APPENDIX 4-C

CLOSURE AND POST-CLOSURE CARE PLANS FOR THE CHROMIUM HYDROXIDE LANDFILL AND CERTIFICATION

CLOSURE AND POST-CLOSURE PLANS FOR THE CHROMIUM HYDROXIDE LANDFILL

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IA-1 CLOSURE PLAN

IA-1a INTRODUCTION

This plan identifies steps necessary to close the chromium hydroxide (CrOH) sludge landfill located at the William L Bonnell Company, Inc. (Bonnell) plant in Newnan, Georgia (EPA I.D. No. GAD003273224). The site is shown in Figure IA-1. This plan is submitted in accordance with the applicable requirements of the Georgia Hazardous Waste Management Rule (Georgia Rule) 391-3-11 (40 CFR 264 and 265, which are incorporated in the Georgia Rule by reference). Since the CrOH landfill is not and will not be a permitted operating landfill, citations are made to 40 CFR 265, which will apply. For post closure care, citation are made to 40 CFR 264, which will apply.

IA-1b CLOSURE PERFORMANCE STANDARD

This closure plan is designed so that the CrOH sludge landfill will require only minimal maintenance or controls, potential threats to human health and the environment will be minimized, and escape of hazardous waste to the ground, groundwater, surface waters, or the atmosphere will be controlled, minimized, or eliminated in accordance with Georgia Rule 391-3-11-.10 (40 CFR 265.111). To accomplish this, the closure plan consists of installation of a cap over the landfill, construction of run-on and run-off control ditches, removal and appropriate disposal of contaminated materials generated during the cleaning of the site, and the decontamination of the equipment. The following sections discuss in detail the approach Bonnell will take to satisfy the closure performance

standard in accordance with Georgia Rule 391-3-11-.10 (40 CFR 265.112(b)).

IA-1c PARTIAL CLOSURE AND FINAL ACTIVITIES

The partial closure plan describes the activities that will be performed to close the CrOH sludge landfill. Closure of other hazardous waste management units will be addressed in separate closure plans.

IA-1d MAXIMUM WASTE INVENTORY

The maximum waste inventory for the CrOH sludge landfill consists of F019 sludge (wastewater treatment sludges from the chemical conversion coating of aluminum). The listing constituents of F019 sludge are hexavalent chromium and cyanide (complexed). It should be noted that chromium is the only F019 constituent present in the sludge. The chemicals used at the Bonnell facility do not contain any nor does the process generate any cyanides as verified by previous tests performed on sludge samples. The results of these tests were provided to the U.S. EPA by letter dated December 5, 1980 to Mr. Myles Morse, Hazardous and Industrial Waste Division (WH-565), Waste Characterization Branch. A copy of the letter is included as Appendix B.

From 1980 to November 1989, the CrOH sludge landfill received sludge from the chromium hydroxide sand drying beds. The waste solids produced is estimated at 215 tons per year. The total sludge deposited in the landfill since 1980 is approximately 2000 tons. Based on these data, the total volume was calculated to be approximately 2300 cubic yards.

IA-1e SCHEDULE OF CLOSURE AND CERTIFICATION

The CrOH sludge landfill is scheduled to be closed in calendar year 1992. In accordance with Georgia Rule 391-3-11-.10 (40 CFR 265.112(b)(6)), a schedule for each closure activity has been provided as Figure IA-2. As indicated on the schedule, completion of closure is not expected to extend beyond 180 days following Georgia EPD approval of the closure plan. This schedule is in compliance with Georgia Rule 391-3-11-.10 (40 CFR 265.113(b)). The Georgia EPD Director will be notified by Bonnell before beginning final closure of the CrOH sludge landfill.

The certification of closure will be submitted via registered mail to the Georgia EPD Director within 60 days after completion of closure in accordance with the approved closure plan as per Georgia Rule 391-3-11-.10 (40 CFR 265.115). This certification will be signed by both Bonnell and an independent registered professional engineer. Documentation supporting the engineer's certification will be available to Georgia EPD upon request and will be maintained until Bonnell is released from financial assurance requirements. A survey plat containing the information required by Georgia Rule 391-3-11-.10 (40 CFR 265.116) will also be submitted to the local land use authority and the Georgia EPD as part of the certification of closure. Bonnell will maintain an on-site copy of the approved closure plan and all revisions to the plan until the certification of closure completion has been submitted and accepted by the Georgia EPD.

IA-1f CLOSURE ACTIVITIES

During closure of the CrOH sludge landfill, access control devices (fences, gates, etc.) will be maintained to prevent unauthorized

access by non-Bonnell employees or their subcontractors. Closure of the CrOH sludge landfill will consist of placing a low permeability cap over the area and providing run-on and run-off control. The cover design was modeled using the U.S. EPA Hydrologic Evaluation of Landfill Performance (HELP) program. A copy of the HELP model input and output is included as Appendix C. Details of closure activities are provided in the following sections of this plan.

IA-1f(1) Detailed Design and Bidding

Upon final approval of the closure plan by Georgia EPD, preparation of detailed plans and specifications will be initiated. Completion of these documents will allow Bonnell to obtain competitive bids for construction of the CrOH sludge landfill cover and ditch system. The closure activities will be initiated upon approval of the closure plan by EPD.

IA-1f(2) Landfill Cap

The CrOH sludge landfill cover will consist of several layers. The cover layers from top to bottom consist of two feet of a vegetative soil, a geofabric, geonet drainage layer, a geofabric, a 40-mil high density polyethylene (HDPE) liner, and a clayey soil subgrade. A schematic of the cover is shown on Figure IA-3. A plan view of the cover system is shown on Figure IA-4.

Prior to placement of the HDPE membrane the surface of the CrOH sludge landfill will be prepared. The subgrade preparation will include removal of material (e.g. rocks, and sticks,) that could damage the membrane along with placement of a subgrade soil layer.

The soil will be compacted to a density equal to or greater than 92 percent of the material's maximum dry density according the Standard Proctor Compaction Test (ASTM D-698). The approximate six-inch subgrade soil layer will be composed of soil with a Unified Soil Classification of CL having a compacted hydraulic conductivity on the order of 3.2×10^{-6} cm/sec.

The barrier portion of the cover will consist of a 40-mil HDPE membrane that will meet or exceed the U.S. EPA recommend design of 1×10^{-7} cm/sec for a barrier system. HDPE has been shown to have a permeability of 4.5×10^{-10} cm/sec. Boring logs for monitoring wells 4S, 5S, 17D and 18D, installed near the CrOH sludge landfill, show the lithology to be sandy and silty clays and saprolite. Well locations are shown on Figure IA-4. The bottom of the landfill is approximately 9 feet below existing grade. The typical permeability of these soils range from 1×10^{-6} cm/sec to 1×10^{-5} cm/sec (Peck, Hanson and Thornburn, 1973). Hence, the final landfill cover will have a permeability less than the natural subsoils present as per Georgia Rule 391-3-11-.10 (40 CFR 265.310(a)(5)). Manufacturers' literature summarizing physical properties of HDPE are included in Appendix D and the above well boring logs are included in Appendix E.

The membrane portion of the cover will be overlain by a filter fabric. The filter fabric will increase friction and minimize slippage between the drainage layer and the underlying barrier layer.

The geofabric layer will be overlain by a drainage layer consisting of a geonet having a coefficient of permeability equal to or greater than 1×10^{-2} cm/sec. This layer will be utilized as the lateral drainage medium within the cover. A filter fabric will be placed over the geonet to reduce the potential of silt entering and

clogging the drainage layer. The geonet will convey infiltration from the vegetative soil layer to drainage collection pipes, as shown on Figure IA-3. The collection pipes will be located along the northern side of the capped area. At the western corner of the cap, the collected drainage will flow by gravity and discharge to an existing ditch.

The upper filter fabric will be overlain by 24 inches of soil with a Unified Soil Classification of SM or an equivalent soil capable of supporting vegetation. The lower 18 inches will be compacted to at least 92 percent of the material's maximum dry density (ASTM D-698). The upper six inches will be disked in preparation for seeding. Following grading, the vegetative layer will be fertilized and seeded to minimize erosion.

In order to confirm that the subgrade and lower 18 inches of vegetative soil meet the compaction requirements, field density tests will be performed using method ASTM D-2937, Density of Soil in Place by the Drive-Cylinder Method. At least one test will be made for each six-inch lift and for each 5000 square feet or 100 cubic yards of vegetative or subgrade soil placed. Soil not meeting density requirements will be scarified, re-compacted and re-tested.

In addition to construction of the cover system, run-off control ditches will be constructed along the southern boundary of the CrOH sludge landfill. These ditches will be sized to convey run-off from the cover generated by the 24-hour, 25-year storm as determined by U.S. Weather Bureau Technical Paper No. 40. The approximate location of the ditches is shown on Figure IA-4. Copies of the ditch sizing calculations are included in Appendix F.

Storm water run-on to the cover will be intercepted by ditches constructed along the northern boundary of the CrOH sludge landfill. These ditches will be sized to convey run-on to the cover generated by the 24-hour, 25-year storm as determined by U.S. Weather Bureau Technical Paper No. 40. Copies of the ditch sizing calculations are included in Appendix F.

IA-1f(3) Design Considerations

a. Erosion Potential: Analysis of the final grading of the landfill shows that an erosion of 0.57 tons per acre could occur per year. This value is small enough to be considered insignificant. A copy of this calculation is included in Appendix G.

b. Drainage: Storm water run-on and run-off will be controlled by the construction of diversion ditches designed to contain the water volume resulting from a 24-hour, 25-year storm. In addition to the control ditches, the run-off will be controlled through maintenance of the grassed condition of the cover surface. The approximate location of the ditches is shown on Figure IA-4. Copies of the ditch sizing calculations are included in Appendix F.

c. Geosynthetic Materials: Geosynthetic materials used in the cover construction include a 40-mil HDPE membrane, geonet, and filter fabric. The membrane, as required in a RCRA cover, will be placed over the subgrade soil layer to reduce the potential for infiltration into the closed CrOH sludge landfill. The filter fabric will separate the geonet from the vegetative layer, prohibiting the

finer soil particles in the vegetative layer from clogging the drainage layer. A second filter fabric will separate the membrane from the geonet to reduce the potential for slippage between the layers.

d. Leak Detection and Leachate Collection Systems: Since the CrOH sludge landfill is not and will not be an permitted operating landfill, leak detection and leachate collection systems are not required. Thus, there is no clay liner or synthetic liner system to serve as a barrier or to collect and remove leachate from the CrOH sludge landfill. The cover system has been designed to restrict percolation into the underlying soil in accordance with Georgia Rule 391-3-11-.10 (40 CFR 265.310(a)(1)).

e. Prevention of Airborne Contaminant Release: As discussed previously, the main constituent of concern at this facility is chromium. At this time the sludge in the landfill is covered with a soil layer of approximately 1 foot thick. The cap will be placed over this soil layer and therefore, the sludge will not be disturbed. Hence, airborne contaminant release is unlikely.

f. Other Considerations: The cover system has been modelled using the U.S. EPA HELP computer program. This program is used to predict the movement of surface water (from precipitation) throughout the cover system. The model considers run-off, evapotranspiration and lateral drainage as the mechanism for reducing the amount of percolation that penetrates the cover and moves into the waste. The model also predicts that for all rainfall

events including peak rainfall events, no vertical percolation into the waste is expected to occur.

The climatological conditions for the Bonnell facility in Newnan, Georgia were characterized by using synthetically generated rainfall, temperature and solar radiation data for Atlanta, Georgia for a 20-year period. Appendix C presents the HELP model input and output for the cover system to be used for CrOH sludge landfill.

Input values for the various soil physics parameters were selected from the default data base contained within the HELP model, as shown on Table 3. Fine sandy loam (No. 7, Unified Soil Classification - SM) values were used to describe layer 1, the vegetative soil layer. The specific characteristics of the vegetative soil layer have little effect on the amount of percolation through the unit cover. The purpose of the vegetative soil layer is to support vegetation and to provide a medium for evapotranspiration. The soils actually used in the vegetative layer will meet at a minimum the values specified in the HELP Model (No. 7 Unified Soil Classification - SM).

The input parameters that describe layer 2, the lateral drainage layer, were recommended by the author/developer of the HELP model, Dr. Paul Schroeder of the Waterways Experiment Station, U.S. Army Corps of Engineers, Vicksburg, Mississippi. The drainage net actually used will meet at a minimum the parameters specified in the HELP Model. Clay loam (No. 11, Unified Soil Classification - CL) values were used to describe layer 3, barrier soil liner with flexible membrane, a compacted

layer. When compaction is specified such as in layer 3, the soil characteristics are automatically adjusted as follows: (1) the saturated hydraulic conductivity is reduced by a factor of 20, (2) the porosity is reduced by 25 percent, (3) the field capacity is reduced by 25 percent of the difference between uncompacted field capacity and wilting point and (4) the evaporation coefficient is assigned the minimum value of 3.3. Layer 3 contains a HDPE membrane which the model assumes is impermeable except for possible leaks. Therefore, a leakage fraction of 0.0001, as recommended by Dr. Paul Schroeder assuming installation with good QA/QC procedures, was entered to characterize the potential leaks in the HDPE membrane.

HELP model input values such as the maximum leaf area index (2.00) and evaporative zone depth (22.00 inches) are default values for fair grass in Atlanta, Georgia.

IA-1f(4) Extensions for Closure

As previously indicated, the proposed schedule for closure of the CrOH sludge landfill is based on a 180-day construction period. If, due to encountering unforeseen conditions during closure, additional time is necessary to complete closure, the Georgia EPD will be notified within 30 days prior to expiration of the 180-day period in accordance with Georgia Rule 391-3-11-.10 (40 CFR 265.113(c)(2)) and an extension to the schedule to reflect the additional time required will be requested under Georgia Rule 391-3-11-.10 (40 CFR 265.113(b)(1)).

IA-1f(5) Groundwater Monitoring

During closure, groundwater monitoring activities will be performed as described in Sections E-5 and E-8 of the Part B Permit Application.

IA-1g DECONTAMINATION OF EQUIPMENT

Equipment or materials, including earth-moving and transport vehicles, and the pipes and process equipment (pumps) that have been in contact with hazardous wastes during this closure of the landfill will be decontaminated, as per Georgia Rule 391-3-11-.10 (40 CFR 265.112(b)(4) and 265.114), or will be disposed as a hazardous waste. The decontamination will be completed by triple rinsing using a low-volume pressure water wash and visual determination that all soil has been removed. Additional rinsing as needed, based on visual inspections of the equipment, will be implemented in order to ensure that all contaminants have been removed.

A decontamination station, shown on Figure IA-5, will be constructed at the location shown on Figure IA-4. This station will contain the rinse water used in cleaning equipment. At the end of closure activities, the station will be pressure washed. The rinse waters will be pumped through the carbon adsorption treatment units for treatment and disposal through the NPDES-permitted outfall. Soils that are collected in the decontamination tank that cannot be pumped through the treatment system will be disposed as a hazardous waste (F019). Material that cannot be easily decontaminated (e.g. protective clothing) will be bulk-loaded and shipped to an Interim Status or approved facility for disposal as hazardous waste.

A Safety Plan will be developed prior to initiating closure activities. This plan will be prepared and followed so that individuals participating in the closure are knowledgeable of potential dangers and take specific safety precautions. Only qualified personnel will participate in the closure activities.

IA-2 POST-CLOSURE PLAN

IA-2a POST-CLOSURE ACTIVITIES

This Post-Closure Plan describes in general, the activities that will be performed to monitor the CrOH sludge landfill throughout the 30-year post-closure period in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.117-119 and 264.310). Property use during post-closure care will be restricted in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.117(c)). The post-closure period may be shortened or extended by the Georgia EPD under Georgia Rule 391-3-11-.10 (40 CFR 264.117(a)(2)).

The post-closure certification will be submitted via registered mail to the Georgia EPD Director within 60 days after completion of post-closure care period in accordance with the approved post-closure plan as per Georgia Rule 391-3-11-.10 (40 CFR 264.120). This certification will be signed by both Bonnell and an independent registered professional engineer. Documentation supporting the engineer's certification will be available to Georgia EPD upon request and will be maintained until Bonnell is released from financial assurance requirements.

During plant operation, the Environmental Manager of Bonnell will be responsible for retaining and updating the on-site copy of the post-closure plan. In accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.118(b)(3)), the following representative can be contacted concerning the post-closure activities of the facilities at the plant:

Mr. Terry D. Snell, P.E.
Environmental Manager
William L Bonnell Company, Inc.
25 Bonnell Street
Newnan, Georgia 30263

mailing address: P.O. Box 428
Newnan, Georgia 30264

phone number: (404) 253-2020

IA-2a(1) Inspection Plan

The closed CrOH sludge landfill will be monitored and maintained throughout the post-closure period by regular inspections and groundwater monitoring as per Georgia Rule 391-3-11-.10 (40 CFR 264.118(b)(1) and (2)). Inspection items include:

- cover and surrounding area
- groundwater monitoring wells
- run-on and run-off diversion ditches
- permanent benchmarks

Inspections will be made by Bonnell personnel trained for such purposes, on a quarterly basis and after major storm events to ascertain the condition of the cover and surrounding area. This inspection schedule is intended to insure proper monitoring of the closed unit. An inspection checklist has been included as Table 4. The purpose of this checklist is to assist the inspector in noticing particular items during the facility inspections including

ground cover maintenance. The following sections describe the general procedures which will be followed during the post-closure care period.

