Haywood County

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Carmen Johnson
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GROUNDWATER AND SURFACE WATER ASSESSMENT FOR LANDFILL NUMBER 6

Prepared for:

CHAMPION INTERNATIONAL CORPORATION
Canton Pulp and Paper Mill
Canton, North Carolina

William C. Morris, P.G.
Registration Number 1218, North Carolina

Prepared by:

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1000 Perimeter Park Drive, Suite E
Morrisville, North Carolina 27560

30 March 1995

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26 April 1995

Mr. Jim Patterson
North Carolina Department of Environment,
Health, and Natural Resources
Division of Solid Waste Management
Asheville, North Carolina 28801

RE: Transmittal of Groundwater and Surface Water Assessment for Landfill Number 6
Champion International Corporation
Canton Pulp and Paper Mill
Canton, North Carolina

Dear Mr. Patterson:

At the request of Champion International Corporation, please find enclosed one copy of the above referenced report. The report has also been previously submitted to the Division of Solid Waste's Raleigh, North Carolina office, to the attention of Mr. Mark Poindexter.

If you have any questions or comments, please do not hesitate to call Mr. Derric Brown, (704)646-2318, or Mr. Jim Giauque, (704)646-2028, of Champion, at Champion's Canton, North Carolina facility.

Very Truly Yours,

ROY F. WESTON, INC.

William C. Morris, P.G.
Project Manager

enclosures

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SECTION 1

INTRODUCTION

At the request of Champion International Corporation (Champion), Roy F.Weston (WESTON.) has prepared this groundwater and surface water assessment report for the Champion Canton Mill Landfill Number 6. The report presents the findings of an investigation specified in the work plan "Comprehensive Assessment Plan for Groundwater and Surface Water at Landfill Number 6", WESTON, 17 August 1994. The work plan and its implementation were developed in response to an Administrative Agreement on Consent between Champion and the North Carolina Department of Environment, Health, and Natural Resources, Division of Solid Waste Management (DEHNR, DSWM).

This report builds upon an earlier report, "Interim Data Review for Landfill Number 6", WESTON, 5 December 1994. Information from the interim report is presented in this report, and has been extended through the inclusion of more recent groundwater elevation and analytical data, and updated ground surface topographic information. Surface water elevation and quality data has been included in this investigation, as has a fracture trace analysis, a review of data for the Haywood County Construction and Demolition Landfill (located east of and adjacent to the Champion Landfill Number 6), and a more extensive review of regional hydrogeologic and surface water data. Conclusions are developed regarding groundwater and surface water quality at the landfill, and recommendations for further work at the site are presented.

SECTION 2

PHYSICAL SETTING

Landfill No. 6 is located in the western portion of North Carolina, approximately 1.5 miles west of Canton, in Haywood County (Figure 2-1). The site is bordered to the north by Interstate Highway 40, to the south by the Pigeon River, to the east by State Road 1513, and to the west by State Road 1550. The site covers approximately 240 acres, and is subdivided into eight areas, designated A through H (Figure 2-2).

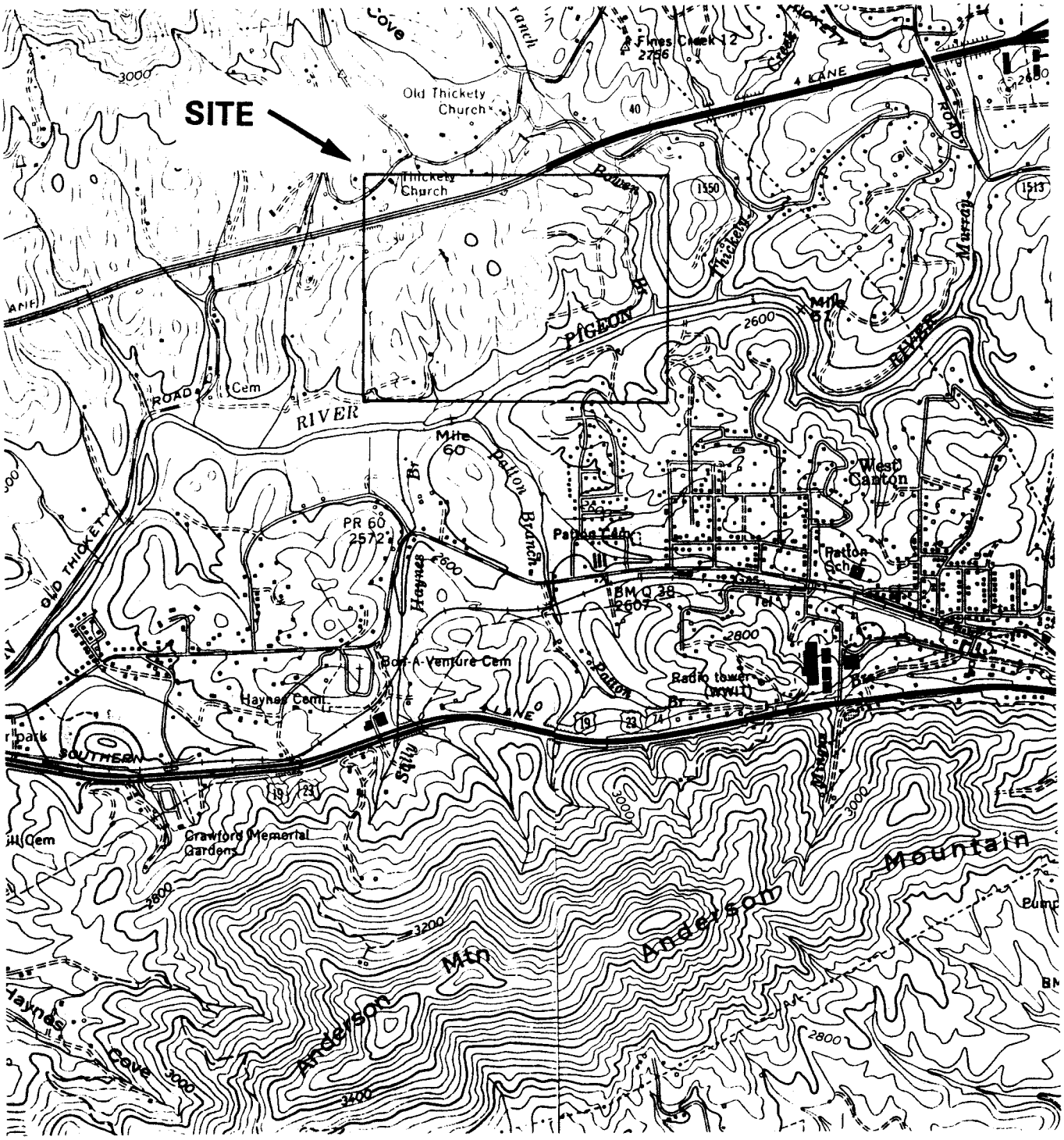
2.1 REGIONAL SETTING

2.1.1 REGIONAL GEOLOGY

The site is located in the Blue Ridge Belt of the Blue Ridge Province (Geologic Map of North Carolina, North Carolina Geological Survey, 1985). The 1985 Geologic Map indicates that the site lies within a (middle) proterozoic sequence of highly metamorphosed (kyanite to sillimanite facies) sedimentary and igneous rock described as felsic and biotite gneiss which is locally migmatitic and mylonitic. Local intrusions of later Proterozoic mafic and felsic plutons are present.

The area of interest, Canton, North Carolina, and immediate vicinity are described as Precambrian Biotite Gneiss (Carolina Gneiss) (Reconnaissance of the Ground-Water Resources in the Waynesville Area, North Carolina. Owen T. Marsh, USGS, May 1966; this study identifies the Waynesville as including Haywood, jackson and Macon Counties). This rock underlies the southern two-thirds of Haywood County, and extends to the southwest to underlie most of Jackson and Macon Counties. Although quartz-biotite gneiss predominates overwhelmingly in these counties, a variety of other rock types of small exposures were also encountered, such as metacongolmerate, quartzite, mica schist, veins of quartz, aplite, and pegmatite, and small intrusive bodies of granite.

The quartz-biotite gneiss in the area consists of distinct, even bands of quartz and feldspar which alternate with layers rich in biotite (March 1966). These bands are described as typically 1/8 to 1 inch wide, although occasional bands are several inches wide. The rock is generally medium grained and well foliated. Accessory minerals in the biotite gneiss unit included: kyanite, sillimanite, muscovite, chlorite, and actinolite. Throughout the Waynesville area, the biotite gneiss unit contains large amounts of granitic material, although according to logs and maps in this study, this did not appear to be the case for the biotite gneiss in the Canton area. However, at 4 1/2 miles north of Canton and at 3.2 miles northwest of Balsam Gap on the Blue Ridge Parkway, beds of light-colored quartzite occurred within the biotite gneiss. The foliation of the gneiss is parallel to the bedding planes of the quartzite.



REFERENCE: USGS TOPOGRAPHIC MAPS
CLYDE,NC AND CANTON, NC QUADRANGLES
CLYDE – 1967, PHOTOREVISED 1978
1967, PHOTOREVISED 1990

SCALE (Feet)
0 2000
1000

FIGURE	2-1
DATE	7/5/94
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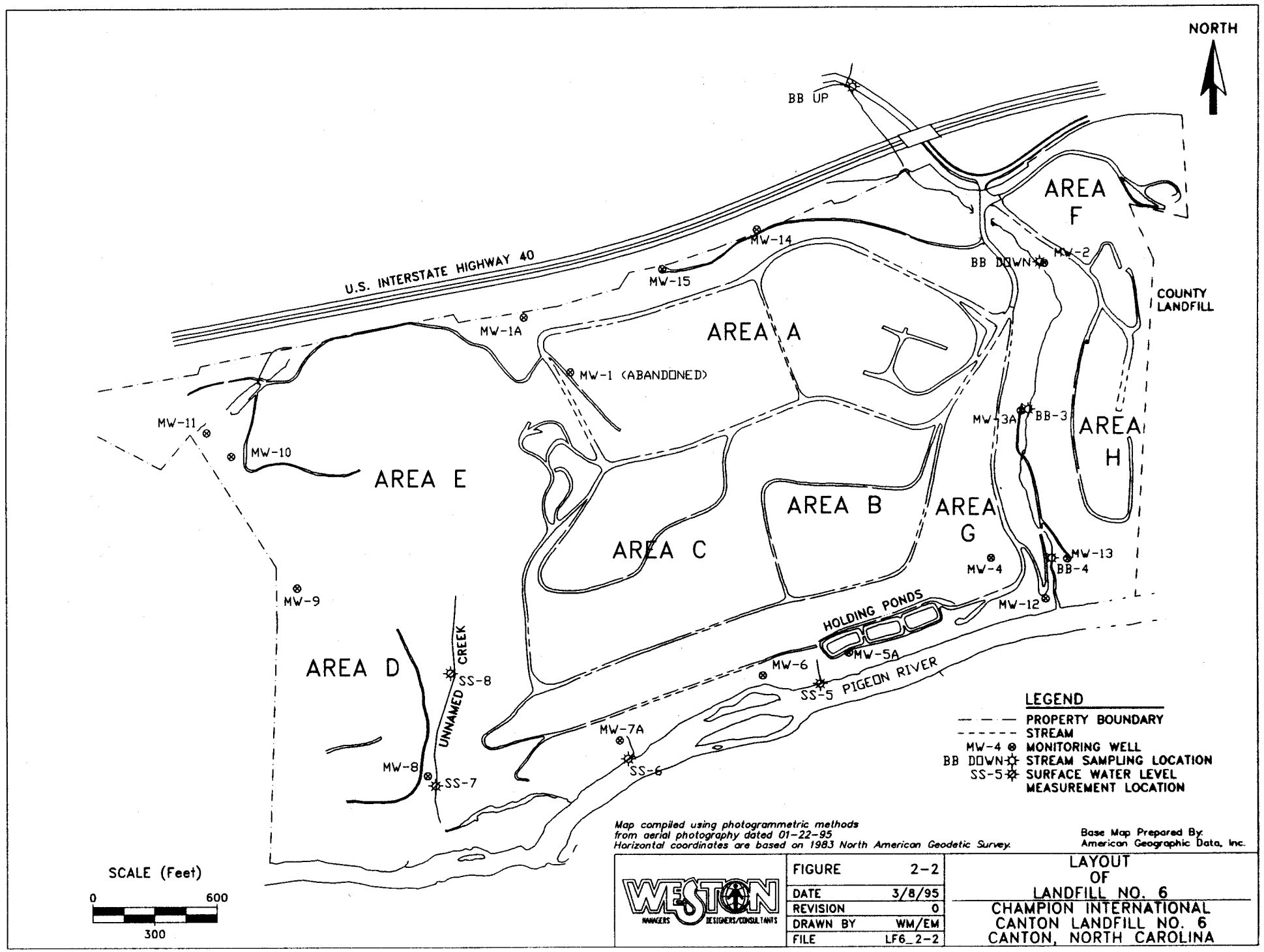
FILE	SITETOPO

FACILITY LOCATION MAP
CHAMPION INTERNATIONAL
CANTON LANDFILL NO. 6
CANTON, NORTH CAROLINA



Map compiled using photogrammetric methods from aerial photography dated 01-22-95
Horizontal coordinates are based on 1983 North American Geodetic Survey.

Base Map Prepared By:
American Geographic Data, Inc.

WESTON MANAGERS DESIGNERS/CONSULTANTS

FIGURE	2-2
DATE	3/8/95
REVISION	0
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FILE	LF6_2-2

LAYOUT
OF
LANDFILL NO. 6
CHAMPION INTERNATIONAL
CANTON LANDFILL NO. 6
CANTON, NORTH CAROLINA

In much of the area investigated by Marsh, the biotite gneiss was found to be deeply weathered to saprolite. The feldspars had disintegrated to chalky-white kaolin and other clay minerals, the biotite had decayed to a soft, light-golden material, and iron from mafic minerals had been converted to limonite. Ultimately, the rock weathers to a reddish-brown earth (Marsh 1966).

The gross geologic structure of the Waynesville area is a synclinorium whose axis trends northeastward across the center of the Waynesville study area approximately in line from Franklin, Macon County, to Canton, Haywood County. The structure extends northeast and southwest beyond the limits of the area. Nearly all the rock units in the three counties are aligned in this same direction, which corresponds to the regional trend of structures in the southern Appalachian Mountains.

The eastern portion of the landfill site lies within the study area of the North Carolina Geological Survey Bulletin 90 (Geology of the Sandymush and Canton Quadrangles, North Carolina, 1988). The area in the vicinity of the site is mapped as the Ashe Metamorphic Suite - schist unit (Late Proterozoic), with a dunite body present in the eastern portion of the site (mapped as part of the Earlies Gap Biotite Gneiss. The schist unit is described as a two mica (muscovite-biotite) schist, light-to-medium gray, thin-to-medium layered, medium-to-coarse grained, and finely foliated. Kyanite or sillimanite is an accessory mineral, depending on metamorphic grade (the study's geologic map indicates the site lies within the kyanite facies). The schist is variably garnetiferous and sulfidic. Metagraywacke, muscovite-biotite to biotite gneiss, amphibolite (composed primarily of horneblende and plagioclase) and (rare) calc-silicate granofels are variably interlayered with the schist.

Earlies Gap Biotite Gneiss, of Middle Proterozoic age, is highly jointed and folded, comprised primarily of biotite gneiss. As the biotite content increases, the gneiss becomes more schistose. Muscovite is present in much lesser quantities than biotite. Amphibolite occurs as thin layers, lenses and pods. Interlayered calc-silicate granofels may also be present, though much less abundantly than amphibolite. The Earlies Gap Biotite Gneiss contacts the Ashe Metamorphic Suite along the Holland Mountain thrust fault. The units are readily distinguished based on the absence of muscovite and aluminous minerals in the gneiss, both of which are common in the Ashe metamorphic Suite.

A late proterozoic dunite body in the vicinity of the site is mapped on the upper plate of the western edge of the Holland Mountain thrust fault, located approximately where monitor well MW-2 resides. Unaltered dunite is comprised primarily of olivine (Forsterite - Fo_{92}). It is pale olive to duskey yellow green, fine-to-coarse grained, granular and locally friable, with black crystals and blebs of chromite. Weathered or altered dunite is dusky yellow, with hydrous alteration minerals including talc, anthophyllite, chlorite, tremolite, and vermiculite. The dunites weather out to a nickeliferous saprolite and a dark red soil containing chalcedonic fragments. Magnetite is formed during serpentization.

Soils of the area are generally comprised of thin alluvium (clastic material deposited by running water, such as in stream beds and flood plains) and colluvium (coarse to fine grained material moved downward primarily by gravity). The alluvium and colluvium are modified by running water, vegetation, and weathering. Deposits in flood plains are characterized by a significant amounts of silt and clay intermixed with micaceous sands, and generally are not considered useful for development as groundwater supplies (Marsh, 1966).

Underlying the surface alluvium and colluvium is a variable thickness of saprolite (rock which has been weathered in-situ to soil). The saprolite is typically finer grained nearer the surface, where weathering is most pronounced. With increasing depth, the degree of weathering decreases, and the saprolite typically becomes progressively coarser. Eventually, the saprolite grades into heavily fractured rock, which typically becomes less fractured with depth. The transition from saprolitic soils to fractured rock may be gradual or abrupt, and may be highly variable over short distances.

From a review of the regional geologic literature, it is observed that the mineralogic composition of the region is varied, and includes a diverse array of metamorphic minerals. Several of these minerals tend to concentrate metals, such as biotite, garnets, horneblende, and forsterite. Weathering has also affected the mineralogic composition of the area, resulting in the formation of clay minerals (such as kaolin), chlorite, and limonite. Metamorphism has resulted in intense folding, faulting and fracturing of the bedrock. Fracturing of the bedrock results in increased mobilization of constituents of the minerals composing the bedrock.

2.1.2 REGIONAL HYDROGEOLOGY

Groundwater in the region may be present in the soil (filling interstitial spaces) and in the fractured rock (filling the fractures). Depth to groundwater is highly variable, depending to a large degree on the surface topography. In low lying areas, groundwater may be encountered within 10 feet or less of ground surface, whereas depth to groundwater on hilltops may be in excess of 100 feet.

The 1966 study by Marsh of the Waynesville area surveyed 153 drilled wells. The study indicated that nearly all drilled wells in the study area receive water from bedrock fractures (joints, faults, and other fractures) and, to a lesser extent, from other openings such as cleavage and bedding planes. (Metamorphism of former sedimentary rocks may not completely destroy the original bedding, so that rocks like gneiss or schist that were derived from sedimentary formations may retain bedding planes along which water may enter.) Total well depths ranged from 20 to 800 feet in depth, and water levels ranged from 12 feet above land surface to 205 feet below land surface. Wells screened into granite gneiss experienced the highest yields, followed by wells screened into biotite gneiss, with wells screened into other rock types experiencing lower yields. Well yield was also affected by topographic location, with higher yields experienced at topographic lows. The average yield for biotite gneiss per foot of well was

estimated to be 0.10 gallons per minute. Most of the wells in Haywood County tap biotite gneiss (Marsh, 1966).

According to the National Water Summary, 1986 - Ground-Water Quality for North Carolina (NWS, 1986), Haywood County lies entirely within a crystalline bedrock principal aquifer. This aquifer is defined as a crystalline igneous, metasedimentary and metavolcanic rock, semiconfined to confined, with little storage capacity (NWS, 1986).

The water quality for this aquifer for samples collected from 1932 to 1986 is as follows:

Percentile: percentage of analyses equal to or less than indicated values:

Data:	90th:	75th:	50th:	25th:	10th:
Dissolved Solids	110	105	96	65	45
Hardness	105	70	42	25	15
Nitrate	1.4	0.55	0.14	0.04	--
Chloride	10	5	3.0	1	--
Fluoride	0.2	0.1	0.1	--	--
Iron	1.000	NA	NA	NA	0.100
Manganese	0.110	NA	NA	NA	0.050
pH	7.4	NA	NA	NA	6.0

Note: concentrations expressed in milligrams per liter, or parts per million
NA indicates data not presented in reference material

It is noted that 90th percentile concentrations of the first five elements do not exceed North Carolina Groundwater Quality Standards (NCGWQSs). However, NCGWQSs were exceeded in the 90th percentile by iron (0.300 milligram per liter, mg/l) and manganese (0.050 mg/l). In the 10th percentile, the NCGWQS for pH (6.5 - 8.5 standard pH units) was exceeded.

According to Marsh, nitrate and chloride were frequently detected in groundwater in Haywood County at concentrations greater than 1.8 parts per million (ppm) and 2.3 ppm, respectively. Iron concentrations in groundwater were typically less than 0.3 ppm. Aluminum concentrations in groundwater sampled in the Waynesville area ranged from 0 to 0.3 ppm, with a majority of the samples exhibiting less than 0.2 ppm aluminum. Most of the groundwater sampled in the Waynesville area is classified as soft water (0 ppm to 60 ppm of calcium carbonate) (Marsh, 1966). From the review of the literature, it is observed that a variety of cations and anions are naturally occurring at variable concentrations in groundwater in the region.

2.1.3 REGIONAL HYDROLOGY

The site is located in the French Broad River Basin. This basin is composed of three separate drainages, including the Pigeon River Watershed which includes the site (Water Quality of the French Broad River, North Carolina, USGS , 1979, C.C. Daniels et al.).

Haywood County is drained principally by the Pigeon River and its tributaries. The river starts at the southernmost edge of the county and flows northward across its length to join the French Broad River in Tennessee. Hominy Creek flows eastward from Canton and enters the French Broad River in Buncombe County.

2.2 FRACTURE TRACE ANALYSIS

A fracture trace analysis by lineament analysis was conducted as part of this investigation. The analysis was conducted to assess if a dominant orientation was present in bedrock fractures in the vicinity of the site, as groundwater flow through bedrock is significantly influenced by fractures.

Rock fabric in the form of bedding, schistosity, foliation, cleavage, joints, and faults often impart a preferred orientation to the topography of a region. Rock fabric is also responsible for secondary, or fracture porosity a formation may have and, therefore, can greatly influence groundwater flow and direction in bedrock. A visual evaluation of the rock fabric using aerial photography, or lineament analysis, in the study area can often provide insight into groundwater flow and direction. A lineament analysis was completed for the study area using available topographic and geologic maps, and aerial photographs. The maps and photographs were evaluated to determine if the topography, drainage patterns, or other features in the study area showed any linearity and a preferred orientation.

Two sets of aerial photographs were used in the evaluation; 1:80,000 scale, and 1:24,000 scale. Both sets were obtained from the USGS National High Altitude Program (NHAP) repository in Sioux Falls, South Dakota. Each set provided approximately 60 % image overlap, facilitating stereographic viewing of the study area. Photographs used in this study were taken in 1992. Subsequent portions of this section include discussions of the rectified drainage pattern, its correlation with regional geology, and the implications for groundwater flow in the study area.

2.2.1 RECTIFIED DRAINAGE ANALYSIS

In mature physiographic provinces such as the Blue Ridge, weathering is the dominant geologic process. Consequently, bedrock structures can often be very difficult or impossible to observe directly on aerial photographs. Soil cover in the study area can be 10-feet thick or less on ridges and up to 100 feet thick or more in valleys. Since rock fabric significantly affects drainage in

a young physiographic province, and to a lesser degree in a mature province, a detailed analysis of the drainage pattern is a useful tool in understanding the areas' geology and hydrogeology.

A rectified drainage analysis was completed for the study area. The drainage pattern was simplified in an overlay of the 1:24,000 scale aerial photograph to straight line segments, where appropriate. Line segments comprising the rectified drainage pattern were then evaluated with regards to preferred orientation and length. Length data was normalized using a weighing process; 1/2-inch (equivalent to 1,000 feet) of line length equals one line segment. Additionally, first, second, and third order elements of the drainage pattern rectified as line segments are multiplied by one, one-half, and one-third, respectively. Only one visual first order element exists for the study area, the Pigeon River. Several second order elements are in the study area and include tributaries such as Thickety and Bowen Branch Creeks. Third order elements typically are intermittent streams and observable, vertical/near vertical jointing, bedding planes, and foliation. Only third order elements greater than 100 feet in length were used for this analysis. No fourth order or higher linear elements in the study area were used as their length is generally on the order of tens of feet or less.

Figure 2-3 illustrates the rectified drainage pattern. Several elements are noted on the map to orient the reader and illustrate the line segment weighing process. Once the pattern was generated, line segments were weighed, counted and referenced to its orientation. The weighted line segment orientation data is presented in Figure 2-4 as a rose diagram.

A total of 136 line segments were observed. The total weighted line segment count was 46.16. As illustrated in Figure 2-4, the primary general orientation for the first order element is east to west. Most second order elements are oriented in a north-northwest to north-northeast direction. The orientation for third order elements is more diffuse, but generally plot either in an east-northeast or northwest direction.

The primary apparent trend in the rectified drainage pattern is the 61° - 90° (north-northwest) preferred orientation. The north-northwest trend accounted for 33 % of total line segments counted and weighed. The second most dominant trend occurs with 23 % of the weighted line segments within the 91° - 120° (north-northeast) preferred orientation. Other, less significant trends include 151° - 180° (east-northeast) with 16 %, 31° - 60° (northwest) with 15 %, and 121° - 150° (northeast) with 13 % of total line segments counted and weighed.

2.2.2 GEOLOGIC CORRELATION

The study area has undergone at least three principal orogenic events. Most notably are the high-grade metamorphism and deformation associated with the Grenville Orogeny in the Middle Proterozoic, and the widespread deformation and metamorphism associated with the Middle Paleozoic Taconic and the Late Paleozoic Alleganian Orogenies. Each of these events has affected the region in its own particular way and together have formed a structurally complex

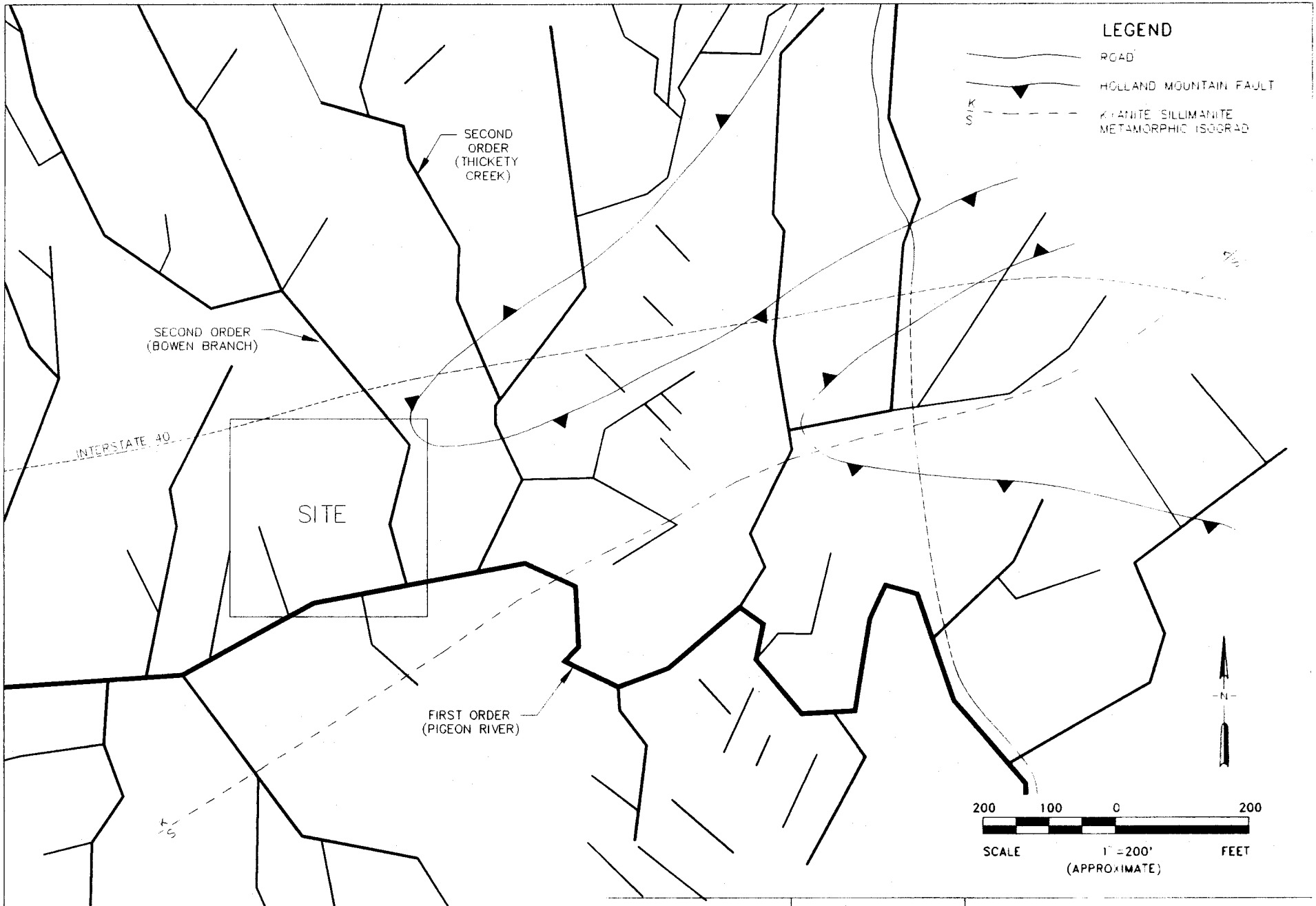

FIGURE	2-3
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FILL	DRAIN.DWG

LINEAMENT ANALYSIS MAP

CHAMPION INTERNATIONAL
CANTON LANDFILL NO.6
CANTON, NORTH CAROLINA

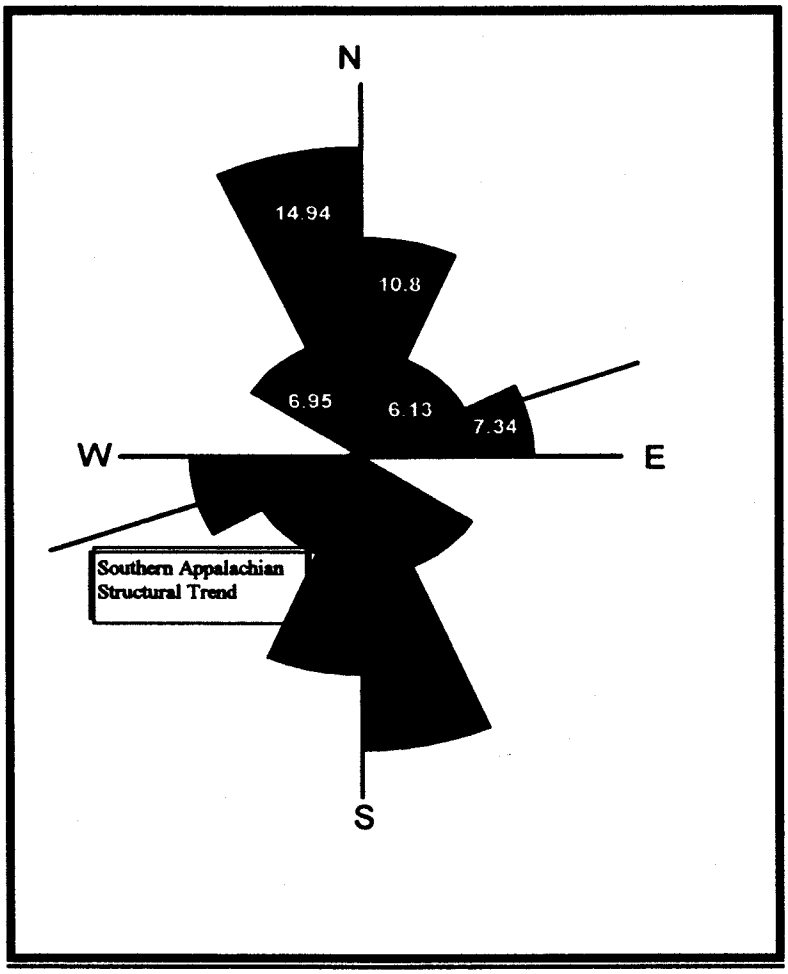


Figure 2-4 Rose Diagram Illustrating Trends in Line Segment Data.

geologic history. With the exception of some evidence of folding and foliation within the Middle Proterozoic units, much of the structural features associated with the Grenville orogeny have been overprinted by subsequent tectonic events.

Foliation in the layered gneisses is likely of Early to Middle Paleozoic Age. The foliation and co-planar schistosity crosscut contacts between Middle Proterozoic units. Also evident in the study area and possibly associated with the Taconic Orogeny is the nonconformable contact between the Late Proterozoic Ashe Metamorphic Suite and the underlying Middle Proterozoic Earlies Gap Biotite Gneiss. The nonconformity is interpreted by Merschat and Wiener (1988) as the folded, low angle Holland Mountain Fault (Figure 2-3). Syn- and antiform axes of the folded fault have a similar northeast strike as the Paleozoic foliation, suggesting they are coeval. Of a similar strike and showing no detectable offset (Merschat and Wiener, 1988a) is the kyanite/sillimanite isograd representing thermal peak in the later part of the Taconic.

Pegmatite and igneous intrusions, possibly including the dunite in the study area, diking, and mylonitization have all been associated with Late Paleozoic deformation. The dunite, however, may have been tectonically emplaced during the Taconic. A lack of crosscutting is noted in the relationship of the dunite to the fault. Mylonitic zones appear co-planar to the overall east-northeast Southern Appalachian structural trend. Fractures and joints evident in outcrops in the Canton area are also associated with this tectonic event. Both the Ashe and the Earlies Gap Formations moved as part of the allocthon during the orogenic event.

Stereoplots of joint orientations in the Canton area show a general north and north-northeast trend (Merschat and Wiener, 1988b). These are likely tensional joints or release fractures co-planar with the orientation of maximum stress and normal to the strike of the structural trend associated with southern Appalachians. A review of Figure 2-4 illustrates a north-northeast trend, the second dominant trend orientation in the weighted line segment data, which may be associated with the tensional joints. The dominant trend orientation data of weighted line segments is the north-northwest data group. It is suggested that this data, as being normal to the strike (structural trend) of the southern Appalachians, may also represent tensional jointing or release fractures.

2.2.3 IMPLICATIONS FOR GROUNDWATER FLOW

A review of the available geologic data and the lineament analysis indicates that jointing, release fractures, schistosity, and foliation may be associated with the bedrock in the study area. As these rock fabric components function as secondary porosity, it can have a significant impact on direction and flow of groundwater in bedrock. Given the observed primary dominant north-northwest preferred line segment trend normal to the structural strike of the region, and the match of the tensional jointing measured in the area with the second dominant north-northeast preferred line segment trend, the dominant groundwater flow direction for areas north of the Pigeon River is expected to be in a southerly direction towards the Pigeon River.

Other potentially important rock fabrics which cannot be identified from aerial photographs include near horizontal exfoliation jointing and schistosity. These structures are identified in outcrops in the Canton area. Additional hydrogeologic testing and downhole geophysical testing would more clearly ascertain the impact these structures may have on groundwater flow and direction.

2.3 SITE SETTING

This section discusses the physical setting of the site, including the geology as indicated from soil boring logs for work previously conducted at the site, the hydrogeology as indicated from groundwater and surface water elevation data, and hydrology as indicated from surface water elevation data. Groundwater and surface water quality are not included in this section, as this information is presented in Section 4.

2.3.1 SITE GEOLOGY

Alluvial and colluvial soils are present across those unexcavated portions of the site, underlain by saprolite, weathered rock and rock. The soil composition is variable, ranging from silty fine to coarse sands to clayey sandy silts. Mica is commonly encountered, frequently in abundance. Gravel and rock fragments are also present. Coloration varies from tan to brown, red brown, dark brown and black. Bedrock, as quartz mica schist and quartz mica garnet schist outcrop in portions of the site, and appear to underlie the site (Law, 1984).

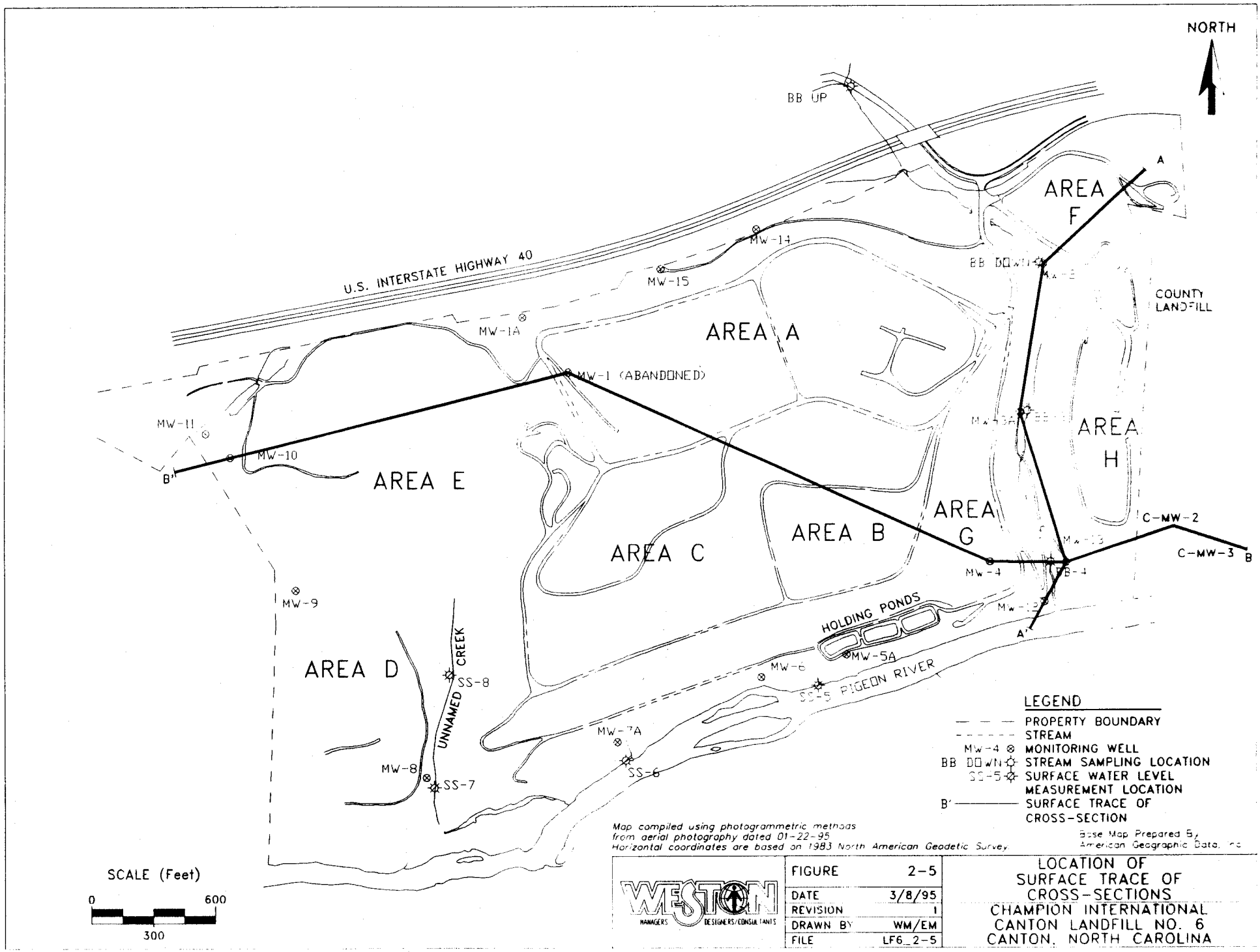
Two cross-sections have been prepared using lithologic data from the monitoring well installation. Figure 2-5 indicates the surface trace of the cross sections, while Figure 2-6 present the cross-sections. The cross-sections illustrate the ground surface elevation (as of January 1995, based on a topographic map prepared from aerial photographs taken in January 1995). Subsurface occupance of overburden and bedrock is estimated, using available (somewhat limited) data. Groundwater and surface water elevations are presented for data collected 10 March 1995. Profiles of the various landfill cells intercepted by the cross-section are presented where such data was available.

2.3.2 SITE HYROGEOLOGY

In order to assess the hydrogeology of the site, it is useful to examine well construction information for monitor wells installed at the landfill. Lithologic information is incorporated in the well construction data review.

Well Construction Information

Presently there are 15 monitor wells at the landfill. Three monitor wells have been abandoned; replacement well (designated with an "A") were subsequently installed to replace the abandoned

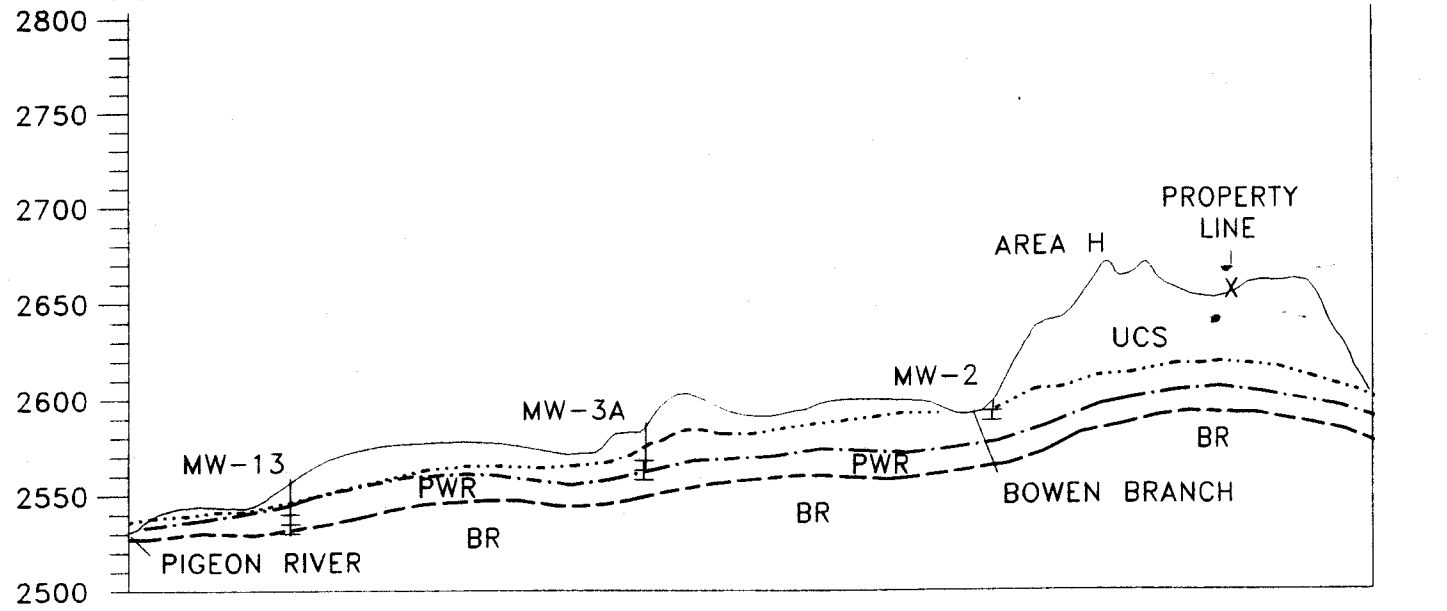

NORTH
BB UP
U.S. INTERSTATE HIGHWAY 40
MW-14
MW-15
MW-1A
AREA A
MW-1 (ABANDONED)
MW-11
MW-10
B'
AREA E
AREA F
A
BB DOWN
COUNTY LANDFILL
AREA H
AREA G
AREA B
AREA C
C-MW-2
C-MW-3
B
MW-4
MW-9
HOLDING PONDS
MW-5A
MW-6
SS-5 PIGEON RIVER
A'
AREA D
UNNAMED CREEK
SS-8
MW-8
SS-7
MW-7A
SS-6
LEGEND
PROPERTY BOUNDARY
STREAM
MW-4 MONITORING WELL
BB DOWN STREAM SAMPLING LOCATION
SS-5 SURFACE WATER LEVEL MEASUREMENT LOCATION
B' SURFACE TRACE OF CROSS-SECTION
Map compiled using photogrammetric methods from aerial photography dated 01-22-95
Horizontal coordinates are based on 1983 North American Geodetic Survey
Base Map Prepared By American Geographic Data, Inc
SCALE (Feet)
0
600
300
WESTON MANAGERS DESIGNERS/CONSULTANTS
FIGURE 2-5
DATE 3/8/95
REVISION 1
DRAWN BY WM/EM
FILE LF6_2-5
LOCATION OF SURFACE TRACE OF CROSS-SECTIONS
CHAMPION INTERNATIONAL
CANTON LANDFILL NO. 6
CANTON, NORTH CAROLINA

SOUTHERLY DIRECTION

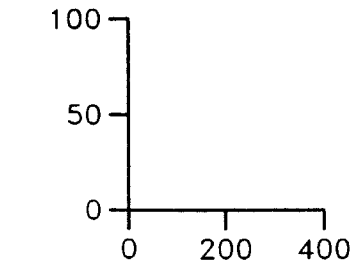
A'

NORTHERLY DIRECTION

A



SCALE (Feet)



VERTICAL EXAGGERATION: 4X

LEGEND

.....	ESTIMATED GROUNDWATER POTENTIOMETRIC SURFACE
UCS	UNCONSOLIDATED SOIL
PWR	PARTIALLY WEATHERED ROCK BOUNDARY
BR	BEDROCK BOUNDARY
- - - - -	ESTIMATED LANDFILL CELL ELEVATION
∓	MONITOR WELL
MW-3A	CHAMPION MONITOR WELL
CMW-2	COUNTY MONITOR WELL

WESTERLY DIRECTION

B'

EASTERLY DIRECTION

B

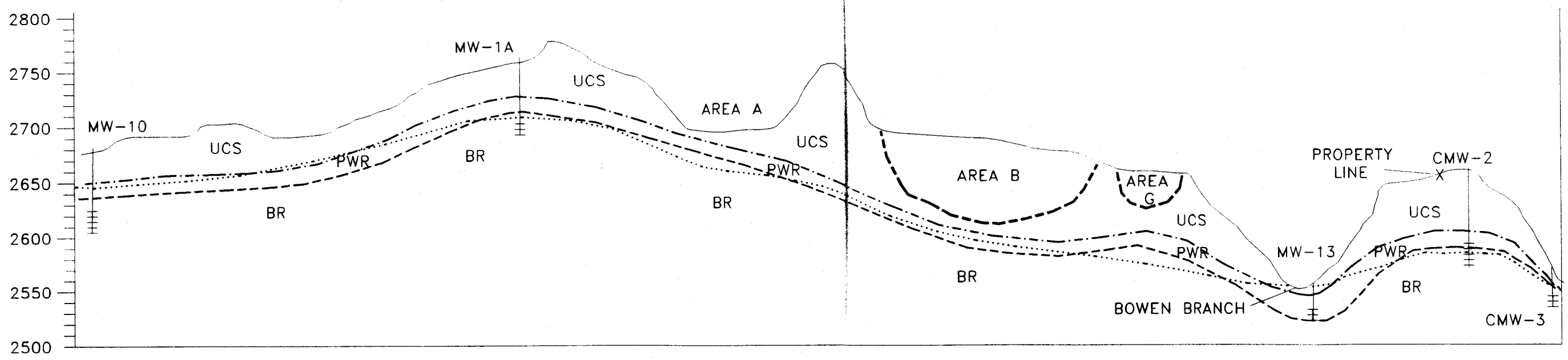


FIGURE	2-6
DATE	3/23/95
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CROSS-SECTIONS FOR LANDFILL NO. 6
CHAMPION INTERNATIONAL
CANTON LANDFILL NO. 6
CANTON, NORTH CAROLINA

wells. Both existing and abandoned wells construction logs were reviewed. Additionally, lithologic data from some soil borings were reviewed and compared to the well construction information. In some instances, no lithologic log could be located for a given monitoring well, and lithologic data from nearby borings were used to estimate subsurface conditions in the vicinity of the well. Occasionally, lithologic information was limited to a reference to bedrock depth. A summary of well construction data is presented in Table 2-1. Appendix A presents monitoring well construction logs and soil boring lithologic logs.

Comparison of monitor well construction records and depth to groundwater measurements suggests that most or all wells are screened into the first encountered saturation (the surficial or water table aquifer), which appears to variably occur in overburden and bedrock. Only at monitoring well MW-10 is the depth to water significantly shallower than the top of the sand pack. (When reviewing Table 2-1, note that total well depth and depth to water are referenced from the top-of-casing, whereas the other data in the table are referenced relative to ground surface. The top-of-casing typically extends 2-to-3 feet above ground surface.)

Well screens vary in length from 5 feet to 20 feet, and sand pack intervals vary in length from approximately 6 feet to 25 feet, although the sand pack at monitoring well MW-4 is approximately 50 feet long. In some wells (MW-2, MW-3, MW-5, and MW-7) the top of the sand pack is very shallow (5 feet or less below ground surface), and therefore these wells may be (or may have been, in the case of abandoned wells MW-3, MW-5, and MW-7) more sensitive to surface water infiltration. (Wells MW-3, MW-5, and MW-7 were abandoned as a consequence of landfill construction activities. The replacements for these wells, MW-3A, MW-5A and MW-7A, respectively, have sand packs which do not extend to within five feet of ground surface.)

It is noted that the bentonite seal extends into the screened interval at well MW-2. At well MW-6, the bentonite seal extends to a level even with the top of the screened interval. The presence of bentonite within or adjacent to the screened interval is irregular, but probably does not significantly affect the analytical results for samples collected from these wells.

Groundwater and Surface Water Elevation Data

In general, it is expected that groundwater occupance and flow in water table aquifers (such as monitored by wells installed at the site) is influenced by surface topography. Consequently, as part of this investigation, a topographic map of the Landfill Number 6 and the adjacent Haywood County Landfill was prepared. American Geographic Data, Inc., under subcontract to WESTON, generated the topographic map from stereoscopic aerial photographs taken in January 1995. The topographic map is presented in Appendix B. The topographic map was augmented with a horizontal and vertical ground survey of monitor wells and stream gauges.

TABLE 2-1
SUMMARY OF MONITORING WELL DATA

MONITOR WELL #	TOTAL DEPTH (FT BTOC)	DEPTH TO WATER (FT BTOC)	CASING ELEVATION (FT MSL)	DEPTH TO FIRST SATURATION (FT BGS)	SCREENED INTERVAL (FT BGS)	SANDPACK INTERVAL (FT BGS)	SEAL THICKNESS (FEET)	GROUTED INTERVAL (FT BGS)	SCREENED WITHIN	LITHOLOGIC DATA SOURCE**	DOWN-GRADIENT TO AREAS
*MW-1	122.9	93.8	2714.10	NS	102.9-122.9	122.9-92.1	4.9	0.0-87.4	BEDROCK	IR	A
MW-1A	71.5	49.4	2715.65	NS	60.2-70.2	70.8-57.8	2.3	0.0-55.5	BEDROCK	IR	A
MW-2	10.2	4.2	2591.16	NS	5.2-10.2	10.2-4.5	1.0	0.0-3.5	SAPROLITE	IR	F
*MW-3	11.0	8.3	2569.40	6.0	6.0-11.0	11.0-4.5	1.0	0.0-3.5	SAPROLITE	IR/B9	A,B,G
MW-3A	21.2	7.6	UNKNOWN	NS	7.5-17.5	17.5-12.3	1.2	0.0-4.0	SOIL	IR/B9	A,B,G
MW-4	84.0	59.7	2569.95	66.0	64.0-84.0	84.0-34.4	1.4	0.0-33.0	BEDROCK	IR/B10	B,G
*MW-5	15.6	5.1	2542.10	NS	5.6-15.6	15.6-5.0	1.5	0.0-3.5	SAPROLITE	IR/B7	B
MW-5A	42.0	35.0	UNKNOWN	NS	32.0-42.0	42.0-24.4	1.1	0.0-28.3	BEDROCK	IR/B7	B
MW-6	20.4	15.0	2534.71	NS	8.5-18.5	18.5-9.0	1.0	0.0-8.0	BEDROCK	IR	B,C
*MW-7	14.3	6.2	2544.30	8.5	4.3-14.3	14.03-4.0	1.0	0.0-3.0	SAPROLITE	IR/B15	C
MW-7A	26.2	9.6	UNKNOWN	8.5	13.5-23.5	23.5-10.8	1.3	0.0-9.5	BEDROCK	IR/B15	C
MW-8	29.0	11.3	2583.14	NS	17.7-27.7	27.7-7.0	1.0	0.0-6.0	BEDROCK	IR	D
MW-9	66.7	35.4	2648.62	NS	44.8-64.8	64.8-41.0	1.7	0.0-39.3	BEDROCK	IR	-
MW-10	74.5	36.2	2641.63	NS	54.0-74.0	74.0-52.4	3.4	0.0-49.0	BEDROCK	IR/B1	-
MW-11	21.5	10.6	2628.81	NS	10.4-20.4	20.4-10.0	2.0	0.0-8.0	SOIL	IR/B1	-
MW-12	29.2	11.4	2532.35	NS	20.4-30.4	30.4-18.0	2.0	0.0-16.0	BEDROCK	IR	B,G
MW-13	36.3	18.6	UNKNOWN	NS	24.0-34.0	34.0-12.9	1.5	0.0-19.6	BEDROCK	IR	H
MW-14	27.0	26.3	2623.75	10.4	17.0-27.0	27.0-14.8	2.4	0.0-12.4	BEDROCK	IR/B11	A
MW-15	43.5	22.3	2587.70	NS	31.0-41.0	41.0-28.3	2.8	0.0-25.5	BEDROCK	IR	A

* Monitor Well has been abandoned.

** IR is Installation Record. Additional information available from borehole sampling conducted near monitor well.

NS = Not Specified

FT BTOC = Feet Below Top of Casing

FT MSL = Feet Above Mean Sea Level

FT BGS = Feet Below Ground Surface

Figure 2-7 illustrates 10 March 1995 groundwater and surface water elevations, and indicates the downslope direction of the surface topography as estimated from the 1995 topographic map of the landfill. Table 2-2 presents groundwater and surface water elevations for 10 March 1995. (The topographic map in Appendix B denotes BB-Up as SS-1, BB-Down as SS-2, BB-3 as SS-3, and BB-4 as SS-4).

It is noted that the monitoring wells are generally installed at topographic low areas of the landfill, but are not located in areas of relatively higher elevation. Wells were presumably sited in this manner to be able to monitor possible releases from the landfill cells, as the lower lying areas were expected to be downgradient of the higher areas (where the landfill cells are located), assuming that groundwater flow will largely mimic surface topography. While in the general case this assumption is considered likely to be correct, without monitor wells located at higher elevations, this assumption cannot be verified. Other influences, such as fracture orientation in the bedrock and regional groundwater gradients, can affect groundwater flow and reduce to the extent to which groundwater elevations follow surface topography.

In general, surficial groundwater elevations are consistent with an interpretation of groundwater flow which would somewhat reflect surface topography (i.e., groundwater elevations are highest in areas where the ground surface is highest, groundwater elevations are lower in areas of lower ground surface elevation, and groundwater flow is expected to generally flow from areas of high to areas of low groundwater elevation). Estimated groundwater flow directions based on this interpretation of the March 1995 data are generally similar to the previous interpretation of groundwater flow using similar assumptions, as depicted in the November 1994 data (presented in the Interim Data Review report for Landfill 6) and a 1982 Law Environmental Incorporated map (Appendix C).

Using an interpretation of groundwater flow paths similar to surface topography, monitoring wells were categorized according to which landfill cell(s) they appeared be downgradient of (Table 2-1 and Figure 2-7). Monitor wells MW-9, MW-10 and MW-11 do not appear to be located so as to intercept groundwater flowing away from any of the areas of the landfill. Consequently, groundwater quality data from these wells should be useful as indicators of the natural or background conditions of the aquifer, and have been used as such in conducting the statistical analysis of groundwater quality (Section 4).

Groundwater elevation data for four monitor wells installed in the adjacent Haywood County landfill were also reviewed. (County landfill data available for review for this report is presented in Appendix D.) Groundwater elevations in these wells indicate groundwater flow to the east-southeast, away from Landfill Number 6, and generally mimic surface topography. Ground surface elevations tend to increase somewhat from the eastern edge of Area H to slightly east of the property line between Landfill Number 6 and the County landfill, before decreasing further east within the County landfill. Consequently, groundwater would not be expected to flow from the vicinity of Area H towards the County landfill, if groundwater elevations (and

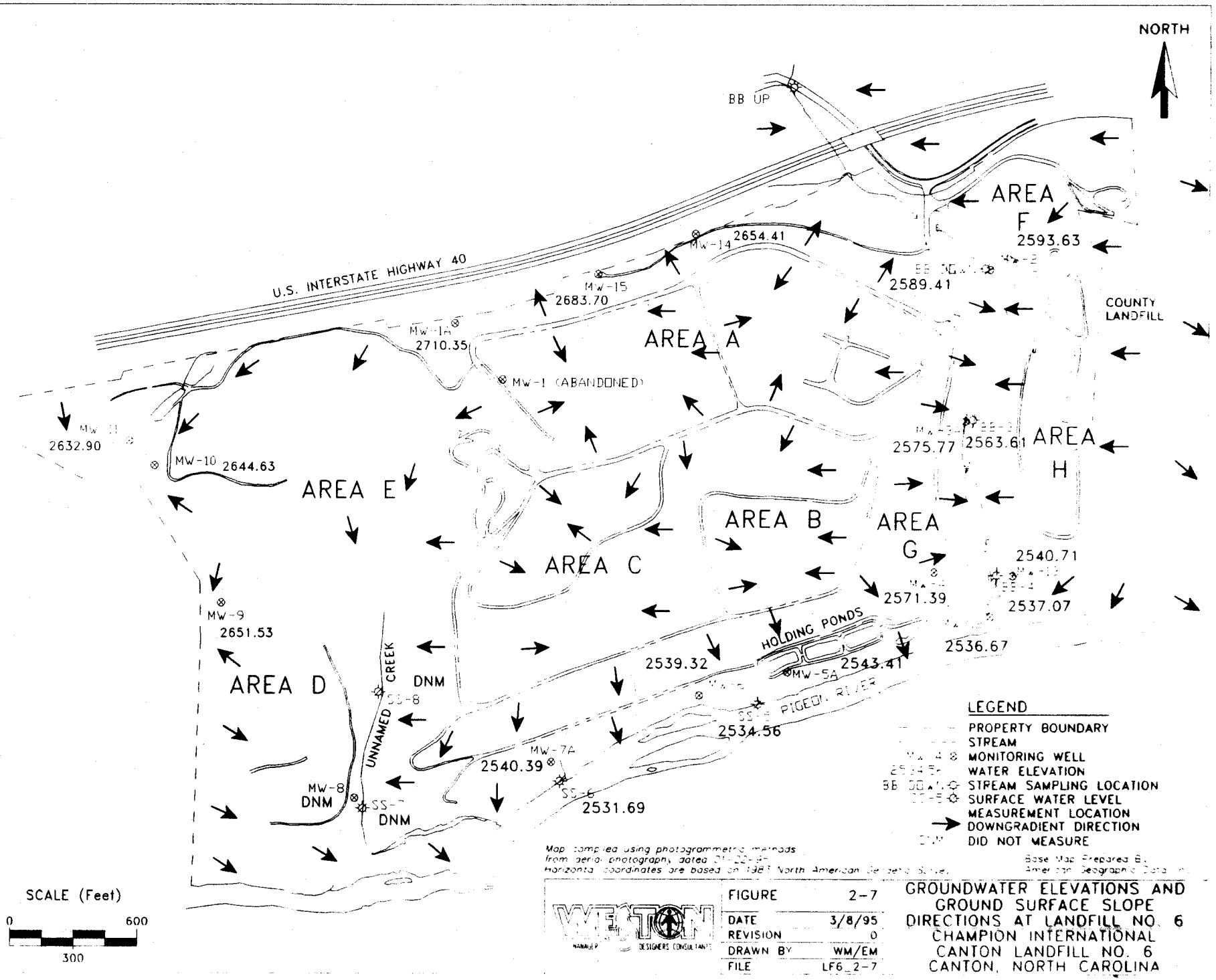

FIGURE	2-7
DATE	3/8/95
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GROUNDWATER ELEVATIONS AND GROUND SURFACE SLOPE DIRECTIONS AT LANDFILL NO. 6
CHAMPION INTERNATIONAL
CANTON LANDFILL NO. 6
CANTON, NORTH CAROLINA

TABLE 2-2
LANDFILL NUMBER 6 GROUNDWATER
ELEVATIONS FOR 10 MARCH 1995

WELL ID #	TOP OF CASING	DEPTH TO WATER	GROUND-WATER ELEVATION
MW-1A	2760.78	50.43	2710.35
MW-2	2597.36	3.73	2593.63
MW-3A	2582.17	6.40	2575.77
MW-4	2631.27	59.88	2571.39
MW-5A	2578.07	34.66	2543.41
MW-6	2551.90	12.58	2539.32
MW-7A	2548.89	8.50	2540.39
MW-8	2596.05	NM*	NM*
MW-9	2686.27	34.74	2651.53
MW-10	2679.61	34.98	2644.63
MW-11	2641.11	8.21	2632.90
MW-12	2545.43	8.76	2536.67
MW-13	2557.94	17.23	2540.71
MW-14	2679.45	25.04	2654.41
MW-15	2701.43	17.73	2683.70
BB-UP	2618.74	6.90	2611.84
BB-DOWN	2596.11	6.70	2589.41
BB-3	2567.86	4.25	2563.61
BB-4	2543.40	6.33	2537.07
SS-5	2539.94	5.38	2534.56
SS-6	2538.04	6.35	2531.69
SS-7	2584.65	NM*	NM*
SS-8	2613.83	NM*	NM*

* NM indicates that location was not measured due to inaccessability associated with the recent heavy rainfall.

therefore flow direction) closely follows surface topography. However, as discussed above, groundwater flow can be influenced by several other factors besides ground surface elevation. (Groundwater elevations are not directly comparable between the County landfill wells and the Landfill Number 6 wells as synoptic ground water levels were not collected for both the County wells and the Landfill Number 6 wells.

