LANDFILL FINAL CLOSURE PLAN

WEYERHAEUSER COMPANY

NEW BERN, NORTH CAROLINA

DELTA PROJECT NO. E096-019-2.0004

Carmen Johnson

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This report was prepared by:

Delta Environmental Consultants, Inc.
6701 Carmel Road, Suite 200
Charlotte, NC 28226

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LANDFILL FINAL CLOSURE PLAN

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1.0 BACKGROUND

1.1 Purpose of Report

This report presents the methodology and procedures to close Weyerhaeuser Company's (Weyerhaeuser) New Bern landfill. The purpose of the report is to satisfy North Carolina Administrative Code Title 15A Subchapter 13B .0503 by submitting a closure design which ensures that ground water standards established under North Carolina Administrative Code Title 15A Subchapter 2L (NCAC 2L) will not be exceeded in the uppermost aquifer at the compliance boundary. The landfill Closure Plans are included as attachments and consist of current configuration, final configuration, filling sequence and stormwater management.

1.2 Site Development

Prior to initiating pulping operations at the Weyerhaeuser's New Bern Pulp Mill in 1969, Weyerhaeuser immediately identified the need for on-site solid waste disposal. The current landfill site was chosen based on proximity to mill operations, and because it was contained within Weyerhaeuser property. Material began to be placed into the landfill upon mill start up and it has been in active operation since that time.

1.3 Waste Characteristics

Waste is consistent with pulp mill operations and generally consists of the following:

Waste	Estimated Annual Disposal	Comments
Wood yard debris, grit	1,300 Bone Dry Tons (BDT)	periodic clean up
Primary clarifier solids	20,000 tons	As received from clarifier via the sidehill screen
Grits	3,000 tons	from the lime kiln
General mill trash	1,500 tons	
Construction/Demolition Debris		Non-routine: dependent upon construction activities
Off specification production	100 tons	Some routine, some periodic
Asbestos	100 cubic feet	None routine

The primary clarifier solid is primary wastewater treatment system solids separated from the total mill effluent stream in a primary clarifier from which they are pumped to a sidehill screen for dewatering. This waste stream primarily consists of pulp fibers.

1.4 Daily Operations

The landfill is owned and operated by Weyerhaeuser under Solid Waste Permit No. 25-02 dated August 28, 1992 issued by the North Carolina Department of Environment and Natural Resources, Solid Waste Division. The landfill has been in operation since 1969 and access is open to Weyerhaeuser personnel only under existing mill security measures. The landfill is accessible 365 days a year and access roads have been maintained as needed for disposal over the life of the landfill.

Operation has resulted in the current configuration that is shown in the attached Closure Plans. Material consists of that listed in Section 1.2 above and placement has occurred to maximize available space over the 30-acre site. To ensure that no liquid or hazardous wastes have been disposed at the landfill, waste screening and acceptability procedures have been implemented at the landfill including inspection at the generation location as well as inspection by the landfill operators.

Leachate generated, as well as stormwater runoff from the landfill and mill, is collected in a canal shown on the Closure Plans. Leachate is then pumped from the canal to the mill's wastewater treatment system.

1.5 Closure Plan Overview

The landfill will be configured to consist of two distinct peaks, at the completion of the 1998 filling sequence, to maximize run-off during operation and allow sufficient slope based on waste volumes. When filling is complete the final slopes will be at approximately 5:1 based on slope stability analysis. Final cover will consist of a low permeability layer overlain by soil with a grass cover. Stormwater and leachate will be collected in the modified leachate collection canal and pumped to the on-site wastewater treatment system.

This report is to be reviewed in conjunction with the Final Closure Plans, prepared by Delta, dated December 15, 1997, Sheet Nos. 1-10.

2.0 SLOPE STABILITY EVALUATION

A slope stability evaluation was performed on the waste and underlying material to properly design final slope stability and plan for final landfill filling sequence.

2.1 Interim Corrective Actions

As discussed earlier, placement of waste into the landfill has occurred to maximize the available space of the landfill over the 30 acre site. This has resulted in a topographic surface generally depicted in the Closure Plans. Since July 1997 interim corrective measures have been taken on the landfill to better shape the waste toward a final configuration, remove material that had sloughed into the canal, allow for a better planned filling sequence and promote run-off prior to initiating closure.

The slope on the north side of the landfill, running parallel to the leachate canal, also has been reduced to approximately four to one (4:1 H:V). Waste material removed as part of the slope reduction has been placed on the flatter sections of the landfill to the south to promote better stormwater runoff. The remainder of the landfill has been sloped gently from the north/northeast to the southeast toward the leachate pumping station. This allows better runoff on the southern portions of the landfill.

Filling of the landfill has also been modified to include filling in lifts that mimics operation planned after December 31, 1997. Waste is being placed in 5 to 10 foot lifts, spread and compacted 2 to 3 feet thick by a landfill operator. Each final lift is worked to the proposed 5:1 to allow minimal efforts in attaining the final slope required for closure.

2.2 Soil Boring Program

From June 3 through 13, 1997, nine soil borings (SB00100 through SB00900) were advanced by Law Engineering, Inc. at the locations shown in the Closure Plans. The boreholes were advanced using hollow stem auger drilling techniques. Split spoon samples and undisturbed samples of the waste and underlying soils were collected in accordance with ASTM D-1586-84 and D1587-83, respectively and delivered to Law Engineering, Inc. for laboratory testing. Soil boring logs are included as Appendix A.

Soil borings SB00100, SB00400, SB00600, and SB00700 were completed as piezometers. Upon completion, the boreholes and piezometers were abandoned in accordance with NCDENR regulations.

2.3 Modeling

The slope stability analyses were performed using the model GSLOPE. Waste/soil samples analyzed for consolidated/undrained triaxial with pore pressures were used as input parameters for the slope stability analyses. The model allows the user to develop a soil profile based on specific soil parameters and scaled geographic x-y coordinates. Two separate types of evaluations were performed for the Weyerhaeuser landfill; the Modified Bishop's method was used to simulate slip surface (circular arc) failures. This was modeled for the waste alone and for the waste with the cover material in place. The Janbu method was used to simulate wedge

failures. This was modeled with angles from vertical of forty-five and sixty degrees starting at various locations along the sloped waste surface.

The following tables summarize the laboratory test results, and the parameters that were used in the GSLOPE model to characterize the materials. The modeling parameters used in the slope stability analyses were conservative when compared to the actual test results.

2.4 Waste and Cover Properties

Actual Test Results (Total Stress Parameters)

MATERIAL	UNIT WEIGHT (pounds/cubic foot)	COHESION (pounds/square foot)	FRICTION ANGLE (degrees)
Clay Cover	123.2	970	23.1
Waste	68.5-94.7	350-2140	8.3-25.6
Native Soil	116.3-117	2200-3080	30.1-37.6

Actual Test Results (Effective Stress Parameters)

MATERIAL	UNIT WEIGHT (pounds/cubic foot)	COHESION (pounds/square foot)	FRICTION ANGLE (degrees)
Clay Cover	123.2	510	31.1
Waste	68.5-94.7	190-560	35.7-44.8
Native Soil	116.3-117	0-650	35.6-40.5

Modeling Parameters

MATERIAL	UNIT WEIGHT (pounds/cubic foot)	COHESION (pounds/square foot)	FRICTION ANGLE (degrees)
Clay Cover	123	500	23
Waste	88	100	12
Native Soil	114	0	30

Modeling input values were based upon effective stress parameters for cohesion and total stress parameters for the friction angle.

2.5 Elevations and Slope Specification

The landfill profile was evaluated using a five to one (5:1, H:V) slope with 12-foot wide benches approximately every twenty feet in elevation. A piezometric surface was input into the model based on actual ground water elevation measurements. A full search method was used in the

model to identify the critical slip surface failure plane, and specified surfaces were used to identify wedge failures. The slip surfaces were modeled with the waste material alone and with the final cover material in place. All wedge failures were modeled with the waste alone, as this presents the worse-case scenario. All analyses reported a factor of safety of at least 1.5. The modeling analyses are included as Appendix B.

Based on the modeling results, it is recommended that the 5:1 slope with the 12-foot wide benches should provide adequate slope stability.

3.0 GROUND WATER MONITORING

3.1 Ground Water Sampling Program

Semi-annual ground water monitoring is currently being conducted at the landfill. Samples are collected from monitoring wells OWD-01, OWS-01, OWS-02 and OWS-03 and analyzed for BOD, COD, TOC, chloride, fluoride, TDS, priority pollutant metals, AOX, sulfate and nitrate/nitrogen.

A ground water sample was collected by Delta from piezometer SB00100 on June 13, 1997. The piezometer was purged and sampled using low-flow techniques. The ground water sample was submitted to Weyerhaeuser Analytical and Testing Service (WATS) for the analysis of BOD, COD, pH, TDS, AOX, total organic carbon (TOC), fluroide, chloride, nitrites, sulfate and total metals. Pertinent analytical results are summarized below and the laboratory report and chain of custody are included as Appendix C:

Ground Water Analytical Results
Sample ID PZ00100
Date 6/13/97

BOD	8 mg/l
COD	380 mg/l
Turbidity	320 mg/l
pH	7.5
TDS	2835 mg/l
AOX	0.13 mg/l
TOC	136 mg/l
Fluoride	0.1 mg/l
Chloride	75.1 mg/l
Nitrite (NO_2-N)	<0.2 mg/l
Sulfate	34.3 mg/l
Nitrite (NO_3-N)	<0.02 mg/l

mg/l = milligrams per liter

3.2 Ground Water Transport Modeling

A "worst case scenario" approach was assumed for the ground water modeling of the water table aquifer directly under and downgradient of the Weyerhaeuser, New Bern landfill. The basic solution of the dispersion-advection equation employed for the modeling was first presented by Domenico and Robbins (1985). The solution selected accounts for a two dimensional source, longitudinal and transverse dispersion and one-dimensional advection. Because of the "worst case scenario" approach, no decay, degradation or retardation was included in the modeling.

The modeling incorporated yearly leachate production of 11,333 cubic meters (m^3) (obtained from HELP3 modeling, explained in Section 4) with a total dissolved solids (TDS) concentration of 2,835 mg/l (obtained from fluid samples recovered from PZ00100 on June 13, 1997). The resulting leachate was then assumed to be mixed with 32,538 m^3 of groundwater with a TDS concentration of 230 mg/l (TDS concentration in background well OWS-01). The volume of ground water that flows under the landfill per year was calculated using Darcy's law, a ground water flow velocity calculated from data collected on June, 13, 1997 and porosity and hydraulic conductivity values measured from undisturbed soil samples. Using the aforementioned method, the resulting TDS concentration in groundwater directly downgradient of the landfill (source area) was estimated to be 903 mg/l.

3.3 Projected Downgradient Quality

The TDS concentration in groundwater directly upgradient of Swift Creek was estimated using the Model presented by Domenico and Robbins (1985) incorporating a source area TDS concentration of 903 mg/l. The resulting concentration at Swift Creek, 200 feet downgradient of the landfill and within the compliance boundary, was estimated to be 379 mg/l or less than the 500 mg/l specified by NCAC 2L.

4.0 FINAL COVER DESIGN

4.1 Projected Land Use

Weyerhaeuser owns approximately 6,500 acres for their New Bern pulp mill operations and the nearest property boundary to the current landfill is approximately 0.45 miles to the north. Land use in the vicinity consists of mill operations to the south and west. To the east and north is the flood plain of Swift Creek. No other land use is planned for this area.

4.2 Cover System Components

The cover system was designed as a 4-layer system. The lowermost (directly above the waste) layer will consist of approximately 24-inches of select non-bulky waste that will function to

create a uniform surface on which to construct the remaining layers of the cover. Atop the non-bulky waste will be low permeability, sandy clay soil that will act as a barrier layer limiting fluid infiltration into the waste below. Above the low permeability zone will be a geo-textile fabric that will act to protect the low permeability zone. The uppermost layer of the cover will be comprised of organic soil that will support a good stand of grass. Additionally, a turf reinforcement mat will be placed on top of the organic soil to prevent erosion in select locations.

4.3 Soil Laboratory Testing

Representative samples of the waste, underlying soils, and proposed cover materials (i.e. barrier layer only) were submitted to Law Engineering, Inc. in Raleigh, North Carolina to measure physical properties. The laboratory analytical report is included as Appendix D.

4.4 Hydraulic Evaluation (HELP modeling)

The cover system was designed using the Hydrologic Evaluation of Landfill Performance Model, Version 3.0 (HELP3) presented in Schroeder and others (1994). Precipitation, evapotranspiration and solar radiation data were synthetically generated using coefficients for Raleigh, North Carolina. The cap was designed to allow less than 11,500 m^3/year of leachate to be produced (based on preliminary ground water transport modeling).

4.5 Final Cover Specification

From the environmental and leachate constraints it was determined that an 18-inch low permeability barrier layer with an in place hydraulic conductivity of less than 0.00005 (5×10^{-5}) cm/sec will be required. Additionally, an 18-inch soil layer that will function both as a lateral drainage layer and a medium for vegetative growth will be placed atop the barrier layer. Also, to protect the barrier layer, a geo-textile fabric will be used between the barrier and organic layers. Configuration of the final cover is included in the Closure Plans.

Weyerhaeuser has identified a potential soil to be used as the barrier layer. The soil consists of a sandy clay with a permeability that meets the criteria set forth for the barrier. The material is currently located approximately 10 miles from the New Bern mill.

5.0 STORMWATER MANAGEMENT

5.1 Drainage Areas

The final landfill area was divided into nine segments to evaluate stormwater runoff according to topography and estimated runoff channels. Each peak of the landfill included four segments and there was one additional segment located at the drainage ditch between the two peaks. The segments ranged in size from 0.3 to 22.4 acres. The remainder of the facility, the mill upstream of the landfill, that would contribute to the runoff condition (125 acres) was treated as one

drainage area. The slopes used on the landfill sections were 5:1 H to V (0.2 ft/ft) for the main landfill and 0.01 ft/ft for the benches. The approximate slope used for the facility section was 0.002 ft/ft.

5.2 Soil Cover Hydrologic Factors

Based on a soil survey map for Craven County, soil in the area surrounding the site is labeled Dorovan. The facility has several feet of top soil and a general soil with the characteristics of a "B" Hydrologic Soil Group was used in the stormwater model. The facility ground cover consists of poor to good condition grass, paved and graveled surfaces, and brush and woods. The segments of the landfill were assumed to have a topsoil cover consistent with Hydrologic Soil Group condition "B" with a crop cover in poor to fair condition.

5.3 Peak Runoff Quantity

The stormwater runoff model TR-55 was used to determine the peak runoff expected from the facility and the landfill during a 25-year storm event. This model is based on the document "Urban Hydrology for Small Watersheds" published by the United States Department of Agriculture; Soil Conservation Service. Each of the nine landfill segments were modeled separately as was the upstream mill facility area. A tabular hydrograph for each segment and the facility also was generated. The TR-55 model results are included as Appendix E. A total tabular hydrograph also was compiled to summarize the contributions from the nine landfill segments and the mill facility. The peak runoff expected during a 25-year storm event from the landfill and the facility is estimated to be 193 cubic feet per second (cfs).

5.4 Conveyance Channels

Three conveyance channels were designed to carry the runoff from the landfill and facility to its final destination at the pump station. The first feature is a ditch situated between the two peaks of the landfill. This ditch was designed to carry water flowing from the interior of the landfill to the outside edge. The second feature is a drainage ditch located on the southern portion of the landfill between the toe of the landfill and an existing access road. This ditch is designed to carry water that flows down the southern side of the landfill to the leachate canal. The leachate canal is the third conveyance channel. The canal will be bordered on the south by an earthen dike which will serve to separate the landfill waste deposit from the canal. The leachate canal will accept water from the northern section of the landfill, the southern conveyance ditch and the facility. Prior to landfill closure, any necessary modifications to the canal or the overall stormwater management system, in order to provide adequate capacity to handle run-off, will be addressed at that time. Detailed drawings of the two drainage conveyance channels are included in the Closure Plans.

6.0 LANDFILL OPERATION AND CLOSURE

6.1 Responsible Party

Weyerhaeuser owns and operates the landfill under Weyerhaeuser Company. Operation and closure of the landfill will be conducted under the supervision of the Environmental Manager at the New Bern mill. Certain tasks, such as waste screening, landfill site management, waste management and security may be delegated to other members of the Weyerhaeuser team.

6.2 Projected Waste Quantities

Projected waste quantities for the landfill were provided by Weyerhaeuser. These volumes were adjusted with an added margin of 25% to ensure capacity within the landfill design. An estimated 152,414 cubic yards will be added to the landfill by the year 2002. The added margin of 25% increases the volume to approximately 190,518 cubic yards. Table 1 shows the projection estimates.

6.3 Estimated Life

The current estimated waste production rates could allow operation of the landfill well beyond the five years allowed for continued operation of the unlined landfill. This closure plan allows orderly closure of the site at the end of 2002.

6.4 Filling Sequence

Weyerhaeuser will put wastes in the landfill in a sequential way in order to achieve the final topography. The filling sequence is based on Weyerhaeuser's estimated annual waste quantities for years 1997 through 2002 (Section 6.2, above). The landfill will be developed in one-year phases so that each year of filling represents that year's waste quantity. Two peaks were designed to best utilize the existing site features, the total waste flow and achieve adequate slope for drainage. The foot print of the existing landfill was not increased.

The Closure Plans show the proposed contours for the landfill at the end of each successive year. The fill sequence was based on building up the slope on the lower areas early-on to final elevation to promote run-off, and to minimize the flat areas. Then, in the final years, waste will be used to top off the landfill and increase the slope of the upper area to final design specifications. The maximum final slope is approximately 5H to 1V.

Weyerhaeuser will develop a single working face to accommodate the daily waste activities. Wastes will be placed at the working face and compacted in small lifts if necessary. The waste

will be built into a lift 5 to 10 feet high, graded off, and blended into the existing waste. Then, the working face will be moved over and the process repeated.

The elevations and grade will be periodically checked so that the shape of the landfill develops as planned. No intermediate cover is planned for the area of large peak because filling will be continuous for the next five years. The working face will be moved around the landfill in a circular fashion until the propose final elevations are achieved.

6.5 Placement of Final Cover

The smaller of the two waste peaks (top elevation 56.0) will receive an intermediate cover of one foot of soil at the end of 1998. This area then will be seeded to establish a stand of grass to minimize erosion until final cover is placed. Temporary erosion control devices including hay bales and silt fence also may be used as needed. The temporary soil cover will be stripped off and stockpiled on-site for re-use in construction of the final cover. Once the larger peak (top elevation 86.0) reaches final grade and elevation, final cover will be constructed over the entire landfill.

Prior to placement of final cover, all of the waste will be proof-rolled with a heavy compactor. Low spots will then be filled, soft spots excavated and backfilled, and material that might damage the cover will be removed. Following, the waste will be covered with 24-inch thick layer of fine textured wastes (i.e., lime, sand, etc.) or imported sand. A geotextile lining may be used as an alternate protective unit depending on the condition of the waste surface at the time of construction. This layer is designed to provide a reasonably smooth, stable base for the final cap.

Following completion of the base, an 18-inch thick layer of sandy clay will be placed. This will be the infiltration barrier. The clay will be placed and compacted into 6-inch lifts. Quality assurance tests will be conducted on this layer to ensure that the clay content is in an acceptable range and maximum density is achieved.

A geotextile fabric will be laid over the clay cap prior to placing the erosion/vegetation soil layer. This will prevent the mixing of the two soils and provide some support to reduce the affect of settlement on the erosion layer.

An 18-inch thick layer of sandy loam soil will be placed over the geotextile and compacted. Quality assurance tests will be conducted on this layer to ensure that the required density is achieved. In some areas of higher than normal erosion potential, a pre-fabricated turf reinforcement grid will be laid on top of the soil. These areas are shown on the Closure Plans.

Following completion of the erosion layer, the entire cap will be seeded with a mixed grass crop of Bahia and Bermuda. The crop will be watered until the grass has developed a sufficient root system. Permanent and temporary erosion control measures as needed, will be kept in place until the grass crop is established. These may include turf-reinforcement grids, sprayed-on, pre-fabricated or blown on mulch blankets, hay bales, and silt fences.

Weyerhaeuser may alternately choose to complete final closure of the smaller waste peak in 1999 upon reaching final elevation.

6.6 Erosion Control Measures

Several erosion control measures will be in place at the landfill during and after final closure. The primary method will be a crop of Bermuda/Bahia grass mixture on the surface of the landfill. This will serve to deter concentrated runoff which could lead to erosion channels on the landfill surface. Rows of staked hay bales will be used on both ends of the conveyance channel that lies between the two peaks of the landfill. These bales will help convey the water into the southern ditch and will decrease the velocity of the water flowing from the northern ditch. The entire channel will be lined with a turf reinforcement mat designed to keep the organic top soil and cover crop in place.

At approximately every 20 feet of elevation change, a 12-foot wide bench will be cut into the landfill slope. The main purpose of these benches is to slow the water velocity flowing down the side of the landfill and to also serve as access for maintenance equipment. These benches also will be lined with a turf reinforcement mat to stabilize the cover crop. The berm at the edge of the landfill serves as an erosion control measure as well. The berm will slow the velocity of the water before it enters the leachate canal. The berm will be lined with the turf reinforcement mat which will extend part way into the leachate canal.

7.0 LANDFILL GAS (LFG) MANAGEMENT

7.1 Preliminary Survey

On June 2, 1997, Richard Powell (Delta) and Richard Gay (Weyerhaeuser) conducted a preliminary methane survey at the landfill. Twenty-one soil vapor points were advanced. The points were advanced by driving a stainless steel rod approximately three feet below the landfill surface. The rod was immediately extracted and methane, carbon dioxide, and oxygen readings from the borehole were recorded using a Landtec Gem direct reading methane monitor. Methane, carbon dioxide, and oxygen readings are summarized on Table 2.

7.2 LFG Migration Monitoring

Methane management or monitoring is not planned by Weyerhaeuser following final closure. However, to evaluate if methane management measures are necessary, an additional survey will be conducted during late 2001 or upon placement of intermediate and final cover, whichever occurs earlier.

8.0 POST CLOSURE MAINTENANCE

8.1 Responsible Party

Weyerhaeuser owns and operates the current landfill under Weyerhaeuser Company. Post Closure operation and maintenance of the landfill will be conducted under the supervision of the Environmental Manager at the New Bern mill.

8.2 Maintenance Activities

Erosion Control

Several of the erosion control measures will require only routine post-closure maintenance. The turf reinforcement mats and the geoweb will likely require very little maintenance unless there is a product failure or the control does not perform its specified function. The benches and the berm which serve to control velocities will be inspected for erosion following storm events. The staked hay bales that control direction and velocity in the center of the landfill will require visual inspection to ensure effectiveness. These bales will have to be replaced periodically once they begin to decompose. The most labor intensive maintenance activity will involve the cover crop of Bermuda/Bahia grass. Weyerhaeuser will mow, re-seed, and fertilize the grass crop on a regular basis. Stressed or dead areas of grass will be replaced as needed.

Cover Crop

The final cover crop for the landfill will consist of a mixture of Bahia and Bermuda grass. These particular strains of grass have proven to be hardy in coastal North Carolina environments. This allows rapid growth and an interconnected root system to promote stability and maximize run-off.

Drainage Ditches

The drainage ditches will require some post-closure maintenance. They will require visual inspection to ensure that the channels are not eroding and the crop cover remains in good condition. Stressed or dead grass may be replanted, and the ditches will periodically be mowed.

Leachate Management

Leachate will continue to be collected following closure in the modified leachate canal and pumped to the on-site wastewater treatment system. As the infiltration of rain is prevented, following installation of the final cover, leachate generation is expected to decrease.

8.3 Monitoring Activities

The current ground water monitoring network will be used for long term ground water monitoring of the landfill. Monitoring wells OWD-01, OWS-01, OWS-02 and OWS-03 will be sampled on a semi-annual basis for BOD, COD, TOC, TDS, and AOX. Results will be submitted to the DENR semi-annually for 2 years following landfill closure. Subsequent sampling will be done on an annual basis for a period of 5 years. Any increase in ground water concentrations will be noted by Weyerhaeuser and Weyerhaeuser will inform DENR of any potential violation of NCAC 2L. Should there be no violations of NCAC 2L beyond the compliance boundary within 5 years of closure, or indications of an increase in concentrations of constituents of concern, monitoring will be discontinued and existing monitoring wells properly abandoned.

The discussions contained in this report represent our professional opinions. These opinions are arrived at in accordance with currently accepted hydrogeologic practices at this time and location. Other than this, no warranty is implied or intended.

This report was prepared by:

DELTA ENVIRONMENTAL CONSULTANTS, INC.

Scott A. Recker, P.G.
Project Manager

12-18-97
date

Bruce J. Clark, P.E.
Senior Environmental Engineer

12/17/97
date

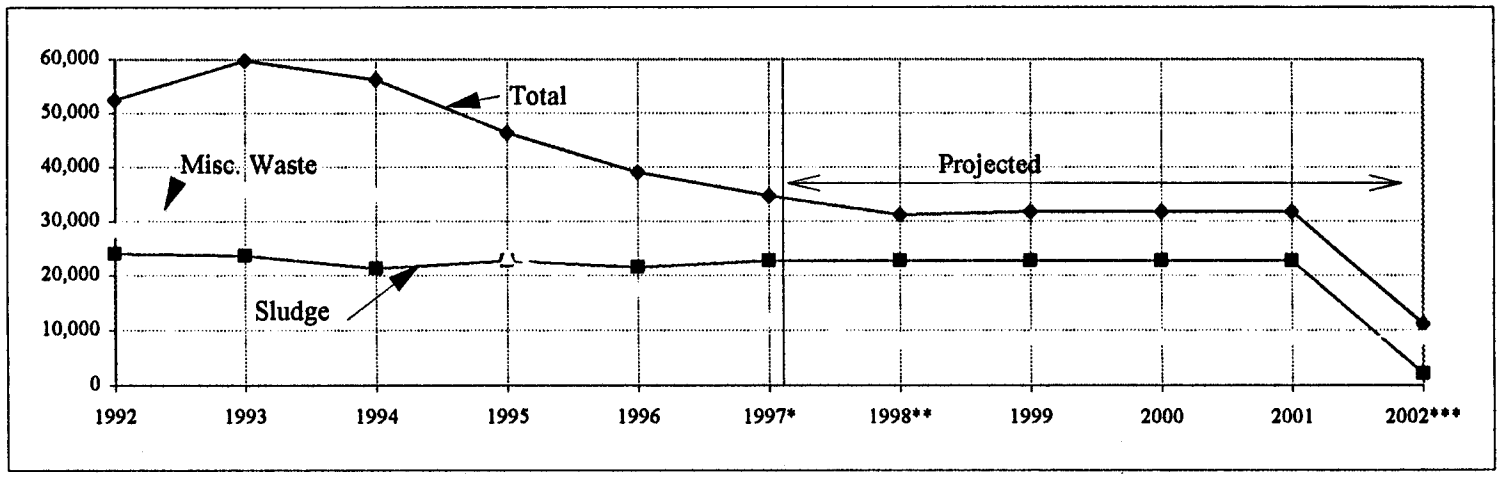
Tables

TABLE 1

Projected Waste Quantities
Weyerhaeuser Company
New Bern, NC

	1992	1993	1994	1995	1996	1997*	1998**	1999	2000	2001	2002***
Total Solid Waste to Landfill (cu. yds.)	52,566	59,906	56,303	46,495	39,155	34,740	31,229	31,810	31,810	31,810	11,281
Total Sludge to Landfill (cu. yds.)	24,210	23,850	21,400	22,920	21,670	22,810	22,810	22,810	22,810	22,810	2,281
Total Misc. Waste to Landfill (cu. yds.)	28,356	36,056	34,903	23,575	17,485	11,930	8,419	9,000	9,000	9,000	9,000
Sludge Percent Solids	9	9.33	10.05	10.15	10.4						

* Pallets will be removed from waste stream
** Knots will be removed from waste stream
***Sludge will be removed from waste stream



Total Additional Waste (cu. yds.)	25% Safety Factor Increase	New Total Waste (cu. yds.)
152,414	38,104	190,518

1996\96019\data\SWASTEP.XLS

TABLE 2

METHANE SCREENING RESULTS
WEYERHAEUSER: NEW BERN LANDFILL
NEW BERN, NORTH CAROLINA

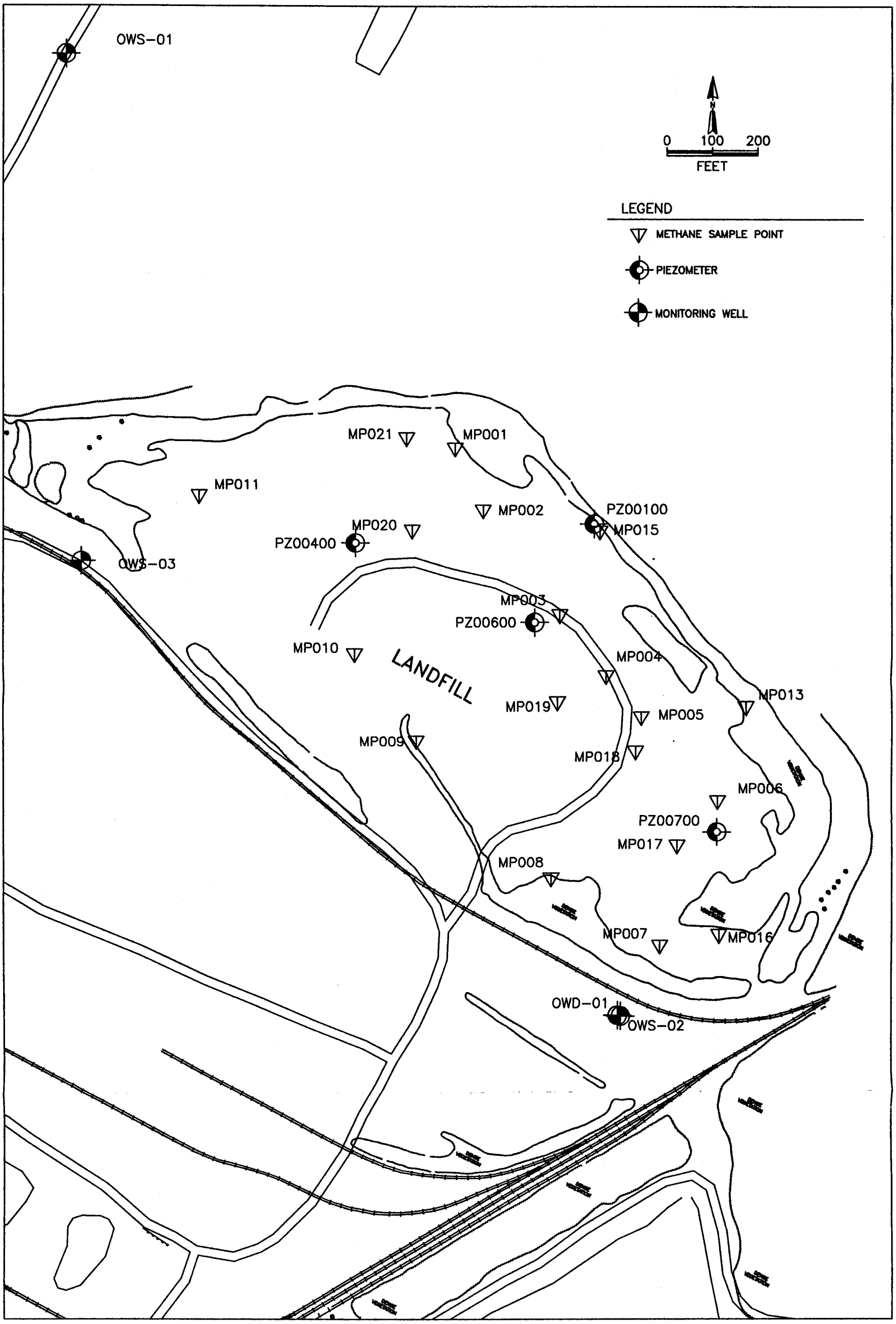
DELTA PROJECT NO. E096-019

SITE	DATE	DEPTH (ft)	Methane (%)
MP001	06/02/97	3.00	23
MP002	06/02/97	3.00	1
MP003	06/02/97	3.00	50.8
MP004	06/02/97	3.00	54.6
MP005	06/02/97	3.00	49.4
MP006	06/02/97	3.00	27.3
MP007	06/02/97	3.00	11.3
MP008	06/02/97	3.00	51.2
MP009	06/02/97	3.00	0
MP010	06/02/97	3.00	15.1
MP011	06/02/97	3.00	0.4
MP013	06/02/97	3.00	0.2
MP015	06/02/97	3.00	0
MP016	06/02/97	3.00	0
MP017	06/02/97	3.00	0
MP018	06/02/97	3.00	34.3
MP019	06/02/97	3.00	18.9
MP020	06/02/97	3.00	49.6
MP021	06/02/97	3.00	0

Values represent total concentrations unless noted < =Not detected at indicated reporting limit ---=Not analyzed

For RCL VAPOR

Figures



Delta Environmental Consultants, Inc.

TITLE:	DWN:	DES.:	PROJECT NO.:
LANDFILL AREA MAP WEYERHAEUSER: NEW BERN LANDFILL NEW BERN, NORTH CAROLINA	DEK		E096-019
	CHKD:	APPD:	FIGURE NO.:
	DATE: 12/01/97	REV.:	1

APPENDIX A

SOIL BORING LOGS/CROSS-SECTIONS

TABLE 1

SOIL BORING DATA
WEYERHAEUSER COMPANY - LANDFILL
NEW BERN, NORTH CAROLINA

DELTA PROJECT E096-019

SITE	SURVEY COORDINATES X	Y	Z	BORE DEPTH TOTAL (feet bgs)*	DATE	DRILLING METHOD	DRILLER	CONSULTANT
SB00100	2565218.6	538914.1	14.32	32.00	06/03/97	Hollow Stem Auger	Law Engineering	Delta Environmental
SB00200	2565623.5	538412.3	16.06	37.00	06/04/97	Hollow Stem Auger	Law Engineering	Delta Environmental
SB00300	2564676.9	539148.4	36.67	47.00	06/05/97	Hollow Stem Auger	Law Engineering	Delta Environmental
SB00400	2564694.8	538871.7	35.36	47.00	06/06/97	Hollow Stem Auger	Law Engineering	Delta Environmental
SB00500	2564600.7	538515.4	27.78	39.00	06/09/97	Hollow Stem Auger	Law Engineering	Delta Environmental
SB00600	2565088.2	538698.1	38.69	49.00	06/10/97	Hollow Stem Auger	Law Engineering	Delta Environmental
SB00700	2565487.5	538237.5	27.56	55.00	06/10/97	Hollow Stem Auger	Law Engineering	Delta Environmental
SB00800	2565372.0	538068.0	24.83	37.00	06/11/97	Hollow Stem Auger	Law Engineering	Delta Environmental
SB00900	2564918.6	538463.5	34.25	42.00	06/12/97	Hollow Stem Auger	Law Engineering	Delta Environmental

bgs = below ground surface

TABLE 2

PIEZOMETER CONSTRUCTION DETAILS
WEYERHAEUSER COMPANY - LANDFILL
NEW BERN, NORTH CAROLINA

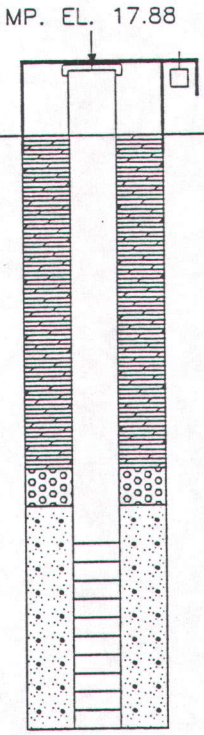
DELTA PROJECT NO. E096-019

SITE	WELL DEPTH (feet bgs)	TOTAL DEPTH (feet bgs)	GROUND SURFACE ELEVATION (feet)	MP ELEVATION (feet)	CASING DIAMETER (inches)	SCREENS (feet bgs)		ANNULAR FILLS (feet bgs)	
						INTERVAL	DESCRIPTION	INTERVAL	TYPE
SB00100	32.00	32.00	14.32	17.88	2.00	22.0-32.0	Slotted	0.0-18.0	Backfill
							PVC	18.0-20.0	Seal
								20.0-32.0	Filter
SB00200	37.00	37.00	16.06	0.00	0.00				
SB00300	47.00	47.00	36.67	0.00	0.00				
SB00400	47.00	47.00	35.36	37.58	2.00	37.0-47.0	Slotted	0.0-33.0	Backfill
							PVC	33.0-35.0	Seal
								35.0-47.0	Filter
SB00500	39.00	39.00	27.78	0.00	0.00				
SB00600	47.00	49.00	38.69	41.50	2.00	37.0-47.0	Slotted	0.0-33.0	Backfill
							PVC	33.0-35.0	Seal
								35.0-47.0	Filter
SB00700	55.00	55.00	27.56	29.93	2.00	42.5-52.5	Slotted	0.0-39.0	Backfill
							PVC	39.0-40.5	Seal
								40.5-52.5	Filter
SB00800	37.00	37.00	24.83	0.00	0.00				
SB00900	42.00	42.00	34.25	0.00	0.00				

Project Number: E096-014	Site Id: SB00100
Project Name: NEW BERN	Location: WEYERHAEUSER LANDFILL
Consulting Firm: Delta Environmental	Elevation: 14.32'
Logged By: Rick Powell	Datum: Mean Sea Level
Date(s): 06/03/97 - 06/03/97	Total Depth: 32.00'
Contractor: Law Engineering	Drilling Method: Hollow Stem Auger
Annular Fill: type: NEAT CEMENT fm: 0.00' to: 18.00' type: Bentonite Pellets fm: 18.00' to: 20.00' type: SAND PACK #2 fm: 20.00' to: 32.00'	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Remarks:	Blank Casing: type: PVC dia: 2.00in fm: -3.5' to: 22.00'
	Screens: type: Slotted size: 0.010india: 2.00in fm: 22.00' to: 32.00'

Depth (ft)	Recovery	Sample No.	Standard Penetration Resistance	Undisturbed Sample	Material Description
		1	5		Waste, ash & lime mud, gray & black. Mud is silty. Root fragments present. AG-LM
		2	2		Waste, as above. No roots, Wet. AG-LM Black ash mixed with lime mud.
10		3	2		Waste, as above. Primarily lime mud, saturated. LM
		4	2		Waste. Saturated black ash. AG
20		5	3		Waste, as above from 20'-21'. Very loose brown fine sand, wet. AG-SP
		6	5		Loose gray fine to medium sand with shell fragments, slightly cemented. SP
30		7	16		Firm gray fine to coarse sand with shell fragments. SW Firm gray fine to medium sand with shell fragments, slightly cemented. SP
					Boring terminated at 32'. Installed piezometer; water level at 15.15 feet.
40					
50					

Well Construction



Project Number: E096-014	Site Id: SB00200
Project Name: NEW BERN	Location: Weyerhaeuser Landfill
Consulting Firm: Delta Environmental	Elevation: 16.06'
Logged By: Rick Powell	Datum: Mean Sea Level
Date(s): 06/04/97 - 06/04/97	Total Depth: 37.00'
Contractor: Law Engineering	Drilling Method: Hollow Stem Auger
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Remarks:	Blank Casing: type: dia: 0.00in fm: 0.0' to:
	Screens: type: size: dia: fm: to:

Depth (ft)	Recovery	Sample No.	Standard Penetration Resistance	Undisturbed Sample	Material Description	Well Construction
		1	3		Waste, ash with wood fragments, black, moist. AG-WC	
		2	6		No recovery. Wood fragment blocked end of split spoon.	
		3			Waste, pulp rejects (knots - unpulped wood). Coarse grained lime grit and wood wastes. WF-LM	
10		4	9		Waste, black-gray pulp. Wood fragment blocked end of split spoon. Limited recovery. WF	
		5	6		Waste, wood fragments, brown. Little recovery. WC	
20		6	5		Waste, wood fragments, saturated Little recovery. WC	
		7	7		Waste, as above at 25'-26'. WC Very loose gray fine to medium sand at 26-26.5'. SP Greenish-gray clayey fine to medium sand at 26.5-27'. SC	
30		8	8		Loose light gray fine to medium sand. SP	
		9			Olive to gray sand. SP	
		10	30		Very firm light gray fine to coarse sand. SW	
					Boring terminated at 37 feet.	
40						
50						

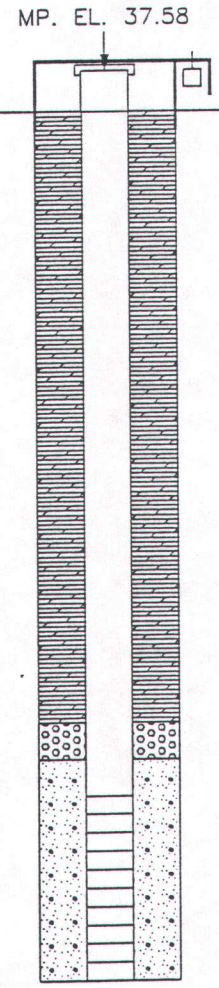
Project Number: E096-014	Site Id: SB00300
Project Name: NEW BERN	Location: Weyerhaeuser - Landfill
Consulting Firm: Delta Environmental	Elevation: 36.67'
Logged By: Rick Powell	Datum: Mean Sea Level
Date(s): 06/05/97 - 06/05/97	Total Depth: 47.00'
Contractor: Law Engineering	Drilling Method: Hollow Stem Auger
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Remarks:	Blank Casing: type: dia: 0.00in fm: 0.0' to:
	Screens: type: size: dia: fm: to:

Depth (ft)	Recovery	Sample No.	Standard Penetration Resistance	Undisturbed Sample	Material Description	Well Construction
		1	4		Waste, light to dark gray lime mud; silty. Moist, portland cement texture. LM	
		2	2		Waste, black ash, moist. AG	
		3			Waste, lime mud, lime grit, wood chips and ash. LM-AG	
10		4	2		Waste, black ash with layers of gray lime mud; wet. AG-LM	
		5	1		Waste, black ash; saturated. AG	
20		6	17		Waste, black ash with wood fragments. AG-WC	
		7	3		Waste, black ash and lime mud with wood fragments. AG-LM	
30		8	4		Waste, black ash; little recovery. AG	
		9	11		Native Soil - Firm light gray fine to medium sand. SP	
40		10	20		Firm light gray fine to coarse sand with occasional fine gravel. SP Black organic silty sand SM	
		11			Light olive sand. SM	
		12	11		Medium to coarse sand with fine gravel. SP	
					Boring terminated at 47 feet.	
50						

Project Number: E096-014	Site Id: SB00400
Project Name: NEW BERN	Location: Weyerhaeuser - Landfill
Consulting Firm: Delta Environmental	Elevation: 35.36'
Logged By: Rick Powell	Datum: Mean Sea Level
Date(s): 06/06/97 - 06/06/97	Total Depth: 47.00'
Contractor: Law Engineering	Drilling Method: Hollow Stem Auger
Annular Fill: type: NEAT CEMENT fm: 0.00' to: 33.00' type: Bentonite Pellets fm: 33.00' to: 35.00' type: SAND PACK #2 fm: 35.00' to: 47.00'	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Remarks:	Blank Casing: type: PVC dia: 2.00in fm: -2.2' to: 37.00'
	Screens: type: Slotted size: 0.010in dia: 2.00in fm: 37.00' to: 47.00'

Depth (ft)	Recovery	Sample No.	Standard Penetration Resistance	Undisturbed Sample	Material Description
		1	9		Waste, black ash with wood fragments, moist. AG-WC
		2	5		Waste, black ash and light gray lime mud, moist. AG-LM
10		3	7		Waste, as above. AG-LM
		4			Waste, dregs with wood chips. WF-WF
		5	6		Waste, dregs and wood yard grit & ash. WF-AG
20		6	16		Waste, as above. Little recovey, moist. WG-AG
		7	20		Waste, primarily wood fragments, moist. WC
30		8	25		Waste, wood fragments, moist. WC
		9	19		Native Soil - Firm light gray fine to medium sand, wet. SP
40		10	27		Very firm light gray fine to coarse sand, wet. SP
		11			Red-yellow sand. SP
		12	29		Firm light gray fine to medium sand. SP
50					Boring terminated at 47 feet. Installed piezometer. Water level at 34.52 feet.

Well Construction



Project Number: E096-014	Site Id: SB00500
Project Name: NEW BERN	Location: Weyerhaeuser - Landfill
Consulting Firm: Delta Environmental	Elevation: 27.78'
Logged By: Rick Powell	Datum: Mean Sea Level
Date(s): 06/09/97 - 06/09/97	Total Depth: 39.00'
Contractor: Law Engineering	Drilling Method: Hollow Stem Auger
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Remarks:	Blank Casing: type: dia: 0.00in fm: 0.0' to:
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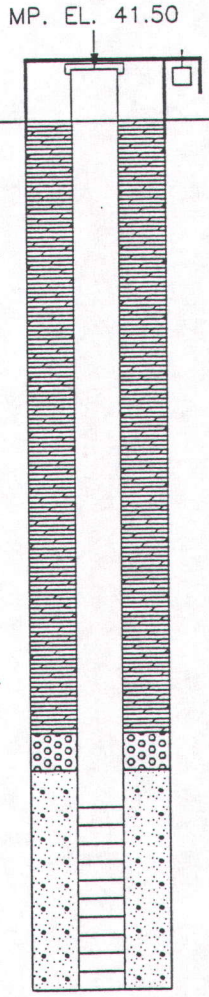
Depth (ft)	Recovery	Sample No.	Standard Penetration Resistance	Undisturbed Sample	Material Description	Well Construction
		1	6		Waste, black and gray ash with lime mud & wood fragments. Dry to damp. AG-LM	
		2	2		Waste, ash. Little recovery. Dry to damp. AG	
10		3	7		Waste, primarily wood fragments & wood yard grit. WC-WF	
		4	0		Waste, wood wastes and ash. WF-AG	
		5	8		Waste, wood fragments. Little recovery. WC	
20		6	41		Waste, wood fragments & woodyard grit. WC-WF	
		7	8		Waste, as above. WC-WF Gray fine to medium sand. SP	
30		8	19		Native Soil - Firm tan and gray fine to medium sand, wet. SP	
		9	14		Tan and gray fine to medium sand. SP	
		10			Very light brown sand. SP	
40					Boring terminated at 39 feet.	
50						

Project Number: E096-014	Site Id: SB00600
Project Name: NEW BERN	Location: Weyerhaeuser - Landfill
Consulting Firm: Delta Environmental	Elevation: 38.69'
Logged By: Rick Powell	Datum: Mean Sea Level
Date(s): 06/10/97 - 06/10/97	Total Depth: 49.00'
Contractor: Law Engineering	Drilling Method: Hollow Stem Auger
Annular Fill: type: NEAT CEMENT fm: 0.00' to: 33.00' type: Bentonite Pellets fm: 33.00' to: 35.00' type: SAND PACK #2 fm: 35.00' to: 47.00'	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Remarks:	Blank Casing: type: PVC dia: 2.00in fm: -2.8' to: 37.00'
	Screens: type: Slotted size: 0.010india: 2.00in fm: 37.00' to: 47.00'

Depth (ft)	Recovery	Sample No.	Standard Penetration Resistance	Undisturbed Sample	Material Description
		1	4		Waste, pulp and lime mud; moist. LM
		2	6		Waste, wood yard grit & ash. WF
		3			Waste, coarse grained lime grit and ash. LM-AG
10		4	4		Waste, lime mud. LM
		5	9		Waste. Black ash from 0-12". Gray lime mud at 12-24". AG-LM
20		6	2		Waste, black ash, wet. AG
		7	11		Waste, pulp wood yard grit and lime mud. WF-LM
		8			Ash and wood wastes. AG-WF
30		9	71		Waste, wood yard grit. WF
		10	7		Waste, wood yard grit. WF Light brown fine to medium sand, wet. SP
40		11	7		Native Soil - Light brown fine to medium sand, wet. SP
					No recovery.
		12			Olive gray sand. SP
50					Boring terminated at 49 feet. Piezometer installed to 47 feet; water level at 38.60 feet.

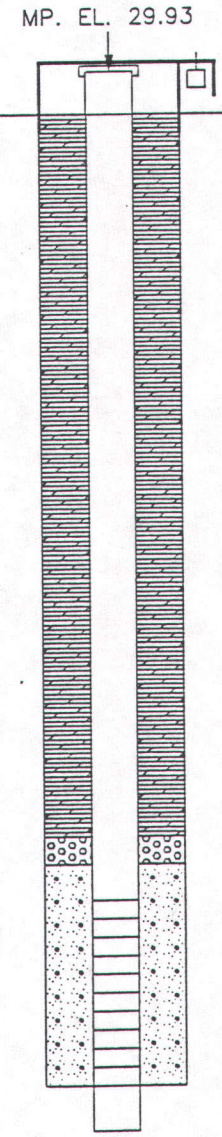
Well Construction



Project Number: E096-014	Site Id: SB00700
Project Name: NEW BERN	Location: Weyerhaeuser - Landfill
Consulting Firm: Delta Environmental	Elevation: 27.56'
Logged By: Rick Powell	Datum: Mean Sea Level
Date(s): 06/10/97 - 06/10/97	Total Depth: 55.00'
Contractor: Law Engineering	Drilling Method: Hollow Stem Auger
Annular Fill: type: NEAT CEMENT fm: 0.00' to: 39.00' type: Bentonite Pellets fm: 39.00' to: 40.50' type: SAND PACK #2 fm: 40.50' to: 52.50'	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Remarks:	Blank Casing: type: PVC dia: 2.00in fm: -2.3' to: 42.50'
	Screens: type: Slotted size: 0.010india: 2.00in fm: 42.50' to: 52.50'

Depth (ft)	Recovery	Sample No.	Standard Penetration Resistance	Undisturbed Sample	Material Description
		1	4		Waste, lime mud. LM
		2	2		Waste, black ash and lime mud. AG-LM
10		3	5		Waste, black ash and wood yard grit. Little recovery. AG-WF
		4			Waste, wood wastes and lime mud. WF-LM
		5	18		Waste, wood fragments and knots, wood yard grit. WC-WF
20		6	38		Waste, wood fragments, knots. WC
					No recovery.
		7	50		Waste, wood fragments, wood yard grit and knots; large fragments. WC-WF
30					No sample collected.
		8	14		Waste, wood yard grit. WF
40		9	17		Waste, as above from 0-12". WF Greenish-gray fine to medium sand from 12-24". SP
		10	20		Waste, mixture of woodwaste. WF Greenish-gray fine to medium sand. SP
50		11	34		Greenish-gray fine to coarse sand. SP
					Boring terminated at 55 feet. Piezometer installed to 55 feet; water level at 27.25 feet..

Well Construction

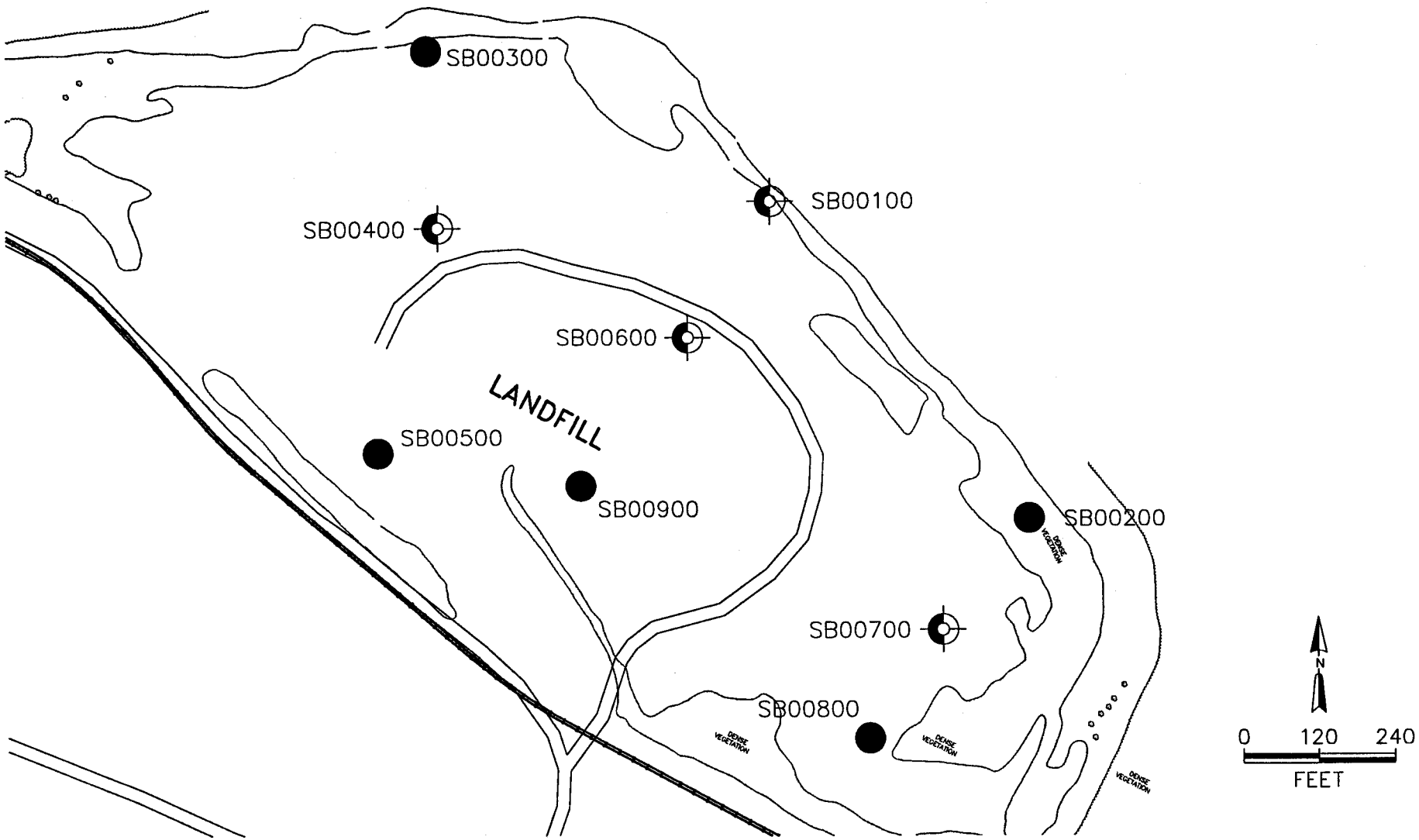


Project Number: E096-014	Site Id: SB00800
Project Name: NEW BERN	Location: Weyerhaeuser - Landfill
Consulting Firm: Delta Environmental	Elevation: 24.83'
Logged By: Rick Powell	Datum: Mean Sea Level
Date(s): 06/11/97 - 06/11/97	Total Depth: 37.00'
Contractor: Law Engineering	Drilling Method: Hollow Stem Auger
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Remarks:	Blank Casing: type: dia: 0.00in fm: 0.0' to:
	Screens: type: size: dia: fm: to:

Depth (ft)	Recovery	Sample No.	Standard Penetration Resistance	Undisturbed Sample	Material Description	Well Construction
		1	5		Waste, light and dark gray lime mud; moist. LM	
		2	5		Waste, lime mud with light to dark gray wood fragments. LM-WC	
10		3	7		Waste, dark gray lime mud with wood fragments. LM-WC	
		4	11		Waste, as above; wet. LM-WC	
		5			Waste, wood fragments and lime mud. WC-LM	
20		6	7		Waste, wood fragments, saturated. WC	
		7	22		Waste, wood fragments; saturated. WC	
		8			Waste, wood fragments; saturated. WC	
30		9	8		Native Soil - Loose to firm light brown and gray fine to medium sand. SP	
		10	14		As above; little recovery. SP	
					Boring terminated at 37 feet.	
40						
50						

Project Number: E096-014	Site Id: SB00900
Project Name: NEW BERN	Location: Weyerhaeuser - Landfill
Consulting Firm: Delta Environmental	Elevation: 34.25'
Logged By: Rick Powell	Datum: Mean Sea Level
Date(s): 06/12/97 - 06/12/97	Total Depth: 42.00'
Contractor: Law Engineering	Drilling Method: Hollow Stem Auger
Annular Fill: type: fm: to: type: fm: to: type: fm: to:	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
	Blank Casing: type: dia: 0.00in fm: 0.0' to:
Remarks:	Screens: type: size: dia: fm: to:

Depth (ft)	Recovery	Sample No.	Standard Penetration Resistance	Undisturbed Sample	Material Description	Well Construction
		1	4		Waste, wood debris. Black pulp, wood grit, sludge. WF	
		2	2		Waste, black ash (sludge), little lime mud, wood fragments, pulp. AG-WC	
		3			Waste, black ash. AG	
10		4	2		Waste, black ash with wood fragments. AG-WC	
		5	9		Waste, black ash with sludge, wood fragments. AG-WC	
20		6	11		Waste, light to dark brown wood fragments, knots. WC	
		7	21		Waste, wood fragments as above with black wood yard grit, sludge. WC-WF	
30		8	12		Waste, as above. WC-WF	
		9	2		Native Soil - Very loose light gray fine to medium sand. SP	
40		10	9		Loose light brown fine to coarse sand.	
					Boring terminated at 42 feet.	
50						



Delta Environmental Consultants, Inc.

