cottontail rabbit, raccoon, and eastern grey squirrel. Deer (mostly), rabbit, and groundhog browse is visible on mature forest vegetation thoughout the site. Racoon tracks were observed in moist soils by streams.

Birds: American crow, American goldfinch, Broad-winged Hawk, Carolina chickadee, Chestnut-sided warbler, Eastern bluejay, Indigo bunting, Ovenbird, Red-eyed vireo, Rufous-sided Towhee

Reptiles: Copperhead, Eastern box turtle

Natural Vegetation:

Dry Oak-Hickory Forest. (Hardwoods)

This second to third growth forest type occupies knobs, upper ridges, and upper slopes on the tract. This forest type in the eastern portion of the tract is more mature than the western part, having more treefalls, downed woody debris, exposed rootballs (pit-mound micro-topography) and standing snags. Dominant canopy trees include White Oak (Quercus alba), Scarlet Oak (Q.coccinea), Chestnut Oak (Q. Montana) Black Oak (Q.velutina), Mockernut Hickory (Carya alba). Other trees include Pignut Hickory (Carya glabra), Sourwood (Oxydendron arborea), Pitch Pine (Pinus rigida), Virgina Pine (P. virginiana), and Red Maple. Understory species include Pink Azalea (Rhododendron periclymoides), New Jersey Tea (Ceonothus americanus), Bigleaf Snowbell (Styrax grandiflora) and Common Blueberry (Vaccinium pallida). Herbs are very sparse but Oat Grass (Danthonia spicata), Striped Wintergreen (Chimaphila maculata), and Pennsylvania Sedge (Carex pennsylvanicum), and Bracken Fern (Pteridium aquilinum) are common.

Mesic Oak Forest. (Hardwoods)

This second-growth forest type is found in mesic coves and cove mid-slopes throughout the tract. Dominant canopy trees include Tulip Poplar (Lireodendron tulipifera), Red Maple (Acer rubrum), White Oak, and Mockernut Hickory. Understory species are more dense and diverse in this forest type including Red Mulberry (Morus rubra), Spicebush (Lindera benzoin), Sweetshrub (Calycanthus florida), Pawpaw (Asimina triloba), and Sweetleaf (Symplocus tinctoria). Herbs are more dense and diverse in this forest type also and include New York Fern (Thelyptris novaborenis), Heartleaf Ginger (Hexastylis arifolia), Black Cohosh (Cimicifuga racemosa), Plume Solomon's Seal (Maianthemum racemosa), Liverleaf (Hepatica acutiloba), and Yellow Passionflower (Passiflora lutea),

Virginia Pine stand (Anthropogenic). (Pine forest)

This forest type follows grazing and agriculture and dominated almost entirely by early and mid-successional Virginia Pine. Regerating oaks are found in the understory, and exotic species are common such as Kudzu (Pueria pubera), Asiatic bittersweet (Celastrus orbiculatus), and Multiflora rose (Rosa Multiflora). Herbs are sparse to absent

Potential Federal or State T / E plant species: (Table 2)

Suitable habitat and regional distributional ranges for Hexastylis naniflora (Dwarf Heartleaf) and Sisyrhinchium dichotomum (White Irisette) and Myodotis sodalis (Indiana bat) exist on-site, however "critical habitats" for these species have not been formally listed for these species by US Fish and Wildlife Service (USFWS). These three species are the most likely to occur of the 5 known federal / state Threatened and Endangered species in Rutherford county. Habitat for Senecio millifolium (Divided-leaf Ragwort) and Minuartia unifolia (One-flower Sandwort), which are granite-flatrock based species, does not exist on-site.

Neither Hexastylis naniflora (Dwarf-flowered Heartleaf) or Sisyrinchium dichotomum (White Irisette) were found in surveys. Both species have been reported in Rutherford county in the last 20 years and have current populations in other protected sites.Specimens of possible Sisyrhichium dichotomum (White Irisette) specimens were compared with specimens at Western Carolina University, July 11, 2000 and determined not to be this species. This finding was additionally confirmed by Dr. Alan Weakley PhD, Senior Ecologist of The Nature Conservancy, NC, and Visiting Scholor, University of North Carolina, Chapel Hill. (Weakley, 2000)

Possible Federal or State E / T animals:
Habitat for Myotis sodalis (Indiana Bat) exists on upper trunks of white oak trees which exfoliate bark and provide small crevices under which to roost during non-winter months (LeGrand, 2000). Caves, which would house the bats in winter, were not observed onsite. Capture or night sighting of this species is beyond the range of this study. USFWS might be further consulted on presence of this species onsite, but it is unlikely that the size of forested habitat provides area for this species to thrive on this tract. Until its sighting in Graham Co. in 1999, Rutherford Co. contained the only currently known sightings (meaning within the last 20 years) of its four known NC counties of occurrence.

In accordance with biological components of EA guidelines of the SEPA of North Carolina, this natural resources inventory is an accurate representation of the property at the time of survey, June 2000.

Kevin Caldwell
Director, AEC

Date 7/31/00

References [EA guidelines, SEPA. G.]

Amoroso, Jame L. NC Natural Heritage Program, (NCNHP). Natural Heritage Program List of the Rare Plant Species of North Carolina. Division of Parks and Recreation. NCDENR, 2000.

Department of the Army, U.S. Army Corps of Engineers (COE) Waterways Experiment Station, Environmental Laboratory. Appendix C, Section 1, National List of Plant Species that Occur in Wetlands. Region 2 -- Southeast. 2000 Corps of Engineers Wetlands Delineation Manual.

LeGrand, Harry E. and Stephen P. Hall. NC Natural Heritage Program, (NCNHP). Natural Heritage Program List of the Rare Animal Species of North Carolina. Division of Parks and Recreation. DENR, 2000.

North Carolina Natural Heritage Program (NCNHP) Website: http://ils.unc.edu/parkproject/nhp/index.html. Element Occurances Database. Jan 2000.

North Carolina Department of Environment and Natural Resources (NCDENR) Website: http://www.ehnr.state.nc.us/files/laws.htm. Laws and Regulations: Environmental Assessment Guidelines, SEPA Intergovernmental Review Process. March, 1999.

Radford, A.E., Ahles, H.E, and Bell, C.R. 1964. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press. Chapel Hill, NC.

Schafale, M.P, and Weakley, A.S. Classification of the Natural Communities of North Carolina, Third Approximation. NCNHP. Division of Parks and Recreation. DEHNR. 1990.

Weakley, A. 1998. Flora of Virginia and the Carolinas: A working draft. The Nature Conservancy. Raleigh, NC.

Weakley, Alan. PhD. Senior Regional Ecologist, Nature Conservancy. Visiting Scholar, UNC Chapel Hill, NC. Specimen verification / personal communication. July 13, 2000.

Table One: NCNHP Rare List Plant and Animal Species. Rutherford Co.
Source: NCNHP database; updated January, 2000. Query performed June 14, 2000.

Search Criteria: rutherford
Search Results: 75 records found.

Major Group	Scientific Name	Common Name	State Status	Federal Status	State Rank	Global Rank	County Status
Mammal	Myotis leibii	Eastern Small-footed Bat	SC	FSC	SUB,S2N	G3	Current - Rutherford - MAP
Mammal	Myotis septentrionalis	Northern Bat	SC	-	SUB,S2N	G4	Current - Rutherford - MAP
Mammal	Myotis sodalis	Indiana Bat	E	LE	SUB,SZN	G2	Current - Rutherford - MAP
Mammal	Neotoma floridana haematoreia	Eastern Woodrat (= Southern Appalachian Woodrat)	SC	FSC	S2S3	G5T4Q	Current - Rutherford - MAP
Mammal	Peromyscus polionotus	Oldfield Mouse	SR	-	S1	G5	Historic - Rutherford - MAP
Mammal	Sorex hoyi winnemana	Southern Pygmy Shrew	SC	-	S3	G5T4	Current - Rutherford - MAP
Bird	Dendroica cerulea	Cerulean Warbler	SR	FSC	S2B,SZN	G4	Current - Rutherford - MAP
Bird	Falco peregrinus	Peregrine Falcon	E	-	S1B,S2N	G4	Current - Rutherford - MAP
Bird	Lanius ludovicianus ludovicianus	Loggerhead Shrike	SC	-	S3B,S3N	G5T5	Current - Rutherford - MAP
Reptile	Crotalus horridus	Timber Rattlesnake	SR	-	S3	G4	Current - Rutherford - MAP
Reptile	Opheodrys vernalis	Smooth Green Snake	SC	-	SH	G5	Historic - Rutherford - MAP
Reptile	Pituophis melanoleucus melanoleucus	Northern Pine Snake	SC	FSC	S3	G4T4	Obscure - Rutherford - MAP
Amphibian	Aneides aeneus	Green Salamander	E	FSC	S2	G3G4	Current - Rutherford - MAP
Amphibian	Plethodon yonahlossee pop 1	Crevice Salamander	SC	-	S1	G4T1Q	Current - Rutherford - MAP
Fish	Cyprinella zanema pop 1	Santee Chub - Piedmont Population	SR	-	S3	G3T3Q	Current - Rutherford - MAP
Arachnid	Hypochilus coylei	a lampshade spider	SR	-	S3?	G3?	Current - Rutherford - MAP
Insect	Homoeoneuria cahabensis	a mayfly	SR	-	S1S2	G1G3	Current - Rutherford - MAP
Insect	Speyeria diana	Diana Fritillary	SR	FSC	S3	G3	Current - Rutherford - MAP
Lichen	Gymnoderma lineare	Rock Gnome Lichen	T	LE	S2	G2	Current - Rutherford - MAP
Moss	Bartramidula wilsonii	Dwarf Apple Moss	SR	-	S1	G3?	Historic - Rutherford - MAP
Vascular Plant	Amelanchier sanguinea	Roundleaf Serviceberry	C	-	S2	G5	Current - Rutherford - MAP
Vascular Plant	Amorpha schwerinii	Piedmont Indigo-bush	SR	-	S3	G3	Current - Rutherford - MAP
Vascular Plant	Arabis patens	Spreading Rockcress	C	-	S1	G3	Current - Rutherford - MAP
Vascular Plant	Asplenium pinnatifidum	Lobed Spleenwort	SR	-	S1	G4	Current - Rutherford - MAP
Vascular Plant	Baptisia albescens	Thin-pod White Wild Indigo	SR	-	S2	G4	Current - Rutherford - MAP
Vascular Plant	Botrychium jenmanii	Alabama Grape Fern	SR	-	S1	G3G4	Current - Rutherford -

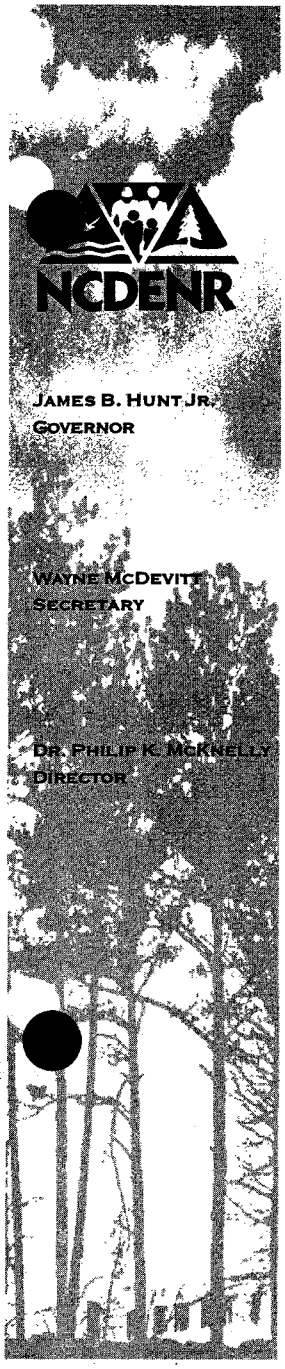
							MAP
Vascular Plant	Calamagrostis porteri	Porter's Reedgrass	SR	-	S1	G4	Current - Rutherford - MAP
Vascular Plant	Calystegia catesbiana ssp sericata	Blue Ridge Bindweed	C	-	S2	G3T2T3	Current - Rutherford - MAP
Vascular Plant	Cardamine dissecta	Dissected Toothwort	C	-	S2	G4?	Current - Rutherford - MAP
Vascular Plant	Carex biltmoreana	Biltmore Sedge	SR	-	S3	G3	Current - Rutherford - MAP
Vascular Plant	Coreopsis latifolia	Broadleaf Coreopsis	SR	-	S3	G3	Current - Rutherford - MAP
Vascular Plant	Dicentra eximia	Bleeding Heart	SR	-	S2	G4	Current - Rutherford - MAP
Vascular Plant	Dodecatheon meadia var meadia	Eastern Shooting Star	SR	-	S2	G5T5	Current - Rutherford - MAP
Vascular Plant	Draba ramosissima	Branching Draba	SR	-	S2	G4	Current - Rutherford - MAP
Vascular Plant	Echinacea purpurea	Purple Coneflower	SR	-	S1	G4	Historic - Rutherford - MAP
Vascular Plant	Fothergilla major	Large Witch-alder	C	-	S2	G3	Current - Rutherford - MAP
Vascular Plant	Hexalectris spicata	Crested Coralroot	SR	-	S2	G5	Current - Rutherford - MAP
Vascular Plant	Hexastylis naniflora	Dwarf-flowered Heartleaf	T	LT	S2	G2	Current - Rutherford - MAP
Vascular Plant	Huperzia appalachiana	Appalachian Fir-clubmoss	C	-	S2	G4G5	Current - Rutherford - MAP
Vascular Plant	Huperzia porophila	Rock Fir-clubmoss	C	-	S2	G4	Current - Rutherford - MAP
Vascular Plant	Liatris microcephala	Small-head Blazing Star	C	-	S1	G3G4	Current - Rutherford - MAP
Vascular Plant	Liatris squarrulosa	Earle's Blazing Star	SR	-	S2	G4G5	Current - Rutherford - MAP
Vascular Plant	Liatris turgida	Shale-barren Blazing Star	SR	-	S2	G3	Current - Rutherford - MAP
Vascular Plant	Lilium canadense ssp editorum	Red Canada Lily	C	-	S1	G5T4	Obscure - Rutherford - MAP
Vascular Plant	Liparis loeselii	Fen Orchid	C	-	S1	G5	Historic - Rutherford - MAP
Vascular Plant	Lonicera flava	Yellow Honeysuckle	SR	-	S2	G5?	Current - Rutherford - MAP
Vascular Plant	Matelea decipiens	Glade Milkvine	SR	-	S2	G5	Historic - Rutherford - MAP
Vascular Plant	Minuartia uniflora	Single-flowered Sandwort	E	-	S1	G4	Current - Rutherford - MAP
Vascular Plant	Monotropsis odorata	Sweet Pinesap	C	FSC	S3	G3	Current - Rutherford - MAP
Vascular Plant	Quercus prinoides	Dwarf Chinquapin Oak	C	-	SH	G5	Historic - Rutherford - MAP
Vascular Plant	Rhynchospora alba	Northern White Beaksedge	C	-	S2	G5	Current - Rutherford - MAP
Vascular Plant	Ruellia purshiana	Pursh's Wild-petunia	SR	-	S2	G5	Historic - Rutherford - MAP
Vascular Plant	Saxifraga caroliniana	Carolina Saxifrage	C	FSC	S2	G2	Historic - Rutherford - MAP
Vascular Plant	Scutellaria saxatilis	Rock Skullcap	C	-	S1	G3G4	Current - Rutherford - MAP
Vascular Plant	Senecio millefolium	Divided-leaf Ragwort	T	FSC	S2	G2	Current - Rutherford - MAP
Vascular Plant	Silene ovata	Mountain Catchfly	C	FSC	S2	G2G3	Historic - Rutherford -

							MAP
Vascular Plant	Sisyrinchium dichotomum	White Irisette	E	LE	S2	G2	Current - Rutherford - MAP
Vascular Plant	Smilax biltmoreana	Biltmore Carrion-flower	C	-	S3	G3G4	Current - Rutherford - MAP
Vascular Plant	Solidago simulans	Granite Dome Goldenrod	C	-	S1	G1	Current - Rutherford - MAP
Vascular Plant	Thermopsis mollis sensu stricto	Appalachian Golden-banner	SR	-	S2	G3G4	Current - Rutherford - MAP
Vascular Plant	Trichophorum cespitosum	Deerhair Bulrush	C	-	S2S3	G5	Current - Rutherford - MAP
Vascular Plant	Trillium simile	Sweet White Trillium	SR	-	S1	G3	Current - Rutherford - MAP

Table Two: Potential Federal and state Threatened and Endangered vertebrate and plant species. Rutherford Co. MSW Site.

Form	Latin / Common Name	Habitat	Habitat onsite	Status
Mammal	Myotis sodalis / Indiana Bat	roosts in hollow trees or under loose bark (warmer months), in caves (winter).	Possible	Federal E, State E
Amphibian	Aneides aeneus / Green Salamander	Damp, shaded crevices of cliffs or rock outcrops in deciduous forests	No habitat	State E
Vascular Plant	Hexastylis naniflora / Dwarf Hearleaf	Rich, deciduous forests, bluffs, and ravines	Possible	Federal T, State T
Vascular Plant	Sisyrhichium dichotomum / White Irisette	Thin woods over amphibolite in the escarpment region	Possible	Federal E, State E
Vascular Plant	Minuartia uniflora / Single flower Sandwort		No habitat	State E
Vascular Plant	Senecio millefolium / Divided-leaf Ragwort		No habitat	State E

*****highlighted species are most likely to occur in portions of the project area.**



NCDENR

JAMES B. HUNT JR.
GOVERNOR

WAYNE MCDEVITT
SECRETARY

DR. PHILIP K. MCKNELLY
DIRECTOR

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF PARKS AND RECREATION

May 21, 1999

RECEIVED
MAY 26 1999
BY:

Mr. G. David Garrett, P.G.
G.N. Richardson & Associates
425 N. Boylan Avenue
Raleigh, NC 27603

SUBJECT: Rare Species, High Quality Natural Communities, and Significant Natural Heritage Areas at the Proposed Lined Landfill South of Rutherfordton, Rutherford County, N.C.

Dear Mr. Garrett:

The NC Natural Heritage Program (NCNHP) does not have a record of rare species, high quality natural communities, state park and recreation areas, or Significant Natural Heritage Areas at or within a 1.0 mile radius of the proposed lined landfill site which is about one mile south of downtown Rutherfordton in Rutherford County, N.C. However, because Rutherford County has not been systematically inventoried, I cannot state definitively that no rare species exist there.

Enclosed is a list of rare species known to exist in Rutherford County. If habitat for any of these species exists at the site, they may be present there. Consultant acquired knowledge of the existing habitat should determine if a survey is necessary.

Please do not hesitate to contact me at the address below or call me at (919) 715-8703 if you have any questions or need further information.

Sincerely,

Susan Reece Giles
Information Specialist
Natural Heritage Program

Enclosure

P.O. BOX 27687, RALEIGH NC 27611-7687 PHONE 919-733-4181 FAX 919-715-3085
AN EQUAL OPPORTUNITY / AFFIRMATIVE ACTION EMPLOYER - 50% RECYCLED/10% POST-CONSUMER PAPER

SCIENTIFIC NAME	COMMON NAME	STATE STATUS	FED. STATUS	STATE RANK	GLOBAL RANK
Rutherford					
Vertebrate Animals					
Aneides aeneus	Green Salamander	E	FSC	S2	G3G4
Corvus corax	Common Raven	SR	-	S3	G5
Crotalus horridus horridus	Timber Rattlesnake - Mountain Population	SR	-	S3	G4T4
Cyprinella zanema pop 1	Santee Chub - Piedmont Population	SR	-	S3	G3T3Q
Dendroica cerulea	Cerulean Warbler	SR	FSC	S3B,SZN	G4
Falco peregrinus	Peregrine Falcon	E	LE	S1B,S2N	G4
Lanius ludovicianus ludovicianus	Loggerhead Shrike	SC	-	S3B,S3N	G5T5
Myotis leibii	Eastern Small-footed Myotis	SC	FSC	SUB,S2N	G3
Myotis septentrionalis	Northern Myotis	SC	-	SUB,S2N	G4
Myotis sodalis	Indiana Bat	E	LE	SUB,SZN	G2
Neotoma floridana haematoreia	Southern Appalachian Woodrat	SC	FSC	S2S3	G5T4Q
Plethodon yonahlossee pop 1	Crevice Salamander	SC	-	S1	G4T1Q
Sorex hoyi winnemana	Southern Pygmy Shrew	SC	-	S3	G5T4
Invertebrate Animals					
Hypochilus coylei	a lampshade spider	SR	-	S3?	G3?
Speyeria diana	Diana Fritillary	SR	FSC	S3	G3
Vascular Plants					
Amelanchier sanguinea	Roundleaf Serviceberry	C	-	S1	G5
Amorpha schwerinii	Piedmont Indigo-bush	SR	-	S3	G3
Arabis patens	Spreading Rockcress	C	-	S1	G3
Asplenium pinnatifidum	Lobed Spleenwort	SR	-	S1	G4
Baptisia albescens	Thin-pod White Wild Indigo	SR	-	S2	G4
Botrychium jenmanii	Alabama Grape Fern	SR	-	S1	G3G4
Calamagrostis porteri	Porter's Reedgrass	SR	-	S1	G4
Calystegia catesbiana ssp sericata	Blue Ridge Bindweed	C	-	S2	G3T2T3
Cardamine dissecta	Dissected Toothwort	C	-	S2	G4?
Carex biltmoreana	Biltmore Sedge	SR	-	S3	G3
Coreopsis latifolia	Broadleaf Coreopsis	SR	-	S3	G3
Dicentra eximia	Bleeding Heart	SR	-	S2	G4
Dodecatheon meadia var meadia	Eastern Shooting Star	SR	-	S2	G5T5
Draba ramosissima	Branching Draba	SR	-	S2	G4
Fothergilla major	Large Witch-alder	C	-	S2	G3
Hexalectris spicata	Crested Coralroot	SR	-	S2	G4?
Hexastylis naniflora	Dwarf-flowered Heartleaf	E/PT	LT	S2	G2
Huperzia appalachiana	Appalachian Fir-clubmoss	C	-	S2	G4G5
Huperzia porophila	Rock Fir-clubmoss	C	-	S2	G4
Liatris microcephala	Small-head Blazing Star	C	-	S1	G3G4
Liatris squarrulosa	Earle's Blazing Star	SR	-	S2	G4G5
Liatris turgida	Shale-barren Blazing Star	SR	-	S2	G3
Lonicera flava	Yellow Honeysuckle	SR	-	S2	G5?
Minuartia uniflora	Single-flowered Sandwort	E	-	S1	G4
Monotropsis odorata	Sweet Pinesap	C	FSC	S3	G3
Rhynchospora alba	Northern White Beaksedge	C	-	S2	G5
Scutellaria saxatilis	Rock Skullcap	C	-	S1	G3G4
Senecio millefolium	Divided-leaf Ragwort	T	FSC	S2	G2
Sisyrinchium dichotomum	White Irisette	E	LE	S2	G2
Smilax biltmoreana	Biltmore Carrion-flower	C	-	S3	G3G4
Solidago simulans	Granite Dome Goldenrod	C	-	S1	G1
Thermopsis mollis sensu stricto	Appalachian Golden-banner	SR	-	S2	G3G4
Trichophorum cespitosum	Deerhair Bulrush	C	-	S2S3	G5
Trillium simile	Sweet White Trillium	SR	-	S1	G3
Nonvascular Plants					
Gymnoderma lineare	Rock Gnome Lichen	T	LE	S2	G2
Natural Communities					
Acidic Cove Forest	-	-	-	S5	G5
Canada Hemlock Forest	-	-	-	S5	G5
Carolina Hemlock Bluff	-	-	-	S2	G2G3
Chestnut Oak Forest	-	-	-	S5	G5
Granitic Flatrock	-	-	-	S2	G3
Low Elevation Granitic Dome	-	-	-	S1	G2
Low Elevation Rocky Summit	-	-	-	S2	G2
Montane Acidic Cliff	-	-	-	S3	G4
Montane Oak--Hickory Forest	-	-	-	S5	G5

SCIENTIFIC NAME	COMMON NAME	STATE STATUS	FED. STATUS	STATE RANK	GLOBAL RANK
Montane Red Cedar-Hardwood Woodland	-	-	-	S1?	G?
Pine--Oak/Heath	-	-	-	S4	G5
Rich Cove Forest	-	-	-	S4	G4
Spray Cliff	-	-	-	S2	G2

Rutherford*

Vertebrate Animals

Liochlorophis vernalis	Smooth Green Snake	SC	-	SH	G5
Peromyscus polionotus	Oldfield Mouse	SR	-	S1	G5

Vascular Plants

Agalinis decemloba	Piedmont Gerardia	SR	-	S2?	G4Q
Echinacea purpurea	Purple Coneflower	SR	-	S1	G4
Liparis loeselii	Fen Orchid	C	-	S1	G5
Matelea decipiens	Glade Milkvine	SR	-	S2	G5
Quercus prinoides	Dwarf Chinquapin Oak	C	-	SH	G5
Ruellia purshiana	Pursh's Wild-petunia	SR	-	S2	G5
Saxifraga caroliniana	Carolina Saxifrage	C	FSC	S2	G2
Silene ovata	Mountain Catchfly	C	FSC	S2	G2G3

Nonvascular Plants

Bartramidula wilsonii	Dwarf Apple Moss	SR	-	S1	G3?

Rutherford**

Vertebrate Animals

Pituophis melanoleucus melanoleucus	Northern Pine Snake	SC	FSC	S3	G5T4

Vascular Plants

Lilium canadense ssp editorum	Red Canada Lily	C	-	S1	G5T4

NC NATURAL HERITAGE PROGRAM COUNTY SPECIES LIST COVER SHEET

The county species list from the NC Natural Heritage Program is a listing of the elements of natural diversity (rare species, exemplary natural communities, and special animal habitats) known to occur in a county. The information on this printout is compiled from a variety of sources, including field surveys, museums and herbaria, literature, and personal communications. The Heritage Program's Biological and Conservation Database (BCD) is dynamic, with new records being added and old records being revised as new information is received. The BCD was developed and is maintained using methodology developed by The Nature Conservancy. The enclosed list cannot be considered a definitive record of natural heritage elements, and it should not be considered a substitute for field surveys. When this information is used in any document, we request that the printout date be given and that the NC Natural Heritage Program be credited.

This cover sheet explains the four columns of status codes that are given on the right-hand side of the county status list.

STATE STATUS

CODE	STATUS	CODE	STATUS
E	Endangered	P_	Proposed (E, T, or C)
T	Threatened	SR	Significantly Rare
SC	Special Concern	EX	Extirpated
C	Candidate		

Plant statuses are determined by the Plant Conservation Program (NC Department of Agriculture) and the Natural Heritage Program (NC Department of Environment and Natural Resources). E, T, and SC species are protected by state law (Plant Protection and Conservation Act, 1979). C and SR designations indicate rarity and the need for population monitoring and conservation action.

Animal statuses that indicate state protection (E, T, and SC) are published in *Endangered Wildlife of North Carolina*, March 16, 1992, Nongame and Endangered Wildlife Program (NC Department of Environment and Natural Resources). SR and EX statuses are Natural Heritage Program designations. SR indicates rarity and the need for population monitoring and conservation action.

FEDERAL STATUS

This status is designated by the US Fish and Wildlife Service. Federally listed Endangered and Threatened species are protected under the provisions of the Endangered Species Act of 1973, as amended through the 100th Congress. Unless otherwise noted, definitions are taken from the *Federal Register*, Vol. 56, No. 225, November 21, 1991 (50 CFR Part 17).

CODE	STATUS	DEFINITION
LE	Endangered	A taxon "in danger of extinction throughout all of a significant portion of its range."
LT	Threatened	A taxon "likely to become an endangered species within the foreseeable future throughout all of a significant portion of its range."
P_	Proposed	A taxon proposed for official listing as endangered or threatened.
C	Candidate	A taxon under consideration for which there is sufficient information to support listing. This category was formerly designated as a Candidate 1 (C1) species.
FSC		Federal "Species of Concern" (also called "Species at Risk"). Formerly defined as a taxon under consideration for which there is insufficient information to support listing; formerly designated as a Candidate 2 (C2) species. Currently, the US Fish and Wildlife Service does not recognize this as an official designation.
T(S/A)		Threatened due to Similarity of Appearance. The Endangered Species Act authorizes the treatment of a species (subspecies or population segment) as threatened even though it is not otherwise listed as threatened if: (a) The species so closely resembles in appearance a threatened species that enforcement personnel would have substantial difficulty in differentiating between the listed and unlisted species; (b) the effect of this substantial difficulty is an additional threat to a threatened species; and (c) such treatment of an unlisted species will substantially facilitate the enforcement and further the policy of the Act. The American Alligator has this designation due to similarity of appearance to other rare crocodilians. The Bog Turtle (southern population) has this designation due to similarity of appearance to Bog Turtles in the threatened northern population.

GLOBAL AND STATE RANKS

These ranks are determined by The Nature Conservancy's system of measuring rarity and threat status. "Global" refers to worldwide ranks and "State" to statewide ranks.

STATE RANK DEFINITIONS

S1	Critically imperiled in North Carolina because of extreme rarity or otherwise very vulnerable to extirpation in the state.
S2	Imperiled in North Carolina because of rarity or otherwise vulnerable to extirpation in the state.
S3	Rare or uncommon in North Carolina.
S4	Apparently secure in North Carolina, with many occurrences.
S5	Demonstrably secure in North Carolina and essentially ineradicable under present conditions.
SA	Accidental or casual; one to several records for North Carolina, but the state is outside the normal range of the species.
SH	Of historical occurrence in North Carolina, perhaps not having been verified in the past 25 years, and suspected to be still extant in the state.
SR	Reported from North Carolina, but without persuasive documentation for either accepting or rejecting the report.
SX	Believed to be extirpated from North Carolina.
SU	Possibly in peril in North Carolina, but status uncertain; more information is needed.
S?	Unranked, or rank uncertain.
_B	Rank of breeding population in the state. Used for migratory species only.
_N	Rank of non-breeding population in the state. Used for migratory species only.
_Z_	Population is not of significant conservation concern; applies to transitory, migratory species.

GLOBAL RANK DEFINITIONS

G1	Critically imperiled globally because of extreme rarity or otherwise very vulnerable to extinction throughout its range.
G2	Imperiled globally because of rarity or otherwise vulnerable to extinction throughout its range.
G3	Either very rare and local throughout its range, or found locally in a restricted area.
G4	Apparently secure globally, although it may be quite rare in parts of its range (especially at the periphery).
G5	Demonstrably secure globally, although it may be quite rare in parts of its range (especially at the periphery).
GH	Of historical occurrence throughout its range.
GX	Believed to be extinct throughout its range.
GU	Possibly in peril, but status uncertain; more information is needed.
G?	Unranked, or rank uncertain.
G_Q	Of questionable taxonomic status.
T_	Status of subspecies or variety; the G rank refers to the species as a whole.

ADDITIONAL DEFINITIONS

Elements following county names marked with one or two asterisks indicate obscure or historic records.

*	Obscure record: the date the element was last observed in the county is uncertain.
**	Historic record: the element was last observed in the county more than 20 years ago.

Scientific and common names listed in parentheses are synonyms listed in US Fish and Wildlife Service, 1992, Endangered and Threatened Species of the Southeastern United States (The Red Book).

G.N. RICHARDSON & ASSOCIATES
Engineering and Geological Services

May 21, 1999

Ms. Susan Giles
NC Division of Parks and Recreation
Information Request Specialist
Natural Heritage Program
P.O. Box 27687
Raleigh, North Carolina 27611-7687

RE: Request for Information
Proposed Landfill Development Site
Rutherfordton, North Carolina

Dear Ms. Giles:

G.N. Richardson & Associates respectfully requests information pertaining to endangered species or State Park and Recreation Areas which may affect plans to develop a lined landfill on the above referenced site.

The site is located on the Rutherfordton South, N.C. topographic map, about one mile south of downtown Rutherfordton. The site is approximately 250 acres in size and contains three existing solid waste management facilities: a closed municipal solid waste (MSW) landfill, an active construction and demolition (C&D) debris landfill, and a solid waste transfer station.

There is also an office building/garage on the site, and the western half of the property to the north of the east-west power line has recently undergone disturbance for the procurement of soil borrow associated with the closure of the MSW landfill. None of these features show on the vintage USGS topographic map.

A qualified biologist from our firm will be visiting the site during the upcoming week to conduct a survey for habitats of any species listed in the information you provide. We look forward to receiving your reply at your earliest convenience. If we can provide any further information to assist you, please contact this office.

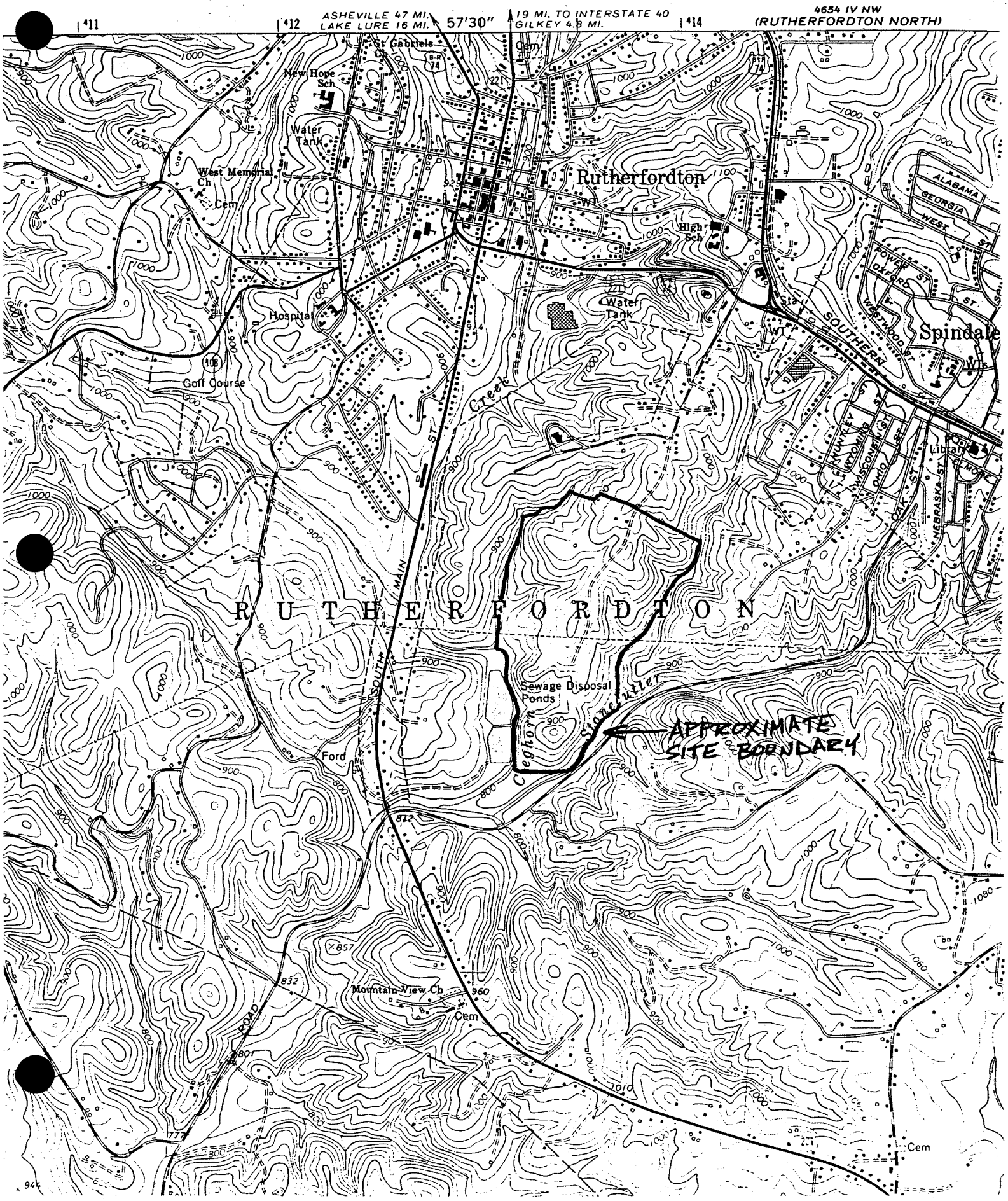
Sincerely,
G.N. Richardson & Associates

G. David Garrett, P.G.
Principal

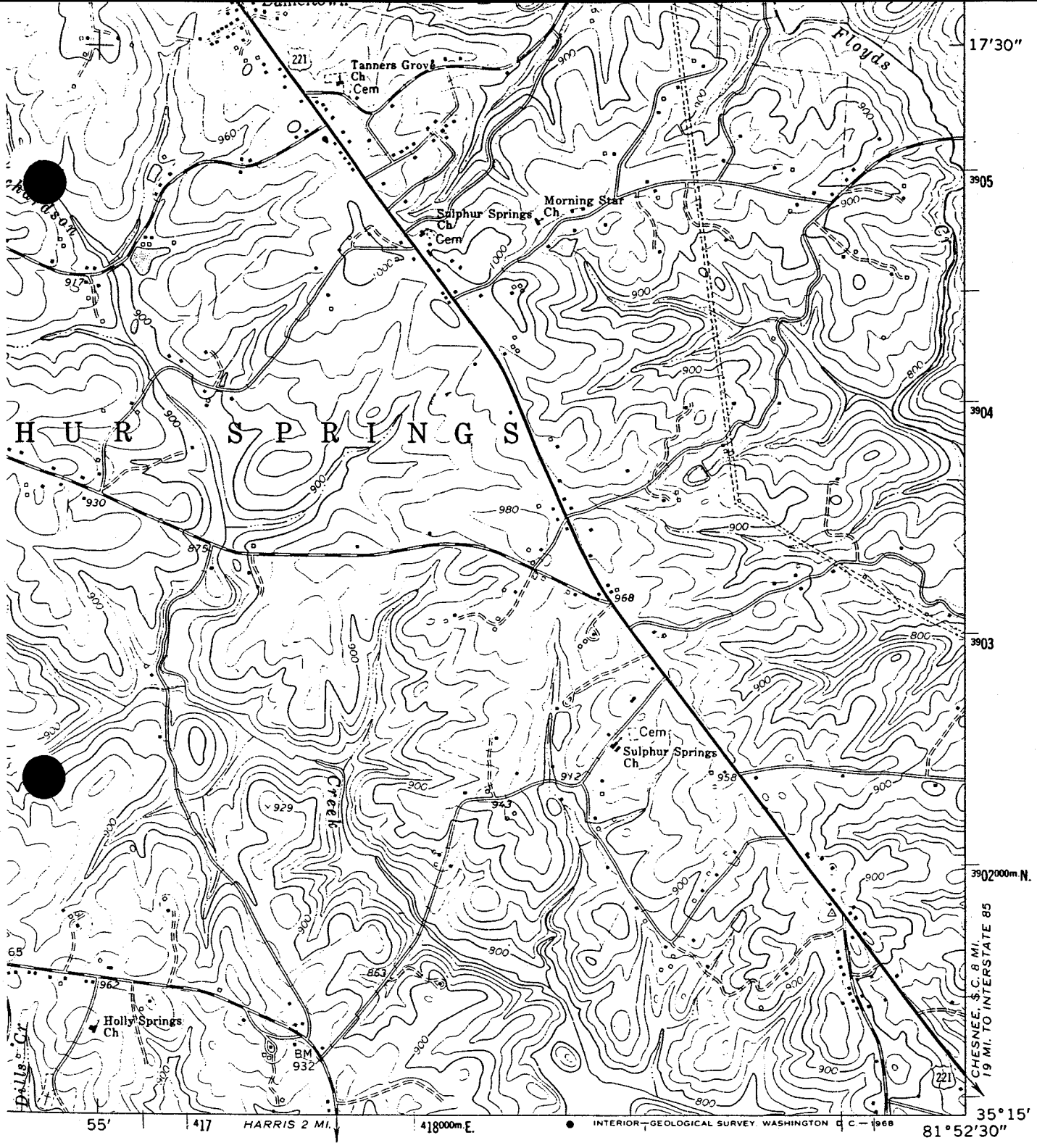
Attachments

425 N. BOYLAN AVENUE • RALEIGH, NC 27603 • TEL. 919-828-0577 • FAX 919-838-3899 • WWW.GNRA.COM

ERIOR



ASHEVILLE 47 MI.
LAKE LURE 16 MI.
57'30"
19 MI. TO INTERSTATE 40
GILKEY 4.8 MI.
4654 IV NW
(RUTHERFORDTON NORTH)
St Gabriels Ch
New Hope Sch
Water Tank
West Memorial Ch
Cem
Rutherfordton
High Sch
Water Tank
Hospital
Golf Course
Creek
SOUTHERN
Spindale
ALABAMA
GEORGIA
WEST ST
POWER ST
OXFORD ST
WESTWOOD ST
HUNTLEY ST
WYOMING ST
WISCONSIN ST
OHIO ST
OAK ST
NEBRASKA ST
ELMORE
Library
RUTHERFORDTON
SOUTH MAIN ST
Sewage Disposal Ponds
Cleghorn
Stonecutter
APPROXIMATE SITE BOUNDARY
Ford
Mountain View Ch
Cem
ROAD
Cem



1 MILE

ROAD CLASSIFICATION

Heavy-duty

Light-duty

Medium-duty

Unimproved dirt

U. S. Route

State Route

(COWPENS 1:62 500)
4654 III

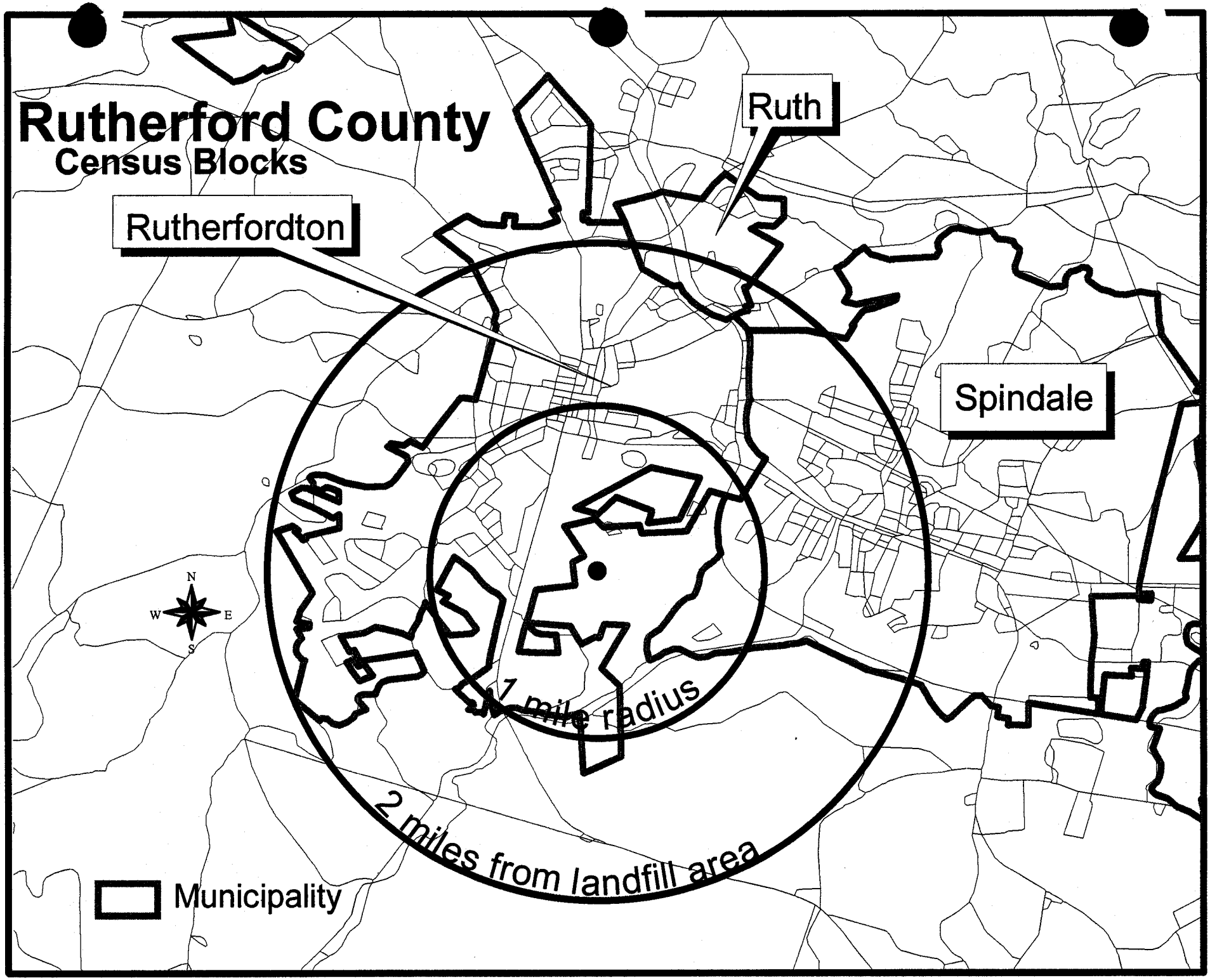
QUADRANGLE LOCATION

RUTHERFORDTON SOUTH, N. C.

N3515—W8152.5/7.5

1966

AMS 4654 IV SW—SERIES V842


Rutherford County
Census Blocks
Rutherfordton
Ruth
Spindale
N
W
E
S
1 mile radius
2 miles from landfill area
Municipality

Rutherford County Demographics for Landfill Study

1990 CENSUS Data by Block	Total Persons	White	Black	American Indian	Asian	Hispanic	Age: under 18	Age: 18 to 65	Age: over 65	# of Houses in area	Block Group Median Household Income
1 mile radius (approx)	**1552**	1265	275	5	3	4	317	912	319	764	$ 23,884
percentage	100%	81.51%	17.72%	0.32%	0.19%	0.26%	20.43%	58.76%	20.55%		
2 mile radius (approx)	7349	6526	779	7	14	23	1598	4130	1603	3200	$ 23,311
percentage	100%	88.80%	10.60%	0.10%	0.19%	0.31%	21.74%	56.20%	21.81%		
County	56918	50133	6514	95	98	342	13881	34162	8875	25220	$ 23,827
percentage	100%	88.08%	11.44%	0.17%	0.17%	0.60%	24.39%	60.02%	15.59%		

-DRAWING At End of FILE-

Appendix C

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-1

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1047.38**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/ Air Rotary**	Water Level, TOB	**63.2**
Date Started	**5/31/00**	Date Ended	**5/31/00**	Water Level, 24 Hr.	**64.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**64.8**
Comments	**Cleared and stripped surface**	Total Depth	**78.0**	Date of Observation	**6/2/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
0 / 1046.00		CLAYEY SILT: Advanced with auger, no samples, refusal at 42 feet	
2 / 1044.00			
4 / 1042.00			
6 / 1040.00			
8 / 1038.00			
10 / 1036.00		PWR: based upon drilling characteristics	
12 / 1034.00			
14 / 1032.00			
16 / 1030.00			
18 / 1028.00			
20 / 1026.00			
22 / 1024.00			
24 / 1022.00			
26 / 1020.00			
28 / 1018.00			
30 / 1016.00			Soil Backfill
32 / 1014.00			
34 / 1012.00			
36			

David Garrett, P.G., P.E.

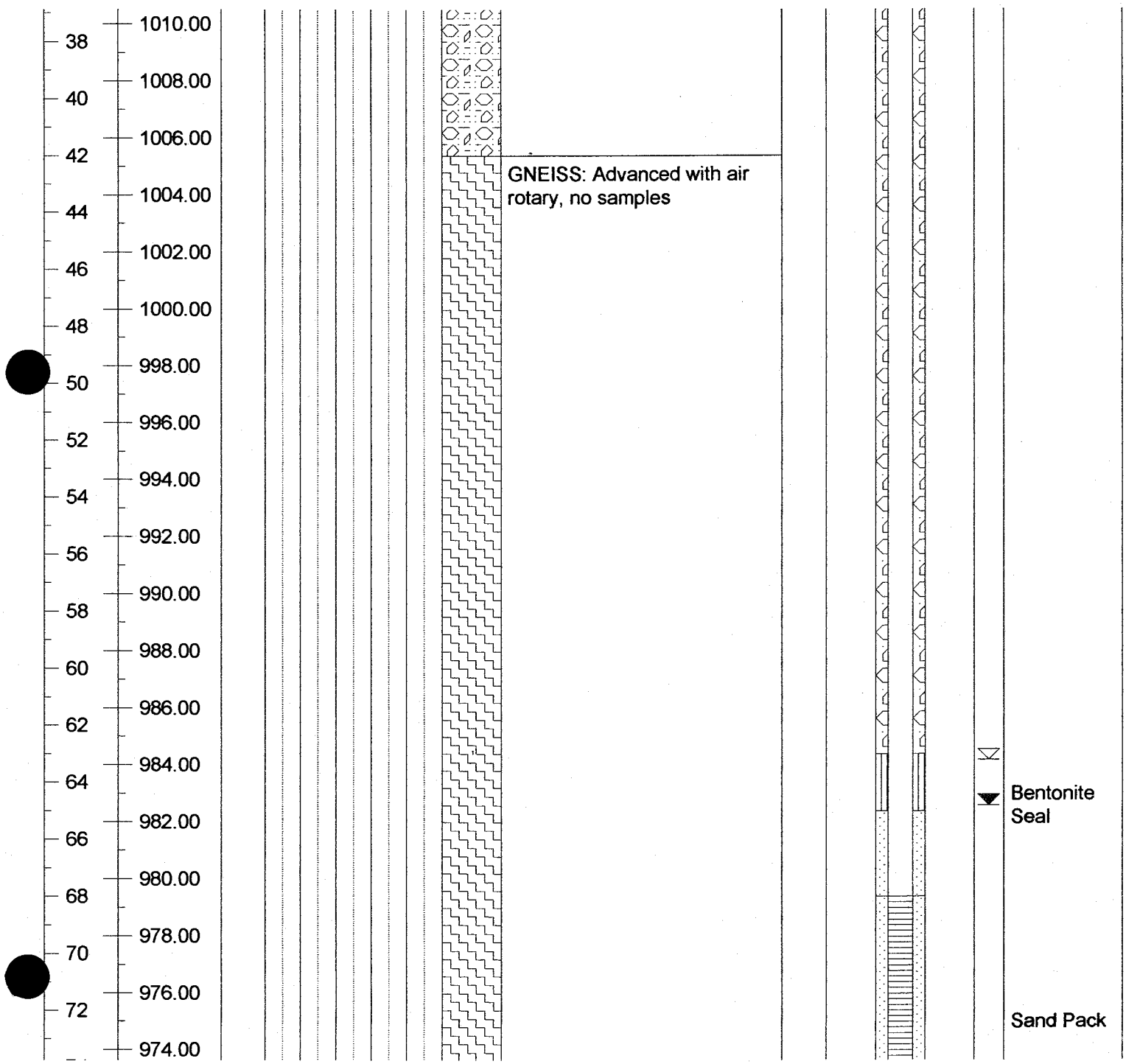
Engineering and Geology

Test Boring No. B-1

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1047.38**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/ Air Rotary**	Water Level, TOB	**63.2**
Date Started	**5/31/00**	Date Ended	**5/31/00**	Water Level, 24 Hr.	**64.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**64.8**
Comments	**Cleared and stripped surface**		Total Depth **78.0**	Date of Observation	**6/2/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.
Engineering and Geology

Test Boring No. B-1

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1047.38**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/ Air Rotary**	Water Level, TOB	**63.2**
Date Started	**5/31/00**	Date Ended	**5/31/00**	Water Level, 24 Hr.	**64.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**64.8**
Comments	**Cleared and stripped surface**	Total Depth	**78.0**	Date of Observation	**6/2/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
74 76 78 972.00 970.00			0.010" Slotted Screen

FIELD BOREHOLE LOG

BOREHOLE NUMBER: B-2

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County LandFill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Geller
GEOLOGIST: Philip May
DATE BEGUN: 5/11/99 DATE COMPLETED: 5/11/99

TOP OF CASING ELEVATION: 1007.84
TOTAL DEPTH: 65.0 FT
GROUND SURFACE ELEVATION: 1005.62
SHEET: 1 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	52.0	47.51
Time	15:00	7:00
Date:	5/11/99	5/12/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
3.0–4.0	20 16 12	Ss	s1	D				SILTY CLAYEY SAND: Orange-brown dry F silty clayey micaceous sand w/ Mn mottles and feldspar.
8.0–9.0	28 32 50	Ss	s2	D				SILTY SAND: Brown-grey & red-pink & white mottled silty M-C micaceous sand, w/ relict rock, Mn, & feldspar.
13.0–14.0	37 50/1	Ss	s3	D				SANDY SILT: Tan-orange dry fine sandy micaceous silt w/ Mn & feldspar.
18.0–19.0	50/6	Ss	s4	D				SILTY SAND: Tan-brown dry F silty micaceous sand w/ relict rock & Mn mottles.
23.0–24.0	27 32 50	Ss	s5	D				SANDY SILT: Layered tan-orange dry F sandy micaceous silt w/ Mn mottling.
28.0–29.0	50/6	Ss	s6	D				SILTY SAND: Same as above but silty sand, some feldspar and weathered rock.
33.0–34.0	50/6	Ss	s7	D				SANDY SILT: Layered tan-orange F sandy micaceous silt w/ feldspar, Mn, & Fe

LITHOLOGY

WELL INSTALLATION

FIELD BOREHOLE LOG

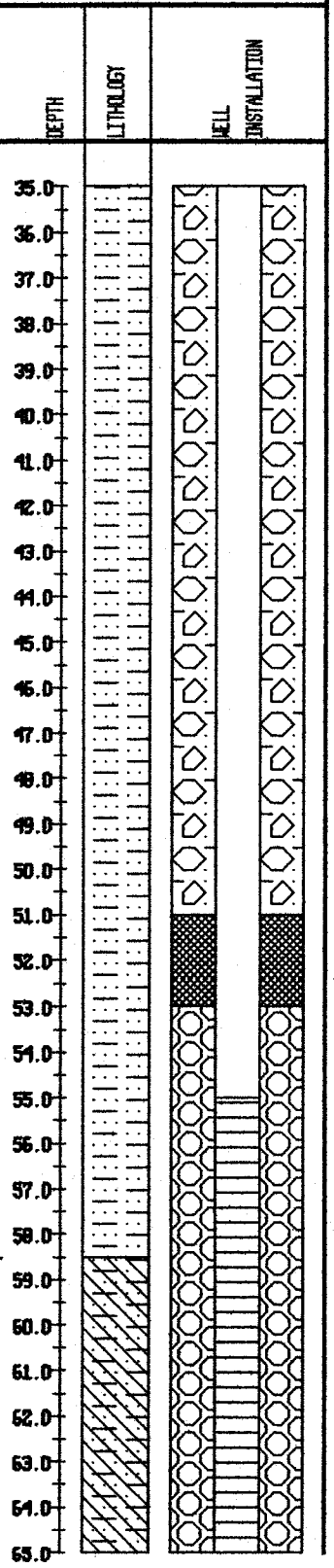
BOREHOLE NUMBER: B-2

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County LandFill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seiler
GEOLOGIST: Philip May
DATE BEGUN: 5/11/99 DATE COMPLETED: 5/11/99

TOP OF CASING ELEVATION: TBD
TOTAL DEPTH: 65.0 FT
GROUND SURFACE ELEVATION: TBD
SHEET: 2 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	52.0	47.51
Time	15:00	7:00
Date:	5/11/99	5/12/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
35.0								mottles;
36.0								
37.0								
38.0	50/4	SS	S8	D				38.5' Tan-orange, black, & grey mottled F slightly sandy micaceous silt, relict appearance;
39.0								
40.0								
41.0								
42.0								43.5' slighlty moist, tan-orange;
43.0	50/6	SS	S9	D				
44.0								
45.0								
46.0								48.5' same as above;
47.0								
48.0	32	SS	S10	D				
49.0	50							
50.0								
51.0								53.5' moist, tan-brown & white M sandy micaceous silt.
52.0								
53.0	50/6	SS	S11	M				
54.0								
55.0								
56.0								
57.0								
58.0	50/6	SS	S12	M				
59.0								CLAYEY SANDY SILT: Tan-brown wet clayey F sandy micaceous silt;
60.0								
61.0								
62.0								63.5' dark grey & white wet clayey F sandy micaceous silt;
63.0	50/2	SS	S13	W				
64.0								65.0' boring terminated.
65.0								



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-3

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**961.74**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**Dry**
Date Started	**6/1/00**	Date Ended	**6/5/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**67.0**
Comments	**Cleared and stripped surface**		Total Depth **68.5**	Date of Observation	**6/6/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
0		SILT: Advanced with auger, no samples, hard ledges at 28 to 29 feet and at 31 to 31.9 feet	
2 — 960.00			
4 — 958.00			
6 — 956.00			
8 — 954.00			
10 — 952.00			
12 — 950.00			
14 — 948.00			
16 — 946.00			
18 — 944.00			
20 — 942.00			
22 — 940.00			
24 — 938.00			
26 — 936.00			
28 — 934.00			
30 — 932.00			
32 — 930.00			
34 — 928.00			
36 — 926.00			

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-3

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**961.74**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**Dry**
Date Started	**6/1/00**	Date Ended	**6/5/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**67.0**
Comments	**Cleared and stripped surface**		Total Depth **68.5**	Date of Observation	**6/6/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
38 — 924.00			
40 — 922.00			
42 — 920.00		PWR: Variably hard drilling, very hard ledge at 44 to 47 feet, moist below 47 feet, refusal at 68.5 feet	
44 — 918.00			
46 — 916.00			Soil Backfill
48 — 914.00			
50 — 912.00			
52 — 910.00			
54 — 908.00			Bentonite Seal
56 — 906.00			Sand Pack
58 — 904.00			
60 — 902.00			
62 — 900.00			
64 — 898.00			
66 — 896.00			0.010" Slotted Screen
68 — 894.00			

FIELD BOREHOLE LOG

BOREHOLE NUMBER: B-4

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County LandFill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Geller
GEOLOGIST: Philip May
DATE BEGUN: 5/11/99 DATE COMPLETED: 5/12/99

TOP OF CASING ELEVATION: 989.58
TOTAL DEPTH: 75.0 FT
GROUND SURFACE ELEVATION: 987.89
SHEET: 1 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=AFter Boring		
Depth(ft)	73.0	59.70
Time	9:00	7:00
Date:	5/12/99	5/13/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
3.0–8.0	6 9 9	Ss	s1	D		14"		CLAYEY SILTY SAND: Orange-brown dry F clayey silty sand, angular quartz grains to 0.5mm, F sandy silt in lower 3", slightly micaceous.
8.0–13.0	8 11 14	Ss	s2	D		10"		SANDY SILT: Red-pink slightly moist F sandy micaceous silt, manganese streaks w/ tan-white borders, 5" of orange-tan and red-orange mottled M silty sand at 8.5';
13.0–18.0	8 8 9	Ss	s3	SM		12"		13.5' Dark red-pink, manganese streaking, slightly moist.
18.0–23.0	20 22 23	Ss	s4	SM		10"		SILTY SAND: Red-pink & grey slightly moist fine silty sand, tight, some grey & white F sand w/ pink mottling.
23.0–28.0	50/6	Ss	s5	D		6"		SAND: Grey & white salt & peppered F-C sand w/ gneiss PMR.
28.0–33.0	13 17 22	Ss	s6	D		8"		SANDY SILT: Tan-pink & tan-grey mottled M-C sandy micaceous silt, tight, heavy manganese mottling, relict rock - quartz & granite?.
33.0–35.0	17 23 26	Ss	s7	SM		8"		SILTY SAND: Grey-tan F silty sand, some relict rock w/ subangular quartz grains,

DEPTH | LITHOLOGY | WELL INSTALLATION

FIELD BOREHOLE LOG

BOREHOLE NUMBER: B-4

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County LandFill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seller
GEOLOGIST: Philip May
DATE BEGUN: 5/11/99 DATE COMPLETED: 5/12/99

TOP OF CASING ELEVATION: TBD
TOTAL DEPTH: 75.0 FT
GROUND SURFACE ELEVATION: TBD
SHEET: 2 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	72.0	59.70
Time	9:00	7:00
Date:	5/12/99	5/13/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
35.0								slightly moist, iron & manganese.
36.0								
37.0								
38.0	14	Ss	s8	M		10"		
39.0	9							SANDY SILT: Grey-tan & black(manganese) moist F sandy silt.
40.0	10							
41.0								
42.0								
43.0	21	Ss	s9	M		12"		
44.0	27							SILTY SAND: Tan-orange, white, & grey moist F micaceous silty sand, some relict rock.
45.0	35							
46.0								
47.0								
48.0	50/3	Ss	s10	M		2"		
49.0								SAND: Grey, white, & tan salt & peppered moist F sand w/ PWR-gneiss;
50.0								
51.0								
52.0								
53.0	50/4	Ss	s11	M		2"		53.5' Grey-brown moist micaceous F sand, trace silt;
54.0								
55.0								
56.0								
57.0								58.5' Grey-brown & white mottled slightly moist M-C sand, some PWR.
58.0	50/1	Ss	s12	SM		1"		
59.0								
60.0								
61.0								
62.0								
63.0	50/2	Ss	s13	M		1"		
64.0								SILTY SAND: Grey-brown moist micaceous F silty sand w/ dark brown mottles;
65.0								
66.0								
67.0								
68.0								68.0' Very hard drilling.
69.0								
70.0								
71.0								SAND: Light tan & brown-grey wet M sand & PWR, layered;
72.0								
73.0	50/1	Ss	s14	W		1"		75.0' Boring terminated.
74.0								
75.0								

WELL INSTALLATION

David Garrett, P.G., P.E.

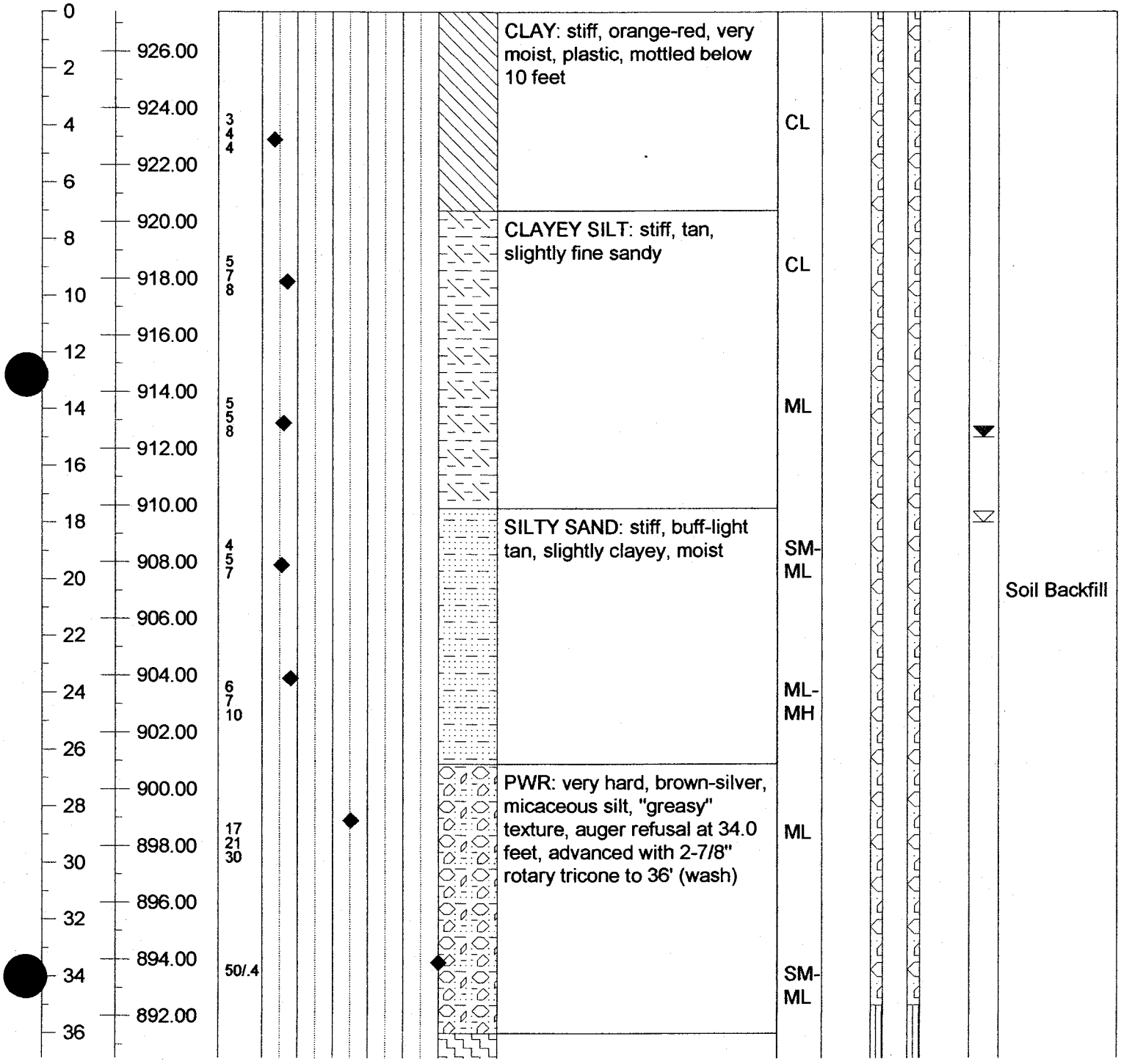
Engineering and Geology

Test Boring No. B-5d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**927.40**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/NQWL core**	Water Level, TOB	**18.0**
Date Started	**5/5/00**	Date Ended	**5/5/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**15.0**
Comments	**Cleared and stripped**		Total Depth **51.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-5d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**927.40**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/NQWL core**	Water Level, TOB	**18.0**
Date Started	**5/5/00**	Date Ended	**5/5/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**15.0**
Comments	**Cleared and stripped**		Total Depth **51.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
38 — 890.00		GNEISS: Core Run #1: hard, black-white, coarse grain, biotite-plagioclase, with aplite veins, foliar, REC = 90%, RQD = 50%	Bentonite Seal
40 — 888.00			
42 — 886.00		GNEISS: Core Run #2: same, weathered, friable, REC = 81%, RQD = 20%	
44 — 884.00			Sand Pack
46 — 882.00		GNEISS: Core Run #3: same, REC = 90%, RQD = 70%	0.010" Slotted Screen
48 — 880.00			
50 — 878.00			

David Garrett, P.G., P.E.

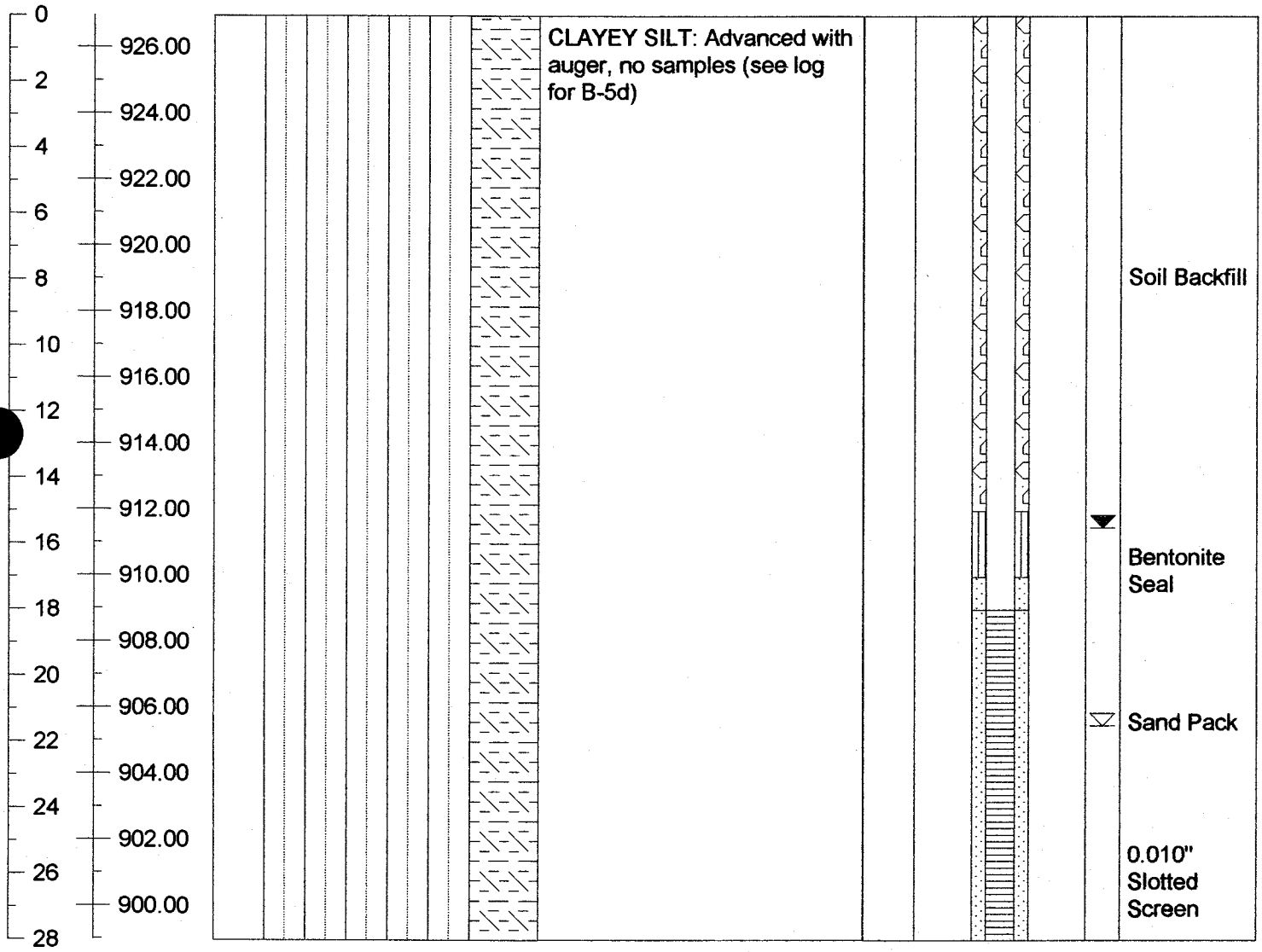
Engineering and Geology

Test Boring No. B-5s

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**926.96**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**21.5**
Date Started	**5/5/00**	Date Ended	**5/5/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**15.5**
Comments	**Cleared and stripped surface**		Total Depth **28.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-6

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**960.80**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/4" rotary air**	Water Level, TOB	**81.0**
Date Started	**5/19/99**	Date Ended	**5/24/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**79.4**
Comments	**Cleared and stripped**		Total Depth **88.0**	Date of Observation	**6/1/00**

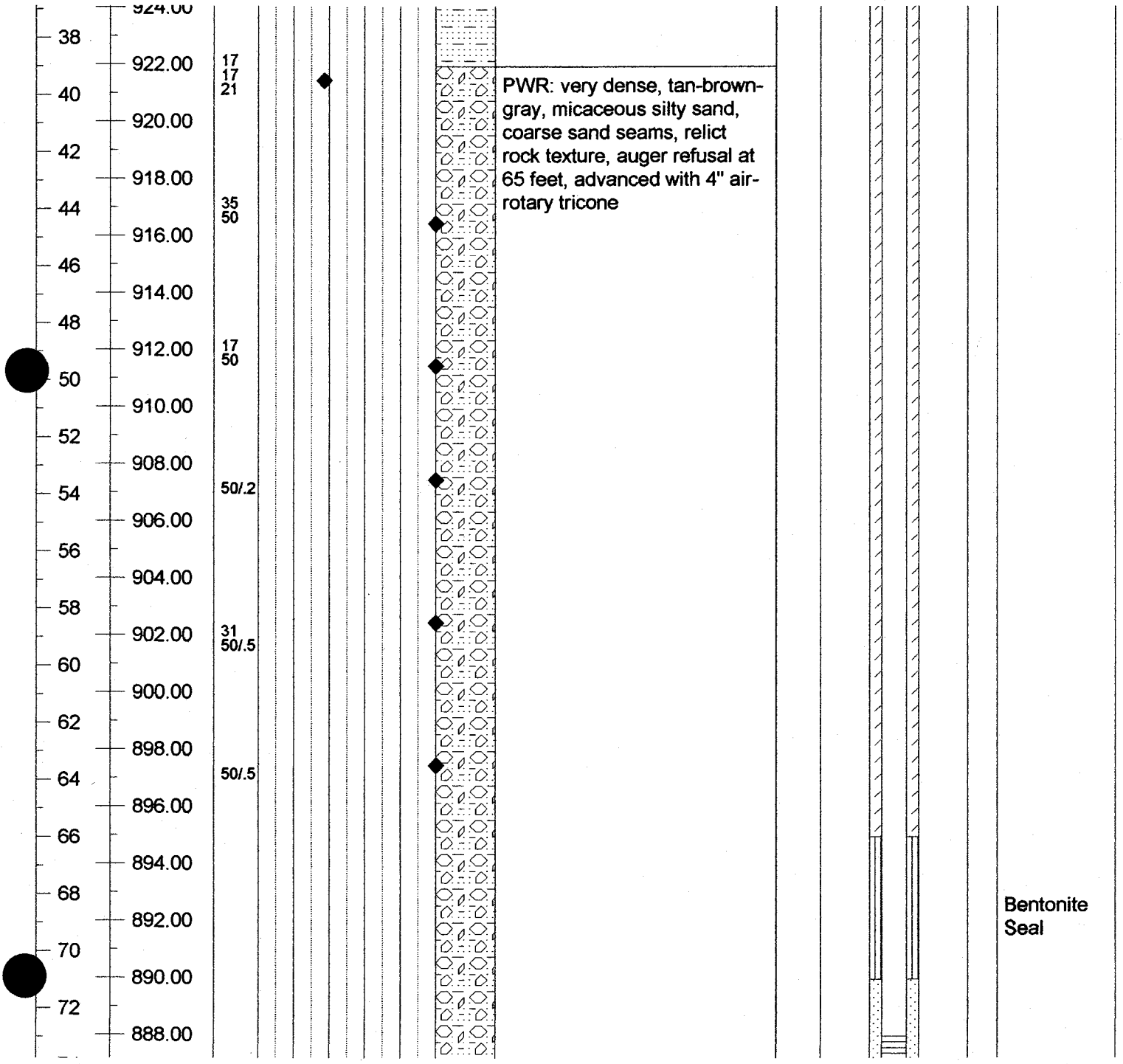
All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
0 / 960.00		FILL DIRT: medium stiff, dark red-brown, silty clayey fine sand, dry NOTE: original boring dry to 65 feet, left open, caved moist to 49 feet, redrilled with air a year later and converted to a monitoring well	
2 / 958.00			
4 / 956.00	5 6 6		
6 / 954.00			
8 / 952.00	4 4 5		
10 / 950.00			
12 / 948.00			
14 / 946.00	4 5 6	SILT: medium stiff, brown, micaceous, variably sandy, with clayey layers and aplite seams, slightly moist	
16 / 944.00			
18 / 942.00	4 5 6		
20 / 940.00			
22 / 938.00			
24 / 936.00	7 8 9	SILTY SAND: medium dense to dense, tan-brown-red, variable clay, Fe-Mn staining and color mottling, moist, changing to gray-brown, micaceous, Fe-Mn staining	
26 / 934.00			
28 / 932.00	6 8 14		
30 / 930.00			
32 / 928.00			
34 / 926.00	9 11 14		Portland-Cement Grout
36 / 924.00			

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**960.80**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/4" rotary air**	Water Level, TOB	**81.0**
Date Started	**5/19/99**	Date Ended	**5/24/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**79.4**
Comments	**Cleared and stripped**		Total Depth **88.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

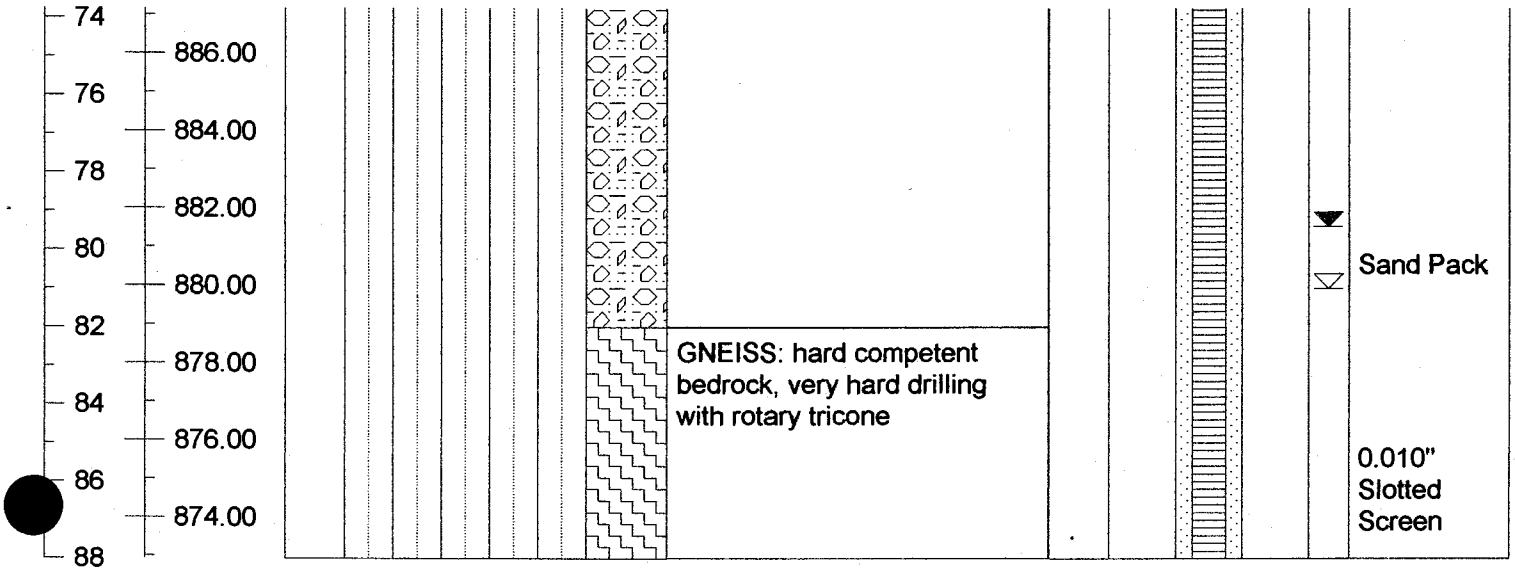
Engineering and Geology

Test Boring No. B-6

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**960.80**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/4" rotary air**	Water Level, TOB	**81.0**
Date Started	**5/19/99**	Date Ended	**5/24/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**79.4**
Comments	**Cleared and stripped**		Total Depth **88.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-7

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**927.41**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**48.7**
Date Started	**4/5/00**	Date Ended	**4/6/00**	Water Level, 24 Hr.	**46.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**46.7**
Comments	**Wooded area, cleared with dozer**	Total Depth	**65**	Date of Observation	**4/12/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
0		CLAYEY SILT: stiff, brown-red, slightly moist, trace of mica and rock fragments (ML-CL)	
2 / 926.00			
4 / 924.00	12, 15, 14	SANDY SILT: dense, yellow-brown, slightly moist, variably micaceous, with trace of clay, distinct laying, rock fragments at 8 to 9 feet (ML-SM)	
6 / 922.00			
8 / 920.00			
10 / 918.00	7, 9, 12		
12 / 916.00			
14 / 914.00	6, 9, 10		
16 / 912.00			
18 / 910.00			
20 / 908.00	12, 11, 15		
22 / 906.00			
24 / 904.00	35, 32, 40	SILT: stiff to hard, dark brown, micaceous, "greasy feel" with occasional white aplite veinlets (ML-MH)	Soil Backfill
26 / 902.00			
28 / 900.00			
30 / 898.00	9, 10, 12		
32 / 896.00			
34 / 894.00	10, 13, 15		
36 / 892.00			

David Garrett, P.G., P.E.

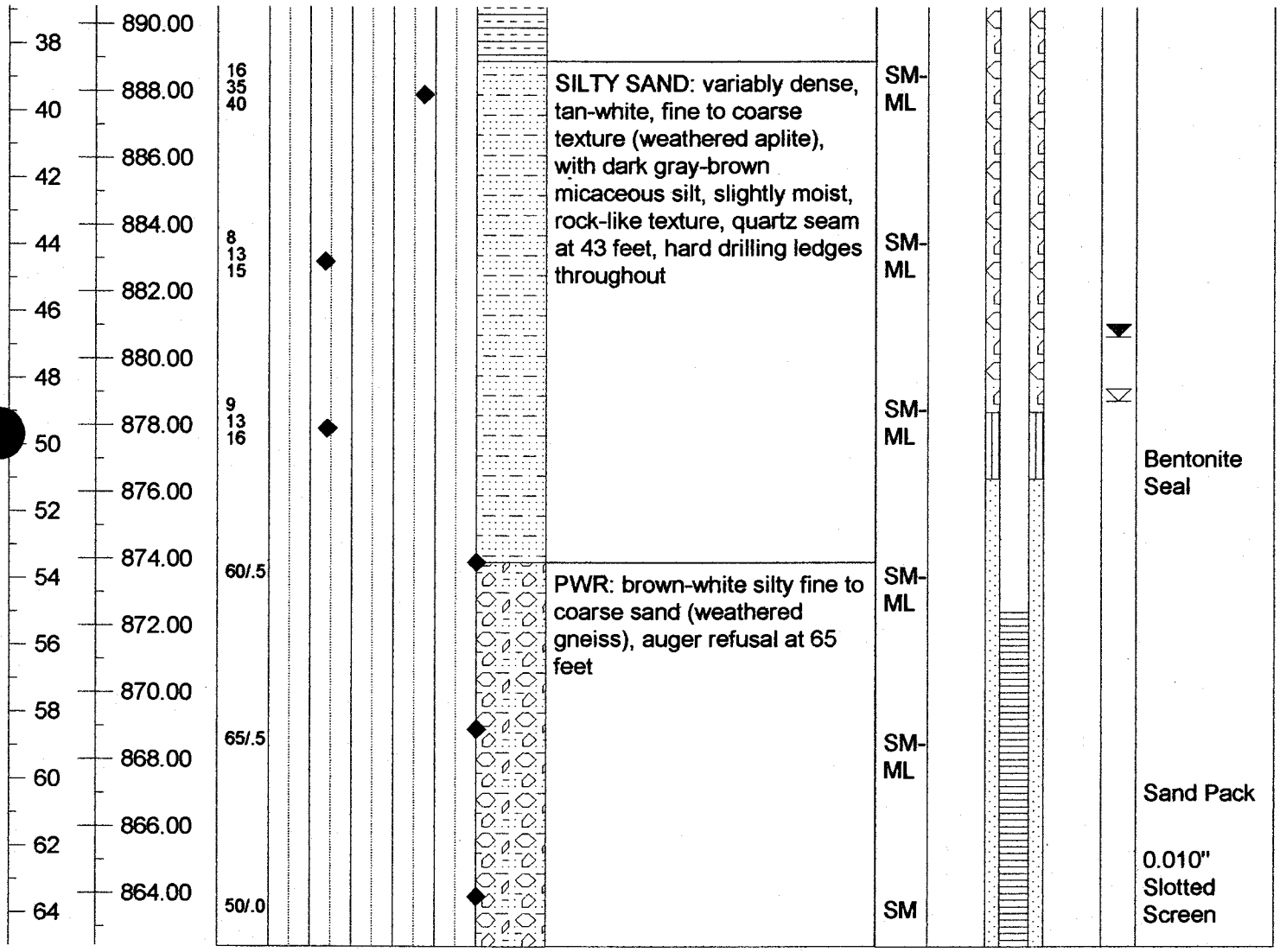
Engineering and Geology

Test Boring No. B-7

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**927.41**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**48.7**
Date Started	**4/5/00**	Date Ended	**4/6/00**	Water Level, 24 Hr.	**46.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**46.7**
Comments	**Wooded area, cleared with dozer**	Total Depth	**65**	Date of Observation	**4/12/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

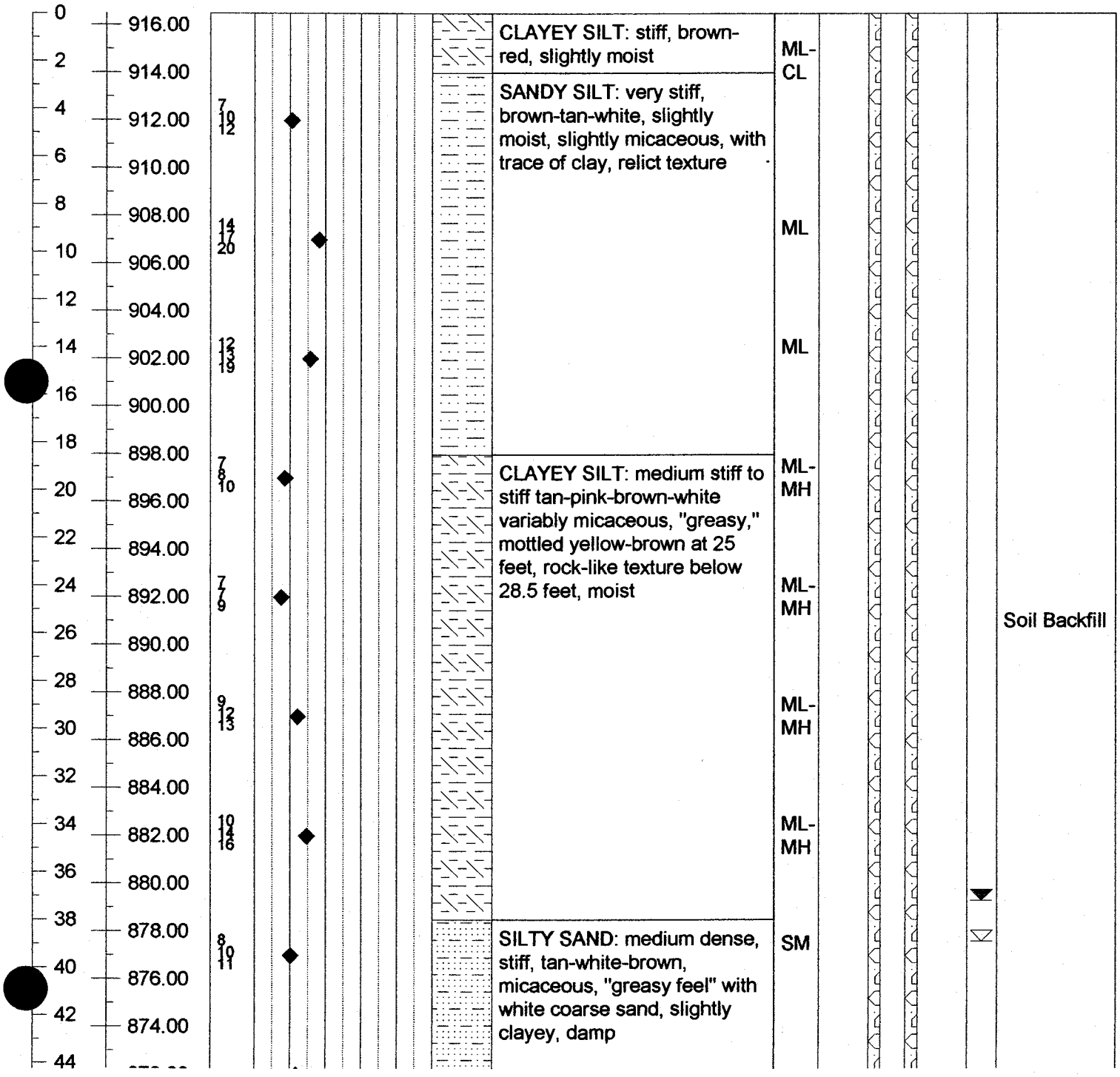
Engineering and Geology

Test Boring No. B-8

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**916.46**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**38.9**
Date Started	**4/11/00**	Date Ended	**4/11/00**	Water Level, 24 Hr.	**37.4**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**37.2**
Comments	**Wooded area, cleared with dozer**	Total Depth	**74.0**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

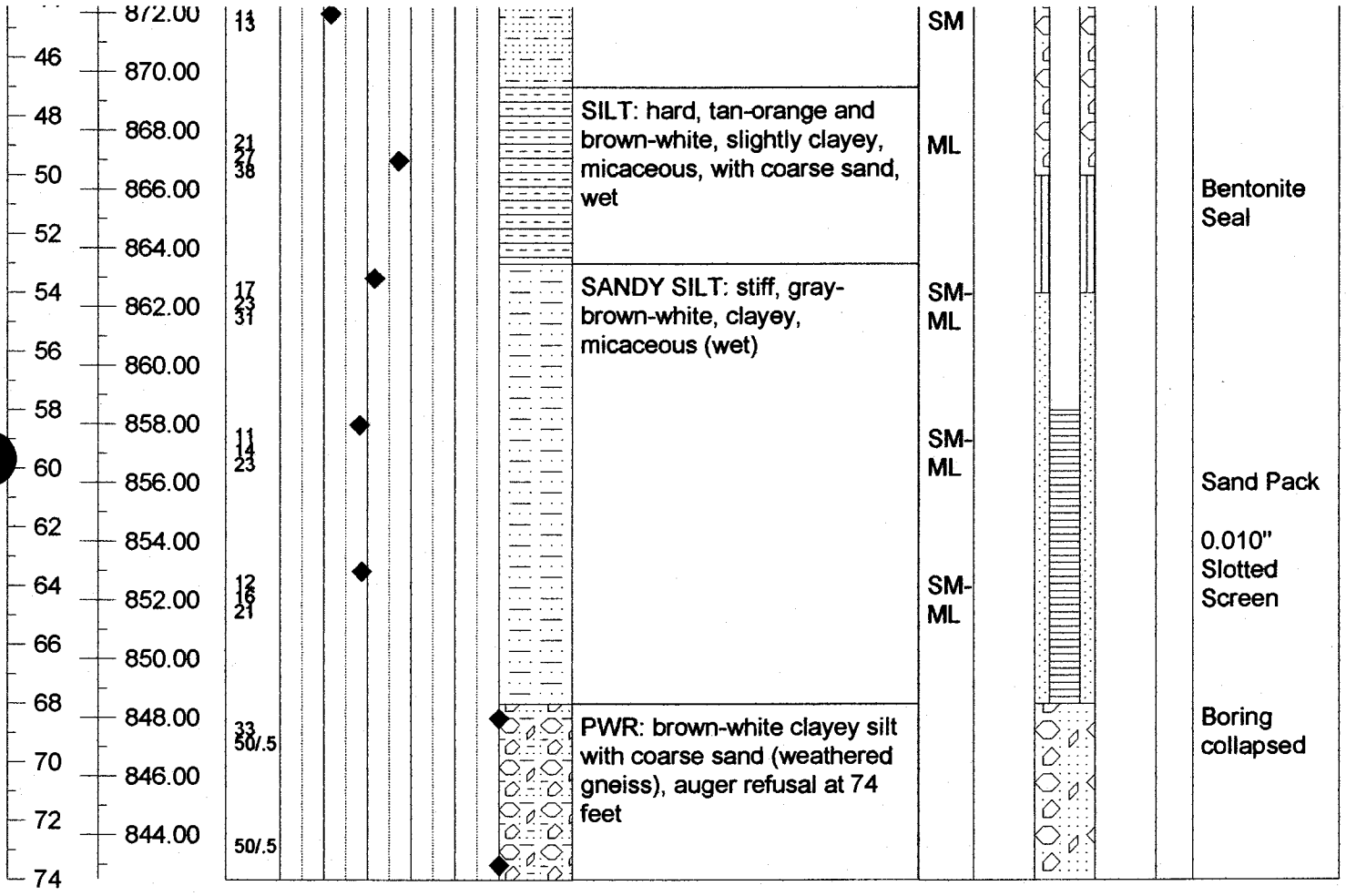
Engineering and Geology

Test Boring No. B-8

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**916.46**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**38.9**
Date Started	**4/11/00**	Date Ended	**4/11/00**	Water Level, 24 Hr.	**37.4**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**37.2**
Comments	**Wooded area, cleared with dozer**	Total Depth	**74.0**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-9d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**860.18**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**6.1**
Date Started	**4/11/00**	Date Ended	**4/11/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**6.1**
Comments	**Cleared and stripped**		Total Depth **72.0**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol		Piezometer Constuction Data
0 — 860.00		CLAYEY SILT: Advanced with HSA (see boring log for B-9s for description). Undisturbed samples acquired at 4 - 6 feet and 8 - 10 feet.		
2 — 858.00				
4 — 856.00				
6 — 854.00	4 3 4	CLAY: med. stiff bright yellow and brown, silty, micaceous, slightly sandy, trace of mica, angular rock fragments, large gravel (possible alluvium)	CL	
8 — 852.00				
10 — 850.00	12 6 5			
12 — 848.00		SILT: stiff, dark brown-silver, micaceous, "greasy" feeling, moist, auger refusal at 43.5 feet	ML-MH	
14 — 846.00				
16 — 844.00				
18 — 842.00				
20 — 840.00				
22 — 838.00				
24 — 836.00				
26 — 834.00				Soil Backfill
28 — 832.00				
30 — 830.00				
32 — 828.00				
34 — 826.00				
36 — 824.00				

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-9d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**860.18**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**6.1**
Date Started	**4/11/00**	Date Ended	**4/11/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**6.1**
Comments	**Cleared and stripped**		Total Depth **72.0**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
38 — 822.00			
40 — 820.00			
42 — 818.00			
44 — 816.00		PWR: very dense, dark brown, silty sand and micaceous silt with quartz, advanced with 2-7/8" roller cone to 57 feet (required 5 minutes per foot)	
46 — 814.00			
48 — 812.00	50/.1		
50 — 810.00			
52 — 808.00			
54 — 806.00	50/0		
56 — 804.00			
58 — 802.00		GNEISS: Core Run #1: hard, black-white, banded, migmatitic, biotite-plagioclase gneiss with "augen" REC = 88%, RQD = 40%	Bentonite Seal
60 — 800.00			
62 — 798.00		GNEISS: Core Run #2: same, weathered, friable, REC = 94%, RQD = 40	Sand Pack
64 — 796.00			
66 — 794.00			
68 — 792.00		GNEISS: Core Run #3: same, competent, high silica content, REC = 100%, RQD = 87%	0.010" Slotted Screen
70 — 790.00			
72			

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-9s

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**860.05**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**8.5**
Date Started	**4/11/00**	Date Ended	**4/11/00**	Water Level, 24 Hr.	**5.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**5.8**
Comments	**Wooded area, undisturbed surface**	Total Depth	**43.6**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data

Depth	Elev.	SPT Value	Soil Description	USCS	Piezometer
0	860.00		CLAYEY SILT: medium stiff, green-gold, very micaceous, with coarse sand and gravel from 5 to 7 feet, possible lignite (alluvium or colluvium), wet, with about 4 inches of topsoil	MH	
2	858.00				
4	856.00	3 4 4			
6	854.00				
8	852.00				Soil Backfill
10	850.00	4 5 5		MH-SM	
12	848.00		CLAYEY SILT: stiff, bright orange-tan and black mottled, trace of sand and mica (residual), moist		
14	846.00	4 5 7	CLAYEY SILT: stiff, dark orange-brown and silver mottled, micaceous, "greasy," moist, layered with white coarse sand	MH-SM	
16	844.00				Bentonite Seal
18	842.00				
20	840.00	14 19 20		MH	
22	838.00				
24	836.00	4 5 4		MH	
26	834.00				Sand Pack
28	832.00				0.010" Slotted Screen
30	830.00	7 8 10	CLAYEY SILT: stiff, black-white speckled with orange mottle, slightly sandy, relict "salt and pepper" texture	MH	
32	828.00				
34	826.00	50/.5	PWR: very dense, gray-white and dark brown, slightly clayey, micaceaous with coarse sand, auger refusal at	ML	
36	824.00				Sand

Test Boring No. B-9s

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**860.05**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**8.5**
Date Started	**4/11/00**	Date Ended	**4/11/00**	Water Level, 24 Hr.	**5.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**5.8**
Comments	**Wooded area, undisturbed surface**	Total Depth	**43.6**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
38 — 822.00	50/.4	43.5 feet	
40 — 820.00			
42 — 818.00	50/.1		

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-10

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1018.84**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/Rotary Air**	Water Level, TOB	**64.0**
Date Started	**4/7/00**	Date Ended	**5/30/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**63.7**
Comments	**Wooded area, undisturbed surface**	Total Depth	**80.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol		Piezometer Constuction Data
0 / 1018.00		CLAYEY SILT: medium stiff, brown-red, slightly moist, trace of mica and rock fragments	ML-CL	
2 / 1016.00				
4 / 1014.00	5, 6, 7			
6 / 1012.00		CLAYEY SILT: stiff. pink-brown-white, slightly fine sandy, slightly moist, with mica, distinct laying	ML	
8 / 1010.00	10, 12, 14			
10 / 1008.00				
12 / 1006.00		SANDY SILT: stiff to hard, pink-brown and tan mottled, micaceous, slightly moist, scattered coarse sand	ML-SM	
14 / 1004.00	19, 23, 30			
16 / 1002.00				
18 / 1000.00	15, 17, 26		ML-SM	
20 / 998.00				
22 / 996.00		SANDY SILT: very hard, purple-brown, micaceous, slightly moist, with white quartz-kaolinite veinlets (weathered aplite), transitions with depth to partially weathered rock	ML-MH	
24 / 994.00	10, 12, 13			
26 / 992.00				
28 / 990.00	9, 13, 15		ML-MH	
30 / 988.00				
32 / 986.00				Soil Backfill
34 / 984.00	21, 38, 50		ML-SM	
36 / 982.00				
38 / 980.00	37, 50		ML-SM	
40 / 978.00				
42 / 976.00				
44				

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-10

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1018.84**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/Rotary Air**	Water Level, TOB	**64.0**
Date Started	**4/7/00**	Date Ended	**5/30/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**63.7**
Comments	**Wooded area, undisturbed surface**	Total Depth	**80.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
974.00	50/.5	PWR: very hard drilling, auger refusal at 48.5 feet, advanced with air-rotary tricone to 80 feet, dry — ML-SM	
46			
972.00			
48			
970.00	50/0		
50			
968.00			
52			
966.00			
54			
964.00			
56			
962.00			
58			
960.00			
60			
958.00			
62			
956.00		GNEISS: hard bedrock, advanced with air-rotary tricone	
64			
954.00			Bentonite Seal
66			
952.00			
68			
950.00			
70			
948.00			
72			Sand Pack
946.00			
74			
944.00			
76			
942.00			0.010" Slotted Screen
78			
940.00			
80			

FIELD BOREHOLE LOG

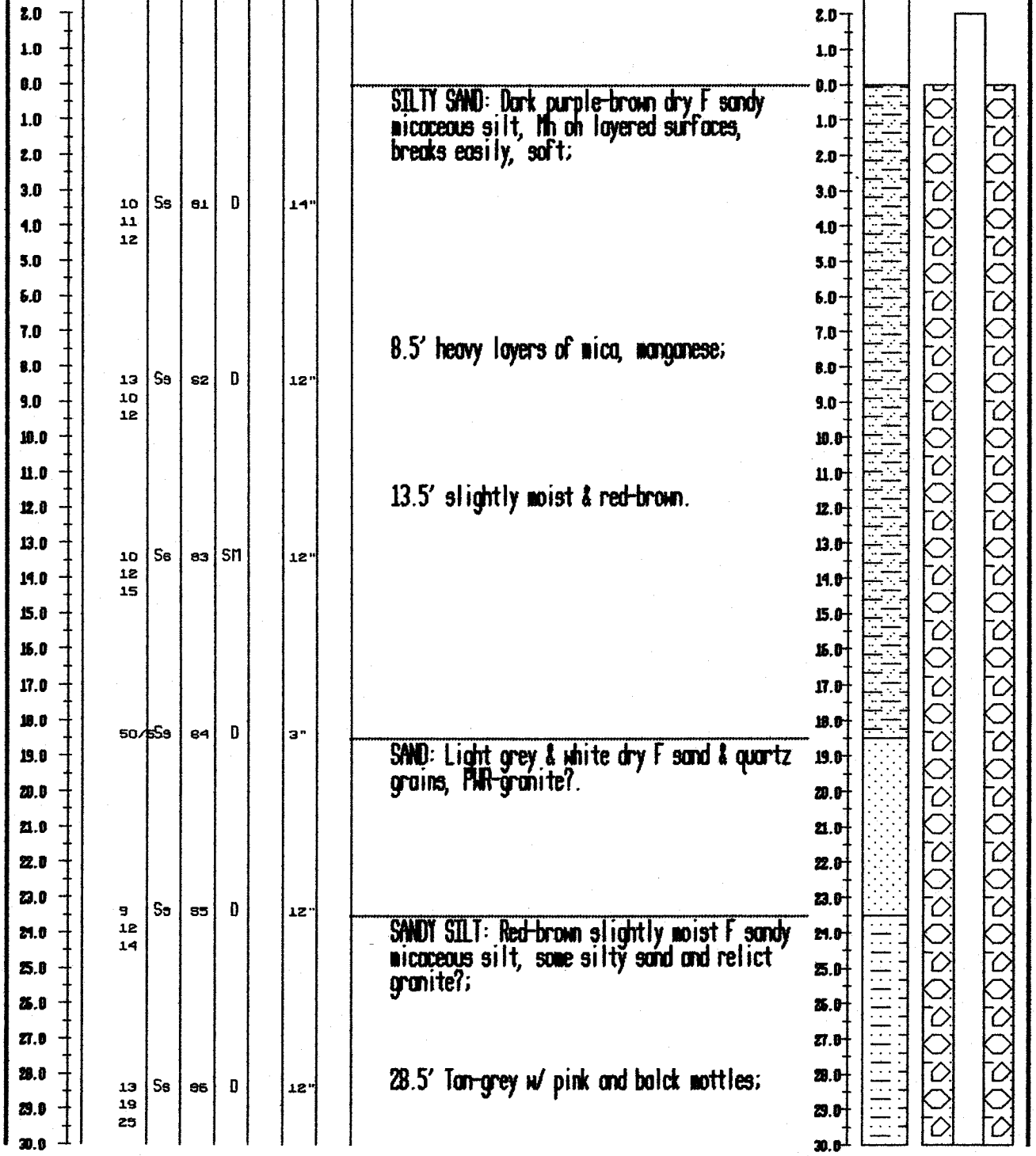
BOREHOLE NUMBER: B-11

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County Landfill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Beller
GEOLOGIST: Philip May
DATE BEGUN: 5/12/99 DATE COMPLETED: 5/12/99

TOP OF CASING ELEVATION: 1016.01
TOTAL DEPTH: 60.0 FT
GROUND SURFACE ELEVATION: 1015.07
SHEET: 1 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	53.0	51.50
Time	9:00	7:00
Date:	5/12/99	5/13/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
3.0	10 11 12	Ss	S1	D		14"		SILTY SAND: Dark purple-brown dry F sandy micaceous silt, Mn on layered surfaces, breaks easily, soft;
8.0	13 10 12	Ss	S2	D		12"		8.5' heavy layers of mica, manganese;
13.0	10 12 15	Ss	S3	SM		12"		13.5' slightly moist & red-brown.
18.0	50/5	SSs	S4	D		3"		SAND: Light grey & white dry F sand & quartz grains, PWR-granite?.
23.0	9 12 14	Ss	S5	D		12"		SANDY SILT: Red-brown slightly moist F sandy micaceous silt, some silty sand and relict granite?;
28.0	13 19 25	Ss	S6	D		12"		28.5' Tan-grey w/ pink and balck mottles;



FIELD BOREHOLE LOG

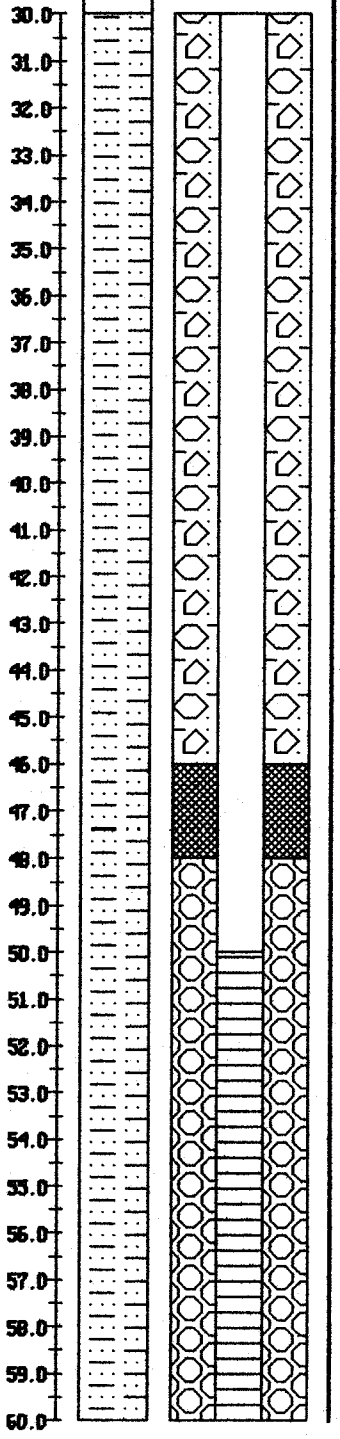
BOREHOLE NUMBER: B-11

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County Landfill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seiler
GEOLOGIST: Philip May
DATE BEGUN: 5/12/99 DATE COMPLETED: 5/12/99

TOP OF CASING ELEVATION: TBD
TOTAL DEPTH: 60.0 FT
GROUND SURFACE ELEVATION: TBD
SHEET: 2 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	53.0	51.50
Time	9:00	7:00
Date:	5/12/99	5/13/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
33.0	17 20 28	Ss	S7	D		10"		33.5' layered and 45 degree fractures, Mn streaks along 45 degree fractures, white & red-orange mottling;
38.0	22 50/3	Ss	S8	D		6"		38.5' Grey-brown, manganese;
40.0								40' Hard drilling;
41.0								41' soft seam (1");
43.0		Ss	S9					
46.0								46' soft seam (1');
48.0	50/4	Ss	S10	SM		2"		48.5' dark red-brown weathered PWR w/ tan-red, Mn, and yellow mottles, micaceous;
53.0								53.0' water;
53.0	35 50/3	Ss	S11	M		8"		53.5' Grey-brown, highly striated w/ Mn & Fe, moist;
59.0	50/0		S12					60.0' Boring terminated. REFUSAL ON SPT



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-12d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**970.87**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**28.8**
Date Started	**4/6/00**	Date Ended	**4/7/00**	Water Level, 24 Hr.	**28.9**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**29.1**
Comments	**Former borrow site**		Total Depth **104**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
0 / 970.00		NO SAMPLE: Advanced with HSA (see boring log for B-12s for description)	
2 / 968.00			
4 / 966.00			
6 / 964.00			
8 / 962.00			
10 / 960.00			
12 / 958.00			
14 / 956.00			
16 / 954.00			
18 / 952.00			
20 / 950.00			
22 / 948.00			
24 / 946.00			Soil Backfill
26 / 944.00			
28 / 942.00			
30 / 940.00			
32 / 938.00			
34 / 936.00			
36 / 934.00			

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-12d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**970.87**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**28.8**
Date Started	**4/6/00**	Date Ended	**4/7/00**	Water Level, 24 Hr.	**28.9**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**29.1**
Comments	**Former borrow site**		Total Depth **104**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
934.00			
38			
932.00	12 14 15	SANDY SILT: stiff to hard, tan-brown, slightly moist, trace of mica, distinct laying, rock fragments — ML-MH	
40			
930.00			
42			
928.00			
44	10 14 17	ML-SM	
926.00			
46			
924.00			
48		PWR: very dense, tan-white, slightly clayey, fine to coarse silty sand, moist, trace of mica — SM	
922.00	50/.4		
50			
920.00			
52		PWR: very hard, dark brown, micaceous sandy silt, moist, with coarse white sand, advanced with hollow stem auger — ML	
918.00			
54	50/.5		
916.00			
56			
914.00			
58			
912.00	27 32 50	ML	
60			
910.00			
62			
908.00			
64	50/.5	SM-ML	
906.00			
66			
904.00		PWR: very dense tan fine sandy micaceous silt, trace of clay (weathered gneiss), auger refusal at 74 feet	
68			
902.00	50/.5		
70			
900.00			
72			
898.00	50/.4		

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-12d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**970.87**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**28.8**
Date Started	**4/6/00**	Date Ended	**4/7/00**	Water Level, 24 Hr.	**28.9**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**29.1**
Comments	**Former borrow site**		Total Depth **104**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
74 / 896.00		PWR: set NW casing to 74 feet, advanced with 2-15/16 inch roller bit, refusal at 89 feet	
76 / 894.00			
78 / 892.00	50/.5		
80 / 890.00			
82 / 888.00			
84 / 886.00	50/.3		
86 / 884.00			
88 / 882.00	50/0		Bentonite Seal
90 / 880.00		GNEISS: Core Run #1: weathered, black, friable, biotite-plagioclase with "augen" REC = 84%, RQD = 30%	Sand Pack
92 / 878.00			
94 / 876.00		GNEISS: Core Run #2: moderately hard, black, friable, REC = 50%, RQD = 8%	0.010" Slotted Screen
96 / 874.00			
98 / 872.00			
100 / 870.00		GNEISS: Core Run #3: hard, competent, high silica content below 102 feet, REC = 98%, RQD = 42%	
102 / 868.00			
104			

FIELD BOREHOLE LOG

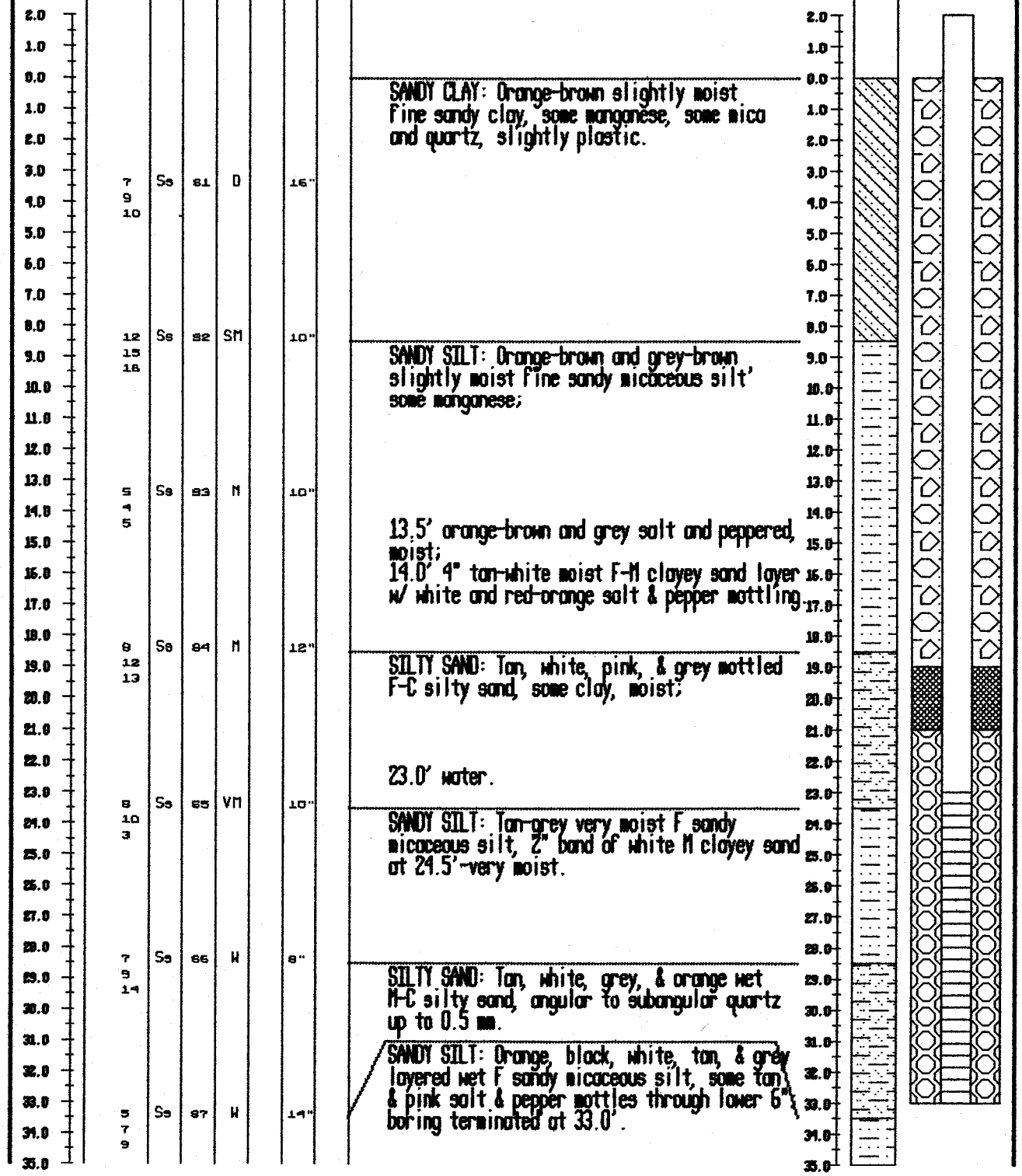
BOREHOLE NUMBER: B-12S

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County LandFill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Geller
GEOLOGIST: Philip May
DATE BEGUN: 5/11/99 DATE COMPLETED: 5/11/99

TOP OF CASING ELEVATION: 972.90
TOTAL DEPTH: 33.0 FT
GROUND SURFACE ELEVATION: 970.59
SHEET: 1 OF: 1

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(Ft)	23.0	18.40
Time	15:00	7:00
Date:	5/11/99	5/12/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
3.0–4.0	7 9 10	Ss	S1	D		16"		SANDY CLAY: Orange-brown slightly moist fine sandy clay, some manganese, some mica and quartz, slightly plastic.
8.0–9.0	12 15 18	Ss	S2	SM		10"		SANDY SILT: Orange-brown and grey-brown slightly moist fine sandy micaceous silt' some manganese;
13.0–14.0	5 4 5	Ss	S3	M		10"		13.5' orange-brown and grey salt and peppered, moist; 14.0' 4" tan-white moist F-M clayey sand layer w/ white and red-orange salt & pepper mottling.
18.0–19.0	8 12 13	Ss	S4	M		12"		SILTY SAND: Tan, white, pink, & grey mottled F-C silty sand, some clay, moist; 23.0' water.
23.0–24.0	8 10 3	Ss	S5	VM		10"		SANDY SILT: Tan-grey very moist F sandy micaceous silt, 2" band of white M clayey sand at 24.5'-very moist.
28.0–29.0	7 9 14	Ss	S6	W		8"		SILTY SAND: Tan, white, grey, & orange wet M-C silty sand, angular to subangular quartz up to 0.5 mm.
33.0–34.0	5 7 9	Ss	S7	W		14"		SANDY SILT: Orange, black, white, tan, & grey layered wet F sandy micaceous silt, some tan & pink salt & pepper mottles through lower 6"; boring terminated at 33.0'.



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-13

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**939.92**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**15.5**
Date Started	**5/02/00**	Date Ended	**5/02/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**16.0**
Comments	**Cleared surface, rocky**		Total Depth **31.0**	Date of Observation	**5/5/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data

Depth	Elev.
0	
2	938.00
4	936.00
6	934.00
8	932.00
10	930.00
12	928.00
14	926.00
16	924.00
18	922.00
20	920.00
22	918.00
24	916.00
26	914.00
28	912.00
30	910.00

PWR: hard, rocky, set casing

GNEISS: Core Run #1: weathered brown-white mica gneiss, schistose, with aplite seams; REC = 76, RQD = 0

GNEISS: Core Run #2: REC = 80%, RQD = 16%

GNEISS: Core Run #3: REC = 80%, RQD = 10%

GNEISS: Core Run #4: more competent aplite and schist; REC = 100%, RQD = 60%

GNEISS: Core Run #5: same with increasing quartz content; REC = 100%, RQD = 94%

GNEISS: Core Run #6: REC = 100%, RQD = 95%

Soil Backfill

Bentonite Seal

Sand Pack

0.010" Slotted Screen

FIELD BOREHOLE LOG

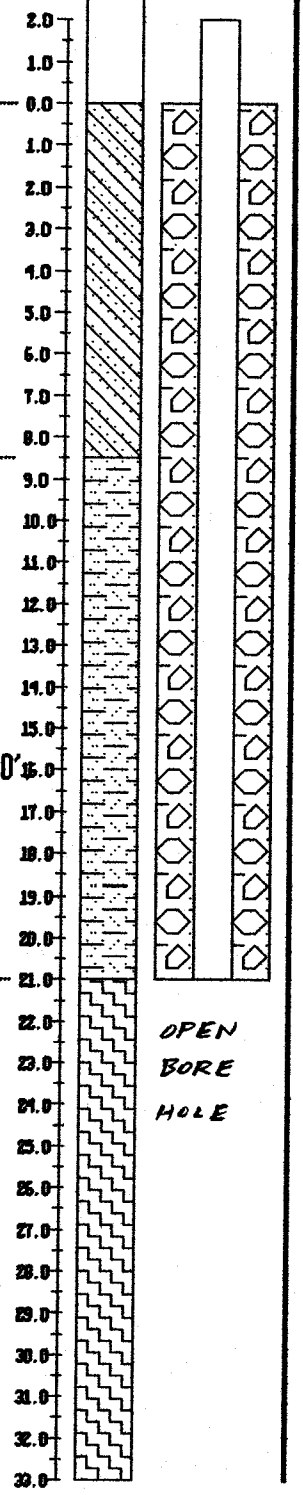
BOREHOLE NUMBER: B-14

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County Landfill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seiler
GEOLOGIST: Philip May
DATE BEGUN: 5/14/99 DATE COMPLETED: 5/18/99

TOP OF CASING ELEVATION: 972.50
TOTAL DEPTH: 100.0 FT
GROUND SURFACE ELEVATION: 971.17
SHEET: 1 OF: 3

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	100.0	100.0
Time	15:00	7:00
Date:	5/19/99	5/20/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
2.0								
1.0								
0.0								CLAYEY SAND: Rust brown clayey sand w/ quartz grains and predominant grey & white relict rock.
1.0								
2.0								
3.0	11 12 15	Ss	S1	D		12"		
4.0								
5.0								
6.0								
7.0								
8.0	11 12 20	Ss	S2	D		10"		
9.0								SILTY SAND: Partially weathered pink-red, white, & tan dry silty F-C sand, 3" band of dark brown-black micaceous F-M sandy clay at 9.0';
10.0								
11.0								
12.0								
13.0	11 16 27	Ss	S3	D		12"		
14.0								
15.0								13.5' grey-white M-C silty sand, rust brown layer at 14.5', pink mottles and moist at 15.0'
16.0								
17.0								
18.0	21 50	Ss	S4	D		10"		
19.0								18.5' slightly moist, PWR throughout;
20.0								
21.0								21.0' auger refusal. GNEISS: Competent rock, gneiss/schist; air rotary from 21.0' to 55.0; 21.0' tan-brown rock flour, grab sample-small rock fragments - quartz & dark grey;
22.0								
23.0								
24.0								
25.0								
26.0								
27.0								
28.0								
29.0								
30.0								
31.0								
32.0								
33.0								



FIELD BOREHOLE LOG

BOREHOLE NUMBER: B-14

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County LandFill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seiler
GEOLOGIST: Philip May
DATE BEGUN: 5/14/99 DATE COMPLETED: 5/19/99

TOP OF CASING ELEVATION: TBD
TOTAL DEPTH: 100.0 FT
GROUND SURFACE ELEVATION: TBD
SHEET: 2 OF: 3

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(Ft)	100.0	100.0
Time	15:00	7:00
Date:	5/19/99	5/20/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION	DEPTH	LITHOLOGY	WELL INSTALLATION
33.0									33.0		
34.0									34.0		
35.0								tan grey rock flour	35.0		
36.0									36.0		
37.0									37.0		
38.0									38.0		
39.0									39.0		
40.0									40.0		
41.0									41.0		
42.0								40.0-48.0' grab sample-same as above;	42.0		
43.0									43.0		
0									44.0		
									45.0		
46.0									46.0		
47.0									47.0		
48.0									48.0		
49.0									49.0		
50.0									50.0		
51.0									51.0		
52.0									52.0		
53.0									53.0		
54.0									54.0		
55.0									55.0		
56.0								55.0' air rotary refusal,	56.0		
57.0								grey & white rock flour - no fragments;	57.0		
58.0								air hammered from 55.0 to 100.0'	58.0		
59.0								drill rate varied from 3 to 6 in/min,	59.0		
60.0									60.0		
61.0									61.0		
62.0									62.0		
									63.0		
									64.0		
65.0									65.0		
66.0									66.0		

FIELD BOREHOLE LOG

BOREHOLE NUMBER: B-14

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County Landfill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seiler
GEOLOGIST: Philip May
DATE BEGUN: 5/14/99 DATE COMPLETED: 5/18/99

TOP OF CASING ELEVATION: TBD
TOTAL DEPTH: 100.0 FT
GROUND SURFACE ELEVATION: TBD
SHEET: 3 OF: 3

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	100.0	100.0
Time	15:00	7:00
Date:	5/19/99	5/20/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION	DEPTH	LITHOLOGY	WELL INSTALLATION
66.0									66.0		
67.0									67.0		
68.0									68.0		
69.0									69.0		
70.0									70.0		
71.0									71.0		
72.0									72.0		
73.0									73.0		
74.0									74.0		
75.0									75.0		
76.0								76.0' grab sample-dark grey & white fragments, light grey-white rock flour drilled to 71.0' on 5-17-99 but no water in hole on 5-18-99, drilled to 100.0' and set a 4" casing to 21.0' under which is a 3-4" borehole;	76.0		
77.0									77.0		
78.0									78.0		
79.0									79.0		
80.0									80.0		
81.0									81.0		
82.0									82.0		
83.0									83.0		
84.0									84.0		
85.0									85.0		
86.0									86.0		
87.0									87.0		
88.0									88.0		
89.0									89.0		
90.0									90.0		
91.0									91.0		
92.0									92.0		
93.0									93.0		
94.0									94.0		
95.0									95.0		
96.0									96.0		
97.0									97.0		
98.0								100.0' boring terminated.	98.0		
99.0									99.0		
100.0									100.0		

FIELD BOREHOLE LOG

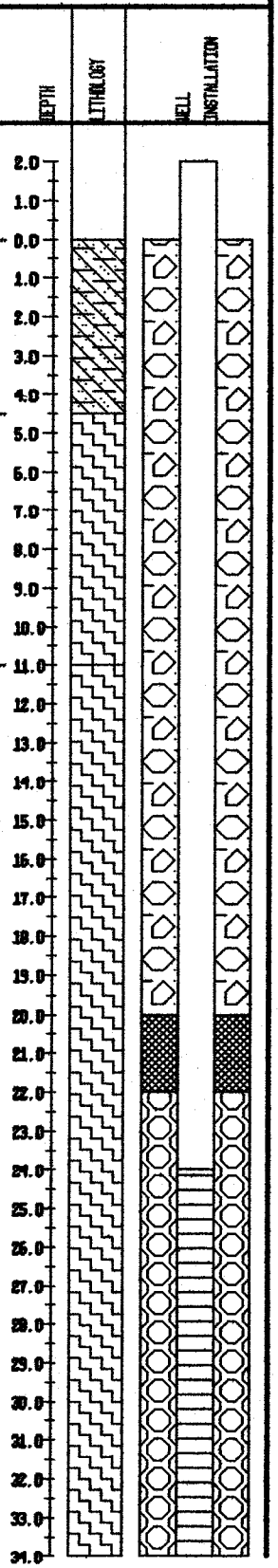
BOREHOLE NUMBER: B-15

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County LandFill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Geller
GEOLOGIST: Philip May
DATE BEGUN: 5/14/99 DATE COMPLETED: 5/18/99

TOP OF CASING ELEVATION: 899.84
TOTAL DEPTH: 34.0 FT
GROUND SURFACE ELEVATION: 897.55
SHEET: 1 OF: 1

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	32.0	30.0
Time	15:00	7:00
Date:	5/18/99	5/19/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
2.0								
1.0								
0.0								SILTY SANDY CLAY: Orange-brown slightly moist M silty sandy clay, some quartz grains up to 2mm, some mica, stiff, non-plastic.
1.0								
2.0								
3.0	6	SS	S1	D				
4.0	21							
	50/2							
5.0								GNEISS: Partially weathered dark grey and white salt & peppered rock fragments w/ white banding, mica;
6.0								
7.0								
8.0								
9.0								
10.0								
11.0								11.0' Auger refusal.
								GNEISS: Competent rock, gneiss/schist;
12.0								
13.0								
14.0								
15.0								15.0' Air rotary refusal;
16.0								
17.0								air hammered from 15.0' to 34.0' at approximately 6 in/min;
18.0								
19.0								grab sample-tan, grey, & white rock fragments & rock flour;
20.0								
21.0								
22.0								
23.0								
24.0								
25.0								
26.0								
27.0								
28.0								
29.0								
30.0								30.0' grab sample - same as above;
31.0								
32.0								32.0' Soft seam, moist, produced water
33.0								
34.0								34.0' Boring terminated.



David Garrett, P.G., P.E.

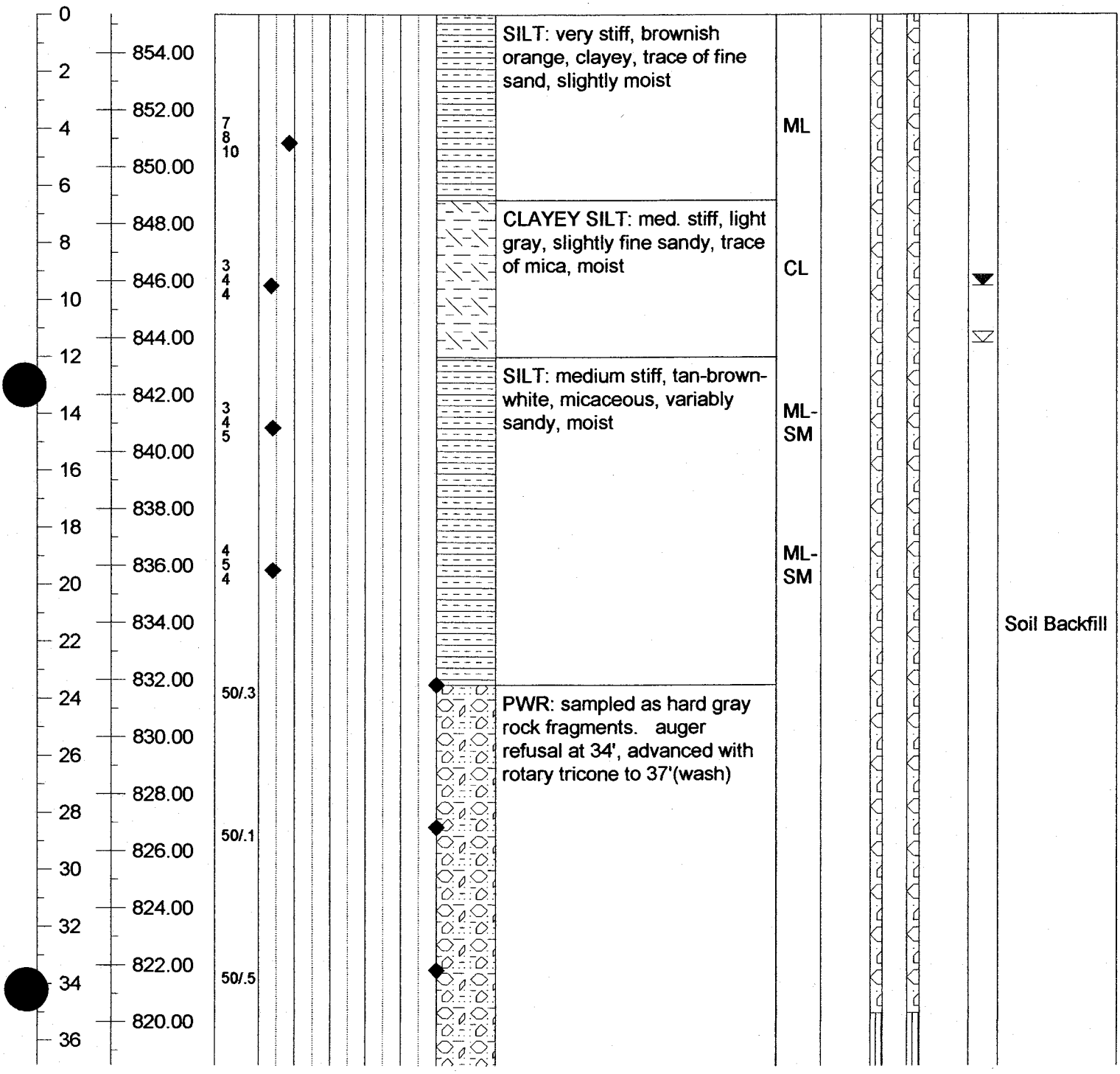
Engineering and Geology

Test Boring No. B-16d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**855.34**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**11.5**
Date Started	**5/4/00**	Date Ended	**5/4/00**	Water Level, 24 Hr.	**9.5**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**10.1**
Comments	**Cleared and stripped**		Total Depth **52.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-16d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**855.34**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**11.5**
Date Started	**5/4/00**	Date Ended	**5/4/00**	Water Level, 24 Hr.	**9.5**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**10.1**
Comments	**Cleared and stripped**		Total Depth **52.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
38 / 818.00		GNEISS: Core Run #1: black-white speckled, biotite-plag gneiss, mica partings spaced 3-6 inches at 45 deg REC = 90%, RQD = 84%	Bentonite Seal
40 / 816.00			
42 / 814.00		GNEISS: Core Run #2: same, REC = 100%, RQD = 100%	
44 / 812.00			
46 / 810.00			
48 / 808.00		GNEISS: Core Run #3: same, REC = 100%, RQD = 100%	Sand Pack
50 / 806.00			0.010" Slotted
52 / 804.00			

David Garrett, P.G., P.E.