Surface water elevation data was collected from several surface water elevation gauging stations, including three locations along Bowen Branch where monitor wells are located in close proximity to a stream station (stream station BB Down and well MW-2; stream station BB-3 and well MW-3A; and stream station BB-4 and well MW-13). A review of the elevation data at the three paired locations indicate surface water elevations in the stream are lower than the groundwater elevations in the associated adjacent monitor wells. Because the hydraulic head of the groundwater is greater than that of the stream, it is expected that the groundwater discharges into the stream (known as a stream gaining situation). It is noted that heavy rainfall occurred in the area over the two days prior to measuring surface water and groundwater level. In general, it is expected surface water levels would rise more rapidly and to a larger degree than would groundwater levels in response to a rain event. Under conditions in which rain had not recently occurred, the stream water levels would be expected to be further lowered relative to the groundwater levels, and groundwater would discharge into the stream under a somewhat greater head differential.

During preparation of this report, a seep was noted along the western side of Area H, in the general area between wells MW-2 and MW-3A. Discussion with facility personnel indicated that a spring may have been present in this area in the past, but this information cannot be verified. The seep may represent the percolation of surface water through the cell, which could flow laterally and discharge to the side of the cell. Following observation of the seep, Champion has been closely monitoring the surface of the landfill in the area above the seep. Following rain events, any standing water present on the surface of the cell is pumped off to the leachate collection holding ponds for subsequent treatment by the Champion's wastewater treatment facility, thereby reducing the opportunity for surface water to migrate through the cell.

2.3.3 SITE HYDROLOGY

The area is drained by numerous small creeks and the larger Beaverdam Creek and Hominy Creek. Thickety Creek is located immediately east of the site. Bowen Branch runs through the eastern portion of the site. Small unnamed creeks are present along the western portion of site. The creeks and branches drain into the Pigeon River, located along the southern border of the site. In the vicinity of the site, the Pigeon River flows from east-to-west.

As discussed previously, surface water in the vicinity of Landfill Number 6 appears to be a discharge point for groundwater. This assessment was made based on a comparison of surface water elevations to groundwater elevations, which indicate surface water elevations are lower

than groundwater elevations, as measured in areas where monitor wells and stream gauges are in close proximity.

SECTION 3

LANDFILL NUMBER 6 DATA

3.1 LANDFILL HISTORY

On 28 March 1984, Champion received Solid Waste Permit Number 45-06 from the North Carolina Department of Environment, Health, and Natural Resources, Division of Solid Waste Management (DEHNR, DSWM) to operate Landfill Number 6 for disposal of solid, non-hazardous waste. On 16 October 1992, the permit was amended to allow for a vertical expansion of the landfill. Prior to 1984, this site was owned by Brantley M. and Gladys S. Davis. Aerial photographs taken in 1964 indicate that this land was used primarily for agricultural purposes. Aerial photographs associated with a 1983 report also reveal the presence of some small structures (homes and trailers) in the area, including a structure in the vicinity of monitoring well MW-1A and MW-1 (abandoned) and a structure between existing wells MW-2 and MW-3A.

The landfill received papermill wastes consisting of lime, sludge, flyash, cinders, asbestos, and woodwaste. The landfill consists of eight areas, designated A through H, which have received various wastes over time (Table 3-1, Figures 3-1 and 3-2, and Appendix E). Five of these areas are designated for combined sludge and ash disposal (A,B,C,D, and E), while the remaining three have been used for lime and asbestos disposal. Disposal has been completed in areas F and G, and is expected to be completed in areas B and C in 1995. A lined cell in area A is slated to begin operation in 1995. Areas D and E are still undeveloped, but borrow operations have resulted in some excavation of soil from area E.

The first area to be constructed was Area F, completed in the first half of 1984. Aerial photographs taken in April 1984 show this area as undergoing construction, but not yet receiving waste. Champion records indicate this area was opened in the fall of 1984 and was used to accept lime and asbestos materials. This area was filled to capacity and closed in October 1986.

Construction of Area B was completed by December 1986. This site was designed to hold sludge, cinders, woodwaste, and flyash. The first load was delivered in June 1987, and is still in use due to vertical expansion.

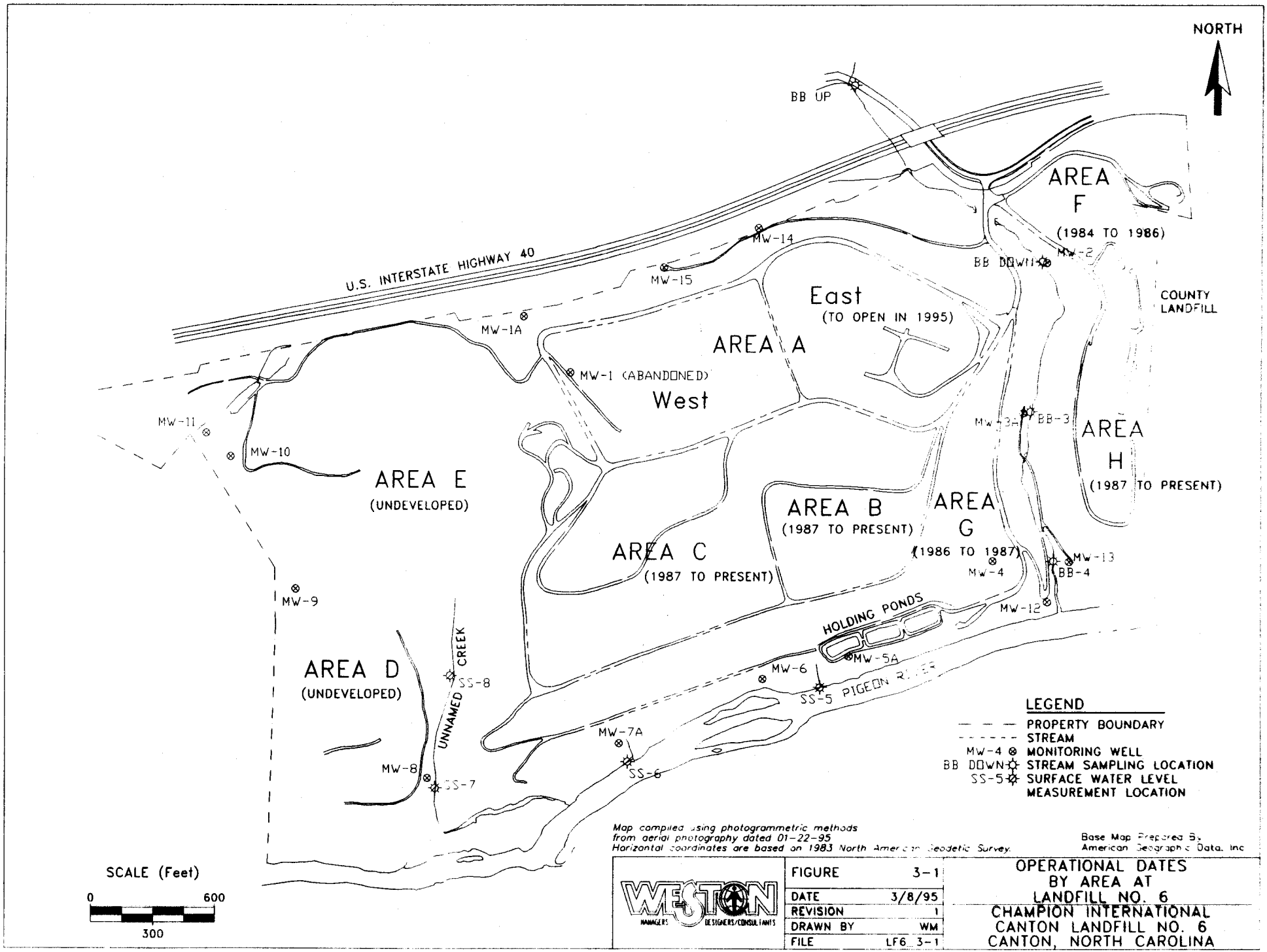
Area G was constructed and started receiving lime and asbestos in 1986. Champion records indicate the area was filled to capacity in late 1987. Aerial photographs taken in October 1987 indicate the area as being inactive and covered with soil.

Area H construction was completed in the first half of 1987. Lime and asbestos disposal began in September 1987. Individual cells are still active at present.

TABLE 3–1
HISTORY OF LANDFILL USAGE

YEAR	SLUDGE (CU. YARDS)	FLYASH (CU. YARDS)	WOODWASTE (CU. YARDS)	CINDERS (CU. YARDS)	LIME (CU. YARDS)	*ESTIMATED TOTAL FILL AMOUNTS (CU.YARDS)	****ACTIVE CELL AREAS
1984	312980	86300	55140	15840	141540	638600	F
1985	318700	81960	39680	16540	132083	5984200	F
1986	277800	73240	26340	14340	158500	635220	F,G
1987	273900	66480	24860	14420	133180	512840	B,G,H
1988	290940	71480	11520	16720	140900	531560	B,H
1989	246200	82180	5400	16900	148220	498900	B,H
1990	270180	82540	19860	6940	103800	483320	B,C,H
1991	255620	73080	2820	11780	99020	442320	B,C,H
1992	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	B,C,H
1993	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	**170944	B,C,H
1994	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	***170944	B,C,H

* Based on Champion landfill haul records.
** Total for July to December 1993.
*** Total for January to June 1994.
**** Landfill No. 5 received sludge until June 1990.



Map compiled using photogrammetric methods from aerial photography dated 01-22-95
Horizontal coordinates are based on 1983 North American Geodetic Survey.

Base Map Prepared By: American Geographic Data, Inc

FIGURE	3-1
DATE	3/8/95
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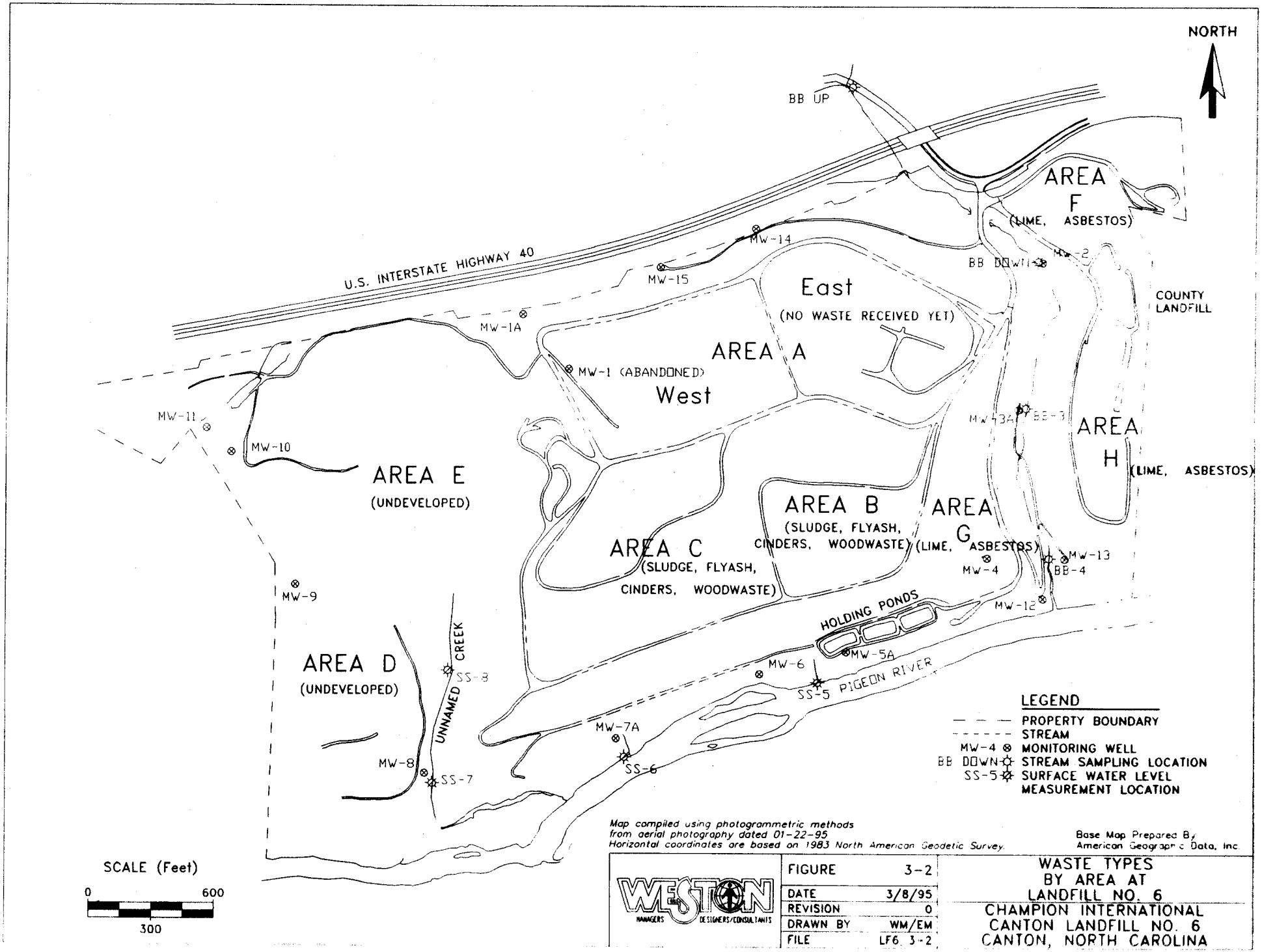
FILE	LF6 3-1

OPERATIONAL DATES BY AREA AT LANDFILL NO. 6
CHAMPION INTERNATIONAL
CANTON LANDFILL NO. 6
CANTON, NORTH CAROLINA


NORTH
BB UP
U.S. INTERSTATE HIGHWAY 40
MW-14
MW-15
MW-1A
MW-1 (ABANDONED)
MW-11
MW-10
MW-9
MW-8
SS-7
SS-8
UNNAMED CREEK
MW-7A
SS-6
MW-6
SS-5
PIGEON RIVER
MW-5A
HOLDING PONDS
MW-12
MW-4
MW-13
BB-4
MW-13A
BB-3
MW-2
BB DOWN
AREA A
East
(NO WASTE RECEIVED YET)
West
AREA B
(SLUDGE, FLYASH, CINDERS, WOODWASTE)
AREA C
(SLUDGE, FLYASH, CINDERS, WOODWASTE)
AREA D
(UNDEVELOPED)
AREA E
(UNDEVELOPED)
AREA F
(LIME, ASBESTOS)
AREA G
(LIME, ASBESTOS)
AREA H
(LIME, ASBESTOS)
COUNTY LANDFILL
LEGEND
PROPERTY BOUNDARY
STREAM
MW-4 MONITORING WELL
BB DOWN STREAM SAMPLING LOCATION
SS-5 SURFACE WATER LEVEL MEASUREMENT LOCATION
SCALE (Feet)
0
600
300
Map compiled using photogrammetric methods from aerial photography dated 01-22-95
Horizontal coordinates are based on 1983 North American Geodetic Survey.
Base Map Prepared By American Geographic Data, Inc.
WESTON MANAGERS DESIGNERS/CONSULTANTS
FIGURE 3-2
DATE 3/8/95
REVISION 0
DRAWN BY WM/EM
FILE LF6 3-2
WASTE TYPES BY AREA AT LANDFILL NO. 6
CHAMPION INTERNATIONAL
CANTON LANDFILL NO. 6
CANTON, NORTH CAROLINA

In October 1987, construction of Area C was completed. Sludge, woodwaste, cinder, and flyash are still disposed of in this area. Aerial photographs taken in its initial month of operation indicate the presence of sludge.

The most recent area to be constructed is Area A. This section is divided into a lined cell, completed in May 1993, and an second cell that will be completed in the future. (Specifics on the construction of the various cells in Landfill Number 6 are presented Section 3-2.) This area will be used to hold sludge, lime, flyash, and woodwaste.

Areas D and E have not been used for waste disposal. In 1987, some topsoil was removed from Area D during the construction of Area C. Area E is largely undeveloped and is covered with vegetation.

The leachate holding ponds were built during the initial construction phase in 1984, as shown in aerial photographs taken in April 1985. The ponds are gravity fed from the various cells' leachate collection systems. The leachate from the holding ponds is pumped to Champion's wastewater treatment facility.

3.2 LANDFILL CONSTRUCTION

This section presents an overview of construction details on an area by area basis. Items discussed include: date of construction, cell lining information, and leachate collection system used. Table 3-2 presents a summary of construction data for each cell in Landfill Number 6. Figure 3-3 illustrates construction data for each of the areas at the landfill. Appendix F presents various construction drawings for the landfill.

AREA A

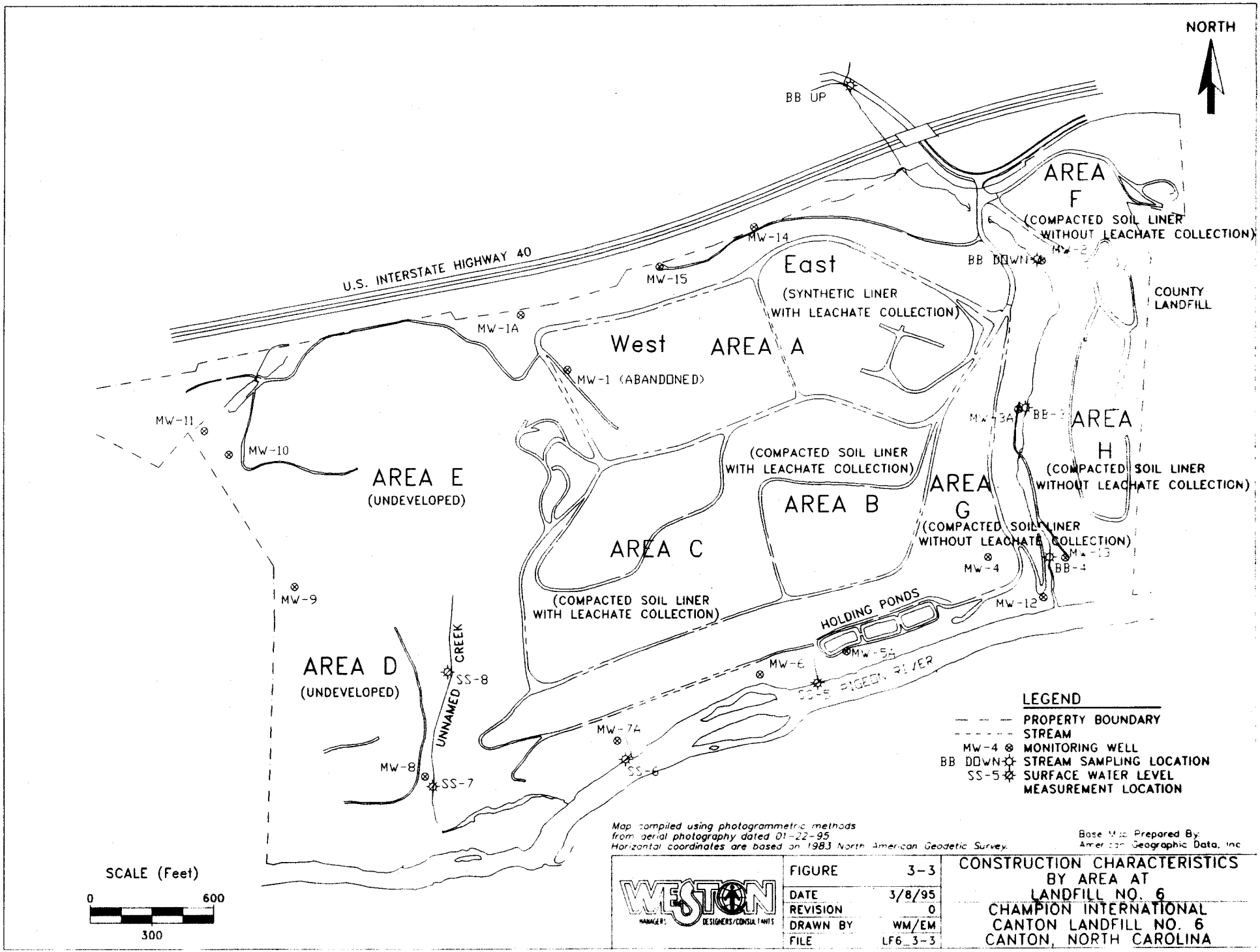
Area A construction began in June of 1992. Construction of Area A East was completed in May of 1993, and is scheduled to open in 1995. Construction of a second cell, Area A West, is not yet completed.

The lining of the completed Area A East cell is comprised of a 60 mil textured high density polyethylene synthetic membrane. The leachate collection system in both cells consists of 6-inch perforated HDPE laterals which connect to a 12-inch header that runs down the length of Area A. This header is connected to a 12-inch steel leachate collection pipe that conveys to the leachate ponds. The laterals and headers are protected from damage by a mounded gravel berm extending the length of Area A.

Additional construction activities are planned for Area A West. The cross-section presented in Figure 2-6 illustrates a profile of the cell along the surface trace of the cross-section in this area.

TABLE 3-2
SUMMARY OF LANDFILL NUMBER 6 CELL CONSTRUCTION

CELL AREA	STATUS	LINER	LEACHATE COLLECTION SYSTEM	MAJOR WASTE TYPE
A – East	OPENS 1995	SYNTHETIC	YES	NA
B	NEAR CAPACITY	COMPACTED SOIL	YES	SLUDGE, FLYASH,, CINDERS, WOODWASTE
C	NEAR CAPACITY	COMPACTED SOIL	YES	SLUDGE, FLYASH,, CINDERS, WOODWASTE
D	UNDEVELOPED	NA	NA	NA
E	UNDEVELOPED	NA	NA	NA
F	CLOSED	COMPACTED SOIL	NO	LIME, ASBESTOS
G	CLOSED	COMPACTED SOIL	NO	LIME, ASBESTOS
H	ACTIVE	COMPACTED SOIL	NO	LIME, ASBESTOS



Map compiled using photogrammetric methods from aerial photography dated 01-22-95
Horizontal coordinates are based on 1983 North American Geodetic Survey.

Base Map Prepared By:
American Geographic Data, Inc

WESTON MANAGERS/DESIGNERS/CONSULTANTS

FIGURE	3-3
DATE	3/8/95
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CONSTRUCTION CHARACTERISTICS BY AREA AT LANDFILL NO. 6
CHAMPION INTERNATIONAL
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CANTON, NORTH CAROLINA

AREA B

Construction of Area B began in 1985 and was completed by December of 1986. This area was designed to contain sludge, woodwaste, and flyash. The liner at the base of the landfill consists native soils compacted during construction of the cell. A leachate collection system was installed and is operational. The leachate collection system collects the leachate and transfers it to the leachate collection ponds. The area is currently active, but is planned to no longer be accepting waste in 1995. The cross-section presented in Figure 2-6 illustrates a profile of the cell along the surface trace of the cross-section in this area.

AREA C

Construction was completed on Area C in mid-1987. As with Area B, this area was built to contain sludge, flyash, and woodwaste. The soil at the base of the landfill was compacted during construction and a leachate collection system was installed. This collection system is tied into lines leading to the leachate collection ponds. The area is currently active, but is planned to no longer be accepting waste in 1995.

AREA D

Area D has not been developed for use in receiving waste. The only use of the area to date is as a soil borrow area during construction of other cells in Landfill Number 6.

AREA E

This is an undeveloped section of the landfill, and has not been used to receive waste. There has been some limited excavation of soil for borrow operations during construction of other cells at Landfill Number 6.

AREA F

Area F construction was completed in the summer of 1984. This section was developed to handle lime and asbestos. This site was opened in September of 1984 and reached capacity in October of 1986. The liner is comprised of native soil at the base of the landfill compacted at the time of construction. A leachate collection system was not installed in Area F.

AREA G

Construction of this area was completed in December 1986. The area reached capacity in December 1987. Area G was designated to contain lime and asbestos. Records indicate the lining consists of compaction of on-site materials (soil). No leachate collection system was

installed. The cross-section presented in Figure 2-6 illustrates a profile of the cell along the surface trace of the cross-section in this area.

AREA H

Area H construction was completed in mid-1987 and began operation shortly thereafter. The site was designated for mixed lime and asbestos fill. Additionally, a dedicated cell, located in the northern portion of Area H, is designated for asbestos only. Area H is still in use at the present time. Records indicate that the lining consists of compaction of on-site soils. A leachate collection system was not installed.

3.3 WASTE STREAM ANALYTICAL DATA

From 1983 to the present, Champion has tested solid wastes generated at the papermill, including: flyash from coal boilers; cinders from the bark-coal burners; sludge from the wastewater treatment plant; and causticising wastes. These wastes have been tested and characterized as non-hazardous according to RCRA and USEPA standards, primarily using the EP Toxicity test through June 1993 and the TCLP test since June 1993. Solid wastes which have been disposed of in Landfill Number 6 include: woodwaste; flyash from coal boilers; cinders from the bark-coal burners; sludge from the waste treatment plant; and lime kiln wastes.

The flyash consists of particles of ash carried by combustion gases of the coal boilers, collected by electrostatic precipitators. Cinders can be described as incombustible matter remaining after the burning process. The sludge comes from a slurry collected during processing of plant wastewater; a large amount is comprised of wood fibers lost from the paper machines. Lime kiln wastes (calcium carbonate) are precipitated in the causticizing reaction.

The results of the tests are reported in Table 3-3, which identifies those constituents detected in a given waste. (The analytic suite employed for groundwater and surface water monitoring is also based on the characteristics of the wastes. Monitoring data is discussed in the following section.) Barium is the most frequently detected constituent, with a variety of other metals detected at various times. Some organic compounds have been detected on occasion. All TCLP (and EP Toxicity) analyses indicate the wastes are non-hazardous. Appendix G presents the laboratory reports for the analyses summarized in Table 3-3.

TABLE 3-3
SUMMARY OF HISTORICAL WASTE ANALYSES

SAMPLE NAME	DATE	TEST METHOD	CONCENTRATION OF DETECTED CONSTITUENTS
Flyash	06/27/83	EP Toxicity	Arsenic/ 0.41 mg/L
			Barium/ 0.22 mg/L
			Cadmium/ 0.02 mg/L
			Selenium/ 0.045 mg/L
			Siver/ 0.004 mg/L
Cinders	06/27/83	EP Toxicity	Arsenic/ 0.022 mg/L
			Barium/ 0.46 mg/L
WTP Sludge	06/27/83	EP Toxicity	Arsenic/ 0.013 mg/L
			Barium/ 0.24 mg/L
Lime Mud	06/27/83	EP Toxicity	Barium/ 0.49 mg/L
Leachate	07/25/88	TCLP	Phenol/ 34.1 ppb
			p-Cresol/ 63.2 ppb
Sludge Extract	07/25/88	TCLP	Phenol/ 56.4 ppb
			4-Ethylphenol/ 12.6 ppb
Flyash	07/25/88	TCLP	Phenol/ 21.9 ppb
Lime Mud Extract	07/25/88	TCLP	Phenol/ 53.6 mg/L
Sludge	09/05/90	TCLP	Cloroform/ 0.490 mg/L
			*Barium/ 1.4 mg/L
Lime Mud	09/05/90	TCLP	Chloroform/ 1.1 mg/L
			*Barium/ 0.04 mg/L
Flyash	09/05/90	TCLP	*Chloroform/ 0.023 mg/L
			*Barium/ 0.10 mg/L
Cinders	09/05/90	TCLP	Chloroform/ 0.062 mg/L
			Barium/ 2.1 mg/L
			*Cadmium/ 0.009 mg/L
Lime Sample	10/12/90	PP METALS	Antimony/ 3.0 mg/kg
			Cadmium/ 2.0 mg/kg
			Chromium/ 9.4 mg/kg
			Copper/ 11.0 mg/kg
			Lead/ 1.3 mg/kg
			Nickel/ 14.0 mg/kg
			Silver/ 2.6 mg/kg
			Zinc/ 15.0 mg/kg
		Volatile Organics	Chlorobenzene/ 35.0 ug/kg
			Methylene Chloride/ 31.0 ug/kg
Lime Mud	08/06/91	TCLP	Barium/ 72.0 ppm
			Silver/ 5.0 ppm
Lime Mud	01/08/92	TCLP	Barium/ 0.2 mg/L
Fly Ash-#4 Boiler	08/13/94	TCLP	Arsenic/ 0.70 mg/L
			Selenium/ 0.13 mg/L
Flyash-PG/BB/RC	08/13/94	TCLP	Arsenic/ 1.85 mg/L
Flyash-Riley Bark	08/13/94	TCLP	Arsenic/ 0.10 mg/L
WTP Sludge	08/13/94	TCLP	Barium/ 2.76 mg/L

* Indicates compound was detected at levels below the practical quantitation limit. The level reported is approximate.

SECTION 4

WATER QUALITY DATA

In conducting the review and analysis of groundwater and surface water quality data for Landfill Number 6, the data was first examined with respect to laboratory analytical methods and field sampling techniques employed. For much of the early data, little documentation is available. Therefore, it was not attempted to create subsets of the data or to exclude data from use based on possible variations in field and laboratory methods. For groundwater, a review of the lithologic and well construction logs suggest that all wells screen first saturation, so subdivision of the groundwater data by hydrologeologic system was not indicated. Wells expected to be representative of background conditions were identified, as previously discussed. For surface water, an upstream background location was identified.

4.1 STATISTICAL ANALYSIS OF GROUNDWATER QUALITY DATA

A significant volume of groundwater quality data is available for Landfill Number 6, as semi-annual monitor well sampling has been conducted since 1983. A majority of the constituents included in the analytic suite are inorganic compounds, many of which are often naturally present in groundwater systems. Concentrations of these naturally occurring compounds will typically exhibit variations over time and at different locations. Consequently, analysis of the groundwater quality data must include a method to differentiate the natural occupance of these compounds from potential impacts from other sources. A statistical approach was employed to make this differentiation.

The objective of the statistical analysis was to determine if there is a statistically significant difference in groundwater quality between areas of the facility thought to represent background conditions of the aquifer (represented by wells MW-9, MW-10, and MW-11) and other parts of the site which have the potential to monitor possible influences of the landfill usage.

Appendix H presents a summary table of groundwater quality data, and includes copies of available laboratory analytical reports. Appendix I presents the output of the statistical analysis.

4.1.1 STATISTICAL MODELING APPROACH

The statistical analysis involved conducting a parametric, one-way, univariate, repeated-measures analysis of variance (ANOVA) on pH, dissolved solids, conductivity, and concentrations of 25 potential groundwater contaminants. An ANOVA model was used instead of t-test because the ANOVA statistical design accounts for both temporal and spatial variations, while t-tests only assess spatial variation. Furthermore, the ANOVA tests can compensate for false test results (positive or negative) such as may occasionally occur in a large number of individual chemical

analytical tests; simple t-testing does not allow for such compensation to be incorporated into the model.

Database

The database of the analytical information used in the statistical analysis consisted of analytical data generated between July 1983 and November 1994 from 16 wells (MW-1, MW-1A, MW-2, MW-3A, MW-4, MW-5A, MW-6, MW-7A, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, MW-15). Analytical parameters included in the database were: pH; dissolved solids; conductivity; silver; arsenic; barium; calcium; cadmium; chloride; chromium; fluoride; iron; mercury; chloride; fluoride; manganese; nickel; nitrite; lead; phenol; selenium; sodium; sulfate; total organic carbon (TOC); and total organic halogens (TOX).

A preliminary examination of the data set was undertaken to ensure that the data were in forms appropriate for statistical modeling. This task consisted of five activities:

(1) Recoding "nondetects" as one-half of the detection limit in accordance with U.S. EPA policy. The recoding approach proposed is described in U.S. EPA, 1989, Methods for evaluating the attainment of cleanup standards, p. 2-16.

(2) evaluating whether the analytical data appear to be normally distributed. This activity involved examining descriptive statistics (e.g., skewness, kurtosis, and the coefficient of variation), statistical graphics (e.g., stem-leaf diagrams, box plots, and normal probability plots) and statistical tests (e.g., Shapiro-Wilk's test) to identify gross departures from normality that should be corrected prior to conducting the ANOVA. Because each approach has its advantages and limitations, the decision on whether the concentrations of an analyte are normally distributed was based on the preponderance of the evidence.

(3) Correcting non-normal distributions by applying a logarithmic transformation. This transformation was applied to all data except pH.

(4) Reevaluating whether the transformed data appear to be normally distributed. Although several analytes failed the Shapiro-Wilk normality test, the distributions were deemed to be sufficiently close to normal to proceed with the ANOVA.

(5) Evaluating the analyte measurements for outliers. This activity involved identifying influential observations that may be outliers using box plots, bivariate plots, and other statistical techniques. Although several possible

outliers were identified (as discussed below), none were excluded from the analysis because sampling and analysis records were not available to determine if the sample should be representative of the groundwater quality in the area at the time the sample was collected.

Statistical Testing

The statistical analysis involved conducting a parametric, one-way, univariate, repeated-measures analysis of variance (ANOVA) on pH, dissolved solids, conductivity, and concentrations of 25 potential groundwater contaminants. The GLM Procedure in SAS (version 6.02) was used to conduct the analysis. (The GLM procedure in the SAS software is used for analyzing general linear models using either an ANOVA or regression approach. For details, see SAS Institute Inc., SAS/STAT™ User's Guide, Release 6.03 Edition, Cary, NC: SAS Institute Inc., 1988, 1028 pp.) Well location was used as the main blocking factor and date of sampling was the repeated measure. Output from the analysis is provided in Appendix E.

A variety of tests are shown on the output, including the following:

- Global Tests — one test for each analyte to determine whether the ANOVA model accounts for a significant proportion of the variance in the groundwater quality. These tests were not of major importance in the analysis because the focus of the study was on detecting specific difference between background and downgradient areas.

- Main Effects Tests — one test of whether the mean concentration for an analyte is statistically greater than or equal to zero (or not equal to zero in the case of pH). These tests were not of major importance in the analysis because the focus of the study was on detecting specific differences between background and downgradient areas.

- *A Priori* Tests for Comparison to "Background" — Tests of whether the mean analyte concentration in a well is greater than or equal to the mean analyte concentration in a wells MW-9, MW-10, and MW-11 (or not equal to the background in the case of pH). These tests were the primary focus of the analysis because they indicated where specific differences may exist between background and downgradient wells.

4.1.2 RESULTS OF THE ANOVA

A priori tests for the comparison to the background wells are shown on the SAS output after the main ANOVA table for each analyte. Significant tests were defined as those having an F-test

probability less than 0.05. Only 6 of the 16 wells appear to have water qualities that are different from the three background wells. An interpretation of these results is provided below.

Wells MW-13 and MW-4

Wells MW-13 and MW-4, located in the southeastern corner of the site, appear to have similar deviations from background groundwater quality. Both wells have elevated concentrations of sodium and sulfate, and higher specific conductances.Well MW-4 also has elevated levels of chloride and dissolved solids. It is not clear whether these trends are attributable to landfill releases, natural environmental conditions (e.g., geologic deposits), or other factors.

Well MW-2

Analysis of data from MW-2, located in the northeastern corner of the site, did not produce any significant *a priori* tests for the comparison to the background wells. However, the large variance of the data from this well may have rendered the ANOVA model unable to detect these differences effectively. (ANOVA models assume that the variance is approximately equal in all the cells of the ANOVA block design. If this assumption is not valid, estimates of the test statistics may be somewhat in error. For additional details, see Kufs, C., 1992, "Statistical Modeling of Hydrogeologic Data - Part 1: Regression and ANOVA Models." Ground Water Monitoring Review, v. XII, No.2, p. 120-130.) This well appears to share the same geochemical profile as wells MW-13 and MW-4 (elevated concentrations of sodium, chloride, and sulfate, and higher specific conductances). MW-2 also appears to have an elevated TOC concentration (356 mg/l in MW-2 versus 3.6 mg/l in the background wells).

Well MW-14

Well MW-14, located on the north central border of the site, had a significant *a priori* test for nickel. However, a review of the raw data suggests that these differences are attributable to changes in detection limits over time rather than any degradation in the groundwater quality. (As non-detects are input to the model as data points set at half of the detection limit, variations in the detection limits are processed by the model in the same manner as would actual variations of detected groundwater constituents.)

Well MW-1

Well MW-1, located in the north central part of the site, had a significant *a priori* test for pH. However, a review of the raw data suggests that this difference is attributable to one anomalously elevated pH value (9.9 on 13 July 1993) that may not be representative of the true groundwater pH in the area. The mean pH of groundwater in well MW-1 between 1983 and 1994 is 6.76, whereas the mean pH in the background wells during this time period is 5.61.

Well MW-3A

Well MW-3A had a significant *a priori* test for barium. However, the mean barium concentration of barium in well MW-3A is 0.15 mg/l, compared to 0.12 mg/l in the background wells. Therefore, this difference is not meaningful.

4.1.3 CONCLUSIONS FROM THE STATISTICAL ANALYSIS

Based on the statistical analysis of the groundwater quality data, it appears that there may be some water quality degradation, primarily associated with elevated levels of chloride, sodium and sulfate. The apparent degradation appears to be isolated to the vicinity of wells MW-2, MW-4, and MW-13 on the eastern side of the site.

Using only the statistical analysis of the monitoring data, it is not clear whether this apparent degradation can be attributed to releases from the landfill or to other factors. Section 7 presents conclusions using the statistical analysis in conjunction with other elements of this investigation.

4.2 SURFACE WATER QUALITY DATA

From 1987 to present, Champion included surface water sampling of Bowen Branch as part of the monitoring program for Landfill Number 6. Samples were collected from two locations, BB Up and BB Down, and were generally analyzed for the same parameters as the groundwater. BB Up is located north of U.S. Interstate Highway 40 and topographically upgradient of the Landfill Number 6 site. Data from this location should be indicative of background surface water quality at the landfill. Bowen Down is located near monitor well MW-2, downstream of BB Up and adjacent to Area F. This location is situated so as to monitor possible impacts to surface water from Area F (Figure 2-7). Two new locations, designated BB-3 and BB-4, have been added to the monitoring program, and were first sampled in November 1994. These locations are downstream of BB Down, located near to wells MW-3A and MW-13, and should be situated so as to monitor possible impacts to surface water quality from Areas G and H (Figure 2-7). Surface water quality data is presented in Table 4-1 for BB Up, BB Down, BB-3, and BB-4 locations. Laboratory analytical reports are presented in Appendix H.

As with the groundwater data, it is necessary when evaluating the significance of the surface water data to distinguish the natural occupance of tested inorganic constituents from the effects of possible impacts from the Areas F, G and H. Because of the limited number of stream sampling points for which historical data is available, a statistical analysis has not been performed on the surface water quality data. Rather, surface water concentrations of sodium, chloride, and sulfate (constituents of concern in groundwater as identified in the ANOVA analysis) for BB Up and BB Down have been plotted over time. Figures 4-1, 4-2, and 4-3

TABLE 4-1
SURFACE WATER QUALITY DATA

LOCATION: BB UP												
ANALYTE	6/3/87	9/23/87	11/30/87	10/12/88	11/28/89	5/22/90	12/7/90	10/29/91	11/08/93	06/01/94	11/12/94	NCSWQS
pH	5.7	6	6.5	5.8		7.2	6.3		7.32	7.3	7.2	6-9
TDS	116	28	64	60	41	54	104	83	66	38	68	500
Sp. Cond.	55	52	55	56		47	61	51	60	54	92	
Ag	<.015	<.003	<.01	<.01	<0.01	<0.005	<.01	<0.05	<0.05	<0.005	<0.005	0.00006
As	<.01	<.01	<.005	<.005	<0.01	<0.010	<0.01	<0.15	<0.01	<0.001	<0.010	0.05
Ba	<0.1	<0.2	<0.1	<1.0	<0.20	0.019	<0.5	<0.20	<0.2	<0.1	0.03	1
Ca	1.5	1.6	1.6	1.2	3.6	2.79	1.8	3.89	<5.0	3.392	3.779	
Cd	<.005	<.005	<.005	<.01	0.004	<0.005	<.005	<0.01	<0.01	0.001	0.001	0.002
Cr	<.02	<.02	<.02	<.02	<.02	<0.008	<.02	<0.05	<0.05	<0.005	<0.005	0.05
Cu										<0.005	<0.005	0.007
Fe	0.11	0.15	0.09	1.6	0.435	0.352	0.07	0.52	0.28	0.397	1.124	1
Hg	<0.001	<0.001	<0.0003	<0.001	<0.0002	<0.0002	<0.0005	<0.003	<0.002	<0.0002	0.0004	0.000012
K										2.041	3.02	
Mg						1.19				1.401	1.719	
Mn	<.02	<.01	<.02	0.08	0.046		0.02	<0.08	0.022	0.038	0.057	0.2
Na	2.3	0.45	3.3	4.1	6.28	2.76	2.4	3.53	<5.0	3.07	3.225	
Ni	<.03	<.03	<.03	<.03	<0.02	<0.050	<.03	<0.12	<0.04	<0.005	<0.005	0.025
Pb	<.03	<.03	<.03	<.03	0.0111	<0.030	<.03	<0.08	<0.05	<0.010	<0.010	0.025
Se	<.002	<.005	<.002	<.001	<0.01	<0.020	<.006	<0.03	<0.01	<0.002	<0.010	0.005
Zn										0.03	0.088	0.05
Cl-	2.5	2	4	5.5	1.8	1	5.5	2.7	3.4	2	3.3	230/250
F-	<.1	<.1	0.16	<.1	0.04	0.06	<0.1	<1.0	0.15	<0.5	<0.50	1.8
NO_2-N	<.005	<.005	<.005	<.005	<0.1	<0.01	<.005	<0.01	<0.02	<0.01	<0.010	
Nitrate										3.4	0.51	10
Phenol	0.01	<.01	0.06	<.01	<.0005	<0.005	<.01	<0.010	0.017	0.0061	<0.007	0.001
Sulfate	4	<5	<5	<5	6.5	<5	<5	3.6	<10.0	3.7	5	250
TOC	1.8	1.7	2.3	<0.5	7	2	<1.0	<5.0	2.4	4.001	6.7	
TOH	0.053	0.025	0.014	0.014		<0.010	0.02	<0.010		<0.005	0.032	
TOX					<0.10				<0.010			

Concentration in milligrams per liter; <# indicates compound not detected at the indicated detection limit

TABLE 4-1 (Continued)
SURFACE WATER QUALITY DATA

LOCATION: BB DOWN												
ANALYTE	6/3/87	9/23/87	11/30/87	10/12/88	11/28/89	5/22/90	12/7/90	10/29/91	11/08/93	06/01/94	11/12/94	NCSWQS
pH	6.2	6.4	6.7	6		7.2	6.5		7.39	7.4	8	6-9
TDS	140	88	64	88	54	78	112	90	68	134	89	500
Sp. Cond.	77	92	88	107		66	104	79	65	120	68	
Ag	<.013	<.003	<.01	<.01	<0.01	<0.005	<.01	<0.05	<0.05	<0.005	<0.005	0.00006
As	<.01	<.01	<.005	<.005	<0.01	<0.005	<.01	<0.15	<0.01	<0.001	<0.010	0.05
Ba	<0.1	<0.2	<0.1	<1	<0.20	0.027	<0.5	<0.20	<0.2	<0.1	0.023	1
Ca	1.7	2	2.1	2.3	4.05	3.75	2	5.51	<5.0	3.765	4.445	
Cd	<.005	<.005	<.005	<.01	<0.002	<0.005	<.005	<0.01	<0.01	0.001	<0.001	0.002
Cr	<.02	<.02	<.02	<.02	<0.02	<0.008	<.02	<0.05	<0.05	<0.005	<0.005	0.05
Cu										<0.005	<0.005	0.007
Fe	0.21	0.56	0.52	1.1	0.686	1.26	0.33	1.05	0.22	0.314	0.581	1
Hg	<.001	<.001	<.0003	<.001	<0.0002	<0.0002	<.0005	<0.003	<0.002	<0.0002	0.0004	0.000012
K										2.037	2.321	
Mg						1.71				1.489	1.743	
Mn	<.02	<.01	<0.14	0.2	0.096		0.06	0.11	0.035	0.042	0.042	0.2
Na	5.4	8.5	7.9	9.8	7.82	5.36	2.2	6.13	<5.0	5.8	4.76	
Ni	<.03	<.03	<.03	<.03	<0.02	<0.050	<.03	<0.12	<0.04	<0.005	<0.005	0.025
Pb	<.03	<.03	<.03	<.03	<0.005	<0.030	<.03	<0.08	<0.05	0.01	<0.010	0.025
Se	<.001	<.005	<.002	<.001	<0.01	<0.010	<.006	<0.03	<0.01	<0.002	<0.010	0.005
Zn										0.037	0.029	0.05
Cl-	5.5	9.5	16.5	8	7.3	2	6	5.2	3.7	2.7	3.3	230/250
F-	<0.1	0.1	0.16	<0.1	0.03	0.07	<0.1	<1.0	<0.1	<0.50	<0.500	1.8
NO_2-N	0.008	<.005	<.005	<.005	<0.1	<0.01	<.005	<0.01	<0.02	<0.01	<0.010	
Nitrate										5.56	0.58	10
Phenol	0.01	<.01	0.08	<.01	0.016	0.009	<.01	<0.010	<0.01	0.006	<0.007	0.001
Sulfate	16	12	9.6	<5	7	6	7	7.3	<1.0	4.3	3.7	250
TOC	1.7	3.5	<1	<.5	3	3	<1	<5.0	1.2	3.7	1.2	
TOH	0.149	0.028	0.022	0.02		<0.010	0.036	<0.010		0.033	0.024	
TOX					<0.10							

Concentration in milligrams per liter; <# indicates compound not detected at the indicated detection limit

TABLE 4-1 (Continued)
SURFACE WATER QUALITY DATA

	LOCATION: BB-3	LOCATION: BB-4	
ANALYTE	11/12/94	11/12/94	NCSWQS
pH	7.9	7.9	6-9
TDS	105	122.5	500
Sp. Cond.	169	193	
Ag	<0..005	<0.005	0.00006
As	<0.010	<0.010	0.05
Ba	0.064	0.068	1
Ca	12.675	9.656	
Cd	0.001	0.001	0.002
Cr	<0.005	0.006	0.05
Cu	0.009	0.008	0.007
Fe	4.620	5.746	1
Hg	0.003	0.003	0.000012
K	4.921	4.853	
Mg	2.845	3.156	
Mn	0.243	0.229	0.2
Na	17.244	21.255	
Ni	0.02	0.021	0.025
Pb	<0.010	<0.010	0.025
Se	<0.01	<0.01	0.005
Zn	<0.01	0.165	0.05
Cl-	5.5	6.0	230/250
F-	<0.5	<0.5	1.8
NO_2-N	<0.010	<0.010	
Nitrate	0.43	0.70	10
Phenol	0.0075	0.006	0.001
Sulfate	39.6	47	250
TOC	14	5.1	
TOH	0.009	0.009	
TOX			

Concentration in milligrams per liter; <# indicates compound not detected at the indicated detection limit

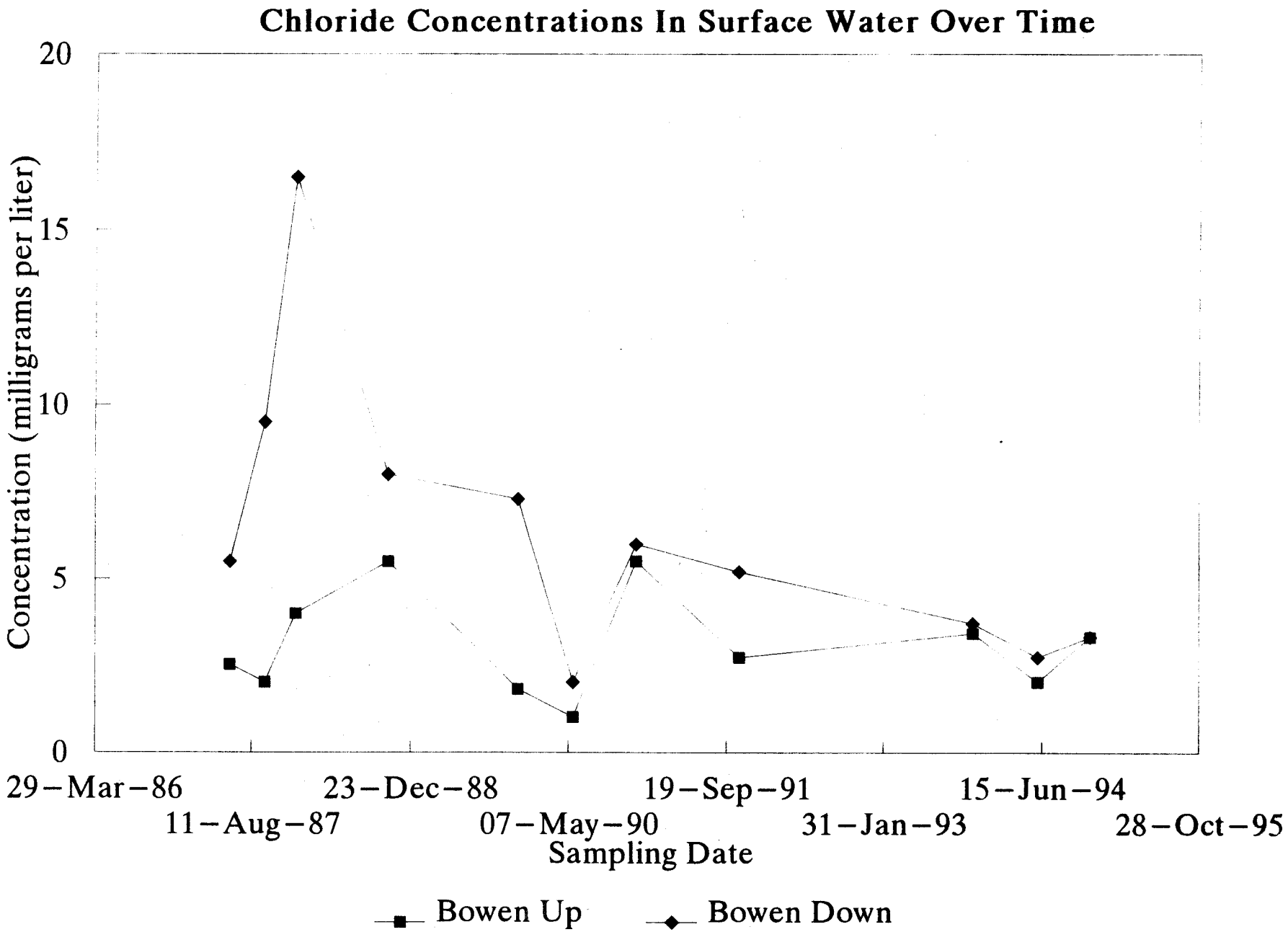

Chloride Concentrations In Surface Water Over Time
Concentration (milligrams per liter)
20
15
10
5
0
29-Mar-86
11-Aug-87
23-Dec-88
07-May-90
19-Sep-91
31-Jan-93
15-Jun-94
28-Oct-95
Sampling Date
Bowen Up
Bowen Down

Figure 4-1

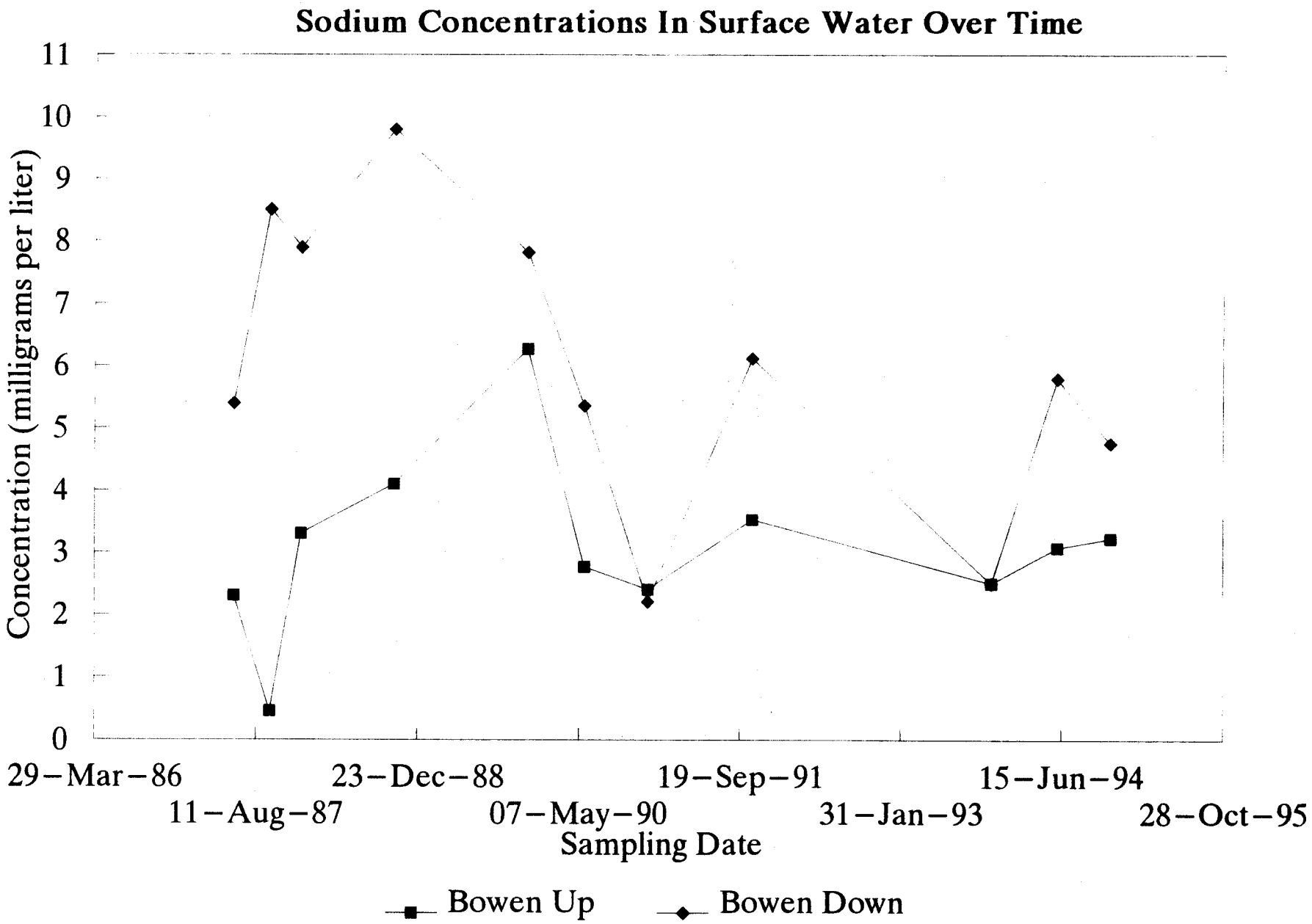

Sodium Concentrations In Surface Water Over Time
Concentration (milligrams per liter)
11
10
9
8
7
6
5
4
3
2
1
0
29-Mar-86
11-Aug-87
23-Dec-88
07-May-90
19-Sep-91
31-Jan-93
15-Jun-94
28-Oct-95
Sampling Date
Bowen Up
Bowen Down

Figure 4-2

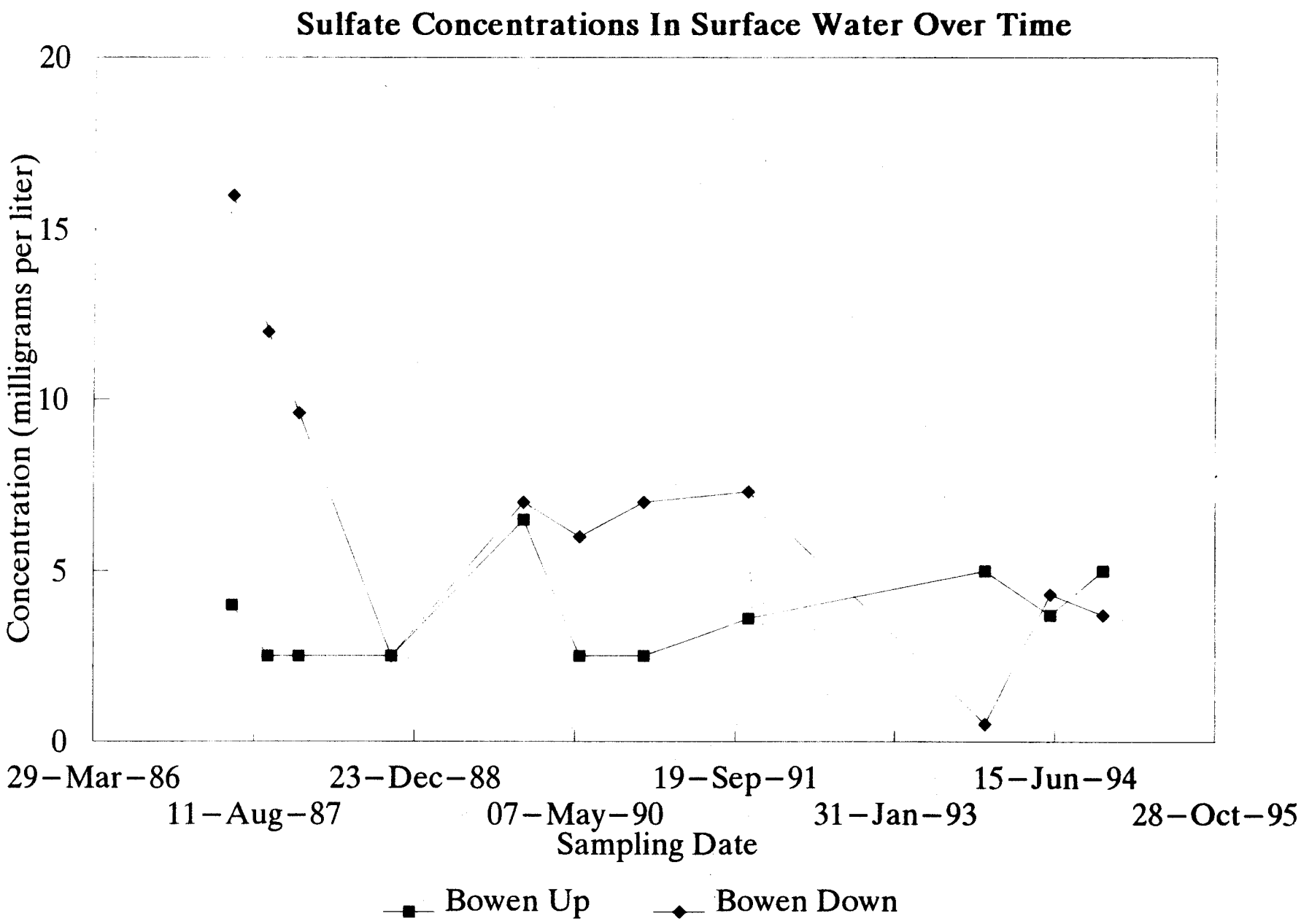

Sulfate Concentrations In Surface Water Over Time
20
15
10
5
0
Concentration (milligrams per liter)
29-Mar-86
11-Aug-87
23-Dec-88
07-May-90
19-Sep-91
31-Jan-93
15-Jun-94
28-Oct-95
Sampling Date
Bowen Up
Bowen Down

Figure 4-3

respectively, present chloride, sodium, and sulfate concentrations over time, with each plot illustrating the BB Up and BB Down sample data.

From a review of the plots, some similarities are apparent. For each of the analytes, variation over time in both sampling locations are observed. Concentrations at BB Up do not exhibit a discernable long term trend in the variations. At BB Down, early data (up through 1988) exhibits the highest concentrations, then concentrations decline to levels comparable to that observed at the BB Up location. It is unknown what is responsible for the apparent trend in BB Down concentrations. However, it does not appear to reflect an ongoing impact from the landfill, as concentrations in BB Down would be expected to remain above BB Up concentrations, and possible increase over time, if an ongoing release from the landfill to the surface water were occurring.

Concentrations of sodium, sulfate and calcium for November 1994 at BB-3 and BB-4 appear to be elevated with respect to current and historical concentrations of these analytes at BB Up and BB Down (Table 4-1). Concentrations of sulfate do not exceed North Carolina Surface Water Quality Standards (NCSWQSs) for class C and class WS-I surface waters; NCSWQS are not available for sodium and calcium. Given that BB-3 and BB-4 have only been sampled once, the significance of the data is uncertain, but the data may reflect some minor influence associated with the landfill (Areas G and/or H). Continued monitoring at BB-3 and BB-4 will assist in further assessing the significance of the data.

Various compounds were detected in the surface water sampling locations for the November 1994 sampling at concentration above NCSWQSs. However, most of these compounds, including iron, mercury, and zinc, were detected in BB Up at concentration above NCSWQS as well as the downstream location. Phenol (NCSWQS of 0.001 mg/l) was present in BB-3 (0.0075 mg/l) and BB-4 (0.006 mg/l) but not detected at BB Up (detection limit of 0.007). However, phenol was detected at BB-UP in the two previous sampling rounds. Consequently, the existing data do not suggest phenol is significant. Copper was detected at low concentrations at BB-3 and BB-4 (0.009 and 0.008 mg/l; NCSWQS of 0.007 mg/l) and was not detected at BB Up (detection limit of 0.005 mg/l). Copper has not been included in the analytic suite except for the last two sampling rounds. At this time, the presence of copper does not appear to be significant, but additional monitoring will assist in assessing the data. Manganese was present in BB-3 and BB-4 above its NCSWQS. However, manganese is a very common constituent of soil and rock, and is not considered significant at this time. In general, the constiutents identified in surface water at concentrations above NCSWQSs do not appear to be site related.

SECTION 5

HAYWOOD COUNTY LANDFILL DATA

The Haywood County Construction and Demolition Landfill is located adjacent to the eastern boundary of Champion's Landfill Number 6. The landfill is used for the disposal of construction waste, such as roofing shingles, plywood, lumber, insulation materials, and other common construction materials.

The western section of the County Landfill is separated from the eastern section of Champion's Landfill Number 6 (Areas F and H) by a north-south trending ridge. The property boundary is west of this topographic divide. County Landfill surface water runoff to the east of this divide drains into Thickety Creek or the Pigeon River. County Landfill surface water runoff west of the divide drains onto Landfill Number 6 Areas F and H before entering Bowen Branch or the Pigeon River.

Limited information regarding the County landfill was available from a partial report produced by GEI Consultants of Winchester, Massachusetts (Appendix D). This partial report contains a description of a field geotechnical investigation, geotechnical laboratory data, soil and rock boring lithologic logs, monitor well construction logs, a ground surface topographic map, and groundwater elevation data. Six soil and rock borings were conducted in April 1993. Four monitor wells were subsequently constructed. According to the report, these monitor wells were constructed in accordance with DEHNR monitor well construction standards. Well construction and groundwater level information has been summarized in Table 5-1. The boring logs provided data on subsurface conditions such as soil, saprolite, and bedrock location. This information was used in the cross-sections presented in Section 2 (Figure 2-6).