TITLE:
SOIL BORING LOCATIONS
WEYERHAEUSER COMPANY – LANDFILL
NEW BERN, NORTH CAROLINA

DWN: BLG	DES.:	PROJECT NO.: E096-019
CHKD:	APPD:	FIGURE NO.: 1
DATE: 08/07/97	REV.:	

APPENDIX B

SLOPE STABILITY MODELING ANALYSIS

GEOTECHNICAL EVALUATION

Introduction

Weyerhaeuser Company located in New Bern, North Carolina operates an approximately thirty-acre landfill on their property. Weyerhaeuser has taken steps to prepare a plan to provide for the landfill to be closed in approximately five years. The first step in this action was to perform a geotechnical evaluation on the existing waste, underlying native soil, and proposed cover material. The geotechnical evaluation provides information about material properties which are used to investigate the slope stability.

Site Work and Testing

From June 2 through June 13, 1997, nine borings were drilled at the landfill site (see Figure 1). The detailed boring logs as well as selected cross sections are included as Attachment I and Figures 2-6, respectively. The waste material consists primarily of ash, lime mud and wood waste. Several laboratory tests were performed on the various waste, underlying native soil, and cover material samples. The tests included unit weight, moisture content, specific gravity, liquid and plastic limits, grain-size distribution analyses, consolidated/undrained triaxial with pore pressures, constant and falling head permeability, and standard proctor compaction. The tests results are included with this report as Attachment II.

Modeling

Data from the consolidated/undrained triaxial with pore pressures analyses were used as input parameters for the slope stability analyses. The slope stability analyses were performed using the model GSLOPE. The model allows the user to develop a soil profile based on specific soil parameters and scaled geographic x-y coordinates. Two separate types of evaluations were performed for the Weyerhaeuser landfill; the Modified Bishop's method was used to simulate slip surface (circular arc) failures. This was modeled for the waste alone and for the waste with the cover material in place. The Janbu method was used to simulate wedge failures. This was modeled with angles from vertical of forty-five and sixty degrees starting at various locations along the sloped waste surface.

The following tables summarize the laboratory test results, and the parameters that were used in the GSLOPE model to characterize the materials. The modeling parameters used in the slope stability analyses were conservative when compared the actual test results.

Table 1. ACTUAL TEST RESULTS (TOTAL STRESS PARAMETERS)

MATERIAL	UNIT WEIGHT (pounds/cubic foot)	COHESION (pounds/square foot)	FRICTION ANGLE (degrees)
Clay Cover	123.2	970	23.1
Waste	68.5-94.7	350-2140	8.3-25.6
Native Soil	116.3-117	2200-3080	30.1-37.6

Table 2. ACTUAL TEST RESULTS (EFFECTIVE STRESS PARAMETERS)

MATERIAL	UNIT WEIGHT (pounds/cubic foot)	COHESION (pounds/square foot)	FRICTION ANGLE (degrees)
Clay Cover	123.2	510	31.1
Waste	68.5-94.7	190-560	35.7-44.8
Native Soil	116.3-117	0-650	35.6-40.5

Table 3. MODELING PARAMETERS

MATERIAL	UNIT WEIGHT (pounds/cubic foot)	COHESION (pounds/square foot)	FRICTION ANGLE (degrees)
Clay Cover	123	500	23
Waste	88	100	12
Native Soil	114	0	30

Modeling input values were based upon effective stress parameters for cohesion and total stress parameters for the friction angle.

Results

The landfill profile was evaluated using a five to one (5:1, H:V) slope with twelve-feet wide benches approximately every twenty feet in elevation. A piezometric surface was input into the model. A full search method was used in the model to identify the critical slip surface failure plane, and specified surfaces were used to identify wedge failures. The slip surfaces were modeled with the waste material alone and with the cover material in place. All wedge failures were modeled with the waste alone, as this presents the worse-case scenario. All analyses reported a factor of safety of at least 1.5. The modeling analyses are included as Attachment III.

Based on the modeling results, it is recommended that the five to one slope with the twelve-feet wide benches should prove to be adequate from a slope stability standpoint.

The discussions contained in this report represent our professional opinions. These opinions are arrived at in accordance with currently accepted hydrogeologic practices at this time and location. Other than this, no warranty is implied or intended.

Dawn C. Reeves 12/17/97 — Dawn C. Reeves, date

12/13/97 — Neil J. Gilbert, P.E., date

CIRCULAR ARC FAILURE WITH COVER MATERIAL

F = 1.553

Material	Unit Wt pcf	C psf	Phi deg	Piezo Surf.	Ru
CLAY COVER	123	500	23	0	0
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

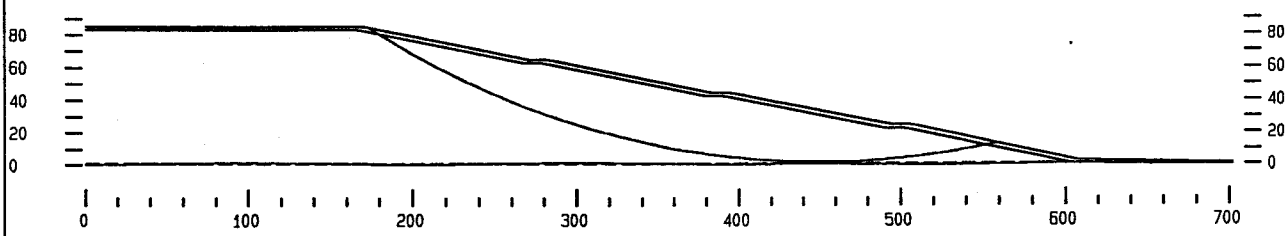
NEW BERN LANDFILL

8/05/97

BENCHED 5:1 SLOPE

SLIP SURFACE FAILURES

cover.gsl



GSLOPE 3.32d

LIMIT EQUILIBRIUM SLOPE STABILITY ANALYSIS

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Delta Environmental - Charlotte NC

Results are for Bishop's Modified Method unless otherwise noted.

File C:\GSLOPE\cover.gsl Output dated 11-24-1997 at 10:18:06

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surf.	Ru	Interaction Coefficient
1 CLAY COVER	123	500	23	0	0	0
2 WASTE MATERIAL	88	100	12	1	0	0
3 NATIVE SAND	114	0	30	1	0	0

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices	M Alpha Warnings
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	504.00	1.5550	3	34	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	506.00	1.8232	3	35	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	508.00	2.0400	3	37	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	510.00	2.2073	3	38	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	512.00	2.3218	3	38	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	514.00	2.4027	3	39	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	516.00	2.4629	3	40	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	518.00	2.5107	3	40	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	520.00	2.5489	3	41	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	522.00	2.5797	3	40	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	524.00	2.6058	3	42	0

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Maximum Slice Width Doubled to  20
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Maximum Slice Width Doubled to  20
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Maximum Slice Width Doubled to  20
   453.00    506.00    520.00   2.5413    3         41         0
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Maximum Slice Width Doubled to  20
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Maximum Slice Width Doubled to  10
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Maximum Slice Width Doubled to  10
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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to 20

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Maximum Slice Width Doubled to  20
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Maximum Slice Width Doubled to  20
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Maximum Slice Width Doubled to  20
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Maximum Slice Width Doubled to  20
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Maximum Slice Width Doubled to  20
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Maximum Slice Width Doubled to  20
   455.00    508.00    516.00   2.3930    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    518.00   2.4516    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    520.00   2.4979    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    522.00   2.5335    3         41         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    524.00   2.5627    3         41         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    526.00   2.5861    3         43         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    507.00   1.5536    3         34         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    509.00   1.8202    3         36         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    511.00   2.0366    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    513.00   2.2056    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    515.00   2.3204    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    517.00   2.4015    3         39         0
```

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

451.00	509.00	519.00	2.4620	3	40	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

451.00	509.00	521.00	2.5099	3	40	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

451.00	509.00	523.00	2.5484	3	41	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

451.00	509.00	525.00	2.5794	3	40	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

451.00	509.00	527.00	2.6057	3	42	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	507.00	1.5549	3	34	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	509.00	1.8227	3	35	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	511.00	2.0389	3	37	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	513.00	2.2044	3	38	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	515.00	2.3186	3	38	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	517.00	2.3991	3	39	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	519.00	2.4592	3	40	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	521.00	2.5072	3	39	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	523.00	2.5445	3	41	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	525.00	2.5751	3	40	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

452.00	509.00	527.00	2.6010	3	43	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	507.00	1.5561	3	34	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	509.00	1.8243	3	35	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	511.00	2.0413	3	37	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	513.00	2.2042	3	38	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	515.00	2.3169	3	39	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	517.00	2.3968	3	39	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	519.00	2.4564	3	40	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	521.00	2.5039	3	38	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	523.00	2.5406	3	41	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	525.00	2.5708	3	40	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

453.00	509.00	527.00	2.5954	3	44	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	507.00	1.5574	3	34	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	509.00	1.8259	3	35	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	511.00	2.0439	3	37	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	513.00	2.2041	3	38	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	515.00	2.3159	3	38	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	517.00	2.3946	3	38	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	519.00	2.4538	3	40	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	521.00	2.5007	3	38	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	523.00	2.5368	3	41	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	525.00	2.5666	3	40	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

454.00	509.00	527.00	2.5906	3	43	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

455.00	509.00	507.00	1.5586	3	34	0

Maximum Slice Width Doubled to 10
Maximum Slice Width Doubled to 20

455.00	509.00	509.00	1.8269	3	34	0

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Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    511.00   2.0467    3         37         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    513.00   2.2043    3         37         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    515.00   2.3138    3         39         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    517.00   2.3925    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    519.00   2.4511    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    521.00   2.4975    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    523.00   2.5332    3         41         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    525.00   2.5626    3         41         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    527.00   2.5860    3         43         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    508.00   1.5532    3         34         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    510.00   1.8191    3         36         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    512.00   2.0355    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    514.00   2.2051    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    516.00   2.3200    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    518.00   2.4011    3         39         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    520.00   2.4617    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    522.00   2.5097    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    524.00   2.5482    3         41         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    526.00   2.5793    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    528.00   2.6056    3         42         0
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Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    508.00   1.5545    3         34         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    510.00   1.8219    3         35         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    512.00   2.0377    3         37         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    514.00   2.2037    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    516.00   2.3181    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    518.00   2.3987    3         39         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    520.00   2.4588    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    522.00   2.5069    3         39         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    524.00   2.5443    3         41         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    526.00   2.5750    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    528.00   2.6009    3         43         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    508.00   1.5557    3         34         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    510.00   1.8236    3         35         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    512.00   2.0401    3         37         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    514.00   2.2033    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    516.00   2.3164    3         39         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    518.00   2.3964    3         39         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    520.00   2.4561    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    522.00   2.5036    3         39         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    524.00   2.5404    3         41         0
```

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Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    526.00   2.5707    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    528.00   2.5953    3         44         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    508.00   1.5569    3         34         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    510.00   1.8252    3         35         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    512.00   2.0426    3         37         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    514.00   2.2032    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    516.00   2.3154    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    518.00   2.3941    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    520.00   2.4534    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    522.00   2.5004    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    524.00   2.5366    3         41         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    526.00   2.5664    3         40         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    528.00   2.5904    3         43         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    508.00   1.5581    3         34         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    510.00   1.8262    3         34         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    512.00   2.0455    3         37         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    514.00   2.2032    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    516.00   2.3132    3         39         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    518.00   2.3920    3         38         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    520.00   2.4507    3         40         0
```

```
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00     510.00     522.00    2.4972     3          38          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00     510.00     524.00    2.5329     3          41          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00     510.00     526.00    2.5624     3          41          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00     510.00     528.00    2.5859     3          43          0

Minimum Bishop Factor of Safety this run:
   451.00     510.00     508.00    1.5532     3          34          0
```

CIRCULAR ARC FAILURE WITHOUT COVER MATERIAL

F = 1.54

Material	Unit Wt pcf	C psf	Phi deg	Piezo Surf.	Ru
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

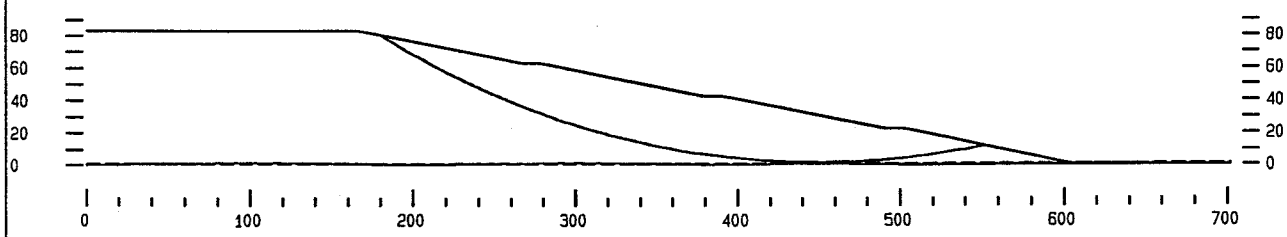
NEW BERN LANDFILL

8/05/97

BENCHED 5:1 SLOPE

SLIP SURFACE FAILURES

slip1.gsl



GSLOPE 3.32d

LIMIT EQUILIBRIUM SLOPE STABILITY ANALYSIS

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Delta Environmental - Charlotte NC

Results are for Bishop's Modified Method unless otherwise noted.

File C:\GSLOPE\slip1.gsl Output dated 11-24-1997 at 10:19:54

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surf.	Ru	Interaction Coefficient
1 WASTE MATERIAL	88	100	12	1	0	0
2 NATIVE SAND	114	0	30	1	0	0

X-centre	Y-centre	Radius	Factor of Safety	Iterations	Slices	M Alpha Warnings
Maximum Slice Width Doubled to 10						
451.00	506.00	504.00	1.5418	3	48	0
Maximum Slice Width Doubled to 10						
451.00	506.00	506.00	1.8108	3	49	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	508.00	2.0297	3	29	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	510.00	2.1977	3	29	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	512.00	2.3036	3	31	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	514.00	2.3767	3	31	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	516.00	2.4288	3	32	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	518.00	2.4679	3	31	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	520.00	2.4988	3	33	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	522.00	2.5234	3	32	0
Maximum Slice Width Doubled to 10						
Maximum Slice Width Doubled to 20						
451.00	506.00	524.00	2.5440	3	33	0
Maximum Slice Width Doubled to 10						
452.00	506.00	504.00	1.5428	3	48	0
Maximum Slice Width Doubled to 10						

```
   452.00    506.00    506.00   1.8123    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    506.00    508.00   2.0312    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    506.00    510.00   2.1971    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    506.00    512.00   2.3036    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    506.00    514.00   2.3743    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    506.00    516.00   2.4265    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    506.00    518.00   2.4650    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    506.00    520.00   2.4953    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    506.00    522.00   2.5194    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    506.00    524.00   2.5396    3         33         0
Maximum Slice Width Doubled to  10
   453.00    506.00    504.00   1.5438    3         48         0
Maximum Slice Width Doubled to  10
   453.00    506.00    506.00   1.8139    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    506.00    508.00   2.0328    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    506.00    510.00   2.1964    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    506.00    512.00   2.3028    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    506.00    514.00   2.3727    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    506.00    516.00   2.4242    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    506.00    518.00   2.4622    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    506.00    520.00   2.4919    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    506.00    522.00   2.5154    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    506.00    524.00   2.5350    3         32         0
Maximum Slice Width Doubled to  10
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   454.00    506.00    504.00   1.5448    3         48          0
Maximum Slice Width Doubled to  10
   454.00    506.00    506.00   1.8153    3         48          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    506.00    508.00   2.0344    3         29          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    506.00    510.00   2.1956    3         29          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    506.00    512.00   2.3021    3         31          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    506.00    514.00   2.3714    3         31          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    506.00    516.00   2.4221    3         32          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    506.00    518.00   2.4602    3         30          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    506.00    520.00   2.4886    3         32          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    506.00    522.00   2.5115    3         32          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    506.00    524.00   2.5298    3         33          0
Maximum Slice Width Doubled to  10
   455.00    506.00    504.00   1.5458    3         48          0
Maximum Slice Width Doubled to  10
   455.00    506.00    506.00   1.8167    3         48          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    506.00    508.00   2.0360    3         29          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    506.00    510.00   2.1948    3         29          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    506.00    512.00   2.3016    3         30          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    506.00    514.00   2.3702    3         31          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    506.00    516.00   2.4200    3         32          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    506.00    518.00   2.4575    3         30          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    506.00    520.00   2.4854    3         32          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    506.00    522.00   2.5079    3         33          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
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   455.00    506.00    524.00   2.5255    3         33         0
Maximum Slice Width Doubled to  10
   451.00    507.00    505.00   1.5414    3         48         0
Maximum Slice Width Doubled to  10
   451.00    507.00    507.00   1.8101    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    507.00    509.00   2.0288    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    507.00    511.00   2.1969    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    507.00    513.00   2.3028    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    507.00    515.00   2.3760    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    507.00    517.00   2.4282    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    507.00    519.00   2.4673    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    507.00    521.00   2.4984    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    507.00    523.00   2.5230    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    507.00    525.00   2.5437    3         33         0
Maximum Slice Width Doubled to  10
   452.00    507.00    505.00   1.5424    3         48         0
Maximum Slice Width Doubled to  10
   452.00    507.00    507.00   1.8117    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    507.00    509.00   2.0303    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    507.00    511.00   2.1962    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    507.00    513.00   2.3027    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    507.00    515.00   2.3735    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    507.00    517.00   2.4258    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    507.00    519.00   2.4644    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    507.00    521.00   2.4948    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    507.00    523.00   2.5190    3         32         0
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Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    507.00    525.00   2.5393    3         33         0
Maximum Slice Width Doubled to  10
   453.00    507.00    505.00   1.5434    3         48         0
Maximum Slice Width Doubled to  10
   453.00    507.00    507.00   1.8132    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    507.00    509.00   2.0319    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    507.00    511.00   2.1956    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    507.00    513.00   2.3019    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    507.00    515.00   2.3720    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    507.00    517.00   2.4235    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    507.00    519.00   2.4616    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    507.00    521.00   2.4914    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    507.00    523.00   2.5150    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    507.00    525.00   2.5347    3         32         0
Maximum Slice Width Doubled to  10
   454.00    507.00    505.00   1.5444    3         48         0
Maximum Slice Width Doubled to  10
   454.00    507.00    507.00   1.8146    3         48         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    507.00    509.00   2.0335    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    507.00    511.00   2.1948    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    507.00    513.00   2.3012    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    507.00    515.00   2.3706    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    507.00    517.00   2.4214    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    507.00    519.00   2.4595    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    507.00    521.00   2.4881    3         32         0
Maximum Slice Width Doubled to  10
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Maximum Slice Width Doubled to  20
   454.00    507.00    523.00   2.5111    3         32          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    507.00    525.00   2.5294    3         33          0
Maximum Slice Width Doubled to  10
   455.00    507.00    505.00   1.5454    3         48          0
Maximum Slice Width Doubled to  10
   455.00    507.00    507.00   1.8160    3         48          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    507.00    509.00   2.0352    3         29          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    507.00    511.00   2.1940    3         29          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    507.00    513.00   2.3006    3         30          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    507.00    515.00   2.3694    3         31          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    507.00    517.00   2.4193    3         32          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    507.00    519.00   2.4568    3         30          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    507.00    521.00   2.4848    3         32          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    507.00    523.00   2.5075    3         33          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    507.00    525.00   2.5251    3         33          0
Maximum Slice Width Doubled to  10
   451.00    508.00    506.00   1.5410    3         48          0
Maximum Slice Width Doubled to  10
   451.00    508.00    508.00   1.8094    3         49          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    508.00    510.00   2.0279    3         29          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    508.00    512.00   2.1960    3         30          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    508.00    514.00   2.3020    3         31          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    508.00    516.00   2.3753    3         31          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    508.00    518.00   2.4275    3         32          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    508.00    520.00   2.4668    3         31          0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
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   451.00    508.00    522.00   2.4980    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    508.00    524.00   2.5227    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    508.00    526.00   2.5435    3         33         0
Maximum Slice Width Doubled to  10
   452.00    508.00    506.00   1.5420    3         48         0
Maximum Slice Width Doubled to  10
   452.00    508.00    508.00   1.8110    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    508.00    510.00   2.0295    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    508.00    512.00   2.1954    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    508.00    514.00   2.3018    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    508.00    516.00   2.3728    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    508.00    518.00   2.4252    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    508.00    520.00   2.4639    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    508.00    522.00   2.4944    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    508.00    524.00   2.5187    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    508.00    526.00   2.5390    3         33         0
Maximum Slice Width Doubled to  10
   453.00    508.00    506.00   1.5430    3         48         0
Maximum Slice Width Doubled to  10
   453.00    508.00    508.00   1.8125    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    508.00    510.00   2.0311    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    508.00    512.00   2.1947    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    508.00    514.00   2.3010    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    508.00    516.00   2.3712    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    508.00    518.00   2.4229    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    508.00    520.00   2.4611    3         31         0
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Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    508.00    522.00   2.4909    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    508.00    524.00   2.5147    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    508.00    526.00   2.5344    3         32         0
Maximum Slice Width Doubled to  10
   454.00    508.00    506.00   1.5441    3         48         0
Maximum Slice Width Doubled to  10
   454.00    508.00    508.00   1.8139    3         48         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    508.00    510.00   2.0327    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    508.00    512.00   2.1940    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    508.00    514.00   2.3003    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    508.00    516.00   2.3698    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    508.00    518.00   2.4206    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    508.00    520.00   2.4589    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    508.00    522.00   2.4875    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    508.00    524.00   2.5107    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    508.00    526.00   2.5291    3         33         0
Maximum Slice Width Doubled to  10
   455.00    508.00    506.00   1.5451    3         48         0
Maximum Slice Width Doubled to  10
   455.00    508.00    508.00   1.8154    3         48         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    510.00   2.0343    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    512.00   2.1932    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    514.00   2.2997    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    516.00   2.3685    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    518.00   2.4185    3         32         0
Maximum Slice Width Doubled to  10
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Maximum Slice Width Doubled to  20
   455.00    508.00    520.00   2.4562    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    522.00   2.4843    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    524.00   2.5071    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    508.00    526.00   2.5248    3         33         0
Maximum Slice Width Doubled to  10
   451.00    509.00    507.00   1.5406    3         48         0
Maximum Slice Width Doubled to  10
   451.00    509.00    509.00   1.8087    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    511.00   2.0270    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    513.00   2.1951    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    515.00   2.3012    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    517.00   2.3746    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    519.00   2.4269    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    521.00   2.4663    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    523.00   2.4976    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    525.00   2.5224    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    509.00    527.00   2.5432    3         33         0
Maximum Slice Width Doubled to  10
   452.00    509.00    507.00   1.5416    3         48         0
Maximum Slice Width Doubled to  10
   452.00    509.00    509.00   1.8103    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    509.00    511.00   2.0286    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    509.00    513.00   2.1946    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    509.00    515.00   2.3010    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    509.00    517.00   2.3720    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
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   452.00    509.00    519.00   2.4245    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    509.00    521.00   2.4633    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    509.00    523.00   2.4940    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    509.00    525.00   2.5183    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    509.00    527.00   2.5388    3         33         0
Maximum Slice Width Doubled to  10
   453.00    509.00    507.00   1.5427    3         48         0
Maximum Slice Width Doubled to  10
   453.00    509.00    509.00   1.8118    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    509.00    511.00   2.0302    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    509.00    513.00   2.1939    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    509.00    515.00   2.3001    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    509.00    517.00   2.3705    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    509.00    519.00   2.4222    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    509.00    521.00   2.4605    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    509.00    523.00   2.4904    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    509.00    525.00   2.5143    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    509.00    527.00   2.5344    3         33         0
Maximum Slice Width Doubled to  10
   454.00    509.00    507.00   1.5437    3         48         0
Maximum Slice Width Doubled to  10
   454.00    509.00    509.00   1.8133    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    509.00    511.00   2.0318    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    509.00    513.00   2.1932    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    509.00    515.00   2.2994    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    509.00    517.00   2.3690    3         31         0
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Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    509.00    519.00   2.4200    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    509.00    521.00   2.4583    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    509.00    523.00   2.4870    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    509.00    525.00   2.5103    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    509.00    527.00   2.5288    3         33         0
Maximum Slice Width Doubled to  10
   455.00    509.00    507.00   1.5447    3         48         0
Maximum Slice Width Doubled to  10
   455.00    509.00    509.00   1.8147    3         48         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    511.00   2.0335    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    513.00   2.1924    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    515.00   2.2987    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    517.00   2.3677    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    519.00   2.4178    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    521.00   2.4556    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    523.00   2.4837    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    525.00   2.5066    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    509.00    527.00   2.5244    3         33         0
Maximum Slice Width Doubled to  10
   451.00    510.00    508.00   1.5402    3         48         0
Maximum Slice Width Doubled to  10
   451.00    510.00    510.00   1.8080    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    512.00   2.0262    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    514.00   2.1943    3         30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    516.00   2.3005    3         31         0
Maximum Slice Width Doubled to  10
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Maximum Slice Width Doubled to  20
   451.00    510.00    518.00   2.3739    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    520.00   2.4263    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    522.00   2.4658    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    524.00   2.4972    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    526.00   2.5221    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   451.00    510.00    528.00   2.5430    3         33         0
Maximum Slice Width Doubled to  10
   452.00    510.00    508.00   1.5413    3         48         0
Maximum Slice Width Doubled to  10
   452.00    510.00    510.00   1.8096    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    512.00   2.0277    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    514.00   2.1937    3         30         0
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Maximum Slice Width Doubled to  20
   452.00    510.00    516.00   2.3002    3         30         0
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Maximum Slice Width Doubled to  20
   452.00    510.00    518.00   2.3713    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    520.00   2.4239    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    522.00   2.4628    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   452.00    510.00    524.00   2.4936    3         33         0
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Maximum Slice Width Doubled to  20
   452.00    510.00    526.00   2.5180    3         32         0
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Maximum Slice Width Doubled to  20
   452.00    510.00    528.00   2.5385    3         33         0
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   453.00    510.00    508.00   1.5423    3         48         0
Maximum Slice Width Doubled to  10
   453.00    510.00    510.00   1.8111    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    512.00   2.0293    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    514.00   2.1931    3         29         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
```

```
   453.00    510.00    516.00   2.2993    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    518.00   2.3697    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    520.00   2.4215    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    522.00   2.4599    3         31         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    524.00   2.4900    3         33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    526.00   2.5139    3         32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   453.00    510.00    528.00   2.5341    3         33         0
Maximum Slice Width Doubled to  10
   454.00    510.00    508.00   1.5433    3         48         0
Maximum Slice Width Doubled to  10
   454.00    510.00    510.00   1.8127    3         49         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   454.00    510.00    512.00   2.0309    3         29         0
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Maximum Slice Width Doubled to  20
   454.00    510.00    514.00   2.1923    3         29         0
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Maximum Slice Width Doubled to  20
   454.00    510.00    516.00   2.2985    3         31         0
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Maximum Slice Width Doubled to  20
   454.00    510.00    518.00   2.3682    3         31         0
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Maximum Slice Width Doubled to  20
   454.00    510.00    520.00   2.4193    3         32         0
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Maximum Slice Width Doubled to  20
   454.00    510.00    522.00   2.4577    3         30         0
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Maximum Slice Width Doubled to  20
   454.00    510.00    524.00   2.4865    3         32         0
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Maximum Slice Width Doubled to  20
   454.00    510.00    526.00   2.5100    3         32         0
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Maximum Slice Width Doubled to  20
   454.00    510.00    528.00   2.5285    3         33         0
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   455.00    510.00    508.00   1.5443    3         48         0
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   455.00    510.00    510.00   1.8140    3         48         0
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   455.00    510.00    512.00   2.0327    3         29         0
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Maximum Slice Width Doubled to  20
   455.00    510.00    514.00   2.1916    3         29         0
```

```
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    516.00   2.2978    3        31         0
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Maximum Slice Width Doubled to  20
   455.00    510.00    518.00   2.3669    3        31         0
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Maximum Slice Width Doubled to  20
   455.00    510.00    520.00   2.4171    3        32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    522.00   2.4550    3        30         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    524.00   2.4832    3        32         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    526.00   2.5062    3        33         0
Maximum Slice Width Doubled to  10
Maximum Slice Width Doubled to  20
   455.00    510.00    528.00   2.5241    3        33         0

