Prepared for:

ABTco, Inc.
Highway 268, P. O. Box 98
Roaring River, North Carolina 28669
JEI Project No. 364.00, Task 01

Carmen Johnson
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ABTco, Inc.
Landfill Design Plan

November 24, 1997

APPROVED
DIVISION OF WASTE MANAGEMENT
SOLID WASTE SECTION
DATE 11/4/02 BY SLC
Permit # 97-03

Prepared by:

Joyce Engineering, Inc.
436 Spring Garden Street
Greensboro, North Carolina 27401
(910) 230-1992

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Note: 11 x 17 versions of the Drawings listed below included herein.

Appendices

Drawings

1.0 INTRODUCTION

ABTco, Inc., Siding Division is located south of State Route 268, west of Roaring River, North Carolina. The site location is indicated on an excerpt of the USGS topographic quadrangle for Roaring River (see Figure 1). The ABTco facility produces building products from hardwood and softwood. These raw materials are ground into wood chips, and then formed into hardboard and fiber cement siding products. Waste wood chips are used as fuel to fire a boiler, and the resulting ash is landfilled on site in an unlined land disposal unit.

ABTco's wood ash monofill began operation in 1981. This landfill unit is regulated and permitted by the North Carolina Department of Environment and Natural Resources (DENR), Solid Waste Section, as an industrial landfill. It was originally permitted on January 7, 1981, and is identified as Permit No. 97-03. The Solid Waste Section has notified ABTco that a landfill design plan must be submitted to satisfy the requirements of the North Carolina Solid Waste Management Rules, specifically Rule .0503(2)(d)(ii), if the industrial landfill is to continue operations after January 1, 1998. The required components of this landfill design plan are given in a letter dated June 2, 1997 from James C. Coffey to Erich Burke of ABTco (attached in Appendix I, Miscellaneous Correspondence), and are as follows:

- A Construction and Operational Plan, illustrating the vertical expansion of the waste footprint established as of January 1, 1998, shown in one-year phases;
- A Water Quality Monitoring Plan, demonstrating compliance with groundwater standards established under 15A NCAC 2L; and
- A Closure Plan, designed to ensure closure in compliance with the above referenced groundwater standards.

The intent of this report and the accompanying drawings is to illustrate the proposed vertical expansion of ABTco's industrial landfill in a manner that satisfies the above requirements. The existing site conditions, including the waste footprint as of January 1, 1998, are shown on Drawing No. 1. The construction and operational plan is illustrated by Drawing Nos. 2 and 3, and by narrative discussion in Section 2.0 following this introduction. The water quality monitoring plan is described in Section 3.0 of this report and Drawing No. 4, while the closure plan consists of Section 4.0 and Drawing Nos. 5 and 6.

2.0 CONSTRUCTION AND OPERATIONAL PLAN

2.1 Introduction

The existing landfill is located northwest of the production facility at the ABTco site. There is no development immediately adjacent to the disposal area. The landfill was constructed within a northeast-to-southwest trending valley after extensive grading activities occurred. Earth berms constructed on the south and west sides of the facility serve to contain the ash and to provide access around the perimeter of the disposal area. The berms reach a maximum height of about sixty feet at the southwest end of the facility. Ash has been placed to the top of the berms throughout most of the disposal area. The one exception is at the west end, where there remains a large concave unfilled area. About 3 ½ acres of undeveloped land drain toward the landfill from the upper part of the hill. Other areas adjacent to the landfill drain to natural drainageways leading away from the landfill.

The approximate limits of ash are indicated on Drawing No. 1, Existing Site Conditions, and encompass approximately 6.0 acres. This is the footprint that is proposed for vertical expansion. In support of this request for an expansion, five one-year phases are shown on the accompanying drawings, as are the final closure contours and associated construction details.

2.2 Waste Characteristics

Approximately 604 cubic yards of wood ash are generated each month. The ash is fairly lightweight, weighing approximately 1,100 pounds per cubic yard. No direct strength testing of the ash was performed during this analysis. However, values of up to 45 degrees for the angle of internal friction have been documented in literature. In addition, cohesion in the ash increases over time with cementation within the ash fill. This process is evident in the field from observation of the older ash fill areas. Laboratory tests conducted to determine the chemical constituents of the ash are discussed in the Water Quality Monitoring Plan, Section 3.0 of this report.

ABTco is producing another byproduct or excess material from a new production facility at the Roaring River plant. The material is a fiber and cement based product typically consisting of the following ranges of materials:

Sand (Silica)	40% to 65%
Portland Cement	30% to 50%
Cellulose	1% to 10%
Clay	1% to 10%.

Laboratory analyses (TCLP) were performed previously on a single composite sample of the material. The data showed no organics, no herbicides or pesticides, and very low metals concentrations. In correspondence from DENR/Division of Waste Management dated March 31, 1997, the Division determined that this waste material can be classified as recovered material if it

is used by ABTco for roadbed stabilization, structural fill or similar applications. If the production operations generate more of this fiber-cement byproduct than can be reused on site, ABTco may opt to dispose of the material in the landfill. Refer to Appendix II for information regarding the fiber and cement based waste product.

2.3 Waste Placement and Operations

The ash is transported from the manufacturing facility in trucks to the on-site landfill. The material is spread and compacted with conventional earth moving equipment. A sprinkler system is provided to control air-borne particles, and can be used for fire-fighting purposes in the event that the ash contains particles that are still smoldering.

2.4 Vertical Expansion Area

The proposed grades for expansion of the landfill in five one-year phases are shown on Drawing Nos. 2 and 3. In 1998 and 1999, landfilling will continue at the western end of the disposal area, in the concave area that is created by the existing earthen berm around the perimeter of the fill. After that time, exterior fill slopes will be constructed at 3 feet horizontal to 1 foot vertical (3H:1V) to allow landfilling to continue above the grade of the existing berm until the final contours are reached (see the Closure Plan and Drawing No. 5). The proposed final contours will enable the maximum storage potential of the site to be attained. It is understood that this permit request is for a five year period, and that the facility is to be constructed so that it can be closed at any point during its active life. If constructed to the proposed maximum contours shown on Drawing No. 5, the landfill's available capacity is 91,500 cubic yards, which could serve ABTco's needs for approximately 12.5 years.

2.5 Erosion and Sediment Control Plan

The erosion and sediment control plan has been prepared to serve anticipated development during the first five years of the vertical expansion. At the end of five years, the erosion and sediment control plan will need to be revised as needed to serve disturbed areas of the subsequent expansion. The following erosion control devices are proposed:

Grass-lined Channels: Grass-lined channels will be provided at the perimeter of the landfill to convey runoff away from the active areas. Temporary liners will be provided as needed to stabilize channels subject to erosion prior to the establishment of channel vegetation. Runoff from disturbed areas will be diverted to one of the sediment control features discussed below. Runoff from off-site areas will be diverted so that it does not flow across the landfill surface. Concentrated runoff will be conveyed to the toe of the landfill via permanent slope drains strategically located on the landfill sides. From the toe, runoff will be directed to natural drainageways at the site.

Silt Fences: Temporary silt fences will be used as needed at the perimeter of disturbed areas not served by a sediment trap. Silt fences are proposed to be used when the disposed ash has reached

the top of the existing berms, but has not been placed to a height above the berms such that a sediment trap is required. For example, silt fences will be erected during the latter part of phase two (the second year), but will be replaced by a sediment trap at the appropriate point in time during phase three (the third year).

Sediment Trap: A temporary sediment trap is proposed to be constructed at the southwest corner of the disposal area as shown on the drawings. The location provides a convenient point for the collection of sediment-laden runoff before it is conveyed to the toe of the landfill. Runoff from disturbed areas as well as runoff from off-site areas will flow to the trap, which will provide in excess of 1800 cubic feet of storage for each disturbed acre draining to it. Accumulated sediment is to be removed from the trap when the sediment has reached a depth of one foot. The sediment trap spillway is sized to accommodate the peak flow resulting from a 25-year storm.

Outlet Stabilization Structure: Riprap aprons will be located at the outlets of the three slope drains to minimize potential scour.

Surface stabilization: Surface stabilization will be accomplished with vegetation and mulch as specified in the vegetation plan.

The complete erosion and sediment control plan has been included as Appendix III to this report.

2.6 Slope Stability Analysis

The landfill side slopes consist of soil fill embankments on the south and west sides, cut slopes and natural slopes on the north and east, and proposed ash fill slopes above the top of the embankment. The grading and soil embankment constructed was completed in about 1981. As discussed above, soil fill depths range up to approximately 60 feet. Soil fill slopes range between 1.2H:1V in the south central portion of the fill embankment, to approximately 2H:1V at the southwest corner. The existing slopes are mostly well vegetated. Slope drains are in place, and more are planned, for stormwater management.

The current height of the ash fill and stockpiled soils in the eastern end of the site is approximately 6 feet above the embankment, at a slope of approximately 5 percent. At the western end of the landfill, the depth of the ash fill is approximately 26 feet below the top of the soil embankment. As discussed above, proposed fill slopes for the ash are 3H:1V. The proposed maximum fill height is approximately 28 feet above the top of the embankment. The final slope on the top of the landfill is approximately 5 percent.

Slope stability analyses were performed for the static condition for a representative "worst case" section through the existing and proposed final slopes of the landfill. The modeling was performed using the computer program, "PC Stabl 5M." The representative slope section, indicated on Drawing No. 5, and the assumptions, calculations and computer output are provided in Appendix IV.

Prior to performing the analysis, one soil test boring was drilled through the embankment to verify the depth of fill at that location, and soil conditions within the embankment. No water was encountered in the borehole to the termination depth of 50 feet. The fill soils primarily consist of silty sand and sandy silt, with Standard Penetration Resistances (N-values) ranging between 8 and 23 blows per foot (bpf). One zone of loose silty sand was identified at a depth of approximately 23.5 to 25 feet with a N-value of 5 bpf. A soft zone of clayey silt (N-value of 6 bpf) was identified at the interface of the fill and residual soils. A copy of the boring log is included in Appendix IV.

An undisturbed sample was collected in the clayey silt between the depths of 37 and 39 feet. A consolidated undrained triaxial shear test was performed on the undisturbed sample by Trigon Engineering Consultants, Inc. of Greensboro, North Carolina. The results of the triaxial shear test indicated a cohesion (c) of 800 pounds per square foot (psf), and an angle of internal friction (ϕ) of 16 degrees (see Appendix V). Soil parameters were assumed for the other fill soils, the residual soil, and the ash, using literature values and empirical knowledge. The assumed strength parameters used in the stability analysis are as follows:

Soil Type	**ϕ (degrees)**	**c (psf)**
Fill: Ash	36	100
Fill: Silty Sand	34	100
Residual?: Clayey Silt	16	800
Residual: Sandy Silt	28	300

References for typical soil strength parameters are provided in Section 5.0 of this report. A total strength analysis was performed since groundwater appears to be at a depth of at least 10 feet below the original ground surface at the toe of the embankment.

Based on the results of the stability analyses, the embankment appears stable under static loading for the existing conditions and proposed landfill development. Using the available information, the mode of failure for the existing and proposed slopes is a face failure through the silty sands in the steep slope. The increased height of the ash fill behind the embankment does not have a significant adverse affect on the stability of the slope, given the light weight of the ash and the strength characteristics for the ash and the existing soils assumed in this analysis. The existing vegetation on the slope will help to stabilize the face against failure.

The factor of safety determined for the slope was less than desirable. The calculated factor of safety for the critical failure surface is 1.22, versus a preferable safety factor of 1.3 or higher. This is an indication that the slope appears stable but that the "margin of error" is smaller than the commonly accepted value. Changing conditions within the slope such as saturation (e.g., due to a leak in the water line installed at the top of the embankment), alteration of the toe of the slope, or denuding of the vegetation could create instability in the surface of the slope.

3.0 WATER QUALITY MONITORING PLAN

3.1 Site and Geologic Description

The general topography of the area is indicated on an enlarged USGS topographic quadrangle (see Figure 1). The landfill was constructed along the side slope of a major northeast to southwest trending valley. Elevations the topographic highs surrounding the site are approximately 1100 feet (MSL) to the north, and 1140 feet (MSL) to the northwest. Elevations in the lower end of the valley below the landfill range to approximately 970 feet (MSL).

Geologically, the site is located on the northwestern edge of the Inner Piedmont belt, between a series of ancient thrust faults known as the Brevard Fault zone. This long linear zone is often referred to as the Brevard belt. The lithologies present, as mapped by Rankin, et al (1972), are of the Precambrian age Crossnore plutonic-volcanic group, and the Ashe Formation, both largely composed of schists and gneisses.

Regarding landfill operations, there do not appear to be any unusual geologic conditions that would complicate the environmental monitoring or other day-to-day management of the facility. There are no known active surficial fault systems in the region (Howard, et al, 1978) that would affect the stability of filling. The Brevard Fault zone, a major tectonic feature of the southern Appalachians, has not been active since the Paleozoic era.

Regarding hydrogeology, there do not appear to be any geologic features such as diabase dikes which could potentially complicate the flow of groundwater in the area. Rankin, et al (1972) have not mapped any such units in the area, nor has any diabase float been observed on site.

3.2 Groundwater Flow Directions

Groundwater flow patterns most likely mimic the pre-development topography. An approximation of that topography is indicated on Drawing No. 4. Based on the original site contours and knowledge of groundwater flow patterns in the Piedmont physiographic province, groundwater from beneath the majority of the landfill flows south towards the bottom of the valley, then flows west towards an unnamed tributary to the Yadkin River. Based on groundwater elevations obtained from two monitoring wells on site, inferred groundwater contours were developed for the landfill area and added to Drawing No. 4.

3.3 Groundwater Monitoring Network

Two groundwater monitoring wells were installed for the ABTco landfill in November 1989. The locations were specified by the Solid Waste Section prior to installation. One upgradient well (FA-1) is located at the upper end of the main northeast-southwest hollow (see Drawing No. 4). The second well (FA-2) is located in the same hollow near the toe of the soil embankment, approximately 450 feet downgradient from FA-1. Wells FA-1 and FA-2 are 28 and 29 feet in depth, respectively. Both

wells have 10-foot screens installed in residual soils. Well Completion Records and correspondence related to the well network are included in Appendix VI. Recorded depths to water have been on the order of 20 to 24 feet in well FA-1, and 12 to 13 feet in FA-2.

On November 14, 1996, Mr. Bobby Lutfy of the Solid Waste Section visited the site to inspect the groundwater monitoring wells. Following Mr. Lutfy's site visit, he stated in a letter dated November 18, 1996, "Pending the evaluation of the boring logs and the next set of sampling results, the existing monitoring system appears generally adequate." Mr. Lutfy commented on the possible influence of surface water on the upgradient well, the proximity of the well to waste, and the shallow depth of the well screen, but has not found the upgradient well to be inadequate. Regarding the downgradient well, Mr. Lutfy stated that, "The downgradient well appears to be located in an excellent location. It appears this well may be screened slightly deeper than is ideal, however otherwise it appears to be a properly designed monitoring well." Mr. Lutfy's visit resulted in a request for additional information, which was supplied by Mr. Erich Burke, P.E. of ABTco on December 30, 1996. As of this date, ABTco has not received further written comment on the monitoring network from the Solid Waste Section.

Given the original and existing site contours and the homogeneous nature of the ash placed in the landfill, the current downgradient well is in an adequate location to detect potential impacts to groundwater. The well is positioned in the hollow downgradient from the earliest portion of the fill area, and is approximately 60 feet from the waste boundary. If future monitoring results indicate that an adverse impact to groundwater has occurred, ABTco may discuss the possibility of adding to or replacing the current upgradient well with the Solid Waste Section. The purpose of a new upgradient well would be to confirm background concentrations for the facility. If an adverse groundwater impact downgradient from the facility is confirmed, ABTco. will discuss with the Section the need for an additional downgradient well, located further down the valley and west-southwest of well FA-2.

3.4 Historic Monitoring Data

In a letter dated October 12, 1987, ABTco was instructed to use the Section's standard list of 23 groundwater monitoring parameters when they began monitoring at their facility. The groundwater monitoring wells have been sampled 16 times beginning with the first event in April 1990. The wells primarily have been sampled for metals, non-metallic inorganic parameters, and organic indicator parameters, but the specific target analyte list has varied over the course of the monitoring program. Summaries of the inorganic analytical data are provided in Appendix VII. Organic parameters have been included on the target analyte lists for special sampling events, but have not been detected during previous sampling events. The analytical results have been submitted to the Solid Waste Section after each sampling event by ABTco.

The concentrations of six metals (arsenic, cadmium, chromium, iron, lead, and manganese) have been reported sporadically above the groundwater quality standards established under 15A NCAC 2L (the "2L standards") in the upgradient and/or downgradient monitoring wells. Concentrations

in the downgradient well are generally comparable with or below those in the upgradient well. Also, trends towards increasing concentrations with time are not evident in the data for either of the wells. Review of the data does not indicate an impact to groundwater from the facility.

3.5 Waste Characterization Relative to 2L Standards

Monitoring of the landfill is required to demonstrate compliance with the groundwater quality standards established under 15A NCAC 2L. Therefore, the intent of the waste characterization included herein is to determine the relationship between the chemical characteristics of leachate generated from the waste (i.e., the ash) and 2L groundwater standards. Previous Toxicity Characteristic Leachate Procedure (TCLP) analyses on the ash included testing for metals, non-metallic inorganic compounds, and organic compounds. The results indicated that organic compounds were not present in leachate generated during the procedure. Thus, the focus of the laboratory testing performed as part of this investigation was to identify the inorganic parameters present in ash leachate that could result in exceedences of 2L standards.

A TCLP was performed on a sample of ash by Enviro-Tech Mid-Atlantic in November 1997. The TCLP analysis list included the inorganic parameters that have current or proposed 2L standards. Those parameters are: antimony, arsenic, barium, beryllium, cadmium, chloride, chromium, cobalt, copper, cyanide, fluoride, iron, lead, manganese, mercury, nickel, nitrate, selenium, silver, sulfate, thallium, vanadium, and zinc. The laboratory achieved levels of detection below existing 2L standards for all parameters. Laboratory detection limits were at or below proposed 2L standards for all parameters except antimony, cobalt and thallium. A summary of the TCLP analyses and the recent analytical results are provided in Appendix VIII.

Of the 24 parameters on the target analyte list, twenty have been reported present in leachate generated from the ash during TCLP analyses. Of these, eight parameters (antimony, barium, chloride, cobalt, fluoride, silver, and vanadium) have been reported present above existing or proposed 2L standards. Twelve parameters were either not detected or were at low concentrations that do not appear to have the potential for producing concentrations in groundwater that would exceed 2L standards. The remaining parameters are present in concentrations that are close enough to 2L standards that we recommend including them in the monitoring program.

3.6 Proposed Monitoring Program

Based on the analyses discussed above in Section 3.5, we recommend the following routine monitoring program for the ABTco ash monofill. Parameters with existing or proposed 2L standards that were not present or were present in low concentrations during TCLP analyses should be excluded from the list of target analytes. In addition, organic compounds should be omitted from the target analyte list since they have not been detected during previous analyses of the ash.

The recommended monitoring list is: antimony, barium, beryllium, cadmium, chloride, cobalt, fluoride, manganese, nickel, nitrite, silver, and vanadium. Since total concentrations of inorganic

parameters can be substantially increased when suspended particles are included in the sample, we recommend that turbidity measurements be made in the field at the time of sampling. In addition, we recommend that the sampling procedure be modified if turbidity measurements are substantially and consistently higher than a target turbidity value of 5 NTU or less. The recommended monitoring frequency is semiannual.

4.0 CLOSURE PLAN

4.1 Background

Because the industrial landfill is projected to operate as a vertical expansion after January 1, 1998, the landfill will require final cover that is acceptable to the Solid Waste Section. ABTco proposes to close the landfill in accordance with the procedures described in this Closure Plan. The proposed maximum final fill contours and associated drainage features are provided on Drawing No. 5, and a typical cross-section of the cap is shown on Drawing No. 6.

4.2 Soil Testing

Laboratory analyses were performed for two on-site soils and two soil composites to determine the suitability of the materials for use during construction of the closure cap. Two potential borrow soils were identified on site. One borrow source, designated as the "stockpile," is located on the eastern end of the ash fill. The stockpile soil consists of brown micaceous silty coarse to fine sand with cobbles. The second potential borrow source, identified in the laboratory report as "borrow," is located on the hill to the north of the landfill. This potential borrow soil consists of red-brown coarse to fine sandy slightly clayey silt. In addition to these soils, one composite mixture was prepared of the stockpile soil and wood ash, and and one composite was prepared of the stockpile soil with wood ash and sludge from the on-site treatment plant.

The laboratory tests consisted of Standard Proctor compaction tests and flexible walled permeability tests. The compaction tests were performed first to establish the moisture-density relationships of the soils and soil composites. Using those test results, test specimens were prepared at densities ranging between 96 and 99 percent of the Standard Proctor maximum dry densities for the materials, with moisture contents of 1.7 to 5.2 over the optimums established for those samples.

The laboratory results for the borrow and stockpile soils indicated remolded hydraulic conductivity values of 1.5×10^{-7} cm/sec and 5.6×10^{-6} cm/sec, respectively. The two composite samples were prepared as follows: (1) 50 percent stockpile soil and 50 percent ash, by volume; and (2) 50 percent stockpile soil, 30 percent ash, and 20 percent sludge, by volume. The laboratory results for the composite samples indicated remolded hydraulic conductivity values on the order of 10^{-6} cm/sec. Based on these results, the on-site soils or composites similar to those tested will be suitable for construction of the barrier layer in the cap. Laboratory results are included in Appendix V.

4.3 Final Cover Design

The North Carolina Solid Waste Management Rules do not provide specific performance requirements for caps over industrial landfills. Given the relatively innocuous waste characteristics of the wood ash being disposed in the landfill, particularly when compared to municipal solid waste (MSW), ABTco is proposing a cap section that is no more stringent than the regulatory minimum cap (RMC) used by the Solid Waste Section for closure of unlined MSW landfills. The proposed cap section consists of a 12-inch low permeability layer of the soil/ash mixture, a 12-inch erosion layer, and vegetative cover.

ABTco will construct a low permeability soil or soil/ash cap over the landfill once the available disposal capacity is reached. Any of the materials discussed in Section 4.2 would be suitable for cap construction. However, at this time, ABTco is proposing to use a 50-50 percent mixture (by volume) of the stockpile soil and wood ash. The hydraulic conductivity of that mixture was 3.4×10^{-6} cm/sec when tested in the laboratory. Use of the soil/ash mixture will enable ABTco to make better use of the site by disposing of additional waste at the facility. An intermediate cover layer is not proposed given the ease with which the ash can be graded to provide a smooth working surface for placement of the cap, and the desire to avoid an unnecessary loss of disposal capacity. A 12-inch erosion layer of unspecified soil or soil amended with sludge is proposed above the low permeability layer.

EPA's Hydrologic Evaluation of Landfill Performance computer program (HELP3 Model) was used to compare the performance of ABTco's proposed cap section with the RMC. The RMC section consists of 18 inches of compacted soil with a permeability of less than or equal to 1×10^{-5} cm/sec, 6 inches of topsoil, and vegetative cover. Average infiltration through the RMC cap section was calculated to be 8.37 inches, or 18.45 percent of an average annual rainfall of 45 inches.

The 12-inch erosion layer in the proposed cap was modeled as a vertical percolation layer consisting of moderately compacted silts and sands (USCS Classification ML, soil texture #22). The low-permeability layer was modeled first as a barrier layer and then as a vertical percolation layer. The hydraulic conductivity used in the model was the value (3.4×10^{-6} cm/sec) obtained from laboratory testing of the proposed soil/ash mixture.

The results from the HELP3 Model analyses indicated an average annual infiltration through the proposed cap to be 8.3 inches or less with an average annual rainfall of 45 inches, which is at least equivalent to infiltration rates through the RMC. Output from the HELP3 program is provided in Appendix IX.

4.4 Cap Construction

All construction and seeding activities will be carried out in accordance with the "North Carolina Erosion and Sediment Control Planning and Design Manual". Appropriate construction quality assurance activities will be conducted to document that the cover is constructed in substantial accordance with the performance standard discussed herein.

5.0 REFERENCES

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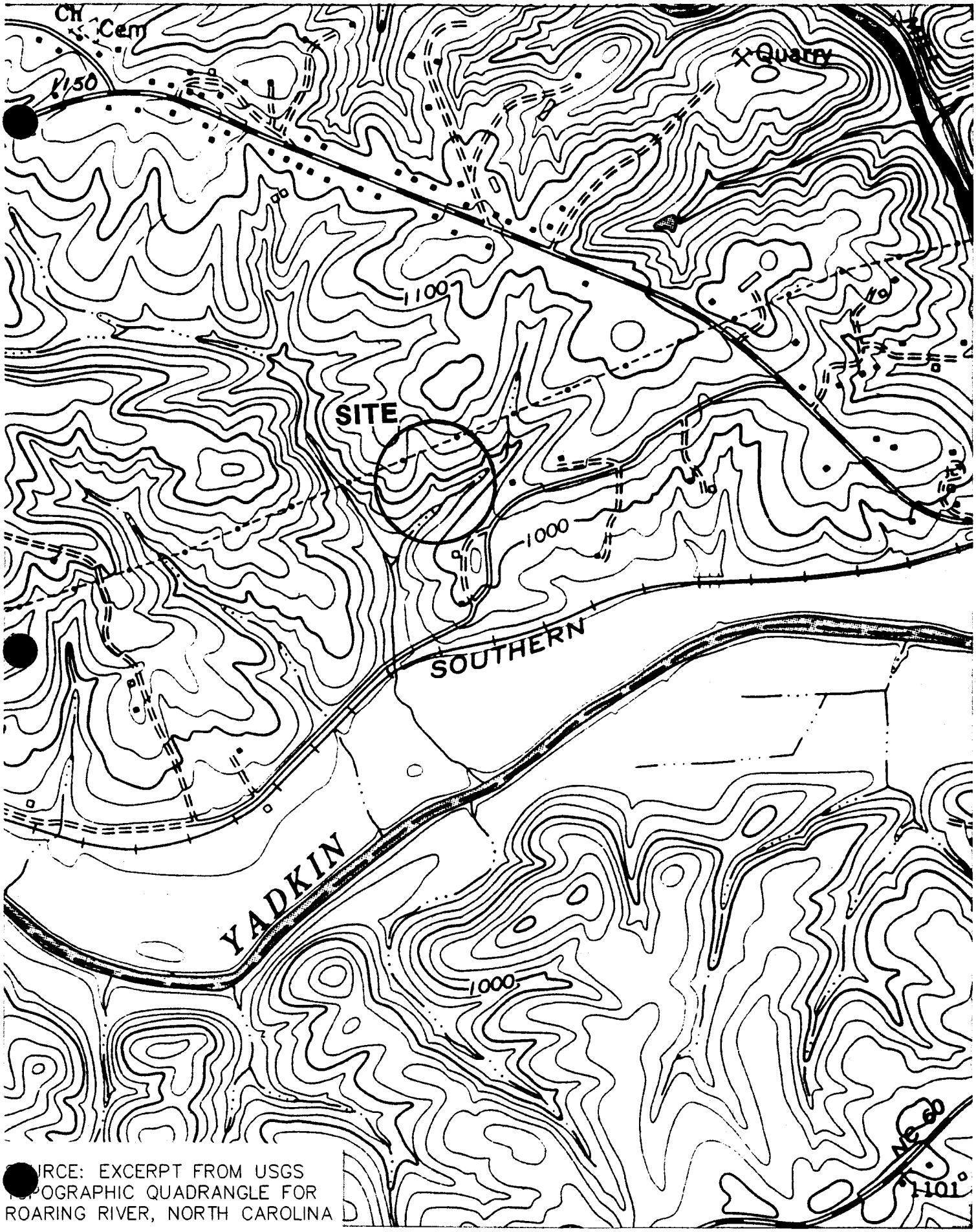
Figures

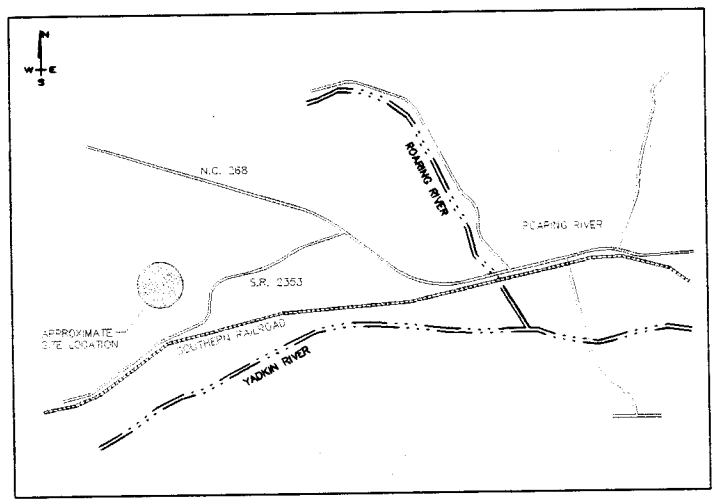


SOURCE: EXCERPT FROM USGS TOPOGRAPHIC QUADRANGLE FOR ROARING RIVER, NORTH CAROLINA

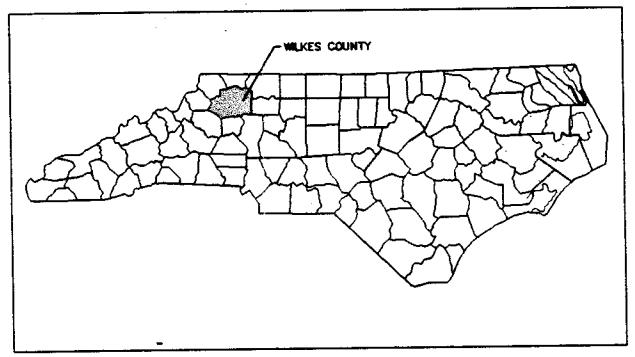
FIGURE 1	JOYCE ENGINEERING INC.	SCALE 1"=1000'	PROJECT NO. 364.01	ABTCo INDUSTRIAL LANDFILL SITE LOCATION MAP 11/17/97

ABTCO
ABT BUILDING PRODUCTS

LANDFILL CLOSURE DESIGN PLAN



VICINITY MAP



STATE & COUNTY LOCATION MAP

DRAWING NO.	TITLE
1	EXISTING SITE CONDITIONS
2	ANNUAL PHASES OF DEVELOPMENT
3	ANNUAL PHASES OF DEVELOPMENT
4	INFERRED GROUNDWATER CONTOURS
5	CLOSURE PLAN
6	DETAILS

DRAWING INDEX

PREPARED FOR:

ABTCO
ABT BUILDING PRODUCTS
HWY. 268, P.O. BOX 98
ROARING RIVER, NORTH CAROLINA 28669

NOVEMBER, 1997

PREPARED BY:

JOYCE ENGINEERING, INC.