In general, subsurface conditions in the County landfill are similar to conditions reported for Landfill Number 6, with a variable thickness of unconsolidated soil and saprolite overlying bedrock. Depth to bedrock varies with surface topography, such that bedrock is encountered at the greatest depths in areas where the ground surface elevation is highest. From a review of the boring logs, depth to bedrock varies from approximately 90 feet below ground surface to less than 10 feet below ground surface.

Groundwater elevations and estimated groundwater flow direction for the County landfill was discussed in Section 2. Briefly, groundwater elevation data for the four County wells suggests groundwater flows to the east-southeast, away from Landfill Number 6, and appears to mimic surface topography. Using surface topography to assist in interpreting groundwater flow direction, groundwater from Landfill Number 6 would not be expected to flow towards the County landfill, as a topographic high separates eastern edge of the Areas F and H from the County landfill. However, as previously discussed, groundwater flow can be influenced by

TABLE 5-1
SUMMARY OF HAYWOOD COUNTY LANDFILL MONITOR WELL DATA

BORING OR MONITOR WELL #	SURFACE ELEVATION (FT MSL)	TOTAL DEPTH (FT BGS)	TOTAL DEPTH (FT MSL)	GROUNDWATER ELEVATION (FT MSL)	SCREENED INTERVAL (FT BGS)	SCREENED WITHIN
MW-1	2711.45	97.00	2614.45	2634.70	72.00-97.00	BEDROCK
MW-2	2660.50	90.00	2570.50	2588.50	70.00-90.00	BEDROCK
MW-3	2556.56	22.00	2534.56	2545.80	12.00-22.00	SAPROLITE
MW-4	2553.46	16.00	2537.46	2550.80	5.00-15.00	SOIL
B-5	2624.03	65.00	2559.03	2573.80	NA	NA
B-6	2610.00	35.50	2574.50	NA	NA	NA

NA indicates not applicable

several other factors besides ground surface elevation, including bedrock fracture characteristics and regional gradients.

Limited groundwater quality data for the County landfill was available for review. A laboratory report was received which provided groundwater quality data (primarily for inorganic constituents) for samples collected 17 August 1993 (Appendix D). The laboratory report did not identify analytical methods or discuss field sampling procedures.

Of the compounds included in the analytic suite, chloride and sulfate concentrations at County landfill well MW-2 appear to be elevated with respect to the three other County landfill wells (sodium was not included in the analytic suite). The chloride concentration at MW-2 was reported 170 mg/l, while chloride concentrations at wells MW-1 and MW-3 were below detection limits of 1 mg/l, and at well MW-4, a chloride concentration of 6.3 mg/l was reported. The sulfate concentration at well MW-2 was 4900 mg/l, while the sulfate concentration at well MW-4 was 5.3 mg/l; sulfate was not detected at wells MW-1 and MW-3, at a detection limit of 1 mg/l. Higher specific conductance (based on field measurements) is also reported for well MW-2 relative to the other County landfill wells, probably reflective of the relatively elevated concentrations of chloride and sulfate.

Relative to Landfill Number 6, County well MW-2 is located approximately 100 feet east of the southern portion of Area H. It is possible that the chloride and sulfate concentrations observed in County well MW-2 are associated with Landfill Number 6 operations. However, groundwater flow data is limited, and only one set of County landfill groundwater quality data is available. Therefore, is significance of the groundwater quality data for the County landfill data is uncertain.

SECTION 6

RECEPTOR SURVEY

There are few potential groundwater or surface water receptors in the vicinity of Landfill Number 6. Champion owns two leased homes on the western boundary of the site which have private groundwater supply wells. The City of Canton uses the Pigeon River as a source of drinking water, but the intakes are several thousand feet upstream of the site. The City of Clyde is over one mile downstream of the landfill. Additionally, the City of Clyde receives its municipal water via pipeline from the City of Canton. The Haywood County Construction and Demolition landfill lies at the eastern border of the site.

From a review and analysis of the data presented in this report, the area of potential concern is focused on Areas F, G, and H. Groundwater in this portion of the site is not expected to exit the site to the north or west. The two Champion-leased houses on the western portion of the site are not considered receptors because: they are located in an area of the site which does not receive groundwater from Areas F, G, and H (based on estimated groundwater flow directions); they are located several thousand feet west of Areas F, G, and H, and; only low concentrations of analytes in groundwater (considered representative of background conditions) are observed in wells along the western perimeter of the landfill.

The County landfill lies east of Areas F, G, and H. While available groundwater flow data suggests that groundwater does not flow from Landfill Number 6 towards the County landfill, the flow data is incomplete. Consequently, the County Landfill is considered a potential groundwater receptor.

Groundwater in the vicinity of Areas F, G and H appears to discharge into Bowen Branch, which in turn flows into the Pigeon River. Existing surface water quality data suggest that portions of Bowen Branch may experience somewhat elevated concentrations of sulfate and sodium. However, NCSWQSs for compounds thought to be potentially related to Landfill Number 6 operations are not exceeded. Consequently, downstream users of the Pigeon River are not considered to be potential receptors.

SECTION 7

CONCLUSIONS, RECOMMENDATIONS, AND PROPOSED SCHEDULE

Conclusions have been made based on a review and analysis of the available data. Recommendations have been developed to address issues identified in the conclusions, and are presented with the conclusions to which they are associated. A field sampling and analysis plan is presented in Appendix J to discuss general methods proposed to be employed for executing the recommended field program.

Conclusion:	It appears that monitoring wells MW-2, MW-4, and MW-13 may be monitoring groundwater which has been impacted by lime wastes disposed of in Areas F, G, and H, based on examination of types of the wastes disposed of, landfill area construction information, estimated relative hydrogeologic locations of monitoring wells, and a statistical analysis of groundwater quality data
Conclusion:	Constituents of statistical significance identified in monitor wells MW-2, MW-4, and MW-13 include sodium, chloride, and sulfate; Total Organic Carbon is statistically significant at well MW-2
Recommendation:	Install two temporary groundwater monitoring points between Areas G and B, to assess groundwater quality upgradient of Area G
Recommendation:	Redevelop well MW-2, as this well historically has experienced poor yield during routine sampling
Recommendation:	Conduct modeling of leachate movement through landfill cells F, G and/or H, to assess the potential for leachate to impact groundwater
Recommendation:	Continue to remove standing water as it occurs in Area H, to reduce the opportunity for percolation of surface water into the cell
Recommendation:	Evaluate engineering controls to address the seep area

Conclusion:	Groundwater flow at Landfill Number 6 and the Haywood County Landfill appears to generally follow surface topography, and is expected to be influenced by characteristics of the bedrock. However, data is limited in that few wells are installed in areas of elevated topography, and little site-specific information is available regarding the bedrock underlying the site
Conclusion:	It is possible the County landfill is receiving potentially impacted groundwater from Area H of Landfill Number 6
Conclusion:	There are no groundwater or surface water human receptors in the vicinity of Landfill Number 6
Recommendation:	Install four monitor wells along the eastern property line to assess groundwater flow direction and groundwater quality near the Haywood County landfill
Recommendation:	Install wells and monitoring points into first groundwater; if first groundwater is encountered above bedrock, install a bedrock well adjacent to the shallow well
Recommendation:	Conduct down-hole geophysics in bedrock well boreholes prior to installation of the well construction material, to assess the degree of bedrock fracturing and fracture orientation
Recommendation:	Conduct a pump test at one of the newly installed monitoring wells, to assess hydraulic characteristics of the aquifer
Recommendation:	Survey the location and elevation of the new wells and new groundwater monitoring points
Conclusion:	Groundwater appears to discharge to surface water, including Bowen Branch
Conclusion:	Based on one round of surface water sampling along the southern portion of Bowen Branch, surface water along this portion of Bowen Branch may be experiencing slightly elevated sodium and sulfate concentrations; surface water quality standards have not been exceeded for compounds thought to be associated with Landfill Number 6 operations

Recommendation:	Install one monitor well east of Bowen Branch, between existing monitor wells MW-2 and MW-13, to monitor groundwater quality in this portion of the site
Recommendation:	Install one monitoring well west of Bowen Branch, between wells MW-4 and MW-13, to assess groundwater quality where groundwater may flow from Area G towards Bowen Branch
Conclusions:	The current analytic suite is appropriate for monitoring groundwater and surface water quality at the site
Recommendation:	Continue groundwater monitoring at existing wells, new wells, and stream locations; maintain existing analytic suite

Upon completion of the above scope of work, it is recommended that a report discussing the findings of the investigation be prepared.

The following schedule is proposed for implementation of the above recommendations. Upon DSWM's concurrence with the recommendations presented in this report, implementation of the recommendations will commence. The estimated total duration to fully execute this plan is 154 calendar days. A breakdown of the implementation schedule is presented below.

TASK 1 SUBCONTRACTOR PROCUREMENT

This task will begin upon the approval of the recommendations by DSWM. Activities under this task include development of subcontractor procurement specifications (installing two temporary groundwater observation points and six monitor wells, down-hole geophysics, elevation survey for new wells), distribution of the specifications to prospective subcontractors, preparation of submittals by prospective subcontractors, evaluation and selection of subcontractors, and formal contracting of the selected subcontractors. The estimated duration of this task is 14 calendar days.

TASK 2 EXECUTION OF TECHNICAL SCOPE OF WORK

This task will begin upon completion of formal contracting of the selected subcontractors. The technical scope of work includes the aspects discussed in the proceeding recommendations paragraph (mobilization of drilling subcontractor; drilling, construction, and development of monitor wells and temporary groundwater observation points; redeveloping existing monitor well

MW-2; monitor well equilibration; down-hole geophysics; groundwater sampling; aquifer pump testing; groundwater sampling; horizontal and vertical survey of wells and observation points; modeling of leachate movement). The estimated duration to execute the technical scope is 70 calendar days. The estimated duration of the drilling program may vary, depending whether and how many shallow monitor wells are required; the drilling program is projected to require five weeks (35 calendar days). The monitor wells will then require one week (7 calendar days) to equilibrate. Following well equilibration, the wells will be sampled for water quality, a pump test will be performed, and the horizontal location and vertical elevation of the monitor wells and temporary groundwater observation points. The activities are estimated to be conducted in one week (7 calendar days). It is estimated that the water quality data and the elevation survey report will be received three weeks (21 calendar days) after completion of the field program.

TASK 3 REPORTING

This task includes preparation of a report to discuss the findings of the investigation. Preparation of the report will be initiated once data becomes available. The draft report will be submitted to Champion an estimated 35 calendar days after receipt of the groundwater quality data and surveyor's report. Upon receipt of Champion's comments of the draft report, estimated at 14 calendar days, WESTON will revise the draft report. The final report will be released to Champion 14 calendar days after receipt of the draft report comments. The final report will be reviewed by Champion and, upon authorization by Champion, released to DSWM, 7 calendar days after Champion's receipt of the final report. The total estimated time for completion of this task is estimated at 70 calendar days.

APPENDIX A

MONITORING WELL CONSTRUCTION LOGS
AND
SOIL BORING LITHOLOGIC LOGS

TABLE 1
GROUND-WATER MONITORING WELLS(1)
Champion Papers
Landfill No. 6
Canton, North Carolina
LETCo. Job No. CH 4507C

Well No.	Ground Surface Elevation	Groundwater(2) Elevation	Groundwater(2) Depth	Depth of Well	Screen Interval	Type Material Exposed to screen	Depth to Top of Sand	Depth to Top of Bentonite
MW-1	2807.82	2714.1	93.8	122.9	102.9-122.9	Rock	92.1	87.4
MW-2	2595.31	2587.6	7.7	10.2	5.2-10.2	PWR	4.5	3.5
MW-3	2577.70	2569.4	8.3	11.0	6.0-11.0	Soil-PWR	4.5	3.5
MW-4	2629.63	2574.8	54.8	84.0	64.0-84.0	Rock	34.4	33.0
MW-5	2547.18	2542.1	5.1	15.6	5.6-15.6	Soil-PWR	5.0	3.5
MW-6	2549.72	2535.6	14.1	18.5	8.5-18.5	PWR-Rock	9.0	8.0
MW-7	2550.44	2544.3	6.2	14.3	4.3-14.3	Soil-PWR	4.0	3.0
MW-8	2594.39	2583.5	10.9	27.7	17.7-27.7	Rock	7.0	6.0
MW-9	2684.02	2652.4	31.7	64.8	44.8-64.8	PWR-Rock	41.0	39.3
MW-10	2677.78	2644.9	32.8	74.0	54.0-74.0	Rock	52.4	49.0
MW-11	2639.44	2630.6	8.9	20.4	10.4-20.4	Soil-PWR	10.0	8.0
MW-12	2543.73	2533.9	9.8	30.4	20.4-30.4	PWR-Rock	18.0	16.0

(1) All measurements in feet.
(2) Based on measurements made on 7/12/83.

PWR - Partially Weathered Rock

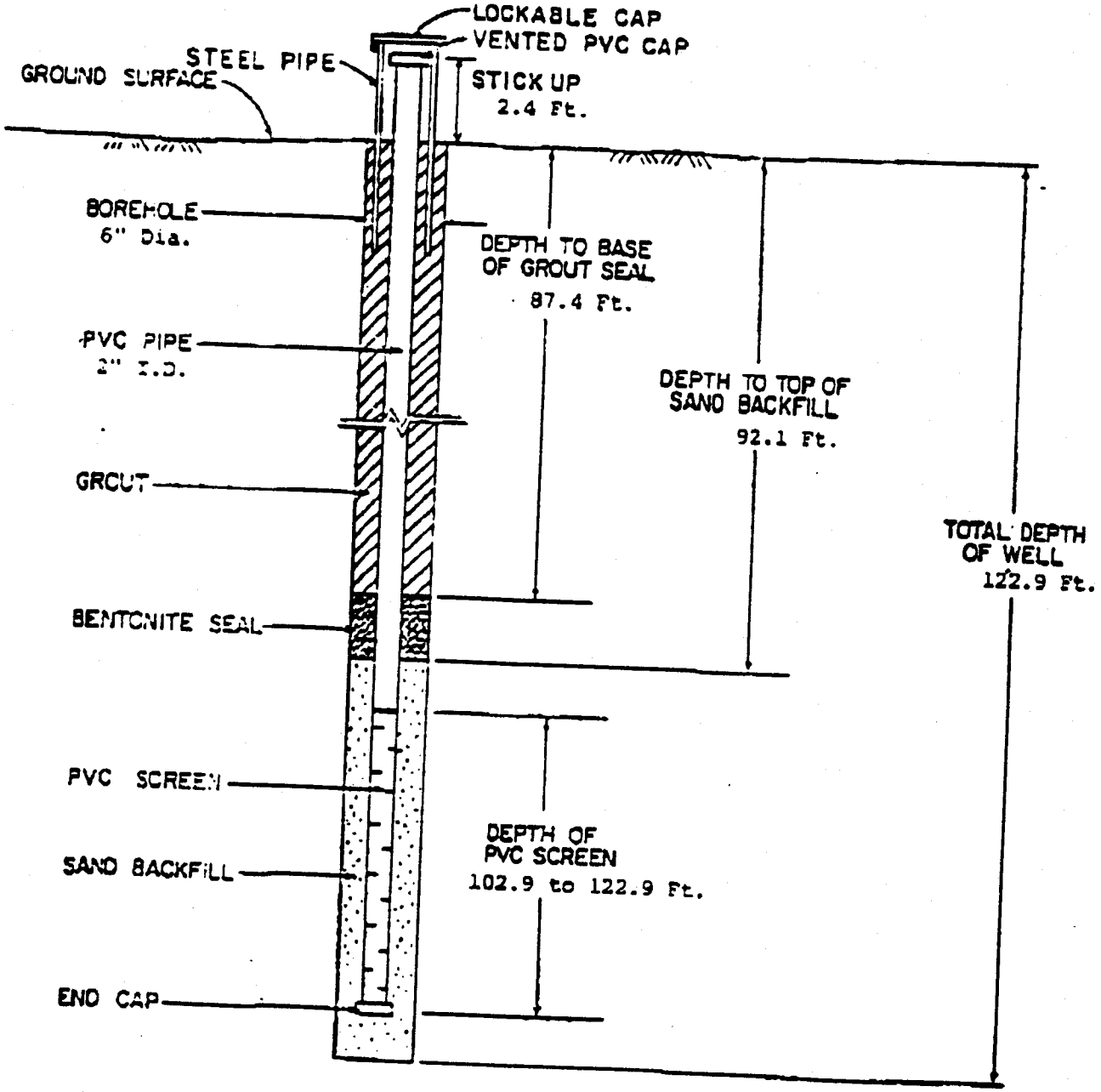
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CL 4507 C

WELL NUMBER MW-1 GROUND SURFACE ELEVATION 2807.82 Ft.

LOCATION Knoll on North Central Part of Site

INSTALLATION DATE 7-6-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-1

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	PENETRATION - BLOWS/FOOT (0 10 20 30 40 60 80 100)
0.0	Hard moist reddish brown fine sandy micaceous SILT relic foliation - high angle - Residuum.		41
7.0	Hard dry reddish brown very micaceous SILT - relic foliation.		32
12.0	Very hard dry red to brown medium sandy micaceous SILT with relic structure.		54
18.0	Very hard dry tan to brown medium to coarse sandy micaceous SILT with relic structure.		74
			50=5.5"
27.0	Hard moist gray to reddish brown fine sandy very micaceous SILT with relic structure.		45
32.0	Hard moist gray to green minor medium sandy very micaceous SILT with relic structure.		41
38.0	Hard moist medium to dark gray minor medium sandy very micaceous SILT with relic structure.		39

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW- 1A
DATE DRILLED	January 27, 1992
PROJECT NUMBER	2410446501
PROJECT	CHAMPION #6A LANDFILL
PAGE 1 OF 2	

LAW ENGINEERING

DEPTH (FT.)	DESCRIPTION	ELEVATION (FT.)	PENETRATION - BLOWS/FOOT (0 10 20 30 40 60 80 100)
43.0	Hard moist brown to gray fine to medium sandy micaceous SILT with relic structure.		32
48.0	Very stiff wet dark gray fine to medium sandy micaceous SILT with relic structure.		20
53.0	Hard wet tan to gray fine to medium sandy micaceous SILT with layering.		40
58.0	Partially weathered rock which sampled as (wet gray fine to medium sandy micaceous SILT with layering).		50=5"
63.0	Partially weathered rock which sampled as (wet brown fine to medium sandy micaceous SILT with layering).		50=3"
68.0	Partially weathered rock which sampled as wet light to dark brown medium to coarse sandy micaceous SILT with layering.		50=4.5"
70.8	Boring terminated at 70.8 feet. Auger refusal at 70.8 feet. Ground water encountered at 47.32 feet after 24 hours. Monitoring well installed to 70.2 feet on January 29, 1992.		

REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW- 1A
DATE DRILLED	January 27, 1992
PROJECT NUMBER	2410446501
PROJECT	CHAMPION #6A LANDFILL
PAGE 2 OF 2	

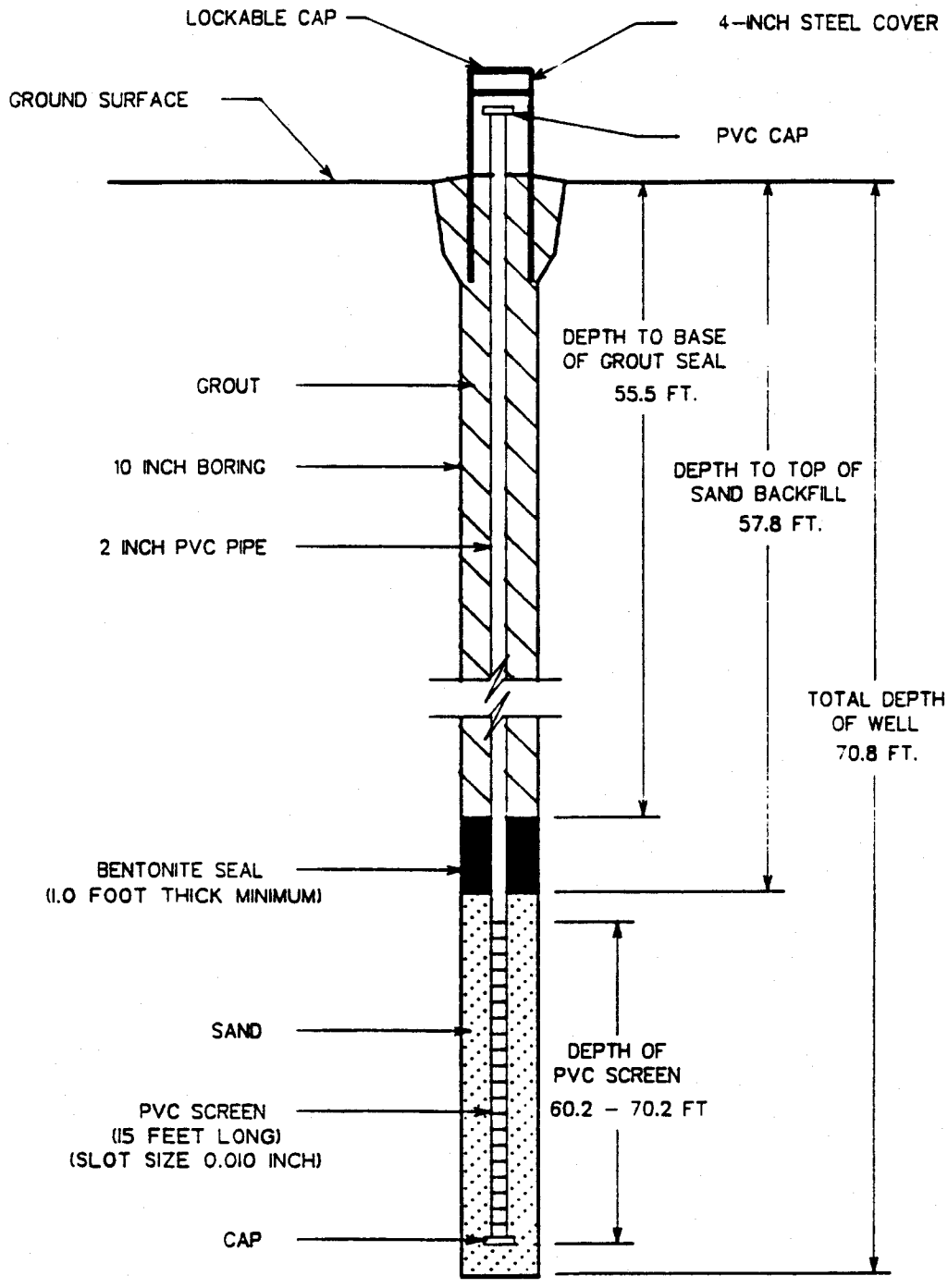
LAW ENGINEERING

JOB NAME CHAMPION NO. 6 LANDFILL JOB NUMBER 2410446501

WELL NUMBER MW-1A GROUND SURFACE ELEVATION 2765 FT (MSL)

LOCATION SEE ATTACHED LOCATION MAP MEASURING POINT ELEVATION

INSTALLATION DATE 1/29/92 LATITUDE LONGITUDE



LAW ENGINEERING
GREENVILLE, SOUTH CAROLINA

MONITORING WELL
INSTALLATION RECORD
CHAMPION LANDFILL NO. 6A
CANTON, SOUTH CAROLINA

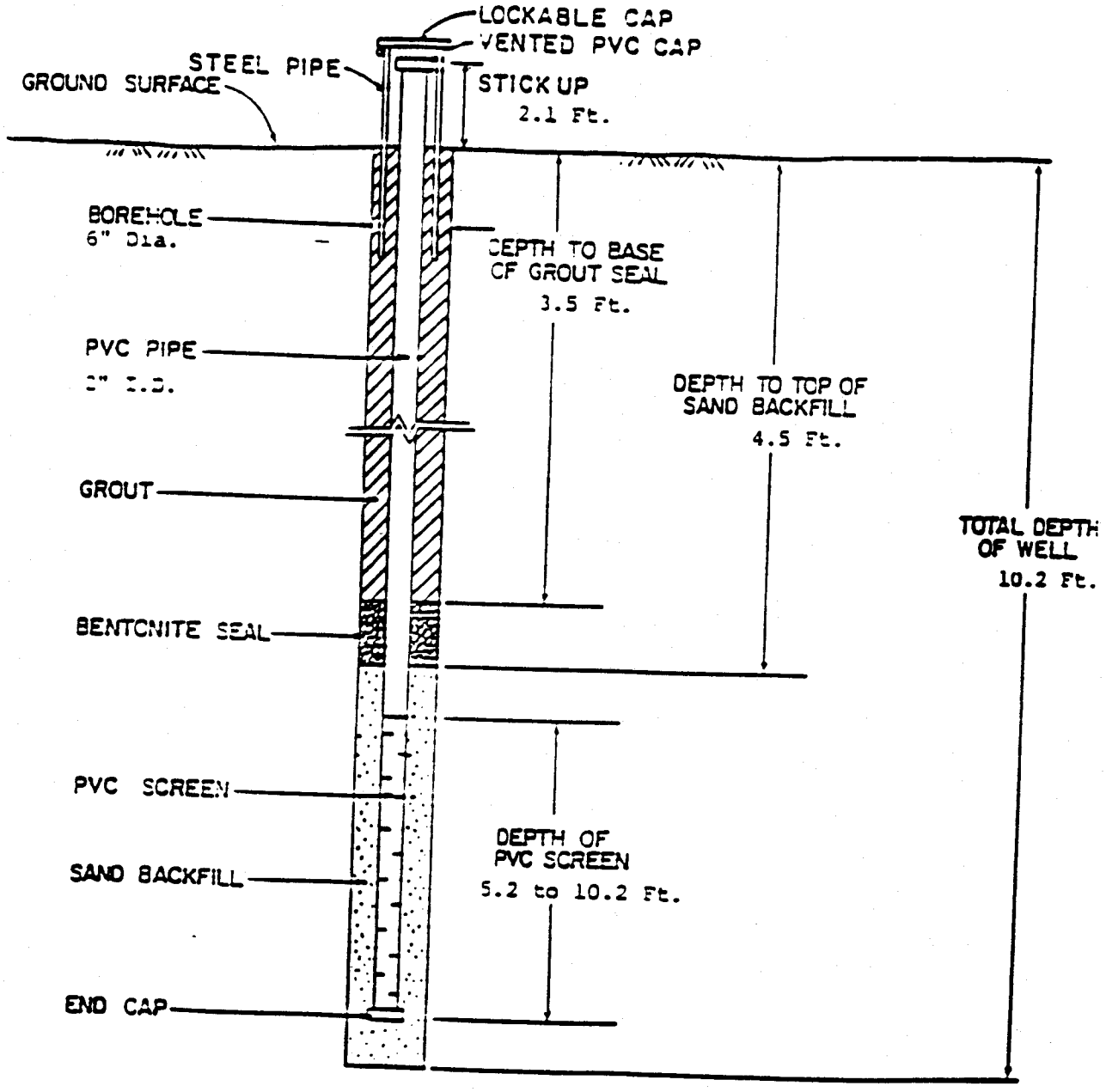
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-2 GROUND SURFACE ELEVATION 595.31 Ft.

LOCATION Southwest of Area F

INSTALLATION DATE 7-6-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-2

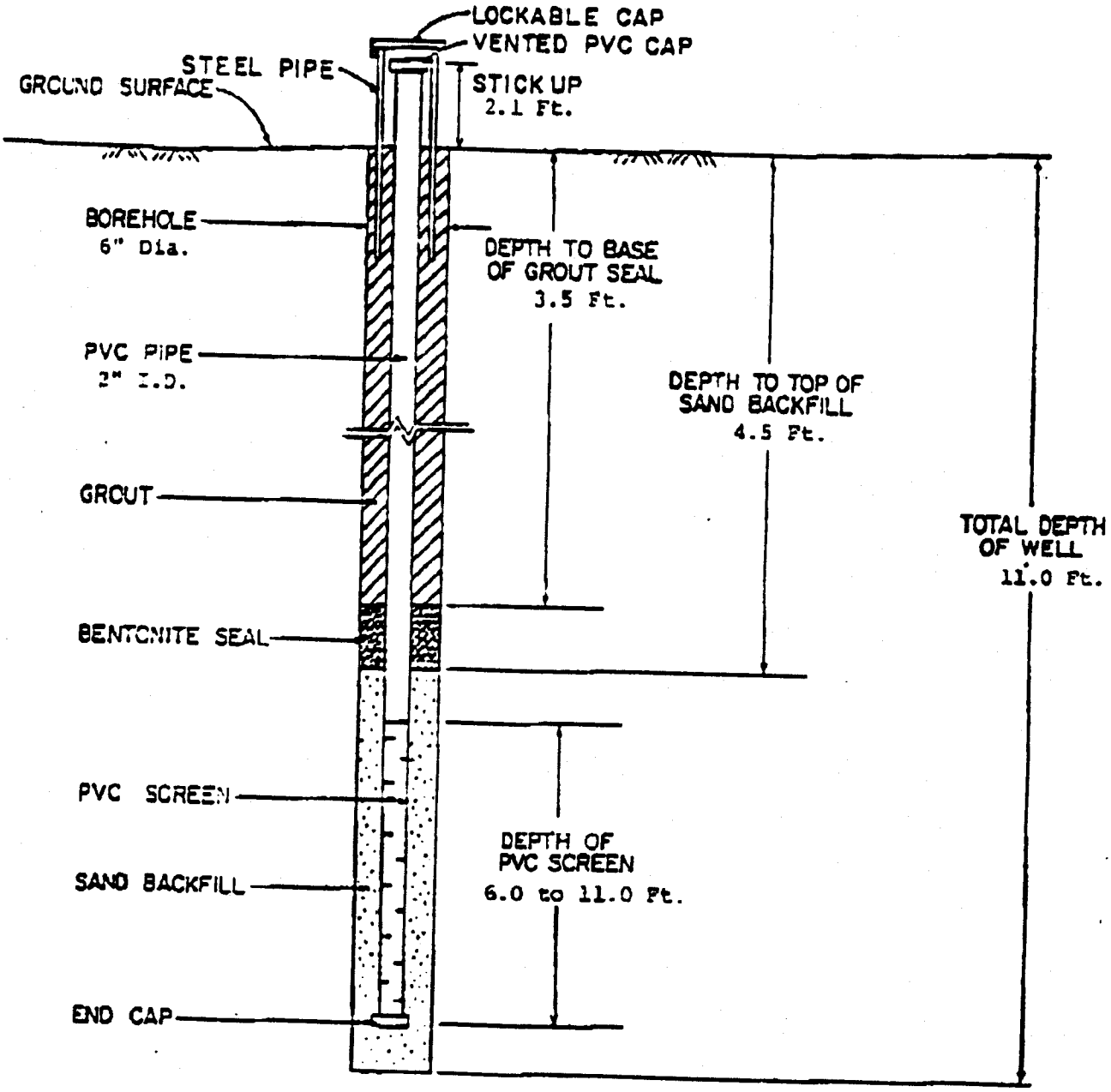
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-3 GROUND SURFACE ELEVATION 2577.70 Ft.

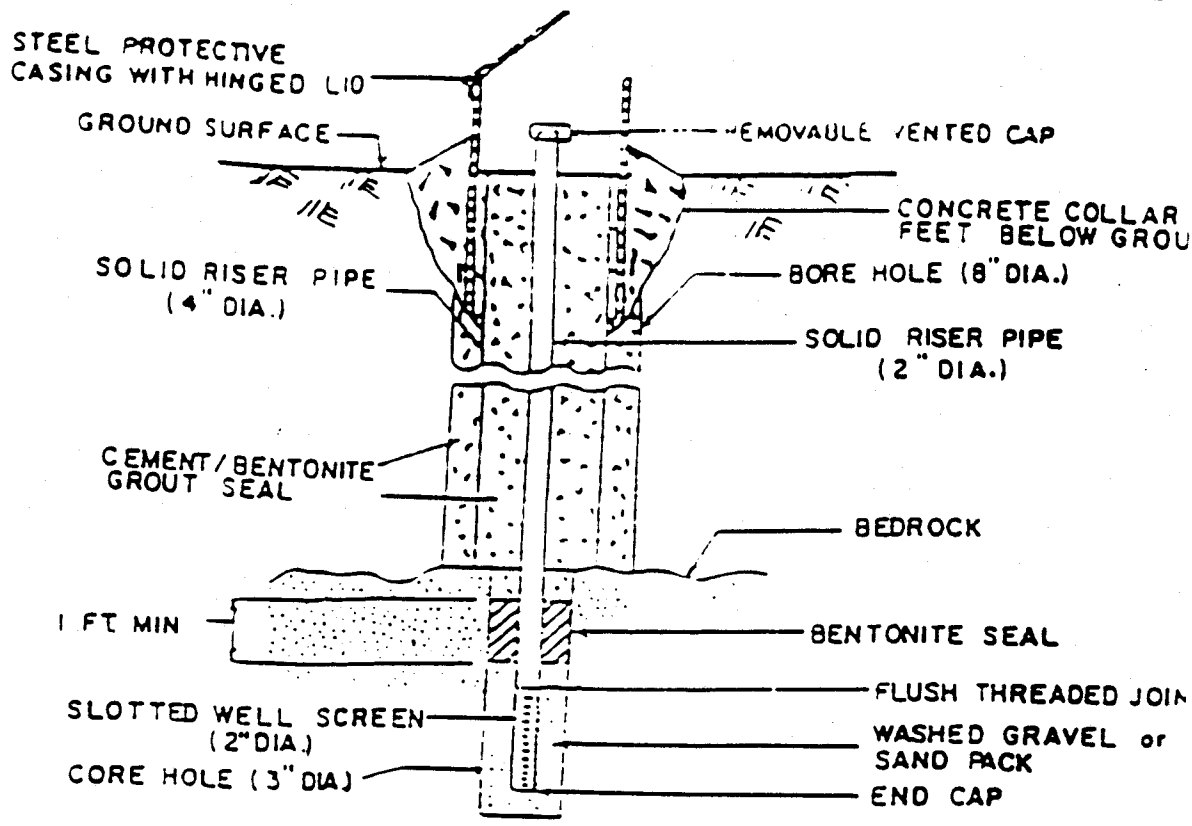
LOCATION East of Area A

INSTALLATION DATE 7-6-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-3

TYPICAL DIAGRAM - TYPE III MONITORING WELL



MONITORING WELL INSTALLATION DETAILS						
WELL NUMBER	MW-3A					
GROUND ELEVATION (FT.)	--					
GROUND WATER ELEVATION (FT.) MEASURED ON:	--					
TOTAL DEPTH OF WELL BELOW GROUND SURFACE (FT.)	17.5					
MEASURING POINT ELEVATION (FT.)	--					
SCREEN LENGTH (FT.)	10.0					
SOLID RISER LENGTH BELOW GROUND SURFACE (FT.)	7.5					
PVC HEIGHT ABOVE GROUND (FT.)	2.5					
THICKNESS OF BENTONITE SEAL	1.2					
THICKNESS OF CEMENT SEAL	4.0					
4 INCH DIAMETER PVC LENGTH BELOW GROUND SURFACE (FT.)	5.0					

Champion International
Canton Landfill
Haywood County, N.C.

LAW ENGINEERING

INSTALLATION DETAILS
TYPE III MONITORING WEL

JOB NO. AV-1834 | FIGURE 2

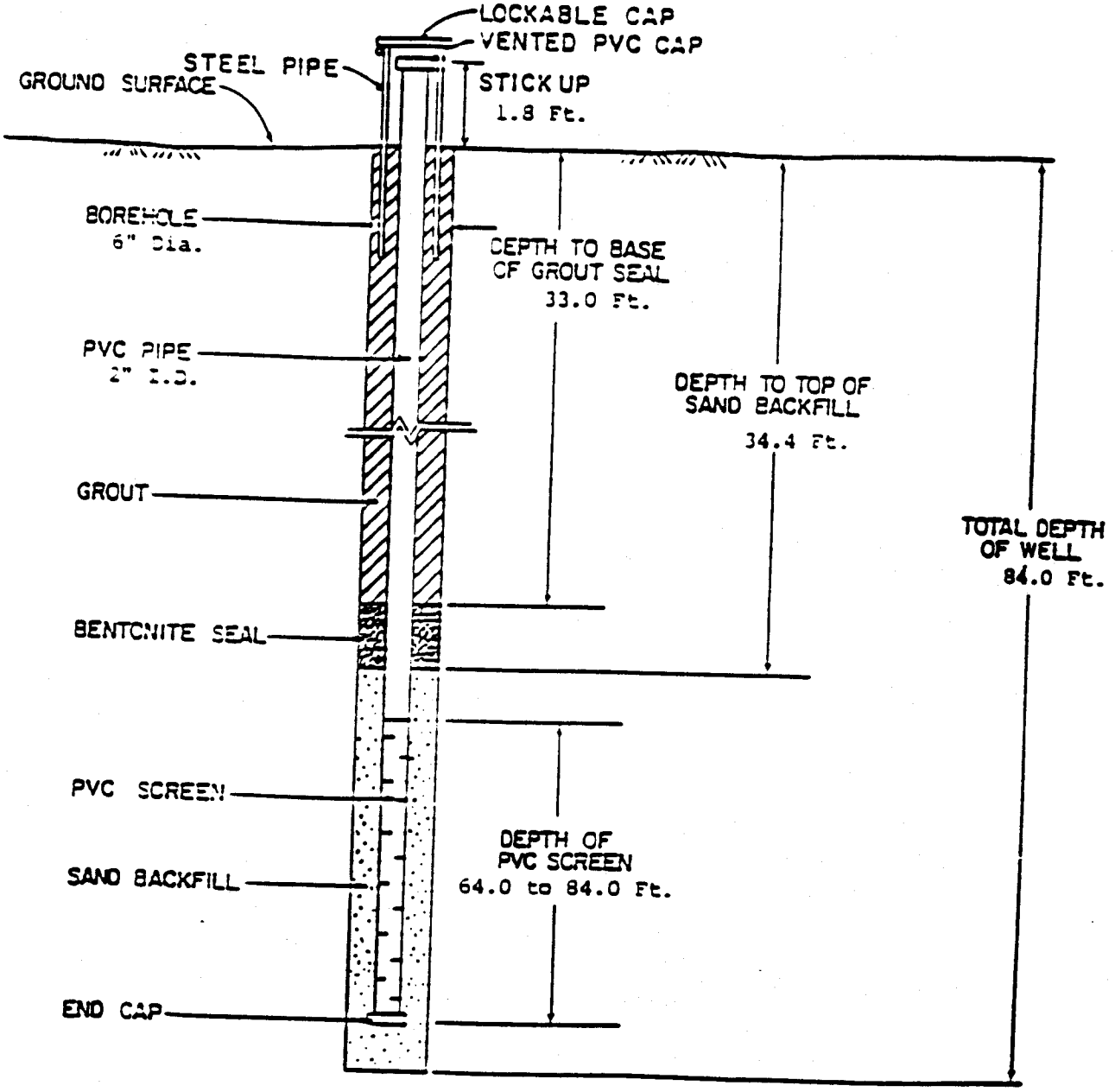
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-4 GROUND SURFACE ELEVATION 2629.63 Ft.

LOCATION Southeast of Area B

INSTALLATION DATE 7-7-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-4

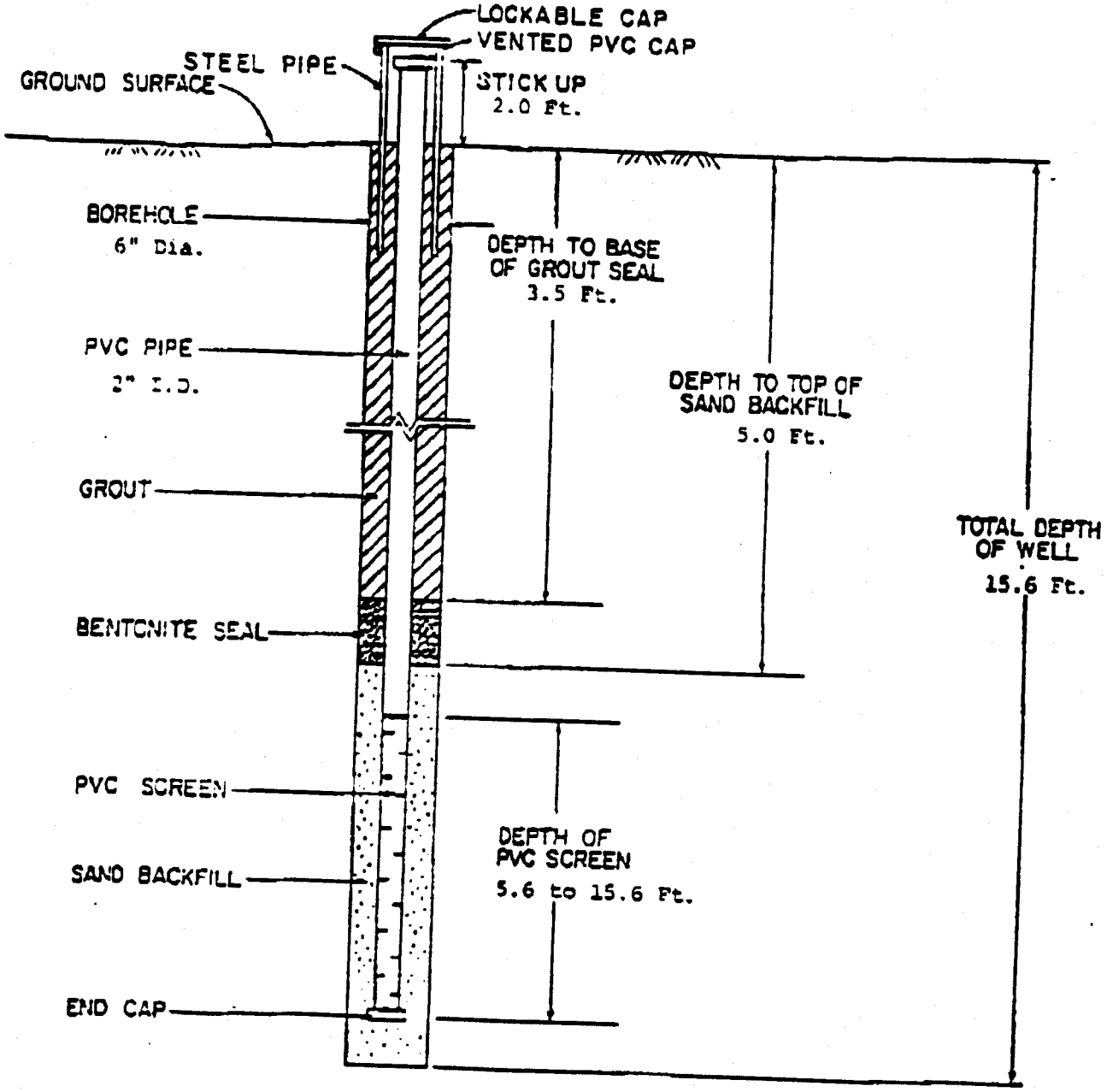
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

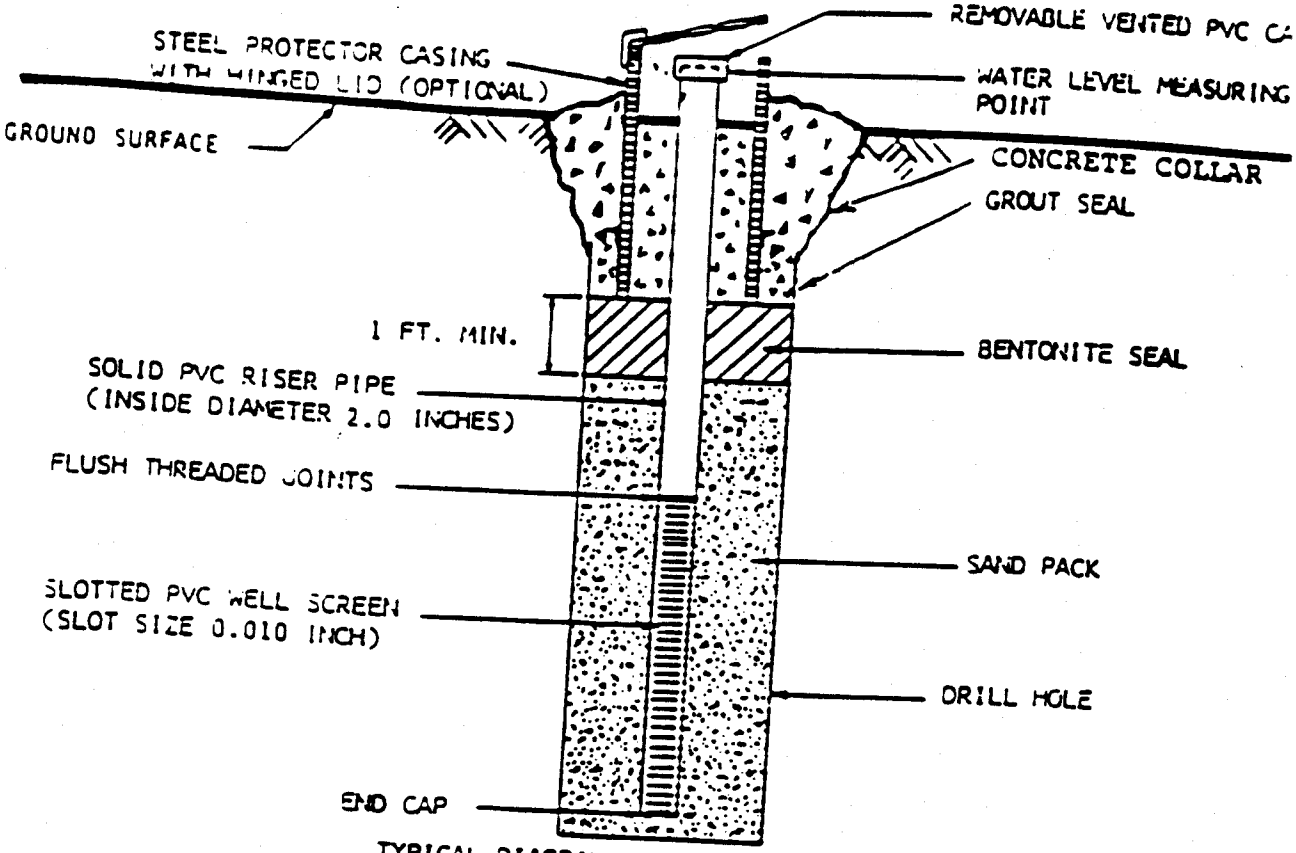
WELL NUMBER MW-5 GROUND SURFACE ELEVATION 2547.18 Ft.

LOCATION South of Area B

INSTALLATION DATE 7-7-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-5



TYPICAL DIAGRAM OF MONITORING WELLS
(NOT TO SCALE)

MONITORING WELL INSTALLATION DETAILS

WELL NUMBER	MW-5A	MW-7A	MW-13		
GROUND ELEVATION (FT.)	---	---	---		
GROUND WATER ELEVATION (FT.) MEASURED ON:	---	---	---		
TOTAL DEPTH OF WELL BELOW GROUND SURFACE (FT.)	42.0	23.5	34.0		
MEASURING POINT ELEVATION (FT.)	---	---	---		
SCREEN LENGTH (FT.)	10.0	10.0	10.0		
SOLID RISER LENGTH BELOW GROUND SURFACE (FT.)	32.0	13.5	24.0		
PVC HEIGHT ABOVE GROUND (FT.)	2.5	2.5	2.5		
THICKNESS OF BENTONITE SEAL (FT.)	1.1	1.3	1.5		
THICKNESS OF CEMENT SEAL (FT.)	28.3	9.5	19.6		

NOTES:

Champion International
Canton Landfill
Haywood County, N.C.

LAW ENGINEERING

MONITORING WELL INSTALLATION DETAILS

JOB NO. AV-1834 FIGURE 3

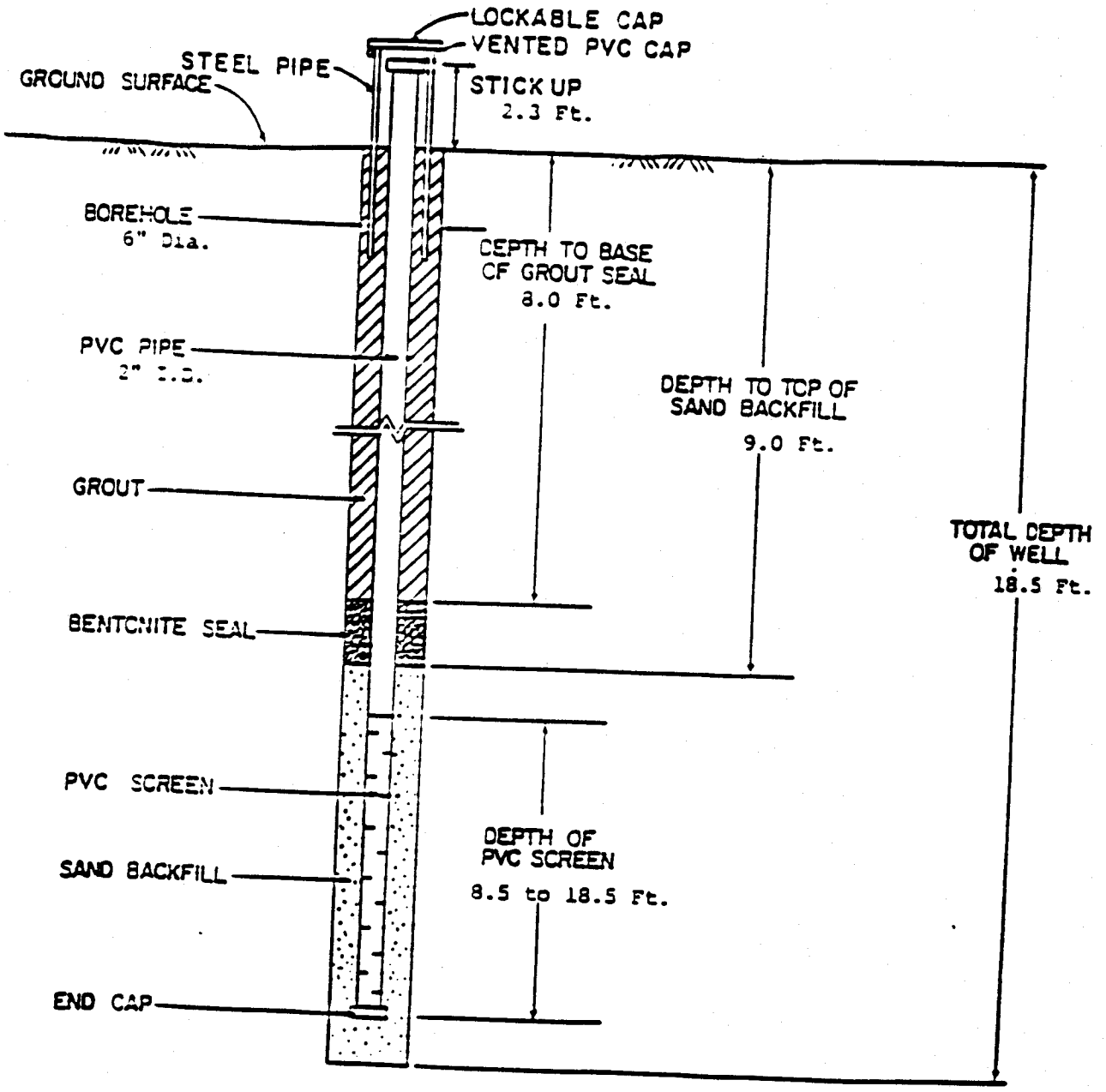
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-6 GROUND SURFACE ELEVATION 3549.72 Ft.

LOCATION South - Southeast of Area C

INSTALLATION DATE 7-7-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-6

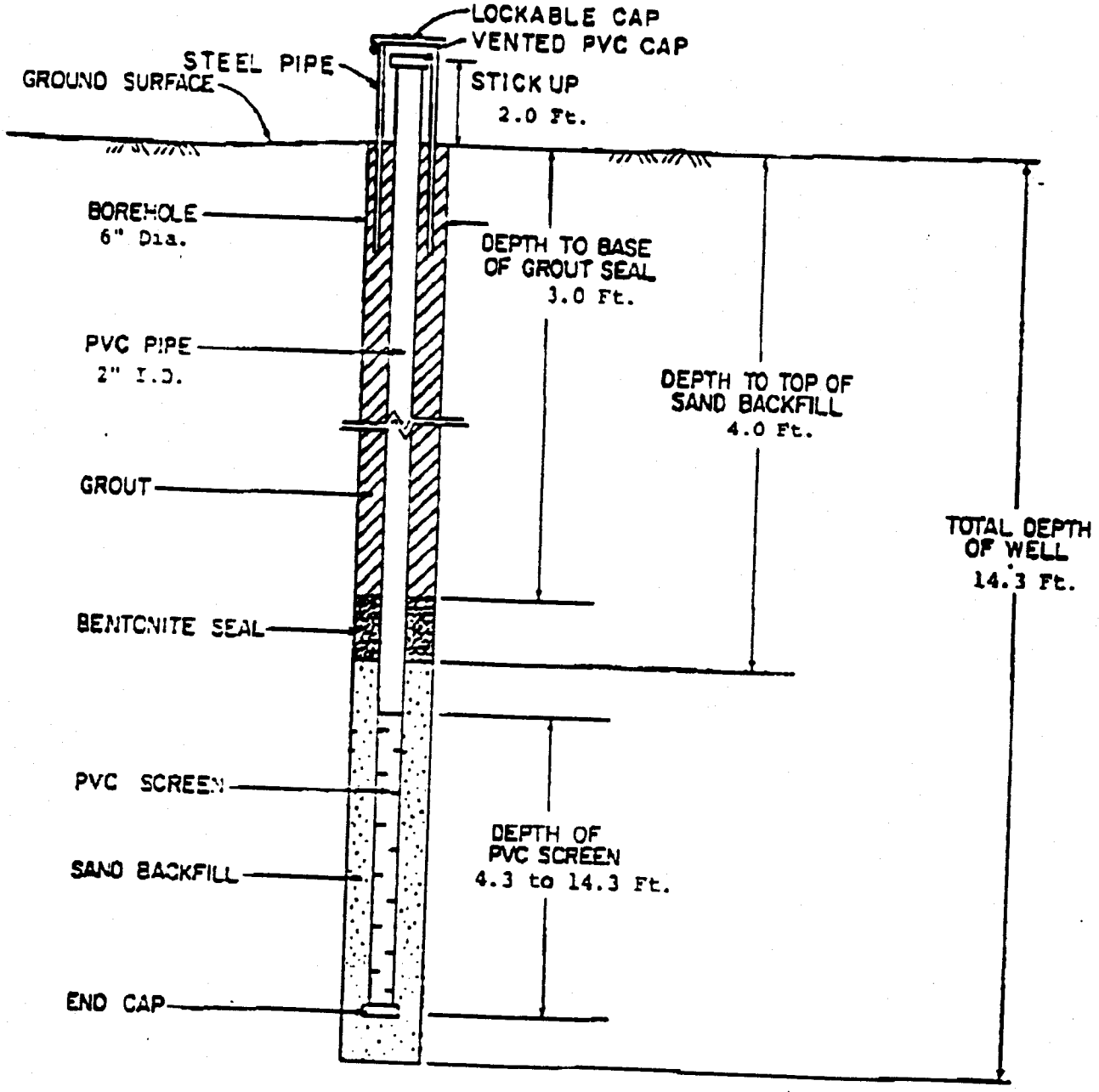
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-7 GROUND SURFACE ELEVATION 2550.44 Ft.

LOCATION South - Southwest of Area C

INSTALLATION DATE 7-7-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-7

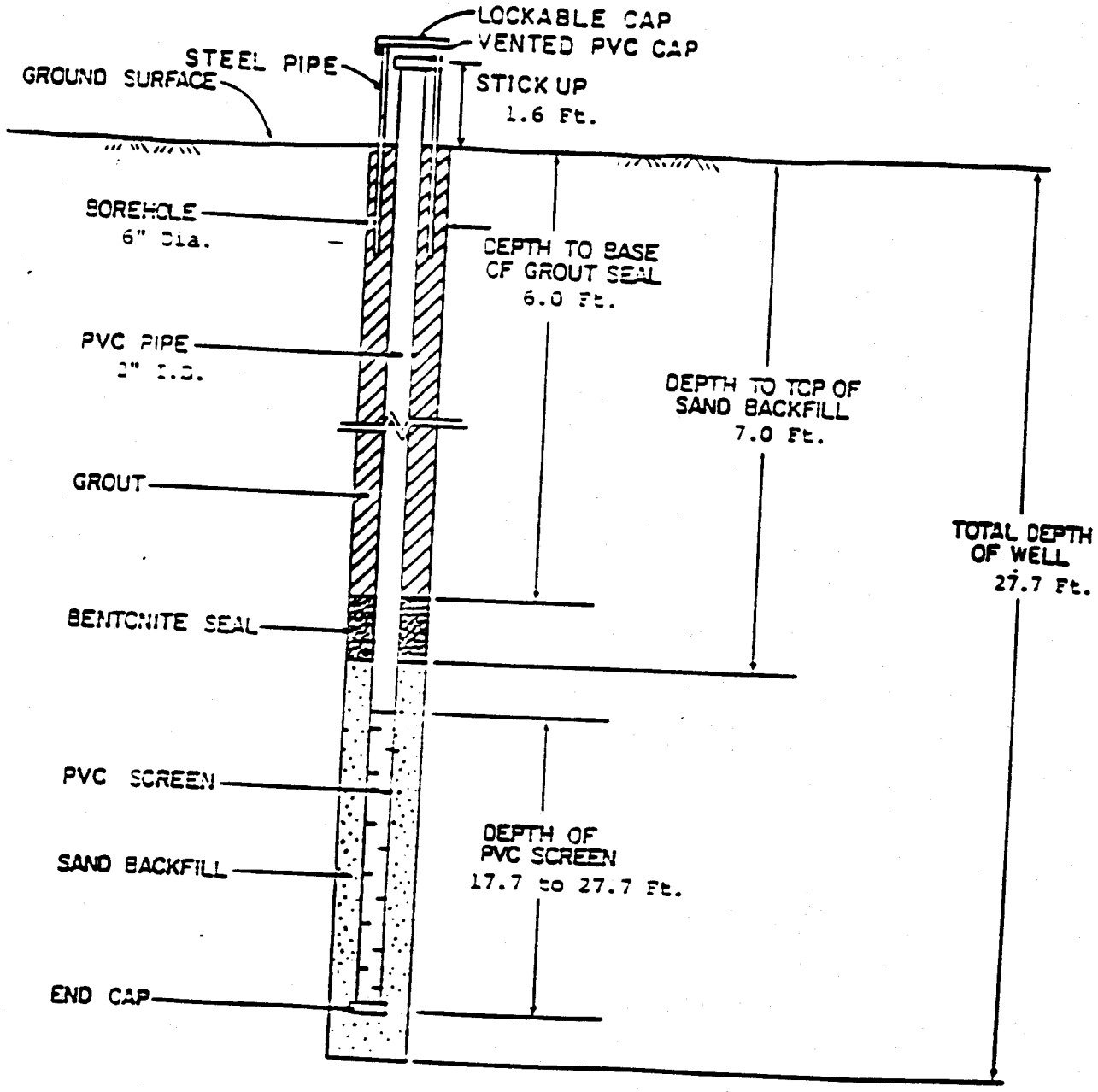
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-8 GROUND SURFACE ELEVATION 1594.39 Ft.

LOCATION South of Area D

INSTALLATION DATE 7-8-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-8

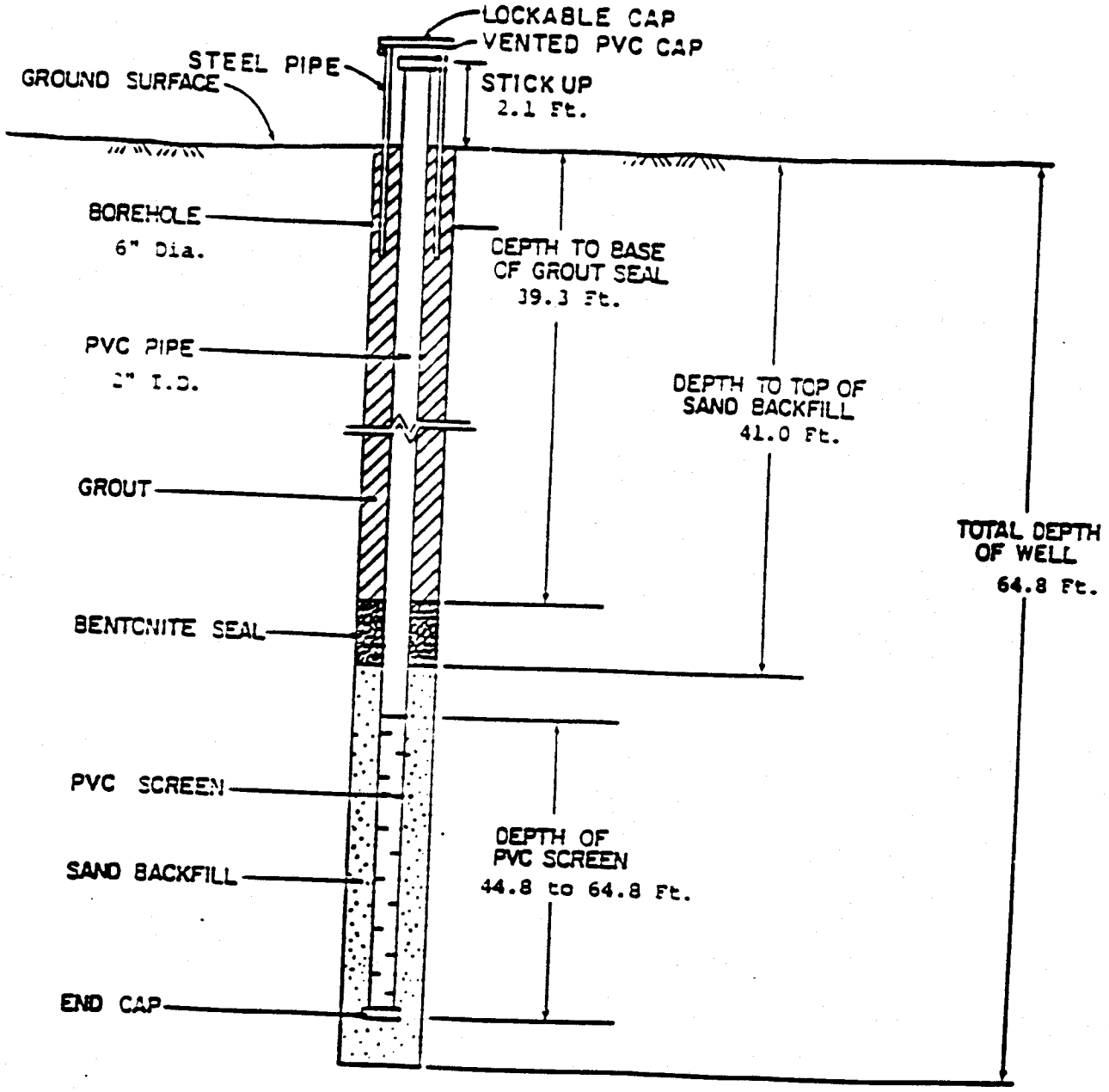
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 4 JOB NUMBER CH 4507 C

WELL NUMBER MW-9 GROUND SURFACE ELEVATION 3684.02 Ft.