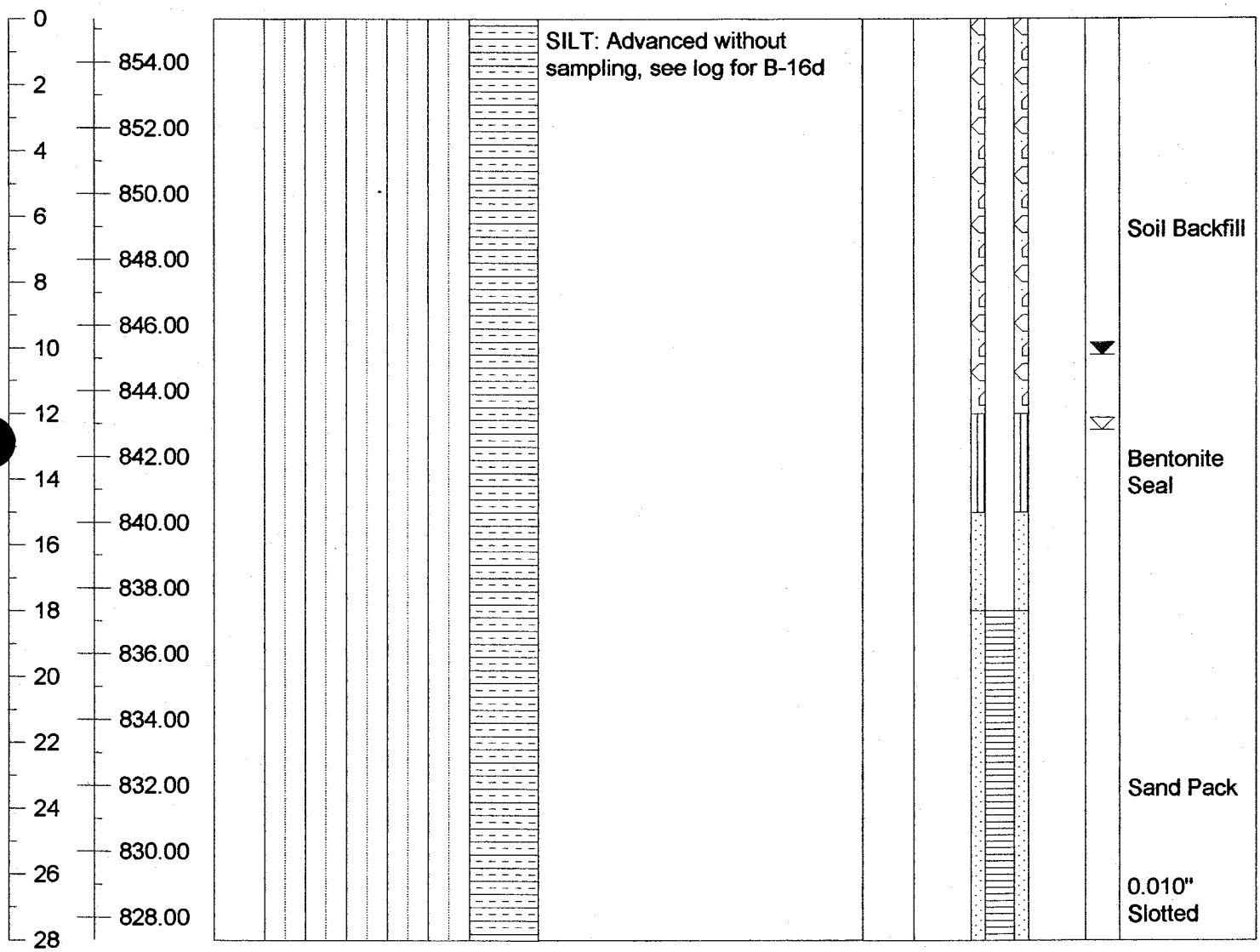
Engineering and Geology

Test Boring No. B-16s

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**855.30**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**12.5**
Date Started	**5/4/00**	Date Ended	**5/4/00**	Water Level, 24 Hr.	**9.5**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**10.2**
Comments	**Wooded area, undisturbed surface**	Total Depth	**28.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



FIELD BOREHOLE LOG

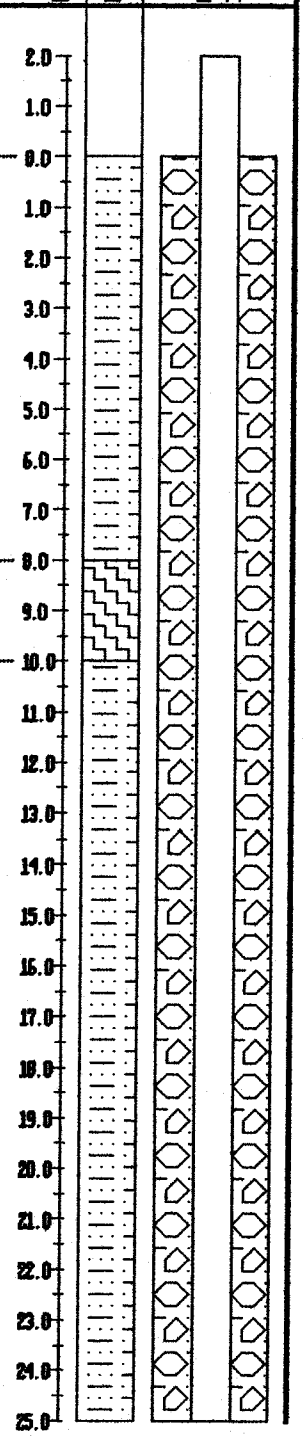
BOREHOLE NUMBER: B-17

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County Landfill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seiler
GEOLOGIST: Philip May
DATE BEGUN: 5/13/99 DATE COMPLETED: 5/17/99

TOP OF CASING ELEVATION: 963.56
TOTAL DEPTH: 50.0 FT
GROUND SURFACE ELEVATION: 960.91
SHEET: 1 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	50.0	41.25
Time	15:00	7:00
Date:	5/13/99	5/17/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
3.0	5 6 7	Ss	81	D		16"		SANDY SILT: Tan-grey dry F sandy micaceous silt, layered horizontally throughout, Mn staining concentrated on surfaces of layers, rust brown mottling.
8.0	50/0	Ss	82	D		0.5"		GNEISS: Partially weathered dark gray and white salt & peppered rock fragments.
								SANDY SILT: Rust brown dry F sandy micaceous silt, tan-grey & Mn mottling;
13.0	6 50/3	Ss	83	D		6"		
18.0	7 8 12	Ss	84	SM		14"		18.5' Light tan-brown slightly moist F sandy micaceous silt, Mn mottling, white M sand pocket at 19.0', rust mottling, layered from 19.5';
23.0	7 12 18	Ss	85	SM		12"		23.5' Tan-brown, grey & white salt & pepper mottling.



FIELD BOREHOLE LOG

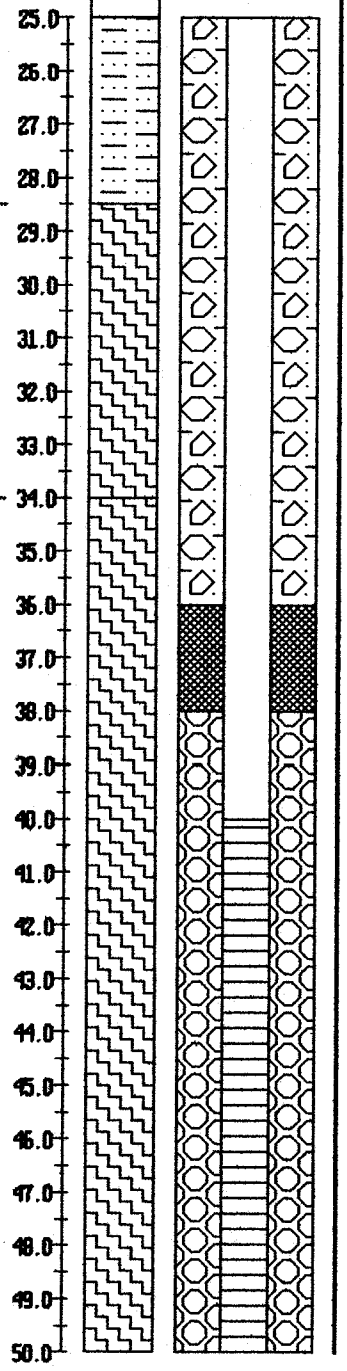
BOREHOLE NUMBER: B-17

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County Landfill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seller
GEOLOGIST: Philip May
DATE BEGUN: 5/13/99 DATE COMPLETED: 5/17/99

TOP OF CASING ELEVATION: TBD
TOTAL DEPTH: 50.0 FT
GROUND SURFACE ELEVATION: TBD
SHEET: 2 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	50.0	41.25
Time	15:00	7:00
Date:	5/13/99	5/17/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
25.0								
26.0								
27.0								
28.0	50/15s		S6			0"		
29.0								GNEISS: Partially weathered gneiss/schist.
30.0								
31.0								
32.0								
33.0	50/15s		S7			0"		
34.0								AUGER REFUSAL 34.0'
35.0								GNEISS: Gneiss/schist, competent rock;
36.0								Cored from 34.0' to 50.0' in 4 runs
37.0								Core speed approx. 2 in/min
38.0								REC RQD
39.0								Run 1 70.8% 0%
40.0								Run 2 98.3% 90.8%
41.0								Run 3 98.1% 100%
42.0								Run 4 103.7% 100%
43.0								REC RQD
44.0								
45.0								
46.0								
47.0								
48.0								Boring terminated at 50.0'.
49.0								
50.0								



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-18

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**958.47**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/Rotary Air**	Water Level, TOB	**dry**
Date Started	**4/14/00**	Date Ended	**6/1/00**	Water Level, 24 Hr.	**dry**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**dry**
Comments	**Cleared, light vegetation**	Total Depth	**50.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol		Piezometer Constuction Data
0 / 958.00		CLAY: very stiff, red, slightly fine sandy, silty	CL	
2 / 956.00				
4 / 954.00	10 14 21			
6 / 952.00		SANDY SILT: very stiff, brown, dry		
8 / 950.00	70 10 13		ML-SM	
10 / 948.00				
12 / 946.00		PWR: very hard, tan-white, slightly micaceous, silty fine to coarse sand, slightly moist, auger refusal at 22 feet		
14 / 944.00	27 50/.5		ML-SM	
16 / 942.00				
18 / 940.00	50/0		ML-SM	
20 / 938.00				
22 / 936.00		GNEISS: gray massive gneiss; some fractures; dry (no piezometer)		
24 / 934.00				
26 / 932.00				
28 / 930.00				
30 / 928.00				
32 / 926.00				
34 / 924.00				
36 / 922.00				

David Garrett, P.G., P.E.

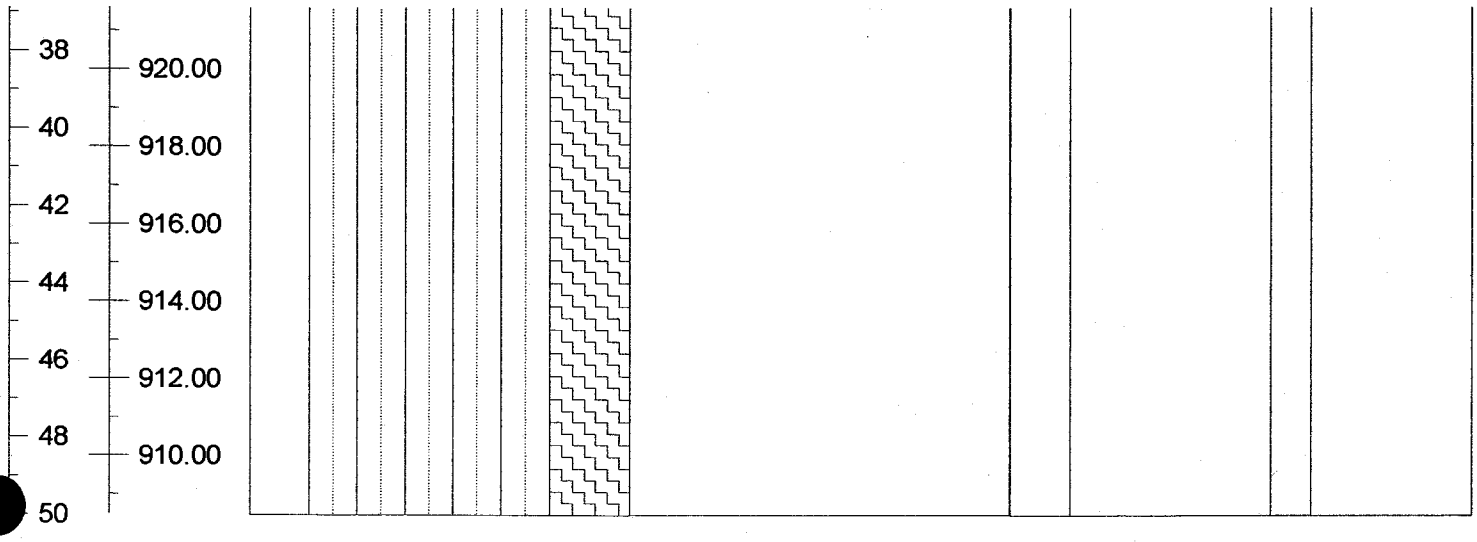
Engineering and Geology

Test Boring No. B-18

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**958.47**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/Rotary Air**	Water Level, TOB	**dry**
Date Started	**4/14/00**	Date Ended	**6/1/00**	Water Level, 24 Hr.	**dry**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**dry**
Comments	**Cleared, light vegetation**		Total Depth **50.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

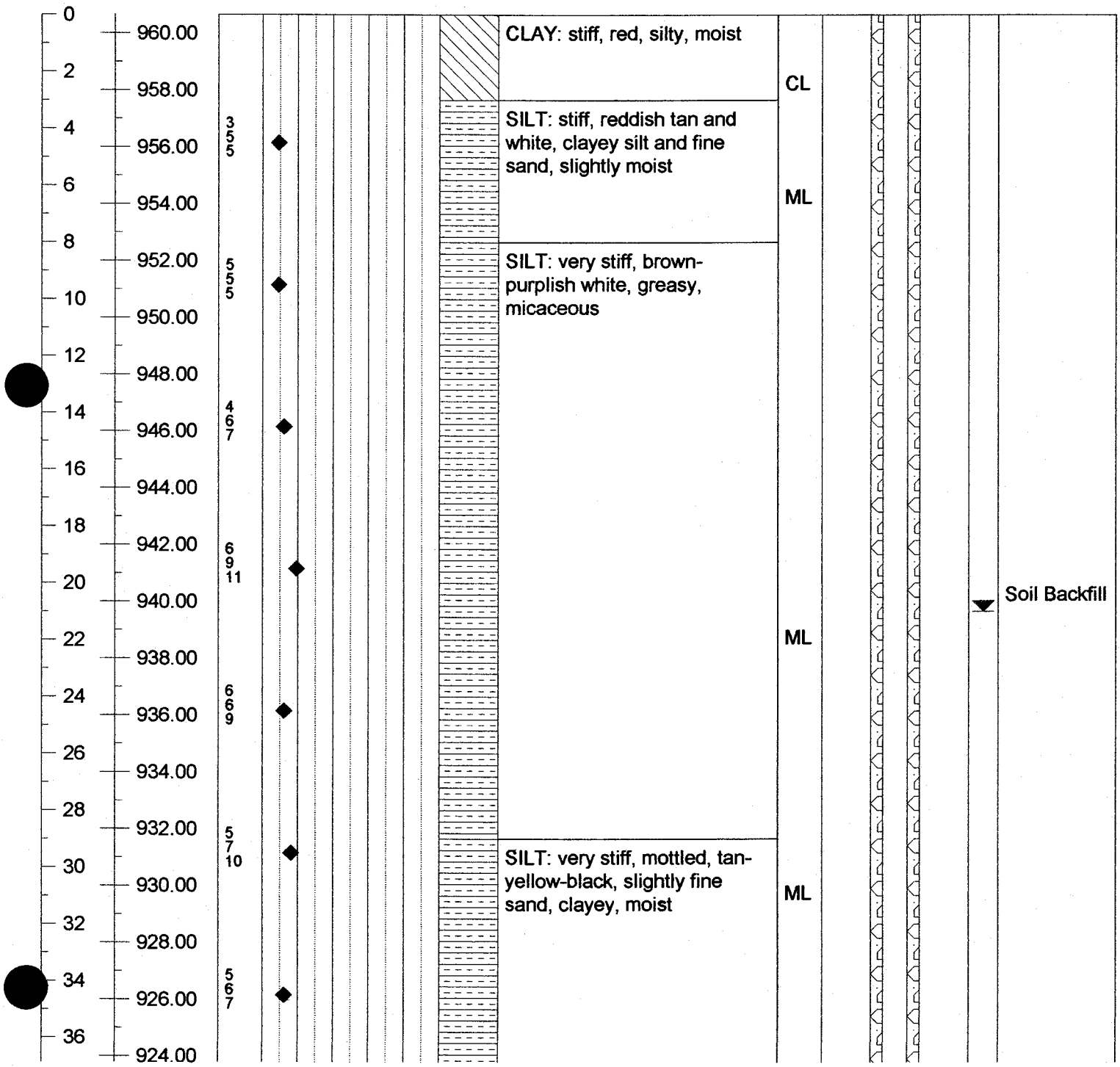
Engineering and Geology

Test Boring No. B-19

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**960.65**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA**	Water Level, TOB	**41.0**
Date Started	**5/2/00**	Date Ended	**5/2/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**20.8**
Comments	**Cleared and stripped surface**	Total Depth	**65.0**	Date of Observation	**6/2/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

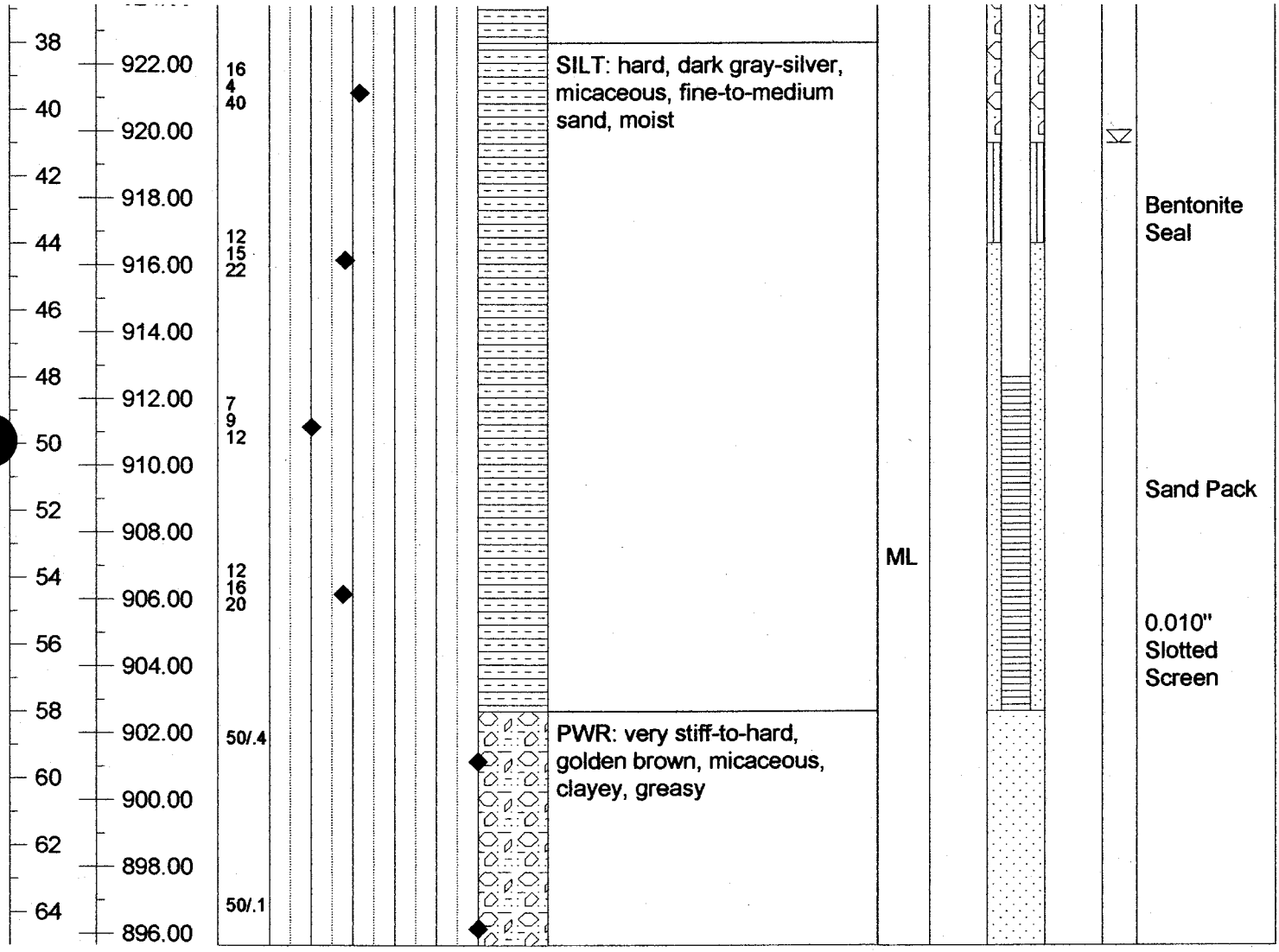
Engineering and Geology

Test Boring No. B-19

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**960.65**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA**	Water Level, TOB	**41.0**
Date Started	**5/2/00**	Date Ended	**5/2/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**20.8**
Comments	**Cleared and stripped surface**	Total Depth	**65.0**	Date of Observation	**6/2/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

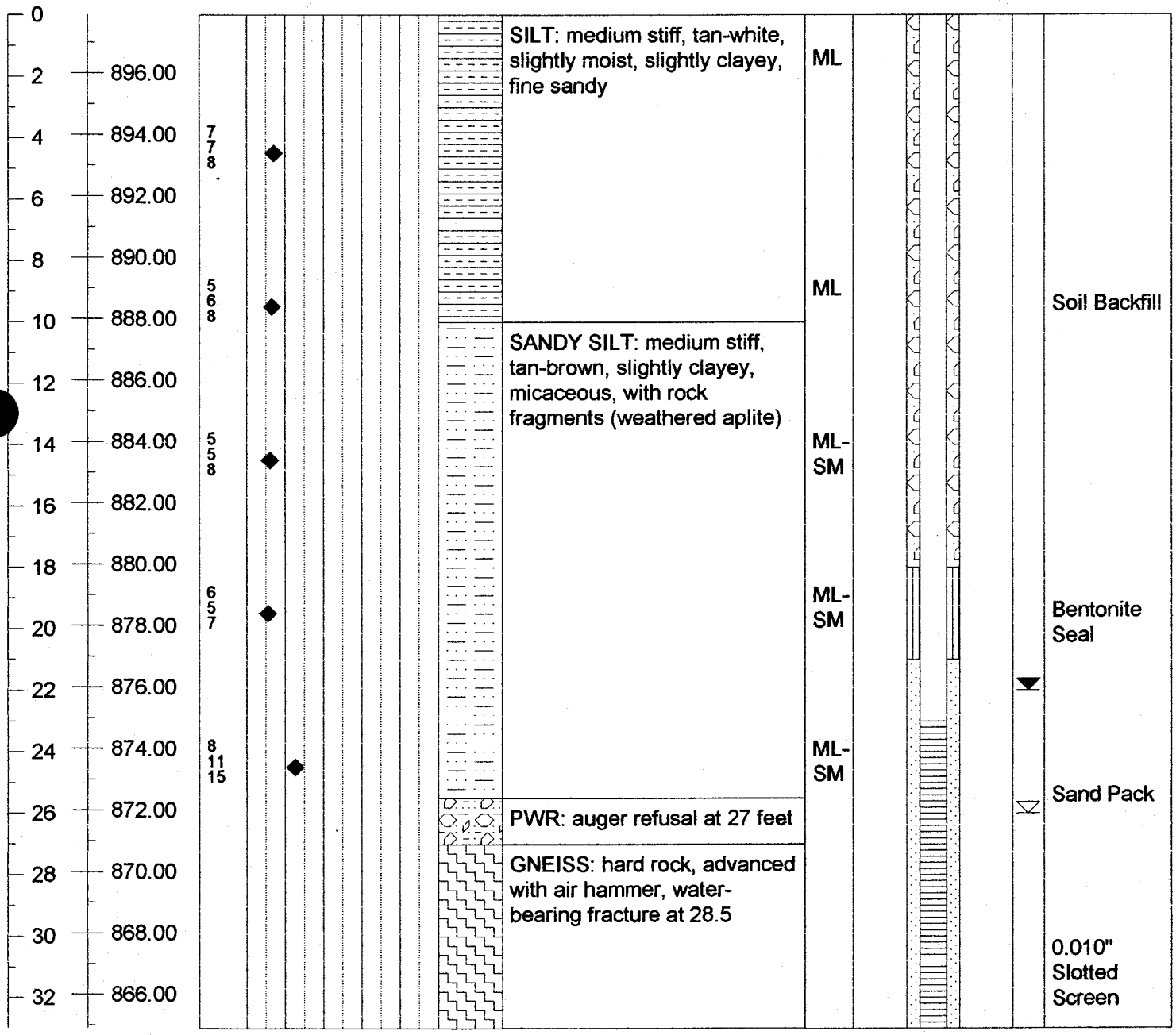
Engineering and Geology

Test Boring No. B-20

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**897.89**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/Rotary Air**	Water Level, TOB	**26.0**
Date Started	**4/14/00**	Date Ended	**5/26/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**22.0**
Comments	**Cleared and stripped surface**	Total Depth	**33.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



FIELD BOREHOLE LOG

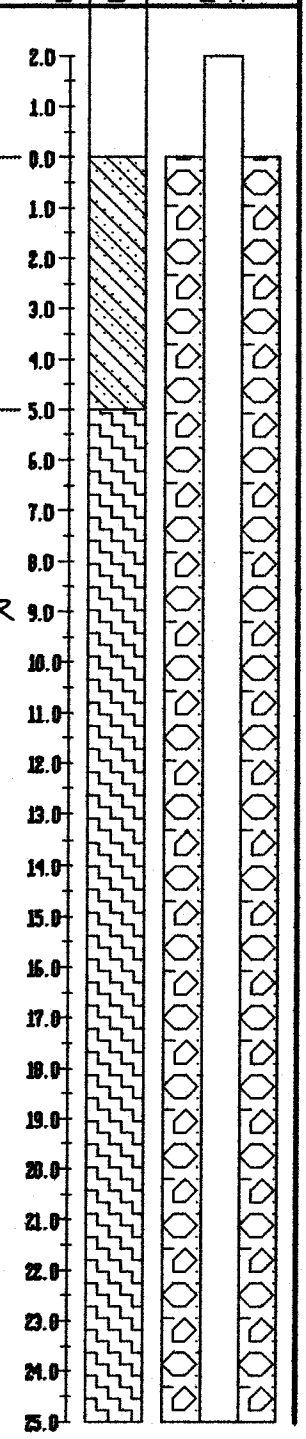
BOREHOLE NUMBER: B-21

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County Landfill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger AIR HAMMER
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seiler
GEOLOGIST: Phillip May
DATE BEGUN: 5/18/99 DATE COMPLETED: 5/19/99

TOP OF CASING ELEVATION: 932.22
TOTAL DEPTH: 50.0 FT
GROUND SURFACE ELEVATION: 930.04
SHEET: 1 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(Ft)	50.0	50.0
Time	15:00	7:00
Date:	5/19/99	5/20/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
2.0								
1.0								
0.0								CLAYEY SAND: Orange-brown F clayey sand
1.0								
2.0								
3.0	3.5'	3-4-4						
4.0								5.0' auger refusal.
5.0								GNEISS: Gneiss/schist;
6.0								5.0' light grey & tan speckled rock flour,
7.0								some fragments w/ quartz, fragments too
8.0								small to see banding;
9.0								ADVANCED WITH AIR HAMMER
10.0								
11.0								
12.0								
13.0								
14.0								
15.0								14.0' Dark grey & white banded gneiss
16.0								fragments, some large quartz fragments;
17.0								
18.0								17.0' some w/ some tan-white fragments;
19.0								
20.0								20.0' some;
21.0								
22.0								
23.0								
24.0								
25.0								



FIELD BOREHOLE LOG

BOREHOLE NUMBER: B-21

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County Landfill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Bore & Core
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seller
GEOLOGIST: Philip May
DATE BEGUN: 5/18/99 DATE COMPLETED: 5/19/99

TOP OF CASING ELEVATION: TBD
TOTAL DEPTH: 50.0 FT
GROUND SURFACE ELEVATION: TBD
SHEET: 2 OF: 2

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(Ft)	50.0 DRY	50.0 DRY
Time	15:00	7:00
Date:	5/19/99	5/20/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTANCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION	DEPTH	LITHOLOGY	WELL INSTALLATION
25.0									25.0		
26.0								27.0' fewer small fragments - dark grey & white;	26.0		
27.0									27.0		
28.0									28.0		
29.0									29.0		
30.0									30.0		
31.0									31.0		
32.0									32.0		
33.0									33.0		
34.0									34.0		
35.0									35.0		
36.0									36.0		
37.0									37.0		
38.0									38.0		
39.0									39.0		
40.0									40.0		
41.0									41.0		
42.0									42.0		
43.0									43.0		
44.0									44.0		
45.0								45.0' all dark grey & white speckled rock dust w/ no fragments;	45.0		
46.0									46.0		
47.0									47.0		
48.0									48.0		
49.0									49.0		
50.0								50.0' boring terminated.	50.0		

FIELD BOREHOLE LOG

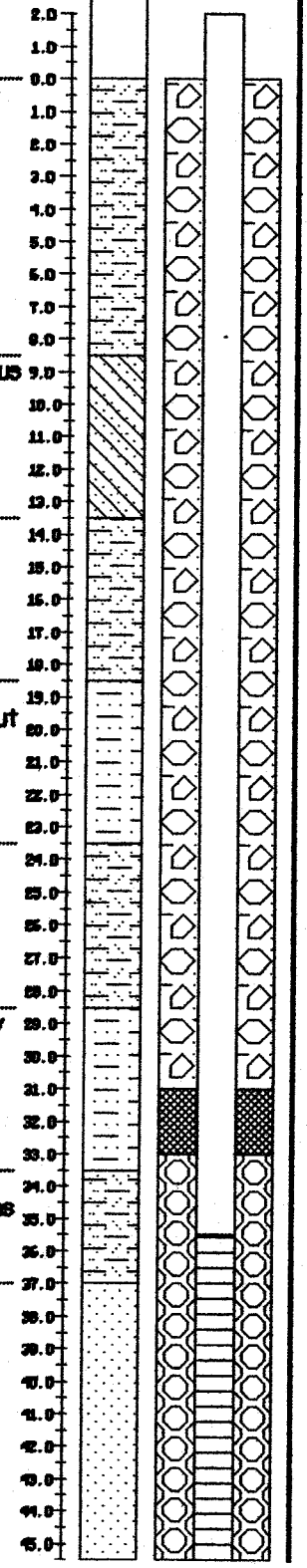
BOREHOLE NUMBER: B-22

PROJECT NUMBER: RUTHERFORD-4
PROJECT NAME: Rutherford County Landfill
LOCATION: Rutherfordton, North Carolina
DRILLING COMPANY: Dore & Dore
RIG TYPE & NUMBER: ATV Rig
DRILLING METHOD: Hollow Stem Auger
WEATHER: Sunny, 70 degrees
FIELD PARTY: Mark Seller
GEOLOGIST: Philip May
DATE BEGUN: 5/14/99 DATE COMPLETED: 5/14/99

TOP OF CASING ELEVATION: 875.33
TOTAL DEPTH: 45.5 FT
GROUND SURFACE ELEVATION: 873.35
SHEET: 1 OF: 1

STATIC WATER LEVEL (BLS)		
WD=While Drilling AB=After Boring		
Depth(ft)	45.0	38.50'
Time	15:00	7:00
Date:	5/14/99	5/17/99

DEPTH	BLOW COUNTS	SAMPLING METHOD	SAMPLE NUMBER	MOISTURE	CONSISTENCY	SAMPLE RECOVERY	DRILL METHOD	LITHOLOGY DESCRIPTION
3.0–4.0	12 13 16	Ss	61	D				SILTY SAND: Dark brown dry F silty micoceous sand.
8.0–9.0	3 1 5	Ss	62	D				CLAYEY SAND: Dark brown dry F clayey micoceous sand.
13.0–14.0	3 1 4	Ss	63	D				SILTY SAND: Light tan-brown dry F silty micoceous sand.
18.0–19.0	6 8 10	Ss	64	D				SANDY SILT: Light tan-grey dry F sandy micoceous silt, rust brown mottling throughout and some Mn mottles (1mm).
23.0–24.0	4 5 6	Ss	65	D		18"		SILTY SAND: Light grey-tan dry F silty sand, Fe & Mn.
28.0–29.0	5 6 6	Ss	66	SM		14"		SANDY SILT: Light grey slightly moist F sandy silt, Fe & Mn.
33.0–34.0	35 30 21	Ss	67	SM		6"		SILTY SAND: Grey-brown slightly moist F-M slightly silty sand, Mn mottles, quartz grains up to 1 mm.
38.0–39.0	50/5	Ss	68	M		5"		SAND: Brown M sand w/ Mn, Fe, & quartz (up to 2mm); PWR from 37 to 37.5';
43.0–44.0	50/2	Ss	69	W		0"		43.5' No recovery - PWR
45.0								45.5' Auger refusal, boring terminated.



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-23

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**999.89**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**58.4**
Date Started	**4/5/00**	Date Ended	**4/7/00**	Water Level, 24 Hr.	**58.6**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**58.7**
Comments	**Previously stripped, lightly vegetated**	Total Depth	**73.6**	Date of Observation	**4/11/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol		Piezometer Constuction Data
0		CLAYEY SILT: slightly moist	ML-CL	
2 — 998.00		SANDY SILT: stiff pink-red, slightly moist, slightly clayey, trace of mica, BULK SAMPLE 0 - 20 FEET		
4 — 996.00	7 9 8			
6 — 994.00				
8 — 992.00				
10 — 990.00	9 13 11	SANDY SILT: stiff to hard, tan-brown-white, variably micaceous, with sandy white aplite veinlets and rock fragments, thin but very dense ledges at 22 and 28 feet	ML	
12 — 988.00				
14 — 986.00	7 22 24		ML-SM	
16 — 984.00				
18 — 982.00				
20 — 980.00	12 18 20		ML-SM	
22 — 978.00				
24 — 976.00	12 32 25		ML	
26 — 974.00				Soil Backfill
28 — 972.00				
30 — 970.00	32 50/.4		ML	
32 — 968.00		SANDY SILT: medium dense, orange-black-white mottled, trace of mica, silty fine sand seams (weathered aplite), with rock fragments, slightly moist		
34 — 966.00	15 7 8		ML-SM	
36 — 964.00				

David Garrett, P.G., P.E.

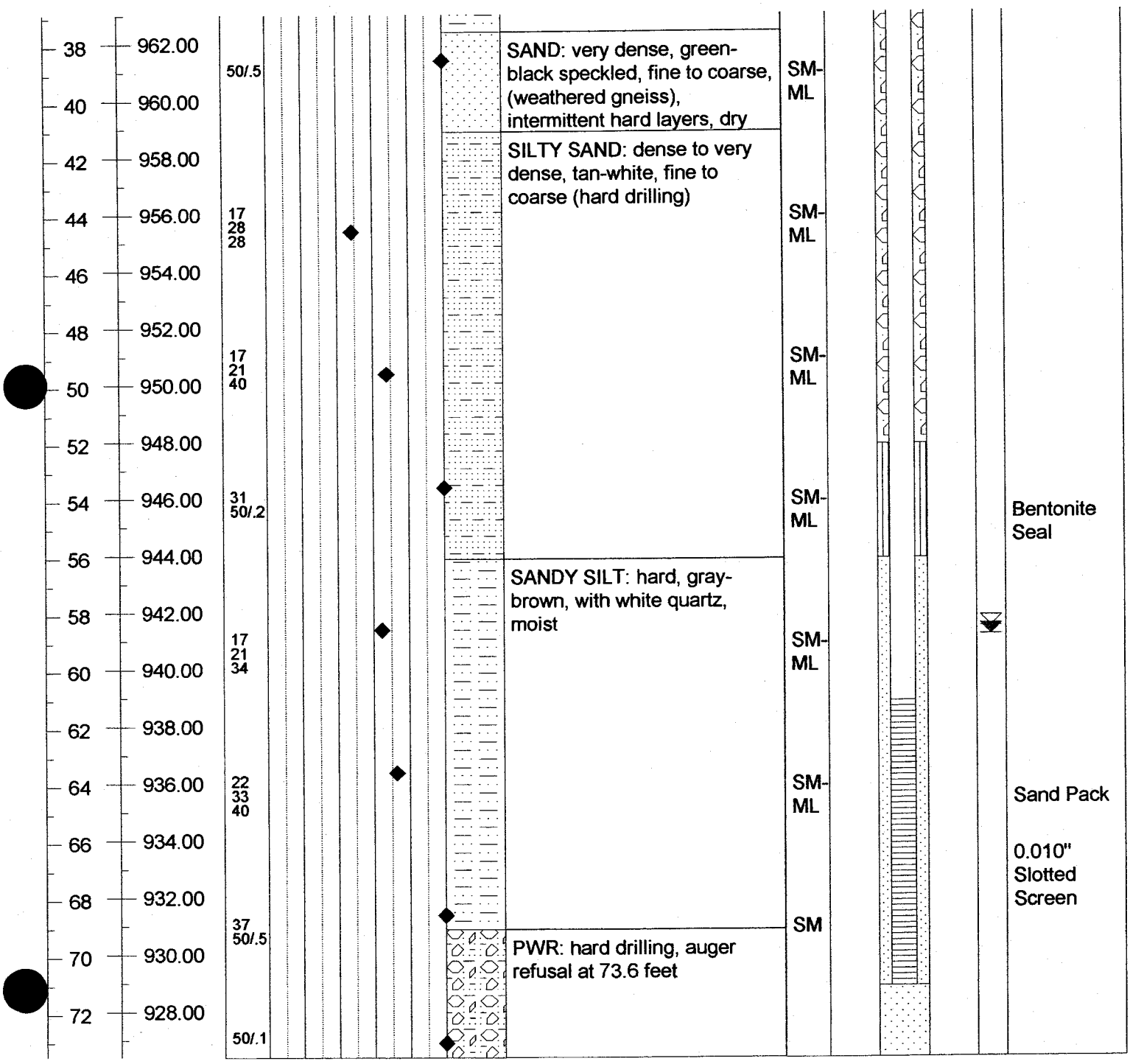
Engineering and Geology

Test Boring No. B-23

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**999.89**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**58.4**
Date Started	**4/5/00**	Date Ended	**4/7/00**	Water Level, 24 Hr.	**58.6**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**58.7**
Comments	**Previously stripped, lightly vegetated**	Total Depth	**73.6**	Date of Observation	**4/11/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

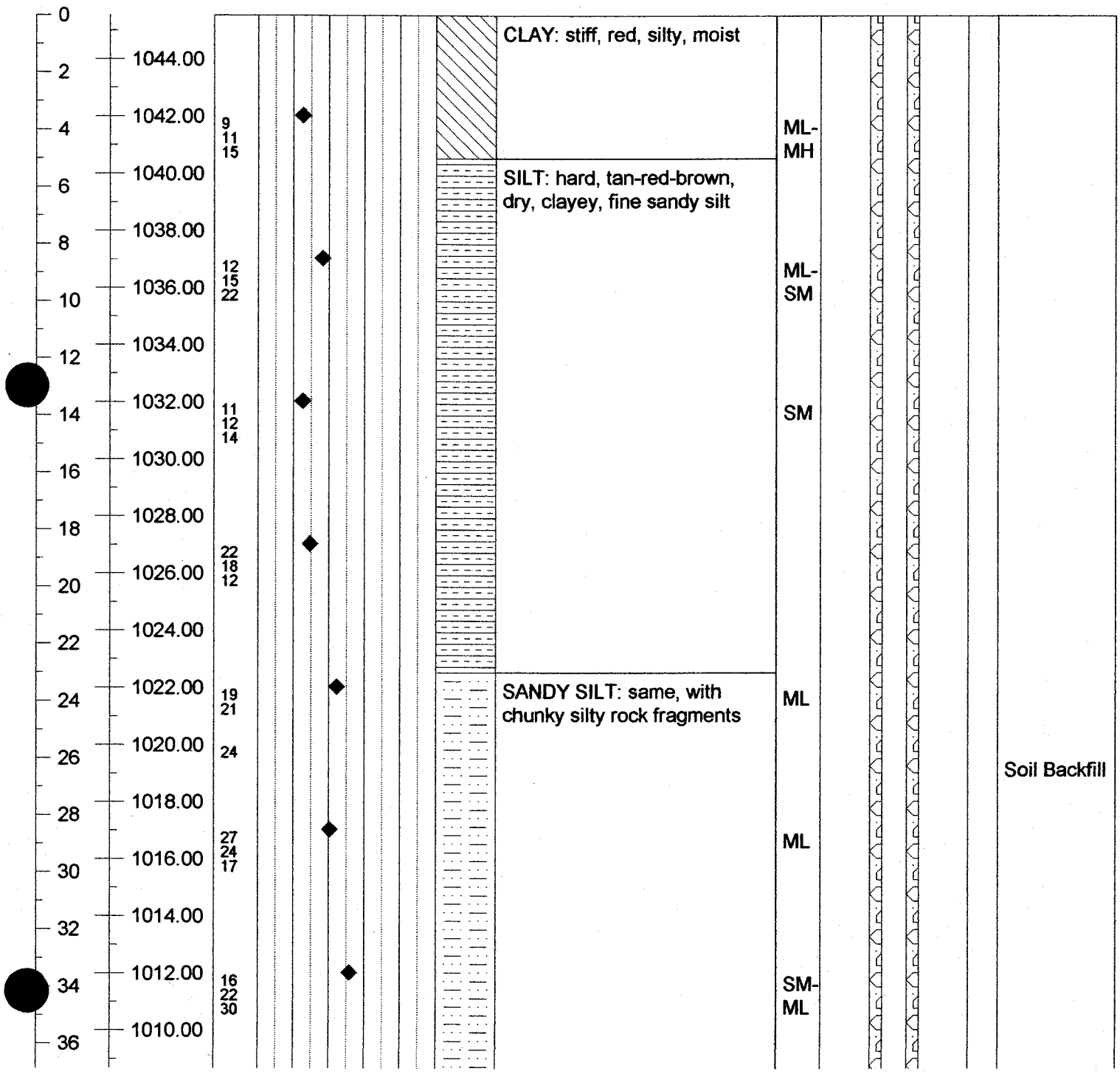
Engineering and Geology

Test Boring No. B-24

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1045.54**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**65.1**
Date Started	**5/31/00**	Date Ended	**5/31/00**	Water Level, 24 Hr.	**69.1**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**68.5**
Comments	**Wooded area, cleared for setup**		Total Depth **71**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-24

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1045.54**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**65.1**
Date Started	**5/31/00**	Date Ended	**5/31/00**	Water Level, 24 Hr.	**69.1**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**68.5**
Comments	**Wooded area, cleared for setup**		Total Depth **71**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol		Piezometer Constuction Data
38 — 1008.00	50/.3	PWR: auger refusal at 40.5', advanced with roller cone to 41.0'	SM-ML	
40 — 1006.00				
42 — 1004.00		GNEISS: Core Run #1: moderately hard, weathered, friable, biotite-plagioclase gneiss, heavy Mn stains, garnet, REC = 90%, RQD = 22%		
44 — 1002.00				
46 — 1000.00		GNEISS: Core Run #2: same, REC = 100%, RQD = 74%		
48 — 998.00				
50 — 996.00				
52 — 994.00		GNEISS: Core Run #3: same, REC = 70%, RQD = 15%		
54 — 992.00				
56 — 990.00		GNEISS: Core Run #4: same with lower plagioclase content and seams weathered to soil, REC = 50%, RQD = 10%		Bentonite Seal Sand Pack
58 — 988.00				
60 — 986.00				0.010" Slotted Screen
62 — 984.00		GNEISS: Core Run #5: same, REC = 74%, RQD = 0%		
64 — 982.00				
66 — 980.00		GNEISS: Core Run #6, same with higher plagioclase content, REC = 74%, RQD = 30%		
68 — 978.00				
70 — 976.00				

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-25

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**951.46**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**38.0**
Date Started	**6/2/00**	Date Ended	**6/2/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**24.6**
Comments	**Cleared and stripped surface**		Total Depth **50.0**	Date of Observation	**6/6/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
0		CLAYEY SILT: Advanced with auger, no samples	
2 / 950.00			
4 / 948.00			
6 / 946.00			
8 / 944.00			
10 / 942.00			
12 / 940.00			
14 / 938.00			
16 / 936.00			
18 / 934.00			
20 / 932.00			
22 / 930.00			
24 / 928.00			
26 / 926.00			
28 / 924.00			
30 / 922.00			Soil Backfill
32 / 920.00			
34 / 918.00			Bentonite Seal
36 / 916.00			

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-25

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**951.46**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**38.0**
Date Started	**6/2/00**	Date Ended	**6/2/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**24.6**
Comments	**Cleared and stripped surface**		Total Depth **50.0**	Date of Observation	**6/6/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
38 914.00			
40 912.00			Sand Pack
42 910.00		PWR: hard augering, refusal at 50 feet	
44 908.00			
46 906.00			0.010" Slotted Screen
48 904.00			
50 902.00			

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-26d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**947.96**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**13.4**
Date Started	**4/27/00**	Date Ended	**4/27/00**	Water Level, 24 Hr.	**12.6**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**12.1**
Comments	**Wooded area near creek**	Total Depth	**86**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol		Piezometer Constuction Data
0		CLAY: Med. Stiff, red-orange, slightly fine sandy, silty, trace mica, very moist (makes thin ribbons)		
2 / 946.00				
4 / 944.00	5, 7, 11		CL	
6 / 942.00				
8 / 940.00				
10 / 938.00	4, 5, 6		CL	
12 / 936.00		CLAYEY SILT: med. stiff, brown, slightly fine sandy, clayey, variably micaceous ("greasy"), very moist, occ. quartz stringers		
14 / 934.00	5, 6, 7		ML-MH	
16 / 932.00				
18 / 930.00				
20 / 928.00	3, 4, 5		ML-MH	
22 / 926.00				
24 / 924.00	4, 6, 7		ML-MH	
26 / 922.00				
28 / 920.00				
30 / 918.00	5, 7, 8		ML-MH	
32 / 916.00				
34 / 914.00	8, 11, 14		SM	
36 / 912.00		SILTY SAND: dense, tan-white, slightly clayey, fine to coarse, silty, moist, micacous,		Cement Grout

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-26d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**947.96**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**13.4**
Date Started	**4/27/00**	Date Ended	**4/27/00**	Water Level, 24 Hr.	**12.6**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**12.1**
Comments	**Wooded area near creek**	Total Depth	**86**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
38 — 910.00	14 27 30	aplite stingers — SM	
40 — 908.00			
42 — 906.00			
44 — 904.00	19 32 37	SM	
46 — 902.00			
48 — 900.00	22 50/.5	SM	
50 — 898.00		PWR: very dense, silty, micaceous, fine to coarse sand	
52 — 896.00			
54 — 894.00	50/.5	SM	
56 — 892.00			
58 — 890.00	50.1	SM	
60 — 888.00			
62 — 886.00		GNEISS: Core Run #1: moderately hard, weathered, black-white, friable, biotite-plagioclase-quartz, schistose, REC = 90%, RQD = 14%	
64 — 884.00			
66 — 882.00		GNEISS: Core Run #2: highly weathered, good drilling resistance but no recovery, net water loss	
68 — 880.00			
70 — 878.00			
72 — 876.00		GNEISS: Core Run #3: highly weathered, recovered 3" aplite fragment	Bentonite Seal

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**947.96**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**13.4**
Date Started	**4/27/00**	Date Ended	**4/27/00**	Water Level, 24 Hr.	**12.6**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**12.1**
Comments	**Wooded area near creek**	Total Depth	**86**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
74 — 874.00			
76 — 872.00		GNEISS: Core Run #4: no recovery, cuttings were micaceous sand	
78 — 870.00			
80 — 868.00			Sand Pack
82 — 866.00		GNEISS: Core Run #5: black, moderately friable, biotite-quartz-plagioclase, 45-degree partings at 3 inch spacings, REC = 86%, RQD = 14%	0.010" Slotted Screen
84 — 864.00			
86 — 862.00			

David Garrett, P.G., P.E.

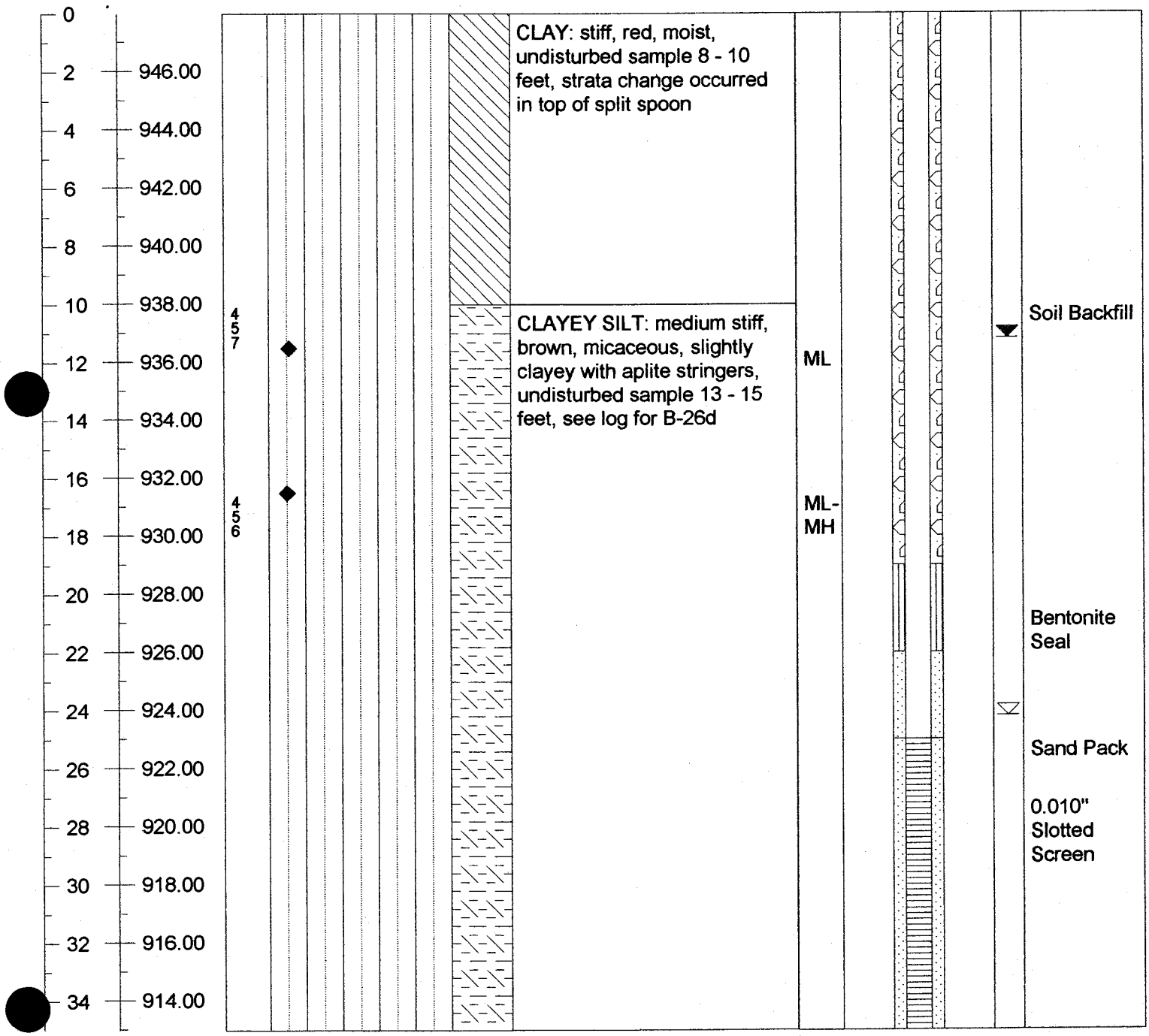
Engineering and Geology

Test Boring No. B-26s

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**947.96**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**24.2**
Date Started	**4/27/00**	Date Ended	**4/27/00**	Water Level, 24 Hr.	**10.3**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**11.2**
Comments	**Wooded area, lightly graded**		Total Depth **35.0**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



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Test Boring No. B-27

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**927.96**
Equipment	**Hand Auger**	Drilling Method		Water Level, TOB	**2.0**
Date Started	**6/2/00**	Date Ended	**6/2/00**	Water Level, 24 Hr.	
Drilling Firm		Logged by	**David Garrett**	Stabilized Level	**2.4**
Comments	**Wooded stream terrace**	Total Depth	**7.0**	Date of Observation	**7/7/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
0		SILT: soft augering, medium gray-brown, organic, moist — ML	
2 — 926.00		CLAYEY SILT: soft, dark gray, sandy and micaceous, moist to wet (alluvium) — ML-CL	
4 — 924.00		SAND: loose, tan-orange, slightly clayey, running coarse sand and gravel, wet (alluvium) — GM-SM	
6 — 922.00		SILTY SAND: soft, buff-gray with orange streaks, silt-clay layers, mica, wet (alluvium) — SM-ML	0.010" Slotted Screen

David Garrett, P.G., P.E.

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Test Boring No. B-28

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**857.31**
Equipment	**Hand Auger**	Drilling Method		Water Level, TOB	**2.7**
Date Started	**6/2/00**	Date Ended	**6/2/00**	Water Level, 24 Hr.	
Drilling Firm		Logged by	**David Garrett**	Stabilized Level	**3.3**
Comments	**Wooded stream terrace**		Total Depth **4.0**	Date of Observation	

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol		Piezometer Constuction Data
0		CLAYEY SILT: soft, red-brown, moist below 1 foot	ML	
856.00				
2		SILTY SAND: loose, tan-brown, fine to medium, coarser with depth, moist (alluvium)	SM-ML	
854.00		GRAVEL: loose coarse sand and large gravel, wet (alluvium)	GM-SM	0.010" Slotted Screen
4				

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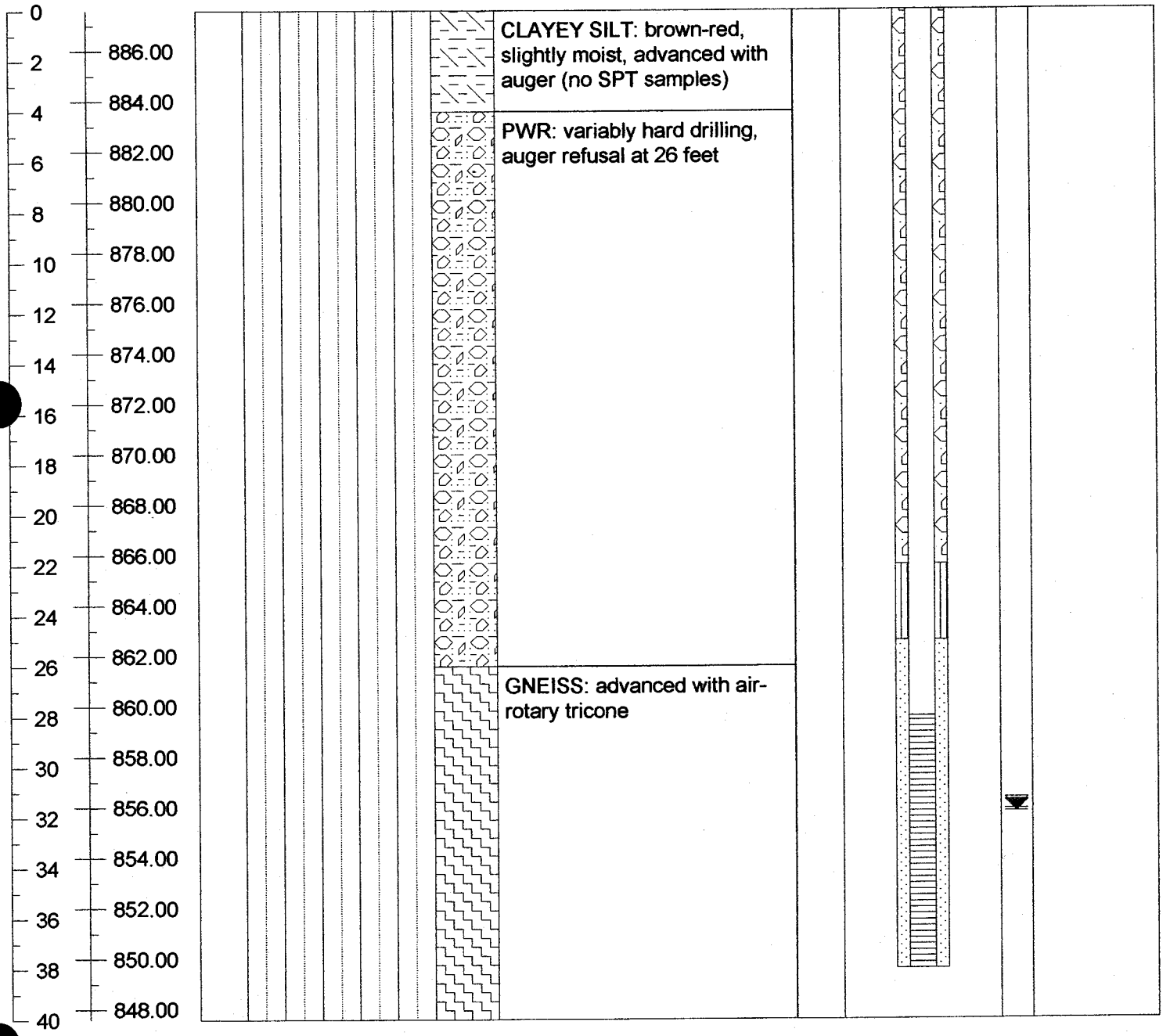
Test Boring No. B-29

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**887.58**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/Rotary Air**	Water Level, TOB	**31.7**
Date Started	**5/2/00**	Date Ended	**5/26/00**	Water Level, 24 Hr.	**31.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**31.8**
Comments	**Cleared area beside sed basin**	Total Depth	**40.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



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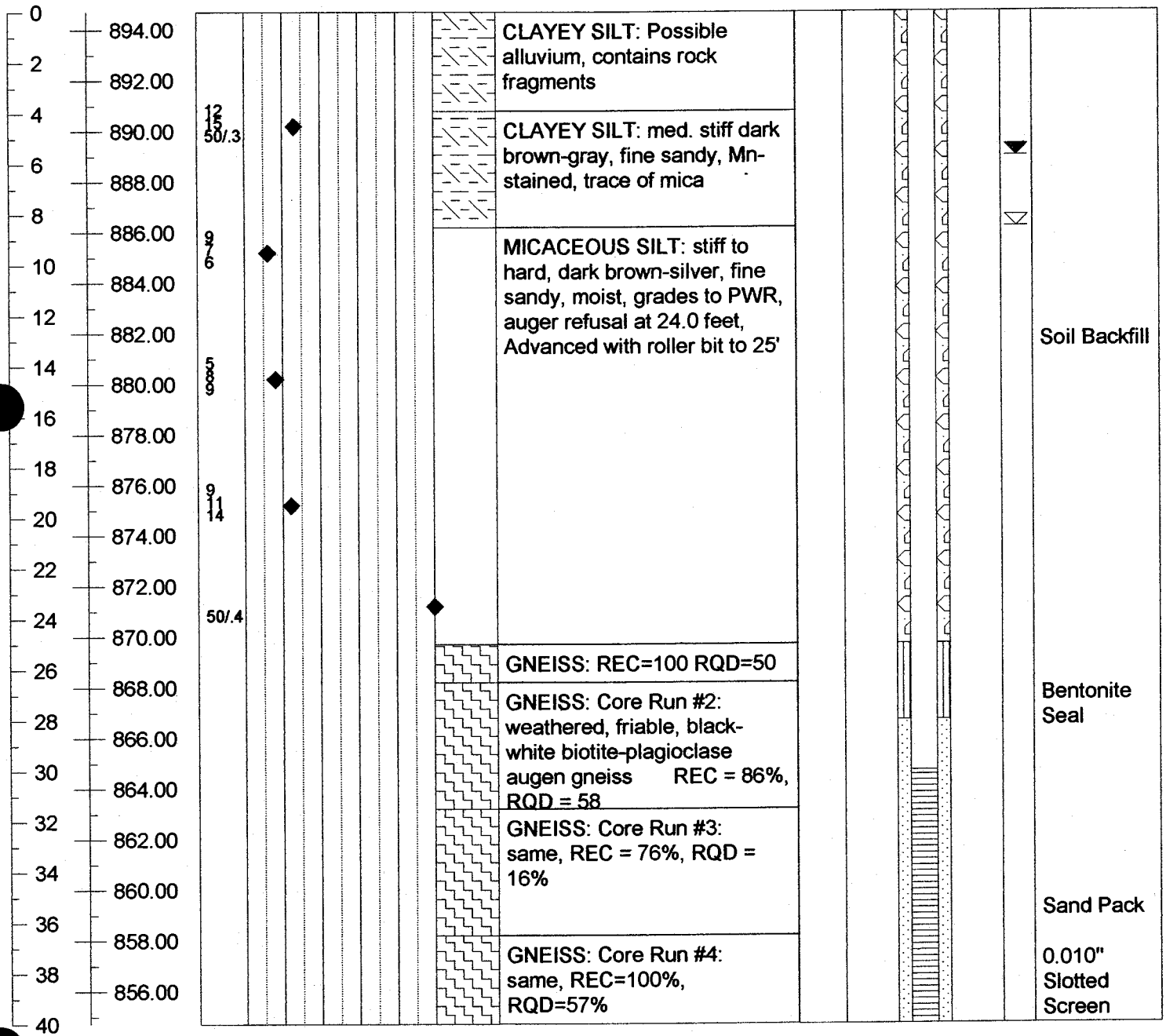
Test Boring No. B-30d

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1000.00**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**8.0**
Date Started	**4/11/00**	Date Ended	**4/11/00**	Water Level, 24 Hr.	**5.7**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**5.7**
Comments	**Cleared and stripped**		Total Depth **40.0**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



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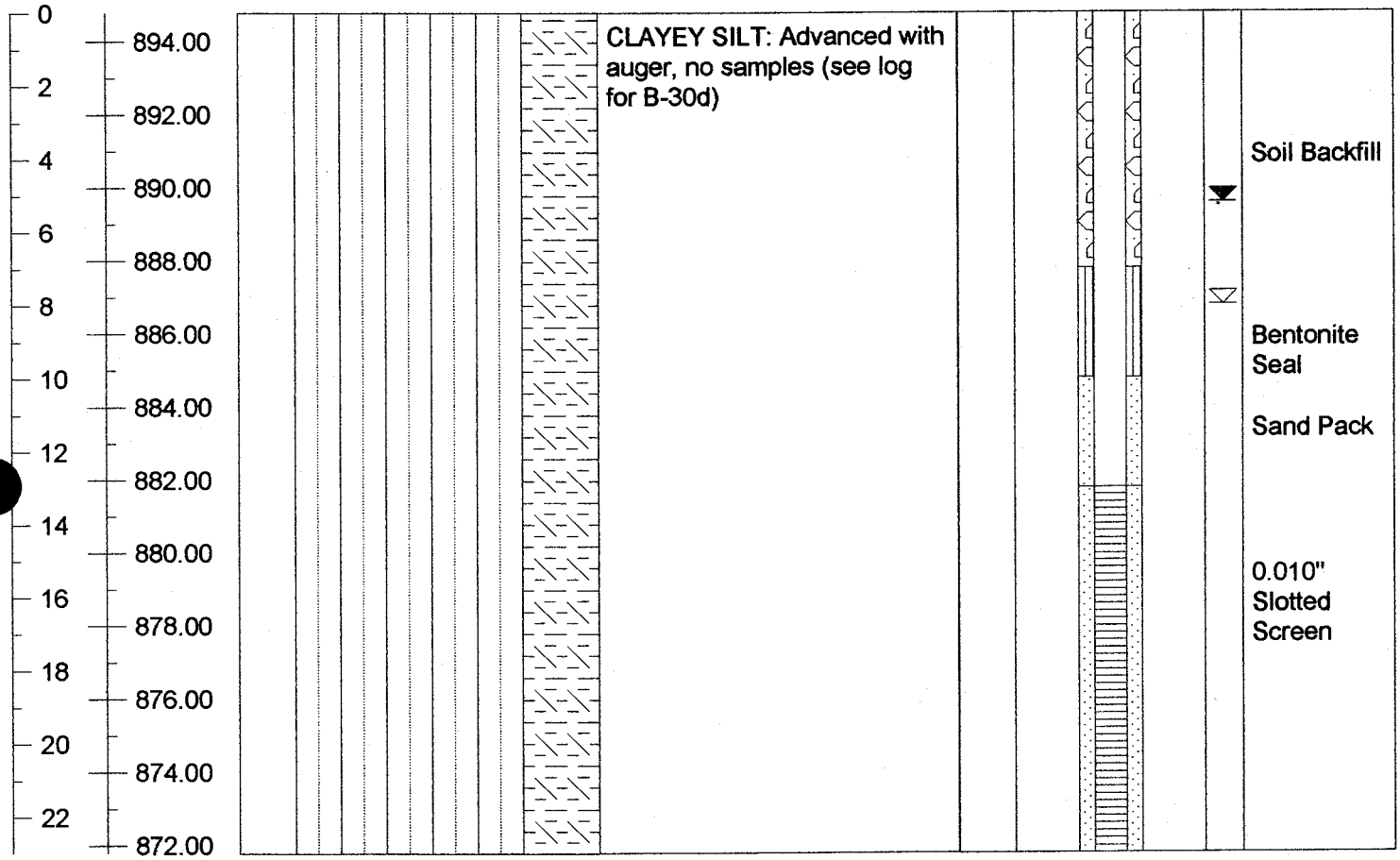
Test Boring No. B-30s

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**894.78**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**8.0**
Date Started	**4/13/00**	Date Ended	**4/13/00**	Water Level, 24 Hr.	**5.5**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**5.2**
Comments	**Cleared and stripped surface**	Total Depth	**23.0**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-31

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1000.71**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**60.0** ▽
Date Started	**4/13/00**	Date Ended	**4/13/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**54.1** ▼
Comments	**Cleared and stripped surface**	Total Depth	**72.0**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol		Piezometer Constuction Data
0 — 1000.00		CLAYEY SILT: Very stiff to hard, brown-red, slightly fine sandy, micaceous, moist	ML-CL	
2 — 998.00				
4 — 996.00	12 23 35			
6 — 994.00				
8 — 992.00				
10 — 990.00	9 10 13		ML	
12 — 988.00		SANDY SILT: very stiff to very hard, brown-tan-white, moist, with trace of clay, relict rock texture		
14 — 986.00	9 12 16		ML	
16 — 984.00				
18 — 982.00	50/.5	PWR: sampled as very dense brown-white silty sand	SM-ML	
20 — 980.00				
22 — 978.00				
24 — 976.00	50/0		SM-ML	
26 — 974.00		SANDY SILT: very stiff to very hard, brown-tan-white, moist, with trace of clay, relict rock texture, increasing mica content with depth ("greasy" at 35 feet)		
28 — 972.00				
30 — 970.00	7 8 10		ML-MH	
32 — 968.00				
34 — 966.00	9 9 13		ML-MH	
36 — 964.00				Soil Backfill

David Garrett, P.G., P.E.

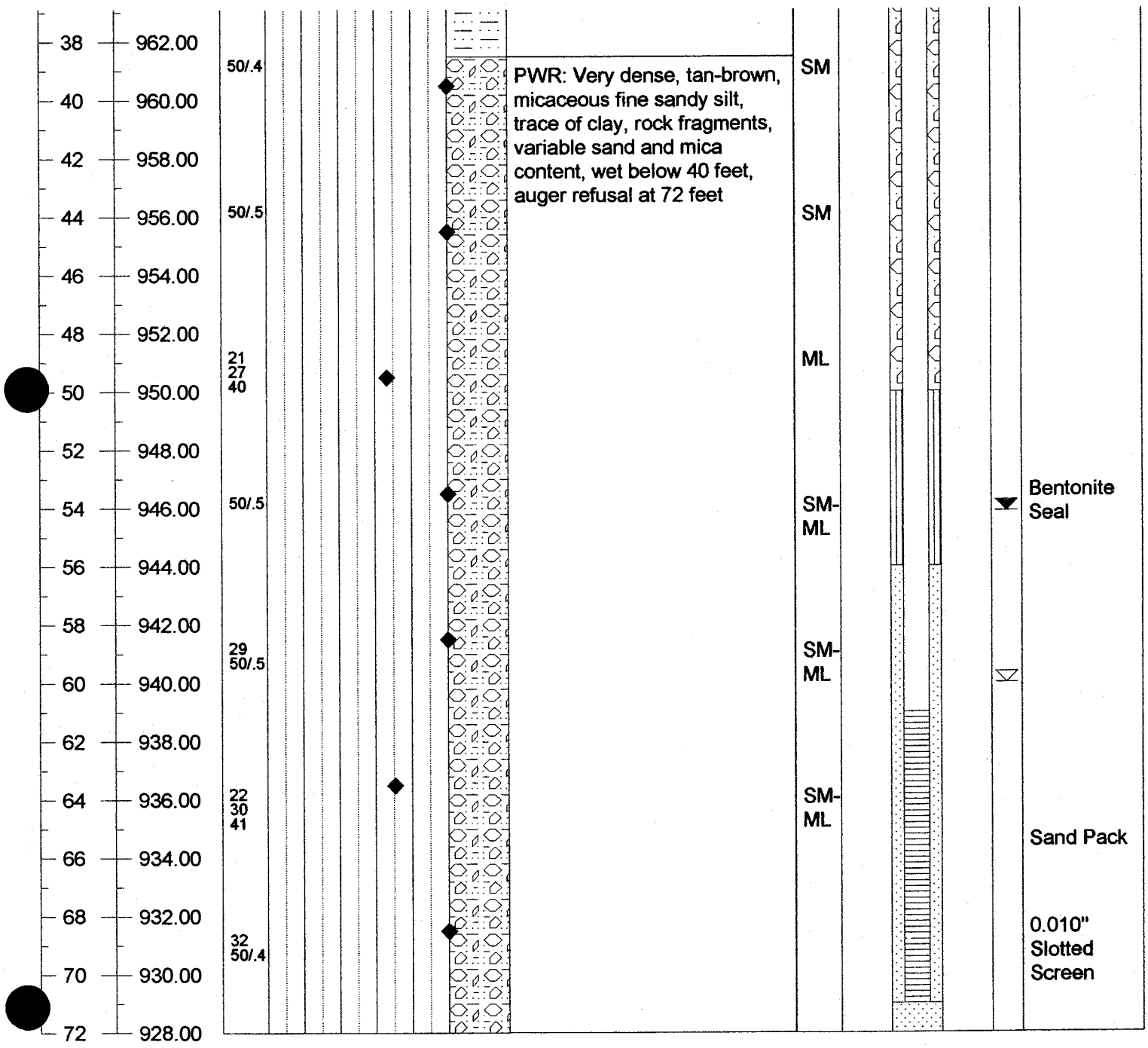
Engineering and Geology

Test Boring No. B-31

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**1000.71**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**60.0**
Date Started	**4/13/00**	Date Ended	**4/13/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**54.1**
Comments	**Cleared and stripped surface**	Total Depth	**72.0**	Date of Observation	**4/24/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-32

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**975.48**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/NQWL core**	Water Level, TOB	**48.9**
Date Started	**4/25/00**	Date Ended	**4/25/00**	Water Level, 24 Hr.	**56.4**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**56.6**
Comments	**Cleared and stripped surface**	Total Depth	**73.0**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
0		PWR: Very Dense, tan-brown-white foliated, slightly clayey, micaceous, silty fine to coarse SAND with occ. Quartz seams, clay lenses, rock fragments, variably micaceous, generally friable. Auger refusal at 53.6 feet. Advanced with roller cone to 54.0 feet.	
2 — 974.00			
4 — 972.00	37 50/.4	SM	
6 — 970.00			
8 — 968.00	50/.3	SM	
10 — 966.00			
12 — 964.00			
14 — 962.00	31 34 30	SM	
16 — 960.00			
18 — 958.00	50/.4	SM	
20 — 956.00			
22 — 954.00			
24 — 952.00	50/.5	SM	
26 — 950.00			
28 — 948.00	31 50/.5	SM	
30 — 946.00			Soil Backfill
32 — 944.00			
34 — 942.00	50/.5	SM	
36 — 940.00			

David Garrett, P.G., P.E.

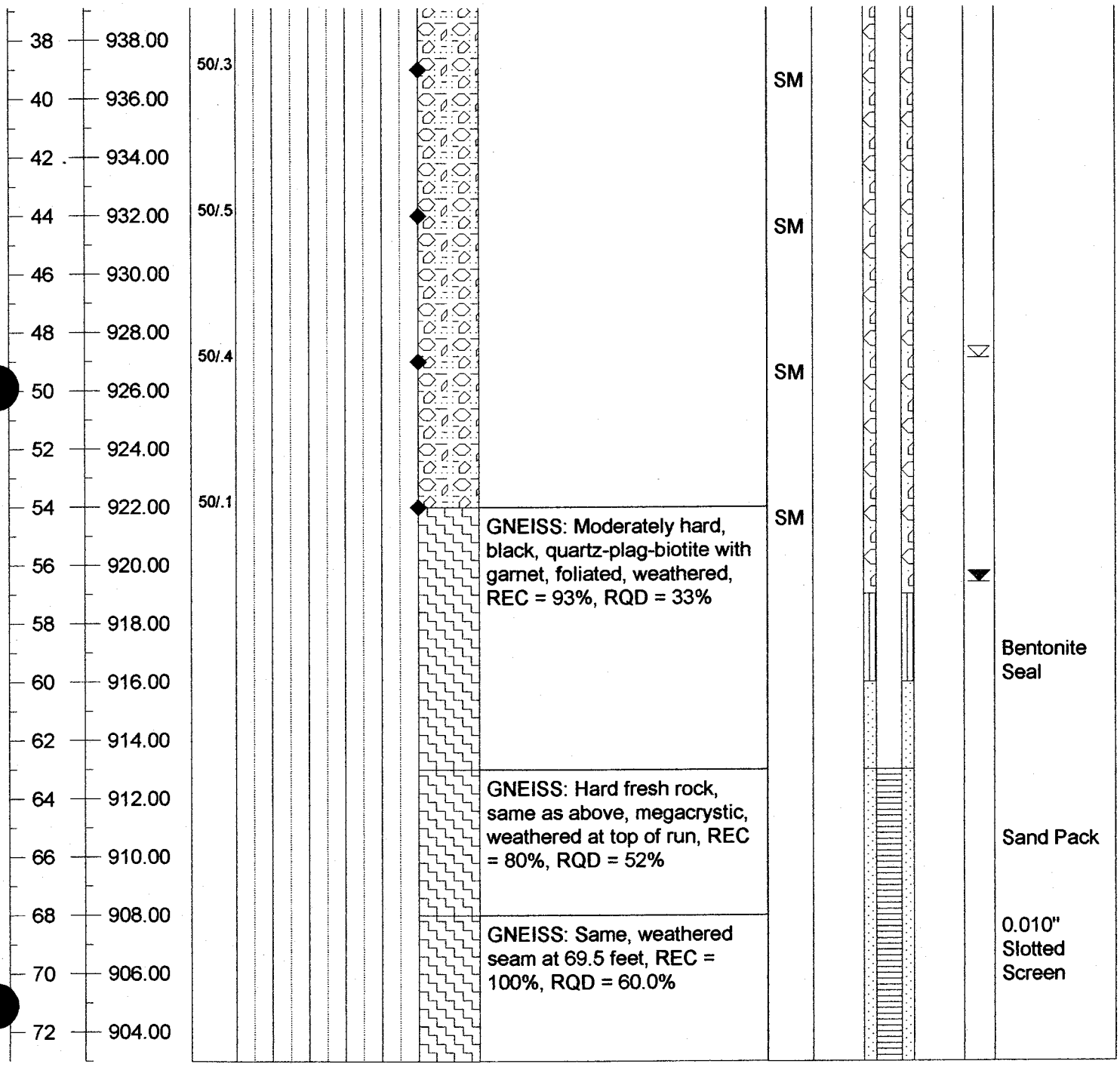
Engineering and Geology

Test Boring No. B-32

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**975.48**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/NQWL core**	Water Level, TOB	**48.9**
Date Started	**4/25/00**	Date Ended	**4/25/00**	Water Level, 24 Hr.	**56.4**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**56.6**
Comments	**Cleared and stripped surface**		Total Depth **73.0**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

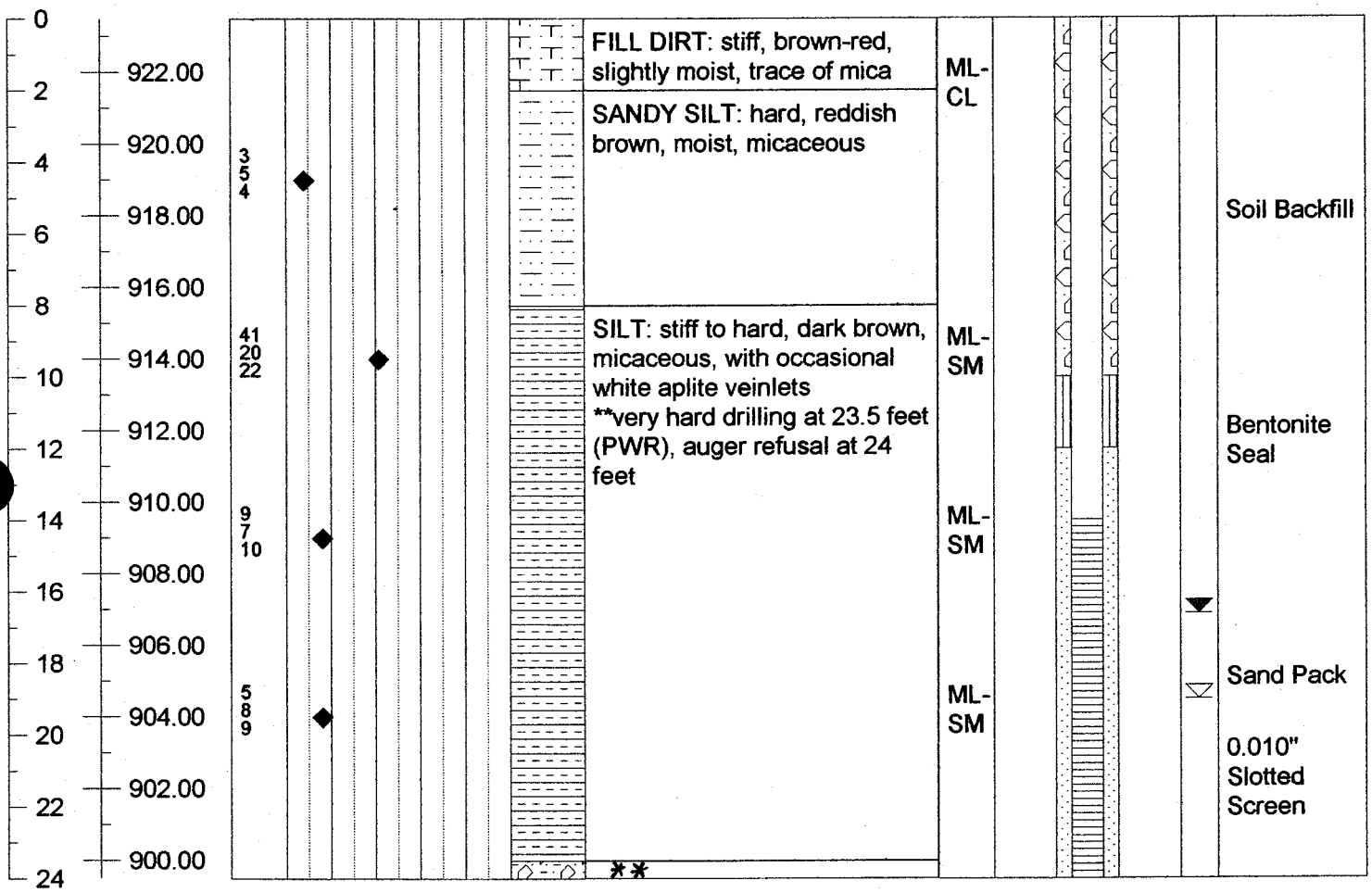
Engineering and Geology

Test Boring No. B-33

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**923.48**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**19.0**
Date Started	**5/2/00**	Date Ended	**5/2/00**	Water Level, 24 Hr.	**16.7**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**16.6**
Comments	**Wooded area, cleared with dozer**	Total Depth	**24**	Date of Observation	**5/5/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-34

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**928.61**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**Dry**
Date Started	**4/26/00**	Date Ended	**4/26/00**	Water Level, 24 Hr.	**38.5**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**38.1**
Comments	**Cleared and stripped surface**	Total Depth	**67.0**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol		Piezometer Constuction Data
0 / 928.00		SILT: medium stiff, orange, slightly fine sandy, slightly clayey, micaceous, moist	ML	
2 / 926.00				
4 / 924.00	6 7 9			
6 / 922.00		PWR: very dense, gray-white, silty fine to coarse sand w/mica, alternating hard and soft seams, auger refusal at 40 feet		
8 / 920.00	32 50/.5		SM	
10 / 918.00				
12 / 916.00				
14 / 914.00	6 11 20		SM	
16 / 912.00				
18 / 910.00	50/.3		SM	
20 / 908.00				
22 / 906.00				
24 / 904.00	50/0			Soil Backfill
26 / 902.00				
28 / 900.00	50/.5		SM	
30 / 898.00				
32 / 896.00				
34 / 894.00	50/.4		SM	
36 / 892.00				

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-34

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**928.61**
Equipment	**Mobile B-53 ATV**	Drilling Method	**NQWL core**	Water Level, TOB	**Dry**
Date Started	**4/26/00**	Date Ended	**4/26/00**	Water Level, 24 Hr.	**38.5**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**38.1**
Comments	**Cleared and stripped surface**	Total Depth	**67.0**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
38 / 890.00	50/.2		
40 / 888.00		PWR: advanced with roller bit to 52 feet	
42 / 886.00			
44 / 884.00	50/.1		
46 / 882.00			
48 / 880.00	50/0		
50 / 878.00			
52 / 876.00		GNEISS: very hard, black-white, quartz-plag-biotite-amphibole (amphibolite-gneiss), REC = 86%, RQD = 60%	Bentonite Seal
54 / 874.00			
56 / 872.00			
58 / 870.00		GNEISS: low-angle (30 degree) mica partings at 6" spacings, high-angle (75 degree) infilled fractures at 2' spacings, REC = 100%, RQD = 98%	Sand Pack
60 / 868.00			
62 / 866.00		GNEISS: same, very hard, increasing quartz and zones of epidotization, REC = 100%, RQD = 98%	0.010" Slotted Screen
64 / 864.00			
66 / 862.00			

David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-35

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**957.72**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**56.8**
Date Started	**4/28/00**	Date Ended	**4/28/00**	Water Level, 24 Hr.	**38.5**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**30.3**
Comments	**Cleared area, lightly vegetated**		Total Depth **60.0**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
0		SANDY SILT: brown-tan-white, slightly moist, micaceous, advanced with auger (no SPT samples)	
2 — 956.00			
4 — 954.00			
6 — 952.00			
8 — 950.00			
10 — 948.00			
12 — 946.00			
14 — 944.00			
16 — 942.00			
18 — 940.00			
20 — 938.00			
22 — 936.00			Soil Backfill
24 — 934.00			
26 — 932.00			
28 — 930.00			
30 — 928.00			
32 — 926.00			
34 — 924.00			
36 — 922.00			

David Garrett, P.G., P.E.

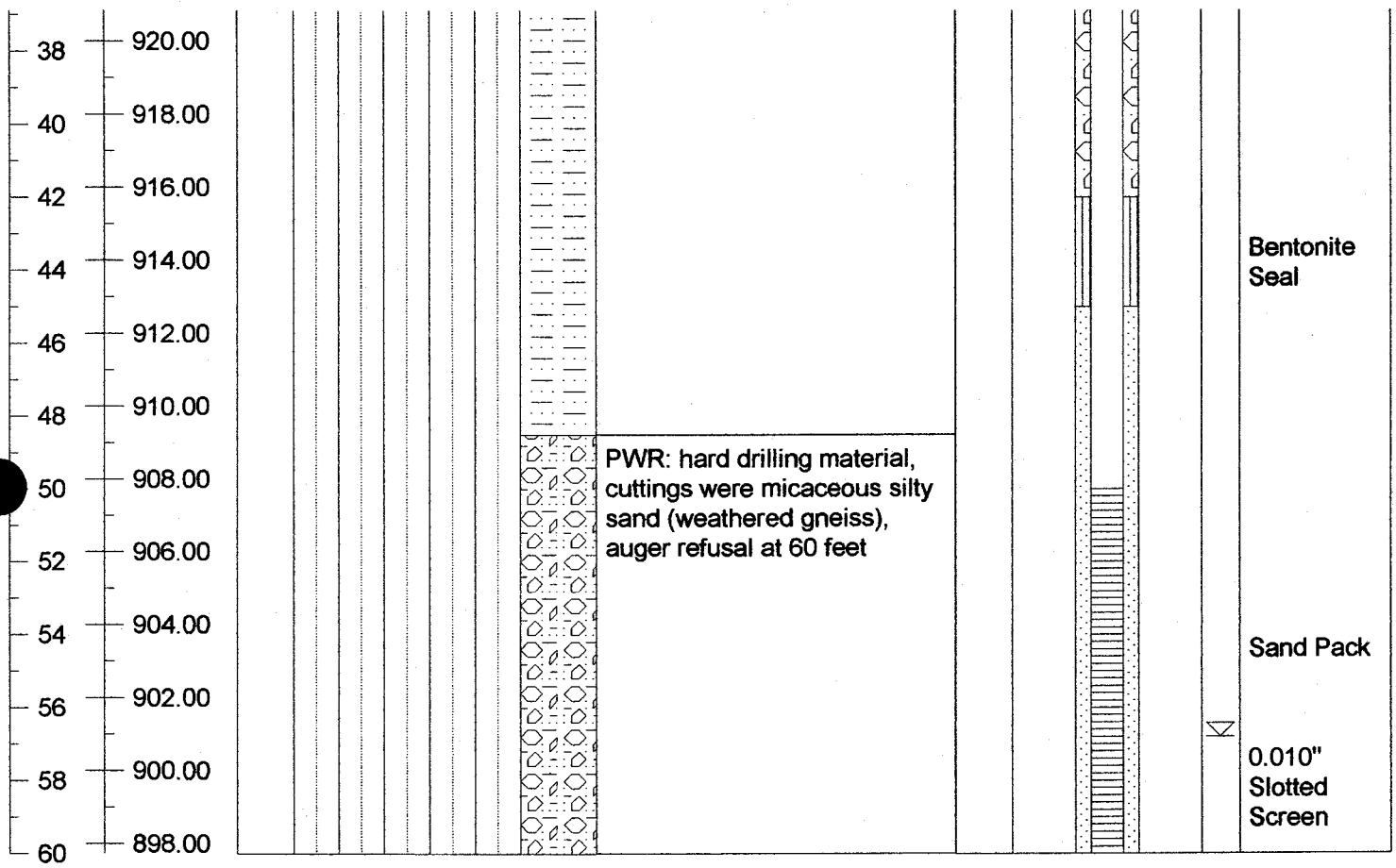
Engineering and Geology

Test Boring No. B-35

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**957.72**
Equipment	**Mobile B-53 ATV**	Drilling Method	**2.25 inch I.D. HSA**	Water Level, TOB	**56.8**
Date Started	**4/28/00**	Date Ended	**4/28/00**	Water Level, 24 Hr.	**38.5**
Drilling Firm	**Bore & Core (Seller)**	Logged by	**David Garrett**	Stabilized Level	**30.3**
Comments	**Cleared area, lightly vegetated**	Total Depth	**60.0**	Date of Observation	**5/03/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

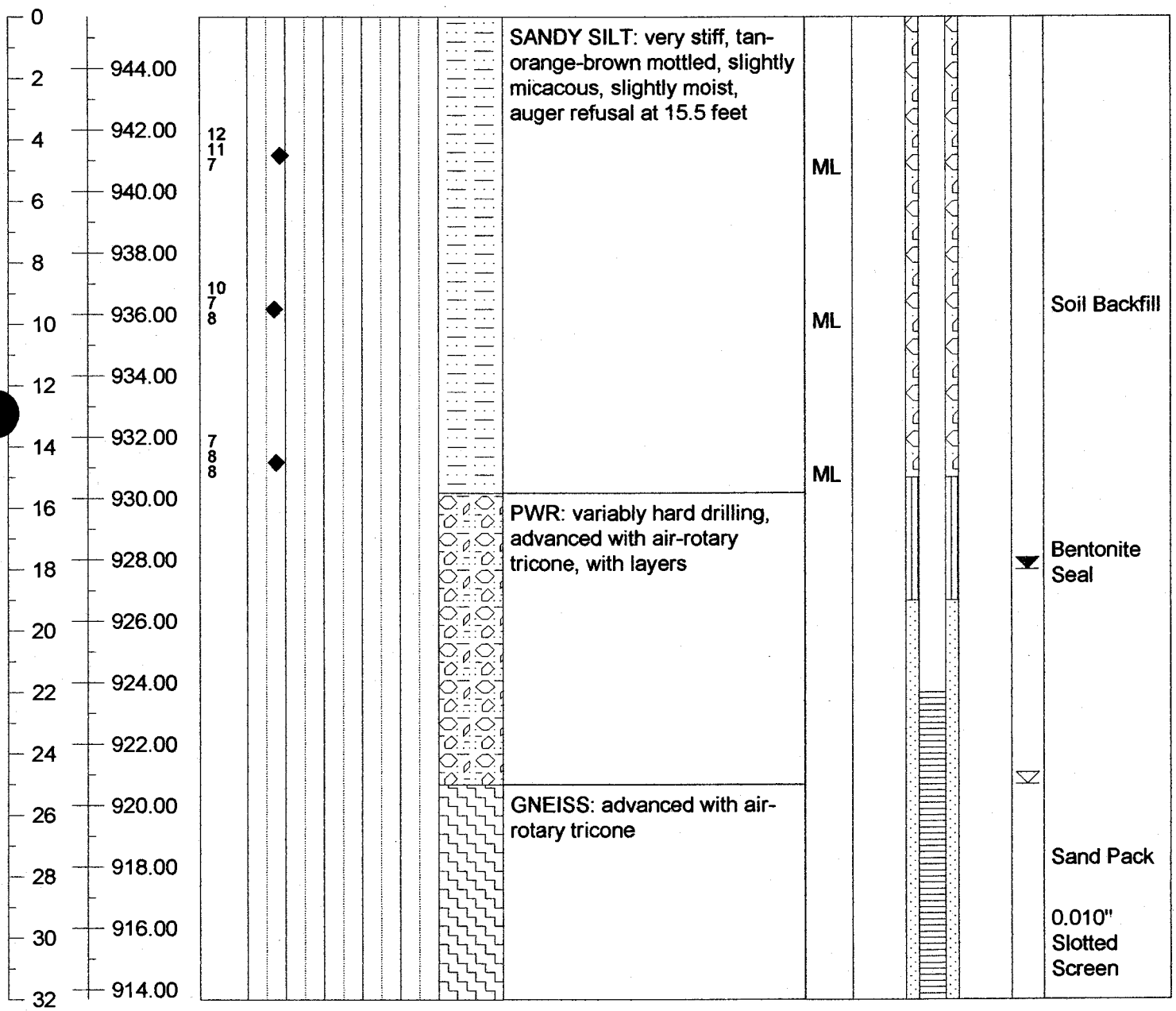
Engineering and Geology

Test Boring No. B-36

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**945.67**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA/Rotary Air**	Water Level, TOB	**25.0**
Date Started	**5/2/00**	Date Ended	**5/23/00**	Water Level, 24 Hr.	
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**18.0**
Comments	**Cleared, former borrow site**	Total Depth	**32.0**	Date of Observation	**6/1/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

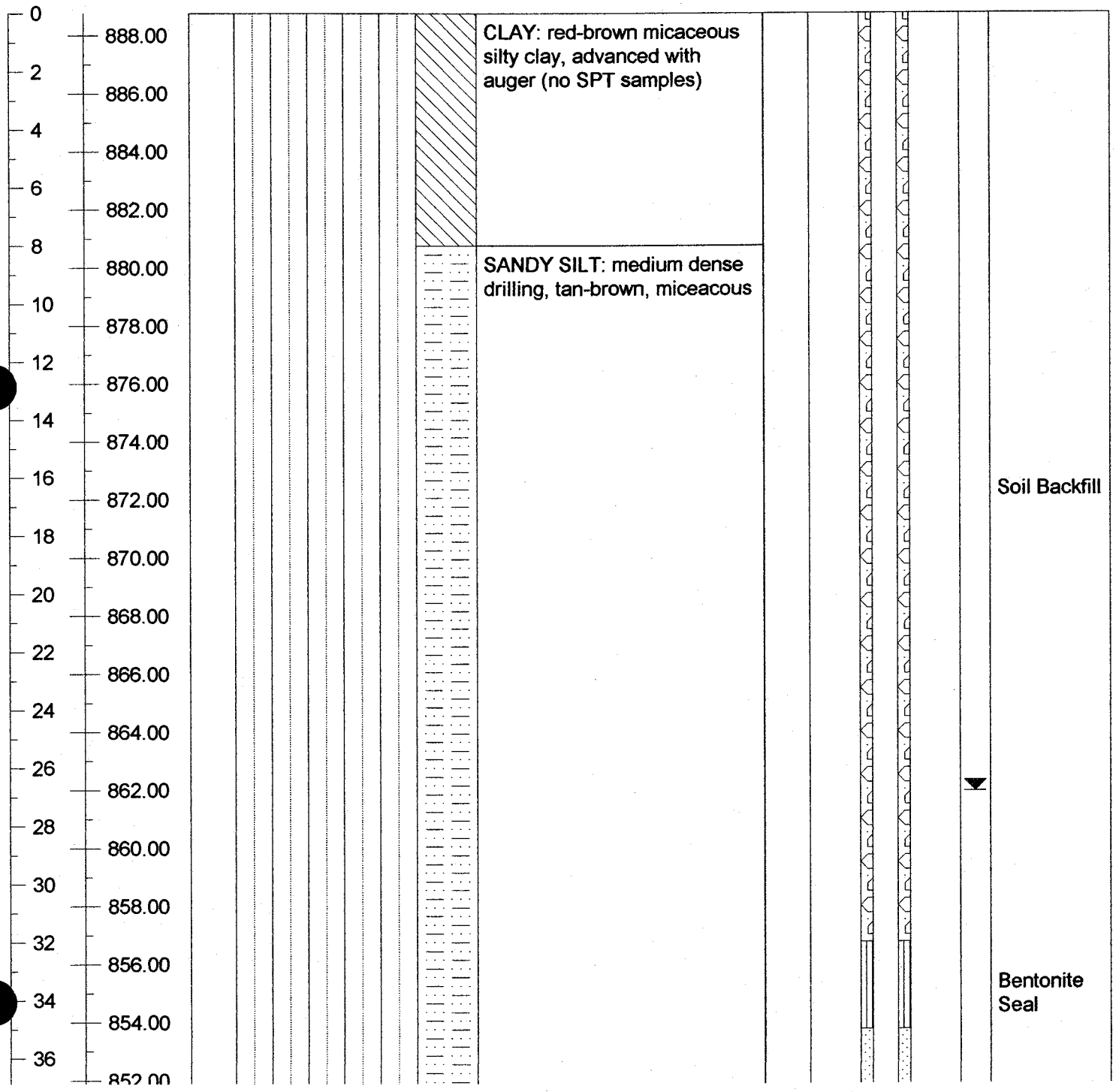
Engineering and Geology

Test Boring No. B-37

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**888.76**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA**	Water Level, TOB	▽
Date Started	**5/31/00**	Date Ended	**5/31/00**	Water Level, 24 Hr.	**26.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**29.4** ▼
Comments	**Cleared and stripped surface**	Total Depth	**53.0**	Date of Observation	**6/6/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



David Garrett, P.G., P.E.

Engineering and Geology

Test Boring No. B-37

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**888.76**
Equipment	**Mobile B-53 ATV**	Drilling Method	**HSA**	Water Level, TOB	▽
Date Started	**5/31/00**	Date Ended	**5/31/00**	Water Level, 24 Hr.	**26.8**
Drilling Firm	**Bore & Core (Seiler)**	Logged by	**David Garrett**	Stabilized Level	**29.4** ▼
Comments	**Cleared and stripped surface**	Total Depth	**53.0**	Date of Observation	**6/6/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data
38 / 850.00		SANDY SILT: dense drilling, gold-tan, micacous, moist	
40 / 848.00			
42 / 846.00		PWR: very dense, brown-tan-gray, sandy silt	
44 / 844.00			Sand Pack
46 / 842.00			
48 / 840.00			0.010" Slotted Screen
50 / 838.00			
52 / 836.00			

David Garrett, P.G., P.E.

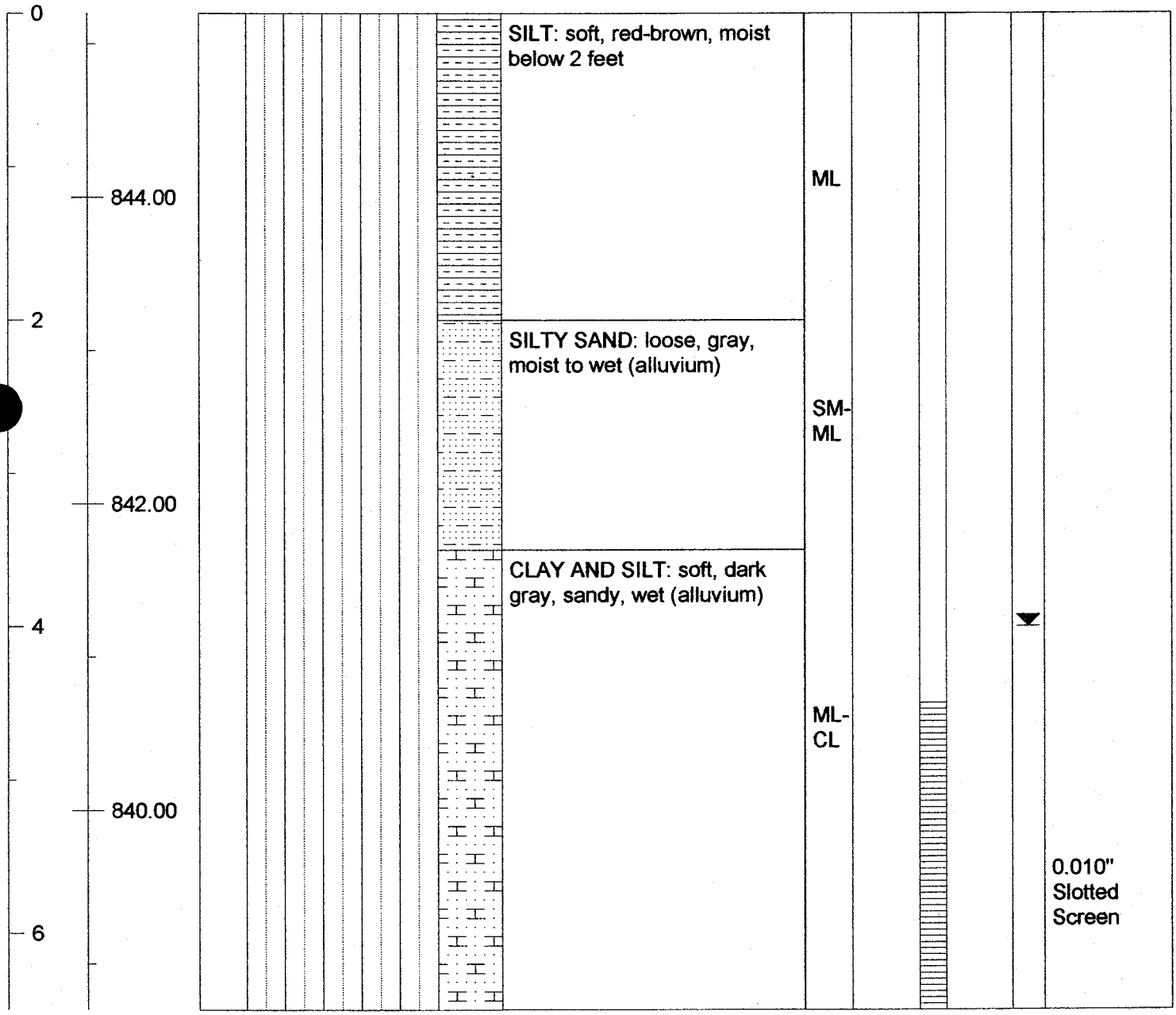
Engineering and Geology

Test Boring No. B-38

Client and Project	**Rutherford County Central MSW Landfill**			Collar Elevation	**845.20**
Equipment	**Hand Auger**	Drilling Method		Water Level, TOB	**4.0**
Date Started	**6/2/00**	Date Ended	**6/2/00**	Water Level, 24 Hr.	
Drilling Firm		Logged by	**David Garrett**	Stabilized Level	**4.0**
Comments	**Wooded stream terrace**		Total Depth **6.5**	Date of Observation	**7/7/00**

All depths are given in feet and referenced b.g.s.

Depth and Elev.	SPT Value and Plot	Soil Description and USCS Symbol	Piezometer Constuction Data



Appendix D

GeoTechnologies, Inc.

4671-B US Hwy 13 South
Greenville, North Carolina 27834
252-756-2801
Fax 252-756-0187

July 3, 2000

David Garrett, P.G., P.E.
1408 Rock Drive
Raleigh, North Carolina 27610

Reference: Submittal of Laboratory Test Data
Rutherford County Landfill
Rutherford County, North Carolina
GeoTechnologies Project No.: 1-00-0383-CA

Mr. Garrett:

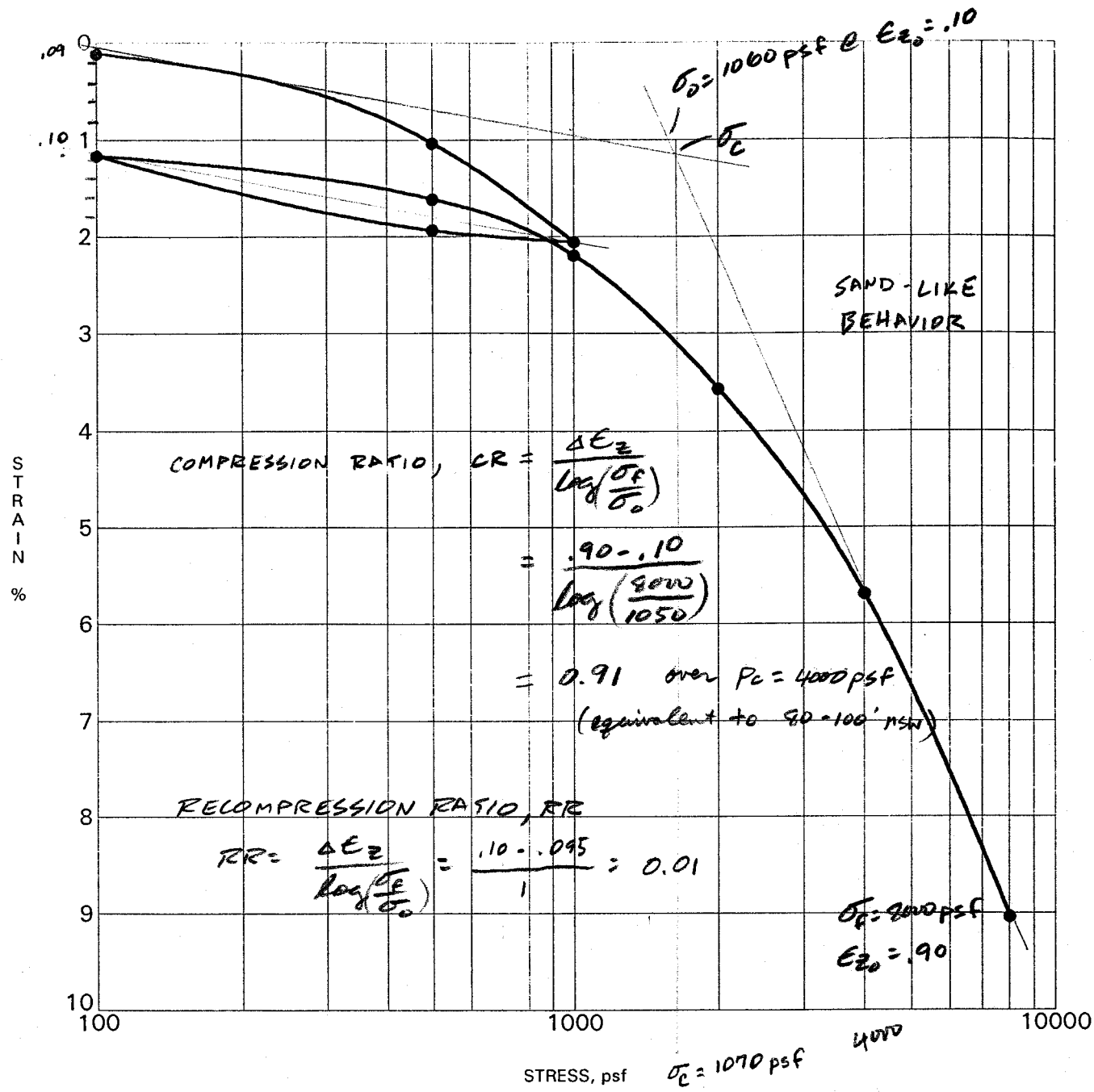
GeoTechnologies has completed the authorized testing of a sample provided to our laboratory from the Rutherford County landfill. The sample which was identified as B-2GS, UD2 from a depth of 13 feet to 15 feet. The sample was classified as a red brown to white slightly clayey fine to medium sandy micaceous silt. The sample was subjected to one-dimensional consolidation testing in accordance with ASTM D 2435.

Please find attached to this letter the consolidation curve as well as the consolidation test work sheet. Should you have any questions regarding this letter of if we may be of further service to you please do not hesitate to call at (252) 756-2801.

Very truly yours,

GeoTechnologies, Inc.

John H. Adams, Jr., C.E.T.
Branch Manager



Specimen Identification	Classification	DD	MC%
● B-~~26~~S 13'-15' Red 26	Brown to White Sli. Clayey F. to Med. Sandy Mic.	SILT	

PROJECT Rutherford County Landfill - Rutherford County, North Carolina

JOB NO. 1-00-0383-CA

DATE 6/30/00

CONSOLIDATION TEST

GeoTechnologies, Inc. P.A.

Greenville, North Carolina

GeoTechnologies, Inc.

CONSOLIDATION TEST

Job Name: Rutherford County Landfill Date: 6/29/00
Job Number: 1-00-0383-CA

Sample I.D. B-~~2~~26GS UD2 Depth: 13'-15'
Soil Description: Red Brown to White Silghtly Clayey Fine to Medium Sandy Micaeous SILT

Notes: Preload = 1000 \ Saturate \ Undisturbed Sample

RING PROPERTIES		
Diameter	**2.5**	inches
Height	**1**	inches
Volume	**0.00284**	cu.ft.
Weight	**110.42**	grams
Ring + Soil	**253.78**	grams

SOIL PROPERTIES		
Init. Moisture	**26.4**	%
Soil Weight.	**143.4**	grams
Wet Density	**111.3**	lbs./cu.ft.
Dry Density	**88.0**	lbs./cu.ft.
Specific Gravity	**2.7**	Apparent
Final Moisture	**28.2**	%

Initial Reading	.0000
Preload Rebound Reading	.0116

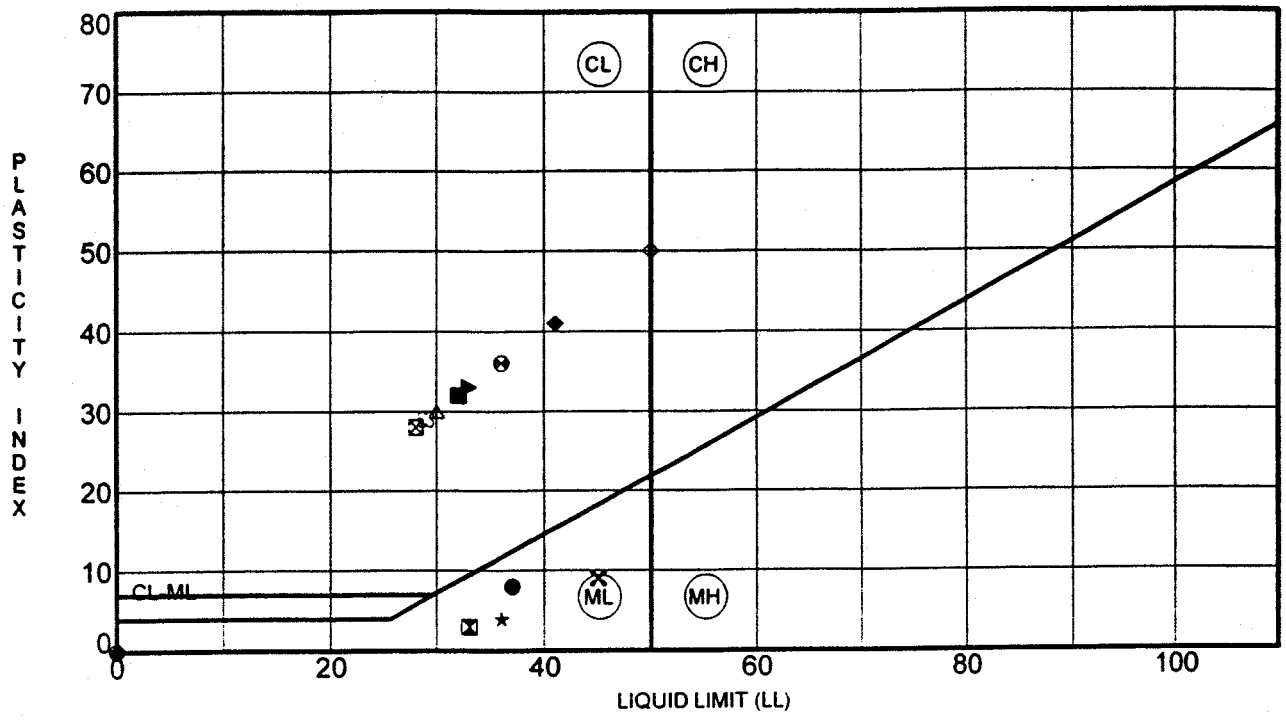
LOAD / psf	R0	R6	R100	T50	R50
100	.0000	.0011	.0012	0.1	0.0011
500	.0012	.0098	.0104	1	0.0101
1000	.0104	.0196	.0206	0.5	0.02
500	.0206	.0195	.0194		
100	.0194	.0123	.0117		
500	.0117	.0159	.0162	0.25	0.016
1000	.0162	.0218	.0220	0.1	0.0218
2000	.0220	.0346	.0357	0.5	0.035
4000	.0357	.0548	.0569	0.25	0.0555
8000	.0569	.0886	.0904	0.25	0.0892

LOAD / psf	%E	Con. Coef.	%IC
100	0.12	4.914	91.7
500	1.04	0.483	93.5
1000	2.06	0.946	90.2
500	1.94		91.7
100	1.17		92.2
500	1.62	1.907	93.3
1000	2.20	4.713	96.6
2000	3.57	0.917	92.0
4000	5.69	1.757	90.1
8000	9.04	1.634	94.6

← on virgin compression portion of consol. curve

NOTE: Consolidation Coefficient in Square Feet Per Day

Initial Void Ratio	0.915
Final Void Ratio	0.742
Initial Saturation, %	77.9
Final Saturation, %	100.0



	Specimen Identification			LL	PL	PI	Fines	Classification
●	B- 8	1	0-20'	37	29	8	26.6	Brown Micaceous Silty Medium to Fine SAND
⊠	B-10	Bulk	10' - 20'	33	30	3	45.2	Brown Micaceous Silty Medium to Fine SAND
▶	B-18	1	3.5-5'	33	NP	33	30.7	REd-Orange Micaceous Silty Medium to Fine SAND
★	B-23	Bulk	0-20'	36	32	4	46.1	Brown Micaceous Silty Medium to Fine SAND (SM)
✕	B-26S	UD-1	8-10'	45	36	9	45.4	Red Brown Micaceous Clayey Silty Medium to Fine SAND (SM)
✪	B-26S	UD-2	13-15'	NP	NP	NP	22.3	Darek Brown micaceous Coarse to Fine SAND with Fine Gravel (SM)
○	B-31	1	3.5-5'	28	NP	28	32.1	Red Brown Slightly Clayey Silty Medium to Fine SAND
△	B-31	2	8.5-10'	30	NP	30	24.3	Brown Micaceous Medium to Fine SAND
⊗	B-31	3	13.5-15'	28	NP	28	22.4	Brown Micaceous Medium to Fine SAND
⊕	B-31	4	18.5-20'	NP	NP	NP	14.6	Yellow Brown Micaceous Silty Meduim to Fine SAND
□	B-35	1	0-20'	28	NP	28	40.9	Yellow Brown Micaceous Silty Medium to Fine SAND
⊖	B-~~50~~ 9D	UD-2	8-10'	36	NP	36	24.4	Yellow Tan Micaceous Silty Medium to Fine SAND
⊘	B- 7	1	3.5' 5'	NP	NP	NP	26.5	Brown Micaceous Silty Medium to Fine SAND
☆	B- 7	2	8.5' - 10'	NP	NP	NP	30.2	Brown Micaceous Silty Medium to Fine SAND
⊠	B- 7	3	13.5' - 15'	29	NP	29	41.5	Brown Micaceous Silty Medium to Fine SAND
■	B- 7	4	18.5' - 20'	32	NP	32	42.1	Brown Micaceous Silty Medium to Fine SAND
◆	B- 7	9	43.5' - 45'	41	NP	41	24.3	Brown Micaceous Silty Medium to Fine SAND
◇	B-9D	UD-1	4-6'	50	NP	50	41.9	Brown Micaceous Silty Medium to Fine SAND

9d

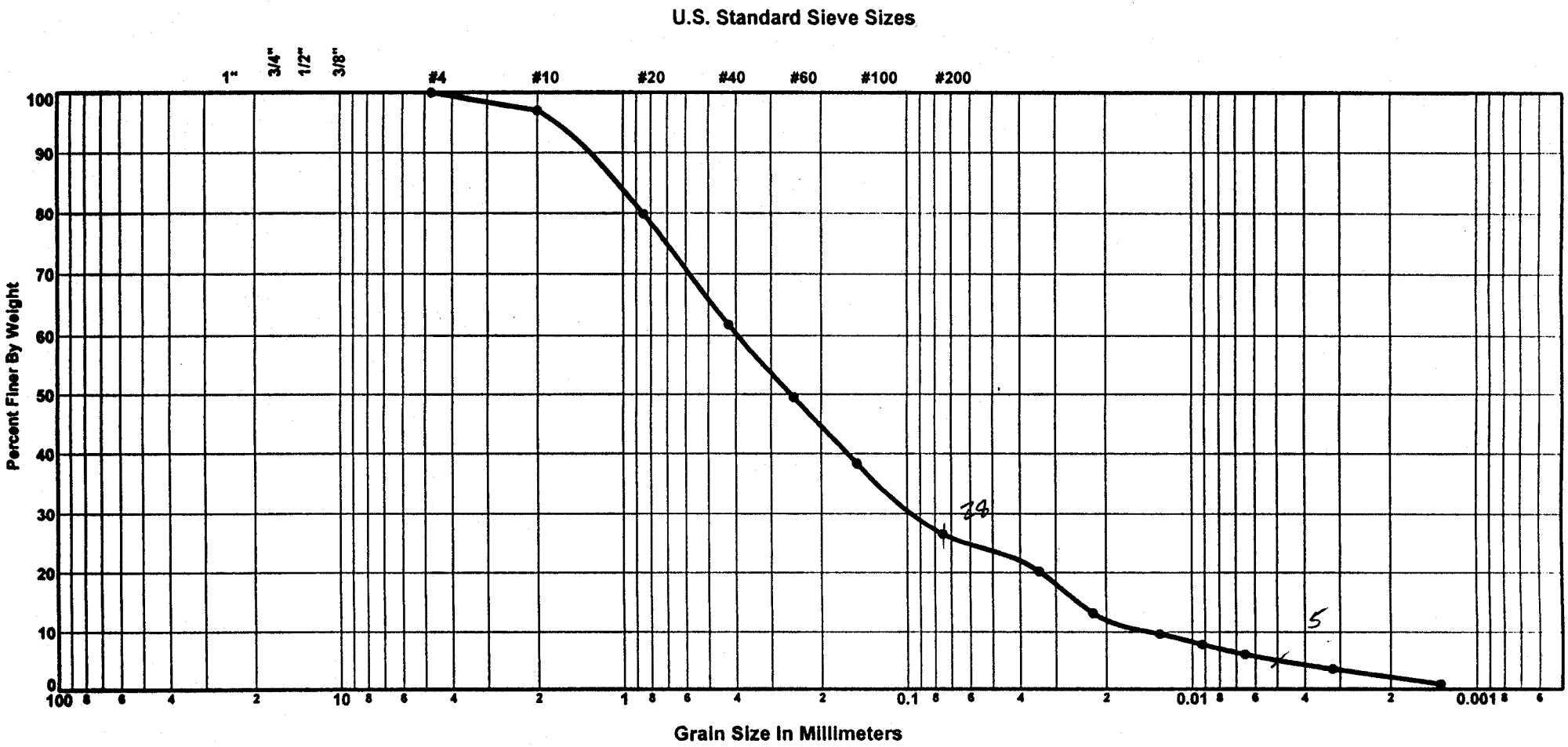
PROJECT Rutherford County MSWLF - Rutherford County, North Carolina

JOB NO. 1-00-0383-CA
DATE 7/3/00

ATTERBERG LIMITS' RESULTS

GeoTechnologies, Inc. PA

1-00-0383-CA Rutherford Co MSWLF			
Boring	**Sample**	**Depth**	**Moisture %**
B-~~5D~~ 9D	UD-2	8-10'	27.1
B-7	1.0	3.5-5'	13.8
B-7	2.0	8.5-10'	15.2
B-7	3.0	13.5-15'	23
B-7	4.0	18.5-20'	18.6
B-7	5.0	43.5-45'	24.2
B-8	1.0	0-20'	27.44
B-9D	UD-1	4-6'	31
B-10	Bulk	10-20'	19
B-18	1.0	3.5-5'	26.68
B-23	Bulk	0-20'	21.5
B-26S	UD-1	8-10'	25.6
B-26S	US-2	13-15'	19.2
B-31	1.0	3.5-5'	19.09
B-31	2.0	8.5-10'	11.17
B-31	3	13.5-15'	13.29
B-31	4	18.5-20'	6.5
B-35	Bulk	0-20'	11.11



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-7 1	3.5' 5'	19.1	NP	NP	NP	Brown Micaceous Silty Medium to Fine SAND

Project:

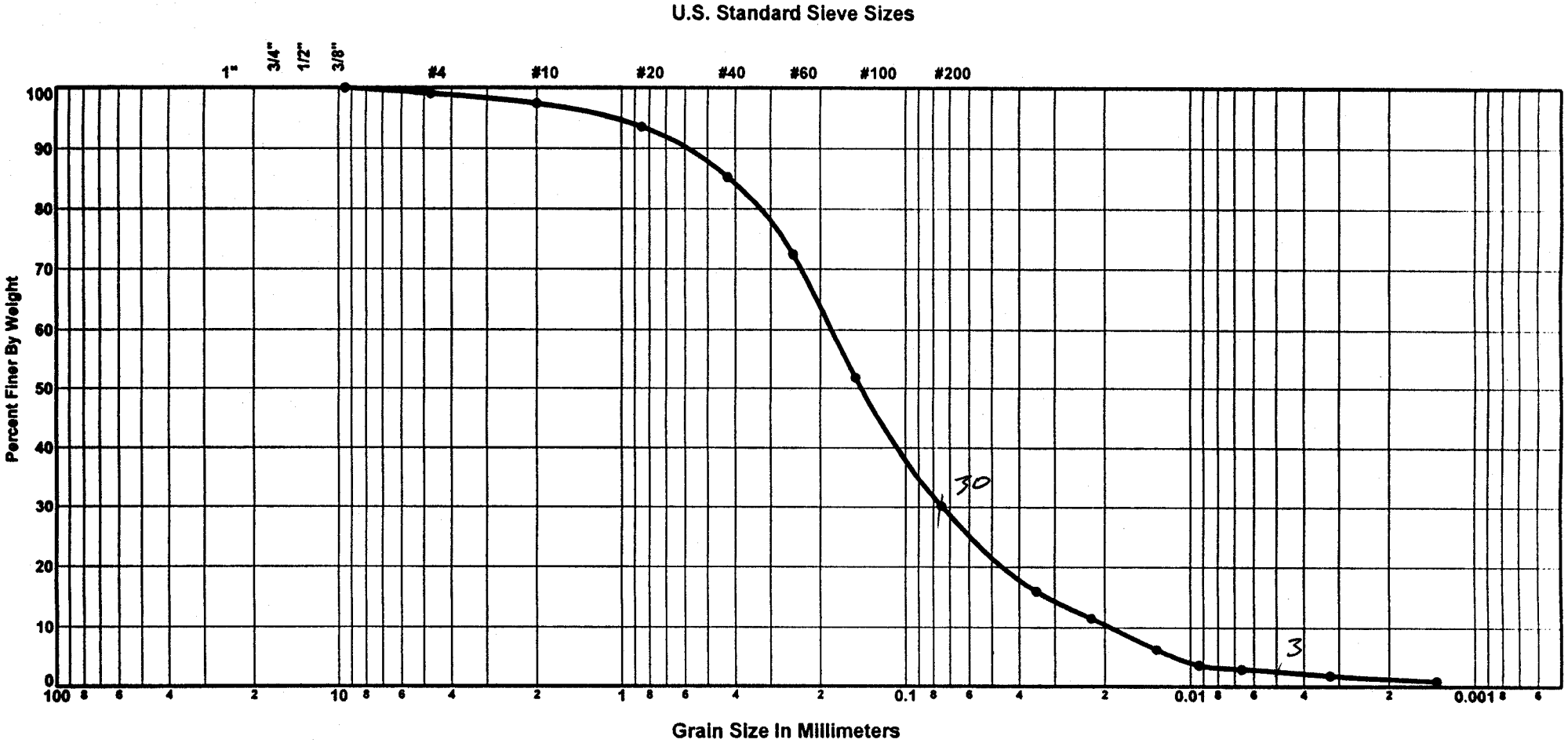
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-7 2	8.5' - 10'	11.2	NP	NP	NP	Brown Micaceous Silty Medium to Fine SAND

Project:

Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

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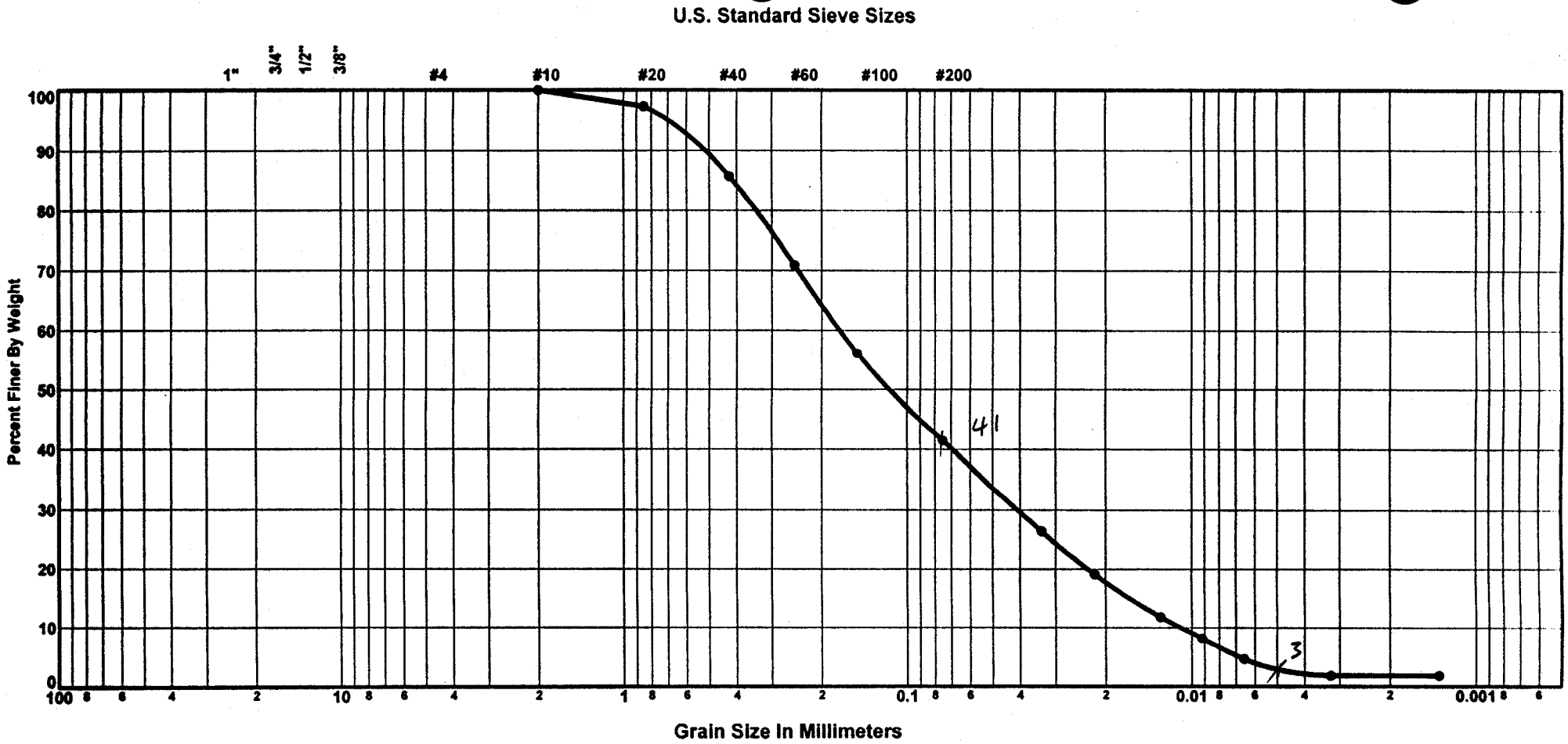

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-7 3	13.5' - 15'	23	29.0	NP	29.0	Brown Micaceous Silty Medium to Fine SAND

Project:

Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

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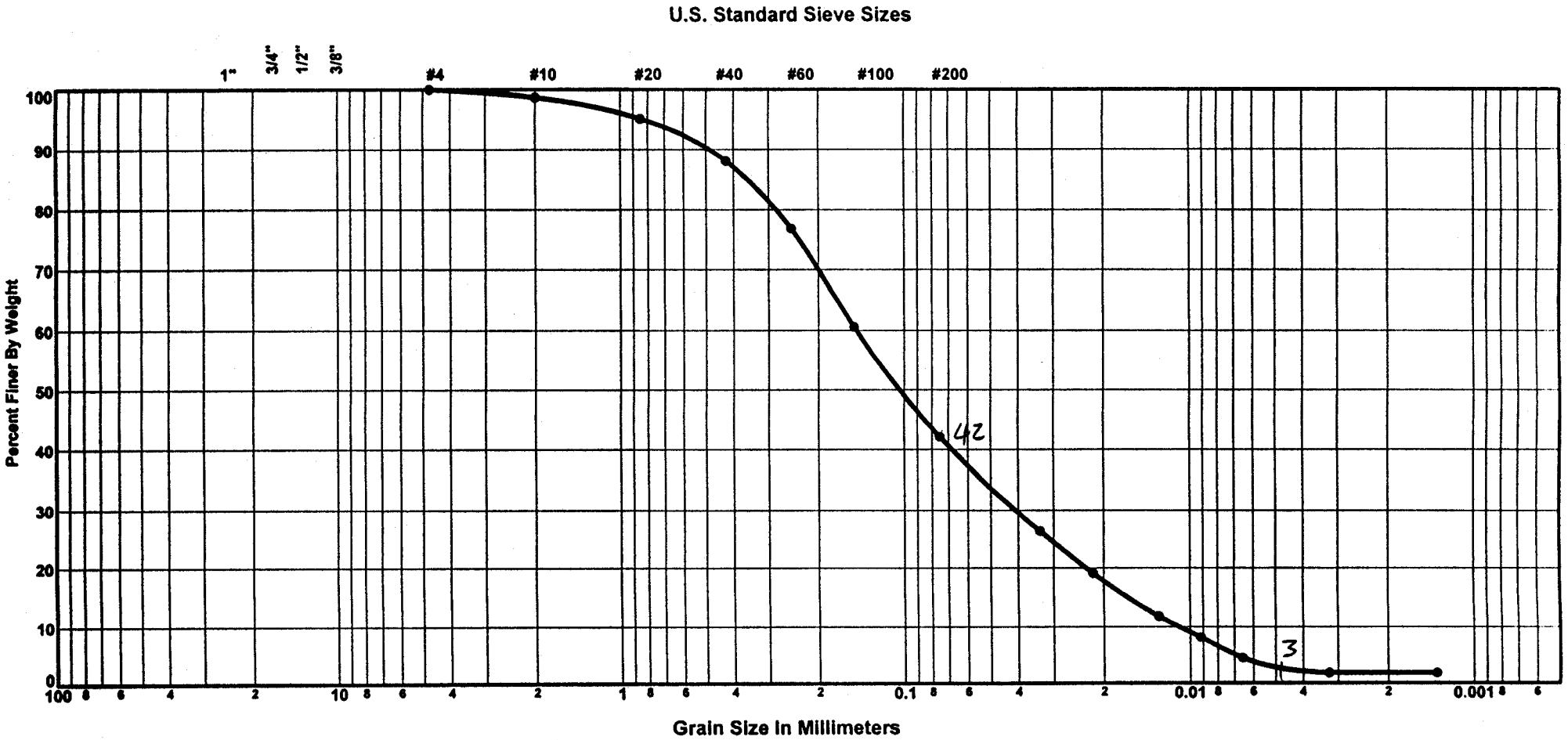