436 SPRING GARDEN STREET
GREENSBORO, NC. 27401
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TOPOGRAPHIC SURVEY FOR

ABTCO
ROARING RIVER PLANT

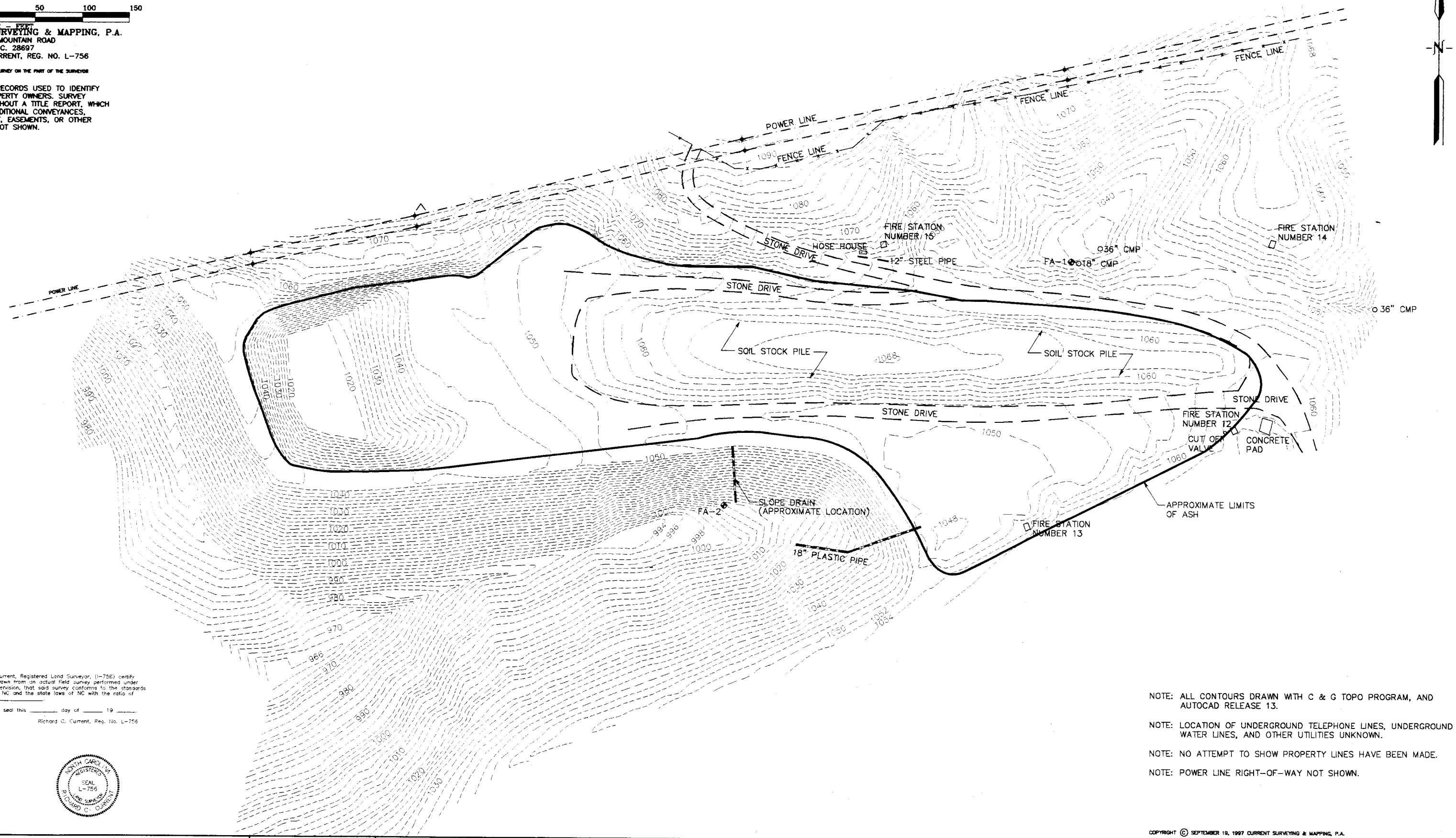
ROCK CREEK TOWNSHIP, WILKES COUNTY, N.C.
SEPTEMBER 19, 1997 SCALE: 1" = 50'

50 0 50 100 150
SCALE - FEET

[redacted]NT SURVEYING & MAPPING, P.A.
1338 BRUSHY MOUNTAIN ROAD
WILKESBORO, N.C. 28697
RICHARD C. CURRENT, REG. NO. L-756

ANY LIABILITY FOR THIS SURVEY ON THE PART OF THE SURVEYOR IS SOLELY TO ABTCO

CURRENT TAX RECORDS USED TO IDENTIFY ADJOINING PROPERTY OWNERS. SURVEY PERFORMED WITHOUT A TITLE REPORT, WHICH MAY REVEAL ADDITIONAL CONVEYANCES, RIGHTS-OF-WAY, EASEMENTS, OR OTHER RESTRICTIONS NOT SHOWN.



I, Richard C. Current, Registered Land Surveyor, (L-756) certify that this map was drawn from an actual field survey performed under my direction and supervision, that said survey conforms to the standards of Land Surveyors of NC and the state laws of NC with the ratio of precision is 1: _____.

Witness my hand and seal this _____ day of _____ 19 _____.

Richard C. Current, Reg. No. L-756

NORTH CAROLINA REGISTERED SEAL L-756 LAND SURVEYOR RICHARD C. CURRENT

NOTE: ALL CONTOURS DRAWN WITH C & G TOPO PROGRAM, AND AUTOCAD RELEASE 13.

NOTE: LOCATION OF UNDERGROUND TELEPHONE LINES, UNDERGROUND WATER LINES, AND OTHER UTILITIES UNKNOWN.

NOTE: NO ATTEMPT TO SHOW PROPERTY LINES HAVE BEEN MADE.

NOTE: POWER LINE RIGHT-OF-WAY NOT SHOWN.

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED J.D.
DRAWN CADD/S.F.
CHECKED J.D.
APPROVED
DATE 11/17/97

JOYCE ENGINEERING, INC.

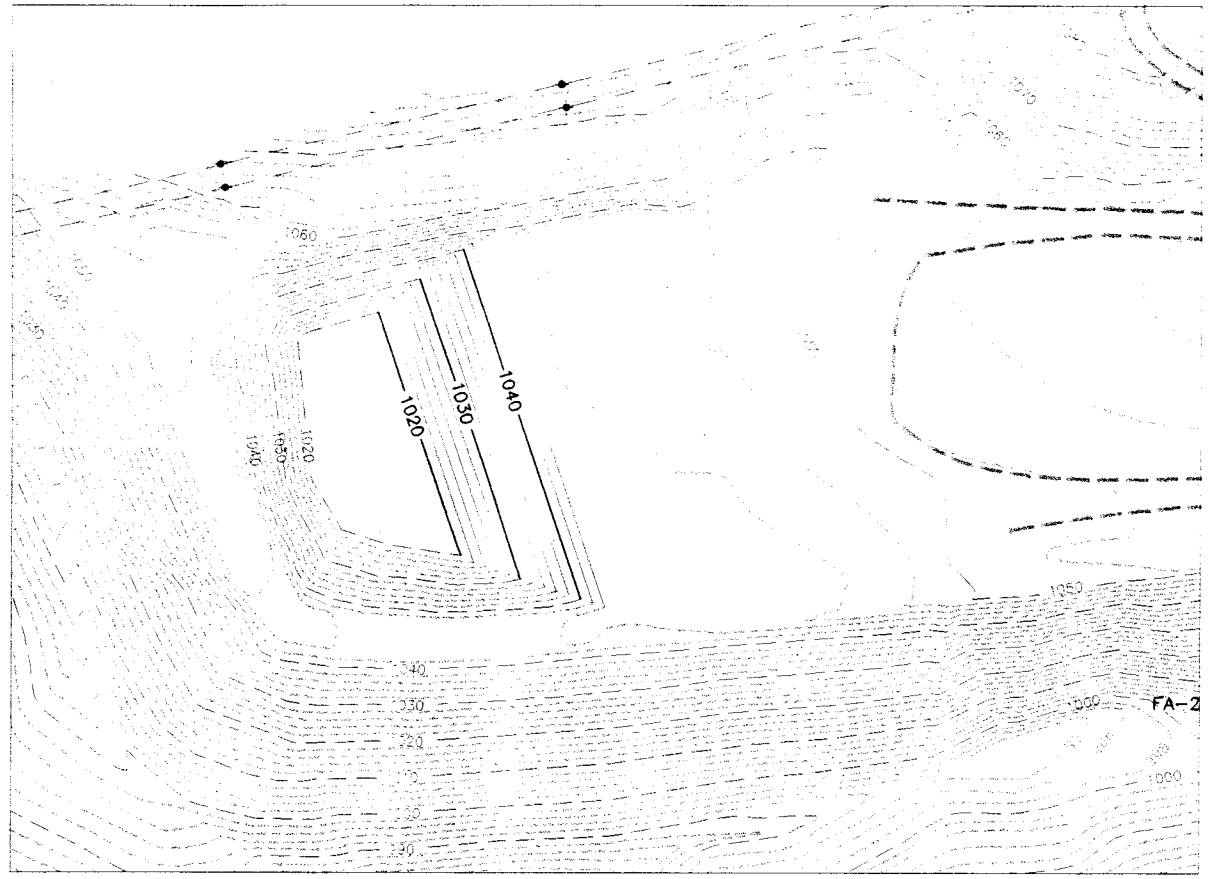
SCALE 1"=100'

PROJECT NO. 364.01

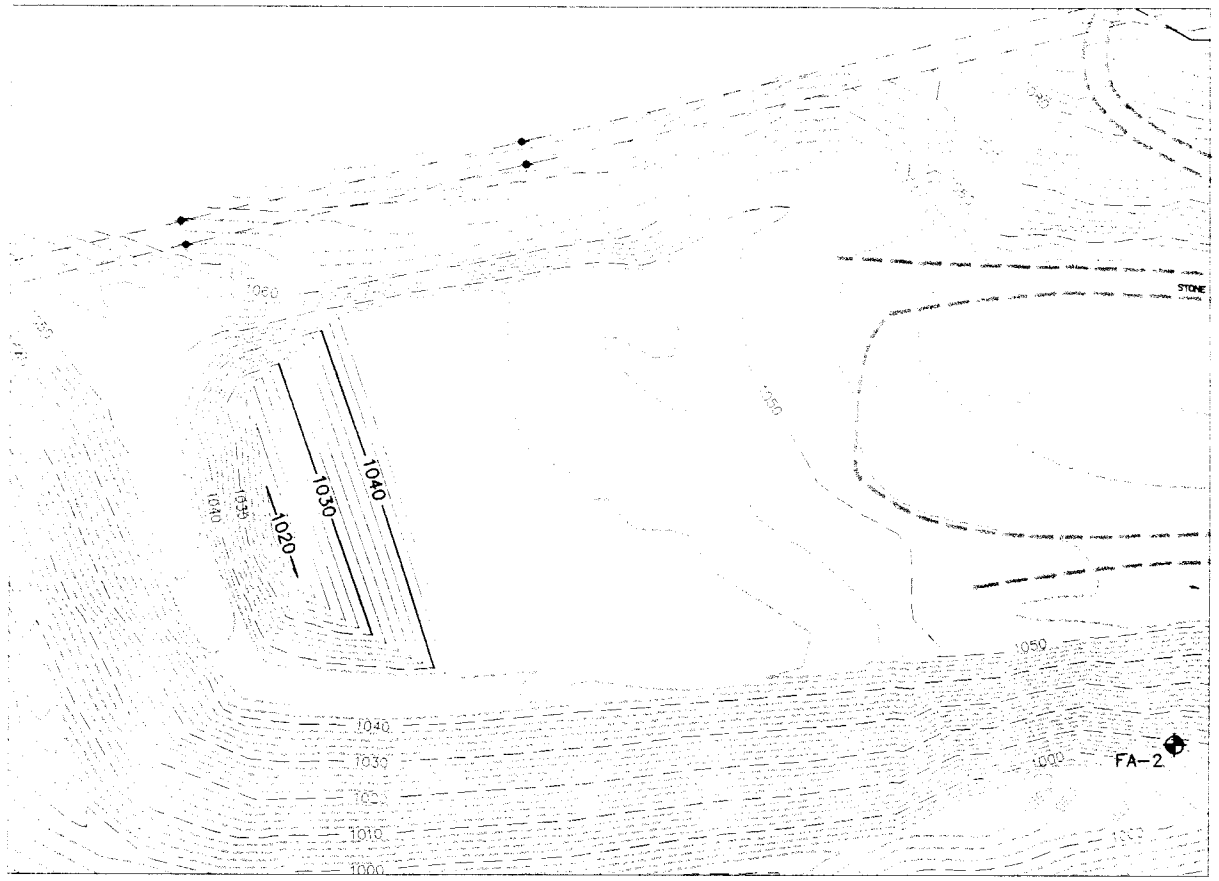
ABTCO – ABT BUILDING PRODUCTS
ROARING RIVER, NORTH CAROLINA

EXISTING SITE CONDITIONS

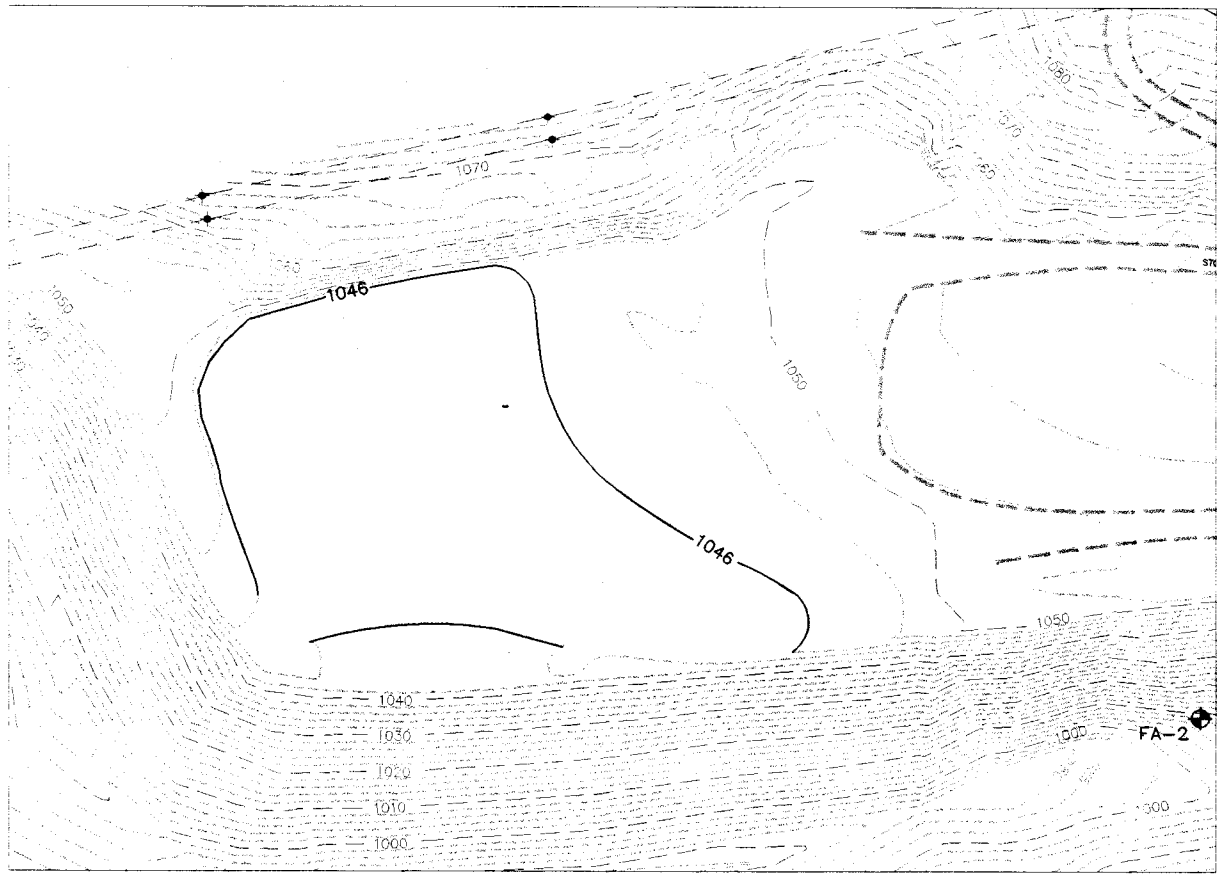
DRAWING NO. 1



GRADES AS OF JAN. 1, 1998



PHASE 1 (END OF 1998)



PHASE 2 (END OF 1999)

LEGEND

EXISTING CONTOUR — — — 1050 — — —

PROPOSED CONTOUR ——— 1056 ———

EXISTING MONITORING WELL FA-2

60 0 60 120
SCALE: 1" = 60'

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED J.D./S.F.
DRAWN CADD/S.F.
CHECKED J.D.
APPROVED
DATE 11/17/97

JOYCE ENGINEERING, INC.

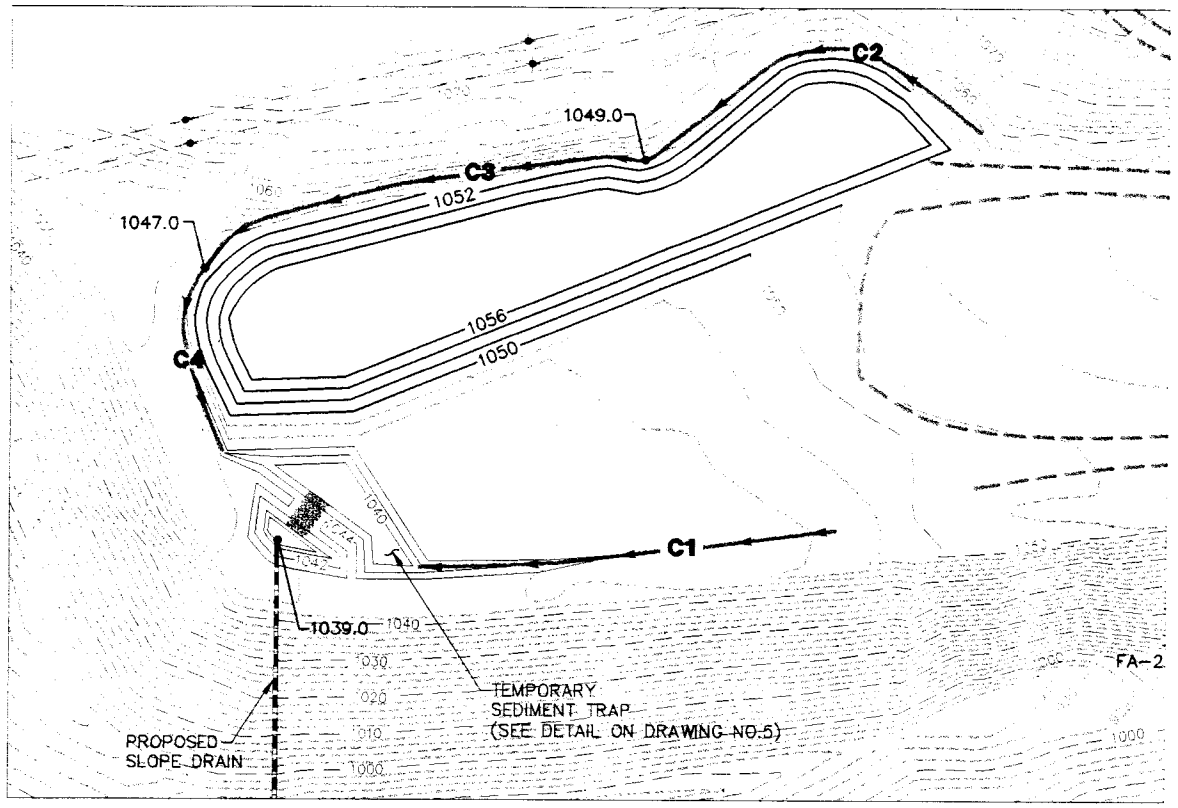
SCALE 1"=100'

PROJECT NO. 364.01

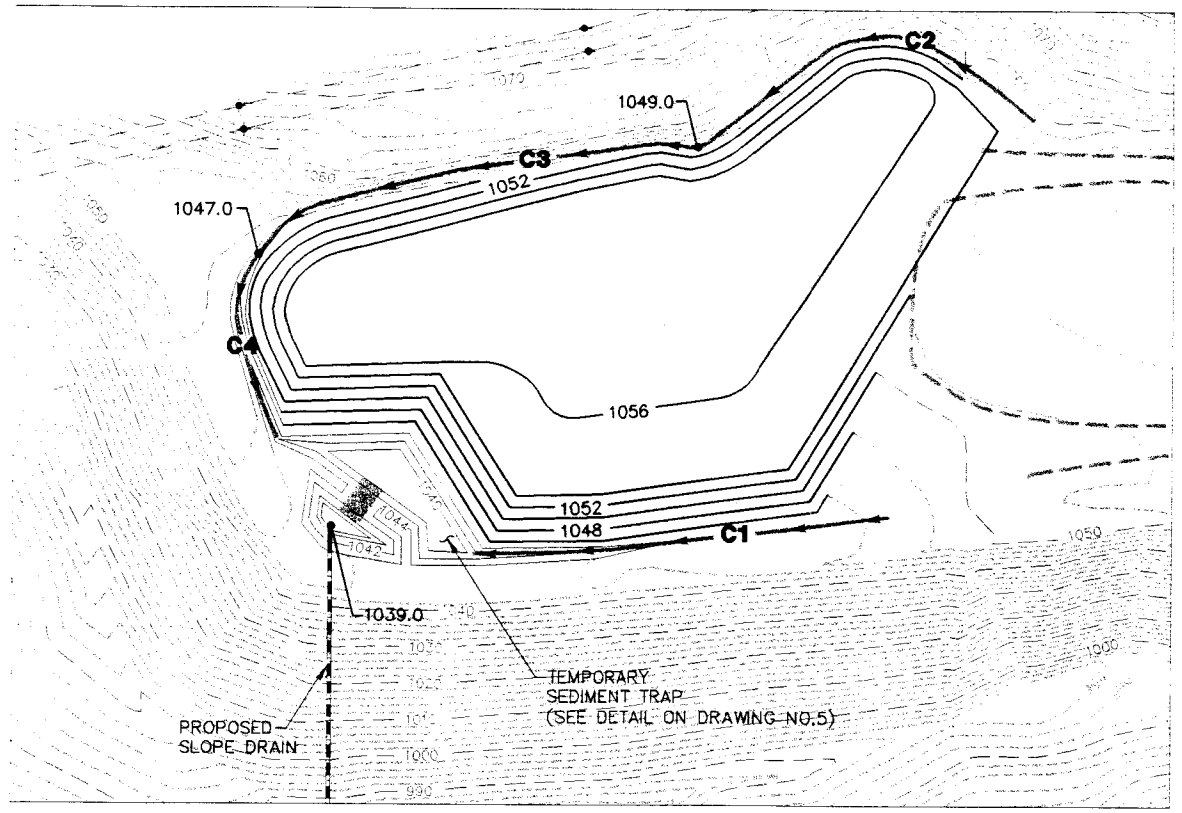
ABTCO – ABT BUILDING PRODUCTS
ROARING RIVER, NORTH CAROLINA

ANNUAL PHASES OF DEVELOPMENT

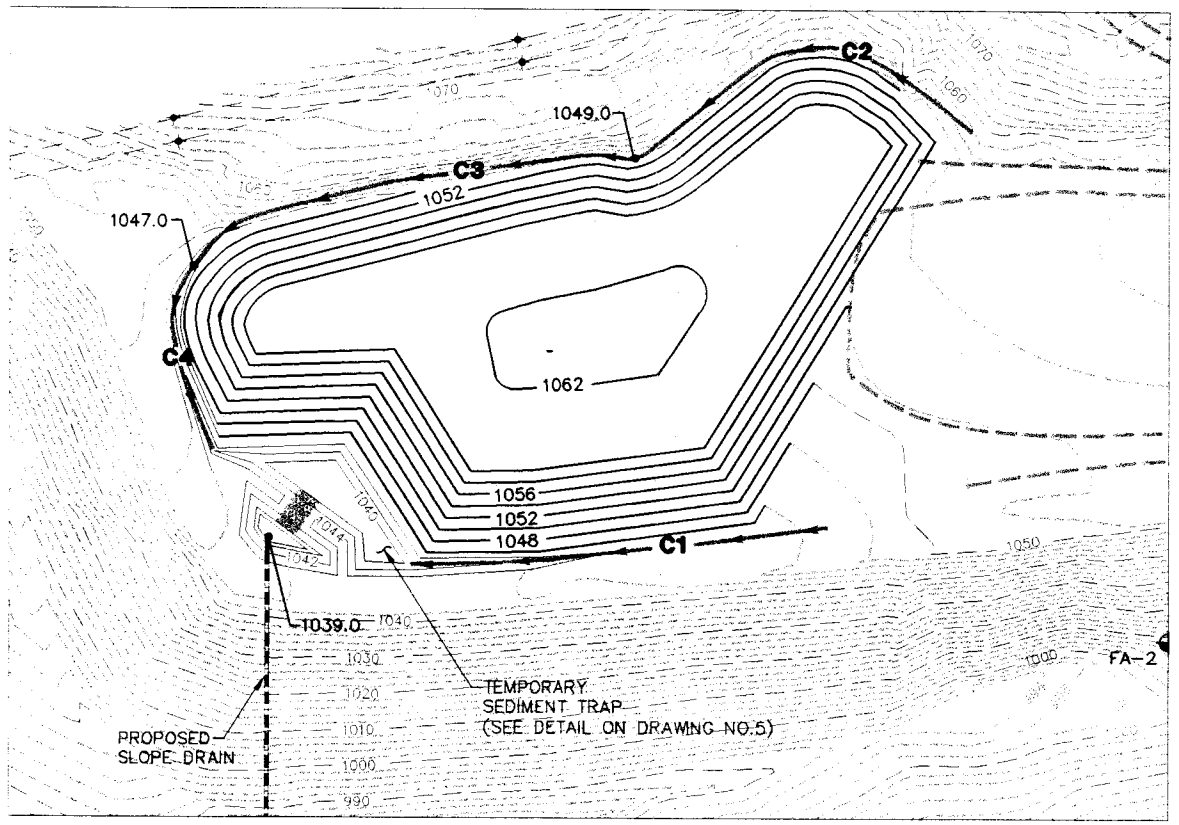
DRAWING NO. 2



PHASE 3 (END OF 2000)



PHASE 4 (END OF 2001)



PHASE 5 (END OF 2002)

CHANNEL	SLOPE
C1	2.1%
C2	3.68%
C3	0.87%
C4	2.22%

LEGEND

- PROPOSED CHANNEL (SEE DETAIL ON DRAWING NO. 5)
- PROPOSED CHANNEL INVERT ELEVATION — 1056.0
- CHANNEL DESIGNATION — C2
- EXISTING CONTOUR — 1050
- PROPOSED CONTOUR — 1056
- EXISTING MONITORING WELL — FA-2

60 0 60 120
SCALE: 1"=60'

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED J.D./S.F.
DRAWN CADD/S.F.
CHECKED J.D.
APPROVED
DATE 11/17/97

JOYCE ENGINEERING, INC.