LOCATION West of Area D

INSTALLATION DATE 7-6-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-9

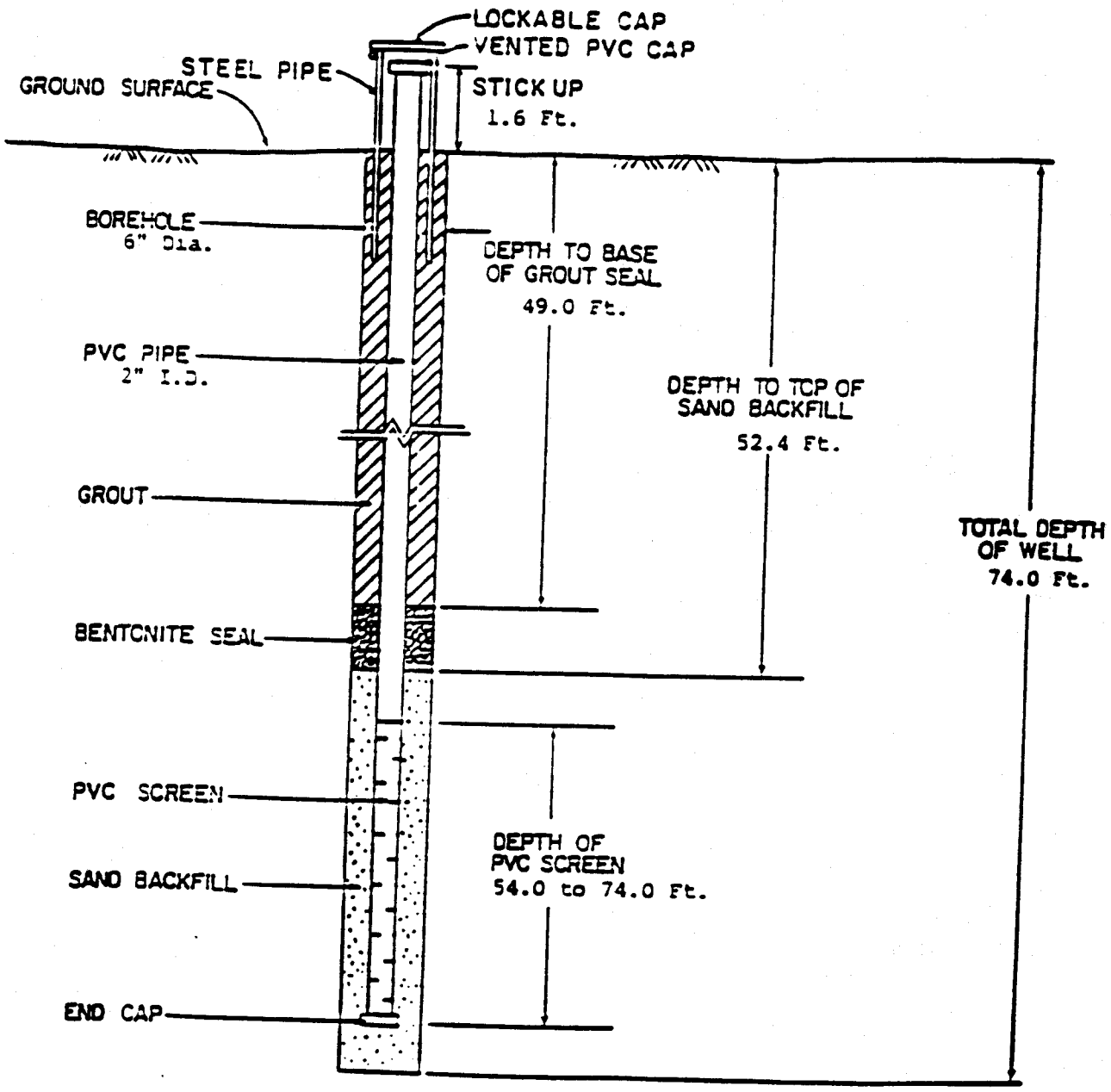
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-10 GROUND SURFACE ELEVATION 3677.78 Ft.

LOCATION West of Area E

INSTALLATION DATE 7-7-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-10

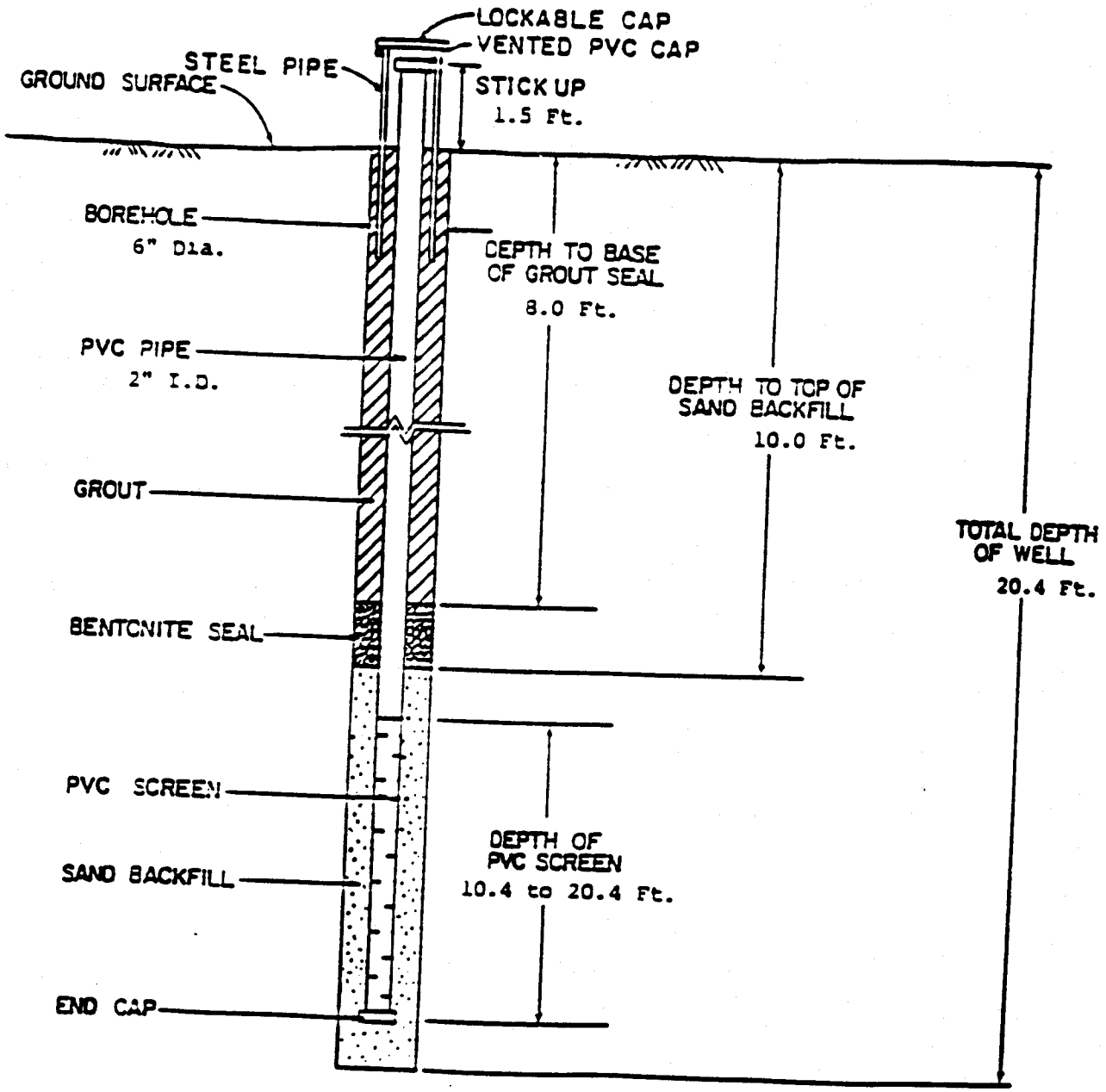
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-11 GROUND SURFACE ELEVATION 2639.44 Ft.

LOCATION West of Area E

INSTALLATION DATE 7-8-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-11

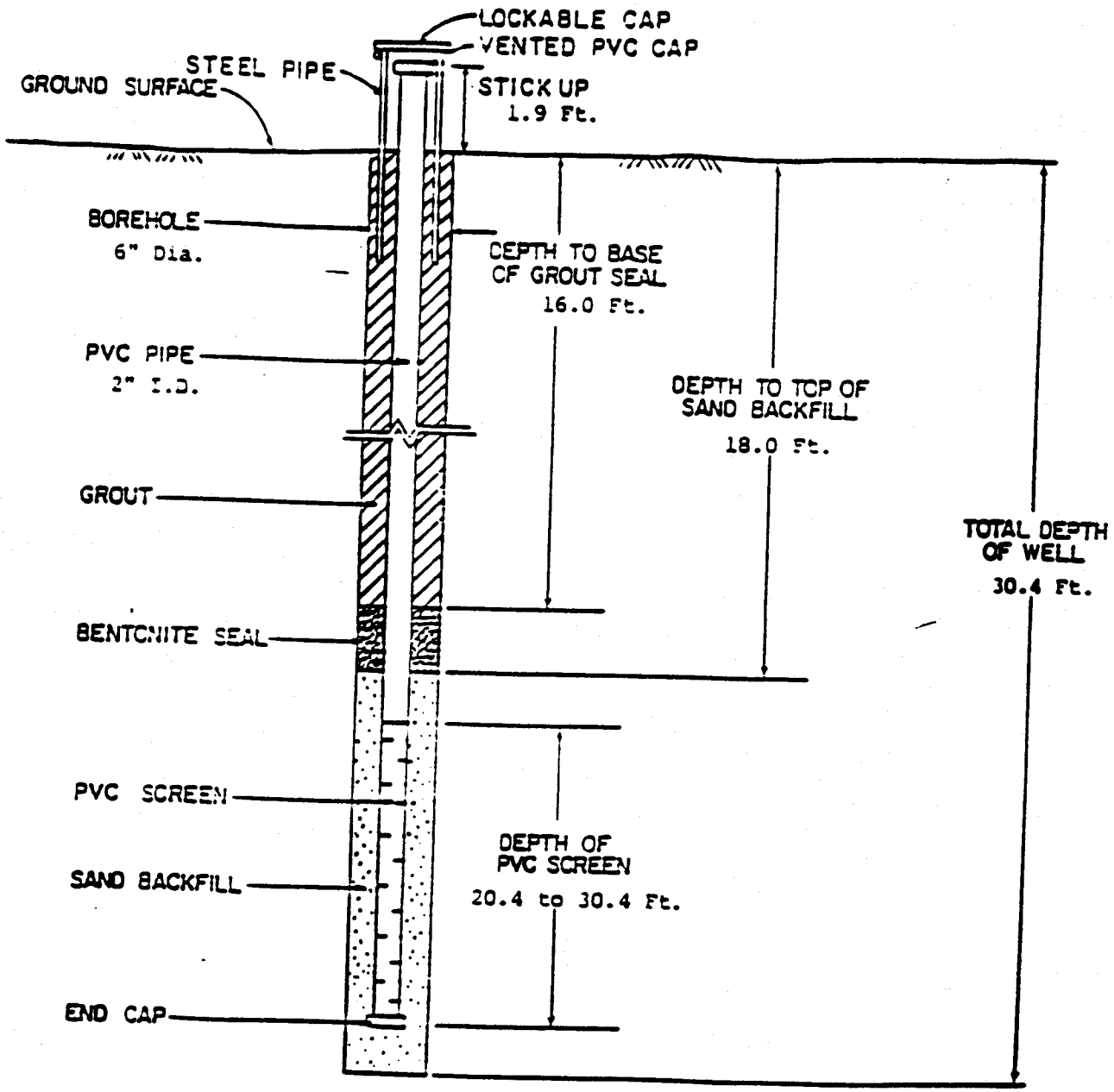
MONITORING WELL INSTALLATION RECORD

JOB NAME Landfill No. 6 JOB NUMBER CH 4507 C

WELL NUMBER MW-12 GROUND SURFACE ELEVATION 2543.73 Ft.

LOCATION Northwest of Junction of Bowen Branch and Pigeon River

INSTALLATION DATE 7-6-83



Champion Papers Canton, North Carolina	LAW ENGINEERING TESTING COMPANY CHARLOTTE, NORTH CAROLINA	MONITORING WELL INSTALLATION RECORD MW-12

JOB NAME CHAMPION NO. 6 LANDFILL

JOB NUMBER 2410446501

WELL NUMBER MW-14

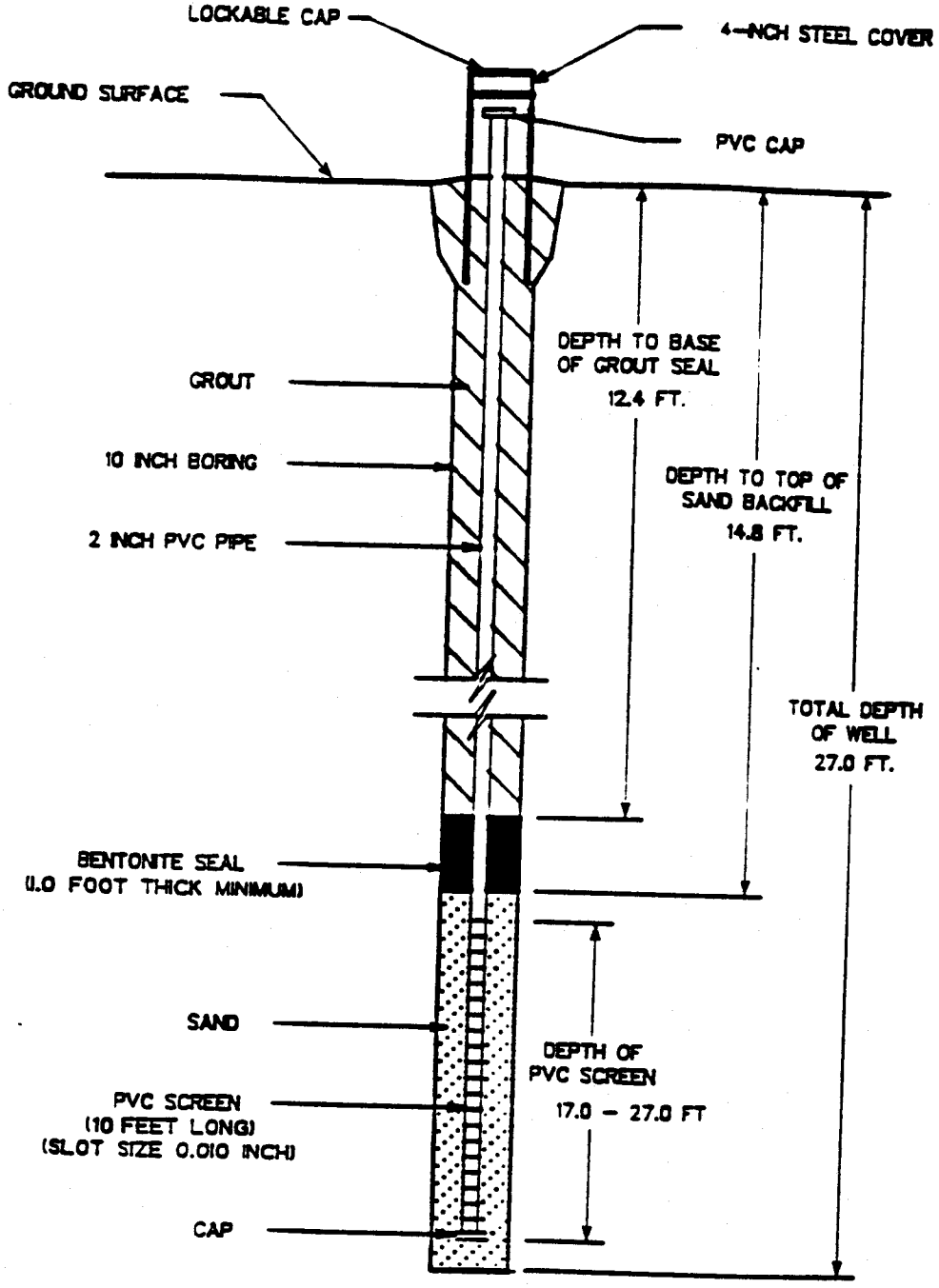
GROUND SURFACE ELEVATION 2660 FT. (MS

LOCATION SEE ATTACHED LOCATION MAP

MEASURING POINT ELEVATION _____

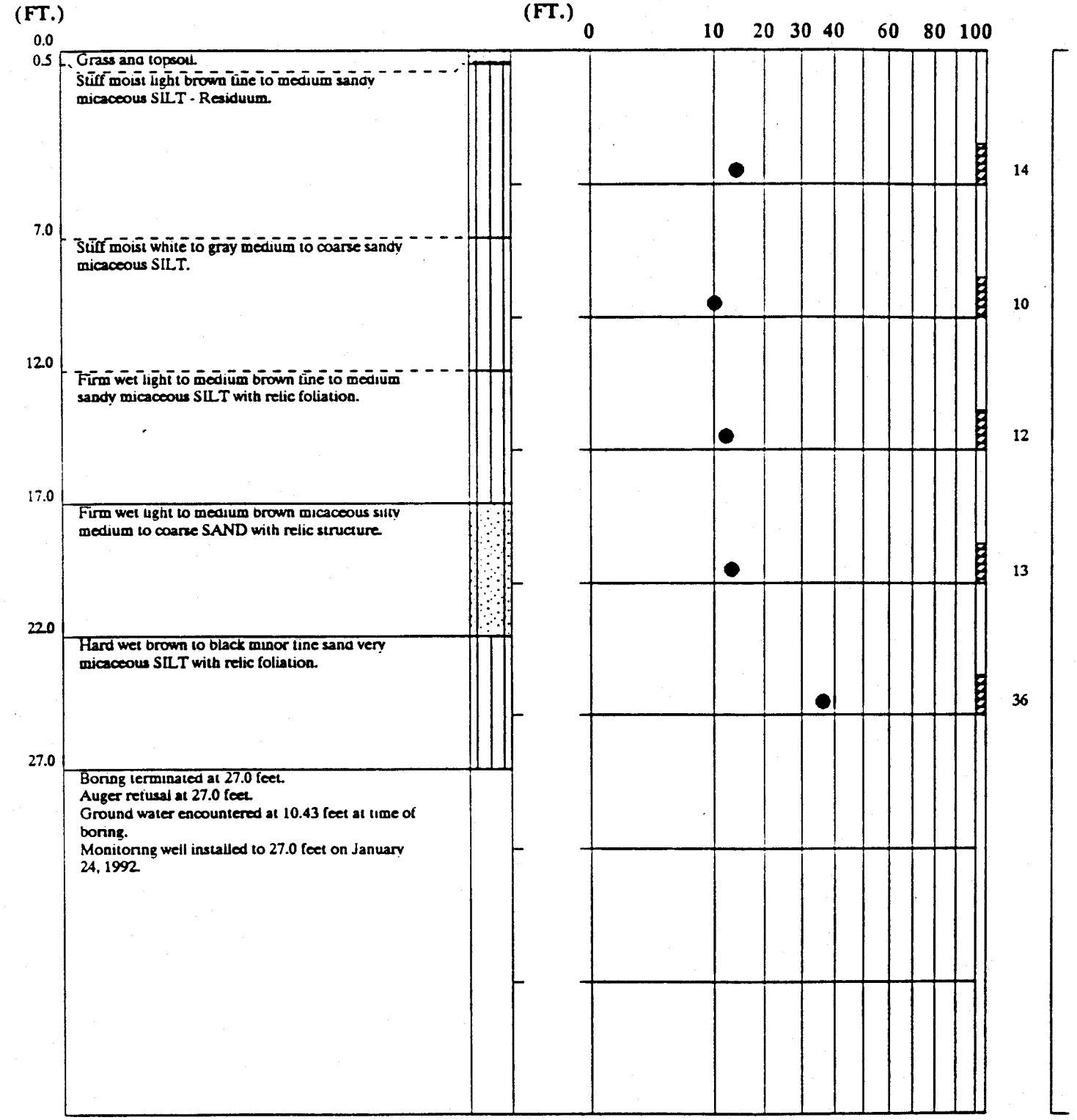
INSTALLATION DATE 1/24/92

LATITUDE _____ LONGITUDE _____



LAW ENGINEERING
GREENVILLE, SOUTH CAROLINA

MONITORING WELL INSTALLATION RECOF
CHAMPION LANDFILL NC
CANTON, SOUTH CARO



REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-14
DATE DRILLED	January 24, 1992
PROJECT NUMBER	2410446501
PROJECT	CHAMPION #6A LANDFILL
PAGE 1 OF 1	

LAW ENGINEERING

JOB NAME CHAMPION NO. 6 LANDFILL

JOB NUMBER 2410446501

WELL NUMBER MW-15

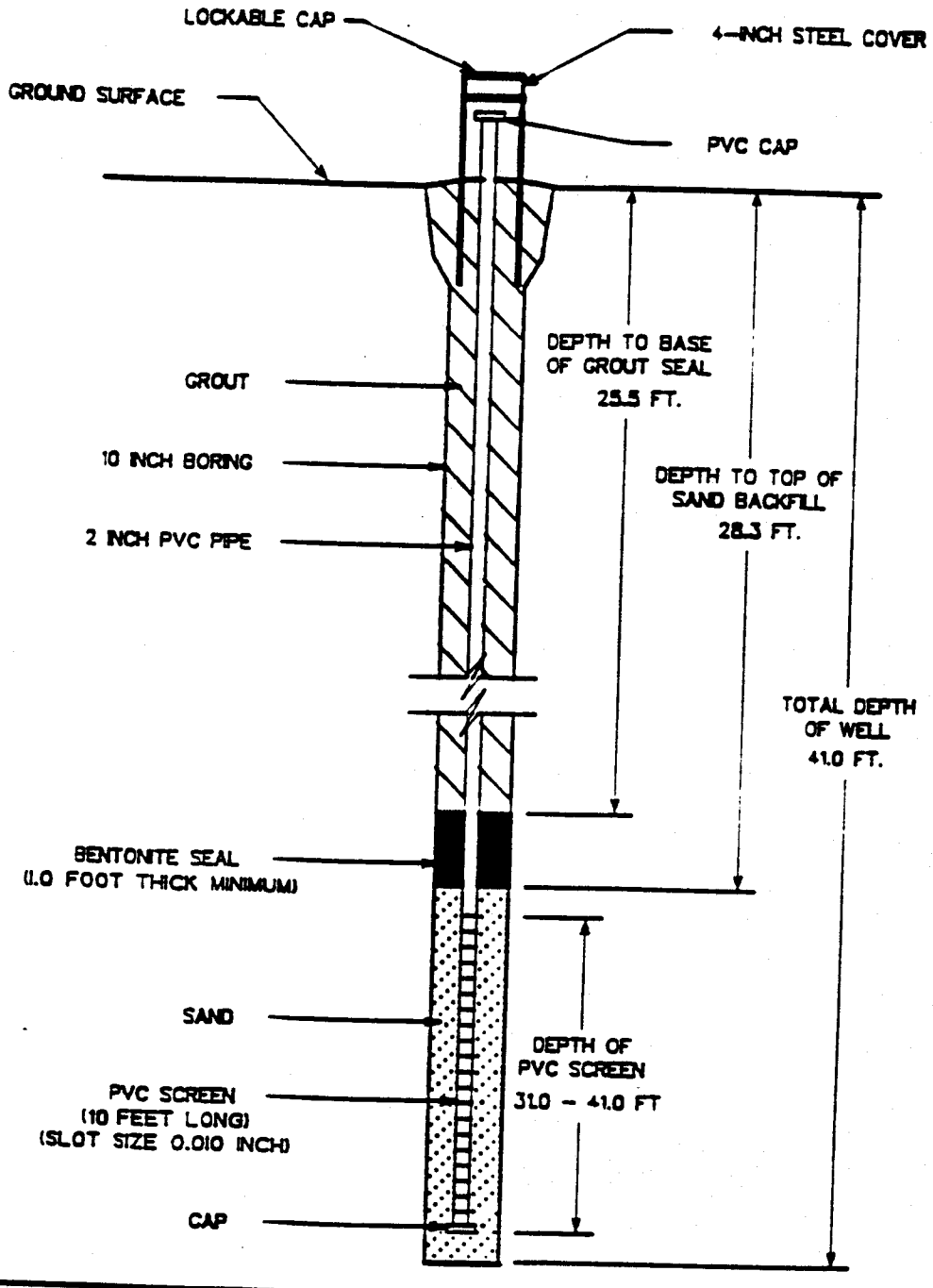
GROUND SURFACE ELEVATION 2810 FT. (MSL)

LOCATION SEE ATTACHED LOCATION MAP

MEASURING POINT ELEVATION _____

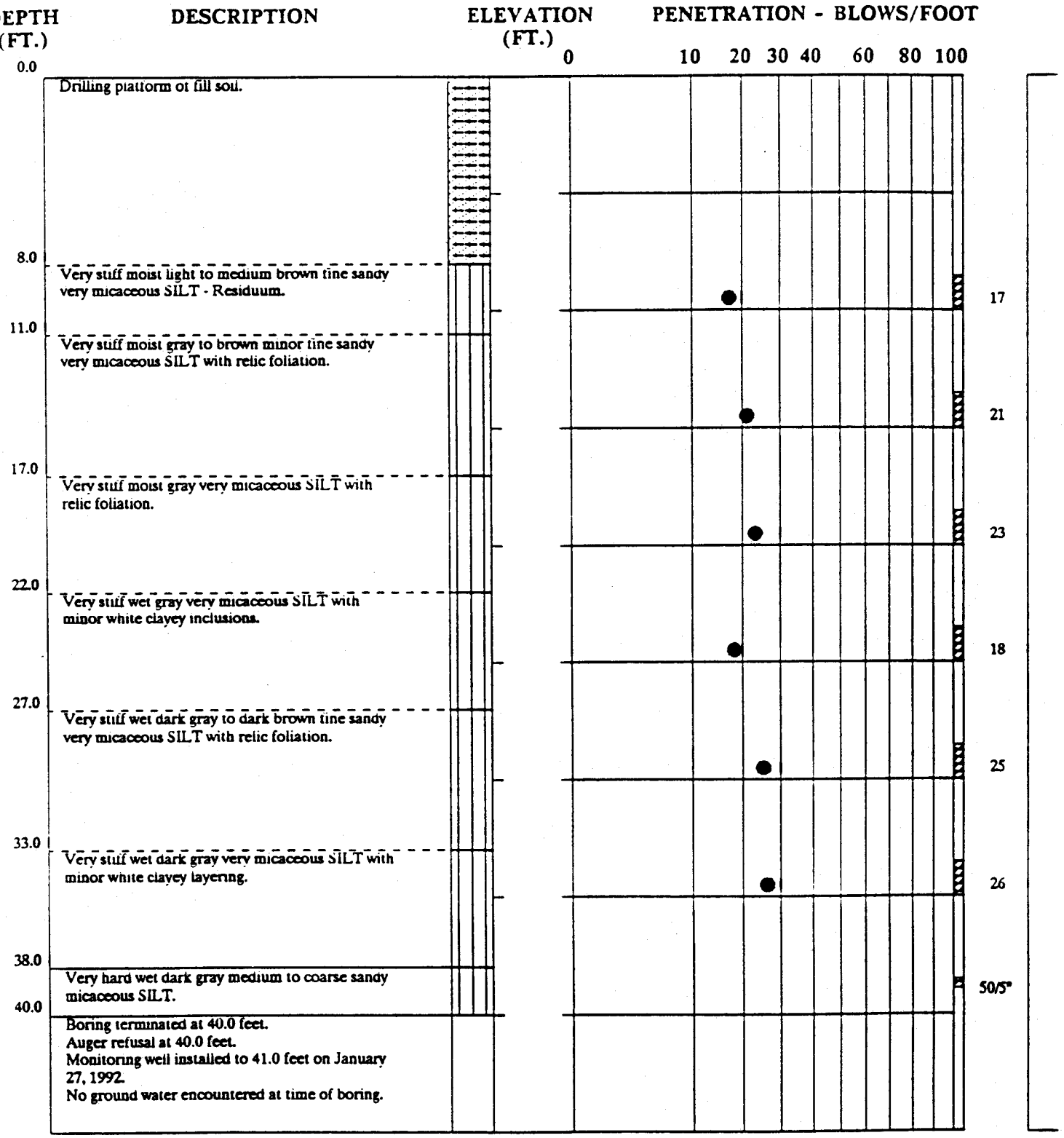
INSTALLATION DATE 1/27/92

LATITUDE _____ LONGITUDE _____



LAW ENGINEERING
GREENVILLE, SOUTH CAROLINA

MONITORING WELL INSTALLATION RECORD
CHAMPION LANDFILL NO
CANTON, SOUTH CAROL



REMARKS:

SEE KEY SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS USED ABOVE

TEST BORING RECORD

BORING NUMBER	MW-15
DATE DRILLED	January 24, 1992
PROJECT NUMBER	2410446501
PROJECT	CHAMPION #6A LANDFILL
PAGE 1 OF 1	

LAW ENGINEERING

CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY

	NO. OF BLOWS. N	RELATIVE DENSITY
SANDS:	0-4	Very Loose
	5-10	Loose
	11-20	Firm
	21-30	Very Firm
	31-50	Dense
	OVER 50	Very Dense

	CONSISTENCY	
SILTS & CLAYS:	0-2	Very Soft
	3-4	Soft
	5-8	Firm
	9-15	Stiff
	16-30	Very stiff
	31-50	Hard
	OVER 50	Very Hard

PARTICAL SIZE IDENTIFICATION

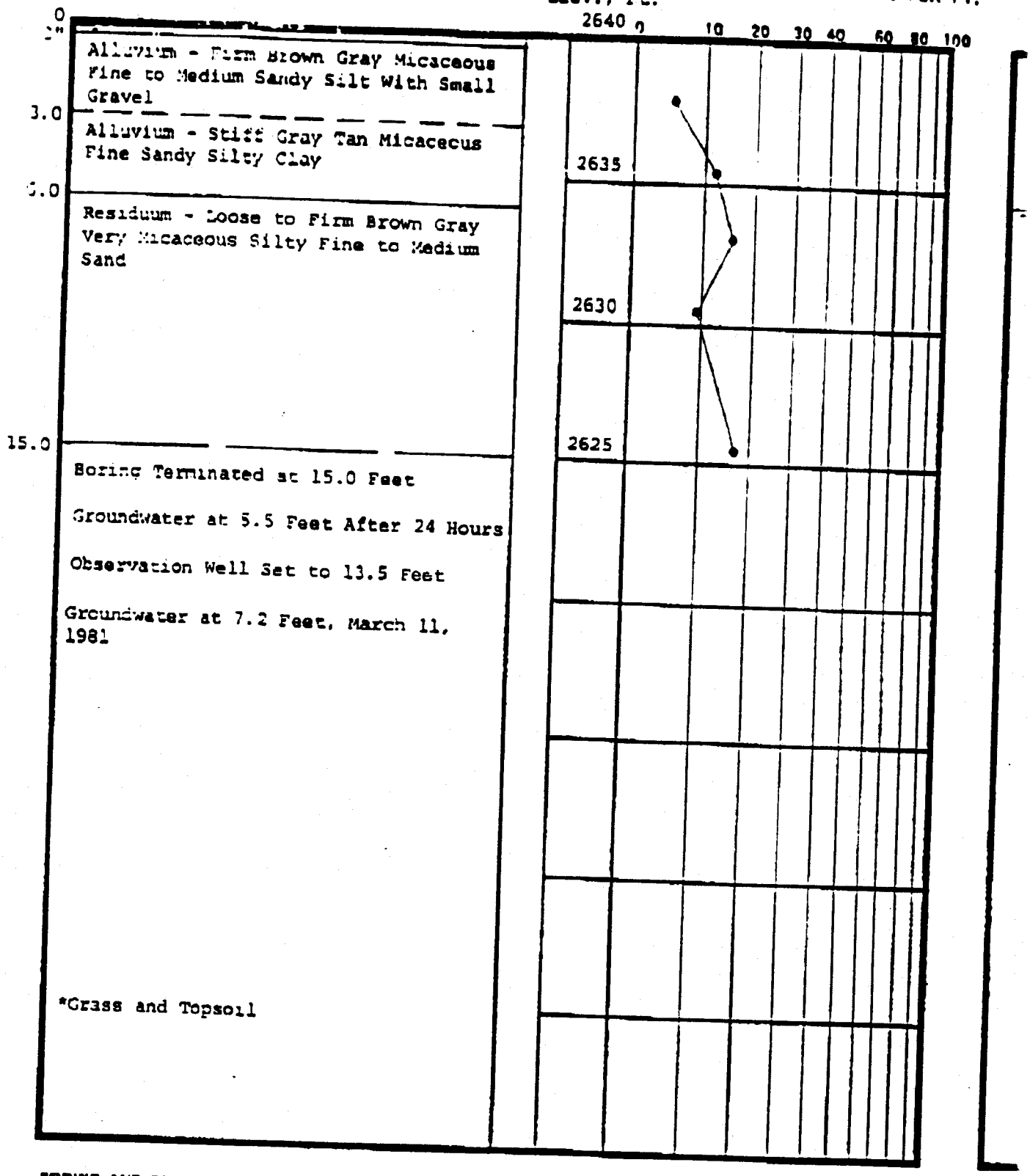
BOULDERS:		Greater than 300 mm
COBBLES:		75 mm to 300 mm
GRAVEL:	Coarse -	19.0 mm to 75 mm
	Fine -	4.75 mm to 19.0 mm
SANDS:	Coarse -	2.00 mm to 4.75 mm
	Medium -	0.425 mm to 2.00 mm
	Fine -	0.075 mm to 0.425 mm
SILTS & CLAYS:		Less than 0.075 mm

KEY TO DRILLING SYMBOLS

- Undisturbed Sample
- Split Spoon Sample
- Water Table 24 HR.
- Water Table at Time of Drilling
- Pressuremeter Test
- Loss of Drilling Water

KEY TO SOIL CLASSIFICATIONS

- ASPHALT
- CL - Low plasticity inorganic clays
- CH - High plasticity inorganic clays
- ML - Low plasticity inorganic silts and very fine sands
- MH - High plasticity inorganic silts
- SP - Poorly graded sands
- SW - Well graded sands
- GP - Poorly graded gravels
- PARTIALLY WEATHERED ROCK - A transitional material between soil and rock which retains the relict structure of the parent rock.
- CONCRETE
- GW - Well graded gravels
- OL - Low plasticity organic silts and clays
- OH - High plasticity organic silts and clays
- SM - Silty sands
- GM - Silty gravels
- SC - Clayey sands
- GC - Clayey gravels
- SP-SM - Typical Dual Classification



BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

TEST BORING RECORD

BORING NO. B-1

DATE DRILLED 4/23/80

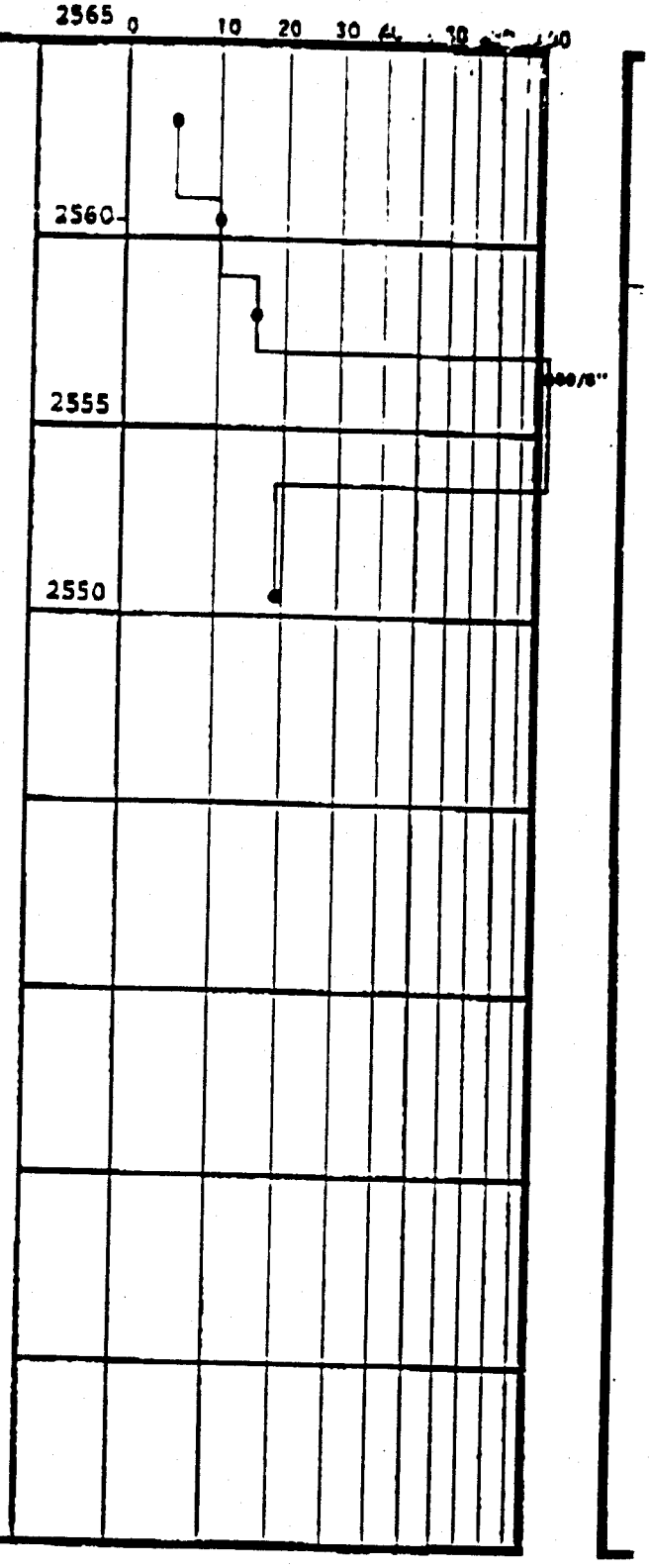
JOB NO. CH 4429

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPAN

Ft.	DESCRIPTION	Elev., Ft.
5"	Grass and Topsoil	2565
	Alluvium - Firm Brown Micaceous Fine to Medium Sandy Silt	
4.0	Possible Alluvium - Stiff Brown Black Micaceous Clayey Fine to Medium Sandy Silt	2560
6.0	Residuum-Stiff Black Gray Brown Micaceous Fine to Medium Sandy Silty**	
8.0	Partially Weathered Rock That Becomes Gray Tan Very Micaceous Silty Fine to Coarse Sand When Sampled*	2555
11.5	Firm Gray Green Very Micaceous Silty Fine to Coarse Sand*	2550
15.0	Boring Terminated at 15.0 Feet Groundwater at 6.0 Feet After 24 Hours Observation Well Set to 14.0 Feet Groundwater at 9.0 Feet, March 11, 1981	

*Sand Sized Particles Are Predominately Mica
**Clay With Rock Fragments



BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

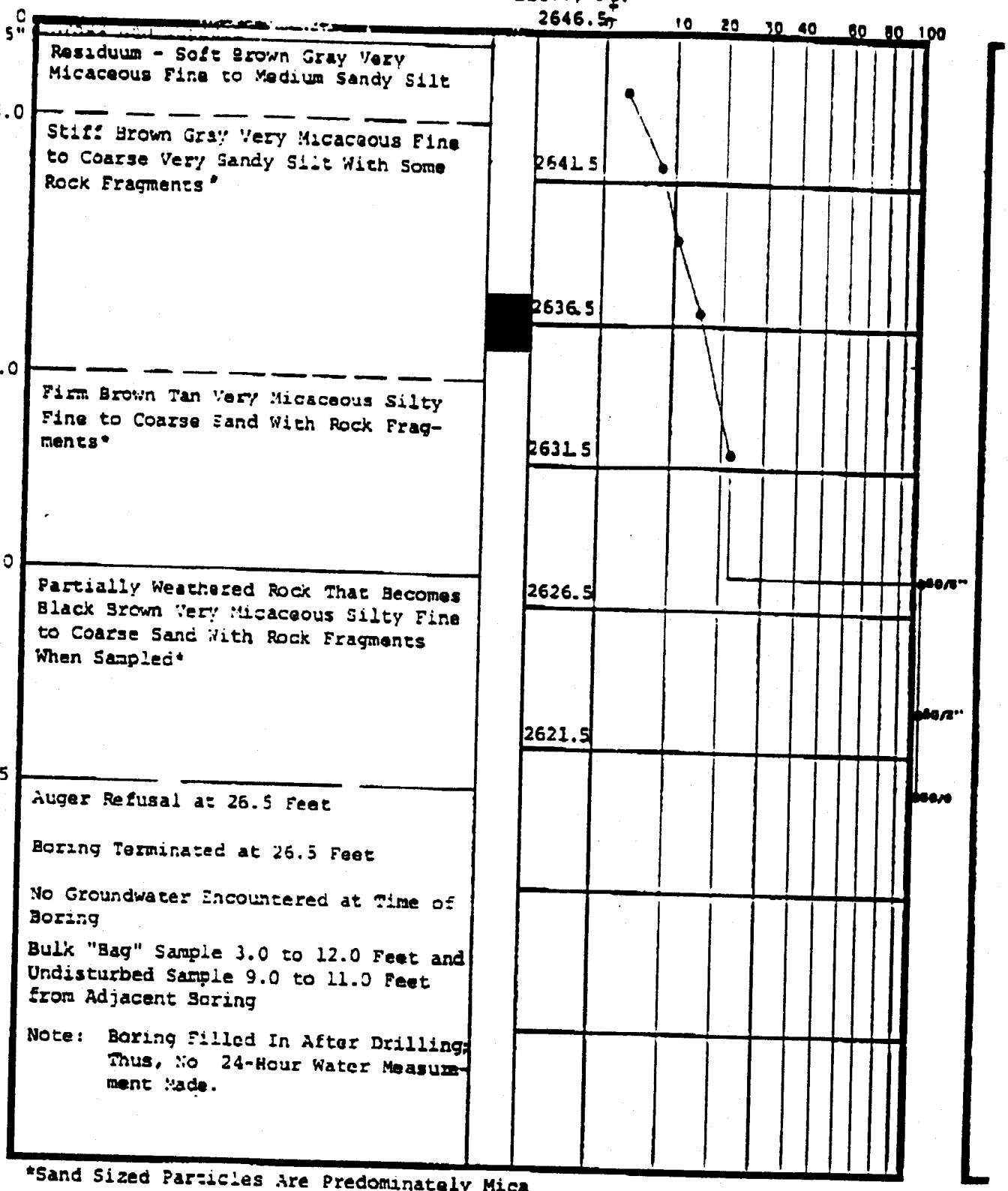
PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE
50 % ROCK CORE RECOVERY
WATER TABLE, 24 HR.
WATER TABLE, 1 HR.
LOSS OF DRILLING WATER

TEST BORING RECORD

BORING NO. B-7
DATE DRILLED 4/22/80
JOB NO. CH 4429
PAGE 1 OF 1

LAW ENGINEERING TESTING COMPA



*Sand Sized Particles Are Predominately Mica

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

TEST BORING RECORD

BORING NO. B-8

DATE DRILLED 4/25/80

JOB NO. CH 4429

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPAI

DEPTH FT.	DESCRIPTION	APPROX. Elev., Ft.
0	Topsoil and Other Organic Material	2591
1.5	Alluvium - Loose Brown Micaceous Silty Fine to Medium Sand with Clayey Silt Seams	
3.5	Alluvium - Soft Brown Gray Clayey Fine to Coarse Sandy Silt with Small Roots and Rock Fragments	2586
6.0	Residuum - Firm Brown Gray Slightly Micaceous Silty Fine to Medium Sand with Small Rock Fragments	
8.0	Very Stiff Dark Brown Micaceous Fine Very Sandy Silt	2581
13.0	Partially Weathered Rock - No Sample Recovery at 14.5 Feet	2576
14.5	Power Auger Refusal at 14.5 Feet Boring Terminated at 14.5 Feet Groundwater Encountered at 6.0 Feet at Time of Boring Installed Observation Well to 14.5 Feet Groundwater at 6.5 Feet After 1 Week Undisturbed Samples From Adjacent Boring 2.0 to 4.0 Feet (No Recovery) and 6.0 to 8.0 Feet Groundwater at 6.4 Feet, March 11, 1981.	

● PENETRATION-BLOWS PER FT.

0 10 20 30 40 80 80 100

50+

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

TEST BORING RECORD

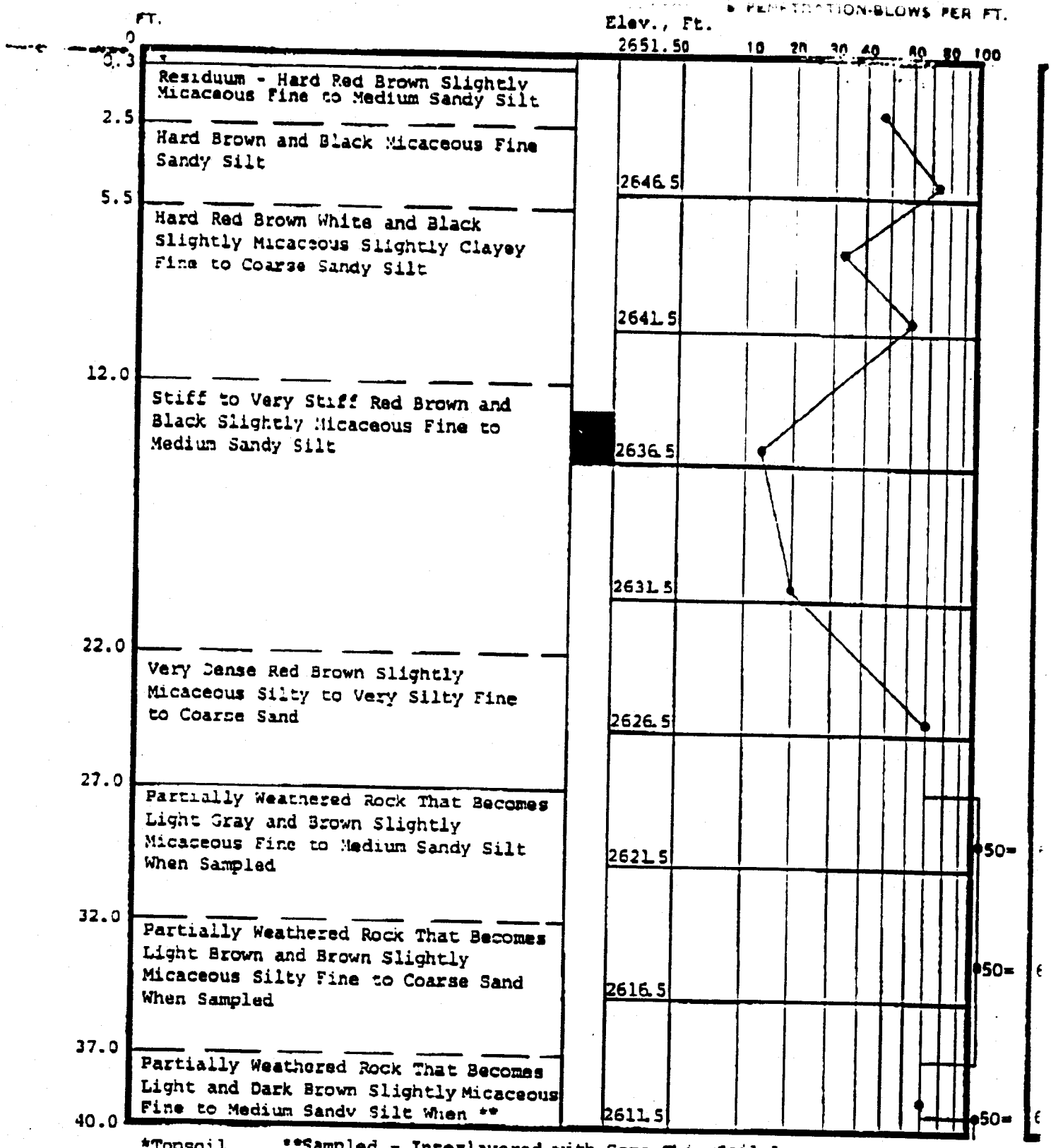
BORING NO. B-9

DATE DRILLED 11/14/80

JOB NO. CH 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPA



*Topsoil **Sampled - Interlayered with Some Thin Soil Lenese

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

TEST BORING RECORD

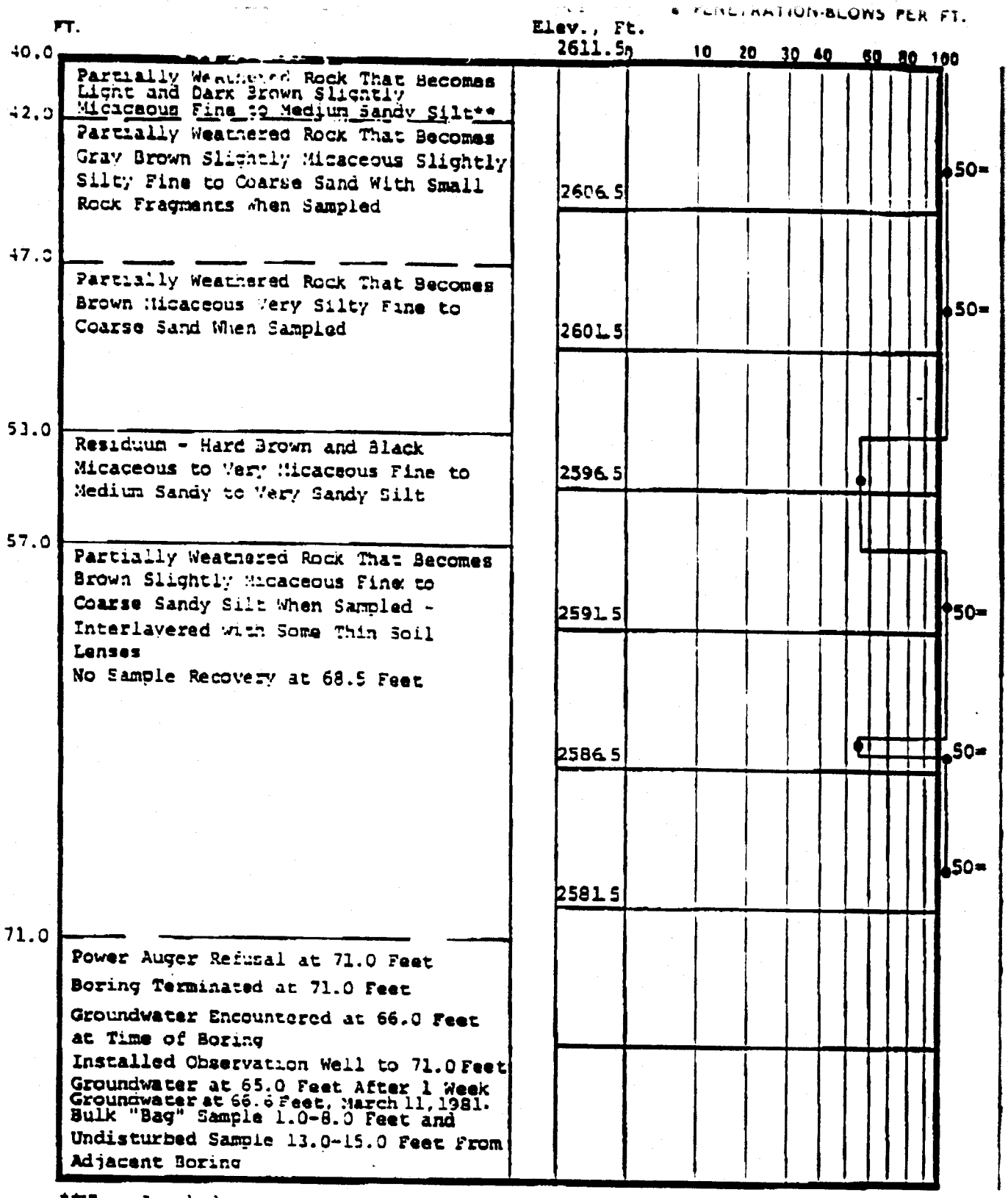
BORING NO. B-10

DATE DRILLED 11/14/80

JOB NO. CH 4507

PAGE 1 OF 2

LAW ENGINEERING TESTING COMPA



**When Sampled - Interlayered with Some Thin Soil Lenses

BORING AND SAMPLING MEETS ASTM D-1586

CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

98 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

TEST BORING RECOR

BORING NO. B-10

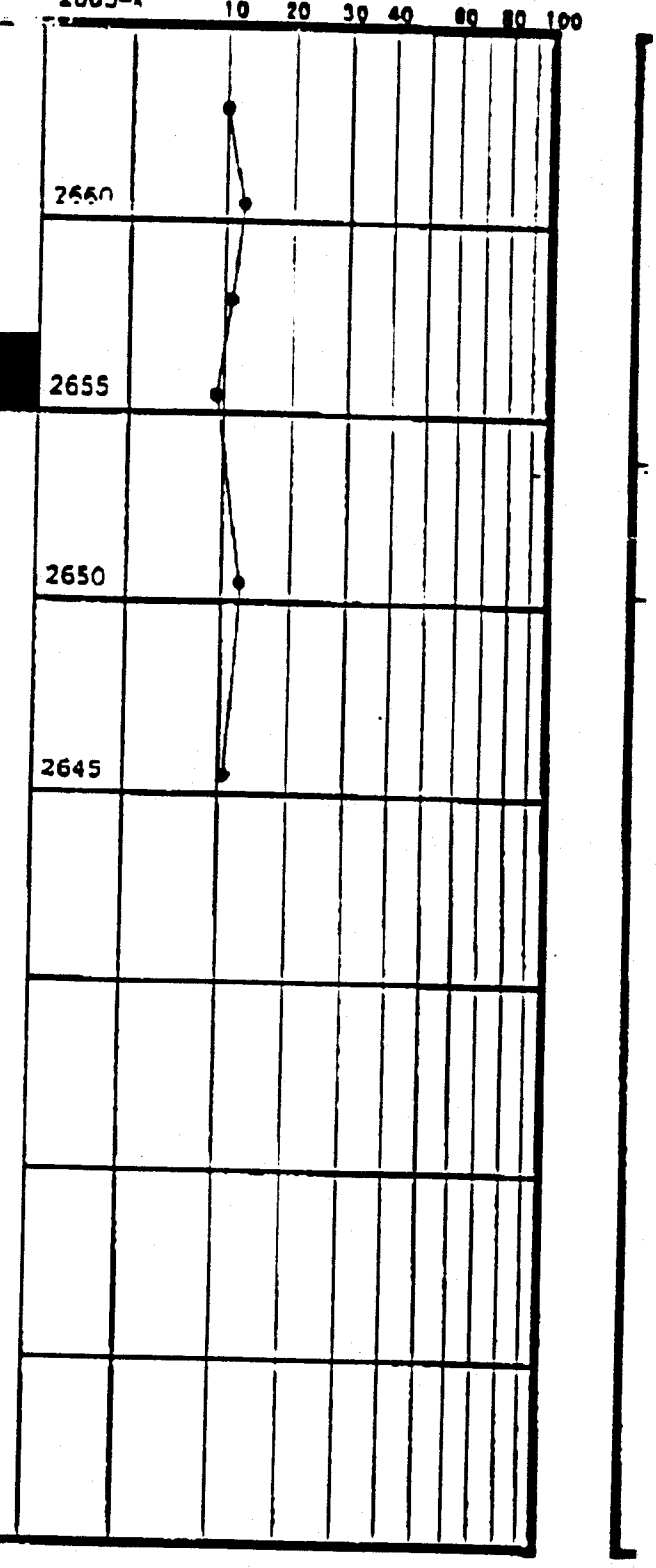
DATE DRILLED 11/14/80

JOB NO. CH 4507

PAGE 2 OF 2

LAW ENGINEERING TESTING COM

FT.	DESCRIPTION	Elev., Ft.
0	Residuum - Stiff Brown and Dark Brown Slightly Micaceous Slightly Clayey Fine to Medium Sandy Silt with Some Small Roots in Sample 1.0-2.5 Feet	2665±
5.5	Stiff Gray Brown Slightly Micaceous Slightly Clayey Fine to Coarse Very Sandy Silt	
8.0	Stiff Brown and Black Micaceous Silty Fine to Coarse Sand with Thin Vertical Mica Seams	
12.0	Stiff Brown Slightly Micaceous to Micaceous Slightly Clayey Fine to Coarse Sandy to Very Sandy Silt	
20.0	Boring Terminated at 20.0 Feet Groundwater Encountered at 14.6 Feet at Time of Boring Installed Observation Well to 19.0 Feet Groundwater at 11.0 Feet After 1 Week Groundwater at 11.2 feet, March 11, 1981 Undisturbed Sample 8.0 to 10.0 Feet from Adjacent Boring	



BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

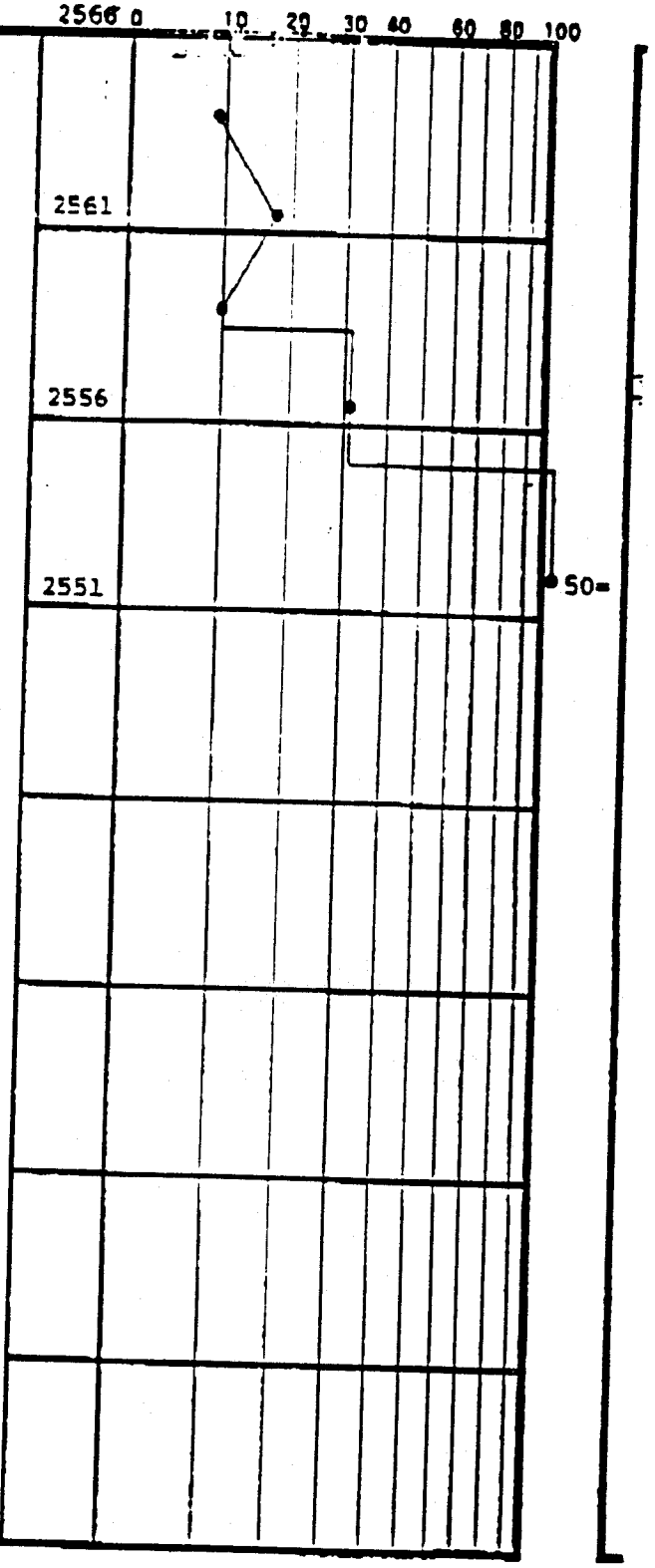
UNDISTURBED SAMPLE
50 % ROCK CORE RECOVERY
WATER TABLE, 24 HR.
WATER TABLE, 1 HR.
LOSS OF DRILLING WATER

TEST BORING RECORD

BORING NO. B-11
DATE DRILLED 11/25/80
JOB NO. CH 4507
PAGE 1 OF 1

LAW ENGINEERING TESTING COMPA

DEPTH FT.	DESCRIPTION	Approx. Elev., Ft.
0	Alluvium - Stiff to Very Stiff Brown Slightly Micaceous Fine to Medium Sandy to Very Sandy Silt with Some Small Roots and Rock Fragments	2566
7.5	Residuum - Dense Brown and Black Micaceous Silty Fine to Coarse Sand with Rock Fragments	2561
11.0	Partially Weathered Rock That Becomes Slightly Micaceous Slightly Silty to Silty Fine to Coarse Sand with Rock Fragments When Sampled	2556
15.0	Boring Terminated at 15.0 Feet Groundwater Encountered at 8.5 Feet at Time of Boring Installed Observation Well to 15.0 Feet Groundwater at 9.0 Feet After 2 Weeks Groundwater at 9.1 Feet, March 11, 1981	2551



PENETRATION-BLOWS PER FT.