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-7 4	18.5' - 20'	18.6	32.0	NP	32.0	Brown Micaceous Silty Medium to Fine SAND

Project:

Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

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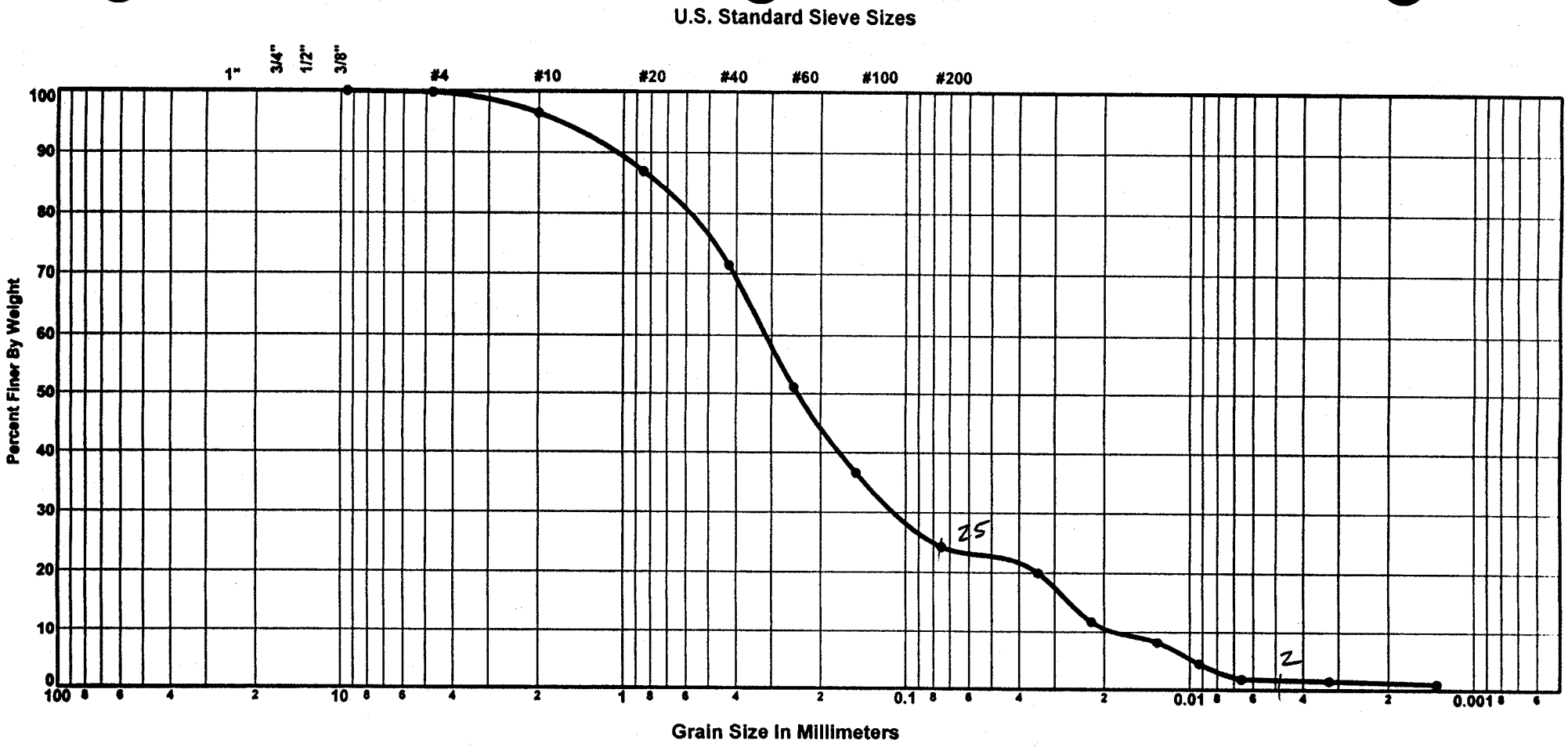

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-7 9	43.5' - 45'	24.2	41.0	NP	41.0	Brown Micaceous Silty Medium to Fine SAND

Project:

Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

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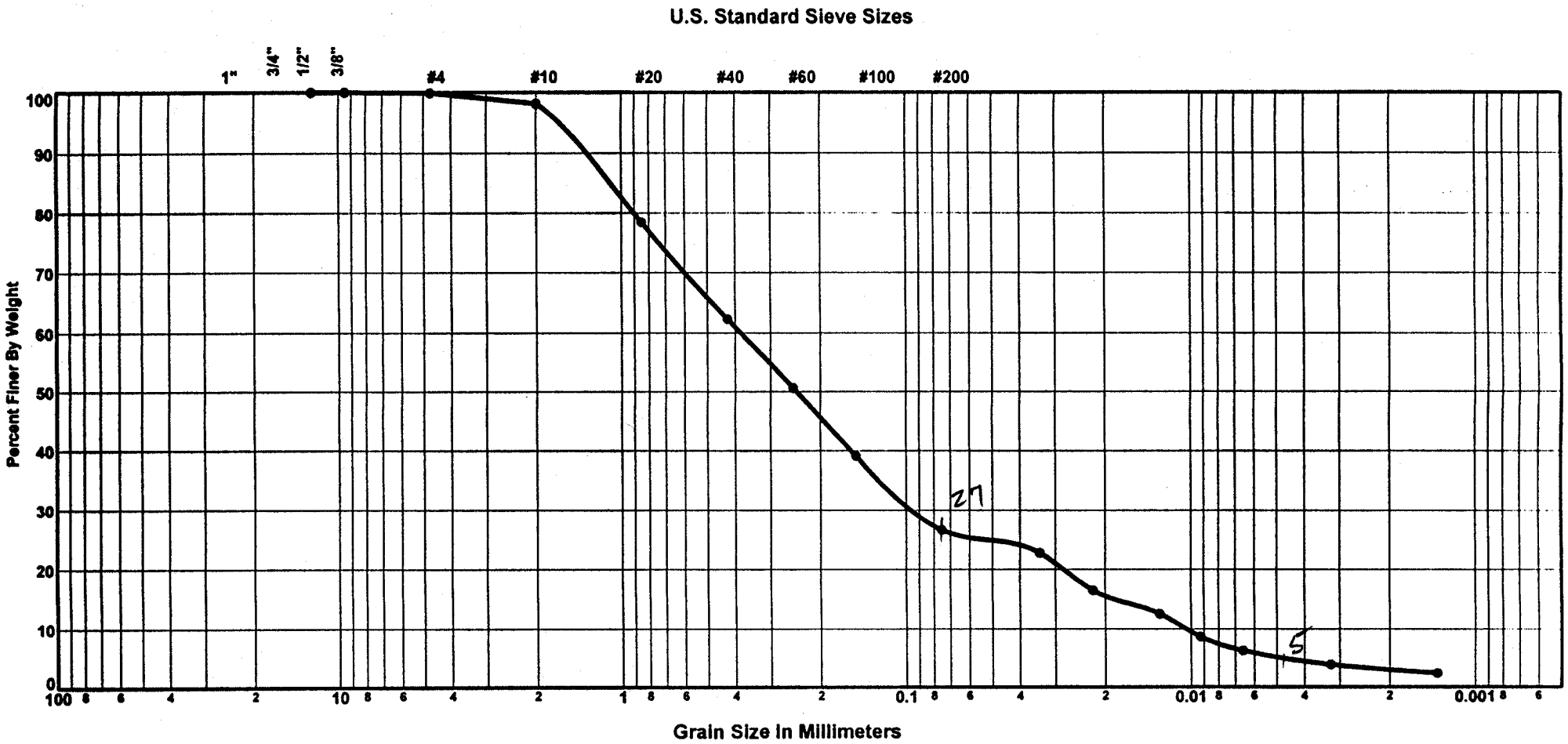


GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B- 8 1	0-20'	27.44	37.0	29.0	8.0	Brown Micaceous Silty Medium to Fine SAND

Project:

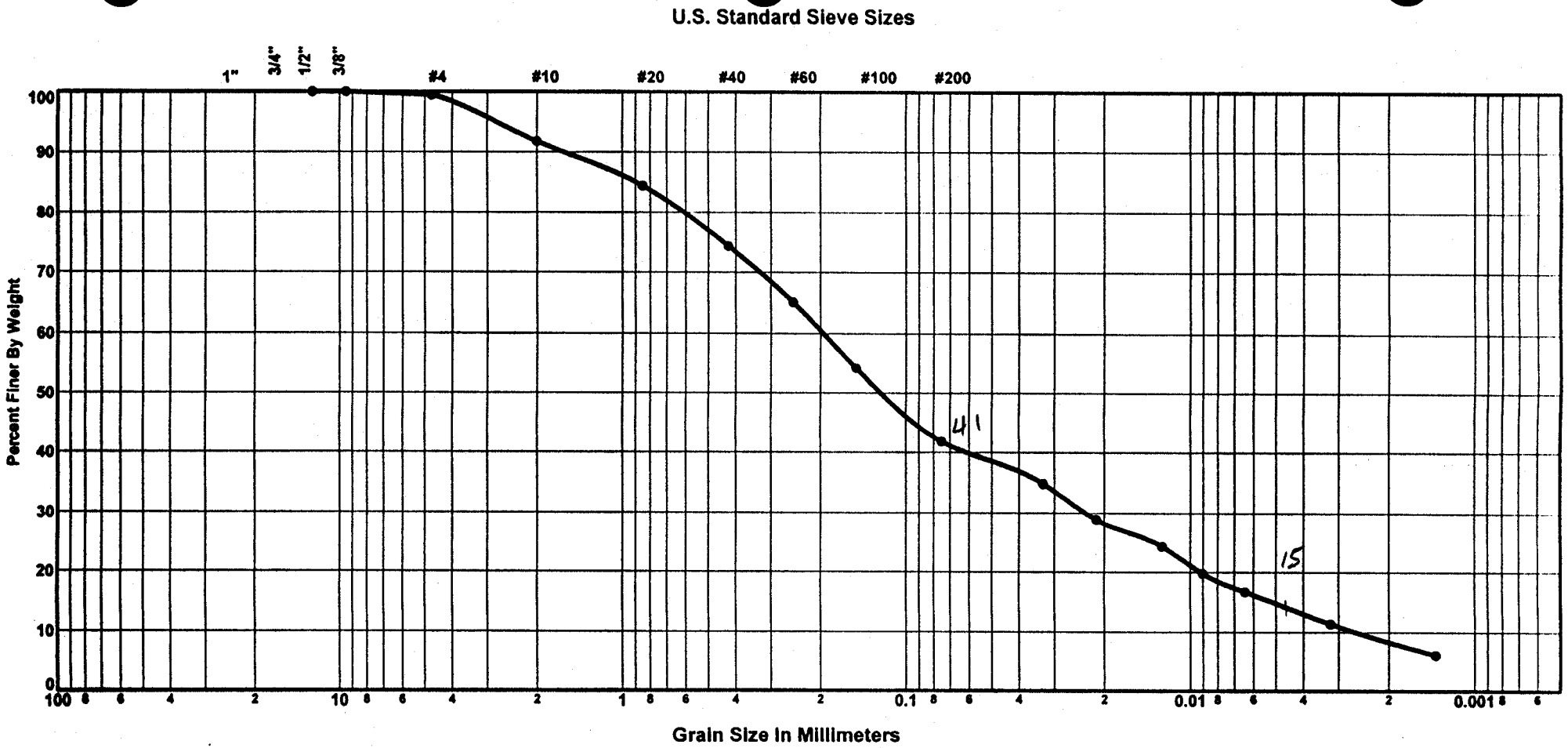
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/5/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-9D UD-1	4-6'	31	50.0	NP	50.0	Brown Micaceous Silty Medium to Fine SAND

Project:

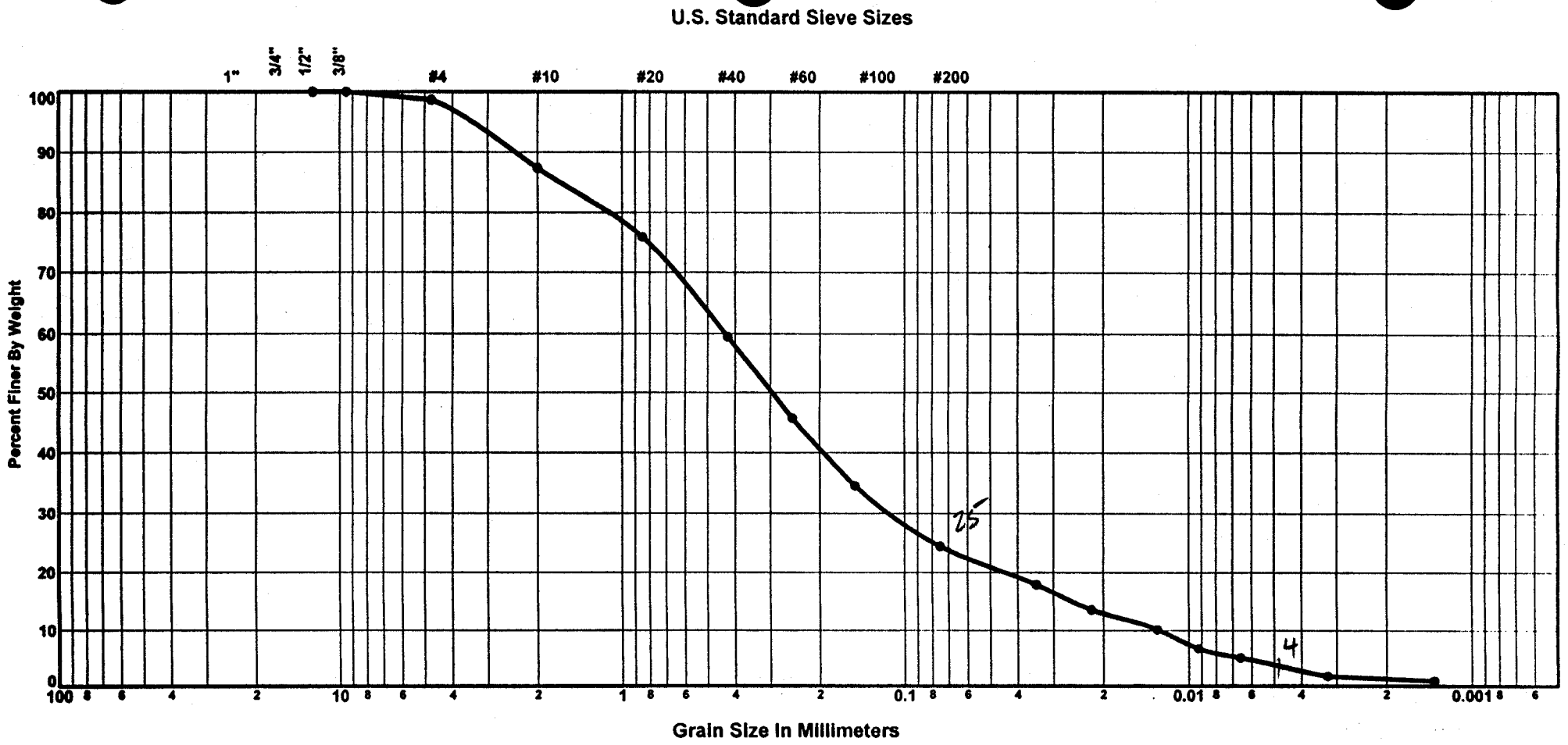
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/5/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
~~B-5D~~ 9D UD-2	8-10'	27.1	36.0	NP	36.0	Yellow Tan Micaceous Silty Medium to Fine SAND

Project:

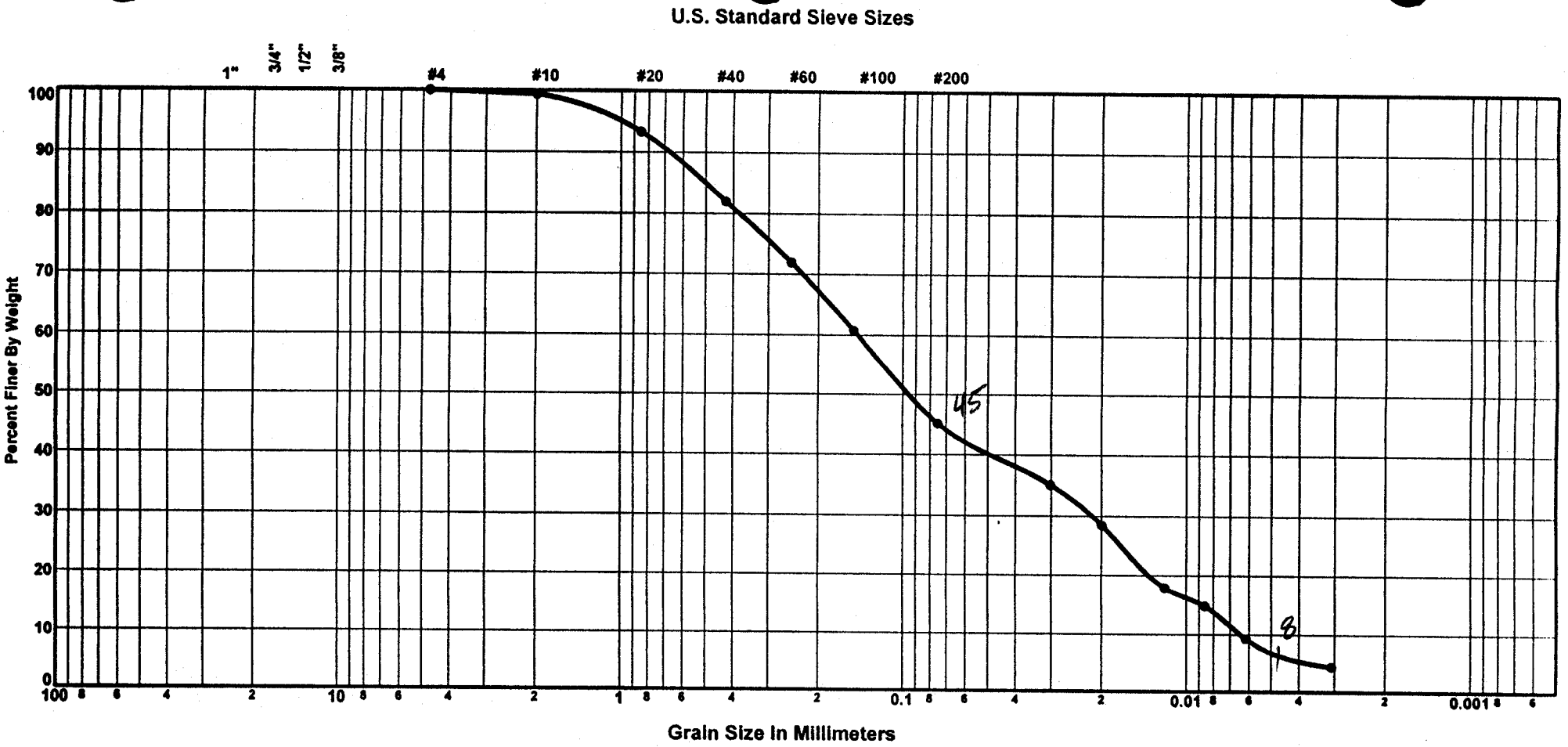
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/5/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-10 Bulk	10' - 20'	19	33.0	30.0	3.0	Brown Micaceous Silty Medium to Fine SAND

Project:

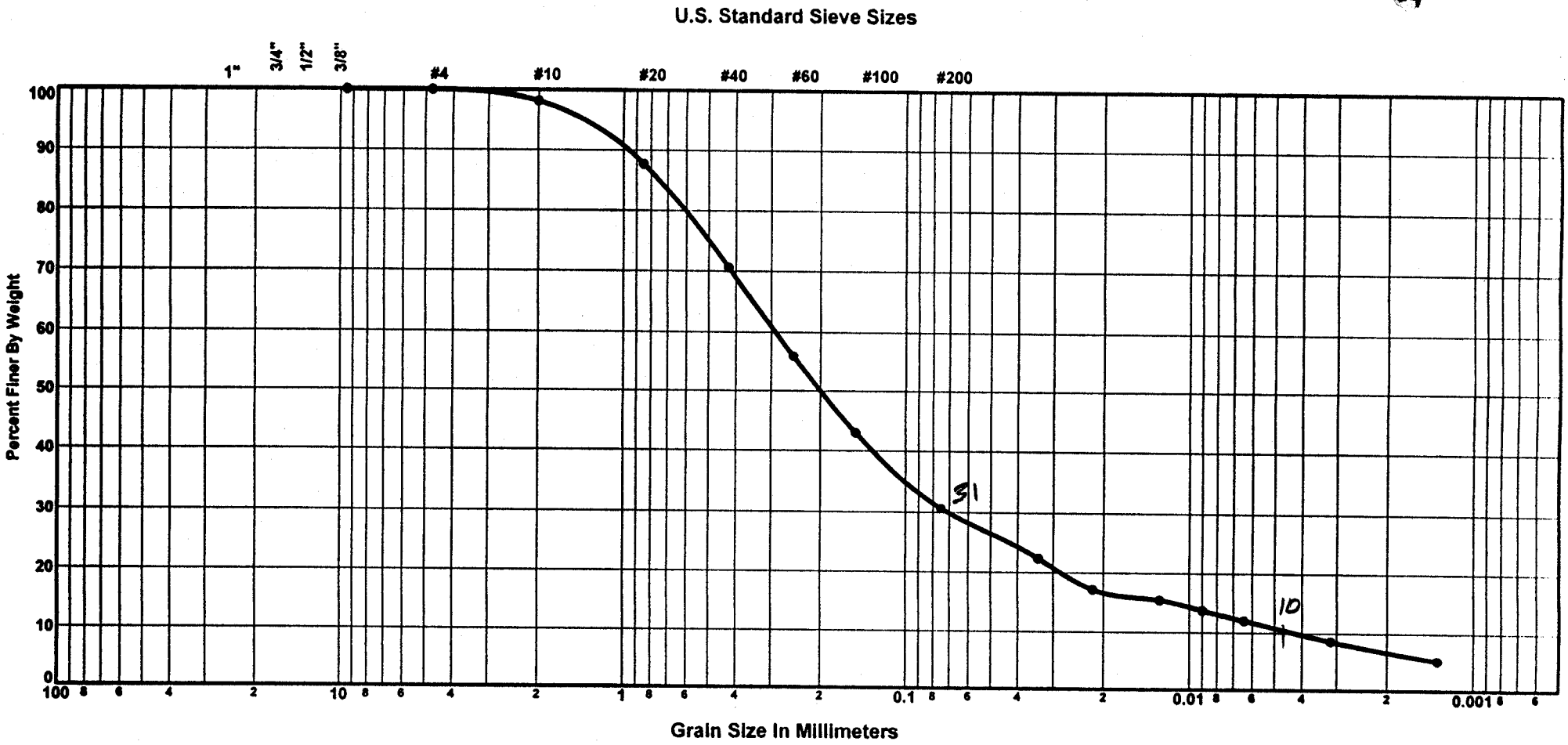
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/5/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies, Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-18 1	3.5-5'	26.68	33.0	NP	33.0	REd-Orange Micaceous Silty Medium to Fine SAND

Project:

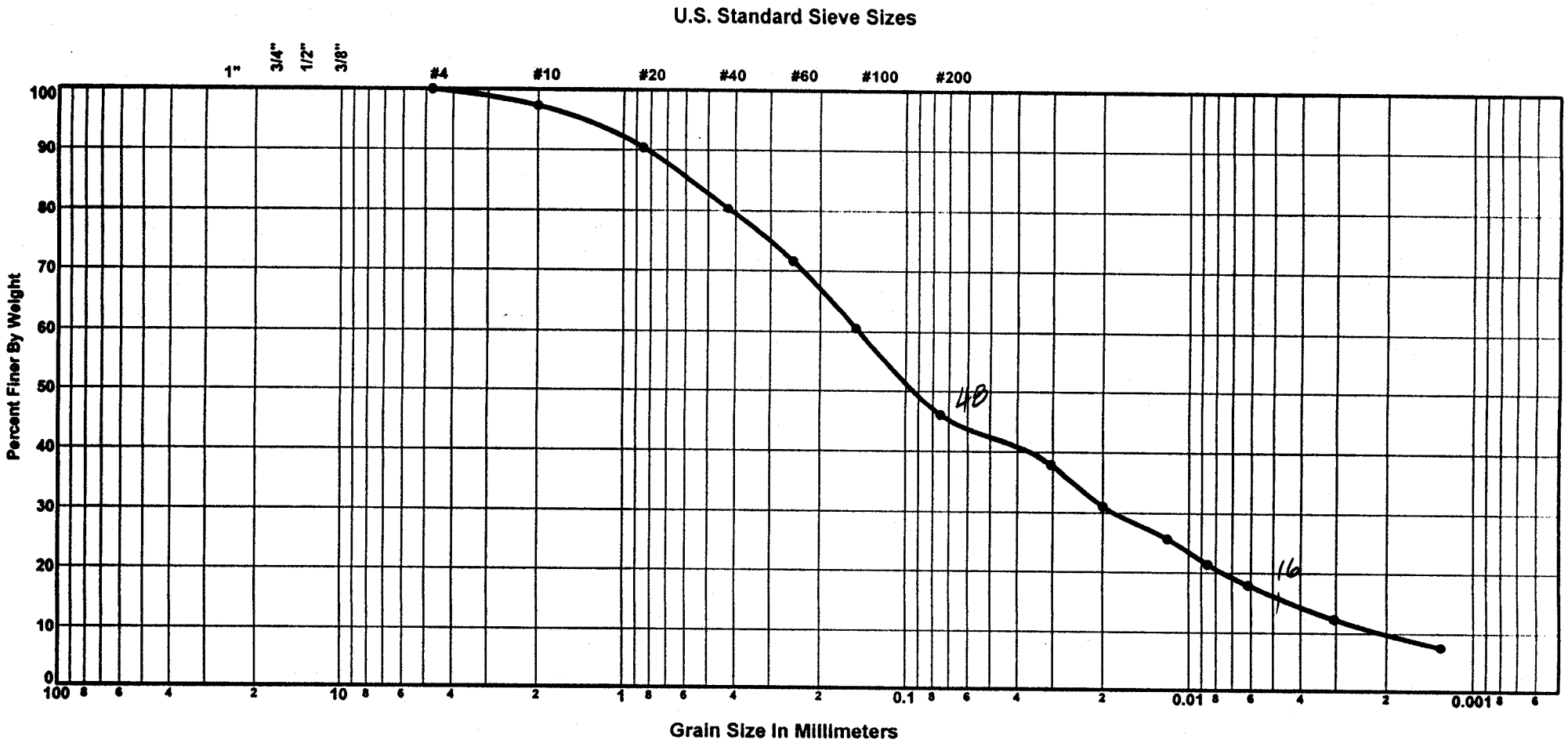
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-23 Bulk	0-20'	21.5	36.0	32.0	4.0	Brown Micaceous Silty Medium to Fine SAND (SM)

Project:

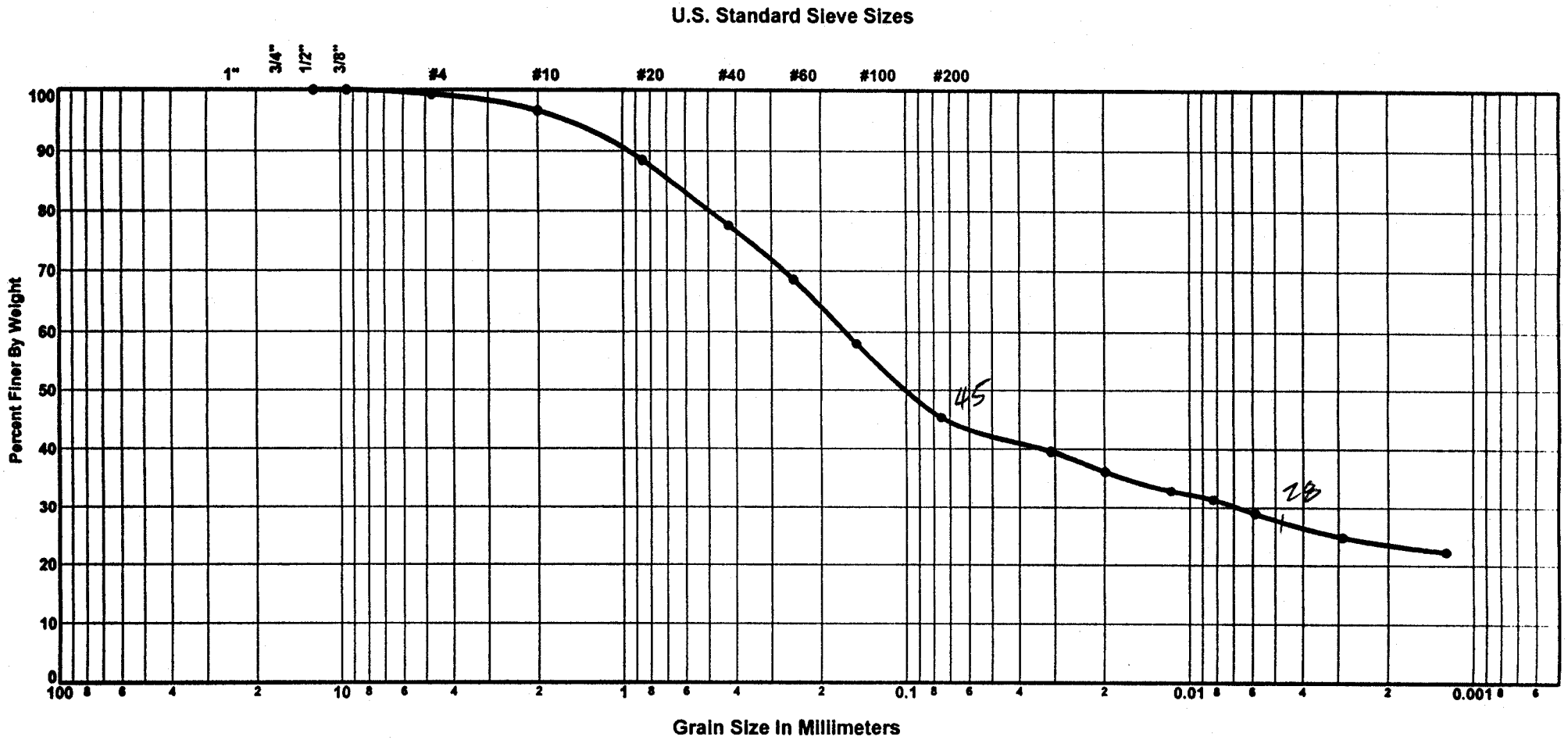
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/5/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-26S UD-1	8-10'	25.6	45.0	36.0	9.0	Red Brown Micaceous Clayey Silty Medium to Fine SAND (SM)

Project:

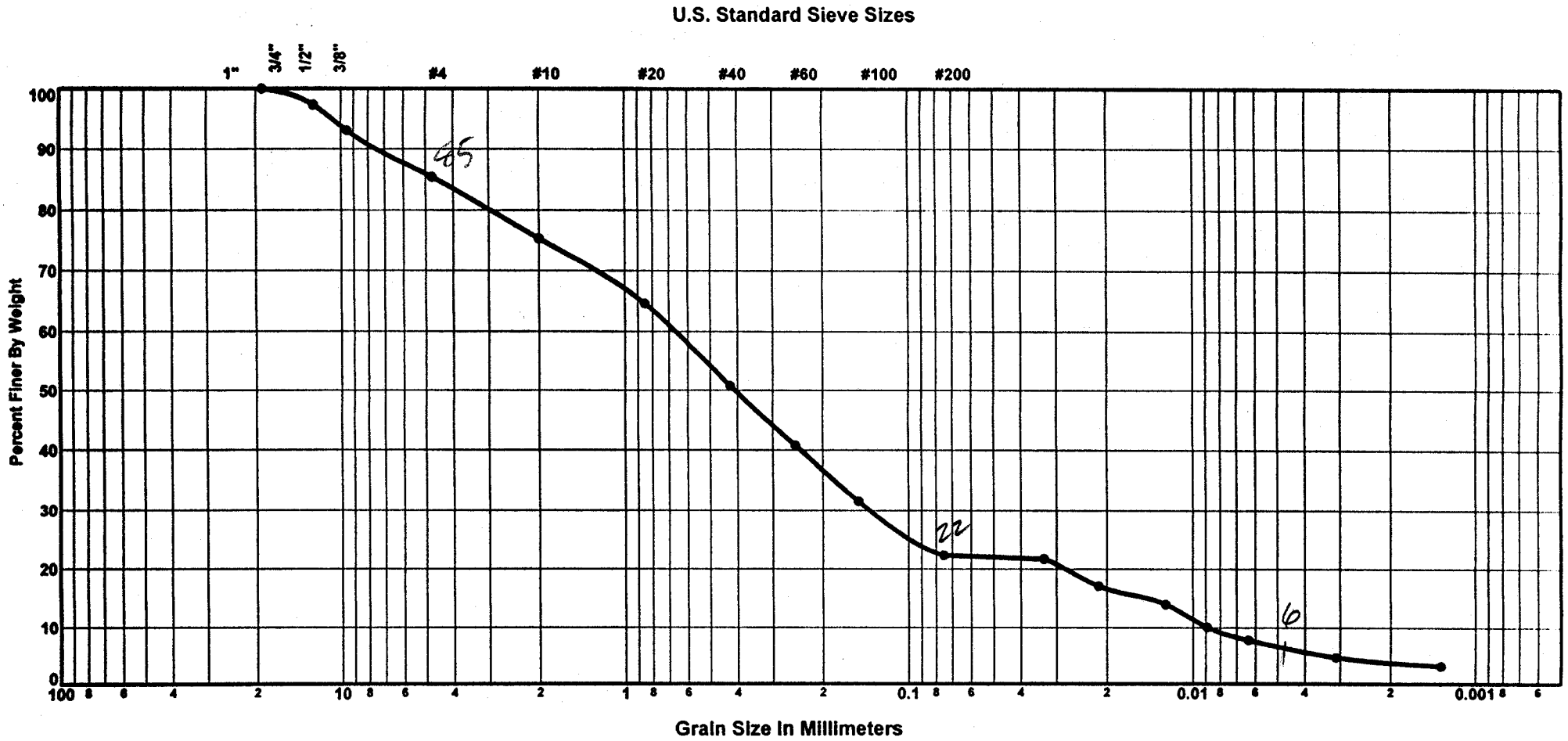
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/5/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-26S UD-2	13-15'	19.2	NP	NP	NP	Darek Brown micaceous Coarse to Fine SAND with Fine Gravel (SM)

Project:

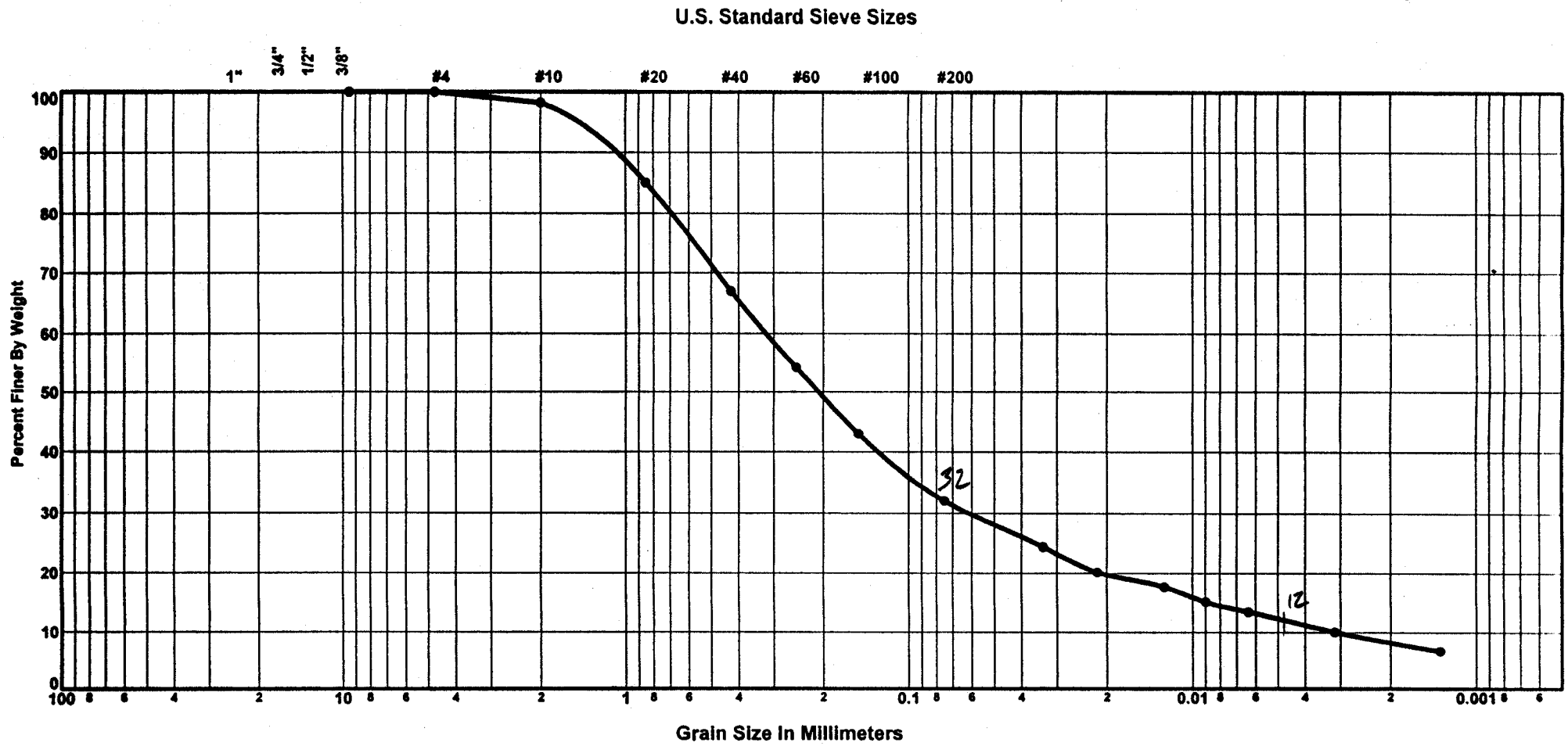
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/5/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-31 1	3.5-5'	19.09	28.0	NP	28.0	Red Brown Slightly Clayey Silty Medium to Fine SAND

Project:

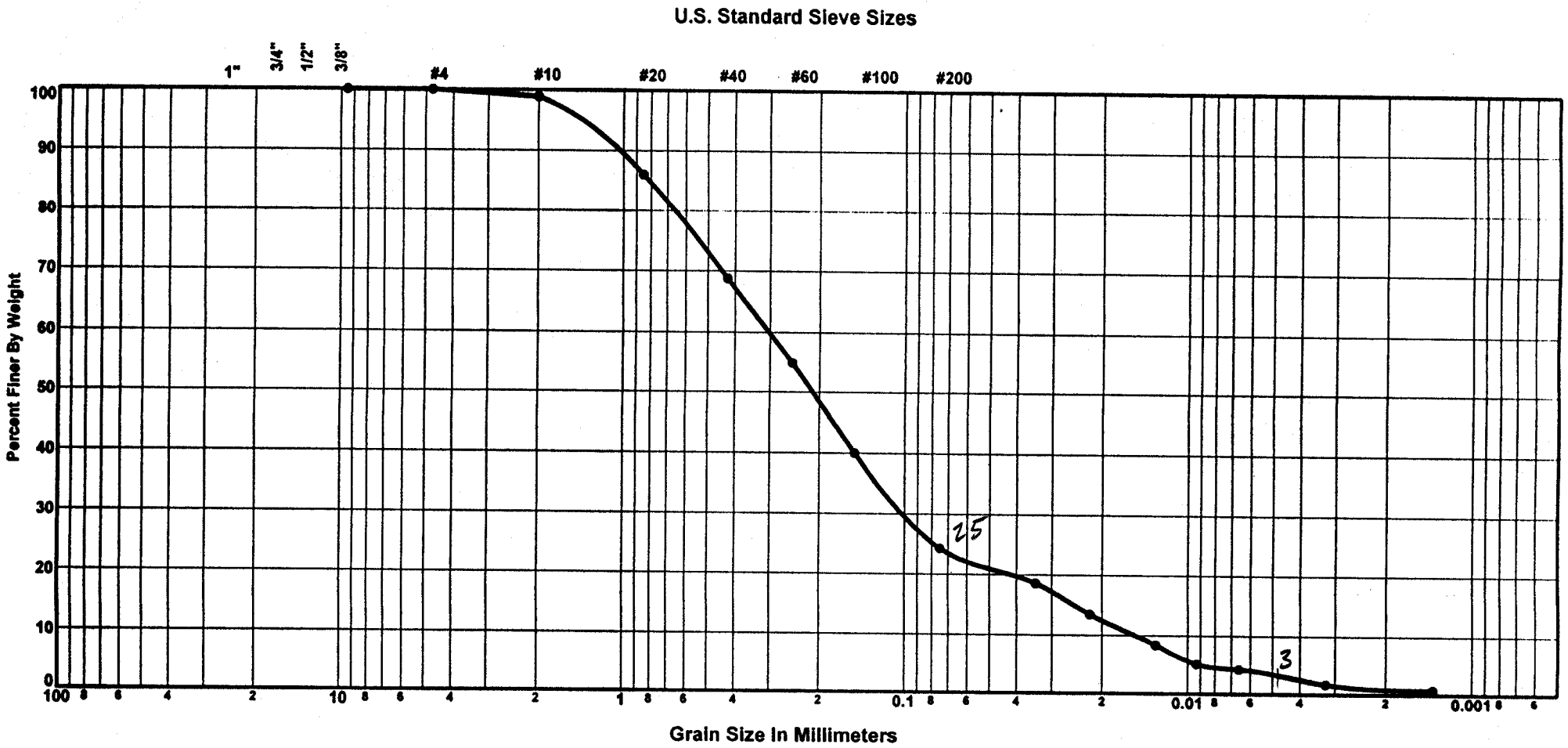
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-31 2	8.5-10'	11.17	30.0	NP	30.0	Brown Micaceous Medium to Fine SAND

Project:

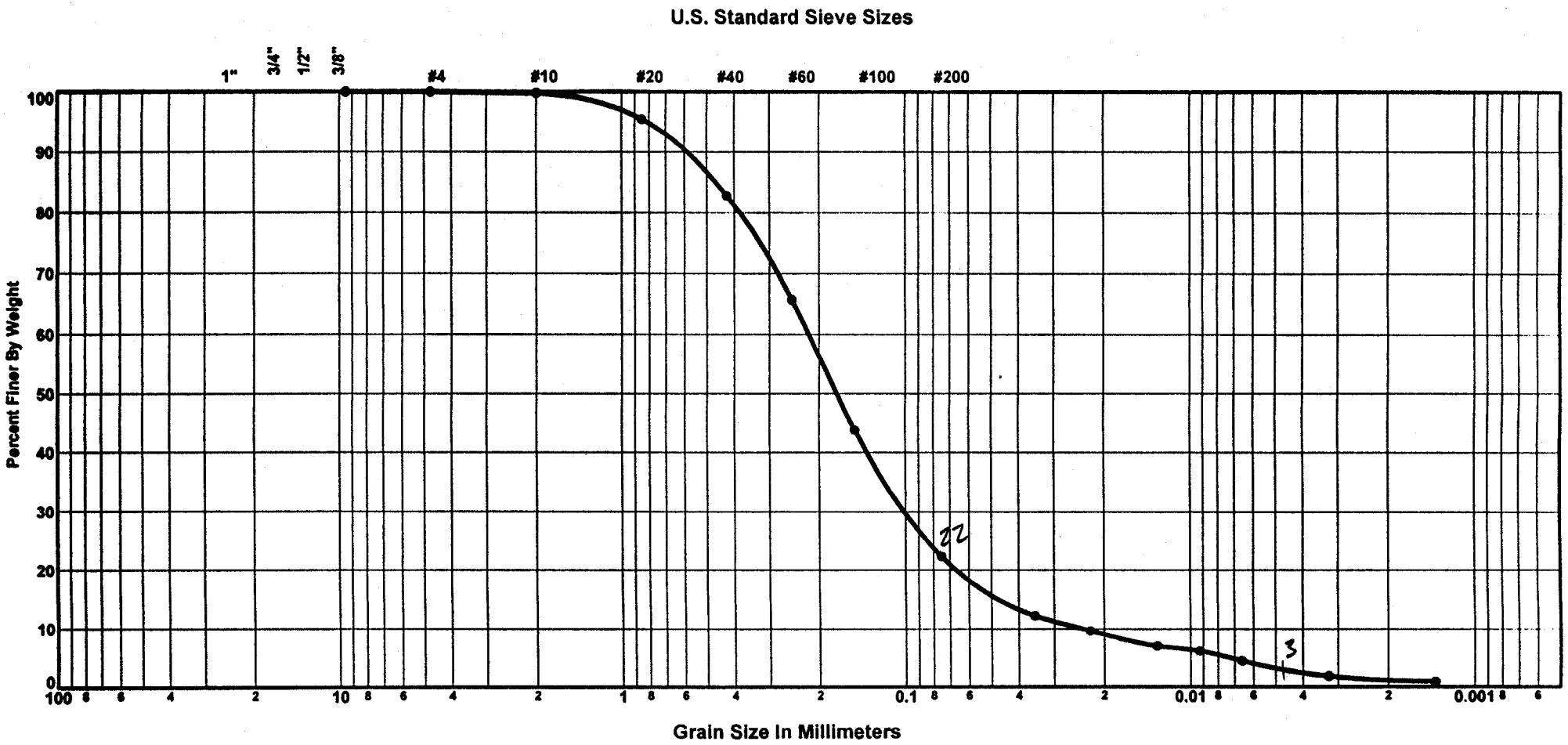
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-31 3	13.5-15'	13.29	28.0	NP	28.0	Brown Micaceous Medium to Fine SAND

Project:

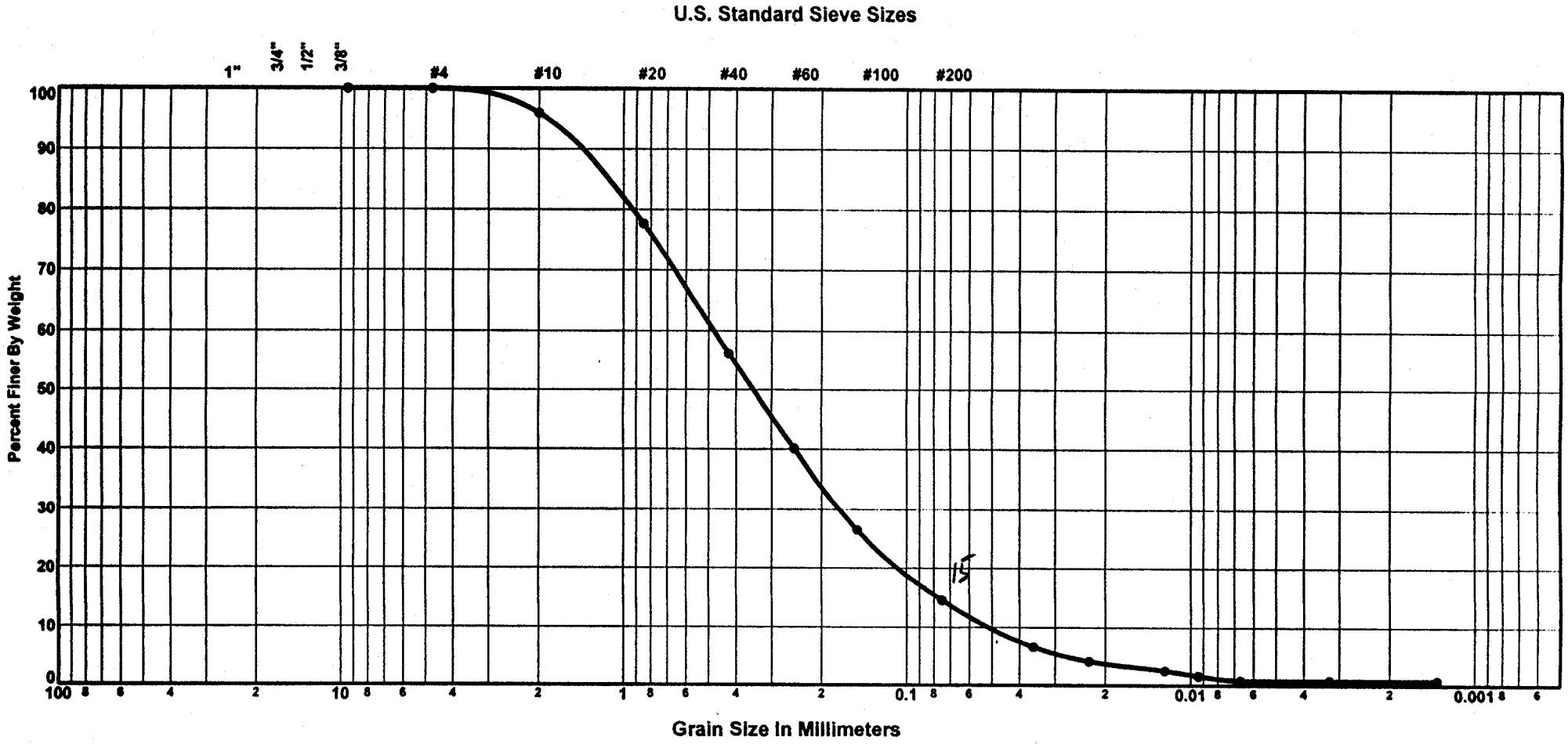
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc.



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-31 4	18.5-20'	6.5	NP	NP	NP	Yellow Brown Micaceous Silty Meduim to Fine SAND

Project:

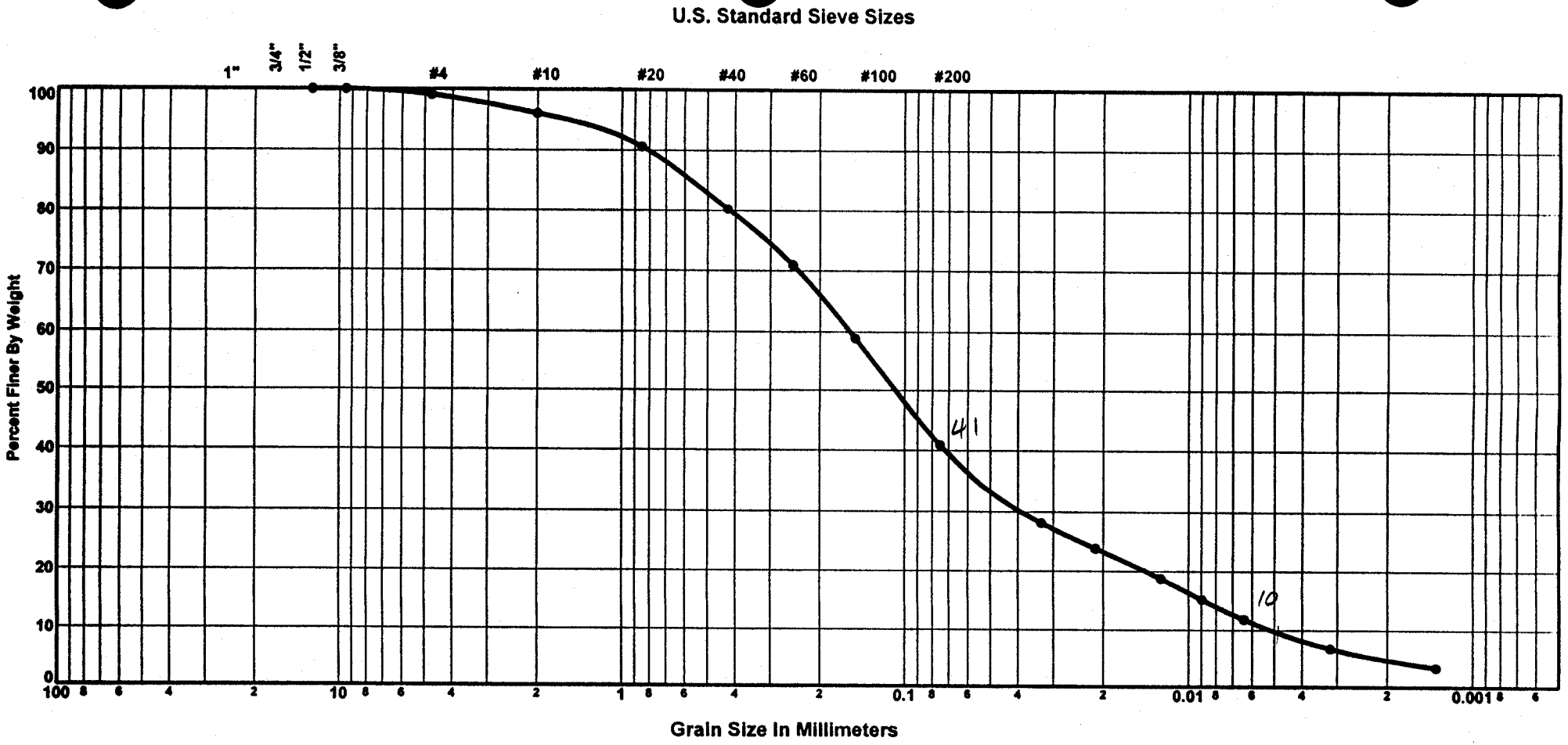
Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc



GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

Boring No.	Elev./Depth	Nat. W.C.	L.L.	P.L.	P.I.	Soil Description or Classification
B-35 1	0-20'	11.11	28.0	NP	28.0	Yellow Brown Micaceous Silty Medium to Fine SAND

Project:

Rutherford County MSWLF
Rutherford County, North Carolina

Job No.: 1-00-0383-CA

Date: 7/3/00

GRAIN SIZE DISTRIBUTION

GeoTechnologies Inc

GeoTechnologies, Inc.

Job No: 1-00-0383-CA Date: 7/5/00

Job Name: Rutherford County MSWLF

Job Location: Rutherford County, North Carolina

Boring No: B- 8

Sample No: 1.0

Depth: 0-20'

TEST RESULTS

Method of Test: ASTM D 698

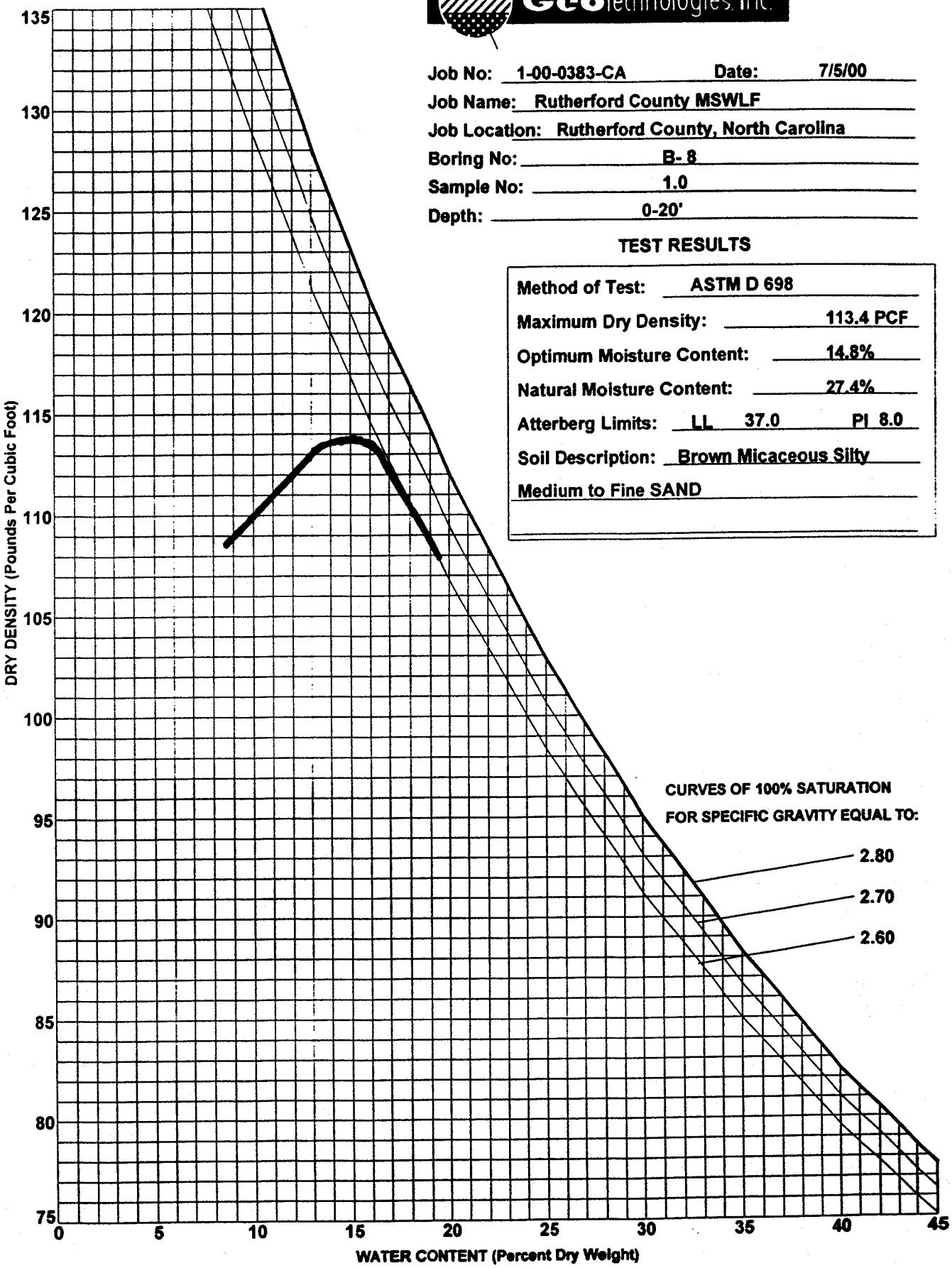
Maximum Dry Density: 113.4 PCF

Optimum Moisture Content: 14.8%

Natural Moisture Content: 27.4%

Atterberg Limits: LL 37.0 PI 8.0

Soil Description: Brown Micaceous Silty Medium to Fine SAND



MOISTURE-DENSITY RELATIONSHIP

GeoTechnologies, Inc. PA

GeoTechnologies, Inc.

Job No: 1-00-0383-CA Date: 7/5/00

Job Name: Rutherford County MSWLF

Job Location: Rutherford County, North Carolina

Boring No: B-10

Sample No: Bulk

Depth: 10-20'

TEST RESULTS

Method of Test: ASTM D 698

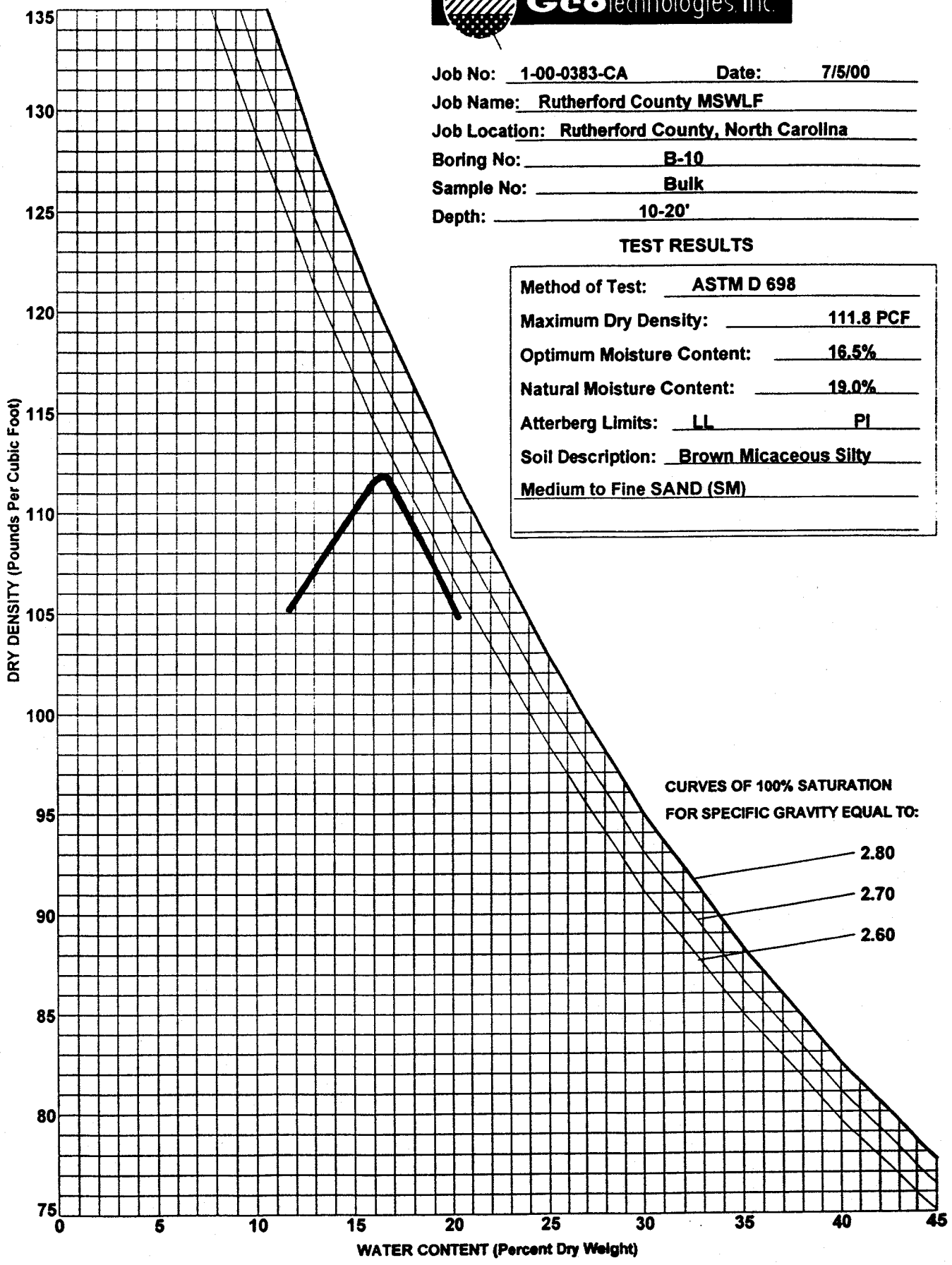
Maximum Dry Density: 111.8 PCF

Optimum Moisture Content: 16.5%

Natural Moisture Content: 19.0%

Atterberg Limits: LL PI

Soil Description: Brown Micaceous Silty Medium to Fine SAND (SM)



MOISTURE-DENSITY RELATIONSHIP

GeoTechnologies, Inc. PA

GeoTechnologies, Inc.

Job No: 1-00-0383-CA Date: 7/5/00

Job Name: Rutherford County MSWLF

Job Location: Rutherford County, North Carolina

Boring No: B-23

Sample No: Bulk

Depth: 0-20'

TEST RESULTS

Method of Test: ASTM D 698

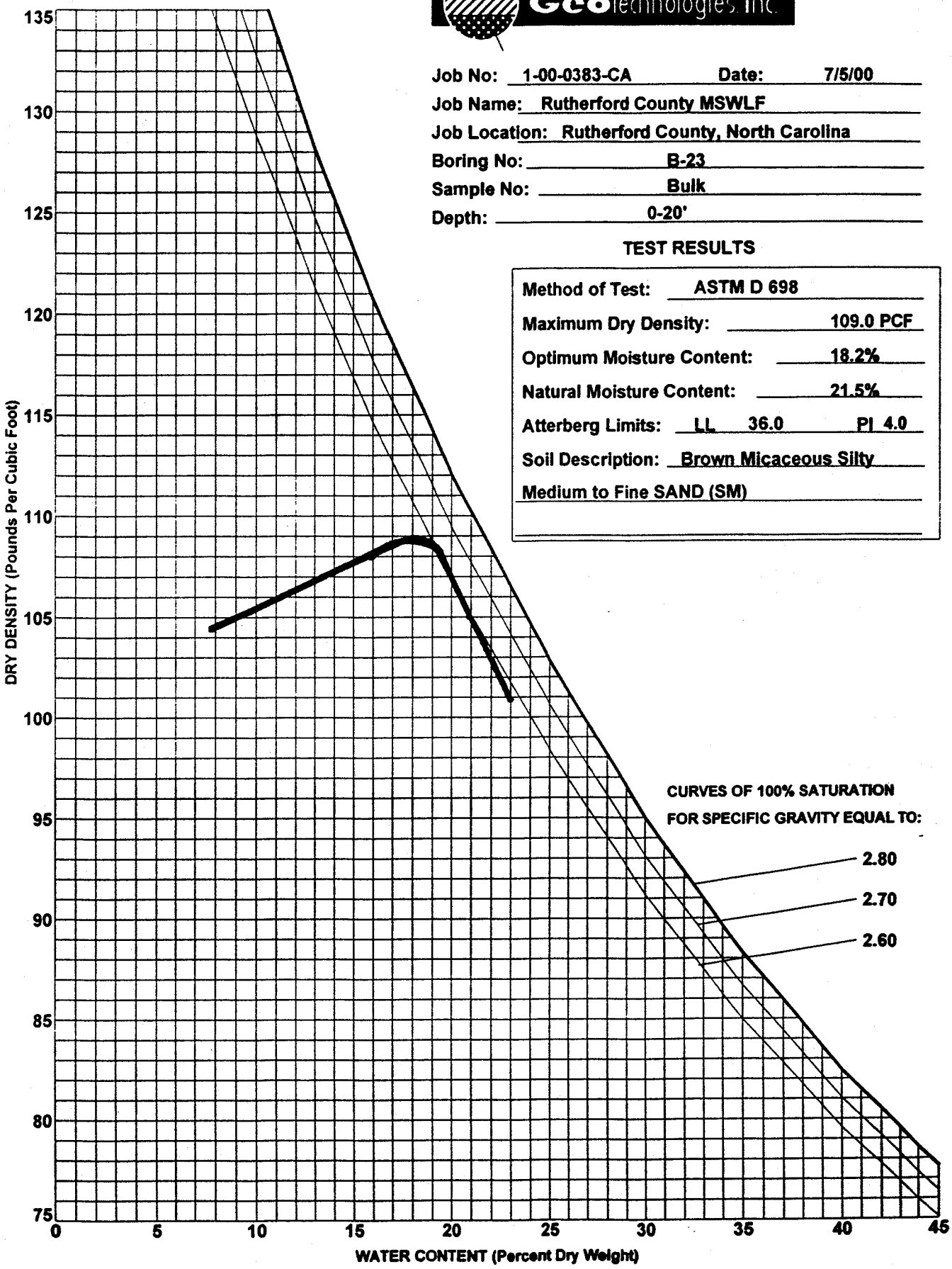
Maximum Dry Density: 109.0 PCF

Optimum Moisture Content: 18.2%

Natural Moisture Content: 21.5%

Atterberg Limits: LL 36.0 PI 4.0

Soil Description: Brown Micaceous Silty Medium to Fine SAND (SM)



MOISTURE-DENSITY RELATIONSHIP

GeoTechnologies, Inc. PA

GeoTechnologies Inc.

Job No: 1-00-0383-CA Date: 7/5/00

Job Name: Rutherford County MSWLF

Job Location: Rutherford County, North Carolina

Boring No: B-35

Sample No: 1.0

Depth: 0-20'

TEST RESULTS

Method of Test: ASTM D 698

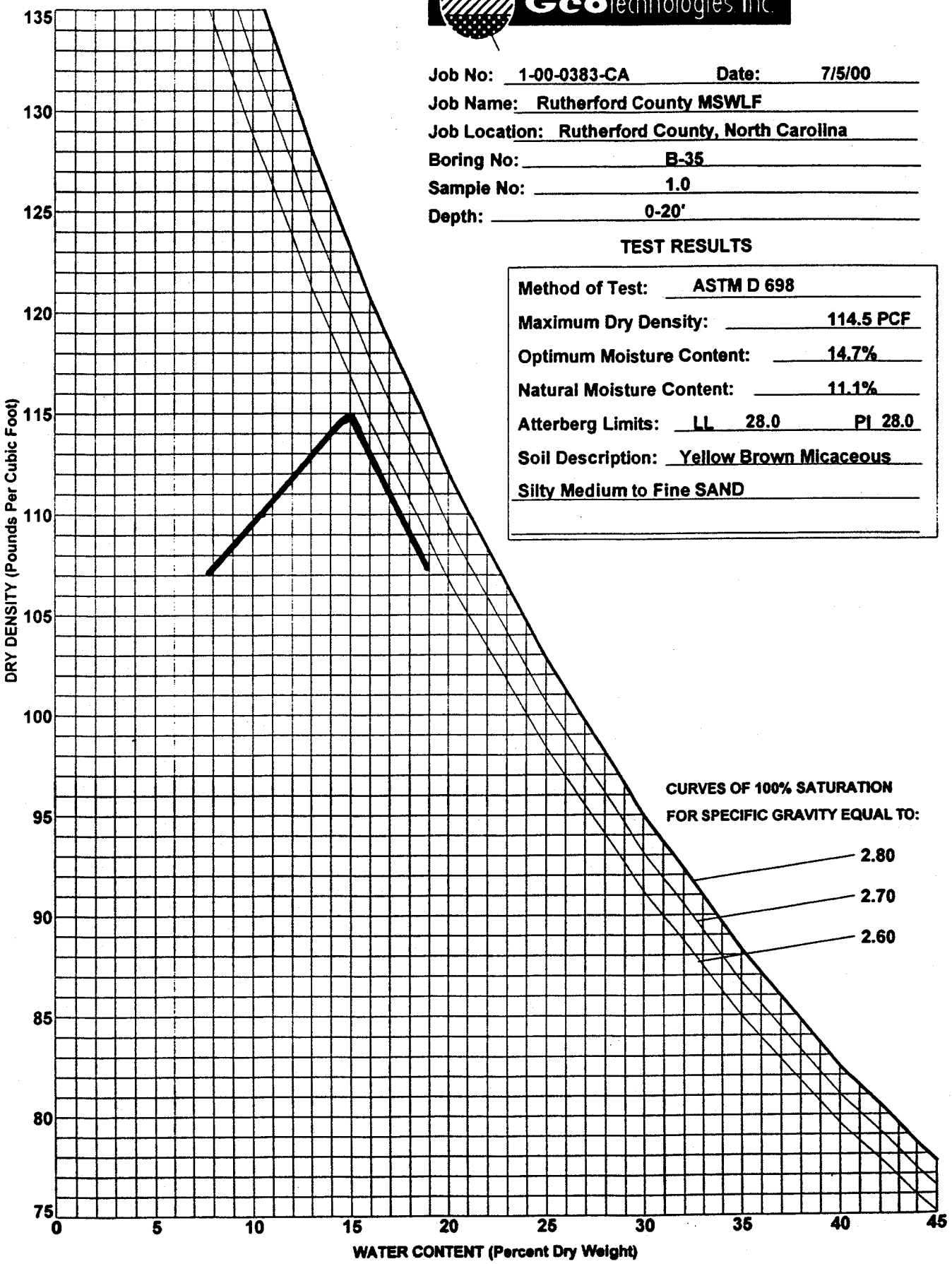
Maximum Dry Density: 114.5 PCF

Optimum Moisture Content: 14.7%

Natural Moisture Content: 11.1%

Atterberg Limits: LL 28.0 PI 28.0

Soil Description: Yellow Brown Micaceous Silty Medium to Fine SAND



MOISTURE-DENSITY RELATIONSHIP

GeoTechnologies, Inc. PA

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number:	1-00-0383-CA	**Job Name:**	Rutherford County Landfill				
Date:	30-Jun-00	**Sample I.D.**	B-9D	UD-1	**Depth:**	4' - 6'	

Soil Description: Brown, Gray Micaceous Silty Medium to Fine SAND

SAMPLE DATA

Type		Standard Proctor (ASTM D-698)	
Remolded	()	Max. Dry Density	lbs/cu.ft.
Undisturbed	(X)	Moisture Content	%
		Compaction	%

	Inches	cm.				
				Moisture Content	**31.0**	%
				Wet Density	**108.0**	lbs./cu.ft.
Length	**5.603**	**14.232**		Dry Density	**82.4**	lbs./cu.ft.
Diameter	**2.883**	**7.323**		Initial Saturation	**80.7**	%
Area	**6.528**	**42.116**		Final Saturation	**100.0**	%
Volume	**36.576**	**599.378**		Initial Void Ratio	**1.03**	
Wet Mass	**2.286**	**1037**	grams	Porosity	**50.7**	%
Dry Mass	**1.7452**	**791.6**	grams	Specific Gravity	**2.68**	apparent

TEST DATA

	L =	14.23 cm.	length of sample
hi = inflow burette	A =	42.116 sq.cm.	area of sample
ho = outflow burette	a =	0.852 sq.cm.	area of burettes
t = time	h1 =	head loss across specimen at t1	
	h2 =	head loss across specimen at t2	

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	**300**	94.3	1.2	**93.1**	85.7	9.8	**75.9**
0	**300**	85.7	9.8	**75.9**	78.8	16.7	**62.1**
0	**300**	78.8	16.7	**62.1**	73.0	22.5	**50.5**

ASTM D 5084

k = ((aaL/(At(a+a)))*ln(h1/h2)

				Percent Deviation
NOTE:	1	k =	9.80E-05	0.18%
5 PSI Confining Pressure	2	k =	9.63E-05	1.58%
1 PSI Driving Head	3	k =	9.92E-05	1.41%

Average k= 9.78E-05 cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number:	1-00-0383-CA	**Job Name:**	9	Rutherford County Landfill			
Date:	30-Jun-00	**Sample I.D.**	B-~~3~~D	UD-2	**Depth:**	8' - 10'	

Soil Description: Brown, Gray Micaceous Silty Medium to Fine SAND

SAMPLE DATA

Type		Standard Proctor (ASTM D-698)	
Remolded	()	Max. Dry Density	lbs/cu.ft.
Undisturbed	(X)	Moisture Content	%
		Compaction	%

	Inches	cm.				
				Moisture Content	**27.1**	%
				Wet Density	**124.0**	lbs./cu.ft.
Length	**5.823**	**14.790**		Dry Density	**97.6**	lbs./cu.ft.
Diameter	**2.888**	**7.336**		Initial Saturation	**101.6**	%
Area	**6.551**	**42.262**		Final Saturation	**100.0**	%
Volume	**38.144**	**625.075**		Initial Void Ratio	**0.71**	
Wet Mass	**2.737**	**1241.55**	grams	Porosity	**41.7**	%
Dry Mass	**2.1535**	**976.8**	grams	Specific Gravity	**2.68**	apparent

TEST DATA

	L =	14.79 cm.	length of sample
hi = inflow burette	A =	42.262 sq.cm.	area of sample
ho = outflow burette	a =	0.852 sq.cm.	area of burettes
t = time	h1 = head loss across specimen at t1		
	h2 = head loss across specimen at t2		

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	**61**	108.7	8.2	**100.5**	104.4	12.5	**91.9**
0	**61**	104.4	12.5	**91.9**	100.4	16.5	**83.9**
0	**122**	118.5	1.5	**117**	108.7	11.3	**97.4**

ASTM D 5084

k = ((aaL/(At(a+a)))*ln(h1/h2)

				Percent Deviation
NOTE:	1	k =	2.19E-04	1.41%
5 PSI Confining Pressure	2	k =	2.23E-04	0.37%
1 PSI Driving Head	3	k =	2.24E-04	1.03%

Average k= 2.22E-04 cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number:	1-00-0383-CA	**Job Name:**	Rutherford County MSWLF				
Date:	20-Jun-00	**Sample I.D.**	B-26S	UD-1	**Depth:**	8' - 10'	

Soil Description: Brown Micaceous Silty Medium to Fine SAND (SM)

SAMPLE DATA

Type		Standard Proctor (ASTM D-698)	
Remolded	()	Max. Dry Density	lbs/cu.ft.
Undisturbed	(X)	Moisture Content	%
		Compaction	%

	Inches	cm.				
				Moisture Content	**25.6**	%
				Wet Density	**123.1**	lbs./cu.ft.
Length	**3.693**	**9.380**		Dry Density	**98.0**	lbs./cu.ft.
Diameter	**2.890**	**7.341**		Initial Saturation	**93.6**	%
Area	**6.560**	**42.321**		Final Saturation	**100.0**	%
Volume	**24.225**	**396.978**		Initial Void Ratio	**0.75**	
Wet Mass	**1.725**	**782.64**	grams	Porosity	**42.9**	%
Dry Mass	**1.3737**	**623.1**	grams	Specific Gravity	**2.75**	apparent

TEST DATA

	L =	9.38 cm.	length of sample
hi = inflow burette	A =	42.321 sq.cm.	area of sample
ho = outflow burette	a =	0.852 sq.cm.	area of burettes
t = time	h1 =	head loss across specimen at t1	
	h2 =	head loss across specimen at t2	

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	**60000**	91.6	2.3	**89.3**	74.6	19.5	**55.1**
0	**15600**	92.5	0.6	**91.9**	86.9	5.9	**81**
0	**7080**	86.9	5.9	**81**	84.1	8.6	**75.5**

ASTM D 5084

k = ((aaL/(At(a+a)))*ln(h1/h2)

				Percent Deviation
NOTE:	1	k =	7.60E-07	7.40%
5 PSI Confining Pressure	2	k =	7.64E-07	6.88%
1 PSI Driving Head	3	k =	9.38E-07	14.28%

Average k= 8.21E-07 cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number:	1-00-0383-CA	**Job Name:**	Rutherford County MSWLF				
Date:	20-Jun-00	**Sample I.D.**	B-26S	UD-2	**Depth:**	13' - 15'	

Soil Description: Brown Micaceous Silty Medium to Fine SAND (SM)

SAMPLE DATA

Type		Standard Proctor (ASTM D-698)	
Remolded	()	Max. Dry Density	lbs/cu.ft.
Undisturbed	(X)	Moisture Content	%
		Compaction	%

	Inches	cm.				
				Moisture Content	**19.2**	%
				Wet Density	**115.0**	lbs./cu.ft.
Length	**3.232**	**8.209**		Dry Density	**96.5**	lbs./cu.ft.
Diameter	**2.892**	**7.346**		Initial Saturation	**67.8**	%
Area	**6.569**	**42.379**		Final Saturation	**100.0**	%
Volume	**21.230**	**347.904**		Initial Void Ratio	**0.78**	
Wet Mass	**1.413**	**641.01**	grams	Porosity	**43.8**	%
Dry Mass	**1.1855**	**537.8**	grams	Specific Gravity	**2.75**	apparent

TEST DATA

	L =	8.21 cm.	length of sample
hi = inflow burette	A =	42.379 sq.cm.	area of sample
ho = outflow burette	a =	0.852 sq.cm.	area of burettes
t = time	h1 = head loss across specimen at t1		
	h2 = head loss across specimen at t2		

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	**1140**	94	2.6	**91.4**	78.6	18	**60.6**
0	**1380**	94.3	0.9	**93.4**	75.9	19.3	**56.6**
0	**1080**	93.8	1.5	**92.3**	78.3	17	**61.3**

ASTM D 5084

k = ((aaL/(At(a+a)))*ln(h1/h2)

				Percent Deviation
NOTE:	1	k =	2.97E-05	1.90%
5 PSI Confining Pressure	2	k =	3.00E-05	1.23%
1 PSI Driving Head	3	k =	3.13E-05	3.13%

Average k= 3.03E-05 cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number:	1-00-0383-CA	**Job Name:**		Rutherford County Landfill		
Date:	30-Jun-00	**Sample I.D.**	B-8	Bulk	**Depth:**	0 - 20'

Soil Description: Brown Micaceous Silty Medium to Fine SAND

SAMPLE DATA

Type		Standard Proctor (ASTM D-698)		
Remolded	(X)	Max. Dry Density	**113.4**	lbs/cu.ft.
Undisturbed	()	Moisture Content	**14.8**	%
		Compaction	**97.7**	%

	Inches	cm.				
				Moisture Content	**17.6**	%
				Wet Density	**130.4**	lbs./cu.ft.
Length	**3.107**	**7.892**		Dry Density	**110.8**	lbs./cu.ft.
Diameter	**2.874**	**7.300**		Initial Saturation	**92.6**	%
Area	**6.487**	**41.853**		Final Saturation	**100.0**	%
Volume	**20.156**	**330.298**		Initial Void Ratio	**0.51**	
Wet Mass	**1.520**	**689.68**	grams	Porosity	**33.7**	%
Dry Mass	**1.2929**	**586.5**	grams	Specific Gravity	**2.68**	apparent

TEST DATA

	L =	7.89 cm.	length of sample
hi = inflow burette	A =	41.853 sq.cm.	area of sample
ho = outflow burette	a =	0.852 sq.cm.	area of burettes
t = time	h1 =	head loss across specimen at t1	
	h2 =	head loss across specimen at t2	

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	**15780**	93.6	0.6	**93**	84.1	10.1	**74**
0	**12420**	93.1	0.7	**92.4**	84.4	9.3	**75.1**
0	**13800**	93.7	1.0	**92.7**	84.3	10.4	**73.9**

ASTM D 5084

k = ((aaL/(At(a+a)))*ln(h1/h2)

				Percent Deviation
NOTE:	1	k =	1.16E-06	8.72%
5 PSI Confining Pressure	2	k =	1.34E-06	5.20%
1 PSI Driving Head	3	k =	1.32E-06	3.52%

Average k= 1.27E-06 cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number:	1-00-0383-CA	**Job Name:**		Rutherford County MSWLF		
Date:	25-Apr-00	**Sample I.D.**	B-10	Bulk	**Depth:**	10 - 20'

Soil Description: Brown Micaceous Silty Medium to Fine SAND (SM)

SAMPLE DATA

Type		Standard Proctor (ASTM D-698)		
Remolded	(X)	Max. Dry Density	111.8	lbs/cu.ft.
Undisturbed	()	Moisture Content	16.5	%
		Compaction	**97.8**	%

	Inches	cm.				
				Moisture Content	**19.0**	%
				Wet Density	**130.2**	lbs./cu.ft.
Length	**3.107**	**7.892**		Dry Density	**109.4**	lbs./cu.ft.
Diameter	**2.874**	**7.300**		Initial Saturation	**91.7**	%
Area	**6.487**	**41.853**		Final Saturation	**100.0**	%
Volume	**20.156**	**330.298**		Initial Void Ratio	**0.57**	
Wet Mass	**1.518**	**688.65**	grams	Porosity	**36.3**	%
Dry Mass	**1.2758**	**578.7**	grams	Specific Gravity	**2.75**	apparent

TEST DATA

	L =	7.89 cm.	length of sample
hi = inflow burette	A =	41.853 sq.cm.	area of sample
ho = outflow burette	a =	0.852 sq.cm.	area of burettes
t = time	h1 =	head loss across specimen at t1	
	h2 =	head loss across specimen at t2	

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	**70260**	106.3	11.9	**94.4**	86.6	31.6	**55**
0	**25860**	116.5	2.5	**114**	106.9	12.1	**94.8**
0	**74460**	106.9	12.1	**94.8**	89.3	29.7	**59.6**

ASTM D 5084

k = ((aaL/(At(a+a)))*ln(h1/h2)

				Percent Deviation
NOTE:	1	k =	6.18E-07	9.56%
5 PSI Confining Pressure	2	k =	5.73E-07	1.62%
1 PSI Driving Head	3	k =	5.01E-07	11.18%

Average k= 5.64E-07 cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number:	1-00-0383-CA	**Job Name:**	Rutherford County MSWLF				
Date:	25-Apr-00	**Sample I.D.**	B-23	Bulk	**Depth:**	0 - 20	

Soil Description: Brown Micaceous Silty Medium to Fine SAND (SM)

SAMPLE DATA

Type		Standard Proctor (ASTM D-698)		
Remolded	(X)	Max. Dry Density	109.0	lbs/cu.ft.
Undisturbed	()	Moisture Content	18.2	%
		Compaction	**97.1**	%

	Inches	cm.				
				Moisture Content	**21.5**	%
				Wet Density	**128.6**	lbs./cu.ft.
Length	**3.107**	**7.892**		Dry Density	**105.9**	lbs./cu.ft.
Diameter	**2.874**	**7.300**		Initial Saturation	**99.3**	%
Area	**6.487**	**41.853**		Final Saturation	**100.0**	%
Volume	**20.156**	**330.298**		Initial Void Ratio	**0.58**	
Wet Mass	**1.500**	**680.61**	grams	Porosity	**36.7**	%
Dry Mass	**1.2349**	**560.2**	grams	Specific Gravity	**2.68**	apparent

TEST DATA

	L =	7.89 cm.	length of sample
hi = inflow burette	A =	41.853 sq.cm.	area of sample
ho = outflow burette	a =	0.852 sq.cm.	area of burettes
t = time	h1 =	head loss across specimen at t1	
	h2 =	head loss across specimen at t2	

t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	**18180**	93.4	0.9	**92.5**	90.7	3.6	**87.1**
0	**22200**	94.1	2.7	**91.4**	90.9	5.9	**85**
0	**74220**	90.9	5.9	**85**	83.2	13.6	**69.6**

ASTM D 5084

k = ((aaL/(At(a+a)))*ln(h1/h2)

				Percent Deviation
NOTE:	1	k =	2.66E-07	7.06%
5 PSI Confining Pressure	2	k =	2.63E-07	5.80%
1 PSI Driving Head	3	k =	2.16E-07	12.86%

Average k= 2.48E-07 cm/sec

GeoTechnologies, Inc.

PERMEABILITY TEST

Job Number:	1-00-0383-CA	**Job Name:**	Rutherford County Landfill				
Date:	30-Jun-00	**Sample I.D.**	B-35	Bulk	**Depth:**	0 - 20	

Soil Description: Red Brown Micaceous Clayey Silty Medium to Fine SAND

SAMPLE DATA

Type

Remolded (X)

Undisturbed ()

Standard Proctor (ASTM D-698)

Max. Dry Density	**114.5**	lbs/cu.ft.
Moisture Content	**14.7**	%
Compaction	**98.2**	%

	Inches	cm.	
Length	**3.124**	**7.935**	
Diameter	**2.876**	**7.305**	
Area	**6.496**	**41.912**	
Volume	**20.295**	**332.568**	
Wet Mass	**1.540**	**698.33**	grams
Dry Mass	**1.3204**	**598.9**	grams

Moisture Content	**16.6**	%
Wet Density	**131.1**	lbs./cu.ft.
Dry Density	**112.4**	lbs./cu.ft.
Initial Saturation	**91.1**	%
Final Saturation	**100.0**	%
Initial Void Ratio	**0.49**	
Porosity	**32.8**	%
Specific Gravity	**2.68**	apparent

TEST DATA

hi = inflow burette

ho = outflow burette

t = time

L =	7.93 cm.	length of sample
A =	41.912 sq.cm.	area of sample
a =	0.852 sq.cm.	area of burettes

h1 = head loss across specimen at t1

h2 = head loss across specimen at t2

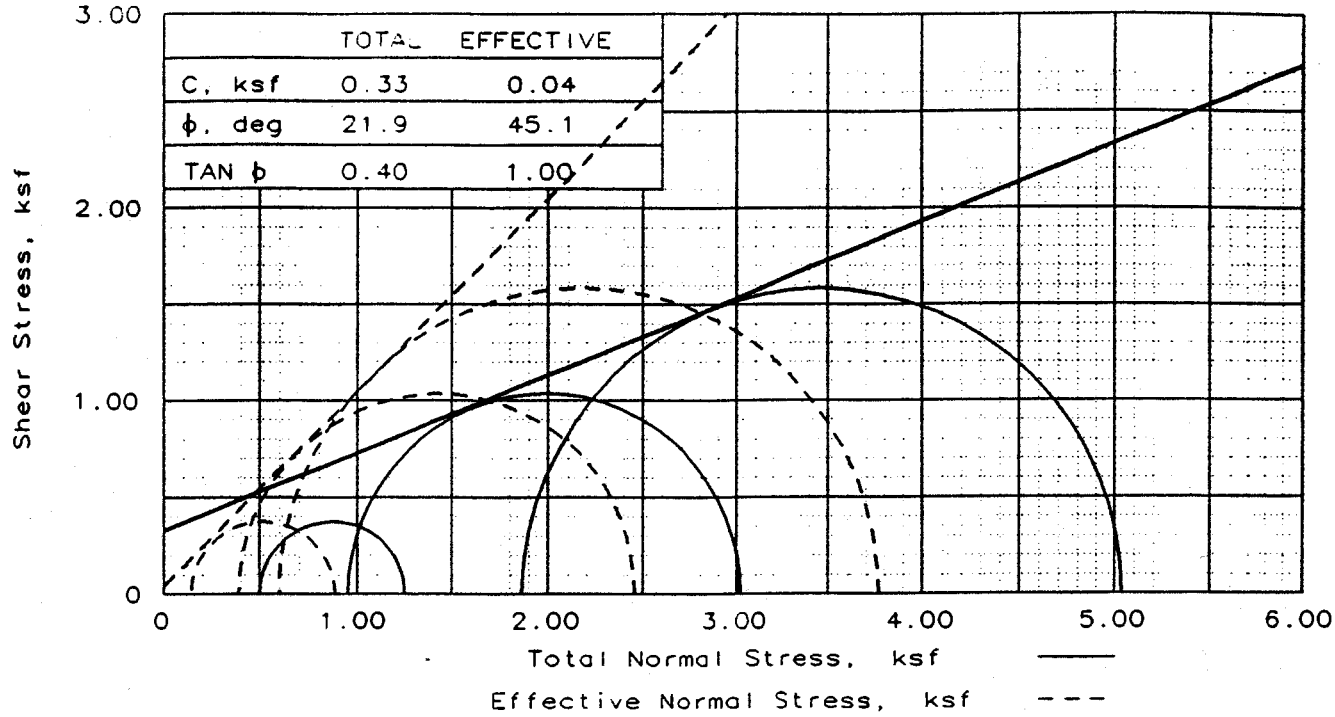
t1	t2	ho1	hi1	h1	ho2	hi2	h2
0	**15600**	93.7	0.7	**93**	90.3	4.1	**86.2**
0	**12960**	90.3	4.1	**86.2**	87.2	7.2	**80**
0	**16260**	87.2	7.2	**80**	83.7	10.7	**73**

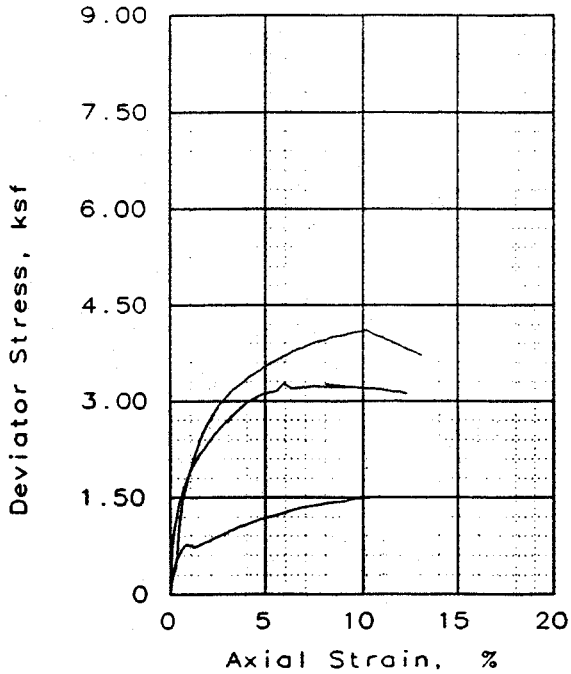
ASTM D 5084

k = ((aaL/(At(a+a)))*ln(h1/h2)

				Percent Deviation
NOTE:	1	k =	3.93E-07	10.19%
5 PSI Confining Pressure	2	k =	4.65E-07	6.28%
1 PSI Driving Head	3	k =	4.54E-07	3.91%

Average k= 4.37E-07 cm/sec





SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	29.9	30.1	26.4
	DRY DENSITY, pcf	92.9	95.3	94.4
	SATURATION, %	97.1	103.3	88.5
	VOID RATIO	0.848	0.801	0.819
	DIAMETER, in	2.89	2.89	2.86
	HEIGHT, in	5.61	5.82	5.60
AT TEST	WATER CONTENT, %	32.9	32.7	35.6
	DRY DENSITY, pcf	97.0	100.2	99.2
	SATURATION, %	117.5	125.9	134.1
	VOID RATIO	0.770	0.714	0.730
	DIAMETER, in	2.85	2.84	2.81
	HEIGHT, in	5.53	5.73	5.51
Strain rate, in/min		3.004	0.004	0.004
BACK PRESSURE, ksf		5.77	5.73	5.73
CELL PRESSURE, ksf		6.28	6.68	7.60
FAILURE STRESS, ksf		0.75	2.07	3.17
PORE PRESSURE, ksf		6.13	6.29	7.00
ULTIMATE STRESS, ksf		0.75	2.07	2.59
PORE PRESSURE, ksf		6.13	6.29	6.97
$\bar{\sigma}_1$ FAILURE, ksf		0.89	2.46	3.77
$\bar{\sigma}_3$ FAILURE, ksf		0.14	0.39	0.6

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: UD
DESCRIPTION: Gray, Brown Fine Sandy Micaceouse SILT
LL= PL= PI=
SPECIFIC GRAVITY= 2.75
REMARKS:

CLIENT: David Garrett

PROJECT: Rutherford County MSWLF

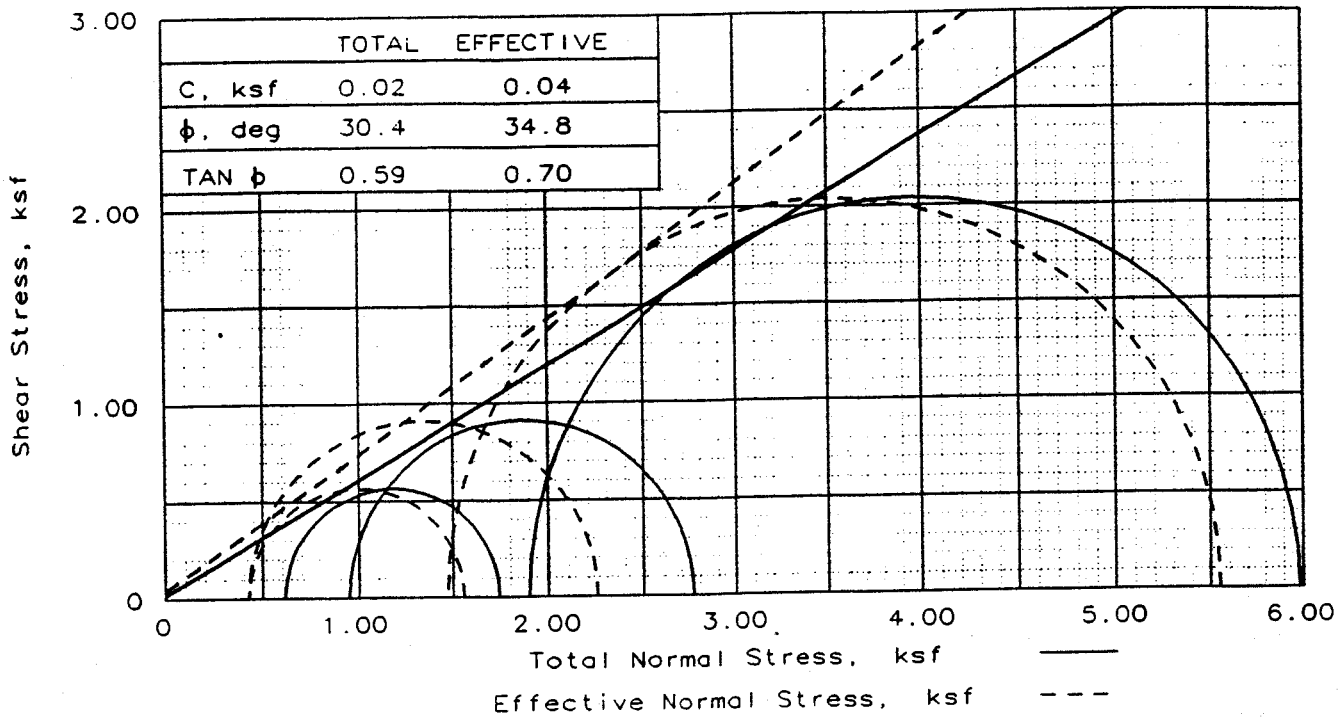
SAMPLE LOCATION: B-~~5~~9D UD 8' - 10'

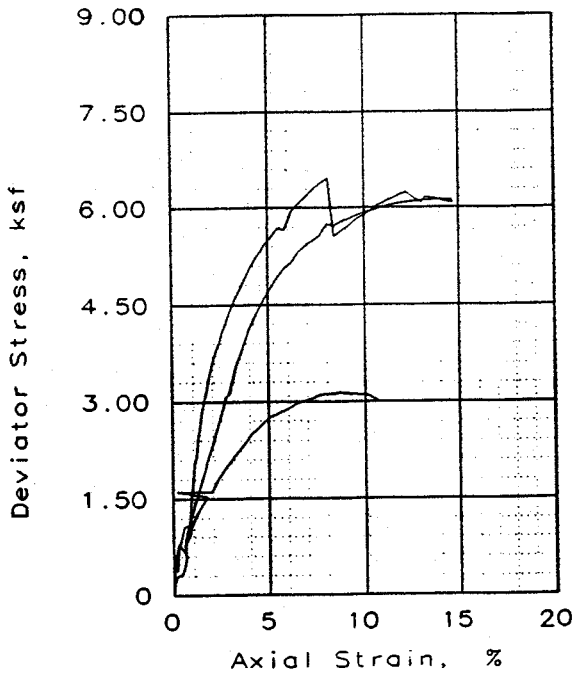
PROJ. NO.: 1-00-383-CA DATE: 5-25-00

TRIAXIAL SHEAR TEST REPORT

GEOTECHNOLOGIES, INC., P.A.

FIG. NO. 1





SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	26.0	33.7	31.0
	DRY DENSITY, pcf	86.7	78.0	82.4
	SATURATION, %	75.8	79.8	81.6
	VOID RATIO	0.908	1.120	1.007
	DIAMETER, in	2.88	2.89	2.88
	HEIGHT, in	5.60	5.60	5.60
AT TEST	WATER CONTENT, %	28.9	40.6	32.0
	DRY DENSITY, pcf	93.8	79.8	89.7
	SATURATION, %	100.0	100.3	100.3
	VOID RATIO	0.765	1.072	0.845
	DIAMETER, in	2.80	2.86	2.80
	HEIGHT, in	5.46	5.56	5.45
Strain rate, in/min		0.004	0.004	0.004
BACK PRESSURE, ksf		7.20	7.16	7.19
CELL PRESSURE, ksf		7.82	8.11	9.09
FAILURE STRESS, ksf		1.13	1.82	4.08
PORE PRESSURE, ksf		7.39	7.68	7.62
ULTIMATE STRESS, ksf		1.13	1.82	4.08
PORE PRESSURE, ksf		7.39	7.68	7.62
$\bar{\sigma}_1$ FAILURE, ksf		1.56	2.25	5.55
$\bar{\sigma}_3$ FAILURE, ksf		0.43	0.43	1.47

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: Undisturbed
DESCRIPTION: Brown, Gray Mica
Silty Fine SAND
LL= 50 PL= 49 PI= 1
SPECIFIC GRAVITY= 2.65
REMARKS:

CLIENT: David Garrett, P.E.

PROJECT: Rutherford County Landfill

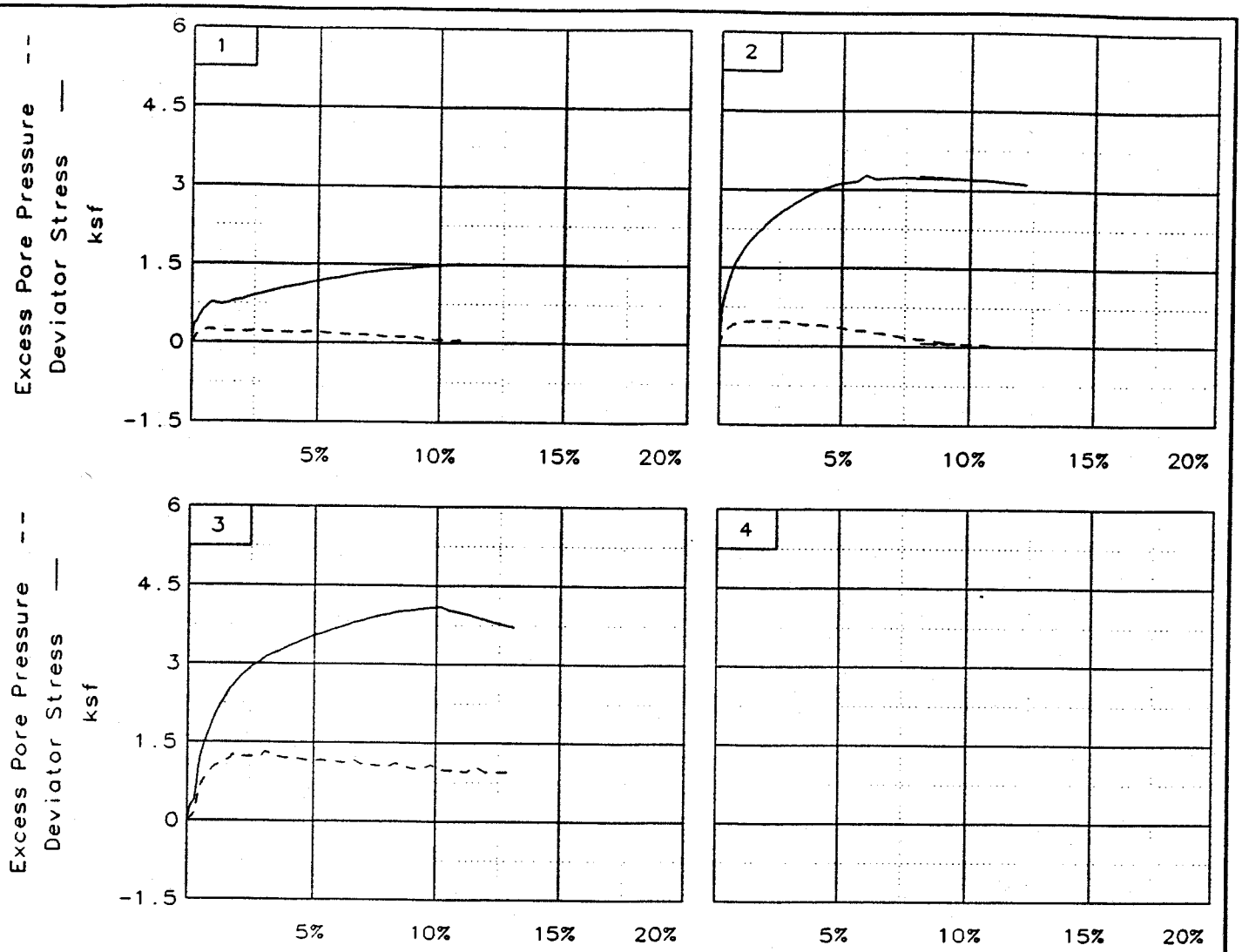
SAMPLE LOCATION: B-9D UD-1 4' - 6'

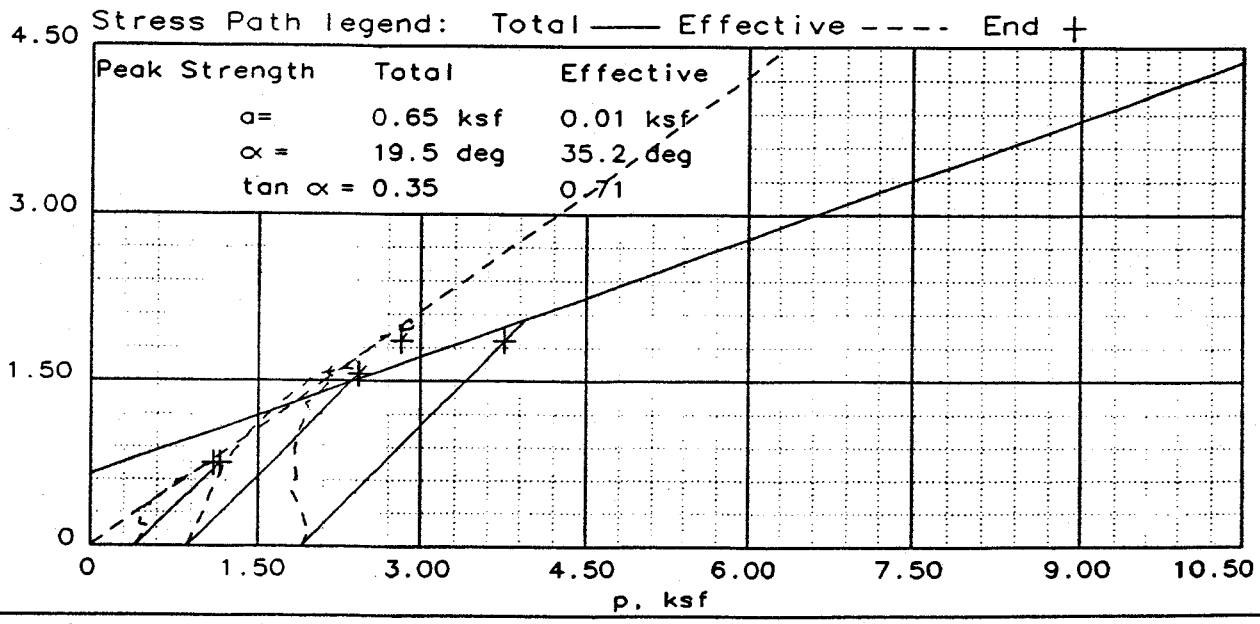
PROJ. NO.: 1-00-383-CA DATE: 6-30-00

TRIAXIAL SHEAR TEST REPORT

GEOTECHNOLOGIES, INC., P.A.

FIG. NO. 1



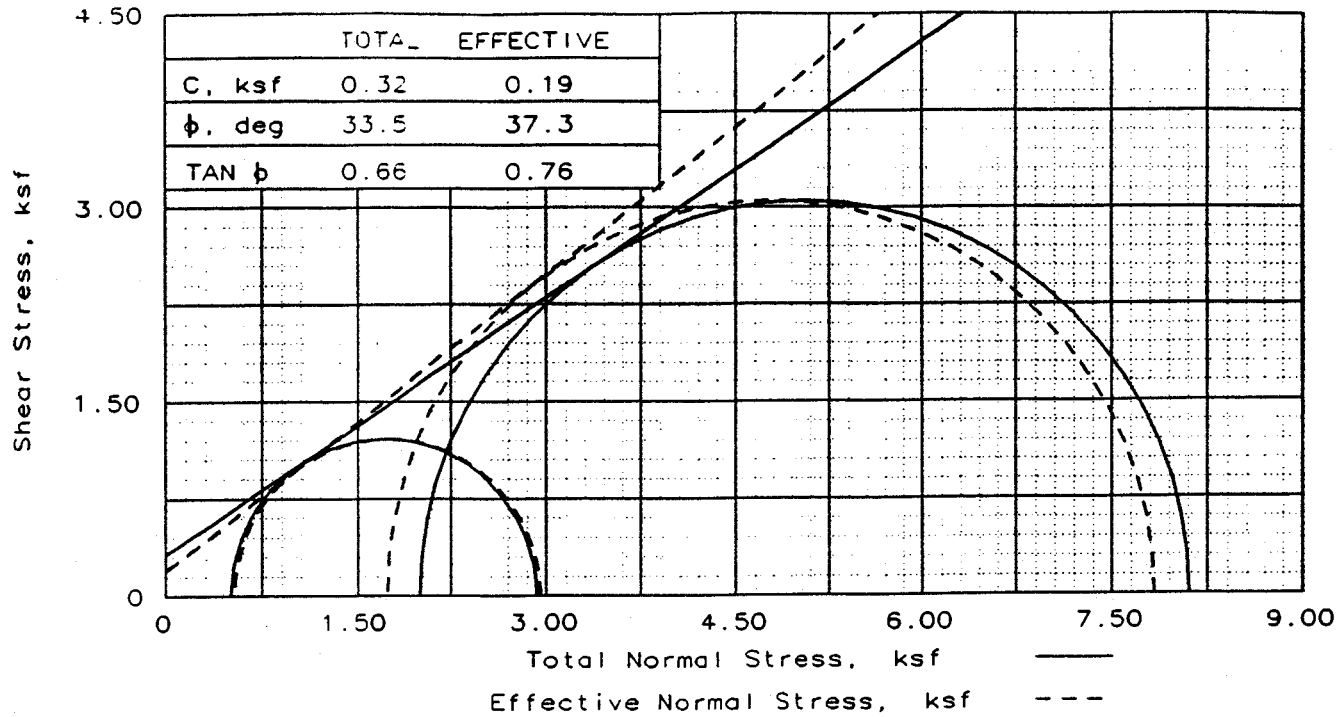


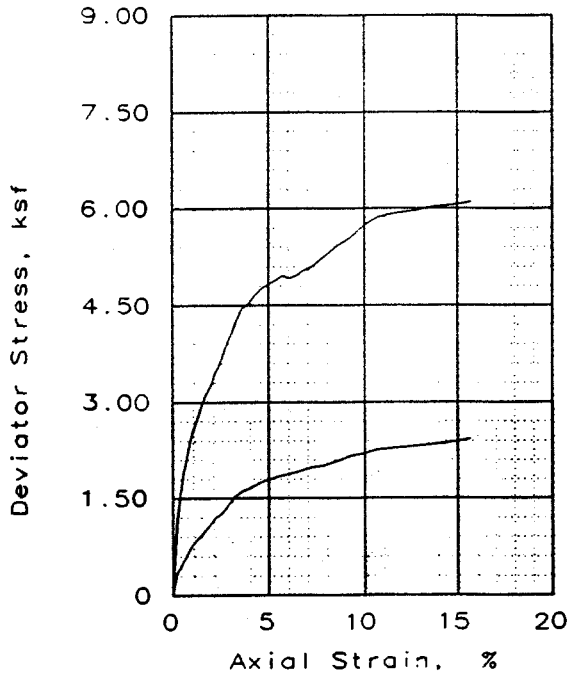
Client: David Garrett

Project: Rutherford County MSWLF

Location: B-~~6~~9D UD 8' - 10'

File: RUTH-1 Project No.: 1-00-383-CA Page 2/2 Fig. No. 1





SAMPLE NO.		1	2
INITIAL	WATER CONTENT, %	14.7	14.7
	DRY DENSITY, pcf	111.0	111.1
	SATURATION, %	77.5	77.8
	VOID RATIO	0.508	0.506
	DIAMETER, in	1.40	1.40
	HEIGHT, in	2.82	2.82
AT TEST	WATER CONTENT, %	18.7	18.2
	DRY DENSITY, pcf	111.4	112.4
	SATURATION, %	100.0	100.0
	VOID RATIO	0.501	0.488
	DIAMETER, in	1.39	1.39
	HEIGHT, in	2.81	2.81
Strain rate, in/min		0.004	0.004
BACK PRESSURE, ksf		7.20	7.19
CELL PRESSURE, ksf		7.70	9.19
FAILURE STRESS, ksf		2.42	6.11
PORE PRESSURE, ksf		7.17	7.46
ULTIMATE STRESS, ksf		0.89	3.30
PORE PRESSURE, ksf		7.55	8.32
$\bar{\sigma}_1$ FAILURE, ksf		2.96	7.83
$\bar{\sigma}_3$ FAILURE, ksf		0.53	1.73

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: Remolded
DESCRIPTION: Brown Micaceous
Medium To Fine Sandy SILT
LL= 37 PL= 29 PI= 8
SPECIFIC GRAVITY= 2.68
REMARKS:

CLIENT: David Garrett, P.E.

PROJECT: Rutherford County Landfill

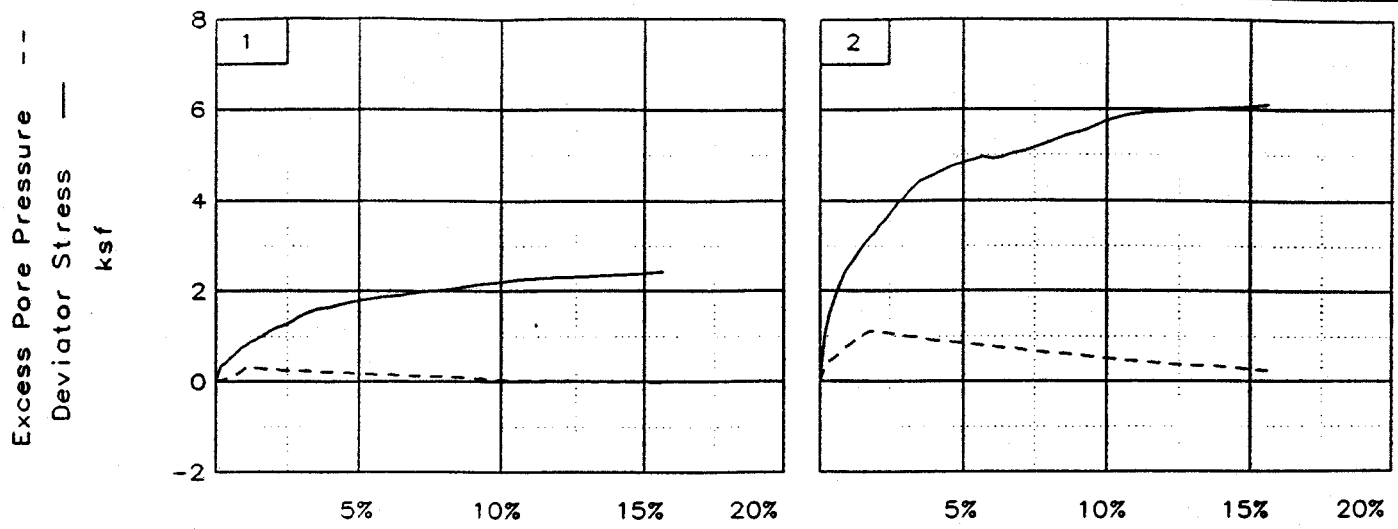
SAMPLE LOCATION: B-8 Bulk 0 - 20'

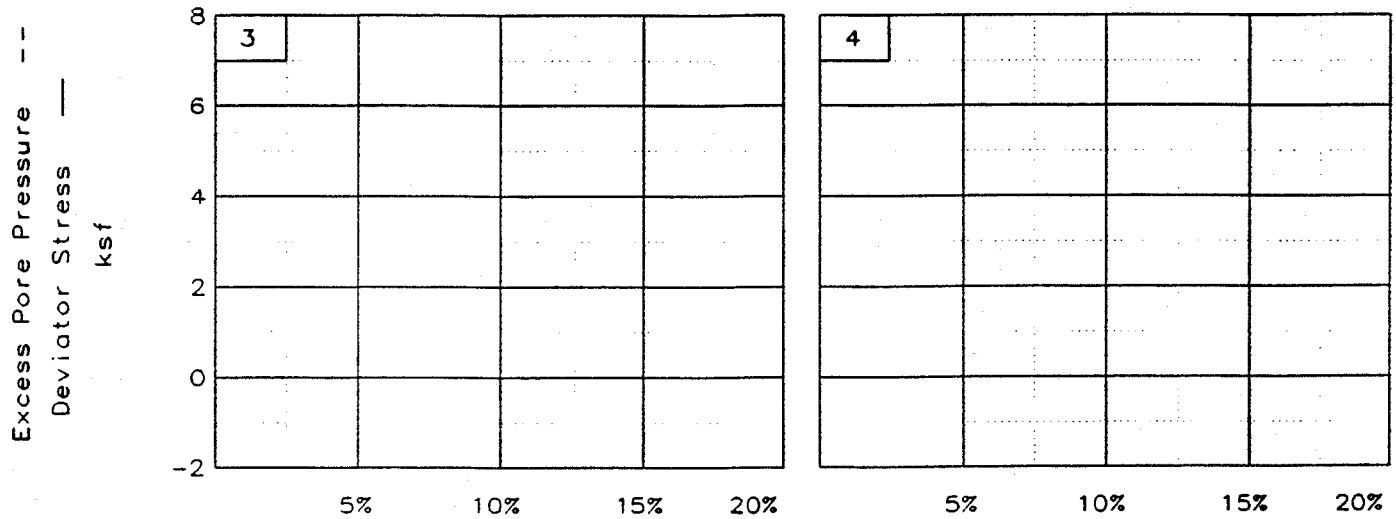
PROJ. NO.: 1-00-383-CA DATE: 6-30-00

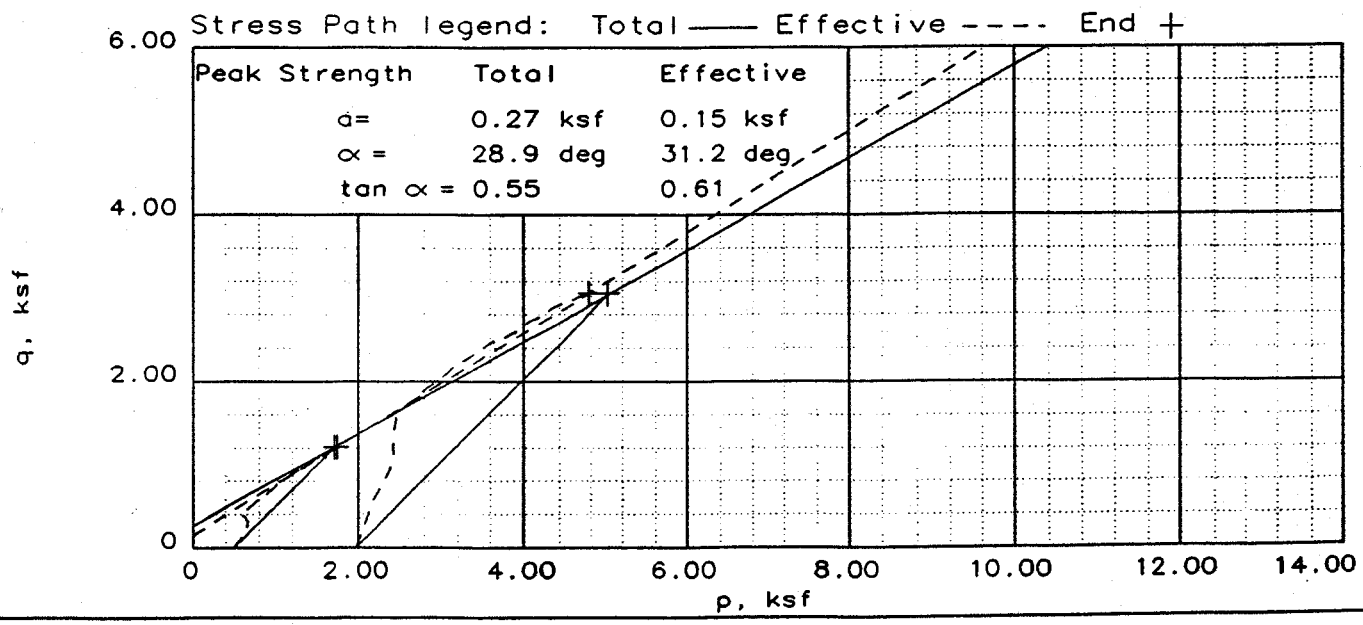
TRIAXIAL SHEAR TEST REPORT

GEOTECHNOLOGIES, INC., P.A.

FIG. NO. 1





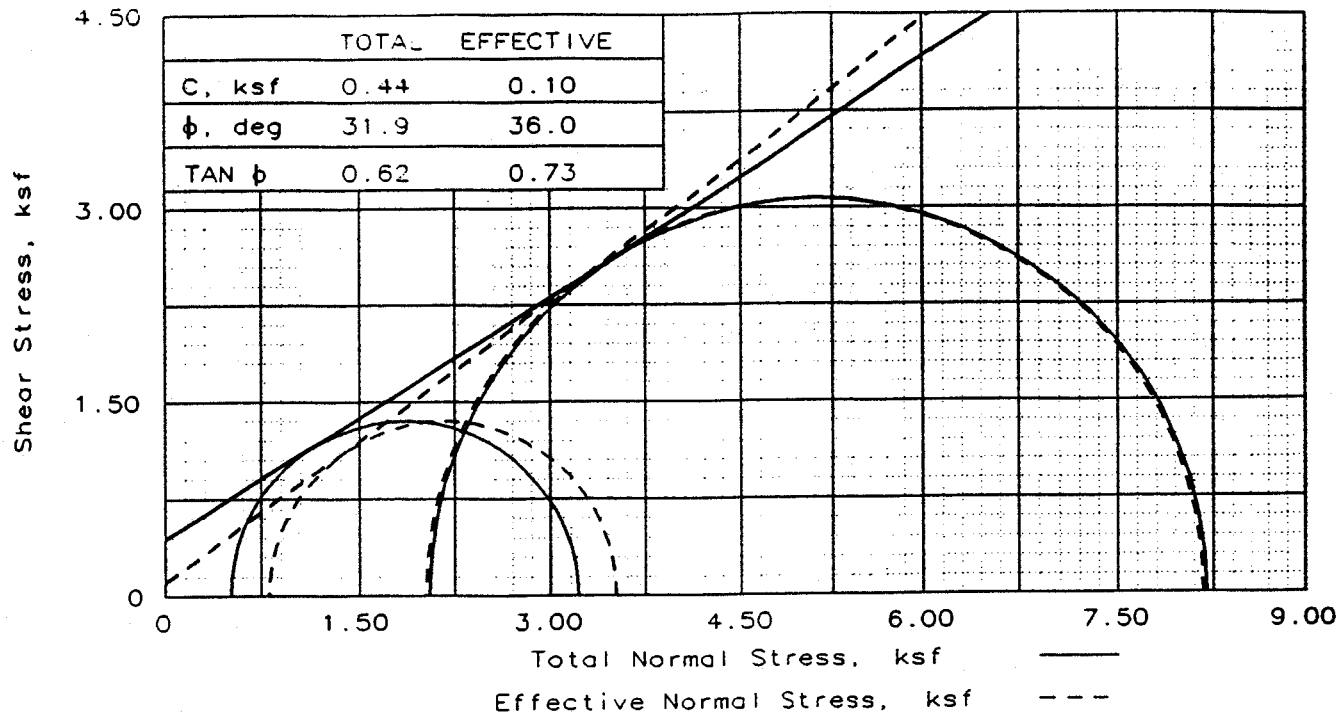


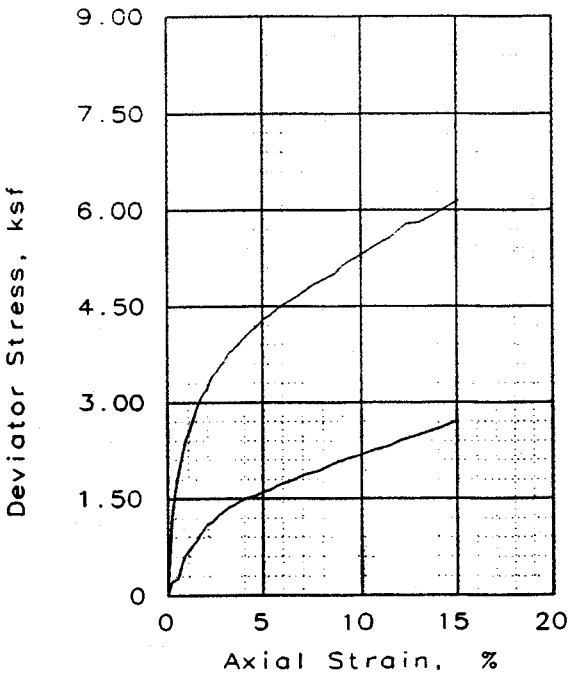
Client: David Garrett, P.E.

Project: Rutherford County Landfill

Location: B-8 Bulk 0 - 20'

File: R8 Project No.: 1-00-383-CA Page 2/2 Fig. No. 1





SAMPLE NO.		1	2
INITIAL	WATER CONTENT, %	18.0	18.0
	DRY DENSITY, pcf	106.9	107.7
	SATURATION, %	85.3	87.1
	VOID RATIO	0.564	0.553
	DIAMETER, in	1.40	1.40
	HEIGHT, in	2.82	2.82
AT TEST	WATER CONTENT, %	20.6	18.4
	DRY DENSITY, pcf	107.7	112.1
	SATURATION, %	100.0	100.2
	VOID RATIO	0.553	0.492
	DIAMETER, in	1.39	1.38
	HEIGHT, in	2.81	2.78
Strain rate, in/min		0.004	0.004
BACK PRESSURE, ksf		8.57	8.64
CELL PRESSURE, ksf		9.07	10.68
FAILURE STRESS, ksf		2.70	6.15
PORE PRESSURE, ksf		8.27	8.67
ULTIMATE STRESS, ksf		0.70	2.71
PORE PRESSURE, ksf		8.90	9.72
$\bar{\sigma}_1$ FAILURE, ksf		3.51	8.17
$\bar{\sigma}_3$ FAILURE, ksf		0.81	2.02

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: Remolded
DESCRIPTION: Brown Micaceous Silty Fine SAND
LL= 36 PL= 32 PI= 4
SPECIFIC GRAVITY= 2.68
REMARKS:

CLIENT: David Garrett, P.E.

PROJECT: Rutherford County Land Fill

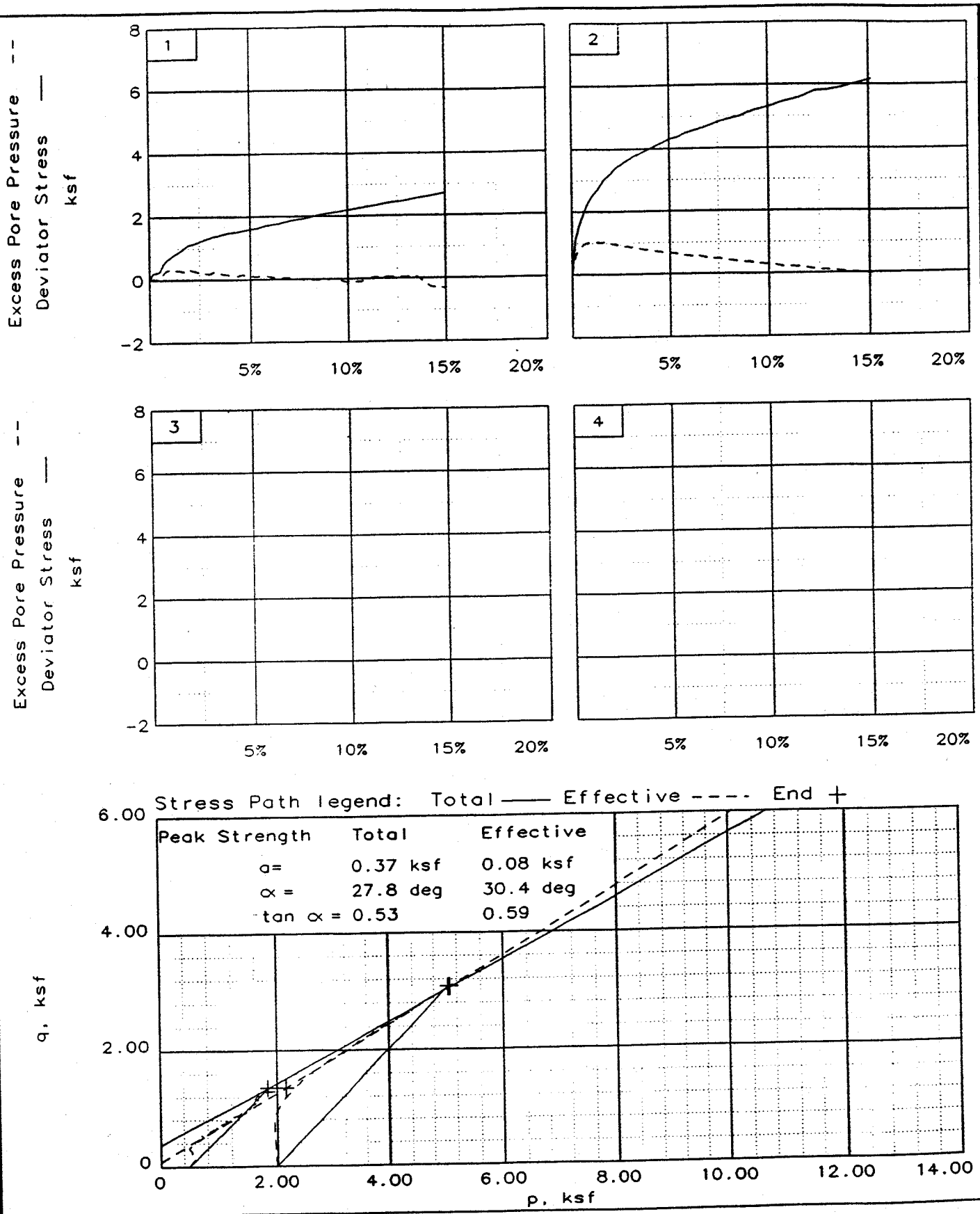
SAMPLE LOCATION: B-23 Bulk 0 - 20'

PROJ. NO.: 1-00-0383-A DATE: 6-30-00

TRIAXIAL SHEAR TEST REPORT

GEOTECHNOLOGIES, INC., P.A.