Minimum Bishop Factor of Safety this run:
   451.00    510.00    508.00   1.5402    3        48         0
```

SIXTY DEGREE WEDGE FAILURES

Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

NEW BERN LANDFILL

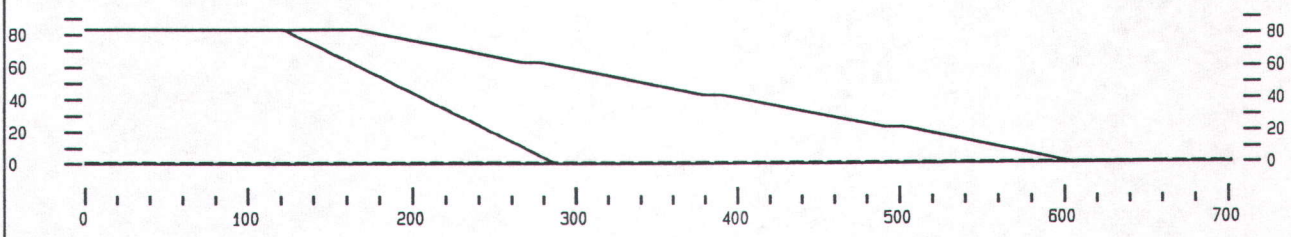
8/05/97

BENCHED 5:1 SLOPE

WEDGE FAILURE (60 DEGREES)

wedge5.gsl

F = 1.581 (Janbu)



Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

NEW BERN LANDFILL

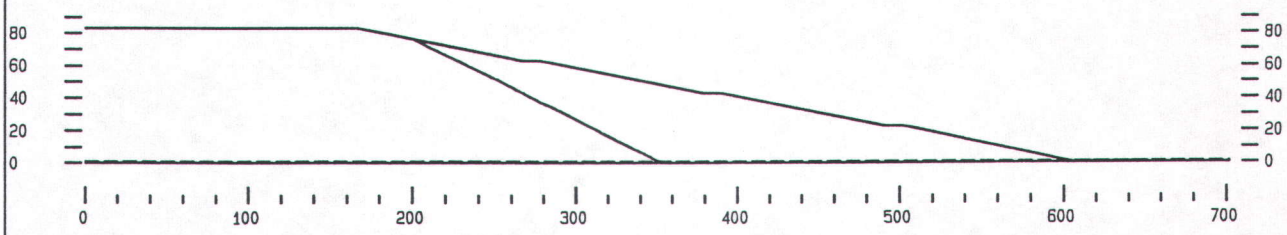
8/05/97

BENCHED 5:1 SLOPE

WEDGE FAILURE (60 DEGREES)

wedge6.gsl

F = 1.62 (Janbu)



Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

F = 1.735 (Janbu)

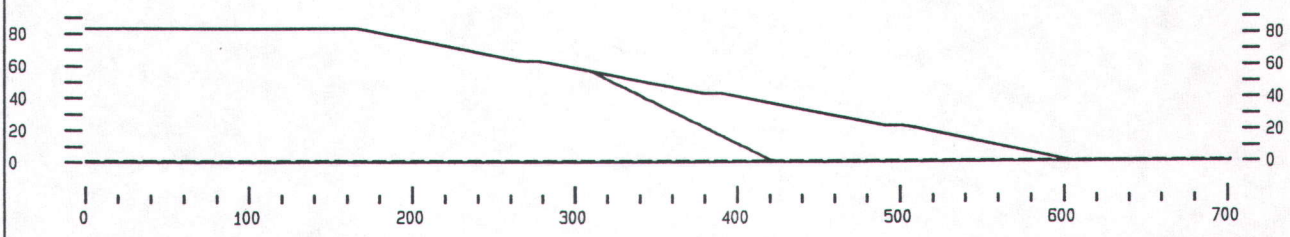
NEW BERN LANDFILL

8/05/97

BENCHED 5:1 SLOPE

WEDGE FAILURE (60 DEGREES)

wedge7.gsl



Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

NEW BERN LANDFILL

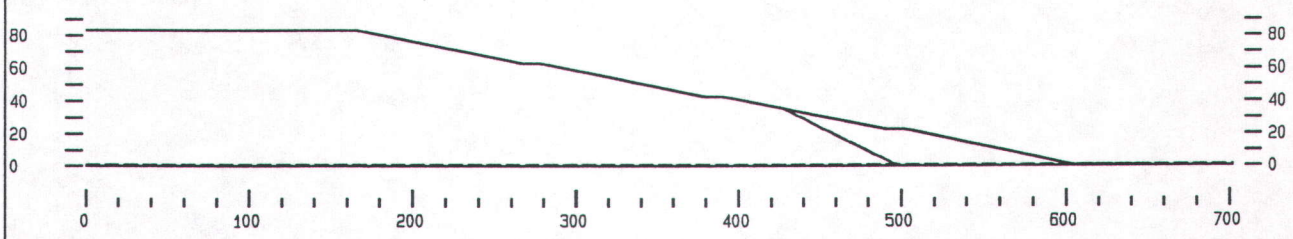
8/05/97

BENCHED 5: 1 SLOPE

WEDGE FAILURE (60 DEGREES)

wedge8.gsl

F = 2.095 (Janbu)



Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

NEW BERN LANDFILL

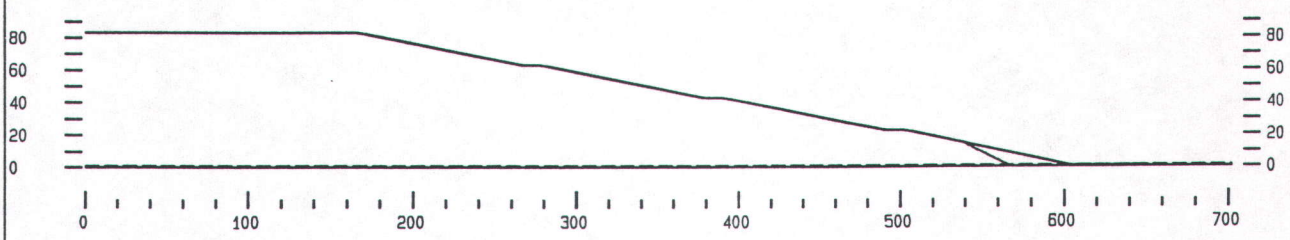
8/05/97

BENCHED 5:1 SLOPE

WEDGE FAILURE (60 DEGREES)

wedge8a.gsl

F = 3.986 (Janbu)



FOURTY-FIVE DEGREE WEDGE FAILURES

Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

NEW BERN LANDFILL

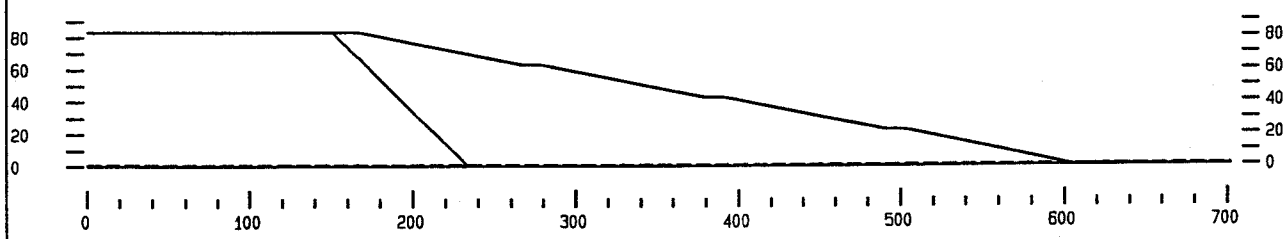
8/05/97

BENCHED 5:1 SLOPE

WEDGE FAILURE (45 DEGREES)

F = 1.629 (Janbu)

wedge1.gsl



Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

NEW BERN LANDFILL

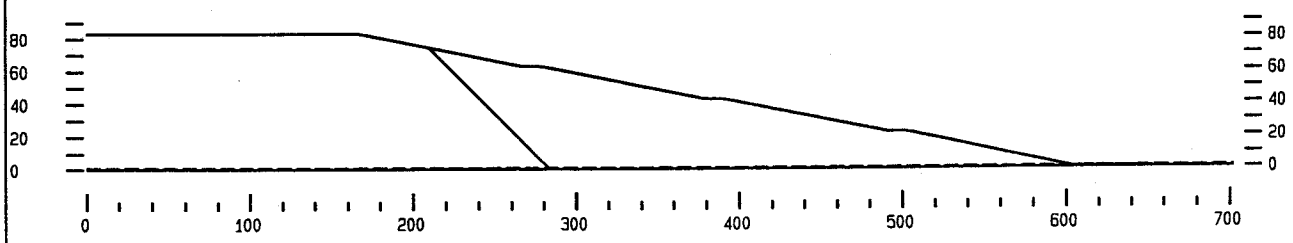
8/05/97

BENCHED 5:1 SLOPE

WEDGE FAILURE (45 DEGREES)

wedge2.gsl

F = 1.687 (Janbu)



Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

NEW BERN LANDFILL

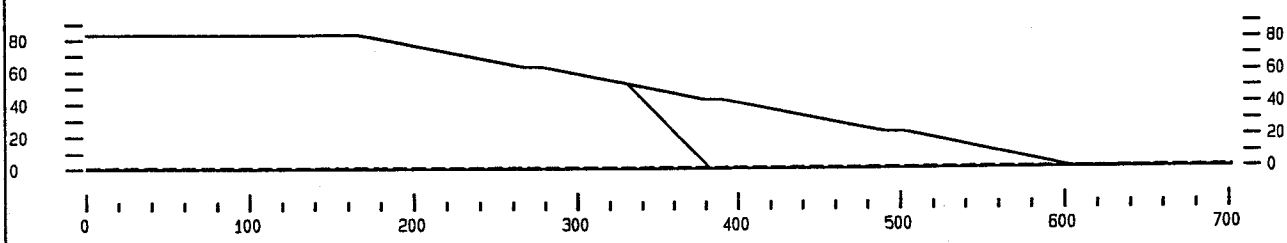
8/05/97

BENCHED 5:1 SLOPE

WEDGE FAILURE (45 DEGREES)

wedge3.gsl

F = 1.832 (Janbu)



Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

NEW BERN LANDFILL

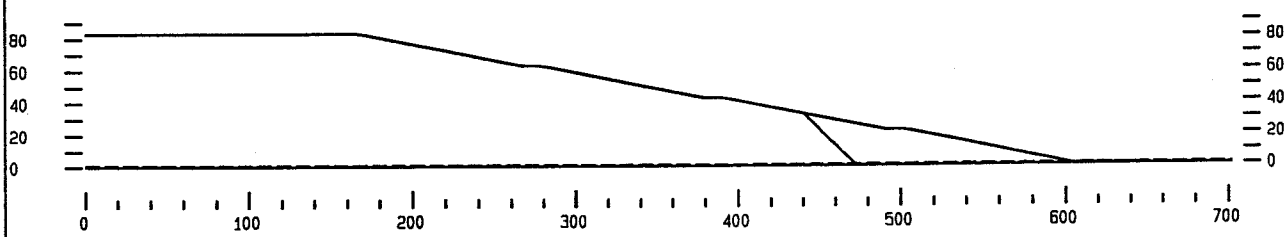
8/05/97

BENCHED 5:1 SLOPE

WEDGE FAILURE (45 DEGREES)

wedge4.gsl

F = 2.092 (Janbu)



Material	Unit Wt	C	Phi	Piezo	Ru
	pcf	psf	deg	Surf.	
WASTE MATERIAL	88	100	12	1	0
NATIVE SAND	114	0	30	1	0

Delta Environmental - Charlotte NC

E096-019-2.0002

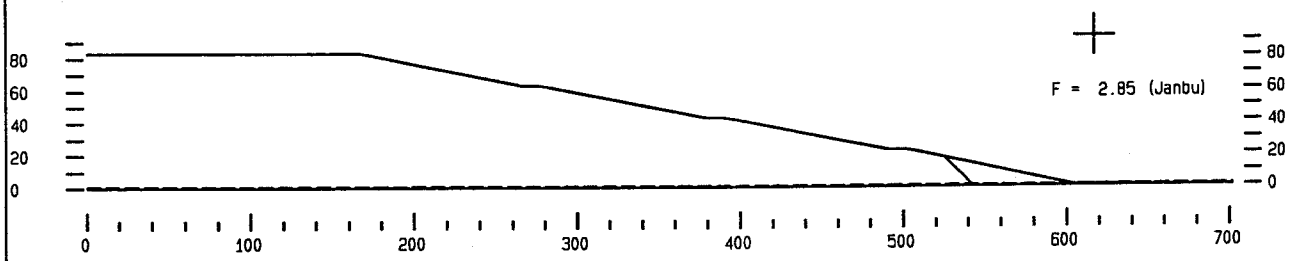
NEW BERN LANDFILL

8/05/97

BENCHED 5:1 SLOPE

WEDGE FAILURE (45 DEGREES)

wedge4a.gsl



APPENDIX C

GROUND WATER SAMPLING LABORATORY RESULTS

JUL 28

WEYERHAEUSER ANALYTICAL & TESTING SERVICES

New Bern, North Carolina (919) 633-7202

Service Request: 92007
Title: New Bern Landfill Groundwater (Delta Env. Consultants)
Submitter: Rick Powell
Date Received: 6/16/97

Submitter's Designation	Date Collected	Time Collected	Lab Code	BOD by method SM 5210 mg/L	COD by method SM 5220C mg/L	Turbidity by method EPA 180.1 mg/L	pH by method SM4500H+B units	TDS by method SM 2540C mg/L	AOX by method SM 5320 mg/L
PZ00100	6/13/97	1010	29064	8	380	-----	7.50	2835	0.13
Turbidity	6/13/97	930	29065	-----	-----	700	-----	-----	-----
Turbidity	6/13/97	1010	29066	-----	-----	320	-----	-----	-----

Reviewed by: Glen R Berrow Date: 6/27/97
SR92007.XLS

ANALYTICAL LABORATORY SERVICES REQUEST

Weyerhaeuser Research and Development – Analysis and Testing

Request Number:	04162

Title: NEW BERN LANDFILL GROUNDWATER - DELTA ENVIRONMENTAL CONSULTANTS - NB 92007		
Number of Samples: 1	Project Number: 046-5751	Groups: 3 4
Date Received: 06/17/97	Date Desired: 07/07/97	Sample Disposition:
Submitted By: MAIMONE, BOB	Location: New Bern 121	Ph: 8-633-7202
Reviewed By: LANZA Mary Beth	Location: WTC 2F25	Ph: 924-6013/6188
Copy To:		

Sample Description and History:

NEED ELECTRONIC DATA DELIVERABLES

Group	Series	Test Description			
			Report Range	Report Basis	Lower Limit of Sensitivity
3	B	*As, Se*			
3	B	Mercury			
3	B	ICP/MS *Ba, Cd, Cu, Cr, Fe, Pb, Mn, Ag, Zn*			
4	A	Fluoride	PPM		
4	A	Ion Scan - 300 *Cl, SO4, NO2, NO3*	PPM		
4	A	Total Organic Carbon for Permit Work (NPDES)	PCT		

Sample Number	Series to Be Evaluated	Submitters Designation	Date Recd
83630	AB	29064 PZ00100 06/13/97 1010	06/17/97

Reference:		Record Book:
Results Approved: Mary Beth Lanza	Date: 07-21-97	

Updated: 06/17/97 14:34

Weyerhaeuser Company
Analytical Laboratories
Tacoma, Washington

Service Request 04162

Report

New Bern Landfill Groundwater

Sample Designation	Analytical Lab Code	Total Organic Carbon (TOC)	Fluoride F	Chloride Cl	Nitrite-N NO_2-N	Sulfate SO_4	Nitrate-N NO_3-N
				mg/L			
29064 PZ00100 06/13/97 1010	83630	136	0.1	75.1	< 0.2	34.3	< 0.02
	83630D	132	0.09	75.6	< 0.2	35.1	< 0.02
	Date Analyzed:	07/02/97	07/01/97	06/24/97	06/24/97	06/24/97	06/24/97
	Method:	EPA 415.1	AM1-340.2	EPA 300.0	EPA 300.0	EPA 300.0	EPA 300.0

WS

Approved: Bill Trout Date: 7/7/97

Weyerhaeuser Company
Analytical Laboratories
Tacoma, Washington

Service Request 04162

Report

New Bern Landfill Groundwater

Sample Designation	29064 PZ00100 06/13/97 1010		
Analytical Lab Code	83630	**Quantitation Limit**	**Method Number**
Total Metals	(µg/L)		
Ag	< 10	10	AM1-3010/6010
As	< 10	10	CEM RD42/200.9
Ba	100	50	AM1-3010/6010
Cd	< 1	1	CEM RD42/200.9
Cr	20	10	AM1-3010/6010
Cu	< 200	200	AM1-3010/6010
Fe	8530	20	AM1-3010/6010
Hg	< 0.2	0.2	AM1-245.1
Mn	126	2	AM1-3010/6010
Pb	< 10	10	AM1-3010/6010
Se	< 20	20	CEM RD42/200.9
Zn	< 50	50	AM1-3010/6010

Approved: Mary Beth Lanza MBL

Report Date 07/18/97 04162M.XLS

Weyerhaeuser Company
Analytical Laboratories
Tacoma, Washington

Service Request 04162

Report
New Bern Landfill Groundwater
Total Metals Analysis

Duplicate Report

Element	Sample 83630 Found	Duplicate Found	RPD
	(µg/L)		
Ag	< 10	< 10	NA
As	< 10	< 10	NA
Ba	104	104	0
Cd	< 1	< 1	NA
Cr	25	27	8
Cu	< 200	< 200	NA
Fe	8530	8280	3.0
Hg	< 0.2	< 0.2	NA
Mn	126	125	0.8
Pb	< 10	< 10	NA
Se	< 20	< 20	NA
Zn	< 50	< 50	NA

Spike Recovery Report

Element	Sample 83630 Found	Spike 83630 Found	Net Spike	Spike Level	% Recovery
		(µg/L)			
Ag	< 10	12	12	12	100
As	< 10	21	21	20	105
Ba	104	160	56	62	90
Cd	< 1	9.7	9.7	10	97
Cr	25	78	53	62	85
Cu	< 200	113(2)	113	125	90
Fe	8530	8370	160	125(1)	128
Hg	< 0.2	1.9	1.9	2.0	95
Mn	126	180	54	62	87
Pb	< 10	114	114	125	91
Se	< 20	34	34	40	85
Zn	32 (3)	88	88	62	90

Notes:
(1) Fe was spiked at a level too low with respect to the sample concentration.
(2) Copper was spiked at our routine level which is less than the required quantitation limit (but greater than the method detection limit so the actual value was used for QC calculations).
(3) Zinc was found at a level less than the required quantitation limit (but greater than the method detection limit so the actual value was used for QC calculations).

Approved: Mary Beth Lanza MBL

Report Date 07/18/97 04162M.XLS

Weyerhaeuser Company
Analytical Laboratories
Tacoma, Washington

Service Request 04162

Report

New Bern Landfill Groundwater
Total Metals Analysis

Water Laboratory Control Sample Report

Element	Sample Found	True Value	Lower Limit	Upper Limit	% Recovery
		(µg/L)			
Ag	72	100	*	*	72
As	50	50	42	58	100
Ba	411	500	*	*	82
Cd	25	25	21	29	100
Cr	390	500	*	*	78
Cu	814	1000	*	*	81
Fe	800	1000	*	*	80
Hg	1.58	1.50	1.40	1.67	105
Mn	391	500	*	*	78
Pb	770	1000	*	*	77
Se	100	100	85	115	100
Zn	390	500	*	*	78

*None established

Method Blank Report

Element	Method Blank Found	Quantitation Limit
Ag	< 10	10
As	< 10	10
Ba	< 50	50
Cd	< 1	1
Cr	< 10	10
Cu	< 200	200
Fe	< 20	20
Hg	< 0.2	0.2
Mn	< 2	2
Pb	< 10	10
Se	< 20	20
Zn	< 50	50

Approved: Mary Beth Lanza MBL

Report Date 07/21/97 04162M.XLS

Weyerhaeuser

Analytical & Testing Services

Sample Analysis Request/Chain of Custody Form

Date 6/13/97

Page 1 of 1

Facility New Bern NC

Sampler's Project No. E096-019

Weyerhaeuser Account No.

Sampled by:
- ☐ Facility
- ☐ E&AS/WTC
- ☐ E&AS/NB

Consultant: Delta Env. Consultants, Inc
Address: 6701 Carmel Rd, Suite 200, Charlotte NC 28226
Phone No.: (704) 541-9840 FAX 543-4035

Project Manager (print): S. Recker

Sampler Name (print): Rick Powell

Recorded By (signed): Rick Powell

Sample Description (ID, Date, Time are Required)

NB#	Method	Field Sample ID (15 characters max.)	Date (m/d/y)	Time (hh:mm)	Depth (ft / m)	Matrix: Water	Matrix: Soil/Sed	Matrix: Oil	Preservative: HCl	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: $Na_2S_2O_3$	Preservative: Filtered	Number of Containers	pH Cond TDS TSS Color Tannins	Volatile Organics / BTEX	Semi-volatile Organics	TPH: 418.1 TPH-G TPH-D	Ca Mg Na K Fe Mn	Metals (list below)	NH_3 HCO_3 CO_3 Cl F NO_3 SO_4	AOX	TCLP: Metals VOA SVOA Pest Herb PCBs	Dioxin: Total / 2,3,7,8-TCDD / 2,3,7,8-TCDF	CN	BOD P-ortho	TKN P-total TOC COD					Notes
29064		PZ00100	6/13/97	1010		X				✓	✓			5	X					X	X	X				X	X					2 METS 1 PLN 1 APP 1 AOX
29065		Turbidity	↓	0930		↓								1															100			1 PLN
29066		Turbidity	↓	1010		↓								1													700					1 PLN *

Method: G, grab; D, depth composite; T, time composite. Depth required for soil or sediment samples.

Remarks/Detection Limit Requirements

As, Ba, Cd, Cu, total Cr, Fe, Pb, Mn, Hg, Se, Ag, Zn

☒ Samples on Ice or Blue Ice

Lab Turn-Around Time
- ☐ 24 Hr ☐ 48 Hr ☐ 7 Day
- ☒ 2-3 wk Date Due: 7/7/97

Reporting and QA/QC Requirements

RESULTS TO: Rick Powell, Delta-Charlotte NC

CC:

- ☐ CLP Package
- ☐ NPDES Permit
- ☐ Other:
- ☒ Electronic Report to be used for GIS key

Laboratory
- ☐ WATS/WTC ☒ WATS/NB
- ☐ Other:

Lab SR#: NB-92007

Case ID:

SDG ID:

Sample Chain of Custody and Shipping Method Record

Relinquished By Sampler (signature):	Date	Time	Received By (signature):	Shipping Method
Rick Powell	6/13/97	1110	Bob Maimone 6/13/97 11:10	
Relinquished By (signature): Bob Maimone	Date 6/16/97	Time 14:50	Received By (signature):	Airbill No.
Relinquished By (signature):	Date	Time	Received For Laboratory By (signature): pH on APP @ NB not < 2 on receipt, preserved in lab < 2 w/ H_2SO_4; pH on METS @ NB not < 2 on receipt, preserved in lab < 2 w/ HNO_3	

Samples Received Intact: Cooler Temp: 15 °C

WATS/WTC: 32901 Weyerhaeuser Way South, Federal Way, WA 98003 (206-924-6293)

WATS/NB: New Bern R&D Field Station, Highway 43 North, New Bern, NC 28563 (919-633-7238)

* 1-L PLN split & 1500mL PLN sent to WTC, along w/ 120mL APP, 2 1-L METS EM 6/16/97

samples freshly collected, not completely chilled.

Form 16307 (2/96) Printing Services TP-1 Tacoma

APPENDIX D

SOIL SAMPLING LABORATORY RESULTS

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

July 14, 1997

Weyerhaeuser
1785 Weyerhaeuser Road
Vanceboro, NC 28586

Attention: Mr. Richard Gay

Subject: **TRANSMITTAL OF LABORATORY TEST DATA**
SOLID WASTE LANDFILL PROJECT
NEW BERN FACILITY
LAW PROJECT NO. 30710-7-2241

Dear Richard:

Attached are the results of laboratory testing conducted on samples obtained from the solid waste landfill at the New Bern Facility. This work was conducted in general accordance with the Laboratory Specifications developed by Delta Environmental.

Test assignments were made by Delta. The attached spreadsheet summarizes the assignments made for the testing program. A copy of this letter and lab data has also been transmitted to Mr. Scott Recker at Delta.

We appreciate this opportunity to be of service to you. Please call if you have any questions.

Sincerely,

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

William R. Mosher, P.E.
Chief Engineer
Assistant Vice President

Attachments

cc: Scott Recker - Delta Environmental

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
3301 ATLANTIC AVENUE • RALEIGH, NC 27604
P. O. BOX 18288 • RALEIGH, NC 27619
(919) 876-0416 • FAX (919) 872-3253
ONE OF THE LAW COMPANIES

WEYERHAEUSER LANDFILL / BORROW MATERIAL
WEYERHAEUSER LANDFILL / NATIVE SOILS
WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002

LABORATORY TESTING SUMMARY

OUTLINE OF CONTENTS

I. TEST PROCEDURES USED

II. VISUAL SOIL DESCRIPTIONS
- a. NATIVE SOILS
- b. WASTE MATERIAL

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- a. NATIVE SOILS
- b. WASTE MATERIAL

IV. TEST REPORTS
- a. NATIVE SOILS
- b. WASTE MATERIAL
- c. BORROW MATERIAL

V. COPY OF CORRESPONDENCE RECEIVED FROM LAW/CHARLOTTE REGARDING PERMEABILITY TESTING

LABORATORY TESTING SUMMARY

I. TEST PROCEDURES USED

UNIT WEIGHT AND MOISTURE CONTENT: No specific ASTM procedure was used for this test. Wet unit weights were determined by dividing wet weight of soil by the soil volume. Dry unit weights were obtained by dividing the moisture out if the wet unit weight. Moisture contents were determined in general accordance with ASTM D 2216.

SPECIFIC GRAVITY: ASTM D 854

Borrow Material: Test was performed on minus #10 material from a representative portion of the hydrometer test specimen.

Native Soils:

SB00600 (UD) 47'-49': Test was performed on minus #4 material from a representative sample from the tube. The test was essentially performed on minus #10 material. Grading results show that 99.9% of this material passed the #10 sieve.

SB00200 (UD) 32'-34': Test was performed on a representative portion of minus #4 material (essentially minus #10 material - only .01% retained on the #10 sieve).

Waste Material: Specific Gracity tests were performed on representative samples of minus #4 material obtained from composites of Triaxial test points after shearing.

LIQUID AND PLASTIC LIMITS: ASTM D 4318

WASH 200 SIEVE ANALYSIS: ASTM D 422

Tests were performed on representative specimens obtained from UD tubes. When this procedure was used to test split-spoon samples, the entire sample was tested. Wash 200 specimens for samples receiving Triaxial testing were obtained from composites of Triaxial test points after shearing.

HYDROMETER ANALYSIS: ASTM D 422

Borrow Material: Test was performed on a representative portion of the sample.

Waste Material SB00800 (UD) 17'-19': Test was performed on a representative sample from the tube. When this procedure was used to test split-spoon samples, the entire sample was tested.

CONSOLIDATED UNDRAINED TRIAXIAL WITH PORE PRESSURE MEASUREMENTS: ASTM D 4767

PERMEABILITY / CONSTANT HEAD: ASTM D 2434

PERMEABILITY / FALLING HEAD-RISING TAILWATER: ASTM D 5084

STANDARD COMPACTION TESTING: ASTM D 698

LABORATORY TESTING SUMMARY

II. VISUAL SOIL DESCRIPTIONS

a. NATIVE SOILS

SB00200 (UD) 32'-34': Material not consistent throughout tube.

0" to 7": Olive sand in a semi-liquid state. Triaxial, Wash 200, and Specific Gravity samples were taken from this section of the tube.

7" to 12.75": Olive sand to gray sand. Root and organic presence. Wax presence.

12.75 to 19": Gray sand to Topsoil.

19" to top of tube: Topsoil.

SB00300 (UD) 42'-44': Bottom of tube was damaged. It was obvious that the bulk of excess moisture present had drained from the bottom of the tube prior to cutting.

0" to 6.6": Black probably organic silty sand.

6.6" to 10.7": Very light olive sand with excessive voids from water drainage.

10.7" to 14.9": Very light olive sand. Some voids at 10.7". Wash 200 sample was obtained from this section of tube.

14.9" to 18.3": Very light olive sand (intact specimen, but drier than natural condition due to water loss). Constant head permeability sample was taken from this section of tube.

SB00400 (UD) 42'-44': Red yellow sand.

SB00500 (UD) 37'-39': Very light brown sand.

SB00600 (UD) 47'-49': Very fragile sample; not excessive moisture.

0" to 4.9": Olive gray sand. Constant head permeability sample was taken from this section.

4.9" to 16.4": Olive gray sand. Triaxial, Wash 200 and Specific Gravity samples were taken from this section of tube.

At approximately 16.4", a layer of wax was present. Above this layer of wax, an olive silty material was present which did not appear to be in its natural state. This could have possibly just been scraps which were used to fill the tube section above the wax.

NOTE: Tube locations are measured from the bottom of the tube.

LABORATORY TESTING SUMMARY

II. VISUAL SOIL DESCRIPTIONS
(Provided by Mr. Richard Gay of Weyerhaeuser)

b. WASTE MATERIAL

SB00100 (UD) 5'-7'
- 0" to 3": Black ash.
- 3" to 8.5": Black ash mixed with lime mud.

SB00200 (UD) 7'-9'
- 0" to 2": Pulp rejects (knots - unpulped wood).
- 2" to 8": Pulp rejects with coarse-grained lime grit, wood waste

SB00300 (UD) 7'-9'
- 0" to 7.25": Lime mud, concrete demolition, lime grit, ash with unburned wood fiber.
- 8.25" to 14.25": Lime mud, ash, wood chips.
- 14.25" to 20.25": Lime mud, ash

SB00400 (UD) 12'-14'
- 0" to 7.3": Black dreggs (sludgey type wood fiber). Presence of wood chips. Ashy appearance. Wash 200 and Permeability test sample were taken from this section of tube.

SB00500 (UD) 12'-14'
- 0" to 1.25": Wood waste dark in color, bark
- 1.25" to 7": Bleached pulp, ash.
- 7" to 13": Fly ash (light gray color) loosely compacted.
- 13" to 19": Fly ash (gray color) light weight, loosely compacted.

SB00600 (UD) 7'-9'
- 0" to 2.5": Coarse-grained lime grit.
- 2.5" to 8": Bottom ash, wood waste, bark, lime.

SB00600 (SS) 10'-12': Lime mud.

SB00600 (UD) 27'-29': Ash, general mill waste including gravel, polyethylene, dirt, wood waste.

SB00700 (SS) 0'-2': Lime mud.

SB00700 (UD) 12'-14'
- 0" to 10": Wood waste, lime mud (not dispersed within the wood waste).

SB00800 (SS) 0'-2': Lime mud.

SB00800 (UD) 17'-19'
- 0" to 6": Wood waste, waste water sludge.
- 6" to 11.5": Wood waste, lime mud.
- 11.5" to 14": Wood waste, lime mud.

SB00900 (UD) 7'-9'
- 0" to 8": Black ash. Wash 200 and Permeability test specimens were taken from this tube section.

NOTE: Tube locations are measured from the bottom of the tube.

LABORATORY TESTING SUMMARY

III. NOTES ON TESTING

a. NATIVE SOILS

SB00300 (UD) 42'-44': Originally assigned Unit Weight and Moisture Content test was deleted from assignment. Unit weight values are provided with Permeability testing.

Due to leaks present in damaged tubes and because of the type of free-draining material present in these samples, the moisture contents of Unit Weight and Moisture Content tests performed do not reflect the natural moisture content of the materials tested. The Dry Unit Weight values obtained should be fairly representative of their natural state.

Moisture Content and Dry Unit Weight values of lab-compacted Triaxial specimens do not represent the natural state of the samples tested.

b. WASTE MATERIAL

SB00100 (UD) 5'-7': Lime presence in sample was not significant enough to justify hydrometer testing. Wash 200 was performed on this sample.

SB00600 (UD) 27'-29': Sample did not contain lime mud. Assigned hydrometer was deleted from assignment. Wash 200 was performed.

SB00300 (UD) 7'-9': 3 ksf Triaxial point contained one piece of +2" concrete trash (discovered after testing). This may have caused this test point to fail prematurely.

SB00500 (UD) 12'-14': Material was not consistent throughout tube. The lower portion of the tube contained ash and wood waste. The upper section was primarily fly ash. Attempts were made to locate additional test specimens from other borings which were similar to this material. One specimen was located and set up, but was lost during shearing due to a significant seating error. It was later discovered that this specimen was not as similar to SB00500 as originally thought. It did not contain anywhere near the amount of wood waste present in SB00500. A multi-staged test was performed on SB00500 (UD) 12'-14'. It was discovered after shearing that one piece of +1.5" concrete trash was present in this test specimen.

PERMEABILITY TESTING: As assigned; Constant head permeability testing was attempted on SB00400 (UD) 12'-14' and SB00900 (UD) 7'-9'. Through these attempts, it was determined that due to the lower permeability of these specimens, this was not the appropriate procedure to use. ASTM D 2434 is intended for use with granular soils having a permeability of 1 x 10E-03 or greater. Falling head-Rising tailwater tests (ASTM D 5084) were performed on these two specimens.

WEYERHAEUSER LANDFILL LABORATORY TESTING
30710-7-2241

SAMPLE IDENTIFICATION	UNIT WEIGHT AND MOISTURE	SPECIFIC GRAVITY	LIQUID AND PLASTIC LIMITS	GRAIN-SIZE ANALYSIS		CONS. UNDR. TRIAXIAL WITH PORE PRESSURES	PERMEABILITY		STANDARD PROCTOR
				WASH 200	HYDROMETER		CONSTANT HEAD	FALLING HEAD	
BORROW MATERIAL		X	X		X	X		X	X
NATIVE SOILS									
SB00100 (SS) 25'-27'				X					
SB00200 (UD) 32'-34'		X		X		X			
SB00300 (UD) 42'-44'				X			X		
SB00400 (UD) 42'-44'	X			X					
SB00500 (UD) 37'-39'	X			X					
SB00600 (UD) 47'-49'		X		X		X	X		
SB00700 (SS) 50'-52'				X					
SB00800 (SS) 30'-32'				X					
SB00900 (SS) 40'-42'				X					
WASTE MATERIALS									
SB00100 (UD) 5'-7'	X			X					
SB00200 (UD) 7'-9'	X			X					
SB00300 (UD) 7'-9'		X		X		X			
SB00400 (UD) 12'-14'				X				X	
SB00500 (UD) 12'-14'		X		X		X			
SB00600 (UD) 7'-9'	X			X					
SB00600 (SS) 10'-12'			X		X				
SB00600 (UD) 27'-29'	X			X					
SB00700 (SS) 0'-2'			X		X				
SB00700 (UD) 12'-14'	X			X					
SB00800 (SS) 0'-2'			X		X				
SB00800 (UD) 17'-19'	X				X				
SB00900 (UD) 7'-9'				X				X	

LABORATORY TESTING SUMMARY

IV. TEST REPORTS

a. NATIVE SOILS

E096-019-2.0002

FINAL REPORTS TO B. MOSHER

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
SOILS LABORATORY ASSIGNMENTS

No. E096-019-2.0002

NATIVE SOILS

PRIORITY _____

DEPT. # _____

DATE 6/18/97 JOB NAME WEYERHAEUSER LANDFILL JOB NO. 30710-7-2241 IN CHARGE _____ REQUESTED COMPLETION DATE _____

SAMPLE LOCATION			PHYSICAL PROPERTIES												STRENGTH TESTS							COMPACTION			CONSOLIDATION	SPECIAL TEST	
BORING NO.	SAMPLE TYPE	SAMPLE DEPTH	COMBINED ANALYSIS (LI)	MOISTURE CONTENT	UNIT WEIGHT NAT. DEN. & MOIST. CONT.	SPECIFIC GRAVITY	ATTERBERG LIMITS	SHRINKAGE LIMITS	DRY	GRAIN SIZE ANALYSIS: WASH 200 W/SEIVE	% FINER NO. 200	HYDROMETER	MAX. & MIN. DENSITY	SWELL TEST	DIRECT SHEAR	UNCONFINED COMP. WITH/STRESS-STRAIN CURVE	UNCONFINED COMP. WITHOUT S-S CURVE	TRIAXIAL UU	TRIAXIAL CU	TRIAXIAL CU W/PP	CONFINING PRESSURES, KSF	STANDARD (A, B, C, D)	MODIFIED (A, B, C, D)	CBR	INDICATE LOADS IN KSF AND RELOAD CYCLE IF ANY	PERMEABILITY	BENTONITE BLENDING
1	SS	26-27		25		27																					
2	UD	32-34																									
3	UD	42-44					NO																				
4	UD	42-44																									
5	UD	37-39																							TESTED IN CHARLOTTE		
6	UD	47-49																									
7	SS	51-52		50		52																					
8	SS	31-32		30		32																					
9	SS	41-42		40		42																				CONSTANT HEAD-	

REMARKS Please call Rick Powell (Delta Environmental Consultants, Inc) @ (704) 541-9890 with questions

REMOVE SAMPLES FROM END OF TUBES IN CASE ADDITIONAL TESTS NEEDED.

SPECIFIC GRAVITIES ADDED FOR TRIAXIALS, NOT NECESSARY TO SAVE SS SAMPLES FOR FURTHER TESTING.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 10, 1997

SAMPLE IDENTIFICATION: SB00100 (SS) 25'-27'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 457.45
PAN WEIGHT (g): 84.21
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 373.24

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
1"	0.00	0.0	**100.0**
3/4"	15.58	4.2	**95.8**
3/8"	29.22	7.8	**92.2**
#4	64.87	17.4	**82.6**
#10	85.12	22.8	**77.2**
#20	94.70	25.4	**74.6**
#40	114.00	30.5	**69.5**
#60	195.05	52.3	**47.7**
#140	310.64	83.2	**16.8**
#200	314.61	84.3	**15.7**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d02.xls

REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 10, 1997

SAMPLE IDENTIFICATION: SB00200 (UD) 32'-34'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 480.00
PAN WEIGHT (g): 82.80
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 397.20

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
#4	0.00	0.0	**100.0**
#10	0.05	0.0	**100.0**
#20	0.15	0.0	**100.0**
#40	1.92	0.5	**99.5**
#60	195.95	49.3	**50.7**
#140	387.99	97.7	**2.3**
#200	389.59	98.1	**1.9**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

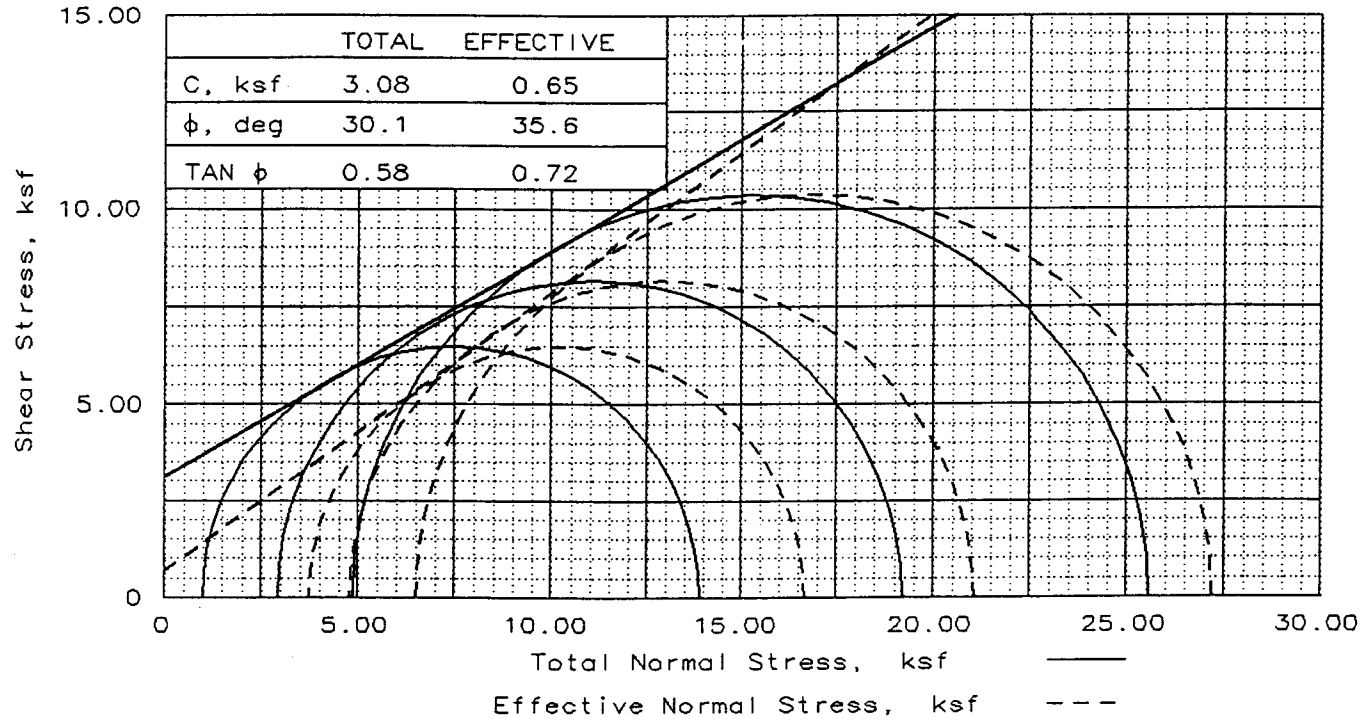
CLASSIFICATION
ND

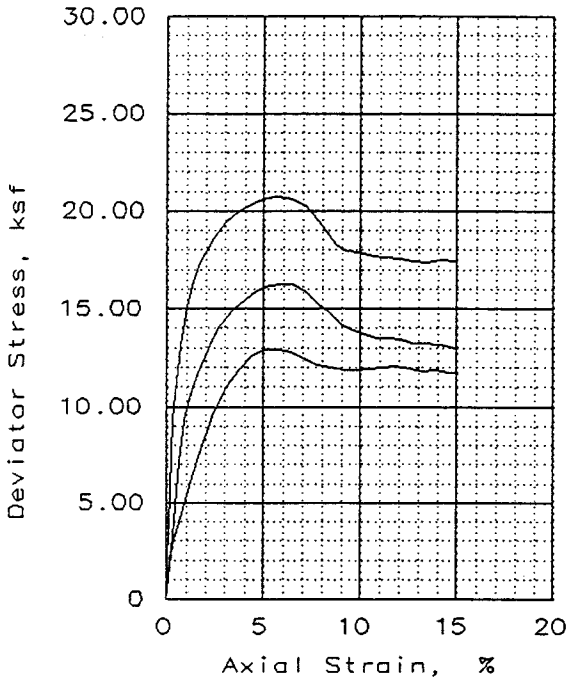
ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d03.xls

REVIEWED BY: John Dailly





SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	20.5	19.7	19.3
	DRY DENSITY, pcf	96.4	95.6	93.1
	SATURATION, %	76.4	72.0	66.1
	VOID RATIO	0.709	0.724	0.770
	DIAMETER, in	1.49	1.50	1.50
	HEIGHT, in	2.95	3.25	2.91
AT TEST	WATER CONTENT, %	24.7	26.6	26.8
	DRY DENSITY, pcf	99.8	96.8	96.6
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.651	0.702	0.707
	DIAMETER, in	1.46	1.49	1.47
	HEIGHT, in	2.95	3.24	2.91
BACK PRESSURE, ksf		6.54	5.50	5.79
CELL PRESSURE, ksf		7.55	8.47	10.68
FAILURE STRESS, ksf		12.91	16.28	20.69
PORE PRESSURE, ksf		3.77	3.66	4.15
STRAIN RATE, %/min.		0.678	0.617	0.688
ULTIMATE STRESS, ksf				
PORE PRESSURE, ksf				
$\bar{\sigma}_1$ FAILURE, ksf		16.69	21.09	27.23
$\bar{\sigma}_3$ FAILURE, ksf		3.77	4.81	6.54

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: LAB-COMPACTED
DESCRIPTION: (VISUAL) OLIVE SAND
LL= ND PL= ND PI= ND
SPECIFIC GRAVITY= 2.64
REMARKS: ND=NOT DETERMINED.

CLIENT: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
PROJECT: WEYERHAEUSER LF / NATIVE SOILS

SAMPLE LOCATION: SB00200 (UD) 32'-34'

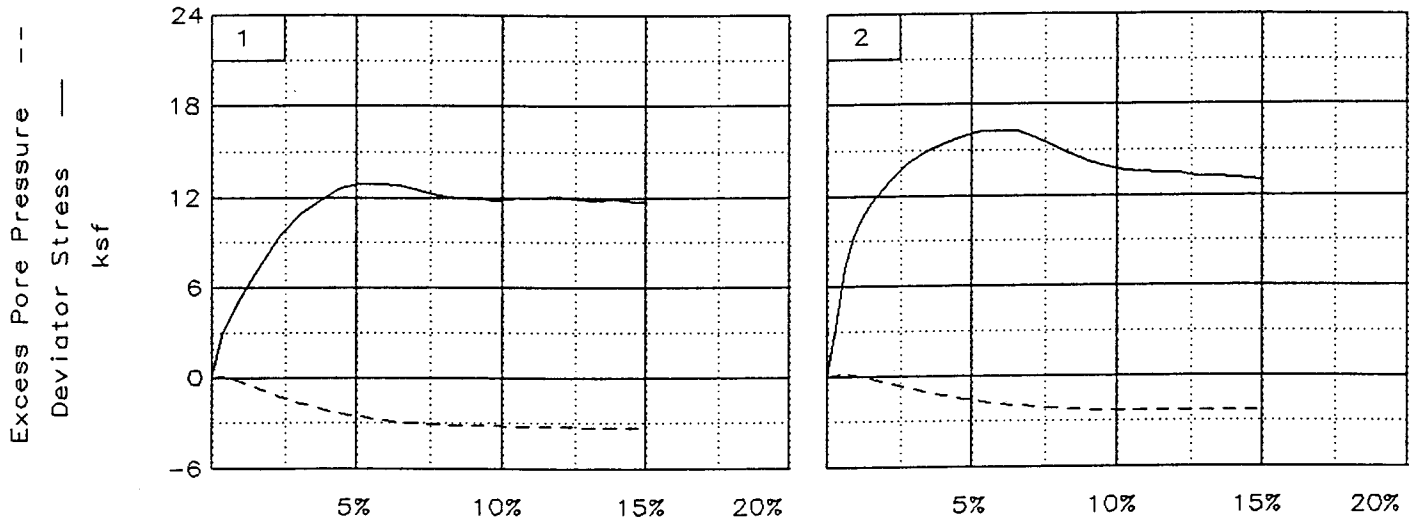
PROJ. NO.: 3071072241 DATE: JUNE 28, 1997

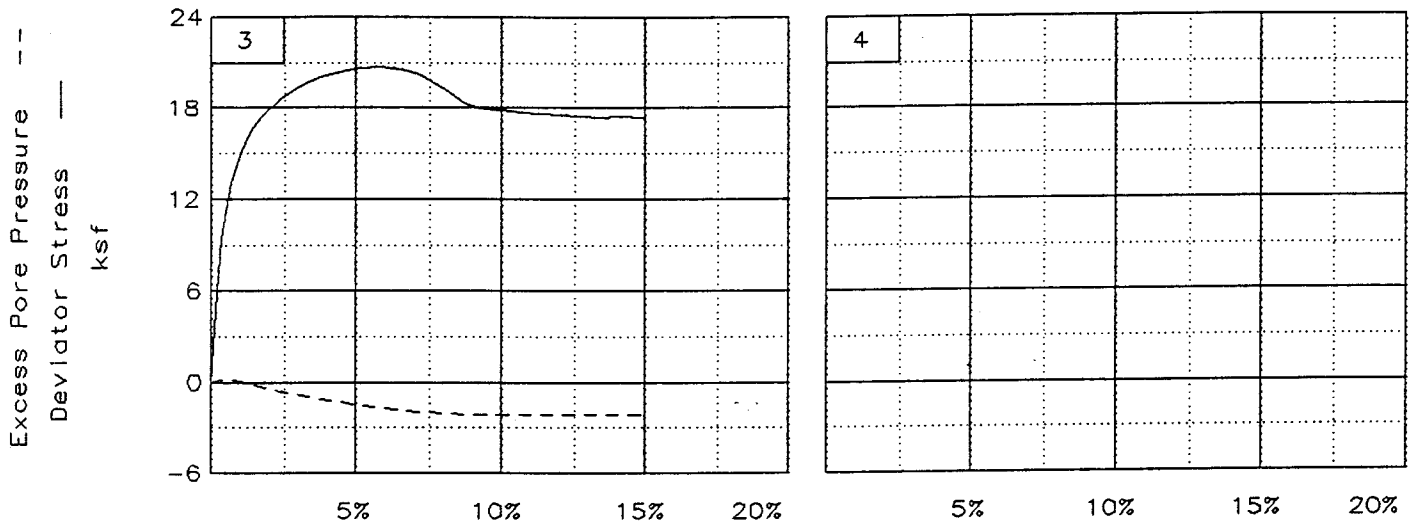
TRIAXIAL COMPRESSION TEST

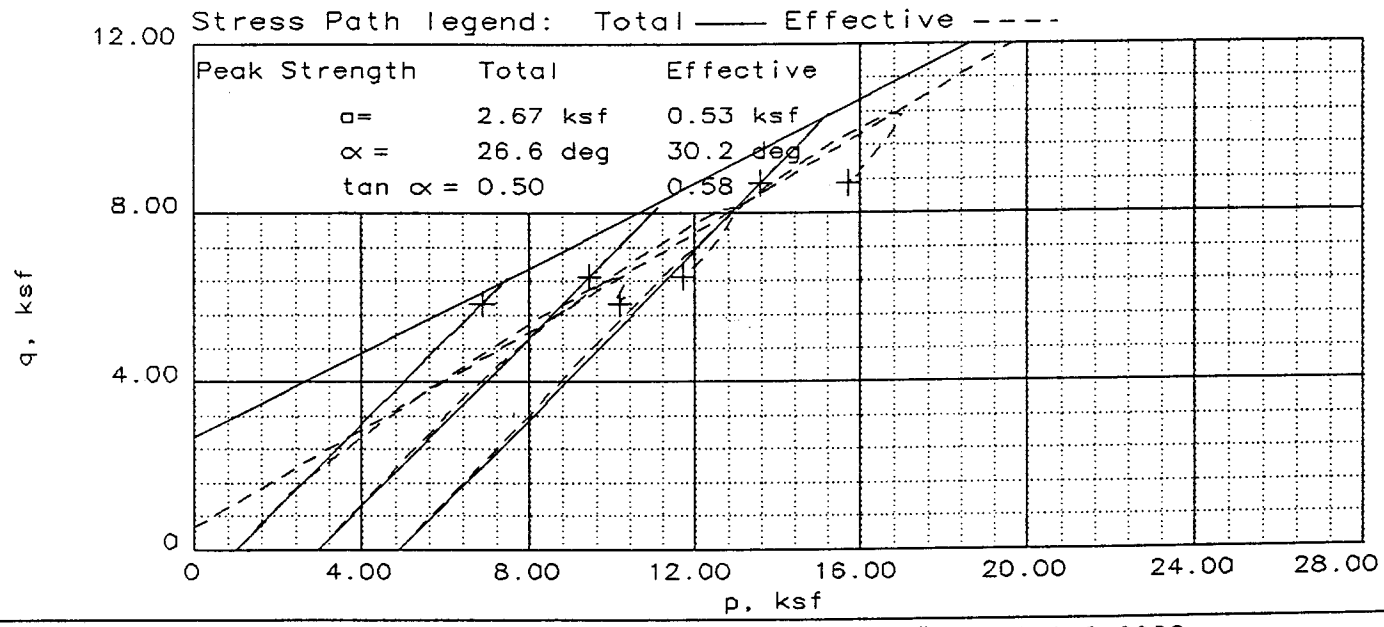
LAW ENGINEERING

FIG. NO. B-2

REVIEWED BY: John Dailly







Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002

Project: WEYERHAEUSER LF / NATIVE SOILS

Location: SB00200 (UD) 32'-34'

File: SB00200 Project No.: 3071072241 Page 2/2 Fig. No. B-2

TRIAXIAL COMPRESSION TEST 7-04-1997
CU with pore pressures 12:20 pm

Project Data

Project No.: 3071072241 Date: JUNE 28, 1997 Data file: SB00200
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LF / NATIVE SOILS
Sample location: SB00200 (UD) 32'-34'
Sample description: (VISUAL) OLIVE SAND
Remarks: ND=NOT DETERMINED.
Fig No. B-2

Sample No. 1 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.64 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.49	1.46	
Height change, in		0.00	
Height, in	2.95	2.95	
Weight, grams	156.3		
Water volume change, cc		-5.36	
Moisture, %	20.5	24.7	24.1
Dry density, pcf	96.4	99.8	
Saturation, %	76.4	100.0	
Void ratio	0.709	0.651	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16571 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.678 % per minute
Consolidation cell pressure = 52.4 psi
Consolidation back pressure = 45.4 psi
Consolidation effective confining stress = 1.008 ksf
Peak deviator stress = 12.91 ksf at reading no. 11
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0240	0.000	440.0	0.0	0.0	0.00	1.01	1.01	1.00	45.4	1.01	0.00
1	0.0340	0.010	640.0	33.1	0.3	2.84	0.95	3.79	3.98	45.8	2.37	1.42
2	0.0440	0.020	736.0	49.1	0.7	4.18	1.12	5.31	4.72	44.6	3.21	2.09
3	0.0540	0.030	822.0	63.3	1.0	5.38	1.31	6.69	5.11	43.3	4.00	2.69
4	0.0640	0.040	907.0	77.4	1.4	6.55	1.56	8.11	5.21	41.6	4.83	3.28
5	0.0740	0.050	985.0	90.3	1.7	7.62	1.80	9.42	5.23	39.9	5.61	3.81

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.0940	0.070	1125.0	113.5	2.4	9.51	2.28	11.79	5.18	36.6	7.03	4.76
7	0.1150	0.091	1238.0	132.2	3.1	11.00	2.71	13.71	5.06	33.6	8.21	5.50
8	0.1350	0.111	1305.0	143.3	3.8	11.84	3.07	14.91	4.86	31.1	8.99	5.92
9	0.1550	0.131	1368.0	153.8	4.4	12.62	3.36	15.97	4.76	29.1	9.66	6.31
10	0.1750	0.151	1396.0	158.4	5.1	12.91	3.59	16.49	4.60	27.5	10.04	6.45
11	0.1950	0.171	1403.5	159.7	5.8	12.91	3.77	16.69	4.42	26.2	10.23	6.46
12	0.2150	0.191	1401.0	159.2	6.5	12.79	3.92	16.70	4.26	25.2	10.31	6.39
13	0.2350	0.211	1384.0	156.4	7.2	12.47	4.02	16.49	4.10	24.5	10.25	6.23
14	0.2550	0.231	1366.0	153.4	7.8	12.14	4.09	16.23	3.97	24.0	10.16	6.07
15	0.2750	0.251	1361.0	152.6	8.5	11.99	4.13	16.12	3.90	23.7	10.13	5.99
16	0.2950	0.271	1361.0	152.6	9.2	11.90	4.18	16.08	3.85	23.4	10.13	5.95
17	0.3150	0.291	1364.0	153.1	9.9	11.85	4.19	16.04	3.83	23.3	10.12	5.92
18	0.3350	0.311	1379.0	155.6	10.5	11.95	4.22	16.17	3.83	23.1	10.19	5.98
19	0.3550	0.331	1390.0	157.4	11.2	12.00	4.23	16.23	3.83	23.0	10.23	6.00
20	0.3750	0.351	1400.0	159.1	11.9	12.03	4.26	16.30	3.82	22.8	10.28	6.02
21	0.3950	0.371	1398.0	158.8	12.6	11.92	4.28	16.19	3.79	22.7	10.23	5.96
22	0.4150	0.391	1399.0	158.9	13.3	11.84	4.29	16.13	3.76	22.6	10.21	5.92
23	0.4350	0.411	1408.0	160.4	13.9	11.85	4.29	16.14	3.76	22.6	10.22	5.93
24	0.4550	0.431	1406.0	160.1	14.6	11.74	4.31	16.04	3.73	22.5	10.17	5.87
25	0.4680	0.444	1411.0	160.9	15.1	11.74	4.32	16.06	3.72	22.4	10.19	5.87

TRIAXIAL COMPRESSION TEST 7-04-1997
CU with pore pressures 12:20 pm

Project Data

Project No.: 3071072241 Date: JUNE 28, 1997 Data file: SB00200
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LF / NATIVE SOILS
Sample location: SB00200 (UD) 32'-34'
Sample description: (VISUAL) OLIVE SAND
Remarks: ND=NOT DETERMINED.
Fig No. B-2

Sample No. 2 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.64 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.50	1.49	
Height change, in		0.00	
Height, in	3.25	3.24	
Weight, grams	171.9		
Water volume change, cc		-9.83	
Moisture, %	19.7	26.6	22.7
Dry density, pcf	95.6	96.8	
Saturation, %	72.0	100.0	
Void ratio	0.724	0.702	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16549 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.617 % per minute
Consolidation cell pressure = 58.8 psi
Consolidation back pressure = 38.2 psi
Consolidation effective confining stress = 2.9664 ksf
Peak deviator stress = 16.28 ksf at reading no. 12
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0670	0.000	445.0	0.0	0.0	0.00	2.97	2.97	1.00	38.2	2.97	0.00
1	0.0770	0.010	683.0	39.4	0.3	3.25	2.89	6.14	2.12	38.7	4.52	1.62
2	0.0870	0.020	973.0	87.4	0.6	7.18	2.81	9.99	3.56	39.3	6.40	3.59
3	0.0970	0.030	1132.0	113.7	0.9	9.32	2.88	12.20	4.23	38.8	7.54	4.66
4	0.1070	0.040	1231.0	130.1	1.2	10.62	3.01	13.63	4.53	37.9	8.32	5.31
5	0.1170	0.050	1305.0	142.3	1.5	11.59	3.18	14.77	4.64	36.7	8.98	5.79

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1370	0.070	1416.0	160.7	2.2	13.00	3.48	16.49	4.73	34.6	9.99	6.50
7	0.1570	0.090	1508.0	175.9	2.8	14.14	3.77	17.92	4.75	32.6	10.84	7.07