BORING AND SAMPLING MEETS ASTM D-1586
CORE DRILLING MEETS ASTM D-2113

PENETRATION IS THE NUMBER OF BLOWS OF 140 LB. HAMMER FALLING 30 IN. REQUIRED TO DRIVE 1.4 IN. I. D. SAMPLER 1 FT.

UNDISTURBED SAMPLE

50 % ROCK CORE RECOVERY

WATER TABLE, 24 HR.

WATER TABLE, 1 HR.

LOSS OF DRILLING WATER

TEST BORING RECORD

BORING NO. B-15

DATE DRILLED 11/20/80

JOB NO. CR 4507

PAGE 1 OF 1

LAW ENGINEERING TESTING COMPA

APPENDIX C

PREVIOUS MAPS (under Seperate Cover)
(LAW ENGINEERING STUDY)

APPENDIX D

COUNTY LANDFILL DATA

3. FIELD AND LABORATORY INVESTIGATIONS

3.1 Field Explorations

GEI engaged Bore & Core, Inc. of Raleigh, N.C. to perform six soil and rock borings at predetermined locations at the site in order to obtain general subsurface conditions about the site. Two of the borings were performed along the hilltop (borings MW-1/1A and MW-2), Two borings along the existing access road on the side-slope (borings B-5 and B-6), one boring just above the 100-year floodplain (boring MW-3), and one boring in the 100-year floodplain (boring MW-4). A Licensed Geologist from GEI supervised the field work on location.

The borings were performed with a CME 75 truck mounted rig and a CME 450 all-terrain vehicle rig. Hollow-stem auger, mud rotary, NQ coring, and air rotary/hammer drilling techniques were used. Air drilling techniques (air rotary and air hammer) were used in locations where the groundwater table was located below the bedrock interface. Boring depths varied from 16 feet in the floodplain area to 97 feet on top of the hill. Refer to Table 1 or the boring logs for a complete listing of boring depths.

The number of borings and their locations were selected jointly by representatives of GEI, DSA, and the NC Solid Waste Section as shown on Figure 2. The borings were located in the field by representatives of GEI and DSA by taping distances and estimating site features from topographic maps. Haywood County has since located these boring locations with a surveyor. The boring logs and Figure 2 reflect these surveyed boring elevations and locations.

Split-spoon samples were obtained from each boring in the soil strata at depth intervals of five feet. Split-spoon samples were taken by driving a 1-3/8-inch-I.D. split-spoon sampler with blows from a 140-pound hammer in general accordance with ASTM D1586 specifications. Three thin wall tubes were obtained at selected locations in accordance with ASTM D1587 specifications. Five feet and 26.3 feet of rock was cored (NQ-size) at borings B-6 and B-5, respectively, in general accordance with ASTM D2113. Three bulk soil samples were also obtained from selected proposed cut locations. In addition, all drilling equipment was decontaminated between boreholes where Type II monitoring wells were installed.

A GEI geologist observed the field work and selected sample locations. Representative portions of all split-spoon samples were sealed in glass jars for laboratory testing. All soil and rock samples were classified by a GEI geologist in accordance with the soil description guidelines prescribed by ASTM D2488-84, "Standard Practice for the Description and Identification of Soils (Visual-Manual Procedure)." Boring logs were prepared by the GEI geologist and are included in Appendix A of this report.

In addition, four of the above borings (MW-1, MW-2, MW-3, and MW-4) were converted into Type II monitoring wells. These wells were installed in accordance with the North Carolina Department of Environment, Health, and Natural Resources, monitoring well construction standards "15A NCAC 2C .0105". A letter from GEI to the NC Solid Waste Section dated March 12, 1993, confirmed approval and permitting procedures for these monitoring wells. GEI's on-site geologist selected screening intervals in each well as necessary to provide sampling in the screened interval including periods during estimated seasonal highs and lows. Well construction diagrams are included as Appendix B.

3.2 Laboratory Testing

GEI performed laboratory testing on selected soil samples to assist in assigning engineering properties of soil types. The laboratory tests consisted of 5 moisture contents, 5 sieve analysis, 4 hydrometers, 5 Atterberg limits tests, 2 compaction tests, 2 triaxial shear strength tests, 2 unit weight determinations, 2 undisturbed permeability tests, 2 remolded permeability tests, and 1 specific gravity determination.

The laboratory test results are summarized in Table 2 and presented in Appendix C.

4. SUBSURFACE CONDITIONS

4.1 Soil Conditions

General descriptions of the subsurface soil conditions encountered in the borings are presented below. Because the descriptions are general, the reader should refer to the boring logs in Appendix A for detailed subsurface conditions encountered at a specific location. Soil types have been described on the boring logs in general accordance with ASTM D2488-84, "Standard Practice for Description and Identification of Soils".

Topsoil - Two to four inches of topsoil including grass rootmat were present in most of the borings. The topsoil in wooded areas is expected to be thicker as dictated by surrounding vegetation.

Fill - Two to three feet of fill soils consisting of orange brown sandy silt was placed at boring MW-4 as a working platform for the boring. No other noticeable fill was observed on the property.

Alluvial Soils - Alluvial soils were encountered in boring MW-4 in the upper 12 feet of the boring overlying residual soils. Alluvial soils are water deposited soils that have been transferred from some distance upstream of the local drainage path. They are typically located in flat low lying areas adjacent to streams or rivers. It is likely that a veneer of these soils overlie the existing soil and rock mass over most of the area below elevation 2555 feet. The alluvial soils consist of a slightly silty very fine to fine rounded sand with some interlayered rounded gravel deposits. These soils have been classified as SP and SM. Standard penetration tests values (N-values) of 4 to 5 blows per foot (bpf) were obtained in this alluvial zone.

Residual Soils - Residual soils were encountered in all boring locations. Residual soils are the product of in-place chemical weathering of rock which is similar to the parent rock underlying the site. A typical residual soil profile at the site consists of firm to stiff (N-values of 11 to 188 bpf) slightly sandy silts (ML) near the ground surface where weathering is more advanced, overlying sandy silts (ML/SM) and silty sands (SM) that generally become stiffer (N-values of 17 to 88 bpf) and sandier with increasing depth until the parent rock is encountered. Thicknesses of residual soil at the site vary from two feet (at MW-3 near a rock outcrop) to 62 feet below the ground surface (at MW-1A on the hilltop).

Partially Weathered Rock - The boundary between residual soil and the parent rock is generally gradual and not sharply defined. A transition zone termed "partially weathered rock" is normally found overlying the parent bedrock. Partially weathered rock (PWR) is defined, for engineering purposes, as residual material with N-values greater than 100 bpf, but which can be penetrated with hollow-stem augers. Materials which can not be penetrated

by hollow-stem augers (auger refusal) are generally referred to as rock or bedrock. The thickness of partially weathered rock (encountered only in borings MW-1A, MW-2, B-5, and B-6) ranged from 3 to 6 feet. The PWR appeared as a weathered biotite gneiss and schist.

Bedrock - Bedrock was encountered in all of the borings with the exception of MW-4 which was located in the floodplain and terminated in residual soil at 16 feet. On the hilltop, bedrock was encountered approximately 60 to 68 feet below the ground surface. Bedrock was encountered at approximately 40 feet below the ground surface along the side-slope. Although boring B-6 encountered rock at about 30 feet below the ground surface, it was not representative of the gneissic bedrock. Instead the rock was quartz and probably associated with a quartz vein which is extremely resistant to weathering and likely to be encompassed by residual soil or partially weathered rock (gneissic origin). The rock core, from boring B-5, and air hammer cuttings, from borings MW-1A, MW-2 and MW-3, indicate a biotite gneiss interlayered with mica schist, garnet gneiss, and muscovite gneiss and schist. Rock Quality Designation (RQD) values obtained from the core samples in boring B-5 ranged from 24% near the top of bedrock to 100% twenty feet into bedrock (higher values indicate less fractured and less weathered rock). Steeply dipping fracture planes associated with foliation planes were common in the upper portions of the rock cores. Detailed descriptions of these rock cores are included in the boring logs in Appendix A.

4.2 Groundwater Conditions/Site Hydrogeology

Groundwater levels were measured in each boring at boring termination, at 24 hours after termination, and at one week after completion of the monitoring well borings. Water level measurements in the monotoring well borings (MW prefix) were taken in the open borehole at boring termination and in the Type II well for the 24 hour and one week water level measurements. A temporary piezometer was installed in boring B-5 for all water level measurements. Since groundwater levels were observed during a seasonal high period and recent precipitation was above normal, we expect that the measured groundwater table was relatively high.

Based on the subsurface conditions it appears that groundwater is located in the fractured zone of the bedrock beneath the soil/rock interface in areas along the hilltop and side-slopes. Measured water levels were more than 4 feet below the bottom of the proposed landfill excavation and the proposed level of debris. Near the toe of the natural slope, the groundwater rises above the soil/rock interface into the saturated zone of the alluvial deposits. Although not encountered, some localized perched conditions may exist along the soil/rock interface of the side-slopes and may not be obvious until construction. Furthermore, it appears that the water table at the site is an unconfined aquifer system that is recharged by precipitation percolating through the soil overburden and stored and transmitted through the upper fractured zone of the bedrock. The hilltop and hillside provide recharge zones for the unconfined aquifer. The floodplain, Thickety Creek and the Pigeon River define discharge zones. Groundwater mounding, somewhat mimicking topography, is likely to vary from hill to hill. This hydrogeologic condition is typical of the Blue Ridge geologic province.

Groundwater flow paths run perpendicular to the potentiometric contours (lines of equal hydraulic head for the given aquifer; see Figure 2) which indicate flow in the studied area from the hilltop to the southeast (towards Thickety Creek) and to the south (towards the Pigeon River). Gradients, calculated as change in potentiometric elevation divided by horizontal distance from those locations, indicate values of 0.078 and 0.168 for southern and southeastern flow, respectively. Groundwater flow direction should not be altered by the planned construction. Groundwater gradients may be altered slightly due to construction phasing. Higher infiltration (higher local recharge) may be expected during times of open-cut excavation and lower infiltration (lower local recharge) would probably occur after erosion control measures are made and the final cover is placed. If the subgrade preparation steps are taken as described in Section 5.6, the four-foot separation should be maintained with the planned excavation depths.

Deeper aquifer systems were not encountered within the boring depths of up to 97 feet.

Undisturbed permeability tests from the residual silty sand (SM/ML) samples taken at approximately 10 feet below the ground surface along the hillside (from B-5 and B-6), indicate an in-situ permeability of about $1x10^{-4}$ centimeters per second (cm/s). These zones beneath the siltier surface soils are sandier and likely to retain residual fracture patterns from the parent bedrock. The undisturbed samples should be representative of at-grade conditions after the hillside has been excavated to a 2H:1V slope. The remolded permeability test results taken from bag samples at similar depths and soil types were about 1 to $2x10^{-6}$ cm/s indicating that the remolding (recompaction) of the soil does significantly decrease the permeability.

TABLE 1 - BORING AND WATER LEVEL DATA
Haywood County C&D Landfill
Canton, North Carolina

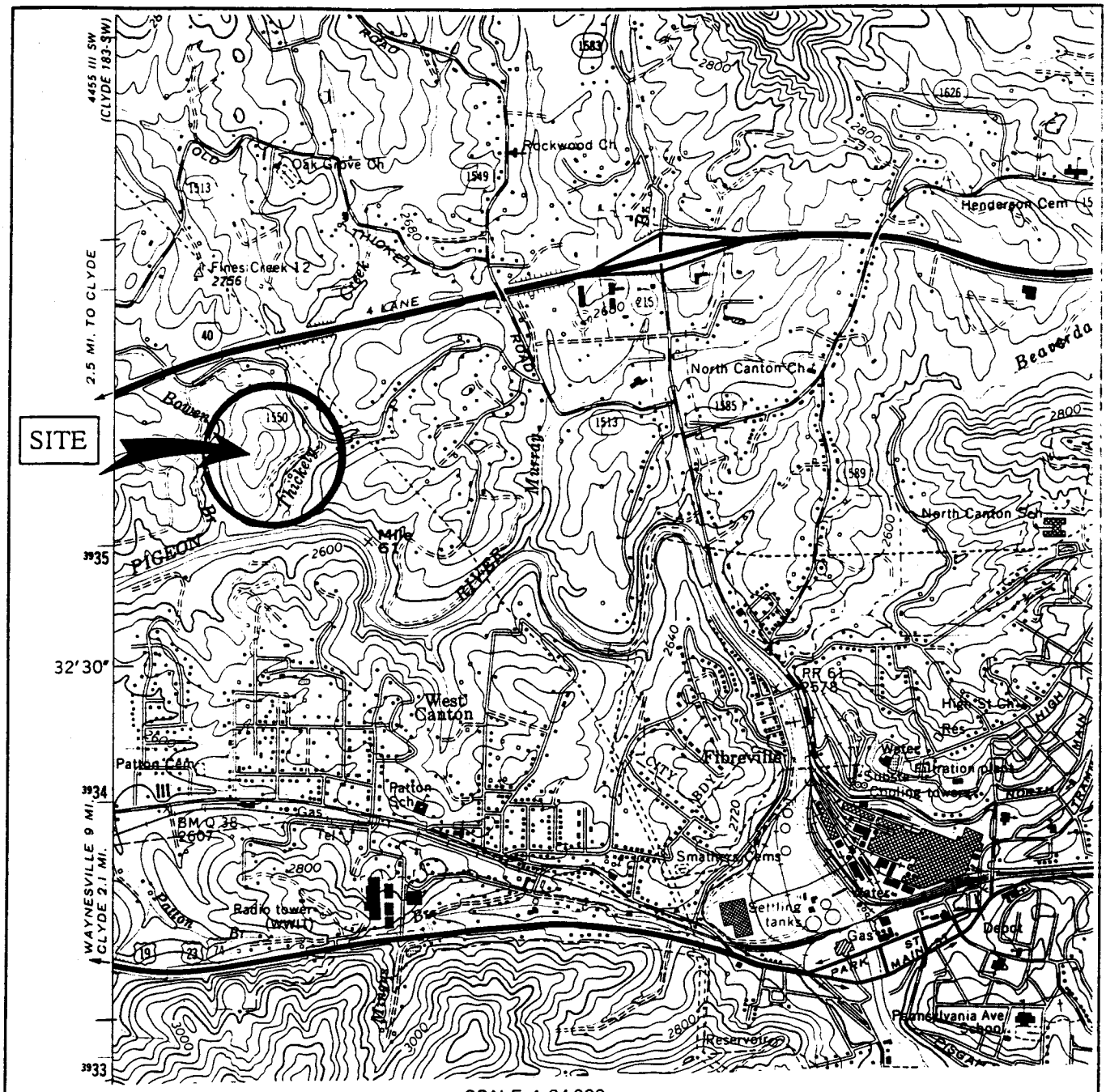
Boring Location	Surface Elevations	Total Depth (ft)	WATER LEVEL READINGS Depths Below Ground Surface (feet)					Screened Interval (feet)	Elevation (feet) Water Table 4/6/93
			3/25/93	3/26/93	3/27/93	3/28/93	One week 4/6/93		
MW-1/1A	2711.45	97.0			(76.3)	76.4	76.8	72.0 - 97.0	2634.7
MW-2	2660.50	90.0	(82.0)		72.0		72.0	70.0 - 90.0	2588.5
MW-3	2556.56	22.0		(17.5)	9.6		10.8	12.0 - 22.0	2545.8
MW-4	2553.46	16.0		(3.0)	1.3		2.7	5.0 - 15.0	2550.8
B-5	2624.03	65.0				42.8	50.2	Temp. Piez.**	2573.8
B-6	2610 *	35.5			(dry)	(dry)	(dry)	N/A	N/A

note - * = estimated elevation from topographic map
** = Temporarary piezometer consisting if 1.25 inch PVC, last eight feet slotted
(depth) = taken from open borehole

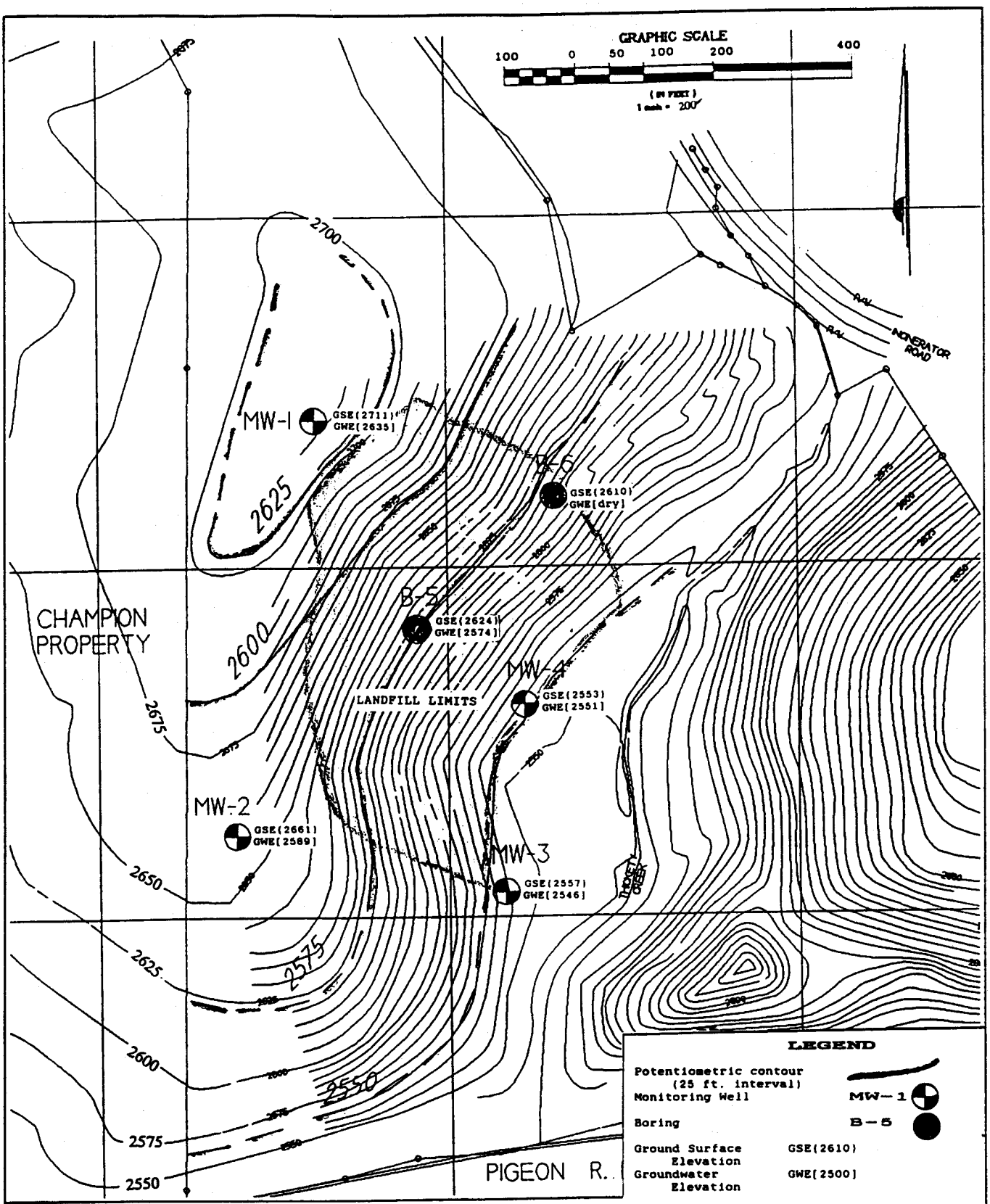
TABLE 2 - SUMMARY OF LABORATORY TESTS
Haywood County C&D Landfill
Canton, North Carolina

Boring Location	Sample Type	Sample Depth (ft)	Natural moisture %	Specific Gravity	Atterberg Limits*			Classification (USCS)	Permeability (centimeters/second)
					Liquid Limit	Plastic Limit	Plasticity Index		
Cut Area	Bag	7 to 12	19.5		36	22	14	SC	1.4E-06
MW - 1	Bag	15 to 20	19.0		47	34	13	SM	2.4E-06
MW - 4	U - 2	4 to 6	43.6		26	24	2	SM	
B - 5	U - 3	8.5 to 10.5	19.3		33	26	7	SM	1.5E-04
B - 6	U - 1	10.2 to 11.4	26.8	2.85	42	34	8	SM	1.2E-04

Note - * = Tested on material passing the #40 sieve



DSA Design Group Raleigh, North Carolina	Haywoood County C&D Landfill Haywood County, NC	SITE LOCATION MAP USGS QUAD "CANTON"
Φ GEI Consultants, Inc.	Project 93086	April 1993 FIGURE 1



Datum is National Geodetic Vertical Datum of 1929 (NGVD).
Elevation contour interval is 5 feet.

Reference : DSA Drawing # C1.1
CADD #92052_07/C1.1

DSA Design Group Raleigh, North Carolina	Haywoood County C&D Landfill Haywood County, NC	BORING LOCATION PLAN/ POTENTIOMETRIC MAP
Φ GEI Consultants, Inc.	Project 93086	April 1993 FIGURE 2

Appendix A.

Boring Logs

Boring Location See Site Plan | Date Start/Finish 3/24/93 | MW-1

Ground Elevation (NGVD) 2711' | Drilled By L. Foskey - Bore & Core | Pg. 1 of 2

Groundwater El. dry | Date 3/28/93 | Logged By M. Landis | Total Depth (ft.) 50.0

El. Ft.	Depth Ft.	Sample Type & No.	Blows per 6 in.	Pen. in.	Rec. in.	Remarks	Soil and Rock Descriptions
		S1	2 2 2	18	8		S1: Widely Graded SAND with silt and gravel (SM); 40 to 60 % fine to medium sand with 1/2 inch gravel, 20% remainder silt, nonplastic, brown.
		S2	6 6 7	18	17		S2: SANDY SILT (ML); micaceous, 70% silt, 30% fine sand, nonplastic to low plasticity, some coarse sand, red-brown.
	5						
		S3	3 6 6	18	17		S3: SILTY SAND (SM/ML); 50% silt, 50% fine sand, red, orange-brown.
	10						
		S4	4 6 8	18	16		S4: Similar to above with zones of narrowly graded coarse SAND and manganese, low to medium dry strength.
	15					Bulk sample taken from 15-20' (Bag #1)	
		S5	6 10 11	18	16		S5 Similar to above and changing to SILTY SAND (SM) with 70 to 80% fine-coarse sand, 30-20% silt.
	20						
		S6	6 7 10	18	18	Firm drilling at 26-27'.	S6: Similar to above.
	25						
		S7	10 13 18	18	NA		S7: Narrowly graded SAND with SILT; 80 to 90% fine sand (SM) manganese, 10 to 20% silt, lt. or brown, steep diagonal residual fractures >60°.
	30						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored), %
S-Split Spoon Sample
U-Undisturbed Samples
C-HQ Diamond Rock Core
¥ Groundwater
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg

Notes:
HSA - boring.
4-1/4" ID to 38.5'.
2-1/4" ID to 50.0'.

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DSA Design Group
Ralegh, North Carolina

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Boring Location See Site Plan Date Start/Finish 3/24/93 | MW-1
Ground Elevation (NGVD) 2711' Drilled By L. Foskey (Bore & Core) | Pg. 2 of 2
Groundwater El. dry Date 3/28/93 Logged By M. Landis Total Depth (ft.) 50.0

El. Ft.	Depth Ft.	Sample Type & No.	Blows per 6 in.	Pen. in.	Rec. in.	Remarks	Soil and Rock Descriptions
						Some qtzite fragments coming out of hole, progressiv	
		S8	12 15 10	18	15	ely harder drilling past 30 feet, hard drilling at 32 feet, less hard at 33'.	S8: Narrowly graded SAND (SP) with silt, 80 to 90% fine sand, ~10% coarse sand, 10% silt manganese staining.
	35						
		S9	16 30 37	18	15	In and out of pwr (33-34').	S9: Similar to above.
	40						
		S 10	22 44 44	18	15		S10: Similar to above with some SANDY SILT (ML/SM) zones from 43.5 - 44 feet, silt ~50%; fine sand ~50%; low dry strength.
	45						
		S 11	17 12 27	18	17		S11 Narrowly graded SANDY SILT (ML); 60% silt, 30% fine sand, 10% coarse sand, very moist.
	50						Boring terminated at 50.0'.
	55						
	60						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored), %
S-Split Spoon Sample
U-Undisturbed Samples
C-NQ Diamond Rock Core
Groundwater
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg

Notes:
MW-1 terminated 3/25/93 due to drilling difficulties. MW-1A completed with air rig on 3/27/93.

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Boring Location See Site Plan	Date Start/Finish 3/27/93	MW-1A
Ground Elevation (NGVD) 2711.5'	Drilled By Jim Giordano - Bore & Core	
Groundwater El. 2634.6 Date 4/6/93	Logged By M. Landis Total Depth (ft.) 97.0	Pg. 1 of 2

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks	Soil and Rock Descriptions
						Air rotary to 53.5'.	RESIDUAL OVERBURDEN
	55	S1	34 43 43	18	NA		S1: SILTY SAND (SM), ~60% fine sand, - 10% medium sand, ~10% coarse sand, ~20% silt, micaceous, yellow brown, manganese staining.
	60	S2	26 31 39	18	NA		S2: Similar to above yet narrowly graded SANDY SILT (ML), 60% silt, 40% fine to medium sand.
	65	S3	50/ 1"	1"	1/ 4"	Begin air hammer drilling at 65.5 ft. Only cuttings retrievable below this point. Very hard drilling at 68 ft.	S3: Partially weathered rock. Appears as a biotite gneiss and schist parent rock.
	70						Rock cuttings appear as biotite GNEISS.
	75						Similar to above but weather stained - brown cuttings. (76-77.5 ft.)
	80						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored),%
S-Split Spoon Sample
U-Undisturbed Samples
C-NQ Diamond Rock Core
¥ Groundwater
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg

Notes:
Drilled with air rig. Located 20 ft. southwest of MW-1. Advanced boring to 53.5 feet without sampling. Set Type II monitoring well. 4.5"-OD tricone and hammer.

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Boring Location See Site Plan	Date Start/Finish 3/27/93	MW-1A
Ground Elevation (NGVD) 2711.5'	Drilled By Jim Giordano - Bore & Core	Pg. 2 of 2
Groundwater El. 2634.6' Date 4/6/93	Logged By M. Landis Total Depth (ft.) 97.0	

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks		Soil and Rock Descriptions
								Rock; appears as biotite GNEISS; dry cuttings.
								Possible transmissive zone such as fractures; wet cuttings (83.0-85.0').
	85							Competent rock -Biotite GNEISS; dry cuttings.
	90							Possible transmissive zone (fractures); wet cuttings (93.0-94.5').
	95							Competent Rock - Biotite GNEISS; dry cuttings (94.5-96.5').
								Possible transmissive zone (fractures); wet cuttings (96.5-97').
								Boring terminated at 97.0'.
	100							
	105							
	110							

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored), %
S-Split Spoon Sample
U-Undisturbed Samples
C-HQ Diamond Rock Core
¥ Groundwater
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg

Notes:

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Boring Location See Site Plan — Date Start/Finish 3/25/93 — MW-2

Ground Elevation (NGVD) 2660.50' — Drilled By Jim Giordano - Bore & Core

Groundwater El. 2588.5' Date 4/16/93 — Logged By M. Landis — Total Depth (ft.) 90.0 — Pg. 1 of 3

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks	Soil and Rock Descriptions
						Boring advanced with air rotary to 57.5'	
	5	S1	5 5 6	18	NA		S1: SANDY SILT (ML): Low plasticity, <30% fine sand, orange brown, dry.
	10	S2	6 6 7	18	NA		S2: SILT (ML); manganese stained, medium dry strength, medium plasticity, orange brown, moist.
	15	S3	6 8 10	18	NA		S3: Similar to above.
	20	S4	4 7 9	18	NA		S4: SILT (ML); with sand, 20 to 30% fine to coarse angular sand in seams (residual feldspars-qtz), 70% silt, pink and white; silt is low to medium plasticity, medium dry strength, moist.
	25	S5	10 11 12	18	NA		S5: Similar to above, more yellow-brown and manganese staining.
	30	S6	8 9 8	18	NA		S6: SANDY SILT (ML); ~60 to 70% silt, ~35% fine to coarse angular sand, silt is low plasticity, brown with manganese staining.

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored),%
S-Split Spoon Sample
U-Undisturbed Samples
C-HQ Diamond Rock Core
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg
Groundwater

Notes:
Drilled with air rig; 4.5" OD tricone and hammer.
Set Type II monitoring well.

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Boring Location See Site Plan Date Start/Finish 3/25/93 | MW-2

Ground Elevation(NGVD) 2660.5' Drilled By Jim Giordano - Bore & Core | Pg. 2 of 3

Groundwater El. 2588.5' Date 4/6/93 Logged By M. Landis Total Depth (ft.) 90.0

El. Ft.	Depth Ft.	Sample Type & No.	Blows per 6 in.	Pen. in.	Rec. in.	Remarks	Soil and Rock Descriptions
	35	S7	9 9 11	18	NA		S7: SILTY SAND (SM); ~60% subangular, fine to medium sand, ~40% silt, low plasticity, yellow brown, manganese stains, moist-dry.
	40	S8	13 12 10	18	NA		S8: Similar to above.
	45	S9	17 14 15	18	NA		S9: SILTY SAND (SM); very micaceous, ~80% fine to coarse subangular sand, ~15-29% silt, moist-dry, brown; manganese staining.
	50	S 10	22 30 28	18	NA		S10: Similar to above.
	55	S 11	10 15 22	18	NA	Encountered soft rock at 57.5'. Completed boring using air hammer. Only cuttings retrievable.	S11: Similar to above. Partially weathered rock to soft rock - biotite GNEISS.
	60						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler

Pen-Penetration Length of Sampler or Core Barrel

Rec-Recovery Length of Sample

RQD-(Length of Sound Cores > 4 in. // Length Cored), %

S-Split Spoon Sample UP-Piston Sample

U-Undisturbed Samples UF-Fixed Piston

C-NQ Diamond Rock Core UO-Osterberg

¥ Groundwater

Notes:

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Boring Location See Site Plan Date Start/Finish 3/25/93 | MW-2

Ground Elevation (NGVD) -2660.5' Drilled By Jim Giordano - Bore & Core | Pg. 3 of 3

Groundwater El. 2588.5' Date 4/6/93 Logged By M. Landis Total Depth (ft.) 90.0

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks	Soil and Rock Descriptions
	65					Hard drilling.	Bedrock: Biotite GNEISS
	70						
	75					Very hard drilling.	
	80						Possible transmissive zone (fractures); wet cuttings.
	85						
	90						Boring terminated at 90.0'.

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored), %
S-Split Spoon Sample
U-Undisturbed Samples
C-HQ Diamond Rock Core
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg
¥ Groundwater

Notes:

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Boring Location See Site Plan	Date Start/Finish 3/26/93	MW-3
Ground Elevation (NGVD) -2556.6'	Drilled By Jim Giordano - Bore & Core	Pg. 1 of 1
Groundwater El. 2545.8' Date 4/6/93	Logged By M. Landis Total Depth (ft.) 22.0	

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks	Soil and Rock Descriptions
	0					Boring advanced with air rotary to 1.2 ft. where encountered rock. Advanced boring with air hammer from 1.2' to 22.0'. Only cuttings retrievable.	Topsoil and residual soil overburden. Micaceous , narrowly grained SANDY SILT (ML); 60 % silt, 30% fine sand, 10% coarse sand orange brown.
							SCHIST ROCK; soft to medium hard micaceous schist, green brown.
	5						At 7 feet, 3 to 4 inches soft weathered zone; (soft weathered rock and hard soil).
	10						
	15						Soft zone 16.5 to 17.5 feet, water at 17 to 18 feet (wet cuttings at 17 feet). Iron staining more noticeable at 17 feet.
	20						Boring terminated at 22.0'.
	25						
	30						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored),%
S-Split Spoon Sample
U-Undisturbed Samples
C-NQ Diamond Rock Core
¥ Groundwater
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg

Notes:
Drilled with air rig; 4.5" OD tricone and hammer. Set Type II monitoring well. Samples taken from drilling cuttings

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Ralegh, North Carolina

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Boring Location See Site Plan	Date Start/Finish 3/26/93	MW-4
Ground Elevation (NGVD) -2553.5	Drilled By Jim Giordano - Bore & Core	Pg 1 of 1
Groundwater El. 2550.8' Date 4/6/93	Logged By M. Landis Total Depth (ft.) 16.0	

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks	Soil and Rock Descriptions
							Fill - Top 2 feet to 3 feet. Appearing as Sandy SILT (ML).
		S1	2 2 2	18	16		S1: Narrowly graded SAND (SP) with silt and mica, -10% silt, no plasticity, -90% very fine to fine sand, brown, wet, alluvial deposits.
	5	U2			24	Undisturbed sample taken from 4-6', 10' west of boring.	
		S2	3 3 2	18	16		S2: Narrowly graded SAND (SP) with silt, some gravel-rounded, brown, wet alluvial deposits, -90% very fine to fine sand, -10% silt.
	10						
		S3	12 19 27	18	NA		S3: Widely graded SAND (SM) with silt, micaceous, yellow-brown, moist, -90% fine to coarse sand, -10% silt. (Residual soil from schistose rock.)
	15						Boring terminated at 16.0'.
	20						
	25						
	30						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored),%
S-Split Spoon Sample
U-Undisturbed Samples
C-NQ Diamond Rock Core
¥ Groundwater
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg

Notes:
Drilled with air rig; advanced with 4.5" OD tricone, then advanced 6-1/4" ID HSA. Set Type II monitoring well.

Haywood County C&D Landfill
DSA Design Group
Ralegh, North Carolina

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Φ GEI Consultants, Inc.

Boring Location See Site Plan	Date Start/Finish 3/26/93 / 3/27/93	B-5
Ground Elevation(NGVD) 2624.0	Drilled By L. Foskey - Bore & Core	Pg. 1 of 3
Groundwater El. 2573.8' Date 4/6/93	Logged By M. Landis Total Depth(ft.) 65.0	

El. Ft.	Depth Ft.	Sample Type & No.	Blows per 6 in.	Pen. in.	Rec. in.	Remarks	Soil and Rock Descriptions
		S1	2 2 3	18	NA		S1: Sandy SILT (ML): With gravel, ~60% silt, 15% fine sand, 15% gravel, moist, brown, micaceous. (Residual soil - gneiss and schist.)
	5						
		U3			20	Undisturbed sample taken from 8.5-10.5'.	U3: SILTY SAND (SM); Very micaceous, 85% fine to medium sand, 15% silt, dark brown, moist - dry.
	10						
		S2	10 16 18	18	NA		S2: Similar to above.
	15						
		S3	23 32 32	18	NA		S3: Similar to above.
	20						
		S4	5 8 9	18	NA		S4: SILTY SAND (SM); Micaceous, 85% fine to coarse, subangular sand, orange brown, moist - dry.
	25						
		S5	10 11 10	18	NA		S5: Similar to above, more manganese staining.
	30						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored),%
S-Split Spoon Sample
U-Undisturbed Samples
C-NQ Diamond Rock Core
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg
¥ Groundwater

Notes:
Geotechnical boring HSA (2-1/4" ID) to refusal at 38.7 feet.
NQ core drill to 65.0 feet.
Install 1-1/4 inch piezometer.
Last 8 feet slotted.

Haywood County C&D Landfill
DSA Design Group
Ralegh, North Carolina

Project 93086

Φ GEI Consultants, Inc.

Boring Location See Site Plan	Date Start/Finish 3/26/93 / 3/27/93	B-5
Ground Elevation (NGVD) 2624.0'	Drilled By L. Foskey - Bore & Core	Pg. 2 of 3
Groundwater El. 2573.8' Date 4/6/93	Logged By M. Landis Total Depth (ft.) 65.0	

El. Ft.	Depth Ft.	Sample Type & No.	Blows per 6 in.	Pen. in.	Rec. in.	Remarks	Soil and Rock Descriptions
	35	S6	34 100	12	NA		S6: Partially weathered rock, appears as soft biotite GNEISS, dry.
	40	C1		41	21	Begin NQ rock coring at -38.7 ft.	C1: First run 38.7 to 42.1 feet. REC = 59% RQD = 35% Banded biotite GNEISS, with muscovite, foliation at 80° from horizontal moderately weathered, medium hard, white, black speckled, light orange brown.
		C2		60	21		C2: Second run 42.1 to 47.1 feet. REC = 34% RQD = 24% Biotite muscovite SCHIST; foliation near vertical, moderately to severely weathered, medium hard, white, black speckled.
	45	C3		60	59		C3: Third run 47.1 to 52.1 feet. REC = 98% RQD = 47% Banded biotite GNEISS with muscovite, foliation at 40° from horizontal, moderately weathered, medium hard, white-black speckled.
	50	C4		60	58		C4: Fourth run 52.1 to 57.1 feet. REC = 96% RQD = 93% Banded biotite GNEISS, trace pyrite, some fractures at 75° from horizontal; foliation at 45° from horizontal; hard, slightly weathered, white-black speckled.
	55	C5		60	60		C5: Fifth Run 57.1 to 62.1 feet. REC = 100% RQD = 100% Similar to above with muscovite.
	60						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored),%
S-Split Spoon Sample
U-Undisturbed Samples
C-NQ Diamond Rock Core
¥ Groundwater
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg

Notes:

Haywood County C&D Landfill
DSA Design Group
Raleigh, North Carolina

Project 93086

Φ GEI Consultants, Inc.

Boring Location See Site Plan	Date Start/Finish 3/26/93 - 3/27/93	B-5
Ground Elevation (NGVD) 2624.0	Drilled By L. Foskey - Bore & Core	Pg. 3 of 3
Groundwater El. 2573.8 Date 4/6/93	Logged By M. Landis Total Depth (ft.) 65.0	

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks	Soil and Rock Descriptions
	65	C6		35	35		C6: Sixth run 62.1 to 65 feet. REC = 100% RQD = 100% Similar to above. Boring terminated at 65 feet.
	70						
	75						
	80						
	85						
	90						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored),%
S-Split Spoon Sample
U-Undisturbed Samples
C-HQ Diamond Rock Core
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg
Groundwater

Notes:

Haywood County C&D Landfill
DSA Design Group
Raleigh, North Carolina

Project 93086

Φ GEI Consultants, Inc.

Boring Location See Site Plan	Date Start/Finish 3/25/93 - 3/26/93	B-6
Ground Elevation (NGVD) 2610.0'	Drilled By L. Foskey - Bore & Core	Pg. 1 of 2
Groundwater El. dry Date 4/6/93	Logged By M. Landis Total Depth (ft.) 35.5	

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks	Soil and Rock Descriptions
							Surface soils along dirt road - sandy SILT, brown.
		S1	6 7 7	18	16		S1: Very micaceous narrowly graded SANDY SILT (ML); silt 80%, fine sand 20%, manganese throughout orange brown.
	5						
		S2	6 7 8	18	17		S2: Similar to above with residual fracture zone at 9.5 feet at 60° from horizontal high feldspar contact at 10 feet.
	10	U1		14	14		U1: Similar to S1
		S3	5 7 10	18	16	Bulk sample taken from 15-23 feet (Bag #2).	S3: SILTY SAND (SM); very micaceous 50 to 60 % fine to very fine sand, 30% silt, 10% coarse sand, orange brown.
	15						
		S4	18 22 20	18	11		S4: Similar to above, slightly more coarse SAND content, 15 to 20%.
	20						
		S5	10 10 15	18	NA		S5: SANDY SILT (ML); 60% silt, 30% fine sand, 10% coarse sand, micaceous, orange-brown.
	25						
		S6	50/ 4"	4	NA		S6: Partially weathered rock - appears as widely graded SAND, with silt, orange brown; manganese staining.
	30						

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored), %
S-Split Spoon Sample
U-Undisturbed Samples
C-NQ Diamond Rock Core
¥ Groundwater
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg

Notes:
HSA 2-1/4" to 30.5 feet at auger refusal; NQ core from 30.5 to 35.5 feet. Terminated at 35.5 feet.

Haywood County C&D Landfill
DSA Design Group
Raleigh, North Carolina

Project 93086

Φ GEI Consultants, Inc.

Boring Location See Site Plan	Date Start/Finish 3/25/93 - 3/26/93	B-6
Ground Elevation (NGVD) 2610.0'	Drilled By L. Foskey - Bore & Core	Pg. 2 of 2
Groundwater El. dry Date 4/6/93	Logged By M. Landis Total Depth (ft.) 35.5	

El. Ft.	Depth Ft.	Sample Type & No.	Sample Blows per 6 in.	Sample Pen. in.	Sample Rec. in.	Remarks		Soil and Rock Descriptions
		C1		24	22	Tricone from 29 to 30.5 feet. Begin rock coring at 30.5'. Lost all water at 32' - no return.		C1: Quartz Rock First run 30.5 to 32.5'. REC = 92% RQD = 50% Qtz with 45 to 60° fractures Iron staining in fractures.
		C2		36	13½			C2: Second run 32.5 to 35.5'. REC = 38% RQD = 0% Similar to above.
	35							Terminate boring at 35.5 feet.
	40							
	45							
	50							
	55							
	60							

Blows per 6" - 140 lb. Hammer Falling 30" to Drive a 2.0 in. O.D. Split Spoon Sampler
Pen-Penetration Length of Sampler or Core Barrel
Rec-Recovery Length of Sample
RQD-(Length of Sound Cores > 4 in. / Length Cored), %
S-Split Spoon Sample
U-Undisturbed Samples
C-HQ Diamond Rock Core
¥ Groundwater
UP-Piston Sample
UF-Fixed Piston
UO-Osterberg

Notes:

Haywood County C&D Landfill
DSA Design Group
Raleigh, North Carolina

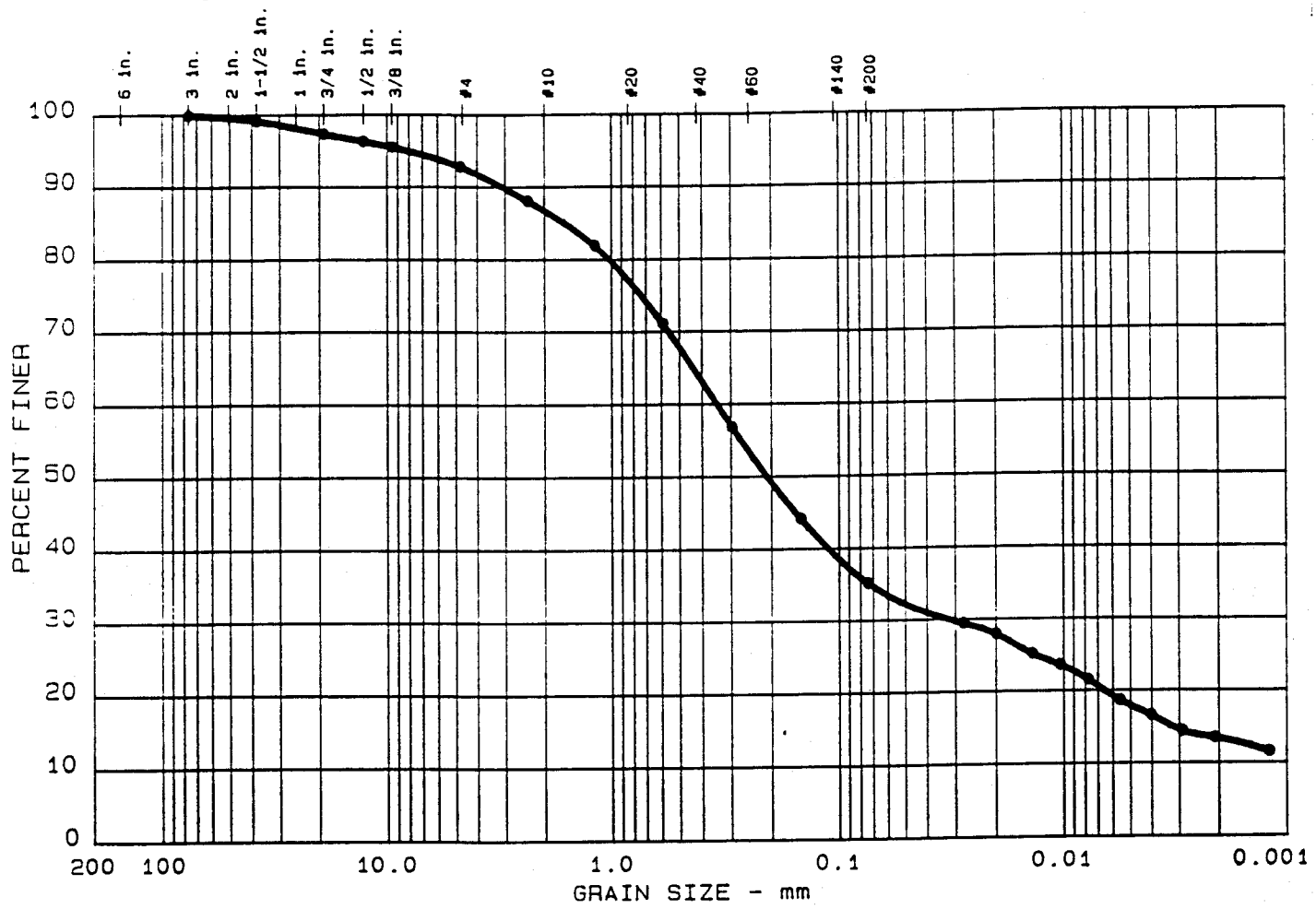
Project 93086

Φ GEI Consultants, Inc.

Appendix C.

Laboratory Test Results

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	7.3	57.6	35.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	36	14	1.62	0.35	0.21	0.033	0.0032			

MATERIAL DESCRIPTION	USCS	AASHTO
● Clayey sand	SC	

Project No.: 93086
Project: Haywood Co. Landfill
● Location:

Date: April 20, 1993

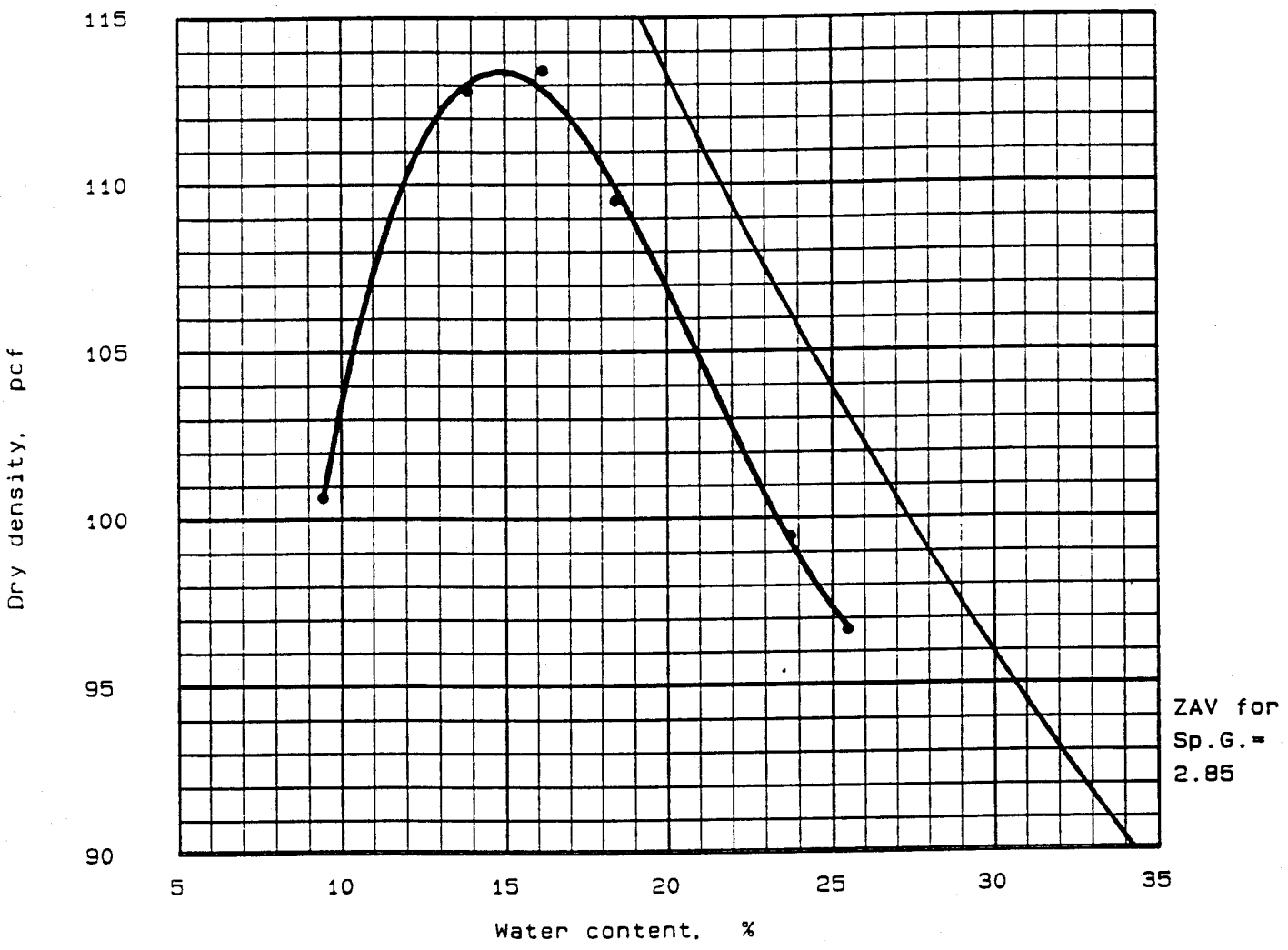
GRAIN SIZE DISTRIBUTION TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Remarks:
Cut Section
Sample from 7 - 12 ft.

Figure No. _____

PROCTOR TEST REPORT



"Standard" Proctor, ASTM D 698, Method A

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
7-12'	SC		19.5 %		36	14	7.3 %	35.1 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 14.8 % Maximum dry density = 113.4 pcf	Clayey sand

Project No.: 93086
Project: Haywood Co. Landfill
Location: Cut Section

Date: 4-09-1993

Remarks:

PROCTOR TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____

SUMMARY OF RESULTS OF FLEXIBLE WALL PERMEABILITY TEST

Project:	Haywood Co. C&D Landfill	By:	D. Aghjayan
Project No.:	93086	Date:	Apr. 14, 1993
Boring:	Cut Section	Checked:	G. Thomas
Sample:	7 to 12 ft.	Date:	April 22, 1993
Test No.:	K1		

Test Result
Permeability: 1.4×10^{-6} cm/sec

Soil:

Sample Type: Batch specimen recompacted to 95% of material's optimum dry density as determined per ASTM D698 Method A.

Description: Clayey SAND (SC)

Initial Dry Density: 108.1 pcf
Initial water content: 17.5 %

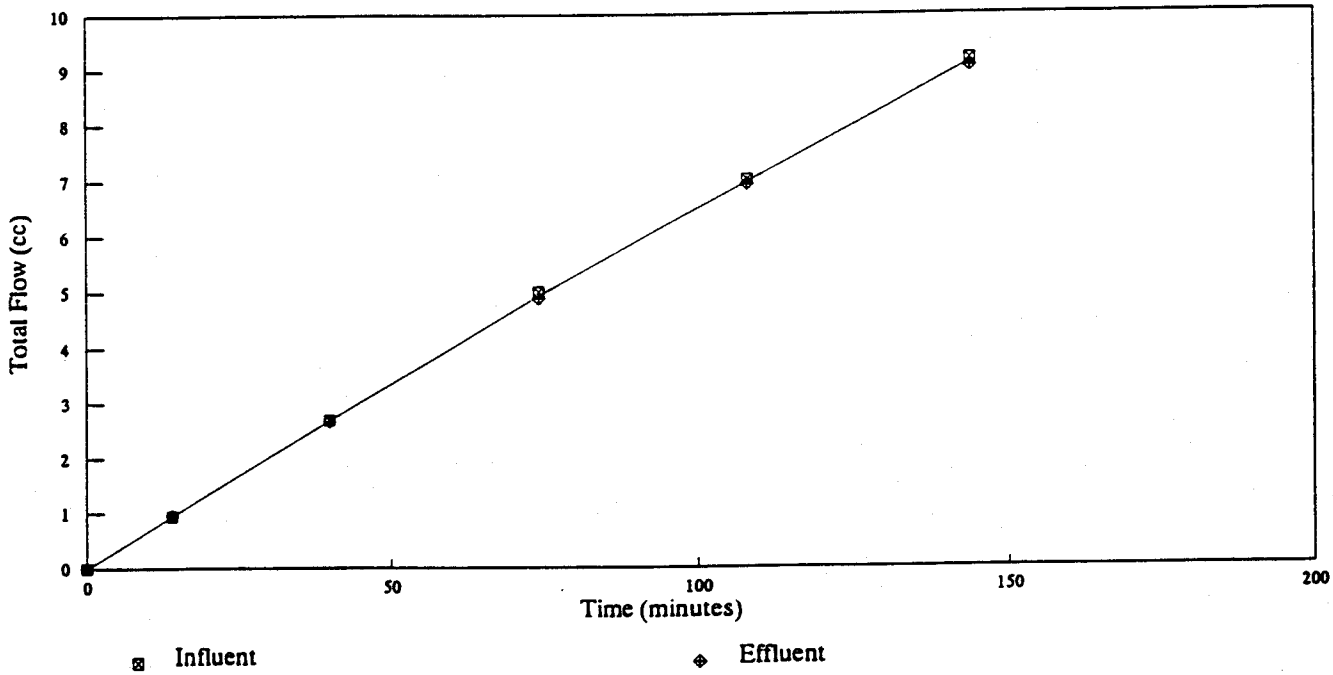
Test Details:

Specimen Diameter: 7.289 cm
Specimen Height: 11.630 cm
Specimen Area: 41.73 cm^2

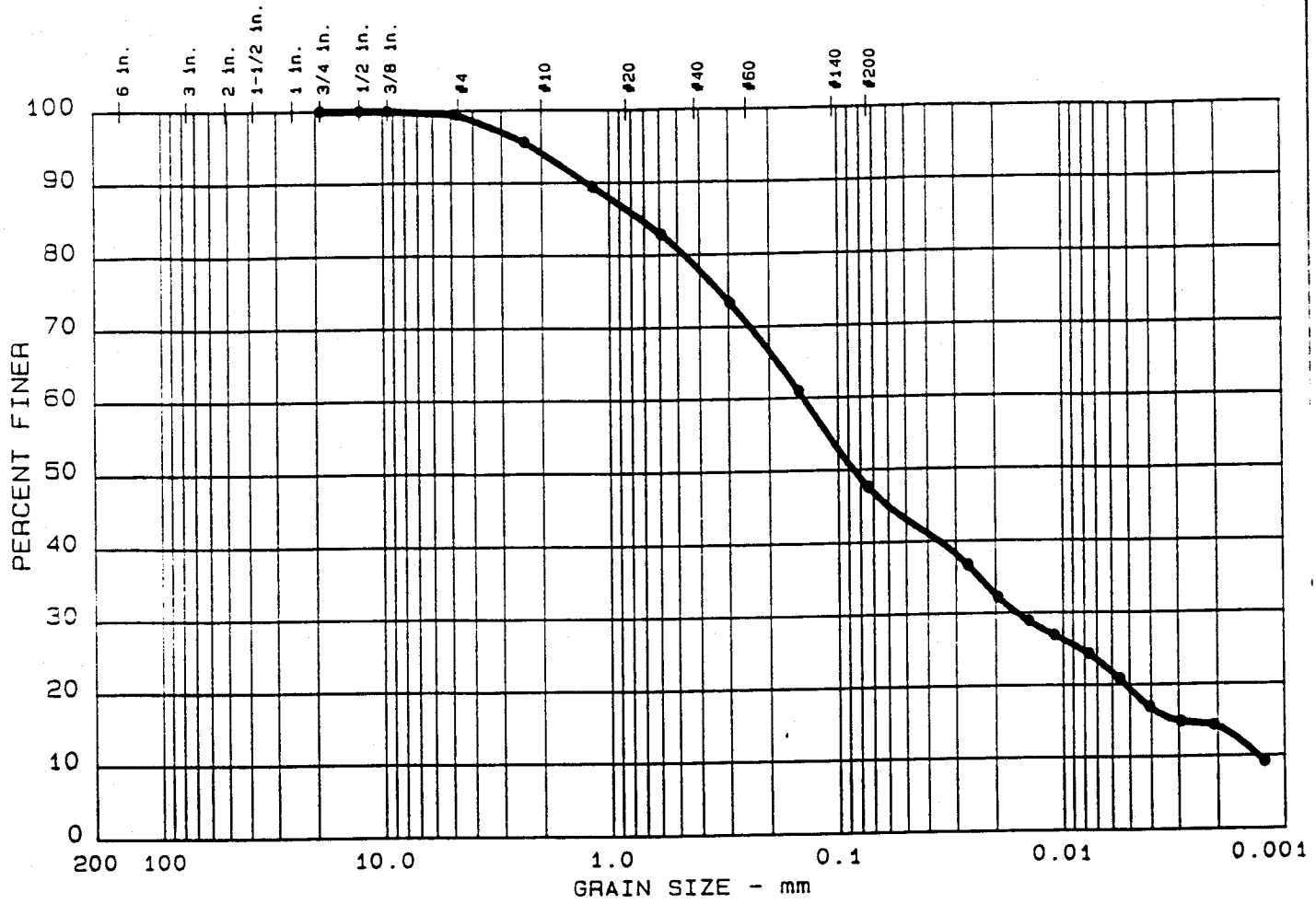
Dry Density: 108.1 pcf
Water Content: 20.7 %

Procedure: ASTM D5084–90 Constant Head
Permeant: 4
Consolidation Stress: 0.5 ksc
B–Value: 0.96

Trial #	1
Gradient:	17.34
Permeability: (cm/sec)	1.39×10^{-6}



GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	0.6	52.0	47.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	47	13	0.72	0.14	0.09	0.016	0.0031	0.0013	1.41	109.6

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty sand	SM	

Project No.: 93086
Project: Haywood Co. Landfill
● Location:

Date: April 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

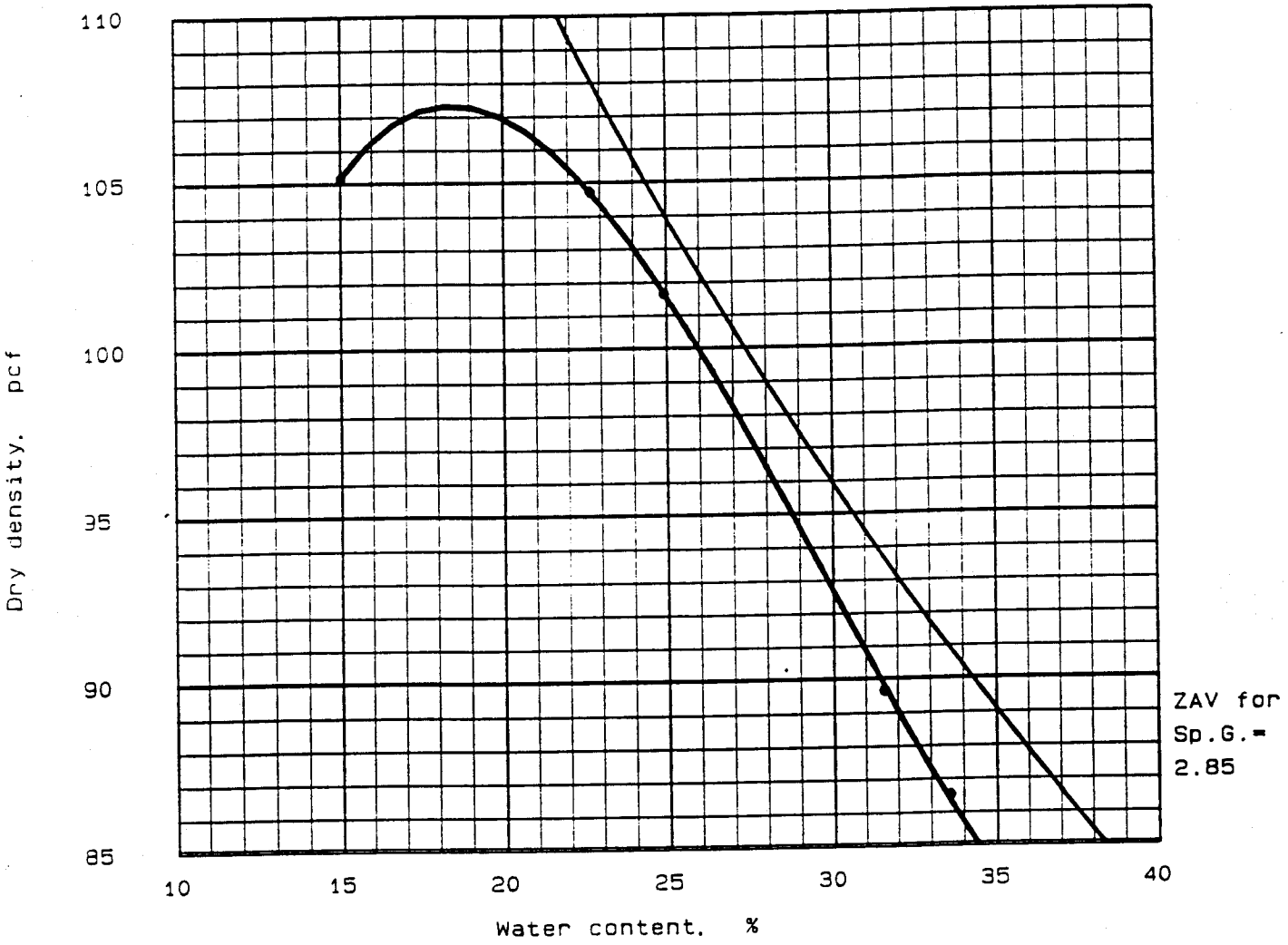
Remarks:

Boring MW-1

Sample No. 15-20'

Figure No. _____

PROCTOR TEST REPORT



"Standard" Proctor, ASTM D 698, Method A

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
15-20'	SM		19.0 %		47	13	.6 %	47.4 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 18.4 % Maximum dry density = 107.3 pcf	Silty sand

Project No.: 93086
Project: Haywood Co. Landfill
Location: MW-1

Date: 4-09-1993

Remarks:

PROCTOR TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____

SUMMARY OF RESULTS OF FLEXIBLE WALL PERMEABILITY TEST

Project:	Haywood Co. C&D Landfill	By:	D. Aghjayan
Project No.:	93086	Date:	Apr. 14, 1993
Boring:	MW–1	Checked:	G. Thomas
Sample:	15 to 20 ft.	Date:	April 21, 1993
Test No.:	K1		

Test Result

Permeability: 2.4×10^{-6} cm/sec

Soil:

Sample Type: Batch specimen recompacted to 95 % of material's maximum dry density as determined per ASTM D698 Method A.