SCALE: 1"=100'

PROJECT NO. 364.01

ABTCO – ABT BUILDING PRODUCTS
ROARING RIVER, NORTH CAROLINA

ANNAUL PHASES OF DEVELOPMENT

DRAWING NO. 3

LEGEND

EXISTING CONTOUR (1997) — — 1050 — — —

APPROXIMATE PRE DEVELOPMENT CONTOUR ——— 1060 ———

EXISTING MONITORING WELL FA-2

INFERRED GROUNDWATER CONTOUR - - - - 1015 - - - -

50 0 50 100 150

GRAPHIC SCALE – FEET

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED N.M.
DRAWN CADD/S.F.
CHECKED N.M.
APPROVED
DATE 11/17/97

JOYCE ENGINEERING, INC.

SCALE 1"=100'

PROJECT NO. 364.01

ABTCO – ABT BUILDING PRODUCTS
ROARING RIVER, NORTH CAROLINA

INFERRED GROUNDWATER CONTOURS

DRAWING NO. 4

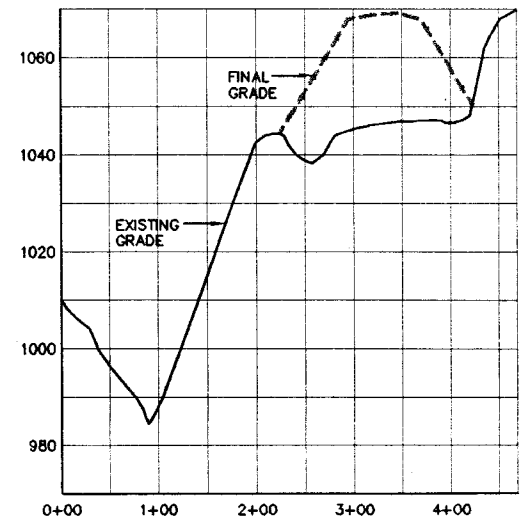
CHANNEL	SLOPE
A1	1.01%
A2	2.9%
A3	2.5%
B1	0.5%
B2	4.0%
C1	2.1%
C2	3.68%
C3	0.87%
C4	2.22%

N
W E
S

POWER LINE
FENCE LINE
FENCE LINE
STONE DRIVE
FIRE STATION NUMBER 15
1063.0
12" STEEL PIPE
FA-1
36" CMP
18" CMP
FIRE STATION NUMBER 14
36" CMP
STONE DRIVE
CONCRETE PAD
FIRE STATION NUMBER 12
1056.0
FIRE STATION NUMBER 13
1049.0
1047.0
1043.0
1051.0
1047.0
EXISTING SLOPE DRAIN
FA-2
1048.0
18" DIAMETER SLOPEDRAIN
1048.0
PROPOSED INLET STRUCTURE
PROPOSED SLOPE DRAIN
A
A
A1
A2
A3
B1
B2
C1
C2
C3
C4
1060
1070
1050
1040
1030
1020
1010
1000
990
980
970
960
950
940

LEGEND
PROPOSED CHANNEL
PROPOSED CHANNEL INVERT ELEVATION — 1056.0
CHANNEL DESIGNATION — C2
EXISTING CONTOUR — 1050
PROPOSED CONTOUR — 1060
EXISTING MONITORING WELL — FA-2

50 0 50 100 150
GRAPHIC SCALE – FEET



SECTION A–A
SCALE: H: 1"=200'
V: 1"=40'

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED J.D./S.F.
DRAWN CADD/S.F.
CHECKED J.D.
APPROVED
DATE 11/17/97

JOYCE ENGINEERING, INC.

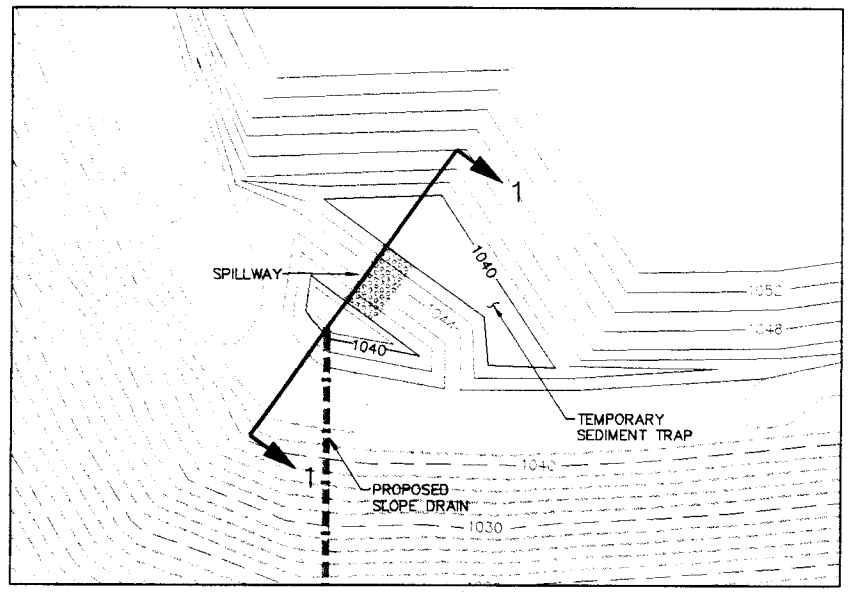
SCALE 1"=100'

PROJECT NO. 364.01

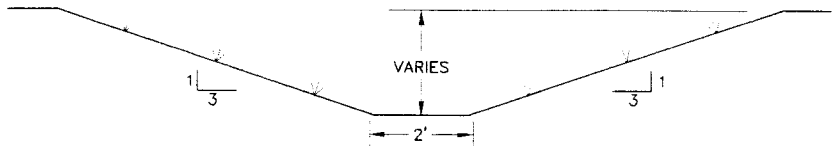
ABTCO – ABT BUILDING PRODUCTS
ROARING RIVER, NORTH CAROLINA

CLOSURE PLAN

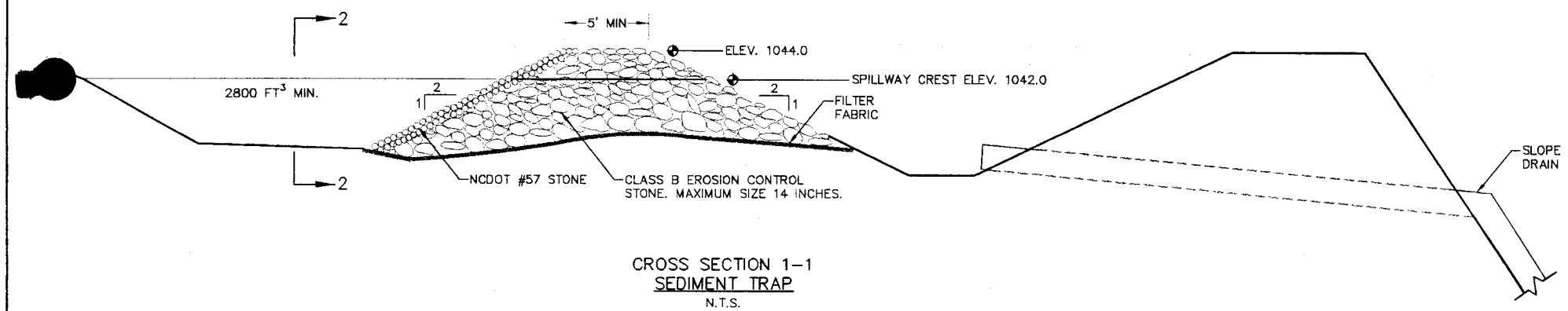
DRAWING NO. 5



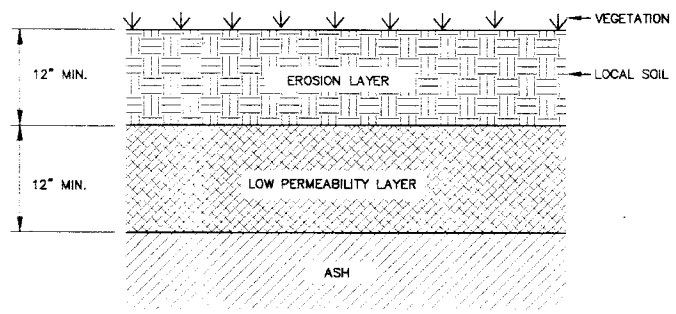
SEDIMENT TRAP
SCALE: 1"=60'



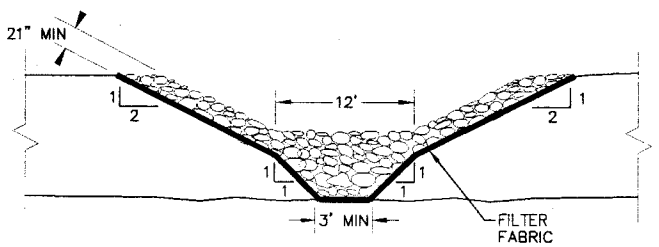
GRASSLINED CHANNEL
N.T.S.



CROSS SECTION 1-1
SEDIMENT TRAP
N.T.S.



PROPOSED CLOSURE CAP CROSS-SECTION
N.T.S.



CROSS SECTION 2-2
N.T.S.

DATE	REVISIONS AND RECORD OF ISSUE	NO	BY	CK	APP

DESIGNED J.D./S.F.
DRAWN CADD/S.F.
CHECKED J.D.
APPROVED
DATE 11/17/97

JOYCE ENGINEERING, INC.

SCALE: AS SHOWN

PROJECT NO.: 364.01

ABTCO – ABT BUILDING PRODUCTS
ROARING RIVER, NORTH CAROLINA

DETAILS

DRAWING NO.: 6

APPENDIX I

Miscellaneous Correspondence

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Waste Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
William L. Meyer, Director

DEHNR

June 2, 1997

Mr. Erich Burke
ABTco, Inc.
P. O. Box 98, Highway 268
Roaring River, NC 28669

RE: Preliminary Evaluation, ABTco Industrial Landfill, Wilkes County, Permit Number 97-03

Dear Mr. Burke:

In accordance with the requirements of Rule .0503(2)(d)(ii), the Solid Waste Section has completed its preliminary evaluation of the information submitted for the referenced landfill. Rule .0503(2)(d)(ii) establishes the requirements for the operators of new industrial waste landfills, lateral expansions of existing landfills, and industrial landfills operating after January 1, 1998. The rule requires the submittal of a design that ensures that the ground water standards established under 15A NCAC 2L (2L) will not be exceeded in the uppermost aquifer at the compliance boundary **or** a design with a leachate collection system, a closure cap system, and a composite liner system.

Since the referenced landfill is an existing unlined landfill and it is not economically or technically feasible to retrofit an existing landfill with liners and a leachate collection system, the Rule effectively requires the operator to submit a closure cap design that ensures compliance with 2L or close before January 1, 1998.

The Section required the submittal of waste and site characterization, including available water quality data to assist in a preliminary evaluation of the existing landfill. The purpose of this submittal was to determine if a final determination of compliance with Rule .0503(2)(d)(ii) could be made based upon this information. This letter serves as notification that the information submitted to date does not provide adequate information to make a final determination as to compliance with that Rule.

In order to meet the requirements of Rule .0503(2)(d)(ii) and to provide adequate landfill capacity while evaluating the landfill design for compliance with those requirements, the Section requires the submittal of a landfill design plan including the following:

A construction and operational plan which limits development of the landfill to the lateral expansion of the waste "footprint" established as of January 1, 1998. The plan shall be developed in one-year phases and operated in such a manner that the landfill may be closed at any time.

P.O. Box 27687,
Raleigh, North Carolina 27611-7687
Voice 919-733-4996

FAX 919-715-3605

The capacity of the landfill design plan shall not exceed five (5) years.

A water quality monitoring plan including additional wells located, sampled, and analyzed in a way that demonstrates compliance with 2L. Please contact Bobby Lutfy of the Section concerning monitoring and sampling parameters.

A closure plan including a final cap system designed to ensure compliance with 2L as demonstrated by modelling methods acceptable to the Section.

The submittal of this information and acknowledgement of receipt by the Section prior to January 1, 1998, will constitute compliance with Rule .0503(2)(d)(ii). However; this does **not** constitute final determination by the Section that the design ensures that the ground water standards established under 15A NCAC 2L will not be exceeded in the uppermost aquifer at the compliance boundary. It should be noted that a lateral expansion beyond the 1998 footprint or a new landfill must meet all the permit requirements of Rules .0503-.0505, including a demonstration that the proposed design meets the requirements of Rule .0503(2)(d)(ii).

This letter serves as notification to the owner/operator that the information previously described as necessary to complete the final determination of compliance with Rule .0503(2)(d)(ii) shall be submitted to the Section thirty (30) days prior to January 1, 1998.

If there are any questions concerning this letter, please contact Susan Leistiko at (919) 733-0692 extension 262.

Sincerely,

James C. Coffey, Supervisor
Permitting Branch
Solid Waste Section

cc: Dexter Matthews
Susan Leistiko
Bobby Lutfy
Julian Foscue
Brent Rockett

APPENDIX II

Correspondence Regarding

Fiber-Cement Byproduct

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Waste Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
William L. Meyer, Director

DEHNR

April 9, 1997

Mr. Erich Burke
ABTco,Inc; Siding Division
P.O. Box 98 Highway 268
Roaring River, NC 28669

Dear Mr. Burke:

The attached copy of the "Recovery and Reuse Policy Number A" contains a revision requiring that an annual report be submitted to the Division by August 1. This requirement was inadvertently omitted from the initial policy as issued. The annual summary shall be for the period of July 1 through June 30 and shall report the volume (tons) of recovered material utilized (reused) in those twelve months.

Please destroy all copies of the initial issue and substitute this revision in its place. The date of issuance remains March 31, 1997. Please excuse any inconvenience that this substitution may cause. If you have any questions about this matter, please telephone me at 919-733-0692, extension 260.

Sincerely,

William R. Hocutt

William R. Hocutt
Waste Determination Coordinator

cc: Jim Coffey
Dexter Matthews
Phil Prete
Julian Foscue
Terry Dover

c:wp6docs/letter/abtco02.97

P.O. Box 27687,
Raleigh, North Carolina 27611-7687
Voice 919-733-4996

NC Reduce Reuse Recycle

FAX 919-715-3605

RECOVERY AND REUSE POLICY NUMBER A
March 31, 1997

Recovered Material

Construction siding material composed of: 40% to 65% sand (silica), 30% to 50% portland cement, 1% to 10% cellulose and 1% to 10% clay.

Generator/User

This policy is for reuse of waste concrete siding construction material generated during and after the sampling period specified for each generator listed in the appendix to this policy. Any use must have a beneficial purpose as an objective and must not be managed in a way that constitutes disposal of the material.

Determination

The Division has determined that this waste material can be classified as recovered material as described in North Carolina Statute GS 130A-309.05(c). The classification requirements are summarized on the cover page to this policy. This designation excludes reuse of this material from regulation by the Division of Waste Management as long as the recovered material classification remains.

This policy specifies no sampling and analytical protocols and no siting, design, construction, operation and closure requirements. Also there are no notification and no recordation requirements for projects utilizing this material.

Demonstration

Submitted TCLP leaching data was obtained on a single composite sample. The appendix to this policy shows the leaching solution utilized in the TCLP extraction procedure. The data showed no organics, no herbicides or pesticides and very low metals concentrations. These results were obtained at acceptably low detection limits.

Annual Reporting

By August 1 of each year, the generator of the recovered material shall submit an annual summary to the Division. The annual summary shall be for the period of July 1 through June 31 and shall report the volume (tons) of recovered material utilized (reused).

Responsibility

Please note that the generator continues to have responsibility for any violation(s) of the recovered materials requirements and any contamination(s) to the environment which might occur. The Division of Waste Management is issuing this policy based on information furnished by the generator and the recovered materials designation has no stipulations directed at the suitability of this material for any type of beneficial reuse. That determination needs to be made by the generator and/or the user of the recovered material.

James C Coffey

James C. Coffey
Permitting Branch Supervisor
Solid Waste Section

APPENDIX

Generators Qualified for This Policy:

1.0 ABTco, Inc.; Siding Division; P.O. Box 98 Highway 268; Roaring River, NC 28669. Policy contact person: Mr. Erich Burke; phone (910) 696-2751 and fax (910) 696 3441.The product period begins in April, 1997 with the plant start-up. SW 846 leaching solution was used in the TCLP analysis.

ABTCO
ABT BUILDING PRODUCTS CORPORATION
ABTco, Inc.
Siding Divison
P.O. Box 98 Highway 268
Roaring River, North Carolina 28669

December 31, 1996

Mr. Bill Hocutt
Solid Waste Management Division
P.O. Box 27687
Raleigh, NC 27611

Dear Mr. Hocutt,

Please review the enclosed data on an excess material or byproduct which will be produced by a new production facility currently under construction at our Roaring River mill site. The material is a fiber and cement based product typically consisting of the following ranges of materials:

Sand (Silica)	40% to 65%
Portland Cement	30% to 50%
Cellulose	1% to 10%
Clay	1% to 10%

The analysis was conducted on new material as well as artificially weathered material. The weathered material was subjected to the equivalent of 2.7 years of exposure to the elements using accepted procedures in a weatherometer. The analytical results show that there is no significant difference between the new and the weathered samples. On both samples, the analytical results show no organics, no herbicides or pesticides and extremely low metals concentrations.

Due to the inert nature of the material and the analytical results which demonstrates no constituents of concern, we propose to reuse this material in a number of ways. The material is well suited to clean fill applications such as road bed stabilization, structural fill or similar landscaping applications. In addition, we would like to pursue direct or indirect sale of the material to consumers as a landscaping material similar to the way the brick industry markets brick waste as brick chips for landscaping.

We seek policy approval to be able to proceed with the various reuse options we are exploring for this material. With the enclosed analysis demonstrating that there is no environmental concern with this material, we feel that we are justified in making this request at this time.

If you have any questions or require any further information, please do not hesitate to contact me at my office.

Sincerely,

Erich Burke, P.E.
Environmental Engineer

cc: Hugh Browder
Mike Blosser

Fiber Cement TCLP Analysis

Pollutant	Required Detection Limit	Actual Detection Limit	New Analytical Results	Weathered Analytical Results	Notes
METALS					
Arsenic	0.50	0.003	BDL	BDL	
Barium	10.00	0.005	0.107	0.115	
Cadmium	0.10	0.001	BDL	BDL	
Chromium	0.50	0.005	0.032	0.028	
Lead	0.50	0.01	BDL	BDL	
Mercury	0.02	0.0002	0.0002	0.0003	
Selenium	0.10	0.003	BDL	BDL	
Silver	0.50	0.001	BDL	BDL	
HERBS + PESTS					
Chlordane	0.003	0.003	BDL	BDL (<.005)	
Endrin	0.002	0.001	BDL	BDL	
Heptachlor	0.0008	0.0005	BDL	BDL	
Lindane	0.04	0.0005	BDL	BDL	
Methoxychlor	1.00	0.005	BDL	BDL	
Toxaphene	0.05	0.01	BDL	BDL	
2,4 - D	1.00	0.1	BDL	BDL	
2, 4, 5 - TP Silvex	0.10	0.1	BDL	BDL	
ORGANICS					
Benzene	0.05	0.001	BDL	BDL	
Carbon Tetrachloride	0.05	0.001	BDL	BDL	
Chlorobenzene	10	0.001	BDL	BDL	
Chloroform	0.60	0.001	BDL	BDL	
0-Cresol	20	0.05	BDL	BDL	2-Methylphenol
M-Cresol	20	0.05	BDL	BDL	3-Methylphenol
P-Cresol	20	0.05	BDL	BDL	4-Methylphenol
1,4 Dichlorobenzene	0.75	0.05	BDL	BDL	
1,2 Dichloroethane	0.05	0.001	BDL	BDL	
1,1 Dichloroethylene	0.07	0.001	BDL	BDL	
2,4 Dinitrotoluene	0.013	0.013	BDL	BDL (<0.05)	
Hexachlorobenzene	0.013	0.013	BDL	BDL (<0.05)	
Hexchloro - 1,3 Butadiene	0.05	0.05	BDL	BDL	
Hexachloroethane	0.30	0.05	BDL	BDL	
Methyl Ethyl Ketone	20	0.1	BDL	BDL	2-Butanone
Nitrobenzene	0.20	0.05	BDL	BDL	
Pentachlorophenol	10	0.25	BDL	BDL	
Pyridine	0.50	0.50	BDL	BDL	
Tetrachloroethylene	0.07	0.001	BDL	BDL	
Trichloroethylene	0.05	0.001	BDL	BDL	Trichloroethene
2,4,5 Trichlorophenol	40	0.25	BDL	BDL	
2,4,6 Trichlorophenol	0.20	0.05	BDL	BDL	
Vinyl Chloride	0.02	0.005	BDL	BDL	

HYDROLOGIC, INC.

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER: ABTCO

HYDROLOGIC PROJECT NUMBER: FL9615279
HYDROLOGIC SAMPLE NUMBER: 9615279
HYDROLOGIC LAB ID #: 399
SAMPLE IDENTIFICATION: ABTCO FC
DATE SAMPLED: 9/27/96
DATE EXTRACTED: 10/03/96
DATE/TIME ANALYZED: 10/08/96

METHOD TCLP 8080

ANALYSIS	CAS NO.	SDL (mg/l)	RESULT (mg/l)
Heptachlor	76-44-8	0.0005	BDL
Endrin	72-20-8	0.001	BDL
Chlordane	57-74-9	0.003	BDL
Toxaphene	8001-35-2	0.01	BDL
Methoxychlor	72-43-5	0.005	BDL
Lindane	58-89-9	0.0005	BDL
Surrogate Recovery: DBC			70%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

HYDROLOGIC, INC.

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER: ABTCO

HYDROLOGIC PROJECT NUMBER: FL9615279
HYDROLOGIC SAMPLE NUMBER: 9615279
HYDROLOGIC LAB ID #: 399
SAMPLE IDENTIFICATION: ABTCO FC
DATE SAMPLED: 9/27/96
DATE EXTRACTED: 10/03/96
DATE/TIME ANALYZED: 10/07/96

METHOD TCLP 8270

ANALYSIS	CAS NO.	SDL (mg/l)	RESULT (mg/l)
1,4-Dichlorobenzene	106-46-7	0.05	BDL
2-Methylphenol	95-48-7	0.05	BDL
3-Methylphenol	108-39-4	0.05	BDL
4-Methylphenol	106-44-5	0.05	BDL
Hexachloroethane	67-72-1	0.05	BDL
Nitrobenzene	98-95-3	0.05	BDL
Hexachlorobutadiene	87-68-3	0.05	BDL
2,4,6-Trichlorophenol	88-06-2	0.05	BDL
2,4,5-Trichlorophenol	95-95-4	0.25	BDL
2,4-Dinitrotoluene	121-14-2	0.013	BDL
Hexachlorobenzene	118-74-1	0.013	BDL
Pentachlorophenol	87-86-5	0.25	BDL
Pyridine	110-86-1	0.50	BDL
Surrogate Recoveries:			
2-Fluorophenol			90%
Phenol-D6			91%
Nitrobenzene-D5			68%
2-Fluorobiphenyl			88%
2,4,6-Tribromophenol			75%
Terphenyl-D14			74%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: COMPOUNDS WITH ELEVATED SDL ARE DUE TO A SAMPLE DILUTION.

HYDROLOGIC, INC.

FINAL REPORT OF ANALYSES

ABTco, INC.
SIDING DIVISION
PO BOX 98, HWY 268
ROARING RIVER, NC 28669-
Attn: ERIC ROGERS EXT 274

PROJECT NAME: ABTCo TCLP
REPORT DATE: 04/12/96

SAMPLE NUMBER- 83084 SAMPLE ID- ABTCo FCB-W
DATE SAMPLED- 04/02/96
DATE RECEIVED- 04/04/96 SAMPLER- ERICH BURKE
TIME RECEIVED- 0945 DELIVERED BY- UPS

SAMPLE MATRIX- OT
TIME SAMPLED- 1300
RECEIVED BY- DHT

Page 1 of 1

ANALYSIS	METHOD	SAMPLE PREP DATE	BY	ANALYSIS DATE	BY	RESULT	UNITS	DET. LIMIT
TOX. CHAR. LEACHING PROCEDURE	6010	04/08/96	LJP	04/09/96	BDL			
ARSENIC, TOTAL	6010					< 0.003	mg/l	0.003
CADMIUM, TOTAL	6010					< 0.001	mg/l	0.001
CHROMIUM, TOTAL	6010					0.028	mg/l	0.005
MERCURY, TOTAL	6010					0.0003	mg/l	0.0002
SELENIUM, TOTAL	6010					< 0.003	mg/l	0.003
SILVER, TOTAL	6010					< 0.001	mg/l	0.001
BARIUM, TOTAL	6010					0.115	mg/l	0.005
LEAD, TOTAL	6010					< 0.010	mg/l	0.010

LABORATORY DIRECTOR

H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER:

HYDROLOGIC PROJECT NUMBER: FL965635
HYDROLOGIC SAMPLE NUMBER: 965635
HYDROLOGIC LAB I.D.#: 399
SAMPLE IDENTIFICATION: ABTCO FCB-W
DATE SAMPLED: 4/2/96
DATE EXTRACTED: 4/08/96
DATE/TIME ANALYZED: 4/13/96

METHOD TCLP 8270

ANALYSIS	CAS NO.	SDL (mg/l)	RESULT (mg/l)
1,4-Dichlorobenzene	106-46-7	0.05	BDL
2-Methylphenol	95-48-7	0.05	BDL
3-Methylphenol	108-39-4	0.05	BDL
4-Methylphenol	106-44-5	0.05	BDL
Hexachloroethane	67-72-1	0.05	BDL
Nitrobenzene	98-95-3	0.05	BDL
Hexachlorobutadiene	87-68-3	0.05	BDL
2,4,6-Trichlorophenol	88-06-2	0.05	BDL
2,4,5-Trichlorophenol	95-95-4	0.25	BDL
2,4-Dinitrotoluene	121-14-2	0.05	BDL
Hexachlorobenzene	118-74-1	0.05	BDL
Pentachlorophenol	87-86-5	0.25	BDL
Pyridine	110-86-1	0.50	BDL
Surrogate Recoveries:			
2-Fluorophenol			107%
Phenol-D6			108%
Nitrobenzene-D5			106%
2-Fluorobiphenyl			68%
2,4,6-Tribromophenol			111%
Terphenyl-D14			105%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER:

HYDROLOGIC PROJECT NUMBER: FL965635
HYDROLOGIC SAMPLE NUMBER: 965635
HYDROLOGIC LAB I.D.#: 399
SAMPLE IDENTIFICATION: ABTCO FCB-W
DATE SAMPLED: 4/2/96
DATE EXTRACTED: 4/08/96
DATE/TIME ANALYZED: 4/09/96

METHOD TCLP 8240

ANALYSIS	CAS NO.	SDL (mg/L)	RESULT (mg/L)
Benzene	71-43-2	0.001	BDL
Carbon Tetrachloride	56-23-5	0.001	BDL
Chlorobenzene	108-90-7	0.001	BDL
Chloroform	67-66-3	0.001	BDL
1,4-Dichlorobenzene	106-46-7	0.001	BDL
1,2-Dichloroethane	107-06-2	0.001	BDL
1,1-Dichloroethene	75-35-4	0.001	BDL
2-Butanone	78-93-3	0.100	BDL
Tetrachloroethene	127-18-4	0.001	BDL
Trichloroethene	79-01-6	0.001	BDL
Vinyl Chloride	75-01-4	0.005	BDL
Surrogate Recoveries:			
1,2-Dichloroethane-D4			108%
Toluene-D8			98%
Bromofluorobenzene			100%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER:

HYDROLOGIC PROJECT NUMBER: FL965635
HYDROLOGIC SAMPLE NUMBER: 965635
HYDROLOGIC LAB I.D.#: 399
SAMPLE IDENTIFICATION: ABTCO FCB-W
DATE SAMPLED: 4/2/96
DATE EXTRACTED: 4/08/96
DATE/TIME ANALYZED: 4/11/96

METHOD TCLP 8080

ANALYSIS	CAS NO.	SDL (mg/l)	RESULT (mg/l)
Heptachlor	76-44-8	0.0005	BDL
Endrin	72-20-8	0.001	BDL
Chlordane	57-74-9	0.005	BDL
Toxaphene	8001-35-2	0.01	BDL
Methoxychlor	72-43-5	0.005	BDL
Lindane	58-89-9	0.0005	BDL
Surrogate Recovery:			
DBC			90%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER:

HYDROLOGIC PROJECT NUMBER: FL965635
HYDROLOGIC SAMPLE NUMBER: 965635
HYDROLOGIC LAB I.D.#: 399
SAMPLE IDENTIFICATION: ABTCO FCB-W
DATE SAMPLED: 4/2/96
DATE EXTRACTED: 4/08/96
DATE/TIME ANALYZED: 4/12/96

METHOD TCLP 8150

ANALYSIS	CAS NO.	SDL (mg/l)	RESULT (mg/l)
2,4-D	94-75-7	0.1	BDL
2,4,5-TP (silvex)	93-72-1	0.1	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

HYDROLOGIC, INC.