Inspection and monitoring will continue for the 30-year post-closure period or until Bonnell receives approval from the Georgia EPD to discontinue the program. Inspection records will be kept at the Bonnell facility for a period of 5 years after the end of the post-closure care period.

IA-2a(2) Groundwater Monitoring

Groundwater monitoring activities will be performed as described in Section IA-1f(5). The monitoring system, along with the sampling and analysis plan procedures, will be continued for the 30-year post-closure period or until Bonnell receives notification from the Georgia EPD of approval to discontinue monitoring.

IA-2a(3) Maintenance Activities

This section addresses maintenance of the closed landfill in the following areas:

1. Maintenance and Repair of the Final Cover: The cover will be inspected quarterly throughout the post-closure care period. Inspections will include checks for consistency of the soil cover, erosion, stability of the lower embankment, settlement, condition of the vegetation, and any other element of the system which may adversely affect the performance of the cover.

2. Run-on/off Control System: The run-on and run-off ditches and diversion structures will be inspected quarterly and after all major storm events to check for proper flow capacity and discharge. Ditches will be repaired and/or seeded as necessary to maintain grass cover.

3. Groundwater Monitoring System: Groundwater monitoring wells will be inspected quarterly to verify that accessible parts of the wells including the outer casing and cap, lock, apron, inner casing and cap, measuring point, and well identification number are maintained.

4. Security Control Devices: All access to the closed CrOH landfill will be controlled by fences surrounding the Bonnell site. These fences will be repaired or replaced as necessary. These fences will be inspected at least quarterly and an inspection log will be completed. The inspection log is included as Figure IA-6.

5. Vegetative Cover: The surficial cover and perimeter run-on diversion ditch and the run-off diversion ditch will be grassed. Fertilizer and seed will be applied as needed to assure continuous grass cover as a deterrent to erosion. Fertilizer will be applied a minimum of once a year.

   Post-closure care will include mowing the grass of the CrOH landfill at least four times per year. Clippings will be left in place to provide nutrients and organic matter and to promote erosion control.

Also during post-closure, supplemental water will be applied as needed during dry weather to maintain the vegetative cover and help control wind erosion. Irrigation will be scheduled based on observations made during field inspections.

During post-closure care, Bonnell will inspect the grass cover quarterly and after major rainfall events. Inspections will be logged, and reports will be retained by Bonnell. The inspections will check for erosion, vegetative distress due to insect infestation or drought, or other factors which may adversely affect the vegetative cover.

6. Additional Considerations: The cover drainage system will be checked during inspections to assure that no ponding of water occurs on the surface of the cover.

IA-2a(4) Demonstration of Security at the Site

The plant site is monitored by security guards 24 hours per day, 365 days per year. Signs will be posted that read "DANGER - UNAUTHORIZED PERSONNEL KEEP OUT." The monitoring wells have been provided with locks to maintain the security of the individual wells.

IA-3 NOTICE IN DEED AND NOTICE TO LAND AUTHORITY

In conjunction with the closure certification, Bonnell will submit to the local zoning authority and to the Director of Georgia EPD, a survey plat indicating the location and dimensions of the closed CrOH sludge landfill. This plat will be prepared and certified by a professional land surveyor. The plat will be filed with the local zoning authority and will contain a note, prominently displayed, which states the owner's obligation to restrict disturbance of the unit as specified in Georgia Rule 391-3-11-.10 (40 CFR 264.116).

Within 60 days after certification of closure, Bonnell will record a notation on the deed to the property as per Georgia Rule 391-3-11-.10 (40 CFR 264.119(b)(1)). The notation on the deed to the property will include: (1) that the CrOH sludge landfill has been used to manage hazardous wastes, (2) that its use is restricted under Georgia Rule 391-3-11-.10 (40 CFR 264.117(c)), (3) that a survey plat and record of the type, location and quantity of the wastes which have been stored there as required under Georgia Rule 391-3-11-.10 (40 CFR 264.116 and 264.119(a)), respectively, has been filed with the local zoning authority and with the Georgia EPD. Bonnell will submit a certification of notice that the notation specified in 40 CFR 264.119(b)(1) has been recorded in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.119(b)(2)) to the Director of Georgia EPD.

IA-4 CLOSURE COST ESTIMATE

The closure cost information presented is submitted in accordance with requirements of Georgia Rule 391-3-11-.10 (40 CFR 265.142 and 265.143). An estimated $71,000 will be needed to close the CrOH sludge landfill. The closure costs for the area are presented by activity in Table IA-5.

These closure cost estimates will be kept on file by Bonnell. Until closure is completed, this estimate will be adjusted annually for inflation within 30 days after close of Bonnell's fiscal year in accordance with Georgia Rule 391-3-11-.10 (40 CFR 265.142(b)). Whenever a change in the closure plan affects the cost of closure, the cost estimate will be adjusted within 30 days after the revision to the closure plan in accordance with Georgia Rule 391-3-11-.10 (40 CFR 265.142(c)).

IA-5 POST-CLOSURE COST ESTIMATE

The post-closure cost information presented is submitted in accordance with requirements of Georgia Rule 391-3-11-.10 (40 CFR 264.144). The post-closure costs are presented by activity in Table IA-6. An estimated $6,732 per year will be needed for post-closure inspections and maintenance procedures over the post-closure care period, for a total of $202,000. In addition, $150 per year is included for chromium plume monitoring for fourteen years. Therefore, the total post-closure care costs presented in Table IA-6 are $204,000.

This post-closure cost estimate will be kept on file by Bonnell. The cost estimate will be adjusted for inflation annually within 30 days after the close of Bonnell's fiscal year in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.144(b). Whenever a change in the post-closure plan affects the cost of post closure, the cost estimate will be adjusted within 30 days after the revision to the post-closure plan in accordance with Georgia Rule 391-3-11-.10 (40 CFR 264.144(c)).

IA-6 FINANCIAL ASSURANCE FOR CLOSURE/POST-CLOSURE AND LIABILITY COVERAGE

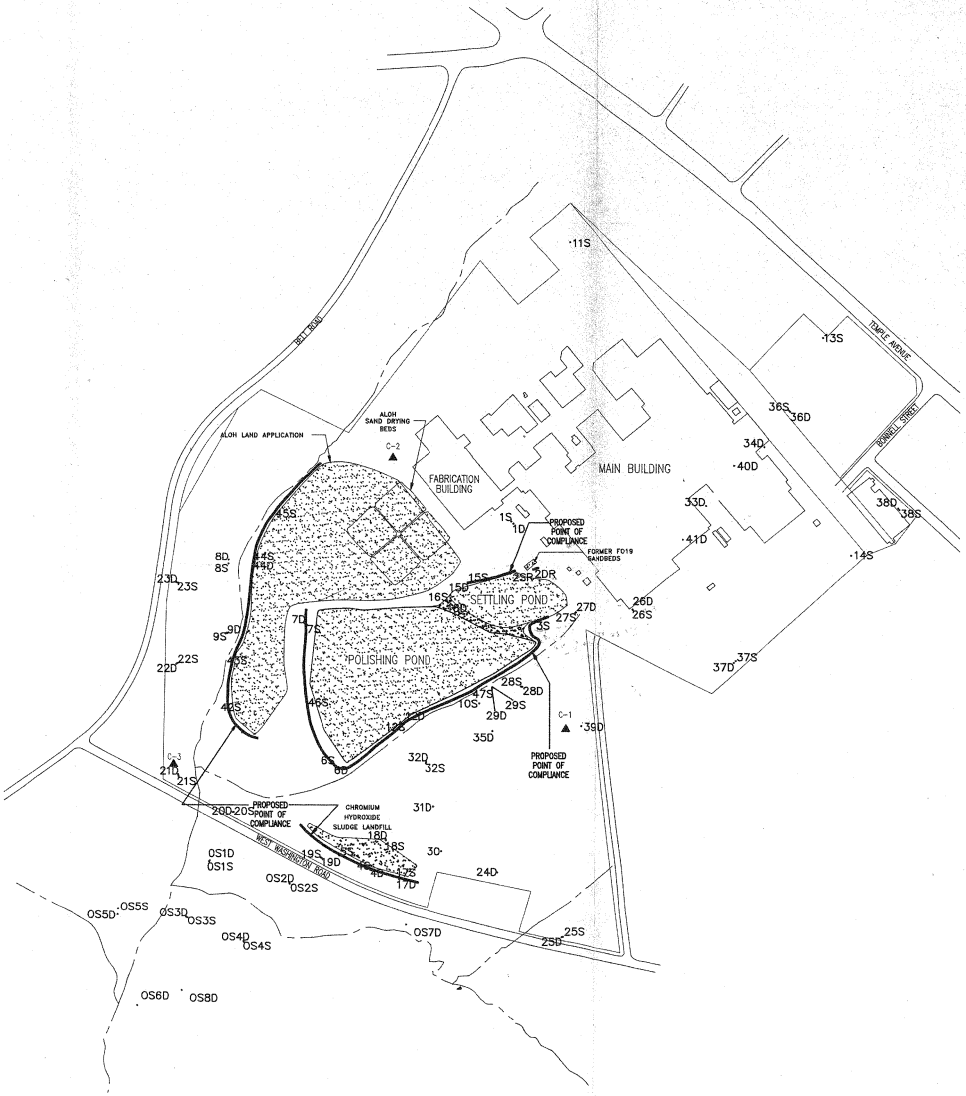
The documentation required to demonstrate financial assurance for closure and post-closure is included in Appendix H. The documentation follows Georgia Rule 391-3-11-.05 (40 CFR 264.143, 264.145, and 264.147).

IA-7 FINANCIAL ASSURANCE MECHANISM FOR SUDDEN/NON-SUDDEN ACCIDENTAL OCCURRENCES

The documentation required to demonstrate financial assurance under Georgia Rule 391-3-11-.05 (40 CFR 264.147), for sudden and non-sudden accidental occurrences, is included in Appendix H. The documentation reflects liability coverage in the amount of $4 million per occurrence and an $8 million annual aggregate.

REFERENCE

Peck, R.B., W.E. Hanson and T.H. Thornburn. 1973. Foundation Engineering, Second Edition. John Wiley & Sons, Inc., New York.



LEGEND:

22D:	"D" DEEP MONITORING WELL (SCREEN GERNEALLY INSTALLED TO AUGER REFUSAL DEPTH, TOP OF ROCK)
22S:	"S" SHALLOW MONITORING WELL (SCREEN GERNERALLY SPANS THE GROUNDWATER SURFACE)
C-1: ▲	BORING WHERE ROCK CORING PERFORMED
	HAZARDOUS WASTE MANAGEMENT UNIT
	PROPOSED POINT OF COMPLIANCE
	STREAMS

0 100 400
50 200 800
SCALE IN FEET
1" = 200'

REV.	DATE	DESCRIPTION	DWN.BY:	DES.BY:	CHK.BY:	APP.BY:
DATE OF ISSUE:		DWN.BY:	CHK.BY:			
		DES.BY:	APP.BY:			

EMCON SOUTHEAST

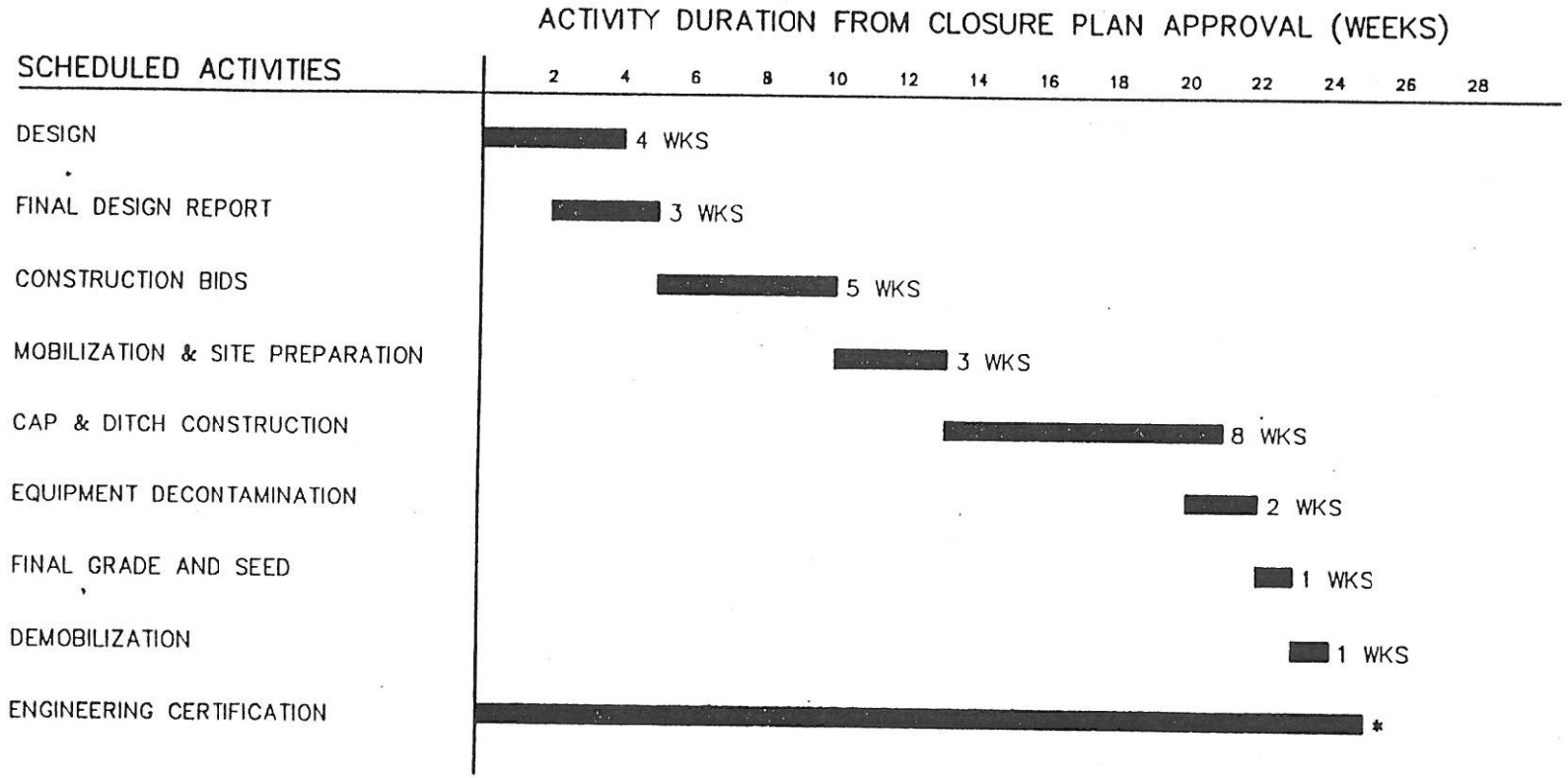
WILLIAM L. BONNELL COMPANY
CHROMIUM HYDROXIDE LANDFILL
CLOSURE AND POST-CLOSURE PLANS