Description: Silty SAND (SM)

Initial Dry Density: 101.1 pcf

Initial water content: 20.4 %

Test Details:

Specimen Diameter: 7.300 cm

Specimen Height: 11.893 cm

Specimen Area: 41.86 cm^2

Dry Density: 101.1 pcf

Water Content: 25.9 %

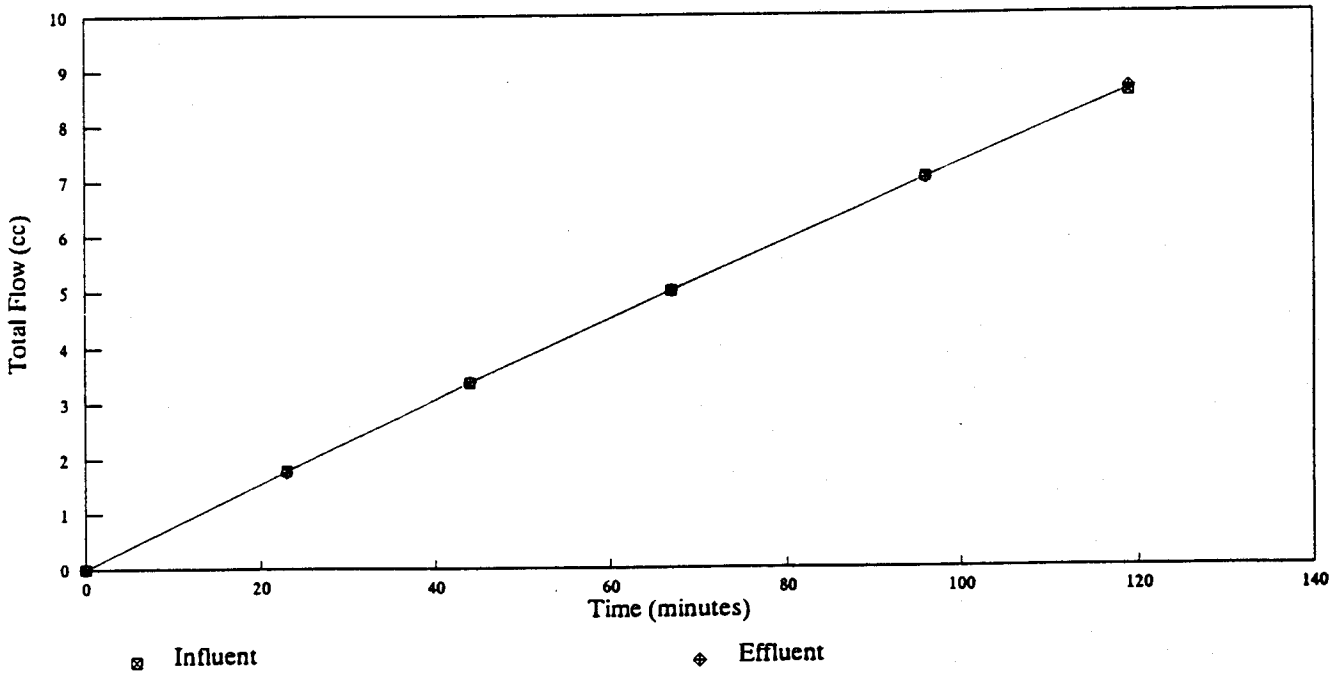
Procedure: ASTM D5084–90 Constant Head

Permeant: Tap Water

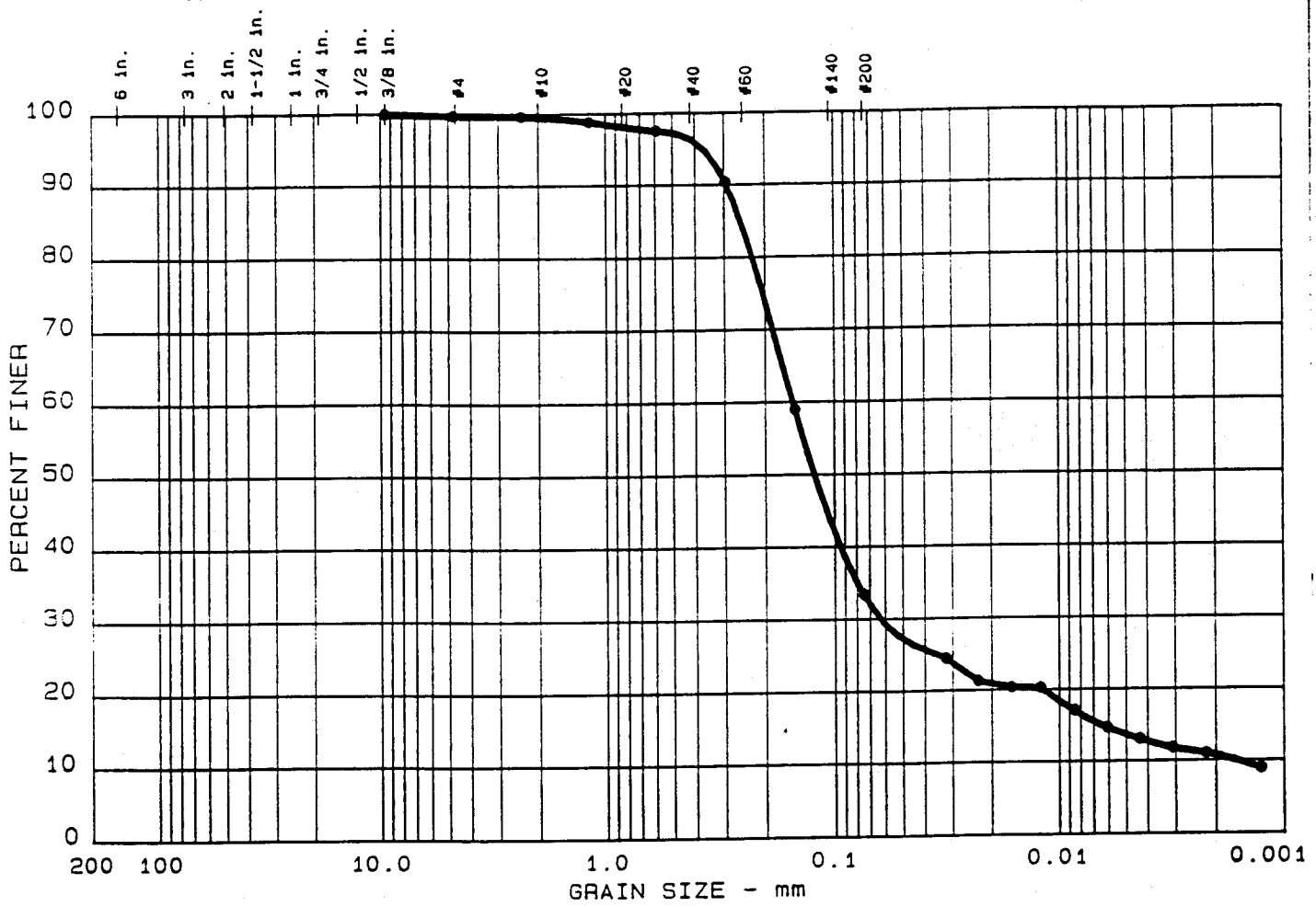
Consolidation Stress: 0.5 ksc

B–Value: 0.96

Trial #	1
Gradient:	11.15
Permeability: (cm/sec)	2.44×10^{-6}



GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	0.2	66.6	33.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	26	2	0.25	0.15	0.12	0.063	0.0065	0.0016	16.60	97.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty sand	SM	

Project No.: 93086
Project: Haywood Co. Landfill
● Location:

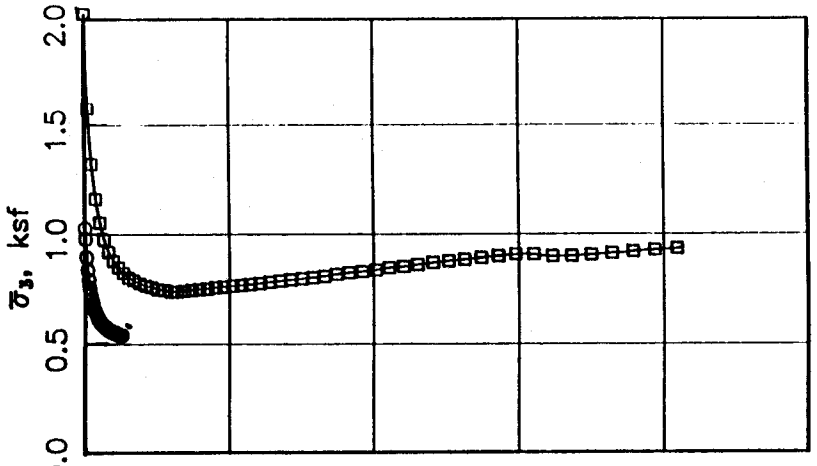
Date: April 20, 1993

Remarks:
Boring MW-4
Sample No. U2

GRAIN SIZE DISTRIBUTION TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____



SOIL: Boring MW-4 Sample U2 Depth = 5 ft.
Description: Silty SAND (SM)

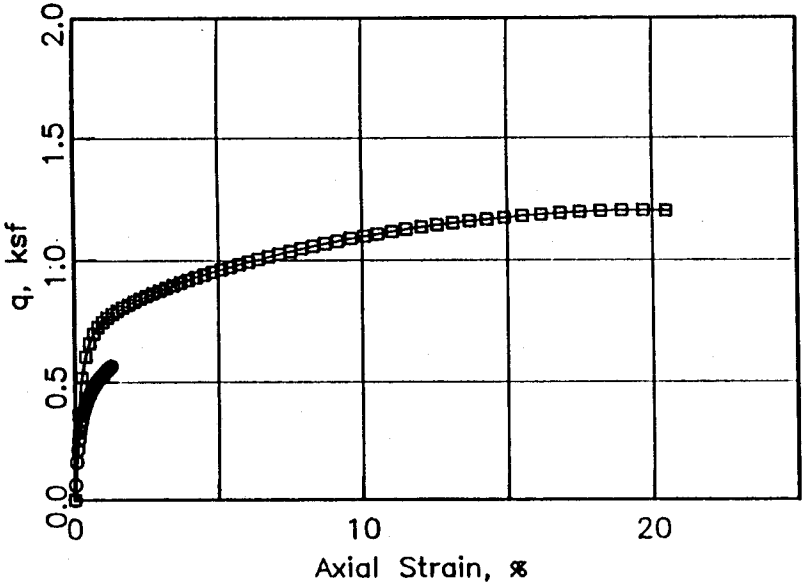
STRUCTURE: 2.8-inch diameter undisturbed tube sample trimmed down to 2.38 inch diameter.

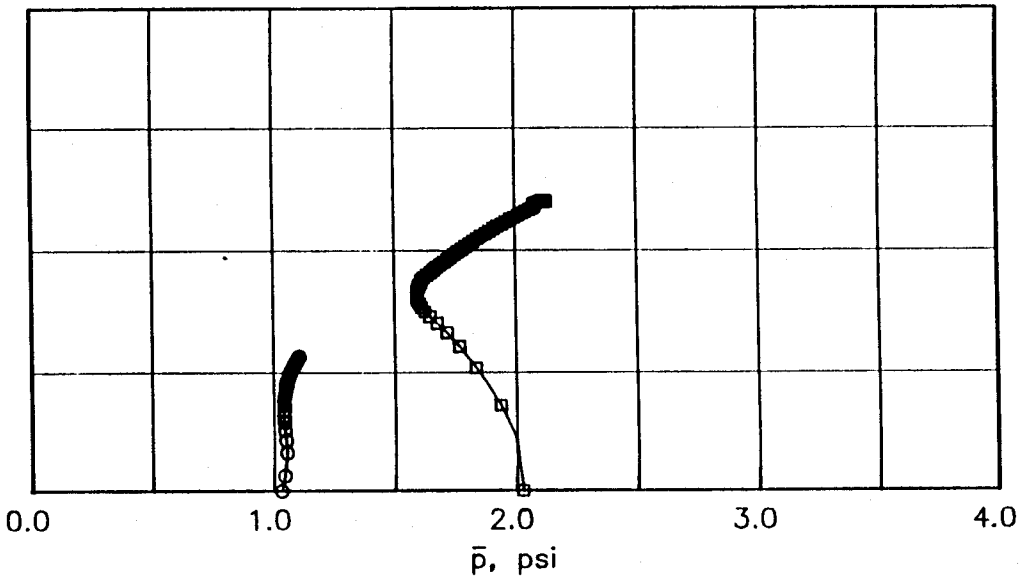
STATE: w_1 = 43.6 %, γ_{d1} = 76.5 pcf, B = 0.96
w_1 = 40.1 %, γ_{d1} = 79.6 pcf
w_2 = 39.3 %, γ_{d2} = 80.5 pcf

LOADING: Undrained axial monotonic compression.

SPECIMEN SIZE: Height = 5.52 in. Diameter = 2.35 in.

REMARKS: Shear failure.





Stage #	$\bar{\sigma}_c$ (ksf)	Symbol
1	1.03	o
2	2.03	□

DSA Design Group

Φ GEI Consultants, Inc.

Geo. Services
C & D Landfill
Haywood Co., NC

Project 93086

ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements

Boring MW-4 Sample U2

April 20, 1993 Fig.

PROJECT #:	Haywood Co. Landfill													
PROJECT:	93086			Stage	SIGMAv'	SIGMAh'	Height	Diameter	Area	Water Content	Dry Density	Total Density	Void Ratio	
TEST:	R'1													
BORING:	MW-4				ksc	ksc	cm	cm	cm²	(%)	g/cm³	g/cm³		
SAMPLE:	U2			In situ	0.00	0.00	0.000	0.000	0.000					
DEPTH (ft):	4.9 ft			After Sampling	0.00	0.00	0.000	0.000	0.000					
OPER.:	D. Aghjayan			In tube before extrusion	0.00	0.00	14.200	6.043	28.681	43.57	1.2	1.8	1.078	
TEST DATE:	4/14/93			Under vac.	0.50	0.50	14.033	5.959	27.886					
DCDT No.		5733										calculated from start of test		
DCDT Calibration Factor		-14.254	mm/(mV/V)	End of:										
Load Cell No.		47784		Saturation	0.50	0.50	14.033	5.959	27.886	40.12	1.3	1.8	1.078	
Load Cell Cal. Factor		-14.719	kg/(mV/V)	Consol. Stage 1	0.50	0.50	14.033	5.959	27.886	40.12	1.3	1.8	1.078	
Pressure Transducer		85032		Consol. Stage 2	0.99	0.99	13.872	5.960	27.897	39.25	1.3	1.8	1.055	
Pres. Trans. Cal. Factor		-0.716	ksc/(mV/V)	Consol. Stage 3	0.99	0.99	13.872	5.960	27.897	39.25	1.3	1.8	1.055	
				Consol. Stage 4	0.99	0.99	13.872	5.960	27.897	39.25	1.3	1.8	1.055	
Gravity of Solids		2.65	(assumed)	Consol. Stage 5	0.99	0.99	13.872	5.960	27.897	39.25	1.3	1.8	1.055	
B value start shear		0.96		Final Shear 6										
Test Stage #	2			This Stage Initial Values	0.50	0.50	14.033	5.959	27.886	40.12	1.3	1.8	1.078	
Stage Strain rate		0.022	%/min	Kc start stage	1.00									
Data Start Row	25													

Axial DCDT (mm)	Load Cell (kg)	Pore Pressure (ksc)	Axial Strain (%)	Area (cm²)	Excess Pore Pressure (ksc)	Sigma3 effective (ksc)	Total SigmaV (ksc)	SigmaV Effective (ksc)	P' (ksc)	q (ksc)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
0.009	-0.031	3.974	0.00	27.89	0.00	0.50	0.50	0.50	0.50	0.00	1.00	0.0	0.00
0.013	0.489	3.981	0.00	27.89	0.01	0.49	0.52	0.51	0.50	0.01	1.04	1.1	0.38
0.026	1.703	3.999	0.01	27.89	0.02	0.48	0.56	0.54	0.51	0.03	1.13	3.5	0.39
0.052	3.294	4.024	0.03	27.89	0.05	0.45	0.62	0.57	0.51	0.06	1.26	6.7	0.42
0.074	4.307	4.040	0.05	27.90	0.07	0.43	0.66	0.59	0.51	0.08	1.36	8.7	0.43
0.104	5.110	4.055	0.07	27.91	0.08	0.42	0.69	0.60	0.51	0.09	1.44	10.4	0.44
0.126	5.773	4.068	0.08	27.91	0.09	0.41	0.71	0.61	0.51	0.10	1.51	11.7	0.45
0.152	6.365	4.081	0.10	27.91	0.11	0.39	0.73	0.62	0.51	0.11	1.58	13.0	0.46
0.178	6.898	4.090	0.12	27.92	0.12	0.39	0.75	0.63	0.51	0.12	1.64	14.1	0.47
0.204	7.369	4.100	0.14	27.92	0.13	0.38	0.77	0.64	0.51	0.13	1.71	15.1	0.47
0.226	7.794	4.108	0.15	27.93	0.13	0.37	0.78	0.65	0.51	0.14	1.76	16.0	0.48
0.256	8.198	4.115	0.18	27.94	0.14	0.36	0.80	0.65	0.51	0.15	1.82	16.9	0.48
0.278	8.561	4.122	0.19	27.94	0.15	0.35	0.81	0.66	0.51	0.15	1.87	17.7	0.48
0.308	8.879	4.128	0.21	27.95	0.15	0.35	0.82	0.67	0.51	0.16	1.92	18.3	0.48
0.330	9.193	4.133	0.23	27.95	0.16	0.34	0.83	0.67	0.51	0.17	1.96	19.0	0.48
0.360	9.475	4.138	0.25	27.96	0.16	0.34	0.84	0.68	0.51	0.17	2.01	19.6	0.48
0.386	9.744	4.142	0.27	27.96	0.17	0.33	0.85	0.68	0.51	0.17	2.05	20.1	0.48

Axial DCDT (inch)	Load Cell (lb)	Pore Pressure (ksf)	Axial Strain (%)	Area (in^2)	Excess Pore Pressure (ksf)	Sigma3 effective (ksf)	Total SigmaV (ksf)	SigmaV Effective (ksf)	P' (ksf)	q (ksf)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
0.016	22.035	8.493	0.29	4.34	0.35	0.67	1.76	1.41	1.04	0.37	2.09	20.7	0.48
0.017	22.569	8.504	0.31	4.34	0.36	0.66	1.78	1.41	1.04	0.38	2.14	21.2	0.48
0.018	23.053	8.511	0.33	4.34	0.37	0.65	1.79	1.42	1.04	0.38	2.17	21.7	0.48
0.019	23.517	8.518	0.35	4.34	0.38	0.65	1.81	1.43	1.04	0.39	2.21	22.1	0.48
0.021	23.962	8.522	0.37	4.34	0.38	0.64	1.82	1.44	1.04	0.40	2.24	22.5	0.48
0.022	24.377	8.529	0.39	4.34	0.39	0.64	1.84	1.45	1.04	0.41	2.27	22.9	0.48
0.023	24.772	8.534	0.40	4.34	0.39	0.63	1.85	1.46	1.04	0.41	2.31	23.3	0.48
0.024	25.148	8.540	0.42	4.34	0.40	0.63	1.86	1.46	1.04	0.42	2.34	23.6	0.48
0.025	25.523	8.545	0.45	4.34	0.41	0.62	1.87	1.47	1.05	0.42	2.37	24.0	0.48
0.026	25.869	8.550	0.46	4.34	0.41	0.62	1.89	1.48	1.05	0.43	2.40	24.3	0.48
0.027	26.225	8.554	0.48	4.34	0.41	0.61	1.90	1.48	1.05	0.44	2.42	24.6	0.48
0.028	26.551	8.557	0.50	4.34	0.42	0.61	1.91	1.49	1.05	0.44	2.45	24.9	0.47
0.029	26.857	8.563	0.52	4.35	0.42	0.60	1.92	1.50	1.05	0.45	2.48	25.2	0.47
0.030	27.154	8.570	0.54	4.35	0.43	0.60	1.93	1.50	1.05	0.45	2.51	25.5	0.48
0.031	27.450	8.572	0.56	4.35	0.43	0.59	1.94	1.51	1.05	0.46	2.53	25.7	0.47
0.032	27.737	8.575	0.58	4.35	0.44	0.59	1.95	1.51	1.05	0.46	2.56	26.0	0.47
0.034	28.023	8.575	0.60	4.35	0.44	0.59	1.96	1.52	1.06	0.47	2.58	26.1	0.47
0.035	28.290	8.579	0.62	4.35	0.44	0.59	1.97	1.53	1.06	0.47	2.60	26.4	0.47
0.036	28.537	8.582	0.64	4.35	0.44	0.58	1.97	1.53	1.06	0.47	2.62	26.6	0.47
0.037	28.804	8.584	0.66	4.35	0.44	0.58	1.98	1.54	1.06	0.48	2.64	26.8	0.47
0.038	29.021	8.588	0.68	4.35	0.45	0.58	1.99	1.54	1.06	0.48	2.67	27.0	0.47
0.039	29.268	8.590	0.70	4.35	0.45	0.58	2.00	1.55	1.06	0.49	2.68	27.2	0.46
0.040	29.496	8.591	0.72	4.35	0.45	0.57	2.00	1.55	1.06	0.49	2.70	27.4	0.46
0.042	29.733	8.595	0.75	4.35	0.46	0.57	2.01	1.56	1.06	0.49	2.73	27.6	0.46
0.043	29.950	8.597	0.76	4.36	0.46	0.57	2.02	1.56	1.07	0.50	2.74	27.8	0.46
0.044	30.168	8.597	0.78	4.36	0.46	0.57	2.03	1.57	1.07	0.50	2.76	27.9	0.46
0.045	30.365	8.600	0.80	4.36	0.46	0.57	2.03	1.57	1.07	0.50	2.78	28.1	0.46
0.046	30.573	8.602	0.83	4.36	0.46	0.56	2.04	1.58	1.07	0.51	2.80	28.2	0.46
0.047	30.780	8.604	0.84	4.36	0.46	0.56	2.05	1.58	1.07	0.51	2.81	28.4	0.46
0.048	30.978	8.606	0.87	4.36	0.47	0.56	2.05	1.59	1.07	0.51	2.83	28.6	0.45
0.049	31.166	8.606	0.89	4.36	0.47	0.56	2.06	1.59	1.08	0.52	2.84	28.6	0.45
0.050	31.353	8.608	0.91	4.36	0.47	0.56	2.06	1.60	1.08	0.52	2.86	28.8	0.45
0.052	31.541	8.609	0.93	4.36	0.47	0.56	2.07	1.60	1.08	0.52	2.87	28.9	0.45
0.053	31.719	8.609	0.95	4.36	0.47	0.56	2.08	1.61	1.08	0.52	2.89	29.0	0.45
0.054	31.907	8.613	0.97	4.36	0.47	0.55	2.08	1.61	1.08	0.53	2.91	29.2	0.45
0.055	32.085	8.615	0.99	4.37	0.47	0.55	2.09	1.61	1.08	0.53	2.92	29.4	0.45
0.056	32.253	8.615	1.01	4.37	0.47	0.55	2.09	1.62	1.08	0.53	2.93	29.4	0.45
0.057	32.440	8.616	1.03	4.37	0.48	0.55	2.10	1.62	1.09	0.54	2.95	29.6	0.44
0.058	32.618	8.616	1.05	4.37	0.48	0.55	2.10	1.63	1.09	0.54	2.96	29.7	0.44
0.059	32.766	8.618	1.07	4.37	0.48	0.55	2.11	1.63	1.09	0.54	2.98	29.8	0.44
0.060	32.934	8.620	1.09	4.37	0.48	0.55	2.11	1.63	1.09	0.54	2.99	29.9	0.44
0.062	33.092	8.622	1.11	4.37	0.48	0.54	2.12	1.64	1.09	0.55	3.01	30.1	0.44

Axial DCDT (inch)	Load Cell (lb)	Pore Pressure (ksf)	Axial Strain (%)	Area (in^2)	Excess Pore Pressure (ksf)	Sigma3 effective (ksf)	Total SigmaV (ksf)	SigmaV Effective (ksf)	P' (ksf)	q (ksf)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
0.063	33.260	8.622	1.13	4.37	0.48	0.54	2.12	1.64	1.09	0.55	3.02	30.1	0.44
0.064	33.419	8.624	1.15	4.37	0.48	0.54	2.13	1.64	1.09	0.55	3.03	30.3	0.44
0.065	33.577	8.624	1.17	4.37	0.48	0.54	2.13	1.65	1.10	0.55	3.04	30.4	0.44
0.066	33.725	8.625	1.19	4.37	0.49	0.54	2.14	1.65	1.10	0.56	3.06	30.5	0.44
0.067	33.853	8.627	1.21	4.38	0.49	0.54	2.14	1.66	1.10	0.56	3.07	30.6	0.44
0.069	34.011	8.627	1.23	4.38	0.49	0.54	2.15	1.66	1.10	0.56	3.08	30.7	0.43
0.070	34.140	8.627	1.25	4.38	0.49	0.54	2.15	1.66	1.10	0.56	3.09	30.7	0.43
0.071	34.288	8.627	1.27	4.38	0.49	0.54	2.16	1.67	1.10	0.57	3.10	30.8	0.43

PROJECT #:	Haywood Co. Landfill
PROJECT:	93086
TEST:	R'1
BORING:	MW-4
SAMPLE:	U2
DEPTH (ft):	4.9 ft
OPER.:	D. Aghjayan
TEST DATE:	4/14/93
DCDT No.	5733
DCDT Calibration Factor	-14.254 mm/(mV/V)
Load Cell No.	47784
Load Cell Cal. Factor	-14.719 kg/(mV/V)
Pressure Transducer	85032
Pres. Trans. Cal. Factor	-0.716 ksc/(mV/V)
Gravity of Solids	2.65 (assumed)
B value start shear	0.96
Test Stage #	3
Stage Strain rate	0.022 %/min
Data Start Row	25

Stage	SIGMAv'	SIGMAh'	Height	Diameter	Area	Water Content	Dry Density	Total Density	Void Ratio
	ksc	ksc	cm	cm	cm²	(%)	g/cm³	g/cm³	
In situ	0.00	0.00	0.000	0.000	0.000				
After Sampling	0.00	0.00	0.000	0.000	0.000				
In tube before extrusion	0.00	0.00	14.200	6.043	28.681	43.57	1.2	1.8	1.078
Under vac.	0.50	0.50	14.033	5.959	27.886				
End of:							calculated from start of test		
Saturation	0.50	0.50	14.033	5.959	27.886	40.12	1.3	1.8	1.078
Consol. Stage 1	0.50	0.50	14.033	5.959	27.886	40.12	1.3	1.8	1.078
Consol. Stage 2	0.99	0.99	13.872	5.960	27.897	39.25	1.3	1.8	1.055
Consol. Stage 3	0.99	0.99	13.872	5.960	27.897	39.25	1.3	1.8	1.055
Consol. Stage 4	0.99	0.99	13.872	5.960	27.897	39.25	1.3	1.8	1.055
Consol. Stage 5	0.99	0.99	13.872	5.960	27.897	39.25	1.3	1.8	1.055
Final Shear 6									
This Stage Initial Values	0.99	0.99	13.872	5.960	27.897	39.25	1.3	1.8	1.055

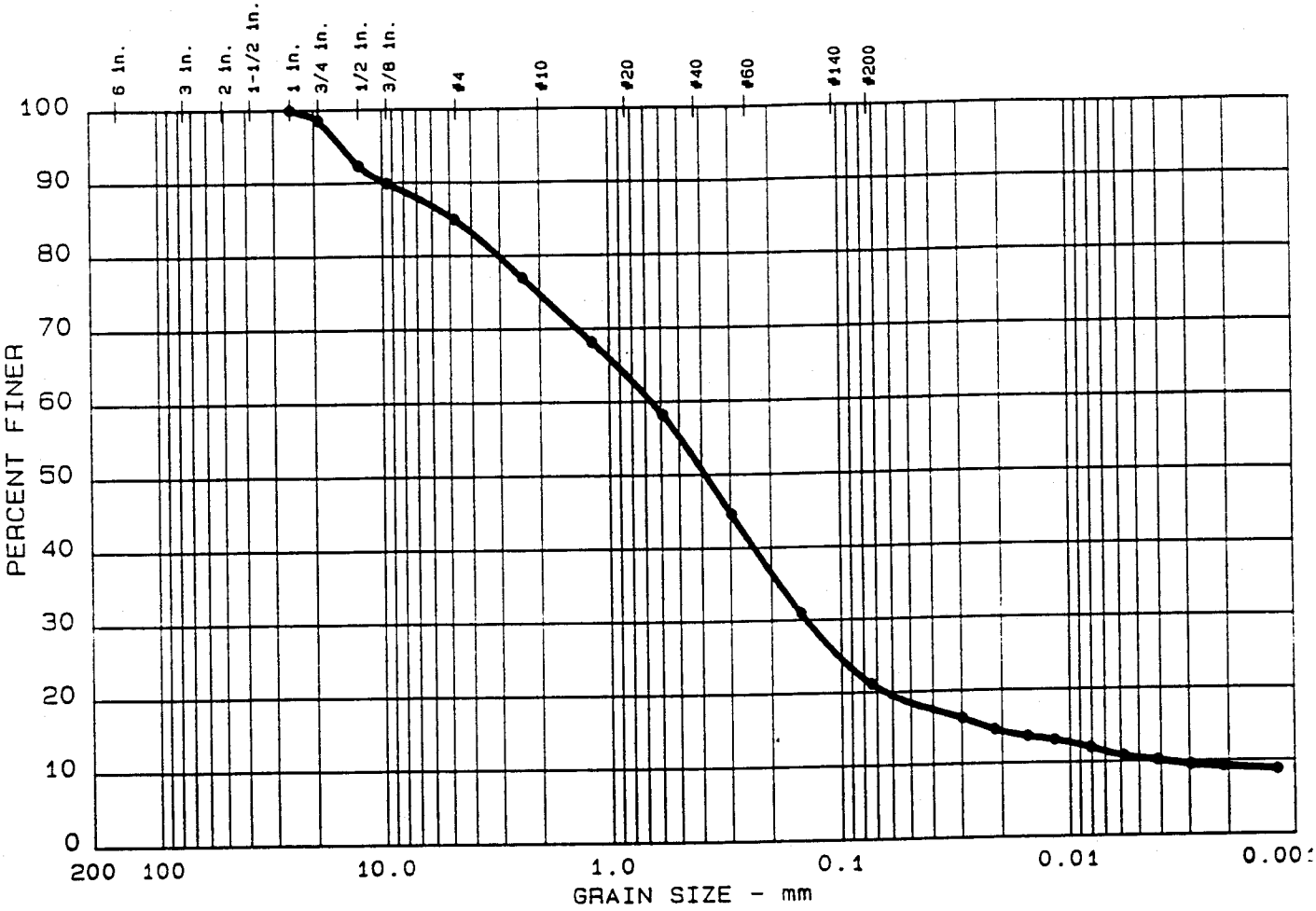
Kc start stage 1.00

Axial DCDT (mm)	Load Cell (kg)	Pore Pressure (ksc)	Axial Strain (%)	Area (cm²)	Excess Pore Pressure (ksc)	Sigma3 effective (ksc)	Total SigmaV (ksc)	SigmaV Effective (ksc)	P' (ksc)	q (ksc)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
1.611	1.508	3.981	0.00	27.90	0.00	0.99	0.99	0.99	0.99	0.00	1.00	0.0	0.00
1.681	7.785	4.108	0.05	27.91	0.13	0.86	1.21	1.09	0.97	0.11	1.26	6.6	0.57
1.763	11.330	4.200	0.11	27.93	0.22	0.77	1.34	1.12	0.95	0.18	1.46	10.7	0.62
1.850	13.848	4.272	0.17	27.94	0.29	0.70	1.43	1.14	0.92	0.22	1.63	13.9	0.66
1.945	15.676	4.327	0.24	27.96	0.35	0.64	1.50	1.15	0.90	0.25	1.79	16.4	0.68
2.041	17.051	4.369	0.31	27.98	0.39	0.60	1.54	1.16	0.88	0.28	1.92	18.4	0.70
2.132	18.181	4.404	0.38	28.00	0.42	0.57	1.58	1.16	0.86	0.30	2.05	20.2	0.71
2.232	19.068	4.434	0.45	28.02	0.45	0.54	1.62	1.16	0.85	0.31	2.17	21.7	0.72
2.327	19.771	4.457	0.52	28.04	0.48	0.51	1.64	1.16	0.84	0.33	2.27	22.8	0.73
2.431	20.349	4.477	0.59	28.06	0.50	0.49	1.66	1.16	0.83	0.34	2.36	23.9	0.74
2.536	20.847	4.495	0.67	28.08	0.51	0.47	1.68	1.16	0.82	0.34	2.45	24.9	0.75
2.640	21.250	4.509	0.74	28.11	0.53	0.46	1.69	1.16	0.81	0.35	2.52	25.6	0.75
2.740	21.604	4.522	0.81	28.13	0.54	0.45	1.70	1.16	0.80	0.36	2.60	26.3	0.76
2.848	21.917	4.532	0.89	28.15	0.55	0.44	1.71	1.16	0.80	0.36	2.66	27.0	0.76
2.961	22.204	4.542	0.97	28.17	0.56	0.43	1.72	1.16	0.80	0.37	2.72	27.5	0.76
3.078	22.473	4.550	1.06	28.19	0.57	0.42	1.73	1.16	0.79	0.37	2.77	28.0	0.77
3.195	22.710	4.557	1.14	28.22	0.58	0.41	1.74	1.16	0.79	0.38	2.82	28.5	0.77
3.308	22.943	4.564	1.22	28.24	0.58	0.41	1.75	1.16	0.79	0.38	2.87	28.9	0.77
3.429	23.159	4.569	1.31	28.27	0.59	0.40	1.75	1.17	0.78	0.38	2.91	29.3	0.77
3.551	23.356	4.574	1.40	28.29	0.59	0.40	1.76	1.17	0.78	0.39	2.95	29.6	0.77
3.677	23.562	4.579	1.49	28.32	0.60	0.39	1.77	1.17	0.78	0.39	3.00	30.0	0.77
3.803	23.763	4.583	1.58	28.34	0.60	0.39	1.77	1.17	0.78	0.39	3.03	30.3	0.77
3.933	23.956	4.586	1.67	28.37	0.60	0.38	1.78	1.18	0.78	0.40	3.06	30.5	0.76
4.067	24.153	4.590	1.77	28.40	0.61	0.38	1.79	1.18	0.78	0.40	3.10	30.8	0.76

Axial DCDT (mm)	Load Cell (kg)	Pore Pressure (ksc)	Axial Strain (%)	Area (cm^2)	Excess Pore Pressure (ksc)	Sigma3 effective (ksc)	Total SigmaV (ksc)	SigmaV Effective (ksc)	P' (ksc)	q (ksc)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
4.202	24.337	4.593	1.87	28.43	0.61	0.38	1.79	1.18	0.78	0.40	3.13	31.0	0.76
4.345	24.530	4.595	1.97	28.46	0.61	0.37	1.80	1.18	0.78	0.40	3.16	31.3	0.76
4.488	24.718	4.598	2.07	28.49	0.62	0.37	1.80	1.19	0.78	0.41	3.19	31.5	0.76
4.631	24.902	4.599	2.18	28.52	0.62	0.37	1.81	1.19	0.78	0.41	3.22	31.7	0.75
4.775	25.081	4.601	2.28	28.55	0.62	0.37	1.81	1.19	0.78	0.41	3.24	31.9	0.75
4.922	25.251	4.604	2.39	28.58	0.62	0.37	1.82	1.20	0.78	0.42	3.27	32.1	0.75
5.074	25.448	4.606	2.50	28.61	0.62	0.36	1.83	1.20	0.78	0.42	3.30	32.3	0.75
5.230	25.623	4.606	2.61	28.64	0.63	0.36	1.83	1.21	0.78	0.42	3.32	32.5	0.74
5.386	25.829	4.607	2.72	28.68	0.63	0.36	1.84	1.21	0.79	0.42	3.34	32.6	0.74
5.547	26.013	4.609	2.84	28.71	0.63	0.36	1.84	1.21	0.79	0.43	3.37	32.8	0.74
5.708	26.192	4.611	2.95	28.75	0.63	0.36	1.85	1.22	0.79	0.43	3.39	33.0	0.73
5.864	26.380	4.611	3.07	28.78	0.63	0.36	1.85	1.22	0.79	0.43	3.41	33.1	0.73
6.029	26.559	4.611	3.18	28.81	0.63	0.36	1.86	1.23	0.79	0.43	3.42	33.2	0.72
6.198	26.734	4.610	3.31	28.85	0.63	0.36	1.86	1.23	0.80	0.44	3.43	33.3	0.72
6.367	26.922	4.609	3.43	28.89	0.63	0.36	1.87	1.24	0.80	0.44	3.44	33.3	0.71
6.541	27.115	4.608	3.55	28.92	0.63	0.36	1.87	1.25	0.80	0.44	3.45	33.4	0.71
6.714	27.303	4.607	3.68	28.96	0.63	0.36	1.88	1.25	0.81	0.45	3.46	33.5	0.70
6.897	27.473	4.606	3.81	29.00	0.63	0.36	1.88	1.26	0.81	0.45	3.47	33.5	0.70
7.074	27.662	4.606	3.94	29.04	0.62	0.36	1.89	1.26	0.81	0.45	3.47	33.6	0.69
7.261	27.854	4.605	4.07	29.08	0.62	0.36	1.89	1.27	0.82	0.45	3.48	33.6	0.69
7.452	28.047	4.605	4.21	29.12	0.62	0.36	1.90	1.28	0.82	0.46	3.50	33.7	0.68
7.647	28.231	4.603	4.35	29.17	0.62	0.37	1.91	1.28	0.82	0.46	3.50	33.7	0.68
7.847	28.423	4.602	4.49	29.21	0.62	0.37	1.91	1.29	0.83	0.46	3.51	33.8	0.67
8.051	28.620	4.601	4.64	29.25	0.62	0.37	1.92	1.30	0.83	0.46	3.52	33.9	0.67
8.255	28.818	4.600	4.79	29.30	0.62	0.37	1.92	1.30	0.84	0.47	3.52	33.9	0.66
8.463	29.010	4.600	4.94	29.35	0.62	0.37	1.93	1.31	0.84	0.47	3.54	34.0	0.66
8.671	29.212	4.599	5.09	29.39	0.62	0.37	1.93	1.31	0.84	0.47	3.54	34.0	0.66
8.880	29.400	4.598	5.24	29.44	0.62	0.37	1.94	1.32	0.85	0.47	3.55	34.1	0.65
9.092	29.597	4.597	5.39	29.49	0.62	0.37	1.94	1.33	0.85	0.48	3.56	34.1	0.65
9.305	29.790	4.596	5.55	29.53	0.62	0.37	1.95	1.33	0.85	0.48	3.56	34.2	0.64
9.526	30.001	4.595	5.71	29.58	0.61	0.37	1.95	1.34	0.86	0.48	3.57	34.2	0.64
9.752	30.207	4.594	5.87	29.64	0.61	0.38	1.96	1.34	0.86	0.48	3.58	34.3	0.63
9.982	30.408	4.593	6.03	29.69	0.61	0.38	1.96	1.35	0.86	0.49	3.58	34.3	0.63
10.216	30.614	4.592	6.20	29.74	0.61	0.38	1.97	1.36	0.87	0.49	3.59	34.3	0.62
10.455	30.821	4.590	6.37	29.80	0.61	0.38	1.97	1.36	0.87	0.49	3.59	34.4	0.62
10.702	31.045	4.589	6.55	29.85	0.61	0.38	1.98	1.37	0.88	0.49	3.60	34.4	0.61
10.954	31.251	4.587	6.73	29.91	0.61	0.38	1.98	1.38	0.88	0.50	3.60	34.4	0.61
11.210	31.475	4.586	6.92	29.97	0.61	0.38	1.99	1.38	0.88	0.50	3.61	34.5	0.61
11.470	31.676	4.585	7.11	30.03	0.60	0.39	1.99	1.39	0.89	0.50	3.61	34.5	0.60
11.739	31.909	4.584	7.30	30.09	0.60	0.39	2.00	1.40	0.89	0.51	3.62	34.5	0.60
12.004	32.120	4.582	7.49	30.16	0.60	0.39	2.00	1.40	0.90	0.51	3.62	34.5	0.59
12.269	32.335	4.581	7.68	30.22	0.60	0.39	2.01	1.41	0.90	0.51	3.63	34.6	0.59
12.538	32.577	4.579	7.88	30.28	0.60	0.39	2.01	1.42	0.90	0.51	3.63	34.6	0.58
12.820	32.792	4.578	8.08	30.35	0.60	0.39	2.02	1.42	0.91	0.52	3.63	34.6	0.58

Axial DCDT (mm)	Load Cell (kg)	Pore Pressure (ksc)	Axial Strain (%)	Area (cm^2)	Excess Pore Pressure (ksc)	Sigma3 effective (ksc)	Total SigmaV (ksc)	SigmaV Effective (ksc)	P' (ksc)	q (ksc)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
13.097	33.016	4.577	8.28	30.42	0.60	0.39	2.02	1.43	0.91	0.52	3.64	34.7	0.58
13.379	33.240	4.574	8.48	30.48	0.59	0.40	2.03	1.44	0.92	0.52	3.63	34.6	0.57
13.670	33.478	4.572	8.69	30.55	0.59	0.40	2.04	1.44	0.92	0.52	3.63	34.6	0.57
13.970	33.697	4.571	8.91	30.62	0.59	0.40	2.04	1.45	0.92	0.53	3.63	34.6	0.56
14.273	33.926	4.569	9.13	30.70	0.59	0.40	2.04	1.46	0.93	0.53	3.64	34.6	0.56
14.586	34.172	4.567	9.35	30.78	0.59	0.40	2.05	1.46	0.93	0.53	3.64	34.7	0.55
14.898	34.410	4.566	9.58	30.85	0.59	0.40	2.06	1.47	0.94	0.53	3.64	34.7	0.55
15.219	34.625	4.565	9.81	30.93	0.58	0.41	2.06	1.48	0.94	0.54	3.64	34.7	0.55
15.532	34.871	4.563	10.03	31.01	0.58	0.41	2.06	1.48	0.94	0.54	3.64	34.7	0.54
15.853	35.086	4.560	10.27	31.09	0.58	0.41	2.07	1.49	0.95	0.54	3.64	34.7	0.54
16.178	35.310	4.558	10.50	31.17	0.58	0.41	2.07	1.50	0.95	0.54	3.63	34.6	0.53
16.512	35.561	4.556	10.74	31.25	0.58	0.41	2.08	1.50	0.96	0.54	3.63	34.6	0.53
16.855	35.812	4.555	10.99	31.34	0.57	0.41	2.08	1.51	0.96	0.55	3.64	34.7	0.52
17.202	36.036	4.552	11.24	31.43	0.57	0.42	2.09	1.52	0.97	0.55	3.63	34.6	0.52
17.532	36.296	4.551	11.48	31.51	0.57	0.42	2.09	1.52	0.97	0.55	3.63	34.6	0.52
17.888	36.556	4.549	11.73	31.60	0.57	0.42	2.10	1.53	0.98	0.55	3.64	34.7	0.51
18.252	36.771	4.546	12.00	31.70	0.57	0.42	2.10	1.54	0.98	0.56	3.63	34.6	0.51
18.617	37.022	4.545	12.26	31.79	0.56	0.43	2.11	1.54	0.98	0.56	3.63	34.6	0.50
18.990	37.273	4.543	12.53	31.89	0.56	0.43	2.11	1.55	0.99	0.56	3.63	34.6	0.50
19.363	37.497	4.541	12.80	31.99	0.56	0.43	2.11	1.55	0.99	0.56	3.62	34.6	0.50
19.745	37.748	4.539	13.07	32.09	0.56	0.43	2.12	1.56	0.99	0.56	3.62	34.6	0.49
20.136	37.990	4.538	13.35	32.20	0.56	0.43	2.12	1.57	1.00	0.57	3.62	34.6	0.49
20.543	38.232	4.536	13.65	32.31	0.56	0.43	2.13	1.57	1.00	0.57	3.62	34.6	0.49
20.951	38.474	4.533	13.94	32.42	0.55	0.44	2.13	1.58	1.01	0.57	3.61	34.5	0.48
21.359	38.715	4.532	14.24	32.53	0.55	0.44	2.13	1.58	1.01	0.57	3.61	34.5	0.48
21.767	38.940	4.530	14.53	32.64	0.55	0.44	2.14	1.59	1.01	0.57	3.61	34.5	0.48
22.192	39.190	4.528	14.84	32.76	0.55	0.44	2.14	1.59	1.02	0.58	3.61	34.5	0.48
22.609	39.414	4.527	15.14	32.87	0.55	0.44	2.14	1.60	1.02	0.58	3.61	34.5	0.47
23.043	39.692	4.528	15.45	32.99	0.55	0.44	2.15	1.60	1.02	0.58	3.62	34.6	0.47
23.494	39.943	4.532	15.77	33.12	0.55	0.44	2.15	1.60	1.02	0.58	3.65	34.7	0.47
23.945	40.185	4.532	16.10	33.25	0.55	0.44	2.15	1.60	1.02	0.58	3.66	34.8	0.47
24.405	40.463	4.532	16.43	33.38	0.55	0.44	2.16	1.60	1.02	0.58	3.67	34.9	0.47
24.857	40.705	4.532	16.76	33.51	0.55	0.44	2.16	1.61	1.02	0.58	3.67	34.9	0.47
25.325	40.956	4.530	17.09	33.65	0.55	0.44	2.16	1.61	1.03	0.59	3.67	34.8	0.47
25.794	41.162	4.529	17.43	33.79	0.55	0.44	2.16	1.61	1.03	0.59	3.66	34.8	0.47
26.280	41.404	4.527	17.78	33.93	0.55	0.44	2.16	1.62	1.03	0.59	3.66	34.8	0.46
26.783	41.628	4.525	18.15	34.08	0.54	0.44	2.17	1.62	1.03	0.59	3.65	34.7	0.46
27.287	41.879	4.525	18.51	34.23	0.54	0.45	2.17	1.62	1.03	0.59	3.65	34.7	0.46
27.790	42.076	4.522	18.87	34.39	0.54	0.45	2.17	1.63	1.04	0.59	3.64	34.6	0.46
28.285	42.264	4.520	19.23	34.54	0.54	0.45	2.17	1.63	1.04	0.59	3.63	34.6	0.46
28.797	42.452	4.518	19.60	34.70	0.54	0.45	2.17	1.63	1.04	0.59	3.62	34.5	0.46
29.317	42.632	4.517	19.97	34.86	0.54	0.45	2.17	1.63	1.04	0.59	3.60	34.4	0.45
29.873	42.802	4.515	20.37	35.03	0.53	0.45	2.17	1.63	1.04	0.59	3.59	34.4	0.45
30.003	42.847	4.514	20.47	35.08	0.53	0.46	2.17	1.63	1.04	0.59	3.59	34.3	0.45

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	15.1	63.8	21.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
●	33	7	4.79	0.66	0.38	0.141	0.0234	0.0037	8.22	179.9

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty sand with gravel	SM	

Project No.: 93086
Project: Haywood Co. Landfill
● Location:

Date: April 20, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Remarks:

Boring B5

Sample No. U3

Figure No. _____

SUMMARY OF RESULTS OF FLEXIBLE WALL PERMEABILITY TEST

Project:	Haywood Co. C&D Landfill	By:	D. Aghjayan
Project No.:	93086	Date:	April 19, 1993
Boring:	B5	Checked:	G. Thomas
Sample:	U3	Date:	April 22, 1993
Test No.:	K1		

Test Result

Permeability: 1.5×10^{-4} cm/sec

Soil:

Sample Type: Undisturbed tube sample.

Description: Silty SAND with Gravel (SM)

Specimen Details:

Specimen Diameter:	7.238 cm	Initial Dry Density:	103.6 pcf
Specimen Height:	12.072 cm	Initial Water Content:	19.3 %
Specimen Area:	41.15 cm^2	Final Water Content:	24.8 %

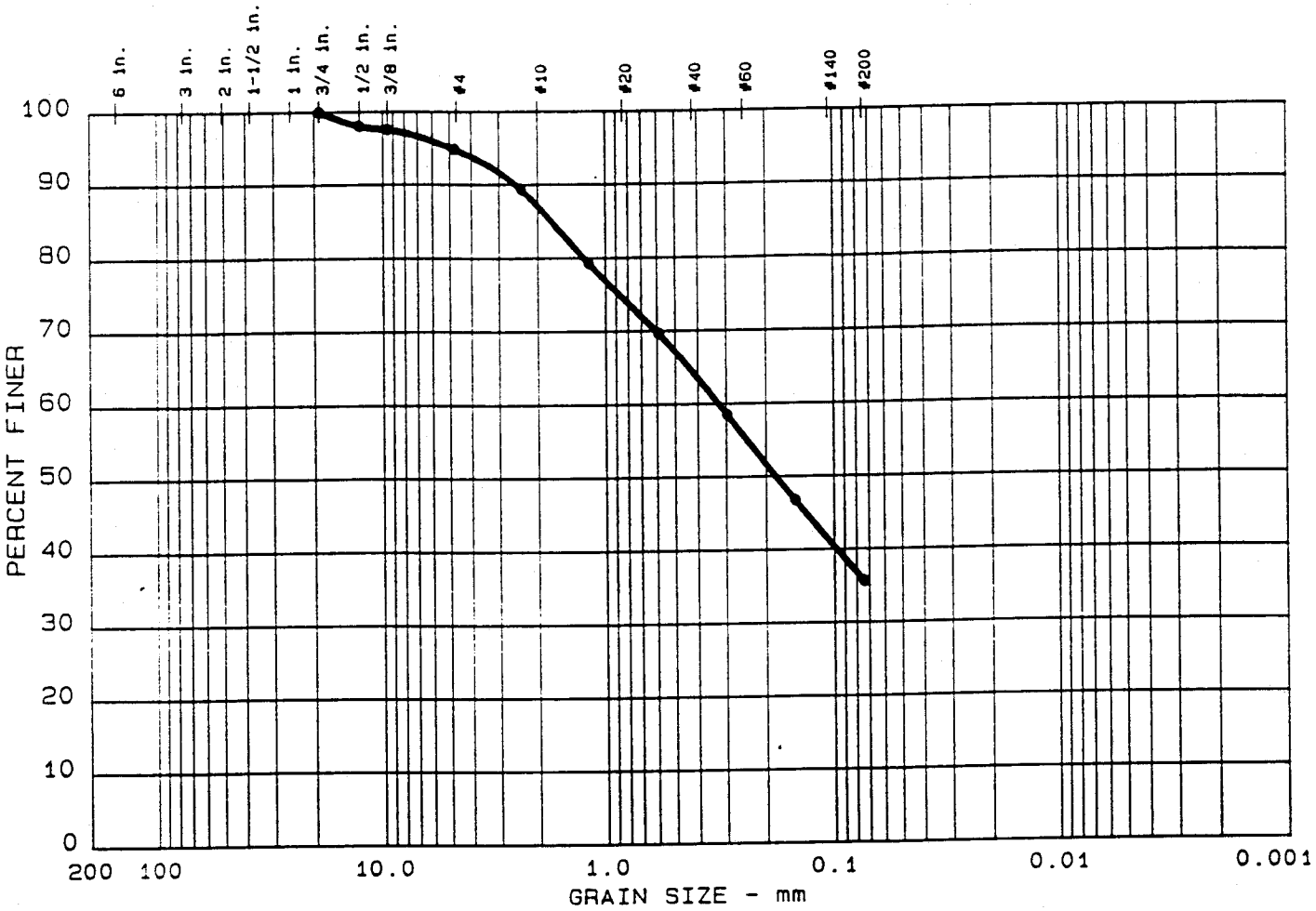
Test Details:

Procedure:	ASTM D5084–90 Falling head with rising tailwater	Consolidation Stress:	0.5 ksc
		Back Pressure:	6.00 ksc
Permeant:	Tap Water	B–Value:	0.96

Trial #	1	2	3	4
Permeability: (cm/sec)	1.80×10^{-4}	1.47×10^{-4}	1.44×10^{-4}	1.46×10^{-4}
Initial Gradient:	5.55	5.72	5.80	5.96

Remarks

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	5.2	59.3	35.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	42	8	1.74	0.32	0.18					

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty sand	SM	

Project No.: 93086
Project: Haywood Co. C&D Landfill
● Location:

Date: April 19, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Remarks:

Boring 86

Sample No. U-1

Figure No. _____

SUMMARY OF RESULTS OF FLEXIBLE WALL PERMEABILITY TEST

Project:	Haywood Co. C&D Landfill	By:	D. Aghjayan
Project No.:	93086	Date:	April 19, 1993
Boring:	B6	Checked:	G. Thomas
Sample:	U1	Date:	April 22, 1993
Test No.:	K1		

Test Result

Permeability: 1.2×10^{-4} cm/sec

Soil:

Sample Type: Undisturbed tube sample.

Description: Silty SAND (SM)

Specimen Details:

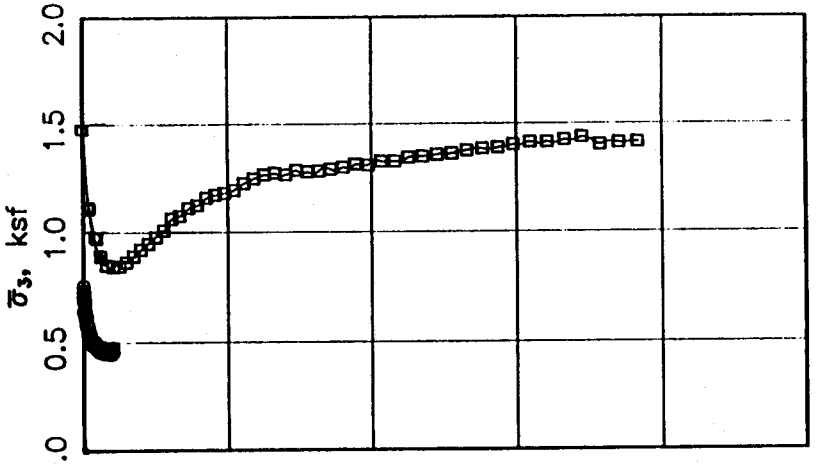
Specimen Diameter:	7.276 cm	Initial Dry Density:	87.7 pcf
Specimen Height:	16.371 cm	Initial Water Content:	26.8 %
Specimen Area:	41.58 cm^2	Final Water Content:	33.2 %

Test Details:

Procedure:	ASTM D5084–90	Consolidation Stress:	0.37 ksc
	Falling head with rising tailwater	Back Pressure:	7.00 ksc
Permeant:	Tap Water	B–Value:	0.99

Trial #	1	2	3	4
Permeability: (cm/sec)	1.08×10^{-4}	1.27×10^{-4}	1.27×10^{-4}	1.16×10^{-4}
Initial Gradient:	6.17	6.96	6.96	7.33

Remarks



SOIL: Boring B6, Sample U1, Depth = 10.3 ft.
Description: Silty SAND (SM)

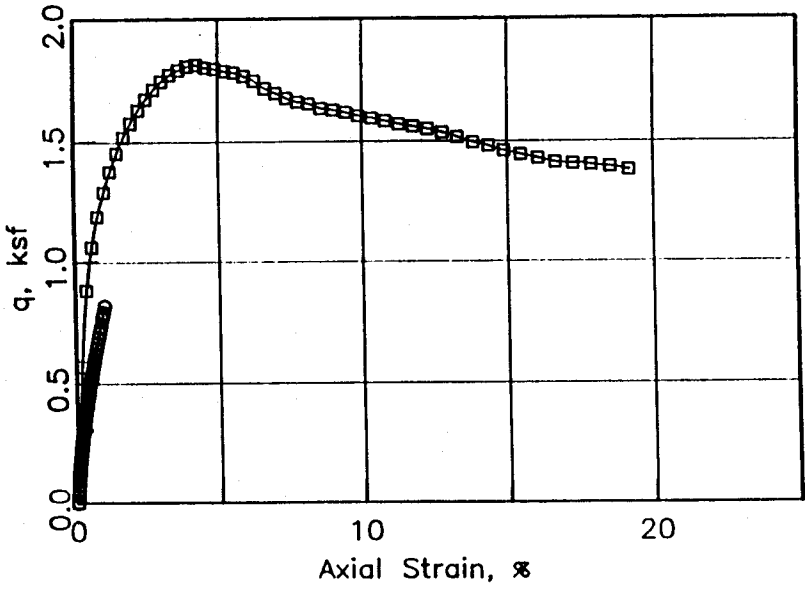
STRUCTURE: 2.8-inch diameter undisturbed tube sample.

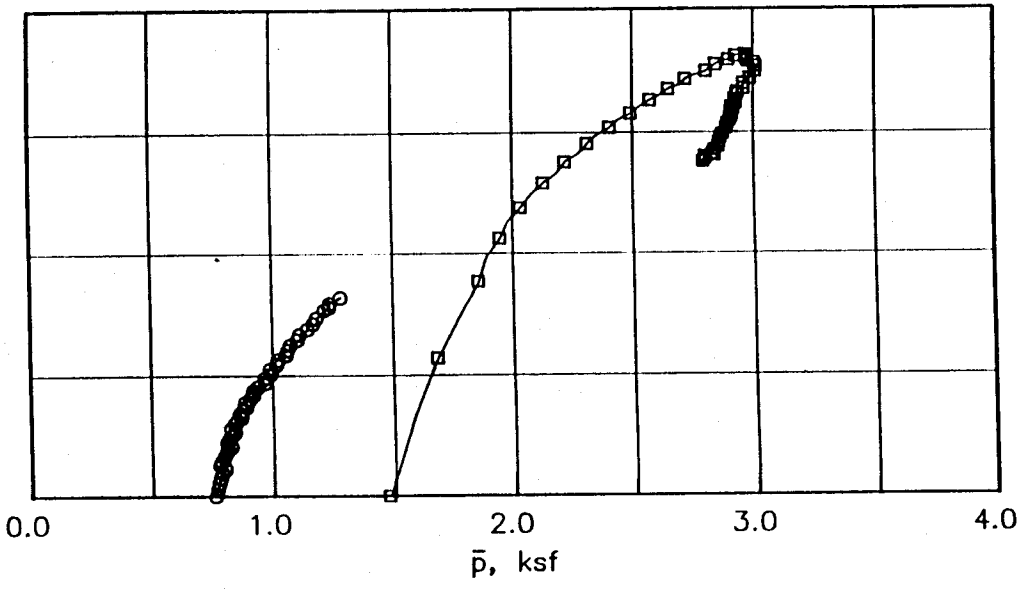
STATE: w_1 = 26.8 %, γ_{d1} = 87.7 pcf, B = 0.99
w_1 = 33.7 %, γ_{d1} = 89.2 pcf
w_2 = 33.2 %, γ_{d2} = 89.7 pcf

LOADING: Undrained axial monotonic compression.

SPECIMEN SIZE: Height = 6.45 in. Diameter = 2.87in.

REMARKS: Shear failure.





Stage #	$\bar{\sigma}_c$ (ksf)	Symbol
1	0.75	o
2	1.47	□

DSA Design Group	Geo. Services C & D Landfill Haywood Co., NC	ISOTROPICALLY CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION with Pore Pressure Measurements Boring B6 Sample U1
GEI Consultants, Inc.	Project 93086	April 20, 1993 Fig.