FINAL REPORT OF ANALYSES

ABTco, INC.
SIDING DIVISION
PO BOX 98, HWY 268
ROARING RIVER, NC 28669-
Attn: ERIC ROGERS EXT 274

PROJECT NAME: ABTCo TCLP
REPORT DATE: 04/12/96

SAMPLE NUMBER- 83083 SAMPLE ID- ABTCo FCB-NEW
DATE SAMPLED- 04/02/96
DATE RECEIVED- 04/04/96 SAMPLER- ERICH BURKE
TIME RECEIVED- 0945 DELIVERED BY- UPS

SAMPLE MATRIX- OT
TIME SAMPLED- 1300
RECEIVED BY- DHT

Page 1 of 1

ANALYSIS	METHOD	SAMPLE PREP DATE	ANALYSIS BY DATE	BY	RESULT	UNITS	DET. LIMIT
TOX. CHAR. LEACHING PROCEDURE	6010	04/08/96	LJP 04/09/96	BDL			
ARSENIC, TOTAL	6010				< 0.003	mg/l	0.003
CADMIUM, TOTAL	6010				< 0.001	mg/l	0.001
CHROMIUM, TOTAL	6010				0.032	mg/l	0.005
MERCURY, TOTAL	6010				0.0002	mg/l	0.0002
SELENIUM, TOTAL	6010				< 0.003	mg/l	0.003
SILVER, TOTAL	6010				< 0.001	mg/l	0.001
BARIUM, TOTAL	6010				0.107	mg/l	0.005
LEAD, TOTAL	6010				< 0.010	mg/l	0.010

LABORATORY DIRECTOR

HYDROLOGIC, INC.

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER:

HYDROLOGIC PROJECT NUMBER: FL965635
HYDROLOGIC SAMPLE NUMBER: 965636
HYDROLOGIC LAB I.D.#: 399
SAMPLE IDENTIFICATION: ABTCO FCB-NEW
DATE SAMPLED: 4/2/96
DATE EXTRACTED: 4/08/96
DATE/TIME ANALYZED: 4/11/96

METHOD TCLP 8080

ANALYSIS	CAS NO.	SDL (mg/l)	RESULT (mg/l)
Heptachlor	76-44-8	0.0005	BDL
Endrin	72-20-8	0.001	BDL
Chlordane	57-74-9	0.005	BDL
Toxaphene	8001-35-2	0.01	BDL
Methoxychlor	72-43-5	0.005	BDL
Lindane	58-89-9	0.0005	BDL
Surrogate Recovery: DBC			98%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER:

HYDROLOGIC PROJECT NUMBER: FL965635
HYDROLOGIC SAMPLE NUMBER: 965636
HYDROLOGIC LAB I.D.#: 399
SAMPLE IDENTIFICATION: ABICO FCB-NEW
DATE SAMPLED: 4/2/96
DATE EXTRACTED: 4/08/96
DATE/TIME ANALYZED: 4/13/96

METHOD TCLP 8270

ANALYSIS	CAS NO.	SDL (mg/l)	RESULT (mg/l)
1,4-Dichlorobenzene	106-46-7	0.05	BDL
2-Methylphenol	95-48-7	0.05	BDL
3-Methylphenol	108-39-4	0.05	BDL
4-Methylphenol	106-44-5	0.05	BDL
Hexachloroethane	67-72-1	0.05	BDL
Nitrobenzene	98-95-3	0.05	BDL
Hexachlorobutadiene	87-68-3	0.05	BDL
2,4,6-Trichlorophenol	88-06-2	0.05	BDL
2,4,5-Trichlorophenol	95-95-4	0.25	BDL
2,4-Dinitrotoluene	121-14-2	0.05	BDL
Hexachlorobenzene	118-74-1	0.05	BDL
Pentachlorophenol	87-86-5	0.25	BDL
Pyridine	110-86-1	0.50	BDL
Surrogate Recoveries:			
2-Fluorophenol			106%
Phenol-D6			120%
Nitrobenzene-D5			112%
2-Fluorobiphenyl			62%
2,4,6-Tribromophenol			89%
Terphenyl-D14			100%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

HYDROLOGIC, INC.

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER:

HYDROLOGIC PROJECT NUMBER: FL965635
HYDROLOGIC SAMPLE NUMBER: 965636
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METHOD TCLP 8240

ANALYSIS	CAS NO.	SDL (mg/L)	RESULT (mg/L)
Benzene	71-43-2	0.001	BDL
Carbon Tetrachloride	56-23-5	0.001	BDL
Chlorobenzene	108-90-7	0.001	BDL
Chloroform	67-66-3	0.001	BDL
1,4-Dichlorobenzene	106-46-7	0.001	BDL
1,2-Dichloroethane	107-06-2	0.001	BDL
1,1-Dichloroethene	75-35-4	0.001	BDL
2-Butanone	78-93-3	0.100	BDL
Tetrachloroethene	127-18-4	0.001	BDL
Trichloroethene	79-01-6	0.001	BDL
Vinyl Chloride	75-01-4	0.005	BDL
Surrogate Recoveries:			
1,2-Dichloroethane-D4			112%
Toluene-D8			108%
Bromofluorobenzene			116%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

H Y D R O L O G I C , I N C .

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER:

HYDROLOGIC PROJECT NUMBER: FL965635
HYDROLOGIC SAMPLE NUMBER: 965636
HYDROLOGIC LAB I.D.#: 399
SAMPLE IDENTIFICATION: ABTCO FCB-NEW
DATE SAMPLED: 4/2/96
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DATE/TIME ANALYZED: 4/12/96

METHOD TCLP 8150

ANALYSIS	CAS NO.	SDL (mg/l)	RESULT (mg/l)
2,4-D	94-75-7	0.1	BDL
2,4,5-TP (silvex)	93-72-1	0.1	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

APPENDIX III

Erosion and Sediment Control Plan

I. NARRATIVE

Project Description

The purpose of the project is to vertically expand an existing waste ash disposal facility. In conjunction with the expansion, plans have been prepared to show development of the landfill for a period of five years beginning January 1, 1998. Also, a conceptual plan has been prepared which shows the facility developed at its ultimate capacity (about 12½ years after January 1, 1998). Because permitting of the facility by the Solid Waste Section is limited to five years, the erosion and control plan has been prepared to serve anticipated development during the first five years only.

Site Description

The existing landfill is constructed on a hillside. Earth berms constructed on the south and west sides of the facility serve to contain the ash and to provide access around the perimeter of the disposal area. The berms reach a maximum height of about sixty feet at the west end of the facility. Ash has accumulated to the top of the berms throughout most of the disposal area. The one exception is at the west end where there remains a large unfilled area. The unfilled area is estimated to provide sufficient storage for about two years of ash disposal at the current rate of ash generation.

Adjacent Property

The facility is located in a forested area at the ABTco plant site. There is no development immediately adjacent to the disposal area. About 3 ½ acres of undeveloped land drains toward the landfill from the upper part of the hill. Other areas adjacent to the landfill drain to natural drainageways leading away from the landfill.

Planned Erosion and Sediment Control Measures: The proposed erosion and sediment control features are intended to serve the facility through five years of development. At the end of five years, the erosion and sediment control plan will need to be revised as needed to serve disturbed areas of the subsequent expansion.

1. Grass-lined Channels: Grass-lined channels will be provided at the perimeter of the landfill to convey runoff away from the active areas. Temporary liners will be provided as needed to stabilize channels which are subject to erosion prior to the establishment of channel vegetation. Runoff from disturbed areas will be diverted to one of the sediment control features discussed below. Runoff from off-site areas will be diverted so that it does not flow across the landfill surface. Concentrated runoff will be conveyed to the toe of the landfill via permanent slope drains strategically located on the landfill sides. From the toe, runoff will be directed to natural drainageways at the site.

2. Silt Fences: Temporary silt fences will be used as needed at the perimeter of disturbed areas not served by a sediment trap. Silt fences are proposed to be used when the disposed ash has reached the top of the existing berms, but has not been placed to a height above the berms such that a sediment trap is required. For example, silt fences will be erected during the latter part of phase two (the second year), but will be replaced by a sediment trap at the appropriate point in time during phase three (the third year).

3. Sediment Trap: A temporary sediment trap is proposed to be constructed at the southwest corner of the disposal area as shown on the drawings. The location provides a convenient point for the collection of sediment-laden runoff before it is conveyed to the toe of the landfill. Runoff from disturbed areas as well as runoff from off-site areas will flow to the trap, which will provide in excess of 1800 cubic feet of storage for each disturbed acre draining to it. Accumulated sediment is to be removed from the trap when the sediment has reached a depth of one foot. The sediment trap spillway is sized to accommodate the peak flow resulting from a 25-year storm.

4. Outlet Stabilization Structure: Riprap aprons will be located at the outlets of the three slope drains to minimize potential scour.

5. Surface stabilization: Surface stabilization will be accomplished with vegetation and mulch as specified in the vegetation plan.

II. CONSTRUCTION SCHEDULE

1. Obtain plan approval and other applicable permits.

2. Continue waste disposal under the provisions of the current erosion and sediment control plan as long as accumulated ash remains below or at the level of the top of the existing berms.

3. When the existing storage area is nearing depletion (accumulated ash is nearing the top of the berms), construct a sufficient length of the flow diversion channels at the perimeter of the landfill to serve the facility through the first five-year expansion period. This would include channels on the north, south and west sides of the expansion area.

4. Construct new slope drain and riprap apron at the southwest corner of the facility as shown on the drawings.

5. Install silt fencing at the perimeter of the active disposal area to minimize sediment carried by runoff flowing to the perimeter ditches. Maintain silt fences throughout the disposal period until such time that conditions preclude the use of silt fences. When the use of silt fences is no longer appropriate, construct the sediment trap in accordance with the drawings. Conditions which will trigger the replacement of the silt fence with a sediment trap are any one of the following:
   - The drainage area exceeds ¼ acre per 100 ft. of fence.
   - The slope length behind the silt fence exceeds 100 ft at a 2% slope.
   - The slope length behind the silt fence exceeds 75 ft at a 2 to 5% slope.
   - The slope length behind the silt fence exceeds 50 ft at a 5 to 10% slope.
   - The slope length behind the silt fence exceeds 25 ft at a 10 to 20% slope.
   - The slope length behind the silt fence exceeds 15 ft at a slope greater than 20%.

6. As ash disposal progresses, check sediment trap for accumulation of sediment. Periodically restore trap to its design capacity by the removal of sediment when the accumulated depth reaches one foot.

7. Provide surface stabilization in accordance with the vegetation plan.

III. MAINTENANCE PLAN

1. Check erosion and sediment control features for stability and operation following each rainfall-producing event and at least once each week. Make repairs immediately to maintain all features as designed.

2. Remove sediment from behind the silt fence when it reaches a depth of about six inches. Repair silt fence as necessary to maintain a functioning barrier.

3. Remove sediment from the sediment trap when the depth of accumulated sediment is about one foot. Clean or replace gravel when the sediment trap no longer drains properly.

4. Fertilize, reseed as necessary, and mulch seeded areas according to the specifications in the vegetative plan to maintain a vigorous, dense vegetative cover.

IV. VEGETATIVE PLAN

A. Seedbed Preparation

Temporary seeding for fill slopes 3:1 or steeper.

1) Leave a loose, uncompacted surface. Remove large clods, rocks and debris which might hold netting above the surface.
2) Spread lime and fertilizer evenly at rates recommended by soil tests.
3) Roughen or groove the soil surface on the contour to promote the retention of soil amendments and seed.

Permanent seeding for fill slopes 3:1 or steeper (seed with hydraulic seeder).

1) Leave the last 4 to 6 inches of fill loose and uncompacted, allowing rocks, roots, large clods and other debris to remain on the slope.
2) Roughen slope faces by making grooves 2 to 3 inches deep, perpendicular to the slope.
3) Spread lime evenly over slopes at rates recommended by soil tests.

Gentle or flat slopes where topsoil is not used.

1) Remove rocks and debris.
2) Apply lime and fertilizer at rates recommended by soil tests; spread evenly and incorporate into the top 6 inches with a disk, chisel plow, or rotary tiller.
3) Break up large clods and rake into a loose, uniform seedbed.
4) Rake to loosen surface just prior to applying seed.

B. Seeding Methods

Gentle to flat slopes and temporary seedings

1) Spread seed at the recommended rate with a cyclone seeder, drop spreader, or cultipacker seeder.
2) Rake seed into the soil and lightly pack to establish good contact.

Permanent seedings for fill slopes steeper than 3:1.

1) Use hydraulic seeding equipment to apply seed and fertilizer.

C. Mulch

1) Apply 4,000 lb/acre grain straw. Anchor straw by tacking with asphalt, netting, or roving or by crimping with a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring tool.

Temporary Seedings

1) Apply 90 lb/1,000 ft ^{2} (4000 lb/acre) grain straw and tack with 0.1 gal/yd^2 asphalt (11 gal/1,000ft^2).

Grass-lined channels

1) Install excelsior mat in the channel, extend up to the top of the channel banks, and secure according to manufacturer's specifications.
2) On channel shoulders, apply 100 lb/1,000 ft^2 grain straw and anchor with 0.1 gal/yd^2 (11 gal/1,000 ft^2) asphalt.

D. Maintenance

1) Refertilize in the second year unless growth is fully adequate. May be mowed once or twice per year, but mowing is not necessary. Reseed, fertilize, and mulch damaged areas immediately.

V. SEEDING MIXTURE

Seeding Mixture for Slopes 3H:1V or Less in Mountain Region, Average Soils, Low Maintenance Reference: Table 6.11e, North Carolina Erosion and Sediment Control Planning and Design Manual

Species	Rate (lb/acre)
Tall Fescue	60
Kentucky bluegrass	10
Sericea lespedeza	15
Korean lespedeza	10

Seeding Notes

1) After August 15, use unscarified sericea seed.
2) Where appearance is a consideration, omit sericea lespedeza and increase Korean lespedeza to 40 lb/acre.

Nurse Plants

1) Between May 1 and Aug. 15, add 10 lb/acre German millet or 15 lb/acre Sudangrass. Prior to May 1 or after Aug.15, add 40 lb/acre rye (grain).

Seeding dates

Best	Possible
Aug. 15 - Sept. 1	July 25 - Sept. 15
Mar. 1 - Apr. 1	Mar. 1 - May 10

Soil Amendments

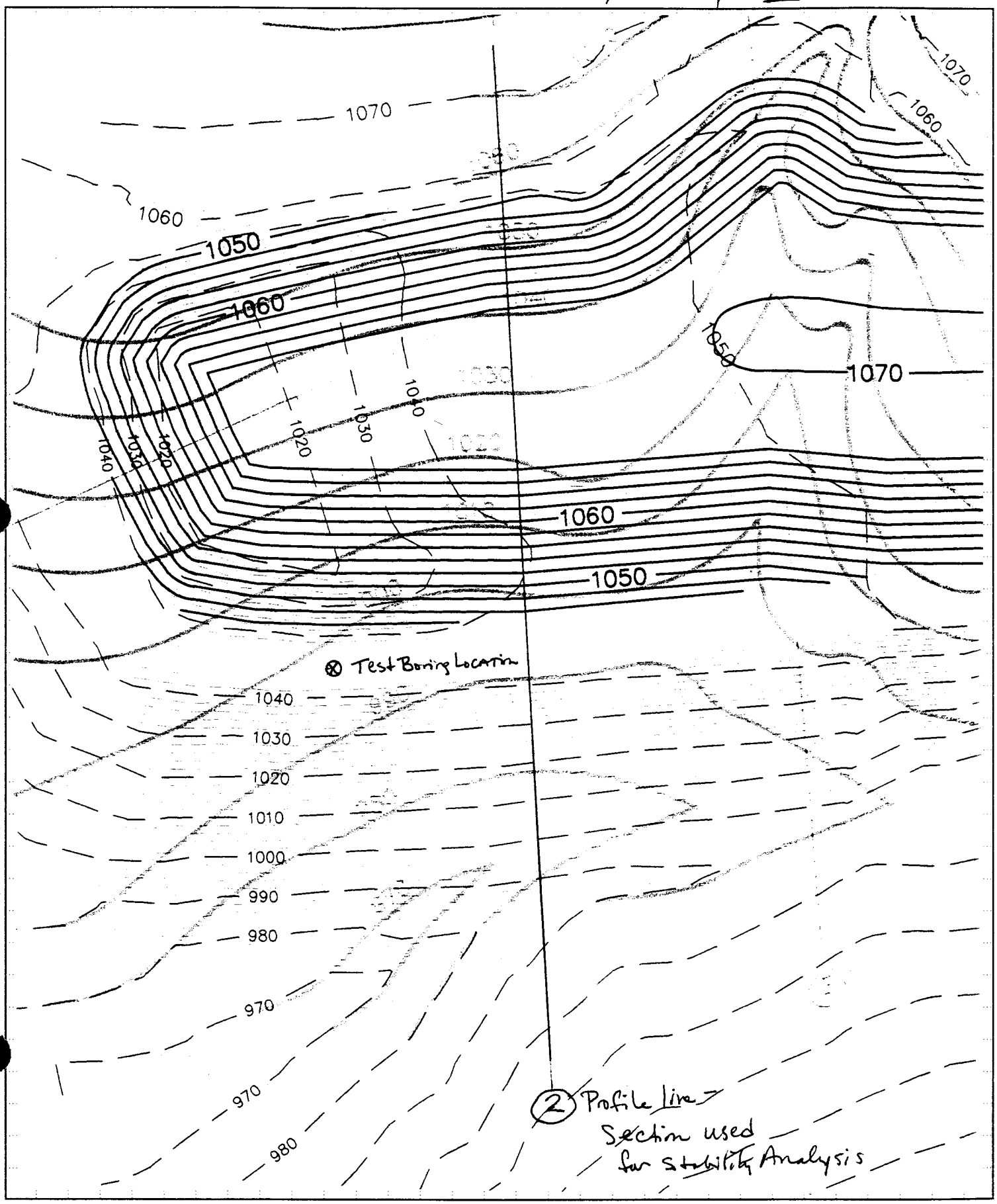
1) Apply lime and fertilizer according to soil tests, or apply 4,000 lb/acre ground agricultural limestone and 1,000 lb/acre 10-10-10 fertilizer.

APPENDIX IV

Slope Stability Calculations

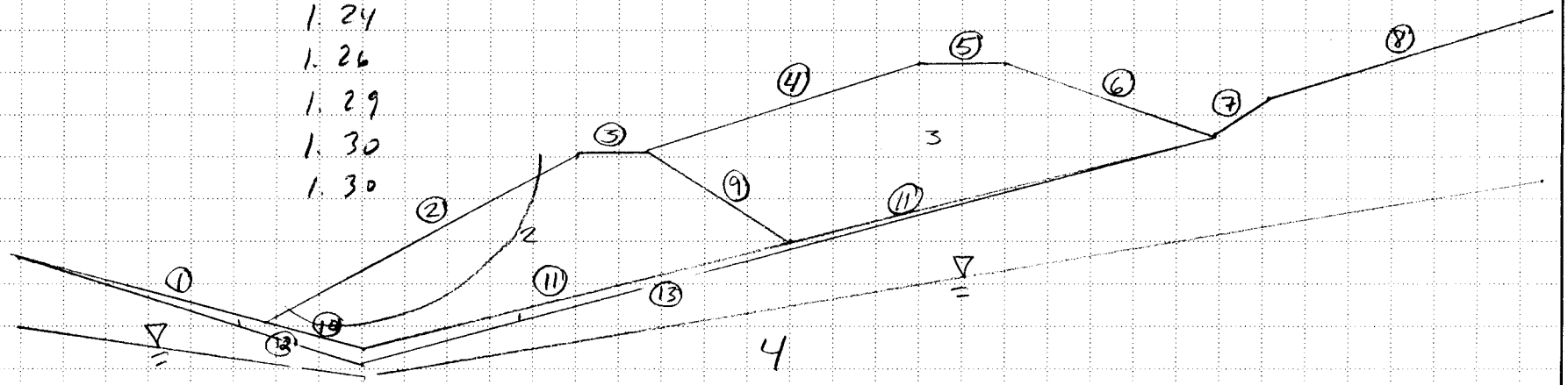
JOYCE ENGINEERING, INC.

JOB ABTco Ash Monofill
JOB NO. 3640 T01 SHEET NO. 1 OF 2
CALCULATED BY NCM DATE
CHECKED BY DATE
SUBJECT Slope Stability - Final SCALE 1"=60'



Critical Circle - FS - All Face circles through Steep Fill

1.22
1.24
1.26
1.29
1.30
1.30



	Left		Right									
Boundary #	x	y	x	y	Soil	γ_m,	γ_{SAT},	c,	ϕ,	u,	u_c	Piez.
1	100	1010	188	985	1	105	115	800*	16*	0	0	0
2	188	985	300	1045	2	120	125	100	34	0	0	0
3	300	1045	326	1046	2							
4	326	1046	415	1075	3	40	50	100	36	0	0	0
5	415	1075	445	1076	3							
6	445	1076	525	1051	3							
7	525	1051	542	1064	4	110	120	300	28	0	0	1
8	542	1064	700	1113	4							
9	326	1046	377	1014	2							
10	188	985	226	975	1							
11	226	975	525	1051	1							
12	100	1010	226	970	4							
13	226	970	525	1051	4							

Notes: * c & ϕ from CU Triaxial Shear Test; Other c & ϕ values - Empirical Knowledge

ENGINEERING, INC.

JOB ABTCo Ash Mountain
JOB NO. 364.00, T01 SHEET NO. 2 OF 2
CALCULATED BY NEM DATE 11-19-92
CHECKED BY DATE
SUBJECT Slope Stability - Final SCALE 1"=60'

** PCSTABL5M **

by
Purdue University

1

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 11-21-97
Time of Run: 12:39pm
Run By: NEM
Input Data Filename: C:2FINAL
Output Filename: C:2FINAL.OUT
Unit: ENGLISH
Plotted Output Filename: C:2FINAL.PLT

PROBLEM DESCRIPTION ABTco Landfill, Profile #2
Final Landfill Slopes

BOUNDARY COORDINATES

8 Top Boundaries
13 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	210.00	188.00	185.00	1
2	188.00	185.00	300.00	245.00	2
3	300.00	245.00	326.00	246.00	2
4	326.00	246.00	415.00	275.00	3
5	415.00	275.00	445.00	276.00	3
6	445.00	276.00	525.00	251.00	3
7	525.00	251.00	542.00	264.00	4
8	542.00	264.00	700.00	313.00	4
9	326.00	246.00	377.00	214.00	2
10	188.00	185.00	226.00	175.00	1
11	226.00	175.00	525.00	251.00	1
12	100.00	210.00	226.00	170.00	4
13	226.00	170.00	525.00	251.00	4

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	105.0	115.0	800.0	16.0	.00	.0	0
2	120.0	125.0	200.0	32.0	.00	.0	0
3	40.0	50.0	100.0	36.0	.00	.0	0
4	110.0	120.0	300.0	28.0	.00	.0	1

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 3 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	100.00	190.00
2	226.00	165.00
3	700.00	240.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 175.00 ft.
and X = 225.00 ft.

Each Surface Terminates Between X = 275.00 ft.
and X = 445.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y =100.00 ft.

23.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.22	189.94
2	220.12	187.82
3	242.45	193.36
4	261.70	205.94
5	275.74	224.16
6	278.91	233.70

Circle Center At X = 215.1 ; Y = 254.8 and Radius, 67.2

*** 1.215 ***

Individual data on the 5 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	22.9	19775.7	.0	.0	.0	.0	.0	.0	.0
2	22.3	49117.8	28146.2	50825.1	.0	.0	.0	.0	.0
3	19.3	47366.1	9096.8	37823.4	.0	.0	.0	.0	.0
4	14.0	22999.7	.0	15721.3	.0	.0	.0	.0	.0
5	3.2	1494.2	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	202.78	192.92
2	225.78	193.08
3	247.78	199.80
4	266.95	212.50
5	281.70	230.15
6	284.52	236.71

Circle Center At X = 214.0 ; Y = 270.2 and Radius, 78.1

*** 1.239 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	202.78	192.92
2	225.74	191.66
3	248.32	196.09
4	269.11	205.91
5	286.86	220.53
6	300.49	239.07
7	302.94	245.11

Circle Center At X = 219.3 ; Y = 284.5 and Radius, 93.0

*** 1.263 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	208.33	195.89
2	231.33	196.34
3	253.40	202.81
4	273.00	214.84
5	288.76	231.60
6	294.26	241.92

Circle Center At X = 218.5 ; Y = 280.2 and Radius, 84.9

*** 1.287 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	191.67	186.96
2	214.57	184.80
3	237.46	186.96
4	259.55	193.36
5	280.06	203.79
6	298.25	217.86
7	313.49	235.09
8	319.83	245.76

Circle Center At X = 214.7 ; Y = 305.8 and Radius, 121.1

*** 1.296 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.22	189.94
2	219.84	194.14
3	241.42	202.09
4	261.35	213.57
5	279.06	228.24
6	287.87	238.50

Circle Center At X = 184.6 ; Y = 322.5 and Radius, 133.1

*** 1.303 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	208.33	195.89
2	231.20	198.34
3	253.18	205.12
4	273.44	216.00
5	291.25	230.57
6	303.31	245.13

Circle Center At X = 207.4 ; Y = 313.9 and Radius, 118.0

*** 1.308 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	191.67	186.96
2	214.35	190.74
3	236.37	197.39
4	257.36	206.79
5	276.98	218.79
6	294.91	233.20
7	306.49	245.25

Circle Center At X = 173.5 ; Y = 365.8 and Radius, 179.8

*** 1.315 ***

```
        Y       A   X   I   S       F   T

          .00    87.50   175.00   262.50   350.00   437.50

X      .00 +---------+---------+---------+---------+---------+
           -
           -
           -
           -
           -
       87.50 +
           -                W *
           -
           -
           -
           -
A     175.00 +                  ..
           -               .*
           -              ... 1
           -              .**129
           -              ....547.
           -              ......12.
X     262.50 +               ......501..
           -              .......5.411
           -              .........3424
           -              ...........3*
           -              ....... ....*
           -              ..............
I     350.00 +               ..............
           -              ..............
           -              ......*......
           -              ..............
           -              ..........*
           -                 .........
S     437.50 +                       .......
           -                        *
           -
           -
           -
           -
       525.00 +                        *
           -                      *
           -
           -
           -
           -
F     612.50 +
           -
           -
           -
           -
           -
T     700.00 +                     W      *
```

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	213.89	198.87
2	236.86	199.94
3	258.07	208.84
4	274.93	224.48
5	279.92	234.24

Circle Center At X = 222.4 ; Y = 264.2 and Radius, 65.9

*** 1.333 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	202.78	192.92
2	225.35	188.47
3	248.16	191.37
4	268.91	201.29
5	285.47	217.25
6	296.17	237.61
7	297.13	243.46

Circle Center At X = 227.8 ; Y = 260.5 and Radius, 72.1

*** 1.346 ***

Boring / Well Construction Log

ENGINEERING, INC.