SITE PLAN

DRAWING IA-1

PROJECT 92013

M:\BONNELL\IA-1

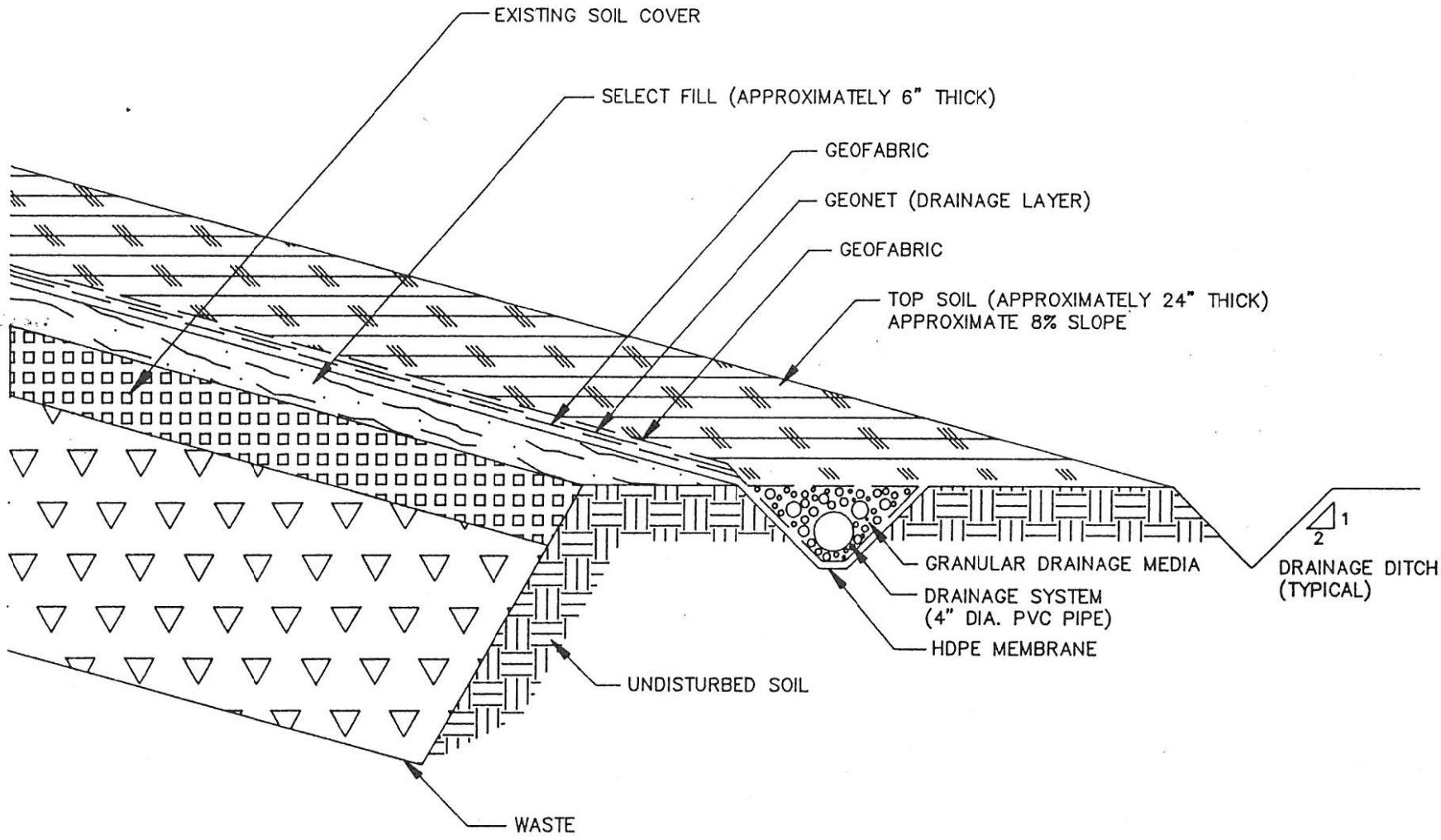


LEGEND

PROJECTED TIME LINE

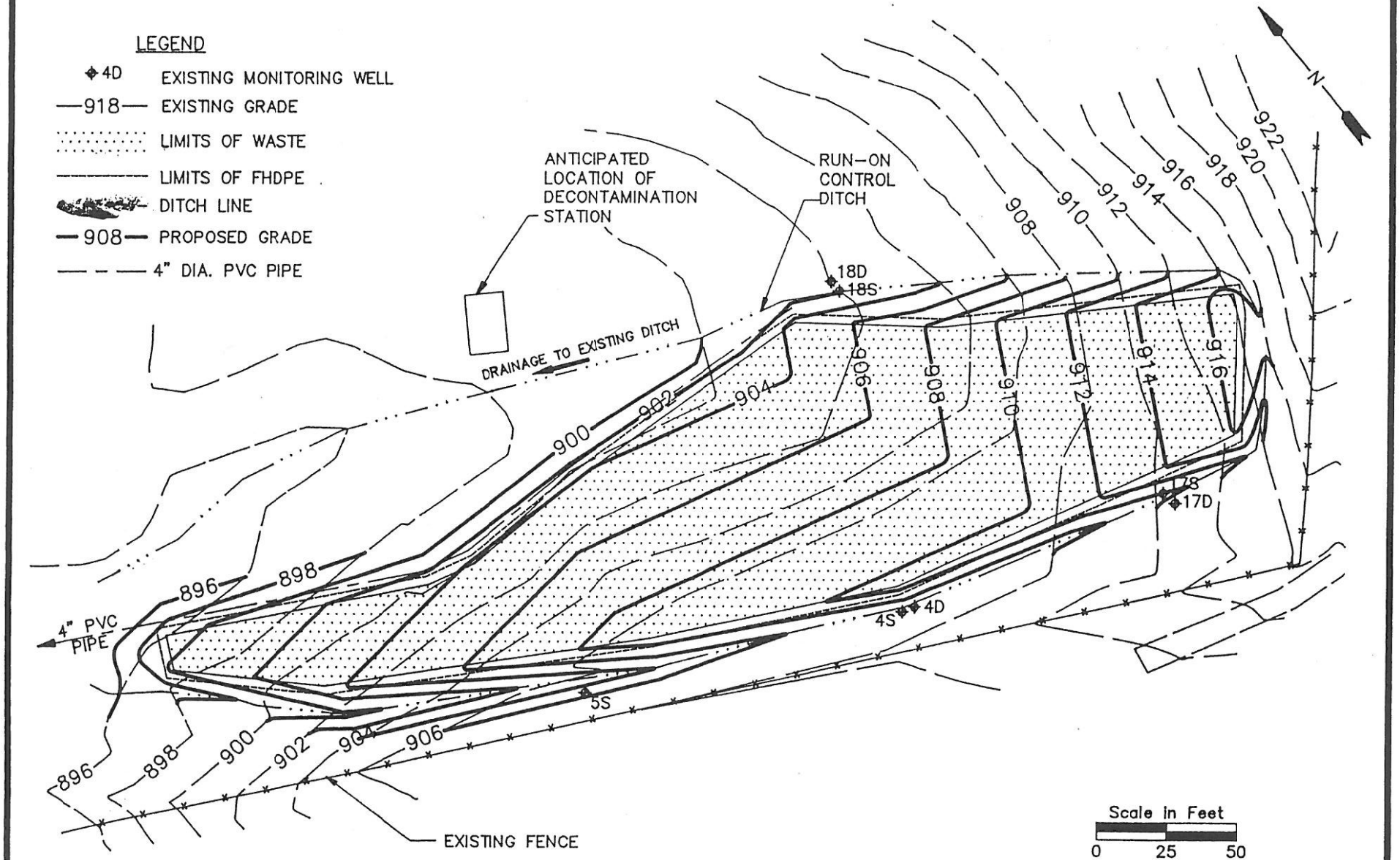
* CERTIFICATION TO BE SUBMITTED WITHIN 60 DAYS AFTER CLOSURE COMPLETION

WILLIAM L BONNELL COMPANY NEWNAN, GEORGIA	FIGURE IA-2	CrOH SLUDGE LANDFILL CLOSURE SCHEDULE



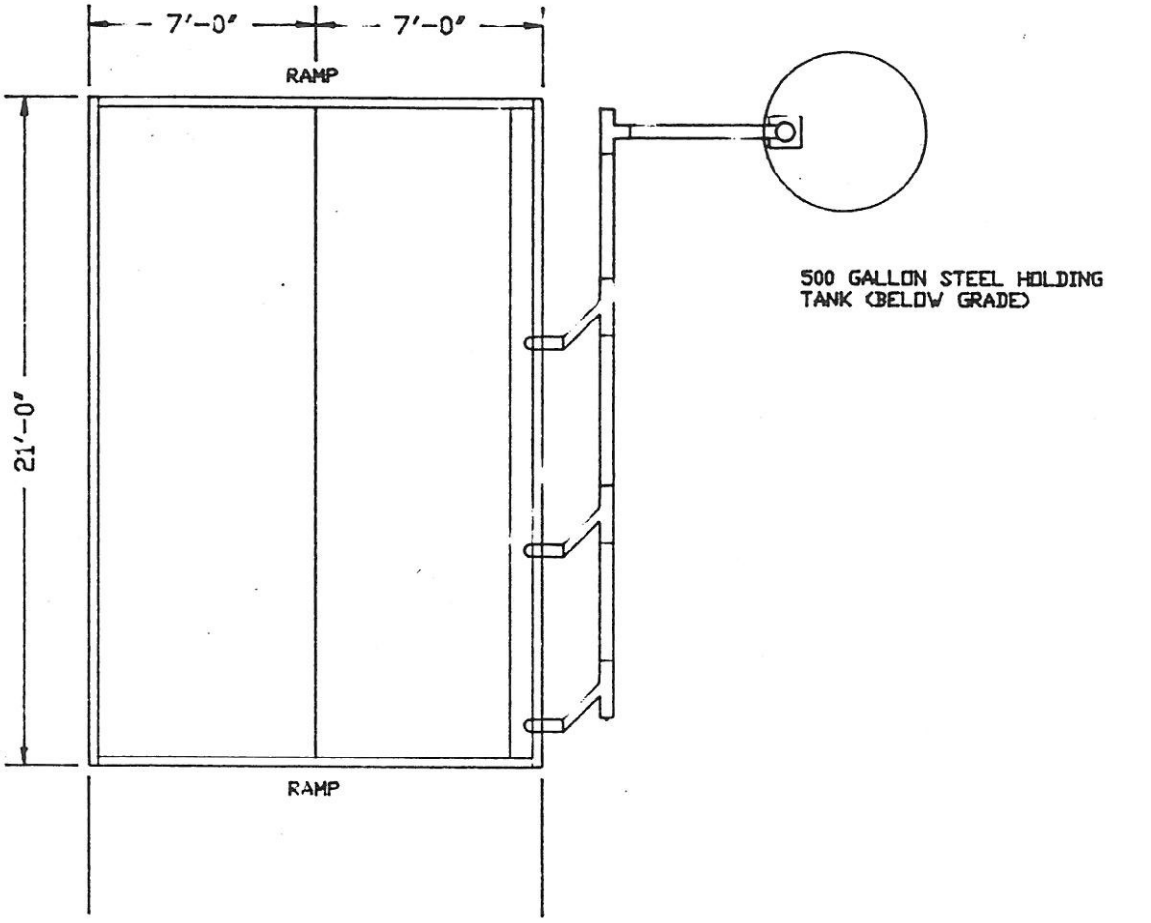
NOT TO SCALE

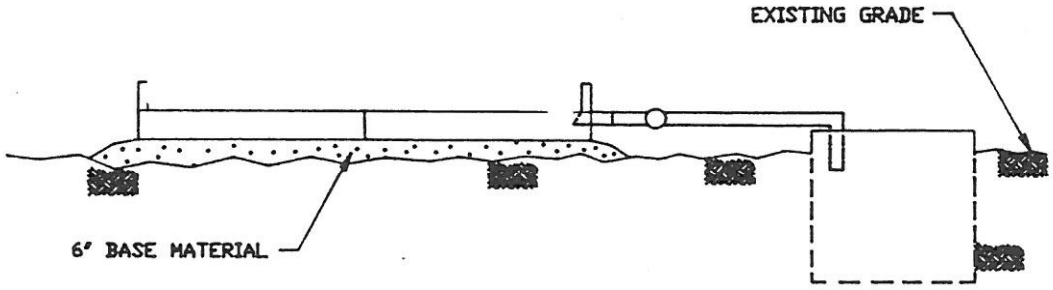
WILLIAM L BONNELL COMPANY, INC. NEWNAN, GEORGIA A-N-0006701	CHROMIUM HYDROXIDE LANDFILL CLOSURE PLAN	TYPICAL COVER SCHEMATIC IA-3



SOURCE: TOPOGRAPHIC SURVEY PROVIDED BY WILLIAM L. BONNELL COMPANY, INC.

WILLIAM L BONNELL COMPANY, INC. NEWNAN, GEORGIA		CrOH SLUCGE LANDFILL CONCEPTUAL COVER IA-4





SOURCE: REVISED CLOSURE PLAN CHROMIUM HYDROXIDE SLUDGE SAND DRYING BEDS BY ATEC ENVIRONMENTAL DATED MARCH 7, 1990

SCALE: 1"=5'

WILLIAM L BONNELL COMPANY NEWNAN, GEORGIA	DECONTAMINATION WATER COLLECTION SYSYEM	DWG. No. IA-5

FIGURE IA-6

BONNELL PERIMETER FENCE

QUARTERLY INSPECTION LOG

INSPECTION DATE AND TIME: _____

INSPECTOR'S NAME: _____

DESCRIBE LOCATION AND TYPE OF DEFICIENCIES (Breaks, collapse, erosion, excessive rust): _____

DESCRIBE REPAIRS MADE TO CORRECT DEFICIENCIES AND INDICATE DATE OF REPAIRS: _____

TABLE 1

LIST OF MATERIALS INTRODUCED IN THE CHEMICAL CONVERSION COATING PROCESS AND WASTEWATER TREATMENT FACILITY WILLIAM L BONNELL COMPANY, INC. NEWNAN, GEORGIA

PROCESS:

Aluminum
Chromic acid
Hydrofluoric acid
Isopropyl alcohol
Phosphoric acid
Sodium hydroxide
Water

WWTF:

Lime
Polymer
Sodium bisulfite
Sulfuric acid

TABLE 2

LIST OF MATERIALS INTRODUCED IN THE ANODIZING PROCESS AND WASTEWATER TREATMENT FACILITY WILLIAM L BONNELL COMPANY, INC. NEWNAN, GEORGIA

PROCESS:

Aluminum
Hydrogen peroxide
Nickel acetate
Nitric acid
Phosphoric acid
Sodium hydroxide
Sulfuric acid
Water

WWTF:

Lime
Polymer
Spent sodium hydroxide
Spent sulfuric acid
Sodium hydroxide

TABLE 3
HELP MODEL-DEFAULT UNVEGETATED, UNCOMPACTED SOIL CHARACTERISTICS

HELP	SOIL CLASSIFICATIONS USDA	USCS	POROSITY (VOL/VOL)	FIELD CAPACITY (VOL/VOL)	WILTING POINT (VOL/VOL)	SAT. HYD. CONDUCTIVITY (CM/SEC)
1	CoS	GS	0.417	0.045	0.018	1.0E - 02
2	S	SW	0.437	0.062	0.024	5.8E - 03
3	FS	SM	0.457	0.083	0.033	3.1E - 03
4	LS	SM	0.437	0.105	0.047	1.7E - 03
5	LFS	SM	0.457	0.131	0.058	1.0E - 03
6	SL	SM	0.453	0.190	0.085	7.2E - 04
7	FSL	SM	0.473	0.222	0.104	5.2E - 04
8	L	ML	0.463	0.232	0.116	3.7E - 04
9	SiL	ML	0.501	0.284	0.135	1.9E - 04
10	SCL	SC	0.398	0.244	0.136	1.2E - 04
11	CL	CL	0.464	0.310	0.187	6.4E - 05
12	SiCL	CL	0.471	0.342	0.210	4.2E - 05
13	SC	CH	0.430	0.321	0.221	3.3E - 05
14	SiC	CH	0.479	0.371	0.251	2.5E - 05
15	C	CH	0.475	0.378	0.265	1.7E - 05
16	Liner Soil		0.430	0.366	0.280	1.0E - 07
17	Liner Soil		0.400	0.356	0.290	1.0E - 08
18	Mun. Waste		0.520	0.294	0.140	2.0E - 04
19	USER SPECIFIED SOIL CHARACTERISTICS					
20	USER SPECIFIED SOIL CHARACTERISTICS					

TABLE 4

POST-CLOSURE INSPECTION CHECKLIST
FOR CrOH SLUDGE LANDFILL
WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

Date Inspected/Time _____

Reasons for Inspection
(routine/rainfall data) _____

Erosion (yes/no) _____

Ample Vegetative Ground-Cover (yes/no) _____

Woody Plant Infiltration (yes/no) _____

Security Barrier Intact (yes/no) _____

Drainage Ditches checked (yes/no) _____

Ground-water Monitoring Wells checked (yes/no)
- Locks
- Structure Integrity
- Identification
- Survey Benchmark

_____

Comments

_____

Date/Type of Corrective Action _____

Name of Inspector _____
(Signature)

Name of Person responsible for Corrective Action or Further Investigation _____
(Signature)

The purpose of this checklist is to assist the inspector in noticing particular item during the facility inspections. These inspections are to occur on a routine basis and also are to be conducted following any heavy rainfall or any natural disaster.

The inspector is encouraged to make general observations in the "Comments" section regarding conditions found during inspections. Comments such as condition of vegetation, weather, repair, etc. should be noted. Any necessary corrective action or further investigation must be noted in the "Comments" section. Finally, the inspector is responsible for obtaining the description of the corrective action or further investigation for entry in the "Date/Type of Corrective Action or Further Investigation" section and for obtaining the signature of the person responsible for the corrective action or further investigation.