PROJECT #:	Haywood Co. Landfill													
PROJECT:	93086			Stage	SIGMAv'	SIGMAh'	Height	Diameter	Area	Water Content	Dry Density	Total Density	Void Ratio	
TEST:	R'1/K1				ksf	ksf	inch	inch	in²	(%)	pcf	pcf		
BORING:	B6			In situ	0.00	0.00	0.000	0.000	0.000					
SAMPLE:	U1			After Sampling	0.00	0.00	0.000	0.000	0.000					
DEPTH (ft):	10.3 ft.			In tube before extrusion	0.00	0.00	6.476	2.882	6.526	26.79	87.7	111.1	0.925	
OPER.:	D. Aghjayan			Under vac.	0.76	0.76	6.445	2.865	6.445					
TEST DATE:	4/13/93													
DCDT No.	147			End of:							calculated from start of test			
DCDT Calibration Factor	-0.561811	inch/(mV/V)		Saturation	0.76	0.76	6.445	2.865	6.445	33.67	89.2	119.2	0.925	
Load Cell No.	A8897			Consol. Stage 1	0.75	0.75	6.445	2.865	6.445	33.67	89.2	119.2	0.925	
Load Cell Cal. Factor	-62.470177	lb/(mV/V)		Consol. Stage 2	1.47	1.47	6.393	2.867	6.457	33.24	89.7	119.6	0.913	
Pressure Transducer	25221			Consol. Stage 3	1.47	1.47	6.393	2.867	6.457	33.24	89.7	119.6	0.913	
Pres. Trans. Cal. Factor	-25.217379	psi/(mV/V)		Consol. Stage 4	1.47	1.47	6.393	2.867	6.457	33.24	89.7	119.6	0.913	
				Consol. Stage 5	1.47	1.47	6.393	2.867	6.457	33.24	89.7	119.6	0.913	
Gravity of Solids	2.75	(assumed)		Final Shear 6										
B value start shear	0.99			This Stage Initial Values	0.75	0.75	6.445	2.865	6.445	33.67	89.2	119.2	0.925	
Test Stage #	2			Kc start stage	1.00									
Stage Strain rate	0.153	%/min												
Data Start Row	118													

Axial DCDT (inch)	Load Cell (lb)	Pore Pressure (ksf)	Axial Strain (%)	Area (in²)	Excess Pore Pressure (ksf)	Sigma3 effective (ksf)	Total SigmaV (ksf)	SigmaV Effective (ksf)	P' (ksf)	q (ksf)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
0.000	-0.228	14.391	0.00	6.44	0.00	0.75	0.75	0.75	0.75	0.00	1.00	0.0	0.00
0.000	1.102	14.405	0.00	6.45	0.01	0.74	0.78	0.77	0.75	0.01	1.04	1.1	0.45
0.000	2.565	14.414	0.01	6.45	0.02	0.73	0.81	0.79	0.76	0.03	1.09	2.4	0.35
0.001	3.781	14.422	0.01	6.45	0.03	0.72	0.84	0.81	0.77	0.04	1.12	3.4	0.35
0.001	4.807	14.431	0.01	6.45	0.04	0.71	0.86	0.82	0.77	0.06	1.16	4.2	0.35
0.001	5.795	14.440	0.02	6.45	0.05	0.70	0.89	0.84	0.77	0.07	1.19	5.0	0.36
0.001	6.650	14.444	0.02	6.45	0.05	0.70	0.91	0.85	0.78	0.08	1.22	5.7	0.35
0.001	7.524	14.453	0.02	6.45	0.06	0.69	0.92	0.86	0.78	0.09	1.25	6.4	0.36
0.002	8.455	14.458	0.03	6.45	0.07	0.69	0.95	0.88	0.78	0.10	1.28	7.1	0.34
0.002	9.139	14.462	0.03	6.45	0.07	0.68	0.96	0.89	0.79	0.10	1.31	7.7	0.34
0.002	10.031	14.462	0.04	6.45	0.07	0.68	0.98	0.91	0.80	0.11	1.34	8.3	0.31
0.003	10.677	14.480	0.05	6.45	0.09	0.66	1.00	0.91	0.79	0.12	1.37	8.9	0.36
0.003	11.437	14.502	0.05	6.45	0.11	0.64	1.01	0.90	0.77	0.13	1.41	9.7	0.42
0.003	12.121	14.506	0.05	6.45	0.11	0.64	1.03	0.91	0.77	0.14	1.43	10.3	0.42
0.004	12.900	14.511	0.06	6.45	0.12	0.63	1.04	0.93	0.78	0.15	1.46	10.8	0.41
0.004	13.603	14.515	0.06	6.45	0.12	0.63	1.06	0.94	0.78	0.15	1.49	11.4	0.40
0.004	14.268	14.515	0.07	6.45	0.12	0.63	1.08	0.95	0.79	0.16	1.52	11.8	0.38

Axial DCDT (inch)	Load Cell (lb)	Pore Pressure (ksf)	Axial Strain (%)	Area (in^2)	Excess Pore Pressure (ksf)	Sigma3 effective (ksf)	Total SigmaV (ksf)	SigmaV Effective (ksf)	P' (ksf)	q (ksf)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
0.005	14.971	14.519	0.07	6.45	0.13	0.62	1.09	0.96	0.79	0.17	1.54	12.3	0.38
0.005	15.655	14.524	0.08	6.45	0.13	0.62	1.11	0.97	0.80	0.18	1.57	12.9	0.37
0.005	16.339	14.524	0.08	6.45	0.13	0.62	1.12	0.99	0.80	0.18	1.60	13.3	0.36
0.006	17.042	14.528	0.09	6.45	0.14	0.61	1.14	1.00	0.81	0.19	1.63	13.8	0.36
0.006	17.707	14.528	0.10	6.45	0.14	0.61	1.15	1.01	0.81	0.20	1.65	14.2	0.34
0.006	18.372	14.528	0.10	6.45	0.14	0.61	1.17	1.03	0.82	0.21	1.68	14.6	0.33
0.007	19.075	14.564	0.11	6.45	0.17	0.58	1.18	1.01	0.79	0.22	1.74	15.7	0.40
0.007	19.721	14.564	0.12	6.45	0.17	0.58	1.20	1.02	0.80	0.22	1.77	16.1	0.39
0.008	20.386	14.564	0.12	6.45	0.17	0.58	1.21	1.04	0.81	0.23	1.79	16.5	0.37
0.008	21.051	14.568	0.13	6.45	0.18	0.57	1.23	1.05	0.81	0.24	1.83	17.0	0.37
0.009	21.716	14.568	0.14	6.45	0.18	0.57	1.24	1.06	0.82	0.24	1.85	17.4	0.36
0.009	22.381	14.572	0.14	6.45	0.18	0.57	1.26	1.08	0.82	0.25	1.88	17.8	0.36
0.010	23.065	14.572	0.15	6.45	0.18	0.57	1.27	1.09	0.83	0.26	1.91	18.2	0.35
0.010	23.673	14.572	0.16	6.46	0.18	0.57	1.28	1.10	0.84	0.27	1.93	18.6	0.34
0.011	24.338	14.568	0.17	6.46	0.18	0.57	1.30	1.12	0.85	0.27	1.95	18.8	0.32
0.011	25.003	14.603	0.17	6.46	0.21	0.54	1.31	1.10	0.82	0.28	2.04	20.0	0.38
0.012	26.656	14.603	0.19	6.46	0.21	0.54	1.35	1.14	0.84	0.30	2.11	20.9	0.35
0.012	26.808	14.608	0.20	6.46	0.22	0.54	1.35	1.14	0.84	0.30	2.13	21.1	0.36
0.012	26.979	14.608	0.20	6.46	0.22	0.54	1.36	1.14	0.84	0.30	2.13	21.2	0.36
0.013	27.606	14.608	0.20	6.46	0.22	0.54	1.37	1.16	0.85	0.31	2.16	21.5	0.35
0.013	28.290	14.603	0.21	6.46	0.21	0.54	1.39	1.18	0.86	0.32	2.18	21.8	0.33
0.014	28.955	14.603	0.22	6.46	0.21	0.54	1.40	1.19	0.86	0.33	2.21	22.1	0.33
0.015	29.677	14.617	0.23	6.46	0.23	0.53	1.42	1.19	0.86	0.33	2.27	22.8	0.34
0.015	30.323	14.626	0.24	6.46	0.23	0.52	1.43	1.20	0.86	0.34	2.32	23.4	0.34
0.016	31.006	14.630	0.25	6.46	0.24	0.51	1.45	1.21	0.86	0.35	2.36	23.8	0.34
0.017	31.671	14.626	0.26	6.46	0.23	0.52	1.46	1.23	0.87	0.36	2.37	24.0	0.33
0.017	32.337	14.626	0.27	6.46	0.23	0.52	1.48	1.24	0.88	0.36	2.40	24.3	0.32
0.018	33.058	14.626	0.28	6.46	0.23	0.52	1.49	1.26	0.89	0.37	2.43	24.7	0.32
0.018	33.723	14.626	0.29	6.46	0.23	0.52	1.51	1.27	0.90	0.38	2.46	25.0	0.31
0.019	34.464	14.648	0.30	6.46	0.26	0.50	1.52	1.27	0.88	0.39	2.56	26.0	0.33
0.020	35.186	14.648	0.31	6.46	0.26	0.50	1.54	1.28	0.89	0.39	2.59	26.3	0.32
0.021	35.889	14.643	0.32	6.47	0.25	0.50	1.56	1.30	0.90	0.40	2.61	26.5	0.31
0.021	36.573	14.643	0.33	6.47	0.25	0.50	1.57	1.32	0.91	0.41	2.64	26.8	0.31
0.022	37.333	14.643	0.34	6.47	0.25	0.50	1.59	1.34	0.92	0.42	2.67	27.1	0.30
0.023	38.036	14.634	0.36	6.47	0.24	0.51	1.60	1.36	0.93	0.43	2.67	27.1	0.29
0.023	38.815	14.661	0.37	6.47	0.27	0.48	1.62	1.35	0.92	0.43	2.80	28.3	0.31
0.024	39.537	14.656	0.38	6.47	0.27	0.49	1.64	1.37	0.93	0.44	2.82	28.4	0.30
0.025	40.335	14.656	0.39	6.47	0.27	0.49	1.65	1.39	0.94	0.45	2.86	28.8	0.29
0.026	41.076	14.652	0.40	6.47	0.26	0.49	1.67	1.41	0.95	0.46	2.87	28.9	0.28
0.027	41.874	14.643	0.42	6.47	0.25	0.50	1.69	1.44	0.97	0.47	2.87	28.9	0.27
0.028	42.672	14.670	0.43	6.47	0.28	0.47	1.71	1.43	0.95	0.48	3.02	30.1	0.29
0.028	43.489	14.665	0.44	6.47	0.27	0.48	1.72	1.45	0.96	0.49	3.04	30.3	0.28

Axial DCDT (inch)	Load Cell (lb)	Pore Pressure (ksf)	Axial Strain (%)	Area (in^2)	Excess Pore Pressure (ksf)	Sigma3 effective (ksf)	Total SigmaV (ksf)	SigmaV Effective (ksf)	P' (ksf)	q (ksf)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
0.029	44.325	14.665	0.46	6.47	0.27	0.48	1.74	1.47	0.97	0.50	3.07	30.6	0.28
0.030	45.180	14.656	0.47	6.48	0.27	0.49	1.76	1.50	0.99	0.50	3.08	30.6	0.26
0.031	45.997	14.679	0.48	6.48	0.29	0.46	1.78	1.49	0.98	0.51	3.21	31.7	0.28
0.032	46.852	14.679	0.50	6.48	0.29	0.46	1.80	1.51	0.99	0.52	3.25	32.0	0.27
0.033	47.707	14.674	0.51	6.48	0.28	0.47	1.82	1.53	1.00	0.53	3.27	32.1	0.27
0.034	48.562	14.670	0.53	6.48	0.28	0.47	1.84	1.56	1.02	0.54	3.29	32.3	0.26
0.035	49.436	14.687	0.54	6.48	0.30	0.46	1.86	1.56	1.01	0.55	3.42	33.2	0.27
0.036	50.309	14.683	0.56	6.48	0.29	0.46	1.87	1.58	1.02	0.56	3.44	33.3	0.26
0.037	51.183	14.679	0.58	6.48	0.29	0.46	1.89	1.61	1.04	0.57	3.46	33.5	0.25
0.038	52.076	14.670	0.59	6.48	0.28	0.47	1.91	1.64	1.05	0.58	3.45	33.4	0.24
0.039	53.026	14.687	0.61	6.48	0.30	0.46	1.93	1.64	1.05	0.59	3.60	34.4	0.25
0.040	53.919	14.683	0.62	6.49	0.29	0.46	1.95	1.66	1.06	0.60	3.61	34.5	0.24
0.041	54.831	14.679	0.64	6.49	0.29	0.46	1.97	1.69	1.08	0.61	3.63	34.6	0.23
0.042	55.781	14.692	0.66	6.49	0.30	0.45	1.99	1.69	1.07	0.62	3.75	35.4	0.24
0.043	56.731	14.692	0.68	6.49	0.30	0.45	2.02	1.72	1.08	0.63	3.80	35.7	0.24
0.044	57.681	14.683	0.69	6.49	0.29	0.46	2.04	1.75	1.10	0.64	3.79	35.6	0.23
0.046	58.707	14.674	0.71	6.49	0.28	0.47	2.06	1.78	1.12	0.65	3.79	35.6	0.22
0.047	59.638	14.696	0.73	6.49	0.30	0.45	2.08	1.77	1.11	0.66	3.97	36.7	0.23
0.048	60.645	14.683	0.75	6.49	0.29	0.46	2.10	1.81	1.14	0.67	3.93	36.5	0.22
0.049	61.652	14.683	0.77	6.49	0.29	0.46	2.12	1.83	1.15	0.69	3.98	36.8	0.21
0.051	62.678	14.692	0.79	6.50	0.30	0.45	2.15	1.85	1.15	0.70	4.09	37.4	0.22
0.052	63.685	14.683	0.81	6.50	0.29	0.46	2.17	1.88	1.17	0.71	4.08	37.3	0.21
0.053	64.711	14.674	0.82	6.50	0.28	0.47	2.19	1.91	1.19	0.72	4.07	37.3	0.20
0.054	65.813	14.692	0.85	6.50	0.30	0.45	2.21	1.91	1.18	0.73	4.24	38.2	0.21
0.056	66.877	14.683	0.87	6.50	0.29	0.46	2.24	1.95	1.20	0.74	4.23	38.1	0.20
0.058	68.891	14.692	0.91	6.50	0.30	0.45	2.28	1.98	1.22	0.77	4.39	39.0	0.20
0.058	69.024	14.692	0.91	6.50	0.30	0.45	2.28	1.98	1.22	0.77	4.40	39.0	0.20
0.059	69.821	14.683	0.93	6.51	0.29	0.46	2.30	2.01	1.24	0.78	4.37	38.9	0.19
0.060	70.069	14.683	0.93	6.51	0.29	0.46	2.31	2.02	1.24	0.78	4.38	38.9	0.19
0.061	71.189	14.696	0.95	6.51	0.30	0.45	2.33	2.03	1.24	0.79	4.54	39.7	0.19
0.063	72.348	14.687	0.98	6.51	0.30	0.46	2.36	2.06	1.26	0.80	4.52	39.6	0.18
0.064	73.451	14.674	1.00	6.51	0.28	0.47	2.38	2.10	1.28	0.81	4.47	39.4	0.17

PROJECT #:	Haywood Co. Landfill												
PROJECT:	93086		Stage	SIGMAv'	SIGMAh'	Height	Diameter	Area	Water Content	Dry Density	Total Density	Void Ratio	
TEST:	R'1/K1												
BORING:	B6			ksf	ksf	inch	inch	in²	(%)	pcf	pcf		
SAMPLE:	U1		In situ	0.00	0.00	0.000	0.000	0.000					
DEPTH (ft):	10.3 ft.		After Sampling	0.00	0.00	0.000	0.000	0.000					
OPER.:	D. Aghjayan		In tube before extrusion	0.00	0.00	6.476	2.882	6.526	26.79	87.7	111.1	0.925	
TEST DATE:	4/13/93		Under vac.	0.76	0.76	6.445	2.865	6.445					
DCDT No.	147												
DCDT Calibration Factor	-0.561811027 inch/(mV/V)		End of:								calculated from start of test		
Load Cell No.	A8897		Saturation	0.76	0.76	6.445	2.865	6.445	33.67	89.2	119.2	0.925	
Load Cell Cal. Factor	-62.47017749 lb/(mV/V)		Consol. Stage 1	0.75	0.75	6.445	2.865	6.445	33.67	89.2	119.2	0.925	
Pressure Transducer	25221		Consol. Stage 2	1.47	1.47	6.393	2.867	6.457	33.24	89.7	119.6	0.913	
Pres. Trans. Cal. Factor	-25.217379 psi/(mV/V)		Consol. Stage 3	1.47	1.47	6.393	2.867	6.457	33.24	89.7	119.6	0.913	
			Consol. Stage 4	1.47	1.47	6.393	2.867	6.457	33.24	89.7	119.6	0.913	
Gravity of Solids	2.75 (assumed)		Consol. Stage 5	1.47	1.47	6.393	2.867	6.457	33.24	89.7	119.6	0.913	
B value start shear	0.99		Final Shear 6										
Test Stage #	3		This Stage Initial Values	1.47	1.47	6.393	2.867	6.457	33.24	89.7	119.6	0.913	
Stage Strain rate	0.019 %/min		Kc start stage	1.00									
Data Start Row	232												

Axial DCDT (inch)	Load Cell (lb)	Pore Pressure (ksf)	Axial Strain (%)	Area (in²)	Excess Pore Pressure (ksf)	Sigma3 effective (ksf)	Total SigmaV (ksf)	SigmaV Effective (ksf)	P' (ksf)	q (ksf)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
0.052	4.864	14.405	0.00	6.46	0.00	1.47	1.47	1.47	1.47	0.00	1.00	0.0	0.00
0.057	35.129	14.630	0.09	6.46	0.23	1.25	2.15	1.92	1.59	0.34	1.54	12.3	0.33
0.063	56.104	14.763	0.18	6.47	0.36	1.12	2.62	2.26	1.69	0.57	2.02	19.8	0.31
0.069	72.596	14.846	0.28	6.48	0.44	1.03	2.98	2.54	1.79	0.75	2.46	24.9	0.29
0.076	84.527	14.904	0.38	6.48	0.50	0.98	3.24	2.75	1.86	0.88	2.81	28.4	0.28
0.082	93.685	14.970	0.48	6.49	0.57	0.91	3.45	2.88	1.90	0.99	3.17	31.3	0.29
0.089	100.942	14.992	0.58	6.49	0.59	0.89	3.60	3.02	1.95	1.07	3.40	33.1	0.28
0.096	107.136	15.027	0.69	6.50	0.62	0.85	3.74	3.12	1.98	1.13	3.66	34.8	0.27
0.103	112.646	15.032	0.80	6.51	0.63	0.85	3.86	3.23	2.04	1.19	3.81	35.8	0.26
0.110	117.699	15.045	0.91	6.52	0.64	0.83	3.97	3.33	2.08	1.25	3.99	36.8	0.26
0.117	122.297	15.041	1.03	6.52	0.64	0.84	4.07	3.43	2.13	1.30	4.09	37.4	0.25
0.125	126.553	15.027	1.14	6.53	0.62	0.85	4.16	3.53	2.19	1.34	4.15	37.7	0.23
0.132	130.429	15.036	1.25	6.54	0.63	0.84	4.24	3.61	2.23	1.38	4.28	38.4	0.23
0.139	134.038	15.014	1.37	6.55	0.61	0.87	4.32	3.71	2.29	1.42	4.28	38.4	0.21
0.147	137.610	15.019	1.49	6.55	0.61	0.86	4.39	3.78	2.32	1.46	4.39	39.0	0.21
0.155	140.992	15.014	1.61	6.56	0.61	0.87	4.46	3.85	2.36	1.49	4.45	39.3	0.20
0.162	143.994	14.992	1.73	6.57	0.59	0.89	4.52	3.94	2.41	1.52	4.44	39.2	0.19
0.170	146.958	14.988	1.86	6.58	0.58	0.89	4.58	4.00	2.45	1.55	4.49	39.5	0.19
0.178	149.694	14.961	1.98	6.59	0.56	0.92	4.64	4.08	2.50	1.58	4.45	39.3	0.18
0.187	152.467	14.952	2.11	6.60	0.55	0.93	4.70	4.15	2.54	1.61	4.48	39.4	0.17
0.195	155.089	14.935	2.24	6.61	0.53	0.94	4.75	4.22	2.58	1.64	4.47	39.4	0.16
0.203	157.407	14.913	2.37	6.61	0.51	0.97	4.80	4.29	2.63	1.66	4.44	39.2	0.15
0.212	159.649	14.904	2.51	6.62	0.50	0.98	4.84	4.34	2.66	1.68	4.45	39.3	0.15
0.220	161.701	14.873	2.64	6.63	0.47	1.01	4.88	4.41	2.71	1.70	4.38	38.9	0.14

Axial DCDT (inch)	Load Cell (lb)	Pore Pressure (ksf)	Axial Strain (%)	Area (in^2)	Excess Pore Pressure (ksf)	Sigma3 effective (ksf)	Total SigmaV (ksf)	SigmaV Effective (ksf)	P' (ksf)	q (ksf)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
0.229	163.791	14.873	2.77	6.64	0.47	1.01	4.92	4.45	2.73	1.72	4.42	39.1	0.14
0.238	165.539	14.855	2.91	6.65	0.45	1.02	4.95	4.50	2.76	1.74	4.40	39.0	0.13
0.247	167.211	14.820	3.05	6.66	0.42	1.06	4.98	4.57	2.81	1.76	4.31	38.6	0.12
0.255	168.769	14.815	3.19	6.67	0.41	1.06	5.01	4.60	2.83	1.77	4.33	38.6	0.12
0.265	170.137	14.807	3.33	6.68	0.40	1.07	5.04	4.64	2.85	1.78	4.32	38.6	0.11
0.274	171.505	14.798	3.48	6.69	0.39	1.08	5.06	4.67	2.88	1.79	4.32	38.6	0.11
0.284	172.417	14.771	3.63	6.70	0.37	1.11	5.08	4.71	2.91	1.80	4.25	38.2	0.10
0.293	173.367	14.763	3.78	6.71	0.36	1.12	5.09	4.73	2.92	1.81	4.24	38.2	0.10
0.303	174.392	14.758	3.93	6.72	0.35	1.12	5.11	4.75	2.94	1.82	4.24	38.2	0.10
0.313	175.191	14.749	4.09	6.73	0.34	1.13	5.12	4.77	2.95	1.82	4.22	38.1	0.09
0.323	175.532	14.723	4.24	6.74	0.32	1.16	5.12	4.80	2.98	1.82	4.15	37.7	0.09
0.333	175.305	14.714	4.40	6.75	0.31	1.17	5.11	4.80	2.98	1.82	4.12	37.5	0.09
0.343	174.963	14.709	4.56	6.77	0.30	1.17	5.10	4.79	2.98	1.81	4.09	37.4	0.08
0.353	174.963	14.705	4.72	6.78	0.30	1.17	5.09	4.79	2.98	1.81	4.08	37.3	0.08
0.364	175.000	14.701	4.88	6.79	0.30	1.18	5.08	4.79	2.98	1.80	4.06	37.2	0.08
0.374	175.000	14.696	5.05	6.80	0.29	1.18	5.08	4.79	2.98	1.80	4.04	37.1	0.08
0.385	174.659	14.687	5.21	6.81	0.28	1.19	5.06	4.78	2.99	1.79	4.01	36.9	0.08
0.395	174.659	14.674	5.37	6.82	0.27	1.21	5.06	4.79	3.00	1.79	3.97	36.7	0.08
0.406	174.734	14.656	5.55	6.84	0.25	1.22	5.05	4.80	3.01	1.79	3.93	36.4	0.07
0.417	174.355	14.648	5.72	6.85	0.24	1.23	5.04	4.80	3.01	1.78	3.89	36.2	0.07
0.428	174.013	14.634	5.89	6.86	0.23	1.25	5.02	4.80	3.02	1.78	3.85	36.0	0.06
0.439	173.670	14.626	6.07	6.87	0.22	1.25	5.01	4.79	3.02	1.77	3.82	35.8	0.06
0.451	172.797	14.617	6.25	6.89	0.21	1.26	4.99	4.77	3.02	1.76	3.78	35.6	0.06
0.463	171.657	14.617	6.43	6.90	0.21	1.26	4.96	4.74	3.00	1.74	3.76	35.4	0.06
0.475	170.555	14.608	6.62	6.91	0.20	1.27	4.93	4.72	3.00	1.73	3.71	35.1	0.06
0.487	169.833	14.621	6.81	6.93	0.22	1.26	4.90	4.69	2.97	1.71	3.72	35.2	0.06
0.499	169.301	14.617	6.99	6.94	0.21	1.26	4.89	4.67	2.97	1.71	3.70	35.1	0.06
0.510	168.731	14.608	7.18	6.96	0.20	1.27	4.87	4.66	2.97	1.70	3.67	34.9	0.06
0.523	167.933	14.595	7.37	6.97	0.19	1.28	4.84	4.65	2.97	1.68	3.62	34.6	0.06
0.535	167.439	14.612	7.56	6.99	0.21	1.27	4.83	4.62	2.94	1.68	3.64	34.7	0.06
0.548	167.135	14.603	7.76	7.00	0.20	1.28	4.81	4.61	2.95	1.67	3.62	34.5	0.06
0.560	167.135	14.612	7.96	7.02	0.21	1.27	4.81	4.60	2.93	1.67	3.63	34.6	0.06
0.573	167.059	14.599	8.16	7.03	0.19	1.28	4.80	4.60	2.94	1.66	3.59	34.4	0.06
0.586	166.527	14.581	8.36	7.05	0.18	1.30	4.78	4.60	2.95	1.65	3.54	34.1	0.05
0.600	165.843	14.590	8.57	7.06	0.19	1.29	4.76	4.57	2.93	1.64	3.55	34.1	0.06
0.613	165.995	14.599	8.79	7.08	0.19	1.28	4.75	4.56	2.92	1.64	3.56	34.2	0.06
0.627	165.957	14.581	9.00	7.10	0.18	1.30	4.74	4.57	2.93	1.63	3.52	33.9	0.05
0.640	165.919	14.586	9.21	7.11	0.18	1.29	4.74	4.55	2.92	1.63	3.52	33.9	0.06
0.655	165.805	14.568	9.43	7.13	0.16	1.31	4.73	4.56	2.94	1.63	3.48	33.6	0.05
0.668	165.463	14.572	9.65	7.15	0.17	1.31	4.71	4.54	2.92	1.62	3.48	33.6	0.05
0.682	165.121	14.572	9.87	7.16	0.17	1.31	4.70	4.53	2.92	1.61	3.46	33.5	0.05
0.697	164.969	14.550	10.09	7.18	0.15	1.33	4.68	4.54	2.93	1.61	3.42	33.2	0.05
0.711	164.931	14.555	10.32	7.20	0.15	1.32	4.68	4.53	2.93	1.60	3.42	33.2	0.05
0.726	164.779	14.555	10.55	7.22	0.15	1.32	4.66	4.51	2.92	1.60	3.41	33.1	0.05

Axial DCDT (inch)	Load Cell (lb)	Pore Pressure (ksf)	Axial Strain (%)	Area (in^2)	Excess Pore Pressure (ksf)	Sigma3 effective (ksf)	Total SigmaV (ksf)	SigmaV Effective (ksf)	P' (ksf)	q (ksf)	s1'/s3'	Friction Angle (deg)	Pressure Parameter A (-)
0.741	164.551	14.555	10.78	7.24	0.15	1.32	4.65	4.50	2.91	1.59	3.40	33.0	0.05
0.756	164.437	14.555	11.01	7.26	0.15	1.32	4.64	4.49	2.91	1.58	3.39	33.0	0.05
0.771	164.133	14.537	11.25	7.28	0.13	1.34	4.63	4.49	2.92	1.58	3.35	32.7	0.04
0.786	164.019	14.533	11.49	7.30	0.13	1.35	4.62	4.49	2.92	1.57	3.33	32.6	0.04
0.802	164.057	14.533	11.73	7.32	0.13	1.35	4.61	4.48	2.91	1.57	3.33	32.5	0.04
0.817	163.905	14.528	11.98	7.34	0.12	1.35	4.60	4.47	2.91	1.56	3.31	32.4	0.04
0.833	163.829	14.524	12.23	7.36	0.12	1.36	4.59	4.47	2.91	1.56	3.30	32.3	0.04
0.849	163.639	14.519	12.47	7.38	0.11	1.36	4.57	4.46	2.91	1.55	3.28	32.2	0.04
0.866	163.221	14.519	12.73	7.40	0.11	1.36	4.56	4.44	2.90	1.54	3.27	32.1	0.04
0.882	162.917	14.511	12.99	7.42	0.11	1.37	4.54	4.44	2.90	1.53	3.24	31.9	0.03
0.899	162.195	14.506	13.25	7.44	0.10	1.37	4.52	4.42	2.90	1.52	3.22	31.7	0.03
0.916	161.397	14.498	13.51	7.47	0.09	1.38	4.49	4.40	2.89	1.51	3.18	31.5	0.03
0.933	160.903	14.498	13.78	7.49	0.09	1.38	4.47	4.38	2.88	1.50	3.17	31.4	0.03
0.950	160.789	14.502	14.06	7.51	0.10	1.38	4.46	4.37	2.87	1.49	3.17	31.4	0.03
0.967	160.409	14.493	14.32	7.54	0.09	1.39	4.45	4.36	2.87	1.49	3.14	31.2	0.03
0.984	159.611	14.488	14.58	7.56	0.08	1.39	4.42	4.34	2.86	1.47	3.12	31.0	0.03
1.001	159.269	14.480	14.86	7.58	0.07	1.40	4.41	4.33	2.87	1.47	3.09	30.8	0.03
1.019	158.965	14.480	15.13	7.61	0.07	1.40	4.39	4.32	2.86	1.46	3.08	30.7	0.03
1.037	158.509	14.467	15.42	7.63	0.06	1.41	4.37	4.31	2.86	1.45	3.05	30.4	0.02
1.056	158.319	14.475	15.71	7.66	0.07	1.40	4.36	4.29	2.85	1.44	3.05	30.4	0.02
1.075	158.015	14.467	16.01	7.69	0.06	1.41	4.34	4.28	2.85	1.43	3.03	30.2	0.02
1.094	157.559	14.471	16.30	7.72	0.07	1.41	4.32	4.26	2.83	1.43	3.02	30.2	0.02
1.113	157.331	14.458	16.60	7.74	0.05	1.42	4.31	4.26	2.84	1.42	2.99	30.0	0.02
1.132	157.445	14.462	16.90	7.77	0.06	1.42	4.30	4.24	2.83	1.41	2.99	30.0	0.02
1.151	157.863	14.444	17.20	7.80	0.04	1.43	4.30	4.26	2.85	1.41	2.97	29.7	0.01
1.171	158.585	14.458	17.51	7.83	0.05	1.42	4.30	4.25	2.84	1.41	2.99	29.9	0.02
1.191	158.509	14.480	17.83	7.86	0.07	1.40	4.29	4.22	2.81	1.41	3.01	30.1	0.03
1.212	158.623	14.467	18.15	7.89	0.06	1.41	4.28	4.22	2.82	1.40	2.99	29.9	0.02
1.232	158.813	14.471	18.47	7.92	0.07	1.41	4.27	4.21	2.81	1.40	2.99	29.9	0.02
1.253	158.775	14.471	18.79	7.95	0.07	1.41	4.26	4.20	2.80	1.39	2.98	29.8	0.02
1.273	158.509	14.467	19.11	7.98	0.06	1.41	4.25	4.18	2.80	1.39	2.96	29.7	0.02
1.274	158.547	14.467	19.12	7.98	0.06	1.41	4.25	4.18	2.80	1.39	2.96	29.7	0.02

PACE INCORPORATED
THE ASSURANCE OF QUALITY

REPORT OF LABORATORY ANALYSIS

Haywood County Solid Waste Management
1600 N. Main St.
Waynesville, NC 28786 Proposed C+D Site

September 07, 1993
PACE Project Number: A308176

Attn: Mr. Keith Burris

Client Reference: Wood Waste Landfill

Parameter	Units	MDL	PACE Sample Number: 93 0126065 Date Collected: 08/17/93 Date Received: 08/17/93 Wood Waste MW #1	93 0126073 08/17/93 08/17/93 Wood Waste MW #2	93 012608 08/17/93 08/17/93 Wood Waste MW #3
FIELD ANALYSIS			97 78 19	90 74 16	22.0 17.8 4.2
INDIVIDUAL PARAMETERS					
Depth to Water	feet	0.01	78.0	74.0	17.8
Specific Conductivity (Field)	umhos/cm2	10	45	3500	55
Temperature (Field)	Degrees C	0.5	15	15	15
pH (Field)	Units	0.1	6.0	6.2	5.5
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Arsenic	mg/L	0.001	ND	ND	ND
Barium	mg/L	0.10	0.14	ND	2.1
Biochemical Oxygen Demand, 05 Day	mg/L	1.0	25	ND	2
Cadmium	mg/L	0.001	ND	ND	0.001
Chemical Oxygen Demand	mg/L	5.0	27	34	54
Chloride	mg/L	1	ND	170	ND
Chromium	mg/L	0.02	ND	ND	ND
Copper	mg/L	0.01	ND	ND	0.034
Fluoride, Total Recoverable (Electrode)	mg/L	0.1	0.10	0.11	ND
Iron	mg/L	0.05	10	4.8	19
Lead	mg/L	0.05	ND	ND	ND
Manganese	mg/L	0.01	0.70	4.4	5.0
Mercury	mg/L	0.0002	ND	ND	ND
Nitrogen, Nitrate	mg/L	1	ND	ND	ND
Selenium	mg/L	0.001	ND	ND	ND
Silver	mg/L	0.01	ND	ND	ND
Solids, Total Dissolved	mg/L	1	100	4200	6300
Sulfate	mg/L	1	ND	4900	ND
Total Organic Carbon	mg/L	0.50	5.1	9.5	13
Zinc	mg/L	0.01	0.018	0.018	0.10

54 Ravenscroft Drive
Asheville, NC 28801
TEL: 704-254-7176
FAX: 704-252-4618

REPORT OF LABORATORY ANALYSIS

Mr. Keith Burris
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September 07, 1993
PACE Project Number: A30817E

Client Reference: Wood Waste Landfill

PACE Sample Number:			93 0126065	93 0126073	93 012608
Date Collected:			08/17/93	08/17/93	08/17/93
Date Received:			08/17/93	08/17/93	08/17/93
Client Sample ID:			Wood Waste	Wood Waste	Wood Wast
Parameter	Units	MDL	MW #1	MW #2	MW #3
ORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Total Organic Halides	mg/L	0.004	0.008	0.004	ND

MW-2
Specific Conductivity
(Chloride)
TDS
Sulfates
(Toc)

MW-3
Barium
TDS
(TOC)

MW-4
(TOX)

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Asheville, NC 28801
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FAX: 704-252-4618

REPORT OF LABORATORY ANALYSIS

Mr. Keith Burris
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September 07, 1993
PACE Project Number: A308176(

Client Reference: Wood Waste Landfill

Parameter	Units	MDL	
PACE Sample Number:			93 0126090
Date Collected:			08/17/93
Date Received:			08/17/93
Client Sample ID:			Wood Waste MW #4
			15.0
			6.0
			9.0
FIELD ANALYSIS			
INDIVIDUAL PARAMETERS			
Depth to Water	feet	0.01	6.0
Specific Conductivity (Field)	umhos/cm2	10	72
Temperature (Field)	Degrees C	0.5	18
pH (Field)	Units	0.1	5.9
INORGANIC ANALYSIS			
INDIVIDUAL PARAMETERS			
Arsenic	mg/L	0.001	ND
Barium	mg/L	0.10	0.24
Biochemical Oxygen Demand, 05 Day	mg/L	1.0	ND
Cadmium	mg/L	0.001	ND
Chemical Oxygen Demand	mg/L	5.0	14
Chloride	mg/L	1	6.3
Chromium	mg/L	0.02	ND
Copper	mg/L	0.01	ND
Fluoride, Total Recoverable (Electrode)	mg/L	0.1	ND
Iron	mg/L	0.05	1.9
Lead	mg/L	0.05	ND
Manganese	mg/L	0.01	0.46
Mercury	mg/L	0.0002	ND
Nitrogen, Nitrate	mg/L	1	ND
Selenium	mg/L	0.001	ND
Silver	mg/L	0.01	ND
Solids, Total Dissolved	mg/L	1	340
Sulfate	mg/L	1	5.3
Total Organic Carbon	mg/L	0.50	4.3
Zinc	mg/L	0.01	ND
ORGANIC ANALYSIS			
INDIVIDUAL PARAMETERS			
Total Organic Halides	mg/L	0.004	0.09

54 Ravenscroft Drive
Asheville, NC 28801
TEL: 704-254-7176
FAX: 704-252-4618

Mr. Keith Burris
Page 4

September 07, 1993
PACE Project Number: A308176

Client Reference: Wood Waste Landfill

These data have been reviewed and are approved for release.

Barbara M. Miller

Barbara M. Miller
Supervisor, Inorganic Chemistry

Walter L. Miller

Walter L. Miller
Regional Director

54 Ravenscroft Drive
Asheville, NC 28801
TEL: 704-254-7176
FAX: 704-252-4618

Mr. Keith Burris
Page 5

FOOTNOTES
for pages 1 through 4

September 07, 1993
PACE Project Number: A3081760

Client Reference: Wood Waste Landfill

MDL Method Detection Limit
ND Not detected at or above the MDL.

54 Ravenscroft Drive
Asheville, NC 28801
TEL: 704-254-7176
FAX: 704-252-4618

Appendix E

APPENDIX E

LANDFILL HAUL RECORDS

L A N D F I L L H A U L R E C O R D

YEAR	SLUDGE	LIME	FLYASH	BARK	CINDERS	POLY	WATER	TOTAL
1979	19,416	10,203	485	3,361	1,103	867	2,744	38,179
1980	19,442	9,214	947	4,310	1,017	43	1,329	36,302
1981	19,184	8,429	2,744	2,659	1,083	0	239	34,338
1982	15,563	7,740	2,921	2,663	853	0	615	30,355
1983	16,658	7,807	3,320	3,183	793	0	0	31,761
1984	15,649	8,417	4,315	2,757	792	0	0	31,930
1985	15,935	7,077	4,098	1,984	827	0	0	29,921
1986	13,890	7,925	3,662	1,317	717	0	0	27,511
1987	13,695	6,659	3,324	1,243	721	0	0	25,642
1988	14,547	7,045	3,574	576	836	0	0	26,578
1989	12,310	7,411	4,109	270	845	0	0	24,945
1990	13,509	5,190	4,127	993	347	0	0	24,166
1991	12,781	4,951	3,654	141	589	0	0	22,116

CANTON MILL WASTE TO CHAMPION LANDFILL

		LOADS	VOLUME (yds x 3)	TONS
1988:				
	WTP SLUDGE	14,547	290,940	254,572
	LIME	7,045	140,900	130,333
	FLYASH	3,574	71,480	62,545
	CINDERS	836	16,720	12,540
	WOOD WASTE	576	11,520	5,760
1989:				
	WTP SLUDGE	12,310	246,200	215,425
	LIME	7,411	148,220	137,104
	FLYASH	4,109	82,180	71,908
	CINDERS	845	16,900	12,675
	WOOD WASTE	270	5,400	2,700
1990:				
	WTP SLUDGE	13,509	270,180	236,408
	LIME	5,190	103,800	96,015
	FLYASH	4,127	82,540	72,223
	CINDERS	347	6,940	5,205
	WOOD WASTE	993	19,860	9,930
1991:				
	WTP SLUDGE	12,781	255,620	223,668
	LIME	4,951	99,020	91,594
	FLYASH	3,654	73,080	63,945
	CINDERS	589	11,780	8,835
	WOOD WASTE	141	2,820	1,410
1992:				
	WTP SLUDGE	12,732	254,640	222,810
	LIME	5,531	110,620	102,324
	FLYASH	3,629	72,580	63,508
	CINDERS	300	6,000	4,500
	WOOD WASTE	257	5,140	2,570

LANDFILL HAUL DATA – 1993

MONTH	SLUDGE (CUBIC YARDS)	LIME MUD	FLY ASH	CINDERS	WOODWASTE	TOTAL (CUBIC YARDS)
JANUARY	22640	10160	6800	560	720	40480.0
FEBRUARY	18220	6560	5280	560	320	30940.0
MARCH	21080	4020	5140	660	520	32320.0
APRIL	19840	6640	5600	860	1140	34080.0
MAY	19580	7700	4580	940	500	33400.0
JUNE	19420	5880	5340	620	1020	31780.0
JULY	18980	9380	5140	780	680	34960.0
AUGUST	14680	10500	4640	600	1340	31960.0
SEPTEMBER	15100	11060	5220	900	1440	33720.0
OCTOBER	15220	13280	5860	900	1980	37140.0
NOVEMBER	17640	11500	5540	480	2320	37480.0
DECEMBER	17900	14660	5940	460	940	39900.0
TOTAL CUBIC YARDS	220500	111640	64600	8820	13020	418160 418160

MONTH	SLUDGE (TONS)	LIME MUD	FLY ASH	CINDERS	WOODWASTE	TOTAL (TONS)
JANUARY	19810	9398	5513	495	360	35575.5
FEBRUARY	15943	6068	4620	420	160	27210.5
MARCH	18445	4459	4498	495	310	28206.0
APRIL	17360	6142	4900	645	570	29617.0
MAY	17139	7128	4095	705	256	29306.0
JUNE	16998	4977	4679	465	510	27616.5
JULY	16606	8677	4498	585	340	30706.5
AUGUST	13020	9713	4060	450	670	27912.5
SEPTEMBER	13213	10231	4568	675	720	29405.5
OCTOBER	13318	12284	5128	600	990	32319.0
NOVEMBER	15435	10638	4848	360	1160	32440.0
DECEMBER	16668	13561	5190	345	470	36235.5
TOTAL TRUCK TONS	192938	103267	56599	6240	6510	365550 365550

MONTH	SLUDGE (TRUCK LOADS)	LIME MUD	FLY ASH	CINDERS	WOODWASTE	TOTAL (CUBIC YARDS)	TOTAL (TONS)
JANUARY	1132	508	340	28	36	40480.0	35575.5
FEBRUARY	911	328	264	28	16	30940.0	27210.5
MARCH	1054	201	257	33	31	32320.0	28206.0
APRIL	992	332	280	43	57	34080.0	29617.0
MAY	979	385	234	47	25	33400.0	29306.0
JUNE	971	269	267	31	51	31780.0	27616.5
JULY	949	469	257	39	34	34960.0	30706.5
AUGUST	744	525	232	30	67	31960.0	27912.5
SEPTEMBER	755	553	261	45	72	33720.0	29405.5
OCTOBER	761	664	293	40	99	37140.0	32319.0
NOVEMBER	882	575	277	24	116	37480.0	32440.0
DECEMBER	895	733	297	28	47	39900.0	36235.5
TOTAL TRUCK LOADS	11025	5582	3284	416	651	418160	365550

USING THESE FACTORS:	JANUARY '93 – DECEMBER '93				
Avg. Tons/Load	17.5	18.5	17.5	15	10

FILE LISTING: AADMLANDF'93

L/F #6

State of North Carolina

Department of Environment, Health, and Natural Resources
Division of Solid Waste Management and Office of Waste Reduction
P.O. Box 27687 Raleigh, NC 27611

INDUSTRIAL WASTE LANDFILL ANNUAL REPORT

FOR THE PERIOD OF JULY 1, 1993-JUNE 30, 1994

Separate surveys will be sent to all counties and cities to gather information about other components of solid waste management programs in North Carolina.

For questions or assistance in completing this report, contact your Regional Waste Management Specialist.
Completed forms must be returned to your Regional Waste Management Specialist:

James Patterson
59 Woodfin Place
Asheville NC 28801 (704)251-6452
A copy of this report must be sent to the county manager of each county from which waste was received.

Name: CHAMPION INTERNATIONAL **Permit Number: 4406**
Address: MAIN STREET CANTON NC 28716
Facility Contact Person: JIM GIAUQUE
Phone Number of Contact Person: (704)646-2028
Fax: 704-646-6892
Date Facility Began Receiving Waste: Sep. 1984 **Date Facility Expected to Close:** 2014
Tipping Fee $ NA **/Ton** _____ **(Attach a schedule of tipping fees if appropriate.)**

1. Total waste landfilled at this facility during the period of July 1, 1993, through June 30, 1994. Indicate below tonnage received by county of waste origin.
(Photocopy the Table and use when waste is received at this landfill from more than three counties.)

MONTH	TONS FROM _____ COUNTY	TONS FROM _____ COUNTY	TONS FROM _____ COUNTY	TOTAL
July 1993				30,707
August				27,912
September				29,406
October				26,869
November				26,961
December				29,089
January 1994				27,552
February				26,251
March				28,279
April				24,992
May				25,537
June				24,678
TOTAL				328,233

170944

4/F #5

State of North Carolina

Department of Environment, Health, and Natural Resources
Division of Solid Waste Management and Office of Waste Reduction
P.O. Box 27687 Raleigh, NC 27611

INDUSTRIAL WASTE LANDFILL ANNUAL REPORT

FOR THE PERIOD OF JULY 1, 1993-JUNE 30, 1994

Separate surveys will be sent to all counties and cities to gather information about other components of solid waste management programs in North Carolina.

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James Patterson
59 Woodfin Place
Asheville NC 28801 (704)251-6452
A copy of this report must be sent to the county manager of each county from which waste was received.

Name: CHAMPION INTERNATIONAL **Permit Number:** 4401
Address: MAIN STREET CANTON NC 28716
Facility Contact Person: JIM GIAUQUE
Phone Number of Contact Person: (704)646-2028
Fax: (704)646-6892
Date Facility Began Receiving Waste: 1983 **Date Facility Expected to Close:** 1994
Tipping Fee $ NA **/Ton** _____ **(Attach a schedule of tipping fees if appropriate.)**

1. Total waste landfilled at this facility during the period of July 1, 1993, through June 30, 1994. Indicate below tonnage received by county of waste origin.
(Photocopy the Table and use when waste is received at this landfill from more than three counties.)

MONTH	TONS FROM _____ COUNTY	TONS FROM _____ COUNTY	TONS FROM _____ COUNTY	TOTAL
July 1993				0
August				0
September				0
October				0
November				0
December				0
January 1994				0
February				0
March				0
April				0
May				0
June				0
TOTAL				0

2. Indicate types of disposal activity occurring at this facility. (Check all that apply.)

☒ Landfilling of industrial waste (specify waste) * Paper mill sludge, flyash, lime mud, cinders, wood waste

☐ Landfilling of construction and demolition waste

☐ Landfilling of asbestos

☒ Landfilling of ash

☒ Landfilling of sludge

☐ Landfilling of other waste (specify)_____

3. Indicate other types of activities occurring at this facility. (Check all that apply.)

☐ Yard waste composting

☐ Recycled material collection

☐ Shredding or grinding (other than tires) operation

Material(specify)_____

☐ Other Activity (describe)_____

4. Are there SWANA/GRCDA or other certified operator(s) at this facility?

☐ Yes

☒ No

If yes, indicate the following: (Attach additional sheet if necessary.)

Name:_____

Certification type and expiration date:_____

Name:_____

Certification type and expiration date:_____

Other Comments

We would appreciate your comments about this report or other matters regarding solid waste management in North Carolina. Thank you for your cooperation. (Attach additional sheets if needed.)

* Note that during the reporting period none of the wastes listed have been deposited in the No. 5 Landfill. A request for closure has been submitted to the Solid Waste Section, but no reply has been received to date.

This report must be sent to the Regional Waste Management Specialist for your area.

Person completing this form: James A. Giauque **Phone:** 704-646-2028

(print legibly)

Signature: James A. Giauque **Date:** 7/28/94

State of North Carolina

Department of Environment, Health, and Natural Resources
Division of Solid Waste Management

SANITARY LANDFILL
ANNUAL REPORT
FOR THE PERIOD OF JULY 1, 1992–JUNE 30, 1993

Solid waste disposal facilities are a vital part of the North Carolina infrastructure to manage solid waste. This report gathers information about solid waste facilities in the State.

Separate surveys have been sent to all counties and cities to gather information about other components of solid waste management programs in North Carolina.

Thank you for your assistance in completing this report. The information gathered as a part of this process should be of value to local governments and the State in assessing waste management programs and future solid waste planning.

If you have any questions or concerns regarding this report please contact the Solid Waste Section at 919-733-0692 or a Waste Management Specialist. Completed forms must be returned to the Waste Management Specialist for your area. Refer to the attached map for names and addresses. A copy of this report must be sent to the County Manager of each county served by this facility.

Facility Name Champion Int. Corp. Landfill No 5 Permit Number 44-01

Address SR 1613

Location Canton, NC 28716

Facility Owner Champion Int. Corp.

Facility Operator Champion Int. Corp.

Facility Contact Person George W. Pickard

Phone Number of Contact Person (704) 646-2653 FAX (704) 646

Date Facility Began Receiving Waste Dec. 1979

Date Facility Expected to Close 8/93

County(s) Served by this Facility Haywood (Champion Waste Only)

Tipping Fee $ NA /Ton _____ *(please attach a schedule of tip fees if appropriate)*

1. Total waste landfilled at this facility during the period of July 1, 1992, thru June 30, 1993. Indicate tonnage received from each county served by this facility.

MONTH 1992/93	COUNTY Haywood	COUNTY	COUNTY	TOTAL TONS
July - 1992	0			0
August	0			0
September	0			0
October	0			0
November	0			0
December	0			0
January - 1993	0			0
February	0			0
March	0			0
April	0			0
May	0			0
June	0			0
TOTAL TONS	0			0

2. Please indicate types of disposal activity occurring at this facility. (Check all that apply)

- ☐ Landfilling of residential waste
- ☐ Landfilling of commercial waste
- ☒ Landfilling of industrial waste
- ☐ Landfilling of yard waste
- ☐ Landfilling of construction and demolition waste
- ☐ Landfilling of demolition waste (limbs, bricks, stumps)
- ☐ Landfilling of asbestos
- ☐ Landfilling of shredded or split tires
- ☒ Landfilling of ash
- ☐ Landfilling of other waste (please specify) _____

3. Please indicate other types of activities occurring at this landfill. (Check all that apply)

- ☐ Scrap tire collection
- ☐ Yard waste composting
- ☐ Recyclable material collection
- ☐ Used oil collection
- ☐ Household hazardous waste collection
- ☐ White goods separation
- ☐ Lead acid battery collection
- ☐ Shredding or grinding (other than tires) operation

  Material (specify) _____
- ☒ Other activity (please describe) Site undergoing closure - not accepting waste

4. Are there SWANA/GRCDA or other certified operator(s) at this facility?

- ☐ Yes
- ☒ No

If yes, please indicate the following: (attach additional sheets if necessary)

Name: _____

Certification type and expiration date: _____

Name: _____

Certification type and expiration date: _____

5. Have you begun the siting process for your county's next landfill?

- ☐ Yes. If yes, please describe: _____
- ☒ No

Other Comments

We would appreciate your comments about this report or other matters regarding solid waste management in North Carolina. Thank you for your cooperation. (Attach additional sheets if needed.)

This completed report must be mailed to the Waste Management Specialist for your area.

Person completing this form: James A. Grayson (please print) Phone: 704-646-2028

Signature: James A Grayson Date: 8/19/93

Champion
Champion International Corporation

To: DISTRIBUTION Date: FEBRUARY 6, 1992

From: GEORGE PICKARD Subject: LANDFILL HAUL DATA

For your information, attached is a listing of loads hauled each month of 1991 and a haul record for the past thirteen (13) years.

It should be noted that during 1990 the Landfill Group had one tractor-trailer which was capable of hauling a heavier pay load than our dump trucks and in 1991 we had two tractor-trailers. This would account for some of the reduction in loads hauled.

Contact me if further information is needed.

George

George Pickard, Superintendent
Landfill Operations

GP/dj

attachments
cc: file (5)

Distribution

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1991 LANDFILL TOTALS

MONTH	SLUDGE	LIME	FLYASH	CINDERS	BARK	TOTALS
JANUARY	1,090	476	306	74	0	1,946
FEBRUARY	991	379	280	51	22	1,723
MARCH	1,065	517	291	71	12	1,723
APRIL	1,027	382	314	47	5	1,956
MAY	953	435	306	48	45	1,746
JUNE	948	368	342	70	27	1,755
JULY	1,075	444	322	67	32	1,940
AUGUST	1,033	567	323	36	2	1,961
SEPTEMBER	928	403	250	19	15	1,615
OCTOBER	1,174	117	346	55	19	1,711
NOVEMBER	1,276	412	282	26	0	1,996
DECEMBER	1,221	451	292	25	3	1,992
	12,781	4,951	3,654	589	141	22,116

APPENDIX G

LABORATORY REPORTS FOR WASTE ANALYSES

Paper Division

Codes: 41/42/43/44

Waste stream 1983

Champion

Champion International Corporation

To:

Mary Lee Ransmeier

Date: -

June 28, 1983

From:

Louise Ahles-Kedziora

Subject:

RCRA Analysis -- Canton Solid Wastes

Project 997-S1000

Louise Ahles-Kedziora

The following solid wastes from Canton Mill were tested according to the RCRA EP Toxicity Procedure:

41 - 1. Fly ash from coal boilers

42 - 2. Cinders from bark-coal boiler

43 - 3. Sludge from WTP

44 - 4. Lime mud from #6 filter

The results are reported on the attached table. For reference, I have included the threshold levels for each of the toxic contaminants analyzed.

lr
Attachments
Central File
copies: P. Blickensderfer
E. Clem
H. Judd
J. Reeve
D. Smiley
H. Fremont

Please note that all of the sludges are well below the Federal EPA hazardous limit of 100 times Drinking Water Standards for toxic metals and organics. However, the limit of 10 times Drinking Water Standard for lead is exceeded by the Primary Sludge, and for arsenic by Secondary Sludge/Coal Fly Ash Mixture.

To insure that the samples are representative, new samples of Primary Sludge, Coal Fly Ash, Secondary Sludge, and the Secondary Sludge/Coal Fly Ash Mixture are to be taken on July 21 and brought back to Hamilton the same day by Bill Dorman. The samples are to be tested for lead, arsenic and barium on July 22 and 23. We will phone the results to you as soon as they are available, and confirm by letter.

If you have any questions, please call me.

PSB/ps
Central File
c: W. Bliesner
E. Clem
W. Dorman
H. Fremont
L. Griffin
E. Potts, Jr.
D. Striley
J. Reeve

CHAMPION INTERNATIONAL CORPORATION
Analytical Services Report

Location : Canton, NC
Project : 997-S1000
Sample ID: Solid Wastes

Date Submitted: 6-17-83
Date Analyzed : 6-27-83

	EP Toxicity Extract Concentration, mg/L			
Parameter	Fly Ash	Cinders	WTP Sludge	Lime Mud
Arsenic	0.41	0.022	0.013	<0.001
Barium	0.22	0.46	0.24	0.49
Cadmium	0.02	<0.02	<0.02	<0.02
Chromium	<0.12	<0.12	<0.12	<0.12
Lead	<0.19	<0.19	<0.19	<0.19
Mercury	<0.001	<0.001	<0.001	<0.001
Selenium	0.045	<0.001	<0.001	<0.001
Silver	0.004	<0.001	<0.001	<0.001
Endrin	<0.002	<0.002	<0.002	<0.002
Lindane	<0.04	<0.04	<0.04	<0.04
Methoxychlor	<1.0	<1.0	<1.0	<1.0
Toxaphene	<0.05	<0.05	<0.05	<0.05
2,4,D	<1.0	<1.0	<1.0	<1.0
2,4,5,TP Silvex	<0.10	<0.10	<0.10	<0.10

THRESHOLD LEVELS OF CONTAMINANTS FOR CHARACTERISTIC OF EP TOXICITY[1]

CONTAMINANT	CONCENTRATION - mg/L 100X Drinking Water Standards	10X Drinking Water Standards
ARSENIC	5.0	0.50
BARIUM	100.0	10.0
CADMIUM	1.0	0.10
CHROMIUM	5.0	0.50
LEAD	5.0	0.50
MERCURY	0.2	0.02
SELENIUM	1.0	0.10
SILVER	5.0	0.50
ENDRIN	0.02	0.002
LINDANE	0.4	0.04
METHOXYCHLOR	10.0	1.0
TOXAPHENE	0.5	0.05
2,4,D	10.0	1.0
2,4,5 -TP SILVEX	1.0	0.10

[1] Federal Register Vol. 45, No. 98, Part 261.24, May 19, 1980.

Attachment 11

LAW ENGINEERING TESTING COMPANY
geotechnical, environmental & construction materials consultants
501 MINUET LANE
P.O. BOX 11297 • CHARLOTTE, NORTH CAROLINA 28220
(704) 523-2022

January 13, 1984

Champion Papers
Canton Mill
Canton, North Carolina 28716

Attention: Mr. Jack M. Harrell

Subject: Champion Papers Landfill No. 6 and
Off-site Leachate Removal Line
Canton, North Carolina
LETCo. Job No. CH 4507E & CH 4507F

Gentlemen:

Submitted herewith are drawings prepared for the construction plan application for Landfill No. 6. Included with the Landfill No. 6 drawings are plans for the off-site leachate removal line (along Thickety Road) for use in obtaining an "Encroachment Permit" from the North Carolina D.O.T. The enclosed Landfill No. 6 drawings largely provide the additional information requested by the State's letter dated June 7, 1983 to Champion's Ms. Mary Lee Ransmeir. The drawings and this letter supplement our "Revised Report of Geotechnical Exploration and Evaluation and Conceptual Site Development Recommendations" dated February 5, 1982 and complete Law Engineering's authorized scope of services presented in Proposal No. 144S3 to Champion dated August 3, 1983.

The specific information requested in the State's June 7 letter is listed below with the corresponding responses.

1. Location (on topo map) of all homes and wells within 500 ft of the property boundary.

   Hampton, Hintz & Associates of Fletcher, N.C. performed the survey and provided this information. The structures and wells are indicated on the enclosed Grading Plan (Drawing No. 1).

2. The EP Toxicity results for lime mud.

Champion is providing this information.

3. Final construction plans per 0.0504(2) a, b, c and d.

The accompanying drawings for Landfill No. 6 provide this information. Item a refers to a map showing existing site features; this is provided by the survey map prepared by Hampton, Hintz & Associates and is used as the base map for the accompanying Grading Plan (Drawing No. 1). Item b refers to a grading plan which is provided by Drawing No. 1. Item c refers to a construction plan which is provided by the accompanying drawing entitled Plan of Final Contours and Permanent Surface Drainage Control Measures (Drawing No. 4). Item d refers to an erosion control plan which is provided by the drawing entitled Erosion/Sediment Control Measures (Drawing No. 2). Also, included in the Landfill No. 6 package are an operation plan entitled Landfill Operation and Leachate Control Measures (Drawing No. 2) and several drawings of Cross Sections (Drawing Nos. 5, 6 and 7).

4. Final disposition of wastewater (i.e., applicable permits).

Champion is preparing this information.

5. Final design calculations of individual drains and their locations.

The principal drainage systems at the proposed landfill are the leachate control system and the uncontaminated runoff control system. The locations and design of these systems are illustrated in specific detail (type, size, etc.) on the accompanying drawings. Both of the systems are designed to utilize gravity flow where possible, and thereby limit the number of pumping stations. Only two pumping stations will be required, both in the handling of leachate; no pumping stations will be required to control uncontaminated runoff.

The leachate control system is designed to allow gravity flow of leachate from the landfill areas (except Area E) to a lined leachate holding pond that has a capacity to hold 100 percent runoff from a 100-year, 24-hour duration rainfall (7.6 inches) over an 8 acre active cell area. From Area E, the collected leachate will be pumped to a pump stand from which the leachate will flow by gravity to the holding pond. The leachate collection system is designed for rapid drainage from the active cells to the holding pond, to minimize ponding of runoff in the active cells. From the holding pond the leachate will be pumped off-site to a City sewer line which ties into Champion's waste

treatment facilities. The capacity of this off-site line is dictated by the capacity of the receiving line and by the capacity of the treatment plant, and is limited .5 cfs (225 gpm) maximum flow rate. Under assumed design storm conditions (100-year rainfall), the leachate could be ponded no more than about five days in the lined holding pond. All the main leachate lines that empty into the holding pond are designed to have shut-off valves to allow cut-off of leachate drainage into the pond in cases of emergency (e.g., prolonged pump repairs, greater than 100-year storm occurrence, storm runoff from an active cell larger than 8-acre area, etc.).

The uncontaminated runoff control system is designed to collect storm runoff from areas upslope of active landfilling operations and convey the uncontaminated runoff out of the landfill area through sealed pipes under the landfill. The pipes and inlet risers in the system are sized to pass runoff resulting from the 100-year storm without overtopping the dikes which separate the upslope areas from the active (and completed) landfill cells. The uncontaminated runoff outlet pipes also are designed to have shut-off valves to allow cut-off of flow of collected runoff in the event of runoff ponding to great enough depth in the active cell to spill over the separation dike into the uncontaminated area (e.g., due to clogging of drains in the active cell or due to runoff from a greater than 100-year storm occurrence, etc.).

6. Quantity and type of final cover.

As indicated in the February 5, 1982 report, a total volume of soil cover on the order of 475,000 cubic yards will be required at the proposed landfill. The soil cover materials will come from on-site. More than 3 million cubic yards of borrow soils are available on-site. The above referenced report indicates that approximately 1.5 million cubic yards will be required for fill (dike construction). The dike construction illustrated by the accompanying drawings will require somewhat greater volume than this, but there still appears to be much more borrow material available at the site than needed for fill and cover materials.

The source of the 3-ft thick final cover will be residual soils excavated from on-site. The residual soils sampled at the site consist of sandy silty clays, clayey sandy silts and sandy silts and silty sands. In general, the more clayey and silty soils are nearer the surface (upper 10 ft on average in the borings) and the sand content increases with depth. Most of the residual soils are very micaceous, some with as much as 60 percent mica. The upper more clayey and silty soils are less micaceous than the

deeper sands. The high mica content will probably cause them to "act" more like a silt than a sand. Unified Soil Classifications of the residual soils are estimated to be CL (clays), ML (silts) and SM (sands). Permeabilities of remolded soils constructed of the deeper, sandy soils are estimated to be in the range of 10^{-5} to 10^{-3} cm/sec. Laboratory permeability test results available on remolded samples of the upper, more clayey and silty soils indicate permeabilities on the order of 10^{-6} to 10^{-5} cm/sec for these soils. Through selective use of the upper, clayey and silty soils and/or blending of these soils with the very micaceous silty sands from deeper in the profile, the in-place final soil cover should have a low to very low permeability. Use of the deeper, very sandy soils in the final cover should be avoided, unless suitably blended with the clayey or silty soils.

7. Engineering calculations for erosion control structures.

   a. Sediment basin (and location)
   b. riser pipe
   c. velocity dissipator

   Each of the major landfill areas, which will be formed by construction of earth dikes at the lower ends of the principal "draws" at the site, will in itself function as a sedimentation basin. Thus, because of the extraordinarily large available capacity of these "basins" for trapping and storing sediment during grading, no rigorous engineering calculations are warranted. As noted on Drawing No. 3, initial grading operations are to involve construction of the dikes at the lower ends of the landfill areas. The area upslope of the dikes are not to be cleared (except in borrow areas for dike fill) until the outlet pipes have been installed and the lower part of the dikes has been constructed to about 3 ft above the top of the riser at the inlet of the outlet pipes. The inlet riser is to be perforated and surrounded by washed stone as shown by a typical detail on the drawing. The outlet pipe and its riser inlet form the first segment in the uncontaminated runoff control system which, as previously discussed, is sized for 100-year storm runoff. In the unlikely event (during grading) of sediment build-up to near the top of the 4-ft high riser, the riser would simply be extended upward by adding another perforated section of the pipe to the top of the riser and surrounding it with washed stone. The outlet pipes will discharge into riprap lined "plunge" pools.