8	0.1800	0.113	1580.0	187.8	3.5	14.99	4.06	19.05	4.69	30.6	11.56	7.50
9	0.2000	0.133	1625.0	195.3	4.1	15.49	4.28	19.76	4.62	29.1	12.02	7.74
10	0.2200	0.153	1669.0	202.6	4.7	15.96	4.48	20.44	4.56	27.7	12.46	7.98
11	0.2400	0.173	1697.0	207.2	5.3	16.22	4.65	20.87	4.49	26.5	12.76	8.11
12	0.2600	0.193	1710.0	209.3	6.0	16.28	4.81	21.09	4.39	25.4	12.95	8.14
13	0.2800	0.213	1715.0	210.2	6.6	16.24	4.92	21.16	4.30	24.6	13.04	8.12
14	0.3000	0.233	1693.0	206.5	7.2	15.85	5.04	20.89	4.15	23.8	12.97	7.93
15	0.3200	0.253	1658.0	200.7	7.8	15.31	5.13	20.43	3.99	23.2	12.78	7.65
16	0.3400	0.273	1625.0	195.3	8.4	14.79	5.20	19.99	3.85	22.7	12.59	7.39
17	0.3600	0.293	1586.0	188.8	9.0	14.20	5.23	19.43	3.72	22.5	12.33	7.10
18	0.3800	0.313	1570.0	186.2	9.7	13.91	5.26	19.17	3.65	22.3	12.21	6.96
19	0.4000	0.333	1560.0	184.5	10.3	13.69	5.27	18.96	3.60	22.2	12.12	6.85
20	0.4200	0.353	1555.0	183.7	10.9	13.54	5.27	18.81	3.57	22.2	12.04	6.77
21	0.4400	0.373	1558.0	184.2	11.5	13.48	5.27	18.75	3.56	22.2	12.01	6.74
22	0.4600	0.393	1565.0	185.3	12.1	13.47	5.27	18.74	3.56	22.2	12.01	6.74
23	0.4800	0.413	1555.0	183.7	12.7	13.26	5.26	18.51	3.52	22.3	11.88	6.63
24	0.5000	0.433	1561.0	184.7	13.4	13.23	5.26	18.49	3.52	22.3	11.87	6.62
25	0.5250	0.458	1567.5	185.8	14.1	13.19	5.26	18.45	3.51	22.3	11.85	6.60
26	0.5530	0.486	1560.0	184.5	15.0	12.97	5.24	18.21	3.47	22.4	11.73	6.49

TRIAXIAL COMPRESSION TEST 7-04-1997
CU with pore pressures 12:20 pm

Project Data

Project No.: 3071072241 Date: JUNE 28, 1997 Data file: SB00200
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LF / NATIVE SOILS
Sample location: SB00200 (UD) 32'-34'
Sample description: (VISUAL) OLIVE SAND
Remarks: ND=NOT DETERMINED.
Fig No. B-2

Sample No. 3 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.64 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.50	1.47	
Height change, in		0.00	
Height, in	2.91	2.91	
Weight, grams	149.5		
Water volume change, cc		-9.39	
Moisture, %	19.3	26.8	24.1
Dry density, pcf	93.1	96.6	
Saturation, %	66.1	100.0	
Void ratio	0.770	0.707	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16407 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.688 % per minute
Consolidation cell pressure = 74.2 psi
Consolidation back pressure = 40.2 psi
Consolidation effective confining stress = 4.896 ksf
Peak deviator stress = 20.69 ksf at reading no. 11
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0300	0.000	459.0	0.0	0.0	0.00	4.90	4.90	1.00	40.2	4.90	0.00
1	0.0400	0.010	1135.0	110.9	0.3	9.36	4.72	14.08	2.98	41.4	9.40	4.68
2	0.0500	0.020	1409.0	155.9	0.7	13.11	4.74	17.84	3.77	41.3	11.29	6.55
3	0.0600	0.030	1557.0	180.1	1.0	15.10	4.85	19.95	4.11	40.5	12.40	7.55
4	0.0700	0.040	1657.0	196.6	1.4	16.41	5.00	21.41	4.28	39.5	13.20	8.21
5	0.0800	0.050	1732.0	208.9	1.7	17.38	5.16	22.53	4.37	38.4	13.85	8.69

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1000	0.070	1832.0	225.3	2.4	18.61	5.47	24.09	4.40	36.2	14.78	9.31
7	0.1200	0.090	1906.0	237.4	3.1	19.48	5.75	25.22	4.39	34.3	15.48	9.74
8	0.1400	0.110	1957.0	245.8	3.8	20.02	5.99	26.01	4.34	32.6	16.00	10.01
9	0.1600	0.130	1994.0	251.8	4.5	20.37	6.21	26.58	4.28	31.1	16.39	10.18
10	0.1800	0.150	2027.0	257.3	5.2	20.66	6.38	27.04	4.24	29.9	16.71	10.33
11	0.2000	0.170	2041.0	259.6	5.8	20.69	6.54	27.23	4.16	28.8	16.88	10.35
12	0.2210	0.191	2046.0	260.4	6.6	20.60	6.70	27.29	4.08	27.7	16.99	10.30
13	0.2400	0.210	2029.0	257.6	7.2	20.23	6.81	27.05	3.97	26.9	16.93	10.12
14	0.2650	0.235	1961.0	246.4	8.1	19.18	6.94	26.12	3.76	26.0	16.53	9.59
15	0.2850	0.255	1903.0	236.9	8.8	18.30	6.98	25.28	3.62	25.7	16.13	9.15
16	0.3000	0.270	1886.0	234.1	9.3	17.98	7.01	24.99	3.56	25.5	16.00	8.99
17	0.3200	0.290	1890.0	234.8	10.0	17.90	7.04	24.94	3.54	25.3	15.99	8.95
18	0.3400	0.310	1887.0	234.3	10.7	17.72	7.04	24.76	3.52	25.3	15.90	8.86
19	0.3600	0.330	1891.0	234.9	11.4	17.63	7.04	24.68	3.50	25.3	15.86	8.82
20	0.3800	0.350	1895.0	235.6	12.0	17.55	7.04	24.59	3.49	25.3	15.81	8.77
21	0.4000	0.370	1898.0	236.1	12.7	17.45	7.03	24.47	3.48	25.4	15.75	8.72
22	0.4220	0.392	1905.0	237.2	13.5	17.38	7.03	24.41	3.47	25.4	15.72	8.69
23	0.4400	0.410	1925.0	240.5	14.1	17.49	7.03	24.52	3.49	25.4	15.77	8.75
24	0.4660	0.436	1933.0	241.8	15.0	17.40	7.01	24.42	3.48	25.5	15.72	8.70

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 10, 1997

SAMPLE IDENTIFICATION: SB00300 (UD) 42'-44'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 603.10
PAN WEIGHT (g): 88.20
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 514.90

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
#4	0.00	0.0	**100.0**
#10	3.04	0.6	**99.4**
#20	92.00	17.9	**82.1**
#40	284.83	55.3	**44.7**
#60	447.35	86.9	**13.1**
#140	507.06	98.5	**1.5**
#200	508.52	98.8	**1.2**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

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REVIEWED BY: John Dailey

SUMMARY OF LABORATORY TESTING

WEYERHAEUSER LANDFILL

LAW PROJECT 30710-7-2241

CONTANT HEAD TEST
ASTM D2434-68

Sample ID	Initial Wet Unit Weight (pcf)	Initial Dry Unit Weight (pcf)	Initial Moisture Content (%)	Hydraulic Gradient	Hydraulic Conductivity (cm/sec)
SB00300 42ft to 44ft Native Soil	107.8	103.5	4.2	4.7	**2.6×10^{-2}**

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 10, 1997

SAMPLE IDENTIFICATION: SB00400 (UD) 42'-44'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 349.55
PAN WEIGHT (g): 86.75
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 262.80

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
#4	0.00	0.0	**100.0**
#10	0.45	0.2	**99.8**
#20	2.26	0.9	**99.1**
#40	4.97	1.9	**98.1**
#60	137.28	52.2	**47.8**
#140	252.82	96.2	**3.8**
#200	254.37	96.8	**3.2**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

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REVIEWED BY: John Daily

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
UNIT WEIGHT AND NATURAL MOISTURE CONTENT OF SOIL

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS PROJECT NUMBER: E096-019-2.0002
DATE: JULY 4, 1997

SAMPLE ID: SB00400 (UD) 42'-44'

VISUAL SOIL DESCRIPTION: RED YELLOW SAND
INCHES FROM BOTTOM OF TUBE: 1

MEASUREMENT DATA (in)			
LENGTH #1:	5.221	TOP DIAMETER #1:	2.884
LENGTH #2:	5.216	TOP DIAMETER #2:	2.887
LENGTH #3:	5.204	TOP DIAMETER #3:	2.885
		BOTTOM DIAMETER #1:	2.877
		BOTTOM DIAMETER #2:	2.881
		BOTTOM DIAMETER #3:	2.880

AVERAGED MEASURED VALUES	
LENGTH OF TUBE SAMPLE (in):	5.214
DIAMETER OF TUBE SAMPLE (in):	2.882

WEIGHT DETERMINATION DATA	
WEIGHT OF TUBE & SOIL (g):	1423.1
WEIGHT OF TUBE (g):	384.4
WEIGHT OF SOIL (g):	1038.7

MOISTURE DETERMINATION DATA	
WET WEIGHT SOIL & DRYING PAN (g):	785.9
DRY WEIGHT SOIL & DRYING PAN (g):	644.7
WEIGHT OF DRYING PAN (g):	82.8

WET UNIT WEIGHT (pcf)
116.3

DRY UNIT WEIGHT (pcf)
93.0

MOISTURE CONTENT (%)
25.1

REMARKS:

\72241d06.xls

REVIEWED BY: John Dailey

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 10, 1997

SAMPLE IDENTIFICATION: SB00500 (UD) 37'-39'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 370.63
PAN WEIGHT (g): 83.59
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 287.04

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/8"	0.00	0.0	**100.0**
#4	0.28	0.1	**99.9**
#10	18.85	6.6	**93.4**
#20	137.72	48.0	**52.0**
#40	257.44	89.7	**10.3**
#60	282.73	98.5	**1.5**
#140	285.53	99.5	**0.5**
#200	285.83	99.6	**0.4**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d07.xls

REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
UNIT WEIGHT AND NATURAL MOISTURE CONTENT OF SOIL

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS

LAW PROJECT NUMBER: 30710-7-2241

DELTA ENVIRONMENTAL CONSULTANTS PROJECT NUMBER: E096-019-2.0002

DATE: JULY 4, 1997

SAMPLE ID: SB00500 (UD) 37'-39'

VISUAL SOIL DESCRIPTION: VERY LIGHT BROWN SAND

INCHES FROM BOTTOM OF TUBE: 1

MEASUREMENT DATA (in)			
LENGTH #1:	4.904	TOP DIAMETER #1:	2.877
LENGTH #2:	4.908	TOP DIAMETER #2:	2.874
LENGTH #3:	4.944	TOP DIAMETER #3:	2.894
		BOTTOM DIAMETER #1:	2.879
		BOTTOM DIAMETER #2:	2.883
		BOTTOM DIAMETER #3:	2.893

AVERAGED MEASURED VALUES	
LENGTH OF TUBE SAMPLE (in):	4.919
DIAMETER OF TUBE SAMPLE (in):	2.883

WEIGHT DETERMINATION DATA	
WEIGHT OF TUBE & SOIL (g):	1351.0
WEIGHT OF TUBE (g):	364.4
WEIGHT OF SOIL (g):	986.6

MOISTURE DETERMINATION DATA	
WET WEIGHT SOIL & DRYING PAN (g):	733.0
DRY WEIGHT SOIL & DRYING PAN (g):	632.5
WEIGHT OF DRYING PAN (g):	88.7

WET UNIT WEIGHT (pcf)
117.0

DRY UNIT WEIGHT (pcf)
98.8

MOISTURE CONTENT (%)
18.5

REMARKS:

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REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 10, 1997

SAMPLE IDENTIFICATION: SB00600 (UD) 47'-49'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 380.32
PAN WEIGHT (g): 100.95
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 279.37

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
#4	0.00	0.0	**100.0**
#10	0.15	0.1	**99.9**
#20	0.86	0.3	**99.7**
#40	3.05	1.1	**98.9**
#60	141.29	50.6	**49.4**
#140	274.39	98.2	**1.8**
#200	275.33	98.6	**1.4**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

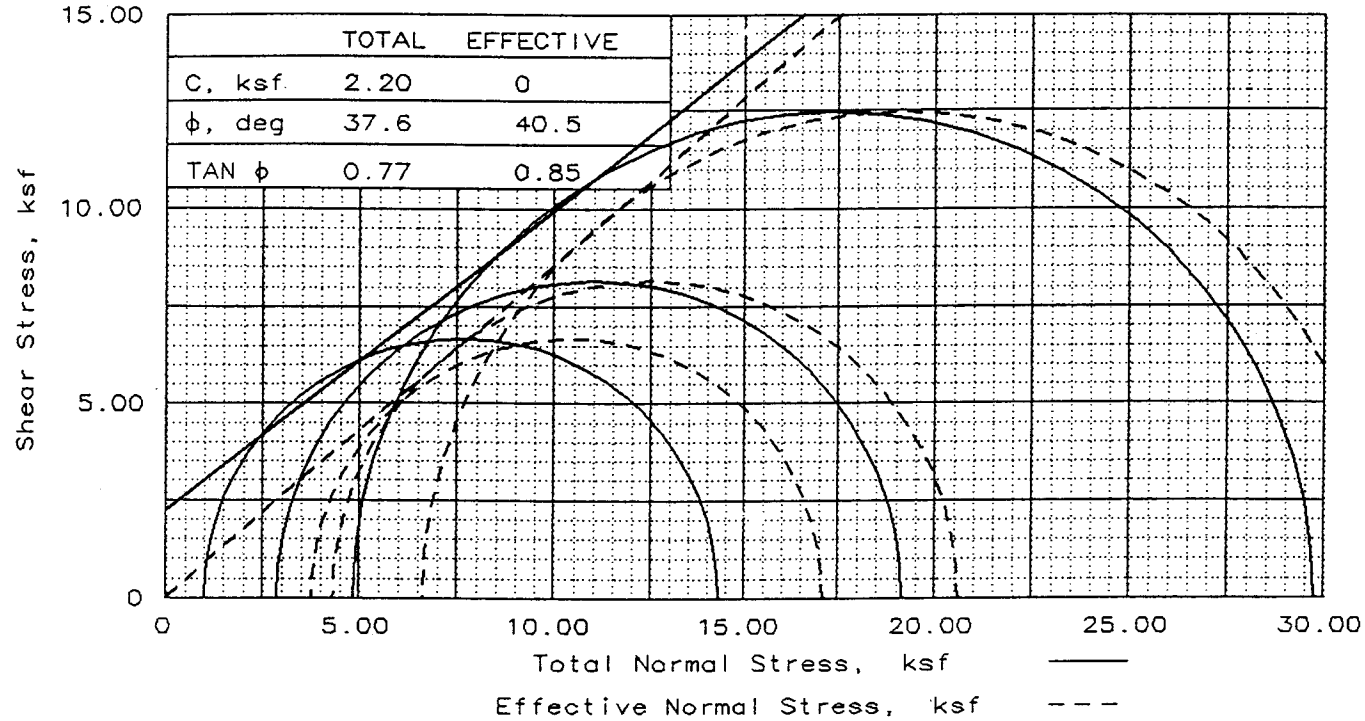
CLASSIFICATION
ND

ORGANICS (%)
ND

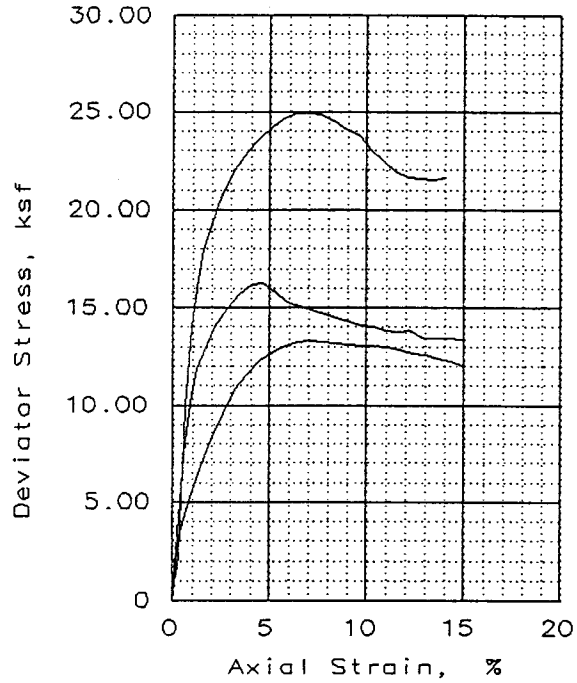
REMARKS: ND=NOT DETERMINED.

\72241d09.xls

REVIEWED BY: John Daily



	TOTAL	EFFECTIVE
C, ksf	2.20	0
ϕ, deg	37.6	40.5
TAN ϕ	0.77	0.85



SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	19.2	21.1	20.6
	DRY DENSITY, pcf	97.1	97.0	95.9
	SATURATION, %	72.2	78.5	75.3
	VOID RATIO	0.703	0.718	0.726
	DIAMETER, in	1.50	1.50	1.50
	HEIGHT, in	3.07	3.18	3.14
AT TEST	WATER CONTENT, %	26.4	24.3	23.8
	DRY DENSITY, pcf	97.4	101.0	101.4
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.699	0.650	0.631
	DIAMETER, in	1.50	1.47	1.46
	HEIGHT, in	3.07	3.18	3.13
BACK PRESSURE, ksf		5.79	5.80	5.82
CELL PRESSURE, ksf		6.81	8.71	10.70
FAILURE STRESS, ksf		13.32	16.28	24.89
PORE PRESSURE, ksf		3.01	4.36	4.05
STRAIN RATE, %/min.		0.652	0.629	0.639
ULTIMATE STRESS, ksf				
PORE PRESSURE, ksf				
$\bar{\sigma}_1$ FAILURE, ksf		17.12	20.63	31.54
$\bar{\sigma}_3$ FAILURE, ksf		3.8	4.35	6.65

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: LAB-COMPACTED
DESCRIPTION: (VISUAL) OLIVE GRAY SAND
LL= ND PL= ND PI= ND
SPECIFIC GRAVITY= 2.67
REMARKS: ND=NOT DETERMINED.

CLIENT: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
PROJECT: WEYERHAEUSER LF / NATIVE SOILS

SAMPLE LOCATION: SB00600 (UD) 47'-49'

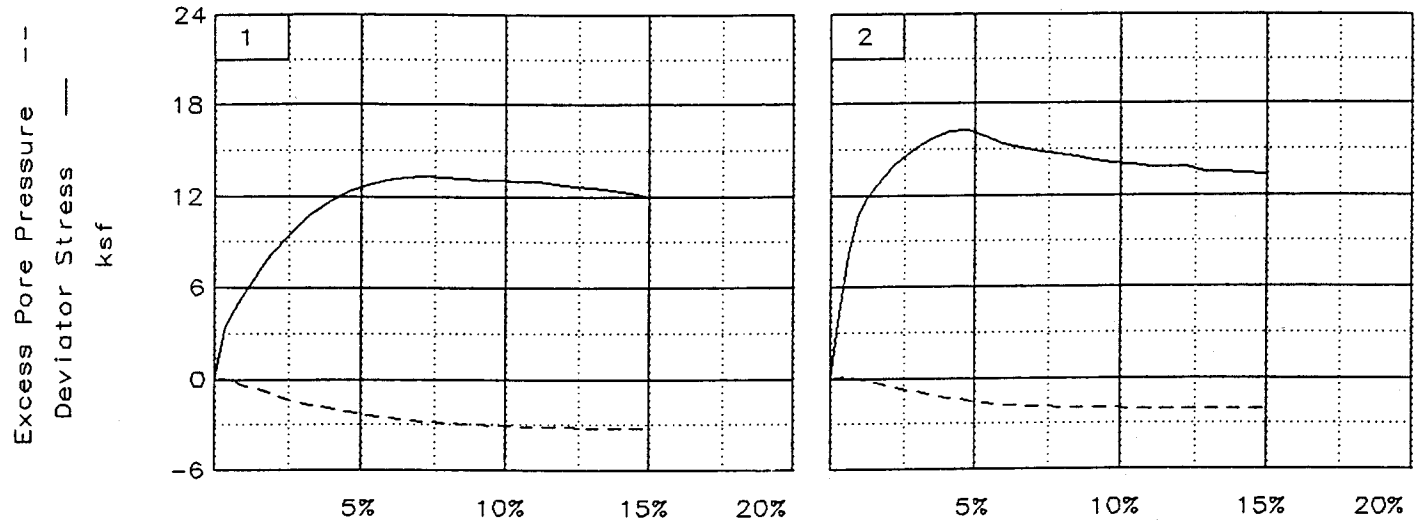
PROJ. NO.: 3071072241 DATE: JULY 3, 1997

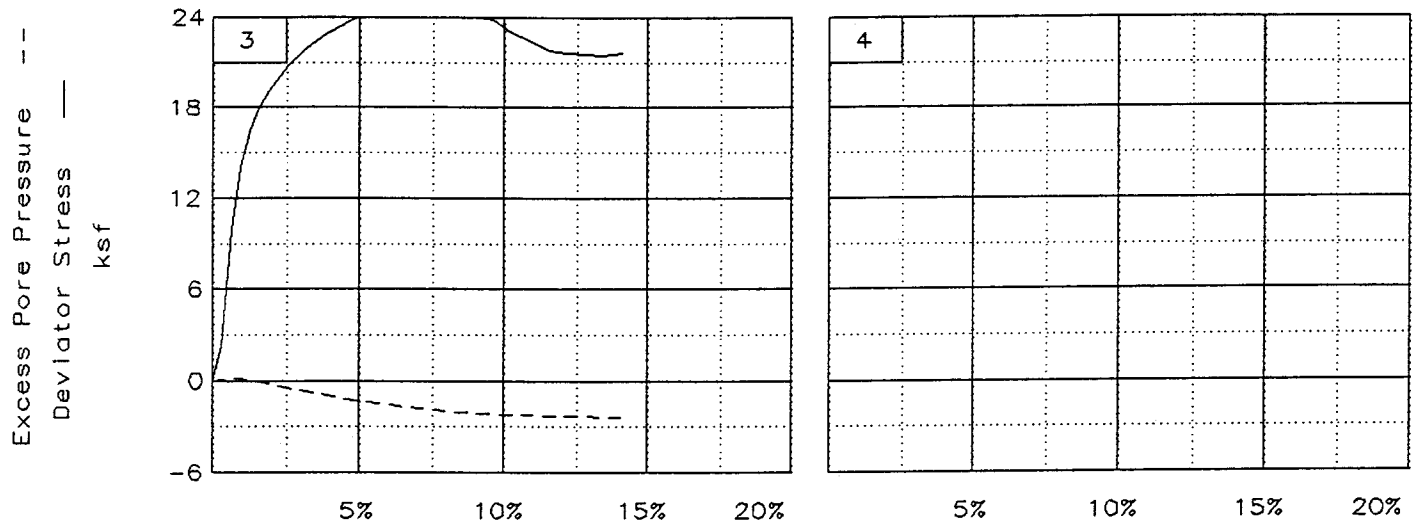
TRIAXIAL COMPRESSION TEST

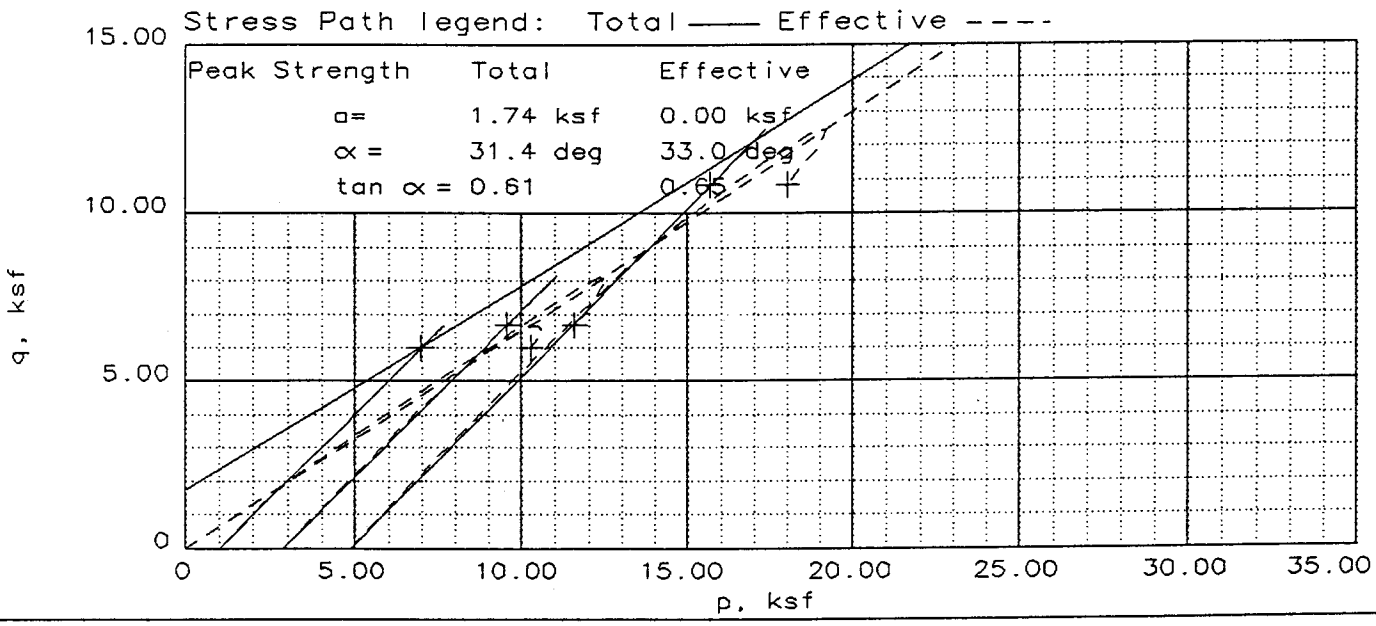
LAW ENGINEERING

FIG. NO. B-6

REVIEWED BY: John Dailly







Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002

Project: WEYERHAEUSER LF / NATIVE SOILS

Location: SB00600 (UD) 47'-49'

File: SB00600 Project No.: 3071072241 Page 2/2 Fig. No. B-6

TRIAXIAL COMPRESSION TEST 7-04-1997
CU with pore pressures 12:41 pm

Project Data

Project No.: 3071072241 Date: JULY 3, 1997 Data file: SB00600
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LF / NATIVE SOILS
Sample location: SB00600 (UD) 47'-49'
Sample description: (VISUAL) OLIVE GRAY SAND
Remarks: ND=NOT DETERMINED.
Fig No. B-6

Sample No. 1 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.67 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.50	1.50	
Height change, in		0.00	
Height, in	3.07	3.07	
Weight, grams	164.7		
Water volume change, cc		-9.95	
Moisture, %	19.2	26.4	22.6
Dry density, pcf	97.1	97.4	
Saturation, %	72.2	100.0	
Void ratio	0.703	0.699	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16533 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.652 % per minute
Consolidation cell pressure = 47.3 psi
Consolidation back pressure = 40.2 psi
Consolidation effective confining stress = 1.0224 ksf
Peak deviator stress = 13.32 ksf at reading no. 14
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0530	0.000	438.0	0.0	0.0	0.00	1.02	1.02	1.00	40.2	1.02	0.00
1	0.0630	0.010	677.0	39.5	0.3	3.22	0.99	4.21	4.24	40.4	2.60	1.61
2	0.0750	0.022	782.0	56.9	0.7	4.61	1.18	5.79	4.91	39.1	3.49	2.31
3	0.0830	0.030	845.0	67.3	1.0	5.44	1.35	6.80	5.02	37.9	4.08	2.72
4	0.0930	0.040	919.0	79.5	1.3	6.41	1.56	7.97	5.12	36.5	4.76	3.21
5	0.1030	0.050	990.0	91.3	1.6	7.34	1.77	9.11	5.14	35.0	5.44	3.67

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1130	0.060	1056.0	102.2	2.0	8.19	1.99	10.17	5.12	33.5	6.08	4.09
7	0.1330	0.080	1166.0	120.4	2.6	9.58	2.38	11.95	5.03	30.8	7.17	4.79
8	0.1530	0.100	1264.0	136.6	3.3	10.80	2.71	13.50	4.99	28.5	8.10	5.40
9	0.1730	0.120	1334.0	148.1	3.9	11.63	2.94	14.57	4.96	26.9	8.75	5.82
10	0.1930	0.140	1392.0	157.7	4.6	12.30	3.18	15.48	4.87	25.2	9.33	6.15
11	0.2130	0.160	1433.0	164.5	5.2	12.74	3.38	16.13	4.77	23.8	9.75	6.37
12	0.2330	0.180	1463.0	169.5	5.9	13.03	3.53	16.56	4.69	22.8	10.05	6.52
13	0.2530	0.200	1489.0	173.8	6.5	13.27	3.67	16.95	4.61	21.8	10.31	6.64
14	0.2730	0.220	1500.0	175.6	7.2	13.32	3.80	17.12	4.50	20.9	10.46	6.66
15	0.2930	0.240	1504.0	176.2	7.8	13.27	3.87	17.15	4.43	20.4	10.51	6.64
16	0.3130	0.260	1503.0	176.1	8.5	13.17	3.96	17.13	4.33	19.8	10.54	6.58
17	0.3330	0.280	1505.0	176.4	9.1	13.10	4.02	17.12	4.26	19.4	10.57	6.55
18	0.3530	0.300	1508.0	176.9	9.8	13.04	4.08	17.12	4.20	19.0	10.60	6.52
19	0.3730	0.320	1514.0	177.9	10.4	13.02	4.12	17.14	4.16	18.7	10.63	6.51
20	0.3930	0.340	1517.0	178.4	11.1	12.96	4.16	17.12	4.11	18.4	10.64	6.48
21	0.4130	0.360	1515.0	178.1	11.7	12.84	4.18	17.02	4.08	18.3	10.60	6.42
22	0.4330	0.380	1507.0	176.7	12.4	12.65	4.20	16.86	4.01	18.1	10.53	6.33
23	0.4530	0.400	1509.0	177.1	13.0	12.58	4.23	16.82	3.97	17.9	10.52	6.29
24	0.4730	0.420	1500.0	175.6	13.7	12.38	4.25	16.63	3.92	17.8	10.44	6.19
25	0.4930	0.440	1495.0	174.8	14.3	12.23	4.26	16.49	3.87	17.7	10.38	6.12
26	0.5130	0.460	1482.0	172.6	15.0	11.99	4.29	16.28	3.79	17.5	10.29	5.99

TRIAXIAL COMPRESSION TEST 7-04-1997
CU with pore pressures 12:41 pm

Project Data

Project No.: 3071072241 Date: JULY 3, 1997 Data file: SB00600
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LF / NATIVE SOILS
Sample location: SB00600 (UD) 47'-49'
Sample description: (VISUAL) OLIVE GRAY SAND
Remarks: ND=NOT DETERMINED.
Fig No. B-6

Sample No. 2 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.67 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.50	1.47	
Height change, in		0.01	
Height, in	3.18	3.18	
Weight, grams	172.6		
Water volume change, cc		-4.60	
Moisture, %	21.1	24.3	21.7
Dry density, pcf	97.0	101.0	
Saturation, %	78.5	100.0	
Void ratio	0.718	0.650	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16545 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.629 % per minute
Consolidation cell pressure = 60.5 psi
Consolidation back pressure = 40.3 psi
Consolidation effective confining stress = 2.9088 ksf
Peak deviator stress = 16.28 ksf at reading no. 10
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0600	0.000	451.0	0.0	0.0	0.00	2.91	2.91	1.00	40.3	2.91	0.00
1	0.0700	0.010	756.0	50.5	0.3	4.28	2.82	7.11	2.52	40.9	4.96	2.14
2	0.0800	0.020	1032.0	96.1	0.6	8.13	2.79	10.93	3.91	41.1	6.86	4.07
3	0.0900	0.030	1206.0	124.9	0.9	10.54	2.91	13.45	4.62	40.3	8.18	5.27
4	0.1000	0.040	1303.0	141.0	1.3	11.85	3.05	14.91	4.88	39.3	8.98	5.93
5	0.1100	0.050	1363.0	150.9	1.6	12.65	3.21	15.86	4.94	38.2	9.54	6.32

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1300	0.070	1468.0	168.3	2.2	14.01	3.50	17.51	5.00	36.2	10.51	7.01
7	0.1500	0.090	1543.0	180.7	2.8	14.95	3.76	18.71	4.98	34.4	11.23	7.48
8	0.1700	0.110	1602.0	190.4	3.5	15.66	4.00	19.66	4.91	32.7	11.83	7.83
9	0.1900	0.130	1647.0	197.9	4.1	16.16	4.20	20.37	4.84	31.3	12.29	8.08
10	0.2100	0.150	1664.0	200.7	4.7	16.28	4.35	20.63	4.74	30.3	12.49	8.14
11	0.2300	0.170	1638.0	196.4	5.3	15.83	4.56	20.40	4.47	28.8	12.48	7.92
12	0.2500	0.190	1606.0	191.1	6.0	15.30	4.68	19.98	4.27	28.0	12.33	7.65
13	0.2700	0.210	1598.0	189.8	6.6	15.09	4.74	19.83	4.19	27.6	12.28	7.55
14	0.2900	0.230	1589.0	188.3	7.2	14.87	4.80	19.67	4.10	27.2	12.23	7.44
15	0.3100	0.250	1581.0	187.0	7.9	14.67	4.84	19.51	4.03	26.9	12.17	7.33
16	0.3300	0.270	1574.0	185.8	8.5	14.48	4.87	19.35	3.97	26.7	12.11	7.24
17	0.3500	0.290	1565.0	184.3	9.1	14.26	4.90	19.16	3.91	26.5	12.03	7.13
18	0.3700	0.310	1558.0	183.2	9.8	14.08	4.91	18.99	3.87	26.4	11.95	7.04
19	0.3900	0.330	1561.0	183.6	10.4	14.02	4.92	18.94	3.85	26.3	11.93	7.01
20	0.4100	0.350	1553.0	182.3	11.0	13.82	4.92	18.74	3.81	26.3	11.83	6.91
21	0.4300	0.370	1559.0	183.3	11.6	13.79	4.94	18.73	3.79	26.2	11.84	6.90
22	0.4500	0.390	1568.0	184.8	12.3	13.81	4.94	18.75	3.80	26.2	11.84	6.90
23	0.4700	0.410	1548.0	181.5	12.9	13.46	4.92	18.39	3.73	26.3	11.66	6.73
24	0.4900	0.430	1556.0	182.8	13.5	13.46	4.94	18.40	3.73	26.2	11.67	6.73
25	0.5100	0.450	1562.0	183.8	14.2	13.44	4.94	18.38	3.72	26.2	11.66	6.72
26	0.5370	0.477	1566.0	184.5	15.0	13.35	4.94	18.29	3.70	26.2	11.62	6.68

TRIAXIAL COMPRESSION TEST 7-04-1997
CU with pore pressures 12:41 pm

Project Data

Project No.: 3071072241 Date: JULY 3, 1997 Data file: SB00600
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LF / NATIVE SOILS
Sample location: SB00600 (UD) 47'-49'
Sample description: (VISUAL) OLIVE GRAY SAND
Remarks: ND=NOT DETERMINED.
Fig No. B-6

Sample No. 3 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.67 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.50	1.46	
Height change, in		0.01	
Height, in	3.14	3.13	
Weight, grams	167.8		
Water volume change, cc		-4.47	
Moisture, %	20.6	23.8	23.3
Dry density, pcf	95.9	101.4	
Saturation, %	75.3	100.0	
Void ratio	0.726	0.631	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16125 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.639 % per minute
Consolidation cell pressure = 74.3 psi
Consolidation back pressure = 40.4 psi
Consolidation effective confining stress = 4.8816 ksf
Peak deviator stress = 24.89 ksf at reading no. 14
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0390	0.000	455.0	0.0	0.0	0.00	4.88	4.88	1.00	40.4	4.88	0.00
1	0.0490	0.010	618.0	26.3	0.3	2.26	4.82	7.08	1.47	40.8	5.95	1.13
2	0.0590	0.020	1170.0	115.3	0.6	9.88	4.72	14.60	3.09	41.5	9.66	4.94
3	0.0690	0.030	1473.0	164.2	1.0	14.02	4.74	18.76	3.96	41.4	11.75	7.01
4	0.0790	0.040	1653.0	193.2	1.3	16.45	4.80	21.24	4.43	41.0	13.02	8.22
5	0.0890	0.050	1770.0	212.0	1.6	17.99	4.91	22.90	4.66	40.2	13.91	9.00

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1000	0.061	1860.0	226.6	1.9	19.16	5.05	24.21	4.79	39.2	14.63	9.58
7	0.1200	0.081	1990.0	247.5	2.6	20.79	5.34	26.13	4.89	37.2	15.74	10.40
8	0.1400	0.101	2091.0	263.8	3.2	22.01	5.59	27.60	4.94	35.5	16.59	11.01
9	0.1600	0.121	2170.0	276.5	3.9	22.93	5.80	28.73	4.95	34.0	17.27	11.46
10	0.1800	0.141	2233.0	286.7	4.5	23.61	6.06	29.67	4.89	32.2	17.87	11.80
11	0.2000	0.161	2288.0	295.6	5.1	24.18	6.22	30.40	4.89	31.1	18.31	12.09
12	0.2200	0.181	2338.0	303.6	5.8	24.67	6.38	31.05	4.87	30.0	18.71	12.33
13	0.2400	0.201	2367.0	308.3	6.4	24.88	6.54	31.42	4.81	28.9	18.98	12.44
14	0.2600	0.221	2381.0	310.6	7.1	24.89	6.65	31.54	4.74	28.1	19.10	12.45
15	0.2800	0.241	2389.0	311.9	7.7	24.82	6.77	31.59	4.67	27.3	19.18	12.41
16	0.3000	0.261	2379.0	310.2	8.3	24.52	6.88	31.41	4.56	26.5	19.14	12.26
17	0.3200	0.281	2356.0	306.5	9.0	24.06	6.96	31.02	4.46	26.0	18.99	12.03
18	0.3400	0.301	2350.0	305.6	9.6	23.82	7.04	30.86	4.38	25.4	18.95	11.91
19	0.3600	0.321	2300.0	297.5	10.3	23.02	7.07	30.09	4.26	25.2	18.58	11.51
20	0.3800	0.341	2268.0	292.3	10.9	22.46	7.10	29.56	4.16	25.0	18.33	11.23
21	0.4000	0.361	2232.0	286.5	11.5	21.86	7.17	29.03	4.05	24.5	18.10	10.93
22	0.4200	0.381	2228.0	285.9	12.2	21.65	7.19	28.84	4.01	24.4	18.01	10.83
23	0.4400	0.401	2235.0	287.0	12.8	21.58	7.20	28.78	4.00	24.3	17.99	10.79
24	0.4600	0.421	2242.0	288.2	13.5	21.51	7.21	28.72	3.98	24.2	17.97	10.75
25	0.4800	0.441	2267.0	292.2	14.1	21.65	7.21	28.86	4.00	24.2	18.04	10.82

SUMMARY OF LABORATORY TESTING

WEYERHAEUSER LANDFILL

LAW PROJECT 30710-7-2241

CONSTANT HEAD TEST
ASTM D2434-68

Sample ID	Initial Wet Unit Weight (pcf)	Initial Dry Unit Weight (pcf)	Initial Moisture Content (%)	Hydraulic Gradient	Hydraulic Conductivity (cm/sec)
SB00600 47ft to 49ft Native Soil	115.2	93.1	23.8	7.1	1.9×10^{-2}

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 10, 1997

SAMPLE IDENTIFICATION: SB00700 (SS) 50'-52'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 545.30
PAN WEIGHT (g): 86.97
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 458.33

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/4"	0.00	0.0	**100.0**
3/8"	10.69	2.3	**97.7**
#4	21.24	4.6	**95.4**
#10	39.17	8.5	**91.5**
#20	63.72	13.9	**86.1**
#40	103.60	22.6	**77.4**
#60	196.16	42.8	**57.2**
#140	402.65	87.9	**12.1**
#200	412.02	89.9	**10.1**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d10.xls

REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 10, 1997

SAMPLE IDENTIFICATION: SB00800 (SS) 30'-32'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 401.39
PAN WEIGHT (g): 79.20
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 322.19

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/4"	0.00	0.0	**100.0**
3/8"	0.74	0.2	**99.8**
#4	0.82	0.3	**99.7**
#10	2.75	0.9	**99.1**
#20	24.18	7.5	**92.5**
#40	110.23	34.2	**65.8**
#60	241.97	75.1	**24.9**
#140	305.27	94.7	**5.3**
#200	309.53	96.1	**3.9**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d11.xls

REVIEWED BY: John Dailey

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / NATIVE SOILS
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 10, 1997

SAMPLE IDENTIFICATION: SB00900 (SS) 40'-42'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 624.44
PAN WEIGHT (g): 83.89
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 540.55

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/8"	0.00	0.0	**100.0**
#4	1.20	0.2	**99.8**
#10	16.34	3.0	**97.0**
#20	155.25	28.7	**71.3**
#40	396.00	73.3	**26.7**
#60	501.93	92.9	**7.1**
#140	536.32	99.2	**0.8**
#200	537.04	99.4	**0.6**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d12.xls

REVIEWED BY: John Dailey

LABORATORY TESTING SUMMARY

IV. TEST REPORTS

b. WASTE MATERIAL

FINAL REPORTS TO B. MOSHER

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
SOILS LABORATORY ASSIGNMENTS

No. _____ PRIORITY _____

DEPT. # _____

WASTE MATERIAL

DATE _____ JOB NAME WEYERHAEUSER LANDFILL JOB NO. 3710-97-2241 IN CHARGE _____ REQUESTED COMPLETION DATE _____

BORING NO.	SAMPLE TYPE	SAMPLE DEPTH	COMBINED ANALYSIS (LI)	MOISTURE CONTENT	UNIT WEIGHT MAX. DEN. & MOIST. CONT.	SPECIFIC GRAVITY	ATTERBERG LIMITS	SHRINKAGE LIMITS	DRY	GRAIN SIZE ANALYSIS: WASH 200 W/SIEVE	% FINER NO. 200	HYDROMETER	MAX. & MIN. DENSITY	SWELL TEST	DIRECT SHEAR	UNCONFINED COMP. WITH STRESS-STRAIN CURVE	UNCONFINED COMP. WITHOUT S-S CURVE	TRIAXIAL CU	TRIAXIAL CU	TRIAXIAL CU W/PP	CONFINING PRESSURES: KSF	STANDARD (A, B, C, D)	MODIFIED (A, B, C, D)	C & R	CONSOLIDATION: INDICATE LOADS IN KSF AND RELOAD CYCLE IF ANY	SPECIAL TEST: PERCEPTIBILITY	BEARMITE BEARING		
1	UD	5-7			X					X		X	NO		NOT A SIGNIFICANT LIME PRESENCE														
2	UD	7-9			X					X																			
3	UD	7-9				X				X										X									
4	UD	12-14								X																			
5	UD	12-14				X				X										X									
6	UD	7-9			X					X																			
10-12 6	SS	11-12					X					X													TESTED IN CHARLOTTE				
6	UD	17-19			X					X		X	NO		- NOT LIME MUD														
0-2 7	SS	1-2					X					X																	
7	UD	12-14			X					X																			
0-2 8	SS	1-2					X					X																	
8	UD	7-9			X							X																	
9	UD	7-9								X																			

CAN FAIL HERE

FAILING AGAIN AGREEMENT

REMARKS • See Attached Field Descriptions of UDs. CALL Rick Powell at Delta ENV. IMMEDIATELY if contents of UD do not match field descriptions.

• Minimize Disturbance While Taking Classification Samples from UDs NOT Assigned for Perm. or Triaxial Testing. They will Be Reserve Samples.

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE IDENTIFICATION: SB00100 (UD) 5'-7'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 182.71
PAN WEIGHT (g): 79.20
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 103.51

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/8"	0.00	0.0	**100.0**
#4	3.09	3.0	**97.0**
#10	8.67	8.4	**91.6**
#20	23.03	22.2	**77.8**
#40	33.71	32.6	**67.4**
#60	45.18	43.6	**56.4**
#140	66.89	64.6	**35.4**
#200	71.15	68.7	**31.3**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d13.xls

REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
UNIT WEIGHT AND NATURAL MOISTURE CONTENT OF SOIL

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIALS

LAW PROJECT NUMBER: 30710-7-2241

DELTA ENVIRONMENTAL CONSULTANTS PROJECT NUMBER: E096-019-2.0002

DATE: JULY 11, 1997

SAMPLE ID: SB00100 (UD) 5'-7'

VISUAL SOIL DESCRIPTION: BLACK ASH MIXED WITH LIME MUD

INCHES FROM BOTTOM OF TUBE: 3

MEASUREMENT DATA (in)			
LENGTH #1:	5.294	TOP DIAMETER #1:	2.895
LENGTH #2:	5.308	TOP DIAMETER #2:	2.896
LENGTH #3:	5.310	TOP DIAMETER #3:	2.897
		BOTTOM DIAMETER #1:	2.888
		BOTTOM DIAMETER #2:	2.893
		BOTTOM DIAMETER #3:	2.883

AVERAGED MEASURED VALUES	
LENGTH OF TUBE SAMPLE (in):	5.304
DIAMETER OF TUBE SAMPLE (in):	2.892

WEIGHT DETERMINATION DATA	
WEIGHT OF TUBE & SOIL (g):	1013.3
WEIGHT OF TUBE (g):	386.7
WEIGHT OF SOIL (g):	626.6

MOISTURE DETERMINATION DATA	
WET WEIGHT SOIL & DRYING PAN (g):	490.7
DRY WEIGHT SOIL & DRYING PAN (g):	273.2
WEIGHT OF DRYING PAN (g):	83.6

WET UNIT WEIGHT (pcf)
68.5

DRY UNIT WEIGHT (pcf)
31.9

MOISTURE CONTENT (%)
114.7

REMARKS:

\72241d14.xls

REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE IDENTIFICATION: SB00200 (UD) 7'-9'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 268.87
PAN WEIGHT (g): 83.80
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 185.07

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/4"	0.00	0.0	**100.0**
3/8"	13.03	7.0	**93.0**
#4	29.92	16.2	**83.8**
#10	53.93	29.1	**70.9**
#20	83.95	45.4	**54.6**
#40	107.08	57.9	**42.1**
#60	122.91	66.4	**33.6**
#140	138.32	74.7	**25.3**
#200	141.95	76.7	**23.3**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d15.xls

REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
UNIT WEIGHT AND NATURAL MOISTURE CONTENT OF SOIL

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIALS
LAW PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE ID: SB00200 (UD) 7'-9'

VISUAL SOIL DESCRIPTION: PULP REJECTS WITH LIME GRIT
INCHES FROM BOTTOM OF TUBE: 2

MEASUREMENT DATA (in)			
LENGTH #1:	5.915	TOP DIAMETER #1:	2.890
LENGTH #2:	5.871	TOP DIAMETER #2:	2.894
LENGTH #3:	5.907	TOP DIAMETER #3:	2.890
		BOTTOM DIAMETER #1:	2.894
		BOTTOM DIAMETER #2:	2.887
		BOTTOM DIAMETER #3:	2.891

AVERAGED MEASURED VALUES	
LENGTH OF TUBE SAMPLE (in):	5.898
DIAMETER OF TUBE SAMPLE (in):	2.891

WEIGHT DETERMINATION DATA	
WEIGHT OF TUBE & SOIL (g):	1253.6
WEIGHT OF TUBE (g):	432.6
WEIGHT OF SOIL (g):	821.0

MOISTURE DETERMINATION DATA	
WET WEIGHT SOIL & DRYING PAN (g):	561.5
DRY WEIGHT SOIL & DRYING PAN (g):	341.9
WEIGHT OF DRYING PAN (g):	86.9

WET UNIT WEIGHT (pcf)
80.8

DRY UNIT WEIGHT (pcf)
43.4

MOISTURE CONTENT (%)
86.1

REMARKS:

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REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422)

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997
SAMPLE IDENTIFICATION: SB00300 (UD) 7'-9'

INITIAL SAMPLE DATA

INITIAL DRY SAMPLE WEIGHT (g): 1579.20

SAMPLE SPLIT ON A #4 SIEVE

SPLIT SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 533.40
PAN WEIGHT (g): 101.94
DRY WEIGHT SPLIT SAMPLE (g): 431.46

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/4"	0.00	0.0	**100.0**
3/8"	17.76	1.1	**98.9**
#4	60.70	3.8	**96.2**
#10	25.18	9.5	**90.5**
#20	74.82	20.5	**79.5**
#40	118.40	30.2	**69.8**
#60	158.34	39.1	**60.9**
#140	209.86	50.6	**49.4**
#200	220.45	53.0	**47.0**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

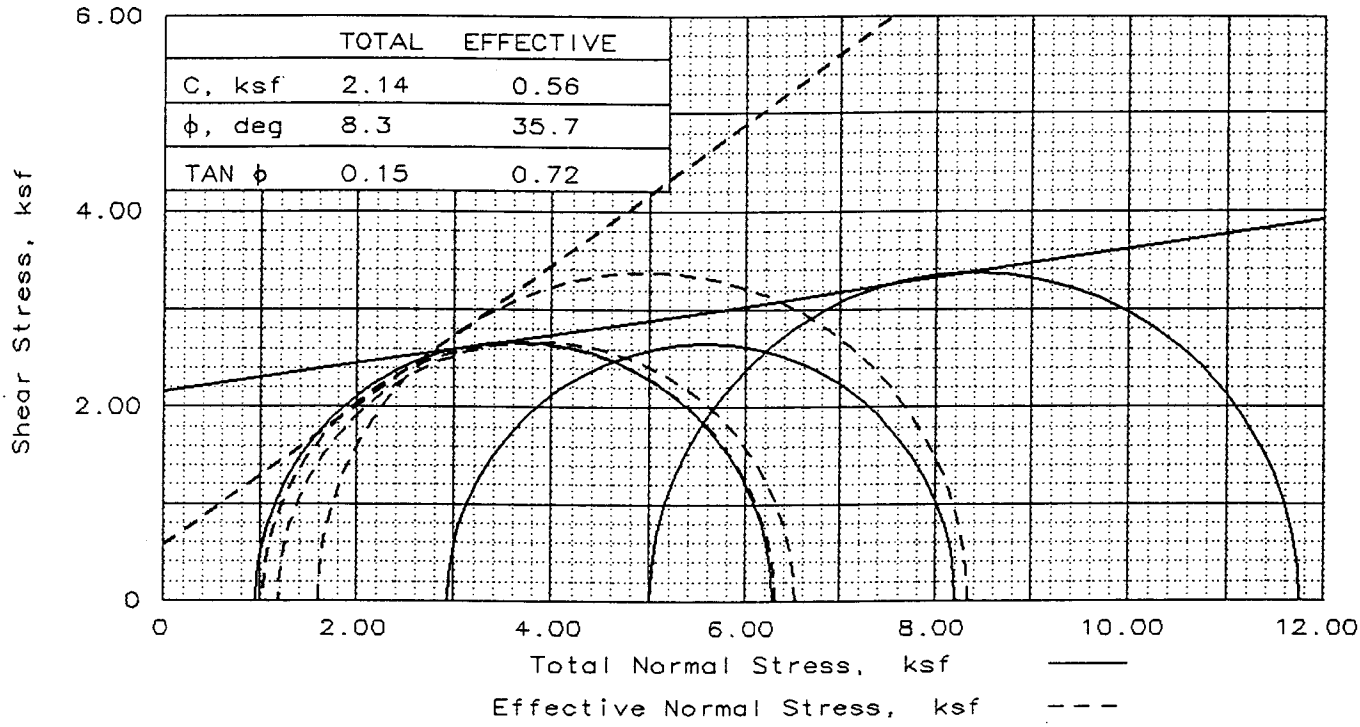
CLASSIFICATION
ND

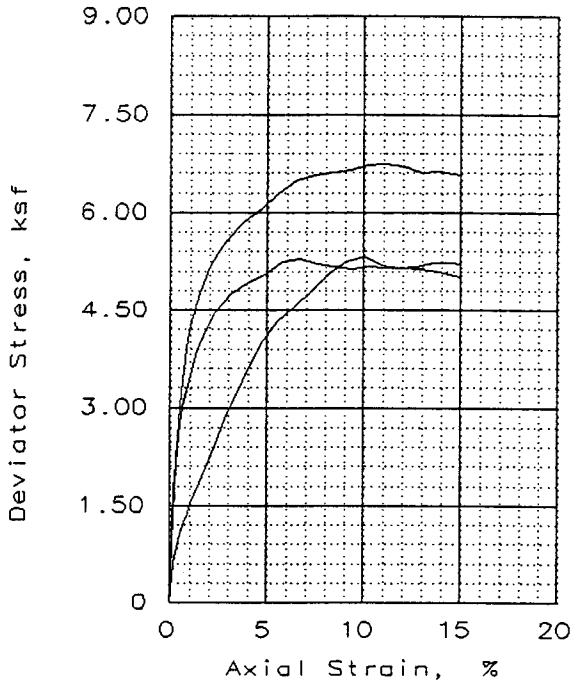
ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d17.xls

REVIEWED BY: John Daily





SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	66.7	50.9	74.6
	DRY DENSITY, pcf	59.0	62.4	50.0
	SATURATION, %	97.8	81.7	85.7
	VOID RATIO	1.806	1.650	2.306
	DIAMETER, in	2.80	2.82	2.83
	HEIGHT, in	5.59	5.69	5.61
AT TEST	WATER CONTENT, %	65.3	51.4	69.5
	DRY DENSITY, pcf	60.6	70.1	58.2
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	1.731	1.361	1.843
	DIAMETER, in	2.77	2.68	2.66
	HEIGHT, in	5.56	5.62	5.45
BACK PRESSURE, ksf		5.56	5.79	5.04
CELL PRESSURE, ksf		6.52	8.73	10.07
FAILURE STRESS, ksf		5.33	5.28	6.74
PORE PRESSURE, ksf		5.33	7.69	8.45
STRAIN RATE, %/min.		0.810	0.801	0.825
ULTIMATE STRESS, ksf				
PORE PRESSURE, ksf				
$\bar{\sigma}_1$ FAILURE, ksf		6.52	6.32	8.35
$\bar{\sigma}_3$ FAILURE, ksf		1.2	1.04	1.61

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: UNDISTURBED
DESCRIPTION: (VISUAL) LIME MUD AND ASH
LL= ND PL= ND PI= ND
SPECIFIC GRAVITY= 2.46
REMARKS:

CLIENT: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
PROJECT: WEYERHAEUSER LANDFILL / WASTE MATERIAL
SAMPLE LOCATION: SB00300 (UD) 7'-9'

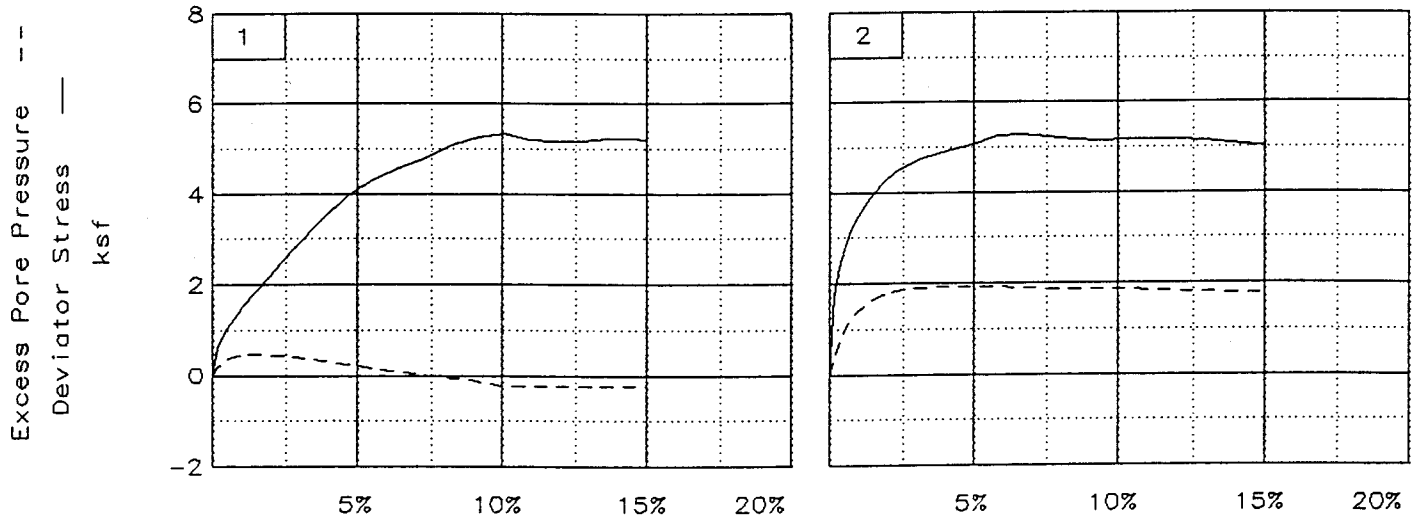
PROJ. NO.: 3071072241 DATE: JULY 11, 1997

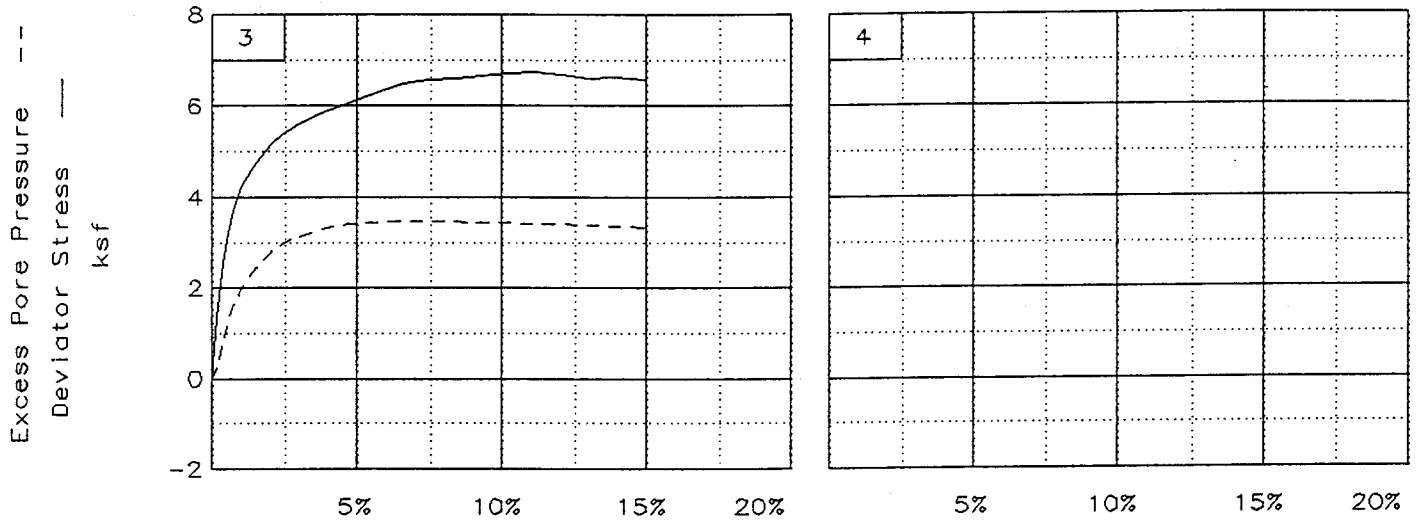
TRIAXIAL COMPRESSION TEST

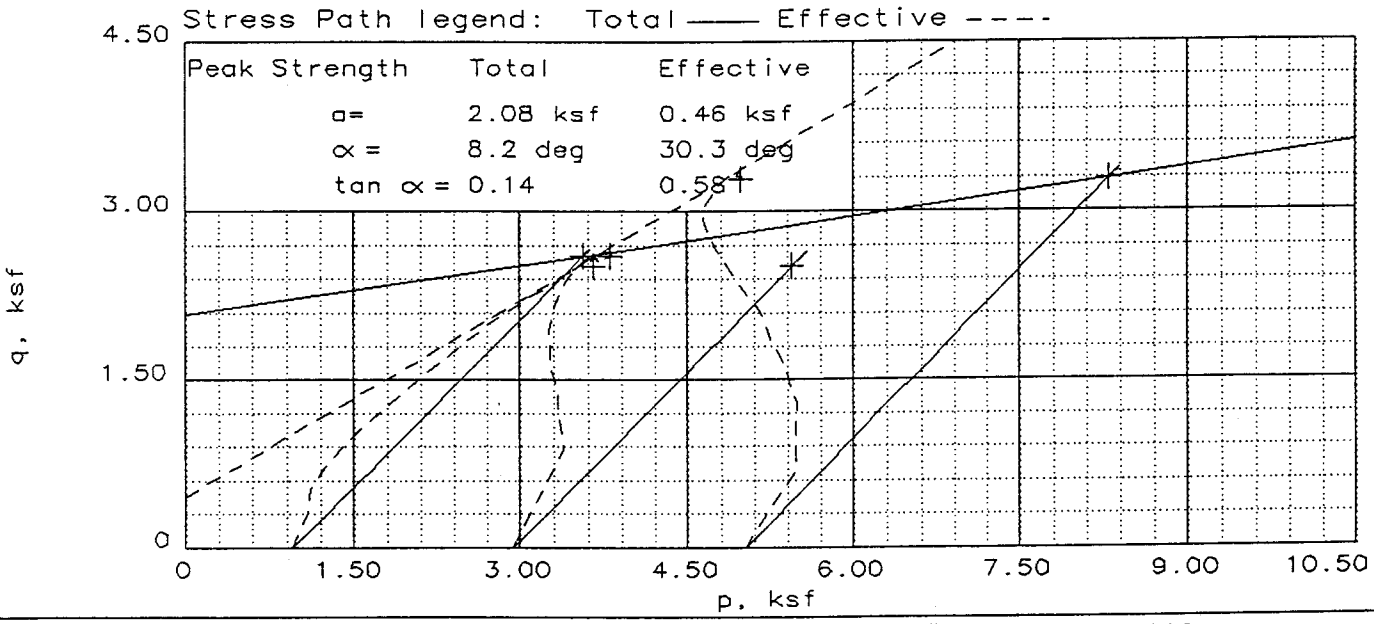
LAW ENGINEERING

FIG. NO. B-3

REVIEWED BY: John Dailey







Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002

Project: WEYERHAEUSER LANDFILL / WASTE MATERIAL

Location: SB00300 (UD) 7'-9'

File: SB00300 Project No.: 3071072241 Page 2/2 Fig. No. B-3

TRIAXIAL COMPRESSION TEST 7-11-1997
CU with pore pressures 4:33 pm

Project Data

Project No.: 3071072241 Date: JULY 11, 1997 Data file: SB00300
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / WASTE MATERIAL
Sample location: SB00300 (UD) 7'-9'
Sample description: (VISUAL) LIME MUD AND ASH
Remarks:
Fig No. B-3

Sample No. 1 Data

Type of sample: UNDISTURBED
Specific Gravity= 2.46 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	2.80	2.77	
Height change, in		0.03	
Height, in	5.59	5.56	
Weight, grams	890.0		
Water volume change, cc		7.12	