I.D. Number	B-1 Page 1 of 2	Purpose	Subsurface Investigation
Project Name	ABTco Industrial Landfill	Contractor	AMERIDRILL Corp.
Project No.	364.01	Registration No.	
Engineer	Nancy E. Marshall, P.E.	Driller	Randy Cutter
Start Date	11/10/97 Complete Date 11/10/97	Equipment	CME-55

Drilling Method: 2.25" ID, 4.25" OD Hollow stem augers

Comments: Obtain and log split-spoons at five-foot intervals

Obtain undisturbed sample from 37 to 39 feet

Well Construction Information (bgs)		Depth (ft.) From - To	Soil / Rock Description / Comments	Blow Counts and Sample Recovery
Borehole Dia.		3.5 - 5.0	(SM) Tan and brown medium to fine-grained silty SAND -	8 - 9 - 13
Riser Type			medium dense, moist - fill	REC = 72%
Riser Diameter				
Screen Type		8.5 - 10.0	(SM) Tan medium to fine-grained silty micaceous SAND-	3 - 4 - 4
Screen Diameter			loose, moist - fill	REC = 83%
Riser Interval				
Screen Interval		13.5 - 15.0	(SM) Brown and gray medium to fine-grained silty SAND-	8 - 9 - 14
Screen Slot Size			medium dense, moist - fill	REC = 100%
Grout Type				
Grout Interval		18.5 - 20.0	(SM) Tan medium to fine-grained silty micaceous SAND-	6 - 6 - 8
Bentonite Type			medium dense, moist - fill	REC = 100%
Bentonite Interval				
Gravel Pack		23.5 - 25.0	(SM) Tan medium to fine-grained silty micaceous SAND-	2 - 3 - 2
Gravel Pack Interval			loose, moist - fill	REC = 83%
Total Depth				
Ground Elevation		28.5 - 30.0	(SM) Tan medium to fine-grained silty micaceous SAND-	6 - 5 - 5
TOC Elevation			loose, moist - fill	REC = 56%
Water Level Information				
Date	**W.L. BGS**	33.5 - 35.0	(SM) Tan medium to fine-grained silty micaceous SAND-	2 - 4 - 4
TOB	Dry		loose, moist - fill	REC = 100%
24-hr	Dry			

R.P. = Reference Point
BC = Blow Counts Per 6"
TBM = Temporary Benchmark
BGS = Below Ground Surface
MSL = Mean Sea Level
TOB = Time of Boring

Boring / Well Construction Log

ENGINEERING, INC.

I.D. Number	**B-1** **Page 2 of 2**	Purpose	Subsurface Investigation
Project Name	ABTco	Contractor	AMERDRILL Corp.
Project No.	364.01	Registration No.	
Engineer	Nancy E. Marshall	Driller	Randy Cutter
Start Date	11/10/97 Complete Date 11/10/97	Equipment	CME-55

Drilling Method: 2.25" ID, 4.25" OD Hollow stem augers

Comments: Obtain and log split-spoons at five-foot intervals

Well Construction Information (bgs)		Depth (ft.) From - To	Soil / Rock Description / Comments	Blow Counts and Sample Recovery
Borehole Dia.		38.5 - 40.0	(ML) Tan and gray fine-grained sandy very clayey SILT -	1 - 2 - 4
Riser Type			medium stiff, moist - probable residual	REC = 72%
Riser Diameter				
Screen Type		43.5 - 45.0	(ML) Tan fine-grained sandy SILT - stiff, moist - residual	4 - 7 - 6
Screen Diameter			soils	REC = 100%
Riser Interval				
Screen Interval		48.5 - 50.0	(ML) Tan fine-grained sandy SILT - very stiff, moist -	8 - 9 - 14
Screen Slot Size			residual soils	REC = 100%
Grout Type				
Grout Interval			Boring terminated at 50.0'	
Bentonite Type				
Bentonite Interval			-Cave-in to 42.10' bgs at TOB	
Gravel Pack				
Gravel Pack Interval				
Total Depth				
Ground Elevation				
TOC Elevation				
Water Level Information				
Date	**W.L. BGS**			
TOB	Dry			
24-hr	Dry			

R.P. = Reference Point
BC = Blow Counts Per 6"
TBM = Temporary Benchmark
BGS = Below Ground Surface
MSL = Mean Sea Level
TOB = Time of Boring

AMERIDRILL Corp.

TEST BORING LOG

Auger Size = 2¼"
Rig Make = Case 55

PROJECT NAME Roaring River Site
SHEET 1 OF 1
LOCATION Roaring River N.C.
BORING # 13-1
CLIENT Joyce Engineering
PROJECT # 364.01
DRILL TEAM NAMES Randy Frank
DATE 11-10-99

SAMPLE DEPTH FROM / TO	TYPE OF SAMPLE	BLOWS PER 6 INCHES ON SAMPLER				IDENTIFICATION	SAMPLE	
		0 TO 6	6 TO 12	12 TO 18	18 TO 24	TOPSOIL= FILL	NO.	REC.
3.5 / 5.0		8	9	13		Tan, BRN, Fi, med, SA, Wood	1	15"
8.5 / 10.0		3	4	4		Tan, Fi, med, mic, SA FILL	2	15"
13.5 / 15.0		8	9	14		BLK Fi, med, SA, FILL	3	18"
18.5 / 20.0		6	6	8		Tan, Fi, mic, Si	4	18"
23.5 / 25.0		2	3	2		Same	5	15"
28.5 / 30.0		6	5	5		Same	6	10"
33.5 / 35.0		2	4	4		Same	7	18"
38.5 / 40.0		1	2	4		Tan, BLK Fi Si, moist FILL TO 42.0	8	18"
43.5 / 45.0		4	7	6		Tan, Fi, SA	9	18"
48.5 / 50.0		8	9	14		Tan, Fi, SA, moist	10	18"

WATER AT TIME OF DRILLING moist
WATER AT COMPLETION OF DRILLING NONE
24 HOUR WATER LEVEL Dry
CAVED DEPTH AT COMPLETION OF DRILLING 42.10
CAVED DEPTH AFTER 24 HOURS 42.10

APPENDIX V

Soil Laboratory Test Results

TRIGON
ENGINEERING CONSULTANTS, INC.

P.O. Box 18846 • Zip 27419-8846 • 313 Gallimore Dairy Rd. • Greensboro, N.C. 27409 • (910) 668-0093 • FAX (910) 668-3868

LETTER OF TRANSMITTAL

To: Ms. Nancy Marshall
Joyce Engineering
436 Spring Garden Street
Greensboro, NC 27401

Date: November 24, 1997

Regular Mail _____
Express Mail _____
Federal Express _____
Hand Carried XXXX
Other _____

COPIES	PAGES	DESCRIPTION
3	10	Laboratory test results for Joyce Engineering Project No. 364.01.

COMMENTS: _____

SIGNATURE: J. D. Hardister

J. Dean Hardister, E.I.T.
Staff Engineer

TRIGON JOB NO. 011-97-199

SUMMARY OF LABORATORY TEST DATA

JOYCE ENGINEERING PROJECT #364.01
GREENSBORO, NORTH CAROLINA
TRIGON JOB NO. 011-97-199

Sample	Sample Depth (ft.)	Sample Type[2]	Natural Moisture Content (%)	Triaxial Shear Data				Standard Proctor Curve		Remolded Data		Permeability (cm\sec.)
				Total Stress		Effective Stress		Max. Dry Density (pcf)	Opt. Water Content (%)	Dry Density (pcf)	Water Content (%)	
				c (ksf)	ϕ	c (ksf)	ϕ					
Stockpile	N/A	Bag	N/A					123.0	8.9	121.2	11.9	5.6×10^{-6}
Borrow	N/A	Bag	N/A					89.0	32.1	88.1	34.1	1.5×10^{-7}
50-50	N/A	Bag	N/A					84.5	26.8	81.0	28.5	3.4×10^{-6}
50-30-20	N/A	Bag	N/A					50.0	67.3	48.5	72.5	1.1×10^{-6}
UD	37 - 39	UD	71.0	0.8	16.0	0.4	31.5					

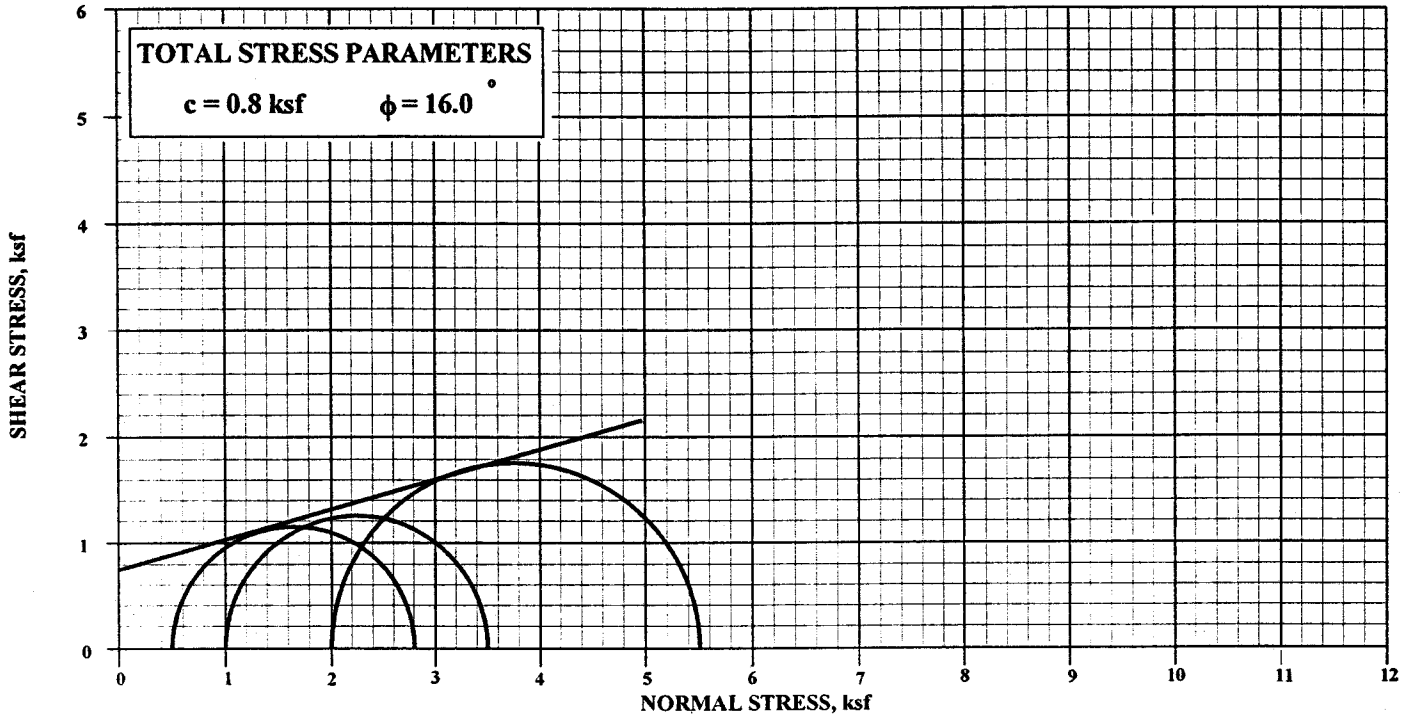
[1]Graphic Presentations of Results of Triaxial, Consolidation, CBR, Proctor, Grain Size, and other tests follow this summary.

[2]SS = Split Spoon Sample (ASTM D-1586)
UD = Undisturbed Sample (ASTM D-1587)

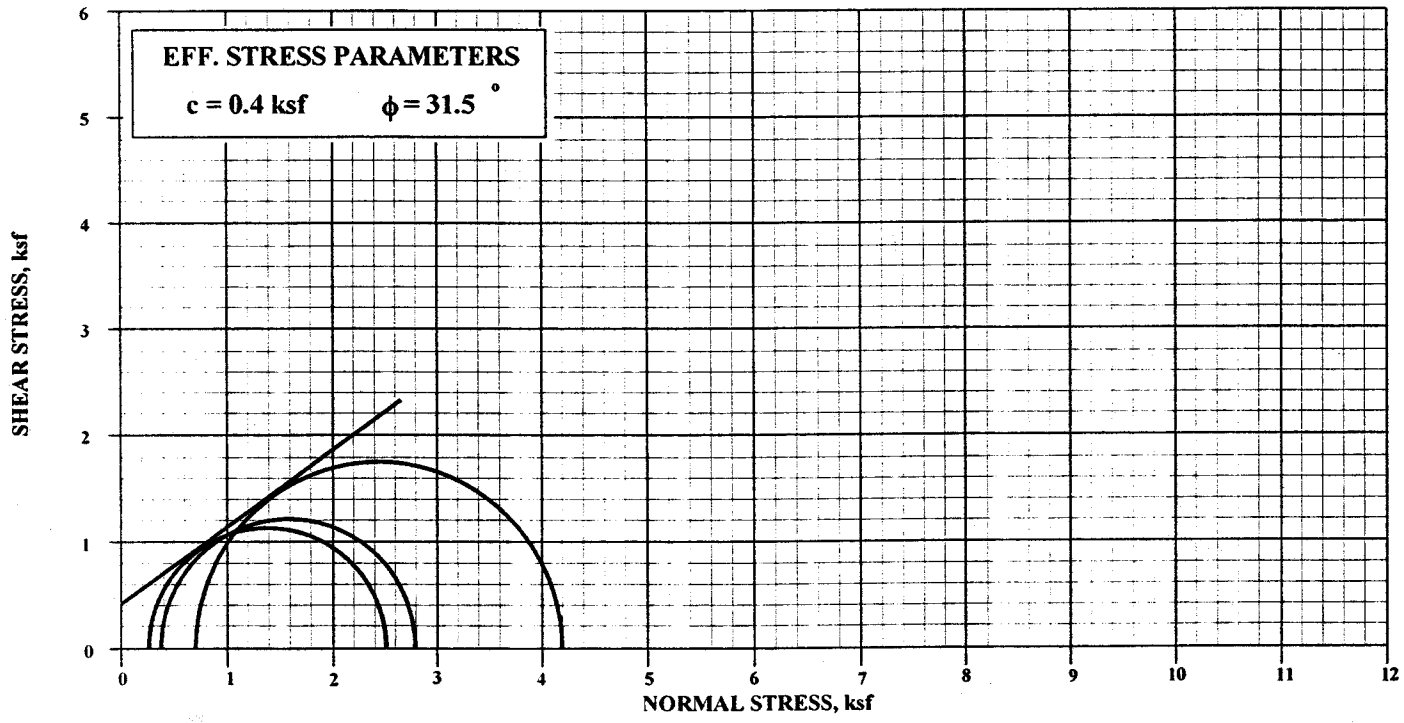
TRIGON ENGINEERING CONSULTANTS, INC.
GREENSBORO, NORTH CAROLINA

REV. 8/14/97

TOTAL STRESS @ MAX. STRESS RATIO



EFFECTIVE STRESS @ MAX. STRESS RATIO



TRIGON
ENGINEERING CONSULTANTS, INC.

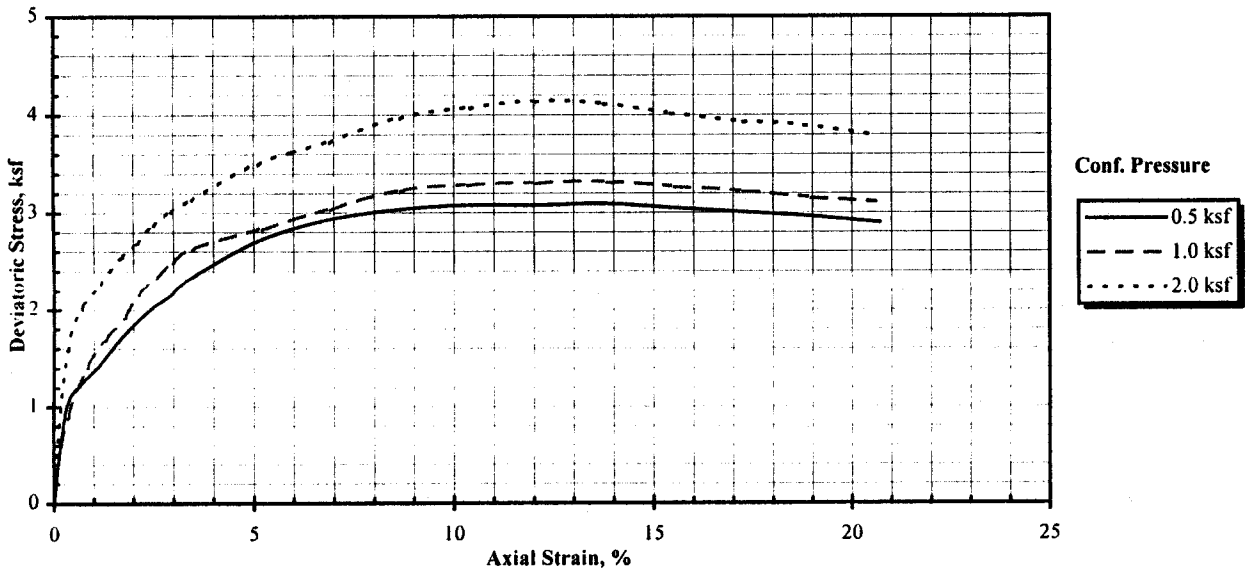
FAILURE ENVELOPES

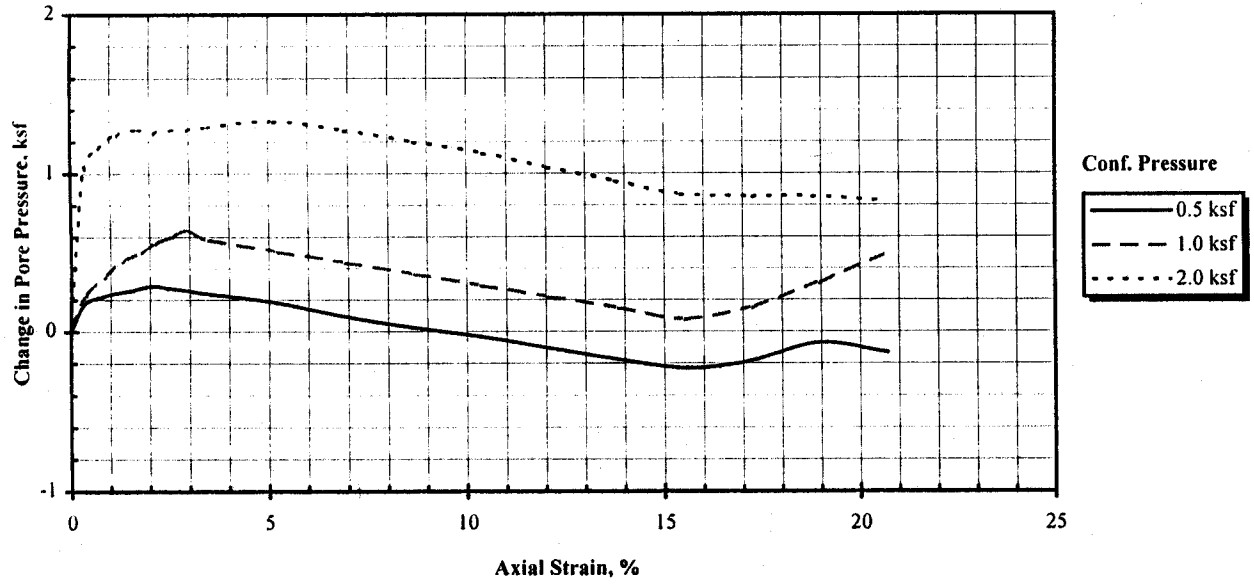
JOYCE ENG. PROJECT NO. 364.01
GREENSBORO, NORTH CAROLINA

Date 11/18/97	Sample: UD Depth: 37 - 39 Feet
Drawn by DH	Drawing No. 011-97-199-1

8/14/97

CONTROLLED STRAIN 0.005 in./min.





Date	11/20/97
Project Number:	011-97-199
Project Name:	Joyce Eng. Proj. 364.01 Greensboro, NC
Boring Number:	N/A
Specimen Type:	Undisturbed
Depth:	37 - 39 Feet

Specimen No.	1	2	3
Water Content, %	71.0	71.0	71.0
Dry Density, pcf	53.3	56.0	56.2
Saturation, %	100	100	100
Void Ratio	N/A	N/A	N/A
Initial Diameter, in.	2.85	2.85	2.85
Initial Height, in.	5.8	5.8	5.8
Minor Principal Stress, ksf	0.5	1.0	2.0
Maximum Deviator Stress, ksf	3.1	3.3	4.1

LL	PL	PI	G_s

Soil Description:

Brown Clayey Med. to Fine Sandy SILT

NOTES:

Project: Joyce Eng Proj. 364.01
Boring: N/A
Depth (feet): 37 - 39
Eff. Conf. Pressure (psi): 3.5

Deform. Dial Reading (inches)	Strain %	Corrected Area (in^2)	Load (#)	Pore Pressure (psi)	Change in Pore Press. (ksf)	Effect. Pressure (ksf)	A-value	Deviatoric Stress (ksf)	Shear Stress (ksf)	p' (ksf)	Stress Ratio
0.000	0.000	6.38	0.0	50.2	0.00	0.50	0.00	0.00	0.00	0.50	0.00
0.019	0.33	6.40	45.0	51.4	0.17	0.33	0.17	1.01	0.51	0.84	4.06
0.042	0.72	6.43	56.0	51.7	0.22	0.29	0.17	1.25	0.63	0.92	5.36
0.066	1.14	6.45	64.0	51.9	0.24	0.26	0.17	1.43	0.71	0.97	6.51
0.090	1.55	6.48	74.0	52.0	0.26	0.24	0.16	1.64	0.82	1.07	7.72
0.118	2.03	6.51	84.0	52.2	0.29	0.22	0.16	1.86	0.93	1.14	9.60
0.144	2.48	6.54	92.0	52.1	0.27	0.23	0.14	2.02	1.01	1.24	9.79
0.169	2.91	6.57	98.0	52.0	0.26	0.24	0.12	2.15	1.07	1.32	9.77
0.191	3.29	6.60	105.0	51.9	0.24	0.26	0.11	2.29	1.15	1.41	9.84
0.293	5.05	6.72	126.0	51.5	0.19	0.32	0.07	2.70	1.35	1.67	9.52
0.395	6.81	6.85	139.0	50.9	0.10	0.40	0.03	2.92	1.46	1.87	8.25
0.497	8.57	6.98	147.0	50.4	0.03	0.48	0.01	3.03	1.52	1.99	7.38
0.593	10.22	7.11	152.0	50.0	-0.03	0.53	-0.01	3.08	1.54	2.07	6.78
0.695	11.98	7.25	155.0	49.5	-0.10	0.60	-0.03	3.08	1.54	2.14	6.09
0.797	13.74	7.40	159.0	49.0	-0.17	0.68	-0.06	3.10	1.55	2.22	5.57
0.902	15.55	7.55	160.0	48.6	-0.23	0.73	-0.08	3.05	1.52	2.26	5.15
0.994	17.14	7.70	161.0	48.9	-0.19	0.69	-0.06	3.01	1.51	2.20	5.36
1.099	18.95	7.87	162.0	49.7	-0.07	0.58	-0.02	2.96	1.48	2.06	6.15
1.201	20.71	8.05	162.0	49.3	-0.13	0.63	-0.04	2.90	1.45	2.08	5.58

Project: Joyce Eng. Proj. 364.01
Boring: N/A
Depth (feet): 37 - 39
Eff. Conf. Pressure (psi): 7.0

Deform. Dial Reading (inches)	Strain %	Corrected Area (in^2)	Load (#)	Pore Pressure (psi)	Change in Pore Press. (ksf)	Effect. Pressure (ksf)	A-value	Deviatoric Stress (ksf)	Shear Stress (ksf)	p' (ksf)	Stress Ratio
0.001	0.00	6.38	0.0	50.0	0.00	1.01	0.00	0.00	0.00	1.01	0.00
0.022	0.38	6.40	39.0	51.5	0.22	0.79	0.25	0.88	0.44	1.23	2.11
0.049	0.84	6.43	62.0	52.3	0.33	0.68	0.24	1.39	0.69	1.37	3.05
0.074	1.28	6.46	75.0	53.0	0.43	0.58	0.26	1.67	0.84	1.41	3.90
0.104	1.79	6.50	86.0	53.4	0.49	0.52	0.26	1.91	0.95	1.47	4.68
0.123	2.12	6.52	97.0	53.8	0.55	0.46	0.26	2.14	1.07	1.53	5.65
0.148	2.55	6.55	105.0	54.1	0.59	0.42	0.26	2.31	1.15	1.57	6.53
0.173	2.98	6.58	113.0	54.4	0.63	0.37	0.26	2.47	1.24	1.61	7.61
0.201	3.47	6.61	120.0	54.0	0.58	0.43	0.22	2.61	1.31	1.74	7.05
0.301	5.19	6.73	132.0	53.5	0.50	0.50	0.18	2.82	1.41	1.92	6.60
0.400	6.90	6.85	144.0	53.0	0.43	0.58	0.14	3.03	1.51	2.09	6.25
0.501	8.64	6.98	156.0	52.5	0.36	0.65	0.11	3.22	1.61	2.26	5.96
0.599	10.33	7.11	162.0	52.0	0.29	0.72	0.09	3.28	1.64	2.36	5.55
0.698	12.03	7.25	166.0	51.5	0.22	0.79	0.07	3.30	1.65	2.44	5.16
0.801	13.81	7.40	170.0	51.0	0.14	0.86	0.04	3.31	1.65	2.52	4.83
0.899	15.50	7.55	171.0	50.5	0.07	0.94	0.02	3.26	1.63	2.57	4.48
0.999	17.22	7.71	172.0	51.0	0.14	0.86	0.04	3.21	1.61	2.47	4.72
1.099	18.95	7.87	172.0	52.1	0.30	0.71	0.10	3.15	1.57	2.28	5.46
1.199	20.67	8.04	173.0	53.3	0.48	0.53	0.15	3.10	1.55	2.08	6.81

Project: Joyce Eng. Proj. 364.01
Boring: N/A
Depth (feet): 37 - 39
Eff. Conf. Pressure (psi): 14.0

Deform. Dial Reading (inches)	Strain %	Corrected Area (in^2)	Load (#)	Pore Pressure (psi)	Change in Pore Press. (ksf)	Effect. Pressure (ksf)	A-value	Deviatoric Stress (ksf)	Shear Stress (ksf)	p' (ksf)	Stress Ratio
0.000	0.00	6.38	0.0	45.2	0.00	2.02	0.00	0.00	0.00	2.02	0.00
0.021	0.36	6.40	70.0	52.3	1.02	0.99	0.65	1.57	0.79	1.78	2.58
0.041	0.71	6.43	89.0	53.2	1.15	0.86	0.58	1.99	1.00	1.86	3.31
0.068	1.17	6.46	101.0	53.8	1.24	0.78	0.55	2.25	1.13	1.90	3.90
0.099	1.71	6.49	114.0	54.0	1.27	0.75	0.50	2.53	1.26	2.01	4.38
0.122	2.10	6.52	121.0	53.9	1.25	0.76	0.47	2.67	1.34	2.10	4.50
0.145	2.50	6.54	130.0	54.0	1.27	0.75	0.44	2.86	1.43	2.18	4.82
0.170	2.93	6.57	137.0	54.0	1.27	0.75	0.42	3.00	1.50	2.25	5.01
0.200	3.45	6.61	143.0	54.1	1.28	0.73	0.41	3.12	1.56	2.29	5.24
0.296	5.10	6.72	163.0	54.4	1.32	0.69	0.38	3.49	1.75	2.44	6.05
0.399	6.88	6.85	177.0	54.0	1.27	0.75	0.34	3.72	1.86	2.61	5.97
0.500	8.62	6.98	192.0	53.5	1.20	0.82	0.30	3.96	1.98	2.80	5.82
0.602	10.38	7.12	201.0	53.0	1.12	0.89	0.28	4.07	2.03	2.93	5.55
0.696	12.00	7.25	208.0	52.4	1.04	0.98	0.25	4.13	2.07	3.04	5.22
0.796	13.72	7.39	211.0	51.8	0.95	1.07	0.23	4.11	2.05	3.12	4.86
0.893	15.40	7.54	210.0	51.2	0.86	1.15	0.22	4.01	2.01	3.16	4.48
0.999	17.22	7.71	210.0	51.1	0.85	1.17	0.22	3.92	1.96	3.13	4.36
1.088	18.76	7.85	212.0	51.1	0.85	1.17	0.22	3.89	1.94	3.11	4.33
1.193	20.57	8.03	211.0	50.9	0.82	1.20	0.22	3.78	1.89	3.09	4.17

Job No. 011-97-199 Date 11/14/97

Project Joyce Eng. Project 364.01 - Greensboro, North Carolina

Source of Material Stockpile

Description of Material Brown Micaceous Silty Cse. to Fine SAND w Quartz Frag.