8. Erosion control measures below the outside dike.

   Erosion control measures are shown on Drawing Nos. 2 and 4.

9. Clarification of details on Drawing No. 12 (in the February 5, 1982 report).

   This was generally accomplished in a meeting on July 11, 1983 between Gordon Layton and Jim Moore of the State, Mary Lee Ransmeier and Mike Singleton of Champion and Jim Smith of Law Engineering. The landfill plan is much more specific now and the accompanying drawings should help clarify details of the proposed landfill.

10. Location of leachate collection system.

    The leachate collection system is shown in plan view on Drawing No. 3 and is illustrated by details and on cross sections on Drawing Nos. 5, 6 and 7.

11. Method of handling surface water from top of landfill.

    Control measures for removing surface water from the top of the landfill are shown on Drawing No. 4.

12. The water quality parameters and sampling frequency suggested by the State are being handled by Champion.

Law Engineering Testing Company has enjoyed working with Champion Papers on this project and looks forward to continuing to provide our professional services on this and related projects. If you have any questions concerning this letter or the drawings, please contact us.

Very truly yours,

LAW ENGINEERING TESTING COMPANY

Fred C. Tucker, P. E.
Project Geotechnical Engineer
Registered, N. C. 8160

Jimmy N. Smith, P. E.
Senior Geotechnical Engineer
Registered, N. C. 7964

FCT/JNS:tmc

Champion

L. Gerard - Canton

July 14, 1986

J. P. Kelly

Toluene Analysis of Canton WTP Sludge

S0943F

02503-CA-53

The sample of Waste Treatment Plant sludge you submitted on June 19 has been analyzed to determine the presence of toluene. The sludge was extracted with methylene chloride and analyzed by GC/MS.

The results of the analysis are as follows:

SAMPLE	TOLUENE CONCENTRATION
WTP Sludge	<10 ppm (µg/g)
	(based on 44% dry weight)

A second sample was spiked with toluene and an 81% recovery was achieved.

If you have any questions or if I can be of any additional assistance please do not hesitate to call me.

Jim Kelly

JPK:fl

copies

F.R. Antonucci
E.G. Kelleher
86-512

Mary Lee Ransmeier
Dave Smiley
Mike Cody

CENTRAL-LAKE STATES REGIONAL CENTER
Western Michigan University
Kalamazoo, MI 49008-3844
(616) 387-5128

NATIONAL COUNCIL OF THE PAPER INDUSTRY FOR AIR AND STREAM IMPROVEMENT, INC.

July 25, 1988

Mr. Paul Weigand
Champion International Corporation
Park Street
Canton, North Carolina 28716

Dear Paul:

About a year ago we collected samples of solid waste at your facilities with the stated intention of subjecting them to the proposed toxicity characteristic leaching procedure (TCLP). At the time we told you that the results from extraction of your waste(s) would be made available to you.

We have finally received all the analytical results and are herewith enclosing the results for your samples. All results are concentrations in TCLP extracts of the waste materials except that leachate concentrations were measured directly without application of any extraction procedure. No extracts were analyzed for metals because our earlier studies of the EP extraction procedure (Technical Bulletin No. 319), which is similar to the TCLP in terms of its ability to solubilize metals from a sample, indicated very low levels of most metals.

The results from all our sampling and analysis will be compiled in a technical bulletin later this year. All data will, of course, be presented in a manner such that the facility from which samples were collected will remain anonymous. We may, however, wish to include some information on bleaching practices at those mills practicing chlorine bleaching. We will be contacting you separately about this if we need information.

Thank you very much for your participation in this research. If you have any questions please feel free to contact me or Research Assistant Steven Norton who was intimately involved with this project and who compiled the information enclosed.

Sincerely,

Jay P. Unwin
Regional Manager

enclosure

pc: I. Gellman, R. Miner, S. Norton

Summary of Semi-Volatiles and TOX Analyses of the Champion International Canton, North Carolina TCLP Samples

Sample Type:		Concentrations (ppb) Leachate	Combined Sludge Extract		
Analytes	Quant. Limit (ppb)	020 LNV-1	016 NV-2	016 NV-3	mean
2-CHLOROPHENOL	2.0	ND	ND	NA	
4-CHLOROPHENOL	1.3	ND	ND	NA	
2,6-DICHLOROPHENOL	5.9	ND	ND	ND	
2,4-DICHLOROPHENOL	4.6	ND	ND	ND	
3,5-DICHLOROPHENOL	6.3	ND	ND	ND	
3,4-DICHLOROPHENOL	5.3	ND	ND	ND	
2,4,6-TRICHLOROPHENOL	4.1	ND	ND	ND	
2,3,6-TRICHLOROPHENOL	6.1	ND	ND	ND	
2,4,5-TRICHLOROPHENOL	5.3	ND	ND	ND	
2,3,4,6-TETRACHLOROPHENOL	3.4	ND	ND	ND	
PENTACHLOROPHENOL	5.4	ND	ND	ND	
4-CHLOROGUAIACOL	6.9	ND	ND	NA	
4,5-DICHLOROGUAIACOL	4.6	ND	ND	ND	
3,4,5-TRICHLOROGUAIACOL	3.2	ND	ND	ND	
4,5,6-TRICHLOROGUAIACOL	4.4	ND	ND	ND	
TETRACHLOROGUAIACOL	3.5	ND	ND	ND	
TRICHLOROSYRINGOL	4.5	ND	ND	ND	
PHENOL	1.5	34.1	56.4	NA	
o-CRESOL	1.4	ND	ND	NA	
m-CRESOL	1.6	ND	ND	NA	
p-CRESOL	3.1	63.2	ND	NA	
2,5-DIMETHYLPHENOL	3.8	ND	ND	NA	
2,4-DIMETHYLPHENOL	5.1	ND	ND	NA	
3,4-DIMETHYLPHENOL	5.0	ND	ND	NA	
4-ETHYLPHENOL	4.9	ND	12.6	NA	
THYMOL	2.7	ND	ND	NA	
CARVACROL	4.2	ND	ND	NA	
GUAIACOL	3.1	ND	ND	NA	
		Concentrations (ppm)			
TOX	20	2.12	2.07	NA	

ND - not detected above quantitation limit.
UQ - unable to quantitate due to analytical problems.
NA - not analyzed.

Summary of Semi-Volatiles and TOX Analyses of the Champion International Canton, North Carolina TCLP Samples

		Concentrations (ppb)			
Sample Type:		Fly Ash Extract			
Analytes	Quant. Limit (ppb)	018 NV-1	018 NV-2	018 NV-3	mean
2-CHLOROPHENOL	2.0	ND	NA	NA	
4-CHLOROPHENOL	1.3	ND	NA	NA	
2,6-DICHLOROPHENOL	5.9	ND	ND	ND	
2,4-DICHLOROPHENOL	4.6	ND	ND	ND	
3,5-DICHLOROPHENOL	6.3	ND	ND	ND	
3,4-DICHLOROPHENOL	5.3	ND	ND	ND	
2,4,6-TRICHLOROPHENOL	4.1	ND	ND	ND	
2,3,6-TRICHLOROPHENOL	6.1	ND	ND	ND	
2,4,5-TRICHLOROPHENOL	5.3	ND	ND	ND	
2,3,4,6-TETRACHLOROPHENOL	3.4	ND	ND	ND	
PENTACHLOROPHENOL	5.4	ND	ND	ND	
4-CHLOROGUAIACOL	6.9	ND	NA	NA	
4,5-DICHLOROGUAIACOL	4.6	ND	ND	ND	
3,4,5-TRICHLOROGUAIACOL	3.2	ND	ND	ND	
4,5,6-TRICHLOROGUAIACOL	4.4	ND	ND	ND	
TETRACHLOROGUAIACOL	3.5	ND	ND	ND	
TRICHLOROSYRINGOL	4.5	ND	ND	ND	
PHENOL	1.5	21.9	NA	NA	
o-CRESOL	1.4	ND	NA	NA	
m-CRESOL	1.6	ND	NA	NA	
p-CRESOL	3.1	ND	NA	NA	
2,5-DIMETHYLPHENOL	3.8	ND	NA	NA	
2,4-DIMETHYLPHENOL	5.1	ND	NA	NA	
3,4-DIMETHYLPHENOL	5.0	ND	NA	NA	
4-ETHYLPHENOL	4.9	ND	NA	NA	
THYMOL	2.7	ND	NA	NA	
CARVACROL	4.2	ND	NA	NA	
GUAIACOL	3.1	ND	NA	NA	
		Concentrations (ppm)			
TOX	20	UQ	NA	NA	

ND - not detected above quantitation limit.
UQ - unable to quantitate due to analytical problems.
NA - not analyzed.

Summary of Semi-Volatiles and TOX Analyses of the Champion International Canton, North Carolina TCLP Samples

Sample Type:	Quant. Limit	Concentrations (ppb) Lime Mud Extract			
Analytes	(ppb)	017 NV-1	017 NV-2	017 NV-3	mean
2-CHLOROPHENOL	2.0	ND	NA	NA	
4-CHLOROPHENOL	1.3	ND	NA	NA	
2,6-DICHLOROPHENOL	5.9	ND	ND	ND	
2,4-DICHLOROPHENOL	4.6	ND	ND	ND	
3,5-DICHLOROPHENOL	6.3	ND	ND	ND	
3,4-DICHLOROPHENOL	5.3	ND	ND	ND	
2,4,6-TRICHLOROPHENOL	4.1	ND	ND	ND	
2,3,6-TRICHLOROPHENOL	6.1	ND	ND	ND	
2,4,5-TRICHLOROPHENOL	5.3	ND	ND	ND	
2,3,4,6-TETRACHLOROPHENOL	3.4	ND	ND	ND	
PENTACHLOROPHENOL	5.4	ND	ND	ND	
4-CHLOROGUAIACOL	6.9	ND	NA	NA	
4,5-DICHLOROGUAIACOL	4.6	ND	ND	ND	
3,4,5-TRICHLOROGUAIACOL	3.2	ND	ND	ND	
4,5,6-TRICHLOROGUAIACOL	4.4	ND	ND	ND	
TETRACHLOROGUAIACOL	3.5	ND	ND	ND	
TRICHLOROSYRINGOL	4.5	ND	ND	ND	
PHENOL	1.5	53.6	NA	NA	
o-CRESOL	1.4	ND	NA	NA	
m-CRESOL	1.6	ND	NA	NA	
p-CRESOL	3.1	ND	NA	NA	
2,5-DIMETHYLPHENOL	3.8	ND	NA	NA	
2,4-DIMETHYLPHENOL	5.1	ND	NA	NA	
3,4-DIMETHYLPHENOL	5.0	ND	NA	NA	
4-ETHYLPHENOL	4.9	ND	NA	NA	
THYMOL	2.7	ND	NA	NA	
CARVACROL	4.2	ND	NA	NA	
GUAIACOL	3.1	ND	NA	NA	
		Concentrations (ppm)			
TOX	20	UQ	NA	NA	

ND - not detected above quantitation limit.
UQ - unable to quantitate due to analytical problems.
NA - not analyzed.

TCLP Volatiles Extraction Fluid Results
Champion International, Canton, North Carolina

Analyte	Quantitation Limit (ppb)	CLS-016-VE-1 Champ.,Canton Comb. Sludge
1,1-diClethene	20	ND
CHCl3	20	163.2
methyl ethyl ketone	100	ND
1,2-diClethane	20	ND
1,1,1-triClethane	20	ND
CCl4	20	ND
triClethene	20	ND
benzene	20	ND
1,1,2-triClethane	20	ND
1,1,1,2-tetClethane	100	ND
1,1,2,2-tetClethane	20	ND
toluene	20	ND
Cl-benzene	20	ND

Summary of the Volatiles Analysis of Leachates
Champion International Canton, North Carolina

Analyte	Quantitation Limit (ppb)	Concentrations (ppb) Sample I.D. CLS-019-LV-1 Champ.,Canton
1,1-diClethene	20	ND
CHCl3	20	ND
methyl ethyl ketone	100	ND
1,2-diClethane	20	ND
1,1,1-triClethane	20	ND
CCl4	20	ND
triClethene	20	ND
benzene	20	ND
1,1,2-triClethane	20	ND
1,1,1,2-tetClethane	100	ND
1,1,2,2-tetClethane	20	ND
toluene	20	ND
Cl-benzene	20	ND

Summary of the Volatiles Analysis of TCLP Extracts and Leachates
Champion International, Canton, North Carolina

Analyte	Quantitation Limit (ppb)	Concentrations (ppb) Sample I.D. CLS-017-VE-1 Champ.,Canton Lime Mud	CLS-018-VE-1 Champ.,Canton Ash
1,1-diClethene	20	ND	ND
CHCl3	20	ND	ND
methyl ethyl ketone	100	ND	ND
1,2-diClethane	20	ND	ND
1,1,1-triClethane	20	ND	ND
CCl4	20	ND	ND
triClethene	20	ND	ND
benzene	20	ND	ND
1,1,2-triClethane	20	ND	ND
1,1,1,2-tetClethane	100	ND	ND
1,1,2,2-tetClethane	20	ND	ND
toluene	20	ND	ND
Cl-benzene	20	ND	ND

54-58

AnalytiKEM *An American NuKEM Company*

AnalytiKEM Inc.
28 Springdale Road
Cherry Hill, NJ 08003
609/751-1122
215/923-2068
Fax: 609/751-0824

TEST REPORT NO. A40194, Revision

November 15, 1990

Prepared for:

Champion International
P.O. Box C-10
Main Street
Canton, NC 28716

Attention: Elizabeth Dickson

Project: TCLP - Canton Mill

Reviewed & Approved by: _____

Name Edward J. Palmer, Jr.

Title Technical Manager

TCLP
TABLE OF CONTENTS

I. List of Certifications

State	Certification Number
Connecticut	PH-0715
Florida	E87201
New Jersey	04012
New York	10815
North Carolina	258
Pennsylvania	68-366
South Carolina	94004
Tennessee	02908

II. Definition of Terms

Term	Definition
DI	Deionized Water
J	Compound was detected at levels below the practical quantitation limit. The level reported is approximate.
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NA	Analysis not applicable to the sample matrix.
ND	Not Detected
NR	Not Requested
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
U	Compound was analyzed for but not detected. The preceding number is the practical quantitation limit for the compound.
mg/L	Milligrams of constituent per liter of TCLP Leachate; equivalent to parts-per-million (ppm).
CCC	Calibration Check Compound; used to verify the precision of a GC/MS calibration curve.
SPCC	System Performance Check Compound; used to verify the correct operation of a GC/MS instrument.
PQL	Practical Quantitation Limit; the minimum level at which compounds can be dependably quantitated.
TCLP	Toxic Characteristic Leachate Procedure
ZHE	Zero Headspace Extraction
TC	Toxic Characteristic
ug	Micrograms

III. Sample Designations

AnalytiKEM Designation	Client Designation	Matrix	Date Sampled
A40194-1	Sludge	Nonaqueous	9/5/90
A40194-2	Lime Mud	Nonaqueous	9/5/90
A40194-3	Fly Ash	Nonaqueous	9/5/90
A40194-4	Cinders	Nonaqueous	9/5/90
A40194-5	Used Oil	Aqueous	9/5/90

Note: Samples will be held for 30 days beyond test report date unless otherwise requested.

IV. Methodology

All analysis are performed in accordance with methodologies found in the following publications:

- Federal Register, Vol. 55, No. 126, June 29, 1990.
- 40 CFR, Part 261, Appendix 2, Method 1311.
- Test Methods for Evaluating Solid Waste, USEPA, SW-846, Second Edition, 1982.
- Test Methods for Evaluating Solid Waste, USEPA, SW-846, Third Edition, 1982.
- Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, USEPA, March 1983.

AnalytiKEM

V. Laboratory Chronicle

	DATE I	DATE II
Date Sampled	9/5/90	
Receipt/Refrigeration	9/6/90	
TCLP Extractions		
Zero Headspace Extraction	9/14/90	
TC Extraction	9/15/90	9/27/90
Sample Preparations		
Semivolatiles	9/20/90	
Metals	9/29/90	
Analyses		
Volatiles	9/23-9/24/90	
Semivolatiles	9/25-9/26/90	
Metals	10/1/90	

Laboratory Manager Review & Approval
(Signature) Elisha F. DeWinkle for
(Printed Name) William Fithian
(Date) 11/14/90

NOTE: If fractions are reextracted and reanalyzed because the initial endeavors failed to meet the required quality control criteria, the dates of reextraction and/or reanalysis will be entered in column II additionally.

AnalytiKEM

VI. Extraction Log

Sample Designation	Zero Headspace Extraction, (g)	TCLP Extraction, (g)	Extraction Fluid Type #	Extraction Fluid Volume (ml)
A40194-1	25	--	1	500
A40194-2	25	--	1	500
A40194-3	25	--	1	500
A40194-4	25	--	1	500
A40194-5	25	--	1	500
A40194-1	--	100	1	2,000
A40194-2	--	100	1	2,000
A40194-3	--	100	1	2,000
A40194-4	--	100	1	2,000
A40194-5	--	100	1	2,000

AnalytiKEM

VII. Outlier Summary: Toxicity Characteristic Leachate Procedure (TCLP)

No Compounds were reported above the Regulatory Limits for the following samples:

A40194-1	Sludge
A40194-2	Lime Mud
A40194-3	Fly Ash
A40194-4	Cinders
A40194-5	Used Oil

AnalytiKEM

II. Analytical Results

TCLP Organic Analyses

AnalytiKEM Designation A40194-1

Client Designation Sludge

EPA HW Number	Contaminant	Method Blank		Sample Result		Regulatory Level
Volatile Organics						
D043	Vinyl Chloride	0.010	U	0.050	U	0.2
D029	1,1-Dichloroethylene	0.010	U	0.050	U	0.7
D022	Chloroform	0.008	J	0.490		6.0
D028	1,2-Dichloroethane	0.010	U	0.050	U	0.5
D035	2-Butanone (Methyl Ethyl Ketone)	0.010	U	0.050	U	200
D019	Carbon Tetrachloride	0.010	U	0.050	U	0.5
D040	Trichloroethylene	0.010	U	0.050	U	0.5
D018	Benzene	0.010	U	0.050	U	0.5
D039	Tetrachloroethylene	0.010	U	0.050	U	0.7
D021	Chlorobenzene	0.010	U	0.050	U	100
Semivolatile Organics						
D038	Pyridine	0.010	U	0.010	U	5.0
D027	1,4-Dichlorobenzene	0.010	U	0.010	U	7.5
D023	o-Cresol	0.050	U	0.050	U	200
D024,D025	m,p-Cresol	0.050	U	0.050	U	200
D034	Hexachloroethane	0.010	U	0.010	U	3.0
D036	Nitrobenzene	0.010	U	0.010	U	2.0
D033	Hexachlorobutadiene	0.010	U	0.010	U	0.5
D042	2,4,6-Trichlorophenol	0.010	U	0.010	U	2.0
D041	2,4,5-Trichlorophenol	0.050	U	0.050	U	400
D030	2,4-Dinitrotoluene	0.010	U	0.010	U	0.13
D032	Hexachlorobenzene	0.010	U	0.010	U	0.13
D037	Pentachlorophenol	0.050	U	0.050	U	100
TCLP Metals						
D004	Arsenic	0.50	U	0.50	U	5.0
D005	Barium	2.0	U	1.4	J	100
D006	Cadmium	0.10	U	0.10	U	1.0
D007	Chromium	0.50	U	0.50	U	5.0
D008	Lead	0.50	U	0.50	U	5.0
D009	Mercury	0.02	U	0.02	U	0.2
D010	Selenium	0.50	U	0.50	U	1.0
D011	Silver	0.40	U	0.40	U	5.0
Units		(mg/L)		(mg/L)		(mg/L)

Total Solids: 100%

NOTE: All results are not corrected for spike recoveries.

AnalytiKEM

III. Analytical Results (Cont'd)

TCLP Organic Analyses

AnalytiKEM Designation A40194-2

Client Designation Lime Mud

EPA HW Number	Contaminant	Method Blank	Sample Result	Regulatory Level
Volatile Organics				
D043	Vinyl Chloride	0.010 U	0.050 U	0.2
D029	1,1-Dichloroethylene	0.010 U	0.050 U	0.7
D022	Chloroform	0.038	1.1	6.0
D028	1,2-Dichloroethane	0.010 U	0.050 U	0.5
D035	2-Butanone (Methyl Ethyl Ketone)	0.010 U	0.050 U	200
D019	Carbon Tetrachloride	0.010 U	0.050 U	0.5
D040	Trichloroethylene	0.002 J	0.050 U	0.5
D018	Benzene	0.010 U	0.050 U	0.5
D039	Tetrachloroethylene	0.010 U	0.050 U	0.7
D021	Chlorobenzene	0.010 U	0.050 U	100
Semivolatile Organics				
D033	Hexachlorobutadiene	0.010 U	0.010 U	0.5
D042	2,4,6-Trichlorophenol	0.010 U	0.010 U	2.0
D041	2,4,5-Trichlorophenol	0.050 U	0.050 U	400
D030	2,4-Dinitrotoluene	0.010 U	0.010 U	0.13
D032	Hexachlorobenzene	0.010 U	0.010 U	0.13
D037	Pentachlorophenol	0.050 U	0.050 U	100
TCLP Metals				
D004	Arsenic	0.50 U	0.50 U	5.0
D005	Barium	2.0 U	0.04 J	100
D006	Cadmium	0.10 U	0.10 U	1.0
D007	Chromium	0.50 U	0.50 U	5.0
D008	Lead	0.50 U	0.50 U	5.0
D009	Mercury	0.02 U	0.02 U	0.2
D010	Selenium	0.50 U	0.50 U	1.0
D011	Silver	0.40 U	0.40 U	5.0
Units		(mg/L)	(mg/L)	(mg/L)

Total Solids: 100%

NOTE: All results are not corrected for spike recoveries.

AnalytiKEM

II. Analytical Results (Cont'd)

TCLP Organic Analyses

AnalytiKEM Designation A40194-3

Client Designation Fly Ash

EPA HW Number	Contaminant	Method Blank		Sample Result		Regulatory Level
Volatile Organics						
D043	Vinyl Chloride	0.010	U	0.050	U	0.2
D029	1,1-Dichloroethylene	0.010	U	0.050	U	0.7
D022	Chloroform	0.038		0.023	J	6.0
D028	1,2-Dichloroethane	0.010	U	0.050	U	0.5
D035	2-Butanone (Methyl Ethyl Ketone)	0.010	U	0.050	U	200
D019	Carbon Tetrachloride	0.010	U	0.050	U	0.5
D040	Trichloroethylene	0.002	J	0.050	U	0.5
D018	Benzene	0.010	U	0.050	U	0.5
D039	Tetrachloroethylene	0.010	U	0.050	U	0.7
D021	Chlorobenzene	0.010	U	0.050	U	100
Semivolatile Organics						
D038	Pyridine	0.010	U	0.010	U	5.0
D027	1,4-Dichlorobenzene	0.010	U	0.010	U	7.5
D023	o-Cresol	0.050	U	0.050	U	200
D024,D025	m,p-Cresol	0.050	U	0.050	U	200
D034	Hexachloroethane	0.010	U	0.010	U	3.0
D036	Nitrobenzene	0.010	U	0.010	U	2.0
D033	Hexachlorobutadiene	0.010	U	0.010	U	0.5
D042	2,4,6-Trichlorophenol	0.010	U	0.010	U	2.0
D041	2,4,5-Trichlorophenol	0.050	U	0.050	U	400
D030	2,4-Dinitrotoluene	0.010	U	0.010	U	0.13
D032	Hexachlorobenzene	0.010	U	0.010	U	0.13
D037	Pentachlorophenol	0.050	U	0.050	U	100
TCLP Metals						
D004	Arsenic	0.50	U	0.50	U	5.0
D005	Barium	2.0	U	0.10	J	100
D006	Cadmium	0.10	U	0.10	U	1.0
D007	Chromium	0.50	U	0.50	U	5.0
D008	Lead	0.50	U	0.50	U	5.0
D009	Mercury	0.02	U	0.02	U	0.2
D010	Selenium	0.50	U	0.50	U	1.0
D011	Silver	0.40	U	0.40	U	5.0
Units		(mg/L)		(mg/L)		(mg/L)

Total Solids: 100%

NOTE: All results are not corrected for spike recoveries.

AnalytiKEM

II. Analytical Results (Cont'd)

TCLP Organic Analyses

AnalytiKEM Designation A40194-4

Client Designation Cinders

EPA HW Number	Contaminant	Method Blank		Sample Result		Regulatory Level
Volatile Organics						
D043	Vinyl Chloride	0.010	U	0.050	U	0.2
D029	1,1-Dichloroethylene	0.010	U	0.050	U	0.7
D022	Chloroform	0.038		0.062		6.0
D028	1,2-Dichloroethane	0.010	U	0.050	U	0.5
D035	2-Butanone (Methyl Ethyl Ketone)	0.010	U	0.050	U	200
D019	Carbon Tetrachloride	0.010	U	0.050	U	0.5
D040	Trichloroethylene	0.002	J	0.050	U	0.5
D018	Benzene	0.010	U	0.050	U	0.5
D039	Tetrachloroethylene	0.010	U	0.050	U	0.7
D021	Chlorobenzene	0.010	U	0.050	U	100
Semivolatile Organics						
D038	Pyridine	0.010	U	0.010	U	5.0
D027	1,4-Dichlorobenzene	0.010	U	0.010	U	7.5
D023	o-Cresol	0.050	U	0.050	U	200
D024,D025	m,p-Cresol	0.050	U	0.050	U	200
D034	Hexachloroethane	0.010	U	0.010	U	3.0
D036	Nitrobenzene	0.010	U	0.010	U	2.0
D033	Hexachlorobutadiene	0.010	U	0.010	U	0.5
D042	2,4,6-Trichlorophenol	0.010	U	0.010	U	2.0
D041	2,4,5-Trichlorophenol	0.050	U	0.050	U	400
D030	2,4-Dinitrotoluene	0.010	U	0.010	U	0.13
D032	Hexachlorobenzene	0.010	U	0.010	U	0.13
D037	Pentachlorophenol	0.050	U	0.050	U	100
TCLP Metals						
D004	Arsenic	0.50	U	0.50	U	5.0
D005	Barium	2.0	U	2.1		100
D006	Cadmium	0.10	U	0.009	J	1.0
D007	Chromium	0.50	U	0.50	U	5.0
D008	Lead	0.50	U	0.50	U	5.0
D009	Mercury	0.02	U	0.02	U	0.2
D010	Selenium	0.50	U	0.50	U	1.0
D011	Silver	0.40	U	0.40	U	5.0
Units		(mg/L)		(mg/L)		(mg/L)

Total Solids: 100%

NOTE: All results are not corrected for spike recoveries.

AnalytiKEM

II. Analytical Results (Cont'd)

TCLP Organic Analyses

AnalytiKEM Designation A40194-5

Client Designation Used Oil

EPA HW Number	Contaminant	Method Blank		Sample Result		Regulatory Level
Volatile Organics						
D043	Vinyl Chloride	0.010	U	0.050	U	0.2
D029	1,1-Dichloroethylene	0.010	U	0.050	U	0.7
D022	Chloroform	0.038		0.050	U	6.0
D028	1,2-Dichloroethane	0.010	U	0.050	U	0.5
D035	2-Butanone (Methyl Ethyl Ketone)	0.010	U	0.050	U	200
D019	Carbon Tetrachloride	0.010	U	0.050	U	0.5
D040	Trichloroethylene	0.002	J	0.050	U	0.5
D018	Benzene	0.010	U	0.050	U	0.5
D039	Tetrachloroethylene	0.010	U	0.050	U	0.7
D021	Chlorobenzene	0.010	U	0.050	U	100
Semivolatile Organics						
D038	Pyridine	0.010	U	0.030	U	5.0
D027	1,4-Dichlorobenzene	0.010	U	0.030	U	7.5
D023	o-Cresol	0.050	U	0.150	U	200
D024,D025	m,p-Cresol	0.050	U	0.150	U	200
D034	Hexachloroethane	0.010	U	0.030	U	3.0
D036	Nitrobenzene	0.010	U	0.030	U	2.0
D033	Hexachlorobutadiene	0.010	U	0.030	U	0.5
D042	2,4,6-Trichlorophenol	0.010	U	0.030	U	2.0
D041	2,4,5-Trichlorophenol	0.050	U	0.150	U	400
D030	2,4-Dinitrotoluene	0.010	U	0.030	U	0.13
D032	Hexachlorobenzene	0.010	U	0.030	U	0.13
D037	Pentachlorophenol	0.050	U	0.150	U	100
TCLP Metals						
D004	Arsenic	0.50	U	0.50	U	5.0
D005	Barium	2.0	U	1.0	J	100
D006	Cadmium	0.10	U	0.10	U	1.0
D007	Chromium	0.50	U	0.50	U	5.0
D008	Lead	0.50	U	0.50	U	5.0
D009	Mercury	0.02	U	0.02	U	0.2
D010	Selenium	0.50	U	0.50	U	1.0
D011	Silver	0.40	U	0.40	U	5.0
Units		(mg/L)		(mg/L)		(mg/L)

Total Solids: 100%

NOTE: All results are not corrected for spike recoveries.

IX. Quality Control Data

TCLP Procedure

Volatile Organics

Aqueous Matrix Spike/Matrix Spike Duplicate Recovery Data

Sample Spiked A22538-1

Parameter	Amount of Spike	Recovery MS	Recovery MSD
Vinyl Chloride	0.25	92	94
1,1-Dichloroethene	0.25	90	91
Chloroform	0.25	98	95
1,2-Dichloroethane	0.25	94	92
2-Butanone (MEK)	0.25	115	110
Carbon Tetrachloride	0.25	96	102
Trichloroethene	0.25	95	97
Benzene	0.25	100	102
Tetrachloroethene	0.25	97	101
Chlorobenzene	0.25	98	100
Units	(ug)	(%)	(%)

AnalytiKEM

IX. Quality Control Data (Cont'd)

TCLP Procedure

Volatile Organics

Aqueous Surrogate Recovery Data

	Surrogate Recovery		
Sample Designation	1,2-Dichloroethane-d_4 (0.25 ug added)	Toluene-d_8 (0.25 ug added)	4-Bromofluorobenzene (0.25 ug added)
Method Blank 1	95	100	100
Method Blank 2	84	101	95
A22538-1 Spike	93	99	106
A22538-1 Spike Dup.	93	99	105
A40194-1	99	99	100
A40194-2	88	100	96
A40194-3	98	100	98
A40194-4	99	100	98
A40194-5	101	102	91
Units	(%)	(%)	(%)

IX. Quality Control Data (Cont'd)

TCLP Procedure

Semivolatile Organics

Aqueous Matrix Spike/Matrix Spike Duplicate Recovery Data

Sample Spiked A22696-1

Parameter	Amount of Spike	Recovery MS	Recovery MSD
Pyridine	50	70	89
1,4-Dichlorobenzene	50	53	62
o-Cresol	100	83	103
m,p-Cresol	100	96	119
Hexachloroethane	50	59	70
Nitrobenzene	50	63	85
Hexachlorobutadiene	50	54	66
2,4,6-Trichlorophenol	100	63	81
2,4,5-Trichlorophenol	100	75	66
2,4-Dinitrotoluene	50	72	67
Hexachlorobenzene	50	55	62
Pentachlorophenol	100	51	49
Units	(ug)	(%)	(%)

IX. Quality Control Data (Cont'd)

TCLP Procedure

Semivolatile Organics

Aqueous Surrogate Recovery Data

	Surrogate Recovery		
Sample Designation	2-Fluorophenol (200 ug Added)	Phenol-d_5 (200 ug Added)	2,4,6-Tribromophenol (200 ug Added)
Method Blank	59	52	88
A22696-1 Spike	63	58	45
A22696-1 Spike Dup.	86	75	61
A40194-1	26	25	36
A40194-2	59	48	69
A40194-3	47	37	61
A40194-4	80	62	93
A40194-5	22	20	34
Units	(%)	(%)	(%)

	Surrogate Recovery		
Sample Designation	Nitrobenzene-d_5 (100 ug Added)	2-Fluorobiphenyl (100 ug Added)	Terphenyl-d_{14} (100 ug Added)
Method Blank	58	71	76
A22696-1 Spike	69	64	55
A22696-1 Spike Dup.	88	73	64
A40194-1	57	84	78
A40194-2	56	73	74
A40194-3	62	79	80
A40194-4	99	108	115
A40194-5	61	97	86
Units	(%)	(%)	(%)

AnalytiKEM

IX. Quality Control Data (Cont'd)

TCLP Procedure

Metals

Aqueous Matrix Spike/Matrix Spike Duplicate Recovery Data

Sample Spiked A40194-3

Parameter	Amount of Spike	Recovery MS	Recovery MSD
Arsenic	100	103	104
Barium	300	110	108
Cadmium	300	107	102
Chromium	300	103	98
Lead	300	100	97
Mercury	20	109	111
Selenium	100	110	109
Silver	300	22	18
Units	(ug)	(%)	(%)

28 Springdale Road
Cherry Hill, New Jersey 08003
(609) 751-1122 • (215) 923-2068
Fax: (609) 751-0824

Chain-of-Custody

454 South Anderson Road BTC 532
Rock Hill, South Carolina 29730
(803) 329-9690
Fax: (803) 329 9689

Client: CHAMPION INTERNATIONAL CORP. Project: TCLP - CANTON MILL AnalytiKEM Contact: NANCY GELLERT

SAMPLE DESIGNATION	DATE	MATRIX	40 ml vials	950 ml Org. Pres.	ml Unpres.	ml HNO_3	ml H_2SO_4	ml NaOH	ml HCL	950 ml. Unpres.	500 ml. Unpres.	120 ml. Unpres.	PARAMETERS
SLUDGE	9/5/90									✓	✓	✓	TCLP
LIME MUD	9/5/90									✓	✓	✓	TCLP
FLY ASH	9/5/90									✓	✓	✓	TCLP
CINDERS	9/5/90									✓	✓	✓	TCLP
USED OIL	9/5/90									✓	✓	✓	TCLP

I. Field Measurements:

Data Sheets: Y N

Filtered: Y Not Required

II. Field Conditions/Comments:

III. Special Instructions:
(Detection Limits, Data Package,etc)

Relinquished By:	Time/Date:	Received By:	Time/Date:
Liz Dickson	3:25pm, 9/5/90	Tracy Zachery	9/6/90 1000

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000

Page: 4

Company: Champion International
Date: February 05, 1991
Client Job No.: 1217.87

Work Order: F0-10-002

TEST NAME: Priority Pollutant Metals

SAMPLE ID: LIME SAMPLE
SAMPLE DATE: 09/24/90
ANALYSIS DATE: 10/15/90

Results in	mg/kg Dry Wt.	Detection Limit
Antimony	ND	3.1
Arsenic	ND	1.6
Beryllium	ND	0.80
Cadmium	2.0	0.80
Chromium	6.4	1.6
Copper	5.6	3.1
Lead	1.3	0.80
Mercury	ND	0.16
Nickel	11	6.2
Selenium	ND	0.80
Silver	3.3	1.6
Thallium	ND	1.6
Zinc	12	3.1

Comments: ND indicates the compound is not detected at the level indicated.

Attachment 1

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000

Company: Champion International
Date: February 05, 1991
Client Job No.: 1217.87
Work Order: F0-10-002

TEST NAME: Pesticides & PCB's

SAMPLE ID: LIME SAMPLE
SAMPLE DATE: 09/24/90
ANALYSIS DATE: 10/06/90

	Results in ug/kg Dry Wt.	Detection Limit
Aldrin	15	13
Alpha-BHC	ND	13
Beta-BHC	ND	13
Delta-BHC	ND	13
Gamma-BHC	ND	13
4,4'-DDD	ND	26
4,4'-DDE	ND	26
4,4'-DDT	ND	26
Dieldrin	ND	26
Endosulfan I	ND	26
Endosulfan II	ND	26
Endosulfan Sulfate	ND	26
Endrin	ND	26
Endrin Aldehyde	ND	26
Heptachlor	ND	13
Heptachlor Epoxide	ND	13
Chlordane	ND	130
Toxaphene	ND	1300
Arochlor 1016	ND	260
Arochlor 1221	ND	260
Arochlor 1232	ND	260
Arochlor 1242	ND	260
Arochlor 1248	ND	260
Arochlor 1254	ND	260
Arochlor 1260	ND	260

Comments: ND indicates the compound is not detected at the level indicated.

Attachment 2(26)

Oxford Laboratories, Inc.

Analytical and Consulting Chemists
1316 South Fifth Street
Wilmington, N.C. 28401
(919) 763-9793

DATE RECEIVED 8-06-91
DATE REPORTED 8-15-91
91W2140

CHAMPION INTERNATIONAL CORP
P. O. BOX C-10
CANTON, NC 28716

P.O. # C92049

ATTENTION: LOUISE JUSTUS

SAMPLE DESCRIPTION: LIME CAKE

1. LIME CAKE

RESULTS

	1
Arsenic, as As, Wt/Wt PPM	<.200
Barium, as Ba, Wt/Wt PPM	72.0
Cadmium, as Cd, Wt/Wt PPM	<1.00
hromium, as Cr, Wt/Wt PPM	<2.00
ead, as Pb, Wt/Wt PPM	<2.00
ercury, as Hg, Wt/Wt PPM	<.0400
Selenium, as Se, Wt/Wt PPM	<.200
Silver, as Ag, Wt/Wt PPM	5.00
(1) Calcium, as Ca, %	30
(2) Calcium, as Calcium Carbonate, %	75.0%
(3) Mesh 20, % Pass (Dry Basis)	99.8
(4) Mesh 100, % Pass (Dry Basis)	99.3
(5) Sodium, as Na, PPM	4850

Attachment 3

TEST DATA REPORT

Date 01/16/92
Page 1

--- Project Information ---

Lab Number : 92-1744-01
Project No. : 2490440802 Cust. No. :
Project Name : CHAMPION GREEN LIME

Manager: GEORGE MAALOUF

--- Sample Information ---

Station ID : GREEN LIME
Matrix : NA
Type : GRAB
Collector : JA

Sampled Date/Time : 01/08/92 13
Received Date/Time : 01/09/92 09
Received From/By : JA/LD
Chain of Custody : 7943
Number of Containers : 2

Remarks :

--- Test Data ---

Parameter	Method	Units	PQL	Results	Test Date
-- INORGANIC CHEMISTRY RESULTS --					
Corrosivity (pH)	SW 846	units	2-12	12.7	01/10/92
-- METALS ANALYSIS - METALS PREP RESULTS --					
Arsenic, TCLP	EPA 6010	mg/l	0.5	ND	01/15/92
Barium, TCLP	EPA 6010	mg/l	0.1	0.2	01/13/92
Cadmium, TCLP	EPA 6010	mg/l	0.1	ND	01/15/92
Chromium, TCLP	EPA 6010	mg/l	0.1	ND	01/15/92
Lead, TCLP	EPA 6010	mg/l	0.1	ND	01/15/92
Mercury, TCLP	EPA 7470	mg/l	0.002	ND	01/15/92
Selenium, TCLP	EPA 6010	mg/l	0.5	ND	01/15/92
Silver, TCLP	EPA 6010	mg/l	0.1	ND	01/15/92
--- SERIES 35000					
Total Metals Prep: Aqueous ICP	EPA 3010			N/A	01/10/92
TCLP EXTRACTION	EPA 1311			N/A	01/09/92

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Champion International
Canton Mill
Canton, NC 28716
Attn: Mr. George Pickard

Date: November 30, 1990

NJ Lab Certification ID#: 12064

Job No.: 1217.87 P.O. Number: C84823

This is the Certificate of Analysis for the following samples:

Client Project ID: Lime sample
Date Received: 10/12/90
Number of Samples: 1
Sample Type: SOIL

I Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY #
LIME SAMPLE	F0-10-196-01

Reviewed and Approved:

Ralph A. Kocsis
Operations Manager

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

Work Order: F0-10-196

SAMPLE ID	LIME SAMPLE	
SAMPLED	10/10/90	
TEST		UNITS
Total Cyanide	ND [0.18]	mg/Kg Dry Wt.
Total Phenols	ND [0.76]	mg/Kg Dry Wt.

ND indicates the parameter was not detected.
Detection limits are specified in [].

Page: 3

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

Work Order: F0-10-196

TEST NAME: **Pesticides & PCB's**

SAMPLE ID: **LIME SAMPLE**
SAMPLE DATE: **10/10/90**
ANALYSIS DATE: 10/30/90

	Results in ug/Kg dry wt.	Detection Limit
Aldrin	ND	13
Alpha-BHC	ND	13
Beta-BHC	ND	13
Delta-BHC	ND	13
Gamma-BHC	ND	13
4,4'-DDD	ND	25
4,4'-DDE	ND	25
4,4'-DDT	ND	25
Dieldrin	ND	25
Endosulfan I	ND	25
Endosulfan II	ND	25
Endosulfan Sulfate	ND	25
Endrin	ND	25
Endrin Aldehyde	ND	25
Heptachlor	ND	13
Heptachlor Epoxide	ND	13
Technical Chlordane	ND	130
Toxaphene	ND	1300
Arochlor 1016	ND	250
Arochlor 1221	ND	250
Arochlor 1232	ND	250
Arochlor 1242	ND	250
Arochlor 1248	ND	250
Arochlor 1254	ND	250
Arochlor 1260	ND	250

Comments: ND indicates the compound is not detected at the level indicated.

Page: 4

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000
Work Order: F0-10-196

TEST NAME: **Priority Pollutant Metals**

SAMPLE ID: **LIME SAMPLE**
SAMPLE DATE: **10/10/90**
ANALYSIS DATE: 10/29/90

	Results in mg/kg dry wt.	Detection Limit
Antimony	3.0	3.0
Arsenic	ND	1.5
Beryllium	ND	0.76
Cadmium	2.0	0.76
Chromium	9.4	1.5
Copper	11	3.0
Lead	1.3	0.76
Mercury	ND	0.15
Nickel	14	6.1
Selenium	ND	1.5
Silver	2.6	1.5
Thallium	ND	1.5
Zinc	15	3.0

Comments: ND indicates the compound is not detected at the level indicated.

Page: 5

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000
Work Order: F0-10-196

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **LIME SAMPLE**
SAMPLE DATE: **10/10/90**
ANALYSIS DATE: 10/20/90

	Results in ug/kg dry wt.	Detection Limit
Acenaphthene	ND	500
Acenaphthylene	ND	500
Anthracene	ND	500
Benzidine	ND	500
Benzo(a)Anthracene	ND	500
Benzo(b)Fluoranthene	ND	500
Benzo(k)Fluoranthene	ND	500
Benzo(a)Pyrene	ND	500
bis(2-Chloroethyl)Ether	ND	500
bis(2-Chloroethoxy)Methane	ND	500
bis(2-Ethylhexyl)Phthalate	ND	500
bis(2-Chloroisopropyl)Ether	ND	500
4-Bromophenyl Phenyl Ether	ND	500
Butyl Benzyl Phthalate	ND	500
2-Chloronaphthalene	ND	500
4-Chlorophenyl Phenyl Ether	ND	500
Chrysene	ND	500
Dibenzo(a,h)anthracene	ND	500
Di-n-butylphthalate	ND	500
1,2-Dichlorobenzene	ND	500
1,3-Dichlorobenzene	ND	500
1,4-Dichlorobenzene	ND	500
3,3'-Dichlorobenzidine	ND	500
Diethylphthalate	ND	500
Dimethylphthalate	ND	500
2,4-Dinitrotoluene	ND	500
2,6-Dinitrotoluene	ND	500
Di-n-Octylphthalate	ND	500
1,2-Diphenylhydrazine	ND	500
Fluoranthene	ND	500
Fluorene	ND	500
Hexachlorobenzene	ND	500
Hexachlorobutadiene	ND	500
Hexachloroethane	ND	500

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000

Work Order: F0-10-196

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **LIME SAMPLE**
SAMPLE DATE: **10/10/90**

Hexachlorocyclopentadiene	ND	500
Indeno(1,2,3-cd)pyrene	ND	500
Isophorone	ND	500
Naphthalene	ND	500
Nitrobenzene	ND	500
N-nitroso-dimethylamine	ND	500
N-Nitrosodipropylamine	ND	500
N-Nitrosodiphenylamine	ND	500
Phenanthrene	ND	500
Pyrene	ND	500
1,2,4-Trichlorobenzene	ND	500
4-Chloro-3-methylphenol	ND	500
2-Chlorophenol	ND	500
2,4-Dichlorophenol	ND	500
2,4-Dimethylphenol	ND	500
2,4-Dinitrophenol	ND	2500
4,6-Dinitro-2-methylphenol	ND	2500
2-Nitrophenol	ND	500
4-Nitrophenol	ND	2500
Pentachlorophenol	ND	2500
Phenol	ND	500
2,4,6-Trichlorophenol	ND	500

Comments: ND indicates the compound is not detected at the level indicated.

Page: 7

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000
Work Order: F0-10-196

TEST NAME: **Volatile Organics**

SAMPLE ID: **LIME SAMPLE**
SAMPLE DATE: **10/10/90**
ANALYSIS DATE: 10/22/90

Results in	ug/kg dry wt.	Detection Limit
Acrolein	ND	76
Acrylonitrile	ND	76
Benzene	ND	8
Bromoform	ND	8
Bromomethane	ND	8
Carbon Tetrachloride	ND	8
Chlorobenzene	35	8
Chlorodibromomethane	ND	8
Chloroethane	ND	8
2-Chloroethylvinyl Ether	ND	8
Chloroform	ND	8
Chloromethane	ND	8
Dichlorobromomethane	ND	8
1,1-Dichloroethane	ND	8
1,2-Dichloroethane	ND	8
1,1-Dichloroethene	ND	8
trans-1-2-Dichloroethene	ND	8
1,2-Dichloropropane	ND	8
cis-1-3-Dichloropropene	ND	8
trans-1-3-Dichloropropene	ND	8
Ethylbenzene	ND	8
Methylene Chloride	31	8
1,1,2,2-Tetrachloroethane	ND	8
Tetrachloroethene	ND	8
Toluene	ND	8
1,1,1-Trichloroethane	ND	8
1,1,2-Trichloroethane	ND	8
Trichloroethene	ND	8
Trichlorofluoromethane	ND	8
Vinyl Chloride	ND	8

Comments: ND indicates the compound is not detected at the level indicated.

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000
Work Order: F0-10-196

TEST NAME: NBS Search for ABN's

SAMPLE ID: LIME SAMPLE
SAMPLE DATE: 10/10/90

Tentatively Identified Compounds	Scan Number	Estimated Concentration (ug/kg dry wt.)
Unknown	113	1000 B
Unknown	154	29000 B
Sulfur, Molecule	1208	260

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000
Work Order: F0-10-196

TEST NAME: NBS Search for VOA's

SAMPLE ID: LIME SAMPLE
SAMPLE DATE: 10/10/90

Tentatively Identified Compounds	Scan Number	Estimated Concentration (ug/kg dry wt.)
Acetone	141	75

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87
Work Order: F0-10-196

II ANALYTICAL RESULTS/METHODOLOGY

The analytical results for this report are presented by Analytical test. Each set of data will include sample identification information, the analytical results, and the appropriate detection limits. Detection limits may vary due to factors arising from concentration/dilution of the sample and sample matrix. ND denotes that the compound is not detected at or above the indicated detection limit. The methodologies for the analytical results requested are described below.

Pesticides/PCB's (Soil)

The analysis of pesticides and PCB's is based on Test Methods for Evaluating Solid Waste (SW-846), 3rd Edition, Method 3550 and Method 8080. An aliquot of sample is sonicated three times with a 1:1 solution of methylene chloride/acetone and exchanged to hexane. The extracts are dried through sodium sulfate and concentrated. The extract is then separated by gas chromotography and the analytes are measured using an electron capture detector.

Metals

The analysis of metals is based on Method 200.7 from 40CFR, Part 136. Samples to be analyzed by flame AA or ICP are digested with hydrochloric and nitric acid. Furnace analysis requires nitric acid digestion and mercury samples are digested with nitric and sulfuric acid.

Arsenic, Selenium, Antimony and Thallium are analyzed by graphite furnace. Mercury by cold vapor AA and all other metals by flame AA or ICP.

Base/Neutral and Acid Extractable Organics - GC/MS (Solid)

The analysis of base/neutral and acid extractables organics is based on Test Methods for Evaluating Soild Waste (SW-846), 3rd Edition Method 3550 and 8270. An aliquot of sample is sonicated three times with methylene chloride. The extracts are dried through sodium sulfate, concentrated and analyzed by mass spectroscopy.

Volatile Organics - GC/MS (Solid)

For the analysis of volatile organics in soils, SW-846, 3RD Edition, Method 8240 is employed. The volatile organic compounds are introduced into the gas chromatograph by the purge and trap method. The purgeables are efficiently transferred from the aqueous phase to the vapor phase. The vapor is swept through a sorbent column where the purgeables are trapped. After purging is completed, the sorbent column is heated and backflushed with the inert gas to

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

Work Order: F0-10-196

desorb the purgeables onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeables which are then detected with a mass spectrometer.

Cyanide

The analysis of cyanide is based on Technicon Method 696-82W and Test Methods for Evaluating Solid Waste (SW-846, 3rd Edition) Method 9010. The cyanide, as hydrocyanic acid (HCN) is released by refluxing the sample with strong acid. The hydrocyanic acid is then distilled into an absorber-scrubber containing sodium hydroxide solution. The cyanide concentration in the absorbing solution is determined colorimetrically using an automated flow injection method.

Phenols - Technicon Method

The analysis of phenol is based on Technicon Industrial Method 127-71 W/B. The sample is distilled and the distillate reacts with alkaline ferricyanide and 4-aminoantipyrine to form a red complex which is measured colorimetrically at 505nm.

III QUALITY CONTROL

The Determinations were performed in accordance with EPA/NJDEP approved methodology.

The value listed for chromium is based on the blank and matrix spike due to the relative percent difference of the replicates not meeting the QC acceptance criteria. The data was accepted due to the value being less than 5 times the detection limit.

The value listed for zinc is based on the blank spike and relative percent difference of the replicates due to the matrix spike not meeting the acceptance criteria. This was attributed to the high concentration of zinc in the sample analyzed as the matrix spike.

The value for selenium is based on the blanks spike and relative percent difference of the replicates. The matrix spikes were not within the QC acceptance limits due to matrix interference.

IT ANALYTICAL SERVICES
EDISON, NJ
(201) 225-2000

Company: Champion International
Date: November 30, 1990
Client Job No.: 1217.87

Work Order: F0-10-196

The tentatively identified compounds denoted with a "B" were also detected in the Method Blank.

The sample was analyzed for cyanide past the recommended holding time. The value reported is based on the blank spike and relative percent difference of the replicate, due to the matrix spike not meeting the QC acceptance limits. This has been attributed to matrix interferences.

LAW ENVIRONMENTAL, INC.
112 TOWNPARK DRIVE
KENNESAW, GEORGIA 30144-5599
404-421-3400

September 8, 1992

Law Engineering, Inc.
Four Interchange Blvd.
Greenville, SC 29607

Attention: Charles Bristow

Job Number: 2490480501

Subject: Chemical Analysis of Samples Received on 08/22/92.

Dear Mr. Bristow:

Law Environmental National Laboratories has completed its analysis of your samples and reports the results on the following pages. These results relate only to the contents of the samples as submitted. This report shall not be reproduced except in full without the approval of Law Environmental National Laboratories.

If there are any questions, please do not hesitate to contact us.

Sincerely,

LAW ENVIRONMENTAL NATL LABS

W. Clifford, Jr.

Clifford H. McBride
QC Coordinator

Attachment: Data Report
Invoice

LAW ENVIRONMENTAL NATIONAL LABORATORIES
TEST DATA REPORT

Date 09/08/92
Page 1

--- Project Information ---

Lab Number : 92-3460-01
Project No. : 2490480501 Cust. No. :
Project Name : CHAMPION

Manager: CHARLES BRISTOW

--- Sample Information ---

Station ID : SLAKER GRIT (5N, 5S, +4) Sampled Date/Time : 08/21/92 11:
Matrix : NA Received Date/Time : 08/22/92 11:
Type : COMP Received From/By : CB/LD
Collector : CB Chain of Custody : 14257
Number of Containers : 2

Parameter	Method	Units	DL	Results	Test Date	A
-- METALS ANALYSIS - METALS PREP RESULTS --						
Arsenic, TCLP	EPA 6010	mg/l	0.50	ND	09/01/92	J
Barium, TCLP	EPA 6010	mg/l	1.0	ND	09/01/92	J
Cadmium, TCLP	EPA 6010	mg/l	0.10	ND	09/01/92	J
Chromium, TCLP	EPA 6010	mg/l	0.50	ND	09/01/92	J
Lead, TCLP	EPA 6010	mg/l	0.50	ND	09/01/92	J
Mercury, TCLP	EPA 7470	mg/l	0.02	ND	08/31/92	H
Selenium, TCLP	EPA 6010	mg/l	0.10	ND	09/01/92	J
Silver, TCLP	EPA 6010	mg/l	0.50	ND	09/01/92	J
--- SERIES 35000						
Total Metals Prep: Aqueous ICP	EPA 3010			N/A	08/30/92	H
Total Metals Prep: Aqueous, Hg	EPA 7470			N/A	08/30/92	H
TCLP EXTRACTION	EPA 1311			EXTRACTED	08/27/92	H
--- SERIES 66000						
Ext/Zero Headspace, TCLP	EPA 1311			EXTRACTED	08/25/92	J
-- Ext/Zero Headspace, TCLP RESULTS --						
Vinyl chloride, TCLP	EPA 8240	ug/l	50	ND	08/28/92	B
1,1-Dichloroethene, TCLP	EPA 8240	ug/l	25	ND	08/28/92	B
Chloroform, TCLP	EPA 8240	ug/l	25	ND	08/28/92	B
1,2-Dichloroethane, TCLP	EPA 8240	ug/l	25	ND	08/28/92	B
2-Butanone (MEK), TCLP	EPA 8240	ug/l	500	ND	08/28/92	B
Carbon tetrachloride, TCLP	EPA 8240	ug/l	25	ND	08/28/92	B
Trichloroethene, TCLP	EPA 8240	ug/l	25	ND	08/28/92	B
Benzene, TCLP	EPA 8240	ug/l	25	ND	08/28/92	B
Tetrachloroethene, TCLP	EPA 8240	ug/l	25	ND	08/28/92	B
Chlorobenzene, TCLP	EPA 8240	ug/l	25	ND	08/28/92	B

Remarks:
DL = Detection Limit ND = Not Detected at the DL
Unless otherwise noted, all soil test results are calculated based on dry weight.

Signed Paul Stafford

ACL

ADVANCED CHEMISTRY LABS, INC.

P.O. BOX 88610 • ATLANTA, GEORGIA 30356
PHONE (404) 409-1444 • FAX (404) 409-1844

Client: Champion International Corp.
Canton Mill, Box C-10
Canton, NC 28716

Attention: Mr. Jim Giauque

Canton Mill
Client Project No.: P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: Lime Mud
ACL #: 86425

MATRIX: Solids

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	< 0.10	08-29-94	1311/6010
Barium	< 2.0	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	< 0.10	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andrps
QA/QC Manager

ACL

ADVANCED CHEMISTRY LABS, INC.

P.O. BOX 88610 • ATLANTA, GEORGIA 30356
PHONE (404) 409-1444 • FAX (404) 409-1844

Client: Champion International Corp.
Canton Mill, Box C-10
Canton, NC 28716

Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: Lime Mud
ACL #: 86425

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2
SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.

ACL

ADVANCED CHEMISTRY LABS, INC.

P.O. BOX 88610 • ATLANTA, GEORGIA 30356
PHONE (404) 409-1444 • FAX (404) 409-1844

Client: Champion International Corp.
Canton Mill, Box C-10
Canton, NC 28716

Attention: Mr. Jim Giauque

Canton Mill
Client Project No.: P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: Slaker Grit
ACL #: 86426

MATRIX: Solids

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	< 0.10	08-29-94	1311/6010
Barium	< 2.0	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	< 0.10	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andros
QA/QC Manager

ACL

ADVANCED CHEMISTRY LABS, INC.

P.O. BOX 88610 • ATLANTA, GEORGIA 30356
PHONE (404) 409-1444 • FAX (404) 409-1844

Client: Champion International Corp.
Canton Mill, Box C-10
Canton, NC 28716

Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: Slaker Grit
ACL #: 86426

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2
SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.

ACL

ADVANCED CHEMISTRY LABS, INC.

P.O. BOX 88610 • ATLANTA, GEORGIA 30356
PHONE (404) 409-1444 • FAX (404) 409-1844

Client: Champion International Corp.
Canton Mill, Box C-10
Canton, NC 28716

Attention: Mr. Jim Giauque

Canton Mill
Client Project No.: P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: Flyash-#4 Boiler
ACL #: 86427

MATRIX: Ash

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	0.70	08-29-94	1311/6010
Barium	< 2.0	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	0.13	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andros
QA/QC Manager

ACL

ADVANCED CHEMISTRY LABS, INC.

P.O. BOX 88610 • ATLANTA, GEORGIA 30356
PHONE (404) 409-1444 • FAX (404) 409-1844

Client: Champion International Corp.
Canton Mill, Box C-10
Canton, NC 28716

Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: Flyash-#4 Boiler
ACL #: 86427

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2
SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.

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Client: Champion International Corp.
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Attention: Mr. Jim Giauque

Canton Mill
Client Project No.: P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: Flyash-PG/BB/RC
ACL #: 86428

MATRIX: Ash

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	1.85	08-29-94	1311/6010
Barium	< 2.0	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	< 0.10	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andros
QA/QC Manager

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Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: Flyash-PG/BB/RC
ACL #: 86428

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2

SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.

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Client: Champion International Corp.
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Attention: Mr. Jim Giauque

Canton Mill
Client Project No.: P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: Flyash-Riley Bark
ACL #: 86429

MATRIX: Ash

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	0.10	08-29-94	1311/6010
Barium	< 2.0	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	< 0.10	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andros
QA/QC Manager

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Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: Flyash-Riley Bark
ACL #: 86429

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2

SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.

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Attention: Mr. Jim Giauque

Canton Mill
Client Project No.: P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: Klinkers/Cinders
ACL #: No. 4 Boiler
86430

MATRIX: Solids

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	< 0.10	08-29-94	1311/6010
Barium	< 2.0	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	< 0.10	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andros
QA/QC Manager

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ADVANCED CHEMISTRY LABS, INC.

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Client: Champion International Corp.
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Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: Klinkers/Cinders
ACL #: No. 4 Boiler
86430

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2

SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.

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Canton Mill
Client Project No.: P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: Klinkers/Cinders
ACL #: PG/BB/RC
86431

MATRIX: Solids

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	< 0.10	08-29-94	1311/6010
Barium	< 2.0	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	< 0.10	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andros
QA/QC Manager

ACL

ADVANCED CHEMISTRY LABS, INC.

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Client: Champion International Corp.
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Canton, NC 28716

Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: Klinkers/Cinders PG/BB/RC
ACL #: 86431

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2

SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.

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Client: Champion International Corp.
Canton Mill, Box C-10
Canton, NC 28716

Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: Klinkers/Cinders
ACL #: Riley Bark 86432

MATRIX: Water/Solids

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	< 0.10	08-29-94	1311/6010
Barium	< 2.0	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	< 0.10	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andros
QA/QC Manager

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ADVANCED CHEMISTRY LABS, INC.

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Client: Champion International Corp.
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Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: Klinkers/Cinders
ACL #: Riley Bark 86432

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2

SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.

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Client: Champion International Corp.
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Canton, NC 28716

Attention: Mr. Jim Giauque

Canton Mill
Client Project No.: P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: Precoat Dregs
ACL #: 86433

MATRIX: Solids

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	< 0.10	08-29-94	1311/6010
Barium	< 2.0	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	< 0.10	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andros
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Client: Champion International Corp.
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Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: Precoat Dregs
ACL #: 86433

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2
SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.

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Waste

Client: Champion International Corp.
Canton Mill, Box C-10
Canton, NC 28716

Attention: Mr. Jim Giauque

Canton Mill
Client Project No.: P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

STATION: WWTP Sludge
ACL #: 86424

MATRIX: Sludge

PARAMETERS:	RESULTS	DATE ANALYZED	METHOD
TCLP Metals (mg/liter)			
Arsenic	< 0.10	08-29-94	1311/6010
Barium	2.76	08-29-94	1311/6010
Cadmium	< 0.10	08-29-94	1311/6010
Chromium	< 0.20	08-29-94	1311/6010
Lead	< 0.50	08-29-94	1311/6010
Mercury	< 0.002	08-29-94	1311/7470
Selenium	< 0.10	08-29-94	1311/6010
Silver	< 0.50	08-29-94	1311/6010

John H. Andros
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Client: Champion International Corp.
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Attention: Mr. Jim Giauque

Client Project No.: Canton Mill P.O. #C72823
ACL Project No.: 16628
Date Received: 08-13-94
Report Date: 09-14-94
NC Lab ID #362

TCLP VOLATILES/SEMI-VOLATILES

STATION: WWTP Sludge
ACL #: 86424

VOLATILES (mg/liter)(1311/8240)	Results	Federal Regulatory Level
Benzene	< 0.05	0.5
Carbon tetrachloride	< 0.05	0.5
Chlorobenzene	< 10	100
Chloroform	< 0.60	6.0
1,2-Dichloroethane	< 0.05	0.5
1,1-Dichloroethylene	< 0.07	0.7
Methyl ethyl ketone	< 20	200
Tetrachloroethylene	< 0.07	0.7
Trichloroethylene	< 0.05	0.5
Vinyl chloride	< 0.02	0.2

SEMI-VOLATILES (mg/liter)(1311/8270)		
m-Cresol	< 20	200
o-Cresol	< 20	200
p-Cresol	< 20	200
Total Cresol*	----	200
1,4-Dichlorobenzene	< 0.75	7.5
2,4-Dinitrotoluene	< 0.013	0.13
Hexachlorobenzene	< 0.013	0.13
Hexachlorobutadiene	< 0.05	0.5
Hexachloroethane	< 0.30	3.0
Nitrobenzene	< 0.20	2.0
Pentachlorophenol	< 10	100
Pyridine	< 0.50	5.0
2,4,5-Trichlorophenol	< 40	400
2,4,6-Trichlorophenol	< 0.20	2.0

* If m-,o- and p-Cresol cannot be differentiated, the total Cresol concentration is used.