Moisture, %	66.7	65.3	66.9
Dry density, pcf	59.0	60.6	
Saturation, %	97.8	100.0	
Void ratio	1.806	1.731	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.69056 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.810 % per minute
Consolidation cell pressure = 45.3 psi
Consolidation back pressure = 38.6 psi
Consolidation effective confining stress = 0.9648 ksf
Peak deviator stress = 5.33 ksf at reading no. 18
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0910	0.000	80.0	0.0	0.0	0.00	0.96	0.96	1.00	38.6	0.96	0.00
1	0.1010	0.010	117.0	25.6	0.2	0.61	0.79	1.40	1.77	39.8	1.10	0.30
2	0.1110	0.020	133.0	36.6	0.4	0.87	0.68	1.55	2.28	40.6	1.11	0.43
3	0.1210	0.030	145.0	44.9	0.5	1.06	0.59	1.65	2.80	41.2	1.12	0.53
4	0.1310	0.040	156.0	52.5	0.7	1.24	0.56	1.80	3.21	41.4	1.18	0.62
5	0.1410	0.050	165.0	58.7	0.9	1.39	0.53	1.92	3.60	41.6	1.23	0.69

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1500	0.059	174.0	64.9	1.1	1.53	0.52	2.05	3.95	41.7	1.28	0.76
7	0.1750	0.084	194.0	78.7	1.5	1.85	0.50	2.35	4.66	41.8	1.43	0.92
8	0.2000	0.109	215.0	93.2	2.0	2.18	0.52	2.70	5.20	41.7	1.61	1.09
9	0.2250	0.134	237.0	108.4	2.4	2.52	0.53	3.05	5.73	41.6	1.79	1.26
10	0.2500	0.159	257.0	122.2	2.9	2.83	0.56	3.39	6.04	41.4	1.98	1.41
11	0.3000	0.209	295.0	148.5	3.8	3.40	0.63	4.04	6.37	40.9	2.34	1.70
12	0.3500	0.259	333.0	174.7	4.7	3.97	0.72	4.69	6.51	40.3	2.70	1.98
13	0.4000	0.309	359.0	192.7	5.6	4.33	0.81	5.14	6.37	39.7	2.97	2.17
14	0.4500	0.359	377.0	205.1	6.5	4.57	0.89	5.46	6.12	39.1	3.18	2.28
15	0.5000	0.409	395.0	217.5	7.4	4.80	0.96	5.77	5.98	38.6	3.36	2.40
16	0.5500	0.459	416.0	232.0	8.3	5.07	1.02	6.09	5.96	38.2	3.56	2.54
17	0.6000	0.509	431.0	242.4	9.2	5.24	1.09	6.34	5.79	37.7	3.72	2.62
18	0.6500	0.559	440.0	248.6	10.1	5.33	1.20	6.52	5.46	37.0	3.86	2.66
19	0.7000	0.609	434.0	244.5	11.0	5.18	1.20	6.38	5.34	37.0	3.79	2.59
20	0.7500	0.659	435.5	245.5	11.9	5.15	1.20	6.35	5.31	37.0	3.77	2.58
21	0.8000	0.709	441.0	249.3	12.8	5.18	1.20	6.38	5.33	37.0	3.79	2.59
22	0.8500	0.759	448.0	254.1	13.7	5.23	1.21	6.44	5.32	36.9	3.82	2.61
23	0.9000	0.809	451.5	256.5	14.6	5.22	1.21	6.43	5.32	36.9	3.82	2.61
24	0.9240	0.833	452.0	256.9	15.0	5.20	1.21	6.41	5.30	36.9	3.81	2.60

TRIAXIAL COMPRESSION TEST 7-11-1997
CU with pore pressures 4:33 pm

Project Data

Project No.: 3071072241 Date: JULY 11, 1997 Data file: SB00300
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / WASTE MATERIAL
Sample location: SB00300 (UD) 7'-9'
Sample description: (VISUAL) LIME MUD AND ASH
Remarks:
Fig No. B-3

Sample No. 2 Data

Type of sample: UNDISTURBED
Specific Gravity= 2.46 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	2.82	2.68	
Height change, in		0.07	
Height, in	5.69	5.62	
Weight, grams	878.2		
Water volume change, cc		-2.96	
Moisture, %	50.9	51.4	53.4
Dry density, pcf	62.4	70.1	
Saturation, %	81.7	100.0	
Void ratio	1.650	1.361	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.69 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.801 % per minute
Consolidation cell pressure = 60.6 psi
Consolidation back pressure = 40.2 psi
Consolidation effective confining stress = 2.9376 ksf
Peak deviator stress = 5.28 ksf at reading no. 13
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0720	0.000	90.0	0.0	0.0	0.00	2.94	2.94	1.00	40.2	2.94	0.00
1	0.0820	0.010	189.0	68.3	0.2	1.74	2.52	4.26	1.69	43.1	3.39	0.87
2	0.0920	0.020	224.0	92.5	0.4	2.36	2.17	4.53	2.08	45.5	3.35	1.18
3	0.1020	0.030	247.0	108.3	0.5	2.75	1.96	4.71	2.41	47.0	3.34	1.38
4	0.1120	0.040	267.0	122.1	0.7	3.10	1.74	4.84	2.78	48.5	3.29	1.55
5	0.1250	0.053	285.0	134.6	0.9	3.41	1.57	4.98	3.17	49.7	3.27	1.70

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1500	0.078	313.0	153.9	1.4	3.88	1.32	5.20	3.93	51.4	3.26	1.94
7	0.1750	0.103	333.0	167.7	1.8	4.21	1.20	5.40	4.52	52.3	3.30	2.10
8	0.2020	0.130	349.0	178.7	2.3	4.46	1.11	5.57	5.02	52.9	3.34	2.23
9	0.2500	0.178	368.5	192.2	3.2	4.76	1.04	5.79	5.59	53.4	3.42	2.38
10	0.3000	0.228	381.0	200.8	4.1	4.92	1.02	5.95	5.82	53.5	3.48	2.46
11	0.3500	0.278	392.0	208.4	4.9	5.06	1.02	6.09	5.95	53.5	3.55	2.53
12	0.4000	0.328	406.0	218.0	5.8	5.25	1.02	6.27	6.13	53.5	3.65	2.62
13	0.4500	0.378	411.0	221.5	6.7	5.28	1.04	6.32	6.09	53.4	3.68	2.64
14	0.5000	0.428	410.0	220.8	7.6	5.21	1.07	6.28	5.89	53.2	3.67	2.61
15	0.5500	0.478	410.0	220.8	8.5	5.16	1.07	6.23	5.85	53.2	3.65	2.58
16	0.6000	0.528	411.0	221.5	9.4	5.13	1.08	6.21	5.75	53.1	3.64	2.56
17	0.6500	0.578	416.5	225.3	10.3	5.17	1.08	6.25	5.78	53.1	3.66	2.58
18	0.7000	0.628	419.5	227.4	11.2	5.16	1.09	6.26	5.72	53.0	3.68	2.58
19	0.7500	0.678	422.5	229.4	12.1	5.16	1.12	6.28	5.59	52.8	3.70	2.58
20	0.8000	0.728	424.0	230.5	13.0	5.13	1.14	6.27	5.51	52.7	3.70	2.56
21	0.8500	0.778	425.0	231.2	13.8	5.09	1.15	6.24	5.42	52.6	3.70	2.55
22	0.9000	0.828	425.0	231.2	14.7	5.04	1.15	6.19	5.37	52.6	3.67	2.52
23	0.9150	0.843	425.0	231.2	15.0	5.02	1.15	6.17	5.36	52.6	3.66	2.51

TRIAXIAL COMPRESSION TEST 7-11-1997
CU with pore pressures 4:33 pm

Project Data

Project No.: 3071072241 Date: JULY 11, 1997 Data file: SB00300
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / WASTE MATERIAL
Sample location: SB00300 (UD) 7'-9'
Sample description: (VISUAL) LIME MUD AND ASH
Remarks:
Fig No. B-3

Sample No. 3 Data

Type of sample: UNDISTURBED
Specific Gravity= 2.46 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	2.83	2.66	
Height change, in		0.16	
Height, in	5.61	5.45	
Weight, grams	808.6		
Water volume change, cc		23.50	
Moisture, %	74.6	69.5	71.3
Dry density, pcf	50.0	58.2	
Saturation, %	85.7	100.0	
Void ratio	2.306	1.843	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.691 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.825 % per minute
Consolidation cell pressure = 69.9 psi
Consolidation back pressure = 35 psi
Consolidation effective confining stress = 5.0256 ksf
Peak deviator stress = 6.74 ksf at reading no. 19
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0420	0.000	90.0	0.0	0.0	0.00	5.03	5.03	1.00	35.0	5.03	0.00
1	0.0520	0.010	166.0	52.5	0.2	1.36	4.80	6.15	1.28	36.6	5.47	0.68
2	0.0620	0.020	234.0	99.5	0.4	2.57	4.20	6.77	1.61	40.7	5.49	1.28
3	0.0720	0.030	271.0	125.1	0.6	3.22	3.77	6.99	1.85	43.7	5.38	1.61
4	0.0830	0.041	300.0	145.1	0.8	3.73	3.38	7.11	2.10	46.4	5.25	1.86
5	0.0920	0.050	318.0	157.5	0.9	4.04	3.18	7.23	2.27	47.8	5.20	2.02

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1000	0.058	331.0	166.5	1.1	4.27	3.01	7.28	2.42	49.0	5.14	2.13
7	0.1250	0.083	360.0	186.6	1.5	4.76	2.56	7.32	2.86	52.1	4.94	2.38
8	0.1540	0.112	385.0	203.8	2.1	5.17	2.23	7.40	3.32	54.4	4.82	2.59
9	0.1750	0.133	398.0	212.8	2.4	5.38	2.06	7.44	3.61	55.6	4.75	2.69
10	0.2000	0.158	410.5	221.5	2.9	5.57	1.92	7.48	3.91	56.6	4.70	2.78
11	0.2500	0.208	430.0	234.9	3.8	5.85	1.73	7.58	4.39	57.9	4.65	2.93
12	0.3000	0.258	445.5	245.7	4.7	6.06	1.63	7.69	4.72	58.6	4.66	3.03
13	0.3500	0.308	463.0	257.7	5.6	6.30	1.58	7.88	4.98	58.9	4.73	3.15
14	0.4000	0.358	477.5	267.8	6.6	6.48	1.56	8.03	5.17	59.1	4.79	3.24
15	0.4500	0.408	487.0	274.3	7.5	6.57	1.56	8.13	5.23	59.1	4.84	3.29
16	0.5000	0.458	493.0	278.5	8.4	6.61	1.57	8.18	5.21	59.0	4.87	3.30
17	0.5500	0.508	500.0	283.3	9.3	6.65	1.58	8.24	5.20	58.9	4.91	3.33
18	0.6000	0.558	508.0	288.8	10.2	6.71	1.60	8.31	5.20	58.8	4.96	3.36
19	0.6500	0.608	514.0	293.0	11.2	6.74	1.61	8.35	5.18	58.7	4.98	3.37
20	0.7000	0.658	515.5	294.0	12.1	6.70	1.63	8.32	5.11	58.6	4.98	3.35
21	0.7500	0.708	514.5	293.3	13.0	6.61	1.64	8.25	5.03	58.5	4.95	3.31
22	0.8000	0.758	519.5	296.8	13.9	6.62	1.67	8.29	4.96	58.3	4.98	3.31
23	0.8600	0.818	521.5	298.2	15.0	6.56	1.70	8.26	4.86	58.1	4.98	3.28

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE IDENTIFICATION: SB00400 (UD) 12'-14'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 292.10
PAN WEIGHT (g): 85.00
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 207.10

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/4"	0.00	0.0	**100.0**
3/8"	38.66	18.7	**81.3**
#4	72.55	35.0	**65.0**
#10	111.85	54.0	**46.0**
#20	143.12	69.1	**30.9**
#40	158.03	76.3	**23.7**
#60	167.99	81.1	**18.9**
#140	178.28	86.1	**13.9**
#200	180.62	87.2	**12.8**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

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REVIEWED BY: John Dailly

SUMMARY OF LABORATORY TESTING

WEYERHAEUSER LANDFILL

LAW PROJECT 30710-7-2241

FALLING-HEAD TEST (METHOD C)
ASTM D5084-90

Sample ID	Initial Wet Unit Weight (pcf)	Initial Dry Unit Weight (pcf)	Initial Moisture Content (%)	Hydraulic Gradient	Hydraulic Conductivity (cm/sec)
SB00400 12ft to 14ft Waste Material	84.0	54.4	54.3	2.9	**3.2×10^{-7}**

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422)

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997
SAMPLE IDENTIFICATION: SB00500 (UD) 12'-14'

INITIAL SAMPLE DATA

INITIAL DRY SAMPLE WEIGHT (g): 371.80

SAMPLE SPLIT ON A #4 SIEVE

SPLIT SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 107.10
PAN WEIGHT (g): 0.00
DRY WEIGHT SPLIT SAMPLE (g): 107.10

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
1.5"	0.00	0.0	**100.0**
1"	102.11	27.5	**72.5**
3/4"	111.92	30.1	**69.9**
3/8"	136.03	36.6	**63.4**
#4	163.85	44.1	**55.9**
#10	27.87	58.6	**41.4**
#20	44.20	67.2	**32.8**
#40	57.57	74.1	**25.9**
#60	71.66	81.5	**18.5**
#140	86.24	89.1	**10.9**
#200	89.02	90.6	**9.4**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

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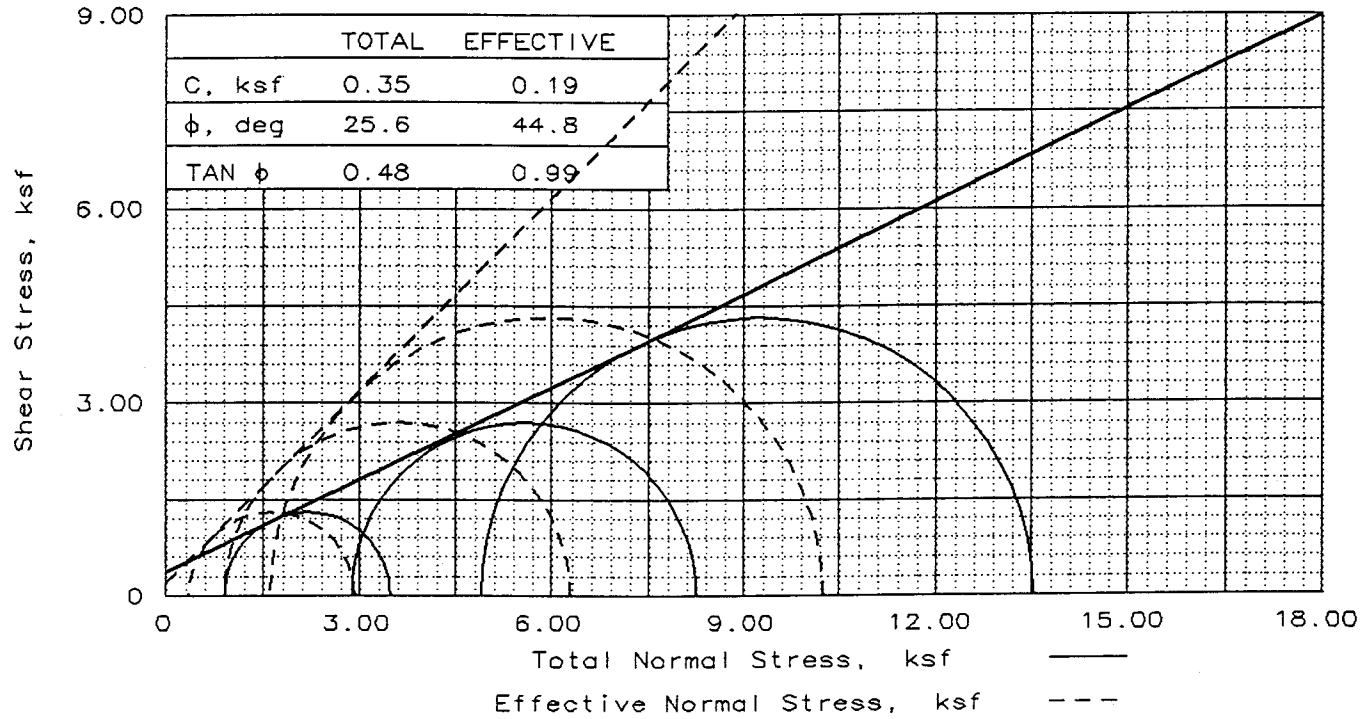
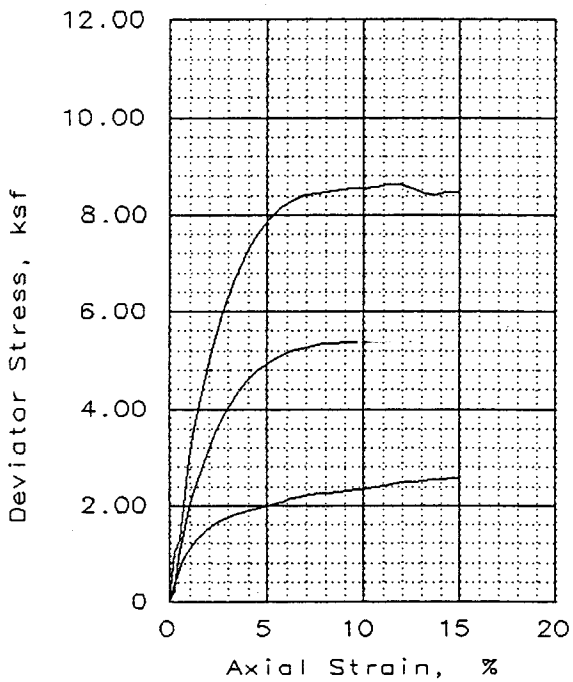
REVIEWED BY: John Dailly





SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	76.7	76.7	76.7
	DRY DENSITY, pcf	38.4	38.4	38.4
	SATURATION, %	65.6	65.6	65.6
	VOID RATIO	2.564	2.564	2.564
	DIAMETER, in	2.99	2.99	2.99
	HEIGHT, in	5.27	5.27	5.27
AT TEST	WATER CONTENT, %	94.9	86.4	80.4
	DRY DENSITY, pcf	44.4	47.3	49.5
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	2.079	1.892	1.760
	DIAMETER, in	2.82	2.94	2.99
	HEIGHT, in	5.12	4.42	4.08
BACK PRESSURE, ksf		5.52	5.52	5.52
CELL PRESSURE, ksf		6.44	8.41	10.43
FAILURE STRESS, ksf		2.57	5.38	8.63
PORE PRESSURE, ksf		6.08	7.49	8.80
STRAIN RATE, %/min.		0.391	0.452	0.490
ULTIMATE STRESS, ksf				
PORE PRESSURE, ksf				
$\bar{\sigma}_1$ FAILURE, ksf		2.93	6.30	10.25
$\bar{\sigma}_3$ FAILURE, ksf		0.36	0.92	1.63

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: UNDISTURBED
DESCRIPTION: (VISUAL) ASH AND WOOD WASTE
LL= ND PL= ND PI= ND
SPECIFIC GRAVITY= 2.19
REMARKS: MULTI-STAGED TEST

CLIENT: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
PROJECT: WEYERHAEUSER LANDFILL / WASTE MATERIAL
SAMPLE LOCATION: SB00500 (UD) 12'-14'

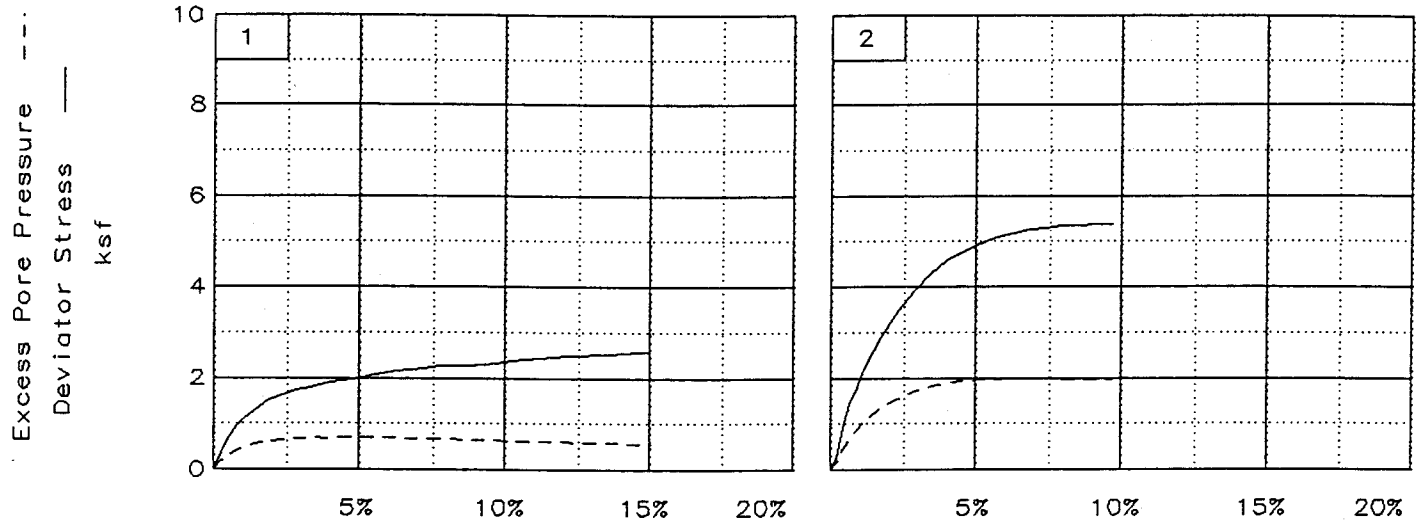
PROJ. NO.: 3071072241 DATE: JULY 11, 1997

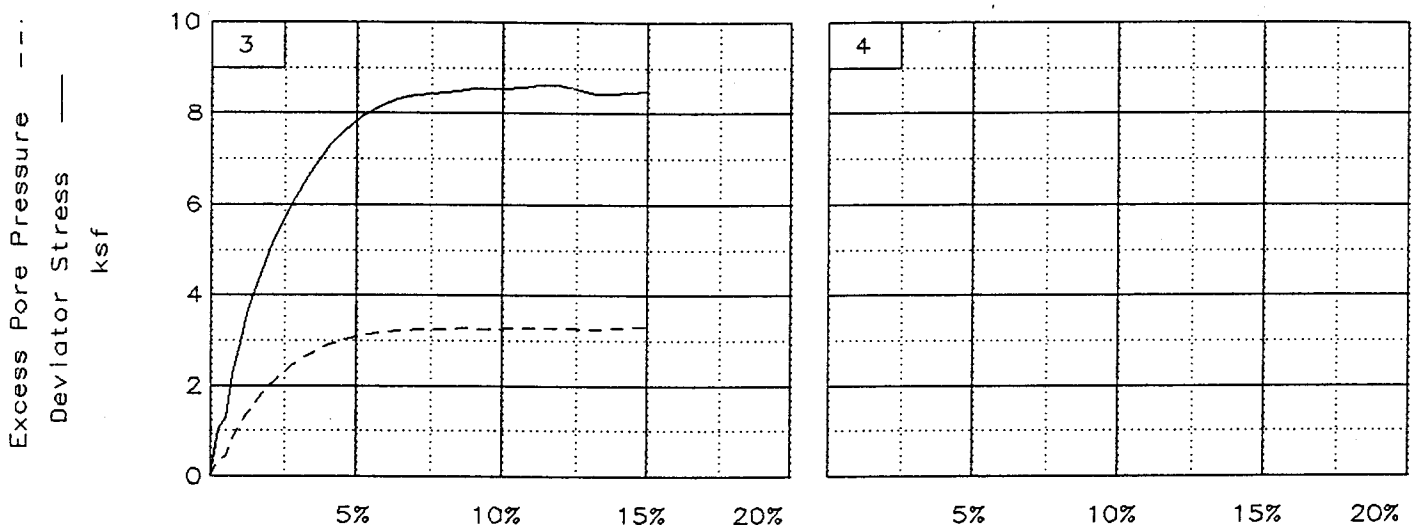
TRIAXIAL COMPRESSION TEST

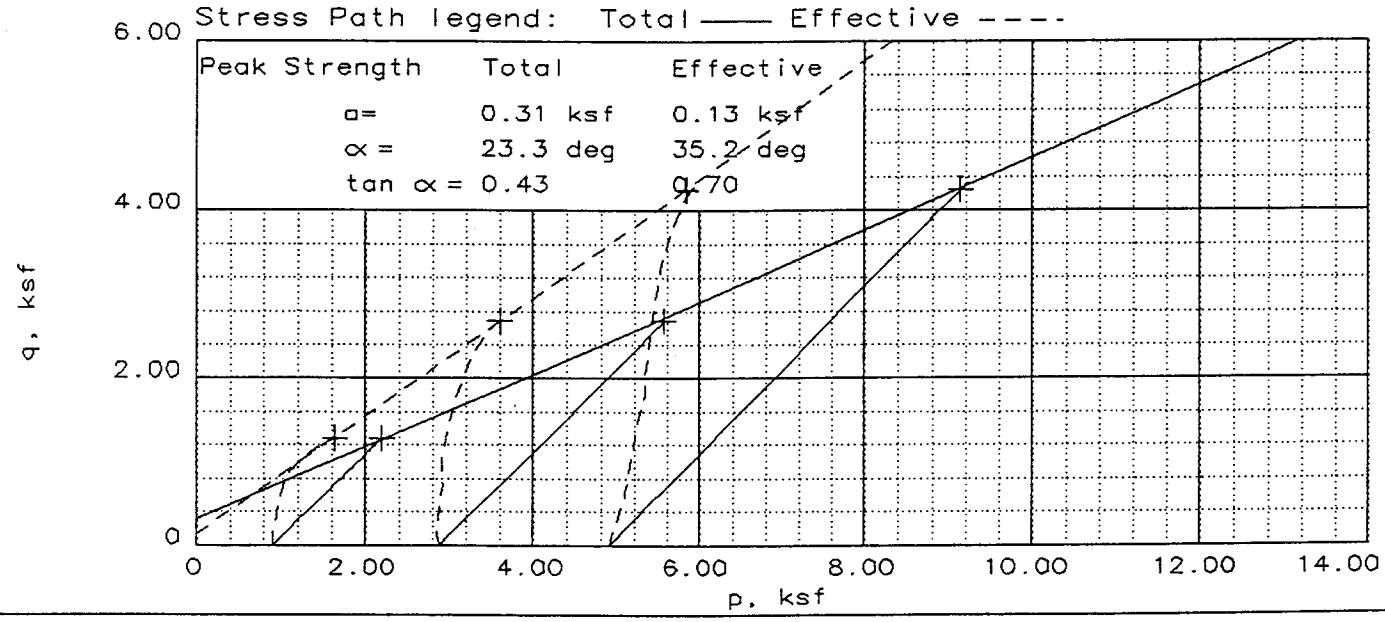
LAW ENGINEERING

FIG. NO. B-5

REVIEWED BY: John Dailey







Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002

Project: WEYERHAEUSER LANDFILL / WASTE MATERIAL

Location: SB00500 (UD) 12'-14'

File: SB00500 Project No.: 3071072241 Page 2/2 Fig. No. B-5

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TRIAXIAL COMPRESSION TEST 7-11-1997
CU with pore pressures 4:34 pm

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Project Data

Project No.: 3071072241 Date: JULY 11, 1997 Data file: SB00500
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / WASTE MATERIAL
Sample location: SB00500 (UD) 12'-14'
Sample description: (VISUAL) ASH AND WOOD WASTE
Remarks: MULTI-STAGED TEST
Fig No. B-5

Sample No. 1 Data

Type of sample: UNDISTURBED
Specific Gravity= 2.19 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	2.99	2.82	
Height change, in		0.15	
Height, in	5.27	5.12	
Weight, grams	657.1		
Water volume change, cc		-67.60	
Moisture, %	76.7	94.9	94.9
Dry density, pcf	38.4	44.4	
Saturation, %	65.6	100.0	
Void ratio	2.564	2.079	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.6825 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.391 % per minute
Consolidation cell pressure = 44.7 psi
Consolidation back pressure = 38.3 psi
Consolidation effective confining stress = 0.9216 ksf
Peak deviator stress = 2.57 ksf at reading no. 34
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0530	0.000	80.0	0.0	0.0	0.00	0.92	0.92	1.00	38.3	0.92	0.00
1	0.0660	0.013	103.0	15.7	0.3	0.36	0.73	1.10	1.49	39.6	0.92	0.18
2	0.0750	0.022	119.0	26.6	0.4	0.61	0.65	1.26	1.95	40.2	0.95	0.31
3	0.0830	0.030	129.5	33.8	0.6	0.78	0.58	1.35	2.35	40.7	0.96	0.39
4	0.0930	0.040	140.0	41.0	0.8	0.94	0.50	1.44	2.86	41.2	0.97	0.47
5	0.1050	0.052	150.0	47.8	1.0	1.09	0.45	1.54	3.45	41.6	0.99	0.55

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1250	0.072	163.5	57.0	1.4	1.30	0.37	1.67	4.47	42.1	1.02	0.65
7	0.1500	0.097	177.0	66.2	1.9	1.50	0.30	1.80	5.96	42.6	1.05	0.75
8	0.1750	0.122	186.0	72.3	2.4	1.63	0.27	1.91	6.96	42.8	1.09	0.82
9	0.2000	0.147	193.0	77.1	2.9	1.73	0.24	1.98	8.07	43.0	1.11	0.87
10	0.2250	0.172	198.5	80.9	3.4	1.81	0.23	2.04	8.84	43.1	1.13	0.90
11	0.2500	0.197	203.5	84.3	3.8	1.87	0.24	2.12	8.65	43.0	1.18	0.94
12	0.2750	0.222	207.5	87.0	4.3	1.92	0.23	2.15	9.35	43.1	1.19	0.96
13	0.3000	0.247	211.5	89.7	4.8	1.97	0.23	2.20	9.57	43.1	1.22	0.99
14	0.3250	0.272	216.0	92.8	5.3	2.03	0.23	2.26	9.81	43.1	1.25	1.02
15	0.3500	0.297	220.5	95.9	5.8	2.09	0.23	2.32	10.06	43.1	1.27	1.04
16	0.3750	0.322	225.0	99.0	6.3	2.14	0.23	2.37	10.30	43.1	1.30	1.07
17	0.4000	0.347	229.0	101.7	6.8	2.19	0.24	2.44	9.95	43.0	1.34	1.10
18	0.4250	0.372	232.0	103.7	7.3	2.22	0.24	2.47	10.08	43.0	1.36	1.11
19	0.4500	0.397	235.0	105.8	7.8	2.25	0.26	2.51	9.70	42.9	1.39	1.13
20	0.4750	0.422	236.0	106.5	8.2	2.26	0.26	2.52	9.71	42.9	1.39	1.13
21	0.5000	0.447	238.5	108.2	8.7	2.28	0.27	2.55	9.34	42.8	1.41	1.14
22	0.5250	0.472	241.0	109.9	9.2	2.30	0.27	2.58	9.42	42.8	1.43	1.15
23	0.5500	0.497	244.0	111.9	9.7	2.34	0.29	2.62	9.11	42.7	1.46	1.17
24	0.5750	0.522	247.5	114.3	10.2	2.37	0.30	2.67	8.84	42.6	1.49	1.19
25	0.6000	0.547	250.0	116.0	10.7	2.39	0.30	2.70	8.92	42.6	1.50	1.20
26	0.6250	0.572	253.0	118.1	11.2	2.42	0.30	2.73	9.01	42.6	1.51	1.21
27	0.6500	0.597	256.5	120.5	11.7	2.46	0.32	2.78	8.76	42.5	1.55	1.23
28	0.6750	0.622	259.5	122.5	12.2	2.49	0.32	2.80	8.85	42.5	1.56	1.24
29	0.7000	0.647	261.5	123.9	12.6	2.50	0.33	2.83	8.55	42.4	1.58	1.25
30	0.7250	0.672	263.5	125.2	13.1	2.51	0.33	2.85	8.59	42.4	1.59	1.26
31	0.7500	0.697	266.0	126.9	13.6	2.53	0.35	2.88	8.33	42.3	1.61	1.27
32	0.7750	0.722	268.5	128.7	14.1	2.55	0.35	2.90	8.39	42.3	1.62	1.28
33	0.8000	0.747	270.5	130.0	14.6	2.57	0.36	2.93	8.13	42.2	1.64	1.28
34	0.8210	0.768	272.0	131.0	15.0	2.57	0.36	2.93	8.15	42.2	1.65	1.29

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TRIAXIAL COMPRESSION TEST 7-11-1997
CU with pore pressures 4:34 pm

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Project Data

Project No.: 3071072241 Date: JULY 11, 1997 Data file: SB00500
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / WASTE MATERIAL
Sample location: SB00500 (UD) 12'-14'
Sample description: (VISUAL) ASH AND WOOD WASTE
Remarks: MULTI-STAGED TEST
Fig No. B-5

Sample No. 2 Data

Type of sample: UNDISTURBED
Specific Gravity= 2.19 LL= ND PL= ND PI= ND

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	2.99	2.94	
Height change, in		0.85	
Height, in	5.27	4.42	
Weight, grams	657.1		
Water volume change, cc		-35.85	
Moisture, %	76.7	86.4	86.4
Dry density, pcf	38.4	47.3	
Saturation, %	65.6	100.0	
Void ratio	2.564	1.892	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.691 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.452 % per minute
Consolidation cell pressure = 58.4 psi
Consolidation back pressure = 38.3 psi
Consolidation effective confining stress = 2.8944 ksf
Peak deviator stress = 5.38 ksf at reading no. 19
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.7470	0.000	88.0	0.0	0.0	0.00	2.89	2.89	1.00	38.3	2.89	0.00
1	0.7570	0.010	105.0	11.7	0.2	0.25	2.74	2.99	1.09	39.4	2.86	0.12
2	0.7670	0.020	151.0	43.5	0.5	0.92	2.43	3.36	1.38	41.5	2.89	0.46
3	0.7770	0.030	186.0	67.7	0.7	1.43	2.22	3.65	1.64	43.0	2.93	0.72
4	0.7870	0.040	212.0	85.7	0.9	1.81	2.02	3.82	1.90	44.4	2.92	0.90
5	0.8000	0.053	242.0	106.4	1.2	2.24	1.81	4.05	2.23	45.8	2.93	1.12

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.8250	0.078	289.0	138.9	1.8	2.90	1.56	4.46	2.87	47.6	3.01	1.45
7	0.8500	0.103	329.0	166.5	2.3	3.46	1.35	4.81	3.56	49.0	3.08	1.73
8	0.8750	0.128	363.0	190.0	2.9	3.92	1.20	5.12	4.28	50.1	3.16	1.96
9	0.9000	0.153	390.0	208.7	3.5	4.28	1.08	5.36	4.97	50.9	3.22	2.14
10	0.9250	0.178	413.0	224.6	4.0	4.58	1.01	5.59	5.55	51.4	3.30	2.29
11	0.9500	0.203	430.0	236.3	4.6	4.79	0.96	5.76	5.97	51.7	3.36	2.40
12	0.9750	0.228	444.5	246.3	5.2	4.97	0.94	5.90	6.31	51.9	3.42	2.48
13	1.0000	0.253	456.0	254.3	5.7	5.10	0.92	6.02	6.53	52.0	3.47	2.55
14	1.0250	0.278	464.5	260.2	6.3	5.18	0.91	6.09	6.72	52.1	3.50	2.59
15	1.0500	0.303	472.0	265.3	6.8	5.26	0.91	6.16	6.79	52.1	3.54	2.63
16	1.0750	0.328	477.0	268.8	7.4	5.29	0.91	6.20	6.83	52.1	3.55	2.65
17	1.1000	0.353	483.0	272.9	8.0	5.34	0.92	6.26	6.80	52.0	3.59	2.67
18	1.1250	0.378	487.0	275.7	8.5	5.36	0.92	6.28	6.82	52.0	3.60	2.68
19	1.1500	0.403	490.5	278.1	9.1	5.38	0.92	6.30	6.83	52.0	3.61	2.69
20	1.1750	0.428	492.5	279.5	9.7	5.37	0.92	6.29	6.83	52.0	3.61	2.68

TRIAXIAL COMPRESSION TEST 7-11-1997
CU with pore pressures 4:34 pm

Project Data

Project No.: 3071072241 Date: JULY 11, 1997 Data file: SB00500
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / WASTE MATERIAL
Sample location: SB00500 (UD) 12'-14'
Sample description: (VISUAL) ASH AND WOOD WASTE
Remarks: MULTI-STAGED TEST
Fig No. B-5

Sample No. 3 Data

Type of sample: UNDISTURBED
Specific Gravity= 2.19 LL= ND PL= ND PI= NP

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	2.99	2.99	
Height change, in		1.19	
Height, in	5.27	4.08	
Weight, grams	657.1		
Water volume change, cc		-13.48	
Moisture, %	76.7	80.4	80.6
Dry density, pcf	38.4	49.5	
Saturation, %	65.6	100.0	
Void ratio	2.564	1.760	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.6825 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.490 % per minute
Consolidation cell pressure = 72.4 psi
Consolidation back pressure = 38.3 psi
Consolidation effective confining stress = 4.9104 ksf
Peak deviator stress = 8.63 ksf at reading no. 23
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	1.0890	0.000	101.0	0.0	0.0	0.00	4.91	4.91	1.00	38.3	4.91	0.00
1	1.1000	0.011	175.0	50.5	0.3	1.04	4.56	5.60	1.23	40.7	5.08	0.52
2	1.1100	0.021	193.0	62.8	0.5	1.28	4.46	5.75	1.29	41.4	5.11	0.64
3	1.1200	0.031	262.0	109.9	0.8	2.24	4.08	6.32	1.55	44.1	5.20	1.12
4	1.1300	0.041	314.0	145.4	1.0	2.96	3.77	6.73	1.78	46.2	5.25	1.48
5	1.1400	0.051	361.0	177.5	1.2	3.60	3.54	7.14	2.02	47.8	5.34	1.80

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	1.1500	0.061	398.0	202.7	1.5	4.10	3.30	7.40	2.24	49.5	5.35	2.05
7	1.1750	0.086	474.0	254.6	2.1	5.12	2.85	7.97	2.80	52.6	5.41	2.56
8	1.2000	0.111	536.0	296.9	2.7	5.94	2.51	8.44	3.37	55.0	5.47	2.97
9	1.2250	0.136	588.0	332.4	3.3	6.61	2.23	8.84	3.96	56.9	5.53	3.30
10	1.2570	0.168	644.0	370.6	4.1	7.31	1.99	9.29	4.68	58.6	5.64	3.65
11	1.2750	0.186	669.0	387.7	4.6	7.61	1.89	9.49	5.03	59.3	5.69	3.80
12	1.3000	0.211	697.0	406.8	5.2	7.93	1.79	9.72	5.44	60.0	5.75	3.97
13	1.3250	0.236	718.5	421.4	5.8	8.16	1.73	9.89	5.72	60.4	5.81	4.08
14	1.3500	0.261	734.0	432.0	6.4	8.31	1.68	10.00	5.93	60.7	5.84	4.16
15	1.3750	0.286	745.5	439.9	7.0	8.41	1.67	10.08	6.03	60.8	5.88	4.20
16	1.4000	0.311	751.5	444.0	7.6	8.43	1.67	10.10	6.05	60.8	5.89	4.22
17	1.4350	0.346	763.0	451.8	8.5	8.50	1.64	10.14	6.18	61.0	5.89	4.25
18	1.4550	0.366	769.0	455.9	9.0	8.53	1.64	10.17	6.20	61.0	5.91	4.27
19	1.4750	0.386	773.0	458.6	9.5	8.54	1.66	10.19	6.16	60.9	5.92	4.27
20	1.5000	0.411	779.0	462.7	10.1	8.56	1.64	10.20	6.21	61.0	5.92	4.28
21	1.5250	0.436	786.0	467.5	10.7	8.58	1.63	10.21	6.28	61.1	5.92	4.29
22	1.5500	0.461	794.0	473.0	11.3	8.63	1.63	10.25	6.30	61.1	5.94	4.31
23	1.5750	0.486	799.0	476.4	11.9	8.63	1.63	10.25	6.30	61.1	5.94	4.31
24	1.6000	0.511	798.0	475.7	12.5	8.56	1.64	10.20	6.21	61.0	5.92	4.28
25	1.6270	0.538	794.0	473.0	13.2	8.44	1.66	10.10	6.10	60.9	5.88	4.22
26	1.6500	0.561	797.0	475.0	13.7	8.42	1.64	10.06	6.13	61.0	5.85	4.21
27	1.6750	0.586	805.5	480.8	14.4	8.47	1.61	10.08	6.25	61.2	5.85	4.23
28	1.7010	0.612	812.0	485.3	15.0	8.48	1.61	10.09	6.26	61.2	5.85	4.24

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE IDENTIFICATION: SB00600 (UD) 7'-9'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 283.09
PAN WEIGHT (g): 57.80
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 225.29

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/4"	0.00	0.0	**100.0**
3/8"	7.22	3.2	**96.8**
#4	13.88	6.2	**93.8**
#10	26.67	11.8	**88.2**
#20	48.33	21.5	**78.5**
#40	67.00	29.7	**70.3**
#60	85.44	37.9	**62.1**
#140	104.74	46.5	**53.5**
#200	107.91	47.9	**52.1**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

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REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
UNIT WEIGHT AND NATURAL MOISTURE CONTENT OF SOIL

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIALS
LAW PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE ID: SB00600 (UD) 7'-9'

VISUAL SOIL DESCRIPTION: BOTTOM ASH, WOOD WASTE, BARK, LIME
INCHES FROM BOTTOM OF TUBE: 2.5

MEASUREMENT DATA (in)			
LENGTH #1:	5.381	TOP DIAMETER #1:	2.885
LENGTH #2:	5.393	TOP DIAMETER #2:	2.889
LENGTH #3:	5.427	TOP DIAMETER #3:	2.883
		BOTTOM DIAMETER #1:	2.889
		BOTTOM DIAMETER #2:	2.899
		BOTTOM DIAMETER #3:	2.889

AVERAGED MEASURED VALUES	
LENGTH OF TUBE SAMPLE (in):	5.400
DIAMETER OF TUBE SAMPLE (in):	2.889

WEIGHT DETERMINATION DATA	
WEIGHT OF TUBE & SOIL (g):	1277.9
WEIGHT OF TUBE (g):	398.4
WEIGHT OF SOIL (g):	879.5

MOISTURE DETERMINATION DATA	
WET WEIGHT SOIL & DRYING PAN (g):	606.0
DRY WEIGHT SOIL & DRYING PAN (g):	407.7
WEIGHT OF DRYING PAN (g):	83.5

WET UNIT WEIGHT (pcf)
94.7

DRY UNIT WEIGHT (pcf)
58.7

MOISTURE CONTENT (%)
61.2

REMARKS:

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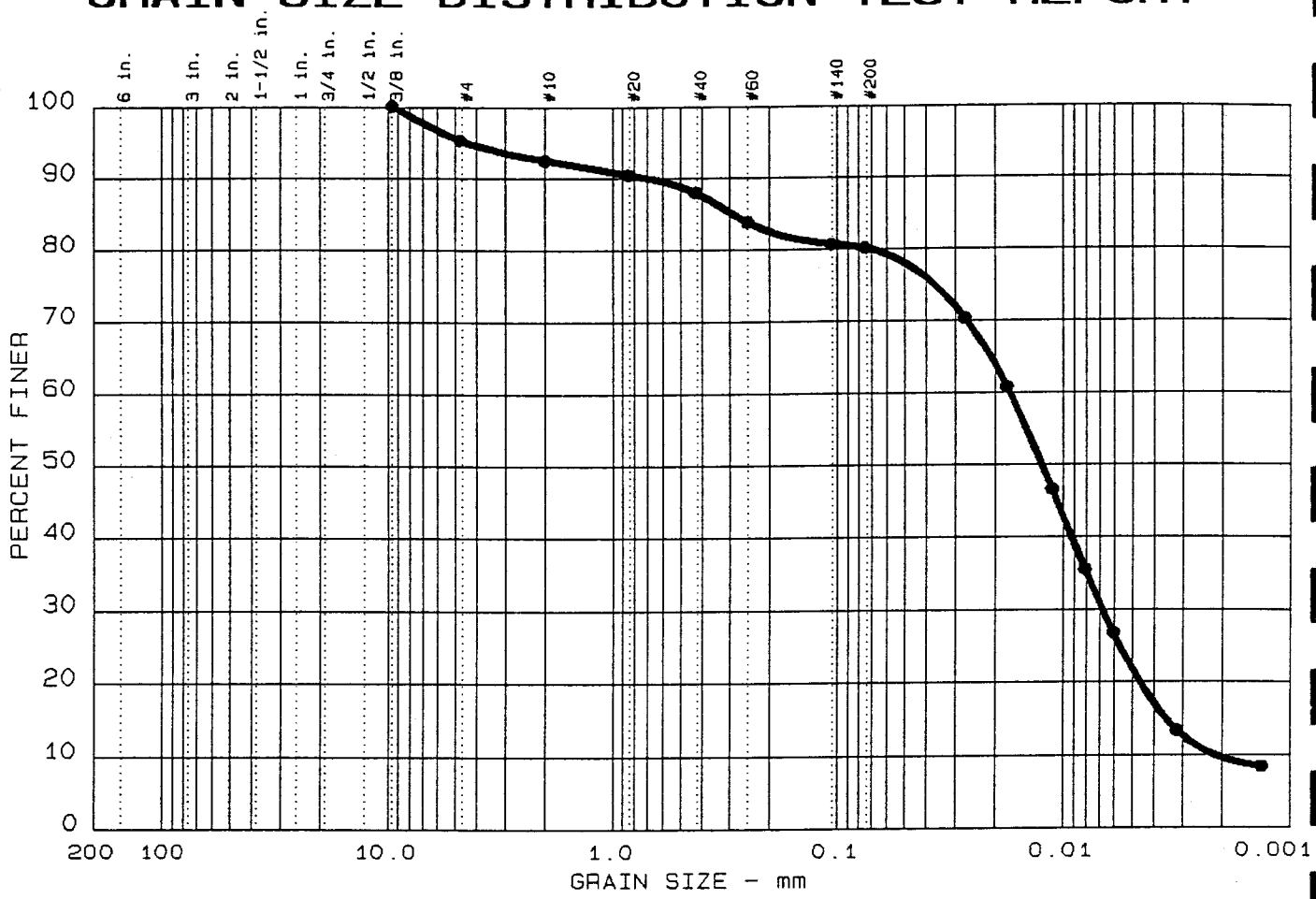
REVIEWED BY: John Hailey

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	4.7	15.2	58.4	21.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	32	NP	0.29	0.02	0.01	0.007	0.0035	0.0022	1.24	7.9

MATERIAL DESCRIPTION	USCS	AASHTO
● SB00600 (SS) 10'-12'	ML	ND

Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / WASTE MATERIALS
● Location: SB00600 (SS) 10'-12'

Date: 07-11-97

Remarks:
ND=NOT DETERMINED.
SPECIFIC GRAVITY IS ASSUMED.

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Figure No. 01

REVIEWED BY: John Dailly

GRAIN SIZE DISTRIBUTION TEST DATA Test No.: 1

Date: 07-11-97
Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / WASTE MATERIALS

Sample Data

Location of Sample: SB00600 (SS) 10'-12'
Sample Description: SB00600 (SS) 10'-12'
USCS Class: ML Liquid limit: 32
AASHTO Class: ND Plasticity index: NP

Notes

Remarks: ND=NOT DETERMINED. SPECIFIC GRAVITY IS ASSUMED.
Fig. No.: 01

Mechanical Analysis Data

	Initial
Dry sample and tare=	214.44
Tare =	0.00
Dry sample weight =	214.44

Sample split on number 10 sieve
Split sample data:
Sample and tare = 58.27 Tare = 0 Sample weight = 58.27
Cumulative weight retained tare= 0
Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
0.375 inches	0.00	100.0
# 4	10.08	95.3
# 10	16.10	92.5
# 20	1.29	90.4
# 40	2.85	88.0
# 60	5.46	83.8
# 140	7.44	80.7
# 200	7.78	80.1

Hydrometer Analysis Data

Separation sieve is number 10
Percent -# 10 based on complete sample= 92.5
Weight of hydrometer sample: 58.27
Calculated biased weight= 63.00
Automatic temperature correction
Composite correction at 20 deg C =-4.5

Meniscus correction only=-1

Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000
Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.0	23.5	48.0	44.3	0.0131	47.0	8.6	0.0271	70.3
5.3	23.5	42.0	38.3	0.0131	41.0	9.6	0.0177	60.8
15.0	23.5	33.0	29.3	0.0131	32.0	11.0	0.0112	46.5
32.0	23.5	26.0	22.3	0.0131	25.0	12.2	0.0081	35.4
61.0	23.5	20.5	16.8	0.0131	19.5	13.1	0.0061	26.7
241.0	24.0	12.0	8.5	0.0130	11.0	14.5	0.0032	13.4
1440.0	23.5	9.0	5.3	0.0131	8.0	15.0	0.0013	8.4

Fractional Components

Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 75mm. = 0.0 % GRAVEL = 4.7 % SAND = 15.2
% SILT = 58.4 % CLAY = 21.7

D85= 0.29 D60= 0.017 D50= 0.012
D30= 0.0068 D15= 0.00352 D10= 0.00217
Cc = 1.2388 Cu = 7.8886

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE IDENTIFICATION: SB00600 (UD) 27'-29'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 223.39
PAN WEIGHT (g): 60.70
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 162.69

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/4"	0.00	0.0	**100.0**
3/8"	1.69	1.0	**99.0**
#4	8.63	5.3	**94.7**
#10	18.32	11.3	**88.7**
#20	35.44	21.8	**78.2**
#40	52.88	32.5	**67.5**
#60	71.70	44.1	**55.9**
#140	97.32	59.8	**40.2**
#200	102.80	63.2	**36.8**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

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REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
UNIT WEIGHT AND NATURAL MOISTURE CONTENT OF SOIL

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIALS
LAW PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE ID: SB00600 (UD) 27'-29'

VISUAL SOIL DESCRIPTION: ASH, GENERAL MILL WASTE INCLUDING GRAVEL, POLYETHELYNE, DIRT, WOOD WASTE
INCHES FROM BOTTOM OF TUBE: 4

MEASUREMENT DATA (in)			
LENGTH #1:	5.040	TOP DIAMETER #1:	2.870
LENGTH #2:	5.060	TOP DIAMETER #2:	2.893
LENGTH #3:	5.016	TOP DIAMETER #3:	2.884
		BOTTOM DIAMETER #1:	2.875
		BOTTOM DIAMETER #2:	2.879
		BOTTOM DIAMETER #3:	2.876

AVERAGED MEASURED VALUES	
LENGTH OF TUBE SAMPLE (in):	5.039
DIAMETER OF TUBE SAMPLE (in):	2.880

WEIGHT DETERMINATION DATA	
WEIGHT OF TUBE & SOIL (g):	1127.4
WEIGHT OF TUBE (g):	369.3
WEIGHT OF SOIL (g):	758.1

MOISTURE DETERMINATION DATA	
WET WEIGHT SOIL & DRYING PAN (g):	575.0
DRY WEIGHT SOIL & DRYING PAN (g):	367.9
WEIGHT OF DRYING PAN (g):	94.9

WET UNIT WEIGHT (pcf)
88.0

DRY UNIT WEIGHT (pcf)
50.0

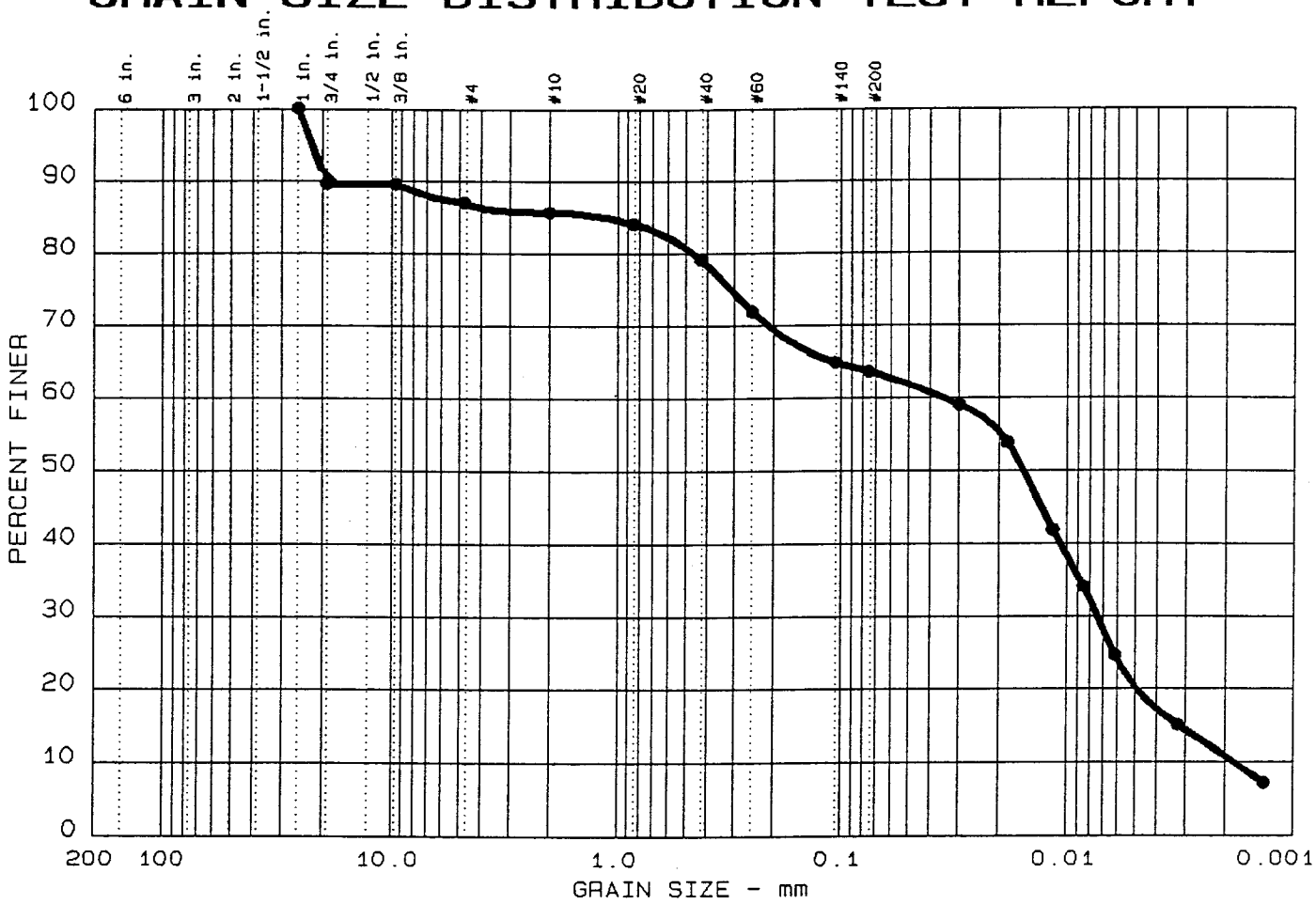
MOISTURE CONTENT (%)
75.9

REMARKS:

\72241d23.xls

REVIEWED BY: John Dailly

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	13.0	23.5	43.3	20.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	29	NP	1.12	0.04	0.02	0.007	0.0032	0.0018	0.84	19.3

MATERIAL DESCRIPTION	USCS	AASHTO
● SB00700 (SS) 0'-2'	ML	ND

Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / WASTE MATERIALS
● Location: SB00700 (SS) 0'-2'

Date: 07-11-97

Remarks:
ND=NOT DETERMINED.
SPECIFIC GRAVITY IS ASSUMED.

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Figure No. 02

REVIEWED BY: John Dailly

GRAIN SIZE DISTRIBUTION TEST DATA Test No.: 2

Date: 07-11-97
Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / WASTE MATERIALS

Sample Data

Location of Sample: SB00700 (SS) 0'-2'
Sample Description: SB00700 (SS) 0'-2'
USCS Class: ML Liquid limit: 29
AASHTO Class: ND Plasticity index: NP

Notes

Remarks: ND=NOT DETERMINED. SPECIFIC GRAVITY IS ASSUMED.
Fig. No.: 02

Mechanical Analysis Data

	Initial
Dry sample and tare=	147.46
Tare =	0.00
Dry sample weight =	147.46

Sample split on number 10 sieve
Split sample data:
Sample and tare = 49.88 Tare = 0 Sample weight = 49.88
Cumulative weight retained tare= 0
Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
1 inches	0.00	100.0
0.75 inches	15.24	89.7
0.375 inches	15.35	89.6
# 4	19.11	87.0
# 10	21.10	85.7
# 20	0.93	84.1
# 40	3.81	79.1
# 60	8.02	71.9
# 140	12.16	64.8
# 200	12.90	63.5

Hydrometer Analysis Data

Separation sieve is number 10
Percent -# 10 based on complete sample= 85.7
Weight of hydrometer sample: 49.88
Calculated biased weight= 58.21
Automatic temperature correction
Composite correction at 20 deg C =-4.5

Meniscus correction only=-1
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000
Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.0	23.5	38.0	34.3	0.0131	37.0	10.2	0.0296	58.9
5.5	23.5	35.0	31.3	0.0131	34.0	10.7	0.0183	53.8
15.3	23.5	28.0	24.3	0.0131	27.0	11.9	0.0115	41.8
30.0	23.5	23.5	19.8	0.0131	22.5	12.6	0.0085	34.0
61.0	23.5	18.0	14.3	0.0131	17.0	13.5	0.0062	24.6
236.0	23.5	12.5	8.8	0.0131	11.5	14.4	0.0032	15.1
1440.0	23.0	8.0	4.2	0.0132	7.0	15.1	0.0013	7.2

Fractional Components

Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 75mm. = 0.0 % GRAVEL = 13.0 % SAND = 23.5
% SILT = 43.3 % CLAY = 20.2

D85= 1.12 D60= 0.035 D50= 0.015
D30= 0.0074 D15= 0.00316 D10= 0.00184
Cc = 0.8404 Cu = 19.2975

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE IDENTIFICATION: SB00700 (UD) 12'-14'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 186.39
PAN WEIGHT (g): 58.30
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 128.09

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
1"	0.00	0.0	**100.0**
3/4"	16.45	12.8	**87.2**
3/8"	29.19	22.8	**77.2**
#4	39.92	31.2	**68.8**
#10	60.55	47.3	**52.7**
#20	81.06	63.3	**36.7**
#40	96.08	75.0	**25.0**
#60	106.05	82.8	**17.2**
#140	115.81	90.4	**9.6**
#200	117.69	91.9	**8.1**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

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REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
UNIT WEIGHT AND NATURAL MOISTURE CONTENT OF SOIL

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIALS
LAW PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE ID: SB00700 (UD) 12'-14'

VISUAL SOIL DESCRIPTION: WOOD WASTE & LIME MUD NOT DISPERSED WITHIN THE WOOD WASTE
INCHES FROM BOTTOM OF TUBE: 4

MEASUREMENT DATA (in)			
LENGTH #1:	5.640	TOP DIAMETER #1:	2.792
LENGTH #2:	5.660	TOP DIAMETER #2:	2.923
LENGTH #3:	5.660	TOP DIAMETER #3:	2.793
		BOTTOM DIAMETER #1:	2.876
		BOTTOM DIAMETER #2:	2.895
		BOTTOM DIAMETER #3:	2.918

AVERAGED MEASURED VALUES	
LENGTH OF TUBE SAMPLE (in):	5.653
DIAMETER OF TUBE SAMPLE (in):	2.866

WEIGHT DETERMINATION DATA	
WEIGHT OF TUBE & SOIL (g):	1111.8
WEIGHT OF TUBE (g):	381.4
WEIGHT OF SOIL (g):	730.4

MOISTURE DETERMINATION DATA	
WET WEIGHT SOIL & DRYING PAN (g):	533.0
DRY WEIGHT SOIL & DRYING PAN (g):	288.0
WEIGHT OF DRYING PAN (g):	58.4

WET UNIT WEIGHT (pcf)