FIG. NO. 1



Client: David Garrett, P.E.

Project: Rutherford County Land Fill

Location: B-23 Bulk 0 - 20'

File: RUTHEB23 Project No.: 1-00-0383-A Page 2/2 Fig. No. 1

Appendix E

TABLE 1
SUMMARY OF MONITORING WELL DATA
CENTRAL SANITARY LANDFILL
RUTHERFORD COUNTY, NORTH CAROLINA
SEPTEMBER 17 & 18, 1998

	Well No.	Elevation				Depth[4] of Well (ft)	Static Water Levels[3]			
							March 25, 1998		September 17 & 18, 1998	
		Land Surface	Top of Casing[1]	Top of Screen	Bottom of Screen		Depth[2] (ft)	Elevation	Depth[2] (ft)	Elevation
AUG. REFUSAL	MW-2	995.43	995.51	945.43	935.43	60	40.68	954.83	39.52	955.99
	MW-3	859.62	860.28	822.62	812.62	47	30.79	829.49	33.47	826.81
	MW-4	849.72	851.03	809.72	799.72	50	31.24	819.79	32.02	819.01
795.43	MW-6	833.43	834.90	810.93	795.93	37.5	25.90	809.00	30.11	804.79
860.50	MW-7	890.51	892.70	851.51	836.51	54	32.20	860.50	36.50	856.20
≤ 810.86	MW-8	857.86	860.31	828.36	813.36	44.5	37.52	822.79	41.55	818.76
≤ 826.97	MW-9	864.97	867.25	842.47	827.47	37.5	29.43	837.82	33.30	833.95
	MW-10A	834.73	837.23	743.73	733.73	101	–	–	90.56[5]	746.67[5]
	MW-10B	834.50	836.15	802.50	797.50	37	–	–	9.13	827.02
	MW-10C	834.50	836.19	823.50	818.50	16	–	–	8.94	827.25
797.5	MW-10D	834.73	837.23	778.73	768.73	66	–	–	9.95	827.28
	MW-11A	815.39	817.18	780.39	770.39	45	–	–	9.06	808.12
779.4	MW-11B	816.02	817.72	806.32	796.32	20	–	–	10.71	807.01

Notes:

[1] Elevations determined by survey: Burnt Chimney Surveying, Forest City, NC, December 1998
[2] Depth to groundwater measured by BPA Environmental & Engineering, Inc.
[3] Water levels taken from Top of Casing
[4] Depth of well measured from land surface
[5] Does not represent static water level. Well has very slow recharge rate.

C:\123R23\RTHC9981.WK1

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C. | Boring No. MW-6
Project Central Sanitary Landfill | Type and Size 6.25 in. ID HS Auger
Total Depth (ft.) 38.00 | Elevation (ft.) 833.43 | Driller Badger Drilling, Inc.
Date Started 11/16/94 | Date Ended 11/16/94 | Logged By Julia I. Almy
Depth to Water (ft.) 23.57 | Date Measured 03/20/95 | Water Level Elevation (ft.) 809.86

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
2	831.4					
4	829.4					
		5 7	90%	SM	5.0 to 6.0 ft., SILT and MEDIUM to FINE GRAINED SAND, micaceous, brown and orange, moist.	
6	827.4	10 12			6.0 to 7.0 ft., SILT and FINE SAND, with little clay, stiff, micaceous, orange, dry.	
8	825.4					
10	823.4	5 7	90%	ML	10.0 to 10.5 ft., Same as above.	
		11 12			10.5 to 11.5 ft., SILT and SAND, stiff, orange with black streaks, saprolite with relict structure, dry.	
12	821.4				11.5 to 12.0 ft., SILT and FINE SAND, with little gray clay, mottled orange with gray, dry.	
14	819.4					
		5 7	95%	SM	FINE to MEDIUM GRAINED SAND and SILT, trace coarse quartz sand, micaceous, crumbles easily, white and orange with black streaks, moist.	
16	817.4	8 10				
18	815.4					
20	813.4					

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C.
Project Central Sanitary Landfill
Total Depth (ft.) 38.00 Elevation (ft.) 833.43
Date Started 11/16/94 Date Ended 11/16/94
Depth to Water (ft.) 23.57 Date Measured 03/20/95

Boring No. MW-6
Type and Size 6.25 in. ID HS Auger
Driller Badger Drilling, Inc.
Logged By Julia I. Almy
Water Level Elevation (ft.) 809.86

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
		12 19 21 27	95%	SM	FINE to MEDIUM GRAINED SAND and SILT, coarse quartz sand, weathered mica schist, crumbles easily, micaceous, olive brown and white with black streaks and relict structure, dry.	
22	811.4					
24	809.4					
		27 50/5	98%	SP	Weathered mica schist, quartz sand, dry.	
26	807.4					
28	805.4					
30	803.4	50/3	100%	SP SM	Same as above, with silt and fine sand, white, black and olive green, wet.	Very hard drilling from 30.0 to 38.0 feet.
32	801.4					
34	799.4					
36	797.4					
						Well set at 37.5 feet.
38	795.4					Auger refusal at 38.0 feet.
40	793.4					

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C. | Boring No. MW-7
Project Central Sanitary Landfill | Type and Size 5.88 in. Tricone, Mud Rotary
Total Depth (ft.) 55.00 | Elevation (ft.) 890.51 | Driller Badger Drilling, Inc.
Date Started 11/15/94 | Date Ended 11/16/94 | Logged By Julia I. Almy
Depth to Water (ft.) 30.75 | Date Measured 03/20/95 | Water Level Elevation (ft.) 859.76

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
2	888.5					
4	886.5					
		9 10	50%	ML	SILT with fine sand and little clay, micaceous, orange with black streaks, damp.	
6	884.5	8 8				
8	882.5					
10	880.5	12 6	70%	SM	FINE SAND with silt, very loose, micaceous, tan, white and black, saprolite with relict structure, dry.	
		10 12				
12	878.5					
14	876.5					
		9 9	65%	ML SW	15.0 to 16.0 ft., FINE SAND with silt, orange and black, dry.	
16	874.5	11 12			16.0 to 16.5 ft., COARSE to FINE SAND with quartz fragments, white.	
					16.5 to 17.0 ft., Same as 15.0 to 16.0 ft. above.	
18	872.5					
20	870.5					

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C.
Project Central Sanitary Landfill
Total Depth (ft.) 55.00
Elevation (ft.) 890.51
Date Started 11/15/94
Date Ended 11/16/94
Depth to Water (ft.) 30.75
Date Measured 03/20/95
Boring No. MW-7
Type and Size 5.88 in. Tricone, Mud Rotary
Driller Badger Drilling, Inc.
Logged By Julia I. Almy
Water Level Elevation (ft.) 859.76

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
		10 12 13 20	90%	SM	FINE to MEDIUM GRAINED SAND with silt, quartz fragments and mica, brown, white and orange with black streaks, saprolite with relict structure, damp.	
22	868.5					
						Hard quartz seam from 23.5 to 25.0 feet.
24	866.5					
		15 30 42 50/4	70%	SM	FINE to MEDIUM GRAINED SAND with silt, black and white, saprolite with relict structure, damp.	
26	864.5					
28	862.5					
30	860.5	50/3	100%	SM	SILT and FINE to MEDIUM GRAINED SAND, micaceous, very loose, crumbles easily, weathered rock, black and brown, damp.	Auger refusal at 30.0 feet. Begin Tricone Rotary drilling at 30.0 feet.
32	858.5					
34	856.5					
36	854.5					
38	852.5					
40	850.5					

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C. | Boring No. MW-7
Project Central Sanitary Landfill | Type and Size 5.88 in. Tricone, Mud Rotary
Total Depth (ft.) 55.00 | Elevation (ft.) 890.51 | Driller Badger Drilling, Inc.
Date Started 11/15/94 | Date Ended 11/16/94 | Logged By Julia I. Almy
Depth to Water (ft.) 30.75 | Date Measured 03/20/95 | Water Level Elevation (ft.) 859.76

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					.Tricone rotary drilling continued.	
					Hard biotite mica schist? Cuttings black and white and gray with traces of sand. Sand may indicate small fractures.	
42	848.5					
44	846.5					
46	844.5					
48	842.5					
50	840.5					
52	838.5					
54	836.5					Well set at 54.0 feet.
						Boring terminated at 55.0 feet.
56	834.5					
58	832.5					
60	830.5					

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C. | Boring No. MW-8
Project Central Sanitary Landfill | Type and Size 4.25 in. ID HS Auger
Total Depth (ft.) 45.00 | Elevation (ft.) 857.86 | Driller Badger Drilling, Inc.
Date Started 03/15/95 | Date Ended 03/15/95 | Logged By Julia I. Almy
Depth to Water (ft.) 34.84 | Date Measured 03/20/95 | Water Level Elevation (ft.) 823.02

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
2	855.9					
4	853.9					
		2 2	75%	ML	5.0 to 6.0 ft., SILT and FINE SAND with a trace of clay, micaceous, reddish brown, moist.	
6	851.9	4 3			6.0 to 7.0 ft., FINE to MEDIUM GRAINED SAND and SILT, pink, white, black and orange with relict structure, moist.	
8	849.9					
10	847.9	2 3	75%	ML	SILT and FINE SAND, micaceous, orange, gold and white with fine black bands and orange soil from 11.2 to 11.4 ft., saprolite with relict structure.	
		4 4				
12	845.9					
14	843.9					
		3 4	90%	ML	SILT and FINE SAND, trace clay and coarse quartz sand in bands, micaceous, salmon, white, orange and tan, saprolite, moist.	
16	841.9	4 5				
18	839.9					
20	837.9					

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C.
Project Central Sanitary Landfill
Total Depth (ft.) 45.00 Elevation (ft.) 857.86
Date Started 03/15/95 Date Ended 03/15/95
Depth to Water (ft.) 34.84 Date Measured 03/20/95

Boring No. MW-8
Type and Size 4.25 in. ID HS Auger
Driller Badger Drilling, Inc.
Logged By Julia I. Almy
Water Level Elevation (ft.) 823.02

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
		3 5 5 5	75%	ML	Same as above.	
22	835.9					
24	833.9					
		6 8 9 11	75%	ML	Same as above.	
26	831.9					
28	829.9					
30	827.9	2 3 9 12	95%	SM/ML	SILT and FINE SAND with trace coarse quartz sand and quartz fragments, micaceous, white, tan and black, saprolite with relict structure, damp.	
32	825.9					
34	823.9					
		7 12 12 14	75%	SP	Very fractured weathered rock (biotite gneiss/granite), large (1 in. wide) biotite plates and very coarse quartz sand, white and gray with orange and black in largest fractures, wet.	Shelby tube pushed 12 in. from 36.0 to 37.0 feet.
36	821.9					
38	819.9					
40	817.9					

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C. | Boring No. MW-8
Project Central Sanitary Landfill | Type and Size 4.25 in. ID HS Auger
Total Depth (ft.) 45.00 | Elevation (ft.) 857.86 | Driller Badger Drilling, Inc.
Date Started 03/15/95 | Date Ended 03/15/95 | Logged By Julia I. Almy
Depth to Water (ft.) 34.84 | Date Measured 03/20/95 | Water Level Elevation (ft.) 823.02

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
		6	75%	ML	SILT and FINE SAND, micaceous, orange, brown and black in fine layers, saprolite, wet.	
		10				
		15				
		17				
42	815.9					
44	813.9					
		29	75%	SM	45.0 to 45.5 ft., Coarse quartz sand,	
		43				Well set at 44.5 feet.
46	811.9	38			45.5 to 47.0 ft., SILT and FINE SAND, black and orange with white bands, saprolite, moist.	Boring terminated at 45.0 feet.
		21				
						Split spoon sampling terminated at 47.0 feet.
48	809.9					
50	807.9					
52	805.9					
54	803.9					
56	801.9					
58	799.9					
60	797.9					

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C.
Project Central Sanitary Landfill
Total Depth (ft.) 38.00 Elevation (ft.) 864.97
Date Started 03/15/95 Date Ended 03/16/95
Depth to Water (ft.) 29.37 Date Measured 03/20/95

Boring No. MW-9
Type and Size 4.25 in. ID HS Auger
Driller Badger Drilling, Inc.
Logged By Julia I. Almy
Water Level Elevation (ft.) 835.60

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
2	863.0					
4	861.0					
6	859.0	9 6 10 17	100%	ML	SILT and FINE SAND with trace clay, stiff, micaceous, orange, red, damp.	
8	857.0					
10	855.0	4 6 8 10	90%	ML	Same as above with quartz fragments.	
12	853.0					
14	851.0					
16	849.0	4 3 6 7	85%	ML	SILT and FINE SAND, soft, micaceous, yellow mottled with light orange and red, saprolite with relict structure, damp.	
18	847.0					
20	845.0					

BPA Environmental & Engineering, Inc.

Client Rutherford County, N.C.
Project Central Sanitary Landfill
Total Depth (ft.) 38.00 Elevation (ft.) 864.97
Date Started 03/15/95 Date Ended 03/16/95
Depth to Water (ft.) 29.37 Date Measured 03/20/95

Boring No. MW-9
Type and Size 4.25 in. ID HS Auger
Driller Badger Drilling, Inc.
Logged By Julia I. Almy
Water Level Elevation (ft.) 835.60

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
		8	85%	SM	FINE SAND, micaceous, tan and white with black bands, saprolite with relict structure, damp.	
		9				
		8				
		10				
22	843.0					
24	841.0					
		5	100%	ML	SILT and FINE SAND, mottled orange, black and white, saprolite, wet.	
		6				
26	839.0	8				
		11				
28	837.0					
30	835.0	4	100%	ML	Same as above.	
		7				
		7				
		13				
32	833.0					Shelby tube pushed 30 in. from 32.0 to 34.5 feet.
34	831.0					
		7	100%	ML	Same as above.	
		10				
36	829.0	13				
		16				
						Well set at 37.5 feet.
38	827.0					Boring terminated at 38.0 feet.
40	825.0					

BPA Environmental & Engineering, Inc.

Client	Rutherford County	Boring No.	MW-10 A/D
Project	Central Sanitary Landfill	Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	101.50	Elevation (ft.)	834.73
Driller	Richard Simmons Drilling		
Date Started	08/04/98	Date Ended	08/05/98
Logged By	Ken Vanhoy		
Depth to Water (ft.)	7.45	Date	09/18/98
Water Level Elevation (ft.)	827.28		

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					See boring log MW-10 B/C for split spoon sample description of soil profile from 0 to 37 feet.	
2	832.7					
4	830.7					
6	828.7					
8	826.7					
10	824.7					
12	822.7					
14	820.7					
16	818.7					
	816.7					
20	814.7					

BPA Environmental & Engineering, Inc.

Client	Rutherford County			Boring No.	MW-10 A/D
Project	Central Sanitary Landfill			Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	101.50	Elevation (ft.)	834.73	Driller	Richard Simmons Drilling
Date Started	08/04/98	Date Ended	08/05/98	Logged By	Ken Vanhoy
Depth to Water (ft.)	7.45	Date	09/18/98	Water Level Elevation (ft.)	827.28

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					See boring log MW-10 B/C for split spoon sample description of soil profile from 0 to 37 feet.	
22	812.7					
24	810.7					
26	808.7					
28	806.7					
30	804.7					
32	802.7					
34	800.7					
36	798.7					
					Rock fragments adhereing to lead auger from 37 feet consist of dark and light banded material indicative of Gneiss.	10.25-inch I.D. auger refusal at 37.0 ft.
	796.7				37 to 39 feet: Drill cuttings consist of a mixture of tan schistose rock fragments and milky quartz.	Drilled 2 ft. shoe into top of rock with 7 7/8 in. tricone rotary bit.
40	794.7					8-inch low carbon black steel pit casing set from surface to 39.0 ft.

BPA Environmental & Engineering, Inc.

Client	Rutherford County			Boring No.	MW-10 A/D
Project	Central Sanitary Landfill			Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	101.50	Elevation (ft.)	834.73	Driller	Richard Simmons Drilling
Date Started	08/04/98	Date Ended	08/05/98	Logged By	Ken Vanhoy
Depth to Water (ft.)	7.45	Date	09/18/98	Water Level Elevation (ft.)	827.28

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					39 to 45 feet: Drill cuttings consist of schist. Water expelled from borehole at 43.5 feet.	7 7/8-inch tricone rotary air drilling from 39 to 46 ft..
42	792.7					
44	790.7					
					45 to 46 feet: Drill cuttings consist of biotite, feldspar, and quartz (Gneiss?).	
46	788.7				46 to 47 feet: Drill cuttings consist of Gneiss, constant hammer chatter.	6.25-inch air hammer drilling with constant 200 lbs. of down
					47 to 48 feet: Drill cuttings consist of Gneiss, intermitent hammer chatter, fracture zone.	pressure from 46 to 101.5 ft.
48	786.7				48 to 51 feet: Drill cuttings consist of Gneiss, constant hammer chatter.	
						Drill rate @ 46 to 50 ft. = 3 min/ft.
50	784.7					
					51 to 52 feet: Drill cuttings consist of Gneiss mixed with schist and quartz, intermitent hammer chatter, fracture zone, drill stem pressure loss from 150 to 75 psi.	
52	782.7				52 to 56.5 feet: Drill cuttings consist of Gneiss, constant hammer chatter, very hard.	
54	780.7					Drill rate @ 50 to 55 ft. = 3.2 min/ft.
56	778.7				56.5 feet: Drill cuttings consist of Gneiss with an increase in the amount of quartz, hammer stopped chattering monmentanly, fracture.	
					56.5 to 57.5 feet: Drill cuttings consist of Gneiss, constant hammer chatter, very hard.	
	776.7				57.5 to 58 feet: Drill cuttings consist of Gneiss mixed with gold colored mica, intermitent hammer chatter, fracture zone.	
					58 to 93 feet: Drill cuttings consist of Gneiss, constant hammer chatter, very hard.	
60	774.7					

BPA Environmental & Engineering, Inc.

Client	Rutherford County	Boring No.	MW-10 A/D
Project	Central Sanitary Landfill	Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	101.50	Elevation (ft.)	834.73
Driller	Richard Simmons Drilling	Date Started	08/04/98
Date Ended	08/05/98	Logged By	Ken Vanhoy
Depth to Water (ft.)	7.45	Date	09/18/98
Water Level Elevation (ft.)	827.28		

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					Same as above	Drill rate @ 55 to 61 ft. = 2.8 min/ft.
62	772.7					
64	770.7					Drill rate @ 61.5 to 65 ft. = 3.5 min/ft.
66	768.7					
68	766.7					
						Drill rate @ 65 to 70 ft. = 3.6 min/ft.
70	764.7					
72	762.7					
74	760.7					Drill rate @ 70 to 75 ft. = 3.0 min/ft.
76	758.7					
	756.7					
						Drill rate @ 75 to 80 ft. = 2.4 min/ft.
80	754.7					

BPA Environmental & Engineering, Inc.

Client	Rutherford County			Boring No.	MW-10 A/D
Project	Central Sanitary Landfill			Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	101.50	Elevation (ft.)	834.73	Driller	Richard Simmons Drilling
Date Started	08/04/98	Date Ended	08/05/98	Logged By	Ken Vanhoy
Depth to Water (ft.)	7.45	Date	09/18/98	Water Level Elevation (ft.)	827.28

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					Same as above.	
82	752.7					
84	750.7					Drill rate @ 80 to 85 ft. = 4.0 min/ft.
86	748.7					
88	746.7					
						Drill rate @ 85 to 90 ft. = 2.6 min/ft.
90	744.7					
92	742.7					
					93 to 95 feet: Drill cuttings consist of darker colored Gneiss, constant hammer chatter, drill stem pressure dropped from 150 to 120 psi, driller indicated that formatiom alternated between hard and soft.	
94	740.7					Drill rate @ 90 to 95 ft. = 2.6 min/ft.
					95 to 98.5 feet: Drill cuttings consist of Gneiss, constant hammer chatter, very hard, drill stem pressure back up to 150 psi.	
96	738.7					
	736.7				98.5 to 99.5 feet: Drill cuttings consist of Gneiss, hammer stopped momentarily, drill stem pressure dropped to 100 psi.	
						Drill rate @ 95 to 100 ft. = 3.0 min/ft.
100	734.7					

BPA Environmental & Engineering, Inc.

Client	Rutherford County			Boring No.	MW-10 A/D
Project	Central Sanitary Landfill			Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	101.50	Elevation (ft.)	834.73	Driller	Richard Simmons Drilling
Date Started	08/04/98	Date Ended	08/05/98	Logged By	Ken Vanhoy
Depth to Water (ft.)	7.45	Date	09/18/98	Water Level Elevation (ft.)	827.28

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					99.5 to 101.5 feet: Drill cuttings consist of Gneiss, constant hammer chatter, drill stem pressure back to 150 psi.	Flow rate at surface from 101.5 ft = 7.5 gpm
102	752.7				Boring terminated at 101.5 feet.	
104	750.7					
106	748.7					
108	746.7					
110	744.7					
112	742.7					
114	740.7					
116	738.7					
118	736.7					
120	734.7					

BPA Environmental & Engineering, Inc.

Client	Rutherford County			Boring No.	MW-10 B/C
Project	Central Sanitary Landfill			Type and Size	10.25 in. ID HS Auger
Total Depth (ft.)	39.00	Elevation (ft.)	834.50	Driller	Richard Simmons Drilling
Date Started	08/06/98	Date Ended	08/06/98	Logged By	Ken Vanhoy
Depth to Water (ft.)	7.25	Date	09/18/98	Water Level Elevation (ft.)	827.25

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					Tan, reddish-brown SILT at surface.	
2	832.5					
4	830.5					
6	828.5	8 24 13 17	24	ML	Brown SILT with a little sand, hard. Note: Residual soil, gravel in bottom of spoon, dry.	
8	826.5					
10	824.5	13 14 10 12	75	ML	Top 6-inches brown SILT, very stiff, residual soil, dry. Bottom 12-inches gray, greenish-gray, micaceous SILT, very stiff, saprolite, damp.	
12	822.5					
14	820.5					
16	818.5	10 12 10 14	75	ML	Gray, tan, white micaceous SILT, trace sand, very stiff. Note: Saprolite layered dark and light, parent material gneiss?	Split spoon wet.
	816.5					
20	814.5					

BPA Environmental & Engineering, Inc.

Client	Rutherford County	Boring No.	MW-10 B/C
Project	Central Sanitary Landfill	Type and Size	10.25 in. ID HS Auger
Total Depth (ft.)	39.00	Elevation (ft.)	834.50
Driller	Richard Simmons Drilling		
Date Started	08/06/98	Date Ended	08/06/98
Logged By	Ken Vanhoy		
Depth to Water (ft.)	7.25	Date	09/18/98
Water Level Elevation (ft.)	827.25		

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
		10	100	ML	Same as above.	
		20				
		17				
		21				
22	812.5					
24	810.5					
		21	100	ML	Gray, tan, white, micaceous sandy SILT, very hard. Note: Weathered rock layered nearly vertically.	
		50/6				
26	808.5					
28	806.5					
30	804.5	50/5	60	SM	Tan, white, gray, micaceous silty SAND, very dense. Note: weathered rock, some iron staining.	
32	802.5					
34	800.5					
		50/3	100	SM	Same as above.	
36	798.5					
[illegible]	796.5					
					Split spoon sampling terminated at 35.25 feet. Auger refusal at 39.0 feet.	
40	794.5					

BPA Environmental & Engineering, Inc.

Client	Rutherford County	Boring No.	MW-11 A
Project	Central Sanitary Landfill	Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	100.00	Driller	Richard Simmons Drilling
Date Started	08/06/98	Logged By	Ken Vanhoy
Depth to Water (ft.)	7.27	Water Level Elevation (ft.)	808.12
Elevation (ft.)	815.39	Date Ended	08/08/98
Date	09/18/98		

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					See boring log MW-11 B for split spoon sample description of soil profile from 0 to 22 feet.	
2	813.4					
4	811.4					
6	809.4					
[illegible]	807.4					
10	805.4					
12	803.4					
14	801.4					
16	799.4					
18	797.4					
20	795.4					

BPA Environmental & Engineering, Inc.

Client	Rutherford County	Boring No.	MW-11 A
Project	Central Sanitary Landfill	Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	100.00	Elevation (ft.)	815.39
Date Started	08/06/98	Date Ended	08/08/98
Depth to Water (ft.)	7.27	Date	09/18/98
Driller	Richard Simmons Drilling	Logged By	Ken Vanhoy
Water Level Elevation (ft.)	808.12		

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
22	793.4					
24	791.4					
				MH	25 to 36 feet: Auger cuttings consist of grayish-tan clayey micaceous SILT with some sand. Note: Augering through hard and soft layers.	
26	789.4					
	787.4					
30	785.4					
32	783.4					
34	781.4					
36	779.4				36 to 37 feet: Drill cuttings consist of Gneiss and quartz.	10.25-inch I.D. auger refusal at 36.0 ft.
					37 to 40 feet: Drill cuttings consist of Gneiss and quartz, constant hammer chatter, water expelled from boring as soon as air hammer reached 37.0 feet.	Drilled 1 ft. shoe into top of rock with 7 7/8 in. tricone rotary bit.
38	777.4					8-inch low carbon black steel pit casing set at 37.0 ft.
40	775.4					

BPA Environmental & Engineering, Inc.

Client	Rutherford County	Boring No.	MW-11 A
Project	Central Sanitary Landfill	Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	100.00	Elevation (ft.)	815.39
Date Started	08/06/98	Date Ended	08/08/98
Depth to Water (ft.)	7.27	Date	09/18/98
Driller	Richard Simmons Drilling	Logged By	Ken Vanhoy
Water Level Elevation (ft.)	808.12		

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					40 to 42.5 feet: Drill cuttings consist of Gneiss, constant hammer chatter.	6.25-inch air hammer drilling with constant down pressure of 200 lbs. and constant drill stem pressure of 150 psi from 37 to 100 ft.
42	773.4				42.5 to 45 feet: Drill cuttings consist of quartz mixed with a little biotite (Granite?), constant hammer chatter.	Drill rate @ 40 to 45 ft. = 2.4 min/ft., flow rate =2.6 gpm. Water at surface ran thru 8" steel pipe and flow rate measured with gallon pale.
44	771.4					
					45 to 50 feet: Drill cuttings consist of layers of Granite? and biotite Gneiss?, constant hammer chatter.	Drill rate @ 45 to 50 ft. =2.2 min/ft., flow rate =3.8 gpm.
46	769.4					
	767.4					
50	765.4				50 to 55 feet: Drill cuttings consist of layers of dark (black) and light (white) colored cuttings (75% dark cuttings), Gneiss/Granite?, constant hammer chatter.	Drill rate @ 50 to 55 ft. = 2.4 min/ft., flow rate = 4.1 gpm.
52	763.4					
54	761.4					
					55 to 70 feet: Drill cuttings black, gray, overall medium gray, consisting of quartz, feldspar?, and biotite, Granite/Gneiss?, constant hammer chatter.	Drill rate @ 55 to 60 ft. = 2.6 min/ft., flow rate = 4.1 gpm.
56	759.4					
58	757.4					
60	755.4					

BPA Environmental & Engineering, Inc.

Client	Rutherford County	Boring No.	MW-11 A
Project	Central Sanitary Landfill	Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	100.00	Elevation (ft.)	815.39
Date Started	08/06/98	Date Ended	08/08/98
Depth to Water (ft.)	7.27	Date	09/18/98
Driller	Richard Simmons Drilling	Logged By	Ken Vanhoy
Water Level Elevation (ft.)	808.12		

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
						Drill rate @ 60 to 65 ft. = 2.6 min/ft., flow rate = 3.5 gpm.
62	753.4					
64	751.4					
						Drill rate @ 65 to 70 ft. = 2.0 min/ft., flow rate = 3.5 gpm.
66	749.4					
	747.4					
70	745.4				70 to 100 feet: Drill cuttings black, gray, overall medium to dark gray, consisting of quartz and biotite Gneiss, quartz vein at 93.0 feet, constant hammer chatter.	Drill rate @ 70 to 75 ft. = 1.8 min/ft., flow rate = 3.5 gpm.
72	743.4					
74	741.4					
						Drill rate @ 75 to 80 ft. = 2.0 min/ft., flow rate = 3.5 gpm.
76	739.4					
78	737.4					
80	735.4					

BPA Environmental & Engineering, Inc.

Client	Rutherford County	Boring No.	MW-11 A
Project	Central Sanitary Landfill	Type and Size	10.25" HSA/6.25" AH
Total Depth (ft.)	100.00	Elevation (ft.)	815.39
Date Started	08/06/98	Date Ended	08/08/98
Depth to Water (ft.)	7.27	Date	09/18/98
Driller	Richard Simmons Drilling	Logged By	Ken Vanhoy
Water Level Elevation (ft.)	808.12		

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					Same as above.	Drill rate @ 80 to 85 ft. = 2.4 min/ft., flow rate = 4.1 gpm.
82	733.4					
84	731.4					
						Drill rate @ 85 to 90 ft. = 2.0 min/ft., flow rate = 4.1 gpm.
86	729.4					
	727.4					
90	725.4					Drill rate @ 90 to 95 ft. = 2.4 min/ft., flow rate = 4.1 gpm.
92	723.4					
94	721.4					
						Drill rate @ 95 to 100 ft. = 2.4 min/ft., flow rate = 4.1 gpm.
96	719.4					
98	717.4					
					Note: No signs of fractures below 37 ft. bls based on constant hammer chatter, no drill stem pressure losses, no increase in flow rates except at drill rod connections. Boring terminated at 100 feet.	
100	715.4					

BPA Environmental & Engineering, Inc.

Client Rutherford County
Project Central Sanitary Landfill
Total Depth (ft.) 22.00 Elevation (ft.) 816.02
Date Started 08/08/98 Date Ended 08/08/98
Depth to Water (ft.) 9.01 Date 09/18/98

Boring No. MW-11 B
Type and Size 4.25 in. ID HS Auger
Driller Richard Simmons Drilling
Logged By Ken Vanhoy
Water Level Elevation (ft.) 807.01

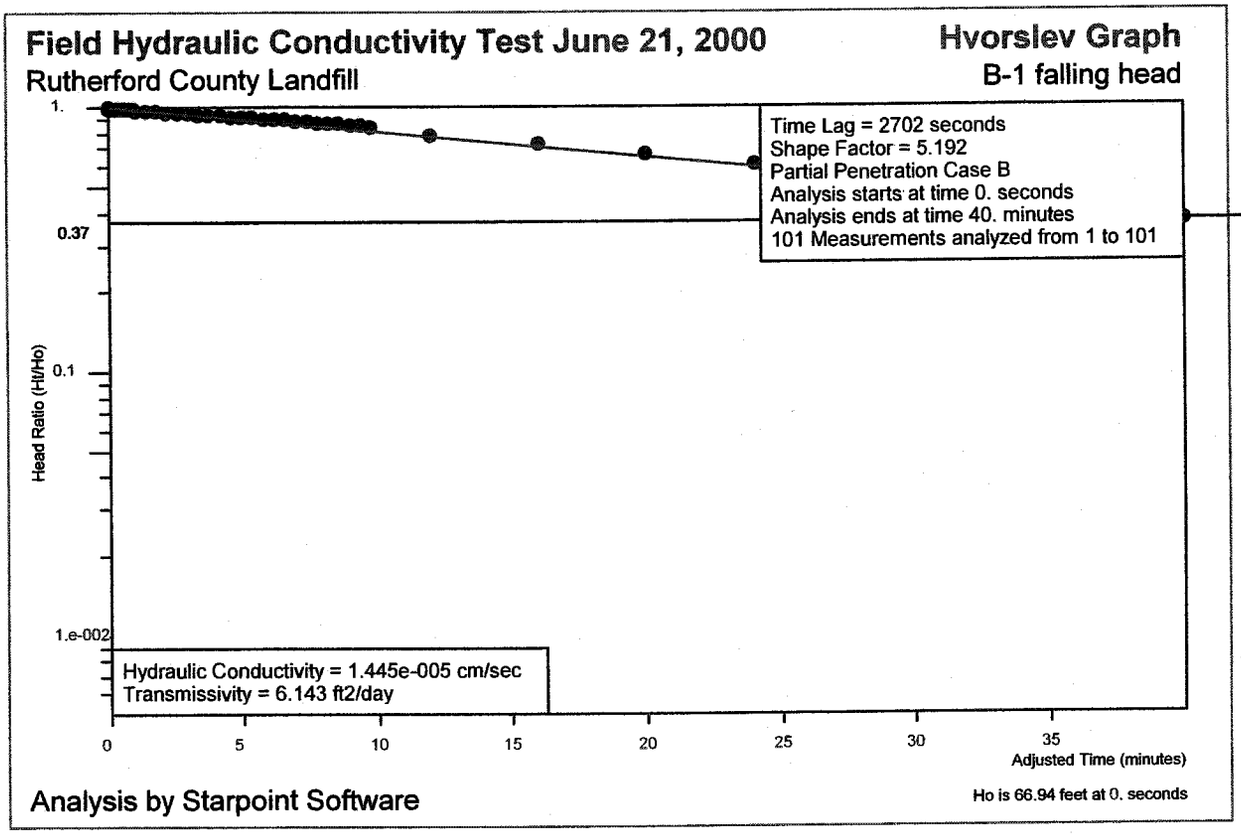
DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
					Brown sandy SILT at surface. Note: Fill, drill pad approximately 3 feet thick.	
2	814.0					
4	812.0					
6	810.0	4 5 6 7	75	ML	Brown sandy SILT, stiff. Note: Residual soil, dry.	
8	808.0					
10	806.0	3 4 4 7	58	SM	Tan, gravelly silty SAND, loose. Note: Residual soil, wet.	
12	804.0					
14	802.0					
16	800.0	3 5 7 8	88	ML	Alternating layers of white, tan, gray, vertically layered, micaceous SILT with a little sand, stiff. Note: Saprolite, wet.	
	798.0					
20	796.0					

BPA Environmental & Engineering, Inc.

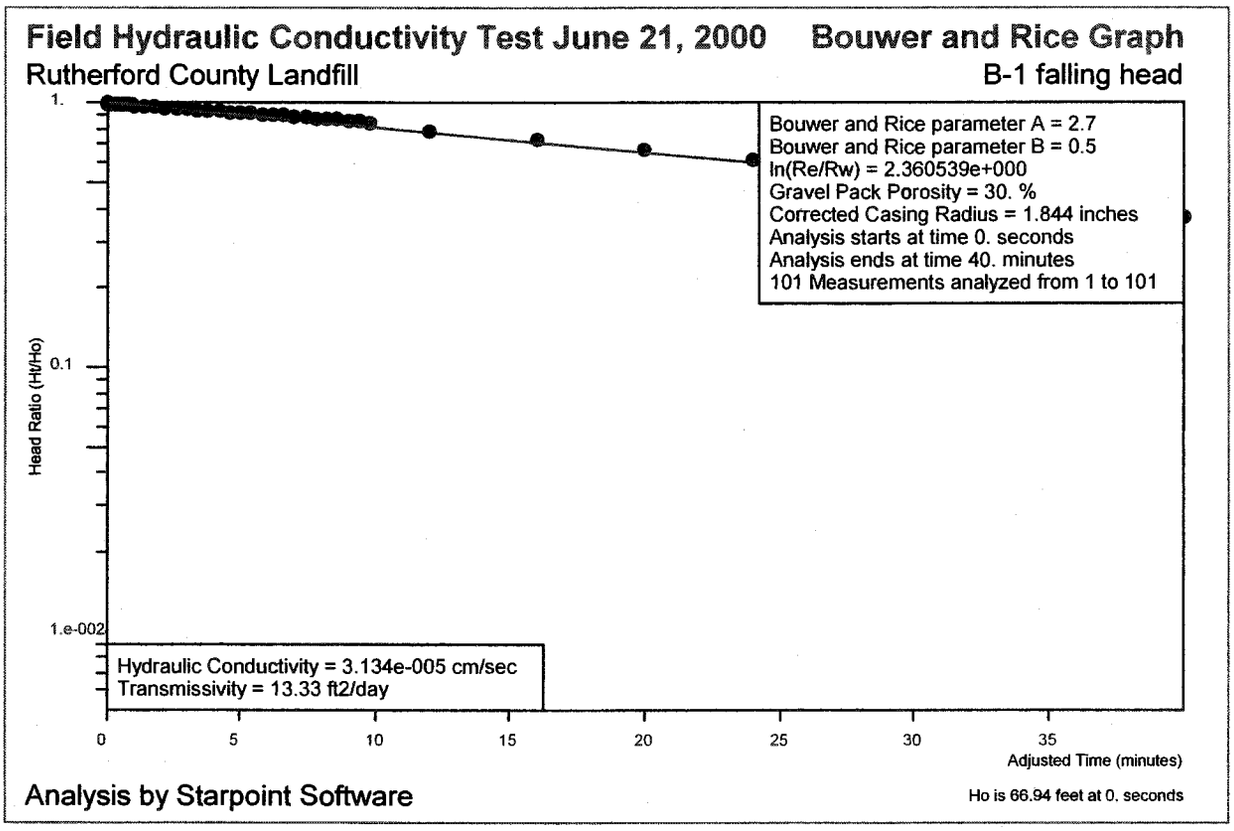
Client Rutherford County | Boring No. MW-11 B
Project Central Sanitary Landfill | Type and Size 4.25 in. ID HS Auger
Total Depth (ft.) 22.00 | Elevation (ft.) | Driller Richard Simmons Drilling
Date Started 8/8/98 | Date Ended 08/08/98 | Logged By Ken Vanhoy
Depth to Water (ft.) | Date Measured | Water Level Elevation (ft.)

DEPTH (FEET)	ELEVATION (ft. AMSL)	BLOWS per 6 in.	PERCENT RECOVERY	UNIFIED CLASS.	LITHOLOGIC DESCRIPTION	Remarks
		3 6 8 8	100	ML	Tan, gray, green, sandy SILT with a little mica, stiff. Note: Saprolite, wet.	
22					Auger boring terminated at 20.0 feet. Split spoon sampling terminated at 22.0 feet.	
24						
26						
28						
30						
32						
34						
36						
40						

Appendix F


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-1 falling head
Time Lag = 2702 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 40. minutes
101 Measurements analyzed from 1 to 101
Hydraulic Conductivity = 1.445e-005 cm/sec
Transmissivity = 6.143 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
35
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 66.94 feet at 0. seconds

T


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-1 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.360539e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 40. minutes
101 Measurements analyzed from 1 to 101
Hydraulic Conductivity = 3.134e-005 cm/sec
Transmissivity = 13.33 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
25
30
35
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 66.94 feet at 0. seconds

Field Hydraulic Conductivity Test

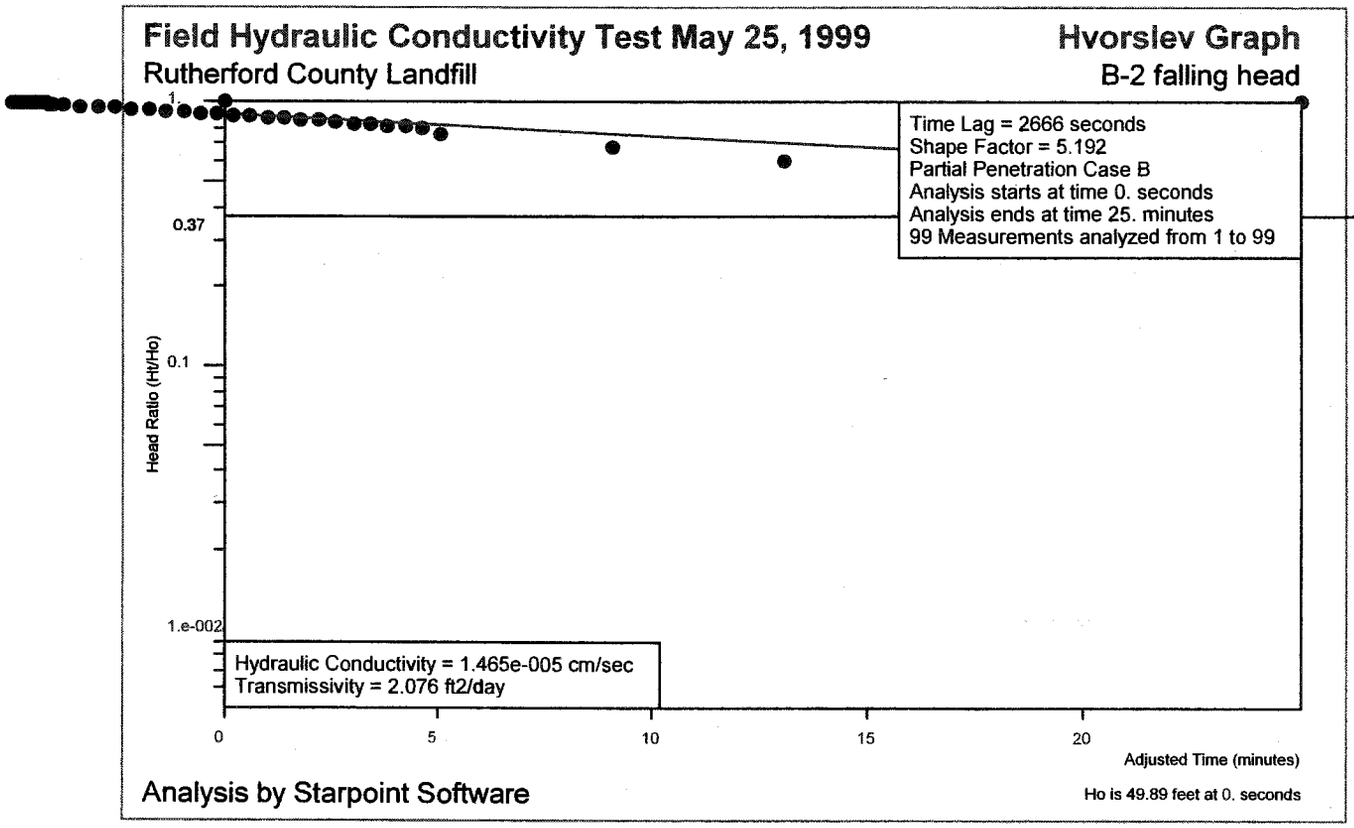
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B1S0

Well Label: B-1 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 66.94 feet
Water Table to Screen Bottom: 13.2 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 101 time and drawdown measurements
Maximum head is 66.94 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	66.94	1.
2	6.6e-003	6.6e-003	1.e-002	66.93	0.9999
3	1.33e-002	1.33e-002	1.66e-002	66.92	0.9998
4	2.e-002	2.e-002	2.33e-002	66.92	0.9997
5	2.66e-002	2.66e-002	3.e-002	66.91	0.9996
6	3.33e-002	3.33e-002	3.66e-002	66.9	0.9995
7	4.e-002	4.e-002	4.33e-002	66.9	0.9994
8	4.66e-002	4.66e-002	5.e-002	66.89	0.9993
9	5.33e-002	5.33e-002	5.66e-002	66.88	0.9992
10	6.e-002	6.e-002	6.33e-002	66.88	0.9991
11	6.66e-002	6.66e-002	7.e-002	66.87	0.999
12	7.33e-002	7.33e-002	7.66e-002	66.86	0.9989
13	8.e-002	8.e-002	8.33e-002	66.86	0.9988
14	8.66e-002	8.66e-002	9.e-002	66.85	0.9987
15	9.33e-002	9.33e-002	9.66e-002	66.84	0.9986
16	0.1	0.1	0.1033	66.84	0.9985
17	0.1066	0.1066	0.11	66.83	0.9984
18	0.1133	0.1133	0.1166	66.82	0.9983
19	0.12	0.12	0.1233	66.82	0.9982
20	0.1266	0.1266	0.13	66.81	0.9981
21	0.1333	0.1333	0.1366	66.8	0.998
22	0.14	0.14	0.1433	66.8	0.9979
23	0.1466	0.1466	0.15	66.79	0.9978
24	0.1533	0.1533	0.1566	66.78	0.9977
25	0.16	0.16	0.1633	66.78	0.9976
26	0.1666	0.1666	0.17	66.77	0.9975
27	0.1733	0.1733	0.1766	66.76	0.9974
28	0.18	0.18	0.1833	66.76	0.9973
29	0.1866	0.1866	0.19	66.75	0.9972
30	0.1933	0.1933	0.1966	66.74	0.9971
31	0.2	0.2	0.2033	66.74	0.997
32	0.2066	0.2066	0.21	66.73	0.9969
33	0.2133	0.2133	0.2166	66.72	0.9968
34	0.22	0.22	0.2233	66.72	0.9967

35	0.2266	0.2266	0.23	66.71	0.9966
36	0.2333	0.2333	0.2366	66.7	0.9965
37	0.24	0.24	0.2433	66.7	0.9964
38	0.2466	0.2466	0.25	66.69	0.9963
39	0.2533	0.2533	0.2566	66.68	0.9962
40	0.26	0.26	0.2633	66.68	0.9961
41	0.2666	0.2666	0.27	66.67	0.996
42	0.2733	0.2733	0.2766	66.66	0.9959
43	0.28	0.28	0.2833	66.66	0.9958
44	0.2866	0.2866	0.29	66.65	0.9957
45	0.2933	0.2933	0.2966	66.64	0.9956
46	0.3	0.3	0.3033	66.64	0.9955
47	0.3066	0.3066	0.31	66.63	0.9954
48	0.3133	0.3133	0.3166	66.62	0.9953
49	0.32	0.32	0.3233	66.62	0.9952
50	0.3266	0.3266	0.33	66.61	0.9951
51	0.3333	0.3333	0.35	66.59	0.9948
52	0.3666	0.3666	0.3833	66.56	0.9943
53	0.4	0.4	0.4166	66.52	0.9938
54	0.4333	0.4333	0.45	66.49	0.9933
55	0.4666	0.4666	0.4833	66.46	0.9928
56	0.5	0.5	0.5166	66.42	0.9923
57	0.5333	0.5333	0.55	66.39	0.9918
58	0.5666	0.5666	0.5833	66.36	0.9913
59	0.6	0.6	0.6166	66.32	0.9908
60	0.6333	0.6333	0.65	66.29	0.9903
61	0.6666	0.6666	0.6833	66.26	0.9898
62	0.7	0.7	0.7166	66.22	0.9893
63	0.7333	0.7333	0.75	66.19	0.9888
64	0.7666	0.7666	0.7833	66.16	0.9883
65	0.8	0.8	0.8166	66.12	0.9878
66	0.8333	0.8333	0.85	66.09	0.9874
67	0.8666	0.8666	0.8833	66.06	0.9869
68	0.9	0.9	0.9166	66.02	0.9864
69	0.9333	0.9333	0.95	65.99	0.9859
70	0.9666	0.9666	0.9833	65.96	0.9854
71	1.	1.	1.2	65.74	0.9821
72	1.4	1.4	1.6	65.34	0.9761
73	1.8	1.8	2.	64.94	0.9702
74	2.2	2.2	2.4	64.54	0.9642
75	2.6	2.6	2.8	64.14	0.9582
76	3.	3.	3.2	63.74	0.9522
77	3.4	3.4	3.6	63.34	0.9463
78	3.8	3.8	4.	62.94	0.9403
79	4.2	4.2	4.4	62.54	0.9343
80	4.6	4.6	4.8	62.14	0.9283
81	5.	5.	5.2	61.74	0.9224
82	5.4	5.4	5.6	61.34	0.9164
83	5.8	5.8	6.	60.94	0.9104
84	6.2	6.2	6.4	60.54	0.9044
85	6.6	6.6	6.8	60.14	0.8985
86	7.	7.	7.2	59.74	0.8925
87	7.4	7.4	7.6	59.34	0.8865
88	7.8	7.8	8.	58.94	0.8805
89	8.2	8.2	8.4	58.54	0.8746
90	8.6	8.6	8.8	58.14	0.8686
91	9.	9.	9.2	57.74	0.8626

92	9.4	9.4	9.6	57.34	0.8566
93	9.8	9.8	10.	56.94	0.8507
94	12.	12.	14.	52.94	0.7909
95	16.	16.	18.	48.94	0.7311
96	20.	20.	22.	44.94	0.6714
97	24.	24.	26.	40.94	0.6116
98	28.	28.	30.	36.94	0.5519
99	32.	32.	34.	32.94	0.4921
100	36.	36.	38.	28.94	0.4323
101	40.	40.	42.	24.94	0.3726

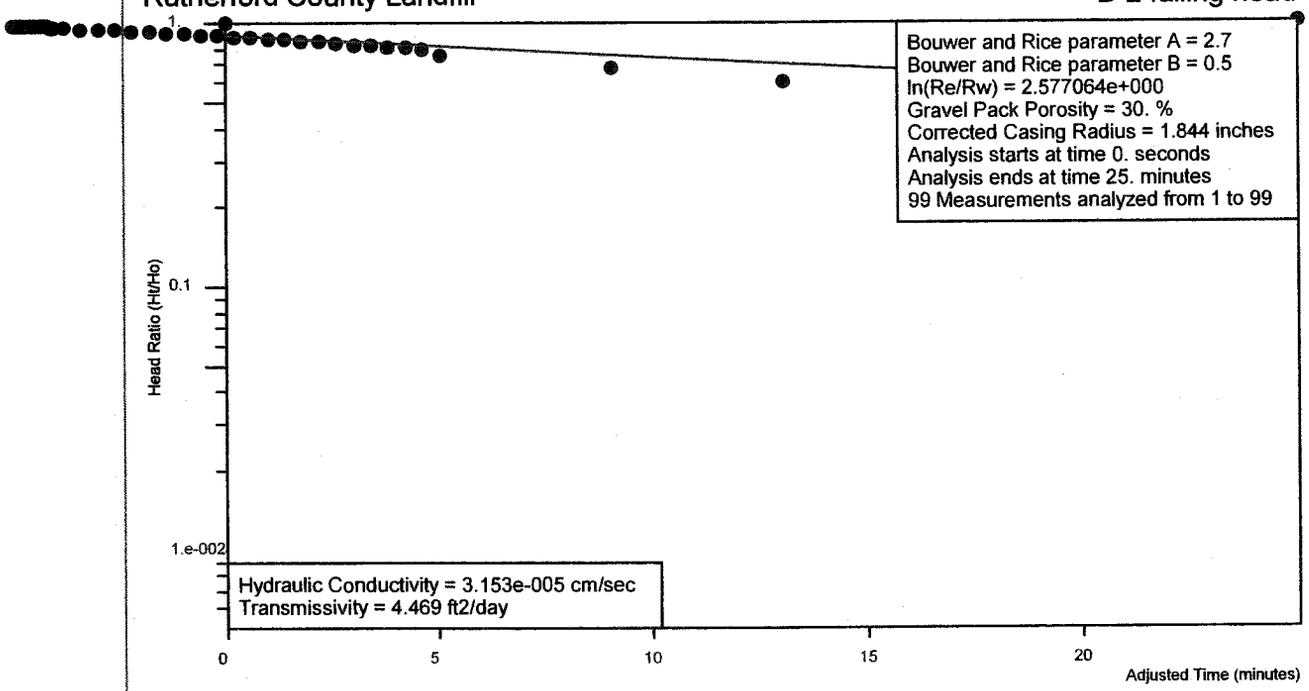

Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Hvorslev Graph
B-2 falling head
Time Lag = 2666 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 25. minutes
99 Measurements analyzed from 1 to 99
Head Ratio (Ht/Ho)
1
0.37
0.1
1.e-002
Hydraulic Conductivity = 1.465e-005 cm/sec
Transmissivity = 2.076 ft2/day
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 49.89 feet at 0. seconds

Field Hydraulic Conductivity Test May 25, 1999

Bouwer and Rice Graph

Rutherford County Landfill

B-2 falling head



Analysis by Starpoint Software

Ho is 49.89 feet at 0. seconds

92	4.2	4.2	9.4	40.49	0.8116
93	4.6	4.6	9.8	40.09	0.8036
94	5.	5.	12.	37.89	0.7595
95	9.	9.	16.	33.89	0.6793
96	13.	13.	20.	29.89	0.5991
97	17.	17.	24.	25.89	0.5189
98	21.	21.	28.	21.89	0.4388
99	25.	25.	0.	49.89	1.

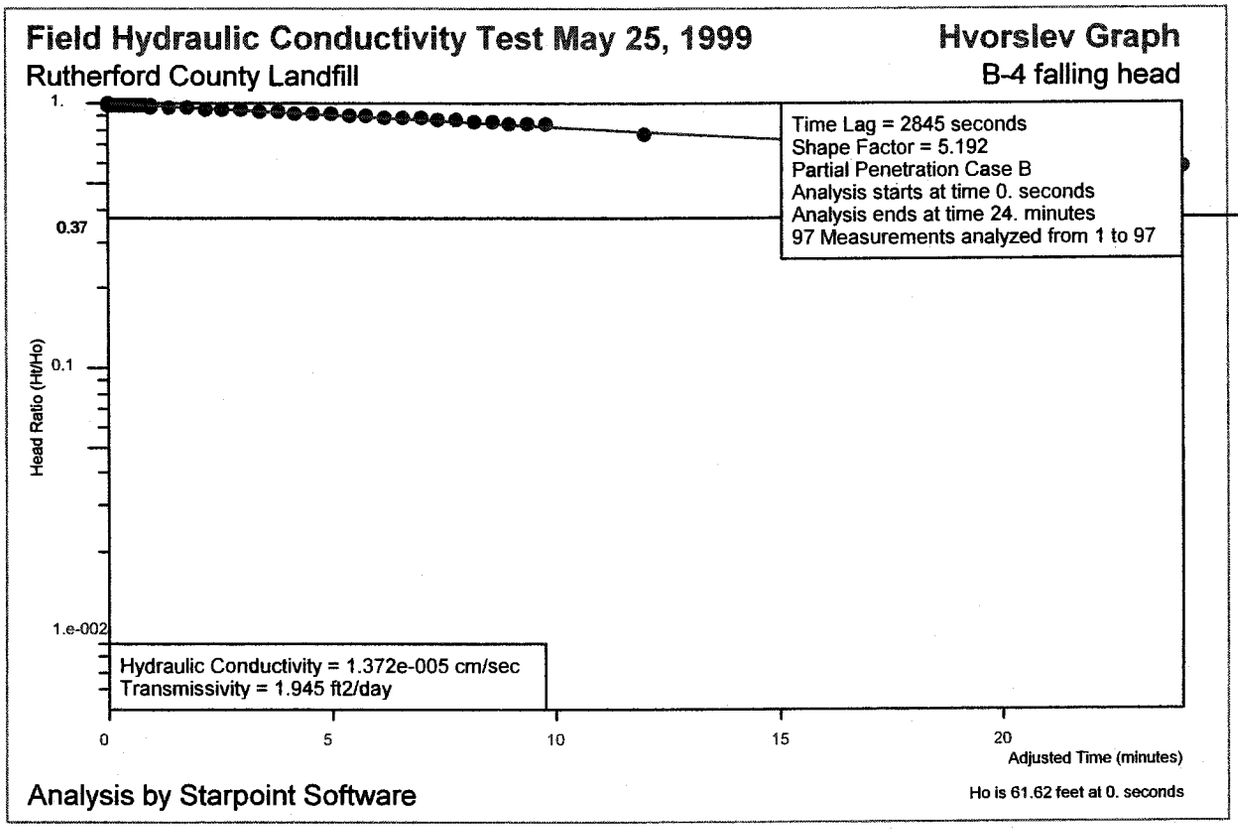
35	-4.777	-4.777	0.2266	49.66	0.9955
36	-4.77	-4.77	0.2333	49.66	0.9953
37	-4.763	-4.763	0.24	49.65	0.9952
38	-4.757	-4.757	0.2466	49.64	0.9951
39	-4.75	-4.75	0.2533	49.64	0.9949
40	-4.743	-4.743	0.26	49.63	0.9948
41	-4.737	-4.737	0.2666	49.62	0.9947
42	-4.73	-4.73	0.2733	49.62	0.9945
43	-4.723	-4.723	0.28	49.61	0.9944
44	-4.717	-4.717	0.2866	49.6	0.9943
45	-4.71	-4.71	0.2933	49.6	0.9941
46	-4.703	-4.703	0.3	49.59	0.994
47	-4.697	-4.697	0.3066	49.58	0.9939
48	-4.69	-4.69	0.3133	49.58	0.9937
49	-4.683	-4.683	0.32	49.57	0.9936
50	-4.677	-4.677	0.3266	49.56	0.9935
51	-4.67	-4.67	0.3333	49.56	0.9933
52	-4.65	-4.65	0.3666	49.52	0.9927
53	-4.617	-4.617	0.4	49.49	0.992
54	-4.583	-4.583	0.4333	49.46	0.9913
55	-4.55	-4.55	0.4666	49.42	0.9906
56	-4.517	-4.517	0.5	49.39	0.99
57	-4.483	-4.483	0.5333	49.36	0.9893
58	-4.45	-4.45	0.5666	49.32	0.9886
59	-4.417	-4.417	0.6	49.29	0.988
60	-4.383	-4.383	0.6333	49.26	0.9873
61	-4.35	-4.35	0.6666	49.22	0.9866
62	-4.317	-4.317	0.7	49.19	0.986
63	-4.283	-4.283	0.7333	49.16	0.9853
64	-4.25	-4.25	0.7666	49.12	0.9846
65	-4.217	-4.217	0.8	49.09	0.984
66	-4.183	-4.183	0.8333	49.06	0.9833
67	-4.15	-4.15	0.8666	49.02	0.9826
68	-4.117	-4.117	0.9	48.99	0.982
69	-4.083	-4.083	0.9333	48.96	0.9813
70	-4.05	-4.05	0.9666	48.92	0.9806
71	-4.017	-4.017	1.	48.89	0.98
72	-3.8	-3.8	1.4	48.49	0.9719
73	-3.4	-3.4	1.8	48.09	0.9639
74	-3.	-3.	2.2	47.69	0.9559
75	-2.6	-2.6	2.6	47.29	0.9479
76	-2.2	-2.2	3.	46.89	0.9399
77	-1.8	-1.8	3.4	46.49	0.9319
78	-1.4	-1.4	3.8	46.09	0.9238
79	-1.	-1.	4.2	45.69	0.9158
80	-0.6	-0.6	4.6	45.29	0.9078
81	-0.2	-0.2	5.	44.89	0.8998
82	0.2	0.2	5.4	44.49	0.8918
83	0.6	0.6	5.8	44.09	0.8837
84	1.	1.	6.2	43.69	0.8757
85	1.4	1.4	6.6	43.29	0.8677
86	1.8	1.8	7.	42.89	0.8597
87	2.2	2.2	7.4	42.49	0.8517
88	2.6	2.6	7.8	42.09	0.8437
89	3.	3.	8.2	41.69	0.8356
90	3.4	3.4	8.6	41.29	0.8276
91	3.8	3.8	9.	40.89	0.8196

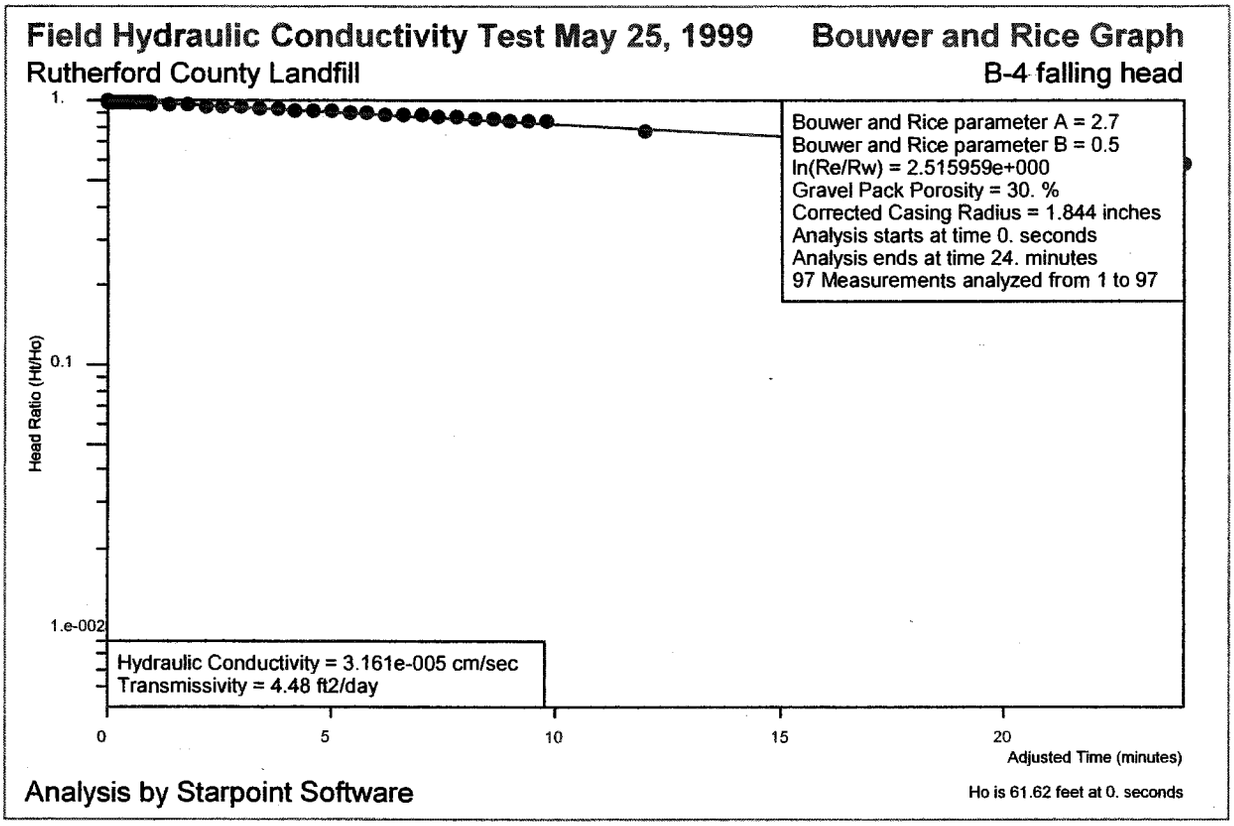
Field Hydraulic Conductivity Test

Site Name: Rutherford County Landfill
Test Date: May 25, 1999
Import File: A:\rutherford\B2S0.txt

Well Label: B-2 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 49.89 feet
Water Table to Screen Bottom: 17.3 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 99 time and drawdown measurements
Maximum head is 49.89 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	0.	49.89	1.
2	-4.997	-4.997	6.6e-003	49.88	0.9999
3	-4.99	-4.99	1.33e-002	49.88	0.9997
4	-4.983	-4.983	2.e-002	49.87	0.9996
5	-4.977	-4.977	2.66e-002	49.86	0.9995
6	-4.97	-4.97	3.33e-002	49.86	0.9993
7	-4.963	-4.963	4.e-002	49.85	0.9992
8	-4.957	-4.957	4.66e-002	49.84	0.9991
9	-4.95	-4.95	5.33e-002	49.84	0.9989
10	-4.943	-4.943	6.e-002	49.83	0.9988
11	-4.937	-4.937	6.66e-002	49.82	0.9987
12	-4.93	-4.93	7.33e-002	49.82	0.9985
13	-4.923	-4.923	8.e-002	49.81	0.9984
14	-4.917	-4.917	8.66e-002	49.8	0.9983
15	-4.91	-4.91	9.33e-002	49.8	0.9981
16	-4.903	-4.903	0.1	49.79	0.998
17	-4.897	-4.897	0.1066	49.78	0.9979
18	-4.89	-4.89	0.1133	49.78	0.9977
19	-4.883	-4.883	0.12	49.77	0.9976
20	-4.877	-4.877	0.1266	49.76	0.9975
21	-4.87	-4.87	0.1333	49.76	0.9973
22	-4.863	-4.863	0.14	49.75	0.9972
23	-4.857	-4.857	0.1466	49.74	0.9971
24	-4.85	-4.85	0.1533	49.74	0.9969
25	-4.843	-4.843	0.16	49.73	0.9968
26	-4.837	-4.837	0.1666	49.72	0.9967
27	-4.83	-4.83	0.1733	49.72	0.9965
28	-4.823	-4.823	0.18	49.71	0.9964
29	-4.817	-4.817	0.1866	49.7	0.9963
30	-4.81	-4.81	0.1933	49.7	0.9961
31	-4.803	-4.803	0.2	49.69	0.996
32	-4.797	-4.797	0.2066	49.68	0.9959
33	-4.79	-4.79	0.2133	49.68	0.9957
34	-4.783	-4.783	0.22	49.67	0.9956


Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Hvorslev Graph
B-4 falling head
Time Lag = 2845 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
Hydraulic Conductivity = 1.372e-005 cm/sec
Transmissivity = 1.945 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 61.62 feet at 0. seconds


Field Hydraulic Conductivity Test May 25, 1999
Bouwer and Rice Graph
Rutherford County Landfill
B-4 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.515959e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
Hydraulic Conductivity = 3.161e-005 cm/sec
Transmissivity = 4.48 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 61.62 feet at 0. seconds

Field Hydraulic Conductivity Test

Site Name: Rutherford County Landfill
Test Date: May 25, 1999
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B4s0.txt

Well Label: B-4 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 61.62 feet
Water Table to Screen Bottom: 15.1 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 97 time and drawdown measurements
Maximum head is 61.62 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	61.62	1.
2	6.6e-003	6.6e-003	1.e-002	61.61	0.9999
3	1.33e-002	1.33e-002	1.66e-002	61.6	0.9998
4	2.e-002	2.e-002	2.33e-002	61.6	0.9997
5	2.66e-002	2.66e-002	3.e-002	61.59	0.9996
6	3.33e-002	3.33e-002	3.66e-002	61.58	0.9995
7	4.e-002	4.e-002	4.33e-002	61.58	0.9994
8	4.66e-002	4.66e-002	5.e-002	61.57	0.9992
9	5.33e-002	5.33e-002	5.66e-002	61.56	0.9991
10	6.e-002	6.e-002	6.33e-002	61.56	0.999
11	6.66e-002	6.66e-002	7.e-002	61.55	0.9989
12	7.33e-002	7.33e-002	7.66e-002	61.54	0.9988
13	8.e-002	8.e-002	8.33e-002	61.54	0.9987
14	8.66e-002	8.66e-002	9.e-002	61.53	0.9986
15	9.33e-002	9.33e-002	9.66e-002	61.52	0.9985
16	0.1	0.1	0.1033	61.52	0.9984
17	0.1066	0.1066	0.11	61.51	0.9983
18	0.1133	0.1133	0.1166	61.5	0.9982
19	0.12	0.12	0.1233	61.5	0.9981
20	0.1266	0.1266	0.13	61.49	0.9979
21	0.1333	0.1333	0.1366	61.48	0.9978
22	0.14	0.14	0.1433	61.48	0.9977
23	0.1466	0.1466	0.15	61.47	0.9976
24	0.1533	0.1533	0.1566	61.46	0.9975
25	0.16	0.16	0.1633	61.46	0.9974
26	0.1666	0.1666	0.17	61.45	0.9973
27	0.1733	0.1733	0.1766	61.44	0.9972
28	0.18	0.18	0.1833	61.44	0.9971
29	0.1866	0.1866	0.19	61.43	0.997
30	0.1933	0.1933	0.1966	61.42	0.9969
31	0.2	0.2	0.2033	61.42	0.9968
32	0.2066	0.2066	0.21	61.41	0.9966
33	0.2133	0.2133	0.2166	61.4	0.9965
34	0.22	0.22	0.2233	61.4	0.9964

35	0.2266	0.2266	0.23	61.39	0.9963
36	0.2333	0.2333	0.2366	61.38	0.9962
37	0.24	0.24	0.2433	61.38	0.9961
38	0.2466	0.2466	0.25	61.37	0.996
39	0.2533	0.2533	0.2566	61.36	0.9959
40	0.26	0.26	0.2633	61.36	0.9958
41	0.2666	0.2666	0.27	61.35	0.9957
42	0.2733	0.2733	0.2766	61.34	0.9956
43	0.28	0.28	0.2833	61.34	0.9955
44	0.2866	0.2866	0.29	61.33	0.9953
45	0.2933	0.2933	0.2966	61.32	0.9952
46	0.3	0.3	0.3033	61.32	0.9951
47	0.3066	0.3066	0.31	61.31	0.995
48	0.3133	0.3133	0.3166	61.3	0.9949
49	0.32	0.32	0.3233	61.3	0.9948
50	0.3266	0.3266	0.33	61.29	0.9947
51	0.3333	0.3333	0.35	61.27	0.9944
52	0.3666	0.3666	0.3833	61.24	0.9938
53	0.4	0.4	0.4166	61.2	0.9933
54	0.4333	0.4333	0.45	61.17	0.9928
55	0.4666	0.4666	0.4833	61.14	0.9922
56	0.5	0.5	0.5166	61.1	0.9917
57	0.5333	0.5333	0.55	61.07	0.9911
58	0.5666	0.5666	0.5833	61.04	0.9906
59	0.6	0.6	0.6166	61.	0.99
60	0.6333	0.6333	0.65	60.97	0.9895
61	0.6666	0.6666	0.6833	60.94	0.989
62	0.7	0.7	0.7166	60.9	0.9884
63	0.7333	0.7333	0.75	60.87	0.9879
64	0.7666	0.7666	0.7833	60.84	0.9873
65	0.8	0.8	0.8166	60.8	0.9868
66	0.8333	0.8333	0.85	60.77	0.9863
67	0.8666	0.8666	0.8833	60.74	0.9857
68	0.9	0.9	0.9166	60.7	0.9852
69	0.9333	0.9333	0.95	60.67	0.9846
70	0.9666	0.9666	0.9833	60.64	0.9841
71	1.	1.	1.2	60.42	0.9806
72	1.4	1.4	1.6	60.02	0.9741
73	1.8	1.8	2.	59.62	0.9676
74	2.2	2.2	2.4	59.22	0.9611
75	2.6	2.6	2.8	58.82	0.9546
76	3.	3.	3.2	58.42	0.9481
77	3.4	3.4	3.6	58.02	0.9416
78	3.8	3.8	4.	57.62	0.9351
79	4.2	4.2	4.4	57.22	0.9286
80	4.6	4.6	4.8	56.82	0.9222
81	5.	5.	5.2	56.42	0.9157
82	5.4	5.4	5.6	56.02	0.9092
83	5.8	5.8	6.	55.62	0.9027
84	6.2	6.2	6.4	55.22	0.8962
85	6.6	6.6	6.8	54.82	0.8897
86	7.	7.	7.2	54.42	0.8832
87	7.4	7.4	7.6	54.02	0.8767
88	7.8	7.8	8.	53.62	0.8702
89	8.2	8.2	8.4	53.22	0.8637
90	8.6	8.6	8.8	52.82	0.8572
91	9.	9.	9.2	52.42	0.8507

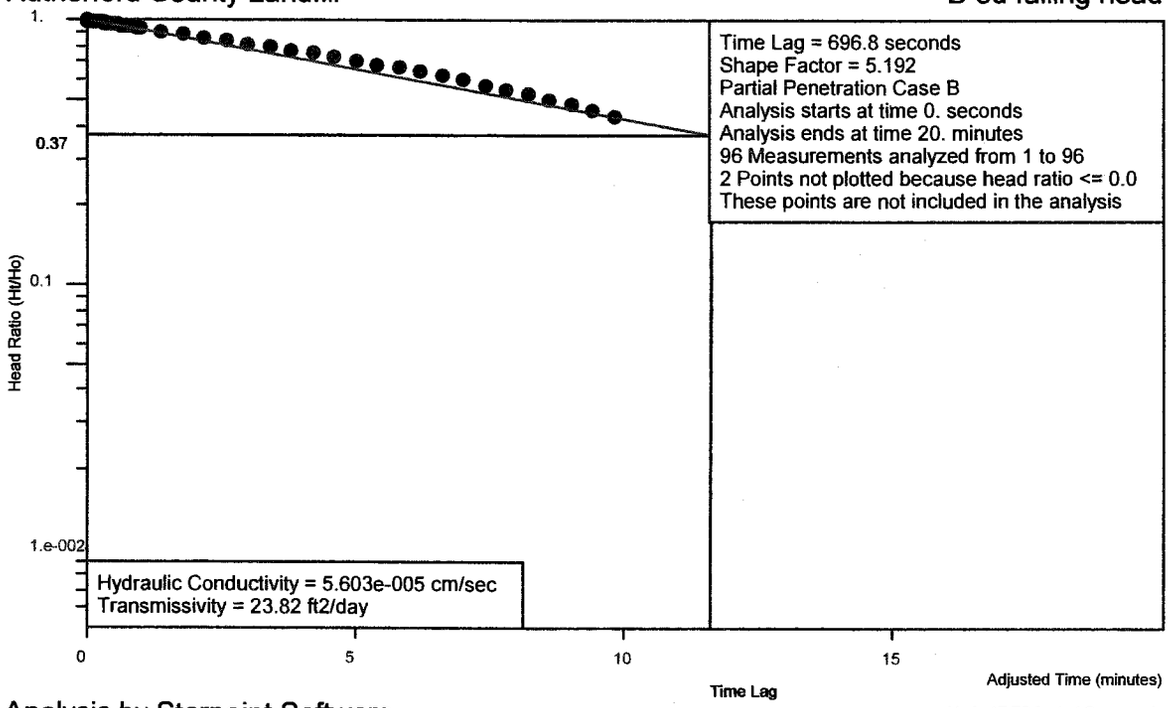
92	9.4	9.4	9.6	52.02	0.8443
93	9.8	9.8	10.	51.62	0.8378
94	12.	12.	14.	47.62	0.7728
95	16.	16.	18.	43.62	0.7079
96	20.	20.	22.	39.62	0.643
97	24.	24.	26.	35.62	0.5781

Field Hydraulic Conductivity Test June 21, 2000

Hvorslev Graph

Rutherford County Landfill

B-5d falling head



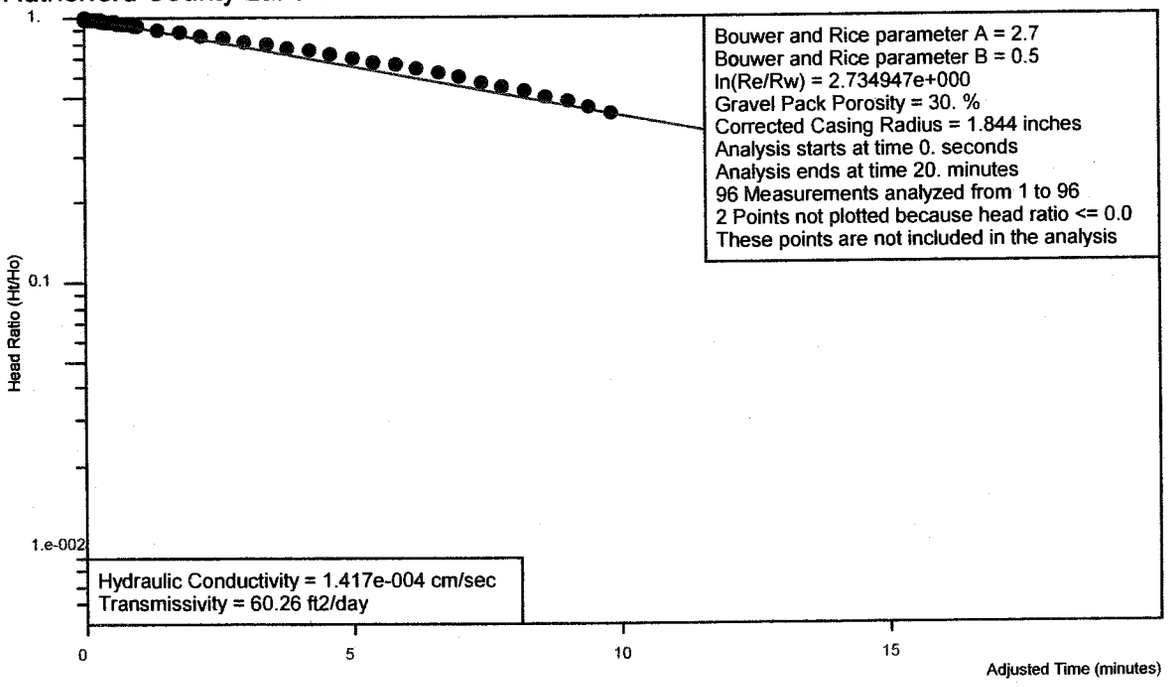
Analysis by Starpoint Software

Ho is 17.78 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000 — Bouwer and Rice Graph

Rutherford County Landfill

B-5d falling head



Analysis by Starpoint Software

Ho is 17.78 feet at 0. seconds

Field Hydraulic Conductivity Test

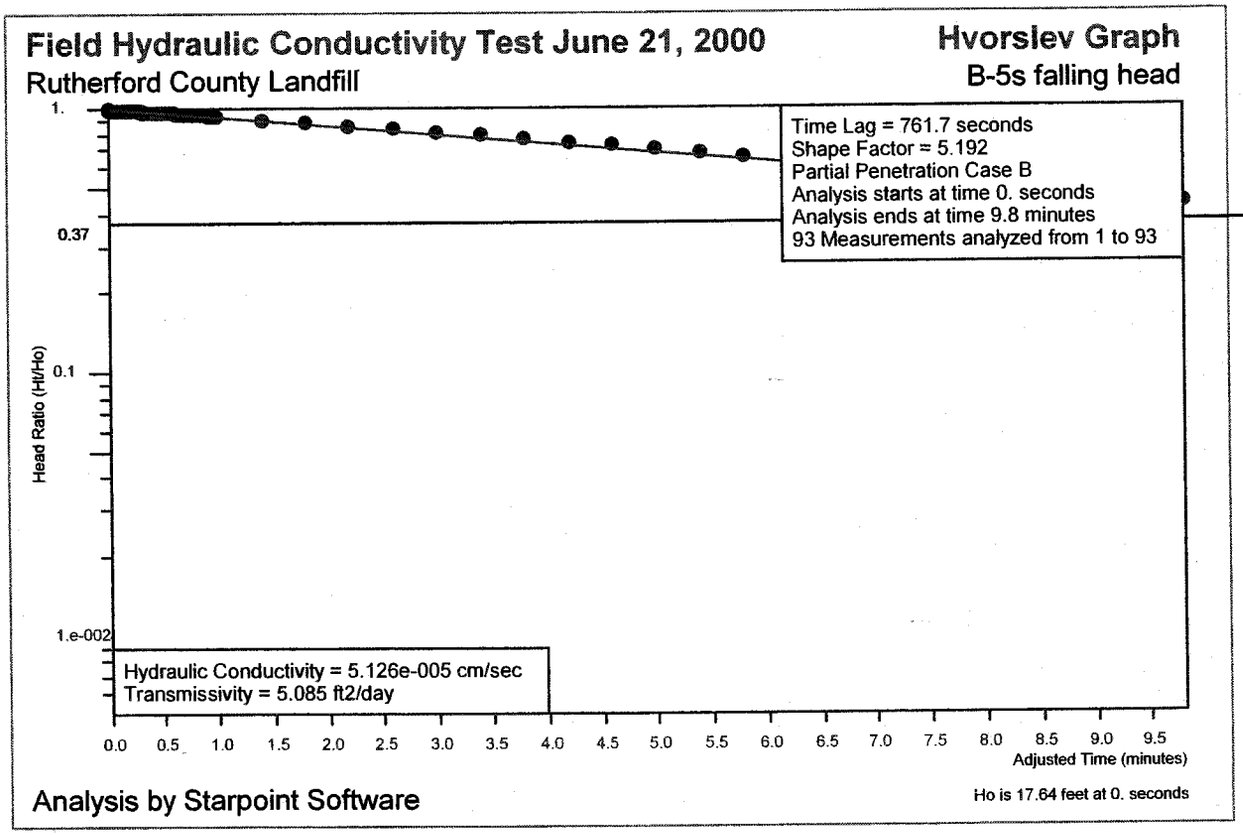
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B5DS0

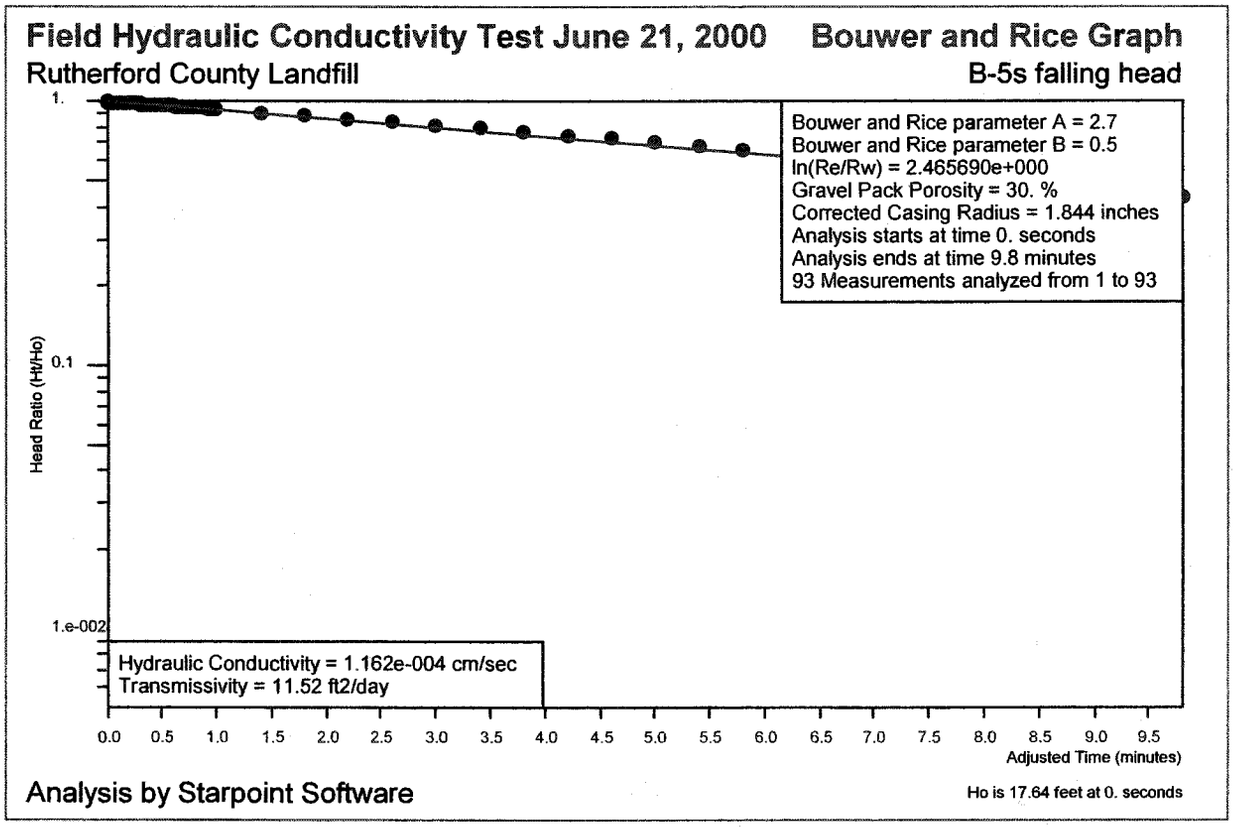
Well Label: B-5d falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 17.78 feet
Water Table to Screen Bottom: 35.8 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 96 time and drawdown measurements
Maximum head is 17.78 feet
Minimum head is -4.22 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	17.78	1.
2	6.6e-003	6.6e-003	1.e-002	17.77	0.9996
3	1.33e-002	1.33e-002	1.66e-002	17.76	0.9993
4	2.e-002	2.e-002	2.33e-002	17.76	0.9989
5	2.66e-002	2.66e-002	3.e-002	17.75	0.9985
6	3.33e-002	3.33e-002	3.66e-002	17.74	0.9981
7	4.e-002	4.e-002	4.33e-002	17.74	0.9977
8	4.66e-002	4.66e-002	5.e-002	17.73	0.9974
9	5.33e-002	5.33e-002	5.66e-002	17.72	0.997
10	6.e-002	6.e-002	6.33e-002	17.72	0.9966
11	6.66e-002	6.66e-002	7.e-002	17.71	0.9962
12	7.33e-002	7.33e-002	7.66e-002	17.7	0.9959
13	8.e-002	8.e-002	8.33e-002	17.7	0.9955
14	8.66e-002	8.66e-002	9.e-002	17.69	0.9951
15	9.33e-002	9.33e-002	9.66e-002	17.68	0.9948
16	0.1	0.1	0.1033	17.68	0.9944
17	0.1066	0.1066	0.11	17.67	0.994
18	0.1133	0.1133	0.1166	17.66	0.9936
19	0.12	0.12	0.1233	17.66	0.9932
20	0.1266	0.1266	0.13	17.65	0.9929
21	0.1333	0.1333	0.1366	17.64	0.9925
22	0.14	0.14	0.1433	17.64	0.9921
23	0.1466	0.1466	0.15	17.63	0.9917
24	0.1533	0.1533	0.1566	17.62	0.9914
25	0.16	0.16	0.1633	17.62	0.991
26	0.1666	0.1666	0.17	17.61	0.9906
27	0.1733	0.1733	0.1766	17.6	0.9903
28	0.18	0.18	0.1833	17.6	0.9899
29	0.1866	0.1866	0.19	17.59	0.9895
30	0.1933	0.1933	0.1966	17.58	0.9891
31	0.2	0.2	0.2033	17.58	0.9887
32	0.2066	0.2066	0.21	17.57	0.9884
33	0.2133	0.2133	0.2166	17.56	0.988
34	0.22	0.22	0.2233	17.56	0.9876

35	0.2266	0.2266	0.23	17.55	0.9872
36	0.2333	0.2333	0.2366	17.54	0.9869
37	0.24	0.24	0.2433	17.54	0.9865
38	0.2466	0.2466	0.25	17.53	0.9861
39	0.2533	0.2533	0.2566	17.52	0.9858
40	0.26	0.26	0.2633	17.52	0.9854
41	0.2666	0.2666	0.27	17.51	0.985
42	0.2733	0.2733	0.2766	17.5	0.9846
43	0.28	0.28	0.2833	17.5	0.9842
44	0.2866	0.2866	0.29	17.49	0.9839
45	0.2933	0.2933	0.2966	17.48	0.9835
46	0.3	0.3	0.3033	17.48	0.9831
47	0.3066	0.3066	0.31	17.47	0.9827
48	0.3133	0.3133	0.3166	17.46	0.9824
49	0.32	0.32	0.3233	17.46	0.982
50	0.3266	0.3266	0.33	17.45	0.9816
51	0.3333	0.3333	0.35	17.43	0.9805
52	0.3666	0.3666	0.3833	17.4	0.9786
53	0.4	0.4	0.4166	17.36	0.9768
54	0.4333	0.4333	0.45	17.33	0.9749
55	0.4666	0.4666	0.4833	17.3	0.973
56	0.5	0.5	0.5166	17.26	0.9711
57	0.5333	0.5333	0.55	17.23	0.9692
58	0.5666	0.5666	0.5833	17.2	0.9674
59	0.6	0.6	0.6166	17.16	0.9655
60	0.6333	0.6333	0.65	17.13	0.9636
61	0.6666	0.6666	0.6833	17.1	0.9617
62	0.7	0.7	0.7166	17.06	0.9599
63	0.7333	0.7333	0.75	17.03	0.958
64	0.7666	0.7666	0.7833	17.	0.9561
65	0.8	0.8	0.8166	16.96	0.9542
66	0.8333	0.8333	0.85	16.93	0.9524
67	0.8666	0.8666	0.8833	16.9	0.9505
68	0.9	0.9	0.9166	16.86	0.9486
69	0.9333	0.9333	0.95	16.83	0.9467
70	0.9666	0.9666	0.9833	16.8	0.9449
71	1.	1.	1.2	16.58	0.9327
72	1.4	1.4	1.6	16.18	0.9102
73	1.8	1.8	2.	15.78	0.8877
74	2.2	2.2	2.4	15.38	0.8652
75	2.6	2.6	2.8	14.98	0.8427
76	3.	3.	3.2	14.58	0.8202
77	3.4	3.4	3.6	14.18	0.7977
78	3.8	3.8	4.	13.78	0.7752
79	4.2	4.2	4.4	13.38	0.7527
80	4.6	4.6	4.8	12.98	0.7302
81	5.	5.	5.2	12.58	0.7077
82	5.4	5.4	5.6	12.18	0.6852
83	5.8	5.8	6.	11.78	0.6627
84	6.2	6.2	6.4	11.38	0.6402
85	6.6	6.6	6.8	10.98	0.6177
86	7.	7.	7.2	10.58	0.5952
87	7.4	7.4	7.6	10.18	0.5727
88	7.8	7.8	8.	9.78	0.5502
89	8.2	8.2	8.4	9.38	0.5277
90	8.6	8.6	8.8	8.98	0.5052
91	9.	9.	9.2	8.58	0.4827

92	9.4	9.4	9.6	8.18	0.4602
93	9.8	9.8	10.	7.78	0.4377
94	12.	12.	14.	3.78	0.2126
95	16.	16.	18.	-0.22	-1.238e-002
96	20.	20.	22.	-4.22	-0.2374


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-5s falling head
Time Lag = 761.7 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Hydraulic Conductivity = 5.126e-005 cm/sec
Transmissivity = 5.085 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 17.64 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-5s falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.465690e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 1.162e-004 cm/sec
Transmissivity = 11.52 ft2/day
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 17.64 feet at 0. seconds

Field Hydraulic Conductivity Test

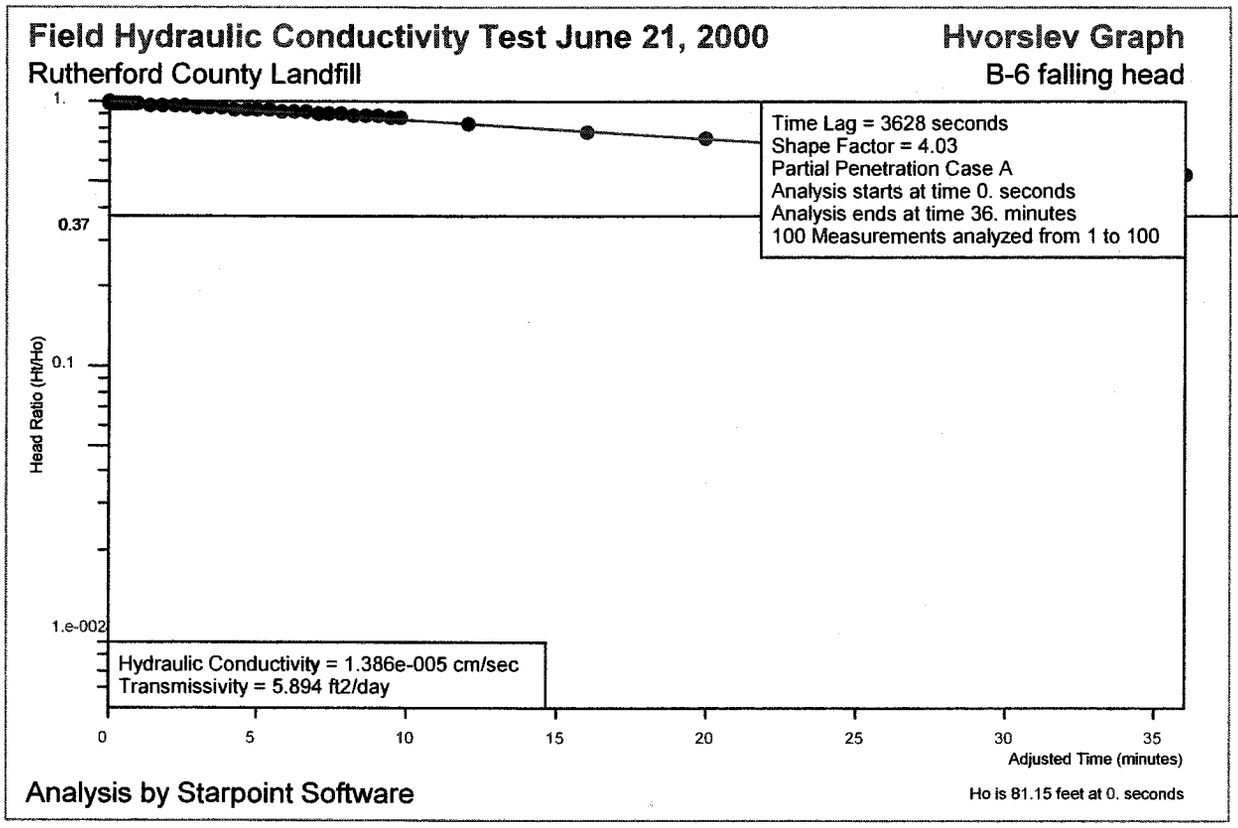
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B5SS0

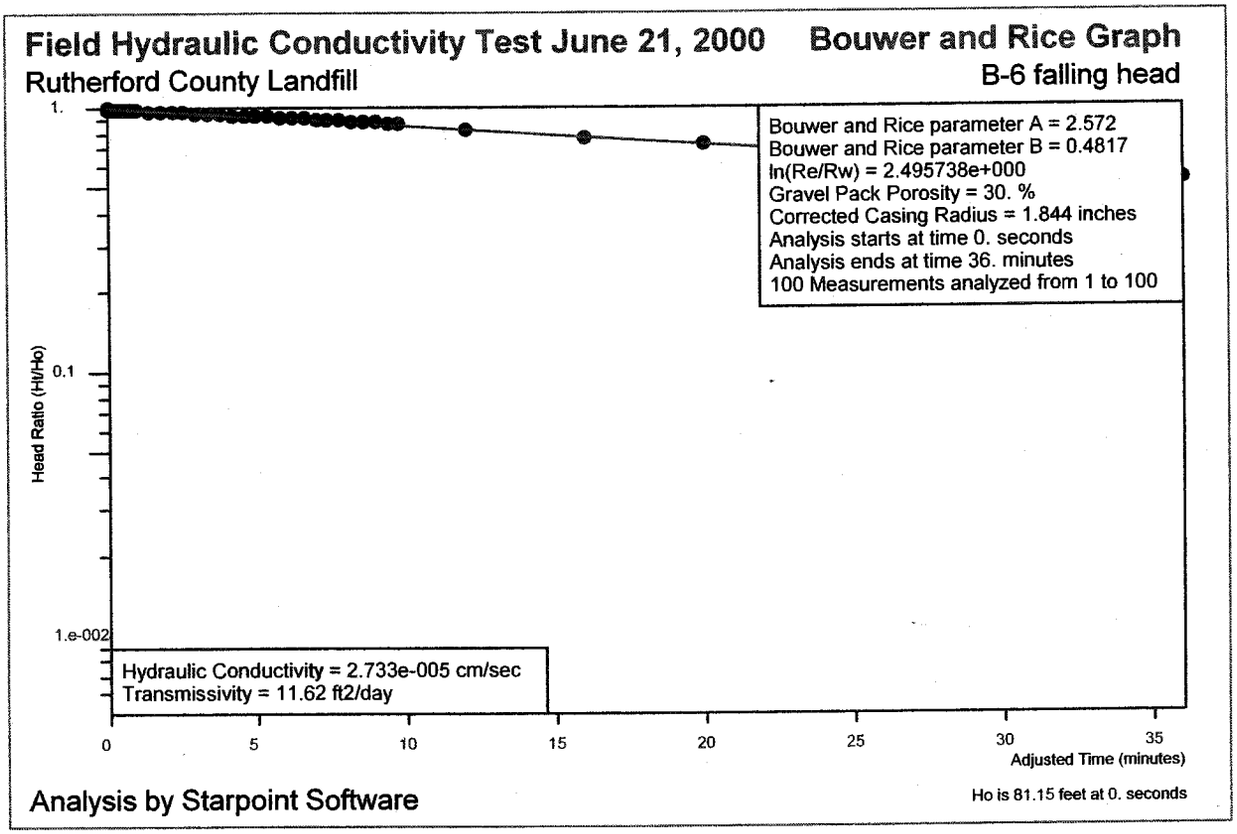
Well Label: B-5s falling head
Aquifer Thickness: 35. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 17.64 feet
Water Table to Screen Bottom: 12.4 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 93 time and drawdown measurements
Maximum head is 17.64 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	17.64	1.
2	6.6e-003	6.6e-003	1.e-002	17.63	0.9996
3	1.33e-002	1.33e-002	1.66e-002	17.62	0.9992
4	2.e-002	2.e-002	2.33e-002	17.62	0.9989
5	2.66e-002	2.66e-002	3.e-002	17.61	0.9985
6	3.33e-002	3.33e-002	3.66e-002	17.6	0.9981
7	4.e-002	4.e-002	4.33e-002	17.6	0.9977
8	4.66e-002	4.66e-002	5.e-002	17.59	0.9974
9	5.33e-002	5.33e-002	5.66e-002	17.58	0.997
10	6.e-002	6.e-002	6.33e-002	17.58	0.9966
11	6.66e-002	6.66e-002	7.e-002	17.57	0.9962
12	7.33e-002	7.33e-002	7.66e-002	17.56	0.9958
13	8.e-002	8.e-002	8.33e-002	17.56	0.9955
14	8.66e-002	8.66e-002	9.e-002	17.55	0.9951
15	9.33e-002	9.33e-002	9.66e-002	17.54	0.9947
16	0.1	0.1	0.1033	17.54	0.9943
17	0.1066	0.1066	0.11	17.53	0.994
18	0.1133	0.1133	0.1166	17.52	0.9936
19	0.12	0.12	0.1233	17.52	0.9932
20	0.1266	0.1266	0.13	17.51	0.9928
21	0.1333	0.1333	0.1366	17.5	0.9924
22	0.14	0.14	0.1433	17.5	0.9921
23	0.1466	0.1466	0.15	17.49	0.9917
24	0.1533	0.1533	0.1566	17.48	0.9913
25	0.16	0.16	0.1633	17.48	0.9909
26	0.1666	0.1666	0.17	17.47	0.9905
27	0.1733	0.1733	0.1766	17.46	0.9902
28	0.18	0.18	0.1833	17.46	0.9898
29	0.1866	0.1866	0.19	17.45	0.9894
30	0.1933	0.1933	0.1966	17.44	0.989
31	0.2	0.2	0.2033	17.44	0.9887
32	0.2066	0.2066	0.21	17.43	0.9883
33	0.2133	0.2133	0.2166	17.42	0.9879
34	0.22	0.22	0.2233	17.42	0.9875

35	0.2266	0.2266	0.23	17.41	0.9871
36	0.2333	0.2333	0.2366	17.4	0.9868
37	0.24	0.24	0.2433	17.4	0.9864
38	0.2466	0.2466	0.25	17.39	0.986
39	0.2533	0.2533	0.2566	17.38	0.9856
40	0.26	0.26	0.2633	17.38	0.9853
41	0.2666	0.2666	0.27	17.37	0.9849
42	0.2733	0.2733	0.2766	17.36	0.9845
43	0.28	0.28	0.2833	17.36	0.9841
44	0.2866	0.2866	0.29	17.35	0.9837
45	0.2933	0.2933	0.2966	17.34	0.9834
46	0.3	0.3	0.3033	17.34	0.983
47	0.3066	0.3066	0.31	17.33	0.9826
48	0.3133	0.3133	0.3166	17.32	0.9822
49	0.32	0.32	0.3233	17.32	0.9819
50	0.3266	0.3266	0.33	17.31	0.9815
51	0.3333	0.3333	0.35	17.29	0.9803
52	0.3666	0.3666	0.3833	17.26	0.9785
53	0.4	0.4	0.4166	17.22	0.9766
54	0.4333	0.4333	0.45	17.19	0.9747
55	0.4666	0.4666	0.4833	17.16	0.9728
56	0.5	0.5	0.5166	17.12	0.9709
57	0.5333	0.5333	0.55	17.09	0.969
58	0.5666	0.5666	0.5833	17.06	0.9671
59	0.6	0.6	0.6166	17.02	0.9652
60	0.6333	0.6333	0.65	16.99	0.9633
61	0.6666	0.6666	0.6833	16.96	0.9614
62	0.7	0.7	0.7166	16.92	0.9596
63	0.7333	0.7333	0.75	16.89	0.9577
64	0.7666	0.7666	0.7833	16.86	0.9558
65	0.8	0.8	0.8166	16.82	0.9539
66	0.8333	0.8333	0.85	16.79	0.952
67	0.8666	0.8666	0.8833	16.76	0.9501
68	0.9	0.9	0.9166	16.72	0.9482
69	0.9333	0.9333	0.95	16.69	0.9463
70	0.9666	0.9666	0.9833	16.66	0.9444
71	1.	1.	1.2	16.44	0.9321
72	1.4	1.4	1.6	16.04	0.9095
73	1.8	1.8	2.	15.64	0.8868
74	2.2	2.2	2.4	15.24	0.8641
75	2.6	2.6	2.8	14.84	0.8414
76	3.	3.	3.2	14.44	0.8187
77	3.4	3.4	3.6	14.04	0.7961
78	3.8	3.8	4.	13.64	0.7734
79	4.2	4.2	4.4	13.24	0.7507
80	4.6	4.6	4.8	12.84	0.728
81	5.	5.	5.2	12.44	0.7053
82	5.4	5.4	5.6	12.04	0.6827
83	5.8	5.8	6.	11.64	0.66
84	6.2	6.2	6.4	11.24	0.6373
85	6.6	6.6	6.8	10.84	0.6146
86	7.	7.	7.2	10.44	0.5919
87	7.4	7.4	7.6	10.04	0.5693
88	7.8	7.8	8.	9.64	0.5466
89	8.2	8.2	8.4	9.24	0.5239
90	8.6	8.6	8.8	8.84	0.5012
91	9.	9.	9.2	8.44	0.4785

92	9.4	9.4	9.6	8.04	0.4559
93	9.8	9.8	10.	7.64	0.4332


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-6 falling head
Time Lag = 3628 seconds
Shape Factor = 4.03
Partial Penetration Case A
Analysis starts at time 0. seconds
Analysis ends at time 36. minutes
100 Measurements analyzed from 1 to 100
Hydraulic Conductivity = 1.386e-005 cm/sec
Transmissivity = 5.894 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
35
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 81.15 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-6 falling head
Bouwer and Rice parameter A = 2.572
Bouwer and Rice parameter B = 0.4817
ln(Re/Rw) = 2.495738e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 36. minutes
100 Measurements analyzed from 1 to 100
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 2.733e-005 cm/sec
Transmissivity = 11.62 ft2/day
0
5
10
15
20
25
30
35
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 81.15 feet at 0. seconds

Field Hydraulic Conductivity Test

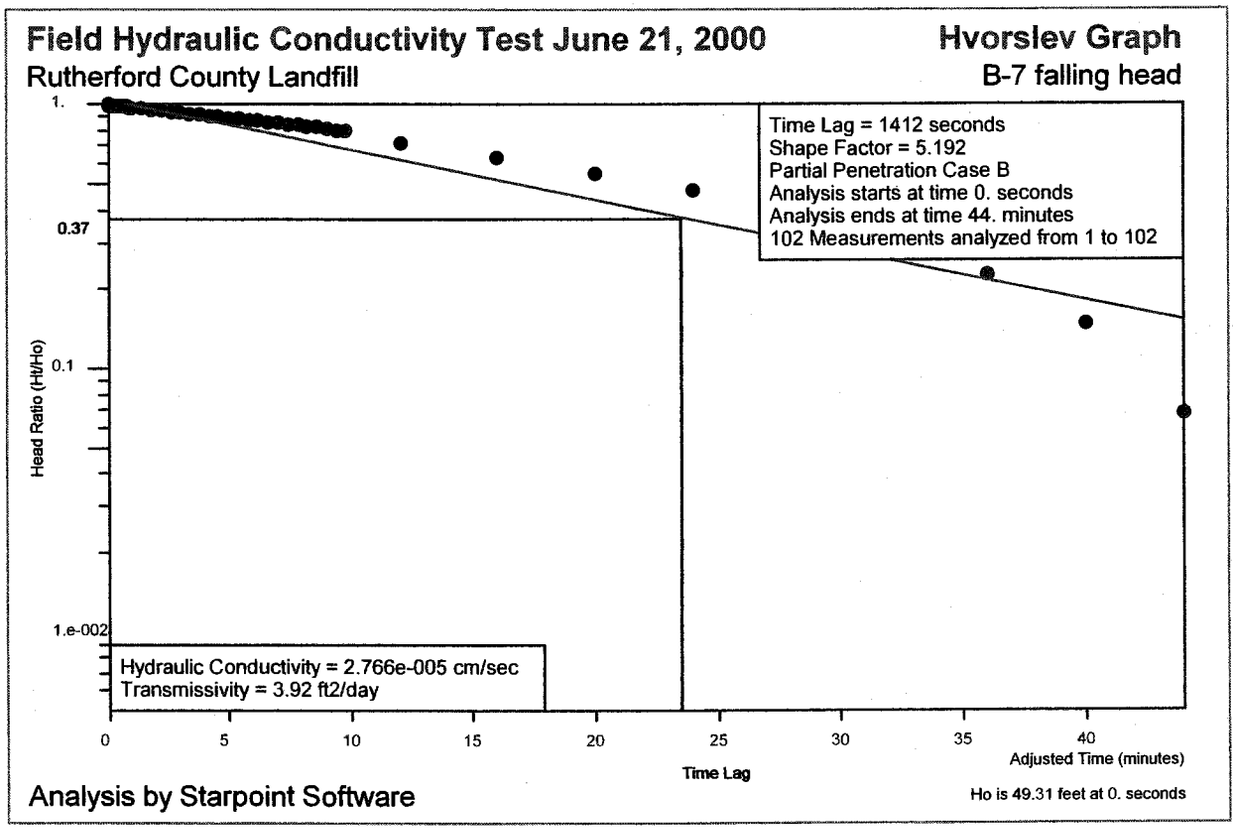
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B6S0

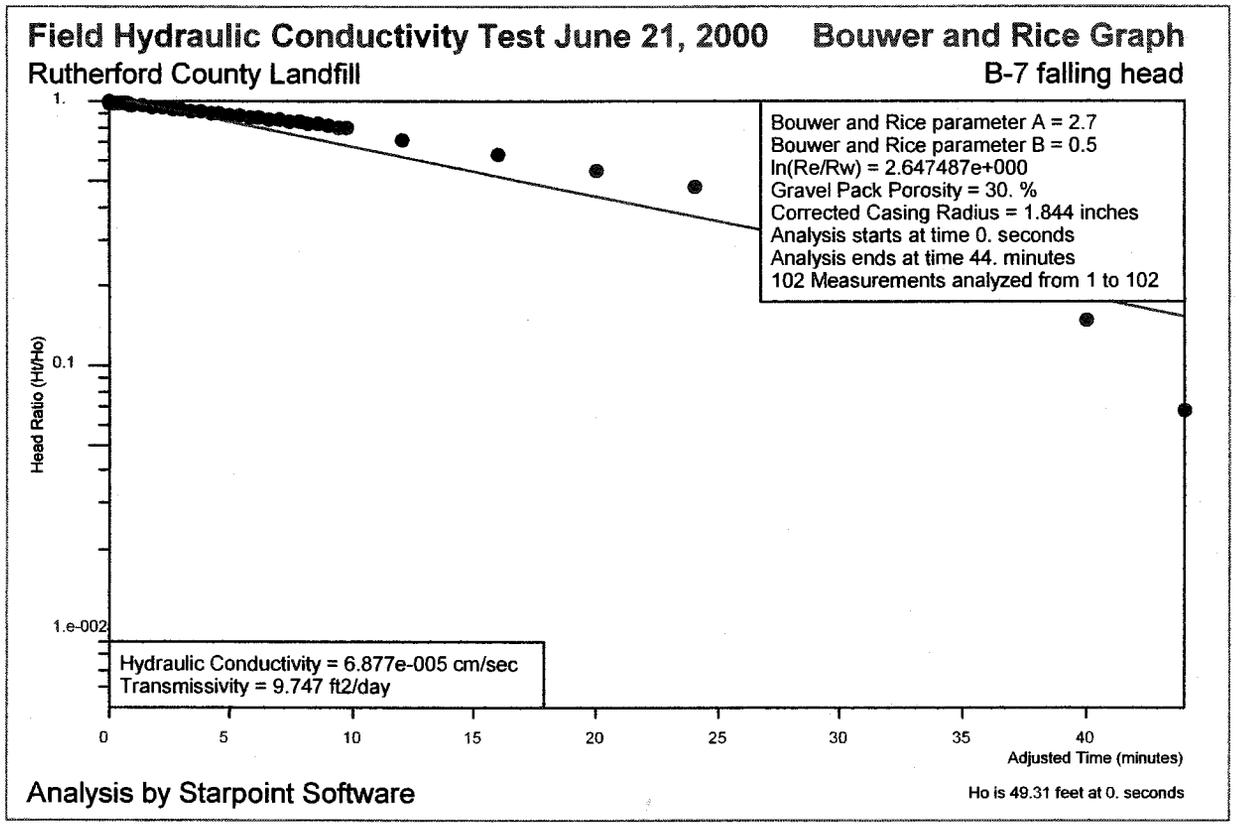
Well Label: B-6 falling head
Aquifer Thickness: 150. feet
Screen Length: 15. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 81.15 feet
Water Table to Screen Bottom: 9. feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 100 time and drawdown measurements
Maximum head is 81.15 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	81.15	1.
2	6.6e-003	6.6e-003	1.e-002	81.14	0.9999
3	1.33e-002	1.33e-002	1.66e-002	81.13	0.9998
4	2.e-002	2.e-002	2.33e-002	81.13	0.9998
5	2.66e-002	2.66e-002	3.e-002	81.12	0.9997
6	3.33e-002	3.33e-002	3.66e-002	81.11	0.9996
7	4.e-002	4.e-002	4.33e-002	81.11	0.9995
8	4.66e-002	4.66e-002	5.e-002	81.1	0.9994
9	5.33e-002	5.33e-002	5.66e-002	81.09	0.9993
10	6.e-002	6.e-002	6.33e-002	81.09	0.9993
11	6.66e-002	6.66e-002	7.e-002	81.08	0.9992
12	7.33e-002	7.33e-002	7.66e-002	81.07	0.9991
13	8.e-002	8.e-002	8.33e-002	81.07	0.999
14	8.66e-002	8.66e-002	9.e-002	81.06	0.9989
15	9.33e-002	9.33e-002	9.66e-002	81.05	0.9989
16	0.1	0.1	0.1033	81.05	0.9988
17	0.1066	0.1066	0.11	81.04	0.9987
18	0.1133	0.1133	0.1166	81.03	0.9986
19	0.12	0.12	0.1233	81.03	0.9985
20	0.1266	0.1266	0.13	81.02	0.9984
21	0.1333	0.1333	0.1366	81.01	0.9984
22	0.14	0.14	0.1433	81.01	0.9983
23	0.1466	0.1466	0.15	81.	0.9982
24	0.1533	0.1533	0.1566	80.99	0.9981
25	0.16	0.16	0.1633	80.99	0.998
26	0.1666	0.1666	0.17	80.98	0.9979
27	0.1733	0.1733	0.1766	80.97	0.9979
28	0.18	0.18	0.1833	80.97	0.9978
29	0.1866	0.1866	0.19	80.96	0.9977
30	0.1933	0.1933	0.1966	80.95	0.9976
31	0.2	0.2	0.2033	80.95	0.9975
32	0.2066	0.2066	0.21	80.94	0.9975
33	0.2133	0.2133	0.2166	80.93	0.9974
34	0.22	0.22	0.2233	80.93	0.9973

35	0.2266	0.2266	0.23	80.92	0.9972
36	0.2333	0.2333	0.2366	80.91	0.9971
37	0.24	0.24	0.2433	80.91	0.997
38	0.2466	0.2466	0.25	80.9	0.997
39	0.2533	0.2533	0.2566	80.89	0.9969
40	0.26	0.26	0.2633	80.89	0.9968
41	0.2666	0.2666	0.27	80.88	0.9967
42	0.2733	0.2733	0.2766	80.87	0.9966
43	0.28	0.28	0.2833	80.87	0.9965
44	0.2866	0.2866	0.29	80.86	0.9965
45	0.2933	0.2933	0.2966	80.85	0.9964
46	0.3	0.3	0.3033	80.85	0.9963
47	0.3066	0.3066	0.31	80.84	0.9962
48	0.3133	0.3133	0.3166	80.83	0.9961
49	0.32	0.32	0.3233	80.83	0.9961
50	0.3266	0.3266	0.33	80.82	0.996
51	0.3333	0.3333	0.35	80.8	0.9957
52	0.3666	0.3666	0.3833	80.77	0.9953
53	0.4	0.4	0.4166	80.73	0.9949
54	0.4333	0.4333	0.45	80.7	0.9945
55	0.4666	0.4666	0.4833	80.67	0.9941
56	0.5	0.5	0.5166	80.63	0.9937
57	0.5333	0.5333	0.55	80.6	0.9933
58	0.5666	0.5666	0.5833	80.57	0.9929
59	0.6	0.6	0.6166	80.53	0.9924
60	0.6333	0.6333	0.65	80.5	0.992
61	0.6666	0.6666	0.6833	80.47	0.9916
62	0.7	0.7	0.7166	80.43	0.9912
63	0.7333	0.7333	0.75	80.4	0.9908
64	0.7666	0.7666	0.7833	80.37	0.9904
65	0.8	0.8	0.8166	80.33	0.99
66	0.8333	0.8333	0.85	80.3	0.9896
67	0.8666	0.8666	0.8833	80.27	0.9892
68	0.9	0.9	0.9166	80.23	0.9887
69	0.9333	0.9333	0.95	80.2	0.9883
70	0.9666	0.9666	0.9833	80.17	0.9879
71	1.	1.	1.2	79.95	0.9853
72	1.4	1.4	1.6	79.55	0.9803
73	1.8	1.8	2.	79.15	0.9754
74	2.2	2.2	2.4	78.75	0.9705
75	2.6	2.6	2.8	78.35	0.9655
76	3.	3.	3.2	77.95	0.9606
77	3.4	3.4	3.6	77.55	0.9557
78	3.8	3.8	4.	77.15	0.9507
79	4.2	4.2	4.4	76.75	0.9458
80	4.6	4.6	4.8	76.35	0.9409
81	5.	5.	5.2	75.95	0.936
82	5.4	5.4	5.6	75.55	0.931
83	5.8	5.8	6.	75.15	0.9261
84	6.2	6.2	6.4	74.75	0.9212
85	6.6	6.6	6.8	74.35	0.9162
86	7.	7.	7.2	73.95	0.9113
87	7.4	7.4	7.6	73.55	0.9064
88	7.8	7.8	8.	73.15	0.9015
89	8.2	8.2	8.4	72.75	0.8965
90	8.6	8.6	8.8	72.35	0.8916
91	9.	9.	9.2	71.95	0.8867

92	9.4	9.4	9.6	71.55	0.8817
93	9.8	9.8	10.	71.15	0.8768
94	12.	12.	14.	67.15	0.8275
95	16.	16.	18.	63.15	0.7782
96	20.	20.	22.	59.15	0.7289
97	24.	24.	26.	55.15	0.6796
98	28.	28.	30.	51.15	0.6303
99	32.	32.	34.	47.15	0.581
100	36.	36.	38.	43.15	0.5318


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-7 falling head
Time Lag = 1412 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 44. minutes
102 Measurements analyzed from 1 to 102
Hydraulic Conductivity = 2.766e-005 cm/sec
Transmissivity = 3.92 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
35
40
Adjusted Time (minutes)
Time Lag
Analysis by Starpoint Software
Ho is 49.31 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-7 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.647487e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 44. minutes
102 Measurements analyzed from 1 to 102
Hydraulic Conductivity = 6.877e-005 cm/sec
Transmissivity = 9.747 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
25
30
35
40
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 49.31 feet at 0. seconds

Field Hydraulic Conductivity Test

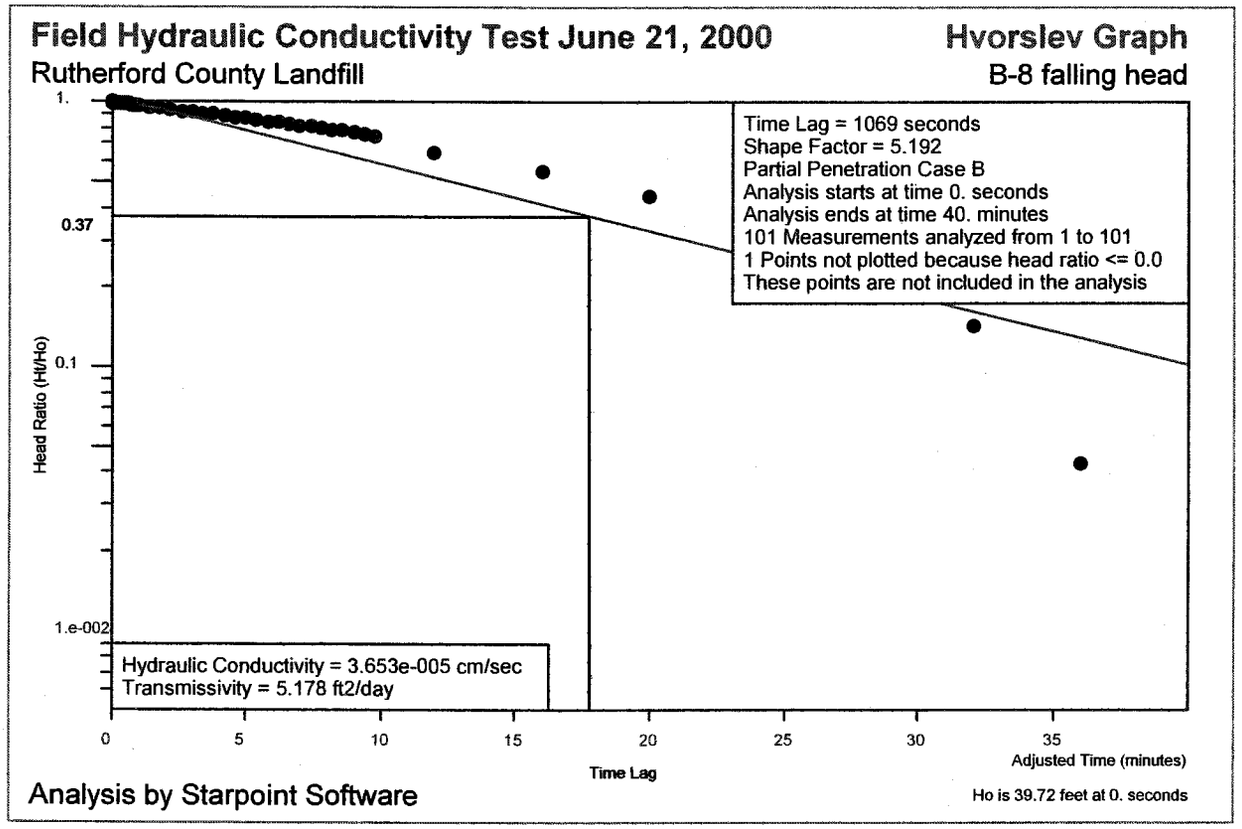
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B7S0

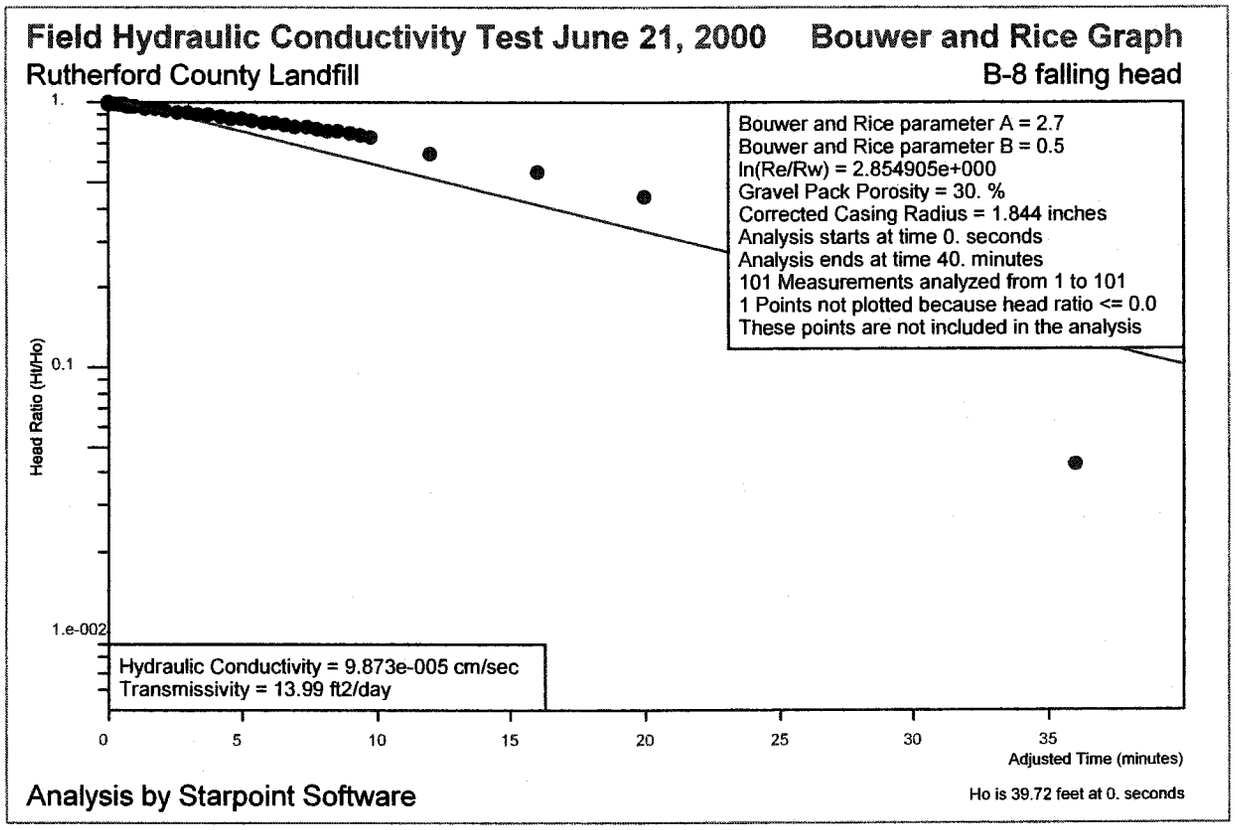
Well Label: B-7 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 49.31 feet
Water Table to Screen Bottom: 20.2 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 102 time and drawdown measurements
Maximum head is 49.31 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	49.31	1.
2	6.6e-003	6.6e-003	1.e-002	49.3	0.9999
3	1.33e-002	1.33e-002	1.66e-002	49.29	0.9997
4	2.e-002	2.e-002	2.33e-002	49.29	0.9996
5	2.66e-002	2.66e-002	3.e-002	49.28	0.9995
6	3.33e-002	3.33e-002	3.66e-002	49.27	0.9993
7	4.e-002	4.e-002	4.33e-002	49.27	0.9992
8	4.66e-002	4.66e-002	5.e-002	49.26	0.9991
9	5.33e-002	5.33e-002	5.66e-002	49.25	0.9989
10	6.e-002	6.e-002	6.33e-002	49.25	0.9988
11	6.66e-002	6.66e-002	7.e-002	49.24	0.9986
12	7.33e-002	7.33e-002	7.66e-002	49.23	0.9985
13	8.e-002	8.e-002	8.33e-002	49.23	0.9984
14	8.66e-002	8.66e-002	9.e-002	49.22	0.9982
15	9.33e-002	9.33e-002	9.66e-002	49.21	0.9981
16	0.1	0.1	0.1033	49.21	0.998
17	0.1066	0.1066	0.11	49.2	0.9978
18	0.1133	0.1133	0.1166	49.19	0.9977
19	0.12	0.12	0.1233	49.19	0.9976
20	0.1266	0.1266	0.13	49.18	0.9974
21	0.1333	0.1333	0.1366	49.17	0.9973
22	0.14	0.14	0.1433	49.17	0.9972
23	0.1466	0.1466	0.15	49.16	0.997
24	0.1533	0.1533	0.1566	49.15	0.9969
25	0.16	0.16	0.1633	49.15	0.9968
26	0.1666	0.1666	0.17	49.14	0.9966
27	0.1733	0.1733	0.1766	49.13	0.9965
28	0.18	0.18	0.1833	49.13	0.9963
29	0.1866	0.1866	0.19	49.12	0.9962
30	0.1933	0.1933	0.1966	49.11	0.9961
31	0.2	0.2	0.2033	49.11	0.9959
32	0.2066	0.2066	0.21	49.1	0.9958
33	0.2133	0.2133	0.2166	49.09	0.9957
34	0.22	0.22	0.2233	49.09	0.9955

35	0.2266	0.2266	0.23	49.08	0.9954
36	0.2333	0.2333	0.2366	49.07	0.9953
37	0.24	0.24	0.2433	49.07	0.9951
38	0.2466	0.2466	0.25	49.06	0.995
39	0.2533	0.2533	0.2566	49.05	0.9949
40	0.26	0.26	0.2633	49.05	0.9947
41	0.2666	0.2666	0.27	49.04	0.9946
42	0.2733	0.2733	0.2766	49.03	0.9945
43	0.28	0.28	0.2833	49.03	0.9943
44	0.2866	0.2866	0.29	49.02	0.9942
45	0.2933	0.2933	0.2966	49.01	0.9941
46	0.3	0.3	0.3033	49.01	0.9939
47	0.3066	0.3066	0.31	49.	0.9938
48	0.3133	0.3133	0.3166	48.99	0.9936
49	0.32	0.32	0.3233	48.99	0.9935
50	0.3266	0.3266	0.33	48.98	0.9934
51	0.3333	0.3333	0.35	48.96	0.993
52	0.3666	0.3666	0.3833	48.93	0.9923
53	0.4	0.4	0.4166	48.89	0.9916
54	0.4333	0.4333	0.45	48.86	0.9909
55	0.4666	0.4666	0.4833	48.83	0.9903
56	0.5	0.5	0.5166	48.79	0.9896
57	0.5333	0.5333	0.55	48.76	0.9889
58	0.5666	0.5666	0.5833	48.73	0.9882
59	0.6	0.6	0.6166	48.69	0.9876
60	0.6333	0.6333	0.65	48.66	0.9869
61	0.6666	0.6666	0.6833	48.63	0.9862
62	0.7	0.7	0.7166	48.59	0.9855
63	0.7333	0.7333	0.75	48.56	0.9849
64	0.7666	0.7666	0.7833	48.53	0.9842
65	0.8	0.8	0.8166	48.49	0.9835
66	0.8333	0.8333	0.85	48.46	0.9828
67	0.8666	0.8666	0.8833	48.43	0.9822
68	0.9	0.9	0.9166	48.39	0.9815
69	0.9333	0.9333	0.95	48.36	0.9808
70	0.9666	0.9666	0.9833	48.33	0.9801
71	1.	1.	1.2	48.11	0.9757
72	1.4	1.4	1.6	47.71	0.9676
73	1.8	1.8	2.	47.31	0.9595
74	2.2	2.2	2.4	46.91	0.9514
75	2.6	2.6	2.8	46.51	0.9433
76	3.	3.	3.2	46.11	0.9352
77	3.4	3.4	3.6	45.71	0.9271
78	3.8	3.8	4.	45.31	0.9189
79	4.2	4.2	4.4	44.91	0.9108
80	4.6	4.6	4.8	44.51	0.9027
81	5.	5.	5.2	44.11	0.8946
82	5.4	5.4	5.6	43.71	0.8865
83	5.8	5.8	6.	43.31	0.8784
84	6.2	6.2	6.4	42.91	0.8703
85	6.6	6.6	6.8	42.51	0.8622
86	7.	7.	7.2	42.11	0.854
87	7.4	7.4	7.6	41.71	0.8459
88	7.8	7.8	8.	41.31	0.8378
89	8.2	8.2	8.4	40.91	0.8297
90	8.6	8.6	8.8	40.51	0.8216
91	9.	9.	9.2	40.11	0.8135

92	9.4	9.4	9.6	39.71	0.8054
93	9.8	9.8	10.	39.31	0.7973
94	12.	12.	14.	35.31	0.7161
95	16.	16.	18.	31.31	0.635
96	20.	20.	22.	27.31	0.5539
97	24.	24.	26.	23.31	0.4728
98	28.	28.	30.	19.31	0.3916
99	32.	32.	34.	15.31	0.3105
100	36.	36.	38.	11.31	0.2294
101	40.	40.	42.	7.31	0.1483
102	44.	44.	46.	3.31	6.713e-002


Field Hydraulic Conductivity Test June 21, 2000
Hvorslev Graph
Rutherford County Landfill
B-8 falling head
Time Lag = 1069 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 40. minutes
101 Measurements analyzed from 1 to 101
1 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 3.653e-005 cm/sec
Transmissivity = 5.178 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
35
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 39.72 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-8 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.854905e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 40. minutes
101 Measurements analyzed from 1 to 101
1 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 9.873e-005 cm/sec
Transmissivity = 13.99 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
25
30
35
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 39.72 feet at 0. seconds