TABLE 1A–5

COST ESTIMATE FOR CLOSURE OF CrOH SLUDGE LANDFILL

WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

ITEM	QUANTITY	UNIT COSTS	COST
1. DESIGN			
a. Professional Engineer	20 hours	$80.00 per hour	$1,600
b. Design Engineer	40 hours	$60.00 per hour	$2,400
c. Drafter	60 hours	$40.00 per hour	$2,400
2. SITE PREPARATION			
a. Mobilization/Demobilization	Lump Sum	$1,000.00	$1,000
b. Cover Preparation	400 c.y.	$6.00 per c.y.	$2,400
3. CONSTRUCTION *			
a. Cap Construction			
1. Fill Material (2 ft. topsoil)	1,600 c.y.	$6.00 per c.y.	$9,600
2. Geofabric	5,560 s.y.	$1.35 per s.y.	$7,506
3. Geonet	2,780 s.y.	$2.43 per s.y.	$6,755
4. HDPE Membrane	2,780 s.y.	$4.14 per s.y.	$11,509
c. Ditch Construction	Lump Sum	$2,000.00	$2,000
4. EQUIPMENT DECONTAMINATION			
a. Labor	12 hours	$10.00 per hour	$120
b. Equipment: High-pressure cleaning	1 day	$75.00 per day	$75
5. FINAL GRADE AND SEED	2,400 s.y.	$1.70 per s.y.	$4,080
6. CONTRACTOR SUPERVISION			
a. Labor	200 hours	$50.00 per hour	$10,000
b. Expenses	60 days	$25.00 per day	$1,500
7. ENGINEERING INSPECTION AND CERTIFICATION			
a. Professional Engineer	40 hours	$80.00 per hour	$3,200
b. Technician	100 hours	$40.00 per hour	$4,000
c. Clerical	10 hours	$25.00 per hour	$250
d. Expenses, Travel and Per Diem	25 days	$25.00 per day	$625
		TOTAL COST	$71,000

* Includes labor cost

** All costs are in 1992 dollars

TABLE IA-6

COST ESTIMATE FOR POST-CLOSURE CARE OF CrOH SLUDGE LANDFILL

WILLIAM L BONNELL COMPANY, INC.
NEWNAN, GEORGIA

ITEM	QUANTITY	UNIT COSTS	COST
1. SITE INSPECTION (4 times/year)			
a. Technician	16 hours	$40.00 per hour	$640
2. MOWING AND FERTILIZING *			
a. Mowing (4 times/year)	2.0 acres	$30.00 per acre	$60
b. Fertilizing	0.5 acres	$100.00 per acre	$50
3. ROUTINE EROSION REPAIR *			
a. Soil excavating, hauling, spreading and compaction	3.5 c.y.	$10.00 per c.y.	$35
b. Seeding	335 s.f.	$0.08 per s.f.	$27
4. GROUND-WATER QUALITY MONITORING			
a. Corrective Action Effectiveness, per year	4 wells	$780.00 per well	$3,120
b. Appendix IX Sampling & Analysis	1 well	$2,800.00 per well	$2,800
		TOTAL COST PER YEAR	$6,732
		POST-CLOSURE COST (30 years)	$202,000
ADDITONAL CHROMIUM PLUME MONITORING (1 well, $150.00 per well, for 14 years)			$2,000
		TOTAL POST-CLOSURE COST (30 years)	$204,000

* Includes labor cost
** All cost are in 1992 dollars

Tredegar
ALUMINUM EXTRUSIONS

Subsidiaries,

The William L Bonnell Co., Inc.
Capitol Products Corporation

July 22, 1993

Ms. Susan Eason
Georgia Department of Natural Resources
Environmental Protection Division
Floyd Towers East, Suite 1154
205 Butler Street
Atlanta, Georgia 30334

Re: Closure of Chromium Hydroxide Landfill
The William L Bonnell Company, Inc., Newnan, Georgia

Dear Ms. Eason:

Attached for your use and review are four (4) copies of the report titled CERTIFICATION OF LINER SYSTEM CONSTRUCTION for the closure of the referenced landfill. This report provides information required by your office to document the closure of the site in accordance with the approved Closure Plan and 40 CFR 264.115.

I trust you find the enclosed information complete and satisfactory. If you should have any questions or comments concerning this, please do not hesitate to call.

Sincerely,

William L Bonnell Company, Inc.

Terry D. Snell, P.E.

TDS/jw

Enclosures

cc: EMCON Southeast

Post Office Box 428 • Newnan, Georgia 30264 • Telephone (404) 253-2020

OWNER CERTIFICATION

I, D. R. Monk, of The WILLIAM L BONNELL COMPANY, INC., hereby state and certify that, to the best of my knowledge and belief, the Chromium Hydroxide Landfill located at The WILLIAM L BONNELL COMPANY, INC., 25 Bonnell Street, Newnan, Georgia, 30263, has been closed in accordance with the attached approved closure plan, and that the closure was substantially completed on the 25th day of May, 1993.

D. R. Monk

7/23/93
Date

D. R. Monk
General Manager
WILLIAM L BONNELL COMPANY, INC.
25 Bonnell Street
Newnan, Georgia 30263
404-253-2020

ENGINEER CERTIFICATION

I, George H. Alexander, a registered professional engineer in the State of Georgia, hereby certify that I have made visual inspections of the Chromium Hydroxide Landfill located at The WILLIAM L BONNELL COMPANY, INC., 25 Bonnell Street, Newnan, Georgia, 30263; and, to the best of my knowledge and belief, closure of the facility has been performed in accordance with the attached approved closure plan; and that the closure was substantially completed on the 25th day of May, 1993.

7-22-93

Date

George H. Alexander, P.E.
EMCON Southeast
1575 Northside Drive, Suite 435
Atlanta, Georgia 30318
Georgia Professional Engineer License No. 11458

CERTIFICATION
of
LINER SYSTEM CONSTRUCTION

Chromium Hydroxide Landfill
The William L Bonnell Company, Inc.
P. O. Box 428
Newnan, Georgia 30264
EMCON Project #:2040.008.92

July 23, 1993

Prepared by
EMCON Southeast
435 Atlanta Technology Center
1575 Northside Drive
Atlanta, Georgia 30318

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SECTION 1
INTRODUCTION

1.1 GENERAL

The William L Bonnell Company, Inc. (Bonnell), owns and operates a facility in Newnan, Georgia, for the production of aluminum extrusions. The facility is commonly referred to as the Newnan Plant. The facility's address is

The William L Bonnell Company, Inc.
25 Bonnell Street
Newnan, Georgia 30263

The mailing address is

The William L Bonnell Company, Inc.
P. O. Box 428
Newnan, Georgia 30264

Bonnell has developed an approximately 0.75-acre chromium hydroxide (CrOH) sludge landfill on the southeast portion of the facility premises. A Closure Plan for this landfill was prepared as Section IA of the "RCRA PART B PERMIT APPLICATION FOR POST CLOSURE CARE" prepared by Bonnell. This document was approved by the Georgia Department of Natural Resources, Environmental Protection Division (EPD) on September 28, 1992.

EMCON Southeast (EMCON) was retained by Bonnell to monitor construction activities at the landfill, to provide the third-party quality assurance inspection services for the synthetic liner system construction and to certify closure of the landfill. Geo-Hydro Engineers, Inc. (Geo-Hydro), was employed by Bonnell to provide third-party quality assurance inspection and testing services for all soil-related aspects of the closure

1.2 PROJECT OVERVIEW

The Closure Plan requires the installation of a cap over the landfill, construction of run-on and run-off control ditches, removal and appropriate disposal of contaminated materials generated during the cleaning of the site, and decontamination of equipment. The approved landfill cap consists of several layers: from top to bottom, two feet of vegetative soil; a geofabric; a geonet drainage layer; a geofabric; a minimum 40-mil thick high density polyethylene (HDPE) liner; and a clayey soil subgrade. A schematic drawing of the landfill cap system is included as Figure 1.

This quality control plan divides the liner installation into the following basic steps:

1. installation of Subgrade Soil Layer;

2. installation of HDPE Liner;

3. installation of geofabrics, drainage net, and drainage piping; and

4. installation of topsoil cover over liner.

Principal parties involved in the closure of the landfill include:

Owner:

The William L Bonnell Company, Inc.
25 Bonnell Street
Newnan, Georgia 30264

Design Engineer:

EMCON Southeast
1575 Northside Drive, Suite 435
Atlanta, Georgia 30318

Earthwork Contractor:

Payton & Sons Construction Company
Country Lane
Newnan, GA 30263

Geosynthetic Material Contractor:

Serrot Corporation
271 Highway 74
Suite 4
Peachtree City, GA 30269

Earthwork Quality Control Engineer:

Geo-Hydro Engineers, Inc.
1000 Cobb Place Boulevard
Suite 290
Kennesaw, Georgia 30144-3684

Geosynthetic Quality Control Engineer:

EMCON Southeast
1575 Northside Drive, Suite 435
Atlanta, Georgia 30318

Registered Surveyor:

Robert A. Moreland, RLS
P. O. Box 101
Woodbury, Georgia 30293

1.3 SCOPE OF SERVICES

The following certification has been conducted and prepared under the direction of professional engineers registered in the state of

Georgia. This report describes the management approach and field test methods employed during each of these steps to ensure that the CrOH Landfill Closure was conducted in substantial compliance with the EPD-approved closure plan.

During installation of the anchor trench, traces of CrOH were discovered outside of the previously established boundaries of the landfill unit. Testing of the soils in these areas indicated that the concentration of CrOH was sufficiently high to require inclusion of these areas into the landfill area to be closed. Accordingly, additional tests were made of soils in areas progressively farther from the known landfill boundaries, until CrOH concentrations lessened to background limits installed in the Closure Plan for the Surface Impoundment. This discovery resulted in Bonnell's filing a Class II Permit Modification request with the EPD to expand the limits of closure. As a result, the final landfill area closed increased from approximately 30,000 SF to approximately 41,300 SF.

This modification was discussed with and verbally approved by EPD personnel prior to implementation. Written approval from EPD for this cell modification was provided in the April 22, 1993, letter authored by Susan Eason of the EPD. A copy of this letter may be found in Appendix A.

1.4 QUALITY ASSURANCE PERSONNEL

The primary Q/A team members that worked on this certification effort is listed in Table 1.

These individuals were supported at various times by other qualified personnel, as required by the project schedule.

1.5 PROJECT SCHEDULE

Following is a schedule describing the dates and duration on which key elements of the closure project were accomplished:

	Beginning Date - Ending Date
Borrow Source Mining	March 19, 1993 - April 27, 1993
Subgrade Placement	March 24, 1993 - April 29, 1993
HDPE Membrane Placement	April 28, 1993 - April 30, 1993
Filler Media	April 30, 1993 - May 4, 1993
Drain Pipe Installation	May 5, 1993 - May 12, 1993
18" Vegetative Soil Layer	May 5, 1993 - May 25, 1993
6" Vegetative Soil Layer	May 26, 1993 - June 3, 1993
Grassing	June 3, 1993 - June 4, 1993

SECTION 2
INSTALLATION OF SUBGRADE SOIL LAYER

2.1 BEGINNING ACTIVITIES

Closure construction activities began March 22, 1993. The existing soil and grass cover was scarified to a depth of approximately six inches using a farm tractor and disc harrow so that there would be a good bond between the existing cover soil and the proposed subgrade soil layer.

2.2 SUBGRADE SOIL SOURCE TESTING

The approved Closure Plan required that the subgrade soil layer be approximately six inches thick, be compacted to a density equal to or greater than 92 percent of the material's maximum dry density according to the Standard Proctor Compaction Test (ASTM D-698), and have a compacted hydraulic conductivity on the order of 3.2×10^{-6} cm/sec. While Bonnell had a stockpile of soil available at the facility, it was doubtful that it would meet the specified conductivity requirement for the subgrade soil layer. Accordingly, Bonnell arranged for Geo-Hydro to provide soil testing of three off-site borrow pits in order to establish an appropriate source for this material. In addition to these three off-site sources, Geo-Hydro tested on-site soils immediately adjacent to the landfill. This was done because the soil appeared that it might meet the Closure Plan specifications and removal of the soil would facilitate surface water drainage.

The three off-site borrow sources investigated by Geo-Hydro were designated as the Goodwyn Road, Newton Road, and Payton Property borrow sites. Four samples were gathered and analyzed from on-site soils located near the landfill, four from the Goodwyn Road site,

two from the Newton Road site, and four from the Payton Property site. These tests indicated that each potential soil source exhibited the following range of permeabilities:

On-site material:	2.8×10^{-7} cm/sec
Goodwyn Road Pit:	2.2×10^{-7} to 3.1×10^{-7} cm/sec
Newton Road Pit:	3.0×10^{-7} to 6.0×10^{-7} cm/sec
Payton Property Pit:	2.0×10^{-7} cm/sec

Based on these results, all four locations were considered satisfactory sources of material for the subgrade soil layer. While material was obtained from each of the four sites, the Goodwyn Road site was the source of the majority of material used in the subgrade soil layer. Under the supervision of the geotechnical engineer at the borrow site and the landfill site, material was selectively removed from the borrow site and stockpiled at the facility near the landfill. This operation was conducted from March 19, 1993, until April 27, 1993.

One bulk sample of the material was also collected randomly from the in-place material. This sample was tested and results confirmed that the soil placed on the landfill was the same material as that tested at the borrow sites.

2.3 SOIL PLACEMENT

Generally, the soil imported from the borrow site was stockpiled near the landfill due to construction sequencing. During the placement of this material on the landfill, the sitework contractor provided several laborers who assisted with the subgrade preparation at the direction of the geotechnical engineer. Concurrently, the geotechnical engineer also performed compaction

tests based on the previously established moisture/density curves. Material consistency was confirmed through Proctor tests and visual observations. The compaction tests were field located using the surveyed subgrade stakes and the on-site coordinate system. These tests are shown on in Geo-Hydro's report found in Appendix B of this report.

The subgrade soil layer material was placed in a single lift that provided for an approximately six-inch thick in-place layer. The material was compacted to a dry density exceeding 95 percent of its maximum as determined by Standard Proctor Compaction Test (ASTM D-698). When desiccation and crusting of the surface layer occurred, the area was adjusted with water and tested for water content to verify uniform moisture compaction. By banking the material in the stockpile, an adequate moisture content was maintained and the soil responded well during placement, meeting or exceeding the compaction requirement.

2.4 FINAL GRADE CONTROLS

When the final subgrade was surveyed, stakes were placed on the surveyed points. These stakes were then marked 24 inches above the subgrade surface for use in placing the compacted clay layer. Due to the care involved in preparing the final 6 inches for geomembrane placement, the compacted clay was surveyed and approved in sections. Final thickness verification was determined by comparing the surveys performed before and after the clay layer placement. Compacted clay surface approval was provided through daily inspections by a geotechnical engineer and periodic visits by EPD personnel.

2.5 COMPLIANCE DOCUMENTATION

Geo-Hydro's report certifying compliance of the subgrade soil layer with the Closure Plan is included as Appendix C.

SECTION 3
GEOMEMBRANE INSTALLATION

3.1 GENERAL

A 40 mil High Density Polyethylene (HDPE) liner was specified for the project. The owner, in an effort to insure environmental integrity of the closure cap, decided to upgrade the thickness to 60 mil. The owner contracted with Serrot Corporation (Serrot) to furnish and install the geomembrane.

3.2 GEOMEMBRANE MATERIAL PROPERTIES AND TESTING

Material properties were tested and certified by the manufacturer. The owner authorized the geosynthetics technician to take material samples from the rolls delivered to the site in order to perform selected conformance tests to confirm the manufacturer's test data. These test results have been included in Appendix D of this report and indicate that the HDPE material used to cap the landfill was in compliance with the project specifications. The following rolls were used on this project:

1020562	1020400
1020574	1020418
1020579	

Table 2 summarizes the material properties specifically referenced in the quality control plan.

3.3 DEPLOYMENT ACTIVITIES

Initial deployment activities began on April 27, 1993. A total of 13 panels were deployed, all on that date. Subgrade preparation was continually reviewed by the geotechnical engineer and the senior geosynthetics technician. Prior to deployment, a subgrade acceptance form was signed by the designated representative of Serrot; a copy of this form is included in Appendix D.

All deployment activities were observed and recorded by EMCON personnel. These activities included aligning panels, overlapping adjacent panels, and labeling panels with unique identification numbers, deployment date, and source roll number. Once deployed, each panel was visually inspected to check for obvious manufacturer's defects, deployment damage, and/or shipping damage. Any such areas were issued a defect number and repaired. The senior geosynthetics technician and the installer were both responsible for measuring the installed panel dimensions. At the end of each day, the unsecured edges of the liner were weighted down with sand bags to prevent uplift from wind. The actual panel positions were recorded on the as-built survey of the top of the clay and these positions are shown on the map labeled "As-Built Panel Layout" in Appendix E of this report.

3.4 SEAMING METHODS

The primary method of seaming for this project was automated double fusion welding with an air channel separation. Repair seams and sump connections were performed using a hand held extrusion welder. Seam intersections were treated in the same manner as repairs by applying a cap strip using an extrusion welder. Each seaming machine and corresponding technician were tested at the beginning

of each seaming period, at the direction of the senior geosynthetics technician, when seaming conditions changed and at least once every eight hours of continuous operation. Based on the type (thickness and texture) of the materials being seamed, trial seams were made on fragment pieces of the same geomembrane liner materials to verify that seaming conditions, personnel and equipment were adequate.

3.5 SEAM TESTING

Each trial seam sample was tested by the Installer under observation of a geosynthetics technician. The Installer supplied all necessary testing equipment and knowledgeable personnel. Six adjoining specimens 25 mm (1 in) wide each were die cut from the trial seam sample. These specimens were tested in the field with a tensiometer for both shear (3 specimens) and peel (3 specimens for each welding track or extrusion bead). A passing machine or hand welded test seam was achieved when the specimens did not fail within the weld. If a test seam failed, the entire operation was repeated. If the additional trial seam failed, the seaming apparatus or seamer was not accepted and was not used for seaming until the deficiencies were corrected and two consecutive successful test seams were achieved. Trial seam failure was defined as failure of any one of the specimens tested in shear or peel.

The senior geosynthetics technician or authorized representative observed all test seam procedures. The remainder of the successful test seam sample was assigned a number and marked accordingly by the geosynthetics technician, who also logged the date, hour, ambient temperature, machine temperature, welding speed, machine number, name of seamer, and pass or fail description. The sample

itself was retained in owner's representative's archives. In addition, at least one tested specimen from each test was selected and retained by the senior geosynthetics technician. The specimens were transmitted to owner's representative following acceptance of the geomembrane materials and installation by the QA/QC team. Copies of the trial seam logs are included in Appendix E.