76.3

DRY UNIT WEIGHT (pcf)
36.9

MOISTURE CONTENT (%)
106.7

REMARKS: OUT-OF-ROUND TUBE DUE TO DAMAGE FROM DRILLING PROCESS.

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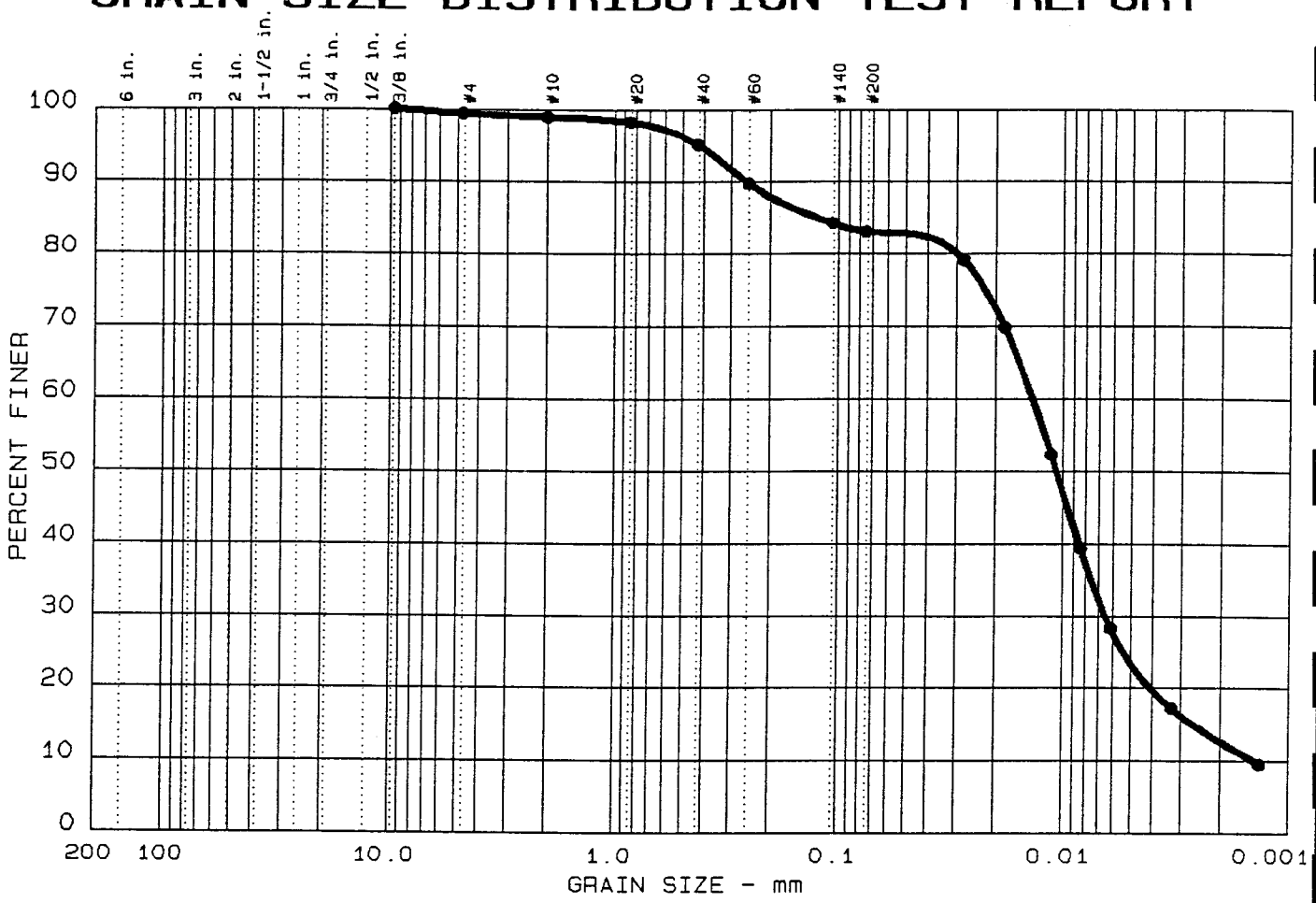
REVIEWED BY: John Dailly

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.7	16.3	59.8	23.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	32	NP	0.12	0.01	0.01	0.007	0.0026	0.0014	2.18	9.6

MATERIAL DESCRIPTION	USCS	AASHTO
● SB00800 (SS) 0'-2'	ML	ND

Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / WASTE MATERIALS
● Location: SB00800 (SS) 0'-2'

Date: 07-11-97

Remarks:
ND=NOT DETERMINED
SPECIFIC GRAVITY IS ASSUMED.

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Figure No. 03

REVIEWED BY: John Dailey

GRAIN SIZE DISTRIBUTION TEST DATA Test No.: 3

Date: 07-11-97
Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / WASTE MATERIALS

Sample Data

Location of Sample: SB00800 (SS) 0'-2'
Sample Description: SB00800 (SS) 0'-2'
USCS Class: ML Liquid limit: 32
AASHTO Class: ND Plasticity index: NP

Notes

Remarks: ND=NOT DETERMINED. SPECIFIC GRAVITY IS ASSUMED.
Fig. No.: 03

Mechanical Analysis Data

	Initial
Dry sample and tare=	330.00
Tare =	0.00
Dry sample weight =	330.00

Sample split on number 10 sieve
Split sample data:
Sample and tare = 53.56 Tare = 0 Sample weight = 53.56
Cumulative weight retained tare= 0
Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
0.375 inches	0.00	100.0
# 4	2.16	99.3
# 10	3.65	98.9
# 20	0.40	98.2
# 40	2.07	95.1
# 60	4.97	89.7
# 140	7.96	84.2
# 200	8.59	83.0

Hydrometer Analysis Data

Separation sieve is number 10
Percent -# 10 based on complete sample= 98.9
Weight of hydrometer sample: 53.56
Calculated biased weight= 54.16
Automatic temperature correction
Composite correction at 20 deg C =-4.5

Meniscus correction only=-1

Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000
Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.0	23.5	46.5	42.8	0.0131	45.5	8.8	0.0275	79.0
5.0	23.5	41.5	37.8	0.0131	40.5	9.7	0.0182	69.8
15.0	23.5	32.0	28.3	0.0131	31.0	11.2	0.0113	52.3
30.0	23.5	25.0	21.3	0.0131	24.0	12.4	0.0084	39.3
60.3	23.5	19.0	15.3	0.0131	18.0	13.3	0.0062	28.3
226.0	23.5	13.0	9.3	0.0131	12.0	14.3	0.0033	17.2
1440.0	23.0	9.0	5.2	0.0132	8.0	15.0	0.0013	9.5

Fractional Components

Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 75mm. = 0.0 % GRAVEL = 0.7 % SAND = 16.3
% SILT = 59.8 % CLAY = 23.2

D85= 0.12 D60= 0.014 D50= 0.011
D30= 0.0065 D15= 0.00262 D10= 0.00143
Cc = 2.1827 Cu = 9.5719

GRAIN SIZE DISTRIBUTION TEST REPORT

	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	3.0	19.8	58.4	18.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	ND	ND	0.37	0.02	0.01	0.007	0.0038	0.0023	1.47	7.3

MATERIAL DESCRIPTION	USCS	AASHTO
● SB00800 (UD) 17'-19'	ND	ND

Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / WASTE MATERIALS
● Location: SB00800 (UD) 17'-19'

Date: 07-11-97

Remarks:
ND=NOT DETERMINED.
SPECIFIC GRAVITY IS ASSUMED.

GRAIN SIZE DISTRIBUTION TEST REPORT

LAW ENGINEERING, INC.

Figure No. 04

REVIEWED BY: John Dailly

GRAIN SIZE DISTRIBUTION TEST DATA

Test No.: 4

Date: 07-11-97
Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / WASTE MATERIALS

Sample Data

Location of Sample: SB00800 (UD) 17'-19'
Sample Description: SB00800 (UD) 17'-19'
USCS Class: ND
Liquid limit: ND
AASHTO Class: ND
Plasticity index: ND

Notes

Remarks: ND=NOT DETERMINED. SPECIFIC GRAVITY IS ASSUMED.
Fig. No.: 04

Mechanical Analysis Data

	Initial
Dry sample and tare=	199.11
Tare =	0.00
Dry sample weight =	199.11

Sample split on number 10 sieve
Split sample data:
Sample and tare = 54.58 Tare = 0 Sample weight = 54.58
Cumulative weight retained tare= 0
Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
0.75 inches	0.00	100.0
0.375 inches	2.88	98.6
# 4	5.88	97.0
# 10	14.31	92.8
# 20	1.68	90.0
# 40	4.01	86.0
# 60	6.41	81.9
# 140	8.61	78.2
# 200	9.14	77.3

Hydrometer Analysis Data

Separation sieve is number 10
Percent -# 10 based on complete sample= 92.8
Weight of hydrometer sample: 54.58
Calculated biased weight= 58.81
Automatic temperature correction
Composite correction at 20 deg C =-4.5

Meniscus correction only=-1
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000
Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.0	23.0	47.0	43.2	0.0132	46.0	8.8	0.0275	73.4
5.0	23.0	41.0	37.2	0.0132	40.0	9.7	0.0184	63.2
15.0	23.0	31.0	27.2	0.0132	30.0	11.4	0.0115	46.2
31.0	23.0	24.0	20.2	0.0132	23.0	12.5	0.0084	34.3
60.0	23.0	18.0	14.2	0.0132	17.0	13.5	0.0062	24.1
207.0	23.0	12.0	8.2	0.0132	11.0	14.5	0.0035	13.9
1428.0	22.5	7.5	3.5	0.0132	6.5	15.2	0.0014	6.0

Fractional Components

Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 75mm. = 0.0 % GRAVEL = 3.0 % SAND = 19.8
% SILT = 58.4 % CLAY = 18.8

D85= 0.37 D60= 0.017 D50= 0.013
D30= 0.0074 D15= 0.00382 D10= 0.00228
Cc = 1.4689 Cu = 7.2946

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
UNIT WEIGHT AND NATURAL MOISTURE CONTENT OF SOIL

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIALS
LAW PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE ID: SB00800 (UD) 17'-19'

VISUAL SOIL DESCRIPTION: WOOD WASTE, LIME MUD
INCHES FROM BOTTOM OF TUBE: 6

MEASUREMENT DATA (in)			
LENGTH #1:	5.368	TOP DIAMETER #1:	2.843
LENGTH #2:	5.363	TOP DIAMETER #2:	2.932
LENGTH #3:	5.371	TOP DIAMETER #3:	2.872
		BOTTOM DIAMETER #1:	2.930
		BOTTOM DIAMETER #2:	2.770
		BOTTOM DIAMETER #3:	2.894

AVERAGED MEASURED VALUES	
LENGTH OF TUBE SAMPLE (in):	5.367
DIAMETER OF TUBE SAMPLE (in):	2.874

WEIGHT DETERMINATION DATA	
WEIGHT OF TUBE & SOIL (g):	1139.4
WEIGHT OF TUBE (g):	363.7
WEIGHT OF SOIL (g):	775.7

MOISTURE DETERMINATION DATA	
WET WEIGHT SOIL & DRYING PAN (g):	696.1
DRY WEIGHT SOIL & DRYING PAN (g):	419.2
WEIGHT OF DRYING PAN (g):	59.3

WET UNIT WEIGHT (pcf)
84.9

DRY UNIT WEIGHT (pcf)
48.0

MOISTURE CONTENT (%)
76.9

REMARKS: OUT-OF-ROUND TUBE DUE TO DAMAGE FROM DRILLING PROCESS.

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REVIEWED BY: John Dailly

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA

REPORT OF
WASH 200 GRAIN-SIZE ANALYSIS (ASTM D 422) AND
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOIL & ROCK (ASTM D 2216-92)

PROJECT NAME: WEYERHAEUSER LANDFILL / WASTE MATERIAL
LAW ENGINEERING PROJECT NUMBER: 30710-7-2241
DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: E096-019-2.0002
DATE: JULY 11, 1997

SAMPLE IDENTIFICATION: SB00900 (UD) 7'-9'

INITIAL SAMPLE DATA

DRY SOIL & PAN WEIGHT (g): 188.67
PAN WEIGHT (g): 92.40
WET SOIL & PAN WEIGHT (g): ND
DRY SOIL WEIGHT. (g): 96.27

SIEVE DESIGNATION	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
3/4"	0.00	0.0	**100.0**
3/8"	0.57	0.6	**99.4**
#4	4.00	4.2	**95.8**
#10	10.01	10.4	**89.6**
#20	28.45	29.6	**70.4**
#40	39.74	41.3	**58.7**
#60	47.68	49.5	**50.5**
#140	59.19	61.5	**38.5**
#200	62.42	64.8	**35.2**

MOISTURE (%)
ND

LIQUID LIMIT
ND

PLASTIC LIMIT
ND

PLASTICITY INDEX
ND

CLASSIFICATION
ND

ORGANICS (%)
ND

REMARKS: ND=NOT DETERMINED.

\72241d27.xls

REVIEWED BY: John Dailly

SUMMARY OF LABORATORY TESTING

WEYERHAEUSER LANDFILL

LAW PROJECT 30710-7-2241

FALLING-HEAD TEST (METHOD C)
ASTM D5084-90

Sample ID	Initial Wet Unit Weight (pcf)	Initial Dry Unit Weight (pcf)	Initial Moisture Content (%)	Hydraulic Gradient	Hydraulic Conductivity (cm/sec)
SB00900 7ft to 9ft Waste Material	69.3	23.6	193.3	2.6	**1.0×10^{-6}**

LABORATORY TESTING SUMMARY

IV. TEST REPORTS

c. BORROW MATERIAL

E096-014-2.0002

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
SOILS LABORATORY ASSIGNMENTS

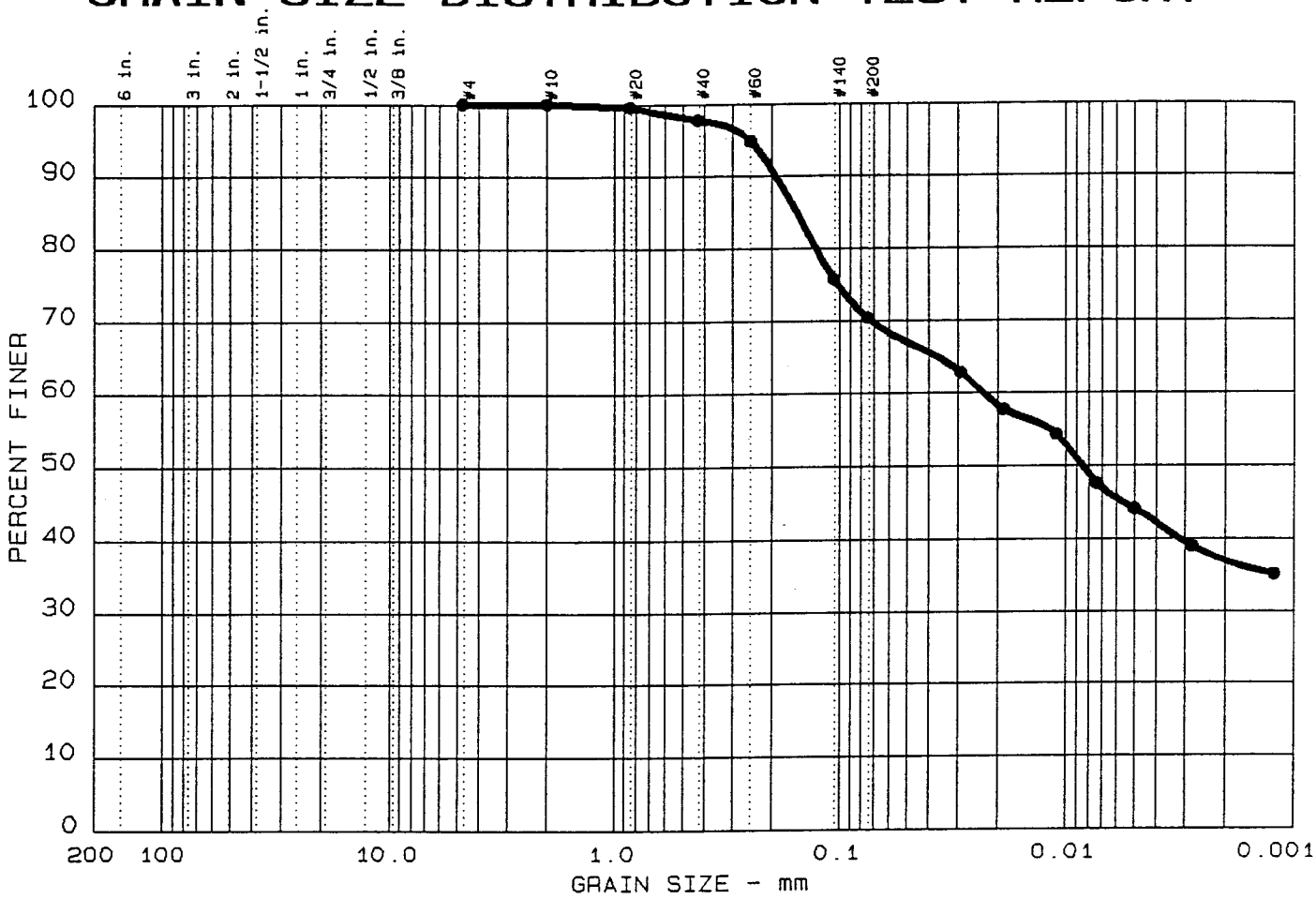
No. _____ PRIORITY _____ DEPT. # _____

DATE _____ JOB NAME WEYERHAEUSER LANDFILL COVER JOB NO. 50710-7-2241 IN CHARGE _____ REQUESTED COMPLETION DATE _____

SAMPLE LOCATION			PHYSICAL PROPERTIES										STRENGTH TESTS							COMPACTION			CONSOLIDATION							SPECIAL TEST		
									GRAIN SIZE ANALYSIS														INDICATE LOADS IN KSF AND RELOAD CYCLE IF ANY									
BORING NO.	SAMPLE TYPE	SAMPLE DEPTH	COMBINED ANALYSIS (LI)	MOISTURE CONTENT	UNIT WEIGHT NAT. DEN. & MOIST. CONT.	SPECIFIC GRAVITY	ATTERBERG LIMITS	SHRINKAGE LIMITS	DRY	WASH 200 W/SIEVE	% FINER NO. 200	HYDROMETER	MAX. & MIN. DENSITY	SWELL TEST	DIRECT SHEAR	UNCONFINED COMP. WITH STRESS-STRAIN CURVE	UNCONFINED COMP. WITHOUT S-S CURVE	TRIAXIAL UU	TRIAXIAL CU	TRIAXIAL CU W/PP	CONFINING PRESSURES, KSF	STANDARD (A, B, C, D)	MODIFIED (A, B, C, D)	CBR							PERMEABILITY	BENTONITE BLENDING	
BORROW																					A			#1									

REMARKS Transmit Compaction Results to Rick Powell @ DELTA
Before Setting Up Triaxial and Perm Tests.
FALLING HEAD PERMS OK

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	29.6	26.4	44.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	48	27	0.16	0.02	0.01					

MATERIAL DESCRIPTION	USCS	AASHTO
● (VISUAL) OLIVE FINE SANDY CLAY	CL	ND

Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / COVER
● Location: BORROW MATERIAL (PROCTOR #1)

Date: 06-25-97

Remarks:
ND=NOT DETERMINED.
DELTA ENV. CONSULTANTS
PROJECT #E096-019-2.0002

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Figure No. 01

REVIEWED BY: John Dailly

GRAIN SIZE DISTRIBUTION TEST DATA Test No.: 1

Date: 06-25-97
Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / COVER

Sample Data

Location of Sample: BORROW MATERIAL (PROCTOR #1)
Sample Description: (VISUAL) OLIVE FINE SANDY CLAY
USCS Class: CL Liquid limit: 48
AASHTO Class: ND Plasticity index: 27

Notes

Remarks: ND=NOT DETERMINED. DELTA ENV. CONSULTANTS
PROJECT #E096-019-2.0002
Fig. No.: 01

Mechanical Analysis Data

	Initial
Dry sample and tare=	420.95
Tare =	0.00
Dry sample weight =	420.95

Sample split on number 10 sieve
Split sample data:
Sample and tare = 58.48 Tare = 0 Sample weight = 58.48
Cumulative weight retained tare= 0
Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
# 4	0.00	100.0
# 10	0.11	100.0
# 20	0.24	99.6
# 40	1.30	97.8
# 60	3.01	94.8
# 140	14.16	75.8
# 200	17.30	70.4

Hydrometer Analysis Data

Separation sieve is number 10
Percent -# 10 based on complete sample= 100.0
Weight of hydrometer sample: 58.48
Calculated biased weight= 58.50
Automatic temperature correction
Composite correction at 20 deg C =-4

Meniscus correction only=-1
Specific gravity of solids= 2.66

Specific gravity correction factor= 0.998
Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

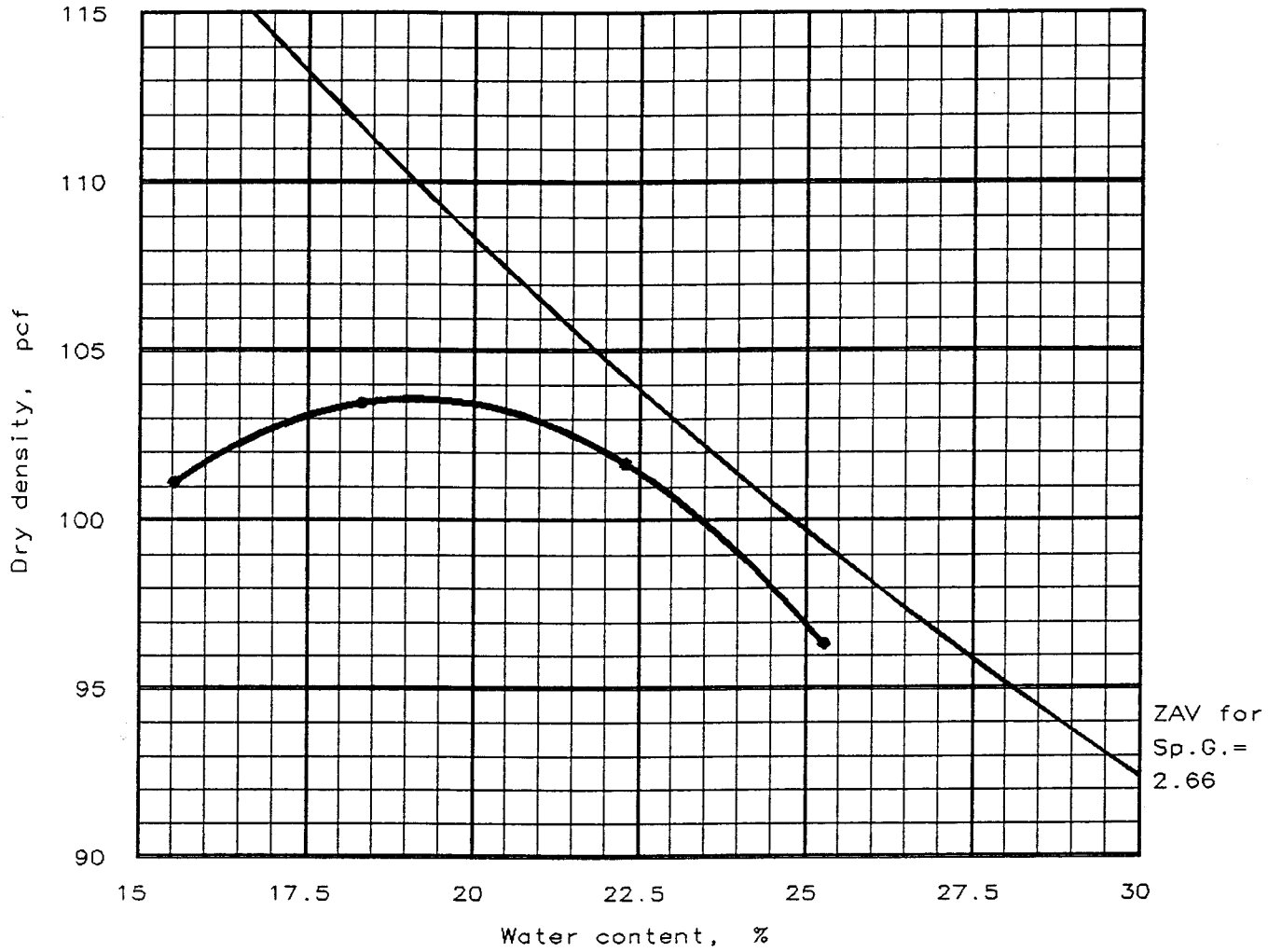
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.0	23.5	40.0	36.8	0.0130	39.0	9.9	0.0290	62.8
5.0	23.5	37.0	33.8	0.0130	36.0	10.4	0.0188	57.7
15.0	23.5	35.0	31.8	0.0130	34.0	10.7	0.0110	54.2
36.0	23.5	31.0	27.8	0.0130	30.0	11.4	0.0073	47.4
79.0	23.5	29.0	25.8	0.0130	28.0	11.7	0.0050	44.0
266.0	23.5	26.0	22.8	0.0130	25.0	12.2	0.0028	38.9
1469.0	22.5	24.0	20.5	0.0132	23.0	12.5	0.0012	35.0

Fractional Components

Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 75mm. = 0.0 % GRAVEL = 0.0 % SAND = 29.6
% SILT = 26.4 % CLAY = 44.0

D85= 0.16 D60= 0.023 D50= 0.008

PROCTOR REPORT



Test specification: ASTM D 698-91 Method A, Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	ND	ND %	2.66	48	27	0 %	70.4 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 103.6 pcf Optimum moisture = 19.1 %	(VISUAL) OLIVE FINE SANDY CLAY

Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / COVER
Location: #1
BORROW MATERIAL
Date: 06-25-97

Remarks:
ND=NOT DETERMINED.
DELTA ENV. CONSULTANTS
PROJECT #E096-019-2.0002

PROCTOR REPORT

LAW ENGINEERING

Fig. No. 620

REVIEWED BY: John Dailly

MOISTURE-DENSITY TEST DATA

DATA FILE: 620

PROJECT DATA

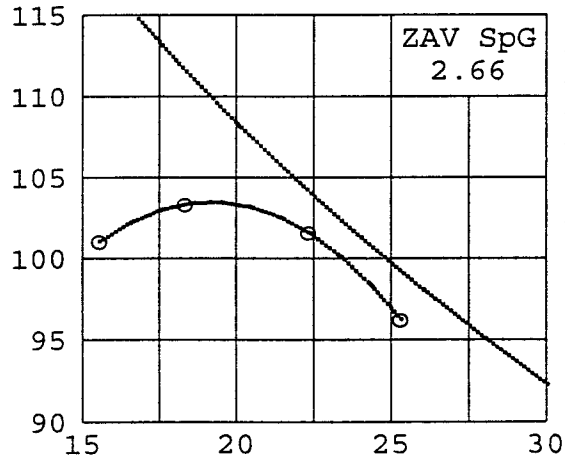
Date: 06-25-97
Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / COVER
Location 1: #1
2: BORROW MATERIAL
Remarks 1: ND=NOT DETERMINED.
2: DELTA ENV. CONSULTANTS
3: PROJECT #E096-019-2.0002
Material 1: (VISUAL) OLIVE FINE
description 2: SANDY CLAY
Elevation or depth:
Figure No.: 620

SPECIMEN DATA

USCS classification: CL
AASHTO classification: ND
Natural moisture: ND
Specific gravity: 2.66
Percent retained on No.4 sieve: 0
Percent passing No. 200 sieve: 70.4
Liquid limit: 48
Plastic limit: 21
Plasticity index: 27

TEST DATA AND RESULTS FOR CURVE 1

Type of test: Standard, ASTM D 698-91 Method A



POINT NO.	1	2	3	4
WM + WS	3746	3830	3860	3805
WM	1981	1981	1981	1981
WW+T #1	328.90	418.90	450.40	615.80
WD+T #1	285.80	355.30	369.80	493.30
TARE #1	8.40	8.30	8.40	8.80
MOIST #1	15.5	18.3	22.3	25.3
MOISTURE	15.5	18.3	22.3	25.3
DRY DEN	101.1	103.5	101.7	96.4

Max dry den= 103.6 pcf, Opt moisture= 19.1 %

Oversize Correction Not Applied

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA
REPORT OF HYDRAULIC CONDUCTIVITY TESTING (FALLING HEAD-RISING TAILWATER) ASTM D5084 METHOD C

PROJECT NAME: WEYERHAEUSER LANDFILL / COVER
LAW ENGINEERING & ENVIRONMENTAL SERVICES PROJECT NUMBER: 30710-7-2241
DATE: JUNE 26, 1997

SAMPLE IDENTIFICATION: BORROW MATERIAL (PROCTOR #1)
LABORATORY ID: BORROW MATERIAL (PROCTOR #1)

REMARKS: b value = 0.98

DELTA ENVIRONMENTAL CONSULTANTS PROJECT #E096-019-2.0002

CELL # :	8
STATION # :	1, 2
(a) AREA OF BURETTE, cm²:	1.26
LENGTH OF SAMPLE, cm :	5.895
DIAMETER OF SAMPLE, cm :	7.234
(A) AREA OF SAMPLE, cm²:	41.100
CELL PRESSURE, psi :	35.0
INFLUENT GAUGE PRESSURE, psi :	31.0
INFLUENT STATION CORRECTION, cm :	23.8
INITIAL INFLUENT BURETTE READING, cm :	51.20
INITIAL INFLUENT BURETTE READING + CORRECTION, cm :	75.00
EFFLUENT GAUGE PRESSURE, psi :	30.0
EFFLUENT STATION CORRECTION, cm :	23.2
INITIAL EFFLUENT BURETTE READING, cm :	5.80
INITIAL EFFLUENT BURETTE READING + CORRECTION, cm :	29.00
PRESSURE HEAD ON SAMPLE, cm :	70.3

START OF TEST		
06/24/97	10:15:00 AM	INITIAL HEAD ACROSS SAMPLE (H1), cm : 116.32
		INITIAL HYDRAULIC GRADIENT (H1/L) : 19.7

UNIT WEIGHT DATA:

LENGTH OF SAMPLE, in:	2.321
DIAMETER OF SAMPLE, in:	2.848
WET WEIGHT OF SOIL, g:	478.1
CALCULATED DRY WEIGHT OF SOIL, g:	391.1

MOISTURE DETERMINATION:

WET SOIL & TARE, g:	350.40
DRY SOIL & TARE, g:	288.10
TARE WEIGHT, g:	8.20

WET UNIT WEIGHT (pcf):	123.2
DRY UNIT WEIGHT (pcf):	100.8
MOISTURE CONTENT (%):	22.3

INFORMATION FROM STANDARD PROCTOR TEST:

Maximum Dry Density (pcf):	103.6
Optimum Moisture Content (%):	19.1

TEST SPECIMEN COMPACTION RESULTS

% Compaction of MDD:	97.3
% Wet of Optimum Moisture:	3.2

DATE OF READING	TIME OF READING	INCREMENTAL TIME (sec)	TOTAL TIME (sec)	BURETTE READING (cm) L1	BURETTE READING (cm) L2	CORRECTED READING (cm) L1	CORRECTED READING (cm) L2	HEAD ACROSS SAMPLE (cm)	INCREMENTAL PERMEABILITY (K) (cm/s)	TOTAL PERMEABILITY (K) (cm/s)
06/24/97	08:32:00 PM	37020	37020	50.50	6.50	74.30	29.70	114.92	3.0E-08	3.0E-08
06/25/97	06:29:00 AM	35820	72840	49.90	6.95	73.70	30.15	113.87	2.3E-08	2.6E-08
06/25/97	04:22:00 PM	35580	108420	49.40	7.45	73.20	30.65	112.87	2.2E-08	2.5E-08
06/26/97	09:00:00 AM	59880	168300	48.65	8.15	72.45	31.35	111.42	2.0E-08	2.3E-08
									K AVG = 2.4E-08	

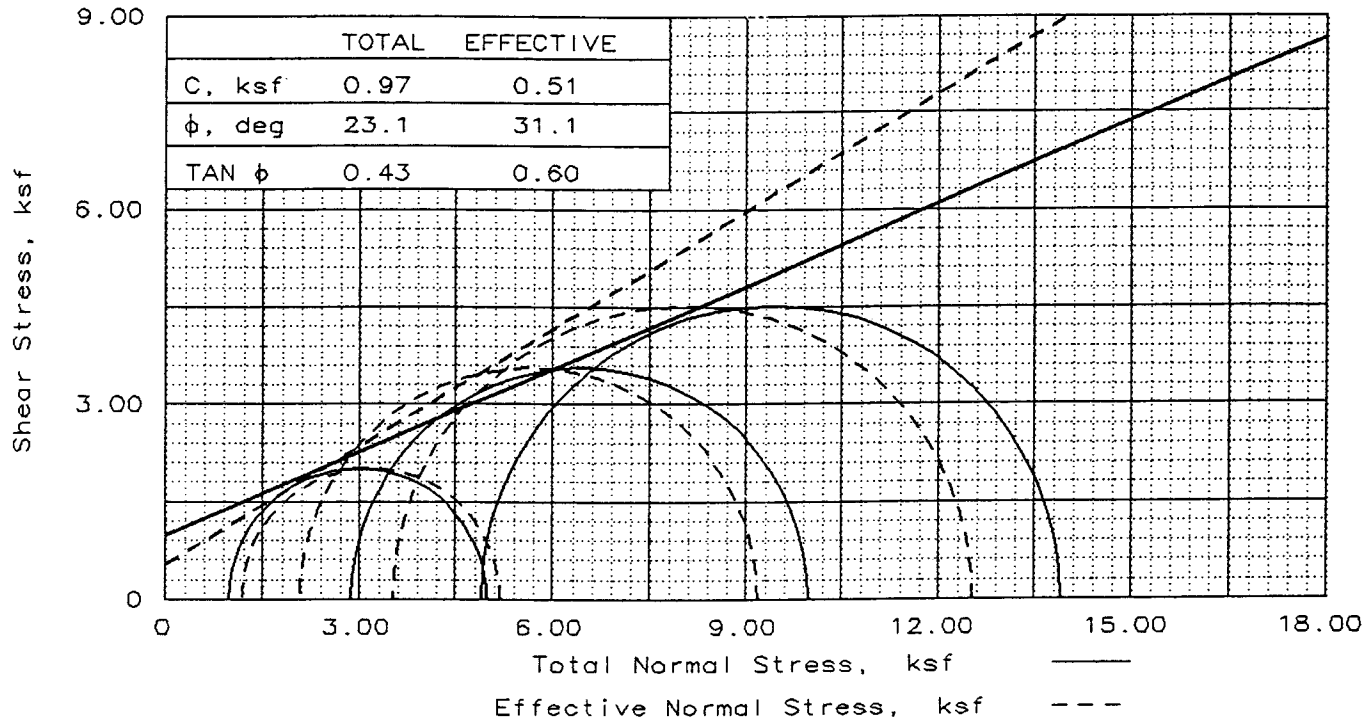
DATE & TIME PRINTED: 06/26/97 09:12 AM

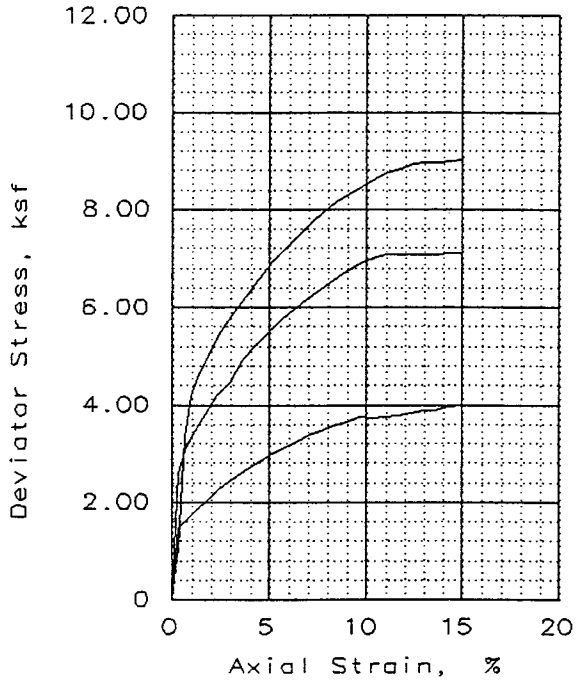
L1 = INFLUENT H20 HEAD, L2 = EFFLUENT H20 HEAD

K = (aL)/(2At) x ln(H1/H2)

\72241d01.xls

REVIEWED BY: John Dailey





SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	21.0	21.0	21.0
	DRY DENSITY, pcf	103.3	103.9	104.2
	SATURATION, %	92.1	93.5	94.4
	VOID RATIO	0.608	0.599	0.593
	DIAMETER, in	1.49	1.50	1.50
	HEIGHT, in	3.07	3.00	3.05
AT TEST	WATER CONTENT, %	25.2	20.6	19.2
	DRY DENSITY, pcf	99.5	107.3	109.9
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.669	0.548	0.511
	DIAMETER, in	1.53	1.48	1.46
	HEIGHT, in	3.05	2.98	3.02
BACK PRESSURE, ksf		5.76	5.85	5.73
CELL PRESSURE, ksf		6.75	8.74	10.64
FAILURE STRESS, ksf		4.00	7.10	9.01
PORE PRESSURE, ksf		5.56	6.64	7.10
STRAIN RATE, %/min.		0.656	0.671	0.663
ULTIMATE STRESS, ksf				
PORE PRESSURE, ksf				
$\bar{\sigma}_1$ FAILURE, ksf		5.20	9.20	12.56
$\bar{\sigma}_3$ FAILURE, ksf		1.2	2.1	3.54

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: LAB-COMPACTED
DESCRIPTION: (VISUAL) OLIVE
FINE SANDY CLAY
LL= 48 PL= 21 PI= 27.0
SPECIFIC GRAVITY= 2.66
REMARKS:

CLIENT: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
PROJECT: WEYERHAEUSER LANDFILL / COVER

SAMPLE LOCATION: BORROW MATERIAL
PROCTOR #1

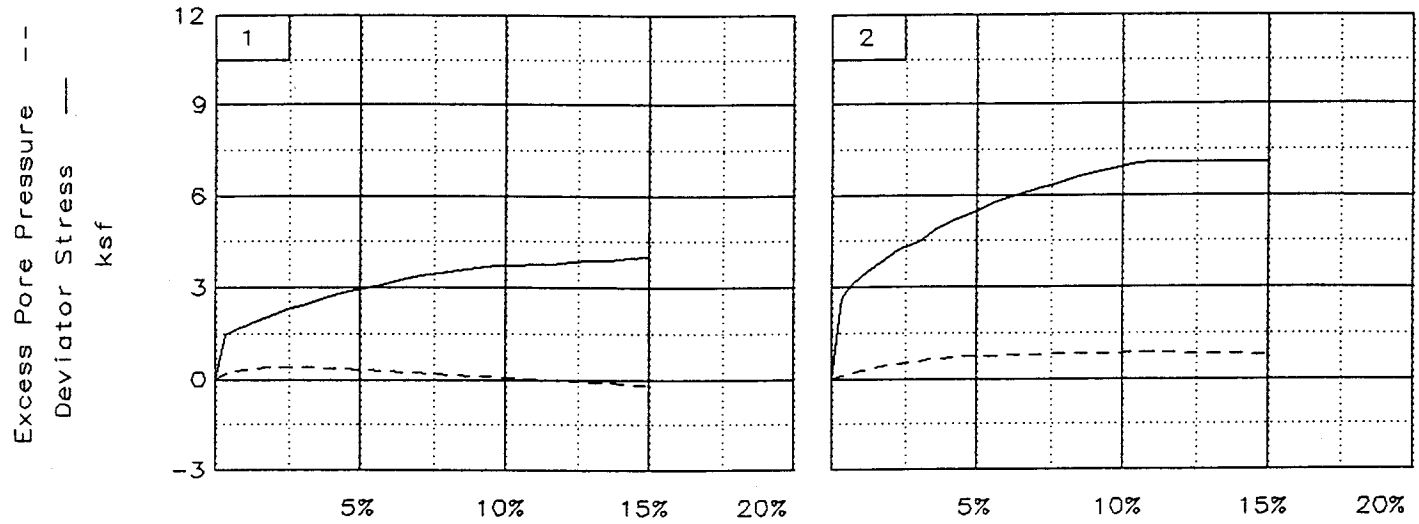
PROJ. NO.: 3071072241 DATE: JUNE 25, 1997

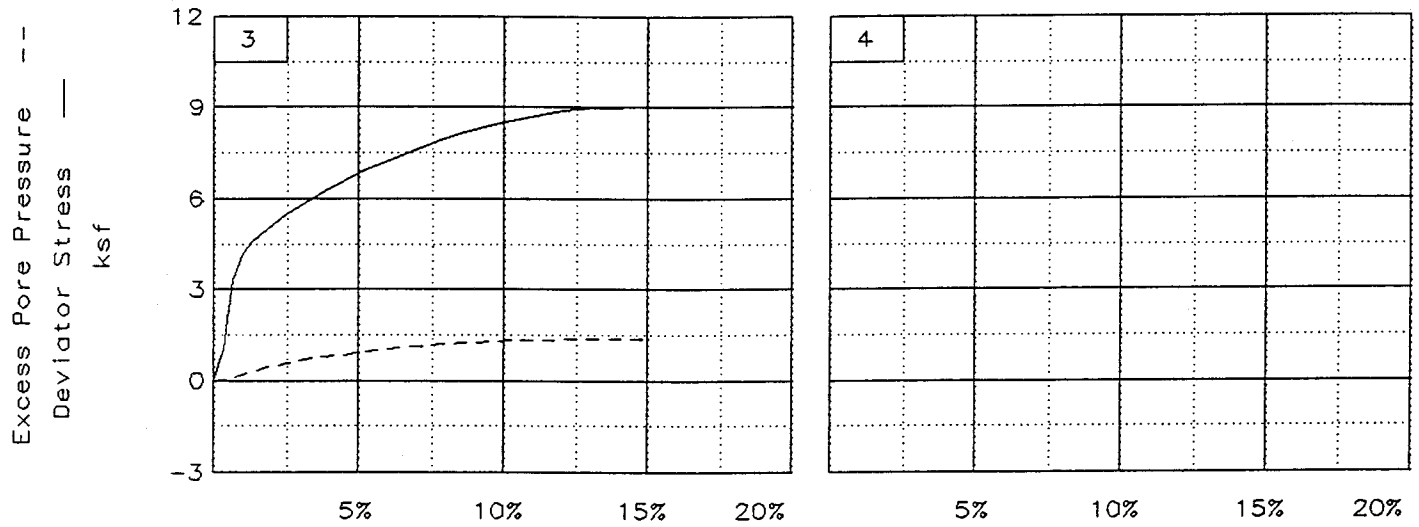
TRIAXIAL COMPRESSION TEST

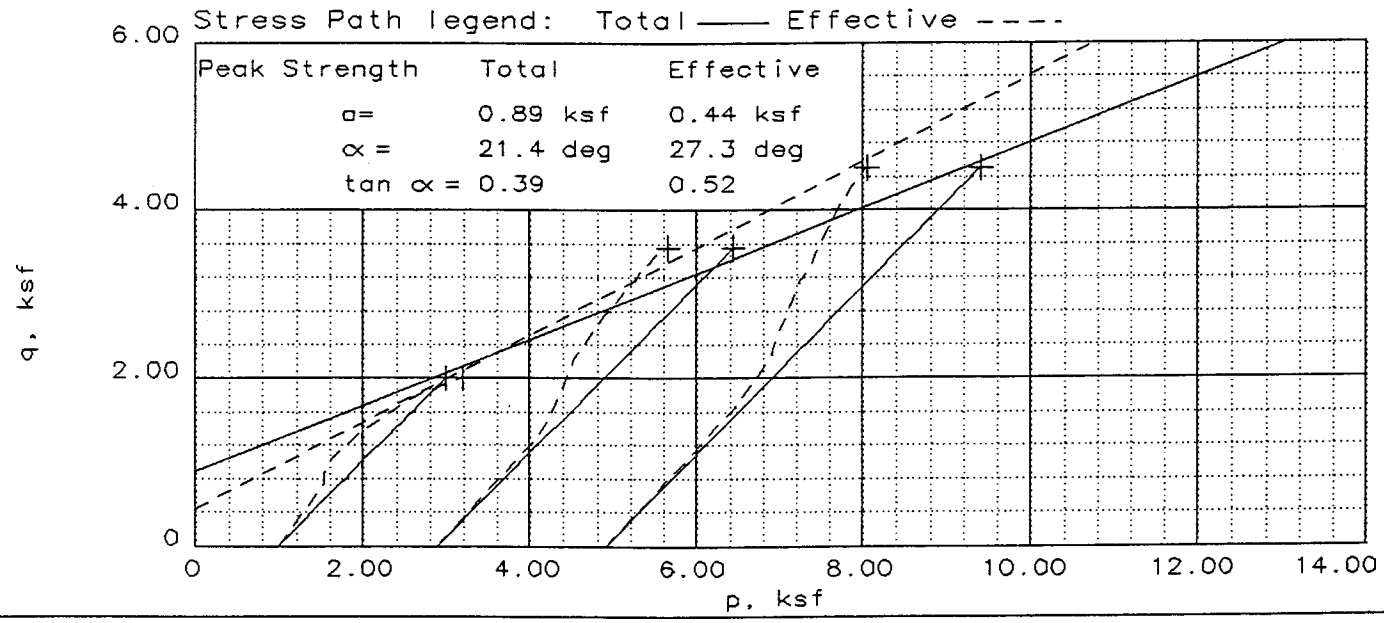
LAW ENGINEERING

FIG. NO. COVER

REVIEWED BY: John Dailly







Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002

Project: WEYERHAEUSER LANDFILL / COVER

Location: BORROW MATERIAL PROCTOR #1

File: COVER Project No.: 3071072241 Page 2/2 Fig. No. COVER

TRIAXIAL COMPRESSION TEST 6-25-1997
CU with pore pressures 2:46 pm

Project Data

Project No.: 3071072241 Date: JUNE 25, 1997 Data file: COVER
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / COVER
Sample location: BORROW MATERIAL PROCTOR #1
Sample description: (VISUAL) OLIVE FINE SANDY CLAY
Remarks:
Fig No. COVER

Sample No. 1 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.66 LL= 48 PL= 21 PI= 27

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.49	1.53	
Height change, in		0.02	
Height, in	3.07	3.05	
Weight, grams	176.3		
Water volume change, cc		-6.00	
Moisture, %	21.0	25.2	23.1
Dry density, pcf	103.3	99.5	
Saturation, %	92.1	100.0	
Void ratio	0.608	0.669	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16667 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.656 % per minute
Consolidation cell pressure = 46.9 psi
Consolidation back pressure = 40 psi
Consolidation effective confining stress = 0.9936 ksf
Peak deviator stress = 4.00 ksf at reading no. 25
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0450	0.000	455.0	0.0	0.0	0.00	0.99	0.99	1.00	40.0	0.99	0.00
1	0.0550	0.010	567.0	18.7	0.3	1.46	0.81	2.27	2.81	41.3	1.54	0.73
2	0.0650	0.020	578.5	20.6	0.7	1.61	0.73	2.34	3.19	41.8	1.54	0.80
3	0.0750	0.030	589.0	22.3	1.0	1.74	0.68	2.42	3.57	42.2	1.55	0.87
4	0.0850	0.040	598.5	23.9	1.3	1.86	0.63	2.49	3.93	42.5	1.56	0.93
5	0.1000	0.055	613.0	26.3	1.8	2.03	0.60	2.64	4.36	42.7	1.62	1.02

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1200	0.075	633.0	29.7	2.5	2.28	0.59	2.87	4.85	42.8	1.73	1.14
7	0.1400	0.095	650.0	32.5	3.1	2.48	0.60	3.08	5.09	42.7	1.84	1.24
8	0.1600	0.115	665.5	35.1	3.8	2.66	0.62	3.27	5.29	42.6	1.95	1.33
9	0.1800	0.135	680.0	37.5	4.4	2.82	0.65	3.47	5.35	42.4	2.06	1.41
10	0.2000	0.155	693.5	39.8	5.1	2.97	0.68	3.64	5.38	42.2	2.16	1.48
11	0.2200	0.175	706.0	41.8	5.7	3.10	0.71	3.81	5.39	42.0	2.26	1.55
12	0.2400	0.195	719.0	44.0	6.4	3.24	0.75	3.99	5.33	41.7	2.37	1.62
13	0.2600	0.215	732.0	46.2	7.1	3.37	0.78	4.15	5.34	41.5	2.46	1.69
14	0.2800	0.235	741.5	47.8	7.7	3.47	0.81	4.27	5.30	41.3	2.54	1.73
15	0.3000	0.255	751.0	49.3	8.4	3.56	0.85	4.40	5.18	41.0	2.63	1.78
16	0.3200	0.275	761.0	51.0	9.0	3.65	0.88	4.53	5.15	40.8	2.70	1.82
17	0.3400	0.295	771.0	52.7	9.7	3.74	0.91	4.65	5.12	40.6	2.78	1.87
18	0.3600	0.315	773.0	53.0	10.3	3.74	0.94	4.67	4.99	40.4	2.80	1.87
19	0.3800	0.335	776.0	53.5	11.0	3.74	0.98	4.72	4.82	40.1	2.85	1.87
20	0.4000	0.355	781.0	54.3	11.7	3.78	1.01	4.78	4.75	39.9	2.90	1.89
21	0.4200	0.375	789.0	55.7	12.3	3.84	1.04	4.88	4.70	39.7	2.96	1.92
22	0.4400	0.395	796.0	56.8	13.0	3.89	1.08	4.97	4.60	39.4	3.03	1.95
23	0.4600	0.415	799.0	57.3	13.6	3.89	1.09	4.99	4.56	39.3	3.04	1.95
24	0.4800	0.435	808.5	58.9	14.3	3.97	1.15	5.12	4.45	38.9	3.14	1.99
25	0.5020	0.457	814.0	59.8	15.0	4.00	1.20	5.20	4.35	38.6	3.20	2.00

TRIAXIAL COMPRESSION TEST 6-25-1997
CU with pore pressures 2:46 pm

Project Data

Project No.: 3071072241 Date: JUNE 25, 1997 Data file: COVER
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / COVER
Sample location: BORROW MATERIAL PROCTOR #1
Sample description: (VISUAL) OLIVE FINE SANDY CLAY
Remarks:
Fig No. COVER

Sample No. 2 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.66 LL= 48 PL= 21 PI= 27

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.50	1.48	
Height change, in		0.02	
Height, in	3.00	2.98	
Weight, grams	174.0		
Water volume change, cc		0.63	
Moisture, %	21.0	20.6	21.6
Dry density, pcf	103.9	107.3	
Saturation, %	93.5	100.0	
Void ratio	0.599	0.548	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16667 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.671 % per minute
Consolidation cell pressure = 60.7 psi
Consolidation back pressure = 40.6 psi
Consolidation effective confining stress = 2.8944 ksf
Peak deviator stress = 7.10 ksf at reading no. 24
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0710	0.000	454.0	0.0	0.0	0.00	2.89	2.89	1.00	40.6	2.89	0.00
1	0.0810	0.010	641.0	31.2	0.3	2.61	2.79	5.40	1.93	41.3	4.10	1.31
2	0.0910	0.020	673.0	36.5	0.7	3.05	2.71	5.75	2.13	41.9	4.23	1.52
3	0.1010	0.030	694.0	40.0	1.0	3.33	2.64	5.96	2.26	42.4	4.30	1.66
4	0.1110	0.040	714.0	43.3	1.3	3.59	2.56	6.16	2.40	42.9	4.36	1.80
5	0.1210	0.050	730.0	46.0	1.7	3.80	2.51	6.31	2.52	43.3	4.41	1.90

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1400	0.069	761.5	51.3	2.3	4.21	2.39	6.60	2.76	44.1	4.49	2.10
7	0.1600	0.089	783.0	54.8	3.0	4.47	2.30	6.77	2.94	44.7	4.54	2.24
8	0.1800	0.109	819.5	60.9	3.7	4.93	2.23	7.16	3.21	45.2	4.70	2.47
9	0.2000	0.129	845.0	65.2	4.3	5.24	2.19	7.43	3.39	45.5	4.81	2.62
10	0.2200	0.149	867.5	68.9	5.0	5.50	2.15	7.65	3.56	45.8	4.90	2.75
11	0.2400	0.169	891.5	72.9	5.7	5.78	2.15	7.93	3.69	45.8	5.04	2.89
12	0.2600	0.189	910.0	76.0	6.3	5.98	2.12	8.10	3.83	46.0	5.11	2.99
13	0.2800	0.209	930.0	79.3	7.0	6.20	2.10	8.30	3.95	46.1	5.20	3.10
14	0.3000	0.229	947.0	82.2	7.7	6.37	2.09	8.46	4.05	46.2	5.28	3.19
15	0.3200	0.249	965.0	85.2	8.4	6.56	2.07	8.63	4.16	46.3	5.35	3.28
16	0.3400	0.269	983.0	88.2	9.0	6.74	2.06	8.80	4.27	46.4	5.43	3.37
17	0.3600	0.289	998.5	90.8	9.7	6.89	2.06	8.95	4.34	46.4	5.50	3.44
18	0.3840	0.313	1015.0	93.5	10.5	7.03	2.04	9.08	4.44	46.5	5.56	3.52
19	0.4000	0.329	1023.0	94.8	11.0	7.09	2.04	9.13	4.47	46.5	5.59	3.54
20	0.4200	0.349	1027.0	95.5	11.7	7.09	2.04	9.13	4.46	46.5	5.59	3.54
21	0.4400	0.369	1031.0	96.2	12.4	7.08	2.06	9.14	4.44	46.4	5.60	3.54
22	0.4600	0.389	1035.0	96.8	13.1	7.07	2.06	9.13	4.44	46.4	5.60	3.54
23	0.4800	0.409	1039.5	97.6	13.7	7.07	2.07	9.15	4.41	46.3	5.61	3.54
24	0.5000	0.429	1046.0	98.7	14.4	7.10	2.10	9.20	4.38	46.1	5.65	3.55
25	0.5180	0.447	1050.0	99.3	15.0	7.09	2.12	9.21	4.35	46.0	5.66	3.55

TRIAXIAL COMPRESSION TEST 6-25-1997
CU with pore pressures 2:46 pm

Project Data

Project No.: 3071072241 Date: JUNE 25, 1997 Data file: COVER
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / COVER
Sample location: BORROW MATERIAL PROCTOR #1
Sample description: (VISUAL) OLIVE FINE SANDY CLAY
Remarks:
Fig No. COVER

Sample No. 3 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.66 LL= 48 PL= 21 PI= 27

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.50	1.46	
Height change, in		0.03	
Height, in	3.05	3.02	
Weight, grams	177.0		
Water volume change, cc		2.71	
Moisture, %	21.0	19.2	20.6
Dry density, pcf	104.2	109.9	
Saturation, %	94.4	100.0	
Void ratio	0.593	0.511	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16667 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.663 % per minute
Consolidation cell pressure = 73.9 psi
Consolidation back pressure = 39.8 psi
Consolidation effective confining stress = 4.9104 ksf
Peak deviator stress = 9.01 ksf at reading no. 25
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0840	0.000	468.0	0.0	0.0	0.00	4.91	4.91	1.00	39.8	4.91	0.00
1	0.0940	0.010	541.0	12.2	0.3	1.04	4.90	5.94	1.21	39.9	5.42	0.52
2	0.1040	0.020	702.0	39.0	0.7	3.32	4.81	8.13	1.69	40.5	6.47	1.66
3	0.1140	0.030	765.0	49.5	1.0	4.20	4.69	8.90	1.90	41.3	6.80	2.10
4	0.1240	0.040	791.0	53.8	1.3	4.56	4.62	9.18	1.99	41.8	6.90	2.28
5	0.1400	0.056	824.0	59.3	1.9	4.99	4.48	9.47	2.12	42.8	6.98	2.50

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	Effective Stresses 1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1600	0.076	863.0	65.8	2.5	5.50	4.35	9.85	2.27	43.7	7.10	2.75
7	0.1800	0.096	893.5	70.9	3.2	5.89	4.22	10.11	2.40	44.6	7.16	2.94
8	0.2000	0.116	922.5	75.8	3.8	6.25	4.10	10.35	2.52	45.4	7.23	3.12
9	0.2200	0.136	951.0	80.5	4.5	6.59	4.06	10.65	2.62	45.7	7.36	3.30
10	0.2400	0.156	978.0	85.0	5.2	6.91	3.97	10.89	2.74	46.3	7.43	3.46
11	0.2600	0.176	1002.0	89.0	5.8	7.19	3.90	11.09	2.84	46.8	7.50	3.59
12	0.2800	0.196	1025.0	92.8	6.5	7.44	3.83	11.28	2.94	47.3	7.55	3.72
13	0.3000	0.216	1048.0	96.7	7.2	7.70	3.77	11.47	3.04	47.7	7.62	3.85
14	0.3200	0.236	1070.0	100.3	7.8	7.93	3.72	11.65	3.14	48.1	7.68	3.97
15	0.3400	0.256	1091.0	103.8	8.5	8.15	3.67	11.82	3.22	48.4	7.75	4.07
16	0.3600	0.276	1108.0	106.7	9.1	8.31	3.64	11.95	3.28	48.6	7.80	4.16
17	0.3800	0.296	1125.5	109.6	9.8	8.48	3.60	12.08	3.35	48.9	7.84	4.24
18	0.4000	0.316	1141.0	112.2	10.5	8.61	3.59	12.20	3.40	49.0	7.89	4.31
19	0.4200	0.336	1156.5	114.8	11.1	8.75	3.57	12.32	3.45	49.1	7.94	4.37
20	0.4400	0.356	1169.0	116.8	11.8	8.84	3.56	12.39	3.48	49.2	7.98	4.42
21	0.4600	0.376	1181.5	118.9	12.5	8.93	3.54	12.47	3.52	49.3	8.01	4.46
22	0.4800	0.396	1190.0	120.3	13.1	8.97	3.54	12.51	3.53	49.3	8.03	4.48
23	0.5000	0.416	1196.5	121.4	13.8	8.98	3.53	12.51	3.54	49.4	8.02	4.49
24	0.5200	0.436	1204.0	122.7	14.4	9.00	3.53	12.53	3.55	49.4	8.03	4.50
25	0.5370	0.453	1210.0	123.7	15.0	9.01	3.54	12.56	3.54	49.3	8.05	4.51

COPY

July 11, 1997

Mr. John Dailly
Law Engineering and Environmental Services, Inc.
3301 Atlantic Avenue
Raleigh, NC 27604

Subject: **Report of Laboratory Testing**
On Native Soil and Waste Material
LAW Project 30710-7-2241

Dear Mr. Dailly:

As authorized by the issuance of your Work Assignment Sheet dated April 2, 1997, LAW's Charlotte, North Carolina office has completed the assigned laboratory testing on the 4 UD tube samples submitted to our laboratory. Testing was performed according to the following ASTM standard:

ASTM D 2434	"Standard Test Method for Permeability of Granular Soils"
ASTM D 5084	"Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter"

The results of our testing are summarized on the attached "Summary of Laboratory Testing" sheet.

We appreciate the opportunity to be of service to you with this project. If you should have any questions concerning this report, or if we may be of further service, please do not hesitate to contact this office at (704) 357-8600.

Sincerely,

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

James H. Alexander
Laboratory Technologies

M. Lindsay Caroll, III
Laboratory Services Manager

JHA/MLC:ls

Attachment: "Summary of Laboratory Testing"

LABORATORY TESTING SUMMARY

V. CORRESPONDENCE FROM LAW / CHARLOTTE

COPY

SUMMARY OF LABORATORY TESTING

WEYERHAEUSER LANDFILL

LAW PROJECT 30710-7-2241

CONTANT HEAD TEST
ASTM D2434-68

Sample ID	Initial Wet Unit Weight (pcf)	Initial Dry Unit Weight (pcf)	Initial Moisture Content (%)	Hydraulic Gradient	Hydraulic Conductivity (cm/sec)
SB00300 42ft to 44ft Native Soil	107.8	103.5	4.2	4.7	**2.6×10^{-2}**

COPY

SUMMARY OF LABORATORY TESTING

WEYERHAEUSER LANDFILL

LAW PROJECT 30710-7-2241

FALLING-HEAD TEST (METHOD C)
ASTM D5084-90

Sample ID	Initial Wet Unit Weight (pcf)	Initial Dry Unit Weight (pcf)	Initial Moisture Content (%)	Hydraulic Gradient	Hydraulic Conductivity (cm/sec)
SB00400 12ft to 14ft Waste Material	84.0	54.4	54.3	2.9	3.2×10^{-7}

COPY

SUMMARY OF LABORATORY TESTING

WEYERHAEUSER LANDFILL

LAW PROJECT 30710-7-2241

CONSTANT HEAD TEST
ASTM D2434-68

Sample ID	Initial Wet Unit Weight (pcf)	Initial Dry Unit Weight (pcf)	Initial Moisture Content (%)	Hydraulic Gradient	Hydraulic Conductivity (cm/sec)
SB00600 47ft to 49ft Native Soil	115.2	93.1	23.8	7.1	**1.9×10^{-2}**

COPY

SUMMARY OF LABORATORY TESTING

WEYERHAEUSER LANDFILL

LAW PROJECT 30710-7-2241

FALLING-HEAD TEST (METHOD C)
ASTM D5084-90

Sample ID	Initial Wet Unit Weight (pcf)	Initial Dry Unit Weight (pcf)	Initial Moisture Content (%)	Hydraulic Gradient	Hydraulic Conductivity (cm/sec)
SB00900 7ft to 9ft Waste Material	69.3	23.6	193.3	2.6	1.0×10^{-6}

APPENDIX E

HYDROGRAPHS/TR-55 MODELING RESULTS

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: FACILITY HYDROGRAPH

Total watershed area: 0.195 sq mi Rainfall type: III Frequency: 25 years

---------- Subareas ----------

	FACILI
Area(sq mi)	0.20
Rainfall(in)	8.0
Curve number	74
Runoff(in)	4.93
Tc (hrs)	2.00
TimeToOutlet	0.00
Ia/P	0.09
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) FACILI
11.0	9	9
11.3	11	11
11.6	14	14
11.9	18	18
12.0	20	20
12.1	22	22
12.2	26	26
12.3	30	30
12.4	38	38
12.5	46	46
12.6	58	58
12.7	72	72
12.8	88	88
13.0	124	124
13.2	158	158
13.4	180	180
13.6	192P	192P
13.8	184	184
14.0	171	171
14.3	141	141
14.6	114	114
15.0	89	89
15.5	66	66
16.0	53	53
16.5	43	43
17.0	36	36
17.5	30	30
18.0	25	25
19.0	19	19
20.0	15	15
22.0	13	13
26.0	3	3

P - Peak Flow

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: SECTION 1 HYDROGRAPH

Total watershed area: 0.035 sq mi Rainfall type: III Frequency: 25 years

	Subareas
	SECT 1
Area(sq mi)	0.04
Rainfall(in)	8.0
Curve number	72
Runoff(in)	4.69
Tc (hrs)	0.15
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.10
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) SECT 1
11.0	4	4
11.3	6	6
11.6	8	8
11.9	20	20
12.0	29	29
12.1	42	42
12.2	74	74
12.3	93P	93P
12.4	79	79
12.5	59	59
12.6	44	44
12.7	32	32
12.8	23	23
13.0	15	15
13.2	12	12
13.4	11	11
13.6	10	10
13.8	9	9
14.0	9	9
14.3	8	8
14.6	7	7
15.0	6	6
15.5	5	5
16.0	5	5
16.5	4	4
17.0	3	3
17.5	3	3
18.0	3	3
19.0	2	2
20.0	2	2
22.0	2	2
26.0	0	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: SECTION 2 HYDROGRAPH

Total watershed area: 0.004 sq mi Rainfall type: III Frequency: 25 years

	Subareas
	SECT 2
Area(sq mi)	0.00
Rainfall(in)	8.0
Curve number	72
Runoff(in)	4.69
Tc (hrs)	0.22
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.10
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) SECT 2
11.0	0	0
11.3	1	1
11.6	1	1
11.9	2	2
12.0	3	3
12.1	5	5
12.2	8	8
12.3	10P	10P
12.4	9	9
12.5	6	6
12.6	5	5
12.7	3	3
12.8	2	2
13.0	2	2
13.2	1	1
13.4	1	1
13.6	1	1
13.8	1	1
14.0	1	1
14.3	1	1
14.6	1	1
15.0	1	1
15.5	1	1