Field Hydraulic Conductivity Test

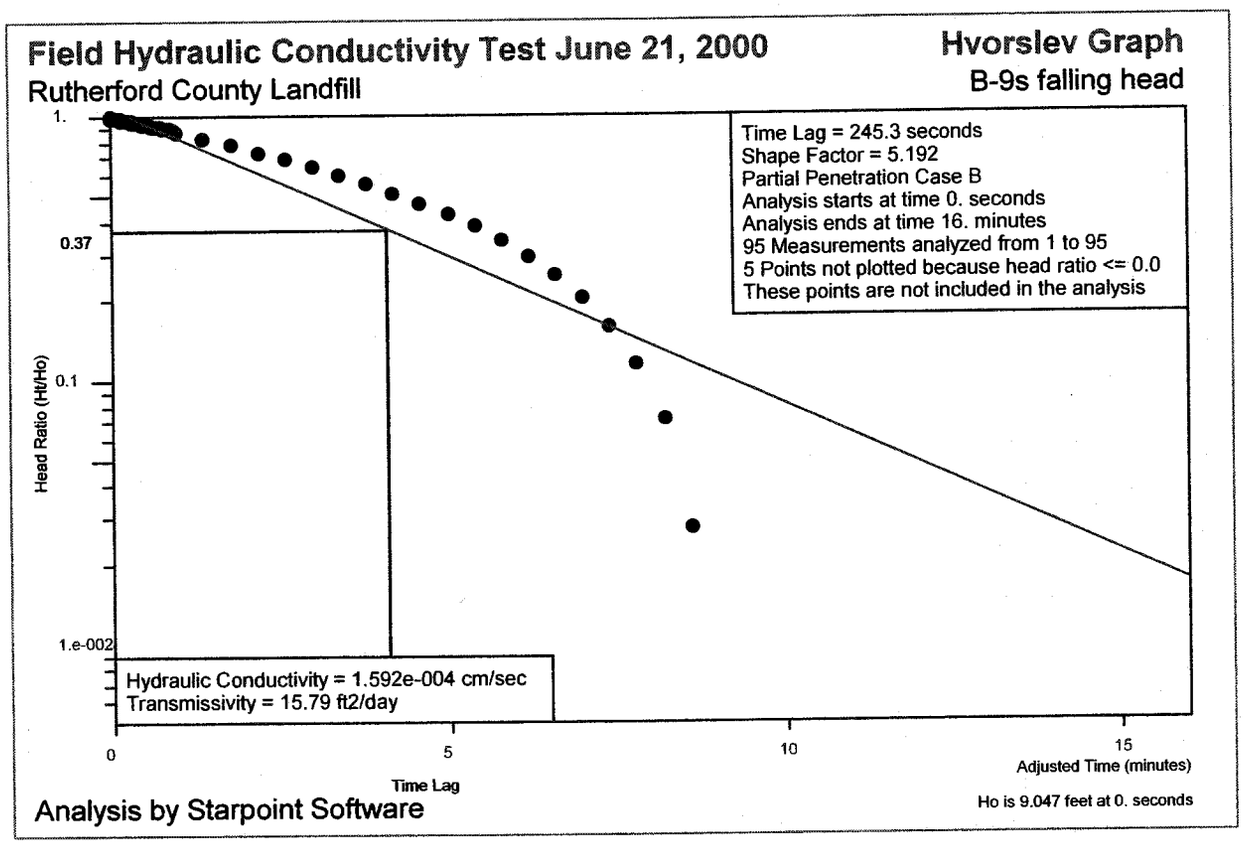
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B8S0

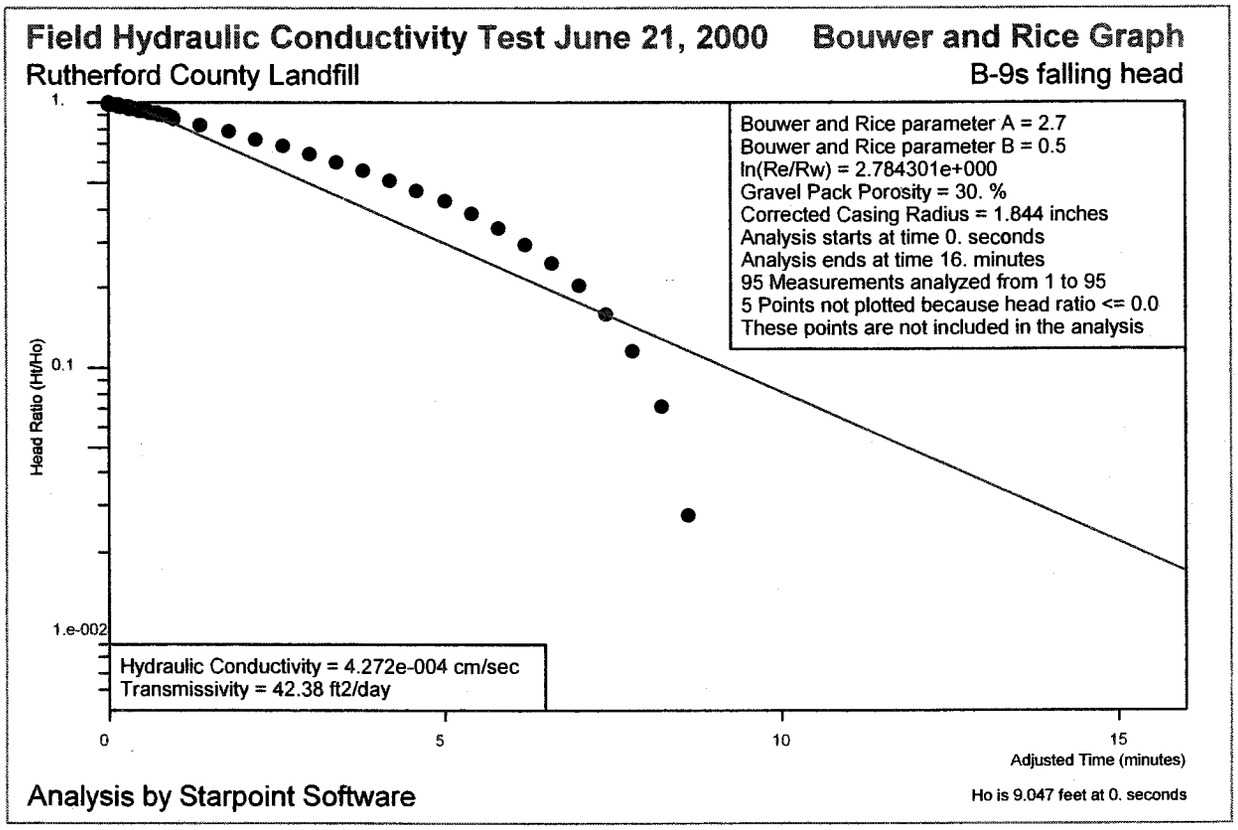
Well Label: B-8 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 39.72 feet
Water Table to Screen Bottom: 30.8 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 101 time and drawdown measurements
Maximum head is 39.72 feet
Minimum head is -2.28 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	39.72	1.
2	6.6e-003	6.6e-003	1.e-002	39.71	0.9998
3	1.33e-002	1.33e-002	1.66e-002	39.7	0.9997
4	2.e-002	2.e-002	2.33e-002	39.7	0.9995
5	2.66e-002	2.66e-002	3.e-002	39.69	0.9993
6	3.33e-002	3.33e-002	3.66e-002	39.68	0.9992
7	4.e-002	4.e-002	4.33e-002	39.68	0.999
8	4.66e-002	4.66e-002	5.e-002	39.67	0.9988
9	5.33e-002	5.33e-002	5.66e-002	39.66	0.9987
10	6.e-002	6.e-002	6.33e-002	39.66	0.9985
11	6.66e-002	6.66e-002	7.e-002	39.65	0.9983
12	7.33e-002	7.33e-002	7.66e-002	39.64	0.9982
13	8.e-002	8.e-002	8.33e-002	39.64	0.998
14	8.66e-002	8.66e-002	9.e-002	39.63	0.9978
15	9.33e-002	9.33e-002	9.66e-002	39.62	0.9977
16	0.1	0.1	0.1033	39.62	0.9975
17	0.1066	0.1066	0.11	39.61	0.9973
18	0.1133	0.1133	0.1166	39.6	0.9971
19	0.12	0.12	0.1233	39.6	0.997
20	0.1266	0.1266	0.13	39.59	0.9968
21	0.1333	0.1333	0.1366	39.58	0.9966
22	0.14	0.14	0.1433	39.58	0.9965
23	0.1466	0.1466	0.15	39.57	0.9963
24	0.1533	0.1533	0.1566	39.56	0.9961
25	0.16	0.16	0.1633	39.56	0.996
26	0.1666	0.1666	0.17	39.55	0.9958
27	0.1733	0.1733	0.1766	39.54	0.9956
28	0.18	0.18	0.1833	39.54	0.9955
29	0.1866	0.1866	0.19	39.53	0.9953
30	0.1933	0.1933	0.1966	39.52	0.9951
31	0.2	0.2	0.2033	39.52	0.995
32	0.2066	0.2066	0.21	39.51	0.9948
33	0.2133	0.2133	0.2166	39.5	0.9946
34	0.22	0.22	0.2233	39.5	0.9945

35	0.2266	0.2266	0.23	39.49	0.9943
36	0.2333	0.2333	0.2366	39.48	0.9941
37	0.24	0.24	0.2433	39.48	0.994
38	0.2466	0.2466	0.25	39.47	0.9938
39	0.2533	0.2533	0.2566	39.46	0.9936
40	0.26	0.26	0.2633	39.46	0.9935
41	0.2666	0.2666	0.27	39.45	0.9933
42	0.2733	0.2733	0.2766	39.44	0.9931
43	0.28	0.28	0.2833	39.44	0.993
44	0.2866	0.2866	0.29	39.43	0.9928
45	0.2933	0.2933	0.2966	39.42	0.9926
46	0.3	0.3	0.3033	39.42	0.9924
47	0.3066	0.3066	0.31	39.41	0.9923
48	0.3133	0.3133	0.3166	39.4	0.9921
49	0.32	0.32	0.3233	39.4	0.9919
50	0.3266	0.3266	0.33	39.39	0.9918
51	0.3333	0.3333	0.35	39.37	0.9913
52	0.3666	0.3666	0.3833	39.34	0.9904
53	0.4	0.4	0.4166	39.3	0.9896
54	0.4333	0.4333	0.45	39.27	0.9888
55	0.4666	0.4666	0.4833	39.24	0.9879
56	0.5	0.5	0.5166	39.2	0.9871
57	0.5333	0.5333	0.55	39.17	0.9862
58	0.5666	0.5666	0.5833	39.14	0.9854
59	0.6	0.6	0.6166	39.1	0.9846
60	0.6333	0.6333	0.65	39.07	0.9837
61	0.6666	0.6666	0.6833	39.04	0.9829
62	0.7	0.7	0.7166	39.	0.982
63	0.7333	0.7333	0.75	38.97	0.9812
64	0.7666	0.7666	0.7833	38.94	0.9804
65	0.8	0.8	0.8166	38.9	0.9795
66	0.8333	0.8333	0.85	38.87	0.9787
67	0.8666	0.8666	0.8833	38.84	0.9778
68	0.9	0.9	0.9166	38.8	0.977
69	0.9333	0.9333	0.95	38.77	0.9762
70	0.9666	0.9666	0.9833	38.74	0.9753
71	1.	1.	1.2	38.52	0.9699
72	1.4	1.4	1.6	38.12	0.9598
73	1.8	1.8	2.	37.72	0.9497
74	2.2	2.2	2.4	37.32	0.9397
75	2.6	2.6	2.8	36.92	0.9296
76	3.	3.	3.2	36.52	0.9195
77	3.4	3.4	3.6	36.12	0.9094
78	3.8	3.8	4.	35.72	0.8994
79	4.2	4.2	4.4	35.32	0.8893
80	4.6	4.6	4.8	34.92	0.8792
81	5.	5.	5.2	34.52	0.8692
82	5.4	5.4	5.6	34.12	0.8591
83	5.8	5.8	6.	33.72	0.849
84	6.2	6.2	6.4	33.32	0.8389
85	6.6	6.6	6.8	32.92	0.8289
86	7.	7.	7.2	32.52	0.8188
87	7.4	7.4	7.6	32.12	0.8087
88	7.8	7.8	8.	31.72	0.7987
89	8.2	8.2	8.4	31.32	0.7886
90	8.6	8.6	8.8	30.92	0.7785
91	9.	9.	9.2	30.52	0.7684

92	9.4	9.4	9.6	30.12	0.7584
93	9.8	9.8	10.	29.72	0.7483
94	12.	12.	14.	25.72	0.6476
95	16.	16.	18.	21.72	0.5469
96	20.	20.	22.	17.72	0.4462
97	24.	24.	26.	13.72	0.3454
98	28.	28.	30.	9.72	0.2447
99	32.	32.	34.	5.72	0.144
100	36.	36.	38.	1.72	4.331e-002
101	40.	40.	42.	-2.28	-5.741e-002


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-9s falling head
Time Lag = 245.3 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 16. minutes
95 Measurements analyzed from 1 to 95
5 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 1.592e-004 cm/sec
Transmissivity = 15.79 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
Time Lag
Adjusted Time (minutes)
Ho is 9.047 feet at 0. seconds
Analysis by Starpoint Software


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-9s falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.784301e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 16. minutes
95 Measurements analyzed from 1 to 95
5 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 4.272e-004 cm/sec
Transmissivity = 42.38 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 9.047 feet at 0. seconds

Field Hydraulic Conductivity Test

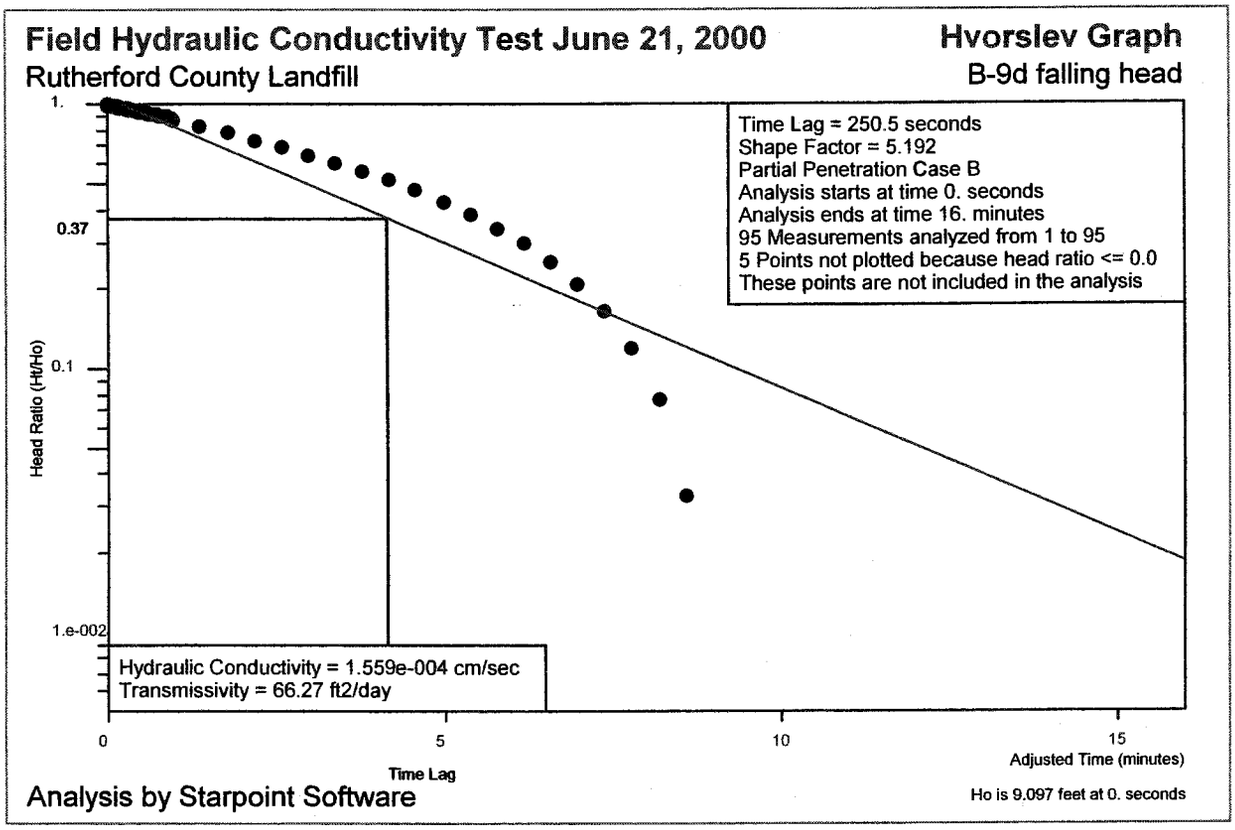
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B9ss0

Well Label: B-9s falling head
Aquifer Thickness: 35. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 9.05 feet
Water Table to Screen Bottom: 23. feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 95 time and drawdown measurements
Maximum head is 9.047 feet
Minimum head is -8.95 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	9.047	1.
2	6.6e-003	6.6e-003	1.e-002	9.04	0.9993
3	1.33e-002	1.33e-002	1.66e-002	9.033	0.9985
4	2.e-002	2.e-002	2.33e-002	9.027	0.9978
5	2.66e-002	2.66e-002	3.e-002	9.02	0.997
6	3.33e-002	3.33e-002	3.66e-002	9.013	0.9963
7	4.e-002	4.e-002	4.33e-002	9.007	0.9956
8	4.66e-002	4.66e-002	5.e-002	9.	0.9948
9	5.33e-002	5.33e-002	5.66e-002	8.993	0.9941
10	6.e-002	6.e-002	6.33e-002	8.987	0.9934
11	6.66e-002	6.66e-002	7.e-002	8.98	0.9926
12	7.33e-002	7.33e-002	7.66e-002	8.973	0.9919
13	8.e-002	8.e-002	8.33e-002	8.967	0.9912
14	8.66e-002	8.66e-002	9.e-002	8.96	0.9904
15	9.33e-002	9.33e-002	9.66e-002	8.953	0.9897
16	0.1	0.1	0.1033	8.947	0.9889
17	0.1066	0.1066	0.11	8.94	0.9882
18	0.1133	0.1133	0.1166	8.933	0.9875
19	0.12	0.12	0.1233	8.927	0.9867
20	0.1266	0.1266	0.13	8.92	0.986
21	0.1333	0.1333	0.1366	8.913	0.9853
22	0.14	0.14	0.1433	8.907	0.9845
23	0.1466	0.1466	0.15	8.9	0.9838
24	0.1533	0.1533	0.1566	8.893	0.9831
25	0.16	0.16	0.1633	8.887	0.9823
26	0.1666	0.1666	0.17	8.88	0.9816
27	0.1733	0.1733	0.1766	8.873	0.9808
28	0.18	0.18	0.1833	8.867	0.9801
29	0.1866	0.1866	0.19	8.86	0.9794
30	0.1933	0.1933	0.1966	8.853	0.9786
31	0.2	0.2	0.2033	8.847	0.9779
32	0.2066	0.2066	0.21	8.84	0.9772
33	0.2133	0.2133	0.2166	8.833	0.9764
34	0.22	0.22	0.2233	8.827	0.9757

35	0.2266	0.2266	0.23	8.82	0.9749
36	0.2333	0.2333	0.2366	8.813	0.9742
37	0.24	0.24	0.2433	8.807	0.9735
38	0.2466	0.2466	0.25	8.8	0.9727
39	0.2533	0.2533	0.2566	8.793	0.972
40	0.26	0.26	0.2633	8.787	0.9713
41	0.2666	0.2666	0.27	8.78	0.9705
42	0.2733	0.2733	0.2766	8.773	0.9698
43	0.28	0.28	0.2833	8.767	0.969
44	0.2866	0.2866	0.29	8.76	0.9683
45	0.2933	0.2933	0.2966	8.753	0.9676
46	0.3	0.3	0.3033	8.747	0.9668
47	0.3066	0.3066	0.31	8.74	0.9661
48	0.3133	0.3133	0.3166	8.733	0.9654
49	0.32	0.32	0.3233	8.727	0.9646
50	0.3266	0.3266	0.33	8.72	0.9639
51	0.3333	0.3333	0.35	8.7	0.9617
52	0.3666	0.3666	0.3833	8.667	0.958
53	0.4	0.4	0.4166	8.633	0.9543
54	0.4333	0.4333	0.45	8.6	0.9506
55	0.4666	0.4666	0.4833	8.567	0.9469
56	0.5	0.5	0.5166	8.533	0.9433
57	0.5333	0.5333	0.55	8.5	0.9396
58	0.5666	0.5666	0.5833	8.467	0.9359
59	0.6	0.6	0.6166	8.433	0.9322
60	0.6333	0.6333	0.65	8.4	0.9285
61	0.6666	0.6666	0.6833	8.367	0.9248
62	0.7	0.7	0.7166	8.333	0.9212
63	0.7333	0.7333	0.75	8.3	0.9175
64	0.7666	0.7666	0.7833	8.267	0.9138
65	0.8	0.8	0.8166	8.233	0.9101
66	0.8333	0.8333	0.85	8.2	0.9064
67	0.8666	0.8666	0.8833	8.167	0.9027
68	0.9	0.9	0.9166	8.133	0.899
69	0.9333	0.9333	0.95	8.1	0.8954
70	0.9666	0.9666	0.9833	8.067	0.8917
71	1.	1.	1.2	7.85	0.8677
72	1.4	1.4	1.6	7.45	0.8235
73	1.8	1.8	2.	7.05	0.7793
74	2.2	2.2	2.4	6.65	0.7351
75	2.6	2.6	2.8	6.25	0.6909
76	3.	3.	3.2	5.85	0.6466
77	3.4	3.4	3.6	5.45	0.6024
78	3.8	3.8	4.	5.05	0.5582
79	4.2	4.2	4.4	4.65	0.514
80	4.6	4.6	4.8	4.25	0.4698
81	5.	5.	5.2	3.85	0.4256
82	5.4	5.4	5.6	3.45	0.3814
83	5.8	5.8	6.	3.05	0.3371
84	6.2	6.2	6.4	2.65	0.2929
85	6.6	6.6	6.8	2.25	0.2487
86	7.	7.	7.2	1.85	0.2045
87	7.4	7.4	7.6	1.45	0.1603
88	7.8	7.8	8.	1.05	0.1161
89	8.2	8.2	8.4	0.65	7.185e-002
90	8.6	8.6	8.8	0.25	2.763e-002
91	9.	9.	9.2	-0.15	-1.658e-002

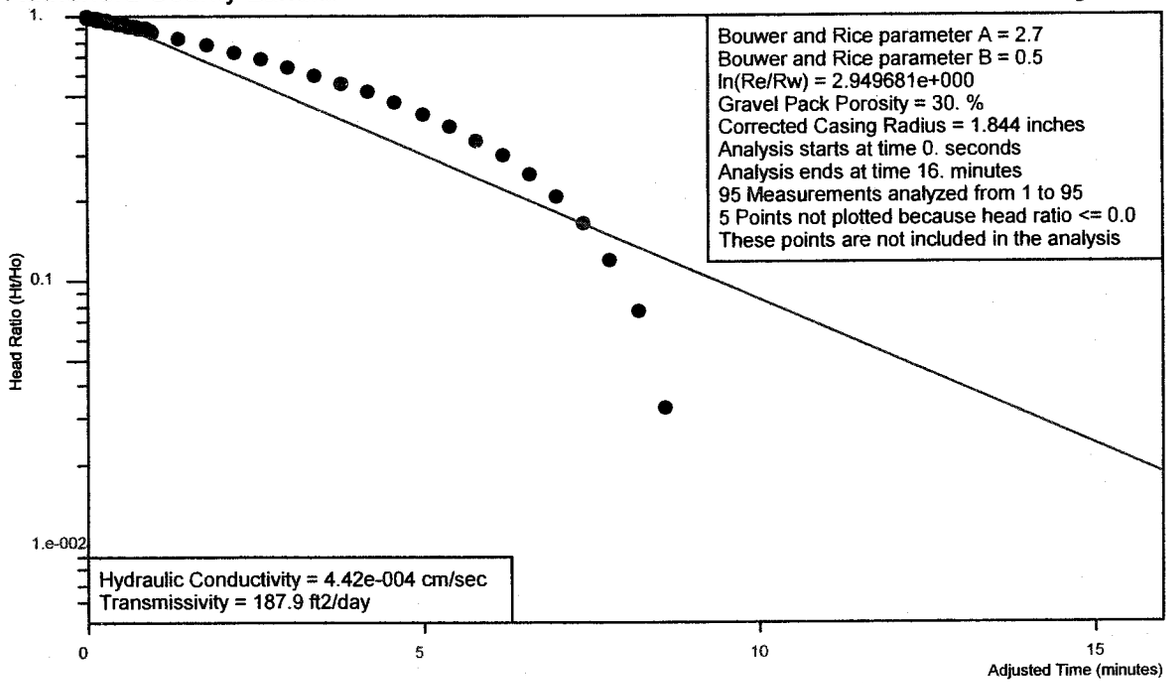
92	9.4	9.4	9.6	-0.55	-6.08e-002
93	9.8	9.8	10.	-0.95	-0.105
94	12.	12.	14.	-4.95	-0.5472
95	16.	16.	18.	-8.95	-0.9893


Field Hydraulic Conductivity Test June 21, 2000
Hvorslev Graph
Rutherford County Landfill
B-9d falling head
Time Lag = 250.5 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 16. minutes
95 Measurements analyzed from 1 to 95
5 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
Hydraulic Conductivity = 1.559e-004 cm/sec
Transmissivity = 66.27 ft2/day
0
5
10
15
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 9.097 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000 Bouwer and Rice Graph

Rutherford County Landfill

B-9d falling head



Analysis by Starpoint Software

Ho is 9.097 feet at 0. seconds

Field Hydraulic Conductivity Test

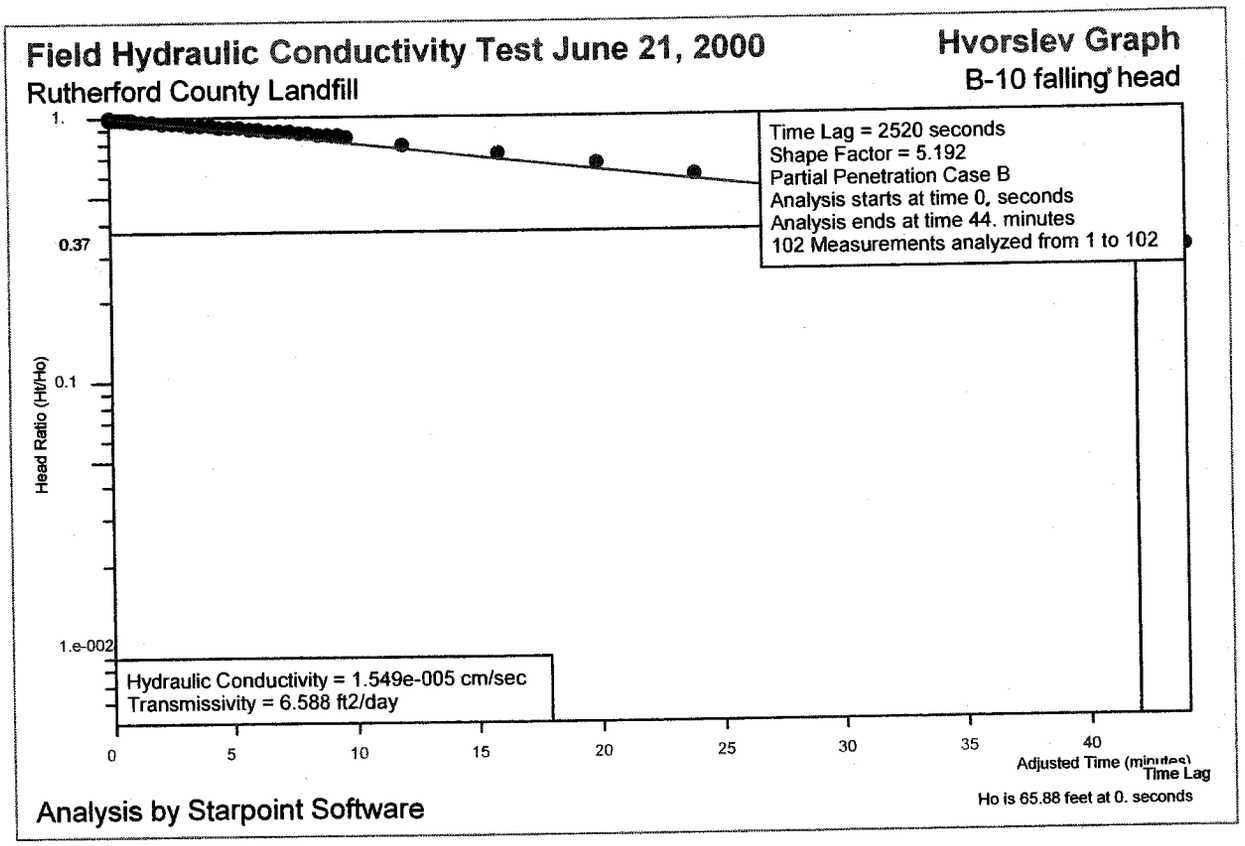
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B9ds0

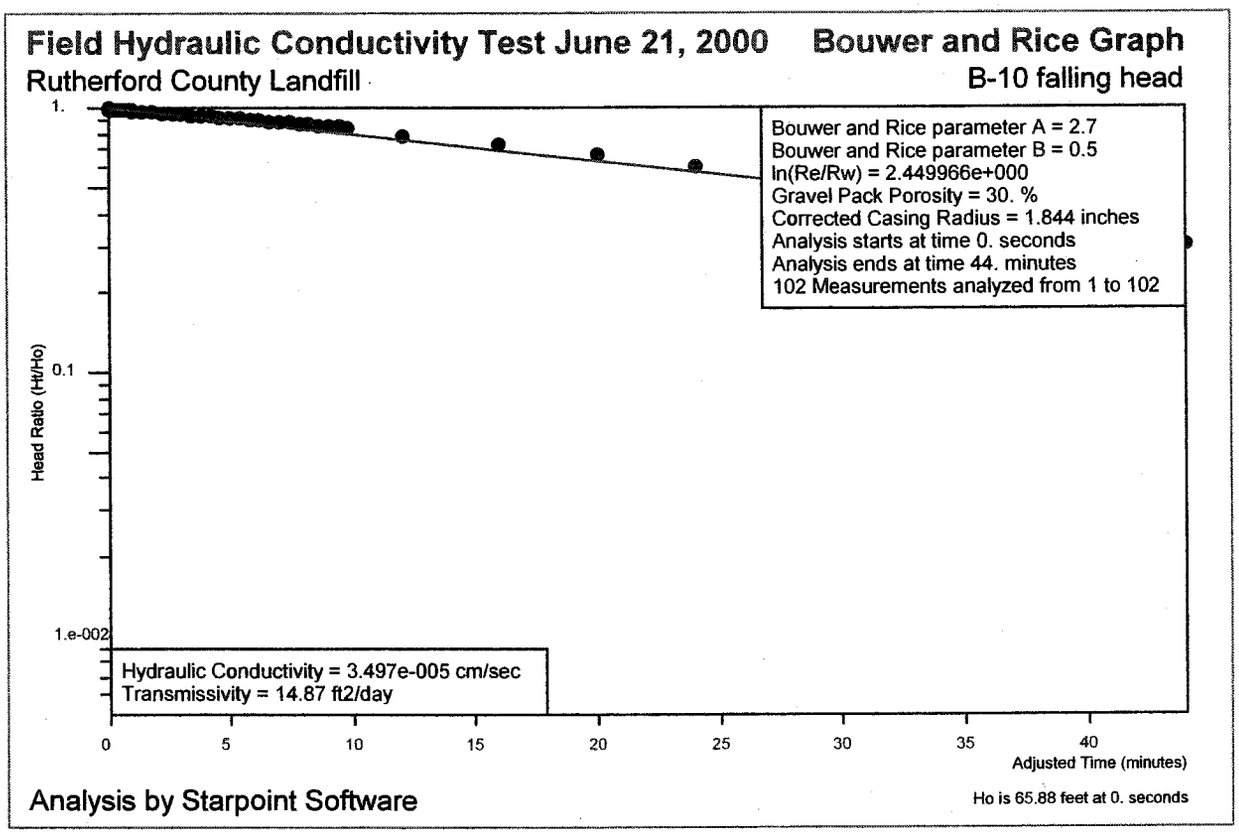
Well Label: B-9d falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 9.1 feet
Water Table to Screen Bottom: 63.8 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 95 time and drawdown measurements
Maximum head is 9.097 feet
Minimum head is -8.9 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	9.097	1.
2	6.6e-003	6.6e-003	1.e-002	9.09	0.9993
3	1.33e-002	1.33e-002	1.66e-002	9.083	0.9985
4	2.e-002	2.e-002	2.33e-002	9.077	0.9978
5	2.66e-002	2.66e-002	3.e-002	9.07	0.9971
6	3.33e-002	3.33e-002	3.66e-002	9.063	0.9963
7	4.e-002	4.e-002	4.33e-002	9.057	0.9956
8	4.66e-002	4.66e-002	5.e-002	9.05	0.9949
9	5.33e-002	5.33e-002	5.66e-002	9.043	0.9941
10	6.e-002	6.e-002	6.33e-002	9.037	0.9934
11	6.66e-002	6.66e-002	7.e-002	9.03	0.9927
12	7.33e-002	7.33e-002	7.66e-002	9.023	0.9919
13	8.e-002	8.e-002	8.33e-002	9.017	0.9912
14	8.66e-002	8.66e-002	9.e-002	9.01	0.9905
15	9.33e-002	9.33e-002	9.66e-002	9.003	0.9897
16	0.1	0.1	0.1033	8.997	0.989
17	0.1066	0.1066	0.11	8.99	0.9883
18	0.1133	0.1133	0.1166	8.983	0.9875
19	0.12	0.12	0.1233	8.977	0.9868
20	0.1266	0.1266	0.13	8.97	0.9861
21	0.1333	0.1333	0.1366	8.963	0.9853
22	0.14	0.14	0.1433	8.957	0.9846
23	0.1466	0.1466	0.15	8.95	0.9839
24	0.1533	0.1533	0.1566	8.943	0.9831
25	0.16	0.16	0.1633	8.937	0.9824
26	0.1666	0.1666	0.17	8.93	0.9817
27	0.1733	0.1733	0.1766	8.923	0.9809
28	0.18	0.18	0.1833	8.917	0.9802
29	0.1866	0.1866	0.19	8.91	0.9795
30	0.1933	0.1933	0.1966	8.903	0.9788
31	0.2	0.2	0.2033	8.897	0.978
32	0.2066	0.2066	0.21	8.89	0.9773
33	0.2133	0.2133	0.2166	8.883	0.9766
34	0.22	0.22	0.2233	8.877	0.9758

35	0.2266	0.2266	0.23	8.87	0.9751
36	0.2333	0.2333	0.2366	8.863	0.9744
37	0.24	0.24	0.2433	8.857	0.9736
38	0.2466	0.2466	0.25	8.85	0.9729
39	0.2533	0.2533	0.2566	8.843	0.9722
40	0.26	0.26	0.2633	8.837	0.9714
41	0.2666	0.2666	0.27	8.83	0.9707
42	0.2733	0.2733	0.2766	8.823	0.97
43	0.28	0.28	0.2833	8.817	0.9692
44	0.2866	0.2866	0.29	8.81	0.9685
45	0.2933	0.2933	0.2966	8.803	0.9678
46	0.3	0.3	0.3033	8.797	0.967
47	0.3066	0.3066	0.31	8.79	0.9663
48	0.3133	0.3133	0.3166	8.783	0.9656
49	0.32	0.32	0.3233	8.777	0.9648
50	0.3266	0.3266	0.33	8.77	0.9641
51	0.3333	0.3333	0.35	8.75	0.9619
52	0.3666	0.3666	0.3833	8.717	0.9582
53	0.4	0.4	0.4166	8.683	0.9546
54	0.4333	0.4333	0.45	8.65	0.9509
55	0.4666	0.4666	0.4833	8.617	0.9472
56	0.5	0.5	0.5166	8.583	0.9436
57	0.5333	0.5333	0.55	8.55	0.9399
58	0.5666	0.5666	0.5833	8.517	0.9362
59	0.6	0.6	0.6166	8.483	0.9326
60	0.6333	0.6333	0.65	8.45	0.9289
61	0.6666	0.6666	0.6833	8.417	0.9252
62	0.7	0.7	0.7166	8.383	0.9216
63	0.7333	0.7333	0.75	8.35	0.9179
64	0.7666	0.7666	0.7833	8.317	0.9143
65	0.8	0.8	0.8166	8.283	0.9106
66	0.8333	0.8333	0.85	8.25	0.9069
67	0.8666	0.8666	0.8833	8.217	0.9033
68	0.9	0.9	0.9166	8.183	0.8996
69	0.9333	0.9333	0.95	8.15	0.8959
70	0.9666	0.9666	0.9833	8.117	0.8923
71	1.	1.	1.2	7.9	0.8684
72	1.4	1.4	1.6	7.5	0.8245
73	1.8	1.8	2.	7.1	0.7805
74	2.2	2.2	2.4	6.7	0.7365
75	2.6	2.6	2.8	6.3	0.6926
76	3.	3.	3.2	5.9	0.6486
77	3.4	3.4	3.6	5.5	0.6046
78	3.8	3.8	4.	5.1	0.5606
79	4.2	4.2	4.4	4.7	0.5167
80	4.6	4.6	4.8	4.3	0.4727
81	5.	5.	5.2	3.9	0.4287
82	5.4	5.4	5.6	3.5	0.3848
83	5.8	5.8	6.	3.1	0.3408
84	6.2	6.2	6.4	2.7	0.2968
85	6.6	6.6	6.8	2.3	0.2528
86	7.	7.	7.2	1.9	0.2089
87	7.4	7.4	7.6	1.5	0.1649
88	7.8	7.8	8.	1.1	0.1209
89	8.2	8.2	8.4	0.7	7.695e-002
90	8.6	8.6	8.8	0.3	3.298e-002
91	9.	9.	9.2	-1.e-001	-1.099e-002

92	9.4	9.4	9.6	-0.5	-5.496e-002
93	9.8	9.8	10.	-0.9	-9.894e-002
94	12.	12.	14.	-4.9	-0.5387
95	16.	16.	18.	-8.9	-0.9784


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-10 falling head
Time Lag = 2520 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 44. minutes
102 Measurements analyzed from 1 to 102
Hydraulic Conductivity = 1.549e-005 cm/sec
Transmissivity = 6.588 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
35
40
Adjusted Time (minutes)
Time Lag
Ho is 65.88 feet at 0. seconds
Analysis by Starpoint Software


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-10 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.449966e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 44. minutes
102 Measurements analyzed from 1 to 102
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 3.497e-005 cm/sec
Transmissivity = 14.87 ft2/day
0
5
10
15
20
25
30
35
40
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 65.88 feet at 0. seconds

Field Hydraulic Conductivity Test

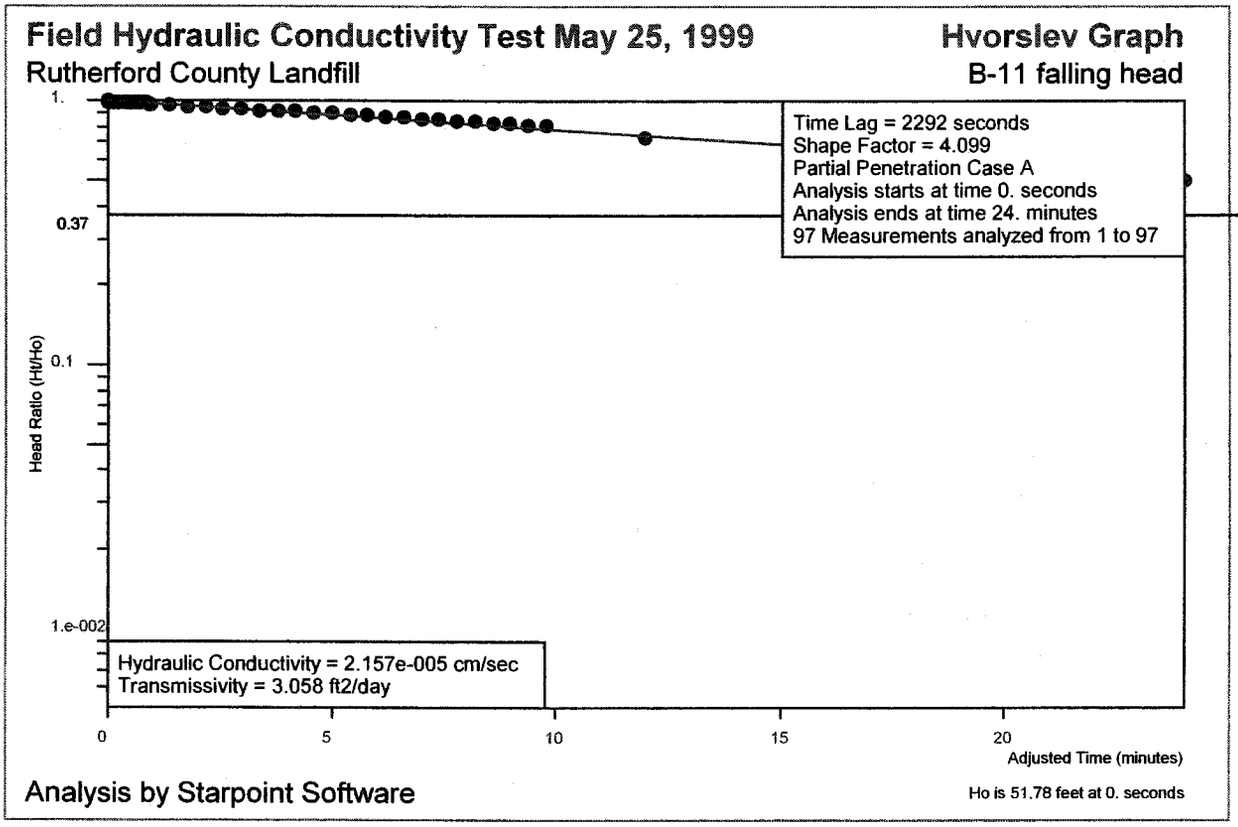
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B10S0

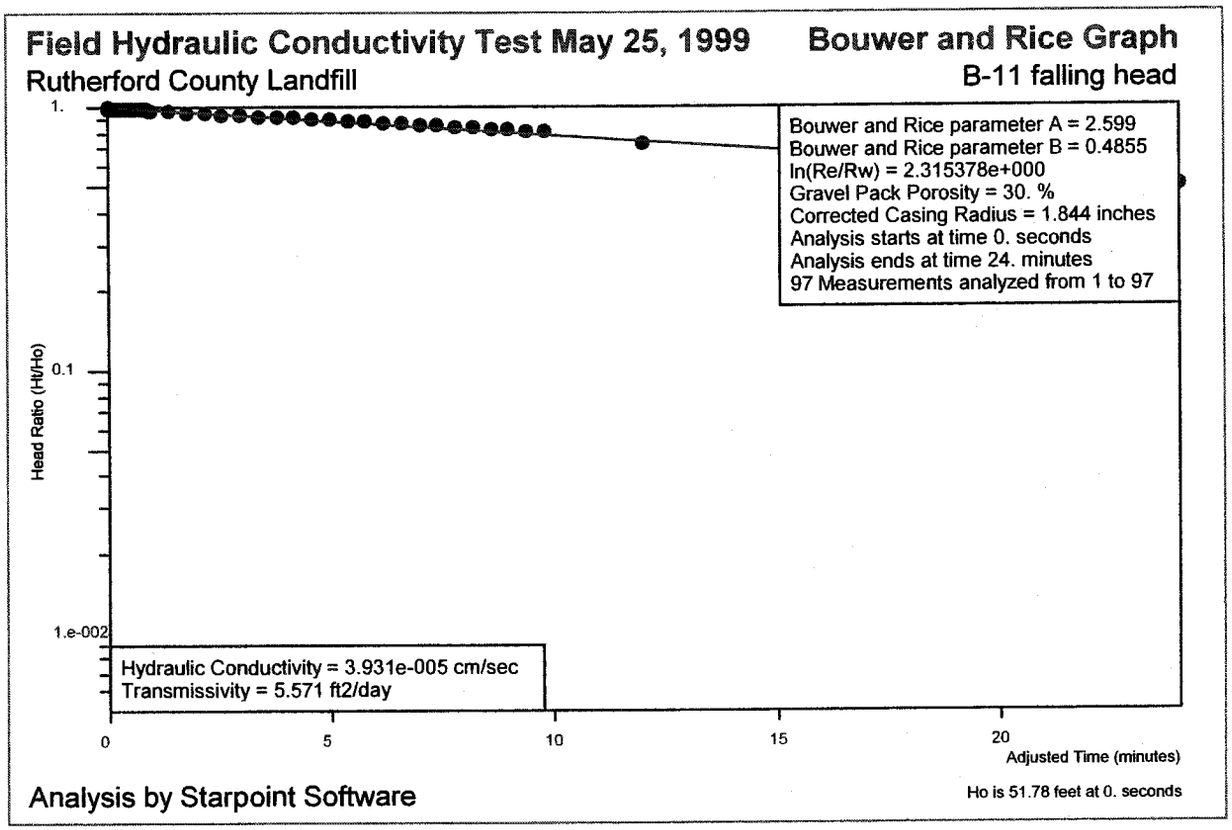
Well Label: B-10 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 65.88 feet
Water Table to Screen Bottom: 16.6 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 102 time and drawdown measurements
Maximum head is 65.88 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	65.88	1.
2	6.6e-003	6.6e-003	1.e-002	65.87	0.9999
3	1.33e-002	1.33e-002	1.66e-002	65.86	0.9998
4	2.e-002	2.e-002	2.33e-002	65.86	0.9997
5	2.66e-002	2.66e-002	3.e-002	65.85	0.9996
6	3.33e-002	3.33e-002	3.66e-002	65.84	0.9995
7	4.e-002	4.e-002	4.33e-002	65.84	0.9994
8	4.66e-002	4.66e-002	5.e-002	65.83	0.9993
9	5.33e-002	5.33e-002	5.66e-002	65.82	0.9992
10	6.e-002	6.e-002	6.33e-002	65.82	0.9991
11	6.66e-002	6.66e-002	7.e-002	65.81	0.999
12	7.33e-002	7.33e-002	7.66e-002	65.8	0.9989
13	8.e-002	8.e-002	8.33e-002	65.8	0.9988
14	8.66e-002	8.66e-002	9.e-002	65.79	0.9987
15	9.33e-002	9.33e-002	9.66e-002	65.78	0.9986
16	0.1	0.1	0.1033	65.78	0.9985
17	0.1066	0.1066	0.11	65.77	0.9984
18	0.1133	0.1133	0.1166	65.76	0.9983
19	0.12	0.12	0.1233	65.76	0.9982
20	0.1266	0.1266	0.13	65.75	0.9981
21	0.1333	0.1333	0.1366	65.74	0.998
22	0.14	0.14	0.1433	65.74	0.9979
23	0.1466	0.1466	0.15	65.73	0.9978
24	0.1533	0.1533	0.1566	65.72	0.9977
25	0.16	0.16	0.1633	65.72	0.9976
26	0.1666	0.1666	0.17	65.71	0.9975
27	0.1733	0.1733	0.1766	65.7	0.9974
28	0.18	0.18	0.1833	65.7	0.9973
29	0.1866	0.1866	0.19	65.69	0.9972
30	0.1933	0.1933	0.1966	65.68	0.9971
31	0.2	0.2	0.2033	65.68	0.997
32	0.2066	0.2066	0.21	65.67	0.9969
33	0.2133	0.2133	0.2166	65.66	0.9968
34	0.22	0.22	0.2233	65.66	0.9967

35	0.2266	0.2266	0.23	65.65	0.9966
36	0.2333	0.2333	0.2366	65.64	0.9965
37	0.24	0.24	0.2433	65.64	0.9964
38	0.2466	0.2466	0.25	65.63	0.9963
39	0.2533	0.2533	0.2566	65.62	0.9962
40	0.26	0.26	0.2633	65.62	0.9961
41	0.2666	0.2666	0.27	65.61	0.996
42	0.2733	0.2733	0.2766	65.6	0.9959
43	0.28	0.28	0.2833	65.6	0.9957
44	0.2866	0.2866	0.29	65.59	0.9956
45	0.2933	0.2933	0.2966	65.58	0.9955
46	0.3	0.3	0.3033	65.58	0.9954
47	0.3066	0.3066	0.31	65.57	0.9953
48	0.3133	0.3133	0.3166	65.56	0.9952
49	0.32	0.32	0.3233	65.56	0.9951
50	0.3266	0.3266	0.33	65.55	0.995
51	0.3333	0.3333	0.35	65.53	0.9947
52	0.3666	0.3666	0.3833	65.5	0.9942
53	0.4	0.4	0.4166	65.46	0.9937
54	0.4333	0.4333	0.45	65.43	0.9932
55	0.4666	0.4666	0.4833	65.4	0.9927
56	0.5	0.5	0.5166	65.36	0.9922
57	0.5333	0.5333	0.55	65.33	0.9917
58	0.5666	0.5666	0.5833	65.3	0.9912
59	0.6	0.6	0.6166	65.26	0.9907
60	0.6333	0.6333	0.65	65.23	0.9902
61	0.6666	0.6666	0.6833	65.2	0.9897
62	0.7	0.7	0.7166	65.16	0.9892
63	0.7333	0.7333	0.75	65.13	0.9887
64	0.7666	0.7666	0.7833	65.1	0.9882
65	0.8	0.8	0.8166	65.06	0.9877
66	0.8333	0.8333	0.85	65.03	0.9871
67	0.8666	0.8666	0.8833	65.	0.9866
68	0.9	0.9	0.9166	64.96	0.9861
69	0.9333	0.9333	0.95	64.93	0.9856
70	0.9666	0.9666	0.9833	64.9	0.9851
71	1.	1.	1.2	64.68	0.9818
72	1.4	1.4	1.6	64.28	0.9758
73	1.8	1.8	2.	63.88	0.9697
74	2.2	2.2	2.4	63.48	0.9636
75	2.6	2.6	2.8	63.08	0.9575
76	3.	3.	3.2	62.68	0.9515
77	3.4	3.4	3.6	62.28	0.9454
78	3.8	3.8	4.	61.88	0.9393
79	4.2	4.2	4.4	61.48	0.9333
80	4.6	4.6	4.8	61.08	0.9272
81	5.	5.	5.2	60.68	0.9211
82	5.4	5.4	5.6	60.28	0.915
83	5.8	5.8	6.	59.88	0.909
84	6.2	6.2	6.4	59.48	0.9029
85	6.6	6.6	6.8	59.08	0.8968
86	7.	7.	7.2	58.68	0.8908
87	7.4	7.4	7.6	58.28	0.8847
88	7.8	7.8	8.	57.88	0.8786
89	8.2	8.2	8.4	57.48	0.8725
90	8.6	8.6	8.8	57.08	0.8665
91	9.	9.	9.2	56.68	0.8604

92	9.4	9.4	9.6	56.28	0.8543
93	9.8	9.8	10.	55.88	0.8483
94	12.	12.	14.	51.88	0.7875
95	16.	16.	18.	47.88	0.7268
96	20.	20.	22.	43.88	0.6661
97	24.	24.	26.	39.88	0.6054
98	28.	28.	30.	35.88	0.5447
99	32.	32.	34.	31.88	0.4839
100	36.	36.	38.	27.88	0.4232
101	40.	40.	42.	23.88	0.3625
102	44.	44.	46.	19.88	0.3018


Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Hvorslev Graph
B-11 falling head
Time Lag = 2292 seconds
Shape Factor = 4.099
Partial Penetration Case A
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
Hydraulic Conductivity = 2.157e-005 cm/sec
Transmissivity = 3.058 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 51.78 feet at 0. seconds


Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Bouwer and Rice Graph
B-11 falling head
Bouwer and Rice parameter A = 2.599
Bouwer and Rice parameter B = 0.4855
ln(Re/Rw) = 2.315378e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
Hydraulic Conductivity = 3.931e-005 cm/sec
Transmissivity = 5.571 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 51.78 feet at 0. seconds

Field Hydraulic Conductivity Test

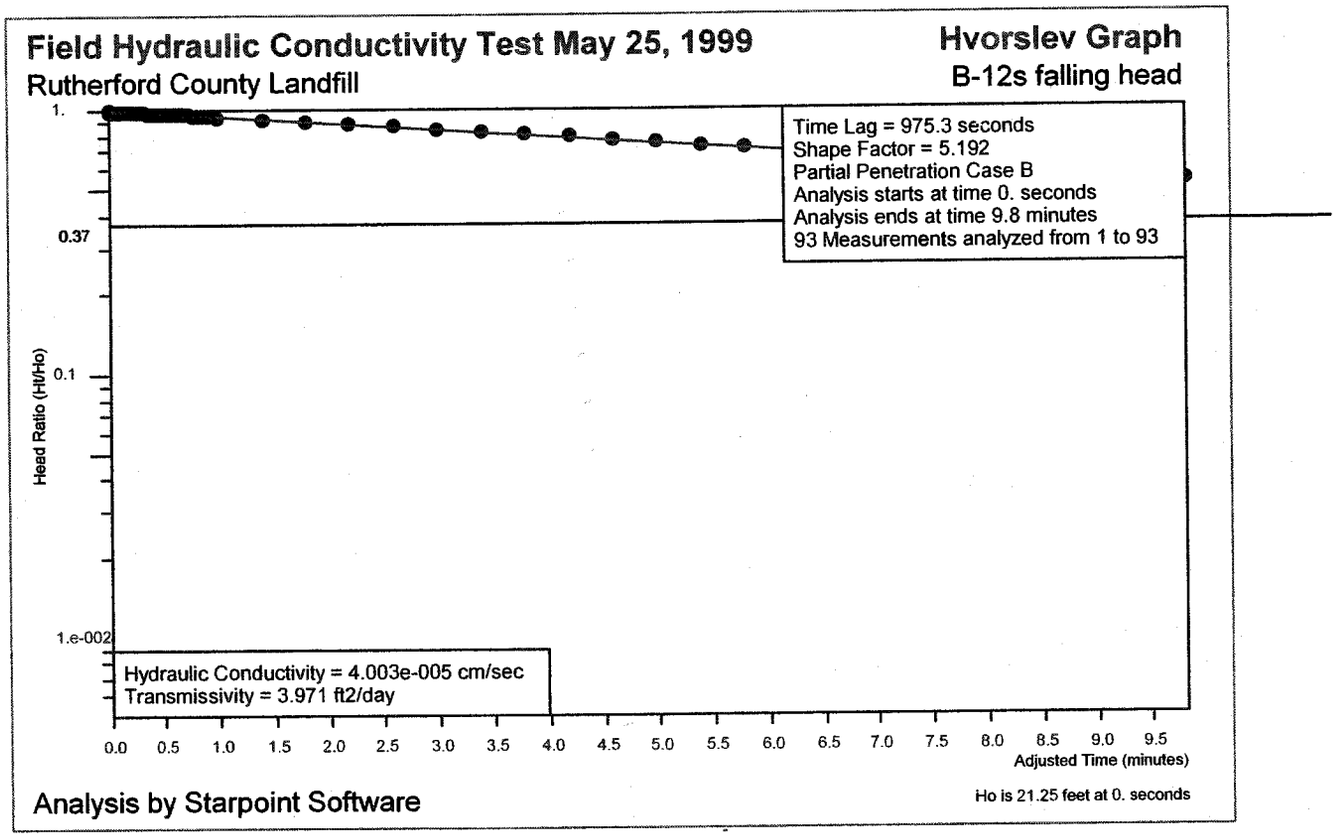
Site Name: Rutherford County Landfill
Test Date: May 25, 1999
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B11S0.TXT

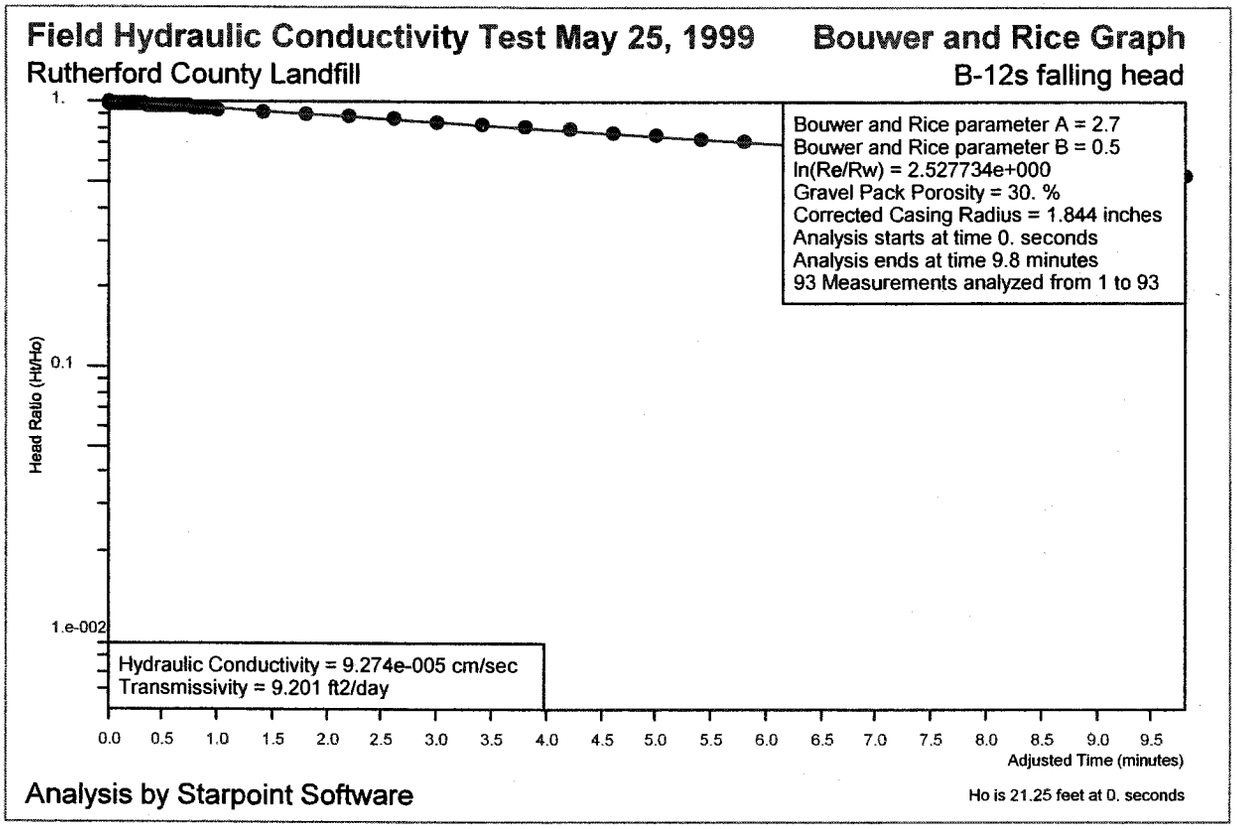
Well Label: B-11 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 51.78 feet
Water Table to Screen Bottom: 9.2 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 97 time and drawdown measurements
Maximum head is 51.78 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	51.78	1.
2	6.6e-003	6.6e-003	1.e-002	51.77	0.9999
3	1.33e-002	1.33e-002	1.66e-002	51.76	0.9997
4	2.e-002	2.e-002	2.33e-002	51.76	0.9996
5	2.66e-002	2.66e-002	3.e-002	51.75	0.9995
6	3.33e-002	3.33e-002	3.66e-002	51.74	0.9994
7	4.e-002	4.e-002	4.33e-002	51.74	0.9992
8	4.66e-002	4.66e-002	5.e-002	51.73	0.9991
9	5.33e-002	5.33e-002	5.66e-002	51.72	0.999
10	6.e-002	6.e-002	6.33e-002	51.72	0.9988
11	6.66e-002	6.66e-002	7.e-002	51.71	0.9987
12	7.33e-002	7.33e-002	7.66e-002	51.7	0.9986
13	8.e-002	8.e-002	8.33e-002	51.7	0.9985
14	8.66e-002	8.66e-002	9.e-002	51.69	0.9983
15	9.33e-002	9.33e-002	9.66e-002	51.68	0.9982
16	0.1	0.1	0.1033	51.68	0.9981
17	0.1066	0.1066	0.11	51.67	0.9979
18	0.1133	0.1133	0.1166	51.66	0.9978
19	0.12	0.12	0.1233	51.66	0.9977
20	0.1266	0.1266	0.13	51.65	0.9976
21	0.1333	0.1333	0.1366	51.64	0.9974
22	0.14	0.14	0.1433	51.64	0.9973
23	0.1466	0.1466	0.15	51.63	0.9972
24	0.1533	0.1533	0.1566	51.62	0.997
25	0.16	0.16	0.1633	51.62	0.9969
26	0.1666	0.1666	0.17	51.61	0.9968
27	0.1733	0.1733	0.1766	51.6	0.9967
28	0.18	0.18	0.1833	51.6	0.9965
29	0.1866	0.1866	0.19	51.59	0.9964
30	0.1933	0.1933	0.1966	51.58	0.9963
31	0.2	0.2	0.2033	51.58	0.9961
32	0.2066	0.2066	0.21	51.57	0.996
33	0.2133	0.2133	0.2166	51.56	0.9959
34	0.22	0.22	0.2233	51.56	0.9958

35	0.2266	0.2266	0.23	51.55	0.9956
36	0.2333	0.2333	0.2366	51.54	0.9955
37	0.24	0.24	0.2433	51.54	0.9954
38	0.2466	0.2466	0.25	51.53	0.9952
39	0.2533	0.2533	0.2566	51.52	0.9951
40	0.26	0.26	0.2633	51.52	0.995
41	0.2666	0.2666	0.27	51.51	0.9948
42	0.2733	0.2733	0.2766	51.5	0.9947
43	0.28	0.28	0.2833	51.5	0.9946
44	0.2866	0.2866	0.29	51.49	0.9945
45	0.2933	0.2933	0.2966	51.48	0.9943
46	0.3	0.3	0.3033	51.48	0.9942
47	0.3066	0.3066	0.31	51.47	0.9941
48	0.3133	0.3133	0.3166	51.46	0.9939
49	0.32	0.32	0.3233	51.46	0.9938
50	0.3266	0.3266	0.33	51.45	0.9937
51	0.3333	0.3333	0.35	51.43	0.9933
52	0.3666	0.3666	0.3833	51.4	0.9927
53	0.4	0.4	0.4166	51.36	0.992
54	0.4333	0.4333	0.45	51.33	0.9914
55	0.4666	0.4666	0.4833	51.3	0.9907
56	0.5	0.5	0.5166	51.26	0.9901
57	0.5333	0.5333	0.55	51.23	0.9894
58	0.5666	0.5666	0.5833	51.2	0.9888
59	0.6	0.6	0.6166	51.16	0.9882
60	0.6333	0.6333	0.65	51.13	0.9875
61	0.6666	0.6666	0.6833	51.1	0.9869
62	0.7	0.7	0.7166	51.06	0.9862
63	0.7333	0.7333	0.75	51.03	0.9856
64	0.7666	0.7666	0.7833	51.	0.9849
65	0.8	0.8	0.8166	50.96	0.9843
66	0.8333	0.8333	0.85	50.93	0.9836
67	0.8666	0.8666	0.8833	50.9	0.983
68	0.9	0.9	0.9166	50.86	0.9824
69	0.9333	0.9333	0.95	50.83	0.9817
70	0.9666	0.9666	0.9833	50.8	0.9811
71	1.	1.	1.2	50.58	0.9769
72	1.4	1.4	1.6	50.18	0.9692
73	1.8	1.8	2.	49.78	0.9614
74	2.2	2.2	2.4	49.38	0.9537
75	2.6	2.6	2.8	48.98	0.946
76	3.	3.	3.2	48.58	0.9383
77	3.4	3.4	3.6	48.18	0.9305
78	3.8	3.8	4.	47.78	0.9228
79	4.2	4.2	4.4	47.38	0.9151
80	4.6	4.6	4.8	46.98	0.9074
81	5.	5.	5.2	46.58	0.8996
82	5.4	5.4	5.6	46.18	0.8919
83	5.8	5.8	6.	45.78	0.8842
84	6.2	6.2	6.4	45.38	0.8765
85	6.6	6.6	6.8	44.98	0.8687
86	7.	7.	7.2	44.58	0.861
87	7.4	7.4	7.6	44.18	0.8533
88	7.8	7.8	8.	43.78	0.8456
89	8.2	8.2	8.4	43.38	0.8378
90	8.6	8.6	8.8	42.98	0.8301
91	9.	9.	9.2	42.58	0.8224

92	9.4	9.4	9.6	42.18	0.8147
93	9.8	9.8	10.	41.78	0.8069
94	12.	12.	14.	37.78	0.7297
95	16.	16.	18.	33.78	0.6524
96	20.	20.	22.	29.78	0.5752
97	24.	24.	26.	25.78	0.4979


Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Hvorslev Graph
B-12s falling head
Time Lag = 975.3 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Hydraulic Conductivity = 4.003e-005 cm/sec
Transmissivity = 3.971 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 21.25 feet at 0. seconds


Field Hydraulic Conductivity Test May 25, 1999
Bouwer and Rice Graph
Rutherford County Landfill
B-12s falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.527734e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Hydraulic Conductivity = 9.274e-005 cm/sec
Transmissivity = 9.201 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 21.25 feet at 0. seconds

Field Hydraulic Conductivity Test

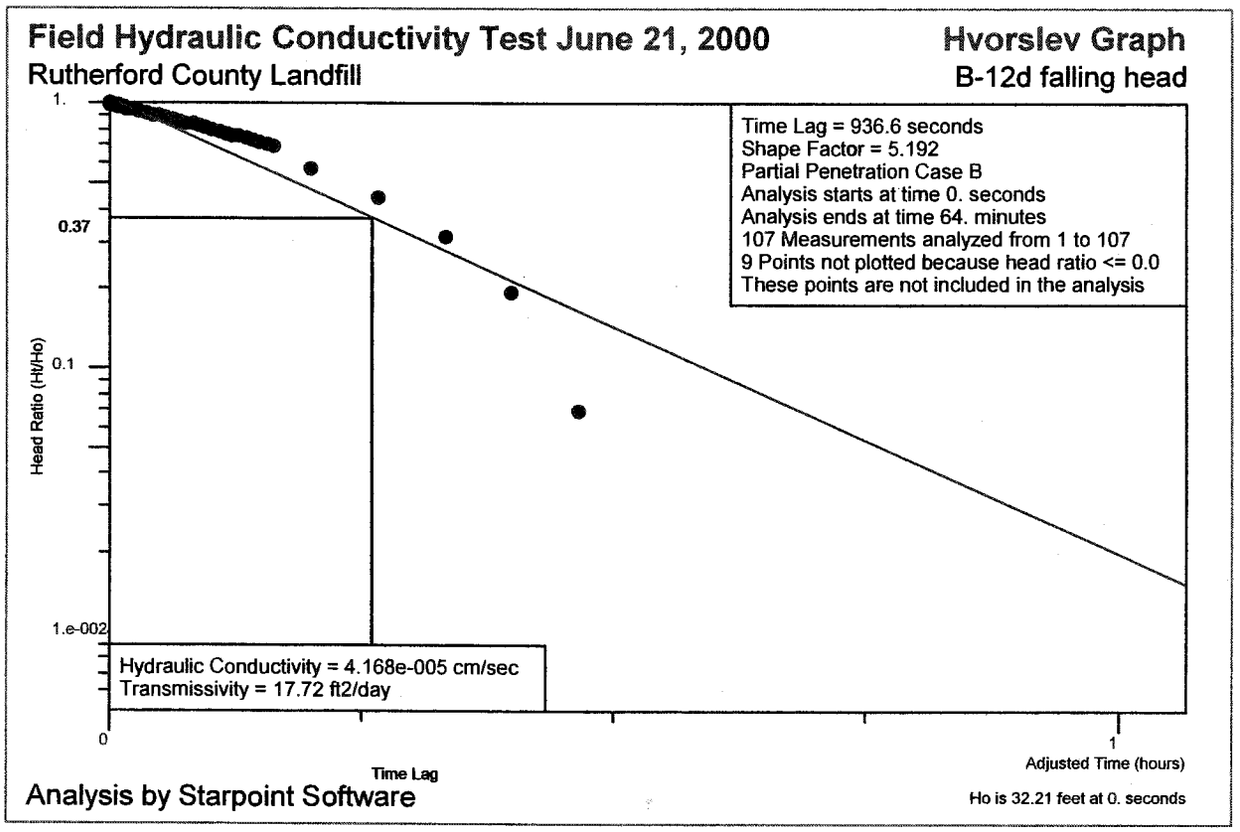
Site Name: Rutherford County Landfill
Test Date: May 25, 1999
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B12S0.TXT

Well Label: B-12s falling head
Aquifer Thickness: 35. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 21.25 feet
Water Table to Screen Bottom: 14.1 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 93 time and drawdown measurements
Maximum head is 21.25 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	21.25	1.
2	6.6e-003	6.6e-003	1.e-002	21.24	0.9997
3	1.33e-002	1.33e-002	1.66e-002	21.23	0.9994
4	2.e-002	2.e-002	2.33e-002	21.23	0.9991
5	2.66e-002	2.66e-002	3.e-002	21.22	0.9987
6	3.33e-002	3.33e-002	3.66e-002	21.21	0.9984
7	4.e-002	4.e-002	4.33e-002	21.21	0.9981
8	4.66e-002	4.66e-002	5.e-002	21.2	0.9978
9	5.33e-002	5.33e-002	5.66e-002	21.19	0.9975
10	6.e-002	6.e-002	6.33e-002	21.19	0.9972
11	6.66e-002	6.66e-002	7.e-002	21.18	0.9969
12	7.33e-002	7.33e-002	7.66e-002	21.17	0.9966
13	8.e-002	8.e-002	8.33e-002	21.17	0.9962
14	8.66e-002	8.66e-002	9.e-002	21.16	0.9959
15	9.33e-002	9.33e-002	9.66e-002	21.15	0.9956
16	0.1	0.1	0.1033	21.15	0.9953
17	0.1066	0.1066	0.11	21.14	0.995
18	0.1133	0.1133	0.1166	21.13	0.9947
19	0.12	0.12	0.1233	21.13	0.9944
20	0.1266	0.1266	0.13	21.12	0.994
21	0.1333	0.1333	0.1366	21.11	0.9937
22	0.14	0.14	0.1433	21.11	0.9934
23	0.1466	0.1466	0.15	21.1	0.9931
24	0.1533	0.1533	0.1566	21.09	0.9928
25	0.16	0.16	0.1633	21.09	0.9925
26	0.1666	0.1666	0.17	21.08	0.9922
27	0.1733	0.1733	0.1766	21.07	0.9918
28	0.18	0.18	0.1833	21.07	0.9915
29	0.1866	0.1866	0.19	21.06	0.9912
30	0.1933	0.1933	0.1966	21.05	0.9909
31	0.2	0.2	0.2033	21.05	0.9906
32	0.2066	0.2066	0.21	21.04	0.9903
33	0.2133	0.2133	0.2166	21.03	0.99
34	0.22	0.22	0.2233	21.03	0.9896

35	0.2266	0.2266	0.23	21.02	0.9893
36	0.2333	0.2333	0.2366	21.01	0.989
37	0.24	0.24	0.2433	21.01	0.9887
38	0.2466	0.2466	0.25	21.	0.9884
39	0.2533	0.2533	0.2566	20.99	0.9881
40	0.26	0.26	0.2633	20.99	0.9878
41	0.2666	0.2666	0.27	20.98	0.9874
42	0.2733	0.2733	0.2766	20.97	0.9871
43	0.28	0.28	0.2833	20.97	0.9868
44	0.2866	0.2866	0.29	20.96	0.9865
45	0.2933	0.2933	0.2966	20.95	0.9862
46	0.3	0.3	0.3033	20.95	0.9859
47	0.3066	0.3066	0.31	20.94	0.9856
48	0.3133	0.3133	0.3166	20.93	0.9853
49	0.32	0.32	0.3233	20.93	0.9849
50	0.3266	0.3266	0.33	20.92	0.9846
51	0.3333	0.3333	0.35	20.9	0.9837
52	0.3666	0.3666	0.3833	20.87	0.9821
53	0.4	0.4	0.4166	20.83	0.9805
54	0.4333	0.4333	0.45	20.8	0.979
55	0.4666	0.4666	0.4833	20.77	0.9774
56	0.5	0.5	0.5166	20.73	0.9758
57	0.5333	0.5333	0.55	20.7	0.9743
58	0.5666	0.5666	0.5833	20.67	0.9727
59	0.6	0.6	0.6166	20.63	0.9711
60	0.6333	0.6333	0.65	20.6	0.9696
61	0.6666	0.6666	0.6833	20.57	0.968
62	0.7	0.7	0.7166	20.53	0.9664
63	0.7333	0.7333	0.75	20.5	0.9649
64	0.7666	0.7666	0.7833	20.47	0.9633
65	0.8	0.8	0.8166	20.43	0.9617
66	0.8333	0.8333	0.85	20.4	0.9601
67	0.8666	0.8666	0.8833	20.37	0.9586
68	0.9	0.9	0.9166	20.33	0.957
69	0.9333	0.9333	0.95	20.3	0.9554
70	0.9666	0.9666	0.9833	20.27	0.9539
71	1.	1.	1.2	20.05	0.9437
72	1.4	1.4	1.6	19.65	0.9248
73	1.8	1.8	2.	19.25	0.906
74	2.2	2.2	2.4	18.85	0.8872
75	2.6	2.6	2.8	18.45	0.8684
76	3.	3.	3.2	18.05	0.8495
77	3.4	3.4	3.6	17.65	0.8307
78	3.8	3.8	4.	17.25	0.8119
79	4.2	4.2	4.4	16.85	0.7931
80	4.6	4.6	4.8	16.45	0.7742
81	5.	5.	5.2	16.05	0.7554
82	5.4	5.4	5.6	15.65	0.7366
83	5.8	5.8	6.	15.25	0.7178
84	6.2	6.2	6.4	14.85	0.6989
85	6.6	6.6	6.8	14.45	0.6801
86	7.	7.	7.2	14.05	0.6613
87	7.4	7.4	7.6	13.65	0.6425
88	7.8	7.8	8.	13.25	0.6236
89	8.2	8.2	8.4	12.85	0.6048
90	8.6	8.6	8.8	12.45	0.586
91	9.	9.	9.2	12.05	0.5671

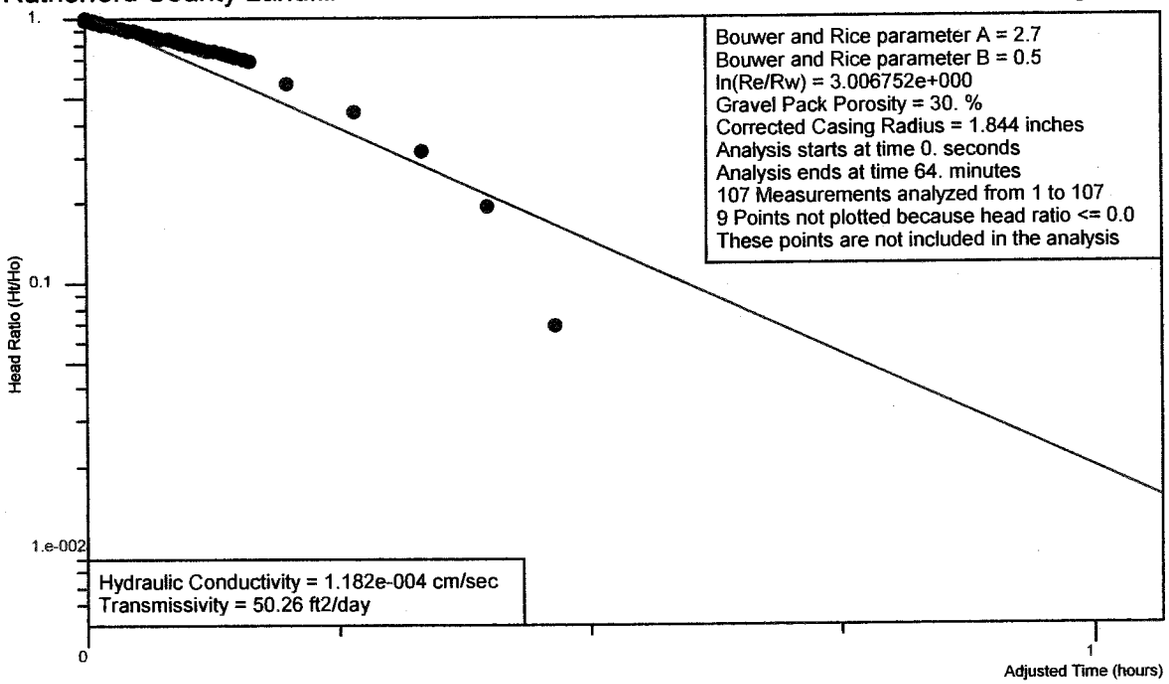
92	9.4	9.4	9.6	11.65	0.5483
93	9.8	9.8	10.	11.25	0.5295


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-12d falling head
Time Lag = 936.6 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 64. minutes
107 Measurements analyzed from 1 to 107
9 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 4.168e-005 cm/sec
Transmissivity = 17.72 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
1
Time Lag
Adjusted Time (hours)
Analysis by Starpoint Software
Ho is 32.21 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000 Bouwer and Rice Graph

Rutherford County Landfill

B-12d falling head



Analysis by Starpoint Software

Ho is 32.21 feet at 0. seconds

Field Hydraulic Conductivity Test

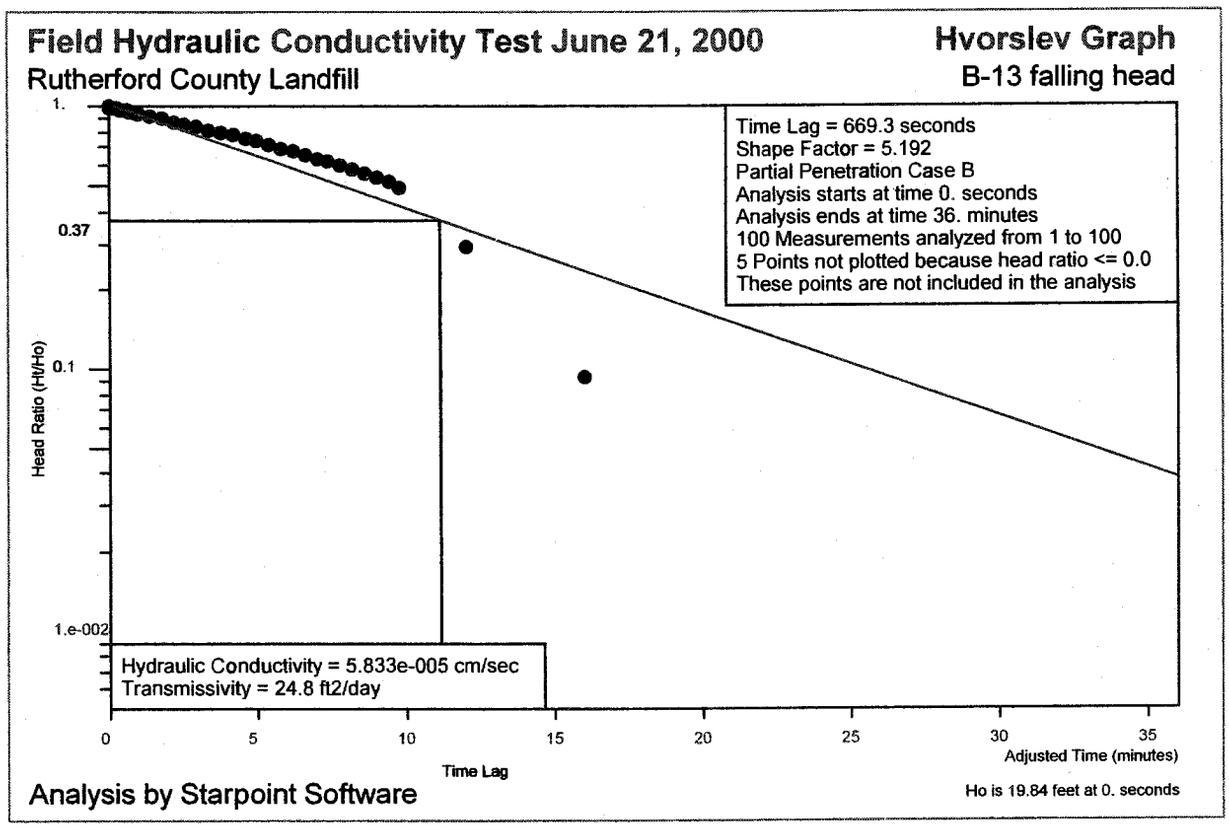
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B12D

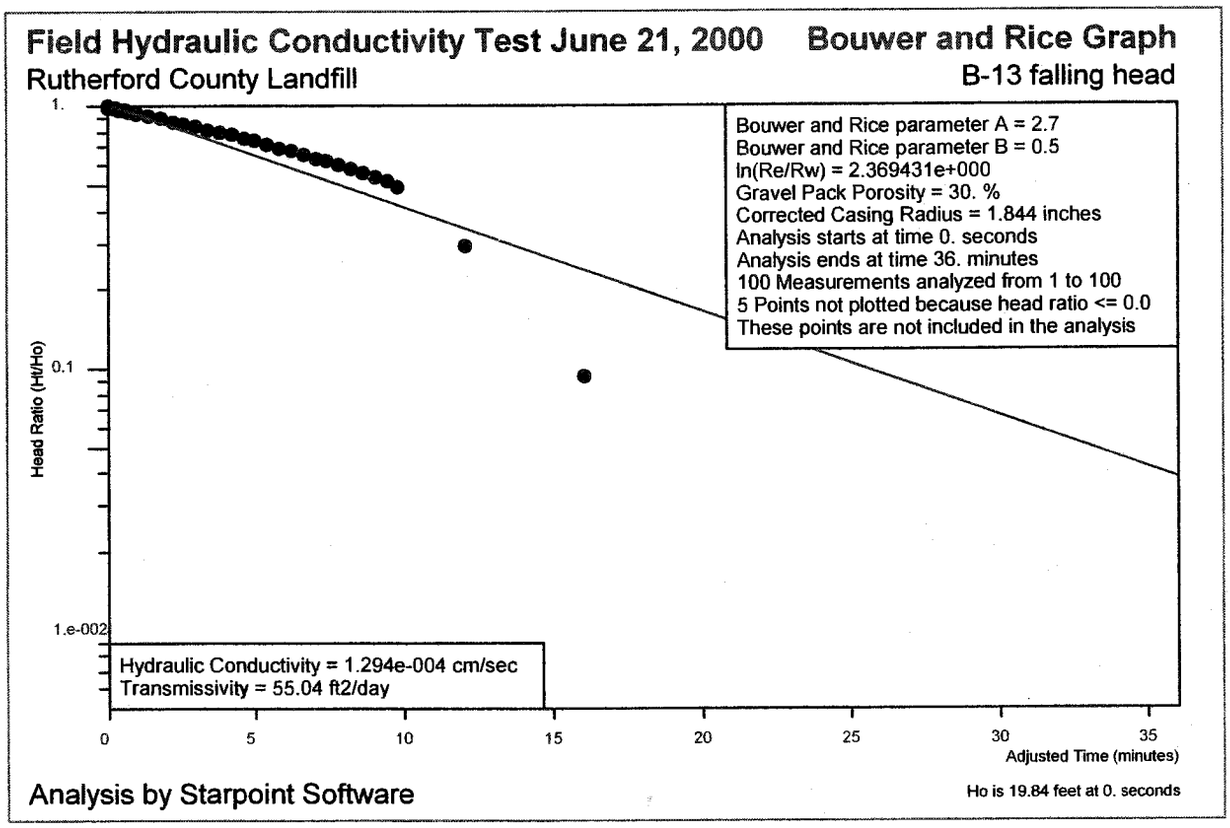
Well Label: B-12d falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 32.21 feet
Water Table to Screen Bottom: 73.5 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 107 time and drawdown measurements
Maximum head is 32.21 feet
Minimum head is -33.79 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	32.21	1.
2	6.6e-003	6.6e-003	1.e-002	32.2	0.9998
3	1.33e-002	1.33e-002	1.66e-002	32.19	0.9996
4	2.e-002	2.e-002	2.33e-002	32.19	0.9994
5	2.66e-002	2.66e-002	3.e-002	32.18	0.9992
6	3.33e-002	3.33e-002	3.66e-002	32.17	0.999
7	4.e-002	4.e-002	4.33e-002	32.17	0.9988
8	4.66e-002	4.66e-002	5.e-002	32.16	0.9985
9	5.33e-002	5.33e-002	5.66e-002	32.15	0.9983
10	6.e-002	6.e-002	6.33e-002	32.15	0.9981
11	6.66e-002	6.66e-002	7.e-002	32.14	0.9979
12	7.33e-002	7.33e-002	7.66e-002	32.13	0.9977
13	8.e-002	8.e-002	8.33e-002	32.13	0.9975
14	8.66e-002	8.66e-002	9.e-002	32.12	0.9973
15	9.33e-002	9.33e-002	9.66e-002	32.11	0.9971
16	0.1	0.1	0.1033	32.11	0.9969
17	0.1066	0.1066	0.11	32.1	0.9967
18	0.1133	0.1133	0.1166	32.09	0.9965
19	0.12	0.12	0.1233	32.09	0.9963
20	0.1266	0.1266	0.13	32.08	0.9961
21	0.1333	0.1333	0.1366	32.07	0.9959
22	0.14	0.14	0.1433	32.07	0.9957
23	0.1466	0.1466	0.15	32.06	0.9954
24	0.1533	0.1533	0.1566	32.05	0.9952
25	0.16	0.16	0.1633	32.05	0.995
26	0.1666	0.1666	0.17	32.04	0.9948
27	0.1733	0.1733	0.1766	32.03	0.9946
28	0.18	0.18	0.1833	32.03	0.9944
29	0.1866	0.1866	0.19	32.02	0.9942
30	0.1933	0.1933	0.1966	32.01	0.994
31	0.2	0.2	0.2033	32.01	0.9938
32	0.2066	0.2066	0.21	32.	0.9936
33	0.2133	0.2133	0.2166	31.99	0.9934
34	0.22	0.22	0.2233	31.99	0.9932

35	0.2266	0.2266	0.23	31.98	0.993
36	0.2333	0.2333	0.2366	31.97	0.9928
37	0.24	0.24	0.2433	31.97	0.9925
38	0.2466	0.2466	0.25	31.96	0.9923
39	0.2533	0.2533	0.2566	31.95	0.9921
40	0.26	0.26	0.2633	31.95	0.9919
41	0.2666	0.2666	0.27	31.94	0.9917
42	0.2733	0.2733	0.2766	31.93	0.9915
43	0.28	0.28	0.2833	31.93	0.9913
44	0.2866	0.2866	0.29	31.92	0.9911
45	0.2933	0.2933	0.2966	31.91	0.9909
46	0.3	0.3	0.3033	31.91	0.9907
47	0.3066	0.3066	0.31	31.9	0.9905
48	0.3133	0.3133	0.3166	31.89	0.9903
49	0.32	0.32	0.3233	31.89	0.9901
50	0.3266	0.3266	0.33	31.88	0.9899
51	0.3333	0.3333	0.35	31.86	0.9892
52	0.3666	0.3666	0.3833	31.83	0.9882
53	0.4	0.4	0.4166	31.79	0.9872
54	0.4333	0.4333	0.45	31.76	0.9861
55	0.4666	0.4666	0.4833	31.73	0.9851
56	0.5	0.5	0.5166	31.69	0.9841
57	0.5333	0.5333	0.55	31.66	0.983
58	0.5666	0.5666	0.5833	31.63	0.982
59	0.6	0.6	0.6166	31.59	0.981
60	0.6333	0.6333	0.65	31.56	0.9799
61	0.6666	0.6666	0.6833	31.53	0.9789
62	0.7	0.7	0.7166	31.49	0.9779
63	0.7333	0.7333	0.75	31.46	0.9768
64	0.7666	0.7666	0.7833	31.43	0.9758
65	0.8	0.8	0.8166	31.39	0.9747
66	0.8333	0.8333	0.85	31.36	0.9737
67	0.8666	0.8666	0.8833	31.33	0.9727
68	0.9	0.9	0.9166	31.29	0.9716
69	0.9333	0.9333	0.95	31.26	0.9706
70	0.9666	0.9666	0.9833	31.23	0.9696
71	1.	1.	1.2	31.01	0.9628
72	1.4	1.4	1.6	30.61	0.9504
73	1.8	1.8	2.	30.21	0.938
74	2.2	2.2	2.4	29.81	0.9256
75	2.6	2.6	2.8	29.41	0.9132
76	3.	3.	3.2	29.01	0.9007
77	3.4	3.4	3.6	28.61	0.8883
78	3.8	3.8	4.	28.21	0.8759
79	4.2	4.2	4.4	27.81	0.8635
80	4.6	4.6	4.8	27.41	0.8511
81	5.	5.	5.2	27.01	0.8386
82	5.4	5.4	5.6	26.61	0.8262
83	5.8	5.8	6.	26.21	0.8138
84	6.2	6.2	6.4	25.81	0.8014
85	6.6	6.6	6.8	25.41	0.789
86	7.	7.	7.2	25.01	0.7765
87	7.4	7.4	7.6	24.61	0.7641
88	7.8	7.8	8.	24.21	0.7517
89	8.2	8.2	8.4	23.81	0.7393
90	8.6	8.6	8.8	23.41	0.7269
91	9.	9.	9.2	23.01	0.7144

92	9.4	9.4	9.6	22.61	0.702
93	9.8	9.8	10.	22.21	0.6896
94	12.	12.	14.	18.21	0.5654
95	16.	16.	18.	14.21	0.4412
96	20.	20.	22.	10.21	0.317
97	24.	24.	26.	6.21	0.1928
98	28.	28.	30.	2.21	6.862e-002
99	32.	32.	34.	-1.79	-5.558e-002
100	36.	36.	38.	-5.79	-0.1798
101	40.	40.	42.	-9.79	-0.304
102	44.	44.	46.	-13.79	-0.4282
103	48.	48.	50.	-17.79	-0.5524
104	52.	52.	54.	-21.79	-0.6766
105	56.	56.	58.	-25.79	-0.8008
106	60.	60.	62.	-29.79	-0.925
107	64.	64.	66.	-33.79	-1.049


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-13 falling head
Time Lag = 669.3 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 36. minutes
100 Measurements analyzed from 1 to 100
5 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 5.833e-005 cm/sec
Transmissivity = 24.8 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
35
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 19.84 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-13 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.369431e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 36. minutes
100 Measurements analyzed from 1 to 100
5 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 1.294e-004 cm/sec
Transmissivity = 55.04 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
25
30
35
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 19.84 feet at 0. seconds

92	9.4	9.4	9.6	10.24	0.5162
93	9.8	9.8	10.	9.84	0.4961
94	12.	12.	14.	5.84	0.2944
95	16.	16.	18.	1.84	9.276e-002
96	20.	20.	22.	-2.16	-0.1089
97	24.	24.	26.	-6.16	-0.3105
98	28.	28.	30.	-10.16	-0.5122
99	32.	32.	34.	-14.16	-0.7138
100	36.	36.	38.	-18.16	-0.9155

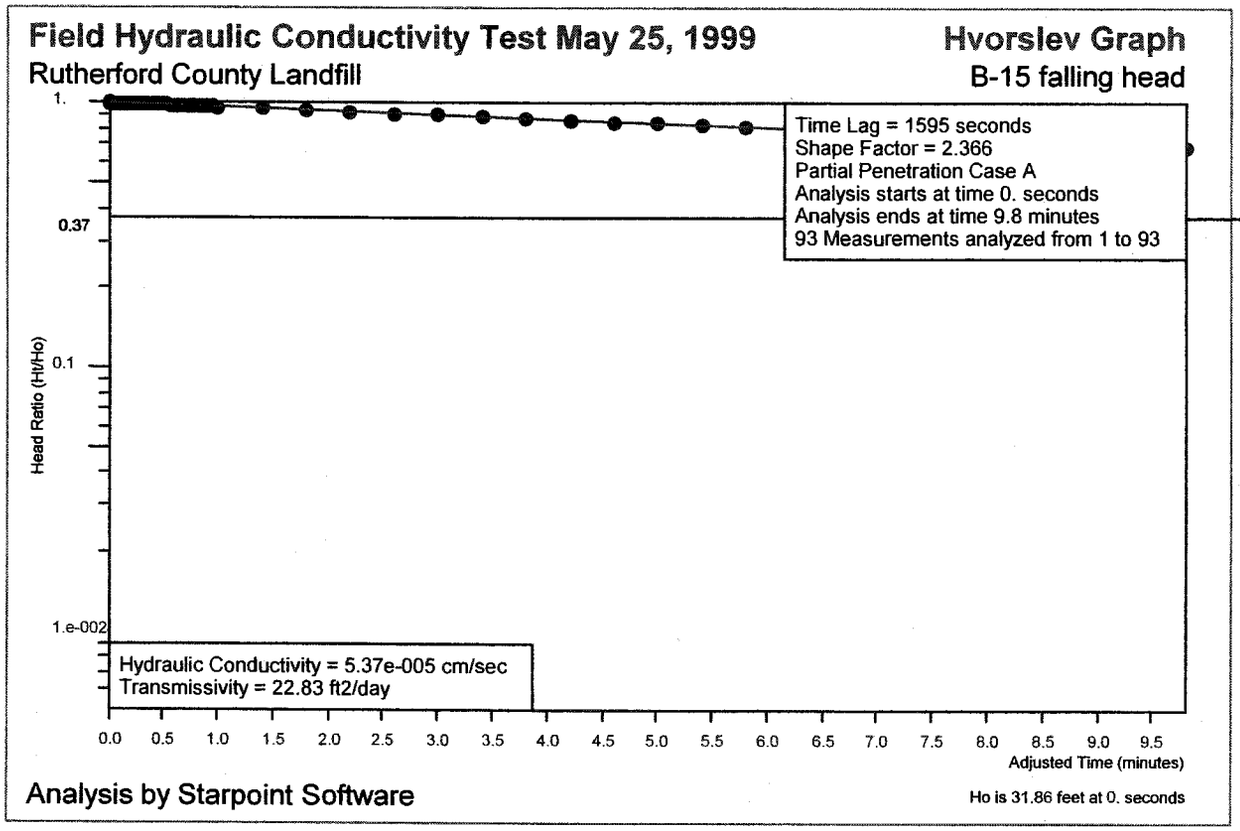
35	0.2266	0.2266	0.23	19.61	0.9886
36	0.2333	0.2333	0.2366	19.6	0.9882
37	0.24	0.24	0.2433	19.6	0.9879
38	0.2466	0.2466	0.25	19.59	0.9876
39	0.2533	0.2533	0.2566	19.58	0.9872
40	0.26	0.26	0.2633	19.58	0.9869
41	0.2666	0.2666	0.27	19.57	0.9866
42	0.2733	0.2733	0.2766	19.56	0.9862
43	0.28	0.28	0.2833	19.56	0.9859
44	0.2866	0.2866	0.29	19.55	0.9855
45	0.2933	0.2933	0.2966	19.54	0.9852
46	0.3	0.3	0.3033	19.54	0.9849
47	0.3066	0.3066	0.31	19.53	0.9845
48	0.3133	0.3133	0.3166	19.52	0.9842
49	0.32	0.32	0.3233	19.52	0.9839
50	0.3266	0.3266	0.33	19.51	0.9835
51	0.3333	0.3333	0.35	19.49	0.9825
52	0.3666	0.3666	0.3833	19.46	0.9808
53	0.4	0.4	0.4166	19.42	0.9792
54	0.4333	0.4333	0.45	19.39	0.9775
55	0.4666	0.4666	0.4833	19.36	0.9758
56	0.5	0.5	0.5166	19.32	0.9741
57	0.5333	0.5333	0.55	19.29	0.9724
58	0.5666	0.5666	0.5833	19.26	0.9708
59	0.6	0.6	0.6166	19.22	0.9691
60	0.6333	0.6333	0.65	19.19	0.9674
61	0.6666	0.6666	0.6833	19.16	0.9657
62	0.7	0.7	0.7166	19.12	0.964
63	0.7333	0.7333	0.75	19.09	0.9624
64	0.7666	0.7666	0.7833	19.06	0.9607
65	0.8	0.8	0.8166	19.02	0.959
66	0.8333	0.8333	0.85	18.99	0.9573
67	0.8666	0.8666	0.8833	18.96	0.9556
68	0.9	0.9	0.9166	18.92	0.954
69	0.9333	0.9333	0.95	18.89	0.9523
70	0.9666	0.9666	0.9833	18.86	0.9506
71	1.	1.	1.2	18.64	0.9397
72	1.4	1.4	1.6	18.24	0.9195
73	1.8	1.8	2.	17.84	0.8993
74	2.2	2.2	2.4	17.44	0.8792
75	2.6	2.6	2.8	17.04	0.859
76	3.	3.	3.2	16.64	0.8388
77	3.4	3.4	3.6	16.24	0.8187
78	3.8	3.8	4.	15.84	0.7985
79	4.2	4.2	4.4	15.44	0.7784
80	4.6	4.6	4.8	15.04	0.7582
81	5.	5.	5.2	14.64	0.738
82	5.4	5.4	5.6	14.24	0.7179
83	5.8	5.8	6.	13.84	0.6977
84	6.2	6.2	6.4	13.44	0.6775
85	6.6	6.6	6.8	13.04	0.6574
86	7.	7.	7.2	12.64	0.6372
87	7.4	7.4	7.6	12.24	0.617
88	7.8	7.8	8.	11.84	0.5969
89	8.2	8.2	8.4	11.44	0.5767
90	8.6	8.6	8.8	11.04	0.5565
91	9.	9.	9.2	10.64	0.5364

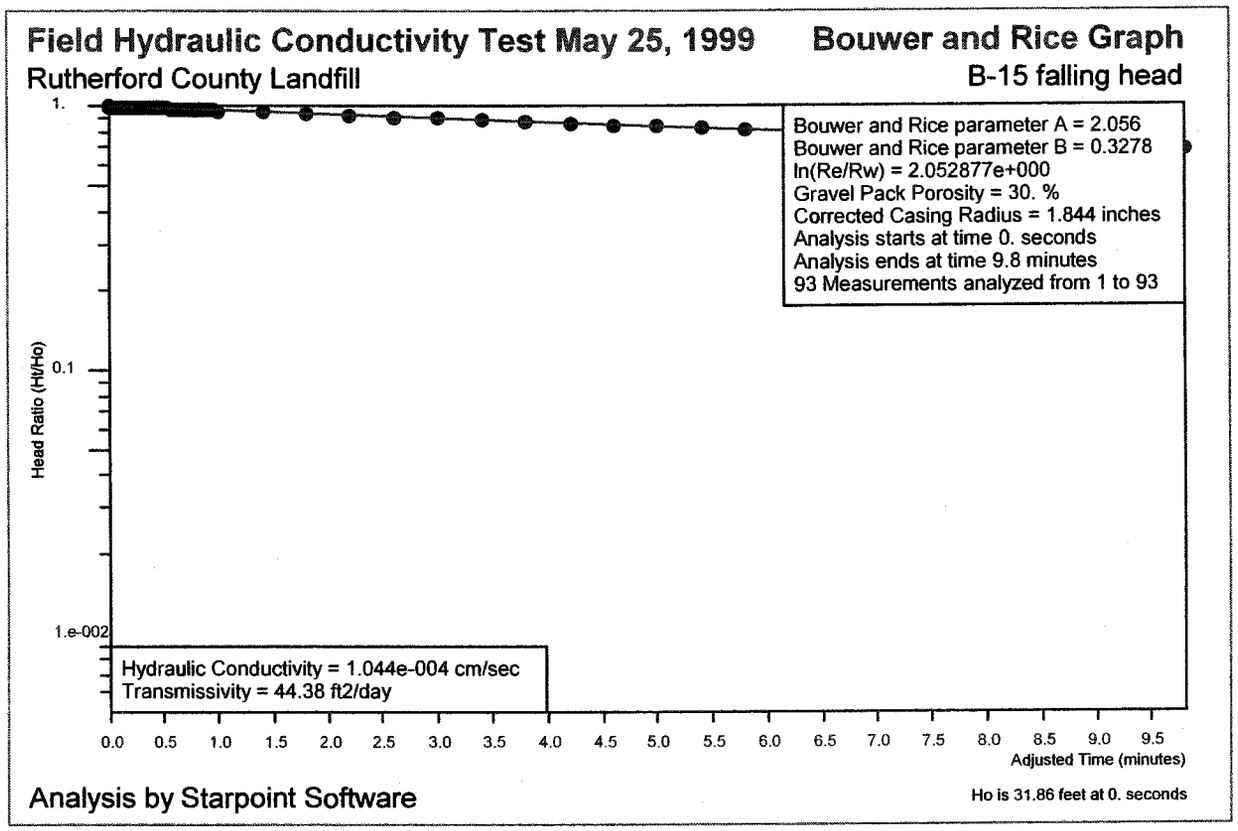
Field Hydraulic Conductivity Test

Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B13s0

Well Label: B-13 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 19.84 feet
Water Table to Screen Bottom: 13.5 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 100 time and drawdown measurements
Maximum head is 19.84 feet
Minimum head is -18.16 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	19.84	1.
2	6.6e-003	6.6e-003	1.e-002	19.83	0.9997
3	1.33e-002	1.33e-002	1.66e-002	19.82	0.9993
4	2.e-002	2.e-002	2.33e-002	19.82	0.999
5	2.66e-002	2.66e-002	3.e-002	19.81	0.9987
6	3.33e-002	3.33e-002	3.66e-002	19.8	0.9983
7	4.e-002	4.e-002	4.33e-002	19.8	0.998
8	4.66e-002	4.66e-002	5.e-002	19.79	0.9976
9	5.33e-002	5.33e-002	5.66e-002	19.78	0.9973
10	6.e-002	6.e-002	6.33e-002	19.78	0.997
11	6.66e-002	6.66e-002	7.e-002	19.77	0.9966
12	7.33e-002	7.33e-002	7.66e-002	19.76	0.9963
13	8.e-002	8.e-002	8.33e-002	19.76	0.996
14	8.66e-002	8.66e-002	9.e-002	19.75	0.9956
15	9.33e-002	9.33e-002	9.66e-002	19.74	0.9953
16	0.1	0.1	0.1033	19.74	0.995
17	0.1066	0.1066	0.11	19.73	0.9946
18	0.1133	0.1133	0.1166	19.72	0.9943
19	0.12	0.12	0.1233	19.72	0.994
20	0.1266	0.1266	0.13	19.71	0.9936
21	0.1333	0.1333	0.1366	19.7	0.9933
22	0.14	0.14	0.1433	19.7	0.9929
23	0.1466	0.1466	0.15	19.69	0.9926
24	0.1533	0.1533	0.1566	19.68	0.9923
25	0.16	0.16	0.1633	19.68	0.9919
26	0.1666	0.1666	0.17	19.67	0.9916
27	0.1733	0.1733	0.1766	19.66	0.9913
28	0.18	0.18	0.1833	19.66	0.9909
29	0.1866	0.1866	0.19	19.65	0.9906
30	0.1933	0.1933	0.1966	19.64	0.9903
31	0.2	0.2	0.2033	19.64	0.9899
32	0.2066	0.2066	0.21	19.63	0.9896
33	0.2133	0.2133	0.2166	19.62	0.9892
34	0.22	0.22	0.2233	19.62	0.9889


Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Hvorslev Graph
B-15 falling head
Time Lag = 1595 seconds
Shape Factor = 2.366
Partial Penetration Case A
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
Hydraulic Conductivity = 5.37e-005 cm/sec
Transmissivity = 22.83 ft2/day
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 31.86 feet at 0. seconds


Field Hydraulic Conductivity Test May 25, 1999
Bouwer and Rice Graph
Rutherford County Landfill
B-15 falling head
Bouwer and Rice parameter A = 2.056
Bouwer and Rice parameter B = 0.3278
ln(Re/Rw) = 2.052877e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 1.044e-004 cm/sec
Transmissivity = 44.38 ft2/day
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 31.86 feet at 0. seconds

Field Hydraulic Conductivity Test

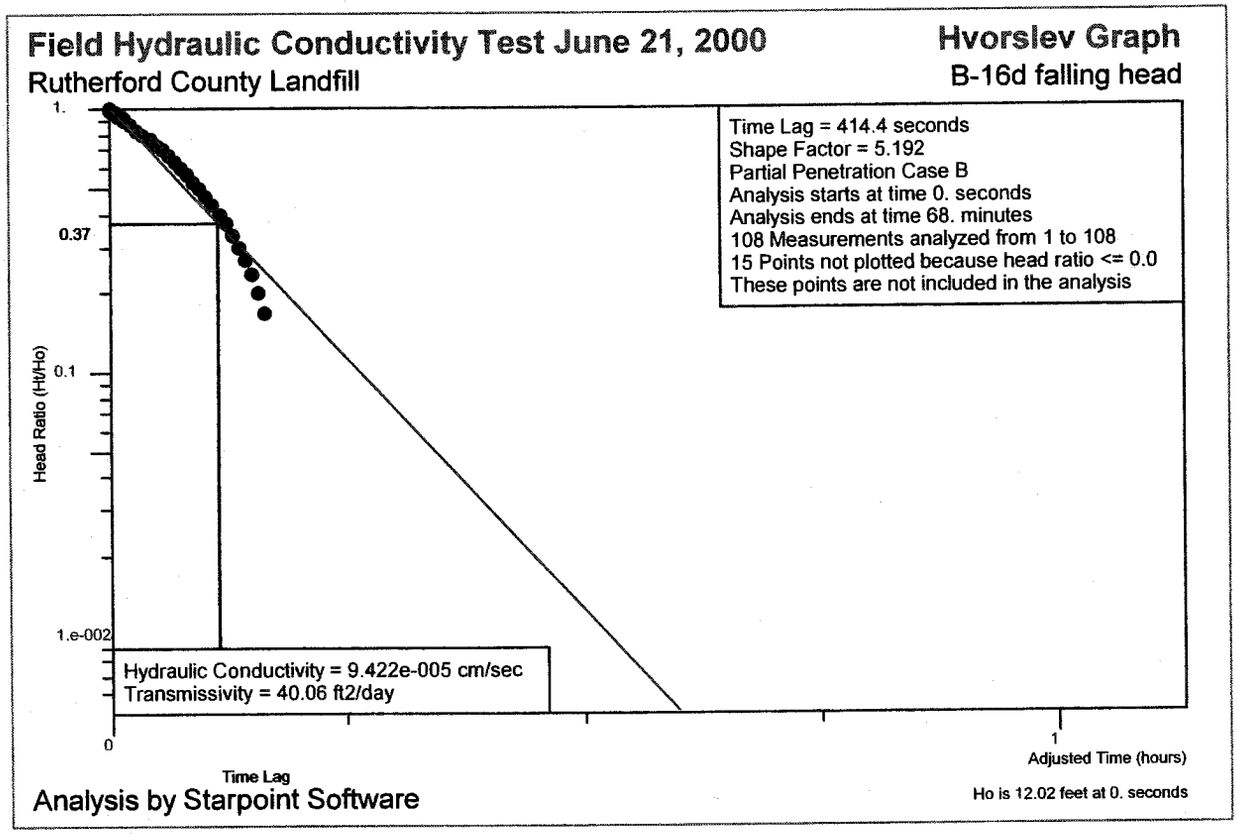
Site Name: Rutherford County Landfill
Test Date: May 25, 1999
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B15S0.TXT

Well Label: B-15 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 31.86 feet
Water Table to Screen Bottom: 4.4 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 93 time and drawdown measurements
Maximum head is 31.86 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	31.86	1.
2	6.6e-003	6.6e-003	1.e-002	31.85	0.9998
3	1.33e-002	1.33e-002	1.66e-002	31.84	0.9996
4	2.e-002	2.e-002	2.33e-002	31.84	0.9994
5	2.66e-002	2.66e-002	3.e-002	31.83	0.9992
6	3.33e-002	3.33e-002	3.66e-002	31.82	0.999
7	4.e-002	4.e-002	4.33e-002	31.82	0.9987
8	4.66e-002	4.66e-002	5.e-002	31.81	0.9985
9	5.33e-002	5.33e-002	5.66e-002	31.8	0.9983
10	6.e-002	6.e-002	6.33e-002	31.8	0.9981
11	6.66e-002	6.66e-002	7.e-002	31.79	0.9979
12	7.33e-002	7.33e-002	7.66e-002	31.78	0.9977
13	8.e-002	8.e-002	8.33e-002	31.78	0.9975
14	8.66e-002	8.66e-002	9.e-002	31.77	0.9973
15	9.33e-002	9.33e-002	9.66e-002	31.76	0.9971
16	0.1	0.1	0.1033	31.76	0.9969
17	0.1066	0.1066	0.11	31.75	0.9967
18	0.1133	0.1133	0.1166	31.74	0.9964
19	0.12	0.12	0.1233	31.74	0.9962
20	0.1266	0.1266	0.13	31.73	0.996
21	0.1333	0.1333	0.1366	31.72	0.9958
22	0.14	0.14	0.1433	31.72	0.9956
23	0.1466	0.1466	0.15	31.71	0.9954
24	0.1533	0.1533	0.1566	31.7	0.9952
25	0.16	0.16	0.1633	31.7	0.995
26	0.1666	0.1666	0.17	31.69	0.9948
27	0.1733	0.1733	0.1766	31.68	0.9946
28	0.18	0.18	0.1833	31.68	0.9943
29	0.1866	0.1866	0.19	31.67	0.9941
30	0.1933	0.1933	0.1966	31.66	0.9939
31	0.2	0.2	0.2033	31.66	0.9937
32	0.2066	0.2066	0.21	31.65	0.9935
33	0.2133	0.2133	0.2166	31.64	0.9933
34	0.22	0.22	0.2233	31.64	0.9931

35	0.2266	0.2266	0.23	31.63	0.9929
36	0.2333	0.2333	0.2366	31.62	0.9927
37	0.24	0.24	0.2433	31.62	0.9925
38	0.2466	0.2466	0.25	31.61	0.9923
39	0.2533	0.2533	0.2566	31.6	0.992
40	0.26	0.26	0.2633	31.6	0.9918
41	0.2666	0.2666	0.27	31.59	0.9916
42	0.2733	0.2733	0.2766	31.58	0.9914
43	0.28	0.28	0.2833	31.58	0.9912
44	0.2866	0.2866	0.29	31.57	0.991
45	0.2933	0.2933	0.2966	31.56	0.9908
46	0.3	0.3	0.3033	31.56	0.9906
47	0.3066	0.3066	0.31	31.55	0.9904
48	0.3133	0.3133	0.3166	31.54	0.9902
49	0.32	0.32	0.3233	31.54	0.99
50	0.3266	0.3266	0.33	31.53	0.9897
51	0.3333	0.3333	0.35	31.51	0.9891
52	0.3666	0.3666	0.3833	31.48	0.9881
53	0.4	0.4	0.4166	31.44	0.987
54	0.4333	0.4333	0.45	31.41	0.986
55	0.4666	0.4666	0.4833	31.38	0.9849
56	0.5	0.5	0.5166	31.34	0.9839
57	0.5333	0.5333	0.55	31.31	0.9828
58	0.5666	0.5666	0.5833	31.28	0.9818
59	0.6	0.6	0.6166	31.24	0.9807
60	0.6333	0.6333	0.65	31.21	0.9797
61	0.6666	0.6666	0.6833	31.18	0.9787
62	0.7	0.7	0.7166	31.14	0.9776
63	0.7333	0.7333	0.75	31.11	0.9766
64	0.7666	0.7666	0.7833	31.08	0.9755
65	0.8	0.8	0.8166	31.04	0.9745
66	0.8333	0.8333	0.85	31.01	0.9734
67	0.8666	0.8666	0.8833	30.98	0.9724
68	0.9	0.9	0.9166	30.94	0.9713
69	0.9333	0.9333	0.95	30.91	0.9703
70	0.9666	0.9666	0.9833	30.88	0.9692
71	1.	1.	1.2	30.66	0.9624
72	1.4	1.4	1.6	30.26	0.9499
73	1.8	1.8	2.	29.86	0.9373
74	2.2	2.2	2.4	29.46	0.9248
75	2.6	2.6	2.8	29.06	0.9122
76	3.	3.	3.2	28.66	0.8997
77	3.4	3.4	3.6	28.26	0.8871
78	3.8	3.8	4.	27.86	0.8745
79	4.2	4.2	4.4	27.46	0.862
80	4.6	4.6	4.8	27.06	0.8494
81	5.	5.	5.2	26.66	0.8369
82	5.4	5.4	5.6	26.26	0.8243
83	5.8	5.8	6.	25.86	0.8118
84	6.2	6.2	6.4	25.46	0.7992
85	6.6	6.6	6.8	25.06	0.7866
86	7.	7.	7.2	24.66	0.7741
87	7.4	7.4	7.6	24.26	0.7615
88	7.8	7.8	8.	23.86	0.749
89	8.2	8.2	8.4	23.46	0.7364
90	8.6	8.6	8.8	23.06	0.7239
91	9.	9.	9.2	22.66	0.7113

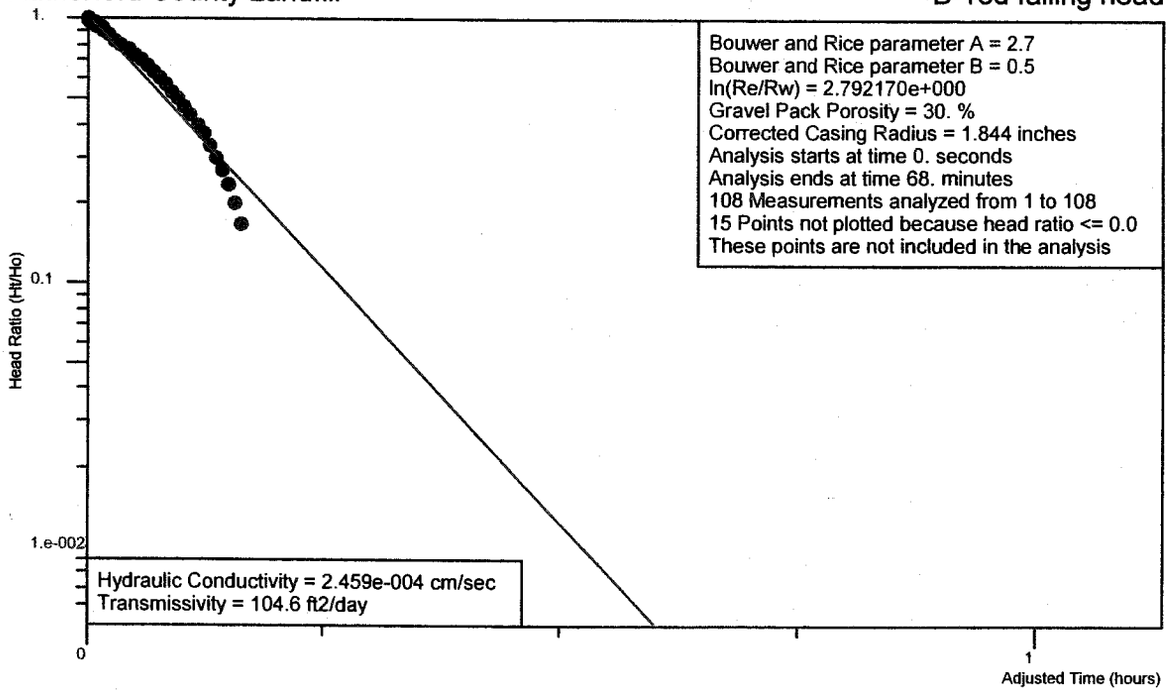
92	9.4	9.4	9.6	22.26	0.6988
93	9.8	9.8	10.	21.86	0.6862


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-16d falling head
Time Lag = 414.4 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 68. minutes
108 Measurements analyzed from 1 to 108
15 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 9.422e-005 cm/sec
Transmissivity = 40.06 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
1
Time Lag
Adjusted Time (hours)
Analysis by Starpoint Software
Ho is 12.02 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000 — Bouwer and Rice Graph

Rutherford County Landfill

B-16d falling head



Analysis by Starpoint Software

Ho is 12.02 feet at 0. seconds

Field Hydraulic Conductivity Test

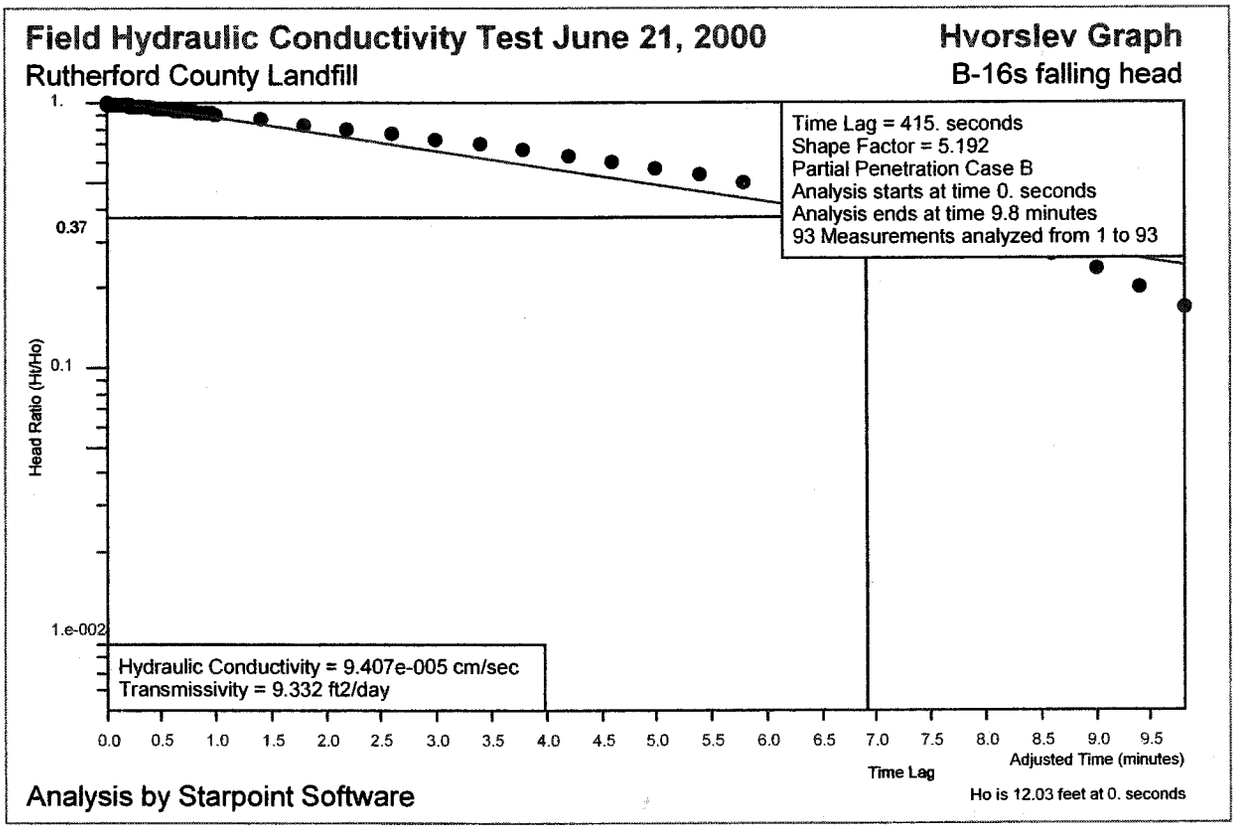
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B16ds0

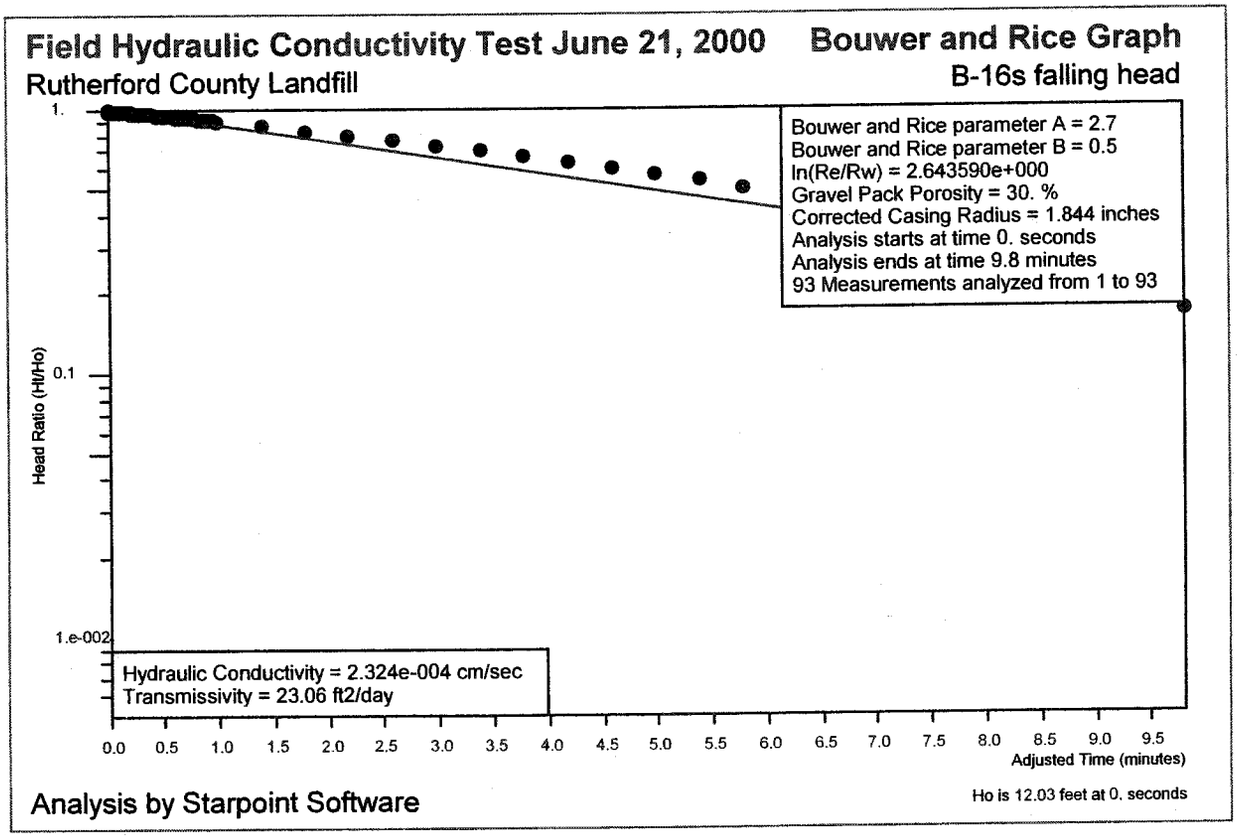
Well Label: B-16d falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 12.02 feet
Water Table to Screen Bottom: 41.9 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 108 time and drawdown measurements
Maximum head is 12.02 feet
Minimum head is -57.98 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	12.02	1.
2	6.6e-003	6.6e-003	1.e-002	12.01	0.9994
3	1.33e-002	1.33e-002	1.66e-002	12.	0.9989
4	2.e-002	2.e-002	2.33e-002	12.	0.9983
5	2.66e-002	2.66e-002	3.e-002	11.99	0.9978
6	3.33e-002	3.33e-002	3.66e-002	11.98	0.9972
7	4.e-002	4.e-002	4.33e-002	11.98	0.9967
8	4.66e-002	4.66e-002	5.e-002	11.97	0.9961
9	5.33e-002	5.33e-002	5.66e-002	11.96	0.9956
10	6.e-002	6.e-002	6.33e-002	11.96	0.995
11	6.66e-002	6.66e-002	7.e-002	11.95	0.9944
12	7.33e-002	7.33e-002	7.66e-002	11.94	0.9939
13	8.e-002	8.e-002	8.33e-002	11.94	0.9933
14	8.66e-002	8.66e-002	9.e-002	11.93	0.9928
15	9.33e-002	9.33e-002	9.66e-002	11.92	0.9922
16	0.1	0.1	0.1033	11.92	0.9917
17	0.1066	0.1066	0.11	11.91	0.9911
18	0.1133	0.1133	0.1166	11.9	0.9906
19	0.12	0.12	0.1233	11.9	0.99
20	0.1266	0.1266	0.13	11.89	0.9895
21	0.1333	0.1333	0.1366	11.88	0.9889
22	0.14	0.14	0.1433	11.88	0.9883
23	0.1466	0.1466	0.15	11.87	0.9878
24	0.1533	0.1533	0.1566	11.86	0.9872
25	0.16	0.16	0.1633	11.86	0.9867
26	0.1666	0.1666	0.17	11.85	0.9861
27	0.1733	0.1733	0.1766	11.84	0.9856
28	0.18	0.18	0.1833	11.84	0.985
29	0.1866	0.1866	0.19	11.83	0.9845
30	0.1933	0.1933	0.1966	11.82	0.9839
31	0.2	0.2	0.2033	11.82	0.9834
32	0.2066	0.2066	0.21	11.81	0.9828
33	0.2133	0.2133	0.2166	11.8	0.9822
34	0.22	0.22	0.2233	11.8	0.9817

35	0.2266	0.2266	0.23	11.79	0.9811
36	0.2333	0.2333	0.2366	11.78	0.9806
37	0.24	0.24	0.2433	11.78	0.98
38	0.2466	0.2466	0.25	11.77	0.9795
39	0.2533	0.2533	0.2566	11.76	0.9789
40	0.26	0.26	0.2633	11.76	0.9784
41	0.2666	0.2666	0.27	11.75	0.9778
42	0.2733	0.2733	0.2766	11.74	0.9773
43	0.28	0.28	0.2833	11.74	0.9767
44	0.2866	0.2866	0.29	11.73	0.9761
45	0.2933	0.2933	0.2966	11.72	0.9756
46	0.3	0.3	0.3033	11.72	0.975
47	0.3066	0.3066	0.31	11.71	0.9745
48	0.3133	0.3133	0.3166	11.7	0.9739
49	0.32	0.32	0.3233	11.7	0.9734
50	0.3266	0.3266	0.33	11.69	0.9728
51	0.3333	0.3333	0.35	11.67	0.9711
52	0.3666	0.3666	0.3833	11.64	0.9684
53	0.4	0.4	0.4166	11.6	0.9656
54	0.4333	0.4333	0.45	11.57	0.9628
55	0.4666	0.4666	0.4833	11.54	0.9601
56	0.5	0.5	0.5166	11.5	0.9573
57	0.5333	0.5333	0.55	11.47	0.9545
58	0.5666	0.5666	0.5833	11.44	0.9517
59	0.6	0.6	0.6166	11.4	0.949
60	0.6333	0.6333	0.65	11.37	0.9462
61	0.6666	0.6666	0.6833	11.34	0.9434
62	0.7	0.7	0.7166	11.3	0.9406
63	0.7333	0.7333	0.75	11.27	0.9379
64	0.7666	0.7666	0.7833	11.24	0.9351
65	0.8	0.8	0.8166	11.2	0.9323
66	0.8333	0.8333	0.85	11.17	0.9295
67	0.8666	0.8666	0.8833	11.14	0.9268
68	0.9	0.9	0.9166	11.1	0.924
69	0.9333	0.9333	0.95	11.07	0.9212
70	0.9666	0.9666	0.9833	11.04	0.9184
71	1.	1.	1.2	10.82	0.9004
72	1.4	1.4	1.6	10.42	0.8671
73	1.8	1.8	2.	10.02	0.8338
74	2.2	2.2	2.4	9.62	0.8006
75	2.6	2.6	2.8	9.22	0.7673
76	3.	3.	3.2	8.82	0.734
77	3.4	3.4	3.6	8.42	0.7007
78	3.8	3.8	4.	8.02	0.6674
79	4.2	4.2	4.4	7.62	0.6341
80	4.6	4.6	4.8	7.22	0.6008
81	5.	5.	5.2	6.82	0.5675
82	5.4	5.4	5.6	6.42	0.5343
83	5.8	5.8	6.	6.02	0.501
84	6.2	6.2	6.4	5.62	0.4677
85	6.6	6.6	6.8	5.22	0.4344
86	7.	7.	7.2	4.82	0.4011
87	7.4	7.4	7.6	4.42	0.3678
88	7.8	7.8	8.	4.02	0.3345
89	8.2	8.2	8.4	3.62	0.3012
90	8.6	8.6	8.8	3.22	0.268
91	9.	9.	9.2	2.82	0.2347

92	9.4	9.4	9.6	2.42	0.2014
93	9.8	9.8	10.	2.02	0.1681
94	12.	12.	14.	-1.98	-0.1648
95	16.	16.	18.	-5.98	-0.4976
96	20.	20.	22.	-9.98	-0.8305
97	24.	24.	26.	-13.98	-1.163
98	28.	28.	30.	-17.98	-1.496
99	32.	32.	34.	-21.98	-1.829
100	36.	36.	38.	-25.98	-2.162
101	40.	40.	42.	-29.98	-2.495
102	44.	44.	46.	-33.98	-2.828
103	48.	48.	50.	-37.98	-3.161
104	52.	52.	54.	-41.98	-3.493
105	56.	56.	58.	-45.98	-3.826
106	60.	60.	62.	-49.98	-4.159
107	64.	64.	66.	-53.98	-4.492
108	68.	68.	70.	-57.98	-4.825


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-16s falling head
Time Lag = 415. seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Hydraulic Conductivity = 9.407e-005 cm/sec
Transmissivity = 9.332 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 12.03 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-16s falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.643590e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Hydraulic Conductivity = 2.324e-004 cm/sec
Transmissivity = 23.06 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 12.03 feet at 0. seconds