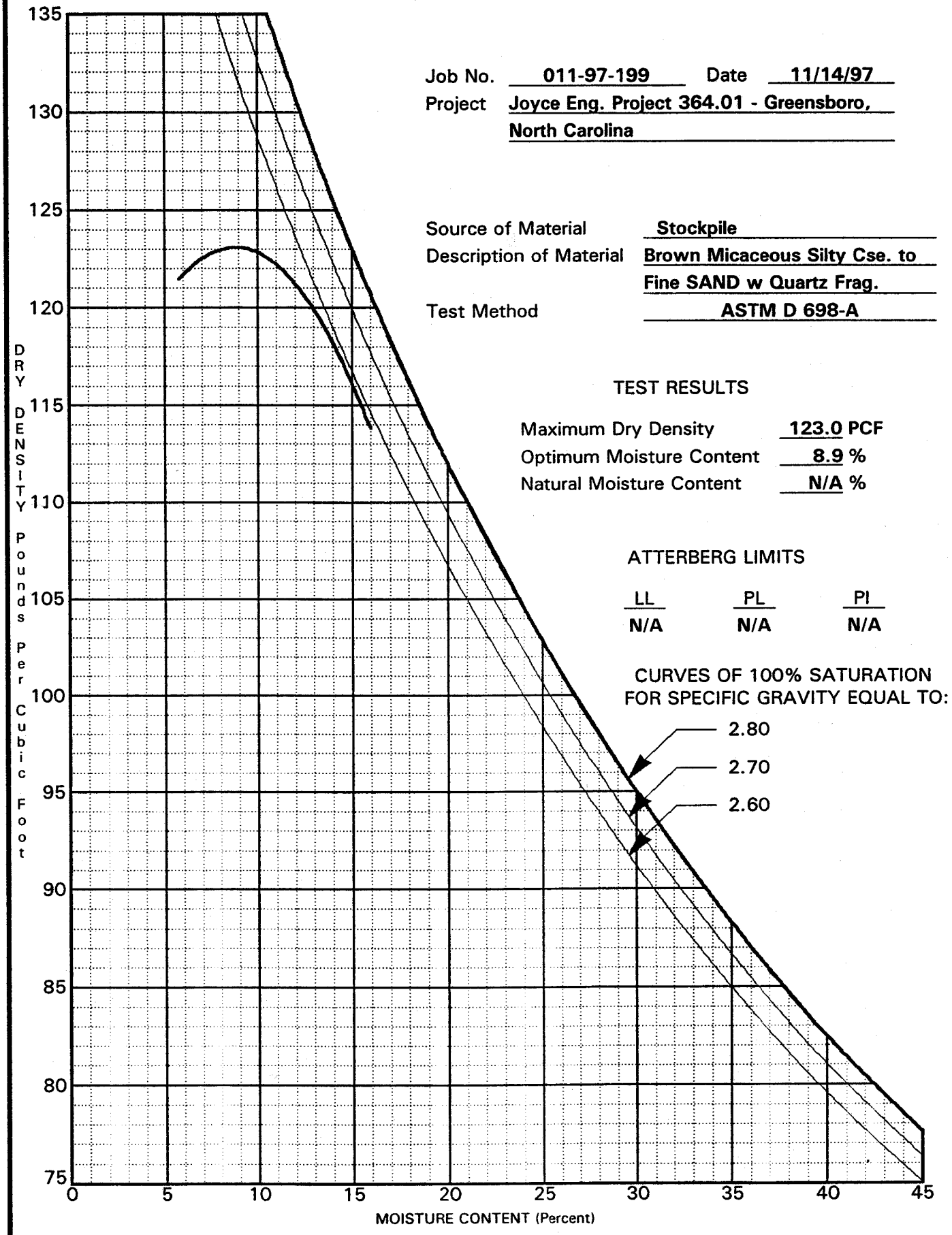
Test Method ASTM D 698-A

TEST RESULTS

Maximum Dry Density	123.0 PCF
Optimum Moisture Content	8.9 %
Natural Moisture Content	N/A %

ATTERBERG LIMITS

LL	PL	PI
N/A	N/A	N/A



MOISTURE-DENSITY RELATIONSHIP

TRIGON ENGINEERING CONSULTANTS, INC.

Greensboro, North Carolina

Job No. 011-97-199 Date 11/14/97

Project Joyce Eng. Project 364.01 - Greensboro, North Carolina

Source of Material Borrow Soil

Description of Material Red Slightly Micaceous Coarse to Fine Sandy SILT

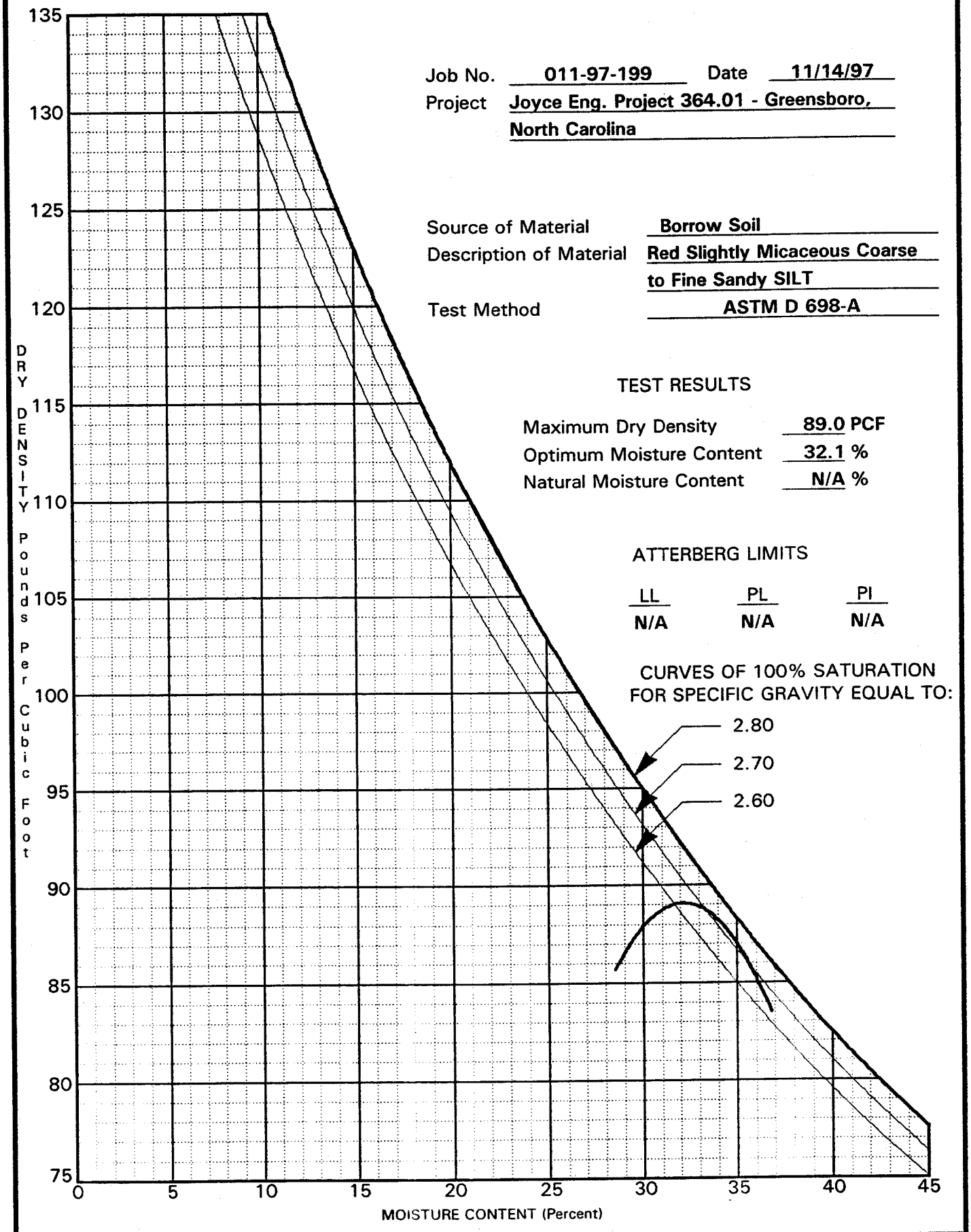
Test Method ASTM D 698-A

TEST RESULTS

Maximum Dry Density	89.0 PCF
Optimum Moisture Content	32.1 %
Natural Moisture Content	N/A %

ATTERBERG LIMITS

LL	PL	PI
N/A	N/A	N/A



MOISTURE-DENSITY RELATIONSHIP

TRIGON ENGINEERING CONSULTANTS, INC.

Greensboro, North Carolina

Job No. 011-97-197 Date 11/14/97

Project Joyce Eng. Project 364.01 - Greensboro, North Carolina

Source of Material Stockpile/Ash

Description of Material 50% Stockpile/50% Ash

Test Method ASTM D 698-A

TEST RESULTS

Maximum Dry Density	84.5 PCF
Optimum Moisture Content	26.8 %
Natural Moisture Content	N/A %

ATTERBERG LIMITS

LL	PL	PI
N/A	N/A	N/A

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:

2.80

2.70

2.60

DRY DENSITY Pounds Per Cubic Foot

110 105 100 95 90 85 80 75 70 65 60 55 50

20 25 30 35 40 45 50 55 60 65

MOISTURE CONTENT (Percent)

MOISTURE-DENSITY RELATIONSHIP

TRIGON ENGINEERING CONSULTANTS, INC.

Greensboro, North Carolina

Job No. 011-97-199 Date 11/14/97

Project Joyce Eng. Project 364.01 -
Greensboro, North Carolina

Source of Material Stockpile/Ash/Sludge

Description of Material 50% Stockpile/30% Ash/20% Sludge

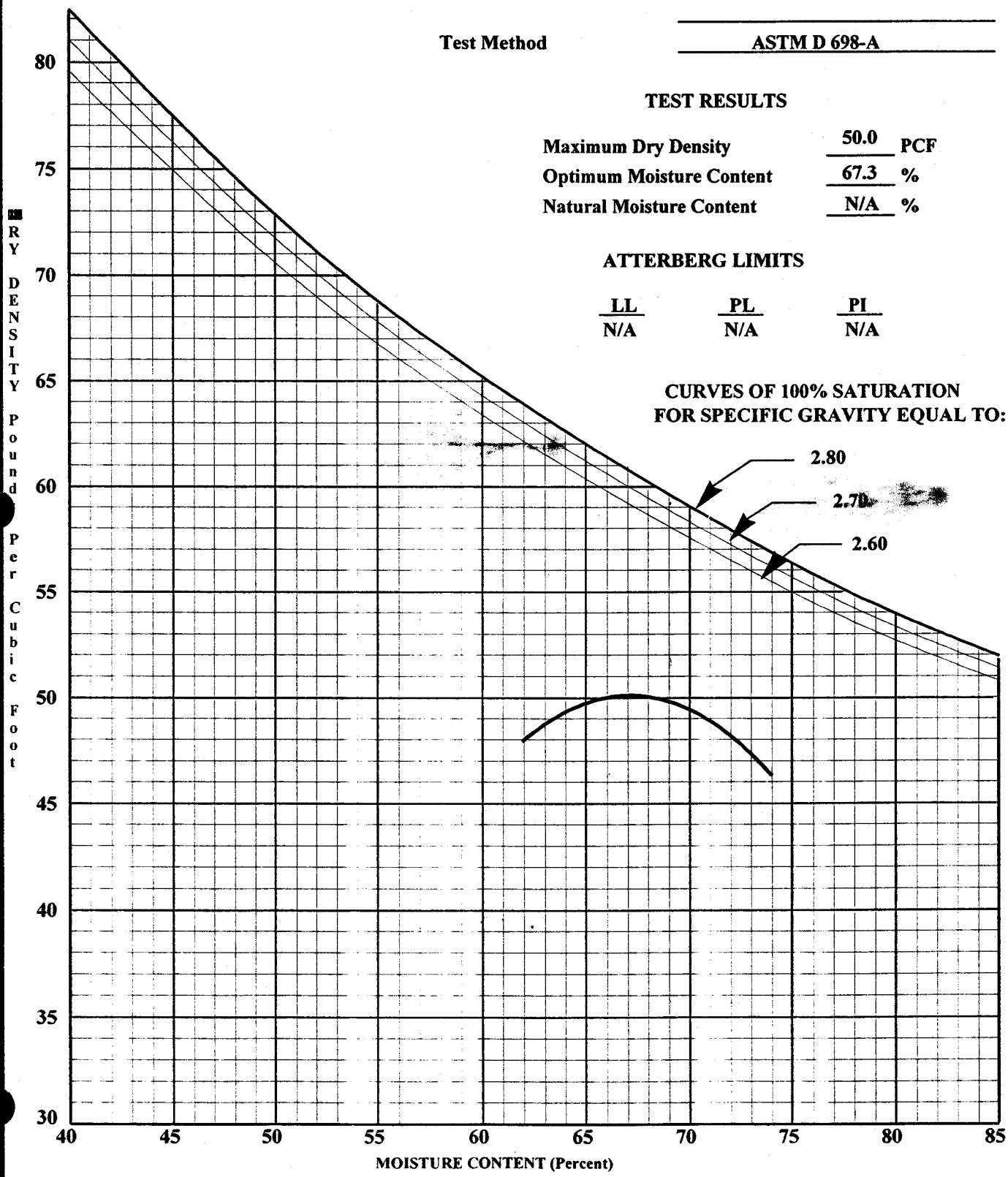
Test Method ASTM D 698-A

TEST RESULTS

Maximum Dry Density	50.0	PCF
Optimum Moisture Content	67.3	%
Natural Moisture Content	N/A	%

ATTERBERG LIMITS

LL	PL	PI
N/A	N/A	N/A



MOISTURE-DENSITY RELATIONSHIP

TRIGON ENGINEERING CONSULTANTS, INC.

Greensboro, North Carolina

APPENDIX VI

Well Construction Records and Correspondence Regarding the Monitoring Well Network

ABITIBI-PRICE

ABITIBI-PRICE CORPORATION, Building Products Division
P.O. Box 98, Highway 268, Roaring River, N.C. 28669, (919) 696-2751

November 22, 1989

Mr. Bobby Lutfy
Hydrogeological Technician
North Carolina Department of
Environment, Health, &
Natural Resources
Division of Solid Waste Management
PO Box 27687
Raleigh, NC 27611-7687

Dear Mr. Lutfy

Enclosed is the information you requested, by letter, on October 23, 1989.

Environmental Testing will perform our annual ground and surface water monitoring extractions. The samples will be taken on April 2, 1990.

If we can be of further service, please contact us.

Sincerely,

David C. Doyle

David C. Doyle

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Enclosures

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N.C. DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH, P. O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE:	PERMIT NO.:
Abitibi - Price	97-03
ADDRESS:	**OWNER (print):**
Hwy 268 Roaring River, NC. 28669	Abitibi - Price
DRILLING CONTRACTOR:	**REGISTRATION NO.:**
Newman Brothers Inc.	

Casing Type: Steel dia. 4 in. Grout Depth: from 3 to 12 ft. - dia. 13 in.
Casing Depth: from 0 to 4 ft. - dia. 4 in. Bentonite Seal: from 12 to 13 ft. - dia. 13 in.
Screen Type: Slotted PVC dia. 2 in. Sand/Gravel PK: from 13 to 28 ft. - dia. 13 in.
Screen Depth: from 18 to 28 ft. - dia. 2 in. Total Well Depth: from 0 to 28 ft. - dia. 13 in.

Static Water Level: 24.4 feet from top of casing Date Measured ___ / ___ / ___

Yield (gpm): N/A Method of Testing: N/A Casing is 1 feet above land surface

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION

LOCATION SKETCH

(show distance to numbered roads, or other map reference points)

See the Attached

REMARKS: This well, # FA1, is the upgradient well. Samples will be taken on 4/2/90.

DATE: 11/22/89 SIGNATURE: David C. Doyle

GW-1342 (6/85)
N. C. Hazardous Waste Management Branch

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

OMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N.C. EPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANCH, O. BOX 2091, RALEIGH, N.C. 27602

AME OF SITE:	PERMIT NO.:
Abitibi - Price Fly Ash Site	97-03
DDRESS:	OWNER (print):
Hwy 268 Roaring River NC 28669	Abitibi - Price
RILLING CONTRACTOR:	REGISTRATION NO.:
Newman Brothers Inc.	

sing Type: Steel dia. 4 in. Grout Depth: from 3 to 13 ft. - dia. 13 in.
sing Depth: from 0 to 4 ft. - dia. 4 in. Bentonite Seal: from 13 to 14 ft. - dia. 13 in.
een Type: Slotted PVC dia. 2 in. Sand/Gravel PK: from 14 to 29 ft. - dia. 13 in.
een Depth: from 19 to 29 ft. - dia. 2 in. Total Well Depth: from 0 to 29 ft. - dia. 13 in.

tic Water Level: 12.4 feet from top of casing Date Measured ___/___/___

ld (gpm): N/A Method of Testing: N/A Casing is 1' feet above land surface

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION

LOCATION SKETCH

(show distance to numbered roads, or other map reference points)

See the attached

MARKS: This well, # FA2, is the downgradient well. Samples will be taken on 4/2/90

TE: 11/22/89 SIGNATURE: David C. Doyle

3342 (6/85)
& Hazardous Waste Management Branch

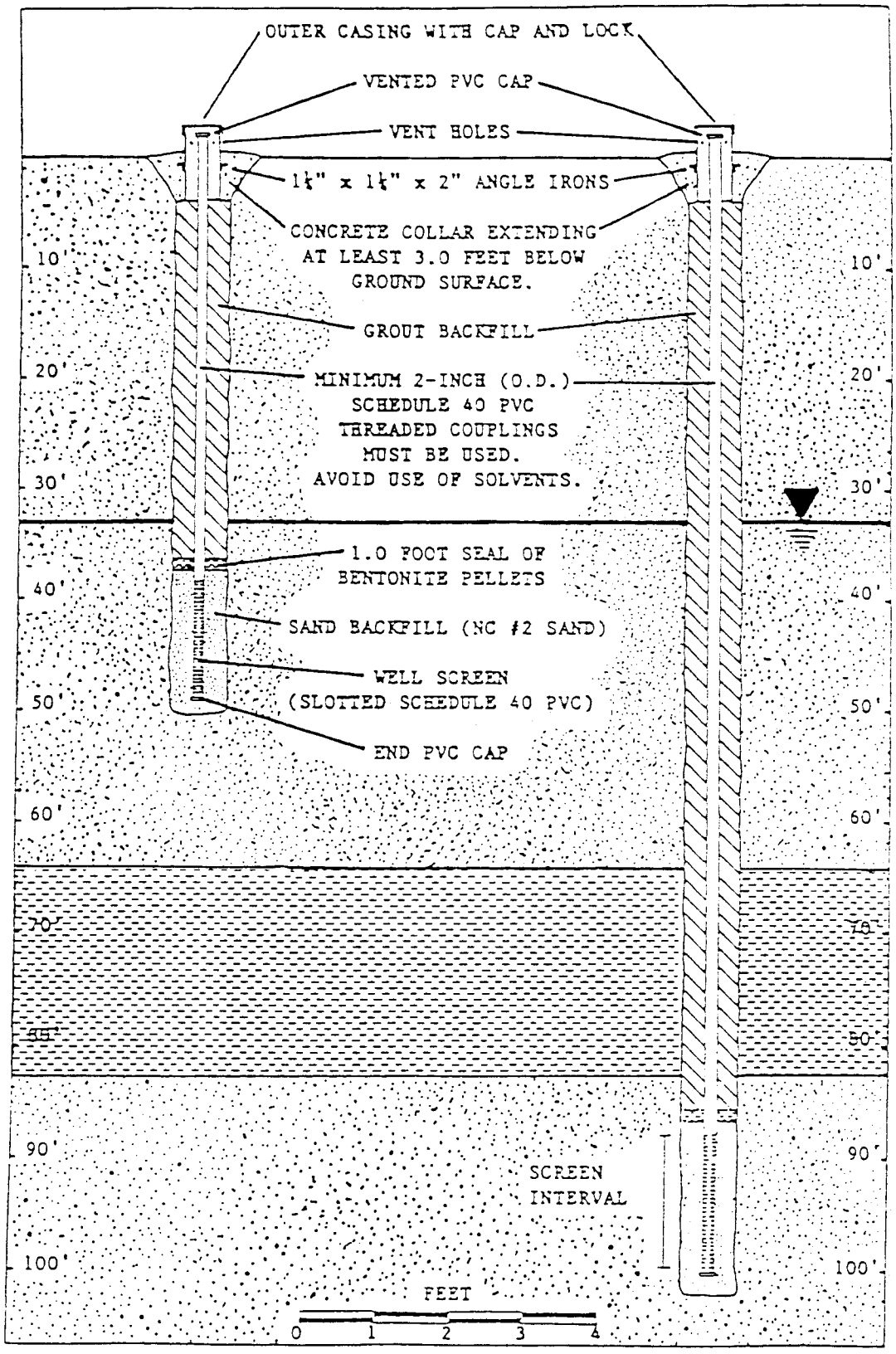

Figure 5. Typical ground-water monitoring well nest schematic.

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Waste Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
William L. Meyer, Director

DEHNR

November 18, 1996

Mr. Erich Burke
Environmental Engineer
ABTCo, Inc.
Hwy. 268, P.O. Box 98
Roaring River, N.C. 28669

RE: Ground-water Monitoring At The ABTCo Industrial Landfill (Permit # 97-03)

Dear Mr. Burke,

Thank you for the opportunity to meet with you this past Thursday and to walk over the wood ash landfill and inspect the ground-water monitoring wells. This letter is written to document our discussion and outline what further steps ABTCo needs to take in the next few months in order to provide some additional information necessary for evaluation of the ash landfill and its ground-water monitoring system.

- The large drawing submitted in the document prepared for ABTCo by Trigon Engineering Consultants (dated May 24, 1996) has incorrect locations for the ground-water monitoring wells. Therefore this drawing is to be deleted from the report. The smaller map at the very end of the report shows the locations for the monitoring wells accurately.

- Boring Logs for the monitoring wells would be useful in evaluating the wells. Are the wells screened in the soil or in fractured bedrock? ABTCo will make an effort to see if the well driller has any Boring Logs or descriptions of the materials drilled during the construction of the monitoring wells.

- The upgradient well (FA-1) is screened a little too shallow and is located too close to the waste to be a true background well. The limited water column of about five feet could yield turbid samples which could result in higher total metals values.

P.O. Box 27687,
Raleigh, North Carolina 27611-7687
Voice 919-733-4996

NRC Reduce Reuse Recycle

FAX 919-715-3605

- For the next sampling event turbidity will be measured and dissolved analyses from filtered samples will be done for the metals in addition to the total (unfiltered) metals analyses. This will assist in the evaluation of the reason for some of the elevated metals values that have been reported in the past for the two monitoring wells.

- For the next sampling event, the two monitoring wells should be analyzed for the following: field measurements - pH, temperature, turbidity, and specific conductivity, and lab measurements - Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Sulfates, Total Dissolved Solids, Zinc, a Volatile Organic Compound scan for the constituents in the list attached using EPA method 8260, and a semi-volatile scan using EPA method 8270. Be sure the 8270 scan includes naphthalenes (such as naphthalene and acenaphthylene) and phenols (such as 2,4-dinitrophenol).

- Additional TCLP analyses of the ash needs to be done for 2,4-Dinitrotoluene and Hexachlorobenzene at detection limits less than or equal to .013 mg/l, which is the regulatory limit for materials that may be disposed in an unlined landfill in North Carolina.

- The downgradient well (FA-2) appears to be located in an excellent location. It appears this well may be screened slightly deeper than is ideal, however otherwise it appears to be a properly designed monitoring well.

- Pending the evaluation of the boring logs and the next set of sampling results, the existing monitoring system appears generally adequate.

The additional information discussed in this letter will be useful in the evaluation of the ABTCo Ash Landfill and its ground-water monitoring system. If you have any questions regarding this letter, please call me at (919) 733-0692, extension 258.

Sincerely,

Bobby Lutfy

Bobby Lutfy, Hydrogeologist
Solid Waste Section

APPENDIX I ORGANIC CONSTITUENTS

ORGANIC CONSTITUENT	PQL (UG/L)	ORGANIC CONSTITUENT	PQL (UG/L)
(16) ACETONE	100	(40) T-1,3-DICHLOROPROPENE	10
(17) ACRYLONITRILE	200	(41) ETHYLBENZENE	5
(18) BENZENE	5	(42) METHYL BUTYL KETONE	50
(19) BROMOCHLOROMETHANE	5	(43) METHYL BROMIDE	10
(20) BROMODICHLOROMETHANE	5	(44) METHYL CHLORIDE	10
(21) BROMOFORM	5	(45) METHYLENE BROMIDE	10
(22) CARBON DISULFIDE	100	(46) METHYLENE CHLORIDE	10
(23) CARBON TETRACHLORIDE	10	(47) MEK: 2-BUTANONE	100
(24) CHLOROBENZENE	5	(48) METHYL IODIDE	10
(25) CHLOROETHANE	10	(49) METHYL ISOBUTYL KETONE	100
(26) CHLOROFORM	5	(50) STYRENE	10
(27) CHLORODIBROMOMETHANE	5	(51) 1,1,1,2-TETRACHLOROETHANE	5
(28) DBCP	25	(52) 1,1,2,2-TETRACHLOROETHANE	5
(29) ETHYLENE DIBROMIDE	5	(53) TETRACHLOROETHYLENE	5
(30) O-DICHLOROBENZENE	5	(54) TOLUENE	5
(31) P-DICHLOROBENZENE	5	(55) 1,1,1,-TRICHLOROETHANE	5
(32) T-1,4-DICHLORO-2-BUTENE	100	(56) 1,1,2-TRICHLOROETHANE	5
(33) 1,1-DICHLOROETHANE	5	(57) TRICHLOROETHYLENE	5
(34) ETHYLENE DICHLORIDE	5	(58) CFC-11	5
(35) VINYLIDENE CHLORIDE	5	(59) 1,2,3-TRICHLOROPROPANE	15
(36) CIS-1,2-DICHLOROETHENE	5	(60) VINYL ACETATE	50
(37) T-1,2-DICHLOROETHENE	5	(61) VINYL CHLORIDE	10
(38) PROPYLENE DICHLORIDE	5	(62) XYLENES	5
(39) CIS-1,3-DICHLOROPROPENE	10		

ALSO KNOWN AS: (21)-TRIBROMOMETHANE, (25)-ETHYL CHLORIDE, (26)-TRICHLOROMETHANE, (27)-DIBROMOCHLOROMETHANE, (28)-1,2-DIBROMO-3-CHLOROPROPANE, (29)-1,2-DIBROMOETHANE, (30)-1,2-DICHLOROBENZENE, (31)-1,4-DICHLOROBENZENE, (33)-ETHYLIDENE CHLORIDE, (34)-1,2-DICHLOROETHANE, (35)-1,1-DICHLOROETHENE (ETHYLENE), (36)-CIS-1,2-DICHLOROETHYLENE, (37)-TRANS-1,2-DICHLOROETHYLENE, (38)-1,2-DICHLOROPROPANE, (42)-2-HEXANONE, (43)-BROMOMETHANE, (44)-CHLOROMETHANE, (45)-DIBROMOMETHANE, (46)-DICHLOROMETHANE, (47)-METHYL ETHYL KETONE, (48)-IODOMETHANE, (49)-4-METHYL-2-PENTANONE, (53)-TETRACHLOROETHENE, PERCHLOROETHYLENE, (55)-METHYLCHLOROFORM, (57)-TRICHLOROETHENE (58)-TRICHLOROFLUOROMETHANE

ABTCO
ABT BUILDING PRODUCTS CORPORATION
ABTco, Inc.
Siding Divison
P.O. Box 98 Highway 268
Roaring River, North Carolina 28669

December 30, 1996

Mr. Bob Lufty
Solid Waste Section
NC D.E.H.N.R.
PO BOX 27687
Raleigh, NC 27611-7687

Dear Mr. Lufty,

Please accept this letter as a response to your letter of November 18, 1996. All the items in your letter are addressed in this letter.

- Per our conversation, the large drawing submitted by Trigon was in error. The well locations are those on the other plans, maps and in the Solid Waste file.

- ABTco made an effort to obtain well boring logs for the landfill wells. However, conversations with Newman Brothers, Elkin NC, who installed the wells did not reveal these documents. Additional conversations with Larry Pierce of Newman Brothers who was the drill operator who actually installed these wells did reveal that these well were not in fractured bedrock, but were rather installed with the screened portion in dirt.