16.0	0	0
16.5	0	0
17.0	0	0
17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: SECTION 3 HYDROGRAPH

Total watershed area: 0.002 sq mi Rainfall type: III Frequency: 25 years

	Subareas
	SECT 3
Area(sq mi)	0.00
Rainfall(in)	8.0
Curve number	72
Runoff(in)	4.69
Tc (hrs)	0.22
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.10
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) SECT 3
11.0	0	0
11.3	0	0
11.6	0	0
11.9	1	1
12.0	2	2
12.1	2	2
12.2	4	4
12.3	5P	5P
12.4	5	5
12.5	3	3
12.6	3	3
12.7	2	2
12.8	1	1
13.0	1	1
13.2	1	1
13.4	1	1
13.6	1	1
13.8	1	1
14.0	0	0
14.3	0	0
14.6	0	0
15.0	0	0
15.5	0	0
16.0	0	0
16.5	0	0
17.0	0	0
17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: SECTION 4 HYDROGRAPH

Total watershed area: 0.004 sq mi Rainfall type: III Frequency: 25 years

	Subareas
	SECT 4
Area(sq mi)	0.00
Rainfall(in)	8.0
Curve number	72
Runoff(in)	4.69
Tc (hrs)	0.22
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.10
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) SECT 4
11.0	1	1
11.3	1	1
11.6	1	1
11.9	2	2
12.0	3	3
12.1	5	5
12.2	9	9
12.3	11P	11P
12.4	9	9
12.5	7	7
12.6	5	5
12.7	4	4
12.8	3	3
13.0	2	2
13.2	1	1
13.4	1	1
13.6	1	1
13.8	1	1
14.0	1	1
14.3	1	1
14.6	1	1
15.0	1	1
15.5	1	1
16.0	1	1
16.5	0	0
17.0	0	0
17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: SECTION 5 HYDROGRAPH

Total watershed area: 0.004 sq mi Rainfall type: III Frequency: 25 years

	Subareas
	SECT 5
Area(sq mi)	0.00
Rainfall(in)	8.0
Curve number	72
Runoff(in)	4.69
Tc (hrs)	0.22
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.10
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) SECT 5
11.0	0	0
11.3	1	1
11.6	1	1
11.9	2	2
12.0	3	3
12.1	4	4
12.2	8	8
12.3	10P	10P
12.4	8	8
12.5	6	6
12.6	5	5
12.7	3	3
12.8	2	2
13.0	2	2
13.2	1	1
13.4	1	1
13.6	1	1
13.8	1	1
14.0	1	1
14.3	1	1
14.6	1	1
15.0	1	1
15.5	1	1
16.0	0	0
16.5	0	0
17.0	0	0
17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: SECTION 6 HYDROGRAPH

Total watershed area: 0.001 sq mi Rainfall type: III Frequency: 25 years

	Subareas
	SECT 6
Area(sq mi)	0.00
Rainfall(in)	8.0
Curve number	72
Runoff(in)	4.69
Tc (hrs)	0.15
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.10
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) SECT 6
11.0	0	0
11.3	0	0
11.6	0	0
11.9	1	1
12.0	1	1
12.1	2	2
12.2	3	3
12.3	4P	4P
12.4	3	3
12.5	2	2
12.6	2	2
12.7	1	1
12.8	1	1
13.0	1	1
13.2	0	0
13.4	0	0
13.6	0	0
13.8	0	0
14.0	0	0
14.3	0	0
14.6	0	0
15.0	0	0
15.5	0	0
16.0	0	0
16.5	0	0
17.0	0	0
17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: SECTION 7 HYDROGRAPH

Total watershed area: 0.002 sq mi Rainfall type: III Frequency: 25 years

	Subareas
	SECT 7
Area(sq mi)	0.00
Rainfall(in)	8.0
Curve number	72
Runoff(in)	4.69
Tc (hrs)	0.15
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.10
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) SECT 7
11.0	0	0
11.3	0	0
11.6	0	0
11.9	1	1
12.0	1	1
12.1	2	2
12.2	4	4
12.3	5P	5P
12.4	4	4
12.5	3	3
12.6	2	2
12.7	2	2
12.8	1	1
13.0	1	1
13.2	1	1
13.4	1	1
13.6	0	0
13.8	0	0
14.0	0	0
14.3	0	0
14.6	0	0
15.0	0	0
15.5	0	0
16.0	0	0
16.5	0	0
17.0	0	0
17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: SECTION 8 HYDROGRAPH

Total watershed area: 0.011 sq mi Rainfall type: III Frequency: 25 years

---------- Subareas ----------

	SECT 8
Area(sq mi)	0.01
Rainfall(in)	8.0
Curve number	72
Runoff(in)	4.69
Tc (hrs)	0.15
(Used)	0.20
TimeToOutlet	0.00
Ia/P	0.10
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) SECT 8
11.0	1	1
11.3	2	2
11.6	3	3
11.9	6	6
12.0	9	9
12.1	14	14
12.2	24	24
12.3	30P	30P
12.4	26	26
12.5	19	19
12.6	14	14
12.7	10	10
12.8	7	7
13.0	5	5
13.2	4	4
13.4	3	3
13.6	3	3
13.8	3	3
14.0	3	3
14.3	2	2
14.6	2	2
15.0	2	2
15.5	2	2
16.0	1	1
16.5	1	1
17.0	1	1
17.5	1	1
18.0	1	1
19.0	1	1
20.0	1	1
22.0	1	1
26.0	0	0

P - Peak Flow

TABULAR HYDROGRAPH METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 10-28-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: SECTION 9 HYDROGRAPH

Total watershed area: 0.001 sq mi Rainfall type: III Frequency: 25 years

---------- Subareas ----------

	SECT 9
Area(sq mi)	0.00
Rainfall(in)	8.0
Curve number	72
Runoff(in)	4.69
Tc (hrs)	0.10
TimeToOutlet	0.00
Ia/P	0.10
(Used)	0.10

Time (hr)	Total Flow	Subarea Contribution to Total Flow (cfs) SECT 9
11.0	0	0
11.3	0	0
11.6	0	0
11.9	0	0
12.0	1	1
12.1	1	1
12.2	2P	2P
12.3	1	1
12.4	1	1
12.5	1	1
12.6	0	0
12.7	0	0
12.8	0	0
13.0	0	0
13.2	0	0
13.4	0	0
13.6	0	0
13.8	0	0
14.0	0	0
14.3	0	0
14.6	0	0
15.0	0	0
15.5	0	0
16.0	0	0
16.5	0	0
17.0	0	0
17.5	0	0
18.0	0	0
19.0	0	0
20.0	0	0
22.0	0	0
26.0	0	0

P - Peak Flow

WEYERHAEUSER COMPANY
NEW BERN, NORTH CAROLINA
DELTA PROJECT NO. E096-019

OCTOBER 28, 1997

25-YR STORM TABULAR HYDROGRAPH

TIME (hrs)	FLOW (cfs)										
	FACILITY	SECT. 1	SECT. 2	SECT. 3	SECT. 4	SECT. 5	SECT. 6	SECT. 7	SECT. 8	SECT. 9	TOTAL
11	7	4	0	0	1	0	0	0	1	0	13
11.3	9	6	1	0	1	1	0	0	2	0	20
11.6	11	8	1	0	1	1	0	0	3	0	25
11.9	15	20	2	1	2	2	1	1	6	0	50
12	16	29	3	2	3	3	1	1	9	1	68
12.1	18	42	5	2	5	4	2	2	14	1	95
12.2	21	74	8	4	9	8	3	4	24	2	157
12.3	24	93	10	5	11	10	4	5	30	1	193
12.4	31	79	9	5	9	8	3	4	26	1	175
12.5	37	59	6	3	7	6	2	3	19	1	143
12.6	47	44	5	3	5	5	2	2	14	0	127
12.7	59	32	3	2	4	3	1	2	10	0	116
12.8	73	23	2	1	3	2	1	1	7	0	113
13	101	15	2	1	2	2	1	1	5	0	130
13.2	128	12	1	1	1	1	0	1	4	0	149
13.4	146	11	1	1	1	1	0	1	3	0	165
13.6	156	10	1	1	1	1	0	0	3	0	173
13.8	150	9	1	1	1	1	0	0	3	0	166
14	139	9	1	0	1	1	0	0	3	0	154
14.3	115	8	1	0	1	1	0	0	2	0	128
14.6	93	7	1	0	1	1	0	0	2	0	105
15	72	6	1	0	1	1	0	0	2	0	83
15.5	54	5	1	0	1	1	0	0	2	0	64
16	43	5	0	0	1	0	0	0	1	0	50
16.5	35	4	0	0	0	0	0	0	1	0	40
17	29	3	0	0	0	0	0	0	1	0	33
17.5	24	3	0	0	0	0	0	0	1	0	28
18	20	3	0	0	0	0	0	0	1	0	24
19	15	2	0	0	0	0	0	0	1	0	18
20	12	2	0	0	0	0	0	0	1	0	15
22	11	2	0	0	0	0	0	0	1	0	14
26	2	0	0	0	0	0	0	0	0	0	2

MAX FLOW 193 CFS

TR-55 MODELING RESULTS

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : Weyerhaeuser - New Bern User: Dawn Date: 10-02-97
County : Craven State: NC Checked: ____ Date: _____
Subtitle: Facility Runoff Calculation for Leachate Canal

Data: Drainage Area : 125.1 * Acres
Runoff Curve Number : 74 *
Time of Concentration: 2.79 * Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8.0
Ia/P Ratio	0.09
Used	0.10
Runoff (in)	4.93
Unit Peak Discharge (cfs/acre/in)	0.252
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	156

* - Value(s) provided from TR-55 system routines

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 08-04-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: NEW BERN LANDFILL - EASTERN PORTION - SECTION 1

Data: Drainage Area : 22.4 Acres
Runoff Curve Number : 72
Time of Concentration: 0.14 Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8
Ia/P Ratio	0.10
Used	0.10
Runoff (in)	4.69
Unit Peak Discharge (cfs/acre/in)	0.959
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	101

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 08-04-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: NEW BERN LANDFILL - EASTERN PORTION - SECTION 2

Data: Drainage Area : 2.4 Acres
Runoff Curve Number : 72
Time of Concentration: 0.22 Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8
Ia/P Ratio	0.10
Used	0.10
Runoff (in)	4.69
Unit Peak Discharge (cfs/acre/in)	0.857
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	10

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 08-04-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: NEW BERN LANDFILL - EASTERN PORTION - SECTION 3

Data: Drainage Area : 1.3 Acres
Runoff Curve Number : 72
Time of Concentration: 0.13 Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8
Ia/P Ratio	0.10
Used	0.10
Runoff (in)	4.69
Unit Peak Discharge (cfs/acre/in)	0.989
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	6

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 08-04-97
County : CRAVEN State: NC Checked: _____ Date: _____
Subtitle: NEW BERN LANDFILL - EASTERN PORTION - SECTION 4

Data: Drainage Area : 2.6 Acres
Runoff Curve Number : 72
Time of Concentration: 0.22 Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8
Ia/P Ratio	0.10
Used	0.10
Runoff (in)	4.69
Unit Peak Discharge (cfs/acre/in)	0.857
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	10

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 08-04-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: NEW BERN LANDFILL - WESTERN PORTION - SECTION 5

Data: Drainage Area : 2.3 Acres
Runoff Curve Number : 72
Time of Concentration: 0.13 Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8
Ia/P Ratio	0.10
Used	0.10
Runoff (in)	4.69
Unit Peak Discharge (cfs/acre/in)	0.978
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	11

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 08-04-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: NEW BERN LANDFILL - WESTERN PORTION - SECTION 6

Data: Drainage Area : .9 Acres
Runoff Curve Number : 72
Time of Concentration: 0.15 Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8
Ia/P Ratio	0.10
Used	0.10
Runoff (in)	4.69
Unit Peak Discharge (cfs/acre/in)	0.954
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	4

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 08-04-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: NEW BERN LANDFILL - WESTERN PORTION - SECTION 7

Data: Drainage Area : 1.1 Acres
Runoff Curve Number : 72
Time of Concentration: 0.15 Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8
Ia/P Ratio	0.10
Used	0.10
Runoff (in)	4.69
Unit Peak Discharge (cfs/acre/in)	0.948
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	5

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 08-04-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: NEW BERN LANDFILL - WESTERN PORTION - SECTION 8

Data: Drainage Area : 7.3 Acres
Runoff Curve Number : 72
Time of Concentration: 0.15 Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8
Ia/P Ratio	0.10
Used	0.10
Runoff (in)	4.69
Unit Peak Discharge (cfs/acre/in)	0.957
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	33

GRAPHICAL PEAK DISCHARGE METHOD Version 2.00

Project : WEYERHAEUSER COMPANY User: DAWN Date: 08-04-97
County : CRAVEN State: NC Checked: ____ Date: _____
Subtitle: NEW BERN LANDFILL - WESTERN PORTION - SECTION 9

Data: Drainage Area : .3 Acres
Runoff Curve Number : 72
Time of Concentration: 0.10 Hours
Rainfall Type : III
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	8
Ia/P Ratio	0.10
Used	0.10
Runoff (in)	4.69
Unit Peak Discharge (cfs/acre/in)	1.034
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	1

Delta
Environmental Consultants, Inc.
6701 Carmel Road, Suite 200
Charlotte, NC 28226-3901
704/541-9890

PROJECT NO. E096-019 SHEET 1 OF 2
PROJECT NAME NEW BERN - LANDFILL
BY DAWN REEVES DATE 12/17/97
SUBJECT DRAINAGE CHANNEL DESIGN
CHECKED BY _____ DATE _____

DRAINAGE CHANNEL SELECTION:

CENTER DITCH:

CONTRIBUTORS - SECTIONS 2 & 3

SECTION 2 = 10 cfs
SECTION 3 = 6 cfs
16 cfs total flow

CHANNEL IS ~450' LONG

ASSUME VELOCITY < 1 ft/sec

& MANNINGS n = 0.03

TRAPEZOIDAL DITCH (D3-C)

RESULTS: SIDE SLOPES : 3 to 1
BASE : 3'
DEPTH : 1.5'
TOP WIDTH : 12'

SOUTHERN DITCH:

CONTRIBUTORS - SECTIONS 5, 6, 7 & 8

SECTION 5 = 11 cfs
SECTION 6 = 4 cfs
SECTION 7 = 5 cfs
SECTION 8 = 33 cfs
* 53 cfs

* USE TOTAL FLOW INSTEAD OF PEAK DUE TO UNCERTAINTIES IN FLOW FROM PLANT & LANDFILL DISCHARGE AREAS

Delta
Environmental Consultants, Inc.
6701 Carmel Road, Suite 200
Charlotte, NC 28226-3901
704/541-9890

PROJECT NO. E096-019 SHEET 2 OF 2
PROJECT NAME NEW BERN - LANDFILL
BY DAWN REEVES DATE 12/17/97
SUBJECT DRAINAGE CHANNEL DESIGN
CHECKED BY _____ DATE _____

ASSUME VELOCITY < 3 ft/SEC

TRAPEZOIDAL DITCH (D4-C)

RESULTS: SIDE SLOPES : 3:1
BASE : 3'
DEPTH : 2'
TOP WIDTH : 15'

LEACHATE CANAL:

CONTRIBUTORS - SECTIONS 4, 9, 1 +
FLOW FROM SOUTHERN DITCH +
FLOW FROM CENTER DITCH +
FLOW FROM PLANT

SEE HYDROGRAPH FOR CALCULATION OF PEAK FLOW

PEAK FLOW = 193 cfs

(VELOCITIES FROM THE DITCH CALCULATIONS WERE USED TO DETERMINE THE APPROPRIATE TIME OF CONCENTRATIONS)

ASSUME VELOCITY < 6.5 ft/SEC

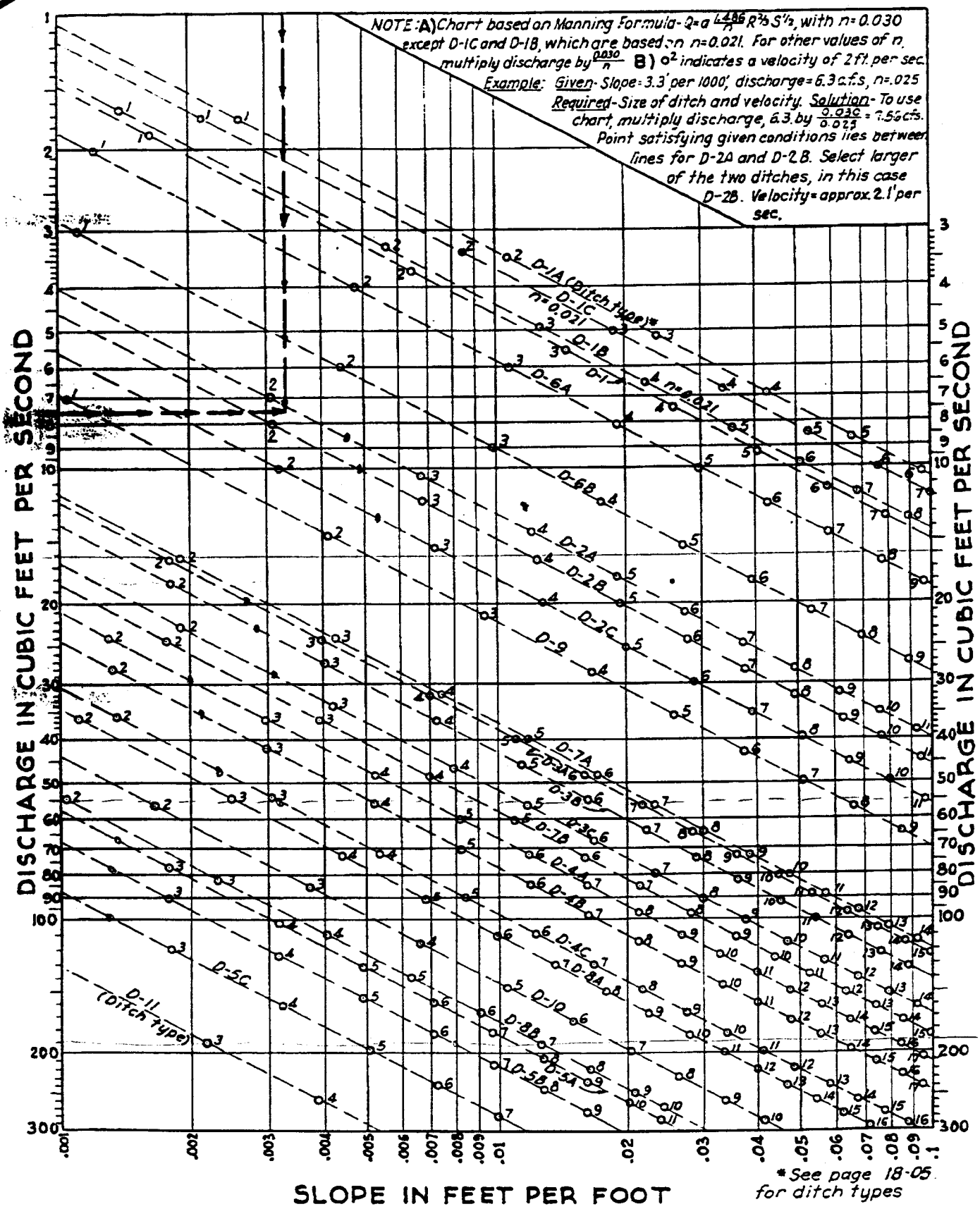
TRAPEZOIDAL DITCH (D5-B)

RESULTS: SIDE SLOPES : 2:1
BASE : 4'
DEPTH : 3'
TOP WIDTH : 16'

THESE DESIGN PARAMETERS WILL FUNCTION AS THE BARE MINIMUM — WIDER CANALS WITH YIELD A SHALLOWER DEPTH AND DECREASED VELOCITY MAY BE MORE SUITABLE FOR THE FINAL PLAN.

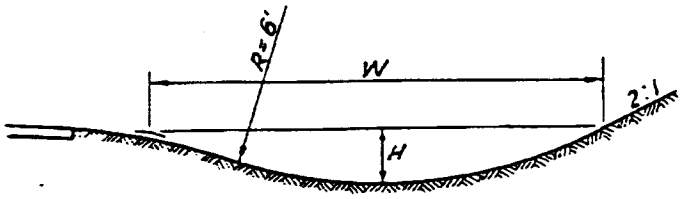
18-06

DRAINAGE-DITCHES-COMMON SECTIONS-2

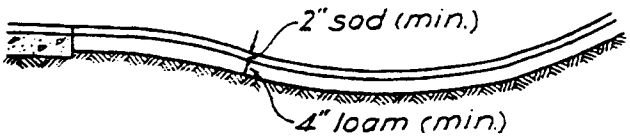


* See page 18-05 for ditch types

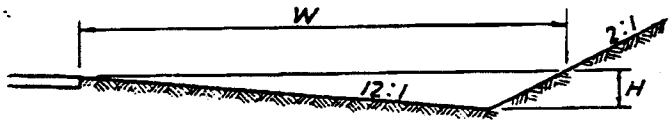
DRAINAGE-DITCHES-COMMON SECTIONS



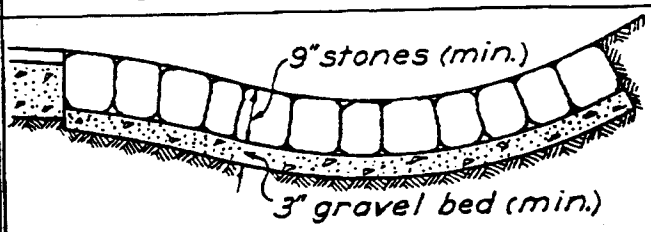
D-1 SEGMENTAL



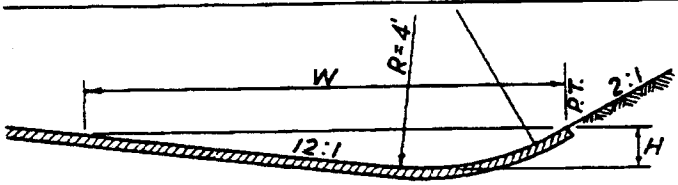
SODDED GUTTER



D-1A TRIANGULAR
Unequal side slopes



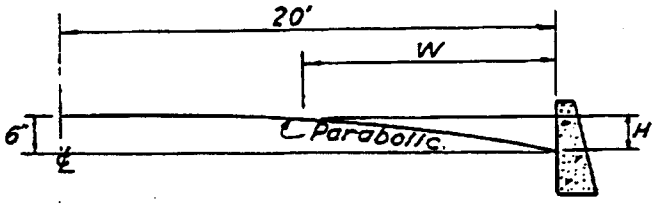
COBBLED GUTTER



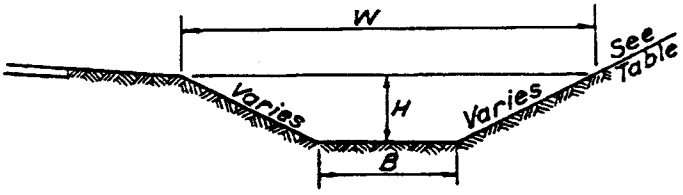
D-1B BITUMINOUS GUTTER

Base required same as for concrete pavement.

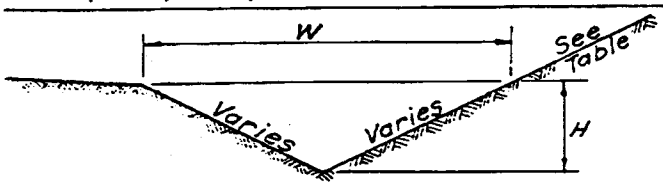
CONCRETE GUTTER



D-1C CURBED CROWNED STREET



D-2, D-3, D-4, D-5 TRAPEZOIDAL



D-6, D-7, D-8, D-9, D-10, D-11
ISOSCELES TRIANGULAR
D-9, D-10 and D-11-Airport ditches

TABLE A- PROPERTIES OF DITCHES

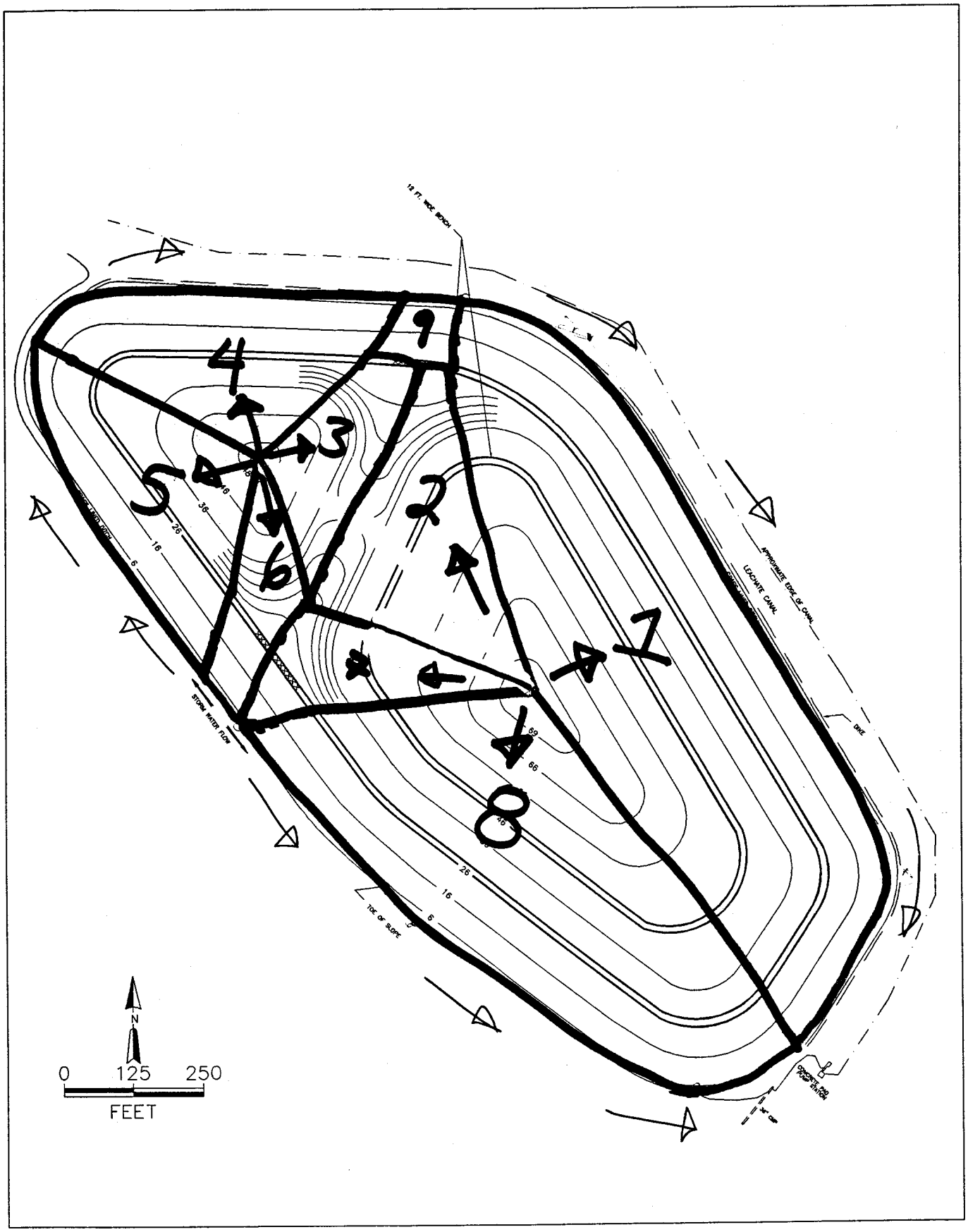
NO.	DIMENSIONS				HYDRAULICS			
	SIDE SLOPES	B	H	W	a	p	R	$R^{2/3}$
D-1	—	—	6½"	5'-0"	1.84	5.16	0.356	0.502
D-1A	12:1 & 2:1	—	6"	7'-0"	1.75	7.14	0.245	0.392
D-1B	12:1 & 2:1	—	5"±	7'-0"	1.64	7.08	0.232	[illegible]
D-1C	½" to 1'-0"	—	4.5"	10'-0"	1.68	10.38	[illegible]	[illegible]
D-2A	1½:1	2'-0"	1'-0"	5'-0"	3.50	5.61	[illegible]	[illegible]
B	2:1	2'-0"	1'-0"	6'-0"	4.00	6.47	0.618	0.726
C	3:1	2'-0"	1'-0"	8'-0"	5.00	8.32	0.601	0.712
D-3A	1½:1	3'-0"	1'-6"	7'-6"	7.88	8.41	0.937	0.958
B	2:1	3'-0"	1'-6"	9'-0"	9.00	9.71	0.927	0.951
C	3:1	3'-0"	1'-6"	12'-0"	11.25	12.49	0.901	0.933
D-4A	1½:1	3'-0"	2'-0"	9'-0"	12.00	10.21	1.175	1.114
B	2:1	3'-0"	2'-0"	11'-0"	14.00	11.94	1.173	1.112
C	3:1	3'-0"	2'-0"	15'-0"	18.00	15.65	1.150	1.097
D-5A	1½:1	4'-0"	3'-0"	13'-0"	25.50	14.82	1.721	1.436
B	2:1	4'-0"	3'-0"	16'-0"	30.00	17.42	1.722	1.437
C	3:1	4'-0"	3'-0"	22'-0"	39.00	22.97	1.698	1.423
D-6A	2:1	—	1'-0"	4'-0"	2.00	4.47	0.447	0.584
B	3:1	—	1'-0"	6'-0"	3.00	6.32	0.475	0.609
D-7A	2:1	—	2'-0"	8'-0"	8.00	8.94	0.895	0.929
B	3:1	—	2'-0"	12'-0"	12.00	12.65	0.949	0.965
D-8A	2:1	—	3'-0"	12'-0"	18.00	13.42	1.341	1.216
B	3:1	—	3'-0"	18'-0"	27.00	18.97	1.423	1.265
D-9	7:1	—	1'-0"	14'-0"	7.00	14.14	0.495	0.626
D-10	7:1	—	2'-0"	28'-0"	28.00	28.28	0.990	0.993
D-11	7:1	—	3'-0"	42'-0"	63.00	42.43	1.485	1.302

THIS SHEET WILL CALCULATE SURFACE AREA OF THE FINAL GRADE												
FOR THE NEW BERN LANDFILL												
									x-product			
ID		x	y	z	vector id	i	j	k	i	j	k	area
1a	P1	672.2	1207.1	6	P3.P1	-182.4	714.6	-66	6886.8	-4902	34042.68	17538.26
	P2	653.2	1094.9	26	P3.P2	-201.4	602.4	-46				
	P3	**854.6**	**492.5**	**72**								
1b	P1	843.1	1160.7	6	P3.P1	-11.5	668.2	-66	3062.4	-11279.4	113661.8	57130.56
	P2	672.2	1207.1	6	P3.P2	-182.4	714.6	-66				
	P3	**854.6**	**492.5**	**72**								
1c	P1	843.1	1160.7	6	P3.P1	-11.5	668.2	-66	-7101.6	9550.2	-95451.1	48095.11
	P2	987.8	1053.1	6	P3.P2	133.2	560.6	-66				
	P3	**854.6**	**492.5**	**72**								
1d	P1	987.8	1053.1	6	P3.P1	133.2	560.6	-66	-54938.4	32722.8	-388821	197022.1
	P2	1483.6	220.7	6	P3.P2	629	-271.8	-66				
	P3	**854.6**	**492.5**	**72**								
1e	P1	1492.1	1154.9	6	P3.P1	637.5	662.4	-66	-61657.2	-561	-589922	296567.9
	P2	1483.6	220.7	6	P3.P2	629	-271.8	-66				
	P3	**854.6**	**492.5**	**72**								
1f	P1	1492.1	1154.9	6	P3.P1	637.5	662.4	-66	-85575.6	-11220	-713975	359586.1
	P2	1322.1	-141.7	6	P3.P2	467.5	-634.2	-66				
	P3	**854.6**	**492.5**	**72**								
										TOTAL AREA		**975940**
2	P1	854.6	492.5	72	P3.P1	405.7	-160.8	42	-17904	-10203.4	212008.6	106503.9
	P2	653.2	1094.9	26	P3.P2	204.3	441.6	-4				
	P3	448.9	653.3	30								
										TOTAL AREA		**106503.9**
3	P1	653.2	1094.9	26	P3.P1	204.3	441.6	-8	73.6	-836	48026.76	24017.05
	P2	548.7	1104.1	26	P3.P2	99.8	450.8	-8				
	P3	448.9	653.3	34								
	P1	361.7	914.4	49	P3.P1	-87.2	261.1	15	-8850.8	-799.4	-65367.5	32984.43
	P2	548.7	1104.1	26	P3.P2	99.8	450.8	-8				
	P3	448.9	653.3	34								
										TOTAL AREA		**57001.48**
4	P1	548.7	1104.1	26	P3.P1	187	189.7	-23	-1231.8	-2978.7	14552.73	7452.717
	P2	581.8	1215.5	6	P3.P2	220.1	301.1	-43				
	P3	361.7	914.4	49								
	P1	581.8	1215.5	6	P3.P1	220.1	301.1	-43	322.5	-23232.9	164335.1	82984.77
	P2	41.5	1223	6	P3.P2	-320.2	308.6	-43				
	P3	361.7	914.4	49								
	P1	41.5	1223	6	P3.P1	-320.2	308.6	-43	-3371.2	-3418.5	49637.38	24934.52
	P2	-38	1144.6	6	P3.P2	-399.7	230.2	-43				
	P3	361.7	914.4	49								
										TOTAL AREA		**115372**
5	P1	-38	1144.6	6	P3.P1	-399.7	230.2	-43	-3956	-1148.1	42918.74	21557.98
	P2	-64.7	1052.6	6	P3.P2	-426.4	138.2	-43				
	P3	361.7	914.4	49								
	P1	-64.7	1052.6	6	P3.P1	-426.4	138.2	-43	-3723.37	4459.1	22590.64	11662.8
	P2	39	966.01	6	P3.P2	-322.7	51.61	-43				
	P3	361.7	914.4	49								
	P1	39	966.01	6	P3.P1	-322.7	51.61	-43	-19139.7	10341.5	131224.8	66507.94
	P2	279.5	520.9	6	P3.P2	-82.2	-393.5	-43				
	P3	361.7	914.4	49								
										TOTAL AREA		**99728.72**
6	P1	279.5	520.9	6	P3.P1	-82.2	-393.5	-43	-2984.2	3104.6	34115.38	17193.04
	P2	351.7	451.5	6	P3.P2	-10	-462.9	-43				
	P3	361.7	914.4	49								
	P1	351.7	451.5	6	P3.P1	-10	-462.9	-43	-4283.8	3899.6	42975.88	21682.27
	P2	448.9	653.3	34	P3.P2	87.2	-261.1	-15				

56 ft

Data\run_off.xls

	P3	361.7	914.4	49								
										TOTAL AREA		38875.32
7	P1	351.7	451.5	6	P3.P1	-502.9	-41	-66	12170.8	-7666	-97500	49277.66
	P2	448.9	653.3	34	P3.P2	-405.7	160.8	-38				
	P3	854.6	492.5	72								
										TOTAL AREA		49277.66
8	P1	351.7	451.5	6	P3.P1	-502.9	-41	-66	-13734.6	8514	109942.5	55561.85
	P2	480.7	243.4	6	P3.P2	-373.9	-249.1	-66				
	P3	854.6	492.5	72								
	P1	480.7	243.4	6	P3.P1	-373.9	-249.1	-66	-30320.4	39223.8	319809.8	161814.8
	P2	1075	-216	6	P3.P2	220.4	-708.5	-66				
	P3	854.6	492.5	72								
	P1	1075	-216	6	P3.P1	220.4	-708.5	-66	-145.2	7893.6	84251.72	42310.41
	P2	1194.6	-218.2	6	P3.P2	340	-710.7	-66				
	P3	854.6	492.5	72								
	P1	1194.6	-218.2	6	P3.P1	340	-710.7	-66	5049	8415	116624.3	58518.2
	P2	1322.1	-141.7	6	P3.P2	467.5	-634.2	-66				
	P3	854.6	492.5	72								
										TOTAL AREA		318205.3
9	P1	653.2	1094.9	26	P3.P1	-24	-112.2	20	-168	1908	-10905.5	5536.203
	P2	581.8	1215.5	6	P3.P2	-95.4	8.4	0				
	P3	677.2	1207.1	6								
	P1	653.2	1094.9	26	P3.P1	104.5	-9.2	0	184	-2090	11945.82	6064.334
	P2	581.8	1215.5	6	P3.P2	33.1	111.4	-20				
	P3	548.7	1104.1	26								
										TOTAL AREA		11600.54



Delta Environmental Consultants, Inc.	TITLE: FINAL GRADING PLAN WEYCO NEW BERN LANDFILL	DWN: DEK	DES.:	PROJECT NO.: E096-019
		CHKD:	APPD:	FIGURE NO.:
		DATE: 09/18/97	REV.:	

LABORATORY TESTING SUMMARY

IV. TEST REPORTS

c. BORROW MATERIAL

E096-019-2.0002

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
SOILS LABORATORY ASSIGNMENTS

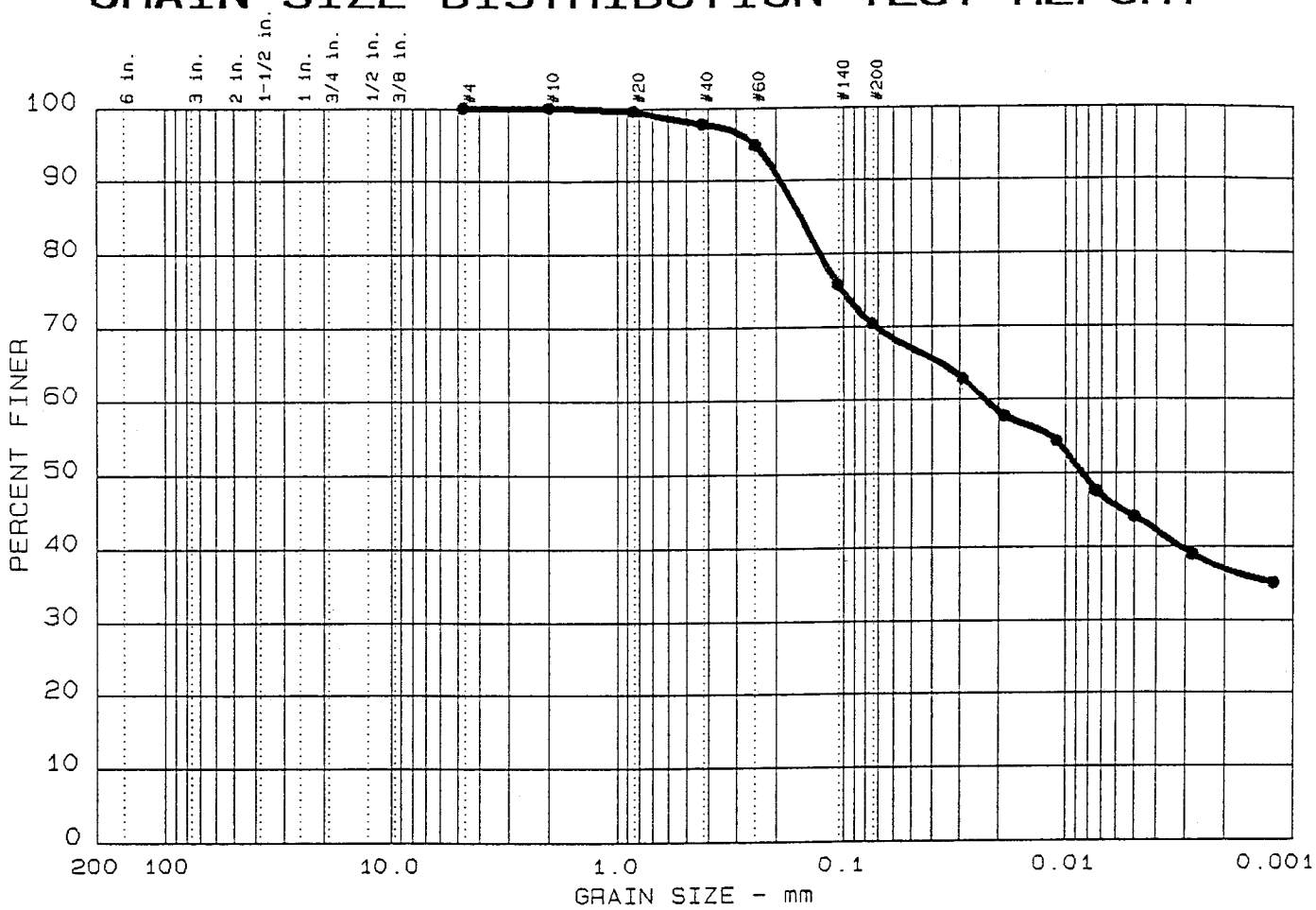
No. _____ PRIORITY _____ DEPT. # _____

DATE _____ JOB NAME WEYERHAEUSER LANDFILL COVER JOB NO. 30710-7-2241 IN CHARGE _____ REQUESTED COMPLETION DATE _____

SAMPLE LOCATION			PHYSICAL PROPERTIES										STRENGTH TESTS								COMPACTION			CONSOLIDATION	SPECIAL TEST	
BORING NO.	SAMPLE TYPE	SAMPLE DEPTH	COMBINED ANALYSIS (LI)	MOISTURE CONTENT	UNIT WEIGHT NAT. DEN. & MOIST. CONT.	SPECIFIC GRAVITY	ATTERBERG LIMITS	SHRINKAGE LIMITS	DRY	GRAIN SIZE ANALYSIS: WASH 200 W/SIEVE	GRAIN SIZE ANALYSIS: % FINER NO. 200	HYDROMETER	MAX. & MIN. DENSITY	SWELL TEST	DIRECT SHEAR	UNCONFINED COMP. WITH STRESS-STRAIN CURVE	UNCONFINED COMP. WITHOUT S-S CURVE	TRIAXIAL UU	TRIAXIAL CU	TRIAXIAL CU W/PP	CONFINING PRESSURES, KSF	STANDARD (A, B, C, D)	MODIFIED (A, B, C, D)	CBR	INDICATE LOADS IN KSF AND RELOAD CYCLE IF ANY	PERMEABILITY	BENTONITE BLENDING
BORROW																					A			#1		

REMARKS Transmit Compaction Results to Rick Powell @ DELTA
Reduce Setting Up Triaxial and Perm Tests.
FALLING HEAD PERMS OK

GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	29.6	26.4	44.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	48	27	0.16	0.02	0.01					

MATERIAL DESCRIPTION	USCS	AASHTO
● (VISUAL) OLIVE FINE SANDY CLAY	CL	ND

Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / COVER
● Location: BORROW MATERIAL (PROCTOR #1)

Date: 06-25-97

Remarks:
ND=NOT DETERMINED.
DELTA ENV. CONSULTANTS
PROJECT #E096-019-2.0002

GRAIN SIZE DISTRIBUTION TEST REPORT
LAW ENGINEERING, INC.

Figure No. 01

REVIEWED BY: John Dailey

GRAIN SIZE DISTRIBUTION TEST DATA Test No.: 1

Date: 06-25-97
Project No.: 30710-7-2241
Project: WEYERHAEUSER LANDFILL / COVER

Sample Data

Location of Sample: BORROW MATERIAL (PROCTOR #1)
Sample Description: (VISUAL) OLIVE FINE SANDY CLAY
USCS Class: CL Liquid limit: 48
AASHTO Class: ND Plasticity index: 27

Notes

Remarks: ND=NOT DETERMINED. DELTA ENV. CONSULTANTS
PROJECT #E096-019-2.0002
Fig. No.: 01

Mechanical Analysis Data

	Initial
Dry sample and tare=	420.95
Tare =	0.00
Dry sample weight =	420.95

Sample split on number 10 sieve
Split sample data:
Sample and tare = 58.48 Tare = 0 Sample weight = 58.48
Cumulative weight retained tare= 0
Tare for cumulative weight retained= 0

Sieve	Cumul. Wt. retained	Percent finer
# 4	0.00	100.0
# 10	0.11	100.0
# 20	0.24	99.6
# 40	1.30	97.8
# 60	3.01	94.8
# 140	14.16	75.8
# 200	17.30	70.4

Hydrometer Analysis Data

Separation sieve is number 10
Percent -# 10 based on complete sample= 100.0
Weight of hydrometer sample: 58.48
Calculated biased weight= 58.50
Automatic temperature correction
Composite correction at 20 deg C =-4

Meniscus correction only=-1
Specific gravity of solids= 2.66

Specific gravity correction factor= 0.998
Hydrometer type: 152H Effective depth L= 16.294964 - 0.164 x Rm

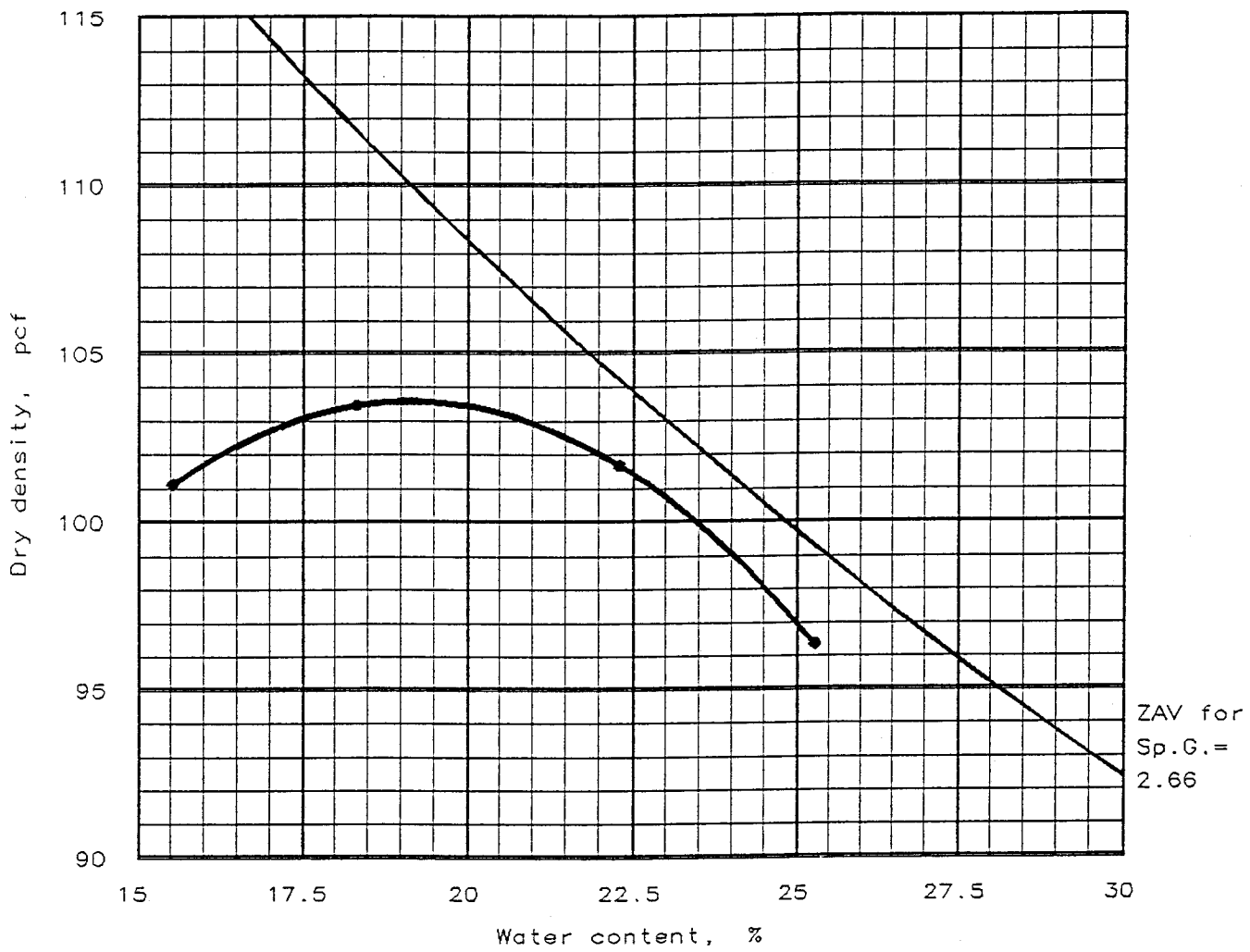
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.0	23.5	40.0	36.8	0.0130	39.0	9.9	0.0290	62.8
5.0	23.5	37.0	33.8	0.0130	36.0	10.4	0.0188	57.7
15.0	23.5	35.0	31.8	0.0130	34.0	10.7	0.0110	54.2
36.0	23.5	31.0	27.8	0.0130	30.0	11.4	0.0073	47.4
79.0	23.5	29.0	25.8	0.0130	28.0	11.7	0.0050	44.0
266.0	23.5	26.0	22.8	0.0130	25.0	12.2	0.0028	38.9
1469.0	22.5	24.0	20.5	0.0132	23.0	12.5	0.0012	35.0

Fractional Components

Gravel/Sand based on #4 sieve
Sand/Fines based on #200 sieve
% + 75mm. = 0.0 % GRAVEL = 0.0 % SAND = 29.6
% SILT = 26.4 % CLAY = 44.0

D85= 0.16 D60= 0.023 D50= 0.008

PROCTOR REPORT



Test specification: ASTM D 698-91 Method A, Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	ND	ND %	2.66	48	27	0 %	70.4 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 103.6 pcf Optimum moisture = 19.1 %	(VISUAL) OLIVE FINE SANDY CLAY
Project No.: 30710-7-2241 Project: WEYERHAEUSER LANDFILL / COVER Location: #1 BORROW MATERIAL Date: 06-25-97	Remarks: ND=NOT DETERMINED. DELTA ENV. CONSULTANTS PROJECT #E096-019-2.0002
PROCTOR REPORT LAW ENGINEERING	Fig. No. 620

REVIEWED BY: John Dailly

MOISTURE-DENSITY TEST DATA

DATA FILE: 620

PROJECT DATA

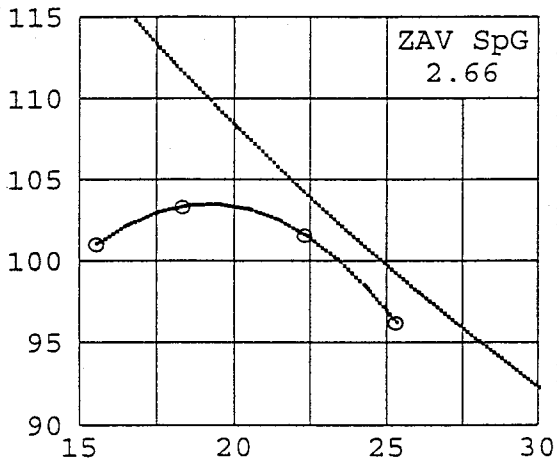
Date:	06-25-97
Project No.:	30710-7-2241
Project:	WEYERHAEUSER LANDFILL / COVER
Location 1:	#1
2:	BORROW MATERIAL
Remarks 1:	ND=NOT DETERMINED.
2:	DELTA ENV. CONSULTANTS
3:	PROJECT #E096-019-2.0002
Material 1:	(VISUAL) OLIVE FINE
description 2:	SANDY CLAY
Elevation or depth:	
Figure No.:	620

SPECIMEN DATA

USCS classification: CL AASHTO classification: ND
Natural moisture: ND Specific gravity: 2.66
Percent retained on No.4 sieve: 0
Percent passing No. 200 sieve: 70.4
Liquid limit: 48 Plastic limit: 21 Plasticity index: 27

TEST DATA AND RESULTS FOR CURVE 1

Type of test: Standard, ASTM D 698-91 Method A



POINT NO.	1	2	3	4
WM + WS	3746	3830	3860	3805
WM	1981	1981	1981	1981
WW+T #1	328.90	418.90	450.40	615.80
WD+T #1	285.80	355.30	369.80	493.30
TARE #1	8.40	8.30	8.40	8.80
MOIST #1	15.5	18.3	22.3	25.3
MOISTURE	15.5	18.3	22.3	25.3
DRY DEN	101.1	103.5	101.7	96.4

Max dry den= 103.6 pcf, Opt moisture= 19.1 %

Oversize Correction Not Applied

LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.
RALEIGH, NORTH CAROLINA
REPORT OF HYDRAULIC CONDUCTIVITY TESTING (FALLING HEAD-RISING TAILWATER) ASTM D5084 METHOD C

PROJECT NAME: WEYERHAEUSER LANDFILL / COVER
LAW ENGINEERING & ENVIRONMENTAL SERVICES PROJECT NUMBER: 30710-7-2241
DATE: JUNE 26, 1997

SAMPLE IDENTIFICATION: BORROW MATERIAL (PROCTOR #1)
LABORATORY ID: BORROW MATERIAL (PROCTOR #1)

REMARKS: b value = 0.98		
DELTA ENVIRONMENTAL CONSULTANTS PROJECT #E096-019-2.0002	STATION # :	1, 2
	(a) AREA OF BURETTE, cm²:	1.26
	LENGTH OF SAMPLE, cm :	5.895
	DIAMETER OF SAMPLE, cm :	7.234
	(A) AREA OF SAMPLE, cm²:	41.100
	CELL PRESSURE, psi :	35.0
	INFLUENT GAUGE PRESSURE, psi :	31.0
	INFLUENT STATION CORRECTION, cm :	23.8
	INITIAL INFLUENT BURETTE READING, cm :	51.20
	INITIAL INFLUENT BURETTE READING + CORRECTION, cm :	75.00
	EFFLUENT GAUGE PRESSURE, psi :	30.0
	EFFLUENT STATION CORRECTION, cm :	23.2
	INITIAL EFFLUENT BURETTE READING, cm :	5.80
	INITIAL EFFLUENT BURETTE READING + CORRECTION, cm :	29.00
	PRESSURE HEAD ON SAMPLE, cm :	70.3

START OF TEST			
06/24/97	10:15:00 AM	INITIAL HEAD ACROSS SAMPLE (H1), cm :	116.32
		INITIAL HYDRAULIC GRADIENT (H1/L) :	19.7

UNIT WEIGHT DATA:

LENGTH OF SAMPLE, in:	2.321
DIAMETER OF SAMPLE, in:	2.848
WET WEIGHT OF SOIL, g:	478.1
CALCULATED DRY WEIGHT OF SOIL, g:	391.1

MOISTURE DETERMINATION:

WET SOIL & TARE, g:	350.40
DRY SOIL & TARE, g:	288.10
TARE WEIGHT, g:	8.20

WET UNIT WEIGHT (pcf):	123.2
DRY UNIT WEIGHT (pcf):	100.8
MOISTURE CONTENT (%):	22.3

INFORMATION FROM STANDARD PROCTOR TEST:

Maximum Dry Density (pcf):	103.6
Optimum Moisture Content (%):	19.1

TEST SPECIMEN COMPACTION RESULTS

% Compaction of MDD:	97.3
% Wet of Optimum Moisture:	3.2

DATE OF READING	TIME OF READING	INCREMENTAL TIME (sec)	TOTAL TIME (sec)	BURETTE READING (cm) L1	BURETTE READING (cm) L2	CORRECTED READING (cm) L1	CORRECTED READING (cm) L2	HEAD ACROSS SAMPLE (cm)	INCREMENTAL PERMEABILITY (K) (cm/s)	TOTAL PERMEABILITY (K) (cm/s)
06/24/97	08:32:00 PM	37020	37020	50.50	6.50	74.30	29.70	114.92	3.0E-08	3.0E-08
06/25/97	06:29:00 AM	35820	72840	49.90	6.95	73.70	30.15	113.87	2.3E-08	2.6E-08
06/25/97	04:22:00 PM	35580	108420	49.40	7.45	73.20	30.65	112.87	2.2E-08	2.5E-08
06/26/97	09:00:00 AM	59880	168300	48.65	8.15	72.45	31.35	111.42	2.0E-08	2.3E-08
									K AVG = 2.4E-08	

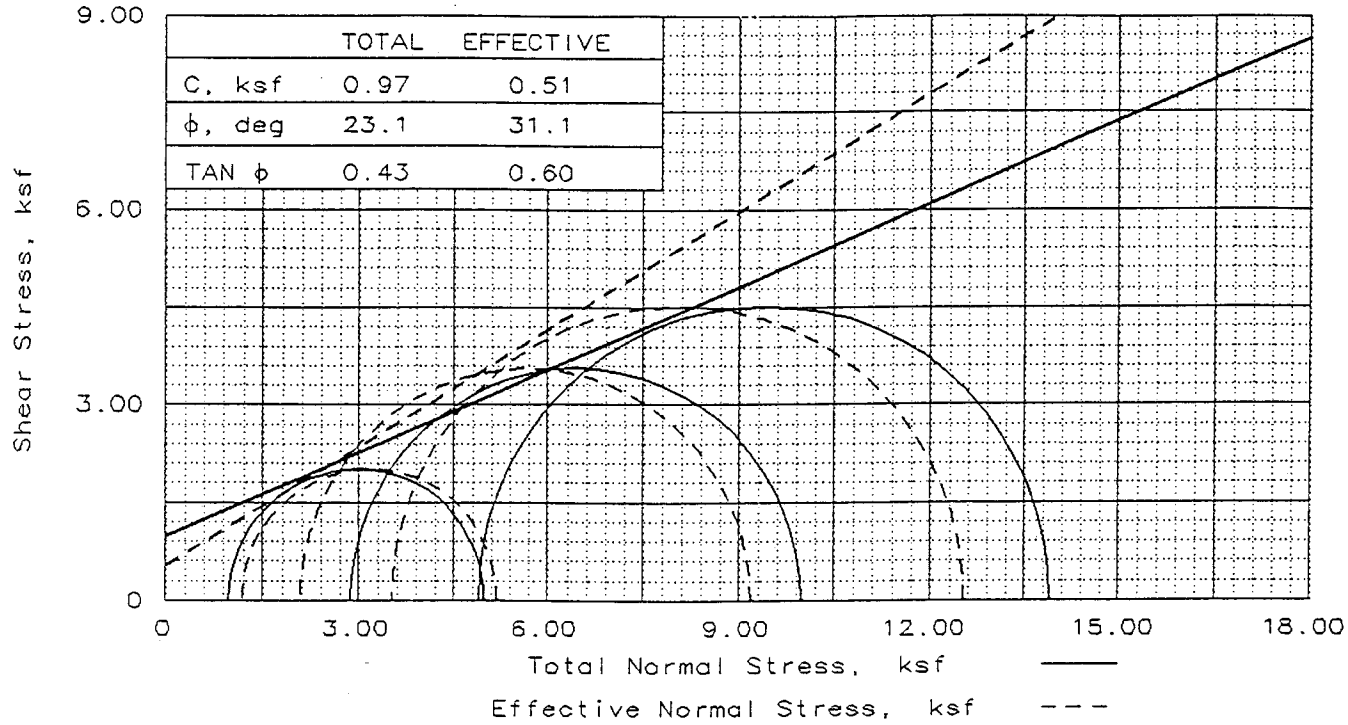
DATE & TIME PRINTED: 06/26/97 09:12 AM

L1 = INFLUENT H20 HEAD, L2 = EFFLUENT H20 HEAD

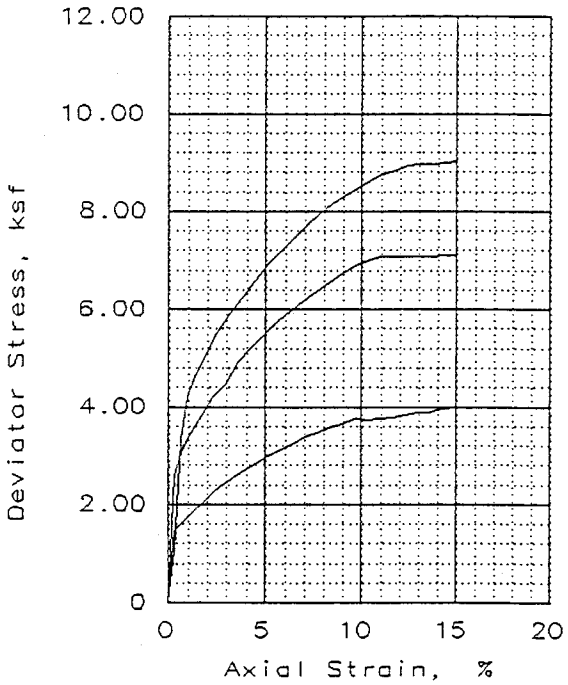
K = (aL)/(2At) x ln(H1/H2)

\72241d01.xls

REVIEWED BY: John Dailey



	TOTAL	EFFECTIVE
C, ksf	0.97	0.51
ϕ, deg	23.1	31.1
TAN ϕ	0.43	0.60



	SAMPLE NO.	1	2	3
INITIAL	WATER CONTENT, %	21.0	21.0	21.0
	DRY DENSITY, pcf	103.3	103.9	104.2
	SATURATION, %	92.1	93.5	94.4
	VOID RATIO	0.608	0.599	0.593
	DIAMETER, in	1.49	1.50	1.50
	HEIGHT, in	3.07	3.00	3.05
AT TEST	WATER CONTENT, %	25.2	20.6	19.2
	DRY DENSITY, pcf	99.5	107.3	109.9
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.669	0.548	0.511
	DIAMETER, in	1.53	1.48	1.46
	HEIGHT, in	3.05	2.98	3.02
BACK PRESSURE, ksf		5.76	5.85	5.73
CELL PRESSURE, ksf		6.75	8.74	10.64
FAILURE STRESS, ksf		4.00	7.10	9.01
PORE PRESSURE, ksf		5.56	6.64	7.10
STRAIN RATE, %/min.		0.656	0.671	0.663
ULTIMATE STRESS, ksf				
PORE PRESSURE, ksf				
$\bar{\sigma}_1$ FAILURE, ksf		5.20	9.20	12.56
$\bar{\sigma}_3$ FAILURE, ksf		1.2	2.1	3.54

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: LAB-COMPACTED
DESCRIPTION: (VISUAL) OLIVE FINE SANDY CLAY
LL= 48 PL= 21 PI= 27.0
SPECIFIC GRAVITY= 2.66
REMARKS:

CLIENT: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
PROJECT: WEYERHAEUSER LANDFILL / COVER

SAMPLE LOCATION: BORROW MATERIAL
PROCTOR #1

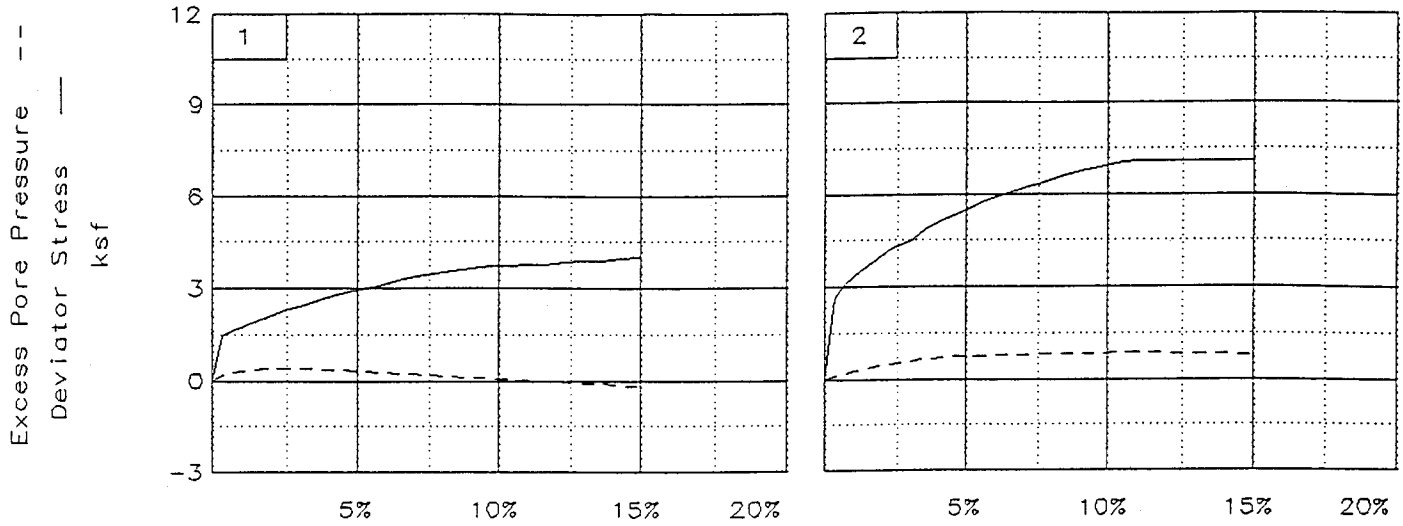
PROJ. NO.: 3071072241 DATE: JUNE 25, 1997

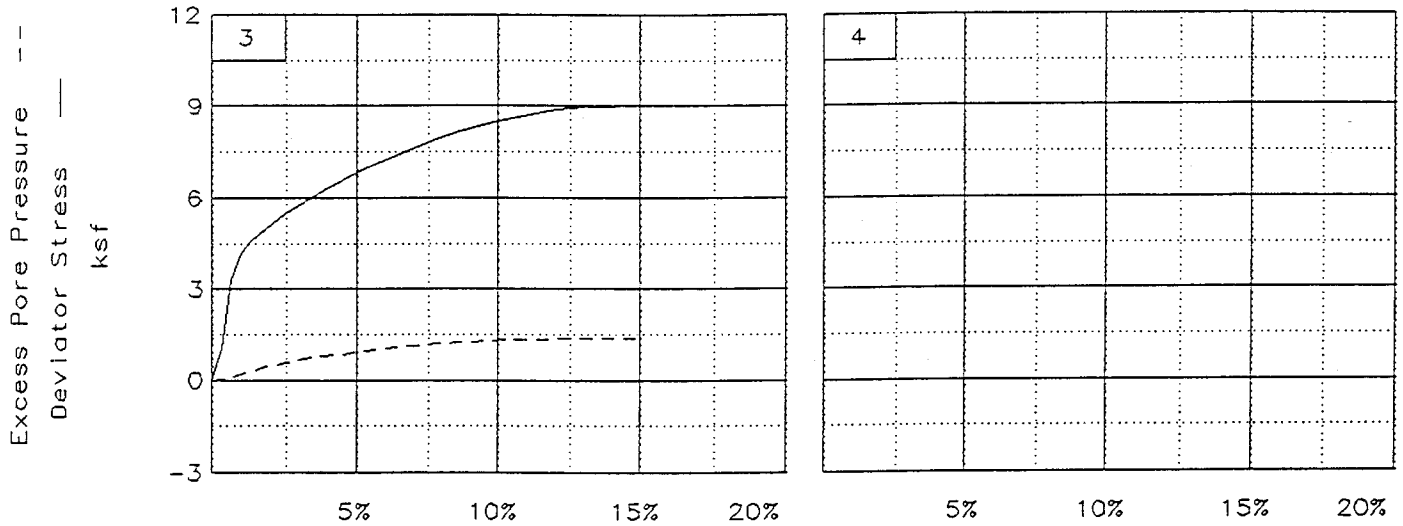
TRIAXIAL COMPRESSION TEST

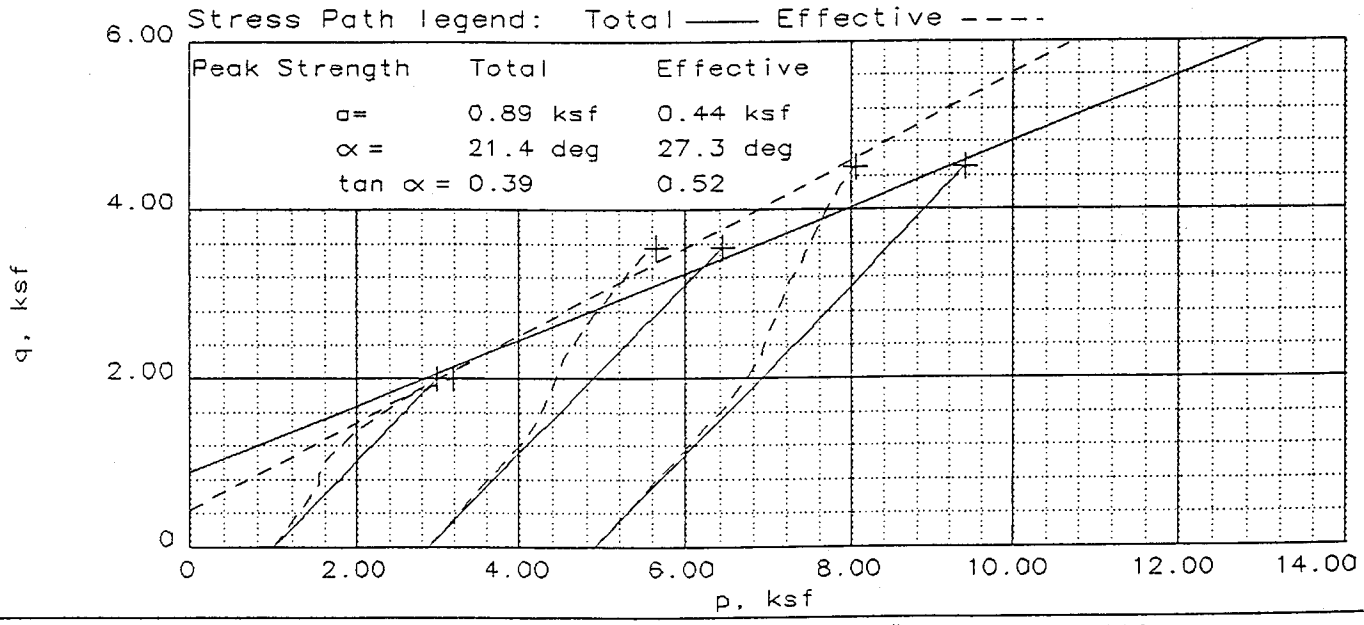
LAW ENGINEERING

FIG. NO. COVER

REVIEWED BY: John Dailly







Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002

Project: WEYERHAEUSER LANDFILL / COVER

Location: BORROW MATERIAL PROCTOR #1

File: COVER Project No.: 3071072241 Page 2/2 Fig. No. COVER

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TRIAXIAL COMPRESSION TEST 6-25-1997
CU with pore pressures 2:46 pm

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Project Data

Project No.: 3071072241 Date: JUNE 25, 1997 Data file: COVER
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / COVER
Sample location: BORROW MATERIAL PROCTOR #1
Sample description: (VISUAL) OLIVE FINE SANDY CLAY
Remarks:
Fig No. COVER

Sample No. 1 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.66 LL= 48 PL= 21 PI= 27

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.49	1.53	
Height change, in		0.02	
Height, in	3.07	3.05	
Weight, grams	176.3		
Water volume change, cc		-6.00	
Moisture, %	21.0	25.2	23.1
Dry density, pcf	103.3	99.5	
Saturation, %	92.1	100.0	
Void ratio	0.608	0.669	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16667 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.656 % per minute
Consolidation cell pressure = 46.9 psi
Consolidation back pressure = 40 psi
Consolidation effective confining stress = 0.9936 ksf
Peak deviator stress = 4.00 ksf at reading no. 25
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0450	0.000	455.0	0.0	0.0	0.00	0.99	0.99	1.00	40.0	0.99	0.00
1	0.0550	0.010	567.0	18.7	0.3	1.46	0.81	2.27	2.81	41.3	1.54	0.73
2	0.0650	0.020	578.5	20.6	0.7	1.61	0.73	2.34	3.19	41.8	1.54	0.80
3	0.0750	0.030	589.0	22.3	1.0	1.74	0.68	2.42	3.57	42.2	1.55	0.87
4	0.0850	0.040	598.5	23.9	1.3	1.86	0.63	2.49	3.93	42.5	1.56	0.93
5	0.1000	0.055	613.0	26.3	1.8	2.03	0.60	2.64	4.36	42.7	1.62	1.02

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1200	0.075	633.0	29.7	2.5	2.28	0.59	2.87	4.85	42.8	1.73	1.14
7	0.1400	0.095	650.0	32.5	3.1	2.48	0.60	3.08	5.09	42.7	1.84	1.24
8	0.1600	0.115	665.5	35.1	3.8	2.66	0.62	3.27	5.29	42.6	1.95	1.33
9	0.1800	0.135	680.0	37.5	4.4	2.82	0.65	3.47	5.35	42.4	2.06	1.41
10	0.2000	0.155	693.5	39.8	5.1	2.97	0.68	3.64	5.38	42.2	2.16	1.48
11	0.2200	0.175	706.0	41.8	5.7	3.10	0.71	3.81	5.39	42.0	2.26	1.55