Field Hydraulic Conductivity Test

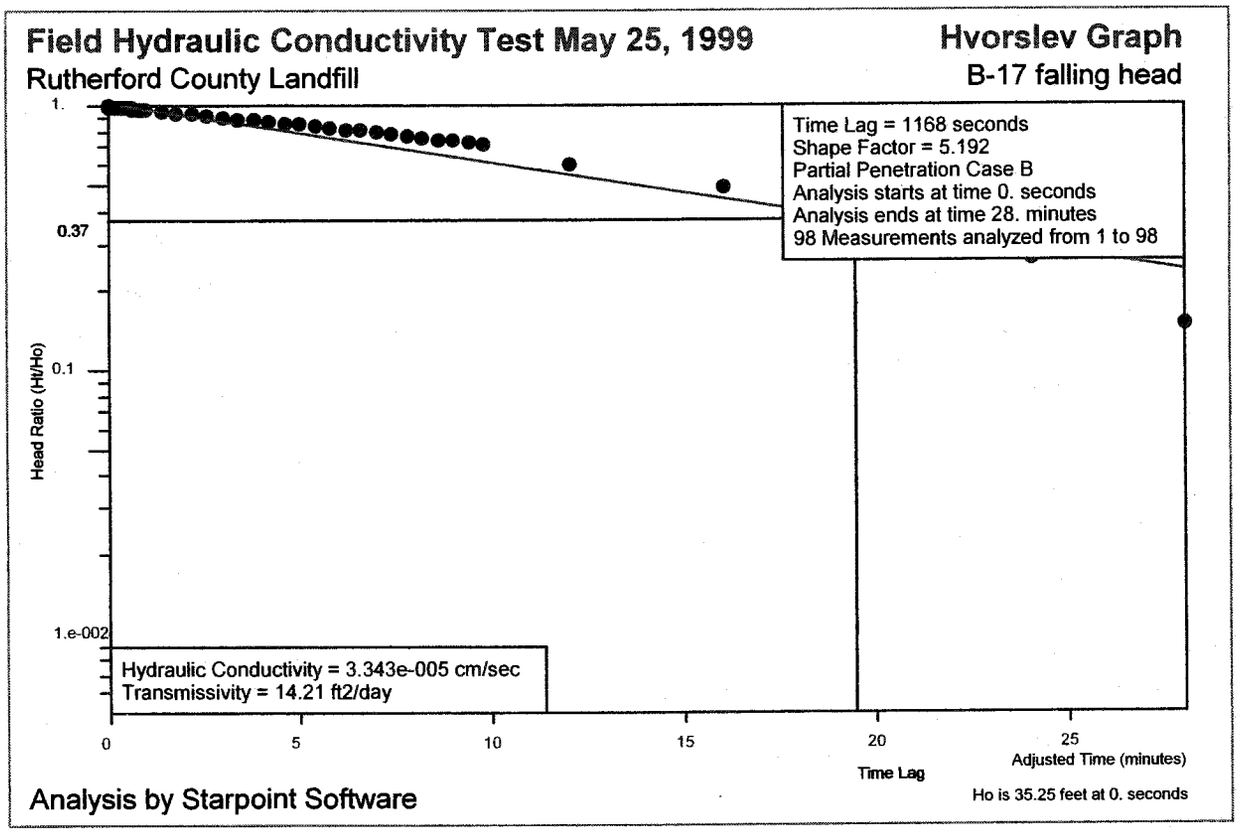
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B16ss0

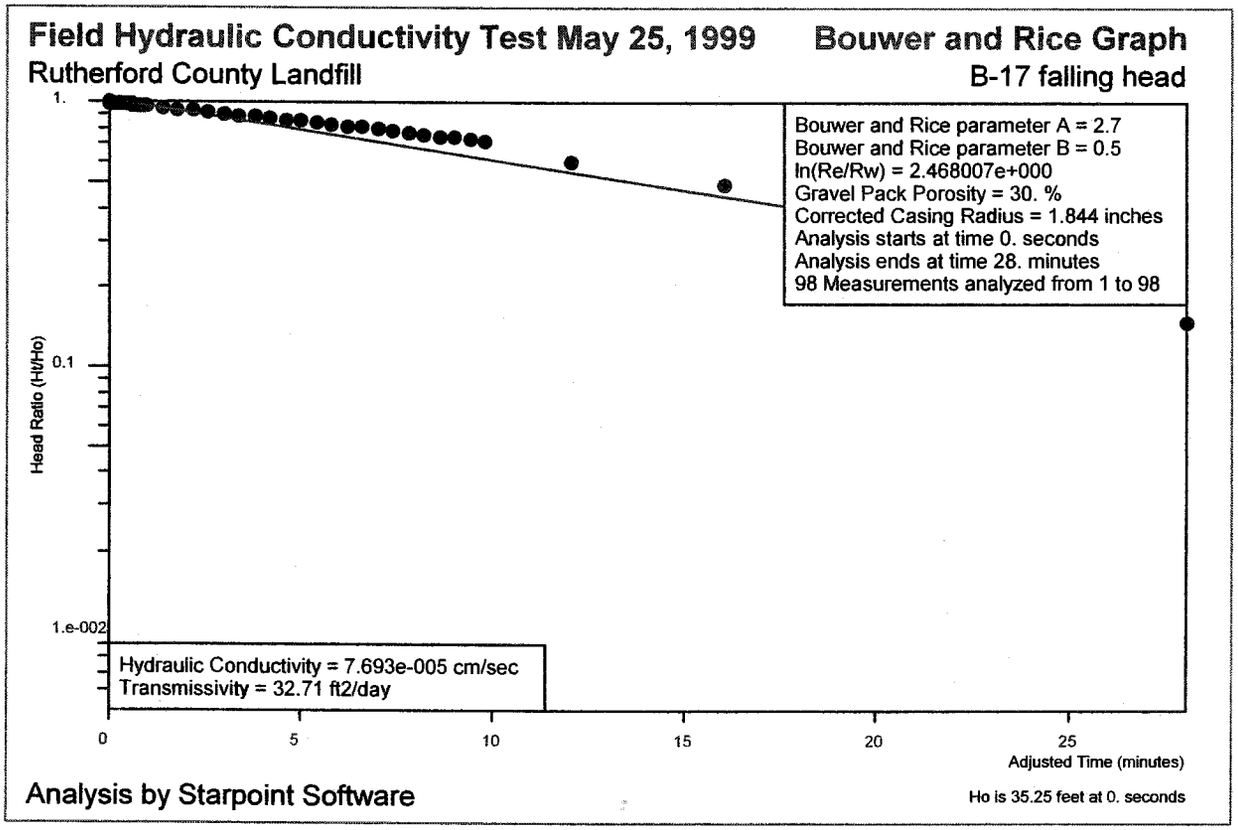
Well Label: B-16s falling head
Aquifer Thickness: 35. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 12.03 feet
Water Table to Screen Bottom: 17.8 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 93 time and drawdown measurements
Maximum head is 12.03 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	12.03	1.
2	6.6e-003	6.6e-003	1.e-002	12.02	0.9994
3	1.33e-002	1.33e-002	1.66e-002	12.01	0.9989
4	2.e-002	2.e-002	2.33e-002	12.01	0.9983
5	2.66e-002	2.66e-002	3.e-002	12.	0.9978
6	3.33e-002	3.33e-002	3.66e-002	11.99	0.9972
7	4.e-002	4.e-002	4.33e-002	11.99	0.9967
8	4.66e-002	4.66e-002	5.e-002	11.98	0.9961
9	5.33e-002	5.33e-002	5.66e-002	11.97	0.9956
10	6.e-002	6.e-002	6.33e-002	11.97	0.995
11	6.66e-002	6.66e-002	7.e-002	11.96	0.9945
12	7.33e-002	7.33e-002	7.66e-002	11.95	0.9939
13	8.e-002	8.e-002	8.33e-002	11.95	0.9933
14	8.66e-002	8.66e-002	9.e-002	11.94	0.9928
15	9.33e-002	9.33e-002	9.66e-002	11.93	0.9922
16	0.1	0.1	0.1033	11.93	0.9917
17	0.1066	0.1066	0.11	11.92	0.9911
18	0.1133	0.1133	0.1166	11.91	0.9906
19	0.12	0.12	0.1233	11.91	0.99
20	0.1266	0.1266	0.13	11.9	0.9895
21	0.1333	0.1333	0.1366	11.89	0.9889
22	0.14	0.14	0.1433	11.89	0.9884
23	0.1466	0.1466	0.15	11.88	0.9878
24	0.1533	0.1533	0.1566	11.87	0.9873
25	0.16	0.16	0.1633	11.87	0.9867
26	0.1666	0.1666	0.17	11.86	0.9861
27	0.1733	0.1733	0.1766	11.85	0.9856
28	0.18	0.18	0.1833	11.85	0.985
29	0.1866	0.1866	0.19	11.84	0.9845
30	0.1933	0.1933	0.1966	11.83	0.9839
31	0.2	0.2	0.2033	11.83	0.9834
32	0.2066	0.2066	0.21	11.82	0.9828
33	0.2133	0.2133	0.2166	11.81	0.9823
34	0.22	0.22	0.2233	11.81	0.9817

35	0.2266	0.2266	0.23	11.8	0.9812
36	0.2333	0.2333	0.2366	11.79	0.9806
37	0.24	0.24	0.2433	11.79	0.98
38	0.2466	0.2466	0.25	11.78	0.9795
39	0.2533	0.2533	0.2566	11.77	0.9789
40	0.26	0.26	0.2633	11.77	0.9784
41	0.2666	0.2666	0.27	11.76	0.9778
42	0.2733	0.2733	0.2766	11.75	0.9773
43	0.28	0.28	0.2833	11.75	0.9767
44	0.2866	0.2866	0.29	11.74	0.9762
45	0.2933	0.2933	0.2966	11.73	0.9756
46	0.3	0.3	0.3033	11.73	0.9751
47	0.3066	0.3066	0.31	11.72	0.9745
48	0.3133	0.3133	0.3166	11.71	0.9739
49	0.32	0.32	0.3233	11.71	0.9734
50	0.3266	0.3266	0.33	11.7	0.9728
51	0.3333	0.3333	0.35	11.68	0.9712
52	0.3666	0.3666	0.3833	11.65	0.9684
53	0.4	0.4	0.4166	11.61	0.9656
54	0.4333	0.4333	0.45	11.58	0.9629
55	0.4666	0.4666	0.4833	11.55	0.9601
56	0.5	0.5	0.5166	11.51	0.9573
57	0.5333	0.5333	0.55	11.48	0.9545
58	0.5666	0.5666	0.5833	11.45	0.9518
59	0.6	0.6	0.6166	11.41	0.949
60	0.6333	0.6333	0.65	11.38	0.9462
61	0.6666	0.6666	0.6833	11.35	0.9435
62	0.7	0.7	0.7166	11.31	0.9407
63	0.7333	0.7333	0.75	11.28	0.9379
64	0.7666	0.7666	0.7833	11.25	0.9351
65	0.8	0.8	0.8166	11.21	0.9324
66	0.8333	0.8333	0.85	11.18	0.9296
67	0.8666	0.8666	0.8833	11.15	0.9268
68	0.9	0.9	0.9166	11.11	0.9241
69	0.9333	0.9333	0.95	11.08	0.9213
70	0.9666	0.9666	0.9833	11.05	0.9185
71	1.	1.	1.2	10.83	0.9005
72	1.4	1.4	1.6	10.43	0.8672
73	1.8	1.8	2.	10.03	0.834
74	2.2	2.2	2.4	9.63	0.8007
75	2.6	2.6	2.8	9.23	0.7675
76	3.	3.	3.2	8.83	0.7342
77	3.4	3.4	3.6	8.43	0.7009
78	3.8	3.8	4.	8.03	0.6677
79	4.2	4.2	4.4	7.63	0.6344
80	4.6	4.6	4.8	7.23	0.6012
81	5.	5.	5.2	6.83	0.5679
82	5.4	5.4	5.6	6.43	0.5346
83	5.8	5.8	6.	6.03	0.5014
84	6.2	6.2	6.4	5.63	0.4681
85	6.6	6.6	6.8	5.23	0.4349
86	7.	7.	7.2	4.83	0.4016
87	7.4	7.4	7.6	4.43	0.3683
88	7.8	7.8	8.	4.03	0.3351
89	8.2	8.2	8.4	3.63	0.3018
90	8.6	8.6	8.8	3.23	0.2686
91	9.	9.	9.2	2.83	0.2353

92	9.4	9.4	9.6	2.43	0.2021
93	9.8	9.8	10.	2.03	0.1688


Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Hvorslev Graph
B-17 falling head
Time Lag = 1168 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 28. minutes
98 Measurements analyzed from 1 to 98
Hydraulic Conductivity = 3.343e-005 cm/sec
Transmissivity = 14.21 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 35.25 feet at 0. seconds


Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Bouwer and Rice Graph
B-17 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.468007e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 28. minutes
98 Measurements analyzed from 1 to 98
Hydraulic Conductivity = 7.693e-005 cm/sec
Transmissivity = 32.71 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
25
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 35.25 feet at 0. seconds

Field Hydraulic Conductivity Test

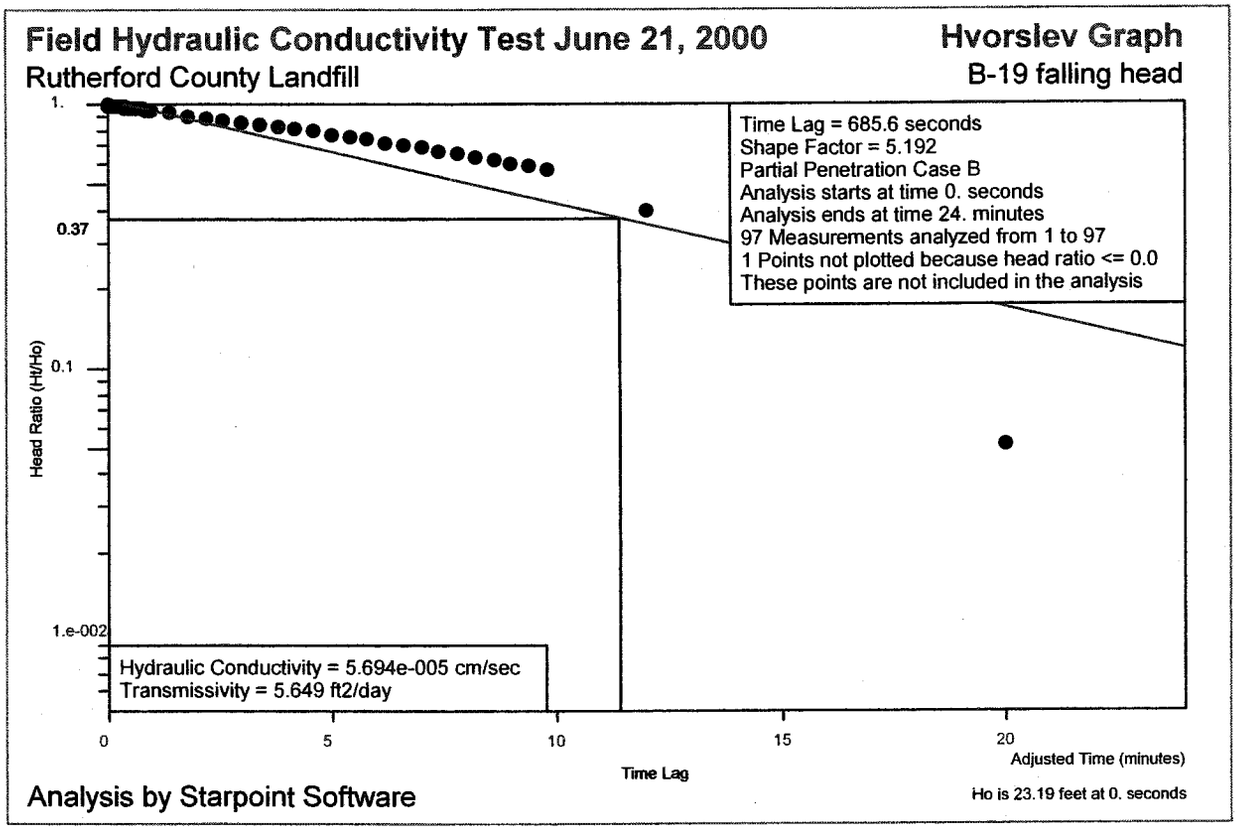
Site Name: Rutherford County Landfill
Test Date: May 25, 1999
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B17S0.TXT

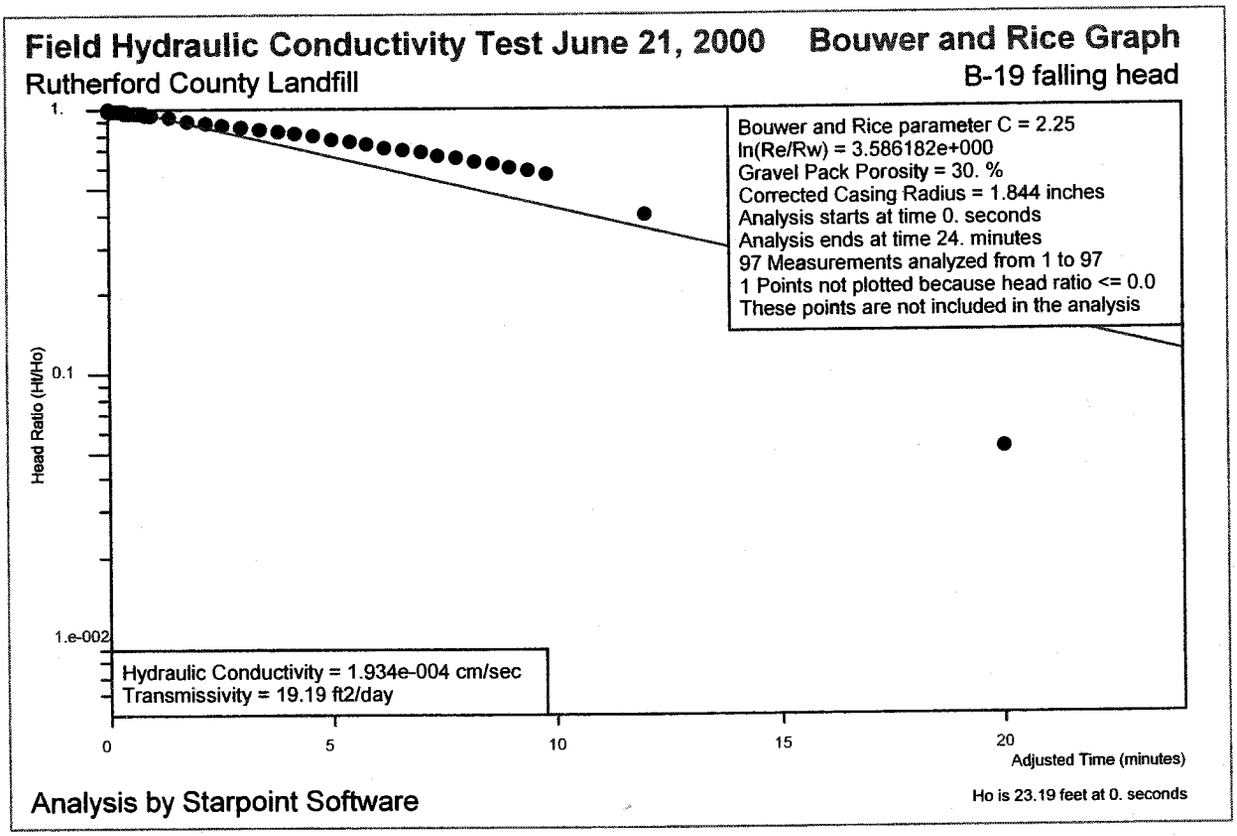
Well Label: B-17 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 35.25 feet
Water Table to Screen Bottom: 17.4 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 98 time and drawdown measurements
Maximum head is 35.25 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	35.25	1.
2	6.6e-003	6.6e-003	1.e-002	35.24	0.9998
3	1.33e-002	1.33e-002	1.66e-002	35.23	0.9996
4	2.e-002	2.e-002	2.33e-002	35.23	0.9994
5	2.66e-002	2.66e-002	3.e-002	35.22	0.9992
6	3.33e-002	3.33e-002	3.66e-002	35.21	0.9991
7	4.e-002	4.e-002	4.33e-002	35.21	0.9989
8	4.66e-002	4.66e-002	5.e-002	35.2	0.9987
9	5.33e-002	5.33e-002	5.66e-002	35.19	0.9985
10	6.e-002	6.e-002	6.33e-002	35.19	0.9983
11	6.66e-002	6.66e-002	7.e-002	35.18	0.9981
12	7.33e-002	7.33e-002	7.66e-002	35.17	0.9979
13	8.e-002	8.e-002	8.33e-002	35.17	0.9977
14	8.66e-002	8.66e-002	9.e-002	35.16	0.9975
15	9.33e-002	9.33e-002	9.66e-002	35.15	0.9974
16	0.1	0.1	0.1033	35.15	0.9972
17	0.1066	0.1066	0.11	35.14	0.997
18	0.1133	0.1133	0.1166	35.13	0.9968
19	0.12	0.12	0.1233	35.13	0.9966
20	0.1266	0.1266	0.13	35.12	0.9964
21	0.1333	0.1333	0.1366	35.11	0.9962
22	0.14	0.14	0.1433	35.11	0.996
23	0.1466	0.1466	0.15	35.1	0.9958
24	0.1533	0.1533	0.1566	35.09	0.9957
25	0.16	0.16	0.1633	35.09	0.9955
26	0.1666	0.1666	0.17	35.08	0.9953
27	0.1733	0.1733	0.1766	35.07	0.9951
28	0.18	0.18	0.1833	35.07	0.9949
29	0.1866	0.1866	0.19	35.06	0.9947
30	0.1933	0.1933	0.1966	35.05	0.9945
31	0.2	0.2	0.2033	35.05	0.9943
32	0.2066	0.2066	0.21	35.04	0.9941
33	0.2133	0.2133	0.2166	35.03	0.9939
34	0.22	0.22	0.2233	35.03	0.9938

35	0.2266	0.2266	0.23	35.02	0.9936
36	0.2333	0.2333	0.2366	35.01	0.9934
37	0.24	0.24	0.2433	35.01	0.9932
38	0.2466	0.2466	0.25	35.	0.993
39	0.2533	0.2533	0.2566	34.99	0.9928
40	0.26	0.26	0.2633	34.99	0.9926
41	0.2666	0.2666	0.27	34.98	0.9924
42	0.2733	0.2733	0.2766	34.97	0.9922
43	0.28	0.28	0.2833	34.97	0.9921
44	0.2866	0.2866	0.29	34.96	0.9919
45	0.2933	0.2933	0.2966	34.95	0.9917
46	0.3	0.3	0.3033	34.95	0.9915
47	0.3066	0.3066	0.31	34.94	0.9913
48	0.3133	0.3133	0.3166	34.93	0.9911
49	0.32	0.32	0.3233	34.93	0.9909
50	0.3266	0.3266	0.33	34.92	0.9907
51	0.3333	0.3333	0.35	34.9	0.9902
52	0.3666	0.3666	0.3833	34.87	0.9892
53	0.4	0.4	0.4166	34.83	0.9883
54	0.4333	0.4333	0.45	34.8	0.9873
55	0.4666	0.4666	0.4833	34.77	0.9864
56	0.5	0.5	0.5166	34.73	0.9854
57	0.5333	0.5333	0.55	34.7	0.9845
58	0.5666	0.5666	0.5833	34.67	0.9835
59	0.6	0.6	0.6166	34.63	0.9826
60	0.6333	0.6333	0.65	34.6	0.9817
61	0.6666	0.6666	0.6833	34.57	0.9807
62	0.7	0.7	0.7166	34.53	0.9798
63	0.7333	0.7333	0.75	34.5	0.9788
64	0.7666	0.7666	0.7833	34.47	0.9779
65	0.8	0.8	0.8166	34.43	0.9769
66	0.8333	0.8333	0.85	34.4	0.976
67	0.8666	0.8666	0.8833	34.37	0.975
68	0.9	0.9	0.9166	34.33	0.9741
69	0.9333	0.9333	0.95	34.3	0.9731
70	0.9666	0.9666	0.9833	34.27	0.9722
71	1.	1.	1.2	34.05	0.966
72	1.4	1.4	1.6	33.65	0.9547
73	1.8	1.8	2.	33.25	0.9434
74	2.2	2.2	2.4	32.85	0.932
75	2.6	2.6	2.8	32.45	0.9207
76	3.	3.	3.2	32.05	0.9093
77	3.4	3.4	3.6	31.65	0.898
78	3.8	3.8	4.	31.25	0.8866
79	4.2	4.2	4.4	30.85	0.8753
80	4.6	4.6	4.8	30.45	0.8639
81	5.	5.	5.2	30.05	0.8526
82	5.4	5.4	5.6	29.65	0.8412
83	5.8	5.8	6.	29.25	0.8299
84	6.2	6.2	6.4	28.85	0.8185
85	6.6	6.6	6.8	28.45	0.8072
86	7.	7.	7.2	28.05	0.7958
87	7.4	7.4	7.6	27.65	0.7845
88	7.8	7.8	8.	27.25	0.7731
89	8.2	8.2	8.4	26.85	0.7618
90	8.6	8.6	8.8	26.45	0.7504
91	9.	9.	9.2	26.05	0.7391

92	9.4	9.4	9.6	25.65	0.7277
93	9.8	9.8	10.	25.25	0.7164
94	12.	12.	14.	21.25	0.6029
95	16.	16.	18.	17.25	0.4894
96	20.	20.	22.	13.25	0.3759
97	24.	24.	26.	9.25	0.2624
98	28.	28.	30.	5.25	0.149


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-19 falling head
Time Lag = 685.6 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
1 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 5.694e-005 cm/sec
Transmissivity = 5.649 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 23.19 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-19 falling head
Bouwer and Rice parameter C = 2.25
ln(Re/Rw) = 3.586182e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
1 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Head Ratio (Hi/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 1.934e-004 cm/sec
Transmissivity = 19.19 ft2/day
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 23.19 feet at 0. seconds

Field Hydraulic Conductivity Test

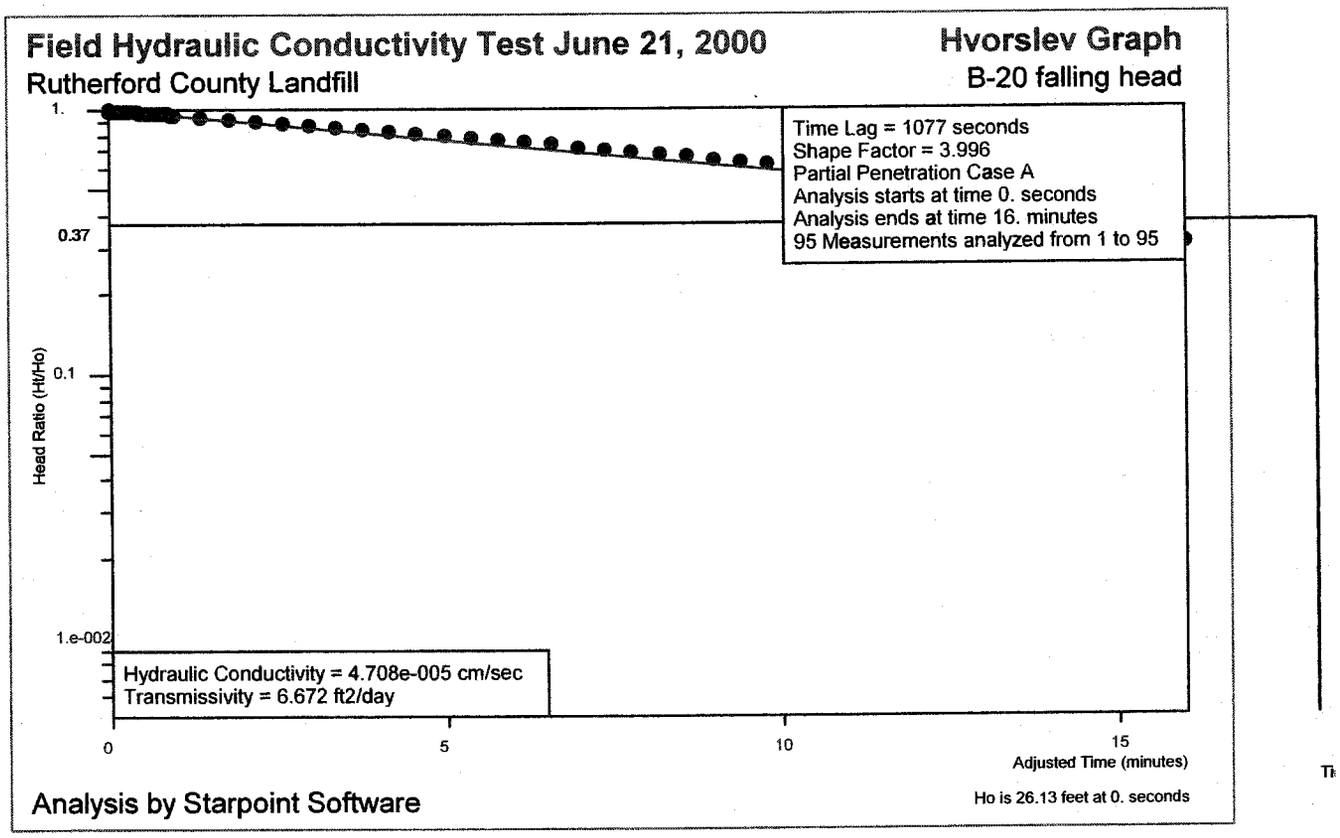
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B19S1

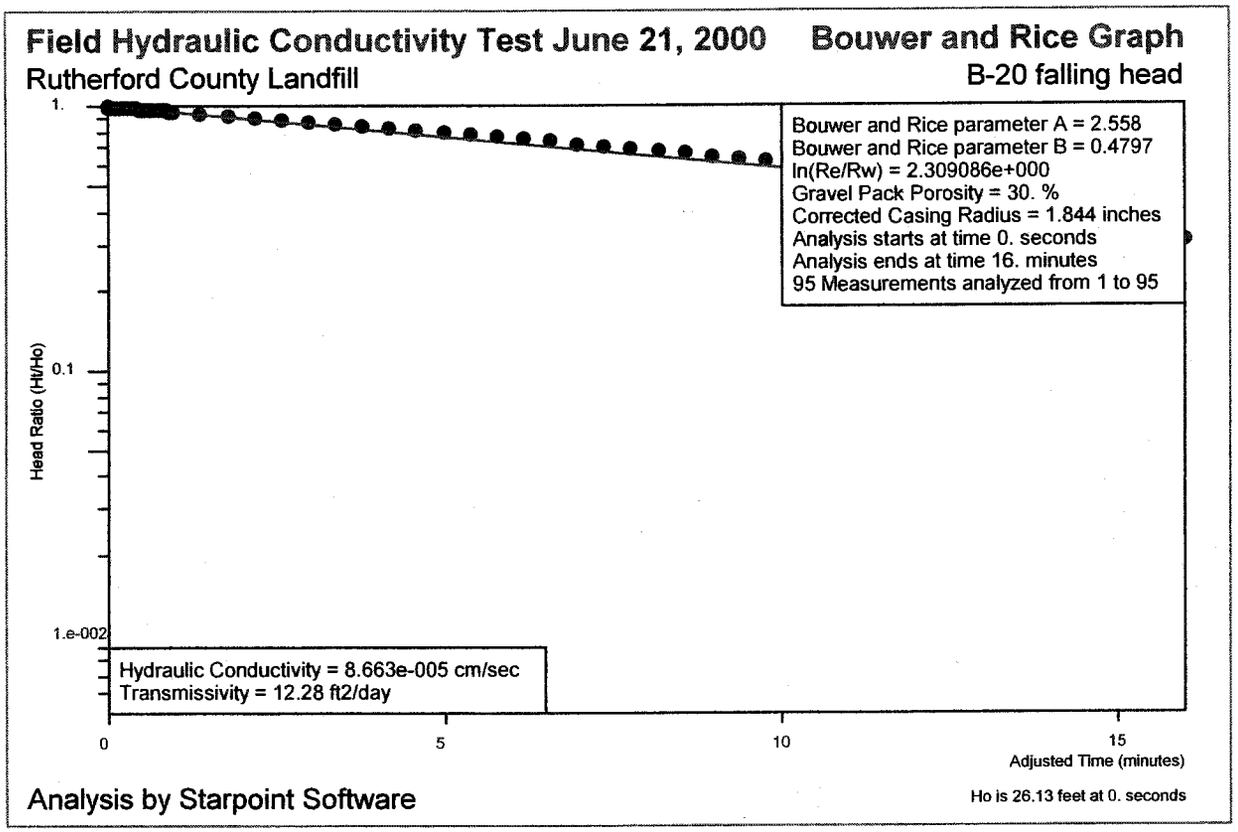
Well Label: B-19 falling head
Aquifer Thickness: 35. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 23.19 feet
Water Table to Screen Bottom: 36.6 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 97 time and drawdown measurements
Maximum head is 23.19 feet
Minimum head is -2.81 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	23.19	1.
2	6.6e-003	6.6e-003	1.e-002	23.18	0.9997
3	1.33e-002	1.33e-002	1.66e-002	23.17	0.9994
4	2.e-002	2.e-002	2.33e-002	23.17	0.9991
5	2.66e-002	2.66e-002	3.e-002	23.16	0.9988
6	3.33e-002	3.33e-002	3.66e-002	23.15	0.9986
7	4.e-002	4.e-002	4.33e-002	23.15	0.9983
8	4.66e-002	4.66e-002	5.e-002	23.14	0.998
9	5.33e-002	5.33e-002	5.66e-002	23.13	0.9977
10	6.e-002	6.e-002	6.33e-002	23.13	0.9974
11	6.66e-002	6.66e-002	7.e-002	23.12	0.9971
12	7.33e-002	7.33e-002	7.66e-002	23.11	0.9968
13	8.e-002	8.e-002	8.33e-002	23.11	0.9965
14	8.66e-002	8.66e-002	9.e-002	23.1	0.9963
15	9.33e-002	9.33e-002	9.66e-002	23.09	0.996
16	0.1	0.1	0.1033	23.09	0.9957
17	0.1066	0.1066	0.11	23.08	0.9954
18	0.1133	0.1133	0.1166	23.07	0.9951
19	0.12	0.12	0.1233	23.07	0.9948
20	0.1266	0.1266	0.13	23.06	0.9945
21	0.1333	0.1333	0.1366	23.05	0.9943
22	0.14	0.14	0.1433	23.05	0.994
23	0.1466	0.1466	0.15	23.04	0.9937
24	0.1533	0.1533	0.1566	23.03	0.9934
25	0.16	0.16	0.1633	23.03	0.9931
26	0.1666	0.1666	0.17	23.02	0.9928
27	0.1733	0.1733	0.1766	23.01	0.9925
28	0.18	0.18	0.1833	23.01	0.9922
29	0.1866	0.1866	0.19	23.	0.9919
30	0.1933	0.1933	0.1966	22.99	0.9917
31	0.2	0.2	0.2033	22.99	0.9914
32	0.2066	0.2066	0.21	22.98	0.9911
33	0.2133	0.2133	0.2166	22.97	0.9908
34	0.22	0.22	0.2233	22.97	0.9905

35	0.2266	0.2266	0.23	22.96	0.9902
36	0.2333	0.2333	0.2366	22.95	0.9899
37	0.24	0.24	0.2433	22.95	0.9896
38	0.2466	0.2466	0.25	22.94	0.9894
39	0.2533	0.2533	0.2566	22.93	0.9891
40	0.26	0.26	0.2633	22.93	0.9888
41	0.2666	0.2666	0.27	22.92	0.9885
42	0.2733	0.2733	0.2766	22.91	0.9882
43	0.28	0.28	0.2833	22.91	0.9879
44	0.2866	0.2866	0.29	22.9	0.9876
45	0.2933	0.2933	0.2966	22.89	0.9874
46	0.3	0.3	0.3033	22.89	0.9871
47	0.3066	0.3066	0.31	22.88	0.9868
48	0.3133	0.3133	0.3166	22.87	0.9865
49	0.32	0.32	0.3233	22.87	0.9862
50	0.3266	0.3266	0.33	22.86	0.9859
51	0.3333	0.3333	0.35	22.84	0.985
52	0.3666	0.3666	0.3833	22.81	0.9836
53	0.4	0.4	0.4166	22.77	0.9822
54	0.4333	0.4333	0.45	22.74	0.9807
55	0.4666	0.4666	0.4833	22.71	0.9793
56	0.5	0.5	0.5166	22.67	0.9779
57	0.5333	0.5333	0.55	22.64	0.9764
58	0.5666	0.5666	0.5833	22.61	0.975
59	0.6	0.6	0.6166	22.57	0.9735
60	0.6333	0.6333	0.65	22.54	0.9721
61	0.6666	0.6666	0.6833	22.51	0.9707
62	0.7	0.7	0.7166	22.47	0.9692
63	0.7333	0.7333	0.75	22.44	0.9678
64	0.7666	0.7666	0.7833	22.41	0.9664
65	0.8	0.8	0.8166	22.37	0.9649
66	0.8333	0.8333	0.85	22.34	0.9635
67	0.8666	0.8666	0.8833	22.31	0.962
68	0.9	0.9	0.9166	22.27	0.9606
69	0.9333	0.9333	0.95	22.24	0.9592
70	0.9666	0.9666	0.9833	22.21	0.9577
71	1.	1.	1.2	21.99	0.9484
72	1.4	1.4	1.6	21.59	0.9311
73	1.8	1.8	2.	21.19	0.9139
74	2.2	2.2	2.4	20.79	0.8966
75	2.6	2.6	2.8	20.39	0.8794
76	3.	3.	3.2	19.99	0.8621
77	3.4	3.4	3.6	19.59	0.8449
78	3.8	3.8	4.	19.19	0.8276
79	4.2	4.2	4.4	18.79	0.8104
80	4.6	4.6	4.8	18.39	0.7931
81	5.	5.	5.2	17.99	0.7759
82	5.4	5.4	5.6	17.59	0.7586
83	5.8	5.8	6.	17.19	0.7414
84	6.2	6.2	6.4	16.79	0.7241
85	6.6	6.6	6.8	16.39	0.7069
86	7.	7.	7.2	15.99	0.6896
87	7.4	7.4	7.6	15.59	0.6724
88	7.8	7.8	8.	15.19	0.6551
89	8.2	8.2	8.4	14.79	0.6379
90	8.6	8.6	8.8	14.39	0.6206
91	9.	9.	9.2	13.99	0.6034

92	9.4	9.4	9.6	13.59	0.5861
93	9.8	9.8	10.	13.19	0.5689
94	12.	12.	14.	9.19	0.3963
95	16.	16.	18.	5.19	0.2238
96	20.	20.	22.	1.19	5.132e-002
97	24.	24.	26.	-2.81	-0.1212


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-20 falling head
Time Lag = 1077 seconds
Shape Factor = 3.996
Partial Penetration Case A
Analysis starts at time 0. seconds
Analysis ends at time 16. minutes
95 Measurements analyzed from 1 to 95
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
Hydraulic Conductivity = 4.708e-005 cm/sec
Transmissivity = 6.672 ft2/day
0
5
10
15
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 26.13 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-20 falling head
Bouwer and Rice parameter A = 2.558
Bouwer and Rice parameter B = 0.4797
ln(Re/Rw) = 2.309086e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 16. minutes
95 Measurements analyzed from 1 to 95
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 8.663e-005 cm/sec
Transmissivity = 12.28 ft2/day
0
5
10
15
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 26.13 feet at 0. seconds

Field Hydraulic Conductivity Test

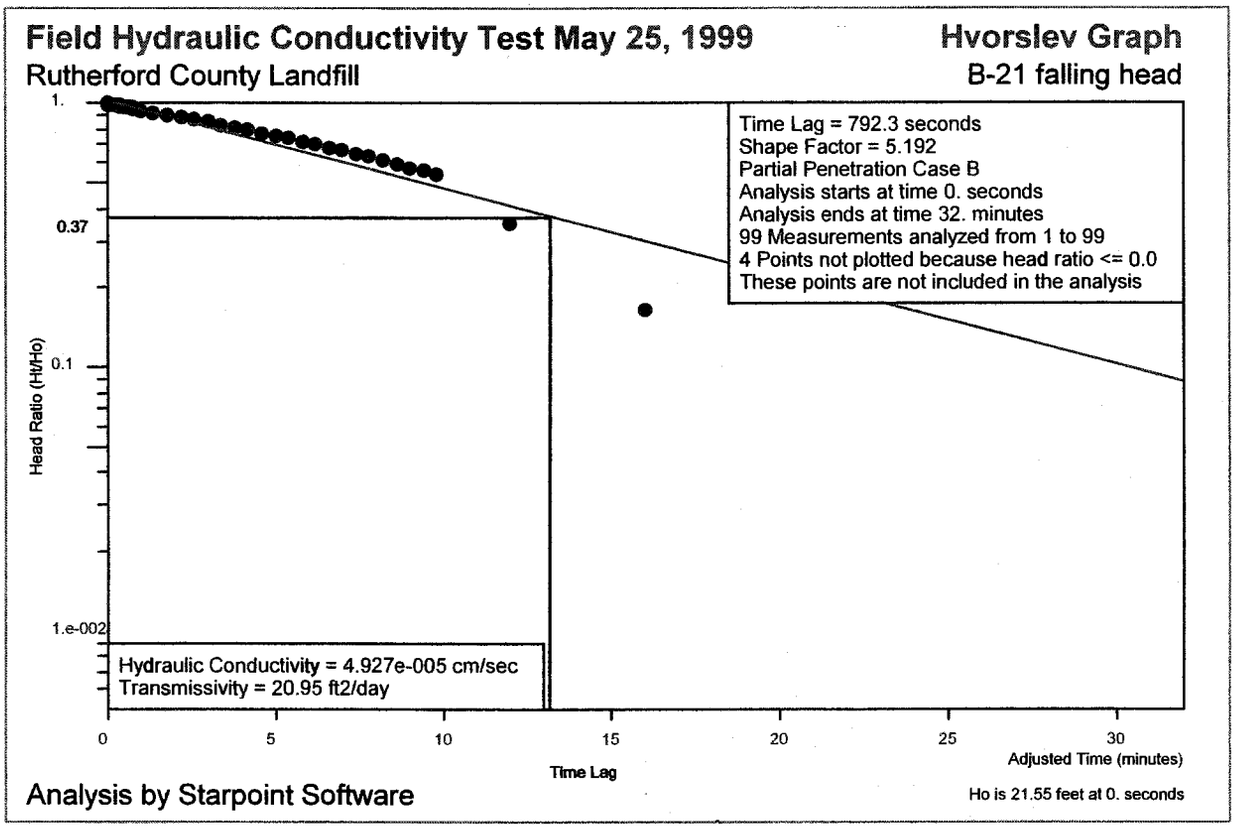
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B20s0

Well Label: B-20 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 26.13 feet
Water Table to Screen Bottom: 8.9 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 95 time and drawdown measurements
Maximum head is 26.13 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	26.13	1.
2	6.6e-003	6.6e-003	1.e-002	26.12	0.9997
3	1.33e-002	1.33e-002	1.66e-002	26.11	0.9995
4	2.e-002	2.e-002	2.33e-002	26.11	0.9992
5	2.66e-002	2.66e-002	3.e-002	26.1	0.999
6	3.33e-002	3.33e-002	3.66e-002	26.09	0.9987
7	4.e-002	4.e-002	4.33e-002	26.09	0.9985
8	4.66e-002	4.66e-002	5.e-002	26.08	0.9982
9	5.33e-002	5.33e-002	5.66e-002	26.07	0.998
10	6.e-002	6.e-002	6.33e-002	26.07	0.9977
11	6.66e-002	6.66e-002	7.e-002	26.06	0.9974
12	7.33e-002	7.33e-002	7.66e-002	26.05	0.9972
13	8.e-002	8.e-002	8.33e-002	26.05	0.9969
14	8.66e-002	8.66e-002	9.e-002	26.04	0.9967
15	9.33e-002	9.33e-002	9.66e-002	26.03	0.9964
16	0.1	0.1	0.1033	26.03	0.9962
17	0.1066	0.1066	0.11	26.02	0.9959
18	0.1133	0.1133	0.1166	26.01	0.9957
19	0.12	0.12	0.1233	26.01	0.9954
20	0.1266	0.1266	0.13	26.	0.9952
21	0.1333	0.1333	0.1366	25.99	0.9949
22	0.14	0.14	0.1433	25.99	0.9946
23	0.1466	0.1466	0.15	25.98	0.9944
24	0.1533	0.1533	0.1566	25.97	0.9941
25	0.16	0.16	0.1633	25.97	0.9939
26	0.1666	0.1666	0.17	25.96	0.9936
27	0.1733	0.1733	0.1766	25.95	0.9934
28	0.18	0.18	0.1833	25.95	0.9931
29	0.1866	0.1866	0.19	25.94	0.9929
30	0.1933	0.1933	0.1966	25.93	0.9926
31	0.2	0.2	0.2033	25.93	0.9923
32	0.2066	0.2066	0.21	25.92	0.9921
33	0.2133	0.2133	0.2166	25.91	0.9918
34	0.22	0.22	0.2233	25.91	0.9916

35	0.2266	0.2266	0.23	25.9	0.9913
36	0.2333	0.2333	0.2366	25.89	0.9911
37	0.24	0.24	0.2433	25.89	0.9908
38	0.2466	0.2466	0.25	25.88	0.9906
39	0.2533	0.2533	0.2566	25.87	0.9903
40	0.26	0.26	0.2633	25.87	0.99
41	0.2666	0.2666	0.27	25.86	0.9898
42	0.2733	0.2733	0.2766	25.85	0.9895
43	0.28	0.28	0.2833	25.85	0.9893
44	0.2866	0.2866	0.29	25.84	0.989
45	0.2933	0.2933	0.2966	25.83	0.9888
46	0.3	0.3	0.3033	25.83	0.9885
47	0.3066	0.3066	0.31	25.82	0.9883
48	0.3133	0.3133	0.3166	25.81	0.988
49	0.32	0.32	0.3233	25.81	0.9878
50	0.3266	0.3266	0.33	25.8	0.9875
51	0.3333	0.3333	0.35	25.78	0.9867
52	0.3666	0.3666	0.3833	25.75	0.9855
53	0.4	0.4	0.4166	25.71	0.9842
54	0.4333	0.4333	0.45	25.68	0.9829
55	0.4666	0.4666	0.4833	25.65	0.9816
56	0.5	0.5	0.5166	25.61	0.9804
57	0.5333	0.5333	0.55	25.58	0.9791
58	0.5666	0.5666	0.5833	25.55	0.9778
59	0.6	0.6	0.6166	25.51	0.9765
60	0.6333	0.6333	0.65	25.48	0.9752
61	0.6666	0.6666	0.6833	25.45	0.974
62	0.7	0.7	0.7166	25.41	0.9727
63	0.7333	0.7333	0.75	25.38	0.9714
64	0.7666	0.7666	0.7833	25.35	0.9701
65	0.8	0.8	0.8166	25.31	0.9689
66	0.8333	0.8333	0.85	25.28	0.9676
67	0.8666	0.8666	0.8833	25.25	0.9663
68	0.9	0.9	0.9166	25.21	0.965
69	0.9333	0.9333	0.95	25.18	0.9638
70	0.9666	0.9666	0.9833	25.15	0.9625
71	1.	1.	1.2	24.93	0.9542
72	1.4	1.4	1.6	24.53	0.9389
73	1.8	1.8	2.	24.13	0.9236
74	2.2	2.2	2.4	23.73	0.9083
75	2.6	2.6	2.8	23.33	0.893
76	3.	3.	3.2	22.93	0.8776
77	3.4	3.4	3.6	22.53	0.8623
78	3.8	3.8	4.	22.13	0.847
79	4.2	4.2	4.4	21.73	0.8317
80	4.6	4.6	4.8	21.33	0.8164
81	5.	5.	5.2	20.93	0.8011
82	5.4	5.4	5.6	20.53	0.7858
83	5.8	5.8	6.	20.13	0.7705
84	6.2	6.2	6.4	19.73	0.7552
85	6.6	6.6	6.8	19.33	0.7399
86	7.	7.	7.2	18.93	0.7245
87	7.4	7.4	7.6	18.53	0.7092
88	7.8	7.8	8.	18.13	0.6939
89	8.2	8.2	8.4	17.73	0.6786
90	8.6	8.6	8.8	17.33	0.6633
91	9.	9.	9.2	16.93	0.648

92	9.4	9.4	9.6	16.53	0.6327
93	9.8	9.8	10.	16.13	0.6174
94	12.	12.	14.	12.13	0.4643
95	16.	16.	18.	8.13	0.3112

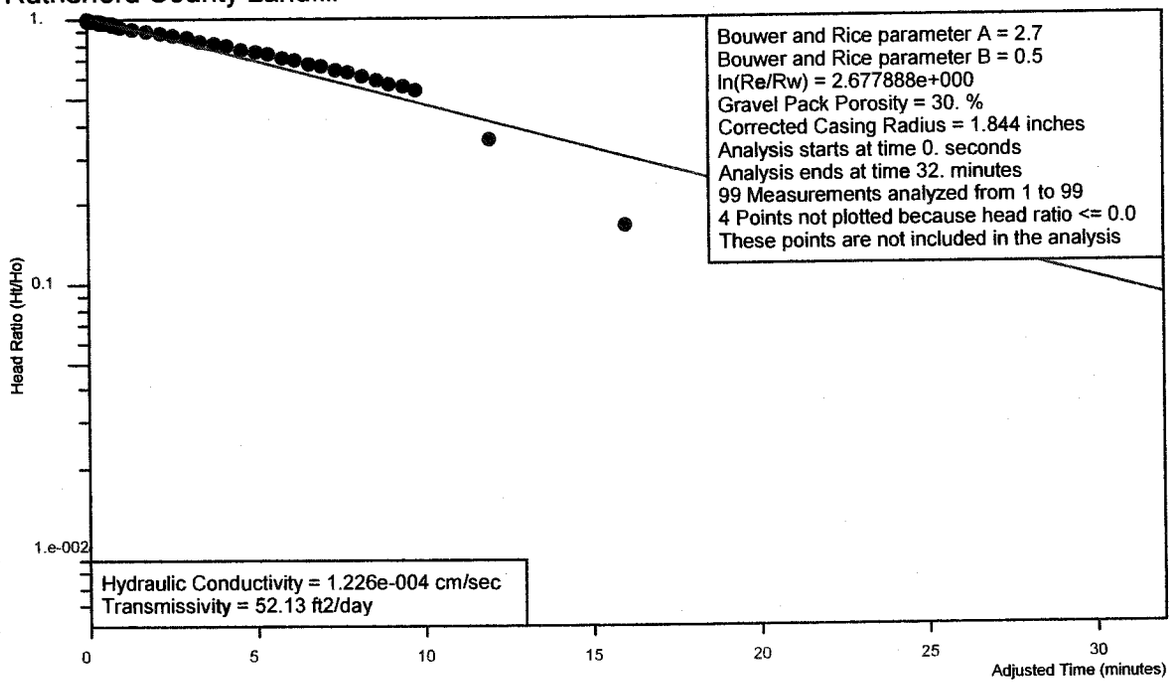

Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Hvorslev Graph
B-21 falling head
Time Lag = 792.3 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 32. minutes
99 Measurements analyzed from 1 to 99
4 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 4.927e-005 cm/sec
Transmissivity = 20.95 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 21.55 feet at 0. seconds

Field Hydraulic Conductivity Test May 25, 1999

Bouwer and Rice Graph

Rutherford County Landfill

B-21 falling head



Analysis by Starpoint Software

Ho is 21.55 feet at 0. seconds

Field Hydraulic Conductivity Test

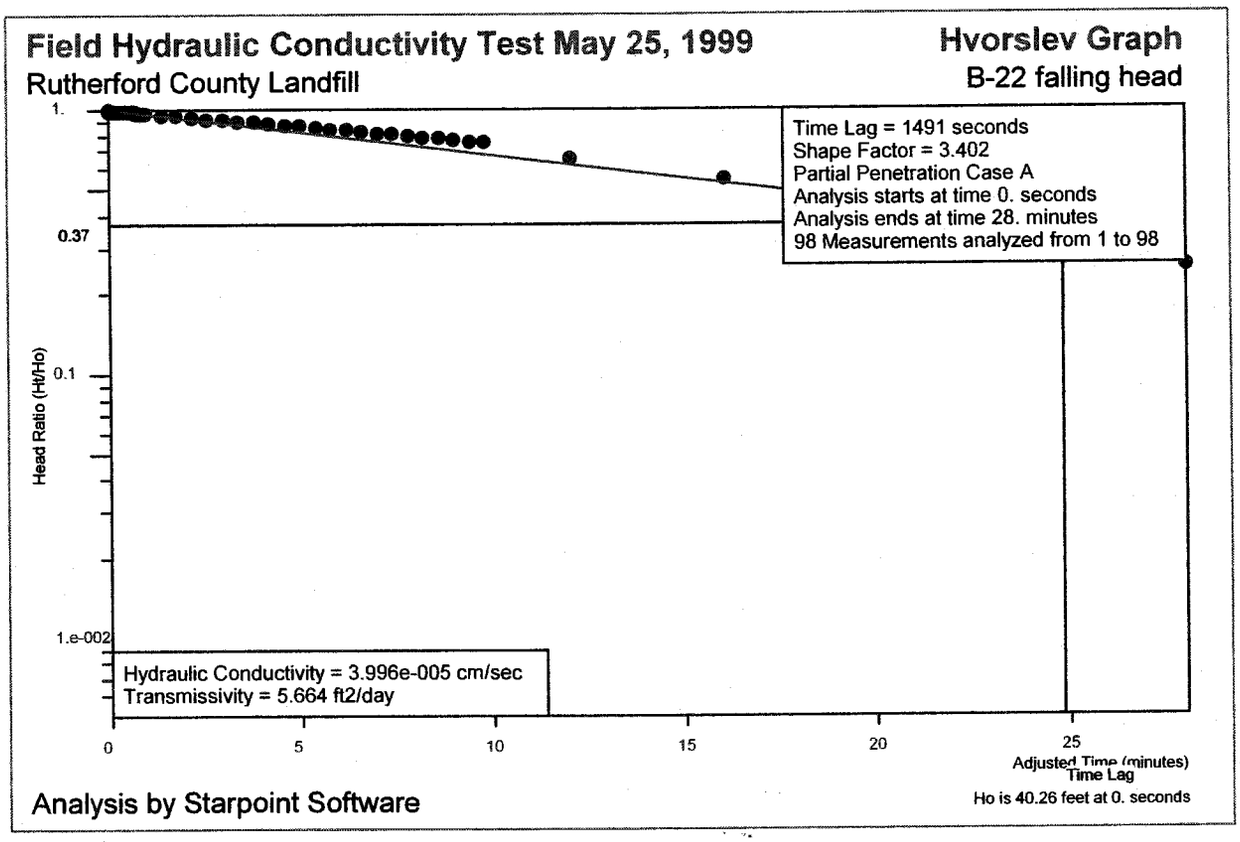
Site Name: Rutherford County Landfill
Test Date: May 25, 1999
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B21S0.TXT

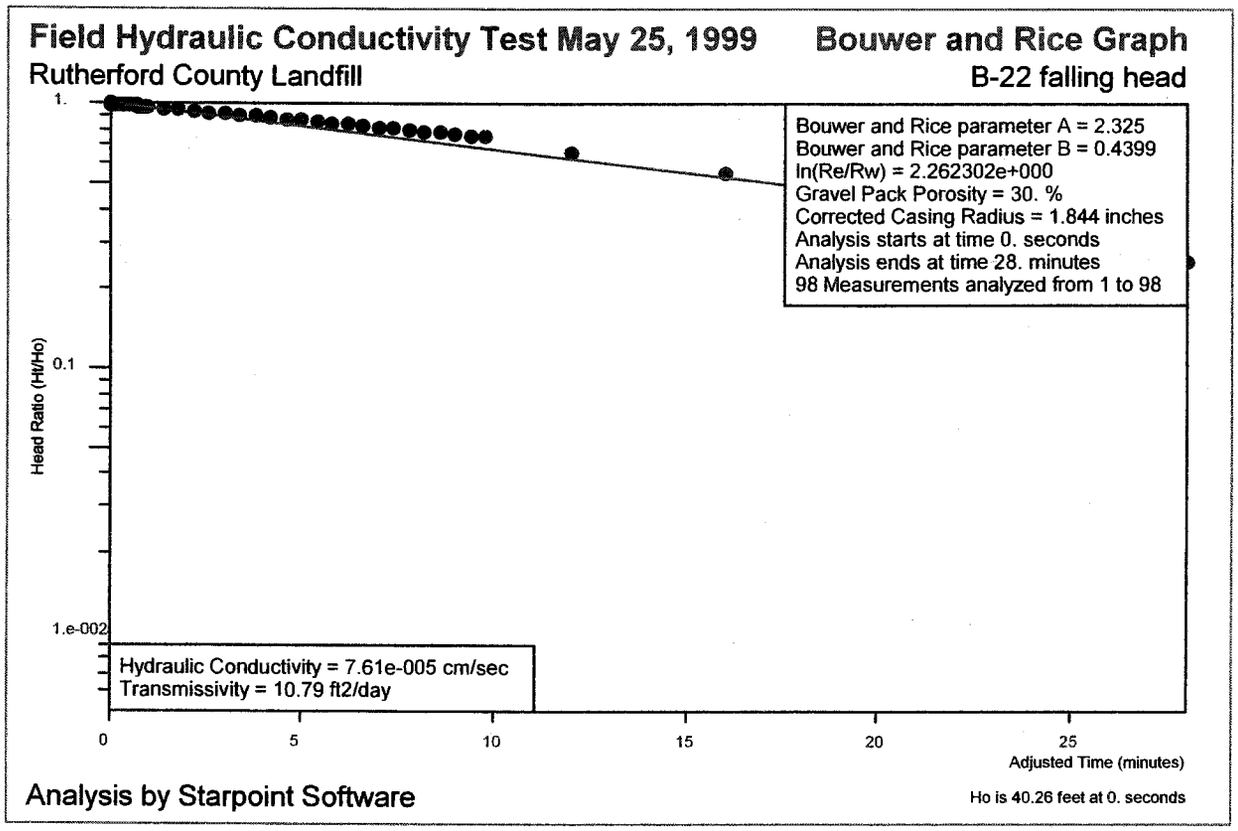
Well Label: B-21 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 21.55 feet
Water Table to Screen Bottom: 30.6 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 99 time and drawdown measurements
Maximum head is 21.55 feet
Minimum head is -12.45 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	21.55	1.
2	6.6e-003	6.6e-003	1.e-002	21.54	0.9997
3	1.33e-002	1.33e-002	1.66e-002	21.53	0.9994
4	2.e-002	2.e-002	2.33e-002	21.53	0.9991
5	2.66e-002	2.66e-002	3.e-002	21.52	0.9988
6	3.33e-002	3.33e-002	3.66e-002	21.51	0.9985
7	4.e-002	4.e-002	4.33e-002	21.51	0.9981
8	4.66e-002	4.66e-002	5.e-002	21.5	0.9978
9	5.33e-002	5.33e-002	5.66e-002	21.49	0.9975
10	6.e-002	6.e-002	6.33e-002	21.49	0.9972
11	6.66e-002	6.66e-002	7.e-002	21.48	0.9969
12	7.33e-002	7.33e-002	7.66e-002	21.47	0.9966
13	8.e-002	8.e-002	8.33e-002	21.47	0.9963
14	8.66e-002	8.66e-002	9.e-002	21.46	0.996
15	9.33e-002	9.33e-002	9.66e-002	21.45	0.9957
16	0.1	0.1	0.1033	21.45	0.9954
17	0.1066	0.1066	0.11	21.44	0.995
18	0.1133	0.1133	0.1166	21.43	0.9947
19	0.12	0.12	0.1233	21.43	0.9944
20	0.1266	0.1266	0.13	21.42	0.9941
21	0.1333	0.1333	0.1366	21.41	0.9938
22	0.14	0.14	0.1433	21.41	0.9935
23	0.1466	0.1466	0.15	21.4	0.9932
24	0.1533	0.1533	0.1566	21.39	0.9929
25	0.16	0.16	0.1633	21.39	0.9926
26	0.1666	0.1666	0.17	21.38	0.9923
27	0.1733	0.1733	0.1766	21.37	0.992
28	0.18	0.18	0.1833	21.37	0.9916
29	0.1866	0.1866	0.19	21.36	0.9913
30	0.1933	0.1933	0.1966	21.35	0.991
31	0.2	0.2	0.2033	21.35	0.9907
32	0.2066	0.2066	0.21	21.34	0.9904
33	0.2133	0.2133	0.2166	21.33	0.9901
34	0.22	0.22	0.2233	21.33	0.9898

35	0.2266	0.2266	0.23	21.32	0.9895
36	0.2333	0.2333	0.2366	21.31	0.9892
37	0.24	0.24	0.2433	21.31	0.9889
38	0.2466	0.2466	0.25	21.3	0.9886
39	0.2533	0.2533	0.2566	21.29	0.9882
40	0.26	0.26	0.2633	21.29	0.9879
41	0.2666	0.2666	0.27	21.28	0.9876
42	0.2733	0.2733	0.2766	21.27	0.9873
43	0.28	0.28	0.2833	21.27	0.987
44	0.2866	0.2866	0.29	21.26	0.9867
45	0.2933	0.2933	0.2966	21.25	0.9864
46	0.3	0.3	0.3033	21.25	0.9861
47	0.3066	0.3066	0.31	21.24	0.9858
48	0.3133	0.3133	0.3166	21.23	0.9855
49	0.32	0.32	0.3233	21.23	0.9851
50	0.3266	0.3266	0.33	21.22	0.9848
51	0.3333	0.3333	0.35	21.2	0.9839
52	0.3666	0.3666	0.3833	21.17	0.9824
53	0.4	0.4	0.4166	21.13	0.9808
54	0.4333	0.4333	0.45	21.1	0.9793
55	0.4666	0.4666	0.4833	21.07	0.9777
56	0.5	0.5	0.5166	21.03	0.9762
57	0.5333	0.5333	0.55	21.	0.9746
58	0.5666	0.5666	0.5833	20.97	0.9731
59	0.6	0.6	0.6166	20.93	0.9715
60	0.6333	0.6333	0.65	20.9	0.97
61	0.6666	0.6666	0.6833	20.87	0.9684
62	0.7	0.7	0.7166	20.83	0.9669
63	0.7333	0.7333	0.75	20.8	0.9653
64	0.7666	0.7666	0.7833	20.77	0.9638
65	0.8	0.8	0.8166	20.73	0.9623
66	0.8333	0.8333	0.85	20.7	0.9607
67	0.8666	0.8666	0.8833	20.67	0.9592
68	0.9	0.9	0.9166	20.63	0.9576
69	0.9333	0.9333	0.95	20.6	0.9561
70	0.9666	0.9666	0.9833	20.57	0.9545
71	1.	1.	1.2	20.35	0.9445
72	1.4	1.4	1.6	19.95	0.9259
73	1.8	1.8	2.	19.55	0.9073
74	2.2	2.2	2.4	19.15	0.8888
75	2.6	2.6	2.8	18.75	0.8702
76	3.	3.	3.2	18.35	0.8516
77	3.4	3.4	3.6	17.95	0.8331
78	3.8	3.8	4.	17.55	0.8145
79	4.2	4.2	4.4	17.15	0.7959
80	4.6	4.6	4.8	16.75	0.7774
81	5.	5.	5.2	16.35	0.7588
82	5.4	5.4	5.6	15.95	0.7403
83	5.8	5.8	6.	15.55	0.7217
84	6.2	6.2	6.4	15.15	0.7031
85	6.6	6.6	6.8	14.75	0.6846
86	7.	7.	7.2	14.35	0.666
87	7.4	7.4	7.6	13.95	0.6474
88	7.8	7.8	8.	13.55	0.6289
89	8.2	8.2	8.4	13.15	0.6103
90	8.6	8.6	8.8	12.75	0.5917
91	9.	9.	9.2	12.35	0.5732

92	9.4	9.4	9.6	11.95	0.5546
93	9.8	9.8	10.	11.55	0.536
94	12.	12.	14.	7.55	0.3504
95	16.	16.	18.	3.55	0.1648
96	20.	20.	22.	-0.45	-2.088e-002
97	24.	24.	26.	-4.45	-0.2065
98	28.	28.	30.	-8.45	-0.3922
99	32.	32.	34.	-12.45	-0.5778


Field Hydraulic Conductivity Test May 25, 1999
Rutherford County Landfill
Hvorslev Graph
B-22 falling head
Time Lag = 1491 seconds
Shape Factor = 3.402
Partial Penetration Case A
Analysis starts at time 0. seconds
Analysis ends at time 28. minutes
98 Measurements analyzed from 1 to 98
Hydraulic Conductivity = 3.996e-005 cm/sec
Transmissivity = 5.664 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
Adjusted Time (minutes)
Time Lag
Analysis by Starpoint Software
Ho is 40.26 feet at 0. seconds


Field Hydraulic Conductivity Test May 25, 1999
Bouwer and Rice Graph
Rutherford County Landfill
B-22 falling head
Bouwer and Rice parameter A = 2.325
Bouwer and Rice parameter B = 0.4399
ln(Re/Rw) = 2.262302e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 28. minutes
98 Measurements analyzed from 1 to 98
Hydraulic Conductivity = 7.61e-005 cm/sec
Transmissivity = 10.79 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
25
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 40.26 feet at 0. seconds

Field Hydraulic Conductivity Test

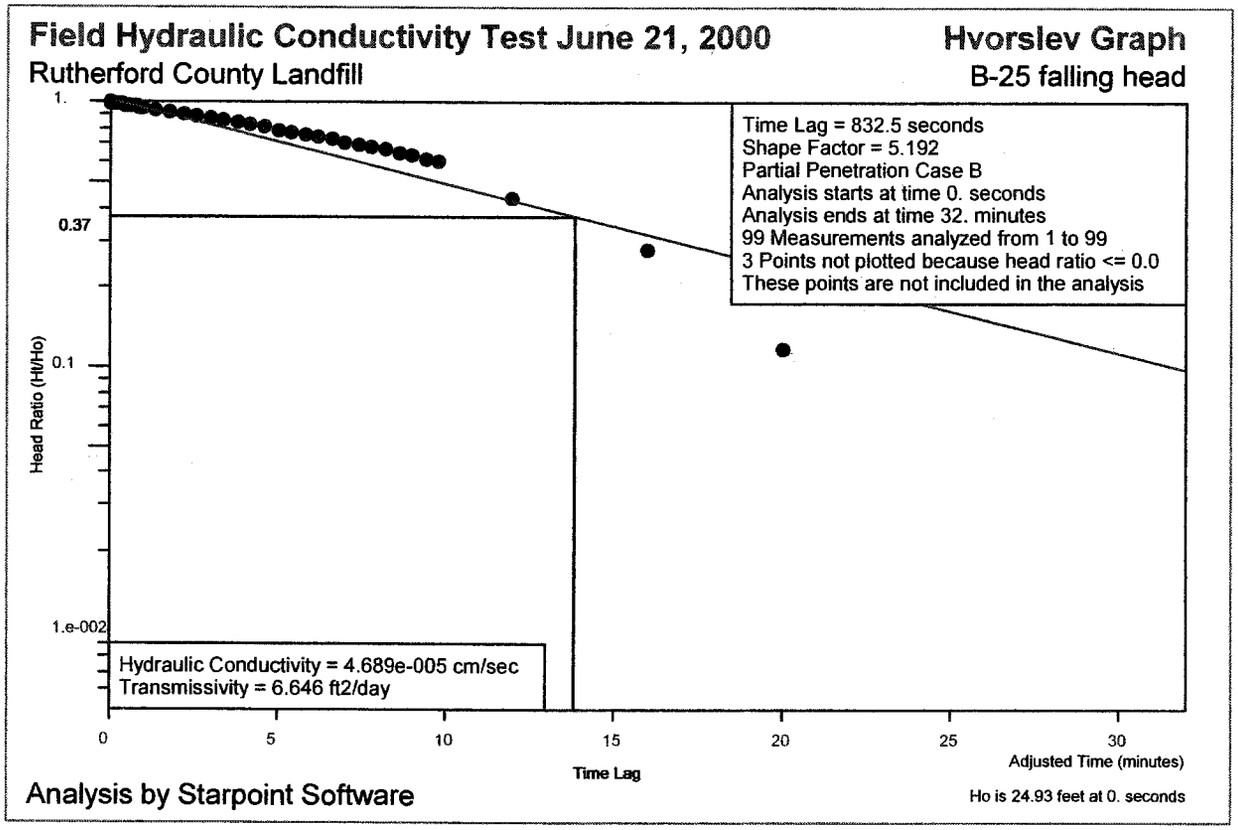
Site Name: Rutherford County Landfill
Test Date: May 25, 1999
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B22S0.TXT

Well Label: B-22 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 40.26 feet
Water Table to Screen Bottom: 7.2 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 98 time and drawdown measurements
Maximum head is 40.26 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	40.26	1.
2	6.6e-003	6.6e-003	1.e-002	40.25	0.9998
3	1.33e-002	1.33e-002	1.66e-002	40.24	0.9997
4	2.e-002	2.e-002	2.33e-002	40.24	0.9995
5	2.66e-002	2.66e-002	3.e-002	40.23	0.9993
6	3.33e-002	3.33e-002	3.66e-002	40.22	0.9992
7	4.e-002	4.e-002	4.33e-002	40.22	0.999
8	4.66e-002	4.66e-002	5.e-002	40.21	0.9988
9	5.33e-002	5.33e-002	5.66e-002	40.2	0.9987
10	6.e-002	6.e-002	6.33e-002	40.2	0.9985
11	6.66e-002	6.66e-002	7.e-002	40.19	0.9983
12	7.33e-002	7.33e-002	7.66e-002	40.18	0.9982
13	8.e-002	8.e-002	8.33e-002	40.18	0.998
14	8.66e-002	8.66e-002	9.e-002	40.17	0.9978
15	9.33e-002	9.33e-002	9.66e-002	40.16	0.9977
16	0.1	0.1	0.1033	40.16	0.9975
17	0.1066	0.1066	0.11	40.15	0.9973
18	0.1133	0.1133	0.1166	40.14	0.9972
19	0.12	0.12	0.1233	40.14	0.997
20	0.1266	0.1266	0.13	40.13	0.9969
21	0.1333	0.1333	0.1366	40.12	0.9967
22	0.14	0.14	0.1433	40.12	0.9965
23	0.1466	0.1466	0.15	40.11	0.9964
24	0.1533	0.1533	0.1566	40.1	0.9962
25	0.16	0.16	0.1633	40.1	0.996
26	0.1666	0.1666	0.17	40.09	0.9959
27	0.1733	0.1733	0.1766	40.08	0.9957
28	0.18	0.18	0.1833	40.08	0.9955
29	0.1866	0.1866	0.19	40.07	0.9954
30	0.1933	0.1933	0.1966	40.06	0.9952
31	0.2	0.2	0.2033	40.06	0.995
32	0.2066	0.2066	0.21	40.05	0.9949
33	0.2133	0.2133	0.2166	40.04	0.9947
34	0.22	0.22	0.2233	40.04	0.9945

35	0.2266	0.2266	0.23	40.03	0.9944
36	0.2333	0.2333	0.2366	40.02	0.9942
37	0.24	0.24	0.2433	40.02	0.994
38	0.2466	0.2466	0.25	40.01	0.9939
39	0.2533	0.2533	0.2566	40.	0.9937
40	0.26	0.26	0.2633	40.	0.9935
41	0.2666	0.2666	0.27	39.99	0.9934
42	0.2733	0.2733	0.2766	39.98	0.9932
43	0.28	0.28	0.2833	39.98	0.993
44	0.2866	0.2866	0.29	39.97	0.9929
45	0.2933	0.2933	0.2966	39.96	0.9927
46	0.3	0.3	0.3033	39.96	0.9925
47	0.3066	0.3066	0.31	39.95	0.9924
48	0.3133	0.3133	0.3166	39.94	0.9922
49	0.32	0.32	0.3233	39.94	0.9921
50	0.3266	0.3266	0.33	39.93	0.9919
51	0.3333	0.3333	0.35	39.91	0.9914
52	0.3666	0.3666	0.3833	39.88	0.9906
53	0.4	0.4	0.4166	39.84	0.9897
54	0.4333	0.4333	0.45	39.81	0.9889
55	0.4666	0.4666	0.4833	39.78	0.9881
56	0.5	0.5	0.5166	39.74	0.9872
57	0.5333	0.5333	0.55	39.71	0.9864
58	0.5666	0.5666	0.5833	39.68	0.9856
59	0.6	0.6	0.6166	39.64	0.9848
60	0.6333	0.6333	0.65	39.61	0.9839
61	0.6666	0.6666	0.6833	39.58	0.9831
62	0.7	0.7	0.7166	39.54	0.9823
63	0.7333	0.7333	0.75	39.51	0.9815
64	0.7666	0.7666	0.7833	39.48	0.9806
65	0.8	0.8	0.8166	39.44	0.9798
66	0.8333	0.8333	0.85	39.41	0.979
67	0.8666	0.8666	0.8833	39.38	0.9781
68	0.9	0.9	0.9166	39.34	0.9773
69	0.9333	0.9333	0.95	39.31	0.9765
70	0.9666	0.9666	0.9833	39.28	0.9757
71	1.	1.	1.2	39.06	0.9703
72	1.4	1.4	1.6	38.66	0.9603
73	1.8	1.8	2.	38.26	0.9504
74	2.2	2.2	2.4	37.86	0.9405
75	2.6	2.6	2.8	37.46	0.9305
76	3.	3.	3.2	37.06	0.9206
77	3.4	3.4	3.6	36.66	0.9107
78	3.8	3.8	4.	36.26	0.9007
79	4.2	4.2	4.4	35.86	0.8908
80	4.6	4.6	4.8	35.46	0.8808
81	5.	5.	5.2	35.06	0.8709
82	5.4	5.4	5.6	34.66	0.861
83	5.8	5.8	6.	34.26	0.851
84	6.2	6.2	6.4	33.86	0.8411
85	6.6	6.6	6.8	33.46	0.8312
86	7.	7.	7.2	33.06	0.8212
87	7.4	7.4	7.6	32.66	0.8113
88	7.8	7.8	8.	32.26	0.8014
89	8.2	8.2	8.4	31.86	0.7914
90	8.6	8.6	8.8	31.46	0.7815
91	9.	9.	9.2	31.06	0.7715

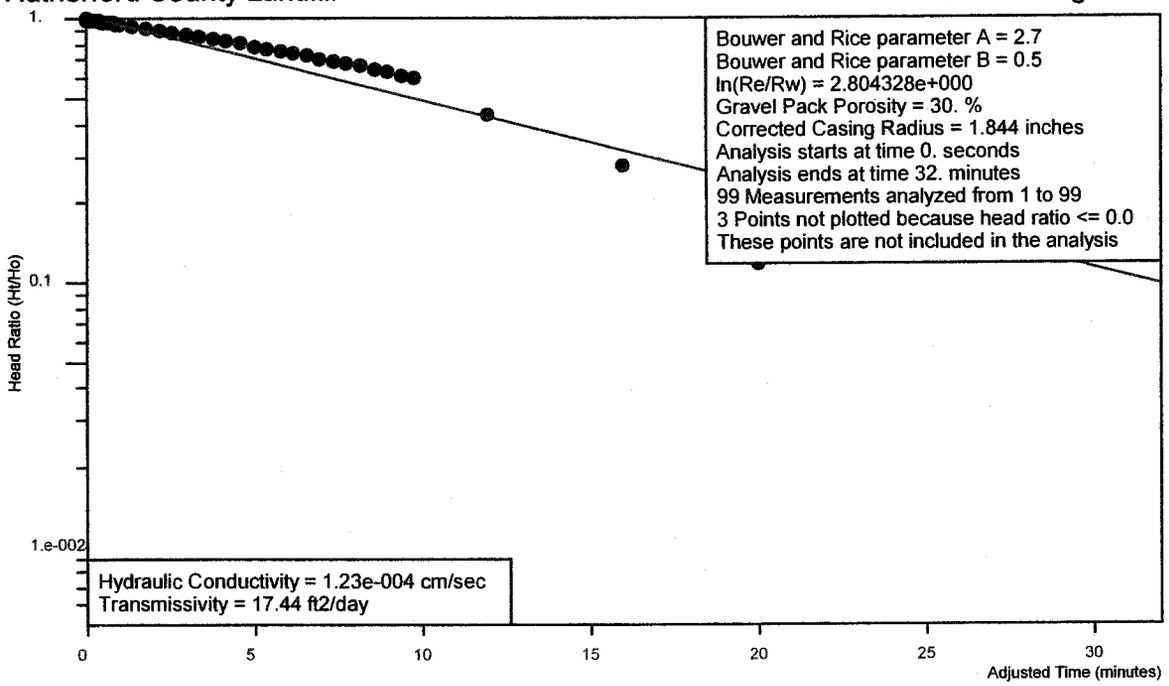
92	9.4	9.4	9.6	30.66	0.7616
93	9.8	9.8	10.	30.26	0.7517
94	12.	12.	14.	26.26	0.6523
95	16.	16.	18.	22.26	0.553
96	20.	20.	22.	18.26	0.4536
97	24.	24.	26.	14.26	0.3542
98	28.	28.	30.	10.26	0.2549


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-25 falling head
Time Lag = 832.5 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 32. minutes
99 Measurements analyzed from 1 to 99
3 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 4.689e-005 cm/sec
Transmissivity = 6.646 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 24.93 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000 Bouwer and Rice Graph

Rutherford County Landfill

B-25 falling head



Analysis by Starpoint Software

Ho is 24.93 feet at 0. seconds

Field Hydraulic Conductivity Test

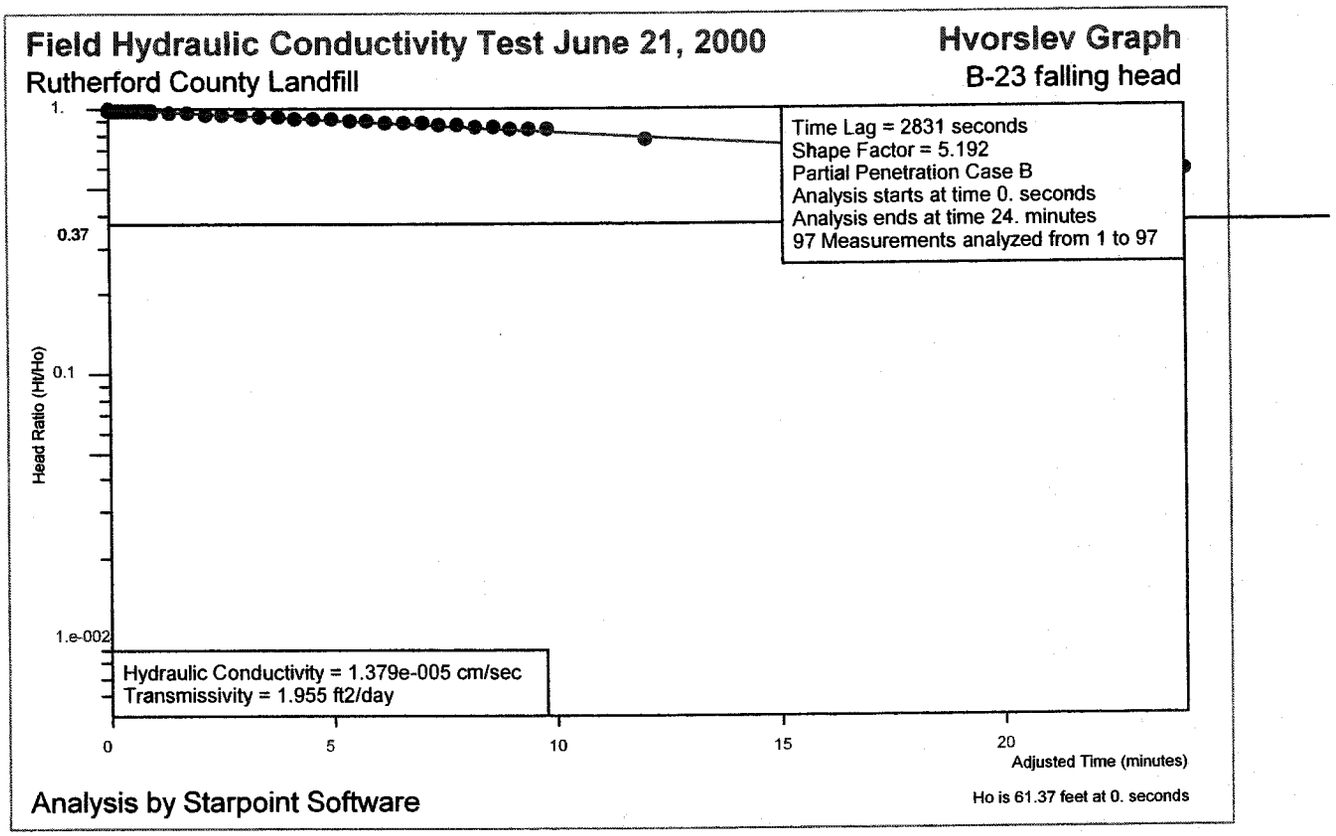
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B25S0

Well Label: B-25 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 24.93 feet
Water Table to Screen Bottom: 28. feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 99 time and drawdown measurements
Maximum head is 24.93 feet
Minimum head is -9.07 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	24.93	1.
2	6.6e-003	6.6e-003	1.e-002	24.92	0.9997
3	1.33e-002	1.33e-002	1.66e-002	24.91	0.9995
4	2.e-002	2.e-002	2.33e-002	24.91	0.9992
5	2.66e-002	2.66e-002	3.e-002	24.9	0.9989
6	3.33e-002	3.33e-002	3.66e-002	24.89	0.9987
7	4.e-002	4.e-002	4.33e-002	24.89	0.9984
8	4.66e-002	4.66e-002	5.e-002	24.88	0.9981
9	5.33e-002	5.33e-002	5.66e-002	24.87	0.9979
10	6.e-002	6.e-002	6.33e-002	24.87	0.9976
11	6.66e-002	6.66e-002	7.e-002	24.86	0.9973
12	7.33e-002	7.33e-002	7.66e-002	24.85	0.9971
13	8.e-002	8.e-002	8.33e-002	24.85	0.9968
14	8.66e-002	8.66e-002	9.e-002	24.84	0.9965
15	9.33e-002	9.33e-002	9.66e-002	24.83	0.9963
16	0.1	0.1	0.1033	24.83	0.996
17	0.1066	0.1066	0.11	24.82	0.9957
18	0.1133	0.1133	0.1166	24.81	0.9955
19	0.12	0.12	0.1233	24.81	0.9952
20	0.1266	0.1266	0.13	24.8	0.9949
21	0.1333	0.1333	0.1366	24.79	0.9947
22	0.14	0.14	0.1433	24.79	0.9944
23	0.1466	0.1466	0.15	24.78	0.9941
24	0.1533	0.1533	0.1566	24.77	0.9938
25	0.16	0.16	0.1633	24.77	0.9936
26	0.1666	0.1666	0.17	24.76	0.9933
27	0.1733	0.1733	0.1766	24.75	0.993
28	0.18	0.18	0.1833	24.75	0.9928
29	0.1866	0.1866	0.19	24.74	0.9925
30	0.1933	0.1933	0.1966	24.73	0.9922
31	0.2	0.2	0.2033	24.73	0.992
32	0.2066	0.2066	0.21	24.72	0.9917
33	0.2133	0.2133	0.2166	24.71	0.9914
34	0.22	0.22	0.2233	24.71	0.9912

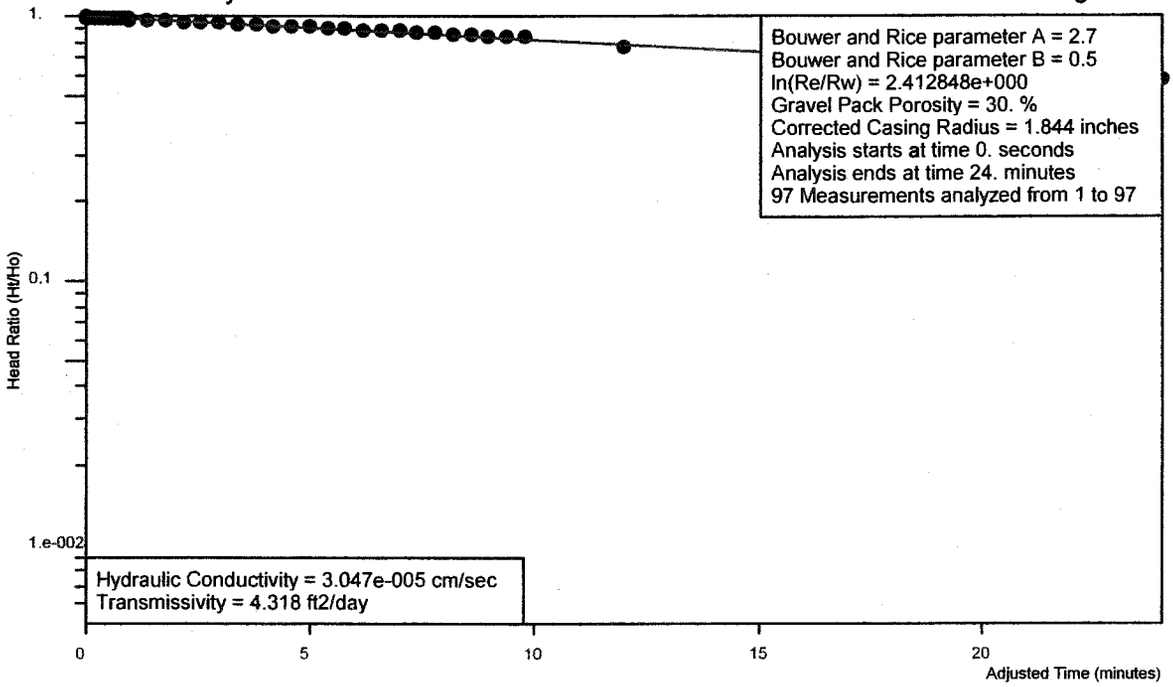
35	0.2266	0.2266	0.23	24.7	0.9909
36	0.2333	0.2333	0.2366	24.69	0.9906
37	0.24	0.24	0.2433	24.69	0.9904
38	0.2466	0.2466	0.25	24.68	0.9901
39	0.2533	0.2533	0.2566	24.67	0.9898
40	0.26	0.26	0.2633	24.67	0.9896
41	0.2666	0.2666	0.27	24.66	0.9893
42	0.2733	0.2733	0.2766	24.65	0.989
43	0.28	0.28	0.2833	24.65	0.9888
44	0.2866	0.2866	0.29	24.64	0.9885
45	0.2933	0.2933	0.2966	24.63	0.9882
46	0.3	0.3	0.3033	24.63	0.988
47	0.3066	0.3066	0.31	24.62	0.9877
48	0.3133	0.3133	0.3166	24.61	0.9874
49	0.32	0.32	0.3233	24.61	0.9872
50	0.3266	0.3266	0.33	24.6	0.9869
51	0.3333	0.3333	0.35	24.58	0.9861
52	0.3666	0.3666	0.3833	24.55	0.9848
53	0.4	0.4	0.4166	24.51	0.9834
54	0.4333	0.4333	0.45	24.48	0.9821
55	0.4666	0.4666	0.4833	24.45	0.9807
56	0.5	0.5	0.5166	24.41	0.9794
57	0.5333	0.5333	0.55	24.38	0.9781
58	0.5666	0.5666	0.5833	24.35	0.9767
59	0.6	0.6	0.6166	24.31	0.9754
60	0.6333	0.6333	0.65	24.28	0.9741
61	0.6666	0.6666	0.6833	24.25	0.9727
62	0.7	0.7	0.7166	24.21	0.9714
63	0.7333	0.7333	0.75	24.18	0.97
64	0.7666	0.7666	0.7833	24.15	0.9687
65	0.8	0.8	0.8166	24.11	0.9674
66	0.8333	0.8333	0.85	24.08	0.966
67	0.8666	0.8666	0.8833	24.05	0.9647
68	0.9	0.9	0.9166	24.01	0.9634
69	0.9333	0.9333	0.95	23.98	0.962
70	0.9666	0.9666	0.9833	23.95	0.9607
71	1.	1.	1.2	23.73	0.952
72	1.4	1.4	1.6	23.33	0.9359
73	1.8	1.8	2.	22.93	0.9199
74	2.2	2.2	2.4	22.53	0.9039
75	2.6	2.6	2.8	22.13	0.8878
76	3.	3.	3.2	21.73	0.8718
77	3.4	3.4	3.6	21.33	0.8557
78	3.8	3.8	4.	20.93	0.8397
79	4.2	4.2	4.4	20.53	0.8236
80	4.6	4.6	4.8	20.13	0.8076
81	5.	5.	5.2	19.73	0.7915
82	5.4	5.4	5.6	19.33	0.7755
83	5.8	5.8	6.	18.93	0.7594
84	6.2	6.2	6.4	18.53	0.7434
85	6.6	6.6	6.8	18.13	0.7273
86	7.	7.	7.2	17.73	0.7113
87	7.4	7.4	7.6	17.33	0.6952
88	7.8	7.8	8.	16.93	0.6792
89	8.2	8.2	8.4	16.53	0.6631
90	8.6	8.6	8.8	16.13	0.6471
91	9.	9.	9.2	15.73	0.6311

92	9.4	9.4	9.6	15.33	0.615
93	9.8	9.8	10.	14.93	0.599
94	12.	12.	14.	10.93	0.4385
95	16.	16.	18.	6.93	0.278
96	20.	20.	22.	2.93	0.1175
97	24.	24.	26.	-1.07	-4.293e-002
98	28.	28.	30.	-5.07	-0.2034
99	32.	32.	34.	-9.07	-0.3639


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-23 falling head
Time Lag = 2831 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
Hydraulic Conductivity = 1.379e-005 cm/sec
Transmissivity = 1.955 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 61.37 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000 — Bouwer and Rice Graph

Rutherford County Landfill — B-23 falling head



Analysis by Starpoint Software

Ho is 61.37 feet at 0. seconds

Field Hydraulic Conductivity Test

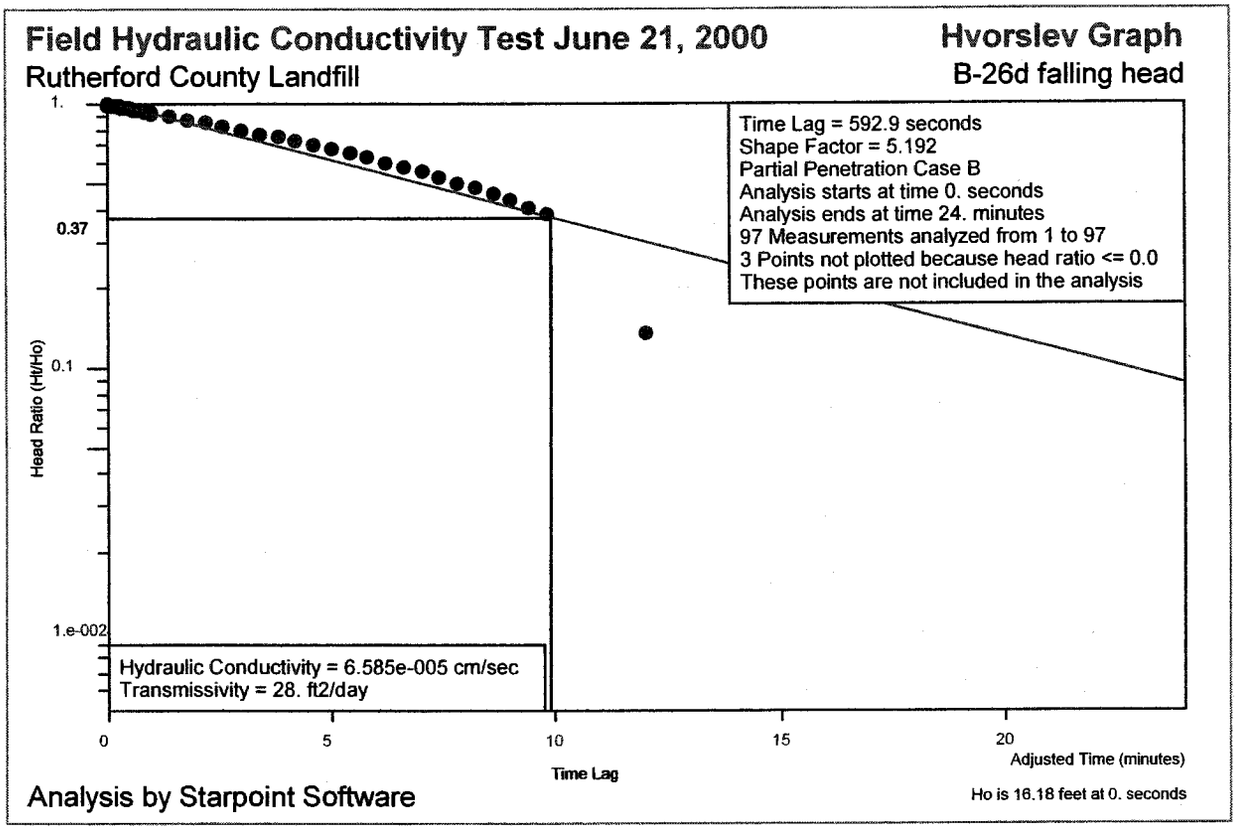
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B23S0

Well Label: B-23 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 61.37 feet
Water Table to Screen Bottom: 12. feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 97 time and drawdown measurements
Maximum head is 61.37 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	61.37	1.
2	6.6e-003	6.6e-003	1.e-002	61.36	0.9999
3	1.33e-002	1.33e-002	1.66e-002	61.35	0.9998
4	2.e-002	2.e-002	2.33e-002	61.35	0.9997
5	2.66e-002	2.66e-002	3.e-002	61.34	0.9996
6	3.33e-002	3.33e-002	3.66e-002	61.33	0.9995
7	4.e-002	4.e-002	4.33e-002	61.33	0.9993
8	4.66e-002	4.66e-002	5.e-002	61.32	0.9992
9	5.33e-002	5.33e-002	5.66e-002	61.31	0.9991
10	6.e-002	6.e-002	6.33e-002	61.31	0.999
11	6.66e-002	6.66e-002	7.e-002	61.3	0.9989
12	7.33e-002	7.33e-002	7.66e-002	61.29	0.9988
13	8.e-002	8.e-002	8.33e-002	61.29	0.9987
14	8.66e-002	8.66e-002	9.e-002	61.28	0.9986
15	9.33e-002	9.33e-002	9.66e-002	61.27	0.9985
16	0.1	0.1	0.1033	61.27	0.9984
17	0.1066	0.1066	0.11	61.26	0.9983
18	0.1133	0.1133	0.1166	61.25	0.9982
19	0.12	0.12	0.1233	61.25	0.998
20	0.1266	0.1266	0.13	61.24	0.9979
21	0.1333	0.1333	0.1366	61.23	0.9978
22	0.14	0.14	0.1433	61.23	0.9977
23	0.1466	0.1466	0.15	61.22	0.9976
24	0.1533	0.1533	0.1566	61.21	0.9975
25	0.16	0.16	0.1633	61.21	0.9974
26	0.1666	0.1666	0.17	61.2	0.9973
27	0.1733	0.1733	0.1766	61.19	0.9972
28	0.18	0.18	0.1833	61.19	0.9971
29	0.1866	0.1866	0.19	61.18	0.997
30	0.1933	0.1933	0.1966	61.17	0.9969
31	0.2	0.2	0.2033	61.17	0.9967
32	0.2066	0.2066	0.21	61.16	0.9966
33	0.2133	0.2133	0.2166	61.15	0.9965
34	0.22	0.22	0.2233	61.15	0.9964

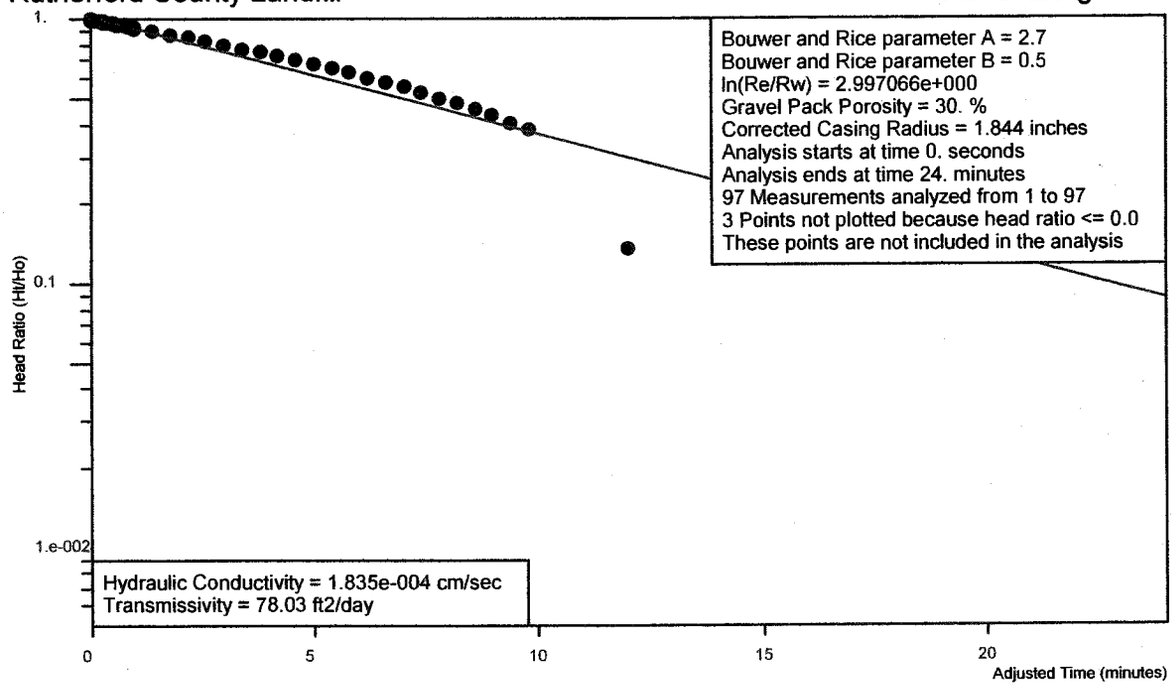
35	0.2266	0.2266	0.23	61.14	0.9963
36	0.2333	0.2333	0.2366	61.13	0.9962
37	0.24	0.24	0.2433	61.13	0.9961
38	0.2466	0.2466	0.25	61.12	0.996
39	0.2533	0.2533	0.2566	61.11	0.9959
40	0.26	0.26	0.2633	61.11	0.9958
41	0.2666	0.2666	0.27	61.1	0.9957
42	0.2733	0.2733	0.2766	61.09	0.9955
43	0.28	0.28	0.2833	61.09	0.9954
44	0.2866	0.2866	0.29	61.08	0.9953
45	0.2933	0.2933	0.2966	61.07	0.9952
46	0.3	0.3	0.3033	61.07	0.9951
47	0.3066	0.3066	0.31	61.06	0.995
48	0.3133	0.3133	0.3166	61.05	0.9949
49	0.32	0.32	0.3233	61.05	0.9948
50	0.3266	0.3266	0.33	61.04	0.9947
51	0.3333	0.3333	0.35	61.02	0.9944
52	0.3666	0.3666	0.3833	60.99	0.9938
53	0.4	0.4	0.4166	60.95	0.9933
54	0.4333	0.4333	0.45	60.92	0.9927
55	0.4666	0.4666	0.4833	60.89	0.9922
56	0.5	0.5	0.5166	60.85	0.9916
57	0.5333	0.5333	0.55	60.82	0.9911
58	0.5666	0.5666	0.5833	60.79	0.9905
59	0.6	0.6	0.6166	60.75	0.99
60	0.6333	0.6333	0.65	60.72	0.9895
61	0.6666	0.6666	0.6833	60.69	0.9889
62	0.7	0.7	0.7166	60.65	0.9884
63	0.7333	0.7333	0.75	60.62	0.9878
64	0.7666	0.7666	0.7833	60.59	0.9873
65	0.8	0.8	0.8166	60.55	0.9867
66	0.8333	0.8333	0.85	60.52	0.9862
67	0.8666	0.8666	0.8833	60.49	0.9857
68	0.9	0.9	0.9166	60.45	0.9851
69	0.9333	0.9333	0.95	60.42	0.9846
70	0.9666	0.9666	0.9833	60.39	0.984
71	1.	1.	1.2	60.17	0.9805
72	1.4	1.4	1.6	59.77	0.974
73	1.8	1.8	2.	59.37	0.9675
74	2.2	2.2	2.4	58.97	0.9609
75	2.6	2.6	2.8	58.57	0.9544
76	3.	3.	3.2	58.17	0.9479
77	3.4	3.4	3.6	57.77	0.9414
78	3.8	3.8	4.	57.37	0.9349
79	4.2	4.2	4.4	56.97	0.9284
80	4.6	4.6	4.8	56.57	0.9218
81	5.	5.	5.2	56.17	0.9153
82	5.4	5.4	5.6	55.77	0.9088
83	5.8	5.8	6.	55.37	0.9023
84	6.2	6.2	6.4	54.97	0.8958
85	6.6	6.6	6.8	54.57	0.8892
86	7.	7.	7.2	54.17	0.8827
87	7.4	7.4	7.6	53.77	0.8762
88	7.8	7.8	8.	53.37	0.8697
89	8.2	8.2	8.4	52.97	0.8632
90	8.6	8.6	8.8	52.57	0.8567
91	9.	9.	9.2	52.17	0.8501

92	9.4	9.4	9.6	51.77	0.8436
93	9.8	9.8	10.	51.37	0.8371
94	12.	12.	14.	47.37	0.7719
95	16.	16.	18.	43.37	0.7067
96	20.	20.	22.	39.37	0.6416
97	24.	24.	26.	35.37	0.5764


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-26d falling head
Time Lag = 592.9 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
3 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 6.585e-005 cm/sec
Transmissivity = 28. ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 16.18 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000 Bouwer and Rice Graph

Rutherford County Landfill B-26d falling head



Analysis by Starpoint Software

Ho is 16.18 feet at 0. seconds

Field Hydraulic Conductivity Test

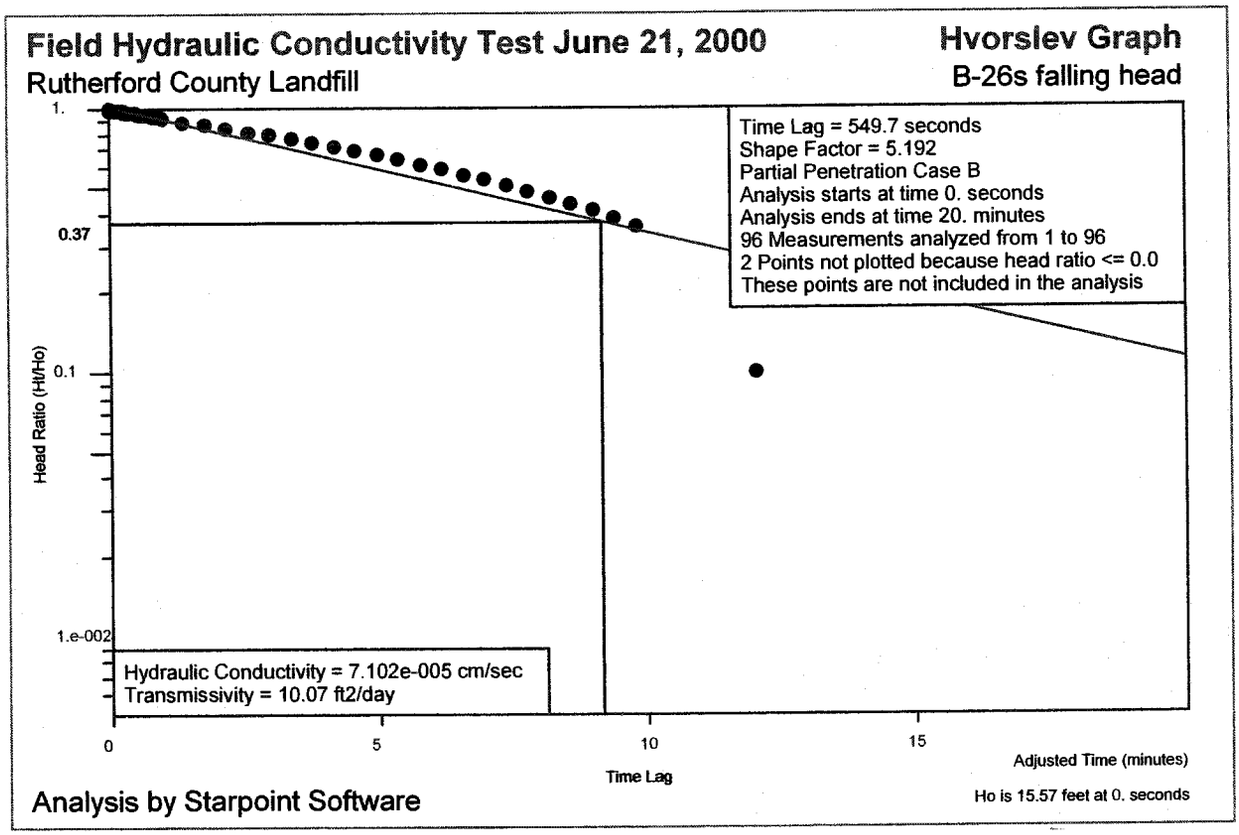
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B26DS0

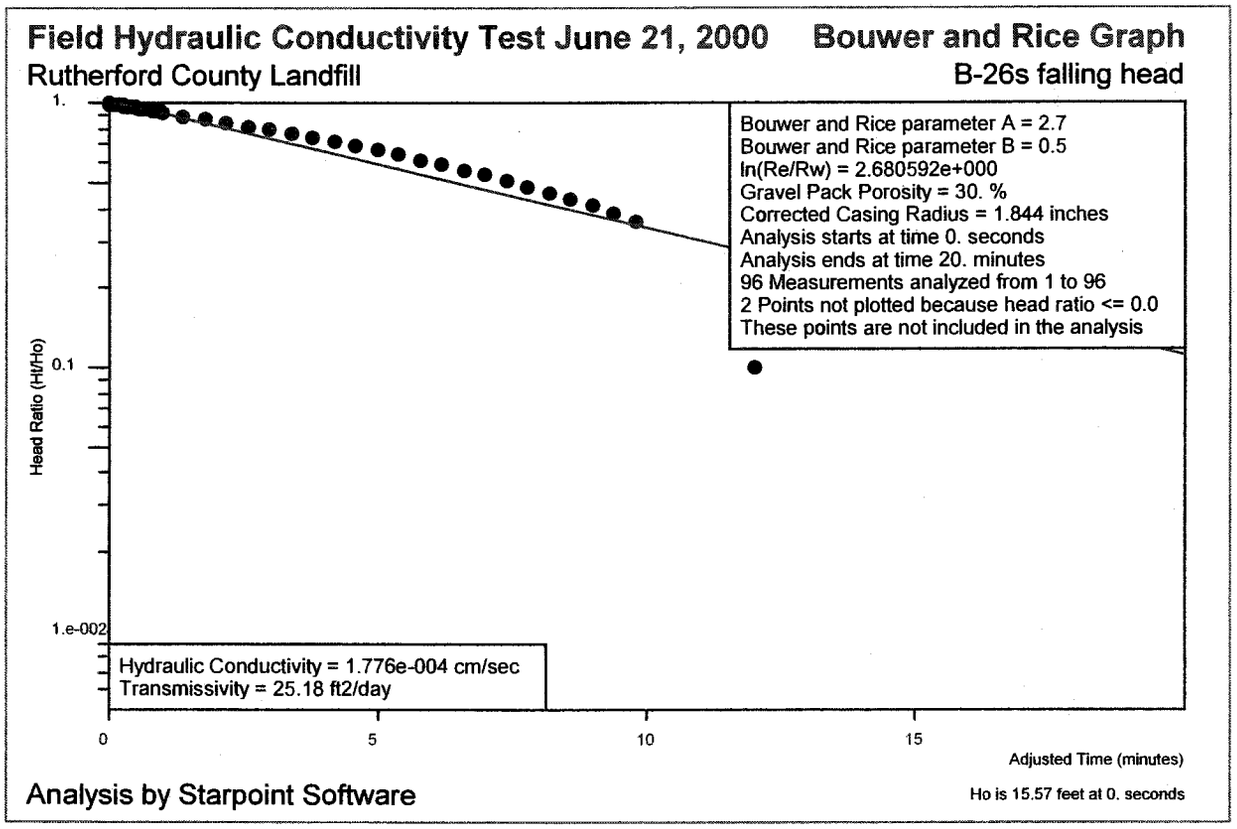
Well Label: B-26d falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 16.18 feet
Water Table to Screen Bottom: 71.8 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 97 time and drawdown measurements
Maximum head is 16.18 feet
Minimum head is -9.82 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	16.18	1.
2	6.6e-003	6.6e-003	1.e-002	16.17	0.9996
3	1.33e-002	1.33e-002	1.66e-002	16.16	0.9992
4	2.e-002	2.e-002	2.33e-002	16.16	0.9988
5	2.66e-002	2.66e-002	3.e-002	16.15	0.9983
6	3.33e-002	3.33e-002	3.66e-002	16.14	0.9979
7	4.e-002	4.e-002	4.33e-002	16.14	0.9975
8	4.66e-002	4.66e-002	5.e-002	16.13	0.9971
9	5.33e-002	5.33e-002	5.66e-002	16.12	0.9967
10	6.e-002	6.e-002	6.33e-002	16.12	0.9963
11	6.66e-002	6.66e-002	7.e-002	16.11	0.9959
12	7.33e-002	7.33e-002	7.66e-002	16.1	0.9955
13	8.e-002	8.e-002	8.33e-002	16.1	0.9951
14	8.66e-002	8.66e-002	9.e-002	16.09	0.9946
15	9.33e-002	9.33e-002	9.66e-002	16.08	0.9942
16	0.1	0.1	0.1033	16.08	0.9938
17	0.1066	0.1066	0.11	16.07	0.9934
18	0.1133	0.1133	0.1166	16.06	0.993
19	0.12	0.12	0.1233	16.06	0.9926
20	0.1266	0.1266	0.13	16.05	0.9922
21	0.1333	0.1333	0.1366	16.04	0.9918
22	0.14	0.14	0.1433	16.04	0.9913
23	0.1466	0.1466	0.15	16.03	0.9909
24	0.1533	0.1533	0.1566	16.02	0.9905
25	0.16	0.16	0.1633	16.02	0.9901
26	0.1666	0.1666	0.17	16.01	0.9897
27	0.1733	0.1733	0.1766	16.	0.9893
28	0.18	0.18	0.1833	16.	0.9889
29	0.1866	0.1866	0.19	15.99	0.9885
30	0.1933	0.1933	0.1966	15.98	0.9881
31	0.2	0.2	0.2033	15.98	0.9876
32	0.2066	0.2066	0.21	15.97	0.9872
33	0.2133	0.2133	0.2166	15.96	0.9868
34	0.22	0.22	0.2233	15.96	0.9864

35	0.2266	0.2266	0.23	15.95	0.986
36	0.2333	0.2333	0.2366	15.94	0.9856
37	0.24	0.24	0.2433	15.94	0.9852
38	0.2466	0.2466	0.25	15.93	0.9847
39	0.2533	0.2533	0.2566	15.92	0.9843
40	0.26	0.26	0.2633	15.92	0.9839
41	0.2666	0.2666	0.27	15.91	0.9835
42	0.2733	0.2733	0.2766	15.9	0.9831
43	0.28	0.28	0.2833	15.9	0.9827
44	0.2866	0.2866	0.29	15.89	0.9823
45	0.2933	0.2933	0.2966	15.88	0.9819
46	0.3	0.3	0.3033	15.88	0.9815
47	0.3066	0.3066	0.31	15.87	0.981
48	0.3133	0.3133	0.3166	15.86	0.9806
49	0.32	0.32	0.3233	15.86	0.9802
50	0.3266	0.3266	0.33	15.85	0.9798
51	0.3333	0.3333	0.35	15.83	0.9786
52	0.3666	0.3666	0.3833	15.8	0.9765
53	0.4	0.4	0.4166	15.76	0.9745
54	0.4333	0.4333	0.45	15.73	0.9724
55	0.4666	0.4666	0.4833	15.7	0.9703
56	0.5	0.5	0.5166	15.66	0.9683
57	0.5333	0.5333	0.55	15.63	0.9662
58	0.5666	0.5666	0.5833	15.6	0.9641
59	0.6	0.6	0.6166	15.56	0.9621
60	0.6333	0.6333	0.65	15.53	0.96
61	0.6666	0.6666	0.6833	15.5	0.958
62	0.7	0.7	0.7166	15.46	0.9559
63	0.7333	0.7333	0.75	15.43	0.9538
64	0.7666	0.7666	0.7833	15.4	0.9518
65	0.8	0.8	0.8166	15.36	0.9497
66	0.8333	0.8333	0.85	15.33	0.9477
67	0.8666	0.8666	0.8833	15.3	0.9456
68	0.9	0.9	0.9166	15.26	0.9435
69	0.9333	0.9333	0.95	15.23	0.9415
70	0.9666	0.9666	0.9833	15.2	0.9394
71	1.	1.	1.2	14.98	0.926
72	1.4	1.4	1.6	14.58	0.9013
73	1.8	1.8	2.	14.18	0.8766
74	2.2	2.2	2.4	13.78	0.8518
75	2.6	2.6	2.8	13.38	0.8271
76	3.	3.	3.2	12.98	0.8024
77	3.4	3.4	3.6	12.58	0.7777
78	3.8	3.8	4.	12.18	0.7529
79	4.2	4.2	4.4	11.78	0.7282
80	4.6	4.6	4.8	11.38	0.7035
81	5.	5.	5.2	10.98	0.6788
82	5.4	5.4	5.6	10.58	0.654
83	5.8	5.8	6.	10.18	0.6293
84	6.2	6.2	6.4	9.78	0.6046
85	6.6	6.6	6.8	9.38	0.5798
86	7.	7.	7.2	8.98	0.5551
87	7.4	7.4	7.6	8.58	0.5304
88	7.8	7.8	8.	8.18	0.5057
89	8.2	8.2	8.4	7.78	0.4809
90	8.6	8.6	8.8	7.38	0.4562
91	9.	9.	9.2	6.98	0.4315

92	9.4	9.4	9.6	6.58	0.4068
93	9.8	9.8	10.	6.18	0.382
94	12.	12.	14.	2.18	0.1348
95	16.	16.	18.	-1.82	-0.1125
96	20.	20.	22.	-5.82	-0.3598
97	24.	24.	26.	-9.82	-0.607


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-26s falling head
Time Lag = 549.7 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 20. minutes
96 Measurements analyzed from 1 to 96
2 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 7.102e-005 cm/sec
Transmissivity = 10.07 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
Time Lag
Adjusted Time (minutes)
Ho is 15.57 feet at 0. seconds
Analysis by Starpoint Software


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-26s falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.680592e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 20. minutes
96 Measurements analyzed from 1 to 96
2 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 1.776e-004 cm/sec
Transmissivity = 25.18 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 15.57 feet at 0. seconds

Field Hydraulic Conductivity Test

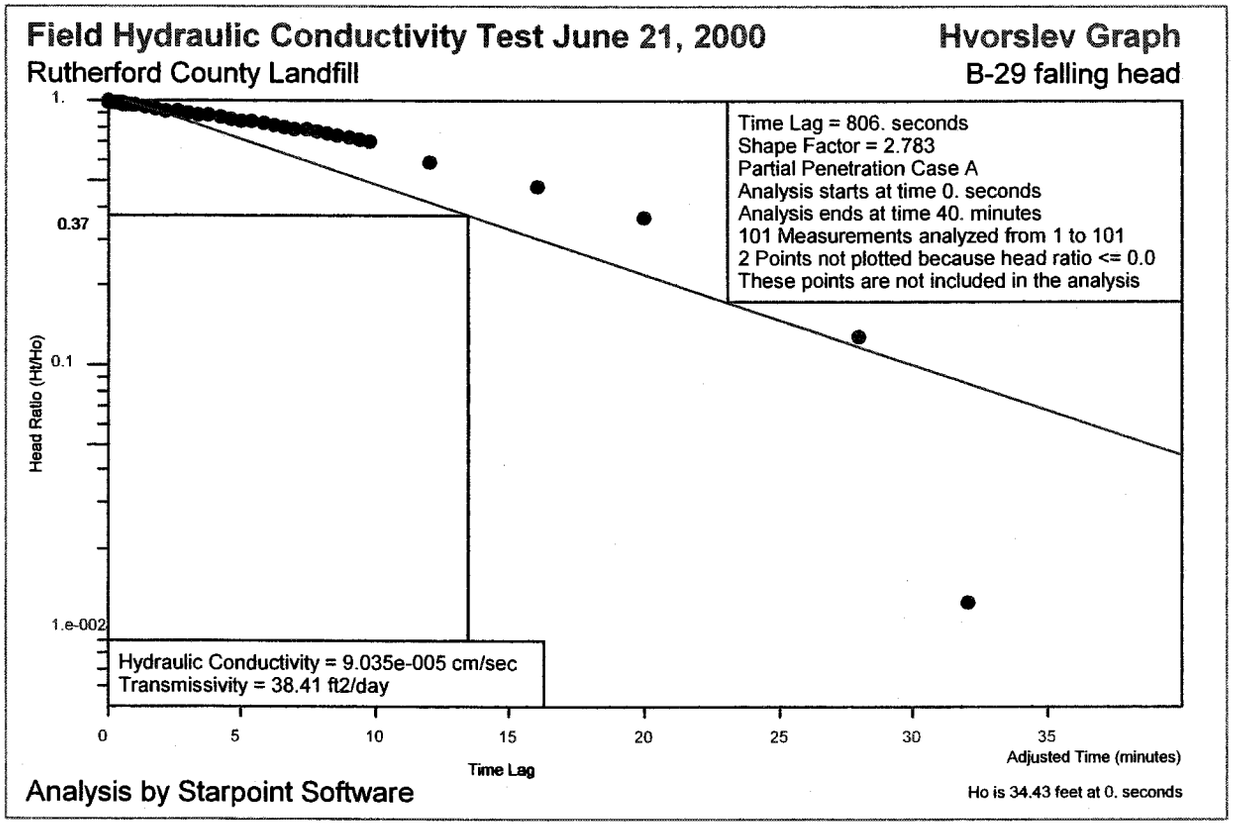
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B26SS0

Well Label: B-26s falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 15.57 feet
Water Table to Screen Bottom: 21.7 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 96 time and drawdown measurements
Maximum head is 15.57 feet
Minimum head is -6.43 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	15.57	1.
2	6.6e-003	6.6e-003	1.e-002	15.56	0.9996
3	1.33e-002	1.33e-002	1.66e-002	15.55	0.9991
4	2.e-002	2.e-002	2.33e-002	15.55	0.9987
5	2.66e-002	2.66e-002	3.e-002	15.54	0.9983
6	3.33e-002	3.33e-002	3.66e-002	15.53	0.9979
7	4.e-002	4.e-002	4.33e-002	15.53	0.9974
8	4.66e-002	4.66e-002	5.e-002	15.52	0.997
9	5.33e-002	5.33e-002	5.66e-002	15.51	0.9966
10	6.e-002	6.e-002	6.33e-002	15.51	0.9961
11	6.66e-002	6.66e-002	7.e-002	15.5	0.9957
12	7.33e-002	7.33e-002	7.66e-002	15.49	0.9953
13	8.e-002	8.e-002	8.33e-002	15.49	0.9949
14	8.66e-002	8.66e-002	9.e-002	15.48	0.9944
15	9.33e-002	9.33e-002	9.66e-002	15.47	0.994
16	0.1	0.1	0.1033	15.47	0.9936
17	0.1066	0.1066	0.11	15.46	0.9931
18	0.1133	0.1133	0.1166	15.45	0.9927
19	0.12	0.12	0.1233	15.45	0.9923
20	0.1266	0.1266	0.13	15.44	0.9919
21	0.1333	0.1333	0.1366	15.43	0.9914
22	0.14	0.14	0.1433	15.43	0.991
23	0.1466	0.1466	0.15	15.42	0.9906
24	0.1533	0.1533	0.1566	15.41	0.9902
25	0.16	0.16	0.1633	15.41	0.9897
26	0.1666	0.1666	0.17	15.4	0.9893
27	0.1733	0.1733	0.1766	15.39	0.9889
28	0.18	0.18	0.1833	15.39	0.9884
29	0.1866	0.1866	0.19	15.38	0.988
30	0.1933	0.1933	0.1966	15.37	0.9876
31	0.2	0.2	0.2033	15.37	0.9872
32	0.2066	0.2066	0.21	15.36	0.9867
33	0.2133	0.2133	0.2166	15.35	0.9863
34	0.22	0.22	0.2233	15.35	0.9859

35	0.2266	0.2266	0.23	15.34	0.9854
36	0.2333	0.2333	0.2366	15.33	0.985
37	0.24	0.24	0.2433	15.33	0.9846
38	0.2466	0.2466	0.25	15.32	0.9842
39	0.2533	0.2533	0.2566	15.31	0.9837
40	0.26	0.26	0.2633	15.31	0.9833
41	0.2666	0.2666	0.27	15.3	0.9829
42	0.2733	0.2733	0.2766	15.29	0.9824
43	0.28	0.28	0.2833	15.29	0.982
44	0.2866	0.2866	0.29	15.28	0.9816
45	0.2933	0.2933	0.2966	15.27	0.9812
46	0.3	0.3	0.3033	15.27	0.9807
47	0.3066	0.3066	0.31	15.26	0.9803
48	0.3133	0.3133	0.3166	15.25	0.9799
49	0.32	0.32	0.3233	15.25	0.9794
50	0.3266	0.3266	0.33	15.24	0.979
51	0.3333	0.3333	0.35	15.22	0.9777
52	0.3666	0.3666	0.3833	15.19	0.9756
53	0.4	0.4	0.4166	15.15	0.9734
54	0.4333	0.4333	0.45	15.12	0.9713
55	0.4666	0.4666	0.4833	15.09	0.9692
56	0.5	0.5	0.5166	15.05	0.967
57	0.5333	0.5333	0.55	15.02	0.9649
58	0.5666	0.5666	0.5833	14.99	0.9627
59	0.6	0.6	0.6166	14.95	0.9606
60	0.6333	0.6333	0.65	14.92	0.9585
61	0.6666	0.6666	0.6833	14.89	0.9563
62	0.7	0.7	0.7166	14.85	0.9542
63	0.7333	0.7333	0.75	14.82	0.952
64	0.7666	0.7666	0.7833	14.79	0.9499
65	0.8	0.8	0.8166	14.75	0.9478
66	0.8333	0.8333	0.85	14.72	0.9456
67	0.8666	0.8666	0.8833	14.69	0.9435
68	0.9	0.9	0.9166	14.65	0.9413
69	0.9333	0.9333	0.95	14.62	0.9392
70	0.9666	0.9666	0.9833	14.59	0.937
71	1.	1.	1.2	14.37	0.9231
72	1.4	1.4	1.6	13.97	0.8974
73	1.8	1.8	2.	13.57	0.8717
74	2.2	2.2	2.4	13.17	0.846
75	2.6	2.6	2.8	12.77	0.8203
76	3.	3.	3.2	12.37	0.7946
77	3.4	3.4	3.6	11.97	0.7689
78	3.8	3.8	4.	11.57	0.7433
79	4.2	4.2	4.4	11.17	0.7176
80	4.6	4.6	4.8	10.77	0.6919
81	5.	5.	5.2	10.37	0.6662
82	5.4	5.4	5.6	9.97	0.6405
83	5.8	5.8	6.	9.57	0.6148
84	6.2	6.2	6.4	9.17	0.5891
85	6.6	6.6	6.8	8.77	0.5634
86	7.	7.	7.2	8.37	0.5377
87	7.4	7.4	7.6	7.97	0.512
88	7.8	7.8	8.	7.57	0.4863
89	8.2	8.2	8.4	7.17	0.4606
90	8.6	8.6	8.8	6.77	0.4349
91	9.	9.	9.2	6.37	0.4092

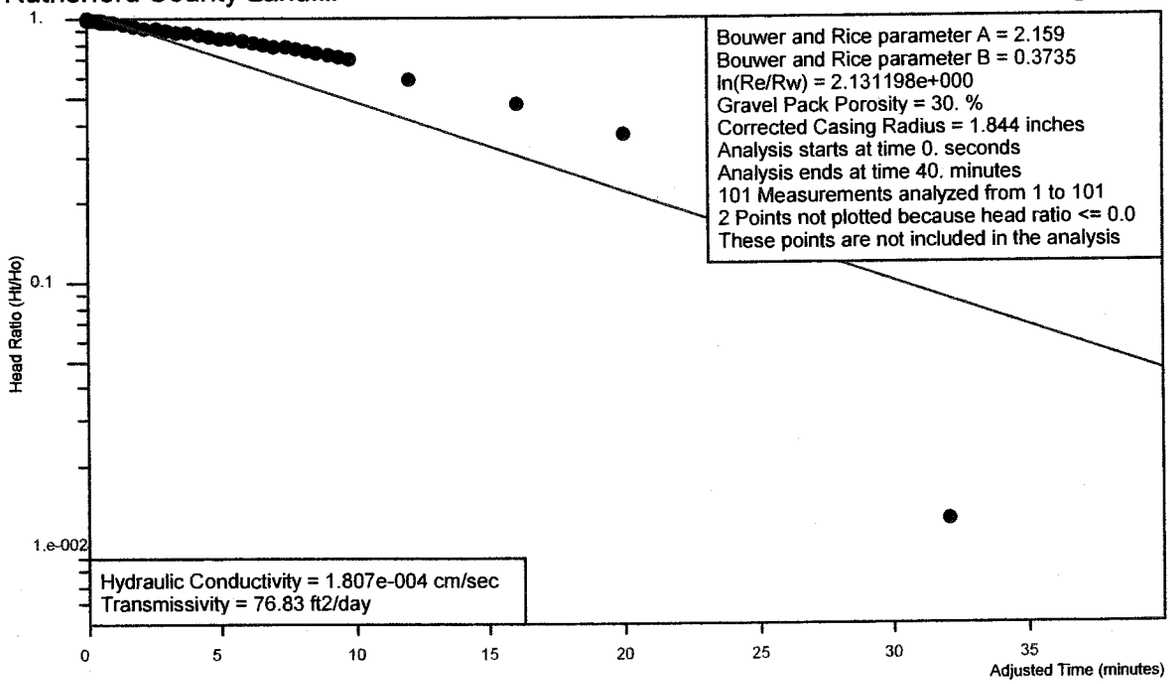
92	9.4	9.4	9.6	5.97	0.3835
93	9.8	9.8	10.	5.57	0.3578
94	12.	12.	14.	1.57	0.1009
95	16.	16.	18.	-2.43	-0.1561
96	20.	20.	22.	-6.43	-0.4131


Field Hydraulic Conductivity Test June 21, 2000
Hvorslev Graph
Rutherford County Landfill
B-29 falling head
Time Lag = 806. seconds
Shape Factor = 2.783
Partial Penetration Case A
Analysis starts at time 0. seconds
Analysis ends at time 40. minutes
101 Measurements analyzed from 1 to 101
2 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 9.035e-005 cm/sec
Transmissivity = 38.41 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
35
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 34.43 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000 Bouwer and Rice Graph

Rutherford County Landfill

B-29 falling head



Analysis by Starpoint Software

Ho is 34.43 feet at 0. seconds

Field Hydraulic Conductivity Test

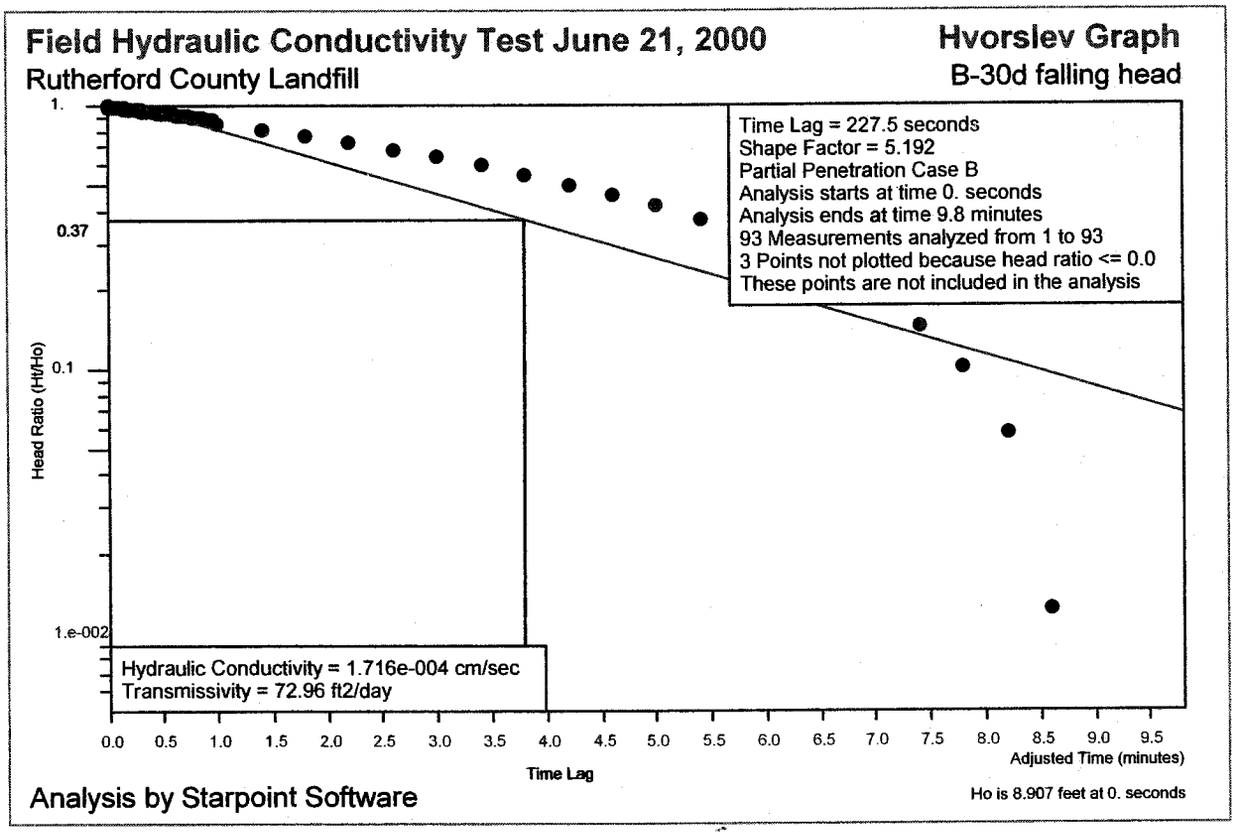
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B29S0