- The upstream well is not ideal but shall suffice for this evaluation.

- The next groundwater sampling event which will be scheduled in early 1997 will include the requested parameters in your letter. This sampling event will be scheduled in February and shall be coordinated with the Division to allow your attendance should the Division decide to send a representative. This sampling shall also be used as one of the annual routine sampling events required by the Division.

- You shall find enclosed the additional TCLP data you requested in your letter. The compounds for which the mandated detection limits were not met were reanalyzed for and the results are attached. None of the compounds which were analyzed for at the lower detection limits were detected in this analysis.

We feel confident that the landfill has not presented any threat to the environment and as such we feel that it should be allowed to operate in a manner consistent with historical practices beyond the December 31, 1997 statutory closure date. If you have any questions or require any further information, please do not hesitate to contact me at my office.

Sincerely,

Erich Burke, P.E.
Environmental Engineer

Enclosure

cc: Hugh Browder
Mike Blosser

HYDROLOGIC, INC.

December 5, 1996

REPORTING:

Hydrologic-Asheville, Inc
122 Lyman Street
Asheville, NC 28801

INVOICING:

Hydrologic-Asheville, Inc
122 Lyman Street
Asheville, NC 28801

PROJECT NUMBER: FL9619039

DATE COMPLETED: December 5, 1996
DATE RECEIVED: November 29, 1996

PROJECT DESCRIPTION:

ABT Co.--1 sample received and analyzed for the following: TCLP-8080/8150.

Enclosed is the laboratory report for the project described above. If you have any questions or if we can be of further assistance, please feel free to **contact Jack Hale Jr. at 1-800-728-2251.** We appreciate your business and look forward to serving you again soon.

Respectfully,

Walter Hogg
QA/QC Officer

HYDROLOGIC, INC.

COMPANY NAME: Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER: ABT Co.

HYDROLOGIC PROJECT NUMBER: FL9619039
HYDROLOGIC SAMPLE NUMBER: 9619039
HYDROLOGIC LAB ID #: 399
SAMPLE IDENTIFICATION: ABTco Ash
DATE SAMPLED: 11/21/96
DATE EXTRACTED: 12/02/96
DATE/TIME ANALYZED: 12/04/96

METHOD TCLP 8080

ANALYSIS	CAS NO.	SDL (mg/l)	RESULT (mg/l)
Heptachlor	76-44-8	0.0005	BDL
Endrin	72-20-8	0.001	BDL
Chlordane	57-74-9	0.003	BDL
Toxaphene	8001-35-2	0.01	BDL
Methoxychlor	72-43-5	0.005	BDL
Lindane	58-89-9	0.0005	BDL
Surrogate Recovery:			
DBC			102%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

1491 TWILIGHT TRAIL FRANKFORT, KY 40601
502-223-0251 FAX 502-875-8016 / TOLL FREE 800-726-2251

HYDROLOGIC, INC.

COMPANY NAME:	Hydrologic-Asheville, Inc
COMPANY PROJECT NUMBER:	ABT Co.
HYDROLOGIC PROJECT NUMBER:	FL9619039
HYDROLOGIC SAMPLE NUMBER:	9619039
HYDROLOGIC LAB ID #:	399
SAMPLE IDENTIFICATION:	ABTco Ash
DATE SAMPLED:	11/21/96
DATE EXTRACTED:	12/01/96
DATE/TIME ANALYZED:	12/04/96

METHOD TCLP 8270

ANALYSIS	CAS NO.	SDL (mg/kg)	RESULT (mg/kg)
2,4-Dinitrotoluene	121-14-2	0.013	BDL
Hexachlorobenzene	118-74-1	0.013	BDL
Surrogate Recovery:			
2-Fluorobiphenyl			102%
Nitrobenzene-d5			114%
4-Terphenyl-D14			82%
2-Fluorophenol			58%
Phenol-D5			48%
2,4,6-Tribromophenol			72%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

APPENDIX VII

Summaries of Historical Groundwater Monitoring Well Data

TABLE VII - 1
Summary of Recent Historical Data
ABTco Industrial Landfill

Parameter	NC 2L Standard	Date	Concentration (mg/L) FA-1	Concentration (mg/L) FA-2
Arsenic	0.05	4/9 - 10/95	ND	ND
		Apr-96	0.004	< 0.003
		Oct-96	< 0.003	< 0.003
		Feb-97	< 0.003	< 0.003
		Aug-97	0.48	0.504
Barium	2	4/9 - 10/95	ND - 3.740	ND - 0.110
		Apr-96	0.392	0.089
		Oct-96	0.110	0.064
		Feb-97	0.093	0.080
		Aug-97	0.920	1.782
Beryllium	(0.002)	4/9 - 10/95	0.001	ND
		Feb-97	< 0.001	< 0.001
BOD	NE	4/9 - 10/95	ND - 69	ND - 16
		Apr-96	2	3.9
		Oct-96	30	6.3
		Feb-97	-	-
		Aug-97	< 2	< 2
Cadmium	0.005	4/9 - 10/95	ND - 0.017	ND - 0.013
		Apr-96	0.011	< 0.001
		Feb-97	0.002	< 0.001
Chemical Oxygen Demand	NE	4/9 - 10/95	ND - 75	ND - 55
		Apr-96	< 10	< 10
		Oct-96	126	21
		Feb-97	-	-
		Aug-97	42	<10
Chloride	250	4/9 - 10/95	ND - 69	6.56 - 14
		Apr-96	2.2	12
		Oct-96	1.7	10.1
		Feb-97	-	-
		Aug-97	1.7	14
Chromium	0.05	4/9 - 10/95	ND - 0.283	ND - 0.012
		Apr-96	0.233	0.011
		Oct-96	0.020	< 0.005
		Feb-97	0.011	< 0.005
		Aug-97	0.057	0.180

TABLE VII - 1
Summary of Recent Historical Data
ABTco Industrial Landfill

Parameter	NC 2L Standard	Date	Concentration (mg/L) FA-1	FA-2
Cobalt	(0.002)	4/9 - 10/95	ND - 0.109	ND
		Oct-96	0.007	< 0.005
		Aug-97	0.044	< 0.005
Conductivity	NE	Apr-96	164	398
		Oct-96	334	362
		Feb-97	418	400
		Aug-97	137	386
Copper	1	4/9 - 10/95	ND - 0.184	ND - 0.032
		Apr-96	0.238	< 0.005
		Feb-97	0.015	< 0.005
		Oct-96	0.026	< 0.005
Flouride	2	4/9 - 10/95	ND - 0.63	ND - 0.10
		Apr-96	< 0.10	< 0.10
		Oct-96	< 0.10	< 0.10
		Feb-97	-	-
		Aug-97	0.09	0.06
Iron	0.3	4/9 - 10/95	0.488 - 154.3	0.025 - 4.19
		Apr-96	113.486	0.241
		Oct-96	13.838	0.391
		Aug-97	69.400	0.140
Lead	0.015	4/9 - 10/95	ND - 0.017	ND - 0.121
		Apr-96	0.16	< 0.010
		Oct-96	< 0.01	< 0.010
		Feb-97	< 0.01	< 0.01
		Aug-97	< 0.01	< 0.01
Magnesium	NE	Apr-96	25.005	19.574
Maganese	0.05	4/9 - 10/95	0.101 - 10.85	ND - 0.260
		Oct-96	0.17	< 0.010
		Aug-97	0.22	0.45
Mercury	0.0011	4/9 - 10/95	ND - 0.0029	ND
		Apr-96	0.0002	< 0.0002
		Oct-96	< 0.0002	< 0.0002
		Feb-97	0.0002	0.0002
		Aug-97	< 0.0005	< 0.0005
Nickel	0.1	Feb-97	0.006	0.008

TABLE VII - 1
Summary of Recent Historical Data
ABTco Industrial Landfill

Parameter	NC 2L Standard	Date	Concentration (mg/L) FA-1	Concentration (mg/L) FA-2
Nitrate, Nitrogen	10	4/9 - 10/95	0.194 - 0.865	0.460 - 13
		Apr-96	0.37	4.13
pH	6.5 - 8.5	Apr-96	5.60	5.88
		Oct-96	5.80	5.54
		Feb-97	5.97	5.75
		Aug-97	5.36	5.71
Selenium	0.05	4/9 - 10/95	ND	ND
		Apr-96	< 0.003	< 0.003
		Oct-96	< 0.003	< 0.003
		Feb-97	< 0.003	< 0.003
		Aug-97	< 0.025	< 0.025
Silver	0.018	4/9 - 10/95	ND - 0.016	ND - 0.345
		Apr-96	< 0.001	< 0.001
		Oct-96	< 0.001	< 0.001
		Feb-97	< 0.001	< 0.001
		Aug-97	< 0.001	< 0.001
Sulfate	250	4/9 - 10/95	ND - 27.0	ND - 110.2
		Apr-96	34.2	89.4
		Oct-96	28.5	69.5
		Feb-97	49.9	86.2
		Aug-97	19.7	104.3
Total Dissoved Solids	NE	4/9 - 10/95	24 - 224	80 - 280
		Apr-96	121	215
		Oct-96	3	203
		Feb-97	283	261
		Aug-97	86.5	245
Total Organic Carbon	NE	4/9 - 10/95	ND - 6.1	ND - 18.2
		Apr-96	3.3	< 1.0
		Oct-96	3.6	4.3
		Aug-97	4.0	2.0
Total Organic Halides	NE	4/9 - 10/95	ND - 0.490	ND - 27
		Apr-96	0.100	0.055
		Oct-96	< 0.005	< 0.005
		Aug-97	< 0.005	0.020

TABLE VII - 1
Summary of Recent Historical Data
ABTco Industrial Landfill

Parameter	NC 2L Standard	Date	Concentration (mg/L) FA-1	Concentration (mg/L) FA-2
Total Solids	NE	4/9 - 10/95	57.5 - 4,078	83.7 - 1,105
		Apr-96	772.9	252.2
		Oct-96	1052.9	206
		Feb-97	52	9
		Aug-97	463.5	23
Total Suspended Solids	NE	4/9 - 10/95	453	9.5
		Apr-96	556	8
Zinc	2.1	4/9 - 10/95	ND - 0.215	ND - 0.084
		Apr-96	0.212	0.115
		Oct-96	0.011	< 0.010
		Feb-97	0.066	0.039
		Aug-97	0.160	0.080

Notes:

1. 2L Standard = Groundwater quality standard established under 15A NCAC 2L
2. 2L standards listed in parentheses are proposed standards that are not yet adopted.
3. NE = Not established
4. All concentrations are in milligrams per liter (mg/L)
5. Twelve sampling events were performed between April 1990 and October 1995. Not all parameters were sampled at each event. The data is summarized from a table presented by Trigon Engineering Consultants, Inc. in a May 1996 report. The summary table from Trigon is provided in this appendix.
6. FA-1 is the upgradient groundwater monitoring well.
7. FA-2 is the downgradient groundwater monitoring well.
8. ND = Not detectected at the laboratory's reporting limit, which was not available.
9. < = Not detected at or above the listed concentration.
10. - = Not sampled

GROUNDWATER MONITORING WELL RESULTS (mg/ℓ) - FA2

ANALYSIS	NCAC 15A 2L	10/95	05/95	10-11/94	04/94	10/93	04/93	04-05/92	06/91	04/90	08/90	04/89	04/88
BOD		12	0.9	5.4	ND	8.0	16	1.7	2.7	4.7	ND	2.4	7.9
TSS			9.5										
TS		270		250	230	200	280%	290	242	1,105			83.7
TDS	500.0	270	255.0	210	210	280	258	170	134	237	138	80	
Chloride	250.0	11.1	13.4	14	14	12	12	13	12	8.17	11.3	7.8	6.56
COD		<1.0	<2	55	ND	39	ND	ND	ND	ND	ND	4.0	19.9
TOC		1.1	<1.0	3	ND	11	18.2	1.2	3.2	3.09	ND	0.39	1.72
Fluoride	2.0	<0.50	<0.5	ND	ND	ND	ND	ND	ND	0.10	ND	<0.100	<0.100
Nitrogen, Nitrate	10.0						13	3.2	6.58	1.07	1.80	0.965	0.460
Sulfate	250.0	96.8	110.2	100	100	82	75	70	43	12.0	18.5	1.4	<1.0
Arsenic, Total	0.05	<0.005	<0.005	ND	ND	ND	ND	ND	ND	ND	ND	<0.005	<0.010
Mercury, Total	0.0011	<0.0002	<0.0002	ND	ND	ND	ND	ND	ND	ND	ND	<0.0002	<0.0005
Selenium, Total	0.05	<0.005	<0.005	ND	ND	ND	ND	ND	ND	ND	ND	<0.005	<0.005
TOX		0.38 (MG/L)	0.130 (MG/L)	ND	ND	0.064	0.004	0.014	0.007	27	ND	0.018	0.022
Silver, Total	0.18	<0.001	<0.001	ND	ND	ND	0.345	ND	ND	ND	ND	<0.010	<0.010
Barium, Total	2.0	0.073		0.074	0.072	0.110	0.079	0.067	0.078	0.084	ND	0.072	<0.050
Cadmium, Total	0.005				ND		ND	ND	0.013	0.012	ND	0.013	<0.005
Chromium, Total	0.05	<0.005	<0.005	ND	ND	ND	ND	ND	0.011	0.012	ND	<0.010	<0.010
Copper, Total	1.0	0.005	<0.005	ND	ND	ND	ND	0.018	0.032	0.024	ND	0.010	<0.010
Iron, Total	0.3	0.025	0.048	0.100	0.223	0.471	0.112	0.870	4.19	1.29	0.06	0.910	0.291
Lead, Total	0.015	<0.010	0.010	ND	0.121	ND	ND	0.007	ND	ND	ND	<0.005	0.082
Manganese, Total	0.05	<0.010	<0.010	ND	ND	0.020	ND	0.022	0.122	0.044	ND	0.260	0.126
Zinc, Total	2.1	0.010	0.010	ND	0.027	0.057	0.036	0.056	0.084	0.058	ND	0.041	0.040
Cobalt, Total		<0.005	<0.005	ND		ND							
Beryllium, Total			<0.001										

BOD - Biochemical Oxygen Demand
COD - Chemical Oxygen Demand
ND - Not detected at or above the method detection limit
TSS - Total Suspended Solids
TOC - Total Organic Carbon
TS - Total Solids
TOX - Total Organic Halides
TSD - Total Dissolved Solids
mg/ℓ - milligrams per liter

Source: Status of ABTco, Inc. Industrial Landfill, Permit No. 97, Trigon Engineering Consultants, Inc. May 24, 1996

Note: *Wells were installed in November 1989. Sampling Date was probably April 1990.

GROUNDWATER MONITORING WELL RESULTS (mg/ℓ) - FA1

ANALYSIS	NCAC 15A 2L	10/95	05/95	10-11/94	04/94	10/93	04/93	04-05/92	06/91	04/90	08/90	04/89*	04/88*
BOD		3	1.4	ND	2.4	13	69	ND	3.0	3.3	ND	1.0	7.6
TSS			453.0										
TS		4,078		540	710	240	160%	1,000	874	263			57.5
TDS	500.0	89	99.0	48	100	62	102	36	24.0	224	96	60	
Chloride	250.0	2.0	3.4	4.9	2.4	2.0	1.9	1.9	2.9	2.40	1.9	<5.0	<5.0
COD		<10	<2	10	75	15	ND	ND	19	ND	ND	8.0	49.0
TOC		2.3	1.4	ND	2	4.5	6.1	1.8	5.5	1.70	ND	0.52	1.71
Fluoride	2.0	<0.50	<0.5	ND	ND	ND	ND	0.63	ND	0.17	ND	<0.100	<0.100
Nitrogen, Nitrate	10.0						0.41	0.64	0.865	0.839	0.481	0.793	0.194
Sulfate	250.0	7.0	19.9	ND	25	5.0	24	2.0	7.0	27.0	6	<1.0	<1.0
Arsenic, Total	0.05	<0.005	<0.005	ND	ND	ND	ND	ND	ND	ND	ND	<0.010	<0.010
Mercury, Total	0.0011	<0.0002	<0.0002	ND	ND	ND	ND	ND	0.0029	ND	ND	<0.0002	<0.0005
Selenium, Total	0.05	<0.005	<0.005	ND	ND	ND	ND	ND	ND	ND	ND	<0.005	<0.005
TOX		0.294 (MG/L)	0.490 (MG/L)	ND	ND	0.043	0.082	0.017	0.018	ND	0.019	<0.005	0.091
Silver, Total	0.18	<0.001	<0.001	ND	ND	ND	0.016	ND	ND	ND	ND	<0.010	<0.010
Barium, Total	2.0	0.644		0.113	0.123	0.081	0.077	0.436	0.252	0.359	ND	3,740	0.487
Cadmium, Total	0.005				ND		ND	0.0048	0.011	0.017	ND	<0.010	<0.005
Chromium, Total	0.05	0.283	0.106	0.024	ND	0.010	0.018	0.039	0.103	0.112	ND	<0.010	0.010
Copper, Total	1.0	<0.005	0.104	0.037	0.015	0.015	0.014	0.090	0.161	0.168	0.015	0.184	0.036
Iron, Total	0.3	154.3	53.151	12	3.25	4.25	7.4	23.7	5.37	63.4	3.97	0.488	2.26
Lead, Total	0.015	<0.010	0.011	ND	ND	ND	ND	0.017	ND	ND	ND	0.007	0.017
Manganese, Total	0.05	2.056	0.949	0.354	0.373	0.122	0.116	0.738	1.07	2.61	0.101	10.85	0.812
Zinc, Total	2.1	0.180	0.061	0.042	0.064	0.067	0.039	0.136	0.168	0.163	ND	0.215	0.058
Cobalt, Total		0.109	0.045	ND		ND							
Beryllium, Total			0.001										

OD - Biochemical Oxygen Demand
OD - Chemical Oxygen Demand
D - Not detected at or above the method detection limit
TSS - Total Suspended Solids
TOC - Total Organic Carbon
TS - Total Solids
TOX - Total Organic Halides
TSD - Total Dissolved Solids
mg/ℓ - milligrams per liter

Source: Status of ABTco, Inc. Industrial Landfill, Permit No. 97, Trigon Engineering Consultants, Inc. May 24, 1996

Note: *Wells were installed in November 1989. Sampling Date was probably April 1990.

Appendix VIII

Results of TLCP Analysis on Ash

TABLE VIII - 1
Summary of TCLP Results on ABTco, Inc. Wood Ash

PARAMETER	2L STANDARD (mg/L)	CONCENTRATION (mg/L)					
		Jun-91		Apr-96		Nov-97	
		DL	Ash Leachate	DL	Ash Leachate	DL	Ash Leachate
Antimony	(0.006)	0.100	ND	-	-	0.04	0.06
Arsenic	0.05	0.005	0.015	0.003	ND	0.005	ND
Barium	2.0	0.010	5.1	0.005	7.917	1.0	24
Beryllium	(0.002)	0.010	ND	-	-	0.002	0.002
Cadmium	0.005	0.010	ND	0.001	0.004	0.0005	0.0017
Chloride	250	-	-	-	-	1	1600
Chromium	0.05	0.010	0.018	0.005	0.015	0.01	0.01
Cobalt	(0.002)	-	-	-	-	0.01	0.04
Copper	1.0	0.010	ND	-	-	0.01	0.02
Cyanide	0.15	-	-	-	-	0.02	0.020
Fluoride	2.0	-	-	-	-	0.1	9.6
Iron	0.3	-	-	-	-	0.01	0.06
Lead	0.015	0.100	ND	0.01	ND	0.001	0.003
Manganese	0.05	0.010	4.94	-	-	0.01	ND
Mercury	0.0011	-	-	0.0002	0.0003	0.0002	ND
Nickel	0.1	0.020	0.053	-	-	0.02	0.04
Nitrate	10	-	-	-	-	0.01	ND
Nitrite	1.0	-	-	-	-	0.05	0.53
Selenium	0.05	0.005	ND	0.003	ND	0.005	ND
Silver	0.018	0.010	ND	0.001	ND	0.01	0.03
Sulfate	250	-	-	-	-	1	7.7
Thallium	(0.0002)	0.100	ND	-	-	0.002	ND
Vanadium	(0.025)	-	-	-	-	0.016	0.085
Zinc	2.1	0.010	0.094	-	-	0.05	ND

TABLE VIII - 1
Summary of TCLP Results on ABTco, Inc. Wood Ash

Notes:
1. 2L Standard = Groundwater quality standard established under 15A NCAC 2L
2. 2L standards listed in parentheses are proposed standards that are not yet adopted.
3. All concentrations are in milligrams per liter (mg/L)
4. DL = Laboratory detection limit
5. ND = Not detected at the laboratory's reporting limit
6. - = Not sampled

EnviroTech Mid-Atlantic Laboratories

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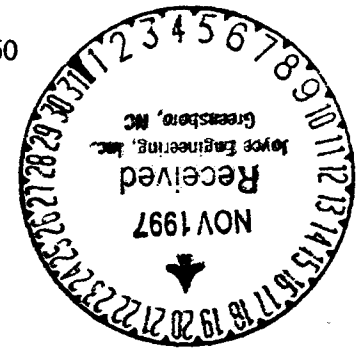

November 18, 1997

Client Contact

Attn.: Nancy Marshall
Fax No.: 910-230-1998

Report Information

ETMA Project #: 16660
Date ETMA Rec'd: 11/7/97

Client Information

Name: Joyce Engineering, Inc.
Address: 436 Spring Garden Street
Greensboro, NC 27401

Sample Information

Client Project: Industrial Landfill Wilkes Co.
Client Project #: -
P.O. #: -

Sample Identification

Sample submitted and identified by client:

Sample	Field Identification	Matrix	Date	Time Collected
16660A	ash	Other	-	-

All analyses were performed in accordance with EPA methods referenced in Code of Federal Regulations, Section 40 Part 136, "Methods for Chemical Analysis of Water and Wastes", EPA 600/4-79 revised March 1983 and/or "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition.

Client Project: Industrial Landfill Wilkes Co.
Client Project #: -
P.O. #: -

Analysis	LOQ	16660A *ash*
TCLP Metals (mg/L)		
Antimony (Sb)	**0.04**	0.060
Arsenic (As)	**0.005**	BLQ
Barium (Ba)	**1.0**	24
Beryllium (Be)	**0.002**	0.002
Cadmium (Cd)	**0.0005**	0.0017
Chromium (Cr)	**0.01**	0.01
Cobalt (Co)	**0.01**	0.04
Copper (Cu)	**0.01**	0.02
Iron (Fe)	**0.01**	0.06
Lead (Pb)	**0.001**	0.003
Manganese (Mn)	**0.01**	BLQ
Mercury (Hg)	**0.0002**	BLQ
Nickel (Ni)	**0.02**	0.04
Selenium (Se)	**0.005**	BLQ
Silver (Ag)	**0.01**	0.03
Thallium (Tl)	**0.002**	BLQ
Vanadium (V)	**0.016**	0.085
Zinc (Zn)	**0.05**	BLQ
TCLP Chloride (mg/L)	**1.0**	1600
TCLP Cyanide (mg/L)	**0.02**	0.020
TCLP Fluoride (mg/L)	**0.1**	9.6
TCLP Nitrate (mg/L)	**0.01**	BLQ
TCLP Nitrite (mg/L)	**0.05**	0.53
TCLP Sulfate (mg/L)	**1.0**	7.7
TCLP Extraction		
Initial pH	-	10.91
Extraction Fluid #	-	2
Extraction Started (Date)	-	11/12/97
Extraction Started (Time)	-	2:55pm
Extraction Ended (Date)	-	11/13/97
Extraction Ended (Time)	-	9:05a
Final pH	-	11.73

***Note:** These analyses not yet complete.*

Client Project: Industrial Landfill Wilkes Co.
Client Project #: -
P.O. #: -

Quality Control Data

Analysis	%STD	%Spike	%RD	Method #	Analyst	Date Analyzed
TCLP Metals						
Antimony (Sb)	101	89	4.8	7041	J. Reid	11/18/97
Arsenic (As)	106	100	15	7060A	J. Reid	11/17/97
Barium (Ba)	101	79	8.0	6010A	A. Stancil	11/17/97
Beryllium (Be)	100	84	<1.0	6010A	A. Stancil	11/17/97
Cadmium (Cd)	90	108	<1.0	7131A	J. Reid	11/18/97
Chromium (Cr)	100	85	2.3	6010A	A. Stancil	11/17/97
Cobalt (Co)	104	103	12	6010A	A. Stancil	11/17/97
Copper (Cu)	99	92	1.2	6010A	J. Reid	11/18/97
Iron (Fe)	103	87	6.7	6010A	A. Stancil	11/17/97
Lead (Pb)	104	89	7.2	7421	J. Reid	11/18/97
Manganese (Mn)	102	101	<1.0	6010A	A. Stancil	11/17/97
Mercury (Hg)	99	105	6.0	7470A	J. Reid	11/18/97
Nickel (Ni)	105	91	13	6010A	A. Stancil	11/17/97
Selenium (Se)	93	106	2.8	7740	J. Reid	11/17/97
Silver (Ag)	90	80	2.2	6010A	A. Stancil	11/17/97
Thallium (Tl)	107	91	15	8741	J. Reid	11/18/97
Vanadium (V)	106	112	1.3	7911	J. Reid	11/18/97
Zinc (Zn)	104	90	3.9	6010A	A. Stancil	11/17/97
TCLP Chloride	101	110	<1.0	9252A	J. Kantrovich	11/17/97
TCLP Cyanide	111	82	<1.0	9010A	A. Beckman	11/13/97
TCLP Fluoride	92	87	<1.0	9214	J. Kantrovich	11/17/97
TCLP Nitrate	94	24	8.0	353.3	J. Kantrovich	11/18/97
TCLP Nitrite	105	38	5.0	354.1	J. Kantrovich	11/13/97
TCLP Sulfate	104	133	4.0	9038	J. Kantrovich	11/17/97
TCLP Extraction	-	-	-	1311	A. Stancil	11/12-13/97

**Note: These anaylses not yet complete.*

C. Brian Kidd
Laboratory Director

Reviewed By

EnviroTech Mid-Atlantic

1861 Pratt Drive, Blacksburg, VA 24060
Phone (540) 231-3983 Fax (540) 231-3984
WWW.ETMALAB.COM

Chain of Custody and Analysis Request

Important!
Please See Reverse Side For Instructions

- ☐ 10 Working Days (Standard)
- ☐ 5 Working Days (Rush)
- ☐ 24 - 48 Hour (Rush)

Billing Client: ABTCo Inc. / Joyce

Project Name/Number: Industrial Landfill Wilkes Co Due 11/14/97

Address:

Project Manager (please print):

Sampler Name (please print):

City: State: Zip:

Phone: Fax:

Purchase Order: Quotation Number:

Requested Analysis

Sample Description and/or Location	Sample Information: Grab	Comp	Date	Time	Matrix: Liquid	Soil	Other	ETMA Code	Number of Containers	Preservation Method: Nitric Acid	Hydrochloric Acid	Sulfuric Acid	Thiosulfate	Sodium Hydroxide	TCLP for Sb, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Ni, Se, Ag, Tl, V, Zn	TCLP Chloride	" Cyanide	" Fluoride	" Nitrate	" Nitrite	" Sulfate	Appearance
								16660 A							✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	

Sample Received Temp: (°C)

Sample Received pH: (pHU)

Special Remarks: all analyses are to be performed on TCLP extract

Relinquished by:	Date	Time	Relinquished by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date	Time	Received by:	Date	Time	Received in Lab:	Date	Time
						[signature]	11/7/97	1:00