12	0.2400	0.195	719.0	44.0	6.4	3.24	0.75	3.99	5.33	41.7	2.37	1.62
13	0.2600	0.215	732.0	46.2	7.1	3.37	0.78	4.15	5.34	41.5	2.46	1.69
14	0.2800	0.235	741.5	47.8	7.7	3.47	0.81	4.27	5.30	41.3	2.54	1.73
15	0.3000	0.255	751.0	49.3	8.4	3.56	0.85	4.40	5.18	41.0	2.63	1.78
16	0.3200	0.275	761.0	51.0	9.0	3.65	0.88	4.53	5.15	40.8	2.70	1.82
17	0.3400	0.295	771.0	52.7	9.7	3.74	0.91	4.65	5.12	40.6	2.78	1.87
18	0.3600	0.315	773.0	53.0	10.3	3.74	0.94	4.67	4.99	40.4	2.80	1.87
19	0.3800	0.335	776.0	53.5	11.0	3.74	0.98	4.72	4.82	40.1	2.85	1.87
20	0.4000	0.355	781.0	54.3	11.7	3.78	1.01	4.78	4.75	39.9	2.90	1.89
21	0.4200	0.375	789.0	55.7	12.3	3.84	1.04	4.88	4.70	39.7	2.96	1.92
22	0.4400	0.395	796.0	56.8	13.0	3.89	1.08	4.97	4.60	39.4	3.03	1.95
23	0.4600	0.415	799.0	57.3	13.6	3.89	1.09	4.99	4.56	39.3	3.04	1.95
24	0.4800	0.435	808.5	58.9	14.3	3.97	1.15	5.12	4.45	38.9	3.14	1.99
25	0.5020	0.457	814.0	59.8	15.0	4.00	1.20	5.20	4.35	38.6	3.20	2.00

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TRIAXIAL COMPRESSION TEST 6-25-1997
CU with pore pressures 2:46 pm

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Project Data

Project No.: 3071072241 Date: JUNE 25, 1997 Data file: COVER
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / COVER
Sample location: BORROW MATERIAL PROCTOR #1
Sample description: (VISUAL) OLIVE FINE SANDY CLAY
Remarks:
Fig No. COVER

Sample No. 2 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.66 LL= 48 PL= 21 PI= 27

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.50	1.48	
Height change, in		0.02	
Height, in	3.00	2.98	
Weight, grams	174.0		
Water volume change, cc		0.63	
Moisture, %	21.0	20.6	21.6
Dry density, pcf	103.9	107.3	
Saturation, %	93.5	100.0	
Void ratio	0.599	0.548	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16667 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.671 % per minute
Consolidation cell pressure = 60.7 psi
Consolidation back pressure = 40.6 psi
Consolidation effective confining stress = 2.8944 ksf
Peak deviator stress = 7.10 ksf at reading no. 24
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0710	0.000	454.0	0.0	0.0	0.00	2.89	2.89	1.00	40.6	2.89	0.00
1	0.0810	0.010	641.0	31.2	0.3	2.61	2.79	5.40	1.93	41.3	4.10	1.31
2	0.0910	0.020	673.0	36.5	0.7	3.05	2.71	5.75	2.13	41.9	4.23	1.52
3	0.1010	0.030	694.0	40.0	1.0	3.33	2.64	5.96	2.26	42.4	4.30	1.66
4	0.1110	0.040	714.0	43.3	1.3	3.59	2.56	6.16	2.40	42.9	4.36	1.80
5	0.1210	0.050	730.0	46.0	1.7	3.80	2.51	6.31	2.52	43.3	4.41	1.90

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1400	0.069	761.5	51.3	2.3	4.21	2.39	6.60	2.76	44.1	4.49	2.10
7	0.1600	0.089	783.0	54.8	3.0	4.47	2.30	6.77	2.94	44.7	4.54	2.24
8	0.1800	0.109	819.5	60.9	3.7	4.93	2.23	7.16	3.21	45.2	4.70	2.47
9	0.2000	0.129	845.0	65.2	4.3	5.24	2.19	7.43	3.39	45.5	4.81	2.62
10	0.2200	0.149	867.5	68.9	5.0	5.50	2.15	7.65	3.56	45.8	4.90	2.75
11	0.2400	0.169	891.5	72.9	5.7	5.78	2.15	7.93	3.69	45.8	5.04	2.89
12	0.2600	0.189	910.0	76.0	6.3	5.98	2.12	8.10	3.83	46.0	5.11	2.99
13	0.2800	0.209	930.0	79.3	7.0	6.20	2.10	8.30	3.95	46.1	5.20	3.10
14	0.3000	0.229	947.0	82.2	7.7	6.37	2.09	8.46	4.05	46.2	5.28	3.19
15	0.3200	0.249	965.0	85.2	8.4	6.56	2.07	8.63	4.16	46.3	5.35	3.28
16	0.3400	0.269	983.0	88.2	9.0	6.74	2.06	8.80	4.27	46.4	5.43	3.37
17	0.3600	0.289	998.5	90.8	9.7	6.89	2.06	8.95	4.34	46.4	5.50	3.44
18	0.3840	0.313	1015.0	93.5	10.5	7.03	2.04	9.08	4.44	46.5	5.56	3.52
19	0.4000	0.329	1023.0	94.8	11.0	7.09	2.04	9.13	4.47	46.5	5.59	3.54
20	0.4200	0.349	1027.0	95.5	11.7	7.09	2.04	9.13	4.46	46.5	5.59	3.54
21	0.4400	0.369	1031.0	96.2	12.4	7.08	2.06	9.14	4.44	46.4	5.60	3.54
22	0.4600	0.389	1035.0	96.8	13.1	7.07	2.06	9.13	4.44	46.4	5.60	3.54
23	0.4800	0.409	1039.5	97.6	13.7	7.07	2.07	9.15	4.41	46.3	5.61	3.54
24	0.5000	0.429	1046.0	98.7	14.4	7.10	2.10	9.20	4.38	46.1	5.65	3.55
25	0.5180	0.447	1050.0	99.3	15.0	7.09	2.12	9.21	4.35	46.0	5.66	3.55

==========

TRIAXIAL COMPRESSION TEST 6-25-1997
CU with pore pressures 2:46 pm

==========

Project Data

Project No.: 3071072241 Date: JUNE 25, 1997 Data file: COVER
Client: DELTA ENVIRONMENTAL CONSULTANTS, INC. PROJECT #E096-019-2.0002
Project: WEYERHAEUSER LANDFILL / COVER
Sample location: BORROW MATERIAL PROCTOR #1
Sample description: (VISUAL) OLIVE FINE SANDY CLAY
Remarks:
Fig No. COVER

Sample No. 3 Data

Type of sample: LAB-COMPACTED
Specific Gravity= 2.66 LL= 48 PL= 21 PI= 27

Sample Parameters	Before Test	At Testing	After Test
Diameter, in	1.50	1.46	
Height change, in		0.03	
Height, in	3.05	3.02	
Weight, grams	177.0		
Water volume change, cc		2.71	
Moisture, %	21.0	19.2	20.6
Dry density, pcf	104.2	109.9	
Saturation, %	94.4	100.0	
Void ratio	0.593	0.511	

Test Data

Deformation dial constant= 1 in per input unit
Primary load ring constant= 0.16667 lbs. per input unit
Secondary load ring constant= 0 lbs. per input unit
Crossover reading for secondary load ring= 0 input units
Rate of strain= 0.663 % per minute
Consolidation cell pressure = 73.9 psi
Consolidation back pressure = 39.8 psi
Consolidation effective confining stress = 4.9104 ksf
Peak deviator stress = 9.01 ksf at reading no. 25
Ult. deviator stress =

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Effective Stresses Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
0	0.0840	0.000	468.0	0.0	0.0	0.00	4.91	4.91	1.00	39.8	4.91	0.00
1	0.0940	0.010	541.0	12.2	0.3	1.04	4.90	5.94	1.21	39.9	5.42	0.52
2	0.1040	0.020	702.0	39.0	0.7	3.32	4.81	8.13	1.69	40.5	6.47	1.66
3	0.1140	0.030	765.0	49.5	1.0	4.20	4.69	8.90	1.90	41.3	6.80	2.10
4	0.1240	0.040	791.0	53.8	1.3	4.56	4.62	9.18	1.99	41.8	6.90	2.28
5	0.1400	0.056	824.0	59.3	1.9	4.99	4.48	9.47	2.12	42.8	6.98	2.50

No.	Def. Dial Units	Def. in	Load Dial Units	Load lbs.	Strain %	Deviator Stress ksf	Effective Stresses Minor ksf	Major ksf	1:3 Ratio	Pore Pres. psi	P ksf	Q ksf
6	0.1600	0.076	863.0	65.8	2.5	5.50	4.35	9.85	2.27	43.7	7.10	2.75
7	0.1800	0.096	893.5	70.9	3.2	5.89	4.22	10.11	2.40	44.6	7.16	2.94
8	0.2000	0.116	922.5	75.8	3.8	6.25	4.10	10.35	2.52	45.4	7.23	3.12
9	0.2200	0.136	951.0	80.5	4.5	6.59	4.06	10.65	2.62	45.7	7.36	3.30
10	0.2400	0.156	978.0	85.0	5.2	6.91	3.97	10.89	2.74	46.3	7.43	3.46
11	0.2600	0.176	1002.0	89.0	5.8	7.19	3.90	11.09	2.84	46.8	7.50	3.59
12	0.2800	0.196	1025.0	92.8	6.5	7.44	3.83	11.28	2.94	47.3	7.55	3.72
13	0.3000	0.216	1048.0	96.7	7.2	7.70	3.77	11.47	3.04	47.7	7.62	3.85
14	0.3200	0.236	1070.0	100.3	7.8	7.93	3.72	11.65	3.14	48.1	7.68	3.97
15	0.3400	0.256	1091.0	103.8	8.5	8.15	3.67	11.82	3.22	48.4	7.75	4.07
16	0.3600	0.276	1108.0	106.7	9.1	8.31	3.64	11.95	3.28	48.6	7.80	4.16
17	0.3800	0.296	1125.5	109.6	9.8	8.48	3.60	12.08	3.35	48.9	7.84	4.24
18	0.4000	0.316	1141.0	112.2	10.5	8.61	3.59	12.20	3.40	49.0	7.89	4.31
19	0.4200	0.336	1156.5	114.8	11.1	8.75	3.57	12.32	3.45	49.1	7.94	4.37
20	0.4400	0.356	1169.0	116.8	11.8	8.84	3.56	12.39	3.48	49.2	7.98	4.42
21	0.4600	0.376	1181.5	118.9	12.5	8.93	3.54	12.47	3.52	49.3	8.01	4.46
22	0.4800	0.396	1190.0	120.3	13.1	8.97	3.54	12.51	3.53	49.3	8.03	4.48
23	0.5000	0.416	1196.5	121.4	13.8	8.98	3.53	12.51	3.54	49.4	8.02	4.49
24	0.5200	0.436	1204.0	122.7	14.4	9.00	3.53	12.53	3.55	49.4	8.03	4.50
25	0.5370	0.453	1210.0	123.7	15.0	9.01	3.54	12.56	3.54	49.3	8.05	4.51

ANALYTICAL LABORATORY SERVICES REQUEST

Request Number:	92249

Title:	New Bern Pulp TCLP's		
Number of Samples 4	Project Number:	046-5604	Group:
Date Received: 12/3/97	Date Desired: 12/22/97	Estimated Completion Date	Interim Report Date (if Desired)
Submitted By:	Dave Gardner	Location: NewBern Pulp	Telephone: 633-7427
Reviewed By:	Bob Maimone	Location: NB ATS	Telephone: 633-7202
Copy to:			

Name of Test/Method	Expected Report Range			Report Basis	Lower Limit	Special Handling
TCLP -Full	%	PPM	PPB			Keep Chilled Keep Frozen
	%	PPM	PPB			Other_____
	%	PPM	PPB			Preservative Added
	%	PPM	PPB			yes No
	%	PPM	PPB			Kind_____
	%	PPM	PPB			Amount_____
	%	PPM	PPB			

Sample Description and History: 4 Samples in 950 mL I-chems. All samples for complete TCLP analysis (inorganic

These materials are landfilled on-site - need this information for characterization purposes.

Laboratory Code	Submitters Designation	Properties to be Evaluated	Comments
32864	Sludge Compress, 12/3/97, 11:20	TCLP-Full	
32865	Lime mud, 12/3/97, 11:12	TCLP-Full	
32866	Grits, 12/3/97, 11:10	TCLP-Full	
32867	Dregs, 12/3/97, 11:05	TCLP-Full	

ANALYTICAL LABORATORY SERVICES REQUEST

Weyerhaeuser Research and Development-Analysis and Testing

Request Number:	05441
Title:	NEW BERN PULP TCLP's NB 92249
Number of Samples:	4
Project Number:	046-5604
Groups:	1,3,5
Date Received:	12/04/97
Date Desired:	12/22/97
Sample Disposition:	
Submitted By:	MAIMONE, BOB
Location:	New Bern 121
Ph:	8-633-7202
Reviewed By:	LANZA Mary Beth
Location:	WTC 2F25
Ph:	924-6013/6188
Copy To:	

Sample Description and History:

SEE ATTACHED

Group	Series	Test Description	Report Range	Report Basis	Lower Limit of Sensitivity
1	A	TCLP BNA, Pesticides and Herbicides			
3	B	TCLP Metals (100% solids)			
3	B	TCLP - ZHE (100% solids)			
3	C	TCLP Metals (2 phase)			
3	C	TCLP - ZHE (2 phase)			
5	D	TCLP - VOA on TCLP Extract			

Sample Number	Series to Be Evaluated	Submitters Designation				Date Recd
90892	AB D	32864	SLUDGE COMPRESS	12/03/97	1120	12/04/97
90893	AB D	32865	LIME MUD	12/03/97	1112	12/04/97
90894	AB D	32866	GRITS	12/03/97	1110	12/04/97
90895	A CD	32867	DREGS	12/03/97	1105	12/04/97

Reference:		Record Book:
Results Approved:	Date:	

Updated: 12/04/97 8:00

Weyerhaeuser

Analytical (sting Services

Sample Analysis Request/Chain of Custody Form

Date 3-97

Page 1 of 1

Facility

Sampler's Project No. 046-5604

Weyerhaeuser Account No.

Project Manager (print): Dave Garber

Sampler Name (print): JENNIFER N. HUDSON

Recorded By (signed):

Sampled by:
- ☒ Facility
- ☐ E&AS/WTC
- ☐ E&AS/NB

Consultant

Address

Phone No. FAX

Sample Description (ID, Date, Time are Required)

Method	Field Sample ID (15 characters max.)	Date (m/d/y)	Time (hh:mm)	Depth (ft / m)	Matrix: Water	Matrix: Soil/Sed	Matrix: Oil	Matrix: Sludge	Preservative: HCl	Preservative: H_2SO_4	Preservative: HNO_3	Preservative: $Na_2S_2O_3$	Preservative:	Preservative: Filtered	Number of Containers	pH Cond TDS TSS Color Tannins	Volatile Organics / BTEX	Semi-volatile Organics	TPH: 418.1 TPH-G TPH-D	Ca Mg Na K Fe Mn	Metals (list below)	NH_3 HCO_3 CO_3 Cl F NO_3 SO_4	AOX	TCLP: Metals VOA SVOA Pest Herb PCBs	Dioxin: Total / 2,3,7,8-TCDD / 2,3,7,8-TCDF	CN	BOD P-ortho	TKN P-total TOC COD	Notes
G	Sludge Compress	12-3-97	1120					✓							1									✓					32864
	Lime Mud	↓	1112			✓									1							2,81.6		✓					32865
↓	Grits	↓	1110			✓									1									✓					32866
↓	Dregs	↓	1105					✓							1									✓					32867
															1	864						32867							

Method: G, grab; D, depth composite; T, time composite. Depth required for soil or sediment samples.

☐ Samples on Ice or Blue Ice

Lab Turn-Around Time

☐ 24 Hr ☐ 48 Hr ☐ 7 Day

☒ 2-3 wk Date Due:

Reporting and QA/QC Requirements

RESULTS TO:

CC:

☐ CLP Package

☐ NPDES Permit

☐ Other:

☒ Electronic Report

Remarks/Detection Limit Requirements

Full TCLP.

PI&A ends this year. complete all billing by 12/23/97! - BubM

Laboratory

☐ WATS/WTC ☒ WATS/NB

☐ Other:

Lab SR#: NB 92249

Case ID:

SDG ID:

Sample Chain of Custody and Shipping Method Record

Relinquished By Sampler (signature):	Date	Time	Received By (signature):	Shipping Method
Jennifer N. Hudson	12-3-97		Bob Moirone 12/3/97 12:10	Hand delivered to N.B. Fedex to WTC
Relinquished By (signature):	Date	Time	Received By (signature):	Airbill No.
Relinquished By (signature):	Date	Time	Received For Laboratory By (signature):	
			Samples Received Intact:	Cooler Temp: °C

WATS/WTC: 32901 Weyerhaeuser Way South, Federal Way, WA 98003 (206-924-6293)

WATS/NB: New Bern R&D Field Station, Highway 43 North, New Bern, NC 28563 (919-633-7238)

Form 16307 (2/96) Printing Services TP-1 Tacoma

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

TCLP Report

New Bern Pulp

EPA #								
	Date Received:	12/04/97		12/04/97				
	Date Extracted:	12/10/97*		12/10/97*				
	Client ID:	32864		32865				
	Date Sampled:	Sludge Compress 12/03/97	% Spike Recovery Sample	Lime Mud 12/03/97	% Spike Recovery Sample	Quanti-tation Limit	TCLP Maximum	Method Number
	Time Sampled:	1120		1112				
	Lab ID:	90892	90892	90893	90893			
		(mg/L in TCLP extract)						
	Metals							
	pH on 5% Sample	9.1		12.6				
	Extraction Fluid Used	#1		#2				
D004	Arsenic	ND	93	ND	89	0.1	5.0	1311/3010/6010
D005	Barium	0.67	76	0.49	83	0.01	100	1311/3010/6010
D006	Cadmium	ND	93	ND	87	0.01	1.0	1311/3010/6010
D007	Chromium (total)	ND	89	ND	85	0.01	5.0	1311/3010/6010
D008	Lead	ND	89	ND	85	0.1	5.0	1311/3010/6010
D009	Mercury	ND	117	ND	126	0.001	0.2	1311/7470
D010	Selenium	ND	83	ND	77	0.005	1.0	1311/3020/7740
D011	Silver	ND	84	ND	92	0.01	5.0	1311/3010/6010
	Insecticides/Herbicides							
D020	Chlordane	ND	NA	ND	NA	0.00005	0.002	1311/3510/8081
D012	Endrin	ND	NA	ND	NA	0.0001	0.0001	1311/3510/8081
D031	Heptachlor	ND	NA	ND	NA	0.00005	0.00005	1311/3510/8081
D031	Heptachlor Epoxide	ND	NA	ND	NA	0.00005	0.00005	1311/3510/8081
D013	Lindane	ND	NA	ND	NA	0.00005	0.00005	1311/3510/8081
D014	Methoxychlor	ND	NA	ND	NA	0.0005	0.0001	1311/3510/8081
D015	Toxaphene	ND	NA	ND	NA	0.005	0.005	1311/3510/8081
D016	2,4-D	ND	156%	ND	NA	0.008	10	1311/3510/8151
D017	2,4,5-TP (Silvex)	ND	121%	ND	NA	0.004	1.0	1311/3510/8151
	VOAs							
D018	Benzene	ND	97	ND	94	0.10	0.5	1311/8240
D019	Carbon Tetrachloride	ND	83	ND	85	0.10	0.5	1311/8240
D021	Chlorobenzene	ND	96	ND	95	0.10	100	1311/8240
D022	Chloroform	ND	96	ND	95	0.10	6.0	1311/8240
D028	1,2-Dichloroethane	ND	98	ND	95	0.10	0.5	1311/8240
D029	1,1-Dichloroethylene	ND	96	ND	94	0.10	0.7	1311/8240
D035	Methyl ethyl ketone	ND	105	ND	99	0.10	200	1311/8240
D039	Tetrachloroethylene	ND	98	ND	98	0.10	0.7	1311/8240
D040	Trichloroethylene	ND	94	ND	136	0.10	0.5	1311/8240
D043	Vinyl chloride	ND	102	ND	99	0.10	0.2	1311/8240

Approved: Mary Beth Lanza
Telephone: (253) 924-6013

Date: 12/22/97

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

TCLP Report

New Bern Pulp

EPA #	Client ID: / Date Sampled: / Time Sampled: / Lab ID:	32864 Sludge Compress 12/03/97 1120 90892	% Spike Recovery Sample 90892	32865 Lime Mud 12/03/97 1112 90893	% Spike Recovery Sample 90893	Quanti-tation Limit	TCLP Maximum	Method Number
		(mg/L in TCLP extract)						
	Semivolatiles							
D023	o-Cresol	ND	NA	ND	70%	0.010	200	1311/3510/8270
D024	m-Cresol	ND	NA	ND	61%	0.010	200	1311/3510/8270
D025	p-Cresol	ND	NA	ND	61%	0.010	200	1311/3510/8270
D026	Cresols	ND	NA	ND	NA	0.010	200	1311/3510/8270
D027	1,4-Dichlorobenzene	ND	NA	ND	72%	0.010	7.5	1311/3510/8270
D030	2,4-Dinitrotoluene	ND	NA	ND	90%	0.010	0.13	1311/3510/8270
D032	Hexachlorobenzene	ND	NA	ND	68%	0.010	0.13	1311/3510/8270
D033	Hexachlorobutadiene	ND	NA	ND	72%	0.010	0.5	1311/3510/8270
D034	Hexachloroethane	ND	NA	ND	71%	0.010	3.0	1311/3510/8270
D036	Nitrobenzene	ND	NA	ND	75%	0.010	2.0	1311/3510/8270
D037	Pentachlorophenol	ND	NA	ND	71%	0.010	100	1311/3510/8270
D038	Pyridine	ND	NA	ND	67%	0.010	5.0	1311/3510/8270
D041	2,4,5-Trichlorophenol	ND	NA	ND	71%	0.010	400	1311/3510/8270
D042	2,4,6-Trichlorophenol	ND	NA	ND	74%	0.010	2.0	1311/3510/8270

ND= Not Detected above the Quantitation Limit Listed
NA= Not Analyzed.

Notes: (1) TCLP metals have not been corrected for spike recovery.
(2) Extraction fluid #1 is always used for VOA (ZHE).
(3) ZHE for VOA was extracted 12/16/97 for samples 90892, 90893 and 90894.
(4) Sample 90895 was reextracted for BNA's on 12/23/97 which is out of holding time. The surrogate recoveries were out of control on the first extract.

Approved: Richard Bogar Date: 1/9/98
Telephone: (253) 924-6013

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

TCLP Report

New Bern Pulp

Date Received:	12/04/97	12/04/97
Date Extracted:	12/10/97*	12/10/97*

EPA #	Client ID: / Date Sampled: / Time Sampled: / Lab ID:	32866 Grits 12/03/97 1110 90894	% Spike Recovery Sample 90894	32867 Dregs 12/03/97 1105 90895	% Spike Recovery Sample 90895	Quanti-tation Limit	TCLP Maximum	Method Number
		(mg/L in TCLP extract)						
	Metals							
	pH on 5% Sample	11.8		11.6				
	Extraction Fluid Used	#2		#2				
D004	Arsenic	ND	79	ND	85	0.1	5.0	1311/3010/6010
D005	Barium	0.79	78	1.6	81	0.01	100	1311/3010/6010
D006	Cadmium	ND	88	ND	88	0.01	1.0	1311/3010/6010
D007	Chromium (total)	ND	82	ND	83	0.01	5.0	1311/3010/6010
D008	Lead	ND	86	ND	82	0.1	5.0	1311/3010/6010
D009	Mercury	ND	130	ND	130	0.001	0.2	1311/7470
D010	Selenium	ND	56	ND	77	0.005	1.0	1311/3020/7740
D011	Silver	ND	85	ND	89	0.01	5.0	1311/3010/6010
	Insecticides/Herbicides							
D020	Chlordane	ND	NA	ND	88%	0.00005	0.002	1311/3510/8081
D012	Endrin	ND	NA	ND	122%	0.0001	0.0001	1311/3510/8081
D031	Heptachlor	ND	NA	ND	74%	0.00005	0.00005	1311/3510/8081
D031	Heptachlor Epoxide	ND	NA	ND	88%	0.00005	0.00005	1311/3510/8081
D013	Lindane	ND	NA	ND	92%	0.00005	0.00005	1311/3510/8081
D014	Methoxychlor	ND	NA	ND	108%	0.0005	0.0001	1311/3510/8081
D015	Toxaphene	ND	NA	ND	NA	0.005	0.005	1311/3510/8081
D016	2,4-D	ND	NA	ND	NA	0.008	10	1311/3510/8151
D017	2,4,5-TP (Silvex)	ND	NA	ND	NA	0.004	1.0	1311/3510/8151
	VOAs							
D018	Benzene	ND	106	ND	97	0.10	0.5	1311/8240
D019	Carbon Tetrachloride	ND	95	ND	89	0.10	0.5	1311/8240
D021	Chlorobenzene	ND	100	ND	96	0.10	100	1311/8240
D022	Chloroform	ND	92	ND	97	0.10	6.0	1311/8240
D028	1,2-Dichloroethane	ND	94	ND	98	0.10	0.5	1311/8240
D029	1,1-Dichloroethylene	ND	91	ND	96	0.10	0.7	1311/8240
D035	Methyl ethyl ketone	ND	108	ND	109	0.10	200	1311/8240
D039	Tetrachloroethylene	ND	103	ND	100	0.10	0.7	1311/8240
D040	Trichloroethylene	ND	118	ND	96	0.10	0.5	1311/8240
D043	Vinyl chloride	ND	98	ND	101	0.10	0.2	1311/8240

Approved: Mary Beth Lanza Date: 12/22/97
Telephone: (253) 924-6013

Weyerhaeuser Analytical & Testing Services
32901 Weyerhaeuser Way South
Federal Way, WA 98003

TCLP Report

New Bern Pulp

EPA #	Client ID:	32866 Grits	% Spike Recovery Sample	32867 Dregs	% Spike Recovery Sample	Quanti-tation Limit	TCLP Maximum	Method Number
	Date Sampled:	12/03/97		12/03/97				
	Time Sampled:	1110		1105				
	Lab ID:	90894	90894	90895	90895			
		(mg/L in TCLP extract)						
	Semivolatiles							
D023	o-Cresol	ND	NA	ND	NA	0.010	200	1311/3510/8270
D024	m-Cresol	ND	NA	ND	NA	0.010	200	1311/3510/8270
D025	p-Cresol	ND	NA	ND	NA	0.010	200	1311/3510/8270
D026	Cresols	ND	NA	ND	NA	0.010	200	1311/3510/8270
D027	1,4-Dichlorobenzene	ND	NA	ND	NA	0.010	7.5	1311/3510/8270
D030	2,4-Dinitrotoluene	ND	NA	ND	NA	0.010	0.13	1311/3510/8270
D032	Hexachlorobenzene	ND	NA	ND	NA	0.010	0.13	1311/3510/8270
D033	Hexachlorobutadiene	ND	NA	ND	NA	0.010	0.5	1311/3510/8270
D034	Hexachloroethane	ND	NA	ND	NA	0.010	3.0	1311/3510/8270
D036	Nitrobenzene	ND	NA	ND	NA	0.010	2.0	1311/3510/8270
D037	Pentachlorophenol	ND	NA	ND	NA	0.010	100	1311/3510/8270
D038	Pyridine	ND	NA	ND	NA	0.010	5.0	1311/3510/8270
D041	2,4,5-Trichlorophenol	ND	NA	ND	NA	0.010	400	1311/3510/8270
D042	2,4,6-Trichlorophenol	ND	NA	ND	NA	0.010	2.0	1311/3510/8270

ND= Not Detected above the Quantitation Limit Listed
NA= Not Analyzed.

Notes: (1) TCLP metals have not been corrected for spike recovery.
(2) Extraction fluid #1 is always used for VOA (ZHE).
(3) ZHE for VOA was extracted 12/16/97 for samples 90892, 90893 and 90894.
(4) Sample 90895 was reextracted for BNA's on 12/23/97 which is out of holding time. The surrogate recoveries were out of control on the first extract.

Approved: Richard Bogar Date: 1/9/98
Telephone: (253) 924-6013

Pollution Prevention Corner

- As a result of changes to Pennsylvania's Residual Waste Regulations, ***Willamette Industries' mill in Johnsonburg, Pennsylvania,*** has been able to obtain ***a "co-product" or beneficial use designation*** for a number of its residuals. ***Dewatered effluent treatment plant solids, wood waste, and boiler ashes are used in an on-site surface impoundment closure project.*** Additional synthetic solids marketed by Sweet Soil are used to reclaim active and abandoned strip mines. ***The synthetic soils make use of the mill's dewatered effluent plant solids, excess wood waste, green liquor dregs, lime grit, calcium carbonate, and pulping rejects. The mill's flyash ash also been used as flowable fill around underground pipes*** during the mill's modernization project. The bark produced by satellite chip plants is hauled by chip suppliers to ***mulch*** marketing firms. More information on the mill's co-product programs, which were discussed at the recent NCASI Northeast Regional Meeting, can be obtained from Andy Redmond at the mill, phone (814) 965-6339. In addition, the state of Pennsylvania has posted information about the mill's pollution prevention activities on the Web at www.dep.state.pa.us/dep/deputate/polycomm/update/09-12-97/09129740.htm.
- ***Georgia-Pacific Corporation is making use of the Web to communicate its pollution prevention accomplishments.*** Among the accomplishments listed at www.gp.com/enviro/html/wws_pollution.html#what is that Georgia-Pacific Corporation has realized nearly $400 million in annualized savings from more than 400 pollution prevention projects that have reduced or beneficially used more than 22 million tons of residuals. Projects are highlights in the areas of source reduction, reducing waste to landfills, increasing recycling, reducing air/water pollution, and developing new products/uses. Among the notable ongoing projects is the company's ***gypsum board plants, which saved more than $1 million in operating costs by reusing more than 160,000 tons of waste wallboard diverted from landfills and reclaimed from stockpiles.***

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Paper industry wastewater treatment plant residuals found to be effective landfill cover

A significant part of NCASI's Technical Studies Program is devoted to identifying alternative solid waste management options. Since 1984, NCASI has conducted research to assess the potential for the use of paper industry wastewater treatment plant sludge as hydraulic barrier construction material in landfill covers. From 1984 to 1987, NCASI conducted a laboratory characterization of physical and chemical properties of sludge. Results of the laboratory research were reported in Technical Bulletin No. 559, *Experience With and Laboratory Studies of the Use of Paper Industry Solid Waste in Landfill Cover Systems.*

In 1987, NCASI constructed four field-scale landfill cover test cells to compare the field performance of paper industry sludge and clay hydraulic barriers. Two covers contained clay as the barrier material, one contained paper mill wastewater treatment plant primary sludge, and one contained paper mill wastewater treatment plant primary and secondary (combined) sludge. Interim results of the field study were reported as Technical Bulletin No. 595, *A Field-Scale Study of the Use of Paper Industry Sludges in Landfill Cover Systems: First Progress Report.* The findings of the eight-year field research, as well as the results of the diagnostic disassembly of the field test cells, were recently published in Technical Bulletin No. 750, *A Field-Scale Study of the Use of Paper Industry Sludges in Landfill Cover Systems: Final Report.*

The primary objective of this study was to compare, under field conditions, the performance of paper mill sludges as a landfill hydraulic barrier material with the performance of a typical clay soil barrier material. Another objective was to collect data useful for verifying the Hydrologic Evaluation of Landfill Performance (HELP) model, which is often used by regulatory agencies to evaluate the expected performance of alternative landfill designs. One of the test cells was specially constructed to facilitate verification of the model. (HELP model verification is presented in Technical Bulletin No. 747.)

At the effective stress existing during the service life of the test plots, the combined sludge had a hydraulic conductivity of 4×10^{-8} cm/sec, whereas the primary sludge had a hydraulic conductivity of 1×10^{-7} cm/sec. The barrier layers in the clay plots had field hydraulic conductivities of approximately 1×10^{-6} cm/sec. For the duration of the field study, both sludge covers produced smaller volumes of seepage and greater volumes of runoff than either of the clay covers.

Laboratory hydraulic conductivity tests of field specimens under stresses equivalent to field conditions produced results comparable to field hydraulic conductivities generated from long-term water balance data. The study documented, however, that to obtain hydraulic conductivities representative of final

over conditions, field and laboratory tests must be conducted at stresses representative of conditions within a final cover.

The test results also show that barrier layers made with paper mill sludge underwent no deterioration in performance during their service life. The field hydraulic conductivities were similar to those obtained from laboratory tests on fresh paper mill sludge. In addition, a dye tracer study showed that only one preferential flow path existed in the sludge barriers, and this flow path appeared to be associated with a construction defect. At the end of the eight-year period, the sludge in the test plots appeared identical to fresh sludge, which also suggests that the sludge had not degraded. In contrast, the clay barrier layers were riddled with preferential flow paths, and thus had much higher hydraulic conductivity than the paper mill sludge barriers. It is likely these flowpaths were present at the time of construction. The findings of this study indicate that the hydraulic performance of barrier layers constructed with paper mill sludge will be as good as, or better than, the performance of barriers constructed with clay. More than 14 landfills have been closed with sludge as the hydraulic barrier material since 1990.

For more information about this study, contact Van Maltby at the Central-Lake States Regional Center, phone (616) 387-5128. To request a copy of the report, contact Mary McReynolds at the NCASI headquarters office, phone (919) 558-1999.

Cation content found to influence settling and dewatering of activated sludge

Recently-published research has demonstrated that the settling and dewatering properties of activated sludge can be influenced significantly by the cation content in the wastewater. The investigations, conducted by Matthew J. Higgins of Bucknell University and John T. Novak of the Virginia Polytechnic Institute and State University, are described in two articles in the March/April 1997 issue of *Water Environment Research.* Although it has been known that cations play a role in the behavior of activated sludge, prior research studies have been limited, have tended to use monocultures in batch experiments, and have produced conflicting results.

The initial work by Higgins and Novak employed laboratory-scale flow-through reactors with a solution of bactopeptone as the wastewater. It was concluded that the soluble monovalent-to-divalent cation ratio $[(Na^+ + K^+)/(Ca^{2+} + Mg^{2+})]$ and the soluble calcium-to-magnesium ratio (Ca^{2+}/Mg^{2+}) can be important to settling and dewatering characteristics. As a rough guideline, either ratio can be considered optimal at approximately 1:1 (on a milliequivalent basis), although the monovalent-to-divalent ratio is expected to be the more important of the two.

An investigation of wastewater and activated sludge from several municipal or industrial treatment plants found high sodium concentrations to be common, and that lowering the monovalent-to-divalent ratio by the addition of a divalent cation could improve settling or dewatering performance as measured by laboratory tests. Full-scale experiments conducted at three plants also showed that adjustment of the cation content could be beneficial.

NCASI has learned that the plant designated as "Industry B" by the researchers is a pulp and paper mill. Although no studies at the treatment-plant scale were conducted, tests with the plant's activated sludge indicated improved dewatering (as measured by capillary suction time) from the addition of either calcium or magnesium. The addition of calcium (magnesium was not tried) was also shown to reduce the optimal polymer dose. The researchers recommended that magnesium be the initial choice for cation addition, because it would reduce both ratios nearer to the desired values.

Two additional points are worth noting. First, conditions were such that filamentous bacteria were not observed or expected in quantities sufficient to be significant. Second, cation addition to the influent of a laboratory reactor was more effective than batch addition to samples of activated sludge.

For more information, contact Dr. William Thacker at the Central-Lake States Regional Center, phone (616) 387-5128, e-mail wthacker@ncasi.org.

EPA institutes new Environmental Technology Verification Program

EPA has instituted a new program, the Environmental Technology Verification Program (ETV), to "verify the performance" of innovative environmentally-related technologies. Managed by EPA's Office of Research and Development, ETV was created to accelerate the entrance of new environmental technologies into the marketplace by documenting the performance of commercially-ready, private sector technologies.

The ETV program currently consists of 12 technology-specific pilot programs, each co-managed by an EPA "Verification Organization" (VO) which will function beyond the termination of EPA's involvement. Of the 12 pilot programs, nine are currently operational and have Stakeholder Groups in place to guide the work. Pilot programs focusing on site characterization and monitoring, P2 and waste treatment systems, indoor air, and drinking water have been active since 1995, and some "Verification Statements" have been issued. Other pilot programs which have more recently-formed Stakeholder Groups focus on advanced monitoring systems,