Production seams were only performed by the seaming machines and corresponding technicians qualified through passing trial seams. Production seams were tested by the Installer continuously using non-destructive techniques and at intervals using destructive tests. Requirements for non-destructive and destructive testing were as follows:

1. Single Weld (Extrusion) Seams: The Installer maintained equipment and personnel to perform continuous vacuum box testing on all single weld seams. This testing was observed by EMCON personnel. A soap and water solution was applied to the surface of the geomembrane, a vacuum of at least 5 psi was applied, and the vacuum was held for a minimum of 15 seconds for each section. Air bubbles resulting from this vacuum were considered to be defects and were repaired. In and near the anchor trenches, where irregularities in the grade of the subgrade soil layer prevented the use of the vacuum box, the seams were tested using a spark test. This testing involved placing a copper wire under the extrusion bead, inducing a high voltage current through the wire, and then moving an electrical receptor along the length of the bead. The appearance of a spark between the copper wire and the receptor would indicate the presence of a hole in the seam.

2. Double Weld Seams: The Installer maintained equipment and personnel to perform air pressure testing of all double weld seams. This testing was observed by EMCON personnel. The testing system applied a pressure of at least 30 psi for not less than 5 minutes. Pressure loss tests were conducted in accordance with the procedures outlined in "Pressurized Air Channel Test for Dual Seamed Geomembranes" Geosynthetic Research Institute Test Method GM-6. As outlined by the test method, a minimum 2 minute pressurization stabilization period was observed and pressure losses over a period of 5 minutes were not allowed to exceed 3 psi. At the conclusion of pressure tests, the end of the seam opposite the pressure gauge was cut, if a decrease in gauge pressure was not observed, the air channel was considered to be "blocked" and the test was repeated until the blockage was located and repaired.

Destructive testing was performed at locations selected by the senior geosynthetics technician; a total of five tests were conducted, for an average of one test every 375 lineal feet of production seam. Samples were obtained by the Installer of sufficient size to provide one sample to the archive, one sample to the QA manager for laboratory testing. Each sample was large enough to test five specimens in peel and five specimens in shear. The independent laboratory used to perform the destructive testing on the production seams was:

AGP Laboratories, Inc.
2004 East Randol Mill Road
Suite 12
Arlington, Texas 76011

These test results have been included in Appendix E of this report. Laboratory tests were conducted in peel and shear using a

calibrated tensiometer. The destructive seam samples were assigned a unique number and located with respect to the panel seams. These locations are shown on the drawing labeled "Geomembrane Panel Layout" found in Appendix E of this report. It should be noted that the entire seam along which destructive sample DS-02 was taken was removed. Destructive sample DS-05 was then taken to test the replaced seam.

Damaged areas, destructive test locations, and sample coupon locations of the geomembrane were repaired by the Installer using a patch or cap strip. For consistency in tracking repairs, all of the aforementioned repairs were considered defects and as such, were numbered, repaired and tested accordingly. Repaired areas were vacuum tested for seam integrity. This testing was observed by EMCON personnel and the documentation regarding these repairs has been included in Appendix E of this report.

SECTION 4
INSTALLATION OF GEOFABRICS, DRAINAGE NET, AND DRAINAGE PIPING

4.1 GENERAL

Once the geomembrane cap had been installed, tested and accepted by the Senior Geosynthetics Technician, a drainage system was constructed on top of the cap to minimize ponding of rainfall on top of the cap, diminishing the likelihood of infiltration of liquid into the landfill. This drainage system consists of two layers of geofabric material surrounding a drainage net and drainage piping constructed in a gravel trench on the downslope side of the landfill to convey rainwater safely away from the landfill.

4.2 GEOFABRICS AND DRAINAGE NET

The two layers of geofabric material were heat bonded to the drainage net, forming a single composite drainage medium. The lower geofabric material increases friction and reduces slippage between the drainage layer and the underlying cap. The drainage net provides a continuous, highly conductive pathway for the transmission of liquid off the liner cap. The top geofabric material reduces the potential of silt entering clogging the drainage net.

4.3 DRAINAGE PIPING

The drainage piping is 6-inch, Schedule 40 PCV pipe, located along the downslope edge of the landfill unit and is used to transport liquids conveyed by the drainage net away from the landfill unit.

4.4 INSTALLATION

The Resident Construction Manager observed the placement of the geofabrics, drainage net, and drainage piping to ensure that reasonable precautions were taken to avoid damage to the geomembrane liner. The pipe diameters, slopes, and locations were found to be in conformance with the plans and specifications.

SECTION 5
INSTALLATION OF TOPSOIL COVER OVER LINER

Once the drainage system had been installed and accepted by the Resident Construction Manager, a topsoil layer was placed over the drainage system in accordance with the Closure Plan. The purpose of this topsoil cover is to provide physical protection to the geomembrane cap and to provide a stabilized, low-maintenance means of shedding rainwater from the landfill unit.

The Closure Plan required that the topsoil cover be a minimum of 24 inches thick. To minimize erosion of the topsoil cover, it was determined that a maximum slope of 8 percent be maintained for the top of the topsoil cover. As a result, much more than 24 inches of topsoil was placed in some places of the landfill. In order to prevent soil depths from becoming excessive, the topsoil cover was benched at a certain point on the landfill, and a drainage berm, swale and pipe was employed to transport surface water drainage from the landfill surface in a manner so as to minimize erosion of the cover surface. A second drainage berm, swale and pipe was placed at the lower edge of the landfill unit for the same reason. Appendix F contains as-built plan and cross-section drawings which portray this grading.

The lower 18 inches of the topsoil cover layer was the same material used as the subgrade soil layer. This portion of the topsoil cover was compacted to at least 92 percent of the material's maximum dry density, in accordance with Closure Plan requirements. The upper six inches of the topsoil cover layer was taken from an on-site stockpile of material that met the Unified Soil Classification of SM and was capable of supporting vegetation, all in accordance with the Closure Plan.

Following completion of the placement of topsoil layer, a registered land surveyor established the physical limits of the landfill unit. A plat describing the extents of the landfill unit is included as Figure 2.

TABLES AND FIGURES

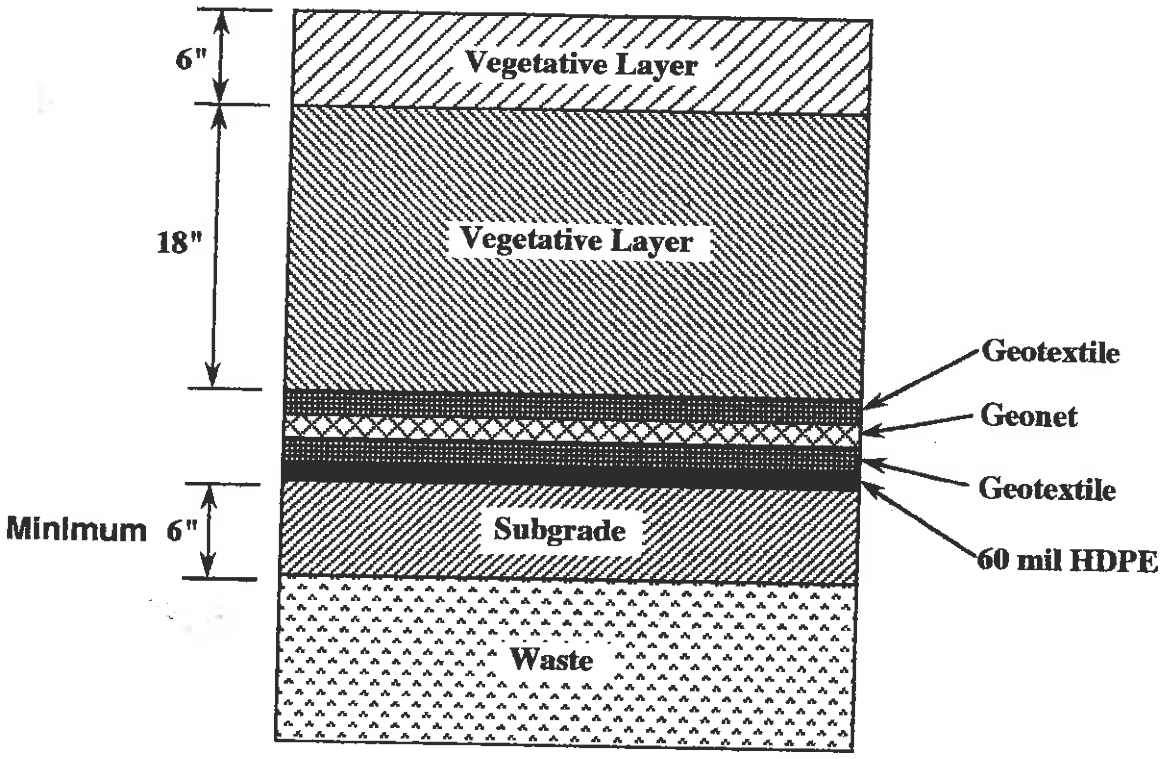
TABLE 1
PRIMARY Q/A TEAM MEMBERS

NAME	ORGANIZATION	ROLE
Terry Snell, P.E.	William L Bonnell	Technical Director
Reagh Underwood	William L Bonnell	Owner's Project Representative
David Buchalter, P.E.	EMCON Southeast	Principal Engineer
George H. Alexander, P.E.	EMCON Southeast	Project CQA Manager
Joe Lewis	EMCON Southeast	Resident Construction Manager
David Radzieta	EMCON Southeast	Project Geologist
Jeff Hansen	EMCON Southeast	Sr. Geosynthetics Technician
Milt Schreiber, P.E.	Geo-Hydro Engineers, Inc.	Sr. Geotechnical Engineer
Louis Babler, E.I.T.	Geo-Hydro Engineers, Inc.	Geotechnical Engineer

TABLE 2

PHYSICAL PROPERTIES OF 60-MIL HDPE MEMBRANE LINER

PROPERTY	TEST METHOD	60 MIL TEXTURED	60 MIL SMOOTH
Gauge (nominal) Thickness (Mil) Min.	ASTM D-1593	60 54	60 54
Specific Gravity (g/cm^3) Min	ASTM D-792 Method A	0.940	0.940
Tensile Strength at Yield (lb/in)	ASTM D-638	126	126
Tensile Strength at Break (lb/in)	ASTM D-638	72	228
Elongational Yield (%)	ASTM D-638	10	12
Elongation at Break (%)	ASTM D-638	240	560
Modulus of Elasticity (lb/sq in)	ASTM D-638	80,000	80,000
Tear Resistance (lbs.) Min.	ASTM D-1004	30	30
Low Temperature Impact (°F)	ASTM D-746	-60	-60
Dimensional stability (%) Max.	ASTM D-1204 (As modified in NSF54)	±3.0	±3.0
Environmental Stress Crack (Min. hrs with no Failure)	ASTM D-1693 (As modified in NSF54)	500	500



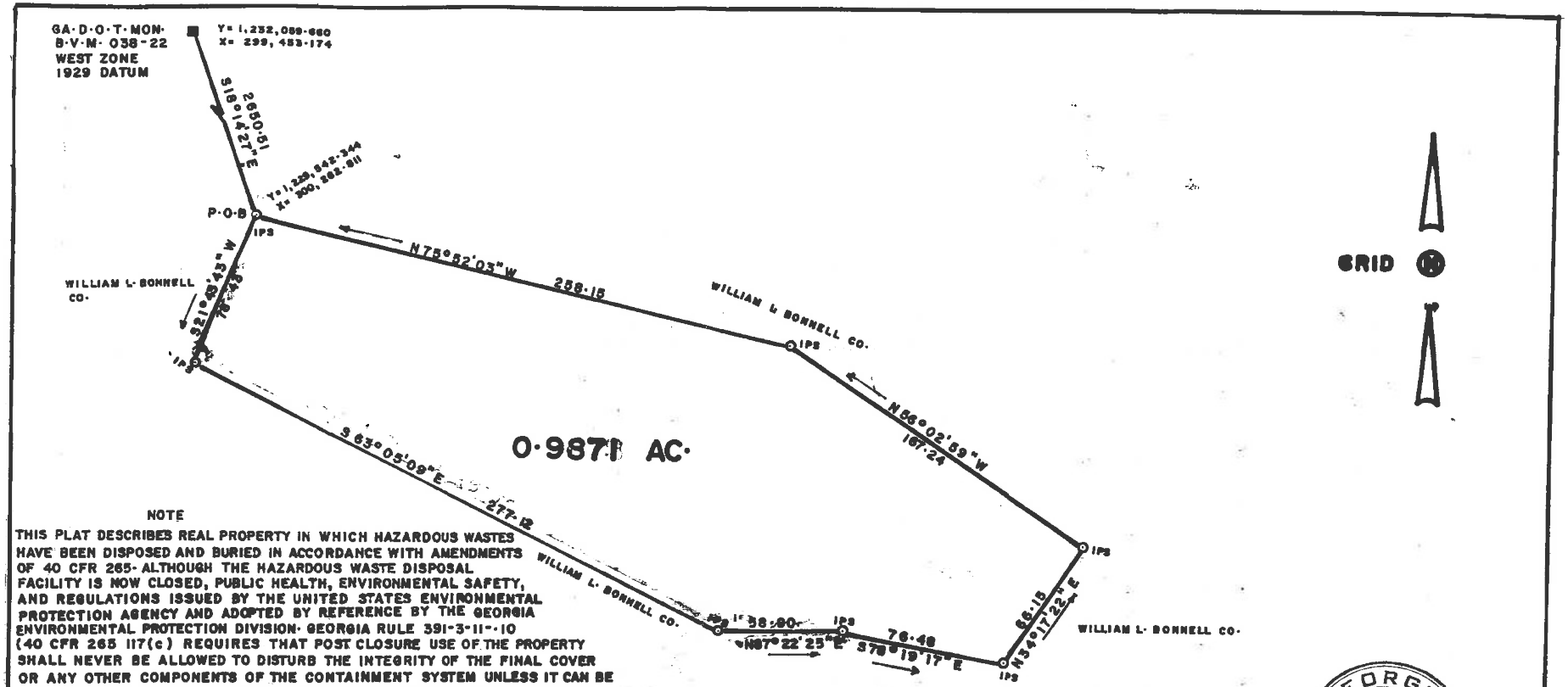
Typical Section

CrOH Landfill Cap

(N.T.S.)

William L. Bonnell Company

Figure 1 - Typical Section, CrOH Landfill Cap



NOTE

THIS PLAT DESCRIBES REAL PROPERTY IN WHICH HAZARDOUS WASTES HAVE BEEN DISPOSED AND BURIED IN ACCORDANCE WITH AMENDMENTS OF 40 CFR 265· ALTHOUGH THE HAZARDOUS WASTE DISPOSAL FACILITY IS NOW CLOSED, PUBLIC HEALTH, ENVIRONMENTAL SAFETY, AND REGULATIONS ISSUED BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AND ADOPTED BY REFERENCE BY THE GEORGIA ENVIRONMENTAL PROTECTION DIVISION· GEORGIA RULE 391-3-11-·10 (40 CFR 265 117(c) REQUIRES THAT POST CLOSURE USE OF THE PROPERTY SHALL NEVER BE ALLOWED TO DISTURB THE INTEGRITY OF THE FINAL COVER OR ANY OTHER COMPONENTS OF THE CONTAINMENT SYSTEM UNLESS IT CAN BE DEMONSTRATED THAT ANY PROPOSED DISTURBANCE WILL NOT INCREASE ANY RISK TO THE PUBLIC OR THE ENVIRONMENT·

In my opinion this is a true representation of the land platted and has been prepared in conformity with minimum standards and requirements of law.

Robert T. A. Moreland R.L.S. # 1891
Woodbury, Ga. 553-5283

GEORGIA REGISTERED No. 1891 PROFESSIONAL LAND SURVEYOR ROBERT A. MORELAND

PLAT FOR

WILLIAM L· BONNELL CO· OF FORMER CHROMIUM HYDROXIDE LANDFILL, IN CITY OF NEWNAN LL#38 5th L D·

COWETA COUNTY GEORGIA

JUNE 23, 1993 SCALE 1" = 50'

Survey and Plat By
ROBERT A. MORELAND, R.L.S.
Woodbury, Ga. Phone 553-5283
Georgia License # 1891

FIGURE 2 PLAT OF LANDFILL UNIT

Georgia Department of Natural Resources
205 Butler Street, S.E., Suite 1252, Atlanta, Georgia 30334
Joe D. Tanner, Commissioner
Harold F. Reheis, Director
Environmental Protection Division

April 22, 1993

Mr. Terry Snell
Environmental Manager
William L. Bonnell Company, Inc.
P.O. Box 428
Newnan, Georgia 30264

Re: April 15, 1993 Letter
"Closure of CrOH Landfill"

Dear Mr. Snell:

This letter is in response to Bonnell's letter dated April 15, 1993 explaining the discovery of additional chromium hydroxide (CrOH) sand filter cake (F019) in the anchor trench of the high density polyethylene (HDPE) cap for the CrOH Landfill.

The Environmental Protection Division (EPD) is aware of the necessity to abandon monitoring wells MW-4S, MW-4D, and MW-5S due to the wells being within the expanded area needed to cap the CrOH Landfill. EPD is granting Bonnell permission to abandon MW-4S, MW-4D, and MW-5S for the sole purpose of allowing Bonnell to continue its closure operations of the CrOH Landfill. Bonnell must document all actions taken during the abandonment of the wells and submit this information within the final closure documentation of the Landfill. Due to the delay caused by the need to expand the Landfill cap, EPD is granting Bonnell an additional fifteen (15) days for the submittal of the closure documentation. EPD is also waving at this time the 90 day requirement, in permit condition III.A.6., for submitting a plan prior to installation that specifies the design, location and installation of any additional monitoring wells. The Department will review and comment on the well replacement information as it is submitted.