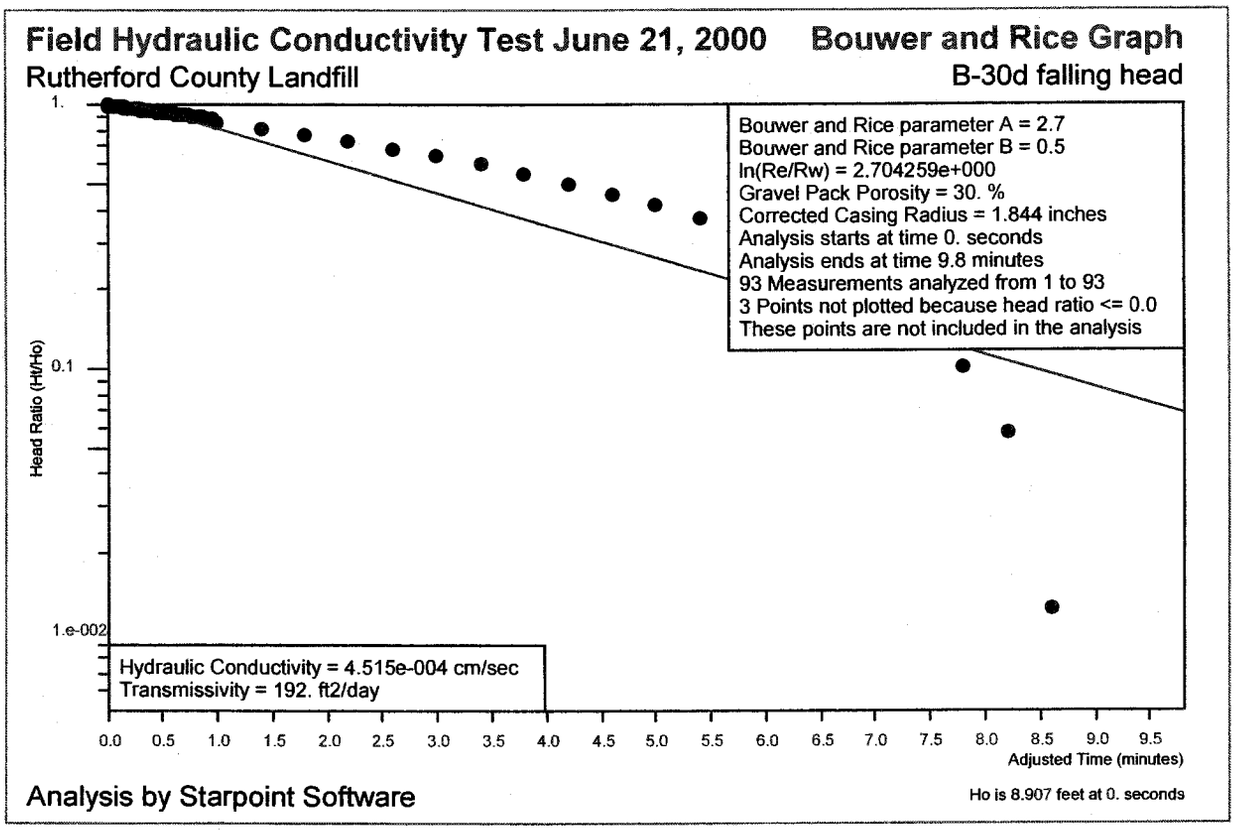
Well Label: B-29 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 34.43 feet
Water Table to Screen Bottom: 5.5 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 101 time and drawdown measurements
Maximum head is 34.43 feet
Minimum head is -7.57 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	34.43	1.
2	6.6e-003	6.6e-003	1.e-002	34.42	0.9998
3	1.33e-002	1.33e-002	1.66e-002	34.41	0.9996
4	2.e-002	2.e-002	2.33e-002	34.41	0.9994
5	2.66e-002	2.66e-002	3.e-002	34.4	0.9992
6	3.33e-002	3.33e-002	3.66e-002	34.39	0.999
7	4.e-002	4.e-002	4.33e-002	34.39	0.9988
8	4.66e-002	4.66e-002	5.e-002	34.38	0.9986
9	5.33e-002	5.33e-002	5.66e-002	34.37	0.9985
10	6.e-002	6.e-002	6.33e-002	34.37	0.9983
11	6.66e-002	6.66e-002	7.e-002	34.36	0.9981
12	7.33e-002	7.33e-002	7.66e-002	34.35	0.9979
13	8.e-002	8.e-002	8.33e-002	34.35	0.9977
14	8.66e-002	8.66e-002	9.e-002	34.34	0.9975
15	9.33e-002	9.33e-002	9.66e-002	34.33	0.9973
16	0.1	0.1	0.1033	34.33	0.9971
17	0.1066	0.1066	0.11	34.32	0.9969
18	0.1133	0.1133	0.1166	34.31	0.9967
19	0.12	0.12	0.1233	34.31	0.9965
20	0.1266	0.1266	0.13	34.3	0.9963
21	0.1333	0.1333	0.1366	34.29	0.9961
22	0.14	0.14	0.1433	34.29	0.9959
23	0.1466	0.1466	0.15	34.28	0.9957
24	0.1533	0.1533	0.1566	34.27	0.9955
25	0.16	0.16	0.1633	34.27	0.9954
26	0.1666	0.1666	0.17	34.26	0.9952
27	0.1733	0.1733	0.1766	34.25	0.995
28	0.18	0.18	0.1833	34.25	0.9948
29	0.1866	0.1866	0.19	34.24	0.9946
30	0.1933	0.1933	0.1966	34.23	0.9944
31	0.2	0.2	0.2033	34.23	0.9942
32	0.2066	0.2066	0.21	34.22	0.994
33	0.2133	0.2133	0.2166	34.21	0.9938
34	0.22	0.22	0.2233	34.21	0.9936

35	0.2266	0.2266	0.23	34.2	0.9934
36	0.2333	0.2333	0.2366	34.19	0.9932
37	0.24	0.24	0.2433	34.19	0.993
38	0.2466	0.2466	0.25	34.18	0.9928
39	0.2533	0.2533	0.2566	34.17	0.9926
40	0.26	0.26	0.2633	34.17	0.9924
41	0.2666	0.2666	0.27	34.16	0.9923
42	0.2733	0.2733	0.2766	34.15	0.9921
43	0.28	0.28	0.2833	34.15	0.9919
44	0.2866	0.2866	0.29	34.14	0.9917
45	0.2933	0.2933	0.2966	34.13	0.9915
46	0.3	0.3	0.3033	34.13	0.9913
47	0.3066	0.3066	0.31	34.12	0.9911
48	0.3133	0.3133	0.3166	34.11	0.9909
49	0.32	0.32	0.3233	34.11	0.9907
50	0.3266	0.3266	0.33	34.1	0.9905
51	0.3333	0.3333	0.35	34.08	0.9899
52	0.3666	0.3666	0.3833	34.05	0.989
53	0.4	0.4	0.4166	34.01	0.988
54	0.4333	0.4333	0.45	33.98	0.987
55	0.4666	0.4666	0.4833	33.95	0.9861
56	0.5	0.5	0.5166	33.91	0.9851
57	0.5333	0.5333	0.55	33.88	0.9841
58	0.5666	0.5666	0.5833	33.85	0.9832
59	0.6	0.6	0.6166	33.81	0.9822
60	0.6333	0.6333	0.65	33.78	0.9812
61	0.6666	0.6666	0.6833	33.75	0.9802
62	0.7	0.7	0.7166	33.71	0.9793
63	0.7333	0.7333	0.75	33.68	0.9783
64	0.7666	0.7666	0.7833	33.65	0.9773
65	0.8	0.8	0.8166	33.61	0.9764
66	0.8333	0.8333	0.85	33.58	0.9754
67	0.8666	0.8666	0.8833	33.55	0.9744
68	0.9	0.9	0.9166	33.51	0.9735
69	0.9333	0.9333	0.95	33.48	0.9725
70	0.9666	0.9666	0.9833	33.45	0.9715
71	1.	1.	1.2	33.23	0.9652
72	1.4	1.4	1.6	32.83	0.9536
73	1.8	1.8	2.	32.43	0.942
74	2.2	2.2	2.4	32.03	0.9304
75	2.6	2.6	2.8	31.63	0.9188
76	3.	3.	3.2	31.23	0.9071
77	3.4	3.4	3.6	30.83	0.8955
78	3.8	3.8	4.	30.43	0.8839
79	4.2	4.2	4.4	30.03	0.8723
80	4.6	4.6	4.8	29.63	0.8607
81	5.	5.	5.2	29.23	0.8491
82	5.4	5.4	5.6	28.83	0.8374
83	5.8	5.8	6.	28.43	0.8258
84	6.2	6.2	6.4	28.03	0.8142
85	6.6	6.6	6.8	27.63	0.8026
86	7.	7.	7.2	27.23	0.791
87	7.4	7.4	7.6	26.83	0.7793
88	7.8	7.8	8.	26.43	0.7677
89	8.2	8.2	8.4	26.03	0.7561
90	8.6	8.6	8.8	25.63	0.7445
91	9.	9.	9.2	25.23	0.7329

92	9.4	9.4	9.6	24.83	0.7212
93	9.8	9.8	10.	24.43	0.7096
94	12.	12.	14.	20.43	0.5934
95	16.	16.	18.	16.43	0.4772
96	20.	20.	22.	12.43	0.3611
97	24.	24.	26.	8.43	0.2449
98	28.	28.	30.	4.43	0.1287
99	32.	32.	34.	0.43	1.249e-002
100	36.	36.	38.	-3.57	-0.1037
101	40.	40.	42.	-7.57	-0.2199


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-30d falling head
Time Lag = 227.5 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
3 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 1.716e-004 cm/sec
Transmissivity = 72.96 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Time Lag
Analysis by Starpoint Software
Ho is 8.907 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-30d falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.704259e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
3 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 4.515e-004 cm/sec
Transmissivity = 192. ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 8.907 feet at 0. seconds

Field Hydraulic Conductivity Test

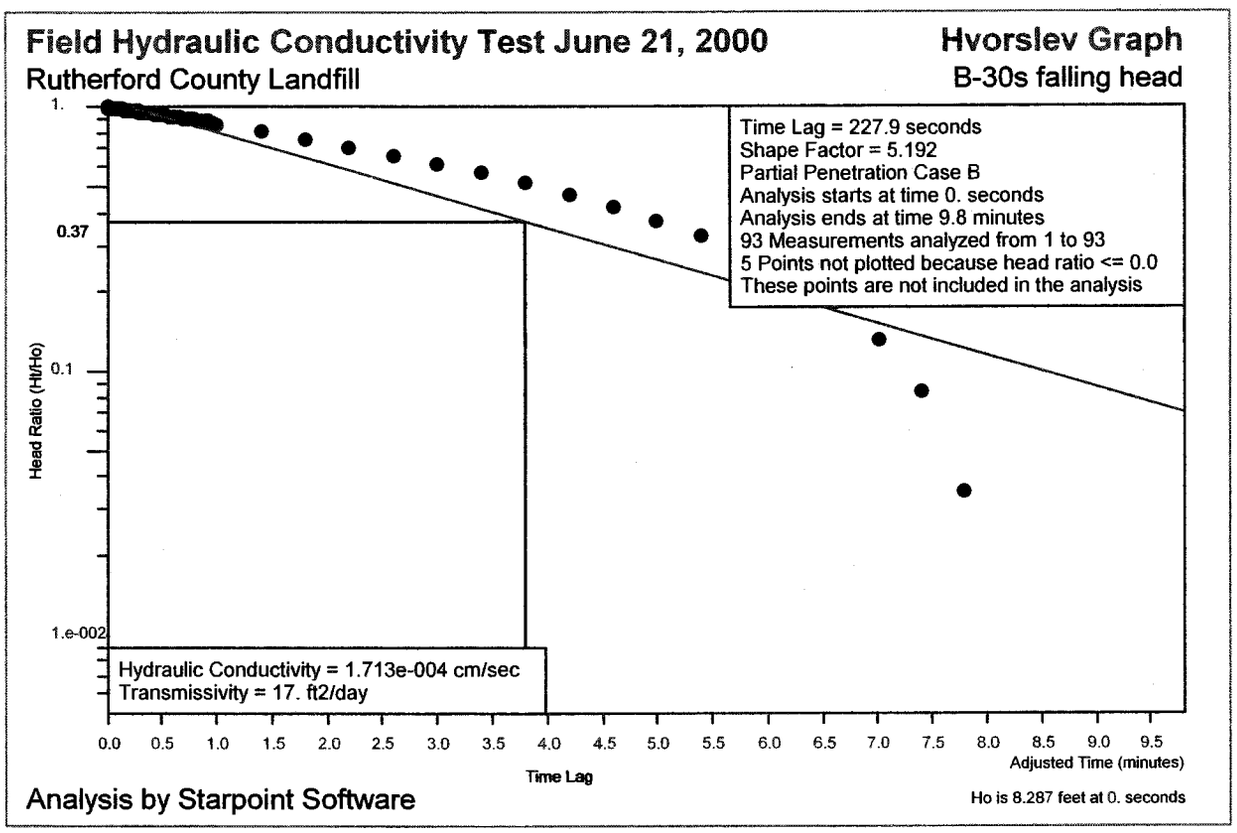
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B30DS0

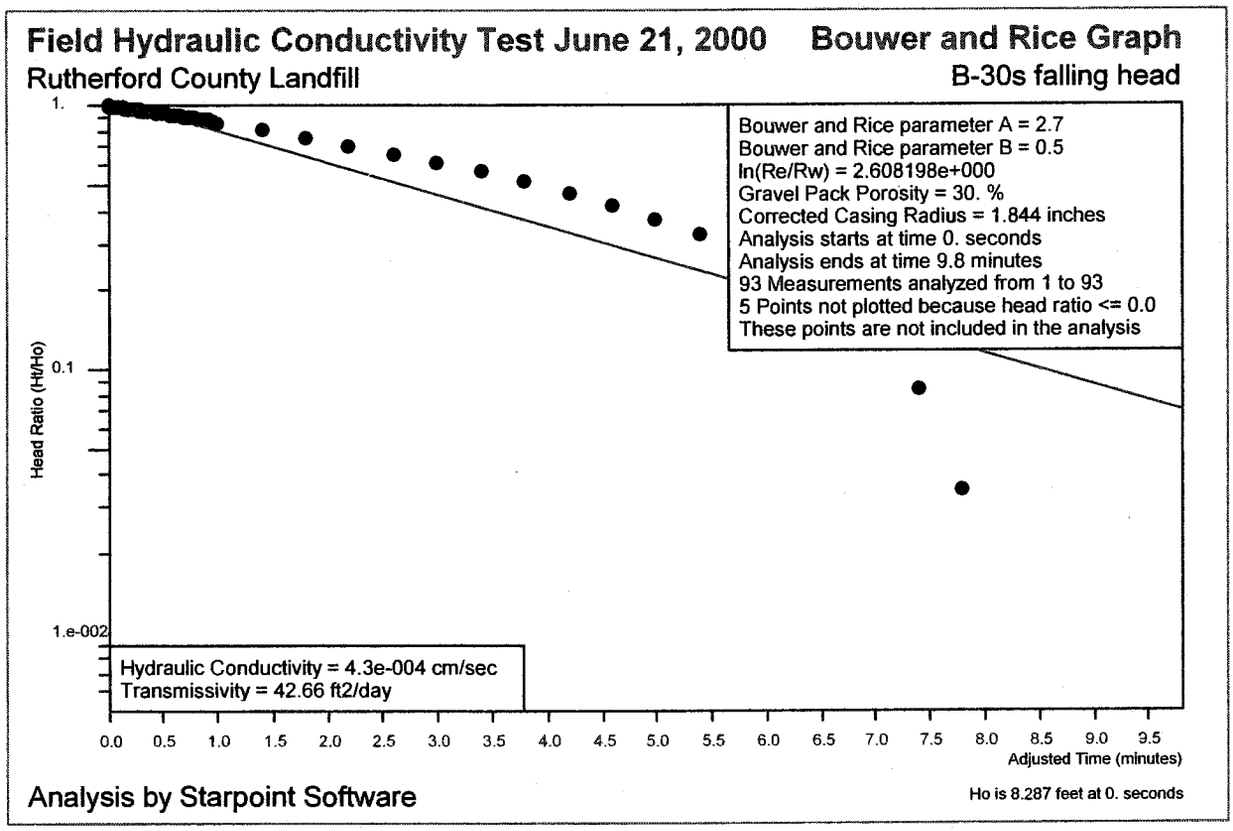
Well Label: B-30d falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 8.91 feet
Water Table to Screen Bottom: 32.9 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 93 time and drawdown measurements
Maximum head is 8.907 feet
Minimum head is -1.09 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	8.907	1.
2	6.6e-003	6.6e-003	1.e-002	8.9	0.9992
3	1.33e-002	1.33e-002	1.66e-002	8.893	0.9985
4	2.e-002	2.e-002	2.33e-002	8.887	0.9978
5	2.66e-002	2.66e-002	3.e-002	8.88	0.997
6	3.33e-002	3.33e-002	3.66e-002	8.873	0.9963
7	4.e-002	4.e-002	4.33e-002	8.867	0.9955
8	4.66e-002	4.66e-002	5.e-002	8.86	0.9948
9	5.33e-002	5.33e-002	5.66e-002	8.853	0.994
10	6.e-002	6.e-002	6.33e-002	8.847	0.9933
11	6.66e-002	6.66e-002	7.e-002	8.84	0.9925
12	7.33e-002	7.33e-002	7.66e-002	8.833	0.9918
13	8.e-002	8.e-002	8.33e-002	8.827	0.991
14	8.66e-002	8.66e-002	9.e-002	8.82	0.9903
15	9.33e-002	9.33e-002	9.66e-002	8.813	0.9895
16	0.1	0.1	0.1033	8.807	0.9888
17	0.1066	0.1066	0.11	8.8	0.988
18	0.1133	0.1133	0.1166	8.793	0.9873
19	0.12	0.12	0.1233	8.787	0.9865
20	0.1266	0.1266	0.13	8.78	0.9858
21	0.1333	0.1333	0.1366	8.773	0.985
22	0.14	0.14	0.1433	8.767	0.9843
23	0.1466	0.1466	0.15	8.76	0.9835
24	0.1533	0.1533	0.1566	8.753	0.9828
25	0.16	0.16	0.1633	8.747	0.982
26	0.1666	0.1666	0.17	8.74	0.9813
27	0.1733	0.1733	0.1766	8.733	0.9805
28	0.18	0.18	0.1833	8.727	0.9798
29	0.1866	0.1866	0.19	8.72	0.979
30	0.1933	0.1933	0.1966	8.713	0.9783
31	0.2	0.2	0.2033	8.707	0.9775
32	0.2066	0.2066	0.21	8.7	0.9768
33	0.2133	0.2133	0.2166	8.693	0.9761
34	0.22	0.22	0.2233	8.687	0.9753

35	0.2266	0.2266	0.23	8.68	0.9745
36	0.2333	0.2333	0.2366	8.673	0.9738
37	0.24	0.24	0.2433	8.667	0.9731
38	0.2466	0.2466	0.25	8.66	0.9723
39	0.2533	0.2533	0.2566	8.653	0.9716
40	0.26	0.26	0.2633	8.647	0.9708
41	0.2666	0.2666	0.27	8.64	0.9701
42	0.2733	0.2733	0.2766	8.633	0.9693
43	0.28	0.28	0.2833	8.627	0.9686
44	0.2866	0.2866	0.29	8.62	0.9678
45	0.2933	0.2933	0.2966	8.613	0.9671
46	0.3	0.3	0.3033	8.607	0.9663
47	0.3066	0.3066	0.31	8.6	0.9656
48	0.3133	0.3133	0.3166	8.593	0.9648
49	0.32	0.32	0.3233	8.587	0.9641
50	0.3266	0.3266	0.33	8.58	0.9633
51	0.3333	0.3333	0.35	8.56	0.9611
52	0.3666	0.3666	0.3833	8.527	0.9573
53	0.4	0.4	0.4166	8.493	0.9536
54	0.4333	0.4333	0.45	8.46	0.9498
55	0.4666	0.4666	0.4833	8.427	0.9461
56	0.5	0.5	0.5166	8.393	0.9424
57	0.5333	0.5333	0.55	8.36	0.9386
58	0.5666	0.5666	0.5833	8.327	0.9349
59	0.6	0.6	0.6166	8.293	0.9311
60	0.6333	0.6333	0.65	8.26	0.9274
61	0.6666	0.6666	0.6833	8.227	0.9237
62	0.7	0.7	0.7166	8.193	0.9199
63	0.7333	0.7333	0.75	8.16	0.9162
64	0.7666	0.7666	0.7833	8.127	0.9124
65	0.8	0.8	0.8166	8.093	0.9087
66	0.8333	0.8333	0.85	8.06	0.9049
67	0.8666	0.8666	0.8833	8.027	0.9012
68	0.9	0.9	0.9166	7.993	0.8975
69	0.9333	0.9333	0.95	7.96	0.8937
70	0.9666	0.9666	0.9833	7.927	0.89
71	1.	1.	1.2	7.71	0.8656
72	1.4	1.4	1.6	7.31	0.8207
73	1.8	1.8	2.	6.91	0.7758
74	2.2	2.2	2.4	6.51	0.7309
75	2.6	2.6	2.8	6.11	0.686
76	3.	3.	3.2	5.71	0.6411
77	3.4	3.4	3.6	5.31	0.5962
78	3.8	3.8	4.	4.91	0.5513
79	4.2	4.2	4.4	4.51	0.5064
80	4.6	4.6	4.8	4.11	0.4615
81	5.	5.	5.2	3.71	0.4165
82	5.4	5.4	5.6	3.31	0.3716
83	5.8	5.8	6.	2.91	0.3267
84	6.2	6.2	6.4	2.51	0.2818
85	6.6	6.6	6.8	2.11	0.2369
86	7.	7.	7.2	1.71	0.192
87	7.4	7.4	7.6	1.31	0.1471
88	7.8	7.8	8.	0.91	0.1022
89	8.2	8.2	8.4	0.51	5.726e-002
90	8.6	8.6	8.8	0.11	1.235e-002
91	9.	9.	9.2	-0.29	-3.256e-002

92	9.4	9.4	9.6	-0.69	-7.747e-002
93	9.8	9.8	10.	-1.09	-0.1224


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-30s falling head
Time Lag = 227.9 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
5 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 1.713e-004 cm/sec
Transmissivity = 17. ft2/day
Head Ratio (Hl/Ho)
1.
0.37
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 8.287 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-30s falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.608198e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
5 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 4.3e-004 cm/sec
Transmissivity = 42.66 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 8.287 feet at 0. seconds

Field Hydraulic Conductivity Test

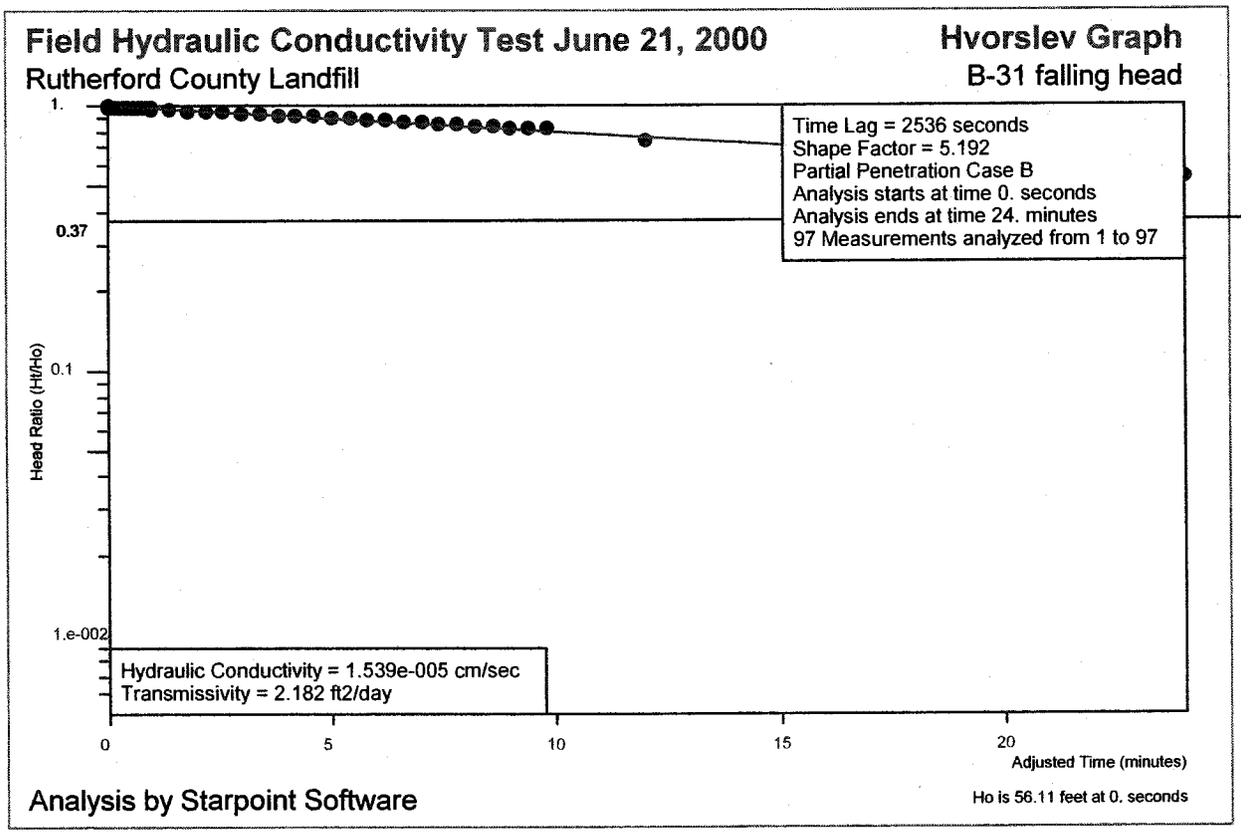
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B30DS0

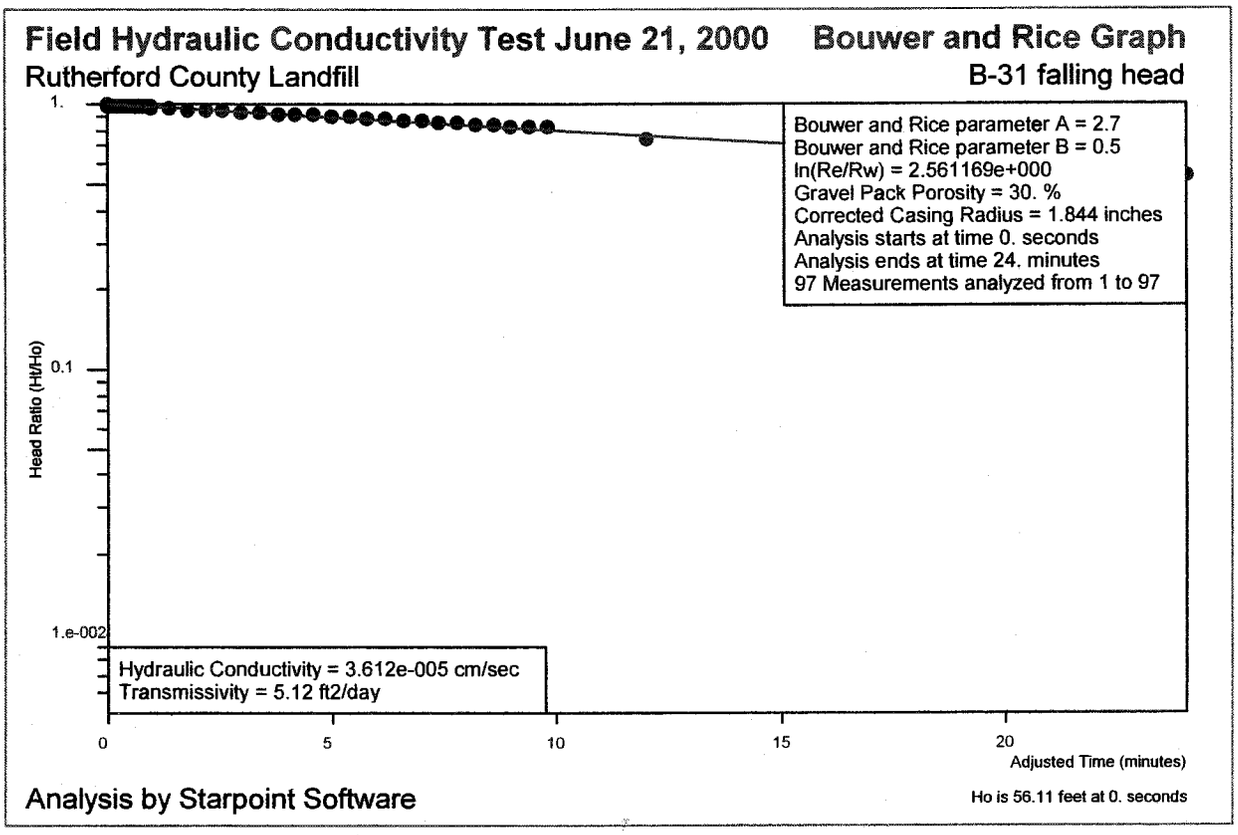
Well Label: B-30s falling head
Aquifer Thickness: 35. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 8.29 feet
Water Table to Screen Bottom: 16.6 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 93 time and drawdown measurements
Maximum head is 8.287 feet
Minimum head is -1.71 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	8.287	1.
2	6.6e-003	6.6e-003	1.e-002	8.28	0.9992
3	1.33e-002	1.33e-002	1.66e-002	8.273	0.9984
4	2.e-002	2.e-002	2.33e-002	8.267	0.9976
5	2.66e-002	2.66e-002	3.e-002	8.26	0.9968
6	3.33e-002	3.33e-002	3.66e-002	8.253	0.996
7	4.e-002	4.e-002	4.33e-002	8.247	0.9952
8	4.66e-002	4.66e-002	5.e-002	8.24	0.9944
9	5.33e-002	5.33e-002	5.66e-002	8.233	0.9936
10	6.e-002	6.e-002	6.33e-002	8.227	0.9928
11	6.66e-002	6.66e-002	7.e-002	8.22	0.992
12	7.33e-002	7.33e-002	7.66e-002	8.213	0.9912
13	8.e-002	8.e-002	8.33e-002	8.207	0.9903
14	8.66e-002	8.66e-002	9.e-002	8.2	0.9895
15	9.33e-002	9.33e-002	9.66e-002	8.193	0.9887
16	0.1	0.1	0.1033	8.187	0.9879
17	0.1066	0.1066	0.11	8.18	0.9871
18	0.1133	0.1133	0.1166	8.173	0.9863
19	0.12	0.12	0.1233	8.167	0.9855
20	0.1266	0.1266	0.13	8.16	0.9847
21	0.1333	0.1333	0.1366	8.153	0.9839
22	0.14	0.14	0.1433	8.147	0.9831
23	0.1466	0.1466	0.15	8.14	0.9823
24	0.1533	0.1533	0.1566	8.133	0.9815
25	0.16	0.16	0.1633	8.127	0.9807
26	0.1666	0.1666	0.17	8.12	0.9799
27	0.1733	0.1733	0.1766	8.113	0.9791
28	0.18	0.18	0.1833	8.107	0.9783
29	0.1866	0.1866	0.19	8.1	0.9775
30	0.1933	0.1933	0.1966	8.093	0.9767
31	0.2	0.2	0.2033	8.087	0.9759
32	0.2066	0.2066	0.21	8.08	0.9751
33	0.2133	0.2133	0.2166	8.073	0.9743
34	0.22	0.22	0.2233	8.067	0.9735

35	0.2266	0.2266	0.23	8.06	0.9726
36	0.2333	0.2333	0.2366	8.053	0.9718
37	0.24	0.24	0.2433	8.047	0.971
38	0.2466	0.2466	0.25	8.04	0.9702
39	0.2533	0.2533	0.2566	8.033	0.9694
40	0.26	0.26	0.2633	8.027	0.9686
41	0.2666	0.2666	0.27	8.02	0.9678
42	0.2733	0.2733	0.2766	8.013	0.967
43	0.28	0.28	0.2833	8.007	0.9662
44	0.2866	0.2866	0.29	8.	0.9654
45	0.2933	0.2933	0.2966	7.993	0.9646
46	0.3	0.3	0.3033	7.987	0.9638
47	0.3066	0.3066	0.31	7.98	0.963
48	0.3133	0.3133	0.3166	7.973	0.9622
49	0.32	0.32	0.3233	7.967	0.9614
50	0.3266	0.3266	0.33	7.96	0.9606
51	0.3333	0.3333	0.35	7.94	0.9582
52	0.3666	0.3666	0.3833	7.907	0.9541
53	0.4	0.4	0.4166	7.873	0.9501
54	0.4333	0.4333	0.45	7.84	0.9461
55	0.4666	0.4666	0.4833	7.807	0.9421
56	0.5	0.5	0.5166	7.773	0.9381
57	0.5333	0.5333	0.55	7.74	0.934
58	0.5666	0.5666	0.5833	7.707	0.93
59	0.6	0.6	0.6166	7.673	0.926
60	0.6333	0.6333	0.65	7.64	0.922
61	0.6666	0.6666	0.6833	7.607	0.9179
62	0.7	0.7	0.7166	7.573	0.9139
63	0.7333	0.7333	0.75	7.54	0.9099
64	0.7666	0.7666	0.7833	7.507	0.9059
65	0.8	0.8	0.8166	7.473	0.9019
66	0.8333	0.8333	0.85	7.44	0.8978
67	0.8666	0.8666	0.8833	7.407	0.8938
68	0.9	0.9	0.9166	7.373	0.8898
69	0.9333	0.9333	0.95	7.34	0.8858
70	0.9666	0.9666	0.9833	7.307	0.8817
71	1.	1.	1.2	7.09	0.8556
72	1.4	1.4	1.6	6.69	0.8073
73	1.8	1.8	2.	6.29	0.759
74	2.2	2.2	2.4	5.89	0.7108
75	2.6	2.6	2.8	5.49	0.6625
76	3.	3.	3.2	5.09	0.6142
77	3.4	3.4	3.6	4.69	0.566
78	3.8	3.8	4.	4.29	0.5177
79	4.2	4.2	4.4	3.89	0.4694
80	4.6	4.6	4.8	3.49	0.4212
81	5.	5.	5.2	3.09	0.3729
82	5.4	5.4	5.6	2.69	0.3246
83	5.8	5.8	6.	2.29	0.2763
84	6.2	6.2	6.4	1.89	0.2281
85	6.6	6.6	6.8	1.49	0.1798
86	7.	7.	7.2	1.09	0.1315
87	7.4	7.4	7.6	0.69	8.327e-002
88	7.8	7.8	8.	0.29	3.5e-002
89	8.2	8.2	8.4	-0.11	-1.327e-002
90	8.6	8.6	8.8	-0.51	-6.154e-002
91	9.	9.	9.2	-0.91	-0.1098

92	9.4	9.4	9.6	-1.31	-0.1581
93	9.8	9.8	10.	-1.71	-0.2064


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-31 falling head
Time Lag = 2536 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
Hydraulic Conductivity = 1.539e-005 cm/sec
Transmissivity = 2.182 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 56.11 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-31 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.561169e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
Head Ratio (Hi/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 3.612e-005 cm/sec
Transmissivity = 5.12 ft2/day
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 56.11 feet at 0. seconds

Field Hydraulic Conductivity Test

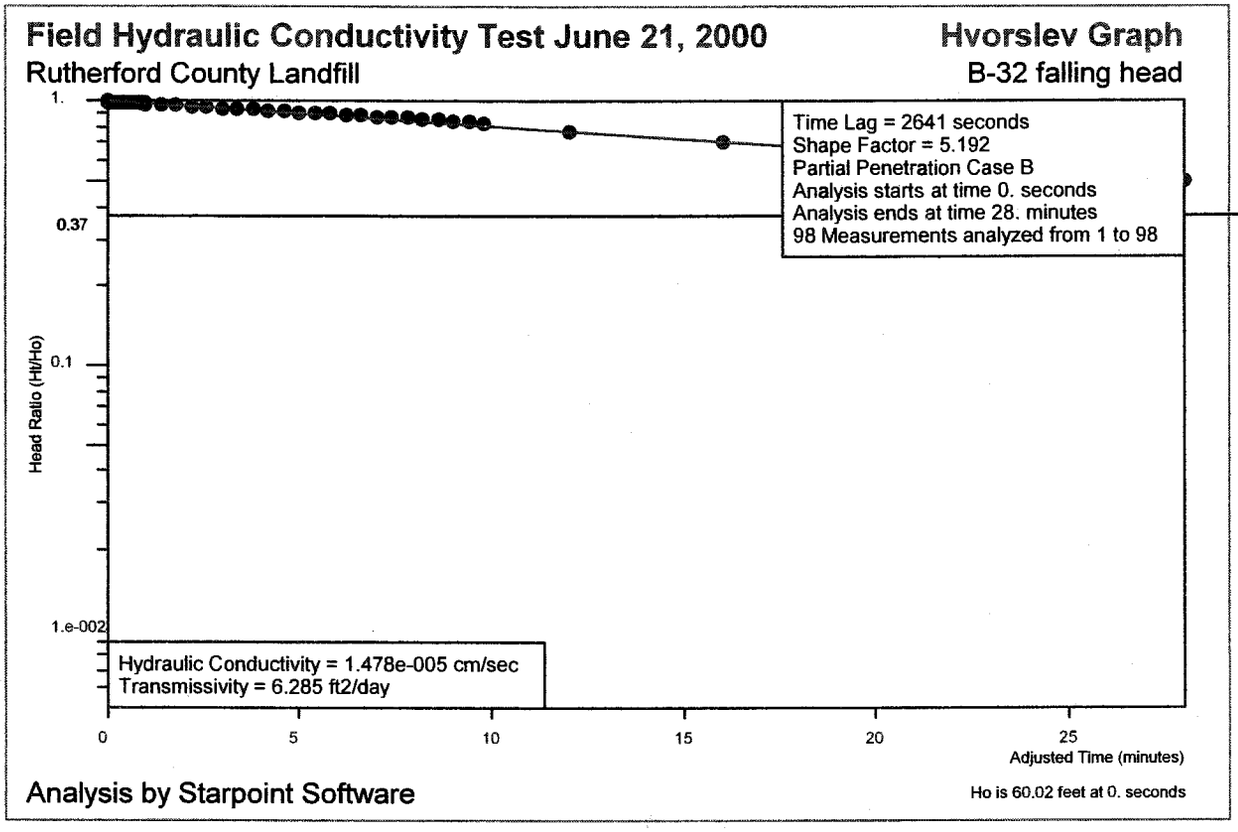
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B31S0

Well Label: B-31 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 56.11 feet
Water Table to Screen Bottom: 16.7 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 97 time and drawdown measurements
Maximum head is 56.11 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	56.11	1.
2	6.6e-003	6.6e-003	1.e-002	56.1	0.9999
3	1.33e-002	1.33e-002	1.66e-002	56.09	0.9998
4	2.e-002	2.e-002	2.33e-002	56.09	0.9996
5	2.66e-002	2.66e-002	3.e-002	56.08	0.9995
6	3.33e-002	3.33e-002	3.66e-002	56.07	0.9994
7	4.e-002	4.e-002	4.33e-002	56.07	0.9993
8	4.66e-002	4.66e-002	5.e-002	56.06	0.9992
9	5.33e-002	5.33e-002	5.66e-002	56.05	0.9991
10	6.e-002	6.e-002	6.33e-002	56.05	0.9989
11	6.66e-002	6.66e-002	7.e-002	56.04	0.9988
12	7.33e-002	7.33e-002	7.66e-002	56.03	0.9987
13	8.e-002	8.e-002	8.33e-002	56.03	0.9986
14	8.66e-002	8.66e-002	9.e-002	56.02	0.9985
15	9.33e-002	9.33e-002	9.66e-002	56.01	0.9983
16	0.1	0.1	0.1033	56.01	0.9982
17	0.1066	0.1066	0.11	56.	0.9981
18	0.1133	0.1133	0.1166	55.99	0.998
19	0.12	0.12	0.1233	55.99	0.9979
20	0.1266	0.1266	0.13	55.98	0.9977
21	0.1333	0.1333	0.1366	55.97	0.9976
22	0.14	0.14	0.1433	55.97	0.9975
23	0.1466	0.1466	0.15	55.96	0.9974
24	0.1533	0.1533	0.1566	55.95	0.9973
25	0.16	0.16	0.1633	55.95	0.9971
26	0.1666	0.1666	0.17	55.94	0.997
27	0.1733	0.1733	0.1766	55.93	0.9969
28	0.18	0.18	0.1833	55.93	0.9968
29	0.1866	0.1866	0.19	55.92	0.9967
30	0.1933	0.1933	0.1966	55.91	0.9966
31	0.2	0.2	0.2033	55.91	0.9964
32	0.2066	0.2066	0.21	55.9	0.9963
33	0.2133	0.2133	0.2166	55.89	0.9962
34	0.22	0.22	0.2233	55.89	0.9961

35	0.2266	0.2266	0.23	55.88	0.996
36	0.2333	0.2333	0.2366	55.87	0.9958
37	0.24	0.24	0.2433	55.87	0.9957
38	0.2466	0.2466	0.25	55.86	0.9956
39	0.2533	0.2533	0.2566	55.85	0.9955
40	0.26	0.26	0.2633	55.85	0.9954
41	0.2666	0.2666	0.27	55.84	0.9952
42	0.2733	0.2733	0.2766	55.83	0.9951
43	0.28	0.28	0.2833	55.83	0.995
44	0.2866	0.2866	0.29	55.82	0.9949
45	0.2933	0.2933	0.2966	55.81	0.9948
46	0.3	0.3	0.3033	55.81	0.9947
47	0.3066	0.3066	0.31	55.8	0.9945
48	0.3133	0.3133	0.3166	55.79	0.9944
49	0.32	0.32	0.3233	55.79	0.9943
50	0.3266	0.3266	0.33	55.78	0.9942
51	0.3333	0.3333	0.35	55.76	0.9938
52	0.3666	0.3666	0.3833	55.73	0.9932
53	0.4	0.4	0.4166	55.69	0.9926
54	0.4333	0.4333	0.45	55.66	0.992
55	0.4666	0.4666	0.4833	55.63	0.9914
56	0.5	0.5	0.5166	55.59	0.9909
57	0.5333	0.5333	0.55	55.56	0.9903
58	0.5666	0.5666	0.5833	55.53	0.9897
59	0.6	0.6	0.6166	55.49	0.9891
60	0.6333	0.6333	0.65	55.46	0.9885
61	0.6666	0.6666	0.6833	55.43	0.9879
62	0.7	0.7	0.7166	55.39	0.9873
63	0.7333	0.7333	0.75	55.36	0.9867
64	0.7666	0.7666	0.7833	55.33	0.9861
65	0.8	0.8	0.8166	55.29	0.9855
66	0.8333	0.8333	0.85	55.26	0.9849
67	0.8666	0.8666	0.8833	55.23	0.9843
68	0.9	0.9	0.9166	55.19	0.9837
69	0.9333	0.9333	0.95	55.16	0.9831
70	0.9666	0.9666	0.9833	55.13	0.9825
71	1.	1.	1.2	54.91	0.9787
72	1.4	1.4	1.6	54.51	0.9715
73	1.8	1.8	2.	54.11	0.9644
74	2.2	2.2	2.4	53.71	0.9573
75	2.6	2.6	2.8	53.31	0.9502
76	3.	3.	3.2	52.91	0.943
77	3.4	3.4	3.6	52.51	0.9359
78	3.8	3.8	4.	52.11	0.9288
79	4.2	4.2	4.4	51.71	0.9216
80	4.6	4.6	4.8	51.31	0.9145
81	5.	5.	5.2	50.91	0.9074
82	5.4	5.4	5.6	50.51	0.9002
83	5.8	5.8	6.	50.11	0.8931
84	6.2	6.2	6.4	49.71	0.886
85	6.6	6.6	6.8	49.31	0.8789
86	7.	7.	7.2	48.91	0.8717
87	7.4	7.4	7.6	48.51	0.8646
88	7.8	7.8	8.	48.11	0.8575
89	8.2	8.2	8.4	47.71	0.8503
90	8.6	8.6	8.8	47.31	0.8432
91	9.	9.	9.2	46.91	0.8361

92	9.4	9.4	9.6	46.51	0.829
93	9.8	9.8	10.	46.11	0.8218
94	12.	12.	14.	42.11	0.7505
95	16.	16.	18.	38.11	0.6792
96	20.	20.	22.	34.11	0.6079
97	24.	24.	26.	30.11	0.5367

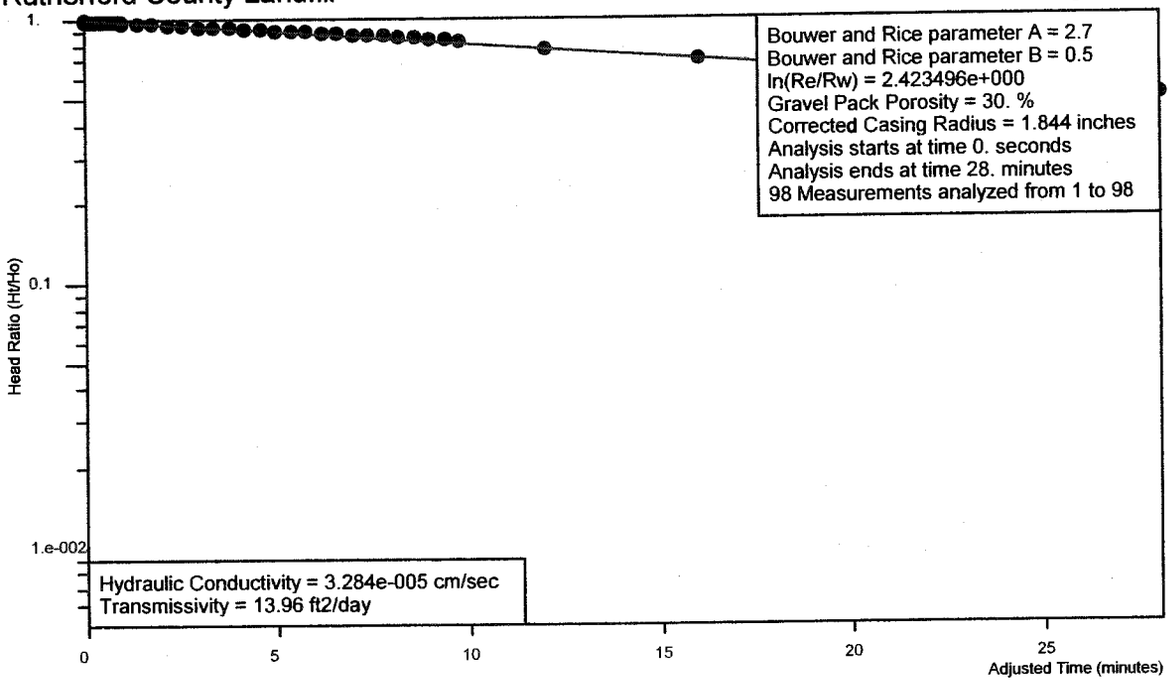

Field Hydraulic Conductivity Test June 21, 2000
Hvorslev Graph
Rutherford County Landfill
B-32 falling head
Time Lag = 2641 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 28. minutes
98 Measurements analyzed from 1 to 98
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
Hydraulic Conductivity = 1.478e-005 cm/sec
Transmissivity = 6.285 ft2/day
0
5
10
15
20
25
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 60.02 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000

Bouwer and Rice Graph

Rutherford County Landfill

B-32 falling head



Analysis by Starpoint Software

Ho is 60.02 feet at 0. seconds

Field Hydraulic Conductivity Test

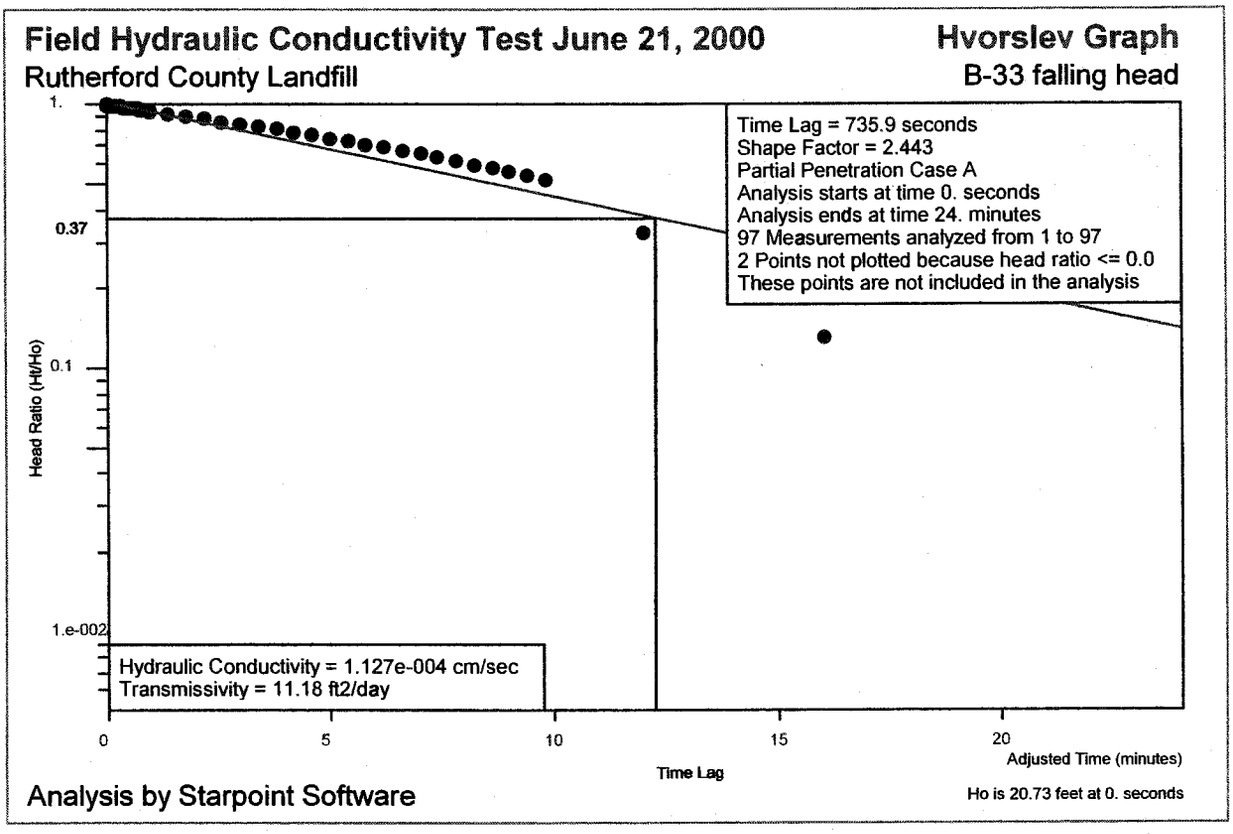
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B32S0

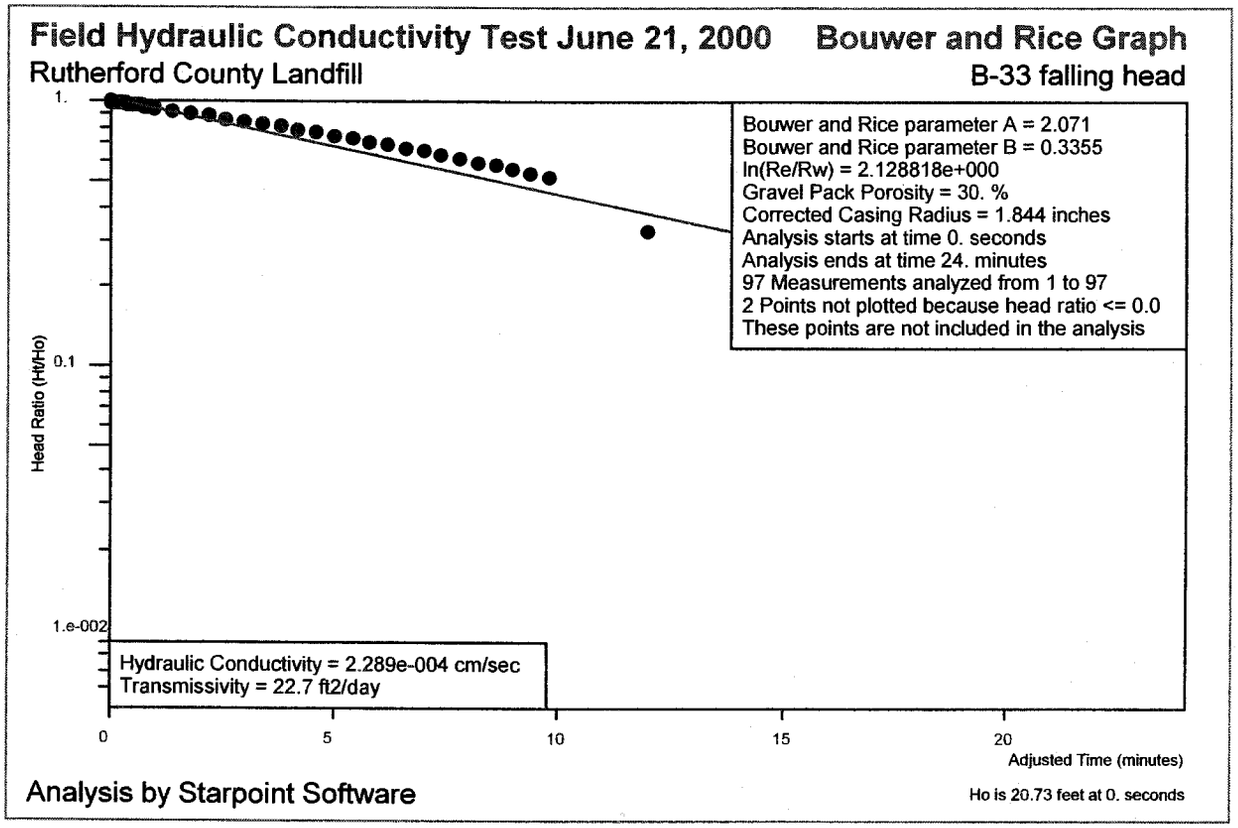
Well Label: B-32 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 60.02 feet
Water Table to Screen Bottom: 15.5 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 98 time and drawdown measurements
Maximum head is 60.02 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	60.02	1.
2	6.6e-003	6.6e-003	1.e-002	60.01	0.9999
3	1.33e-002	1.33e-002	1.66e-002	60.	0.9998
4	2.e-002	2.e-002	2.33e-002	60.	0.9997
5	2.66e-002	2.66e-002	3.e-002	59.99	0.9996
6	3.33e-002	3.33e-002	3.66e-002	59.98	0.9994
7	4.e-002	4.e-002	4.33e-002	59.98	0.9993
8	4.66e-002	4.66e-002	5.e-002	59.97	0.9992
9	5.33e-002	5.33e-002	5.66e-002	59.96	0.9991
10	6.e-002	6.e-002	6.33e-002	59.96	0.999
11	6.66e-002	6.66e-002	7.e-002	59.95	0.9989
12	7.33e-002	7.33e-002	7.66e-002	59.94	0.9988
13	8.e-002	8.e-002	8.33e-002	59.94	0.9987
14	8.66e-002	8.66e-002	9.e-002	59.93	0.9986
15	9.33e-002	9.33e-002	9.66e-002	59.92	0.9984
16	0.1	0.1	0.1033	59.92	0.9983
17	0.1066	0.1066	0.11	59.91	0.9982
18	0.1133	0.1133	0.1166	59.9	0.9981
19	0.12	0.12	0.1233	59.9	0.998
20	0.1266	0.1266	0.13	59.89	0.9979
21	0.1333	0.1333	0.1366	59.88	0.9978
22	0.14	0.14	0.1433	59.88	0.9977
23	0.1466	0.1466	0.15	59.87	0.9976
24	0.1533	0.1533	0.1566	59.86	0.9974
25	0.16	0.16	0.1633	59.86	0.9973
26	0.1666	0.1666	0.17	59.85	0.9972
27	0.1733	0.1733	0.1766	59.84	0.9971
28	0.18	0.18	0.1833	59.84	0.997
29	0.1866	0.1866	0.19	59.83	0.9969
30	0.1933	0.1933	0.1966	59.82	0.9968
31	0.2	0.2	0.2033	59.82	0.9967
32	0.2066	0.2066	0.21	59.81	0.9966
33	0.2133	0.2133	0.2166	59.8	0.9964
34	0.22	0.22	0.2233	59.8	0.9963

35	0.2266	0.2266	0.23	59.79	0.9962
36	0.2333	0.2333	0.2366	59.78	0.9961
37	0.24	0.24	0.2433	59.78	0.996
38	0.2466	0.2466	0.25	59.77	0.9959
39	0.2533	0.2533	0.2566	59.76	0.9958
40	0.26	0.26	0.2633	59.76	0.9957
41	0.2666	0.2666	0.27	59.75	0.9956
42	0.2733	0.2733	0.2766	59.74	0.9954
43	0.28	0.28	0.2833	59.74	0.9953
44	0.2866	0.2866	0.29	59.73	0.9952
45	0.2933	0.2933	0.2966	59.72	0.9951
46	0.3	0.3	0.3033	59.72	0.995
47	0.3066	0.3066	0.31	59.71	0.9949
48	0.3133	0.3133	0.3166	59.7	0.9948
49	0.32	0.32	0.3233	59.7	0.9947
50	0.3266	0.3266	0.33	59.69	0.9946
51	0.3333	0.3333	0.35	59.67	0.9942
52	0.3666	0.3666	0.3833	59.64	0.9937
53	0.4	0.4	0.4166	59.6	0.9931
54	0.4333	0.4333	0.45	59.57	0.9926
55	0.4666	0.4666	0.4833	59.54	0.992
56	0.5	0.5	0.5166	59.5	0.9914
57	0.5333	0.5333	0.55	59.47	0.9909
58	0.5666	0.5666	0.5833	59.44	0.9903
59	0.6	0.6	0.6166	59.4	0.9898
60	0.6333	0.6333	0.65	59.37	0.9892
61	0.6666	0.6666	0.6833	59.34	0.9887
62	0.7	0.7	0.7166	59.3	0.9881
63	0.7333	0.7333	0.75	59.27	0.9876
64	0.7666	0.7666	0.7833	59.24	0.987
65	0.8	0.8	0.8166	59.2	0.9864
66	0.8333	0.8333	0.85	59.17	0.9859
67	0.8666	0.8666	0.8833	59.14	0.9853
68	0.9	0.9	0.9166	59.1	0.9848
69	0.9333	0.9333	0.95	59.07	0.9842
70	0.9666	0.9666	0.9833	59.04	0.9837
71	1.	1.	1.2	58.82	0.9801
72	1.4	1.4	1.6	58.42	0.9734
73	1.8	1.8	2.	58.02	0.9667
74	2.2	2.2	2.4	57.62	0.9601
75	2.6	2.6	2.8	57.22	0.9534
76	3.	3.	3.2	56.82	0.9467
77	3.4	3.4	3.6	56.42	0.9401
78	3.8	3.8	4.	56.02	0.9334
79	4.2	4.2	4.4	55.62	0.9267
80	4.6	4.6	4.8	55.22	0.9201
81	5.	5.	5.2	54.82	0.9134
82	5.4	5.4	5.6	54.42	0.9067
83	5.8	5.8	6.	54.02	0.9001
84	6.2	6.2	6.4	53.62	0.8934
85	6.6	6.6	6.8	53.22	0.8868
86	7.	7.	7.2	52.82	0.8801
87	7.4	7.4	7.6	52.42	0.8734
88	7.8	7.8	8.	52.02	0.8668
89	8.2	8.2	8.4	51.62	0.8601
90	8.6	8.6	8.8	51.22	0.8534
91	9.	9.	9.2	50.82	0.8468

92	9.4	9.4	9.6	50.42	0.8401
93	9.8	9.8	10.	50.02	0.8334
94	12.	12.	14.	46.02	0.7668
95	16.	16.	18.	42.02	0.7001
96	20.	20.	22.	38.02	0.6335
97	24.	24.	26.	34.02	0.5668
98	28.	28.	30.	30.02	0.5002


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-33 falling head
Time Lag = 735.9 seconds
Shape Factor = 2.443
Partial Penetration Case A
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
2 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 1.127e-004 cm/sec
Transmissivity = 11.18 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 20.73 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-33 falling head
Bouwer and Rice parameter A = 2.071
Bouwer and Rice parameter B = 0.3355
ln(Re/Rw) = 2.128818e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
2 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 2.289e-004 cm/sec
Transmissivity = 22.7 ft2/day
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 20.73 feet at 0. seconds

Field Hydraulic Conductivity Test

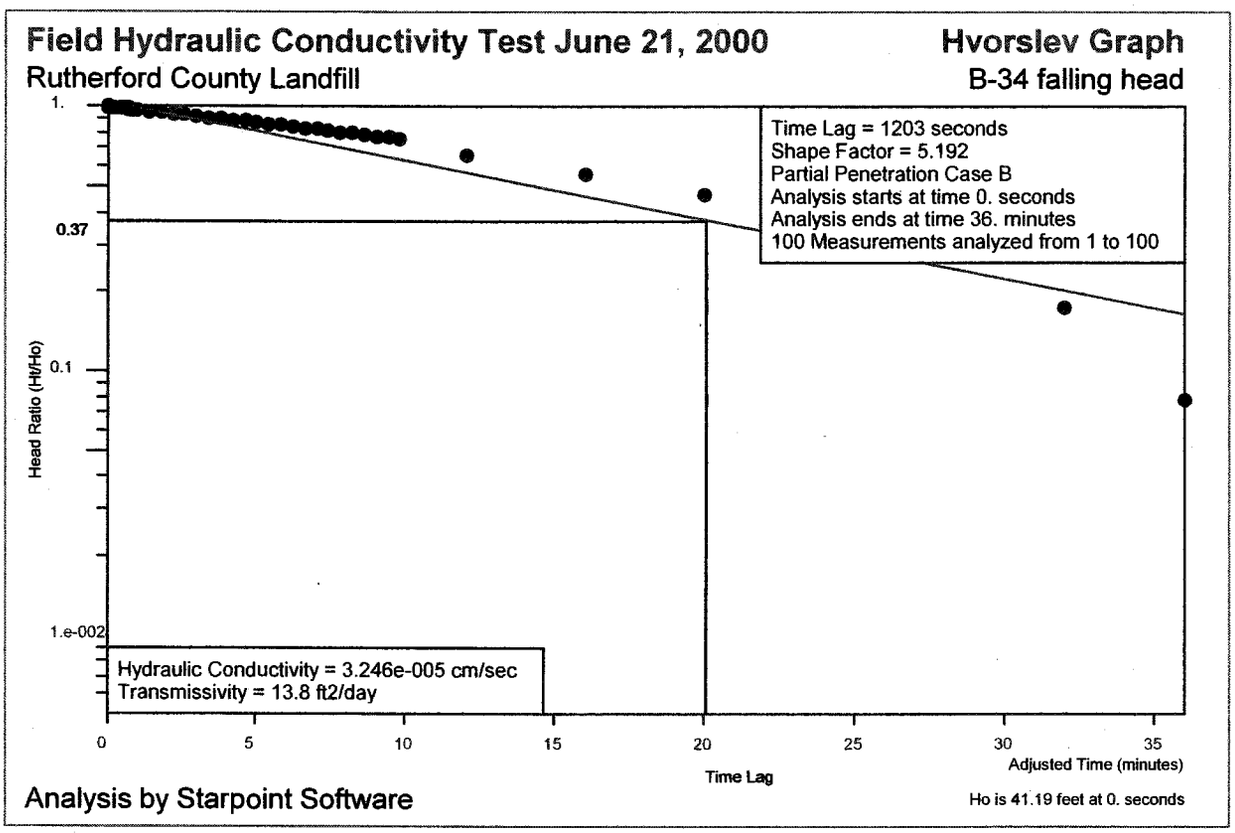
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B33s0

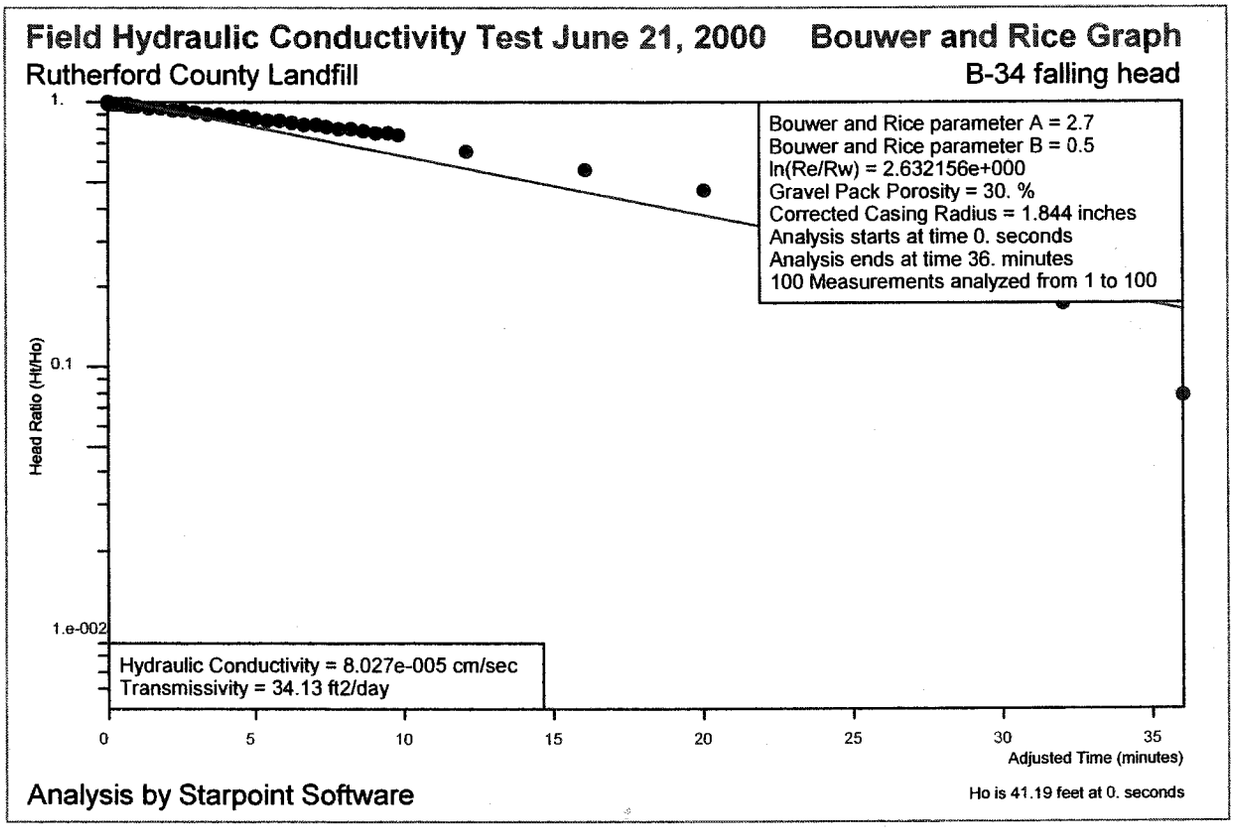
Well Label: B-33 falling head
Aquifer Thickness: 35. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 20.73 feet
Water Table to Screen Bottom: 4.6 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 97 time and drawdown measurements
Maximum head is 20.73 feet
Minimum head is -5.27 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	20.73	1.
2	6.6e-003	6.6e-003	1.e-002	20.72	0.9997
3	1.33e-002	1.33e-002	1.66e-002	20.71	0.9994
4	2.e-002	2.e-002	2.33e-002	20.71	0.999
5	2.66e-002	2.66e-002	3.e-002	20.7	0.9987
6	3.33e-002	3.33e-002	3.66e-002	20.69	0.9984
7	4.e-002	4.e-002	4.33e-002	20.69	0.9981
8	4.66e-002	4.66e-002	5.e-002	20.68	0.9977
9	5.33e-002	5.33e-002	5.66e-002	20.67	0.9974
10	6.e-002	6.e-002	6.33e-002	20.67	0.9971
11	6.66e-002	6.66e-002	7.e-002	20.66	0.9968
12	7.33e-002	7.33e-002	7.66e-002	20.65	0.9965
13	8.e-002	8.e-002	8.33e-002	20.65	0.9961
14	8.66e-002	8.66e-002	9.e-002	20.64	0.9958
15	9.33e-002	9.33e-002	9.66e-002	20.63	0.9955
16	0.1	0.1	0.1033	20.63	0.9952
17	0.1066	0.1066	0.11	20.62	0.9949
18	0.1133	0.1133	0.1166	20.61	0.9945
19	0.12	0.12	0.1233	20.61	0.9942
20	0.1266	0.1266	0.13	20.6	0.9939
21	0.1333	0.1333	0.1366	20.59	0.9936
22	0.14	0.14	0.1433	20.59	0.9932
23	0.1466	0.1466	0.15	20.58	0.9929
24	0.1533	0.1533	0.1566	20.57	0.9926
25	0.16	0.16	0.1633	20.57	0.9923
26	0.1666	0.1666	0.17	20.56	0.992
27	0.1733	0.1733	0.1766	20.55	0.9916
28	0.18	0.18	0.1833	20.55	0.9913
29	0.1866	0.1866	0.19	20.54	0.991
30	0.1933	0.1933	0.1966	20.53	0.9907
31	0.2	0.2	0.2033	20.53	0.9904
32	0.2066	0.2066	0.21	20.52	0.99
33	0.2133	0.2133	0.2166	20.51	0.9897
34	0.22	0.22	0.2233	20.51	0.9894

35	0.2266	0.2266	0.23	20.5	0.9891
36	0.2333	0.2333	0.2366	20.49	0.9887
37	0.24	0.24	0.2433	20.49	0.9884
38	0.2466	0.2466	0.25	20.48	0.9881
39	0.2533	0.2533	0.2566	20.47	0.9878
40	0.26	0.26	0.2633	20.47	0.9875
41	0.2666	0.2666	0.27	20.46	0.9871
42	0.2733	0.2733	0.2766	20.45	0.9868
43	0.28	0.28	0.2833	20.45	0.9865
44	0.2866	0.2866	0.29	20.44	0.9862
45	0.2933	0.2933	0.2966	20.43	0.9858
46	0.3	0.3	0.3033	20.43	0.9855
47	0.3066	0.3066	0.31	20.42	0.9852
48	0.3133	0.3133	0.3166	20.41	0.9849
49	0.32	0.32	0.3233	20.41	0.9846
50	0.3266	0.3266	0.33	20.4	0.9842
51	0.3333	0.3333	0.35	20.38	0.9833
52	0.3666	0.3666	0.3833	20.35	0.9817
53	0.4	0.4	0.4166	20.31	0.9801
54	0.4333	0.4333	0.45	20.28	0.9784
55	0.4666	0.4666	0.4833	20.25	0.9768
56	0.5	0.5	0.5166	20.21	0.9752
57	0.5333	0.5333	0.55	20.18	0.9736
58	0.5666	0.5666	0.5833	20.15	0.972
59	0.6	0.6	0.6166	20.11	0.9704
60	0.6333	0.6333	0.65	20.08	0.9688
61	0.6666	0.6666	0.6833	20.05	0.9672
62	0.7	0.7	0.7166	20.01	0.9656
63	0.7333	0.7333	0.75	19.98	0.964
64	0.7666	0.7666	0.7833	19.95	0.9624
65	0.8	0.8	0.8166	19.91	0.9608
66	0.8333	0.8333	0.85	19.88	0.9591
67	0.8666	0.8666	0.8833	19.85	0.9575
68	0.9	0.9	0.9166	19.81	0.9559
69	0.9333	0.9333	0.95	19.78	0.9543
70	0.9666	0.9666	0.9833	19.75	0.9527
71	1.	1.	1.2	19.53	0.9423
72	1.4	1.4	1.6	19.13	0.923
73	1.8	1.8	2.	18.73	0.9037
74	2.2	2.2	2.4	18.33	0.8844
75	2.6	2.6	2.8	17.93	0.8651
76	3.	3.	3.2	17.53	0.8458
77	3.4	3.4	3.6	17.13	0.8265
78	3.8	3.8	4.	16.73	0.8072
79	4.2	4.2	4.4	16.33	0.7879
80	4.6	4.6	4.8	15.93	0.7686
81	5.	5.	5.2	15.53	0.7493
82	5.4	5.4	5.6	15.13	0.73
83	5.8	5.8	6.	14.73	0.7107
84	6.2	6.2	6.4	14.33	0.6914
85	6.6	6.6	6.8	13.93	0.6721
86	7.	7.	7.2	13.53	0.6528
87	7.4	7.4	7.6	13.13	0.6335
88	7.8	7.8	8.	12.73	0.6142
89	8.2	8.2	8.4	12.33	0.5949
90	8.6	8.6	8.8	11.93	0.5756
91	9.	9.	9.2	11.53	0.5563

92	9.4	9.4	9.6	11.13	0.537
93	9.8	9.8	10.	10.73	0.5177
94	12.	12.	14.	6.73	0.3247
95	16.	16.	18.	2.73	0.1317
96	20.	20.	22.	-1.27	-6.127e-002
97	24.	24.	26.	-5.27	-0.2543


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-34 falling head
Time Lag = 1203 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 36. minutes
100 Measurements analyzed from 1 to 100
Hydraulic Conductivity = 3.246e-005 cm/sec
Transmissivity = 13.8 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
35
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 41.19 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-34 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.632156e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 36. minutes
100 Measurements analyzed from 1 to 100
Hydraulic Conductivity = 8.027e-005 cm/sec
Transmissivity = 34.13 ft2/day
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
0
5
10
15
20
25
30
35
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 41.19 feet at 0. seconds

Field Hydraulic Conductivity Test

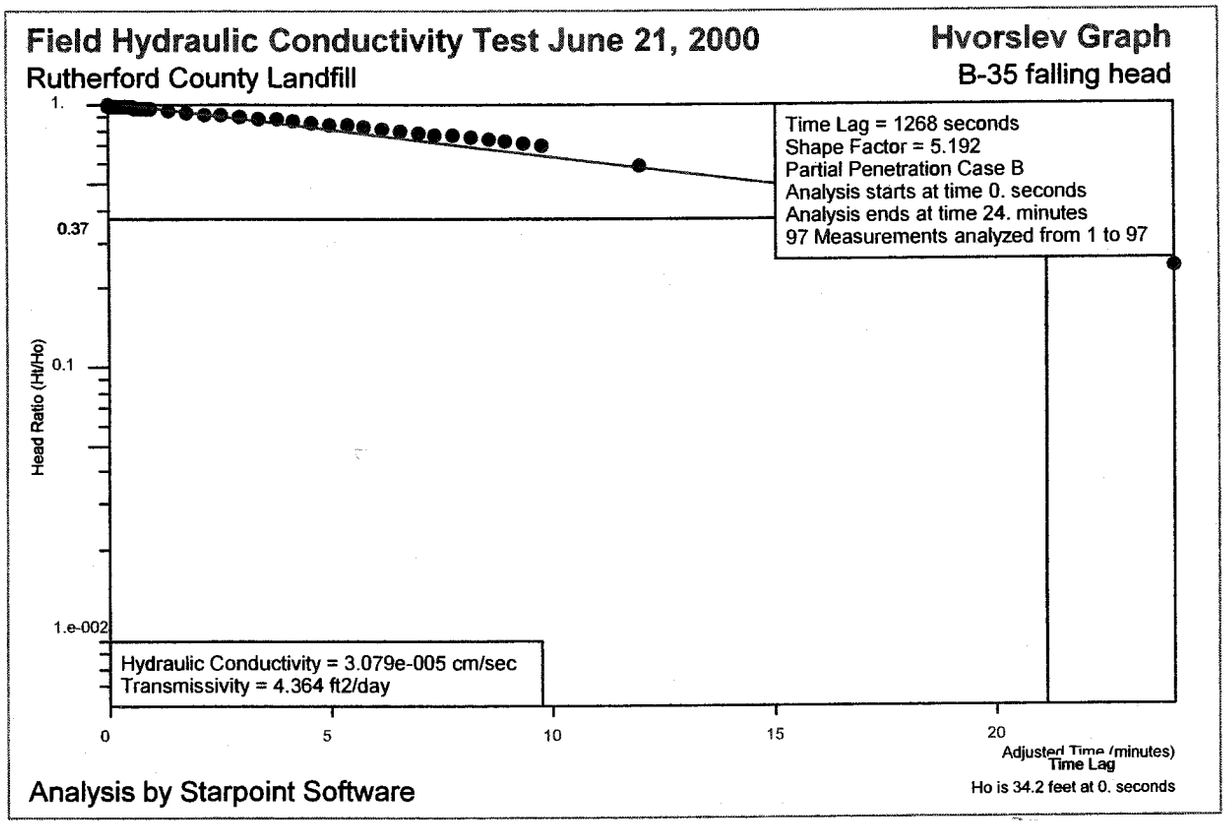
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B34S0

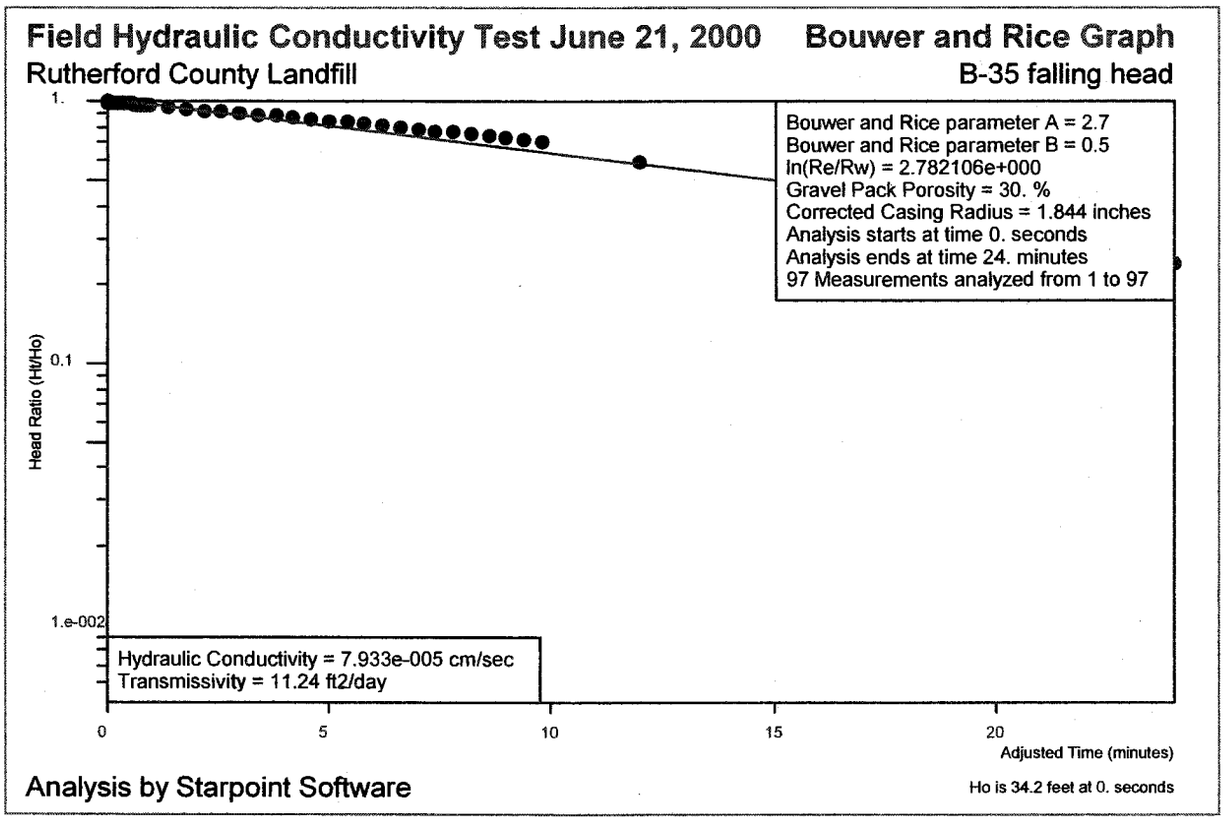
Well Label: B-34 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 41.19 feet
Water Table to Screen Bottom: 27. feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 100 time and drawdown measurements
Maximum head is 41.19 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	41.19	1.
2	6.6e-003	6.6e-003	1.e-002	41.18	0.9998
3	1.33e-002	1.33e-002	1.66e-002	41.17	0.9997
4	2.e-002	2.e-002	2.33e-002	41.17	0.9995
5	2.66e-002	2.66e-002	3.e-002	41.16	0.9994
6	3.33e-002	3.33e-002	3.66e-002	41.15	0.9992
7	4.e-002	4.e-002	4.33e-002	41.15	0.999
8	4.66e-002	4.66e-002	5.e-002	41.14	0.9989
9	5.33e-002	5.33e-002	5.66e-002	41.13	0.9987
10	6.e-002	6.e-002	6.33e-002	41.13	0.9985
11	6.66e-002	6.66e-002	7.e-002	41.12	0.9984
12	7.33e-002	7.33e-002	7.66e-002	41.11	0.9982
13	8.e-002	8.e-002	8.33e-002	41.11	0.9981
14	8.66e-002	8.66e-002	9.e-002	41.1	0.9979
15	9.33e-002	9.33e-002	9.66e-002	41.09	0.9977
16	0.1	0.1	0.1033	41.09	0.9976
17	0.1066	0.1066	0.11	41.08	0.9974
18	0.1133	0.1133	0.1166	41.07	0.9972
19	0.12	0.12	0.1233	41.07	0.9971
20	0.1266	0.1266	0.13	41.06	0.9969
21	0.1333	0.1333	0.1366	41.05	0.9968
22	0.14	0.14	0.1433	41.05	0.9966
23	0.1466	0.1466	0.15	41.04	0.9964
24	0.1533	0.1533	0.1566	41.03	0.9963
25	0.16	0.16	0.1633	41.03	0.9961
26	0.1666	0.1666	0.17	41.02	0.996
27	0.1733	0.1733	0.1766	41.01	0.9958
28	0.18	0.18	0.1833	41.01	0.9956
29	0.1866	0.1866	0.19	41.	0.9955
30	0.1933	0.1933	0.1966	40.99	0.9953
31	0.2	0.2	0.2033	40.99	0.9951
32	0.2066	0.2066	0.21	40.98	0.995
33	0.2133	0.2133	0.2166	40.97	0.9948
34	0.22	0.22	0.2233	40.97	0.9947

35	0.2266	0.2266	0.23	40.96	0.9945
36	0.2333	0.2333	0.2366	40.95	0.9943
37	0.24	0.24	0.2433	40.95	0.9942
38	0.2466	0.2466	0.25	40.94	0.994
39	0.2533	0.2533	0.2566	40.93	0.9938
40	0.26	0.26	0.2633	40.93	0.9937
41	0.2666	0.2666	0.27	40.92	0.9935
42	0.2733	0.2733	0.2766	40.91	0.9934
43	0.28	0.28	0.2833	40.91	0.9932
44	0.2866	0.2866	0.29	40.9	0.993
45	0.2933	0.2933	0.2966	40.89	0.9929
46	0.3	0.3	0.3033	40.89	0.9927
47	0.3066	0.3066	0.31	40.88	0.9926
48	0.3133	0.3133	0.3166	40.87	0.9924
49	0.32	0.32	0.3233	40.87	0.9922
50	0.3266	0.3266	0.33	40.86	0.9921
51	0.3333	0.3333	0.35	40.84	0.9916
52	0.3666	0.3666	0.3833	40.81	0.9908
53	0.4	0.4	0.4166	40.77	0.99
54	0.4333	0.4333	0.45	40.74	0.9892
55	0.4666	0.4666	0.4833	40.71	0.9883
56	0.5	0.5	0.5166	40.67	0.9875
57	0.5333	0.5333	0.55	40.64	0.9867
58	0.5666	0.5666	0.5833	40.61	0.9859
59	0.6	0.6	0.6166	40.57	0.9851
60	0.6333	0.6333	0.65	40.54	0.9843
61	0.6666	0.6666	0.6833	40.51	0.9835
62	0.7	0.7	0.7166	40.47	0.9827
63	0.7333	0.7333	0.75	40.44	0.9819
64	0.7666	0.7666	0.7833	40.41	0.9811
65	0.8	0.8	0.8166	40.37	0.9803
66	0.8333	0.8333	0.85	40.34	0.9794
67	0.8666	0.8666	0.8833	40.31	0.9786
68	0.9	0.9	0.9166	40.27	0.9778
69	0.9333	0.9333	0.95	40.24	0.977
70	0.9666	0.9666	0.9833	40.21	0.9762
71	1.	1.	1.2	39.99	0.9709
72	1.4	1.4	1.6	39.59	0.9612
73	1.8	1.8	2.	39.19	0.9515
74	2.2	2.2	2.4	38.79	0.9418
75	2.6	2.6	2.8	38.39	0.9321
76	3.	3.	3.2	37.99	0.9224
77	3.4	3.4	3.6	37.59	0.9127
78	3.8	3.8	4.	37.19	0.903
79	4.2	4.2	4.4	36.79	0.8932
80	4.6	4.6	4.8	36.39	0.8835
81	5.	5.	5.2	35.99	0.8738
82	5.4	5.4	5.6	35.59	0.8641
83	5.8	5.8	6.	35.19	0.8544
84	6.2	6.2	6.4	34.79	0.8447
85	6.6	6.6	6.8	34.39	0.835
86	7.	7.	7.2	33.99	0.8253
87	7.4	7.4	7.6	33.59	0.8156
88	7.8	7.8	8.	33.19	0.8058
89	8.2	8.2	8.4	32.79	0.7961
90	8.6	8.6	8.8	32.39	0.7864
91	9.	9.	9.2	31.99	0.7767

92	9.4	9.4	9.6	31.59	0.767
93	9.8	9.8	10.	31.19	0.7573
94	12.	12.	14.	27.19	0.6602
95	16.	16.	18.	23.19	0.563
96	20.	20.	22.	19.19	0.4659
97	24.	24.	26.	15.19	0.3688
98	28.	28.	30.	11.19	0.2717
99	32.	32.	34.	7.19	0.1746
100	36.	36.	38.	3.19	7.745e-002


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-35 falling head
Time Lag = 1268 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
Hydraulic Conductivity = 3.079e-005 cm/sec
Transmissivity = 4.364 ft2/day
Head Ratio (Ht/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
Adjusted Time (minutes)
Time Lag
Ho is 34.2 feet at 0. seconds
Analysis by Starpoint Software


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-35 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.782106e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 24. minutes
97 Measurements analyzed from 1 to 97
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 7.933e-005 cm/sec
Transmissivity = 11.24 ft2/day
0
5
10
15
20
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 34.2 feet at 0. seconds

Field Hydraulic Conductivity Test

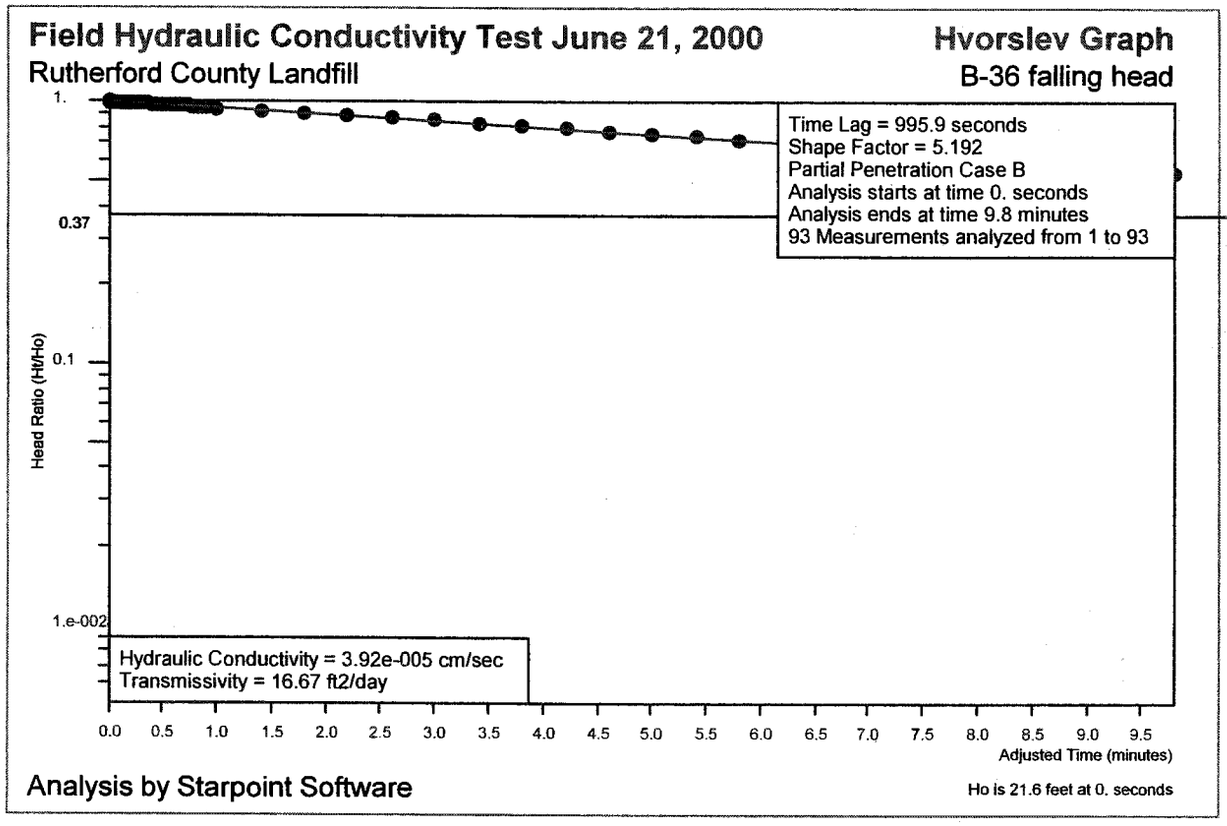
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B35S0

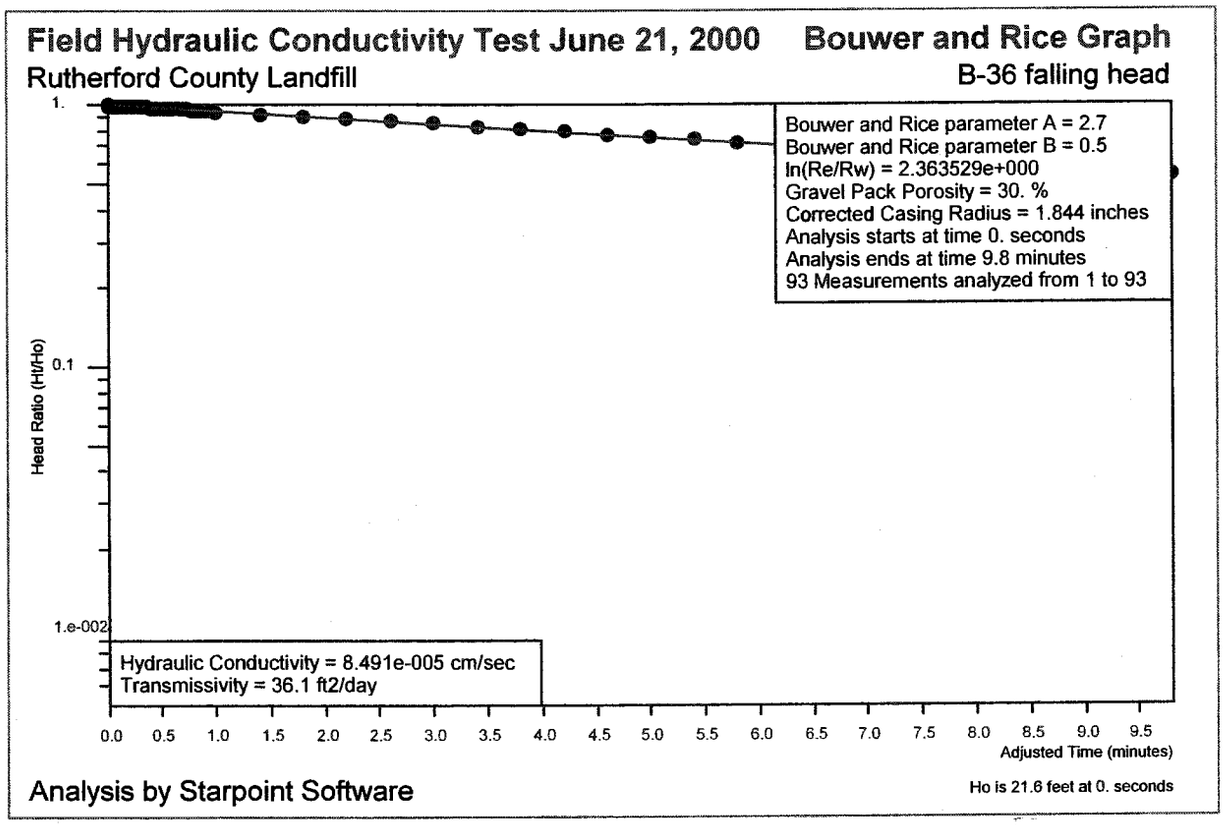
Well Label: B-35 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 34.2 feet
Water Table to Screen Bottom: 26.8 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 97 time and drawdown measurements
Maximum head is 34.2 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	34.2	1.
2	6.6e-003	6.6e-003	1.e-002	34.19	0.9998
3	1.33e-002	1.33e-002	1.66e-002	34.18	0.9996
4	2.e-002	2.e-002	2.33e-002	34.18	0.9994
5	2.66e-002	2.66e-002	3.e-002	34.17	0.9992
6	3.33e-002	3.33e-002	3.66e-002	34.16	0.999
7	4.e-002	4.e-002	4.33e-002	34.16	0.9988
8	4.66e-002	4.66e-002	5.e-002	34.15	0.9986
9	5.33e-002	5.33e-002	5.66e-002	34.14	0.9984
10	6.e-002	6.e-002	6.33e-002	34.14	0.9982
11	6.66e-002	6.66e-002	7.e-002	34.13	0.998
12	7.33e-002	7.33e-002	7.66e-002	34.12	0.9979
13	8.e-002	8.e-002	8.33e-002	34.12	0.9977
14	8.66e-002	8.66e-002	9.e-002	34.11	0.9975
15	9.33e-002	9.33e-002	9.66e-002	34.1	0.9973
16	0.1	0.1	0.1033	34.1	0.9971
17	0.1066	0.1066	0.11	34.09	0.9969
18	0.1133	0.1133	0.1166	34.08	0.9967
19	0.12	0.12	0.1233	34.08	0.9965
20	0.1266	0.1266	0.13	34.07	0.9963
21	0.1333	0.1333	0.1366	34.06	0.9961
22	0.14	0.14	0.1433	34.06	0.9959
23	0.1466	0.1466	0.15	34.05	0.9957
24	0.1533	0.1533	0.1566	34.04	0.9955
25	0.16	0.16	0.1633	34.04	0.9953
26	0.1666	0.1666	0.17	34.03	0.9951
27	0.1733	0.1733	0.1766	34.02	0.9949
28	0.18	0.18	0.1833	34.02	0.9947
29	0.1866	0.1866	0.19	34.01	0.9945
30	0.1933	0.1933	0.1966	34.	0.9943
31	0.2	0.2	0.2033	34.	0.9942
32	0.2066	0.2066	0.21	33.99	0.994
33	0.2133	0.2133	0.2166	33.98	0.9938
34	0.22	0.22	0.2233	33.98	0.9936

35	0.2266	0.2266	0.23	33.97	0.9934
36	0.2333	0.2333	0.2366	33.96	0.9932
37	0.24	0.24	0.2433	33.96	0.993
38	0.2466	0.2466	0.25	33.95	0.9928
39	0.2533	0.2533	0.2566	33.94	0.9926
40	0.26	0.26	0.2633	33.94	0.9924
41	0.2666	0.2666	0.27	33.93	0.9922
42	0.2733	0.2733	0.2766	33.92	0.992
43	0.28	0.28	0.2833	33.92	0.9918
44	0.2866	0.2866	0.29	33.91	0.9916
45	0.2933	0.2933	0.2966	33.9	0.9914
46	0.3	0.3	0.3033	33.9	0.9912
47	0.3066	0.3066	0.31	33.89	0.991
48	0.3133	0.3133	0.3166	33.88	0.9908
49	0.32	0.32	0.3233	33.88	0.9906
50	0.3266	0.3266	0.33	33.87	0.9904
51	0.3333	0.3333	0.35	33.85	0.9899
52	0.3666	0.3666	0.3833	33.82	0.9889
53	0.4	0.4	0.4166	33.78	0.9879
54	0.4333	0.4333	0.45	33.75	0.9869
55	0.4666	0.4666	0.4833	33.72	0.986
56	0.5	0.5	0.5166	33.68	0.985
57	0.5333	0.5333	0.55	33.65	0.984
58	0.5666	0.5666	0.5833	33.62	0.983
59	0.6	0.6	0.6166	33.58	0.9821
60	0.6333	0.6333	0.65	33.55	0.9811
61	0.6666	0.6666	0.6833	33.52	0.9801
62	0.7	0.7	0.7166	33.48	0.9791
63	0.7333	0.7333	0.75	33.45	0.9782
64	0.7666	0.7666	0.7833	33.42	0.9772
65	0.8	0.8	0.8166	33.38	0.9762
66	0.8333	0.8333	0.85	33.35	0.9752
67	0.8666	0.8666	0.8833	33.32	0.9743
68	0.9	0.9	0.9166	33.28	0.9733
69	0.9333	0.9333	0.95	33.25	0.9723
70	0.9666	0.9666	0.9833	33.22	0.9713
71	1.	1.	1.2	33.	0.965
72	1.4	1.4	1.6	32.6	0.9533
73	1.8	1.8	2.	32.2	0.9416
74	2.2	2.2	2.4	31.8	0.9299
75	2.6	2.6	2.8	31.4	0.9182
76	3.	3.	3.2	31.	0.9065
77	3.4	3.4	3.6	30.6	0.8948
78	3.8	3.8	4.	30.2	0.8831
79	4.2	4.2	4.4	29.8	0.8714
80	4.6	4.6	4.8	29.4	0.8597
81	5.	5.	5.2	29.	0.848
82	5.4	5.4	5.6	28.6	0.8363
83	5.8	5.8	6.	28.2	0.8246
84	6.2	6.2	6.4	27.8	0.8129
85	6.6	6.6	6.8	27.4	0.8012
86	7.	7.	7.2	27.	0.7895
87	7.4	7.4	7.6	26.6	0.7779
88	7.8	7.8	8.	26.2	0.7662
89	8.2	8.2	8.4	25.8	0.7545
90	8.6	8.6	8.8	25.4	0.7428
91	9.	9.	9.2	25.	0.7311

92	9.4	9.4	9.6	24.6	0.7194
93	9.8	9.8	10.	24.2	0.7077
94	12.	12.	14.	20.2	0.5907
95	16.	16.	18.	16.2	0.4737
96	20.	20.	22.	12.2	0.3568
97	24.	24.	26.	8.2	0.2398


Field Hydraulic Conductivity Test June 21, 2000
Rutherford County Landfill
Hvorslev Graph
B-36 falling head
Time Lag = 995.9 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Head Ratio (H/Ho)
1.
0.37
0.1
1.e-002
Hydraulic Conductivity = 3.92e-005 cm/sec
Transmissivity = 16.67 ft2/day
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 21.6 feet at 0. seconds


Field Hydraulic Conductivity Test June 21, 2000
Bouwer and Rice Graph
Rutherford County Landfill
B-36 falling head
Bouwer and Rice parameter A = 2.7
Bouwer and Rice parameter B = 0.5
ln(Re/Rw) = 2.363529e+000
Gravel Pack Porosity = 30. %
Corrected Casing Radius = 1.844 inches
Analysis starts at time 0. seconds
Analysis ends at time 9.8 minutes
93 Measurements analyzed from 1 to 93
Head Ratio (Ht/Ho)
1.
0.1
1.e-002
Hydraulic Conductivity = 8.491e-005 cm/sec
Transmissivity = 36.1 ft2/day
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 21.6 feet at 0. seconds

Field Hydraulic Conductivity Test

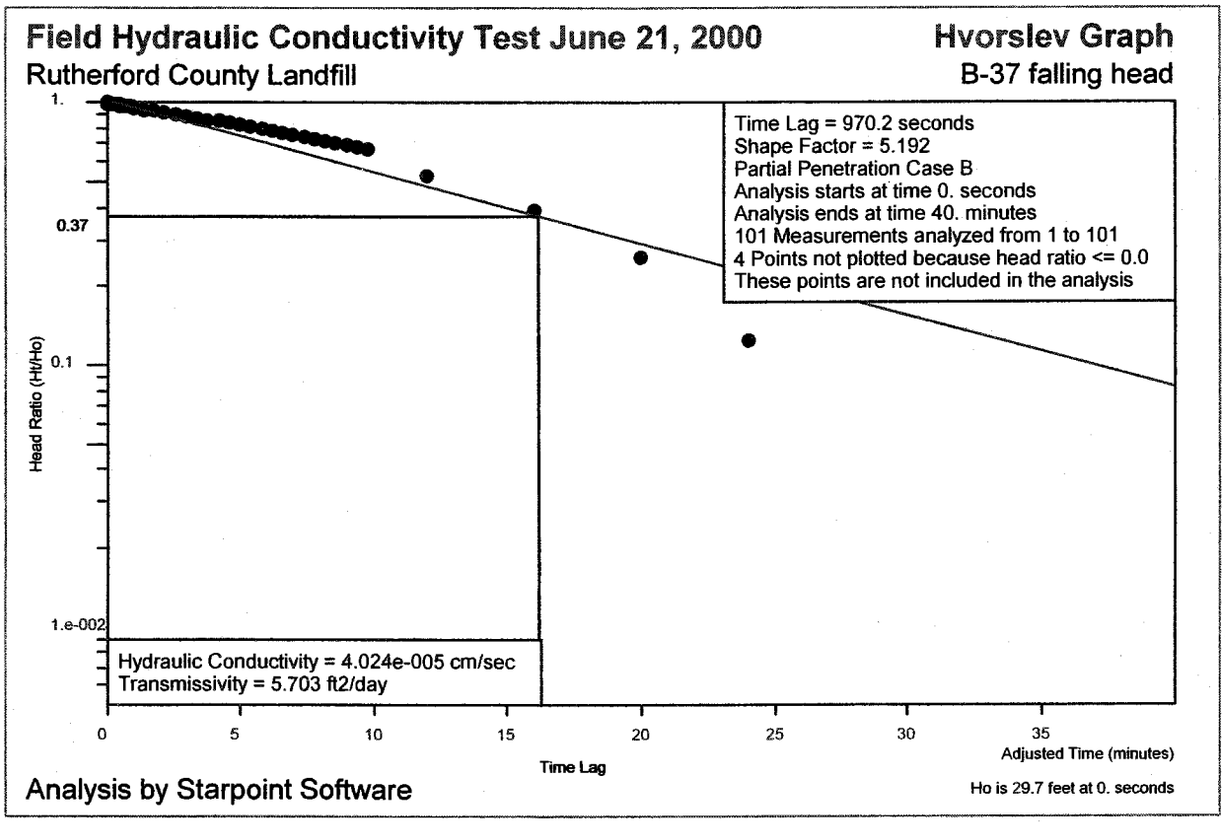
Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B36s0

Well Label: B-36 falling head
Aquifer Thickness: 150. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 21.6 feet
Water Table to Screen Bottom: 13.3 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 93 time and drawdown measurements
Maximum head is 21.6 feet
Minimum head is 0. feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	21.6	1.
2	6.6e-003	6.6e-003	1.e-002	21.59	0.9997
3	1.33e-002	1.33e-002	1.66e-002	21.58	0.9994
4	2.e-002	2.e-002	2.33e-002	21.58	0.9991
5	2.66e-002	2.66e-002	3.e-002	21.57	0.9988
6	3.33e-002	3.33e-002	3.66e-002	21.56	0.9985
7	4.e-002	4.e-002	4.33e-002	21.56	0.9981
8	4.66e-002	4.66e-002	5.e-002	21.55	0.9978
9	5.33e-002	5.33e-002	5.66e-002	21.54	0.9975
10	6.e-002	6.e-002	6.33e-002	21.54	0.9972
11	6.66e-002	6.66e-002	7.e-002	21.53	0.9969
12	7.33e-002	7.33e-002	7.66e-002	21.52	0.9966
13	8.e-002	8.e-002	8.33e-002	21.52	0.9963
14	8.66e-002	8.66e-002	9.e-002	21.51	0.996
15	9.33e-002	9.33e-002	9.66e-002	21.5	0.9957
16	0.1	0.1	0.1033	21.5	0.9954
17	0.1066	0.1066	0.11	21.49	0.9951
18	0.1133	0.1133	0.1166	21.48	0.9948
19	0.12	0.12	0.1233	21.48	0.9944
20	0.1266	0.1266	0.13	21.47	0.9941
21	0.1333	0.1333	0.1366	21.46	0.9938
22	0.14	0.14	0.1433	21.46	0.9935
23	0.1466	0.1466	0.15	21.45	0.9932
24	0.1533	0.1533	0.1566	21.44	0.9929
25	0.16	0.16	0.1633	21.44	0.9926
26	0.1666	0.1666	0.17	21.43	0.9923
27	0.1733	0.1733	0.1766	21.42	0.992
28	0.18	0.18	0.1833	21.42	0.9917
29	0.1866	0.1866	0.19	21.41	0.9914
30	0.1933	0.1933	0.1966	21.4	0.991
31	0.2	0.2	0.2033	21.4	0.9907
32	0.2066	0.2066	0.21	21.39	0.9904
33	0.2133	0.2133	0.2166	21.38	0.9901
34	0.22	0.22	0.2233	21.38	0.9898

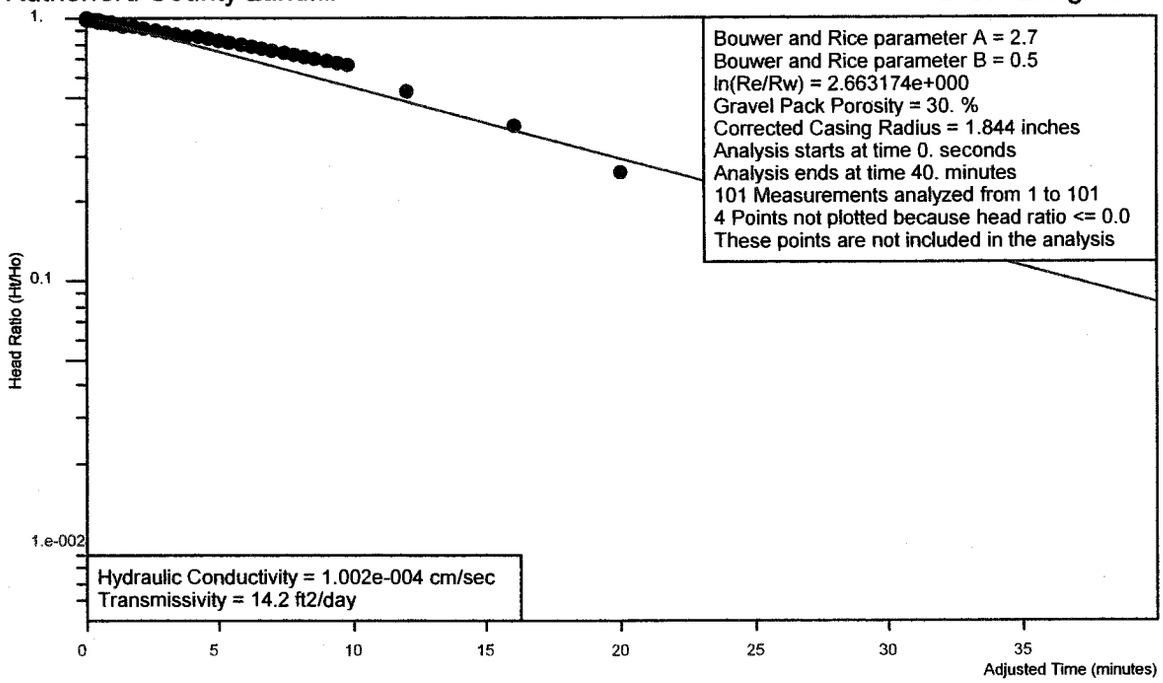
35	0.2266	0.2266	0.23	21.37	0.9895
36	0.2333	0.2333	0.2366	21.36	0.9892
37	0.24	0.24	0.2433	21.36	0.9889
38	0.2466	0.2466	0.25	21.35	0.9886
39	0.2533	0.2533	0.2566	21.34	0.9883
40	0.26	0.26	0.2633	21.34	0.988
41	0.2666	0.2666	0.27	21.33	0.9877
42	0.2733	0.2733	0.2766	21.32	0.9873
43	0.28	0.28	0.2833	21.32	0.987
44	0.2866	0.2866	0.29	21.31	0.9867
45	0.2933	0.2933	0.2966	21.3	0.9864
46	0.3	0.3	0.3033	21.3	0.9861
47	0.3066	0.3066	0.31	21.29	0.9858
48	0.3133	0.3133	0.3166	21.28	0.9855
49	0.32	0.32	0.3233	21.28	0.9852
50	0.3266	0.3266	0.33	21.27	0.9849
51	0.3333	0.3333	0.35	21.25	0.9839
52	0.3666	0.3666	0.3833	21.22	0.9824
53	0.4	0.4	0.4166	21.18	0.9809
54	0.4333	0.4333	0.45	21.15	0.9793
55	0.4666	0.4666	0.4833	21.12	0.9778
56	0.5	0.5	0.5166	21.08	0.9762
57	0.5333	0.5333	0.55	21.05	0.9747
58	0.5666	0.5666	0.5833	21.02	0.9731
59	0.6	0.6	0.6166	20.98	0.9716
60	0.6333	0.6333	0.65	20.95	0.9701
61	0.6666	0.6666	0.6833	20.92	0.9685
62	0.7	0.7	0.7166	20.88	0.967
63	0.7333	0.7333	0.75	20.85	0.9654
64	0.7666	0.7666	0.7833	20.82	0.9639
65	0.8	0.8	0.8166	20.78	0.9623
66	0.8333	0.8333	0.85	20.75	0.9608
67	0.8666	0.8666	0.8833	20.72	0.9593
68	0.9	0.9	0.9166	20.68	0.9577
69	0.9333	0.9333	0.95	20.65	0.9562
70	0.9666	0.9666	0.9833	20.62	0.9546
71	1.	1.	1.2	20.4	0.9446
72	1.4	1.4	1.6	20.	0.9261
73	1.8	1.8	2.	19.6	0.9075
74	2.2	2.2	2.4	19.2	0.889
75	2.6	2.6	2.8	18.8	0.8705
76	3.	3.	3.2	18.4	0.852
77	3.4	3.4	3.6	18.	0.8335
78	3.8	3.8	4.	17.6	0.8149
79	4.2	4.2	4.4	17.2	0.7964
80	4.6	4.6	4.8	16.8	0.7779
81	5.	5.	5.2	16.4	0.7594
82	5.4	5.4	5.6	16.	0.7409
83	5.8	5.8	6.	15.6	0.7223
84	6.2	6.2	6.4	15.2	0.7038
85	6.6	6.6	6.8	14.8	0.6853
86	7.	7.	7.2	14.4	0.6668
87	7.4	7.4	7.6	14.	0.6482
88	7.8	7.8	8.	13.6	0.6297
89	8.2	8.2	8.4	13.2	0.6112
90	8.6	8.6	8.8	12.8	0.5927
91	9.	9.	9.2	12.4	0.5742

92	9.4	9.4	9.6	12.	0.5556
93	9.8	9.8	10.	11.6	0.5371


Field Hydraulic Conductivity Test June 21, 2000
Hvorslev Graph
Rutherford County Landfill
B-37 falling head
Time Lag = 970.2 seconds
Shape Factor = 5.192
Partial Penetration Case B
Analysis starts at time 0. seconds
Analysis ends at time 40. minutes
101 Measurements analyzed from 1 to 101
4 Points not plotted because head ratio <= 0.0
These points are not included in the analysis
Hydraulic Conductivity = 4.024e-005 cm/sec
Transmissivity = 5.703 ft2/day
Head Ratio (Hi/Ho)
1.
0.37
0.1
1.e-002
0
5
10
15
20
25
30
35
Time Lag
Adjusted Time (minutes)
Analysis by Starpoint Software
Ho is 29.7 feet at 0. seconds

Field Hydraulic Conductivity Test June 21, 2000 Bouwer and Rice Graph

Rutherford County Landfill B-37 falling head



Analysis by Starpoint Software

Ho is 29.7 feet at 0. seconds

Field Hydraulic Conductivity Test

Site Name: Rutherford County Landfill
Test Date: June 21, 2000
Import File: C:\Documents and Settings\David Garrett\Desktop\Rutherford Slug Data\B37S0

Well Label: B-37 falling head
Aquifer Thickness: 50. feet
Screen Length: 10. feet
Casing Radius: 1. inches
Effective Radius: 3. inches
Gravel Pack Porosity: 30. %
Corrected Casing Radius: 1.844 inches
Static Water Level: 29.7 feet
Water Table to Screen Bottom: 20.9 feet
Anisotropy Ratio: 1.
Time Adjustment: 0. Seconds
Test starts with trial 0
There are 101 time and drawdown measurements
Maximum head is 29.7 feet
Minimum head is -12.3 feet

Trial	Time (minutes)	Adjusted Time (minutes)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	0.	3.3e-003	29.7	1.
2	6.6e-003	6.6e-003	1.e-002	29.69	0.9998
3	1.33e-002	1.33e-002	1.66e-002	29.68	0.9996
4	2.e-002	2.e-002	2.33e-002	29.68	0.9993
5	2.66e-002	2.66e-002	3.e-002	29.67	0.9991
6	3.33e-002	3.33e-002	3.66e-002	29.66	0.9989
7	4.e-002	4.e-002	4.33e-002	29.66	0.9987
8	4.66e-002	4.66e-002	5.e-002	29.65	0.9984
9	5.33e-002	5.33e-002	5.66e-002	29.64	0.9982
10	6.e-002	6.e-002	6.33e-002	29.64	0.998
11	6.66e-002	6.66e-002	7.e-002	29.63	0.9978
12	7.33e-002	7.33e-002	7.66e-002	29.62	0.9975
13	8.e-002	8.e-002	8.33e-002	29.62	0.9973
14	8.66e-002	8.66e-002	9.e-002	29.61	0.9971
15	9.33e-002	9.33e-002	9.66e-002	29.6	0.9969
16	0.1	0.1	0.1033	29.6	0.9966
17	0.1066	0.1066	0.11	29.59	0.9964
18	0.1133	0.1133	0.1166	29.58	0.9962
19	0.12	0.12	0.1233	29.58	0.996
20	0.1266	0.1266	0.13	29.57	0.9957
21	0.1333	0.1333	0.1366	29.56	0.9955
22	0.14	0.14	0.1433	29.56	0.9953
23	0.1466	0.1466	0.15	29.55	0.9951
24	0.1533	0.1533	0.1566	29.54	0.9948
25	0.16	0.16	0.1633	29.54	0.9946
26	0.1666	0.1666	0.17	29.53	0.9944
27	0.1733	0.1733	0.1766	29.52	0.9942
28	0.18	0.18	0.1833	29.52	0.9939
29	0.1866	0.1866	0.19	29.51	0.9937
30	0.1933	0.1933	0.1966	29.5	0.9935
31	0.2	0.2	0.2033	29.5	0.9933
32	0.2066	0.2066	0.21	29.49	0.993
33	0.2133	0.2133	0.2166	29.48	0.9928
34	0.22	0.22	0.2233	29.48	0.9926

35	0.2266	0.2266	0.23	29.47	0.9924
36	0.2333	0.2333	0.2366	29.46	0.9921
37	0.24	0.24	0.2433	29.46	0.9919
38	0.2466	0.2466	0.25	29.45	0.9917
39	0.2533	0.2533	0.2566	29.44	0.9915
40	0.26	0.26	0.2633	29.44	0.9912
41	0.2666	0.2666	0.27	29.43	0.991
42	0.2733	0.2733	0.2766	29.42	0.9908
43	0.28	0.28	0.2833	29.42	0.9906
44	0.2866	0.2866	0.29	29.41	0.9903
45	0.2933	0.2933	0.2966	29.4	0.9901
46	0.3	0.3	0.3033	29.4	0.9899
47	0.3066	0.3066	0.31	29.39	0.9897
48	0.3133	0.3133	0.3166	29.38	0.9895
49	0.32	0.32	0.3233	29.38	0.9892
50	0.3266	0.3266	0.33	29.37	0.989
51	0.3333	0.3333	0.35	29.35	0.9883
52	0.3666	0.3666	0.3833	29.32	0.9872
53	0.4	0.4	0.4166	29.28	0.9861
54	0.4333	0.4333	0.45	29.25	0.985
55	0.4666	0.4666	0.4833	29.22	0.9838
56	0.5	0.5	0.5166	29.18	0.9827
57	0.5333	0.5333	0.55	29.15	0.9816
58	0.5666	0.5666	0.5833	29.12	0.9805
59	0.6	0.6	0.6166	29.08	0.9793
60	0.6333	0.6333	0.65	29.05	0.9782
61	0.6666	0.6666	0.6833	29.02	0.9771
62	0.7	0.7	0.7166	28.98	0.976
63	0.7333	0.7333	0.75	28.95	0.9749
64	0.7666	0.7666	0.7833	28.92	0.9737
65	0.8	0.8	0.8166	28.88	0.9726
66	0.8333	0.8333	0.85	28.85	0.9715
67	0.8666	0.8666	0.8833	28.82	0.9704
68	0.9	0.9	0.9166	28.78	0.9692
69	0.9333	0.9333	0.95	28.75	0.9681
70	0.9666	0.9666	0.9833	28.72	0.967
71	1.	1.	1.2	28.5	0.9597
72	1.4	1.4	1.6	28.1	0.9462
73	1.8	1.8	2.	27.7	0.9328
74	2.2	2.2	2.4	27.3	0.9193
75	2.6	2.6	2.8	26.9	0.9058
76	3.	3.	3.2	26.5	0.8924
77	3.4	3.4	3.6	26.1	0.8789
78	3.8	3.8	4.	25.7	0.8654
79	4.2	4.2	4.4	25.3	0.8519
80	4.6	4.6	4.8	24.9	0.8385
81	5.	5.	5.2	24.5	0.825
82	5.4	5.4	5.6	24.1	0.8115
83	5.8	5.8	6.	23.7	0.7981
84	6.2	6.2	6.4	23.3	0.7846
85	6.6	6.6	6.8	22.9	0.7711
86	7.	7.	7.2	22.5	0.7577
87	7.4	7.4	7.6	22.1	0.7442
88	7.8	7.8	8.	21.7	0.7307
89	8.2	8.2	8.4	21.3	0.7173
90	8.6	8.6	8.8	20.9	0.7038
91	9.	9.	9.2	20.5	0.6903

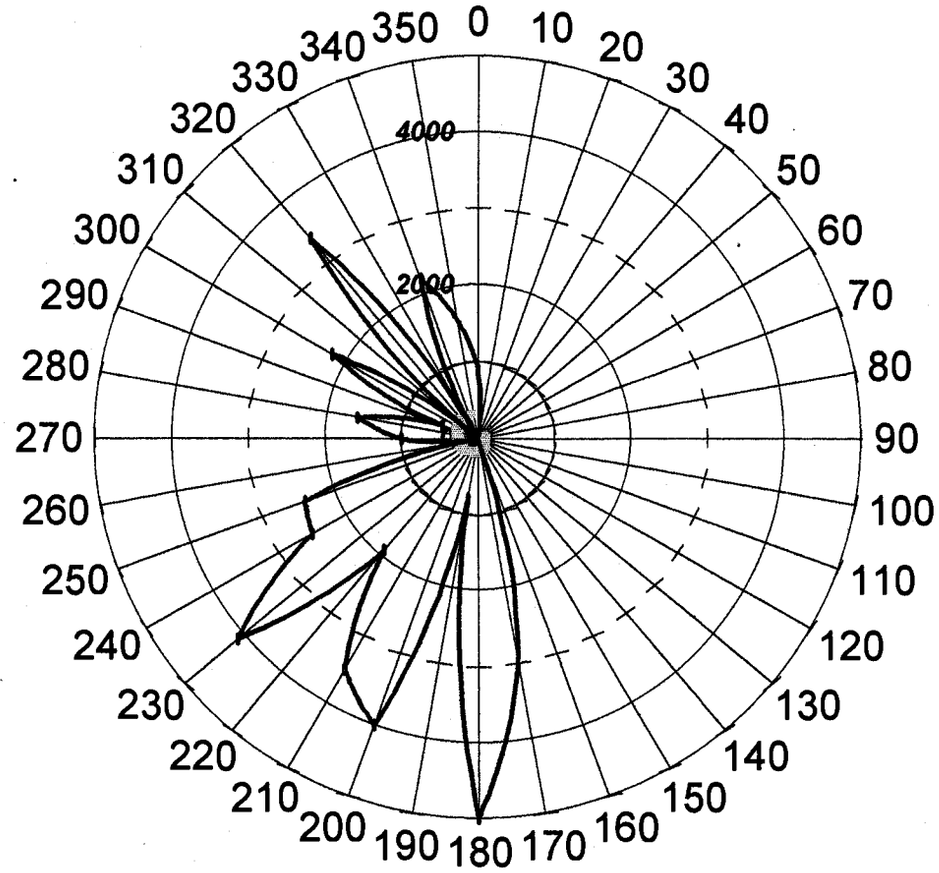
92	9.4	9.4	9.6	20.1	0.6768
93	9.8	9.8	10.	19.7	0.6634
94	12.	12.	14.	15.7	0.5287
95	16.	16.	18.	11.7	0.394
96	20.	20.	22.	7.7	0.2593
97	24.	24.	26.	3.7	0.1246
98	28.	28.	30.	-0.3	-1.01e-002
99	32.	32.	34.	-4.3	-0.1448
100	36.	36.	38.	-8.3	-0.2795
101	40.	40.	42.	-12.3	-0.4142

Appendix G

Fracture Trace Analysis

Cumulative Length, Blue-Line Features

Shows actual stream flow direction within half-mile radius.

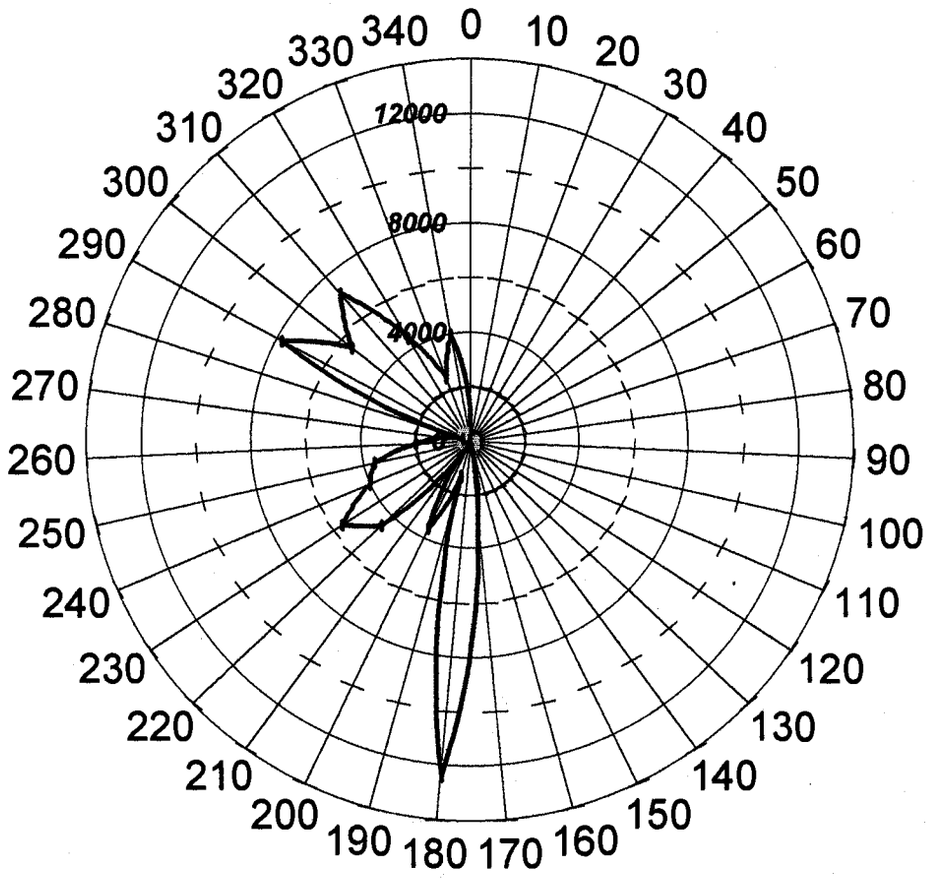


Data are plotted on even even 10-degree increments for preceeding intervals.

Fracture Trace Analysis

Cumulative Length, Blue-Line Features

Shows actual stream flow direction within 1-mile radius.

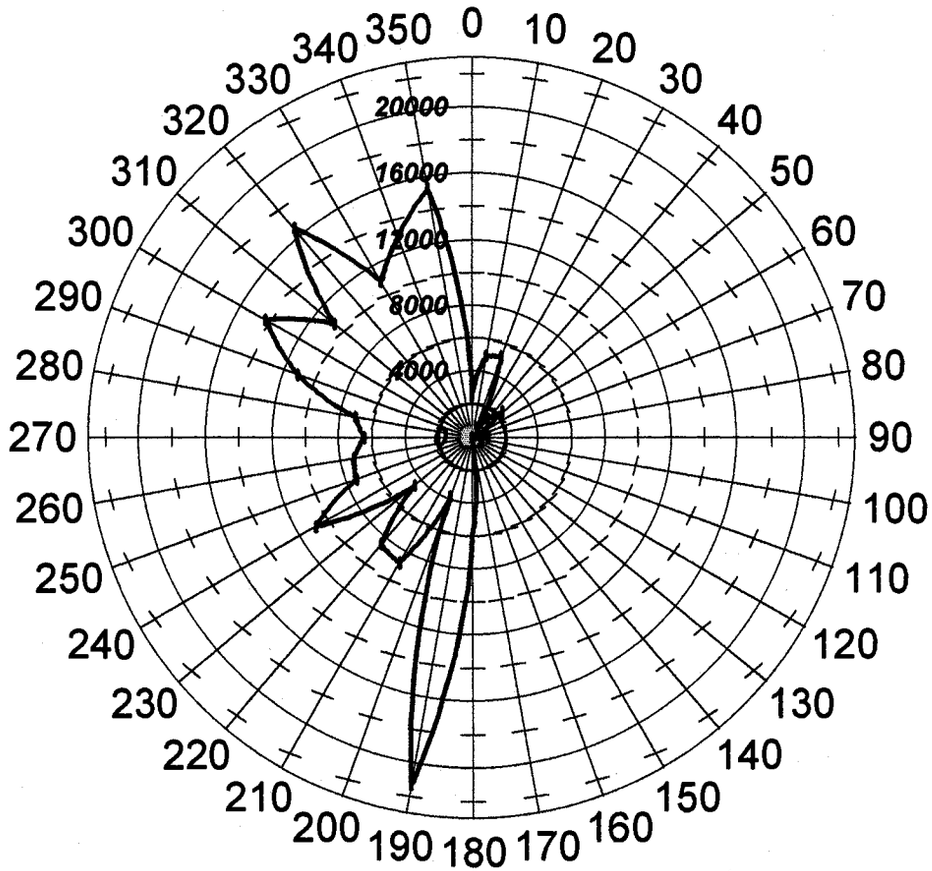


Data are plotted on even even 10-degree increments for preceeding intervals.

Fracture Trace Analysis

Cumulative Length, Blue-Line Features

Shows actual stream flow direction within 2-mile radius.

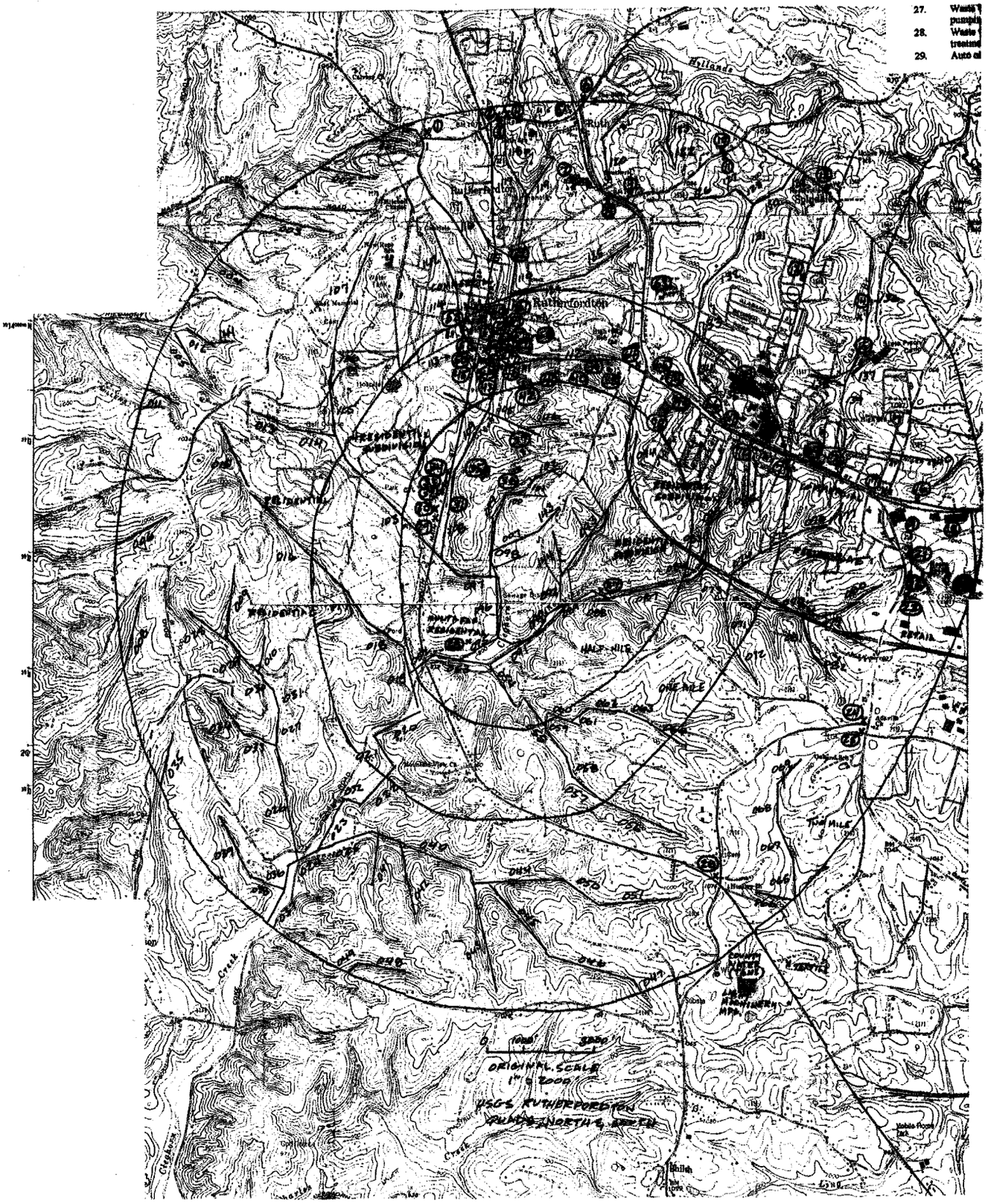


Data are plotted on even even 10-degree increments for preceeding intervals.