Appendix IX

HELP Model

```
**********************************************************************
**********************************************************************
**                                                                  **
**                                                                  **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE        **
**                HELP MODEL VERSION 3.04   (10 APRIL 1995)         **
**                   DEVELOPED BY ENVIRONMENTAL LABORATORY          **
**                     USAE WATERWAYS EXPERIMENT STATION            **
**                FOR USEPA RISK REDUCTION ENGINEERING LABORATORY    **
**                                                                  **
**                                                                  **
**********************************************************************
**********************************************************************


PRECIPITATION DATA FILE:     C:\A-ENGINR\HELP3\ABTCO\AB-PR.D4
TEMPERATURE DATA FILE:       C:\A-ENGINR\HELP3\ABTCO\AB-TE.D7
SOLAR RADIATION DATA FILE:   C:\A-ENGINR\HELP3\ABTCO\AB-SR.D13
EVAPOTRANSPIRATION DATA:     C:\A-ENGINR\HELP3\ABTCO\AB-EV.D11
SOIL AND DESIGN DATA FILE:   C:\A-ENGINR\HELP3\ABTCO\AB-SDD3.D10
OUTPUT DATA FILE:            C:\A-ENGINR\HELP3\ABTCO\AB-OUT3.OUT


TIME:  12:43     DATE:  11/21/1997


**********************************************************************

     TITLE:  ABT CORPORATION CLOSURE PLAN (50-50)

**********************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                LAYER  1
                                --------

                    TYPE 1 - VERTICAL PERCOLATION LAYER
                        MATERIAL TEXTURE NUMBER  22
          THICKNESS                     =     12.00   INCHES
          POROSITY                      =      0.4190 VOL/VOL
          FIELD CAPACITY                =      0.3070 VOL/VOL
          WILTING POINT                 =      0.1800 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.2932 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.189999992000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  1.80
                FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                LAYER  2
                                --------

                    TYPE 3 - BARRIER SOIL LINER
                        MATERIAL TEXTURE NUMBER  55
          THICKNESS                     =     12.00   INCHES
          POROSITY                      =      0.4270 VOL/VOL
          FIELD CAPACITY                =      0.4180 VOL/VOL
          WILTING POINT                 =      0.3670 VOL/VOL
          INITIAL SOIL WATER CONTENT    =      0.4270 VOL/VOL
          EFFECTIVE SAT. HYD. COND.     =  0.339999997000E-05 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	79.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.519	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.028	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.160	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	8.643	INCHES
TOTAL INITIAL WATER	=	8.643	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
GREENSBORO NORTH CAROLINA

STATION LATITUDE	=	35.13	DEGREES
MAXIMUM LEAF AREA INDEX	=	1.00	
START OF GROWING SEASON (JULIAN DATE)	=	90	
END OF GROWING SEASON (JULIAN DATE)	=	305	
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	7.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	70.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.55	3.43	3.69	2.91	3.67	3.66
4.38	4.44	3.29	2.73	2.87	3.14

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR GREENSBORO NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
37.50	39.90	48.00	58.30	66.50	73.50
77.20	76.30	69.90	58.40	48.50	40.20

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR GREENSBORO NORTH CAROLINA
AND STATION LATITUDE = 35.13 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT

PRECIPITATION	39.15	142114.484	100.00
RUNOFF	1.421	5156.655	3.63
EVAPOTRANSPIRATION	31.809	115465.734	81.25
PERC./LEAKAGE THROUGH LAYER 2	5.924588	21506.256	15.13
AVG. HEAD ON TOP OF LAYER 2	0.3591		
CHANGE IN WATER STORAGE	-0.004	-14.159	-0.01
SOIL WATER AT START OF YEAR	8.643	31373.770	
SOIL WATER AT END OF YEAR	8.639	31359.611	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.009	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.90	162986.984	100.00
RUNOFF	4.069	14770.103	9.06
EVAPOTRANSPIRATION	31.046	112698.008	69.15
PERC./LEAKAGE THROUGH LAYER 2	10.029665	36407.684	22.34
AVG. HEAD ON TOP OF LAYER 2	0.6314		
CHANGE IN WATER STORAGE	-0.245	-888.758	-0.55
SOIL WATER AT START OF YEAR	8.639	31359.611	
SOIL WATER AT END OF YEAR	8.394	30470.854	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.048	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	61.74	224116.172	100.00
RUNOFF	14.756	53565.641	23.90
EVAPOTRANSPIRATION	32.809	119095.375	53.14
PERC./LEAKAGE THROUGH LAYER 2	14.150573	51366.578	22.92
AVG. HEAD ON TOP OF LAYER 2	1.0080		

CHANGE IN WATER STORAGE	0.024	88.616	0.04
SOIL WATER AT START OF YEAR	8.394	30470.854	
SOIL WATER AT END OF YEAR	8.419	30559.471	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.031	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	38.86	141061.766	100.00
RUNOFF	2.984	10831.436	7.68
EVAPOTRANSPIRATION	30.403	110361.406	78.24
PERC./LEAKAGE THROUGH LAYER 2	5.353087	19431.707	13.78
AVG. HEAD ON TOP OF LAYER 2	0.2191		
CHANGE IN WATER STORAGE	0.120	437.254	0.31
SOIL WATER AT START OF YEAR	8.419	30559.471	
SOIL WATER AT END OF YEAR	8.539	30996.725	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.045	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.67	144002.109	100.00
RUNOFF	2.156	7825.121	5.43
EVAPOTRANSPIRATION	30.884	112110.344	77.85
PERC./LEAKAGE THROUGH LAYER 2	6.058756	21993.285	15.27
AVG. HEAD ON TOP OF LAYER 2	0.2302		
CHANGE IN WATER STORAGE	0.571	2073.340	1.44
SOIL WATER AT START OF YEAR	8.539	30996.725	
SOIL WATER AT END OF YEAR	9.110	33070.062	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	0.019	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.27	2.81	4.37	2.63	3.53	5.42
	4.57	6.26	2.81	3.77	2.52	2.90
STD. DEVIATIONS	2.95	0.95	1.30	1.89	2.64	1.99
	2.29	5.93	1.69	2.69	1.66	1.28
RUNOFF						
TOTALS	0.638	0.048	0.383	0.034	0.290	0.354
	0.396	1.335	0.686	0.489	0.073	0.350
STD. DEVIATIONS	1.290	0.088	0.434	0.077	0.648	0.416
	0.279	2.812	1.101	0.858	0.101	0.416
EVAPOTRANSPIRATION						
TOTALS	1.473	1.890	2.767	3.020	3.120	4.004
	4.140	3.410	2.629	2.202	1.504	1.230
STD. DEVIATIONS	0.157	0.182	0.192	0.967	1.588	1.158
	1.719	1.379	1.359	0.790	0.806	0.170
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.9273	0.9411	0.9384	0.4545	0.3955	0.6500
	0.2724	0.9006	0.3214	0.7668	0.6857	1.0495
STD. DEVIATIONS	1.1450	0.8951	0.5553	0.6727	0.7873	0.9007
	0.4462	1.3663	0.5471	1.1272	0.6650	1.0259

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2						
AVERAGES	0.8322	0.6816	0.5693	0.1010	0.3841	0.5394
	0.1442	0.7666	0.2797	0.6215	0.2361	0.7189
STD. DEVIATIONS	1.2751	0.6890	0.5504	0.1910	0.8466	0.7588
	0.3051	1.6196	0.6194	0.9486	0.3402	0.7501

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.86 (9.753)	162856.3	100.00
RUNOFF	5.077 (5.4998)	18429.79	11.317

EVAPOTRANSPIRATION	31.390	(0.9403)	113946.17	69.967
PERCOLATION/LEAKAGE THROUGH LAYER 2	8.30333	(3.76068)	30141.104	18.50779
AVERAGE HEAD ON TOP OF LAYER 2	0.490	(0.334)		
CHANGE IN WATER STORAGE	0.093	(0.2990)	339.26	0.208

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	5.22	18948.600
RUNOFF	3.924	14245.2090
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.227191	824.70453
AVERAGE HEAD ON TOP OF LAYER 2	11.573	
SNOW WATER	2.09	7587.2231

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4190
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1800

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	3.9863	0.3322
2	5.1240	0.4270
SNOW WATER	0.000	

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**                                                                              **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                   **
**                HELP MODEL VERSION 3.04   (10 APRIL 1995)                     **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                       **
**                    USAE WATERWAYS EXPERIMENT STATION                         **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                  **
**                                                                              **
**                                                                              **
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PRECIPITATION DATA FILE:     C:\A-ENGINR\HELP3\ABTCO\AB-PR.D4
TEMPERATURE DATA FILE:       C:\A-ENGINR\HELP3\ABTCO\AB-TE.D7
SOLAR RADIATION DATA FILE:   C:\A-ENGINR\HELP3\ABTCO\AB-SR.D13
EVAPOTRANSPIRATION DATA:     C:\A-ENGINR\HELP3\ABTCO\AB-EV.D11
SOIL AND DESIGN DATA FILE:   C:\A-ENGINR\HELP3\ABTCO\AB-SDD3P.D10
OUTPUT DATA FILE:            C:\A-ENGINR\HELP3\ABTCO\AB-OUT3P.OUT


TIME:  12:46     DATE:  11/21/1997


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     TITLE:  ABT CORPORATION CLOSURE PLAN (50-50) - (NO BARRIER)

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  22
          THICKNESS                    =     12.00   INCHES
          POROSITY                     =      0.4190 VOL/VOL
          FIELD CAPACITY               =      0.3070 VOL/VOL
          WILTING POINT                =      0.1800 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3168 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.189999992000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  1.80
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                  LAYER  2
                                  --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  55
          THICKNESS                    =     12.00   INCHES
          POROSITY                     =      0.4270 VOL/VOL
          FIELD CAPACITY               =      0.4180 VOL/VOL
          WILTING POINT                =      0.3670 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.4148 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.339999997000E-05 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	79.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	21.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	7.513	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	8.871	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	5.463	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	8.779	INCHES
TOTAL INITIAL WATER	=	8.779	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
GREENSBORO NORTH CAROLINA

STATION LATITUDE	=	35.13 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.00
START OF GROWING SEASON (JULIAN DATE)	=	90
END OF GROWING SEASON (JULIAN DATE)	=	305
EVAPORATIVE ZONE DEPTH	=	21.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	7.60 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	70.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.55	3.43	3.69	2.91	3.67	3.66
4.38	4.44	3.29	2.73	2.87	3.14

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR GREENSBORO NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
37.50	39.90	48.00	58.30	66.50	73.50
77.20	76.30	69.90	58.40	48.50	40.20

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR GREENSBORO NORTH CAROLINA
AND STATION LATITUDE = 35.13 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT

PRECIPITATION	39.15	142114.484	100.00
RUNOFF	1.583	5745.078	4.04
EVAPOTRANSPIRATION	33.129	120259.094	84.62
PERC./LEAKAGE THROUGH LAYER 2	4.434282	16096.444	11.33
CHANGE IN WATER STORAGE	0.004	13.854	0.01
SOIL WATER AT START OF YEAR	8.779	31867.213	
SOIL WATER AT END OF YEAR	8.783	31881.068	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.007	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.90	162986.984	100.00
RUNOFF	4.883	17726.320	10.88
EVAPOTRANSPIRATION	32.613	118383.930	72.63
PERC./LEAKAGE THROUGH LAYER 2	7.880370	28605.742	17.55
CHANGE IN WATER STORAGE	-0.476	-1728.994	-1.06
SOIL WATER AT START OF YEAR	8.783	31881.068	
SOIL WATER AT END OF YEAR	8.306	30152.074	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.003	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	61.74	224116.172	100.00
RUNOFF	17.056	61914.449	27.63
EVAPOTRANSPIRATION	33.402	121250.164	54.10
PERC./LEAKAGE THROUGH LAYER 2	11.308009	41048.074	18.32
CHANGE IN WATER STORAGE	-0.027	-96.509	-0.04
SOIL WATER AT START OF YEAR	8.306	30152.074	
SOIL WATER AT END OF YEAR	8.280	30055.564	

SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.003	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	38.86	141061.766	100.00
RUNOFF	3.151	11438.581	8.11
EVAPOTRANSPIRATION	30.768	111687.523	79.18
PERC./LEAKAGE THROUGH LAYER 2	4.537332	16470.516	11.68
CHANGE IN WATER STORAGE	0.404	1465.219	1.04
SOIL WATER AT START OF YEAR	8.280	30055.564	
SOIL WATER AT END OF YEAR	8.683	31520.783	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.074	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.67	144002.109	100.00
RUNOFF	2.403	8721.780	6.06
EVAPOTRANSPIRATION	32.456	117816.133	81.82
PERC./LEAKAGE THROUGH LAYER 2	4.347079	15779.897	10.96
CHANGE IN WATER STORAGE	0.464	1684.316	1.17
SOIL WATER AT START OF YEAR	8.683	31520.783	
SOIL WATER AT END OF YEAR	9.147	33205.102	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.016	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.27	2.81	4.37	2.63	3.53	5.42
	4.57	6.26	2.81	3.77	2.52	2.90
STD. DEVIATIONS	2.95	0.95	1.30	1.89	2.64	1.99
	2.29	5.93	1.69	2.69	1.66	1.28
RUNOFF						
TOTALS	0.754	0.127	0.416	0.044	0.378	0.397
	0.412	1.516	0.780	0.526	0.086	0.379
STD. DEVIATIONS	1.536	0.119	0.495	0.099	0.845	0.431
	0.279	3.239	1.305	0.942	0.119	0.436
EVAPOTRANSPIRATION						
TOTALS	1.468	1.889	2.816	3.171	3.365	4.052
	4.413	3.443	2.646	2.466	1.536	1.208
STD. DEVIATIONS	0.157	0.181	0.131	0.875	1.410	1.027
	1.407	1.372	1.264	0.585	0.515	0.172
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.8030	0.9270	0.9054	0.4257	0.2594	0.3146
	0.2050	0.4454	0.2866	0.5195	0.5492	0.8607
STD. DEVIATIONS	0.7299	1.0047	0.6010	0.5605	0.4147	0.5127
	0.2394	0.8835	0.4866	0.8107	0.4907	0.7126

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.86 (9.753)	162856.3	100.00
RUNOFF	5.815 (6.4009)	21109.24	12.962
EVAPOTRANSPIRATION	32.474 (1.0272)	117879.37	72.382
PERCOLATION/LEAKAGE THROUGH LAYER 2	6.50141 (3.07314)	23600.135	14.49139
CHANGE IN WATER STORAGE	0.074 (0.3803)	267.58	0.164

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	5.22	18948.600
RUNOFF	3.965	14392.0557
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.115652	419.81561
SNOW WATER	2.09	7587.2231

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4220

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.2601

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	4.0515	0.3376
2	5.0959	0.4247
SNOW WATER	0.000	

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**                                                                              **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                   **
**                HELP MODEL VERSION 3.04   (10 APRIL 1995)                     **
**                   DEVELOPED BY ENVIRONMENTAL LABORATORY                      **
**                     USAE WATERWAYS EXPERIMENT STATION                        **
**              FOR USEPA RISK REDUCTION ENGINEERING LABORATORY                 **
**                                                                              **
**                                                                              **
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PRECIPITATION DATA FILE:     C:\A-ENGINR\HELP3\ABTCO\AB-PR.D4
TEMPERATURE DATA FILE:       C:\A-ENGINR\HELP3\ABTCO\AB-TE.D7
SOLAR RADIATION DATA FILE:   C:\A-ENGINR\HELP3\ABTCO\AB-SR.D13
EVAPOTRANSPIRATION DATA:     C:\A-ENGINR\HELP3\ABTCO\AB-EV.D11
SOIL AND DESIGN DATA FILE:   C:\A-ENGINR\HELP3\ABTCO\AB-SDD4P.D10
OUTPUT DATA FILE:            C:\A-ENGINR\HELP3\ABTCO\AB-OUT4P.OUT


TIME:  12:56     DATE:  11/21/1997


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     TITLE:  ABT CORPORATION CLOSURE PLAN - STOCKPILE SOIL -(NO BARRIER)

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  22
          THICKNESS                    =     12.00   INCHES
          POROSITY                     =      0.4190 VOL/VOL
          FIELD CAPACITY               =      0.3070 VOL/VOL
          WILTING POINT                =      0.1800 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3073 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.189999992000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  1.80
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                  LAYER  2
                                  --------

                TYPE 1 - VERTICAL PERCOLATION LAYER
                    MATERIAL TEXTURE NUMBER  55
          THICKNESS                    =     12.00   INCHES
          POROSITY                     =      0.4270 VOL/VOL
          FIELD CAPACITY               =      0.4180 VOL/VOL
          WILTING POINT                =      0.3670 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.4033 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.559999989000E-05 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	79.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	21.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	7.289	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	8.871	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	5.463	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	8.526	INCHES
TOTAL INITIAL WATER	=	8.526	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
GREENSBORO NORTH CAROLINA

STATION LATITUDE	=	35.13 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.00
START OF GROWING SEASON (JULIAN DATE)	=	90
END OF GROWING SEASON (JULIAN DATE)	=	305
EVAPORATIVE ZONE DEPTH	=	21.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	7.60 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	70.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.55	3.43	3.69	2.91	3.67	3.66
4.38	4.44	3.29	2.73	2.87	3.14

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR GREENSBORO NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
37.50	39.90	48.00	58.30	66.50	73.50
77.20	76.30	69.90	58.40	48.50	40.20

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR GREENSBORO NORTH CAROLINA
AND STATION LATITUDE = 35.13 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT

PRECIPITATION	39.15	142114.484	100.00
RUNOFF	1.400	5080.526	3.57
EVAPOTRANSPIRATION	32.857	119272.289	83.93
PERC./LEAKAGE THROUGH LAYER 2	4.874873	17695.789	12.45
CHANGE IN WATER STORAGE	0.018	65.886	0.05
SOIL WATER AT START OF YEAR	8.526	30950.691	
SOIL WATER AT END OF YEAR	8.545	31016.578	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.014	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.90	162986.984	100.00
RUNOFF	4.151	15067.473	9.24
EVAPOTRANSPIRATION	32.434	117734.305	72.24
PERC./LEAKAGE THROUGH LAYER 2	8.624378	31306.492	19.21
CHANGE IN WATER STORAGE	-0.309	-1121.244	-0.69
SOIL WATER AT START OF YEAR	8.545	31016.578	
SOIL WATER AT END OF YEAR	8.236	29895.334	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.035	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	61.74	224116.172	100.00
RUNOFF	14.889	54046.543	24.12
EVAPOTRANSPIRATION	33.391	121210.547	54.08
PERC./LEAKAGE THROUGH LAYER 2	13.506679	49029.242	21.88
CHANGE IN WATER STORAGE	-0.047	-170.177	-0.08
SOIL WATER AT START OF YEAR	8.236	29895.334	
SOIL WATER AT END OF YEAR	8.189	29725.156	

SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.024	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	38.86	141061.766	100.00
RUNOFF	3.016	10948.350	7.76
EVAPOTRANSPIRATION	30.713	111486.406	79.03
PERC./LEAKAGE THROUGH LAYER 2	4.846498	17592.787	12.47
CHANGE IN WATER STORAGE	0.285	1034.269	0.73
SOIL WATER AT START OF YEAR	8.189	29725.156	
SOIL WATER AT END OF YEAR	8.474	30759.426	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.054	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.67	144002.109	100.00
RUNOFF	2.309	8382.435	5.82
EVAPOTRANSPIRATION	32.242	117039.695	81.28
PERC./LEAKAGE THROUGH LAYER 2	4.666763	16940.352	11.76
CHANGE IN WATER STORAGE	0.452	1639.609	1.14
SOIL WATER AT START OF YEAR	8.474	30759.426	
SOIL WATER AT END OF YEAR	8.925	32399.035	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.017	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.27	2.81	4.37	2.63	3.53	5.42
	4.57	6.26	2.81	3.77	2.52	2.90
STD. DEVIATIONS	2.95	0.95	1.30	1.89	2.64	1.99
	2.29	5.93	1.69	2.69	1.66	1.28
RUNOFF						
TOTALS	0.638	0.064	0.375	0.044	0.298	0.366
	0.413	1.370	0.672	0.483	0.086	0.344
STD. DEVIATIONS	1.306	0.109	0.415	0.099	0.667	0.410
	0.280	2.913	1.072	0.846	0.119	0.385
EVAPOTRANSPIRATION						
TOTALS	1.468	1.889	2.813	3.171	3.269	4.102
	4.343	3.449	2.636	2.459	1.520	1.210
STD. DEVIATIONS	0.155	0.181	0.131	0.876	1.478	1.061
	1.449	1.372	1.271	0.602	0.560	0.173
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.9119	0.9066	0.9358	0.4129	0.3593	0.4394
	0.1348	0.7009	0.3382	0.6004	0.5468	1.0169
STD. DEVIATIONS	1.0366	0.9432	0.6217	0.5659	0.6531	0.6575
	0.2567	1.4158	0.5756	0.9313	0.4739	0.8204

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES		CU. FEET	PERCENT
PRECIPITATION	44.86	(9.753)	162856.3	100.00
RUNOFF	5.153	(5.5347)	18705.06	11.486
EVAPOTRANSPIRATION	32.327	(1.0047)	117348.66	72.057
PERCOLATION/LEAKAGE THROUGH LAYER 2	7.30384	(3.84420)	26512.934	16.27996
CHANGE IN WATER STORAGE	0.080	(0.2964)	289.67	0.178

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	5.22	18948.600
RUNOFF	3.953	14351.0947
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.190485	691.46100
SNOW WATER	2.09	7587.2231

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4222

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.2601

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	3.9595	0.3300
2	4.9658	0.4138
SNOW WATER	0.000	

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**                                                                              **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                   **
**                HELP MODEL VERSION 3.04   (10 APRIL 1995)                     **
**                   DEVELOPED BY ENVIRONMENTAL LABORATORY                      **
**                     USAE WATERWAYS EXPERIMENT STATION                        **
**                FOR USEPA RISK REDUCTION ENGINEERING LABORATORY               **
**                                                                              **
**                                                                              **
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PRECIPITATION DATA FILE:     C:\A-ENGINR\HELP3\ABTCO\AB-PR.D4
TEMPERATURE DATA FILE:       C:\A-ENGINR\HELP3\ABTCO\AB-TE.D7
SOLAR RADIATION DATA FILE:   C:\A-ENGINR\HELP3\ABTCO\AB-SR.D13
EVAPOTRANSPIRATION DATA:     C:\A-ENGINR\HELP3\ABTCO\AB-EV.D11
SOIL AND DESIGN DATA FILE:   C:\A-ENGINR\HELP3\ABTCO\AB-SDD4.D10
OUTPUT DATA FILE:            C:\A-ENGINR\HELP3\ABTCO\AB-OUT4.OUT


TIME:  12:54     DATE:  11/21/1997


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     TITLE:  ABT CORPORATION CLOSURE PLAN - STOCKPILE SOIL

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                LAYER  1
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                  TYPE 1 - VERTICAL PERCOLATION LAYER
                      MATERIAL TEXTURE NUMBER  22
          THICKNESS                    =     12.00   INCHES
          POROSITY                     =      0.4190 VOL/VOL
          FIELD CAPACITY               =      0.3070 VOL/VOL
          WILTING POINT                =      0.1800 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.2916 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.189999992000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  1.80
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                LAYER  2
                                --------

                  TYPE 3 - BARRIER SOIL LINER
                      MATERIAL TEXTURE NUMBER  55
          THICKNESS                    =     12.00   INCHES
          POROSITY                     =      0.4270 VOL/VOL
          FIELD CAPACITY               =      0.4180 VOL/VOL
          WILTING POINT                =      0.3670 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.4270 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.559999989000E-05 CM/SEC
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GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	79.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	12.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.499	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.028	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	2.160	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	8.623	INCHES
TOTAL INITIAL WATER	=	8.623	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
GREENSBORO NORTH CAROLINA

STATION LATITUDE	=	35.13 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.00
START OF GROWING SEASON (JULIAN DATE)	=	90
END OF GROWING SEASON (JULIAN DATE)	=	305
EVAPORATIVE ZONE DEPTH	=	12.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	7.60 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	66.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	70.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR RALEIGH NORTH CAROLINA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.55	3.43	3.69	2.91	3.67	3.66
4.38	4.44	3.29	2.73	2.87	3.14

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR GREENSBORO NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
37.50	39.90	48.00	58.30	66.50	73.50
77.20	76.30	69.90	58.40	48.50	40.20

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR GREENSBORO NORTH CAROLINA
AND STATION LATITUDE = 35.13 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT

PRECIPITATION	39.15	142114.484	100.00
RUNOFF	1.419	5152.086	3.63
EVAPOTRANSPIRATION	31.769	115322.453	81.15
PERC./LEAKAGE THROUGH LAYER 2	5.951558	21604.156	15.20
AVG. HEAD ON TOP OF LAYER 2	0.1780		
CHANGE IN WATER STORAGE	0.010	35.816	0.03
SOIL WATER AT START OF YEAR	8.623	31302.723	
SOIL WATER AT END OF YEAR	8.633	31338.539	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.031	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.90	162986.984	100.00
RUNOFF	3.485	12649.331	7.76
EVAPOTRANSPIRATION	30.882	112102.875	68.78
PERC./LEAKAGE THROUGH LAYER 2	10.788715	39163.035	24.03
AVG. HEAD ON TOP OF LAYER 2	0.3589		
CHANGE IN WATER STORAGE	-0.256	-928.247	-0.57
SOIL WATER AT START OF YEAR	8.633	31338.539	
SOIL WATER AT END OF YEAR	8.377	30410.293	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.007	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	61.74	224116.172	100.00
RUNOFF	12.812	46506.293	20.75
EVAPOTRANSPIRATION	32.861	119284.695	53.22
PERC./LEAKAGE THROUGH LAYER 2	16.025331	58171.953	25.96
AVG. HEAD ON TOP OF LAYER 2	0.6227		

CHANGE IN WATER STORAGE	0.042	153.259	0.07
SOIL WATER AT START OF YEAR	8.377	30410.293	
SOIL WATER AT END OF YEAR	8.420	30563.551	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.021	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	38.86	141061.766	100.00
RUNOFF	2.675	9709.260	6.88
EVAPOTRANSPIRATION	30.387	110305.984	78.20
PERC./LEAKAGE THROUGH LAYER 2	5.654765	20526.795	14.55
AVG. HEAD ON TOP OF LAYER 2	0.1417		
CHANGE IN WATER STORAGE	0.143	519.760	0.37
SOIL WATER AT START OF YEAR	8.420	30563.551	
SOIL WATER AT END OF YEAR	8.563	31083.312	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.040	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.67	144002.109	100.00
RUNOFF	2.142	7774.384	5.40
EVAPOTRANSPIRATION	30.835	111931.422	77.73
PERC./LEAKAGE THROUGH LAYER 2	6.339220	23011.369	15.98
AVG. HEAD ON TOP OF LAYER 2	0.1332		
CHANGE IN WATER STORAGE	0.354	1284.861	0.89
SOIL WATER AT START OF YEAR	8.563	31083.312	
SOIL WATER AT END OF YEAR	8.917	32368.172	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	0.073	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.27	2.81	4.37	2.63	3.53	5.42
	4.57	6.26	2.81	3.77	2.52	2.90
STD. DEVIATIONS	2.95	0.95	1.30	1.89	2.64	1.99
	2.29	5.93	1.69	2.69	1.66	1.28
RUNOFF						
TOTALS	0.566	0.048	0.338	0.034	0.267	0.349
	0.396	1.196	0.552	0.397	0.073	0.288
STD. DEVIATIONS	1.131	0.088	0.351	0.077	0.598	0.414
	0.279	2.502	0.814	0.659	0.101	0.301
EVAPOTRANSPIRATION						
TOTALS	1.473	1.891	2.781	3.021	3.120	3.976
	4.119	3.400	2.631	2.197	1.507	1.231
STD. DEVIATIONS	0.158	0.184	0.173	0.966	1.587	1.161
	1.758	1.383	1.364	0.782	0.807	0.171
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	1.0433	0.9468	0.9121	0.4764	0.4198	0.7082
	0.2458	1.1045	0.3934	0.8700	0.6848	1.1468
STD. DEVIATIONS	1.3753	0.8178	0.6042	0.7150	0.8957	0.9669
	0.4534	1.7951	0.7065	1.3256	0.6654	1.0426

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2						
AVERAGES	0.5521	0.3104	0.2836	0.0567	0.1986	0.2912
	0.0806	0.4804	0.2124	0.4047	0.1251	0.4472
STD. DEVIATIONS	0.8895	0.2825	0.3560	0.1048	0.4423	0.3975
	0.1736	1.0301	0.4684	0.6645	0.1738	0.4693

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.86 (9.753)	162856.3	100.00
RUNOFF	4.506 (4.7037)	16358.27	10.045

EVAPOTRANSPIRATION	31.347	(0.9835)	113789.48	69.871
PERCOLATION/LEAKAGE THROUGH LAYER 2	8.95192	(4.47511)	32495.461	19.95346
AVERAGE HEAD ON TOP OF LAYER 2	0.287	(0.209)		
CHANGE IN WATER STORAGE	0.059	(0.2213)	213.09	0.131

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	5.22	18948.600
RUNOFF	3.925	14249.1484
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.377312	1369.64148
AVERAGE HEAD ON TOP OF LAYER 2	11.769	
SNOW WATER	2.09	7587.2231

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4190
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1800

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	3.7929	0.3161
2	5.1240	0.4270
SNOW WATER	0.000	

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Drawings Under Seperate Cover