This letter serves the sole purposes of granting Bonnell permission to abandon MW-4S, MW-4D, and MW-5S, provide an extension to the closure deadline of the Landfill, and temporarily wave the 90 day requirement in permit condition III.A.6. EPD will review the class II permit modification for the replacement of MW-4S, MW-4D, and MW-5S when it is submitted.

If you have any questions regarding the above information, please contact Mr. Kenneth Grall at (404) 656-2833.

Sincerely,

Susan Eason

Susan Eason
Acting Unit Coordinator

File: Bonnell (R)
f:\user\kenneth\bonnell\wa-close.ltr

April 1, 1993

GEO-HYDRO

Mr. Terry D. Snell, P.E.
William L. Bonnell Co., Inc.
25 Bonnell Street
P.O. Box 428
Newnan, Georgia 302634

Construction Materials Testing
CrOH Landfill Closure
William L. Bonnell Co., Inc. Plant
Newnan, Georgia
Our Project Number 111-93-20902

Dear Mr. Snell:

The writer visited the subject site on April 1, 1993 to verify clay subgrade conditions at the subject site. As we suspected, dry weather has started to desiccate the surface of the clay subgrade, creating some minor cracking at the surface of the material.

We met with Mr. Joe Lewis, EMCON Southeast's representative at the site. Mr. Lewis indicated that HDPE liner installation is scheduled to begin Monday April 5, 1993. Mr. Lewis was advised to maintain the exposed subgrade material moist until the HDPE liner is installed. Mr. Lewis indicated that he will coordinate efforts to maintain the clay subgrade surface wet until the liner is installed.

We must emphasize the importance of preventing desiccation of the clay subgrade material. If moisture content is not maintained, extensive cracking of the subgrade clay may occur, which would adversely affect the hydraulic conductivity of the subgrade.

Please call us if you have any questions.

Sincerely,

GEO-HYDRO ENGINEERS, INC.

Luis E. Babler, E.I.T.

LEB\ig\CMT\20902L2

cc: Mr. George H. Alexander, P.E.

GEO-HYDRO ENGINEERS, INC.
1000 Cobb Place Boulevard
Suite 290
Kennesaw, Georgia 30144-3684
(404) 426-7100

April 9, 1993

GEO-HYDRO

Mr. Terry D. Snell, P.E.
William L. Bonnell Co., Inc.
25 Bonnell Street
P.O. Box 428
Newnan, Georgia 30264

Construction Materials Testing
CrOH Landfill Closure
William L. Bonnell Co., Inc. Plant
Newnan, Georgia
Our Project Number 111-93-20902

Dear Mr. Snell:

We understand that changes in the above referenced project require the expansion of the clay subgrade layer beyond originally set boundaries. To accomplish this task it is necessary to locate and import additional clay material into the subject site.

As requested by you, the writer visited the project site on April 7, 1993 and met with Mr. Ray Underwood. Mr. Underwood indicated that an area immediately south of the existing CrOH landfill, outside the existing plant fence, may contain some of the desired clay. Four test pits were excavated within the proposed borrow area. A layer of clay material which appeared adequate for placement was encountered. The thickness of this clay layer was measured and ranged roughly between 12 and 16 inches, occupying an area with approximate dimensions of 110 feet by 25 feet.

The attached Test Pit Logs contain information regarding visual soil classification and approximate thickness of the different materials encountered.

A composite sample (TP 5-8) of clay material from the test pits was collected for laboratory testing. We anticipate performing one standard Proctor test (ASTM D-698), one sieve analysis with hydrometer (ASTM D-422), one Atterberg limits test (ASTM D-422), and at least one remolded hydraulic conductivity test (ASTM D-5084) on the composite soil sample.

A Geo-Hydro Engineers, Inc. representative will be present at the subject site to visually classify the new clay soil during excavation. Excavation depth will be monitored to avoid mixing the desired clayey subgrade material with other soils or deleterious materials.

Please call us if you have any questions.

GEO-HYDRO ENGINEERS, INC.
1000 Cobb Place Boulevard
Suite 290
Kennesaw, Georgia 30144-3684
(404) 426-7100

GEO-HYDRO

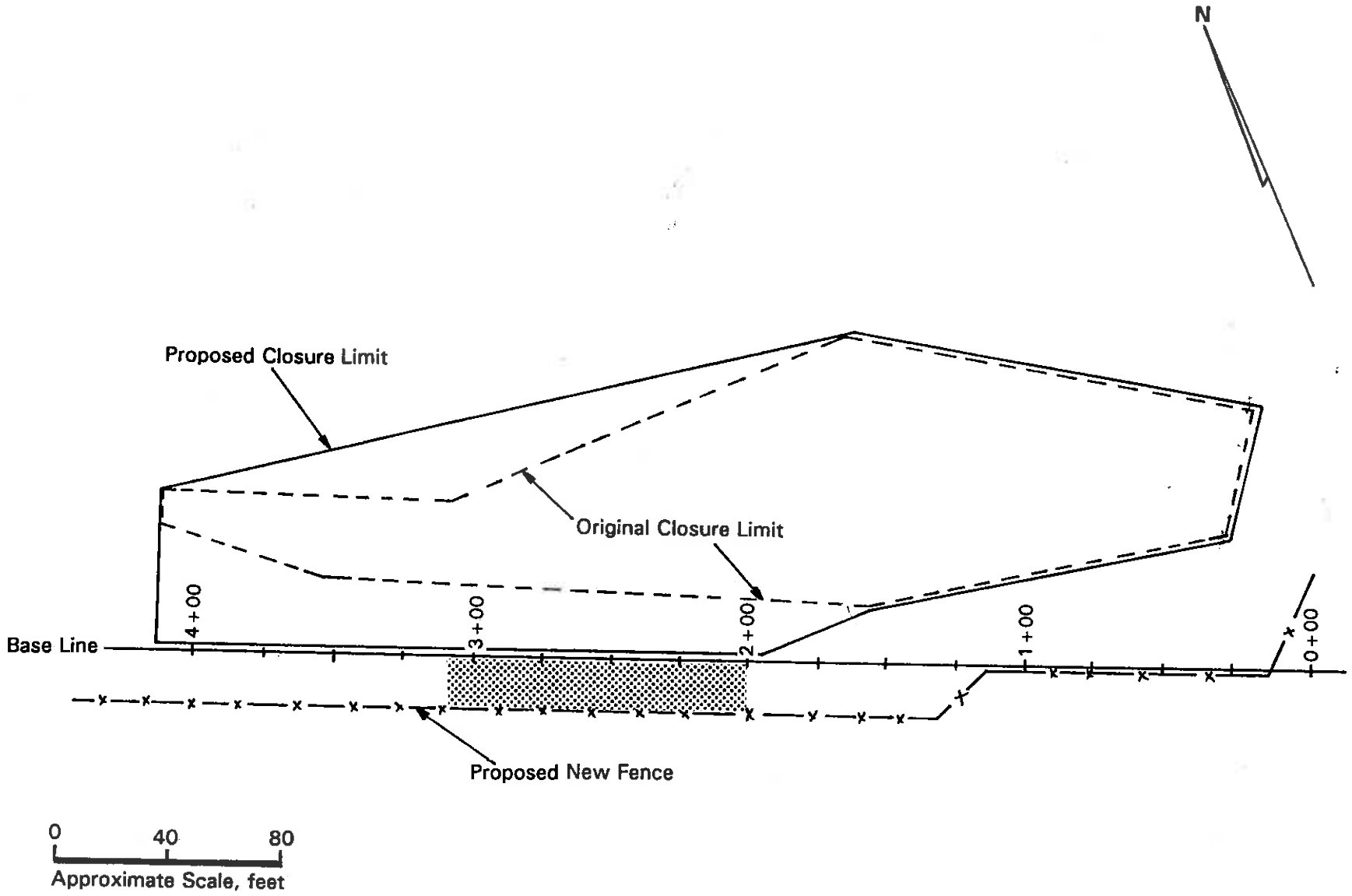
Sincerely,

GEO-HYDRO ENGINEERS, INC.

Luis E. Babler, E.I.T.

LEB\ig\CMT\20902L3

GEOHYDRO



LEGEND: Clay Mining Area

PROJECT: **CrOH Landfill Closure**
William L. Bonnell Co. Plant
Newnan, Georgia
Our Project Number 111-93-20902

GEOHYDRO

TEST PIT LOGS
William L. Bonnell Co., Inc., CrOH Landfill Closure
Plant Borrow Site
Newnan, Georgia
Our Project Number 111-93-20902
Test Pits Performed on 4-7-93

Test Pit No.: TP-5

Depth (ft.)	Soil Description
0 to 0.5	Topsoil
0.5 to 1.2	Light red brown silty clay (CL) (Residuum)
	Sample collected
1.2 to 3	Light red-brown micaceous silty fine sand (SM) with clay

Test pit terminated at 3.0 feet.
No ground water encountered.

Test Pit No.: TP-6

Depth (ft.)	Soil Description
0 to 1	Topsoil
1 to 2.2	Light red brown silty clay (CL) (Residuum)
	Sample collected
2.2 to 3	Light red-brown micaceous silty fine sand (SM) with clay

Test pit terminated at 3.0 feet.
No ground water encountered.

Test Pit No.: TP-7

Depth (ft.)	Soil Description
0 to 1	Topsoil
1to 2.2	Light red brown silty clay (CL) (Residuum)
	Sample collected
2.2 to 3	Light red-brown micaceous silty fine sand (SM) with clay

Test pit terminated at 3.0 feet.
No ground water encountered.

TEST PIT LOGS (cont.)
William L. Bonnell Co., Inc., CrOH Landfill Closure
Plant Borrow Site
Newnan, Georgia
Our Project Number 111-93-20902
Test Pits Performed on 4-7-93

Test Pit No.: TP-8

Depth (ft.)	Soil Description
0 to 1.4	Topsoil
1.4 to 2.5	Light red brown silty clay (CL) (Residuum)
	Sample collected
2.5 to 3	Light red-brown micaceous silty fine sand (SM) with clay

Test pit terminated at 3.0 feet.
No ground water encountered.

GEOHYDRO

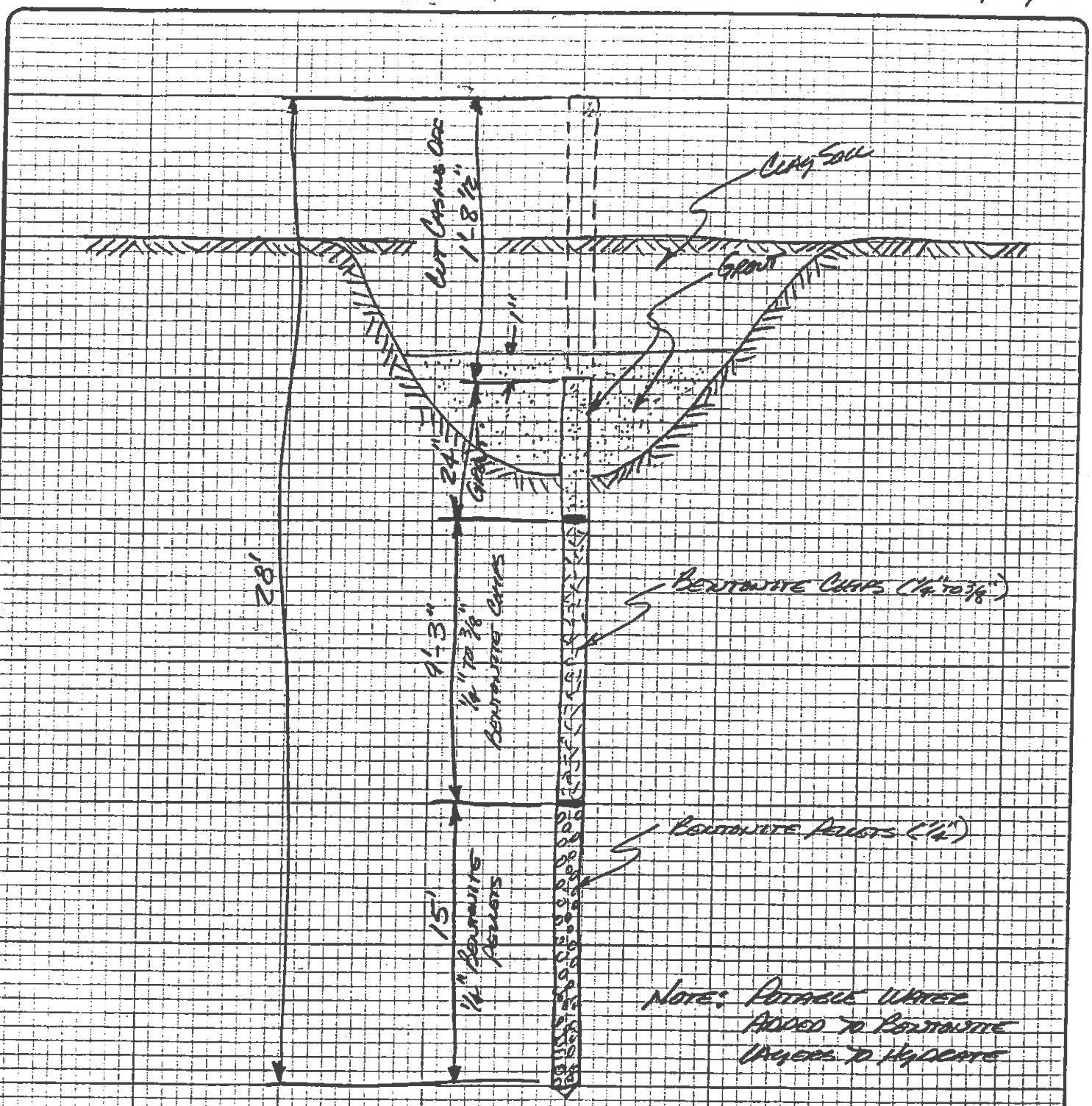
Summary Letter
Geotechnical Laboratory Testing
CrOH Landfill Closure
William L. Bonnell Co., Inc. Plant
Newnan, Georgia

Prepared For

William L. Bonnell Co., Inc.

EMCON SOUTHEAST COMPUTATION SHEET

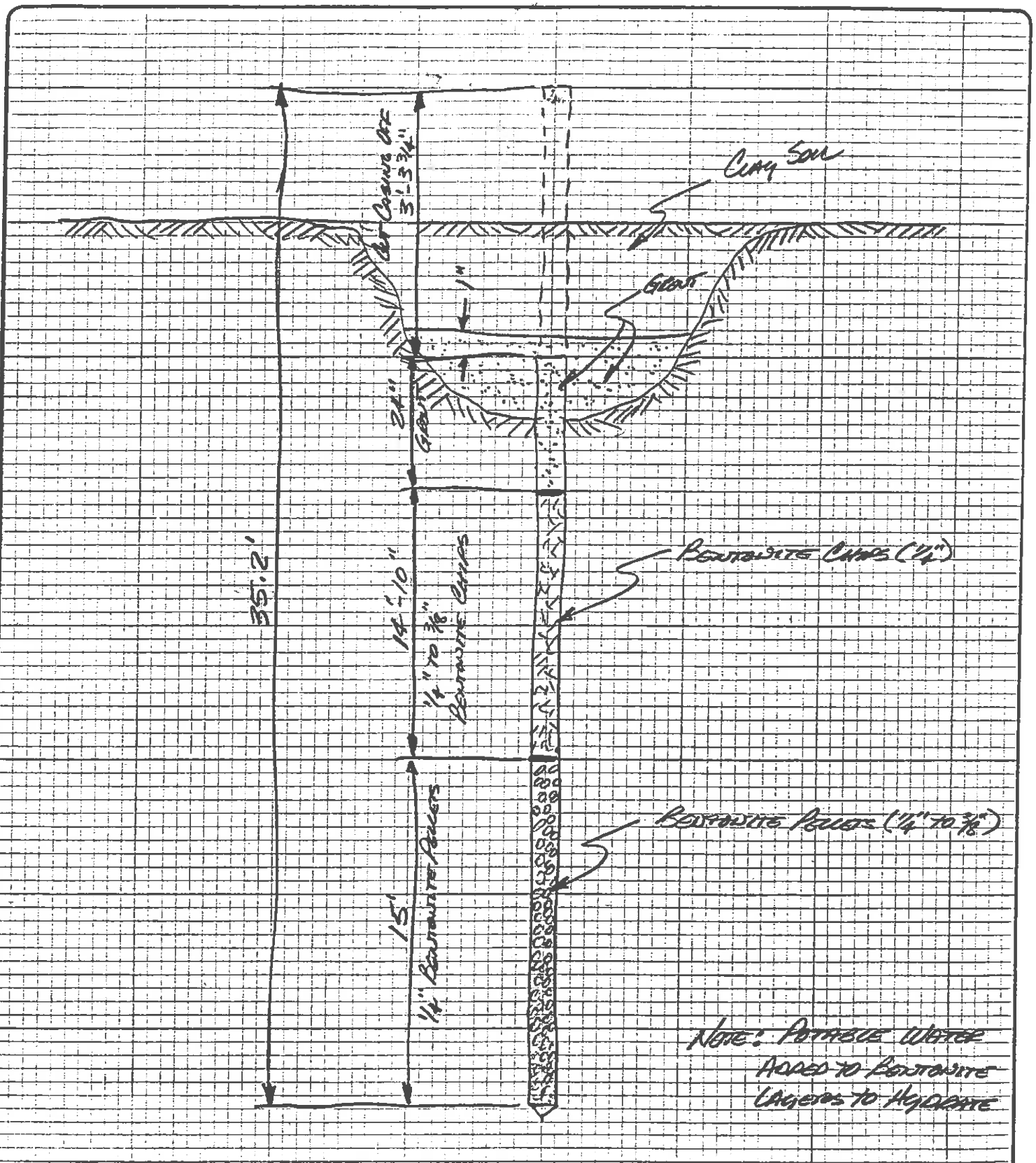
PROJECT TITLE: 4S Well Pair — PROJECT NO. 200.008.92
DESCRIPTION: Completed 3:30pm — SHEET 1 OF 3
PREPARED BY: J. Lewis — DATE: — CHK'D BY: — DATE: 4/23/93