Fracture Trace Analysis – Blue-Line Streams within a Two-mile Region
Raw Data (See Topo Map)

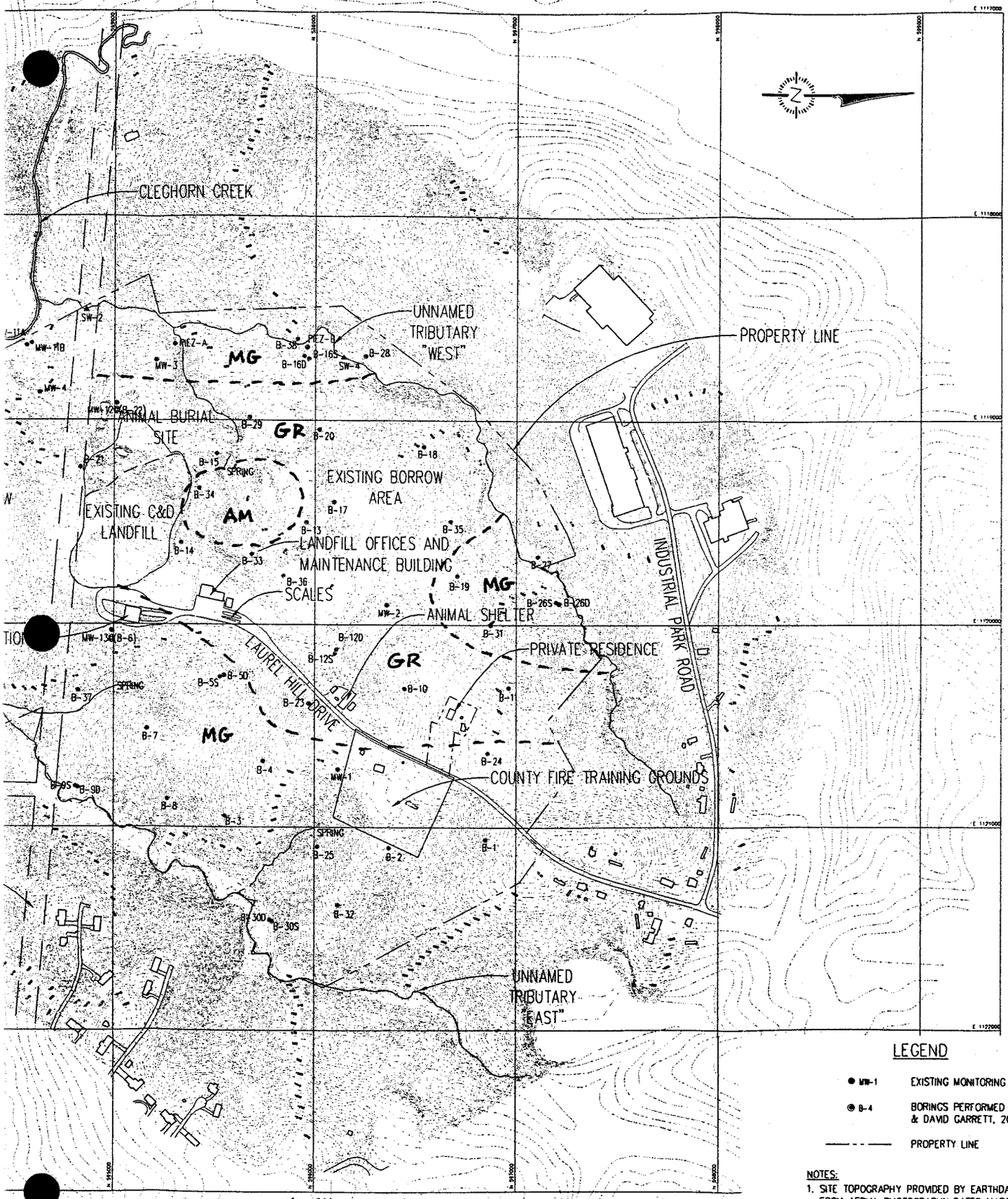
Orientation shows actual stream flow direction, as well as fracture direction, given in azimuth.

Segment	Length	Orientation	Segment	Length	Orientation	Segment	Length	Orientation	Segment	Length	Orientation
1	1000	272	37	1000	206	74	1000	230	111	1200	260
2	1500	282	38	1000	288	75	1300	242	112	2000	270
3	2000	285	39	2000	332	76	700	255	113	1700	320
4	1000	309	40	3000	292	77	800	216	114	1000	351
5	1200	330	41	1500	188	78	1500	280	115	1000	300
6	1500	240	42	2000	348	79	700	250	116	1500	335
7	1500	247	43	3500	350	80	1200	238	117	1000	330
8	2000	190	44	2500	269	81	1300	345	118	1200	180
9	2000	187	45	2700	320	82	700	320	119	1300	215
10	1000	191	46	2500	288	83	1200	184	120	1200	350
11	1000	292	47	400	280	84	700	221	121	1200	40
12	1000	304	48	1500	330	85	500	191	122	800	340
13	1500	292	49	400	215	86	500	225	123	800	9
14	1200	280	50	1200	308	87	2400	259	124	2200	255
15	1700	336	51	2000	265	88	500	300	125	1500	232
16	4000	317	52	800	230	89	1400	238	126	1000	81
17	1200	331	53	1600	284	90	800	210	127	300	40
18	1300	308	54	1400	330	91	1500	238	128	700	310
19	1800	348	55	2000	325	92	1000	180	129	700	30
20	1500	240	56	2500	295	93	3500	215	130	1000	61
21	1000	330	57	1000	310	94	1000	190	131	1500	20
22	1500	220	58	600	340	95	1200	240	132	1200	41
23	1500	205	59	400	181	96	2000	180	133	2200	12
24	1000	240	60	1000	298	97	1000	275	134	700	340
25	1500	250	61	600	222	98	1500	188	135	1000	320
26	3300	350	62	1000	280	99	800	200	136	2800	4
27	1000	183	63	800	298	100	500	250	137	1500	20
28	1300	309	64	1000	308	101	500	210	138	1000	280
29	1300	320	65	1000	180	102	700	250	139	500	10
30	700	319	66	1000	282	103	4500	318	140	1200	50
31	500	340	67	1200	340	104	800	340	141	700	260
32	500	290	68	1000	180	105	1500	355	142	2000	340
33	1000	290	69	1000	220	106	1500	190	143	900	221
34	1300	322	70	2200	307	107	2700	203	144	1200	348
35	1500	195	71	1000	350	108	2500	190	145	3000	295
36	900	188	72	1500	326	109	2300	210	146	1200	250
37	1000	206	73	900	10	110	5800	190			



SEE FIGURE S1 IN THE PROJECT DRAWINGS.

Appendix H



AM - Amphibolite
MG - Mica Gneiss
GR - Granitic Gneiss } Interfingered Contact
---- Inferred Geologic Contact

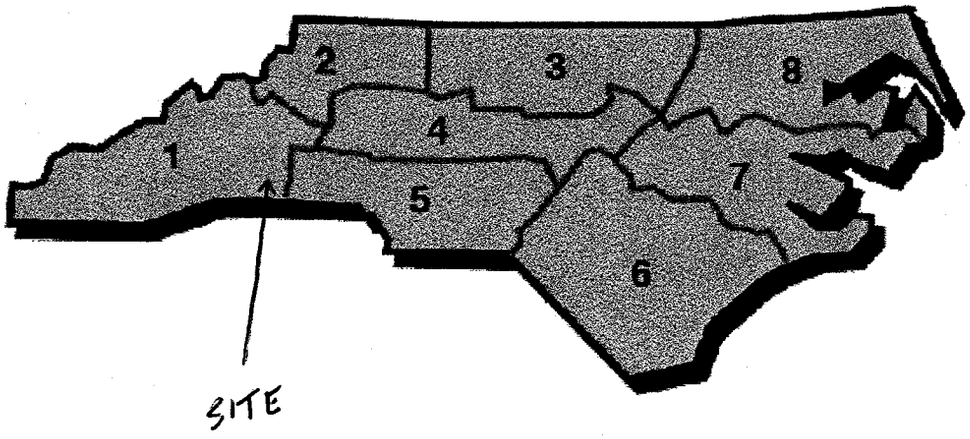
LEGEND

● MW-1	EXISTING MONITORING WELLS
◉ B-4	BORINGS PERFORMED BY GNRA, 1999 & DAVID GARRETT, 2000
—— - - ——	PROPERTY LINE

NOTES:

1. SITE TOPOGRAPHY PROVIDED BY EARTHDATA INTERNATIONAL FROM AERIAL PHOTOGRAPHY DATED MARCH 30, 1999. SUPPLEMENTAL TOPOGRAPHY AROUND SITE PERIMETER OBTAINED FROM USGS MAPPING WITH SOME ADJUSTMENTS MADE TO TIE INTO EARTHDATA TOPOGRAPHY.

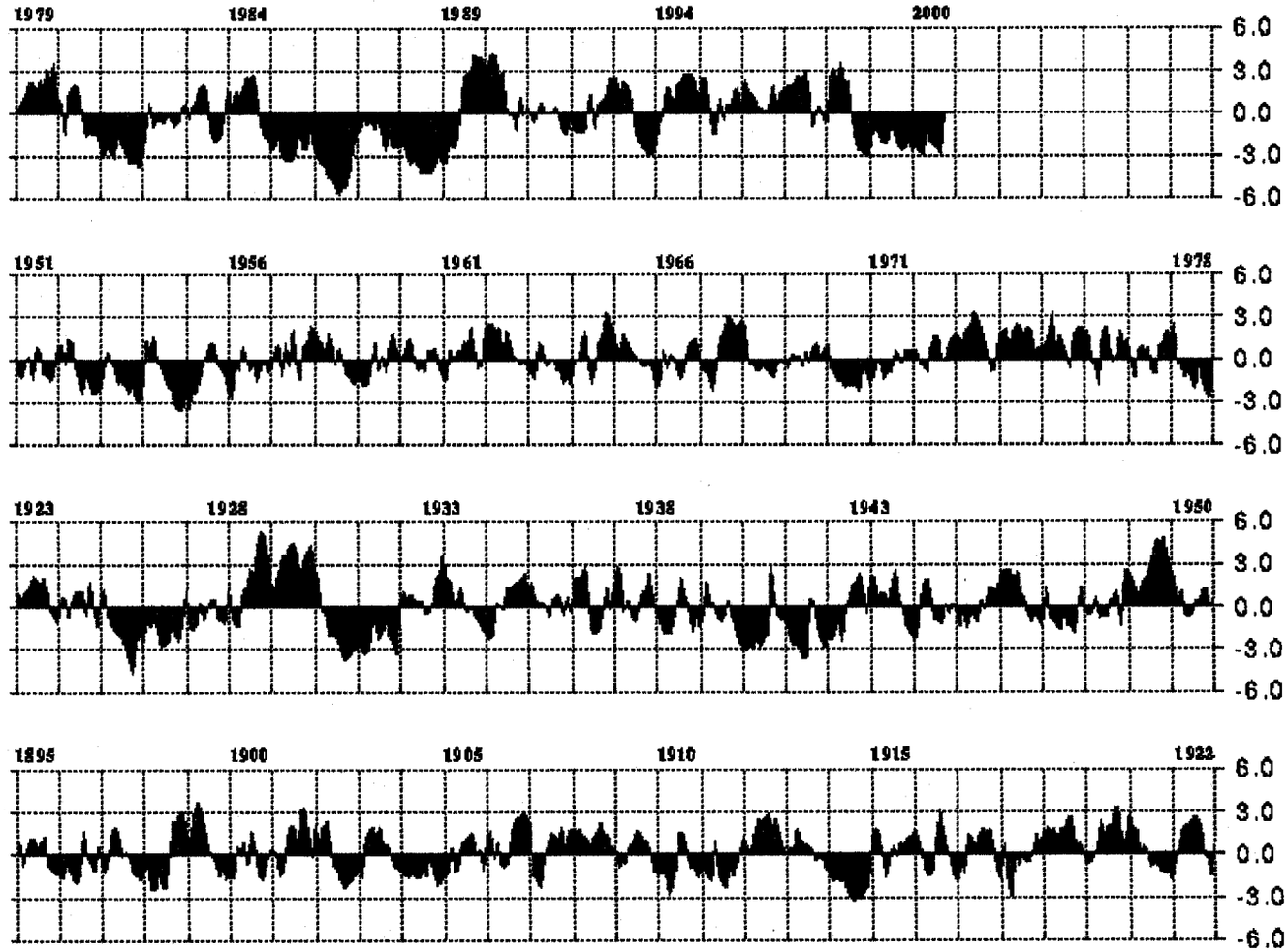
0 300' 600' 900'


1
2
3
4
5
6
7
8
SITE

Explanation of Palmer Index Values

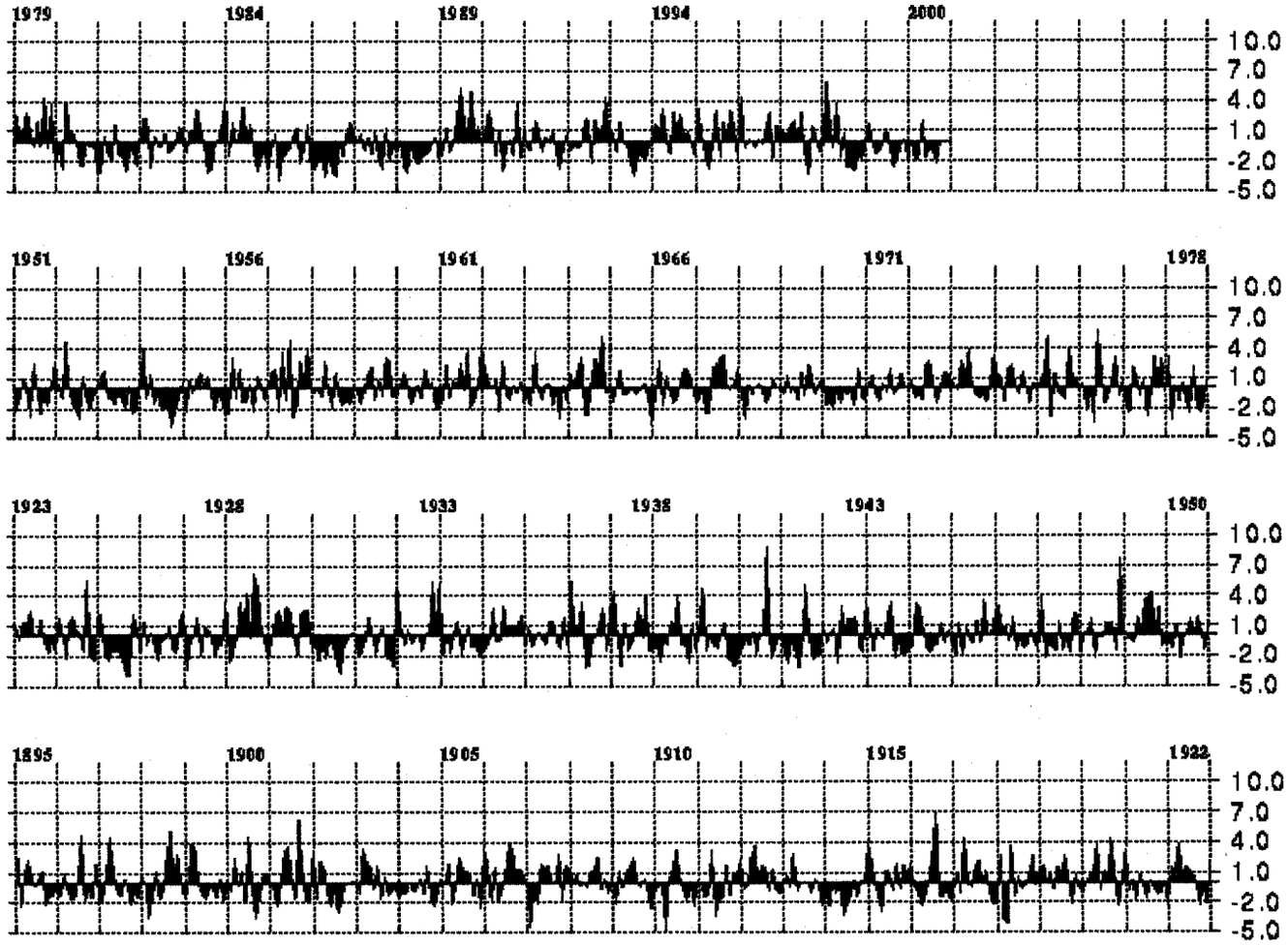
Range PMDI			Range Z	
3.00	3.99	Severe Wetness	2.5	3.49
1.50	2.99	Mild to Moderate Wetness	1	2.49
-1.49	1.49	Near Normal	-1.24	0.99
-1.50	-2.99	Mild to Moderate Drought	-1.25	-1.99
-3.00	-3.99	Severe Drought	-2	-2.74
<4.00		Extreme Drought	<-2.75	

Modified Palmer Drought Severity Index



North Carolina - Division 01: 1895-2000 (Monthly Averages)

Palmer Z Index



North Carolina - Division 01: 1895-2000 (Monthly Averages)

Historic Ground Water Quality Monitoring Results
Closed MSW Landfill and C&D Landfill

*Not considered representative – slow recharge rate

Data Collected and Reported by BPA Environmental & Engineering, Inc., Greensboro, NC

MW-2 is the background well

All results in mille grams per liter (ppm)

Constituent	Well No.	MW-2	MW-3	MW-4	MW-6	MW-7	MW-8	MW-9	MW-10A*	MW-10B	MW-10C	MW-10D	MW-11A	MW-11B	2L Std.	PQL
	Grd. Elev	995.43	859.62	849.72	833.43	890.51	857.86	864.97	834.73	834.50	834.50	834.73	815.39	816.02		
	Bot. Elev	935.43	812.62	799.72	795.93	836.51	813.36	827.47	733.73	797.50	818.50	768.73	770.39	796.32		
	Depth	60.00	47.00	50.00	37.50	54.00	44.50	37.50	101.00	37.00	16.00	66.00	45.00	19.70		
Water Elevation	03/23/99	952.06	827.41	816.45	804.44	857.84	818.71	834.60	764.55	827.87	828.27	828.12	808.77	808.03		
	09/23/99	949.53	825.80	814.39	803.71	855.83	817.16	832.61	792.09	826.20	826.60	826.31	807.55	806.68		
	03/08/00	947.84	826.80	815.43	803.51	856.81	817.08	832.63	806.87	826.69	827.10	826.88	808.25	807.46		
	09/20/00	947.43	826.17	814.66	803.47	855.89	816.85	831.87	817.13	826.05	826.48	826.20	807.80	806.98		
	04/11/01	945.63	827.04	815.99	803.81	858.30	818.87	832.37	822.81	826.96	827.41	827.38	808.53	807.77		
Antimony	03/23/99															
	09/23/99															
	03/08/00													0.016		
	09/20/00															
	04/11/01															
Arsenic	03/23/99														0.05	0.01
	09/23/99															
	03/08/00															
	09/20/00				0.012								0.01			
	04/11/01	0.016		0.01	0.01									0.015		
Barium	03/23/99				0.65	0.72								1.3	2	0.5
	09/23/99				0.56									1.8		
	03/08/00				0.7						0.78			1.5		
	09/20/00				0.68						1			0.58		
	04/11/01	1.4			0.63			0.52			0.95			1		
Beryllium	03/23/99					0.01								0.005		0.002
	09/23/99							0.002			0.002			0.003		
	03/08/00				0.002			0.003			0.003			0.013		
	09/20/00							0.003			0.003			0.002		
	04/11/01	0.01						0.0057			0.0033			0.0066		
Cadmium	03/23/99				[illegible]	0.014	0.002	0.002		0.001		0.001	0.001	0.004	0.005	0.001
	09/23/99	0.001	0.002	0.003	[illegible]		0.002	0.004		0.004	0.004			0.001		
	03/08/00				[illegible]	0.003		0.004		0.001	0.004			[illegible]		
	09/20/00	0.001	0.002		[illegible]			[illegible]			[illegible]			0.004		
	04/11/01	[illegible]		0.0019	[illegible]		0.001	[illegible]		0.0012	[illegible]			[illegible]		
Chromium	03/23/99				[illegible]	0.11	0.016	[illegible]					0.011	[illegible]	0.05	0.01
	09/23/99				0.021			[illegible]		0.013	0.031					
	03/08/00	[illegible]			[illegible]	0.047		[illegible]		0.02	[illegible]			[illegible]		
	09/20/00				[illegible]			[illegible]			[illegible]			0.029		
	04/11/01	0.22			[illegible]		0.014	[illegible]			[illegible]			[illegible]		

Constituent	Well No.	MW-2	MW-3	MW-4	MW-6	MW-7	MW-8	MW-9	MW-10A*	MW-10B	MW-10C	MW-10D	MW-11A	MW-11B	2L Std.	PQL
Cobalt	03/23/99				0.11	0.097	0.027	0.012		0.015			0.014	0.043		0.01
	09/23/99				0.085	0.011		0.022		0.018	0.021			0.016		
	03/08/00				0.11	0.041		0.031		0.016	0.038			0.12		
	09/20/00				0.1			0.034			0.046			0.019		
	04/11/01	0.19			0.094			0.061			0.05			0.064		
Copper	03/23/99														1	0.2
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01	0.43														
Lead	03/23/99				[illegible]	0.014								[illegible]	0.015	0.01
	09/23/99				0.01											
	03/08/00				[illegible]			0.011			[illegible]			[illegible]		
	09/20/00		0.013		[illegible]			0.014			[illegible]			[illegible]		
	04/11/01	[illegible]		0.014	[illegible]			[illegible]			[illegible]			[illegible]		
Nickel	03/23/99														0.1	0.05
	09/23/99															
	03/08/00				0.051			0.059						[illegible]		
	09/20/00							0.061								
	04/11/01	[illegible]						[illegible]			0.053			0.1		
Selenium	03/23/99														0.05	0.02
	09/23/99															
	03/08/00													0.02		
	09/20/00															
	04/11/01															
Silver	03/23/99														0.018	0.01
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Thallium	03/23/99															0.01
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Vanadium	03/23/99				0.086	0.58	0.05	0.055						0.11		0.04
	09/23/99							0.093			0.06					
	03/08/00				0.16	0.15		0.18		0.042	0.18			0.57		
	09/20/00				0.089			0.16			0.17			0.068		
	04/11/01	0.5			0.08			0.34			0.18			0.25		
Zinc	03/23/99				0.12	0.31	0.055						0.069	0.16	2.1	0.05
	09/23/99							0.083			0.068			0.064		
	03/08/00				0.22	0.1		0.12		0.085	0.16			0.39		
	09/20/00				0.16			0.08			0.15			0.07		
	04/11/01	0.66			0.15			0.16			0.18			0.27		

All results in micro grams per liter (ppb)

Constituent	Well No.	MW-2	MW-3	MW-4	MW-6	MW-7	MW-8	MW-9	MW-10A*	MW-10B	MW-10C	MW-10D	MW-11A	MW-11B	2L Std.	PQL
1,1,1,2-Tetrachloroethane	03/23/99															5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
1,1,1-Trichloroethane	03/23/99														200	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
1,1,2,2-Tetrachloroethane	03/23/99															5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
1,1,2-Trichloroethane	03/23/99															5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
1,1-Dichloroethane	03/23/99					28				9.2		28			700	5
	09/23/99					18				6.3		23				
	03/08/00					14						26				
	09/20/00					15						26				
	04/11/01					14						20				
1,1-Dichloroethene	03/23/99														7	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
1,2,3-Trichloropropane	03/23/99							[illegible]							0.005	15
	09/23/99						[illegible]									
	03/08/00							[illegible]								
	09/20/00															
	04/11/01															
1,2-Dibromo-3-Chloropropane															0.025	25
	09/23/99															

Constituent	Well No.	MW-2	MW-3	MW-4	MW-6	MW-7	MW-8	MW-9	MW-10A*	MW-10B	MW-10C	MW-10D	MW-11A	MW-11B	2L Std.	PQL
1,2-Dibromoethane	03/23/99														0.0004	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
1,2-Dichlorobenzene	03/23/99														620	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
1,2-Dichloroethane	03/23/99														0.38	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
1,2-Dichloropropane	03/23/99							[redacted]							0.56	5
	09/23/99						[redacted]									
	03/08/00							[redacted]								
	09/20/00							[redacted]								
	04/11/01							[redacted]								
1,4-Dichlorobenzene	03/23/99				17								7.4		75	5
	09/23/99			7.6	26											
	03/08/00			5.5	22											
	09/20/00			7.8	22											
	04/11/01			8.2	29								6.7			
2-Butanone	03/23/99														170	100
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
2-Hexanone	03/23/99															50
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
4-Methyl-2-Pentanone	03/23/99															100
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															

Constituent	Well No.	MW-2	MW-3	MW-4	MW-6	MW-7	MW-8	MW-9	MW-10A*	MW-10B	MW-10C	MW-10D	MW-11A	MW-11B	2L Std.	PQL
Acetone	03/23/99														700	100
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Acrylonitrile	03/23/99															200
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Benzene	03/23/99														1	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Bromochloromethane	03/23/99															5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Bromodichloromethane	03/23/99														0.6	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Bromoform	03/23/99														0.19	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Bromomethane	03/23/99															10
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Carbon Disulfide	03/23/99									100					700	100
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Carbon Tetrachloride	03/23/99														0.3	10
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															

Constituent	Well No.	MW-2	MW-3	MW-4	MW-6	MW-7	MW-8	MW-9	MW-10A*	MW-10B	MW-10C	MW-10D	MW-11A	MW-11B	2L Std.	PQL
Chlorobenzene	03/23/99			9.7	[redacted]								15		50	5
	09/23/99			15	[redacted]								7.2			
	03/08/00			12	44											
	09/20/00			14	[redacted]											
	04/11/01			17	[redacted]								14			
Chloroethane	03/23/99					18									2800	10
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Chloroform	03/23/99														0.19	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Chloromethane															2.6	10
	09/23/99															
cis-1,2-Dichloroethene	03/23/99				8.4								18	7.9	70	5
	09/23/99			5.7	9.9							22	5.3			
	03/08/00				6.6							20				
	09/20/00				9.5							23				
	04/11/01				8.6							20				
cis-1,3-Dichloropropene	03/23/99														0.2	10
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Dibromochloromethane	03/23/99															5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Dibromomethane	03/23/99															10
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Ethylbenzene	03/23/99														29	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															

Constituent	Well No.	MW-2	MW-3	MW-4	MW-6	MW-7	MW-8	MW-9	MW-10A*	MW-10B	MW-10C	MW-10D	MW-11A	MW-11B	2L Std.	PQL
Iodomethane	03/23/99															10
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Methylene Chloride	03/23/99											[redacted]			5	10
	09/23/99											[redacted]				
	03/08/00											[redacted]				
	09/20/00											[redacted]				
	04/11/01											[redacted]				
Styrene	03/23/99														100	10
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Tetrachloroethene	03/23/99											[redacted]			0.7	5
	09/23/99											[redacted]				
	03/08/00											[redacted]				
	09/20/00											[redacted]				
	04/11/01											[redacted]				
Toluene	03/23/99														1000	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Trans-1,2-Dichloroethene	03/23/99														70	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Trans-1,3-Dichloropropene	03/23/99														0.2	10
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Trans-1,4-Dichloro-2-Butene	03/23/99															100
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Trichloroethene	03/23/99											[redacted]			2.8	5
	09/23/99											[redacted]				
	03/08/00											[redacted]				
	09/20/00											[redacted]				
	04/11/01											[redacted]				

Constituent	Well No.	MW-2	MW-3	MW-4	MW-6	MW-7	MW-8	MW-9	MW-10A*	MW-10B	MW-10C	MW-10D	MW-11A	MW-11B	2L Std.	PQL
Trichlorofluoromethane	03/23/99														2100	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Vinyl Acetate	03/23/99															50
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															
Vinyl Chloride	03/23/99				[redacted]										0.015	10
	09/23/99															
	03/08/00				[redacted]											
	09/20/00				[redacted]											
	04/11/01				[redacted]											
Xylene (total)	03/23/99														530	5
	09/23/99															
	03/08/00															
	09/20/00															
	04/11/01															

Listing of Concentrations of Variables of Stream Sediment, Stream Water, and Groundwater for the Gastonia 30 x 60 - Minute Quadrangle -NURE Database

by
Robert H. Carpenter and Jeffrey C. Reid

INTRODUCTION

This report is a compilation of geochemical data for stream sediment and groundwater for the Gastonia 30 x 60 - minute quadrangle (Figure 1). Maps and tables were prepared from statewide data obtained by the Savannah River Laboratory under sponsorship of the U.S. Dept. of Energy in its National Uranium Resources Evaluation (NURE) program (Sargent and others, 1982). Sampling and analysis were performed during the period 1976 - 1980.

Because of the large size of the database, the North Carolina Geological Survey is presenting the database in both statewide and 30 x 60 - minute quadrangle formats. Statewide formats currently available include atlases of stream sediment and hydrogeochemical data which contain maps showing quartile distribution of concentrations of variables (Reid, 1991; Reid, 1993). Reid and Carpenter (1993a, 1993b) present listings of concentrations of variables which equal or exceed the 90th percentile (and pH and conductivity below the 10th percentile) for stream sediment and groundwater-stream water.

This open-file report is part of a series of reports that present sample-location maps and listings of analyses of all variables in all of the 30 x 60 - minute quadrangles that comprise the state of North Carolina. Subsequent reports will review the NURE data for individual 30 x 60 - minute quadrangles. These reviews will contain the following: 1) maps showing concentrations of all the variables in up to eight class intervals; 2) geologic review of the quadrangle and discussion of relationship of geochemical variables to rock units and structural features; 3) review of mineral resources and discussion of relationship of geochemical variables to mineral occurrences; and 4) discussion of outliers that may relate to anthropogenic contamination.

In this report, site-location maps use state boundaries, county boundaries and 7-1/2 - minute quadrangle boundaries as references to site-locations. The North Carolina Index to Topographic and Other Map Coverage, prepared by the U.S. Geological Survey, is a useful reference document. The List of Publications of the North Carolina Geological Survey indicates areas within the state for which some geologic and geophysical maps, and reports, are available.

Listings in this report are in the same basic format as those presented in microfiche by Sargent

Reid, Jeffrey C., and Carpenter, Robert H.,1993a, Listings of concentrations (stream sediments) of variables which equal or exceed the 90th percentile, and pH and conductivity below the 10th percentile in the North Carolina portion of the NURE database: North Carolina Geological Survey, Open-File Report 93-1, introductory text plus 178 pages of data.

Reid, Jeffrey C., and Carpenter, Robert H., 1993b, Listing of concentrations (groundwater and stream water) of variables which equal or exceed the 90th percentile, and pH and conductivity below the 10th percentile in the North Carolina portion of the NURE data base: North Carolina Geological Survey, Open-File Report 93-2, introductory text plus 162 pages of data.

Sargent, K.A., Cook, J.R., and Fay, W.M., 1982, Data report: North and South Carolina, National Uranium Resource Evaluation Program, Hydrochemical and stream sediment reconnaissance: E.I. du Pont de Nemours & Co., Savannah River Laboratory, Aiken, S.C., under contract to the U.S. Dept of Energy, contract DE-AC09-76SR000001 (DPST-81-146-22; GBJX-102), 45 p. plus microfiche.

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COUNTY CODES

Code	County
CV	Cleveland
GA	Gaston
LI	Lincoln
PO	Polk
RU	Rutherford

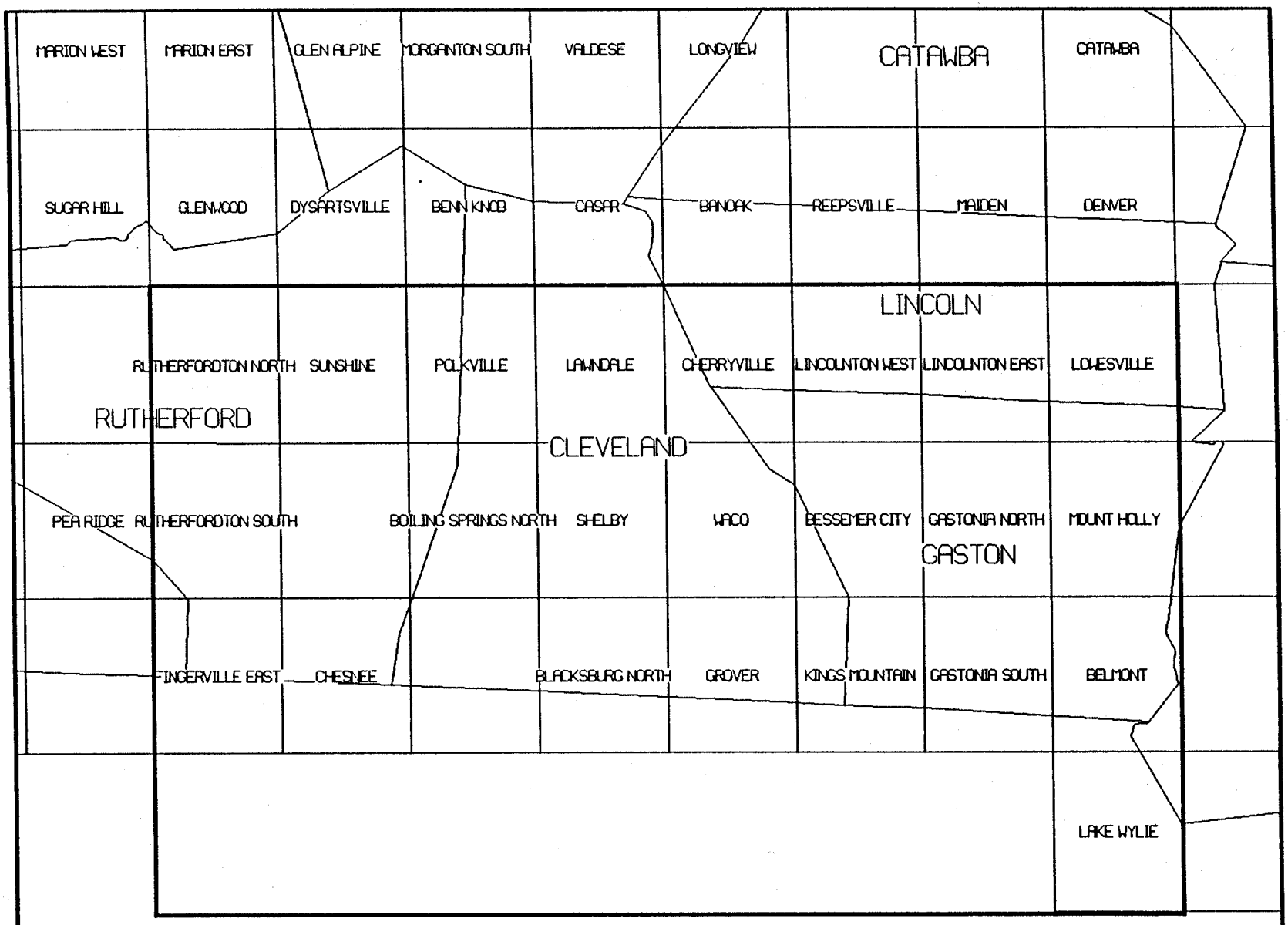
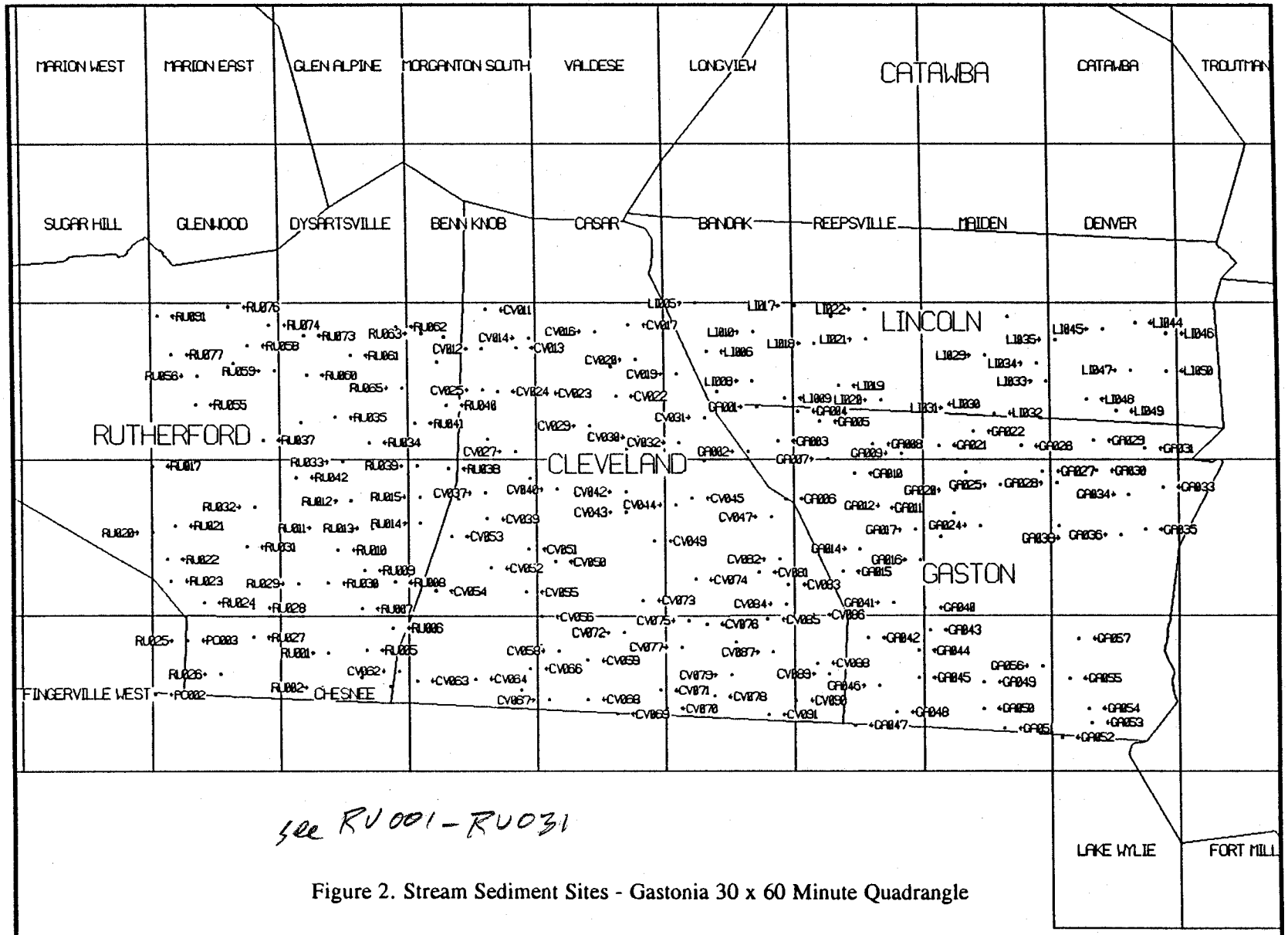


Figure 1. Map Showing Outlines of Gastonia 30 x 60 Minute Quadrangle and Contained 7 - 1/2 Minute Quadrangles.



see RU001 - RU031

Figure 2. Stream Sediment Sites - Gastonia 30 x 60 Minute Quadrangle

see RU001 - 031

GASTONIA 100K QUADRANGLE - STREAM SEDIMENTS

Lab #	County ID	Lat	Long	pH	Cond um/cm	U ppm	Th ppm	Hf ppm	Al ppm	Ce ppm	Fe ppm	Mn ppm	Na ppm	Sc ppm	Ti ppm	V ppm	Dy ppm	Eu ppm	La ppm	Sm ppm	Yb ppm	Lu ppm	Au ppm
3504	LI006	35.4610	81.4587	6.7	67	7.4	52	16	69200	269	12700	140	2300	3.1	7000	120	4.3	-1.0	160	49	4.8	-0.2	
3505	LI007	35.4293	81.4489	7.3	43	14.9	21	44	25600	97	-5000	M	M	4.9	M	M	10.6	-1.0	M	3	M	M	
3506	LI008	35.4377	81.4144	6.8	35	17.9	243	39	44600	1098	45900	170	400	8.5	9600	70	11.8	3.7	593	135	12.3	0.7	
3507	LI009	35.4239	81.3835	7.2	40	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
3508	LI010	35.4767	81.4129	7.2	42	14.6	202	44	44700	897	45600	380	M	10.3	10700	100	9.6	7.0	429	97	8.7	1.1	0.103
3514	LI016	35.4887	81.3377	7.4	40	19.6	263	134	47100	1303	64100	790	1800	16.6	25200	160	11.2	M	672	135	13.6	1.5	
3515	LI017	35.4976	81.3730	6.8	39	11.4	100	80	42400	424	31800	470	1100	5.9	17300	90	8.9	M	220	35	4.4	0.8	
3516	LI018	35.4676	81.3540	7.0	31	11.9	175	43	43300	852	19700	160	400	6.8	10700	80	8.7	M	447	76	8.3	1.1	0.056
3517	LI019	35.4339	81.3310	7.5	49	10.3	79	92	37400	367	35400	810	900	6.5	26000	110	8.2	4.8	222	35	6.6	0.9	
3518	LI020	35.4229	81.2897	7.5	70	7.6	16	36	35100	53	71400	1910	6900	11.6	20900	70	6.9	-1.7	30	14	5.5	0.6	
3519	LI021	35.4710	81.3040	7.1	51	5.9	16	146	45200	147	32900	730	3500	7.9	19500	100	6.0	9.6	55	9	8.2	1.2	
3520	LI022	35.4947	81.3047	7.6	58	14.3	64	415	35600	363	127500	3300	2500	12.0	M	220	11.4	-1.0	152	30	21.1	3.5	
3526	LI028	35.4928	81.2322	7.2	24	8.2	22	6	33000	109	31800	450	1900	6.1	6000	20	3.3	2.4	60	16	2.9	0.6	
3527	LI029	35.4582	81.1880	7.5	55	4.1	12	17	37800	-20	20700	380	5600	7.2	2700	50	1.3	3.7	24	4	M	-0.2	
3528	LI030	35.4196	81.2384	7.3	80	1.8	-2	6	36000	92	69000	670	10100	24.1	8300	100	2.0	-1.0	24	12	M	0.4	
3529	LI031	35.4164	81.2160	7.7	62	2.1	M	17	33500	8	-5000	1200	400	12.9	13500	100	3.8	-1.0	M	M	M	M	
3530	LI032	35.4124	81.1786	7.5	51	1.6	-2	6	40500	-20	19900	290	1800	9.0	4800	60	2.4	-1.0	M	M	M	0.6	
3531	LI033	35.4376	81.1279	7.1	45	7.7	37	62	32000	86	18500	610	2700	3.9	6200	60	3.6	0.9	60	78	2.8	-0.2	
3532	LI034	35.4517	81.1371	7.3	49	5.1	25	26	15100	40	17800	80	1100	4.3	1500	10	0.7	0.7	39	9	M	M	
3533	LI035	35.4708	81.1183	7.2	55	10.5	4	81	M	M	-5000	M	M	5.8	M	M	4.0	0.6	26	M	M	M	
3534	LI036	35.4892	81.1650	7.5	43	3.6	6	13	20900	-20	56200	320	1100	11.0	4000	30	1.7	-1.0	163	M	M	-0.3	
3542	LI044	35.4842	81.0403	7.7	80	6.7	17	45	55500	63	41300	700	7700	9.0	4200	70	M	2.2	72	M	4	M	
3543	LI045	35.4791	81.0727	7.7	65	8.8	25	104	35200	67	24700	700	6400	5.6	5500	70	M	-1.0	M	M	9.8	-0.2	
3544	LI046	35.4756	81.0103	7.8	94	9.3	23	91	49300	90	22100	510	7200	10.2	4900	70	1.7	2.0	96	M	M	-0.3	
3545	LI047	35.4464	81.0454	7.6	85	2.7	M	26	M	7	-5000	M	M	0.6	M	M	0.4	0.7	M	M	M	M	
3546	LI048	35.4233	81.0889	7.5	52	1.6	3	5	31300	20	23300	620	10300	5.9	5800	60	1.7	-1.0	M	M	M	0.5	0.156
3547	LI049	35.4139	81.0601	7.5	55	5.4	14	56	23900	78	18800	560	4600	5.6	6200	40	2.4	1.5	54	6	4.5	0.4	
3548	LI050	35.4458	81.0106	7.7	103	28.7	77	558	44900	245	68900	1370	7200	22.3	10100	190	2.9	4.4	M	M	19.5	2.9	
4735	PO002	35.1869	81.9970	7.1	35	15.9	122	71	19300	547	49400	1640	M	9.9	32600	160	32.4	5.0	286	37	20.3	2.3	
4736	PO003	35.2307	81.9655	7.3	28	42.4	217	256	49300	1216	46000	1610	3400	28.6	22900	220	48.5	3.7	583	127	28.6	3.8	
5233	RU001	35.2205	81.8281	7.6	20	36.7	78	66	50100	385	13800	380	2800	5.2	5700	50	31.7	7.2	183	43	12.3	1.3	0.087
5234	RU002	35.1927	81.8349	7.1	23	43.7	241	33	19100	1090	25000	240	500	7.5	3700	20	25.5	2.0	610	115	23.2	3.2	
5235	RU003	35.2002	81.7964	6.9	18	57.7	208	20	23500	1051	24400	100	600	7.5	1400	30	24.3	1.5	550	110	21	2.5	
5236	RU004	35.1931	81.7687	7.4	16	32.5	197	26	22000	878	22500	120	300	4.2	2700	20	17.6	-1.0	363	66	19.1	2.2	

GASTONIA 100K QUADRANGLE - STREAM SEDIMENTS

Lab #	County ID	Lat	Long	pH	Cond um/cm	U ppm	Th ppm	Hf ppm	Al ppm	Ce ppm	Fe ppm	Mn ppm	Na ppm	Sc ppm	Ti ppm	V ppm	Dy ppm	Eu ppm	La ppm	Sm ppm	Yb ppm	Lu ppm	Au ppm
5237	RU005	35.2227	81.7913	7.1	30	28.4	40	138	71300	156	11200	280	5400	6.2	2800	30	11.7	1.7	87	19	10.6	1.8	
5238	RU006	35.2405	81.7657	7.0	19	26.2	152	39	44800	690	14300	310	2400	5.6	5800	40	15.4	10.5	378	68	13.9	1.4	
5239	RU007	35.2559	81.7954	6.7	19	34.6	83	56	32800	385	18600	130	1600	7.2	1900	30	13.5	-1.2	177	41	14.9	2.6	
5240	RU008	35.2771	81.7632	7.1	30	4.5	35	16	32700	158	16100	120	800	3.3	2900	40	5.9	2.4	92	10	5.7	0.4	
5241	RU009	35.2867	81.7931	7.1	38	11.2	M	17	33400	M	M	130	900	15.4	1300	40	4.5	M	2	M	M	M	
5242	RU010	35.3031	81.8185	7.0	31	86.8	486	62	61400	1861	26600	820	2500	6.7	22000	80	52.9	M	1020	209	42.3	4.6	
5243	RU011	35.3208	81.8315	7.3	45	19.9	96	29	26200	428	14600	200	1100	4.9	4100	30	8.5	2.8	202	41	7.7	0.8	
5244	RU012	35.3419	81.8055	7.3	20	24.9	236	50	29200	1017	27200	400	600	4.5	8600	40	36.3	-1.9	573	85	16.5	2.3	0.122
5245	RU013	35.3204	81.7849	7.3	21	13.7	79	24	18800	384	10000	70	400	4.3	1500	20	8.9	-1.0	222	43	3.7	0.6	
5246	RU014	35.3244	81.7383	7.1	18	11.4	108	27	19400	528	23000	70	300	5.9	2500	20	4.6	1.7	280	42	7.1	0.6	
5247	RU015	35.3453	81.7386	7.2	22	22.6	148	46	24600	748	15500	210	600	4.4	3600	40	26.7	2.6	334	76	11.2	1.4	
5249	RU017	35.3702	81.9990	7.5	22	52.2	97	879	26100	329	62200	890	1800	28.4	10100	140	15.3	3.5	177	43	23	4.1	
5252	RU020	35.3170	81.9988	7.3	20	22.7	115	230	19000	542	47900	320	1900	20.1	3100	40	15.5	6.1	289	55	23.9	3.3	
5253	RU021	35.3225	81.9769	7.3	25	25.2	183	134	15000	961	44800	410	1200	8.4	5200	60	20.2	4.6	417	100	14.8	1.8	0.083
5254	RU022	35.2959	81.9849	7.3	31	31.6	292	85	18300	-20	56300	490	1000	14.2	5400	60	25.3	6.1	832	M	15.9	2.5	
5255	RU023	35.2784	81.9812	7.5	23	51.2	439	174	12200	2276	57600	690	300	8.8	13700	50	40.9	15.6	1150	230	23.4	2.6	
5256	RU024	35.2610	81.9495	7.3	10	44.1	334	50	32200	1491	14400	340	1200	6.2	7800	50	47.7	4.4	817	150	39.8	4.5	
5257	RU025	35.2304	81.9657	7.1	15	17.1	101	44	38400	479	18600	900	1500	9.9	13600	80	27.7	1.5	220	53	12.3	1	
5258	RU026	35.2034	81.9331	7.2	12	25.4	147	21	19000	616	16800	110	800	6.1	1700	20	13.9	-1.0	366	62	13	1.9	
5259	RU027	35.2330	81.9014	7.2	27	24.2	108	68	26200	495	17000	160	1800	3.9	1600	10	7.7	3.1	245	22	8.1	0.9	
5260	RU028	35.2568	81.9009	7.2	11	19.1	132	22	21400	587	13800	210	900	5.2	3800	40	15.8	2.8	355	60	13.6	1	
5261	RU029	35.2763	81.8575	7.1	12	47.4	165	59	17900	664	10300	80	900	2.5	1400	10	14.2	-1.0	327	80	7.6	1	
5262	RU030	35.2765	81.8283	7.0	18	29.1	184	19	83300	720	23600	350	M	8.2	4800	100	13.6	2.0	396	417	11.2	1.5	
5263	RU031	35.3058	81.9075	6.9	23	31.9	259	101	58700	1298	20700	470	1600	4.3	16800	100	34.5	4.0	638	140	16.4	1.8	
5264	RU032	35.3376	81.8993	7.0	28	30.0	279	74	45000	-20	48400	890	1200	10.7	21200	110	24.3	-1.0	736	M	14.7	2.9	
5265	RU033	35.3733	81.8137	7.1	28	22.5	159	31	55400	745	18000	410	M	3.9	9100	80	17.0	-1.0	347	75	9.6	1.3	
5266	RU034	35.3889	81.7876	7.3	30	13.3	98	17	73200	382	30800	250	M	7.9	3400	70	5.7	1.8	241	30	12.1	0.5	
5267	RU035	35.4091	81.8205	7.1	28	58.7	630	118	13400	3028	16900	220	700	7.1	3400	20	28.8	9.2	M	283	24	2.1	
5268	RU036	35.4052	81.8539	7.2	29	31.5	453	113	32100	2115	62600	650	3800	18.3	11700	90	35.9	19.0	1167	202	18	1.8	
5269	RU037	35.3909	81.8908	7.2	29	31.2	260	127	19400	1343	48400	340	800	12.3	7400	40	23.4	9.4	691	151	12.9	1.3	0.154
5270	RU038	35.3677	81.7107	7.3	27	218.3	1592	91	23700	8266	42300	220	500	8.7	8300	40	144.9	11.6	M	784	62.2	5	
5271	RU039	35.3702	81.7411	7.3	31	44.3	166	29	36800	909	16800	170	M	7.0	5300	60	33.3	3.3	396	73	20.3	2.7	0.126
5272	RU040	35.4185	81.7121	7.2	30	74.3	764	84	19800	-20	17400	480	700	7.2	9400	40	61.7	5.2	M	1227	32.7	-0.2	
5273	RU041	35.4042	81.7431	6.9	31	55.9	M	260	46800	M	M	2520	1400	14.6	68400	150	57.4	M	M	M	M	M	

GASTONIA 100K QUADRANGLE - SUPPLEMENTAL STREAM SEDIMENT

Lab #	County ID	Lat	Long	Ux ppm	Ag ppm	As ppm	Ba ppm	Be ppm	Ca ppm	Co ppm	Cr ppm	Cu ppm	K ppm	Li ppm	Mg ppm	Mo ppm	Nb ppm	Ni ppm	P ppm	Pb ppm	Se ppm	Sn ppm	Sr ppm	W ppm	Y ppm	Zn ppm
2327	LI006	35.4610	81.4587	.	-0.5		.	2.0	.	5	30	7	5000	45	1500	5	55	7	5350	-10		-5	-50	2	5	32
2328	LI007	35.4293	81.4489	.	-0.5		.	1.0	.	7	25	8	6200	-5	1400	5	-5	22	2250	-10		-5	-50	-2	15	30
2329	LI008	35.4377	81.4144	.	-0.5		.	-0.5	.	10	30	8	6200	-5	1300	-5	65	19	2000	-10		5	-50	-2	130	25
2330	LI009	35.4239	81.3835	.	-0.5		.	1.0	.	7	30	6	6200	-5	1000	-5	25	23	2900	-10		-5	-50	-2	60	25
2331	LI010	35.4767	81.4129	.	-0.5		.	1.0	.	10	19	7	.	-5	1500	-5	-5	15	2500	-10		5	-50	-2	60	35
2337	LI016	35.4887	81.3377	.	-0.5		.	1.0	.	7	36	11	5200	-5	2200	-5	35	22	1850	-10		5	-50	40	70	20
2338	LI017	35.4976	81.3730	.	-0.5		.	-0.5	.	5	24	6	4200	-5	1800	5	20	25	2300	-10		5	-50	-2	45	15
2339	LI018	35.4676	81.3540	.	-0.5		.	-0.5	.	5	26	6	3200	-5	1300	-5	20	22	2450	-10		-5	-50	2	40	20
2340	LI019	35.4339	81.3310	.	-0.5		.	-0.5	.	7	25	7	3200	-5	1800	-5	130	10	3500	-10		-5	-50	2	35	10
2341	LI020	35.4229	81.2897	.	-0.5		.	12.0	.	5	11	3	13200	31	1700	-5	40	11	3150	-10		5	-50	2	50	17
2342	LI021	35.4710	81.3040	.	-0.5		.	2.0	.	7	12	8	12200	-5	1700	-5	95	25	3000	-10		-5	-50	-2	15	15
2343	LI022	35.4947	81.3047	.	-0.5		.	2.0	.	15	18	8	8200	-5	2300	-5	115	25	3350	-10		5	-50	2	50	15
2349	LI028	35.4928	81.2322	.	-0.5		.	6.0	.	7	16	4	25200	56	800	-5	-5	37	3150	-10		-5	-50	2	-5	20
2350	LI029	35.4582	81.1880	.	-0.5		.	4.0	.	7	8	9	15200	105	1600	-5	-5	56	3000	-10		-5	-50	-2	-5	27
2351	LI030	35.4196	81.2384	.	-0.5		.	14.0	.	25	12	26	2200	91	1700	-5	-5	18	3800	-10		-5	-50	2	20	40
2352	LI031	35.4164	81.2160	.	-0.5		.	3.0	.	12	11	9	4200	10	1600	-5	85	13	3250	-10		-5	-50	2	5	25
2353	LI032	35.4124	81.1786	.	-0.5		.	1.0	.	10	5	7	5200	6	1500	-5	-5	35	2700	-10		-5	-50	2	-5	15
2354	LI033	35.4376	81.1279	.	-0.5		.	1.0	.	7	-5	5	17200	26	1200	-5	5	28	3800	-10		-5	77	-2	5	12
2355	LI034	35.4517	81.1371	.	-0.5		.	2.0	.	5	-5	6	18200	6	1100	5	-5	6	2000	-10		-5	75	-2	5	20
2356	LI035	35.4708	81.1183	.	-0.5		.	2.0	.	5	5	3	18200	-5	1200	-5	-5	8	1750	-10		-5	81	-2	40	27
2357	LI036	35.4892	81.1650	.	-0.5		.	2.0	.	7	16	6	7200	20	1900	-5	30	28	2400	-10		-5	-50	10	10	15
2365	LI044	35.4842	81.0403	.	-0.5		.	2.0	.	10	5	11	20200	-5	1500	-5	-5	39	2500	-10		-5	123	-2	-5	35
2366	LI045	35.4791	81.0727	.	0.5		.	1.0	.	5	-5	6	16200	-5	1000	-5	-5	21	2900	-10		-5	72	-2	-5	27
2367	LI046	35.4756	81.0103	.	-0.5		.	2.0	.	10	7	5	24200	-5	1600	-5	-5	19	3250	-10		-5	152	-2	-5	30
2368	LI047	35.4464	81.0454	.	-0.5		.	2.0	.	5	24	4	10000	-5	2700	5	20	-5	3000	-10		-5	152	-2	-5	7
2369	LI048	35.4233	81.0889	.	-0.5		.	2.0	.	7	-5	9	8000	-5	2200	5	65	-5	2550	-10		-5	94	-2	20	10
2370	LI049	35.4139	81.0601	.	-0.5		.	2.0	.	7	5	3	16000	-5	2800	-5	10	8	3250	-10		-5	136	-2	15	7
2371	LI050	35.4458	81.0106	.	-0.5		.	3.0	.	7	8	7	24000	-5	5800	-5	40	28	6150	12		-5	658	-2	20	20
3063	PO002	35.1869	81.9970	.	-0.5		.	-0.5	.	-5	6	2	2000	-5	850	-5	25	-5	800	-10		-5	-50	2	20	-5
3064	PO003	35.2307	81.9655	.	-0.5		.	0.5	.	8	-5	4	6000	-5	1600	-5	56	-5	2000	-10		-5	53	2	31	13
3365	RU001	35.2205	81.8281	.	-0.5		.	1.0	.	-5	12	-2	21000	21	-200	5	40	-5	3700	12		5	-50	10	140	15
3366	RU002	35.1927	81.8349	.	-0.5		.	0.5	.	5	14	2	9000	11	300	5	230	-5	4600	12		-5	-50	-2	360	17
3367	RU003	35.2002	81.7964	.	-0.5		.	2.0	.	-5	14	2	12000	17	200	-5	50	25	5100	17		-5	-50	53	253	27
3368	RU004	35.1931	81.7687	.	-0.5		.	0.5	.	-5	13	-2	8000	10	300	-5	100	-5	4600	-10		-5	-50	5	135	17

GASTONIA 100K QUADRANGLE - SUPPLEMENTAL STREAM SEDIMENT

Lab #	County ID	Lat	Long	Ux ppm	Ag ppm	As ppm	Ba ppm	Be ppm	Ca ppm	Co ppm	Cr ppm	Cu ppm	K ppm	Li ppm	Mg ppm	Mo ppm	Nb ppm	Ni ppm	P ppm	Pb ppm	Se ppm	Sn ppm	Sr ppm	W ppm	Y ppm	Zn ppm
3369	RU005	35.2227	81.7913	.	-0.5		.	2.0	.	-5	8	-2	40000	10	-200	-5	10	-5	3500	-10		-5	-50	-2	80	10
3370	RU006	35.2405	81.7657	.	-0.5		.	1.0	.	-5	10	2	19000	14	200	-5	90	-5	4200	-10		-5	-50	2	100	20
3371	RU007	35.2559	81.7954	.	-0.5		.	2.0	.	-5	15	3	20000	27	-200	5	10	16	4200	-10		-5	-50	3	85	37
3372	RU008	35.2771	81.7632	.	-0.5		.	2.0	.	-5	10	-2	6000	20	200	-5	5	10	4600	-10		-5	-50	-2	25	15
3373	RU009	35.2867	81.7931	.	0.5		.	0.5	.	15	27	13	17000	10	200	5	35	62	3900	10		-5	-50	-2	70	60
3374	RU010	35.3031	81.8185	.	-0.5		.	1.0	.	-5	6	-2	15000	15	200	-5	120	-5	3500	-10		-5	-50	20	410	7
3375	RU011	35.3208	81.8315	.	-0.5		.	2.0	.	5	9	3	15000	15	300	-5	-5	17	3700	-10		-5	-50	4	50	40
3376	RU012	35.3419	81.8055	.	-0.5		.	-0.5	.	-5	7	-2	9000	11	500	-5	35	14	3000	-10		-5	-50	5	130	17
3377	RU013	35.3204	81.7849	.	-0.5		.	0.5	.	-5	17	-2	6000	11	300	5	50	10	2900	-10		-5	-50	5	45	22
3378	RU014	35.3244	81.7383	.	-0.5		.	-0.5	.	-5	18	4	6000	11	300	5	15	12	3500	-10		-5	-50	2	50	27
3379	RU015	35.3453	81.7386	.	-0.5		.	2.0	.	10	26	-2	8000	12	800	-5	35	15	1800	-10		-5	59	2	140	25
3380	RU017	35.3702	81.9990	.	-0.5		.	0.5	.	10	10	5	8000	-5	1600	-5	40	15	2100	-10		-5	174	-2	125	15
3381	RU020	35.3170	81.9988	.	-0.5		.	1.0	.	-5	5	5	9000	-5	700	-5	15	10	2800	-10		-5	52	-2	110	17
3382	RU021	35.3225	81.9769	.	-0.5		.	0.5	.	-5	32	5	8000	-5	1100	-5	210	15	2900	-10		-5	-50	-2	190	22
3383	RU022	35.2959	81.9849	.	-0.5		.	1.0	.	5	13	8	8000	7	700	5	100	19	3100	-10		-5	-50	2	225	30
3384	RU023	35.2784	81.9812	.	-0.5		.	-0.5	.	-5	9	-2	8000	-5	1000	5	250	7	3900	-10		-5	-50	2	335	7
3385	RU024	35.2610	81.9495	.	-0.5		.	1.0	.	-5	15	5	7700	8	700	10	35	10	1200	-10		15	-50	2	245	18
3386	RU025	35.2304	81.9657	.	-0.5		.	1.0	.	-5	11	6	6700	6	1100	35	20	17	1200	-10		-5	-50	14	214	23
3387	RU026	35.2034	81.9331	.	-0.5		.	1.0	.	5	-5	5	17700	14	500	10	5	10	800	-10		-5	54	2	135	24
3388	RU027	35.2330	81.9014	.	-0.5		.	2.0	.	-5	5	2	38700	14	500	5	30	8	1200	12		-5	61	2	130	25
3389	RU028	35.2568	81.9009	.	-0.5		.	1.0	.	-5	9	3	6700	15	600	-5	-5	-5	1600	-10		-5	-50	-2	133	25
3390	RU029	35.2763	81.8575	.	-0.5		.	2.0	.	-5	6	4	24700	14	300	-5	20	11	800	10		-5	-50	2	120	27
3391	RU030	35.2765	81.8283	.	-0.5		.	2.0	.	8	17	9	12700	25	700	-5	10	7	1500	10		-5	-50	-2	90	42
3392	RU031	35.3058	81.9075	.	-0.5		.	-0.5	.	-5	18	4	6700	-5	300	-5	30	-5	2900	-10		-5	-50	-2	130	14
3393	RU032	35.3376	81.8993	.	-0.5		.	1.0	.	-5	20	7	5700	-5	900	-5	80	12	1200	15		-5	-50	-2	235	19
3394	RU033	35.3733	81.8137	.	-0.5		.	2.0	.	-5	12	11	10700	9	2500	.	.	-5	1600	45		.	-50	.		34
3395	RU034	35.3889	81.7876	.	-0.5		.	1.0	.	7	12	12	9700	14	400	5	10	36	1300	22		-5	-50	-2	85	33
3396	RU035	35.4091	81.8205	.	-0.5		.	1.0	.	10	20	17	7700	-5	1400	-5	60	18	2100	10		5	-50	-2	120	33
3397	RU036	35.4052	81.8539	.	-0.5		.	1.0	.	5	10	5	8700	-5	500	5	30	22	2400	15		5	-50	-2	240	17
3398	RU037	35.3909	81.8908	.	-0.5		.	1.0	.	9	-5	18	7700	5	800	-5	20	20	1200	10		5	-50	2	110	41
3399	RU038	35.3677	81.7107	.	-0.5		.	1.0	.	5	26	6	6700	8	800	-5	110	11	6200	25		5	-50	2	700	20
3400	RU039	35.3702	81.7411	.	-0.5		.	1.0	.	7	21	7	6700	7	400	5	40	15	1300	20		-5	-50	15	285	30
3401	RU040	35.4185	81.7121	.	-0.5		.	1.0	.	-5	11	4	9700	6	700	9	40	17	2300	25		-5	-50	19	343	15
3402	RU041	35.4042	81.7431	.	-0.5		.	2.0	.	-5	17	6	3700	5	1300	12	60	17	3000	22		-5	-50	-2	410	20

Appendix I

1

(PUBLIC HEARING)\LINED MUNICIPAL (SOLID WASTE) (LANDFILL)\(PERMIT) APPLICATION

4

Commissioner Hamrick moved to open the public hearing to discuss the application to the North Carolina Department of Waste Management for construction of a lined landfill. Vice Chairman Splawn seconded the motion. The motion was unanimously approved.

Buster Huggins, chairman of the county's Solid Waste Environmental Education Panel (SWEEP), conveyed the recommendation of the group WHICH WAS to proceed with the filing of the application. He commented that the reasons given by David Garrett are good reasons, and that this will benefit the county in the future.

The public hearing was closed by the Chairman.

Vice Chairman Splawn moved that local government approval be awarded to the application. Commissioner Hamrick seconded the motion. The motion was unanimously approved.

unty Commissioners

Franklin Goode, *Chairman*
on Splawn, *Vice Chairman*
Chivous Bradley
Lewis Hamrick
Charles Hill

John W. Condrey, *County Manager*
Hazel S. Haynes, *Clerk to the Board*
Walter Dalton, *County Attorney*

Rutherford County

Notices

The Rutherford County Board of Commissioners will hold a Public Information Meeting at 10:00 AM on August 6, 2001 in conjunction with its regular meeting at the County Offices. The Office is located at 289 N. Main Street in Rutherfordton. The purpose of the meeting will be to inform the public concerning plans to develop a lined municipal solid waste landfill at the site of the closed landfill, located at 656 Laurel Hill Drive, near Rutherfordton. Representatives of the Rutherford County Solid Waste Department will provide a description of the project including a review of alternative sites and socioeconomic and demographic data. The site characterization report is available for public inspection at the County Clerk's Office and the unty library main branch.

The Rutherford County Board of Commissioners will hold a Public Hearing at 10:20 A.M. on August 6, 2001 in conjunction with its regular meeting at the County Offices. The Office is located at 289 N. Main Street in Rutherfordton. The purpose of the meeting will be to receive public comments concerning plans to develop a lined municipal solid waste landfill at the site of the closed landfill, located at 656 Laurel Hill Drive, near Rutherfordton. Maps and preliminary project plans will be provided for inspection at the meeting. The site characterization report is available for public inspection at the County Clerk's Office and the county library main branch.

289 N. Main Street, Rutherfordton, NC 28139 ♦ 828-287-6045 ♦ 828-287-6262 (FAX)
www.rutherfordgov.org

* * * Transmission Result Report (Jul. 5. 2001 10:56AM) * * *

T T I RUTHERFORD COUNTY

File	Mode	Option	Address (Group)	Result	Page
4355	SAF_TX		DAILY COURIER	OK	P. 1/1

LOCAL PAPER

Reason for Error
1) Hang up or line fail
2) Busy
3) No answer
4) No facsimile connection

Legal Ads

Betty, please publish the following two legal ads in the legal section of the July 6 paper in small fonts. If you have questions, please give me a call. Hazel

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* * * Transmission Result Report (Jul. 5. 2001 2:03PM) * * *

T T I RUTHERFORD COUNTY

File	Mode	Option	Address (Group)	Result	Page
4358	SAF_TX		NORTHLAND CABLE	OK	P. 1/1
			WAGY	OK	P. 1/1
			WCAB	OK	P. 1/1

RADIO STATION

Reason for Error
1) Hang up or line fail
2) Busy
3) No answer
4) No facsimile connection

County Commissioners

Franklin Goode, *Chairman*
Don Splawn, *Vice Chairman*
Chivous Bradley
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The Rutherford County Board of Commissioners will hold a Public Hearing at 10:20 A.M. on August 6, 2001 in conjunction with its regular meeting at the County Offices. The Office is

* * * Transmission Result Report (Jul. 5. 2001 2:26PM) * * *

T T I RUTHERFORD COUNTY

File	Mode	Option	Address (Group)	Result	Page
4359	SAF_TX		92864202 WLOS TV STATION	OK	P. 1/1

Reason for Error
1) Hang up or line fail
2) Busy
3) No answer
4) No facsimile connection

County Commissioners

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Rutherford County

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The Rutherford County Board of Commissioners will hold a Public Hearing at 10:20 A.M. on August 6, 2001 in conjunction with its regular meeting at the County Offices. The Office is

3

NOTICE

The Rutherford County Board of Commissioners will hold a Public Hearing at 10:20 A.M. on August 6, 2001 in conjunction with its regular meeting at the County Offices. The Office is located at 289 North Main Street in Rutherfordton.

The purpose of the meeting will be to receive public comments concerning plans to develop a lined municipal solid waste landfill at the site of the closed landfill, located at 656 Laurel Hill Drive, near Rutherfordton.

Maps and preliminary project plans will be provided for inspection at the meeting. The site characterization report is available for public inspection at the County Clerk's Office and the county library main branch.

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(4)

(PUBLIC INFORMATION)\MUNICIPAL (SOLID WASTE) (LANDFILL)\(PERMIT) APPLICATION

4

Mr. David Garrett, P.G., P.E., presented information from a report he had prepared for the Commissioners and the public on behalf of the Rutherford County Solid Waste Department and the County Manager concerning options for waste disposal in the county in the future, including the option of developing a lined municipal solid waste landfill at the site of the closed landfill located on Laurel Hill Drive.

Mr. Garrett explained that the county has a contract to haul and dispose out of county until January 2004. It is anticipated that this contract may be renewed. However, if the current procedure of hauling waste out of county does not prove to be cost effective in years to come, the opportunity exists to build a lined landfill in Rutherford County. To keep all options open, the Rutherford County Solid Waste Department is evaluating a new high-tech solid waste landfill.

Mr. Garrett cited the following facts: The county right now disposes of between 44,000 and 48,000 tons of waste per year. The cost of shipping and disposal for these wastes is approximately $1.5 million per year. He believes that the landfill could be operated for this amount or substantially less, and would keep a majority of this money in Rutherford County. The plan would provide about 50 years of capacity.

Statewide, North Carolina is disposing of about 1.3 tons per capita, a considerable increase in the last decade. At this rate per capita, Rutherford County would be disposing of about 82 thousand tons per year. Currently, the county disposes of about half that amount.

There is a significant increase in C&D (inert waste from construction and demolition) waste in the county and statewide, representing about 30% of the total waste stream.

A map of the distribution of lined landfills in North Carolina shows that there are no landfills in the counties surrounding Rutherford County.

The proposed new landfill could be built at the site of the old one. Mr. Garrett displayed an aerial photograph of the area. The current facility boundary comprises over 200 acres. The proposed site would be 40 acres. Infrastructure for the new landfill is already on site.

Mr. Garrett presented a NCDOT map showing one of the projected corridors for the US221 relocation and stated that an effort is being made to persuade DOT not to come through the county's property. In addition, he noted that the site is within five miles of the airport, and that there is an unresolved issue with aviation safety. He also will be meeting with representatives of Fish and Wildlife regarding deterrence of birds to the site.

No hauling traffic patterns will be altered, except that waste that is presently being trucked out of the transfer station would not be leaving the site. Mr. Garrett said he did not see a significant

impact on the neighborhood, which now has an industrial park, mixed residential, and undeveloped properties, and which is trending toward industrial.

In the siting study, a requirement is to look at alternative sites, and this has been conducted according to the state statutes. Compared to other possible sites, the central site is viewed as the most cost effective alternative because it is close to population centers; its location next to the waste water treatment plant provides accessibility to waste water treatment for leachate; infrastructure including scales and office building are already in place; the country already owns the land; it is not visible from any public highways; and it is consistent with the mixed industrial/commercial development in the immediate surroundings. Socio-economic and demographic factors also are consistent at the central site.

Plans are to maintain a good visual buffer, as well as the required set-backs from property lines and houses. The landfill would be developed in eight phases, each phase to last approximately five years. Mr. Garrett outlined property lines at the facility, pointing out where each of the phases would be implemented. There will be state-of-the-art liner and leachate collections system, with a water quality monitoring program of both wells and surface water to assure that no leachate gets into the water. There are no downgrade ground water users, and there are no wells in the area which could be impacted.

The old landfill and transfer station operations have exceptional compliance records. Periodic inspections are made by the state. Supervisors and operators of the new lined landfill would undergo rigorous training and certification. Both the state and the county would inspect operations.

The tentative project schedule was reviewed. Mr. Garrett emphasized that moving the application forward does not commit the county to building the landfill. The decision to build or not to build is a couple of years away. What is being asked for at this meeting is approval to submit the Site Suitability Application package to NC DWM.

After the application package is submitted, the next phase would be advanced hydro-geological studies and final design for Phase 1. It is anticipated that designs and additional investigations for the site can be completed in little less than one year, with a construction permit application to be submitted in July 2002. Following that, by October 2002, the state is expected to give an indication of whether the plans are acceptable or whether modifications would be necessary. At that point there would be a decision of whether or not to proceed.

By January 2003, with approval of the construction plan, there would be an 18 month window in which to start construction or not. If not, the permit to construct, which is good for 18 months, can be renewed. This allows another period of time in which to make a final decision. In the intervening time, it will be possible to evaluate options on transferring and out of county disposal. If Commissioners approve, construction could begin in early 2003, with the goal of being completed by the end of 2003, with all documentation and water quality monitoring in place, and with the operation of Phase 1 beginning in January 2004. Following this permits would be issued in a five-year cycle,

which allows for the introduction of new technologies and also allows for evaluating whether it fulfills the county's needs.

All the documentation is available for public inspection at the county office, the landfill office, and the county library.

unty Commissioners

Franklin Goode, *Chairman*
on Splawn, *Vice Chairman*
Chivous Bradley
Lewis Hamrick
Charles Hill

Rutherford County

John W. Condrey, *County Manager*
Hazel S. Haynes, *Clerk to the Board*
Walter Dalton, *County Attorney*

September 26, 2001

To Whom It May Concern:

Rutherford County's current solid waste permit application is on land that is currently not zoned. Please call if you have any additional questions.

Sincerely,

John W. Condrey

ohn W. Condrey,
County Manager

JWC/hh

289 N. Main Street, Rutherfordton, NC 28139 ♦ 828-287-6045 ♦ 828-287-6262 (FAX)
www.rutherfordgov.org

RUTHERFORD COUNTY SOLID WASTE DEPARTMENT
PO BOX 1957
656 LAUREL HILL DRIVE
RUTHERFORDTON, NC 28139
Phone: (828) 287-6125 Fax: (828) 287-6312

October 23, 2001

Mr. Jim Coffee, Acting Section Chief
NC DENR Division of Waste Management
Solid Waste Section
401 Oberlin Road
Raleigh, NC 27609

Re: Site Suitability Application
Central MSW Landfill

Dear Mr. Coffee:

Rutherford County's Solid Waste Management Plan, prepared in 2000 as a 3-year update, states that Rutherford County plans to evaluate options for future solid waste management. These options include a site suitability assessment of the Central Landfill site for a lined Subtitle-D Landfill.

A copy of the relevant time-schedule for completion of the economic and site evaluations, provided on Page 16 of the Solid Waste Management Plan, is attached. Within this context, the subject application is consistent with the county's current solid waste management plan.

Sincerely,

Don Baynard
Director, Solid Waste Department

E. Summary of Intended Actions

The intended actions described on the previous pages are listed chronologically in Table 18.

Table 18. Intended Actions Implementation Schedule Through FY 1998-01

1998-99	• Increase publicity from SWEEP regarding county wide recycling. • Promote Adopt-A-Highway program. • Hold a Hazardous Household Waste Collection Day • Implement the grasscycling and backyard composting programs. • The Industrial Solid Waste Commission will hold one source reduction workshop. • Conduct commercial and industrial waste audits for large contributors to the waste stream.
1999-00	• Complete site suitability assessment of Subtitle D landfill within Rutherford County. • Evaluate site suitability assessment and economic information to determine whether to construct a Subtitle D landfill within Rutherford County or continue to transfer and dispose of waste outside the county. • Increase the purchase of recycled products within the county government offices. • Hold two Hazardous Household Waste Collection Days. • Develop a source reduction resolution for the county.
2000-01	• Contact administrators from the county schools and the community college about establishing a composting program at each K-12 school in the county and the local college.

Source: staff estimates

Part VII. SOLID WASTE COSTS AND FINANCING METHODS

Description and Assessment of Costs:

County Description

Rutherford County operates a solid waste program, while Alexander Mills, Ruth, Ellenboro, Forest City, and Spindale contract out their programs with WHS. The solid waste costs shown below are separated by the county-operated program and the municipal contracted programs. The total budget for the county-operated solid waste program during FY 1997-98 was $3,222,085. The annual cost of county collection was $1,273,470. This includes the collection centers and collection from government-operated facilities such as schools, town hall, and the courthouse. Disposal costs in the same year were $1,797,131. Waste reduction programs costs, including recycling , reuse, mulching, etc. total $151,484. Rutherford County, managed 50,257.04 tons of waste and 1592.36 tons of recyclable materials in FY 97-98. A summary of the county-operated solid waste program costs are shown in Table 19.

Table 19. County-Operated Solid Waste Program Costs, FY 1997-98

	COLLECTION	DISPOSAL	WASTE REDUCTION	TOTAL
PROGRAM COST	$1,273,470.00	$ 1,797,131.00	$ 151,484.00	$ 3,222,085.00
COST PER TON	$ 26.39	$ 37.24	$ 89.92	$ 61.67

Source: Rutherford County Solid Waste Department and Finance Department Records

County Assessment:

EXCERPT FROM SOLID WASTE PLAN

RUTHERFORD COUNTY SOLID WASTE DEPARTMENT
PO BOX 1957
656 LAUREL HILL DRIVE
RUTHERFORDTON, NC 28139
Phone: (828) 287-6125 Fax: (828) 287-6312

September 26, 2001

Mr. Jim Coffey, Acting Chief
NC DENR Division of Waste Management
Solid Waste Section
401 Oberlin Road
Raleigh, North Carolina 27611

Re: Landfill Operations Relative to Airport Safety
Proposed Rutherford County MSW Landfill

Dear Mr. Coffey:

This letter has been prepared pursuant to Rutherford County's site suitability application for a proposed new solid waste landfill. The proposed landfill is to be constructed within an existing facility boundary, adjacent to a closed MSW landfill, an active solid waste transfer station, and an active C&D landfill. Rutherford County's solid waste processing and disposal activities have been conducted on this site for approximately 50 years. Current expectations are for the facility to accept 120 tons per day of municipal solid waste. The facility will be developed in phases that will last the County in excess of 40 years.

A recently completed site evaluation has identified that the site is located approximately 4.73 miles south of the Rutherford County airport. The airport's flight path does cross the landfill property. The County is aware of North Carolina Solid Waste regulations, 15A NCAC 13B.1622 (1)(a) and (b), which specify that solid waste landfills not be located within 5,000 feet of an airport serving piston-powered aircraft or within 10,000 feet of an airport serving turbine-powered aircraft, and that the airport authorities be notified prior to making said application in the event that a landfill is to be located within 5 miles of an airport.

Local airport officials have been notified and provided opportunity to comment. In addition, the County's solid waste consultant met with officials from the North Carolina Department of Transportation, Division of Aviation, to review the findings of a site specific evaluation report, prepared on behalf of NC DOT by a US Fish and Wildlife Service biologist. That letter offered recommendations regarding the safe operation of the landfill in proximity to the airport, paraphrased below.

Pursuant to recommendations offered by the US Fish and Wildlife Service, Rutherford County will observe the following steps to promote safe landfill operations with respect to the airport:

1. Landfill officials shall maintain close communication with the Airport Authority concerning bird activity observed at the landfill.

2. Proper landfill management techniques will be employed to decrease the potential for problems with bird attraction, e.g., not placing animal carcasses in the working face, keeping the working face small, and use of proper waste covering.

3. Monitoring of the numbers and activities of birds that routinely use the landfill shall be performed and, if these numbers and activities become problematic, ...

4. Steps will be taken to discourage bird attraction to the landfill, e.g. use of harassment techniques and/or habitat alteration.

Operations at the landfill shall be conducted such that the facility will remain compliant with pertinent Solid Waste regulations. On behalf of the Rutherford County Solid Waste Department, I appreciate your attention to this matter.

Sincerely,

Don Baynard, Director
Rutherford County Solid Waste Department

Cc: Philip Robbins, Director, Rutherford County Airport Authority
Rick Barkes, Manager, NC DOT Division of Aviation, Airport Development
John Condrey, Rutherford County Manager

Appendix J

RUTHERFORD COUNTY
RUTHERFORD COUNTY MSW LANDFILL

FACILITY PLAN CALCULATIONS

TABLE OF CONTENTS

1.0 Landfill Life Expectancy
2.0 Earthwork Quantities

PROJECT Rutherford County MSW Landfill

SUBJECT Landfill Life Expectancy

JOB NO. RUTHERFORD-1
DATE 9/6/00
COMPUTED BY PKS
CHECKED BY

Objective To determine the expected life of the landfill given the proposed contours and the current loading rate.

Assumptions
1. Density of Waste.
2. Waste to Periodic Cover (i.e. daily and intermediate) Ratio.

Analysis The volume will be calculated by taking cross sections of the landfill, using a planimeter to measure the area of the cross sections, and using the average end area method. Alternatively, AutoCAD will be used to generate volumes.

LIFE.WPD

G.N. RICHARDSON & ASSOCIATES
Engineering and Geological Services
425 N. Boylan Avenue, Raleigh, NC 27603
Telephone: (919) 828-0577

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 2 / 20
JOB #: RUTHERFORD-1
DATE: 9/6/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 1
Analysis of Life Expectancy

Waste Parameters:

Unit Weight (pcy) =	1,200
Unit Weight (tcy) =	0.6
Percentage of Periodic Cover =	20
Area of Waste Footprint (Ac.) =	7.5

Volume Calculations:

Volume From AutoCAD = 426,380 cy (See Attached)

Adjustment For Other Layers:

2 feet of Leachate Collection Media/Pro. Cover = 24,200 cy

Sum = 24,200 cy

Volume of Waste and Periodic Cover (cy) =	402,180
Volume of Periodic Cover (cy) =	80,436
Volume of Waste (cy) =	321,744
Volume of Waste (tons) =	193,046

LIFE.WB3(1)

Phase 1 will handle → 2004-2006 → 145,402 Tons

$\Delta = 193{,}046 - 145{,}402 = 47{,}644$ Tons

$\frac{47{,}644}{48{,}837} = 0.98 \approx 12$ mos. of 2007

$\Sigma = \underline{\underline{4.0 \text{ Yrs}}}$

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 3 / 20
JOB #: RUTHERFORD-1
DATE: 9/6/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 2
Analysis of Life Expectancy

Waste Parameters:

Unit Weight (pcy) =	1,200
Unit Weight (tcy) =	0.6
Percentage of Periodic Cover =	20
Area of Waste Footprint (Ac.) =	6.6

Volume Calculations:

Volume From AutoCAD = 518,363 cy (See Attached)

Adjustment For Other Layers:

2 feet of Leachate Collection Media/Pro. Cover = 21,296 cy

Sum = 21,296 cy

Volume of Waste and Periodic Cover (cy) =	497,067
Volume of Periodic Cover (cy) =	99,413
Volume of Waste (cy) =	397,654
Volume of Waste (tons) =	238,592

LIFE.WB3(2)

Phase 2 will handle → 1,193 Tons 2007

197,398 Tons 2008-2011

198,591 Tons

$\Delta = 238,592 - 198,591 = 40,001$ Tons

$\frac{40,001}{49,783} = 0.80 \approx$ 7 mos. of 2012

$\Sigma = \underline{\underline{4.8 \text{ yrs}}}$

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 4 / 20
JOB #: RUTHERFORD-1
DATE: 9/6/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 3A
Analysis of Life Expectancy

Waste Parameters:

Unit Weight (pcy) =	1,200
Unit Weight (tcy) =	0.6
Percentage of Periodic Cover =	20
Area of Waste Footprint (Ac.) =	9.6

Volume Calculations:

Volume From AutoCAD = 649,889 cy (See Attached)

Adjustment For Other Layers:

2 feet of Leachate Collection Media/Pro. Cover = 30,976 cy

Sum = 30,976 cy

Volume of Waste and Periodic Cover (cy) =	618,913
Volume of Periodic Cover (cy) =	123,783
Volume of Waste (cy) =	495,130
Volume of Waste (tons) =	297,078

LIFE.WB3(3)

Phase 3A will handle → 9,782 Tons 2012

251,283 Tons 2013-2017

261,065 Tons

$\Delta = 297{,}078 - 261{,}065 = 36{,}013$ Tons

$\frac{36{,}013}{50{,}790} = 0.71 \approx 9$ mos. of 2018

$\Sigma = 5.9$ Yrs

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 5 / 20
JOB #: RUTHERFORD-1
DATE: 9/6/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 3B
Analysis of Life Expectancy

Waste Parameters:

Unit Weight (pcy) =	1,200
Unit Weight (tcy) =	0.6
Percentage of Periodic Cover =	20
Area of Waste Footprint (Ac.) =	0

Volume Calculations:

Volume From AutoCAD = 272,534 cy (See Attached)

Adjustment For Other Layers:

2 feet of Leachate Collection Media/Pro. Cover = 0 cy

Sum = 0 cy

Volume of Waste and Periodic Cover (cy) =	272,534
Volume of Periodic Cover (cy) =	54,507
Volume of Waste (cy) =	218,027
Volume of Waste (tons) =	130,816

LIFE.WB3(4)

Phase 3B will handle → 14,777 Tons 2018

102,220 Tons 2019 - 2020

116,997 Tons

$\Delta = 130{,}816 - 116{,}997 = 13{,}819$ Tons

$\frac{13{,}819}{51{,}432} = 0.27 \approx 3$ mos. of 2021

$\Sigma = 2.6$ Yrs

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 6 /20
JOB #: RUTHERFORD-1
DATE: 9/6/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 4
Analysis of Life Expectancy

Waste Parameters:

Unit Weight (pcy) =	1,200
Unit Weight (tcy) =	0.6
Percentage of Periodic Cover =	20
Area of Waste Footprint (Ac.) =	9.5

Volume Calculations:

Volume From AutoCAD = 612,927 cy (See Attached)

Adjustment For Other Layers:

2 feet of Leachate Collection Media/Pro. Cover = 30,653 cy

Sum = 30,653 cy

Volume of Waste and Periodic Cover (cy) =	582,274
Volume of Periodic Cover (cy) =	116,455
Volume of Waste (cy) =	465,819
Volume of Waste (tons) =	279,491

LIFE.WB3(5)

Phase 4 will handle → 37,613 Tons 2021

207,898 Tons 2022-2025

245,511 Tons

$\Delta = 279,491 - 245,511 = 33,980$ Tons

$\frac{33,980}{52,522} = 0.65 \approx$ 8 mos, of 2026

$\Sigma = \underline{\underline{5.4 \text{ Yrs}}}$

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ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 7 / 20
JOB #: RUTHERFORD-1
DATE: 9/8/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 5
Analysis of Life Expectancy

Waste Parameters:

Unit Weight (pcy) =	1,200
Unit Weight (tcy) =	0.6
Percentage of Periodic Cover =	20
Area of Waste Footprint (Ac.) =	7

Volume Calculations:

Volume From AutoCAD = 623,096 cy (See Attached)

Adjustment For Other Layers:

2 feet of Leachate Collection Media/Pro. Cover = 22,587 cy

Sum = 22,587 cy

Volume of Waste and Periodic Cover (cy) =	600,509
Volume of Periodic Cover (cy) =	120,102
Volume of Waste (cy) =	480,407
Volume of Waste (tons) =	288,244

LIFE.WB3(6)

Phase 5 will handle → 18,542 Tons 2026

265,935 Tons 2027-2031

284,477 Tons

$\Delta = 288,244 - 284,477 = 3,767$ Tons

$\frac{3,767}{53,859} = 0.07 \approx 1$ mo. of 2032

$\Sigma = 5.4$ yrs

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 8 /20
JOB #: RUTHERFORD-1
DATE: 12/18/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 6
Analysis of Life Expectancy

Waste Parameters:

Unit Weight (pcy) =	1,200
Unit Weight (tcy) =	0.6
Percentage of Periodic Cover =	20
Area of Waste Footprint (Ac.) =	4.6

Volume Calculations:

Volume From AutoCAD = 640,026 cy (See Attached)

Adjustment For Other Layers:

2 feet of Leachate Collection Media/Pro. Cover = 14,843 cy

Sum = 14,843 cy

Volume of Waste and Periodic Cover (cy) =	625,183
Volume of Periodic Cover (cy) =	125,037
Volume of Waste (cy) =	500,147
Volume of Waste (tons) =	300,088

LIFE.WB3(7)

Phase 6 will handle → 50,092 Tons 2032

217,706 Tons 2033 – 2036

267,798 Tons

$\Delta = 300{,}088 - 267{,}798 = 32{,}290$ Tons

$\frac{32{,}290}{54{,}999} = 0.59 \approx$ 7 mos. of 2037

$\Sigma = \underline{5.5 \text{ yrs}}$

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ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 9 /20
JOB #: RUTHERFORD-1
DATE: 12/18/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 7A
Analysis of Life Expectancy

Waste Parameters:

Unit Weight (pcy) =	1,200
Unit Weight (tcy) =	0.6
Percentage of Periodic Cover =	20
Area of Waste Footprint (Ac.) =	3.9

Volume Calculations:

Volume From AutoCAD = 605,744 cy (See Attached)

Adjustment For Other Layers:

2 feet of Leachate Collection Media/Pro. Cover = 12,584 cy

Sum = 12,584 cy

Volume of Waste and Periodic Cover (cy) =	593,160
Volume of Periodic Cover (cy) =	118,632
Volume of Waste (cy) =	474,528
Volume of Waste (tons) =	284,717

LIFE.WB3(8)

Phase 7A will handle → 22,709 Tons 2037

222,316 Tons 2038-2041

245,025 Tons

$\Delta = 284,717 - 245,025 = 39,692$ Tons

$\frac{39,692}{56,164} = 0.71 \approx 8$ mos. of 2042

$\Sigma = \underline{\underline{5.1 \text{ Yrs}}}$

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ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 10/20
JOB #: RUTHERFORD-1
DATE: 12/20/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 7B
Analysis of Life Expectancy

Waste Parameters:

Unit Weight (pcy) =	1,200
Unit Weight (tcy) =	0.6
Percentage of Periodic Cover =	20
Area of Waste Footprint (Ac.) =	0

Volume Calculations:

Volume From AutoCAD = 212,179 cy (See Attached)

Adjustment For Other Layers:

2 feet of Leachate Collection Media/Pro. Cover = 0 cy

Sum = 0 cy

Volume of Waste and Periodic Cover (cy) =	212,179
Volume of Periodic Cover (cy) =	42,436
Volume of Waste (cy) =	169,743
Volume of Waste (tons) =	101,846

LIFE.WB3(9)

Phase 7B will handle → 16,472 tons 2042
56,400 Tons 2043
72,872

$\Delta = 101,846 - 72,872 = 28,974$ Tons

$\frac{28,974}{56,637} = 0.51 \approx$ 6 mos. of 2044

$\Sigma = 1.8$ yrs

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 11 / 20
JOB #: RUTHERFORD-1
DATE: 11/1/00
BY: PKS
CHKD BY:

Rutherford County MSWLF
Waste Generation Analysis

Year	Population	% Increase From Previous	Projected MSW Tonnage	
1999	59,568	-----	47,158	
2000	60,198	1.06	47,556	
2001	60,440	0.40	47,748	
2002	60,687	0.41	47,943	
2003	60,914	0.37	48,122	START
2004	61,133	0.36	48,295	
2005	61,349	0.35	48,466	
2006	61,571	0.36	48,641	
2007	61,819	0.40	48,837	PHASE 1 ↑
2008	62,078	0.42	49,042	
2009	62,357	0.45	49,262	
2010	62,621	0.42	49,471	
2011	62,814	0.31	49,623	
2012	63,017	0.32	49,783	PHASE 2 ↑
2013	63,207	0.30	49,934	
2014	63,407	0.32	50,092	
2015	63,609	0.32	50,251	
2016	63,810	0.32	50,410	
2017	64,045	0.37	50,596	
2018	64,291	0.38	50,790	PHASE 3A ↑
2019	64,561	0.42	51,003	
2020	64,832	0.42	51,217	PHASE 3B ↑
2021	65,104	0.42	51,432	
2022	65,378	0.42	51,648	
2023	65,652	0.42	51,865	
2024	65,928	0.42	52,083	
2025	66,205	0.42	52,302	
2026	66,483	0.42	52,522	PHASE 4 ↑
2027	66,762	0.42	52,742	
2028	67,043	0.42	52,964	
2029	67,324	0.42	53,186	
2030	67,607	0.42	53,409	
2031	67,891	0.42	53,634	PHASE 5 ↑
2032	68,176	0.42	53,859	
2033	68,462	0.42	54,085	
2034	68,750	0.42	54,312	
2035	69,038	0.42	54,540	
2036	69,328	0.42	54,769	
2037	69,620	0.42	54,999	PHASE 6 ↑
2038	69,912	0.42	55,230	
2039	70,206	0.42	55,462	
2040	70,500	0.42	55,695	
2041	70,796	0.42	55,929	PHASE 7A ↑
2042	71,094	0.42	56,164	
2043	71,392	0.42	56,400	PHASE 7B ↑
2044	71,692	0.42	56,637	
2045	71,993	0.42	56,875	
2046	72,296	0.42	57,114	
2047	72,599	0.42	57,353	
2048	72,904	0.42	57,594	
2049	73,210	0.42	57,836	
2050	73,518	0.42	58,079	

Notes:

1. Actual 1999 population per County Waste Disposal Report. Population increases from 2000 to 2019 are from the NC Office of State Planning (NCOSP). Figures after 2019 are based on an assumed constant percentage increase from 2019 onward.

2. Projected MSW tonnage is based on the per capita disposal rate of 0.79 tons per person per year which currently is taken to the Palmetto Landfill in South Carolina (based on tonnage disposed in FY 1998-1999 divided by the 1999 County population).

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-05-00
Time: 11:28:29
Page: 1

12/20

Prismoidal Volume Results

Original Surface Model: PHASE 1 SUBG
Final Surface Model: ph1 fill top elev 1010
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

PHASE 1 FILL

Raw Cut Volume: 0.19 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 0.19 cu yd

Raw Fill Volume: 426379.98 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 426379.98 cu yd

13/20

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-05-00
Time: 11:22:48
Page: 1

Prismoidal Volume Results

Original Surface Model: PH2 SUBG W/PH1 FILL
Final Surface Model: PH2 FILL TOP ELEV 1050
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

PHASE 2 FILL

Raw Cut Volume: 0.00 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 0.00 cu yd

Raw Fill Volume: 518362.90 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 518362.90 cu yd

14/20

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-05-00
Time: 12:00:59
Page: 1

Prismoidal Volume Results

Original Surface Model: PH3 SUBG W/ PH1-2 FILL
Final Surface Model: PH3A FILL
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

PHASE 3A FILL

Raw Cut Volume: 0.18 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 0.18 cu yd

Raw Fill Volume: 649889.43 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 649889.43 cu yd

15/20

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-05-00
Time: 15:00:21
Page: 1

Prismoidal Volume Results

Original Surface Model: PH3A FILL W/ PH1-2
Final Surface Model: ph3b fill
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

PHASE 3B FILL

Raw Cut Volume: 0.00 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 0.00 cu yd

Raw Fill Volume: 272533.93 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 272533.93 cu yd

16/20

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-06-00
Time: 16:14:50
Page: 1

Prismoidal Volume Results

Original Surface Model: PH4 SUBG W/PH 1-2-3 FILL
Final Surface Model: PH4 FILL ELEV 1050
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

PHASE 4 FILL

Raw Cut Volume: 0.01 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 0.01 cu yd

Raw Fill Volume: 612927.23 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 612927.23 cu yd

17/20

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-08-00
Time: 15:50:03
Page: 1

Prismoidal Volume Results

Original Surface Model: PH5 SUBG W/PH 1-4 FILL
Final Surface Model: PH 5 FILL
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

PHASE 5 FILL

Raw Cut Volume: 2.28 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 2.28 cu yd

Raw Fill Volume: 623095.69 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 623095.69 cu yd

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-12-00
Time: 15:37:35
Page: 1

Prismoidal Volume Results

Original Surface Model: PH6 SUBG WPH 1-5 FILL
Final Surface Model: PH6 FILL
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

Raw Cut Volume: 0.00 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 0.00 cu yd

Raw Fill Volume: 640026.00 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 640026.00 cu yd

PHASE 6 FILL

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-14-00
Time: 08:27:22
Page: 1

Prismoidal Volume Results

Original Surface Model: PH7A SUBG WPH 1-6 FILL
Final Surface Model: PH7A FILL
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

Raw Cut Volume: 0.00 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 0.00 cu yd

Raw Fill Volume: 605744.38 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 605744.38 cu yd

PHASE 7A FILL

20/20

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 12-20-00
Time: 10:39:21
Page: 1

Prismoidal Volume Results

Original Surface Model: PHASE 7A FILL WPH 1-6 FILL
Final Surface Model: PHASE 7B FILL
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

Raw Cut Volume: 0.00 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 0.00 cu yd

Raw Fill Volume: 212179.40 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 212179.40 cu yd

PHASE 7B FILL

PROJECT Rutherford County MSW Landfill

SUBJECT Earthwork Quantities

JOB NO. RUTHERFORD-1
DATE 9/6/00
COMPUTED BY PKS
CHECKED BY

Objective To determine the required volumes of soil and aggregate required for the construction and operation of the landfill.

Analysis The volumes of each material will be calculated by taking design thicknesses and/or cross sections and multiplying by design areas and/or lengths. Areas and lengths are determined using AutoCAD, a planimeter, and/or direct measurement.

EARTHWORK.WPD

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Engineering and Geological Services
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Telephone: (919) 828-0577

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 2 / 13
JOB #: RUTHERFORD-1
DATE: 9/7/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 1
Earthwork Quantities

Subgrade Cut and Fill Volumes:

Volume of Cut (cy) =	92,006	**(User Input - From AutoCAD - See Attached)**
Volume of Fill (cy) =	116,698	**(User Input - From AutoCAD - See Attached)**

Compacted Soil Liner (CSL) Volume:

Area of CSL (Ac.) =	7.5	**(User Input - From Planimeter - See Attached)**
Thickness of CSL (ft) =	1.5	**(User Input)**
Volume of CSL (cy) =	18,150	

Natural Drainage Media (NDM) Volume:

Area of NDM (Ac.) =	4.4	**(User Input - From Planimeter - Base of Landfill)**
Thickness of NDM (ft) =	1	**(User Input)**
Volume of NDM (cy) =	7,099	

Protective Cover Volume:

Area of Protective Cover - Slopes (Ac.) =	3.1	**(User Input - From Planimeter - Slopes of Landfill)**
Thickness of Protective Cover - Slopes (ft) =	2	**(User Input)**
Area of Protective Cover - Base (Ac.) =	4.4	**(User Input - From Planimeter - Base of Landfill)**
Thickness of Protective Cover - Base (ft) =	1	**(User Input)**
Volume of Protective Cover (cy) =	17,101	

Daily/Intermediate Cover Volume:

Volume of Daily/Intermediate Cover (cy) =	80,436	**(User Input - From Life Expectancy Calcs.)**

EARTHWORK.WB3(1)

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 3 / 13
JOB #: RUTHERFORD-1
DATE: 9/7/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 2
Earthwork Quantities

Subgrade Cut and Fill Volumes:

Volume of Cut (cy) =	56,756	(User Input - From AutoCAD - See Attached)
Volume of Fill (cy) =	21,568	(User Input - From AutoCAD - See Attached)

Compacted Soil Liner (CSL) Volume:

Area of CSL (Ac.) =	6.6	(User Input - From Planimeter - See Attached)
Thickness of CSL (ft) =	1.5	(User Input)
Volume of CSL (cy) =	15,972	

Natural Drainage Media (NDM) Volume:

Area of NDM (Ac.) =	4	(User Input - From Planimeter - Base of Landfill)
Thickness of NDM (ft) =	1	(User Input)
Volume of NDM (cy) =	6,453	

Protective Cover Volume:

Area of Protective Cover - Slopes (Ac.) =	2.6	(User Input - From Planimeter - Slopes of Landfill)
Thickness of Protective Cover - Slopes (ft) =	2	(User Input)
Area of Protective Cover - Base (Ac.) =	4	(User Input - From Planimeter - Base of Landfill)
Thickness of Protective Cover - Base (ft) =	1	(User Input)
Volume of Protective Cover (cy) =	14,843	

Daily/Intermediate Cover Volume:

Volume of Daily/Intermediate Cover (cy) =	99,413	(User Input - From Life Expectancy Calcs.)

EARTHWORK.WB3(2)

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 4 / 13
JOB #: RUTHERFORD-1
DATE: 9/7/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 3
Earthwork Quantities

Subgrade Cut and Fill Volumes:

Volume of Cut (cy) =	87,655	(User Input - From AutoCAD - See Attached)
Volume of Fill (cy) =	25,681	(User Input - From AutoCAD - See Attached)

Compacted Soil Liner (CSL) Volume:

Area of CSL (Ac.) =	9.6	(User Input - From Planimeter - See Attached)
Thickness of CSL (ft) =	1.5	(User Input)
Volume of CSL (cy) =	23,232	

Natural Drainage Media (NDM) Volume:

Area of NDM (Ac.) =	6.7	(User Input - From Planimeter - Base of Landfill)
Thickness of NDM (ft) =	1	(User Input)
Volume of NDM (cy) =	10,809	

Protective Cover Volume:

Area of Protective Cover - Slopes (Ac.) =	2.9	(User Input - From Planimeter - Slopes of Landfill)
Thickness of Protective Cover - Slopes (ft) =	2	(User Input)
Area of Protective Cover - Base (Ac.) =	6.7	(User Input - From Planimeter - Base of Landfill)
Thickness of Protective Cover - Base (ft) =	1	(User Input)
Volume of Protective Cover (cy) =	20,167	

Daily/Intermediate Cover Volume:

Phase 3A Volume of Daily/Intermediate Cover (cy) =	123,783	(User Input - From Life Expectancy Calcs.)
Phase 3B Volume of Daily/Intermediate Cover (cy) =	54,507	(User Input - From Life Expectancy Calcs.)

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 5/13
JOB #: RUTHERFORD-1
DATE: 9/7/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 4
Earthwork Quantities

Subgrade Cut and Fill Volumes:

Volume of Cut (cy) =	417,591	**(User Input - From AutoCAD - See Attached)**
Volume of Fill (cy) =	15,091	**(User Input - From AutoCAD - See Attached)**

Compacted Soil Liner (CSL) Volume:

Area of CSL (Ac.) =	9.5	**(User Input - From Planimeter - See Attached)**
Thickness of CSL (ft) =	1.5	**(User Input)**
Volume of CSL (cy) =	22,990	

Natural Drainage Media (NDM) Volume:

Area of NDM (Ac.) =	5.6	**(User Input - From Planimeter - Base of Landfill)**
Thickness of NDM (ft) =	1	**(User Input)**
Volume of NDM (cy) =	9,035	

Protective Cover Volume:

Area of Protective Cover - Slopes (Ac.) =	3.9	**(User Input - From Planimeter - Slopes of Landfill)**
Thickness of Protective Cover - Slopes (ft) =	2	**(User Input)**
Area of Protective Cover - Base (Ac.) =	5.6	**(User Input - From Planimeter - Base of Landfill)**
Thickness of Protective Cover - Base (ft) =	1	**(User Input)**
Volume of Protective Cover (cy) =	21,619	

Daily/Intermediate Cover Volume:

Volume of Daily/Intermediate Cover (cy) =	116,455	**(User Input - From Life Expectancy Calcs.)**

EARTHWORK.WB3(4)

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 6 / 13
JOB #: RUTHERFORD-1
DATE: 12/22/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 5
Earthwork Quantities

Subgrade Cut and Fill Volumes:

Volume of Cut (cy) =	156,131	(User Input - From AutoCAD - See Attached)
Volume of Fill (cy) =	27,994	(User Input - From AutoCAD - See Attached)

Compacted Soil Liner (CSL) Volume:

Area of CSL (Ac.) =	7	(User Input - From Planimeter - See Attached)
Thickness of CSL (ft) =	1.5	(User Input)
Volume of CSL (cy) =	16,940	

Natural Drainage Media (NDM) Volume:

Area of NDM (Ac.) =	3.9	(User Input - From Planimeter - Base of Landfill)
Thickness of NDM (ft) =	1	(User Input)
Volume of NDM (cy) =	6,292	

Protective Cover Volume:

Area of Protective Cover - Slopes (Ac.) =	3.1	(User Input - From Planimeter - Slopes of Landfill)
Thickness of Protective Cover - Slopes (ft) =	2	(User Input)
Area of Protective Cover - Base (Ac.) =	3.9	(User Input - From Planimeter - Base of Landfill)
Thickness of Protective Cover - Base (ft) =	1	(User Input)
Volume of Protective Cover (cy) =	16,295	

Daily/Intermediate Cover Volume:

Volume of Daily/Intermediate Cover (cy) =	120,102	(User Input - From Life Expectancy Calcs.)

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 7 / 13
JOB #: RUTHERFORD-1
DATE: 12/22/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 6
Earthwork Quantities

Subgrade Cut and Fill Volumes:

Volume of Cut (cy) =	102,600	(User Input - From AutoCAD - See Attached)
Volume of Fill (cy) =	18,396	(User Input - From AutoCAD - See Attached)

Compacted Soil Liner (CSL) Volume:

Area of CSL (Ac.) =	4.6	(User Input - From Planimeter - See Attached)
Thickness of CSL (ft) =	1.5	(User Input)
Volume of CSL (cy) =	11,132	

Natural Drainage Media (NDM) Volume:

Area of NDM (Ac.) =	3.4	(User Input - From Planimeter - Base of Landfill)
Thickness of NDM (ft) =	1	(User Input)
Volume of NDM (cy) =	5,485	

Protective Cover Volume:

Area of Protective Cover - Slopes (Ac.) =	1.2	(User Input - From Planimeter - Slopes of Landfill)
Thickness of Protective Cover - Slopes (ft) =	2	(User Input)
Area of Protective Cover - Base (Ac.) =	3.4	(User Input - From Planimeter - Base of Landfill)
Thickness of Protective Cover - Base (ft) =	1	(User Input)
Volume of Protective Cover (cy) =	9,357	

Daily/Intermediate Cover Volume:

Volume of Daily/Intermediate Cover (cy) =	125,037	(User Input - From Life Expectancy Calcs.)

EARTHWORK.WB3(6)

G.N. Richardson & Associates

ENGINEERING AND GEOLOGICAL SERVICES

SHEET: 8 / 13
JOB #: RUTHERFORD-1
DATE: 12/22/00
BY: PKS
CHKD BY:

Rutherford County MSWLF - Phase 7
Earthwork Quantities

Subgrade Cut and Fill Volumes:

Volume of Cut (cy) =	86,987	(User Input - From AutoCAD - See Attached)
Volume of Fill (cy) =	15,597	(User Input - From AutoCAD - See Attached)

Compacted Soil Liner (CSL) Volume:

Area of CSL (Ac.) =	3.9	(User Input - From Planimeter - See Attached)
Thickness of CSL (ft) =	1.5	(User Input)
Volume of CSL (cy) =	9,438	

Natural Drainage Media (NDM) Volume:

Area of NDM (Ac.) =	1.8	(User Input - From Planimeter - Base of Landfill)
Thickness of NDM (ft) =	1	(User Input)
Volume of NDM (cy) =	2,904	

Protective Cover Volume:

Area of Protective Cover - Slopes (Ac.) =	2.1	(User Input - From Planimeter - Slopes of Landfill)
Thickness of Protective Cover - Slopes (ft) =	2	(User Input)
Area of Protective Cover - Base (Ac.) =	1.8	(User Input - From Planimeter - Base of Landfill)
Thickness of Protective Cover - Base (ft) =	1	(User Input)
Volume of Protective Cover (cy) =	9,680	

Daily/Intermediate Cover Volume:

Phase 7A Volume of Daily/Intermediate Cover (cy) =	118,632	(User Input - From Life Expectancy Calcs.)
Phase 7B Volume of Daily/Intermediate Cover (cy) =	42,436	(User Input - From Life Expectancy Calcs.)

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-05-00
Time: 09:13:04
Page: 1

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Prismoidal Volume Results

Original Surface Model: topo 3-99 new msw area
Final Surface Model: PHASE 1 SUBG
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

PHASE 1 SUBGRADE

LINER AREA = 7.5 Ac.

Raw Cut Volume: 75671.18 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 75671.18 cu yd

Raw Fill Volume: 118512.56 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 118512.56 cu yd

Adjust for subgrade elevs. (Plan is top of CSL)

*Add 90% 1.5' CSL to Cut (.9x1.5x7.5Ac = 16,335 CY)

CUT = 92,006 CY

*Subtract 10% 1.5' CSL from Fill (.1x1.5x7.5 Ac = 1,815 CY)

FILL = 116,698 CY

* Assume on all phases that 90% of adjustment for 1.5' of compacted soil liner goes to additional cut & 10% to reduced Fill.

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 08-28-00
Time: 15:03:27
Page: 1

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Prismoidal Volume Results

Original Surface Model: PH1 SUBG W/EXIST TOPO
Final Surface Model: PHASE 2 SUBGRADE
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

Raw Cut Volume: 42380.61 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 42380.61 cu yd

Raw Fill Volume: 23164.85 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 23164.85 cu yd

Adjust for subgrade elevs. (Plan is top of CSL)
-Add 90% 1.5' CSL to Cut (.9x1.5'x6.6 Ac = 14,375 CY)
CUT = 56,756 CY
-subtract 10% 1.5' CSL From Fill (1,597 CY)
FILL = 21,568 CY

PHASE 2 SUBGRADE
LINER AREA = ~~7.40~~ 6.6 Ac.

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User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 08-28-00
Time: 15:24:59
Page: 1

Prismoidal Volume Results

Original Surface Model: PH1-2 SUBG W/EX TOPO
Final Surface Model: PHASE 3 SUBG
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

Raw Cut Volume: 66745.70 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 66745.70 cu yd

Raw Fill Volume: 28004.02 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 28004.02 cu yd

Adjust for subgrade elevs.
- Add 90% 1.5' CSL to Cut (.9x1.5' x 9.6 Ac = 20,909 CY)
CUT = 87,655 CY
- Subtract 10% 1.5' CSL from Fill (2,323 CY)
FILL = 25,681 CY

PHASE 3 SUBGRADE

LINER AREA = ~~9.59~~ 9.6 Ac.

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 09-07-00
Time: 08:44:23
Page: 1

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Prismoidal Volume Results

Original Surface Model: topo 3-99 new msw area
Final Surface Model: PH4 SUBG
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

Raw Cut Volume: 396900.10 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 396900.10 cu yd

Raw Fill Volume: 17389.66 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 17389.66 cu yd

Adjust for subgrade elevs.
- Add 90% 1.5' CSL to Cut (.9x1.5'x9.5Ac = 20,691 cy
cut = 417,591 CY
- Subtract 10% 1.5' CSL from Fill (2299 CY)
Fill = 15,091 CY

PHASE 4 SUBGRADE
LINER AREA = 9.5 AC.

User Name: Anthony Honaker
Project: RUTHERFORD CO MSW LANDFILL
Prismoidal Volume Results

Date: 12-19-00
Time: 15:34:16
Page: 1

Prismoidal Volume Results

Original Surface Model: PHASE 4 SUBG W EX PH 1-4 FILL
Final Surface Model: PHASE 5-7 SUBG
Cut Compaction Factor: 0.00
Fill Compaction Factor: 0.00

Raw Cut Volume: 311959.01 cu yd
Compacted Cut Volume: 0.00 cu yd
Total Cut Volume: 311959.01 cu yd

Raw Fill Volume: 58236.29 cu yd
Compacted Fill Volume: 0.00 cu yd
Total Fill Volume: 58236.29 cu yd

Adjust For Subgrade Elevs.
- Add 90% 1.5' CSL to Cut (.9 x 1.5' x 15.5 Ac)
  ↳ = 33,759 CY

Cut = 345,718 CY
- Add 10% 1.5' CSL to Fill (3751 CY)
  Fill = 61,987 CY

PHASE 5-7 SUBGRADE
LINER AREA = 15.5 Ac.

Apportion Cut/Fill to Phases 5, 6, 7 By Acreage:

Ph. 5 (7.0 Ac) ⇒ Cut = 156,131 CY
Fill = 27,994 CY

Ph. 6 (4.6 Ac.) ⇒ Cut = 102,600 CY
Fill = 18,396 CY

Ph. 7 (3.9 Ac.) ⇒ Cut = 86,987 CY
Fill = 15,597 CY

I, NATHAN ODOM certify that under my supervision this Map was drawn from an actual field survey, that the Error of Closure is 1: 10,000 ; that the boundaries not surveyed are shown as broken lines plotted from information in book ____ page ____. WITNESS my hand and seal this 17th day of May A.D. 1993.

Signature _____
Land Surveyor
Registration Number L-2718

NORTH CAROLINA REGISTERED SEAL L-2718 LAND SURVEYOR NATHAN ODOM

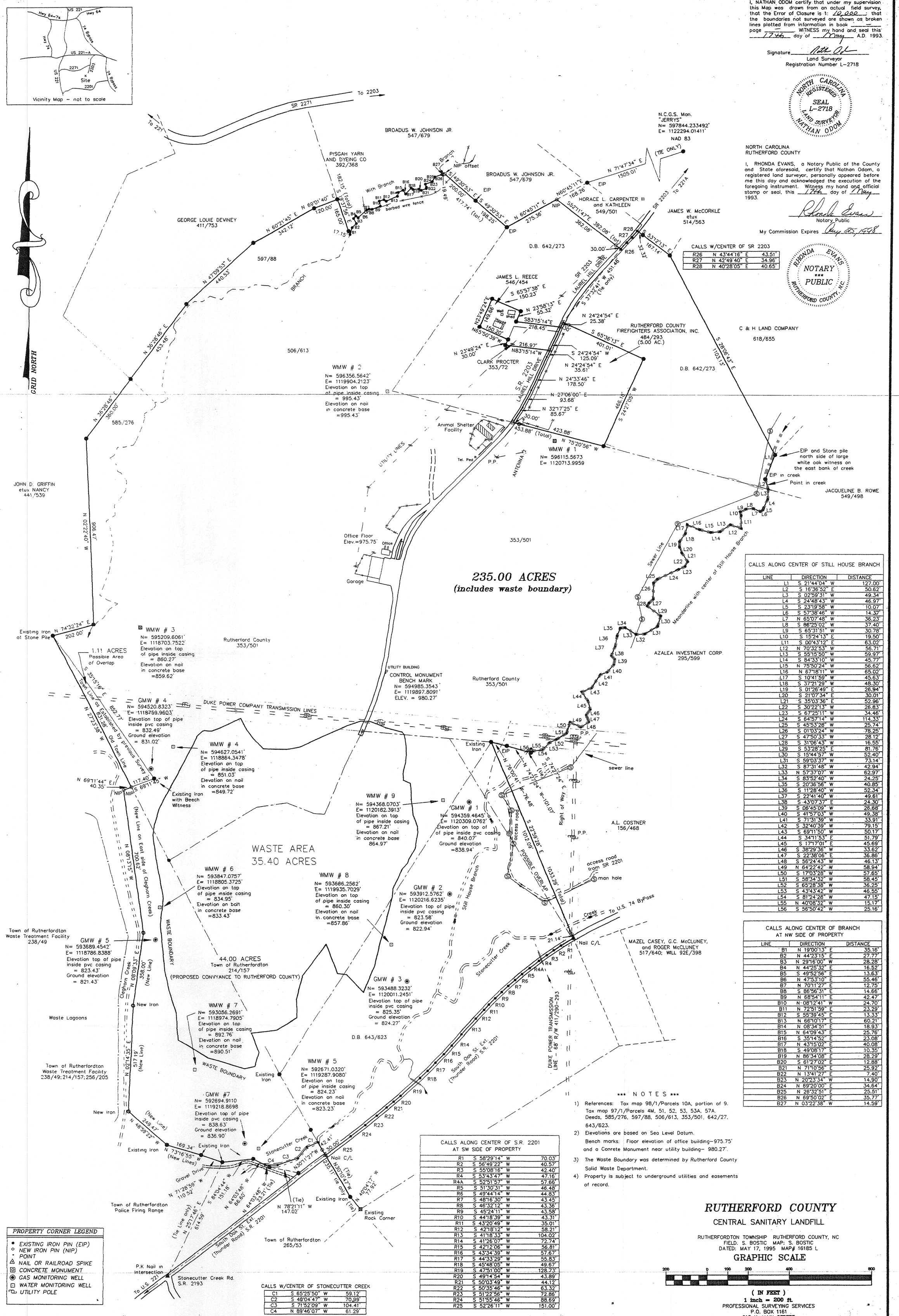
NORTH CAROLINA
RUTHERFORD COUNTY

I, RHONDA EVANS, a Notary Public of the County and State aforesaid, certify that Nathan Odom, a registered land surveyor, personally appeared before me this day and acknowledged the execution of the foregoing instrument. Witness my hand and official stamp or seal, this 17th day of May 1993.

_____
Notary Public

My Commission Expires May 25, 1998

RHONDA EVANS NOTARY PUBLIC RUTHERFORD COUNTY, N.C.



CALLS W/CENTER OF SR 2203

R26	N 43°44'16" E	43.51'
R27	N 42°49'40" E	34.96'
R28	N 40°28'05" E	40.65'

CALLS ALONG CENTER OF STILL HOUSE BRANCH

LINE	DIRECTION	DISTANCE
L1	S 21°44'04" W	127.00'
L2	S 16°36'52" E	50.62'
L3	S 02°59'31" W	49.34'
L4	S 24°48'43" W	46.97'
L5	S 23°19'58" W	10.07'
L6	S 57°38'46" W	14.37'
L7	N 65°07'48" W	36.23'
L8	S 86°25'02" W	37.40'
L9	S 65°31'51" W	30.78'
L10	S 15°24'13" E	19.50'
L11	S 00°43'12" E	63.02'
L12	N 70°32'53" W	56.71'
L13	S 55°15'50" W	59.97'
L14	S 84°33'10" W	45.77'
L15	N 75°50'24" W	56.62'
L16	N 67°18'11" W	65.02'
L17	S 10°41'59" W	45.63'
L18	S 37°21'29" W	48.30'
L19	S 01°26'49" E	26.94'
L20	S 21°07'34" E	30.01'
L21	S 35°03'36" E	52.96'
L22	S 30°22'13" W	26.83'
L23	S 67°25'11" W	34.46'
L24	S 64°57'14" W	114.33'
L25	S 45°53'28" W	25.74'
L26	S 01°03'24" W	78.25'
L27	S 47°50'33" W	28.12'
L28	S 31°06'43" W	16.55'
L29	S 53°28'25" E	81.76'
L30	S 15°44'57" W	52.40'
L31	S 59°03'37" W	73.14'
L32	S 87°31'48" W	42.94'
L33	N 57°37'07" W	62.97'
L34	S 83°52'40" W	24.25'
L35	S 20°36'56" W	40.85'
L36	S 11°28'40" W	52.34'
L37	S 22°41'40" W	49.61'
L38	S 43°07'37" E	24.30'
L39	S 06°45'09" W	26.68'
L40	S 41°57'03" W	49.38'
L41	S 71°31'39" W	33.91'
L42	S 32°40'39" W	79.15'
L43	S 69°11'50" W	50.17'
L44	S 34°11'53" E	51.79'
L45	S 17°17'01" E	45.69'
L46	S 38°29'36" W	33.62'
L47	S 22°38'06" E	36.86'
L48	S 56°24'43" W	46.13'
L49	N 64°22'42" W	58.94'
L50	S 17°03'28" W	57.65'
L51	S 58°34'32" W	58.45'
L52	S 65°28'38" W	36.25'
L53	S 43°43'42" W	46.55'
L54	S 81°24'28" W	47.15'
L55	N 40°08'32" W	15.17'
L56	S 56°50'42" W	25.16'

CALLS ALONG CENTER OF BRANCH AT NW SIDE OF PROPERTY

LINE	DIRECTION	DISTANCE
B1	N 19°00'13" E	35.16'
B2	N 44°23'15" E	27.77'
B3	N 29°16'00" W	28.28'
B4	N 44°25'32" E	16.52'
B5	S 49°52'56" E	13.63'
B6	N 47°53'10" E	55.46'
B7	N 70°11'27" E	12.75'
B8	S 86°56'31" E	14.66'
B9	N 68°54'11" E	42.47'
B10	N 08°12'41" W	24.70'
B11	N 72°51'59" E	23.29'
B12	S 55°39'45" E	13.33'
B13	N 66°10'17" E	60.21'
B14	N 08°34'51" E	18.93'
B15	N 64°09'43" E	25.76'
B16	S 35°14'52" E	23.08'
B17	N 43°15'02" E	40.08'
B18	S 49°08'17" E	10.35'
B19	N 86°34'08" E	28.29'
B20	S 61°27'02" E	12.88'
B21	N 71°10'56" E	25.92'
B22	N 13°41'27" E	7.40'
B23	N 20°23'34" W	14.90'
B24	N 69°20'00" E	34.64'
B25	N 26°32'51" E	25.51'
B26	N 69°50'02" E	35.77'
B27	N 03°22'38" W	14.59'

CALLS ALONG CENTER OF S.R. 2201 AT SW SIDE OF PROPERTY

R1	S 58°29'14" W	70.03'
R2	S 56°49'22" W	40.57'
R3	S 55°08'16" W	42.40'
R4	S 53°43'47" W	47.16'
R4A	S 52°51'57" W	57.66'
R5	S 51°30'31" W	46.48'
R6	S 49°44'14" W	44.83'
R7	S 48°16'30" W	43.45'
R8	S 46°32'12" W	43.36'
R9	S 45°24'11" W	43.58'
R10	S 44°18'39" W	43.31'
R11	S 43°20'49" W	35.01'
R12	S 42°18'12" W	58.21'
R13	S 41°18'33" W	104.02'
R14	S 41°26'07" W	72.74'
R15	S 42°12'06" W	56.81'
R16	S 43°34'39" W	57.67'
R17	S 44°33'29" W	55.83'
R18	S 45°48'05" W	49.67'
R19	S 47°51'00" W	128.73'
R20	S 49°14'54" W	43.89'
R21	S 50°03'49" W	44.12'
R22	S 50°35'46" W	63.32'
R23	S 51°22'56" W	72.86'
R24	S 51°55'46" W	88.69'
R25	S 52°26'11" W	151.00'

CALLS W/CENTER OF STONECUTTER CREEK

C1	S 65°25'50" W	59.12'
C2	S 40°04'47" W	70.99'
C3	S 71°52'09" W	104.41'
C4	N 89°46'07" W	61.29'

*** N O T E S ***

1) References: Tax map 98/1/Parcels 10A, portion of 9. Tax map 97/1/Parcels 4M, 51, 52, 53, 53A, 57A. Deeds, 585/276, 597/88, 506/613, 353/501, 642/27, 643/623.
2) Elevations are based on Sea Level Datum. Bench marks: Floor elevation of office building–975.75' and a Conrete Monument near utility building– 980.27'.
3) The Waste Boundary was determined by Rutherford County Solid Waste Department.
4) Property is subject to underground utilities and easements of record.

RUTHERFORD COUNTY

CENTRAL SANITARY LANDFILL

RUTHERFORDTON TOWNSHIP RUTHERFORD COUNTY, NC
FIELD. S. BOSTIC MAP: S. BOSTIC
DATED: MAY 17, 1995 MAP# 16185 L

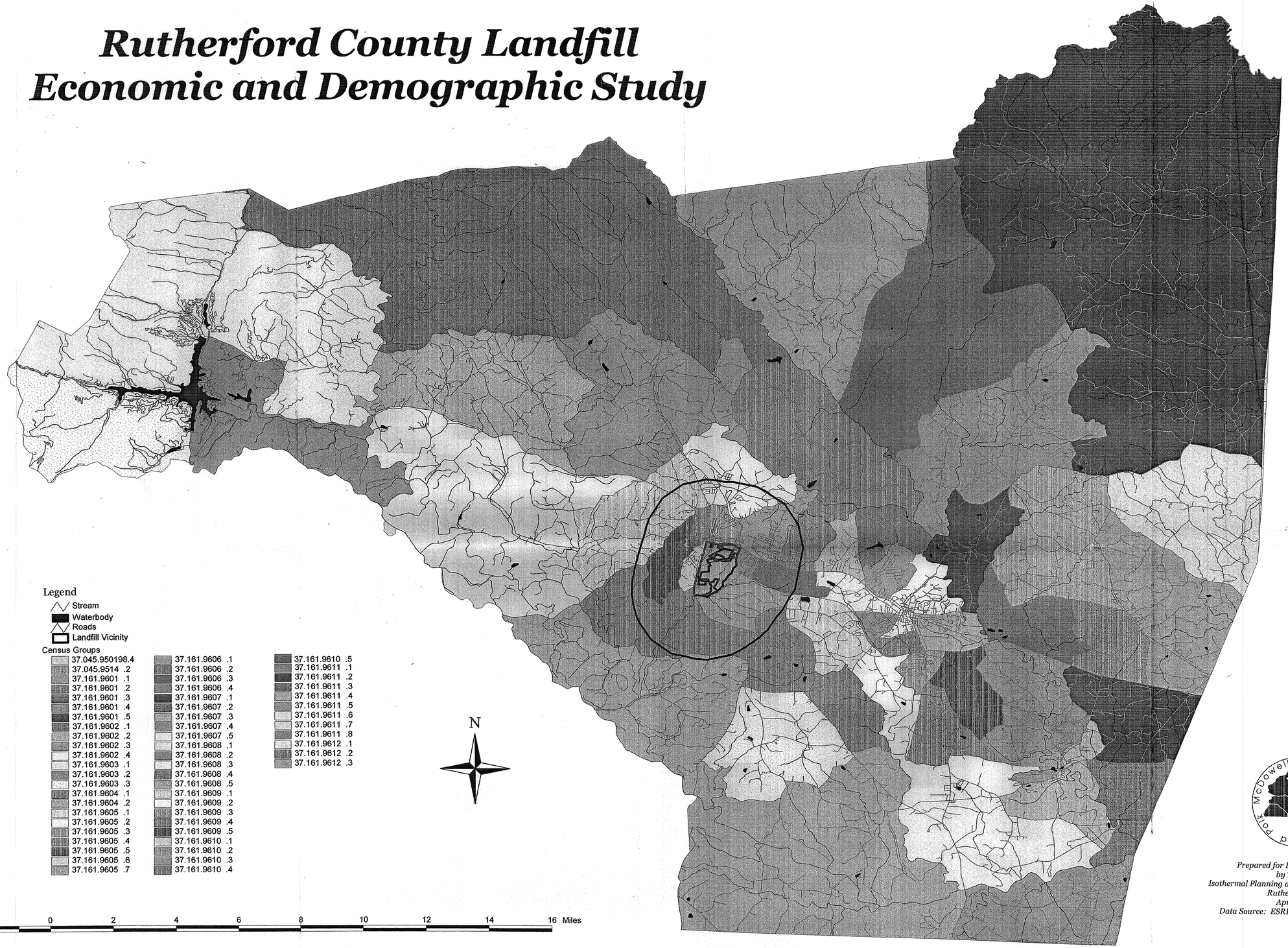
GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

PROFESSIONAL SURVEYING SERVICES
P.O. BOX 1161
218 N. MAIN STREET
RUTHERFORDTON, NC 28139
PHONE: (704) 287-7059

Rutherford County Landfill
Economic and Demographic Study



Prepared for David Garrett, PG, PE
by T. Wright,
Isothermal Planning and Development Commission
Rutherfordton, NC
April 14, 1990
Data Source: ESRI, TIGER, 1990 U.S. Census