EMCON SOUTHEAST
435 ATLANTA TECHNOLOGY CENTER
1575 NORTHSIDE DRIVE
ATLANTA, GEORGIA 30318
(404) 355-5600

EMCON SOUTHEAST COMPUTATION SHEET

PROJECT TITLE: 4D Well Drl PROJECT NO. 2040.008.92
DESCRIPTION: Completed 2:45pm SHEET 2 OF 3
PREPARED BY: J. Lewis DATE: _____ CHK'D BY: _____ DATE: 4/23/93



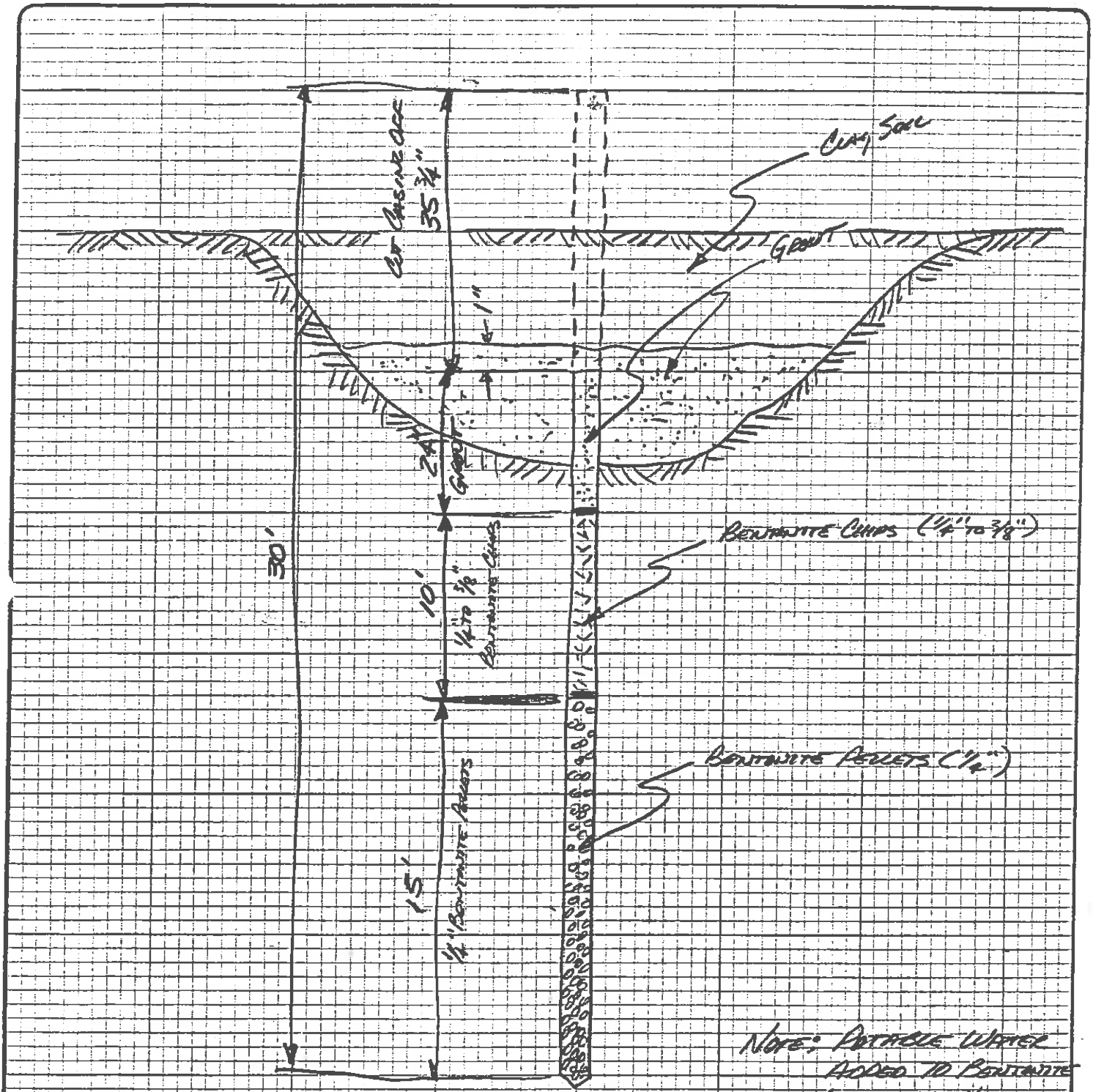
EMCON SOUTHEAST
435 ATLANTA TECHNOLOGY CENTER
1575 NORTHSIDE DRIVE
ATLANTA, GEORGIA 30318
(404) 355-5600

EMCON SOUTHEAST COMPUTATION SHEET

PROJECT TITLE: 55 Well Pull — PROJECT NO. 2040.008,92

DESCRIPTION: Completed 4:15 pm — SHEET 3 OF 3

PREPARED BY: J Lewis — DATE: _____ — CHK'D BY: _____ — DATE: 4/23/93



Note: Potable Water Added to Bentonite Layers to Hydrate.

EMCON SOUTHEAST

435 ATLANTA TECHNOLOGY CENTER
1575 NORTHSIDE DRIVE

ATLANTA, GEORGIA 30318
(404) 355-5600

REQUEST FOR SAMPLING SERVICES
THE WILLIAM L BONNELL COMPANY, INC.

Project Number: 1.2026.25

Project Name: CrOH Landfill Closure

Client Address, and Phone Number: P.O. Box 428
Newnan, GA 30264
404-254-7690

Project Manager: Terry D. Snell

Copy analytical results to: Dave Buchalter, EMCON Southeast

Sta. Nos. to be sampled: Ten soil sample locations adjacent to the CrOH Landfill. See Chain of Custody for station numbers.

Parameters: Total Chromium (EPA Method 6010)

Approximate date samples to be collected: 4/9/93

Date results needed: 4/12/93

Bill to PO number: 13371-OP

Send Invoice to: Terry D. Snell

Copy request form to: Dave Buchalter, EMCON Southeast

Date of Request: 4/9/93

Signature: Terry D. Snell

ASI ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS
390 TRABERT AVENUE • ATLANTA, GEORGIA 30309 • (404) 892-8144
FAX (404) 892-2740 • Federal I.D. # 58-1625655

CHAIN OF CUSTODY RECORD

PROJECT NUMBER: 2026.25
PROJECT NAME: Croh Landfill Closure
CLIENT NAME: William C. Bowzell Co., Inc
CLIENT ADDRESS AND PHONE NUMBER: P.O. Box 428, Newnan, GA. 30264 404-253-2020
PROJECT MANAGER: T.O. Snell
COPY TO: O. Buchmaster, Emcon S.E.
REQUESTED COMP. DATE: Results by 4/12/93
SAMPLING REQUIREMENTS: SDWA ☐ NPDES ☐ RCRA ☐ OTHER ✓

ANALYSES REQUESTED: Total Chloride

STA NO.	DATE	TIME	COMP	GRAB	SOIL	SAMPLE DESCRIPTIONS	# OF CONTAINERS	Total Chloride										LAB ID	REMARKS
C-6	4/9/93	13:20		X	X	Croh Landfill Closure	1	X											Results by 4/12/93
C-7	4/9/93	13:30		X	X	"	1	X											
C-8	4/9/93	13:40		X	X	"	1	X											
C-9	4/9/93	13:50		X	X	"	1	X											
C-10	4/9/93	13:55		X	X	"	1	X											
C-11	4/9/93	14:05		X	X	"	1	X											
C-12	4/9/93	14:15		X	X	"	1	X											
C-13	4/9/93	14:20		X	X	"	1	X											
C-14	4/9/93	14:25		X	X	"	1	X											
C-15	4/9/93	14:30		X	X	"	1	X											

FOR LAB USE ONLY
LAB#
LAB #
PROJECT NO.
ACK | VERIFIED
QUOTE# | BS
NO. OF SAMP | PG | OF

SAMPLED BY AND TITLE: Joe Lewis - Tech — DATE/TIME: 4/9/93
RELINQUISHED BY: Joe Lewis - Tech — DATE/TIME: 4/9/93
RECEIVED BY: — DATE/TIME:
RELINQUISHED BY: — DATE/TIME:
RECEIVED BY: — DATE/TIME:
RELINQUISHED BY: — DATE/TIME:
RECEIVED BY LAB: — DATE/TIME:
SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER ______
AIR BILL #

HAZWRAP/NEESA Y N
QC LEVEL 1 2 3
COC | ICE
ANA REQ | TEMP
CUST SEAL | PH
SAMPLE COND.

REMARKS: P.O. # 13371-OP

ENTERED INTO LIMS ______ COC REVIEWD ______

ASI ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS

390 TRABERT AVENUE • ATLANTA, GEORGIA 30309 • (404) 892-8144

FAX (404) 892-2740 • Federal I.D. # 58-1625655

CHAIN OF CUSTODY RECORD

PROJECT NUMBER: 1,2026.25

PROJECT NAME: Crow Landfill Closure

CLIENT NAME: William L. Bonnell Co., Inc.

PROJECT MANAGER: T.O. Swell

COPY TO: D. Buchacker, Emcon S.E.

REQUESTED COMP. DATE: Hold Until Instructed By T.O. Swell

SAMPLING REQUIREMENTS: SDWA ☐ NPDES ☐ RCRA ☐ OTHER ✓

CLIENT ADDRESS AND PHONE NUMBER: P.O. Box 428, Newnan, GA. 30264, 404-253-2020

ANALYSES REQUESTED: Total Chlorine

FOR LAB USE ONLY: LAB#; LAB #; PROJECT NO.; ACK; VERIFIED; QUOTE#; BS; NO. OF SAMP; PG; OF

STA NO.	DATE	TIME	COMP	GRAB	SOIL	SAMPLE DESCRIPTIONS	# OF CONTAINERS	Total Chlorine	LAB ID
2-16	4/9/93	14:40		X	X	Crow Landfill Closure	1	X	
2-17	4/9/93	14:45		X	X	"	1	X	
2-18	4/9/93	14:50		X	X	"	1	X	
2-19	4/9/93	14:55		X	X	"	1	X	

REMARKS: Hold Until Instructed By T.O. Swell

SAMPLED BY AND TITLE: Joe Lewis - Tech.

DATE/TIME: 4/9/93

RELINQUISHED BY: Joe Lewis - Tech

DATE/TIME: 4/9/93

RECEIVED BY:

DATE/TIME

RELINQUISHED BY:

DATE/TIME

RECEIVED BY:

DATE/TIME

RELINQUISHED BY:

DATE/TIME

RECEIVED BY LAB:

DATE/TIME

SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER

AIR BILL #

HAZWRAP/NEESA Y N

QC LEVEL 1 2 3

COC | ICE

ANA REQ | TEMP

CUST SEAL | PH

SAMPLE COND.

REMARKS: P.O.# 13371-OP

ENTERED INTO LIMS _____ COC REVIEWD _____

ASI ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITOR[illegible] & LABORATORY ANALYSIS

390 TRABERT AVENUE • ATLANTA, GEORGIA 30309 • (404) 892-8144

FAX (404) 892-2740 • Federal I.D. # 58-1625655

HAIN OF CUSTODY RECORD

PROJECT NUMBER: 2026.25

PROJECT NAME: CROH Landfill Closure

CLIENT NAME: William C. Barrett Co., Inc

PROJECT MANAGER: T. D. Sweet

COPY TO: D. Batchelder, Emcon S.E.

REQUESTED COMP. DATE: 7 HR. TURNAROUND

SAMPLING REQUIREMENTS: SDWA ☐ NPDES ☐ RCRA ☐ OTHER X

CLIENT ADDRESS AND PHONE NUMBER

FOR LAB USE ONLY

LAB#

LAB #

PROJECT NO.

ACK | VERIFIED

QUOTE# | BS

NO. OF SAMP | PG | OF

ANALYSES REQUESTED

STA NO.	DATE	TIME	COMP	GRAB	SOIL	SAMPLE DESCRIPTIONS	# OF CONTAINERS	Total Chrome	LAB ID
-20	4/13/93	9:40		X	X	CROH Landfill Closure	1	X	
-21	4/13/93	01:25		X	X	"	1	X	
-22	4/13/93	9145		X	X	"	1	X	

REMARKS

SAMPLED BY AND TITLE	DATE/TIME	RELINQUISHED BY	DATE/TIME
Joe Lewis - Tech.	4/13/93	Joe Lewis - Tech.	4/13/93 1:45 pm
RECEIVED BY:	DATE/TIME 4/13/93 1:45 pm	RELINQUISHED BY:	DATE/TIME
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME
RECEIVED BY LAB:	DATE/TIME	SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER _____	AIR BILL #

HAZWRAP/NEESA Y N

QC LEVEL 1 2 3

COC | ICE

ANA REQ | TEMP

CUST SEAL | PH

SAMPLE COND.

REMARKS

ENTERED INTO LIMS _____ COC REVIEWD _____

ASI ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS

390 TRABERT AVENUE • ATLANTA, GEORGIA 30309 • (404) 892-8144

FAX (404) 892-2740 • Federal I.D. # 58-1625655

CHAIN OF CUSTODY RECORD

PROJECT NUMBER: 2026.25

PROJECT NAME: CAOH Landfill Closure

CLIENT NAME: William C. Bonnell Co., Inc.

PROJECT MANAGER: T. O. Suell

COPY TO: D. Buchhalter, Ertcon S.E.

REQUESTED COMP. DATE: See Remarks!

SAMPLING REQUIREMENTS: SDWA ☐ NPDES ☐ RCRA ☐ OTHER X

CLIENT ADDRESS AND PHONE NUMBER

STA NO.	DATE	TIME	COMP	GRAB	SOIL	SAMPLE DESCRIPTIONS	# OF CONTAINERS	ANALYSES REQUESTED: Total Chrome	LAB ID
-23	4/13/93	9:15		X	X	CAOH Landfill Closure	1	X	

FOR LAB USE ONLY

LAB#

LAB #

PROJECT NO.

ACK | VERIFIED

QUOTE# | BS

NO. OF SAMP | PG | OF

REMARKS

Do Not Analyze Water

Instructed to do so by

T. O. Suell.

SAMPLED BY AND TITLE: Joe Lewis - Tech — DATE/TIME: 4/13/93 9:15 Am

RELINQUISHED BY: Joe Lewis - Tech. — DATE/TIME: 4/13/93 1:45 pm

RECEIVED BY: [signature] — DATE/TIME: 4/13/93 1:45 pm

RELINQUISHED BY: — DATE/TIME:

RECEIVED BY: — DATE/TIME:

RELINQUISHED BY: — DATE/TIME:

RECEIVED BY LAB: — DATE/TIME:

SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER _____ — AIR BILL #

HAZWRAP/NEESA Y N

QC LEVEL 1 2 3

COC | ICE

ANA REQ | TEMP

CUST SEAL | PH

SAMPLE COND.

REMARKS

ENTERED INTO LIMS | COC REVIEWD

ASI ANALYTICAL SERVICES, INC.
ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS
390 TRABERT AVENUE • ATLANTA, GEORGIA 30309 • (404) 892-8144
FAX (404) 892-2740 • Federal I.D. # 58-1625655

CHAIN OF CUSTODY RECORD

PROJECT NUMBER: 1.2026.25
PROJECT NAME: Croh Landfill Closure
CLIENT NAME: William C. Bowzell Co., Inc
CLIENT ADDRESS AND PHONE NUMBER: P.O. Box 428, Newnan, GA. 30264 404-253-2020
PROJECT MANAGER: T.O. Swez
COPY TO: O. Eckhaiter, Emcon S.E.
REQUESTED COMP. DATE: Results By 4/12/93
SAMPLING REQUIREMENTS: SDWA ☐ NPDES ☐ RCRA ☐ OTHER ✓

ANALYSES REQUESTED: Total Chrome

STA NO.	DATE	TIME	COMP	GRAB	SOIL	SAMPLE DESCRIPTIONS	# OF CONTAINERS	Total Chrome	REMARKS
CC-6	4/9/93	13:20		X	X	Croh Landfill Closure	1	X	Results By 4/12/93
CC-7	4/9/93	13:30		X	X	"	1	X	
CC-8	4/9/93	13:40		X	X	"	1	X	
CC-9	4/9/93	13:50		X	X	"	1	X	
CC-10	4/9/93	13:55		X	X	"	1	X	
CC-11	4/9/93	14:05		X	X	"	1	X	
CC-12	4/9/93	14:15		X	X	"	1	X	
CC-13	4/9/93	14:20		X	X	"	1	X	
CC-14	4/9/93	14:25		X	X	"	1	X	
CC-15	4/9/93	14:30		X	X	"	1	X	

FOR LAB USE ONLY: LAB#, LAB #, PROJECT NO., ACK, VERIFIED, QUOTE#, BS, NO. OF SAMP, PG, OF

LAB ID

SAMPLED BY AND TITLE: Joe Lewis - Tech — DATE/TIME: 4/9/93
RELINQUISHED BY: Joe Lewis - Tech — DATE/TIME: 4/9/93 5:35
RECEIVED BY: — DATE/TIME:
RELINQUISHED BY: — DATE/TIME:
RECEIVED BY: — DATE/TIME:
RELINQUISHED BY: — DATE/TIME:
RECEIVED BY LAB: [signature] — DATE/TIME: 4/9/93 5:25
SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER ____
AIR BILL #

HAZWRAP/NEESA Y N
QC LEVEL 1 2 3
COC — ICE
ANA REQ — TEMP
CUST SEAL — PH
SAMPLE COND.

REMARKS: P.O. # 1337/-OP

ENTERED INTO LIMS ____ COC REVIEWD ____

ASI ANALYTICAL SERVICES, INC.

ENVIRONMENTAL MONITORING & LABORATORY ANALYSIS

390 TRABERT AVENUE • ATLANTA, GEORGIA 30309 • (404) 892-8144

FAX (404) 892-2740 • Federal I.D. # 58-1625655

CHAIN OF CUSTODY RECORD

PROJECT NUMBER: 1.2026.25	PROJECT NAME: CP&L Canovelli Closure
CLIENT NAME: William C. Bowen Co., Inc.	
PROJECT MANAGER: T.O. Swell	COPY TO: D. Buchanan Emcon S.E.
REQUESTED COMP. DATE: Hold Until Instructed By T.O. Swell	SAMPLING REQUIREMENTS: SDWA ☐ NPDES ☐ RCRA ☐ OTHER ✓

CLIENT ADDRESS AND PHONE NUMBER: P.O. Box 428 Newnan, GA. 30264 404-253-2020

FOR LAB USE ONLY: LAB# | LAB # | PROJECT NO. | ACK | VERIFIED | QUOTE# | BS | NO. OF SAMP | PG | OF

STA NO.	DATE	TIME	COMP	GRAB	SOIL	SAMPLE DESCRIPTIONS	# OF CONTAINERS	ANALYSES REQUESTED: Total Cutoms	LAB ID
CC-16	4/9/93	14:40		X	X	Creek Canovelli Closure	1	X	
CC-17	4/9/93	14:45		X	X	"	1	X	
CC-18	4/9/93	14:50		X	X	"	1	X	
CC-19	4/9/93	14:55		X	X	"	1	X	

REMARKS: Hold Until Instructed By T.O. Swell

SAMPLED BY AND TITLE: Joe Lewis - Tech.	DATE/TIME: 4/9/93	RELINQUISHED BY: Joe Lewis - Tech	DATE/TIME: 4/9/93 5:35
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME
RECEIVED BY LAB:	DATE/TIME: 4/9/93 5:25	SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER	AIR BILL #

HAZWRAP/NEESA Y N

OC LEVEL 1 2 3

COC | ICE

ANA REQ | TEMP

CUST SEAL | PH

SAMPLE COND.

REMARKS: P.O.# 12211-00

ENTERED INTO LIMS | COC REVIEWD

GEO-HYDRO

June 16, 1993

William L. Bonnell Co., Inc.
25 Bonnell Street
P.O. Box 428
Newnan, Georgia 30264

Attention: Mr. Terry D. Snell, P.E.

Summary Letter
Geotechnical Laboratory Testing
CrOH Landfill Closure
William L. Bonnell Co., Inc. Plant
Newnan, Georgia
Our Project Number 115-93-20901

Gentlemen:

Geo-Hydro Engineers, Inc. has completed the laboratory testing required for the above referenced project. Clay subgrade material and soils for the landfill cap were obtained from several sources and tested throughout the project duration. These tests were performed to provide soil classifications, standard Proctor maximum dry densities, and to determine the hydraulic conductivity of clay subgrade materials.

Geo-Hydro Engineers, Inc. representatives were present at several borrow sites to log test pits and collect soil samples for laboratory testing. The attached Test Pit Logs contain information regarding the location of the borrow sites and the soil profiles encountered. Selected samples from each test pit were collected and transported to the laboratory for processing and testing. The attached Figure 1 shows the location of the borrow sites.

Geotechnical laboratory testing consisted of eight standard Proctor tests (ASTM D-698), seven sieve analyses with hydrometer (ASTM D-422), one sieve analysis without hydrometer (ASTM D-422), eight Atterberg Limits tests (ASTM D-4318), and eight hydraulic conductivity tests performed on remolded samples (ASTM D-5084). The laboratory test results are attached.

We have appreciated the opportunity to work with you on this project. If you have any questions concerning this letter or any of our services, please call us.

GEO-HYDRO ENGINEERS, INC.
1000 Cobb Place Boulevard
Suite 290
Kennesaw, Georgia 30144-3684
(404) 426-7100

GEO-HYDRO

Sincerely,

GEO-HYDRO ENGINEERS, INC.

Luis E. Babler, E.I.T.
Geotechnical Engineer

Milton O. Schreiber, P.E.
Senior Geotechnical Engineer

LEB\ig\GEO\20901L2

GEOHYDRO

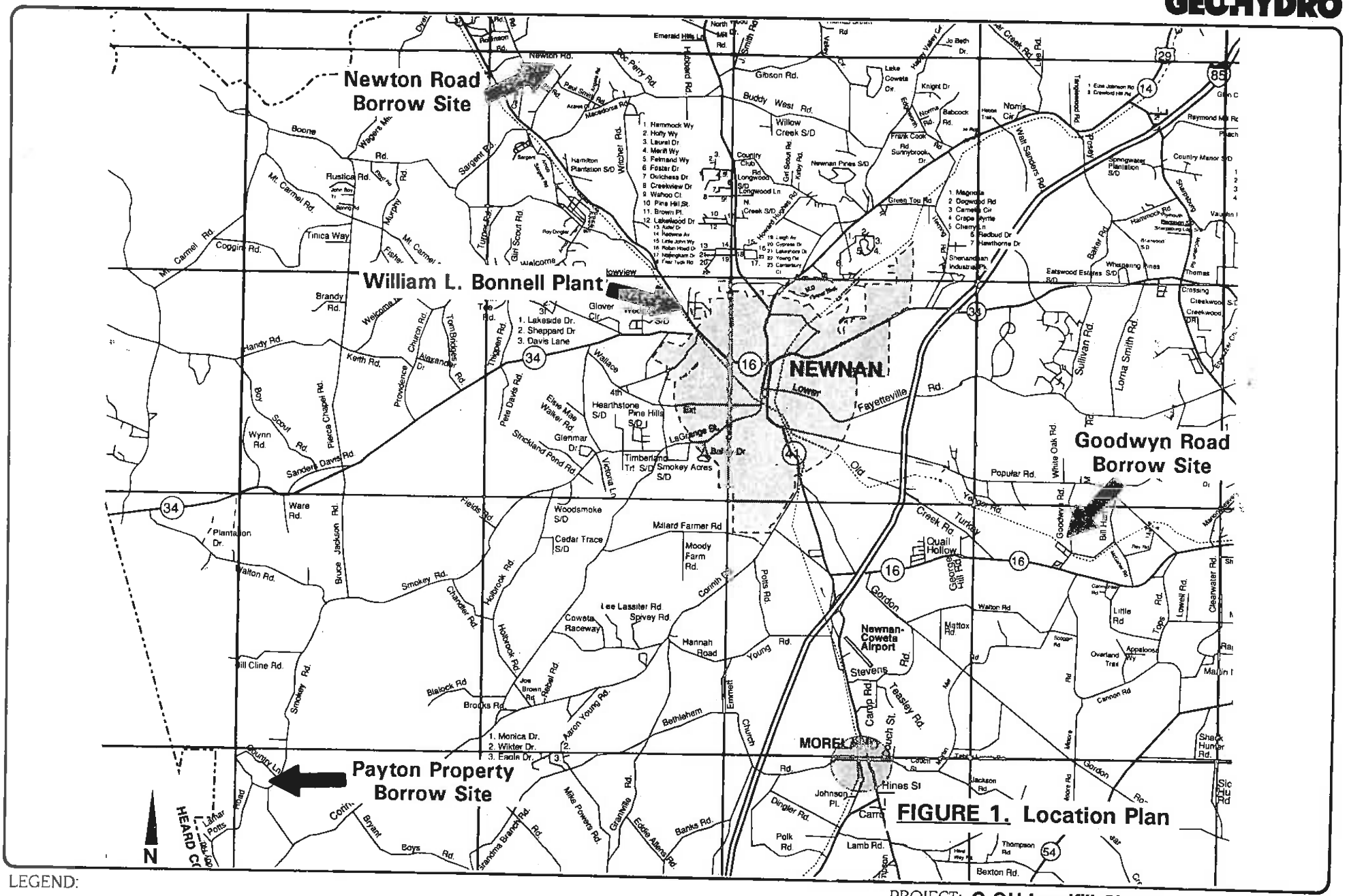


FIGURE 1. Location Plan

LEGEND:

PROJECT: **CrOH Landfill Closure**
William L. Bonnell Co. Plant
Newnan, Georgia
Our Project Number 115-93-20901

GEOHYDRO

TEST PIT LOGS
William L. Bonnell Co., Inc., CrOH Landfill Closure
Goodwyn Road Borrow Site
Coweta County, Georgia
Our Project Number 115-93-20901
Test Pits Performed on 2-18-93

Test Pit No.: TP-1

Depth (ft.)	Soil Description
0 to 1	Topsoil
1 to 2	Red-brown slightly micaceous silty clay (CH) (Residuum)
	Sample collected
2 to 3.5	Red-brown micaceous silty fine sand (SM)

Test pit terminated at 3.5 feet.
No ground water encountered.

Test Pit No.: TP-2

Depth (ft.)	Soil Description
0 to 0.5	Topsoil
0.5 to 1.5	Orange-tan silty clay (CH) with trace of mica (Residuum)
	Sample collected
1.5 to 3.5	Red-tan micaceous silty fine sand (SM) with trace of clay

Test pit terminated at 3.5 feet.
No ground water encountered.

Test Pit No.: TP-3

Depth (ft.)	Soil Description
0 to 1	Topsoil
1to 2	Orange-tan silty clay (CH) with trace of mica (Residuum)
	Sample collected
2 to 3.5	Orange-tan micaceous silty fine sand (SM)

Test pit terminated at 3.5 feet.
No ground water encountered.

TEST PIT LOGS (cont.)
William L. Bonnell Co., Inc., CrOH Landfill Closure
Goodwyn Road Borrow Site
Coweta County, Georgia
Our Project Number 115-93-20901
Test Pits Performed on 2-18-93

Test Pit No.: TP-4

Depth (ft.)	Soil Description
0 to 0.5	Topsoil
0.5 to 1.2	Orange-brown clayey silt (MH) with mica and fine sand (Residuum) Sample collected
1.2 to 3.5	Red-tan highly micaceous silty fine sand (SM) with trace of clay

Test pit terminated at 3.5 feet.
No ground water encountered.

GEOHYDRO

TEST PIT LOGS
William L. Bonnell Co., Inc., CrOH Landfill Closure
Bonnell Plant Borrow Site
Newnan, Georgia
Our Project Number 115-93-20901
Test Pits Performed on 4-7-93

Test Pit No.: TP-5

Depth (ft.)	Soil Description
0 to 0.5	Topsoil
0.5 to 1.2	Light red brown silty clay (CH) (Residuum) (Sample collected)
1.2 to 3	Light red-brown micaceous silty fine sand (SM) with clay

Test pit terminated at 3.0 feet.
No ground water encountered.

Test Pit No.: TP-6

Depth (ft.)	Soil Description
0 to 1	Topsoil
1 to 2.2	Light red brown silty clay (CH) (Residuum) (Sample collected)
2.2 to 3	Light red-brown micaceous silty fine sand (SM) with clay

Test pit terminated at 3.0 feet.
No ground water encountered.

Test Pit No.: TP-7

Depth (ft.)	Soil Description
0 to 1	Topsoil
1to 2.2	Light red brown silty clay (CH) (Residuum) (Sample collected)
2.2 to 3	Light red-brown micaceous silty fine sand (SM) with clay

Test pit terminated at 3.0 feet.
No ground water encountered.

TEST PIT LOGS (cont.)
William L. Bonnell Co., Inc., CrOH Landfill Closure
Plant Borrow Site
Newnan, Georgia
Our Project Number 111-93-20902
Test Pits Performed on 4-7-93

Test Pit No.: TP-8

Depth (ft.)	Soil Description
0 to 1.4	Topsoil
1.4 to 2.5	Light red brown silty clay (CH) (Residuum) (Sample collected)
2.5 to 3	Light red-brown micaceous silty fine sand (SM) with clay

Test pit terminated at 3.0 feet.
No ground water encountered.

GEOHYDRO

TEST PIT LOGS
William L. Bonnell Co., Inc., CrOH Landfill Closure
Newton Road Borrow Site
Coweta County, Georgia
Our Project Number 115-93-20901
Test Pits Performed on 4-14-93

Test Pit No.: TP-1

Depth (ft.)	Soil Description
0 to 1.0	Topsoil
1.0 to 2.0	Red-brown silty clay (CH) (Residuum)
2.0 to 4.5	Red-brown micaceous clayey silt (ML) with fine to medium sand

Test pit terminated at 4.5 feet.
No ground water encountered.

Test Pit No.: TP-2

Depth (ft.)	Soil Description
0 to 0.5	Topsoil
0.5 to 3.0	Red-brown and orange-brown silty clay (CL) with fine to medium sand (Residuum) (Sample collected)
3.0 to 4.0	Red-brown clayey silt (ML) with fine to medium sand (Wet)
4.0 to 5.5	Red-brown micaceous clayey silt (MH) (Sample collected)

Test pit terminated at 5.5 feet.
Water seepage into test pit at 4.0 feet

Test Pit No.: TP-3

Depth (ft.)	Soil Description
0 to 1.0	Topsoil
1.0 to 2.0	Red-brown silty clay (CL) (Residuum)
2.0 to 4.0	Orange-brown silty fine to coarse sand (SM)

Test pit terminated at 4.0 feet.
No ground water encountered.

TEST PIT LOGS
William L. Bonnell Co., Inc., CrOH Landfill Closure
Payton Property Borrow Site
Coweta County, Georgia
Our Project Number 115-93-20901
Test Pits Performed on 4-20-93

Test Pit No.: TP-1

Depth (ft.)	Soil Description
0 to 0.9	Topsoil
0.9 to 2.9	Red-brown silty clay (CH) with fine to medium sand and some rock fragments (Residuum) (Sample collected)
2.9 to 4.0	Red-brown silty fine to medium sand (SM) with clay

Test pit terminated at 4.0 feet.
No ground water encountered.

Test Pit No.: TP-2

Depth (ft.)	Soil Description
0 to 1.0	Topsoil
1.0 to 4.0	Red-brown silty clay (CH) with fine to medium sand (Residuum)
4.0 to 4.2	Red-brown silty fine to medium sand (SM) with clay

Test pit terminated at 4.2 feet.
No ground water encountered.

Test Pit No.: TP-3

Depth (ft.)	Soil Description
0 to 1.0	Topsoil
1.0 to 4.0	Red-brown silty clay (CH) with fine to medium sand and some rock fragments (Residuum) (Sample collected)
4.0 to 4.5	Red-brown silty fine to medium sand (SM) with clay

Test pit terminated at 4.5 feet.
No ground water encountered.

TEST PIT LOGS (cont.)
William L. Bonnell Co., Inc., CrOH Landfill Closure
Payton Property Borrow Site
Coweta County, Georgia
Our Project Number 115-93-20901
Test Pits Performed on 4-20-93

Test Pit No.: TP-4

Depth (ft.)	Soil Description
0 to 1.0	Topsoil
1.0 to 4.0	Light red-brown silty clay (CH) with fine to medium sand (Residuum) (Sample collected)
4.0 to 4.5	Orange-tan silty fine to medium sand (SM)

Test pit terminated at 4.5 feet.
No ground water encountered.

Test Pit No.: TP-5

Depth (ft.)	Soil Description
0 to 1.0	Topsoil
1.0 to 3.7	Red-brown silty clay (CH) with fine to medium sand and some rock fragments(Residuum) (Sample collected)
3.7 to 4.5	Orange-tan silty fine to medium sand (SM)

Test pit terminated at 4.5 feet.
No ground water encountered.

Test Pit No.: TP-6

Depth (ft.)	Soil Description
0 to 0.8	Topsoil
0.8 to 3.3	Brown silty fine to coarse sand (SM) (Fill)
3.3 to 4.2	Orange-tan silty clay (CL) (Residuum)
4.2 to 5.0	Orange-tan micaceous fine sandy silt (ML)

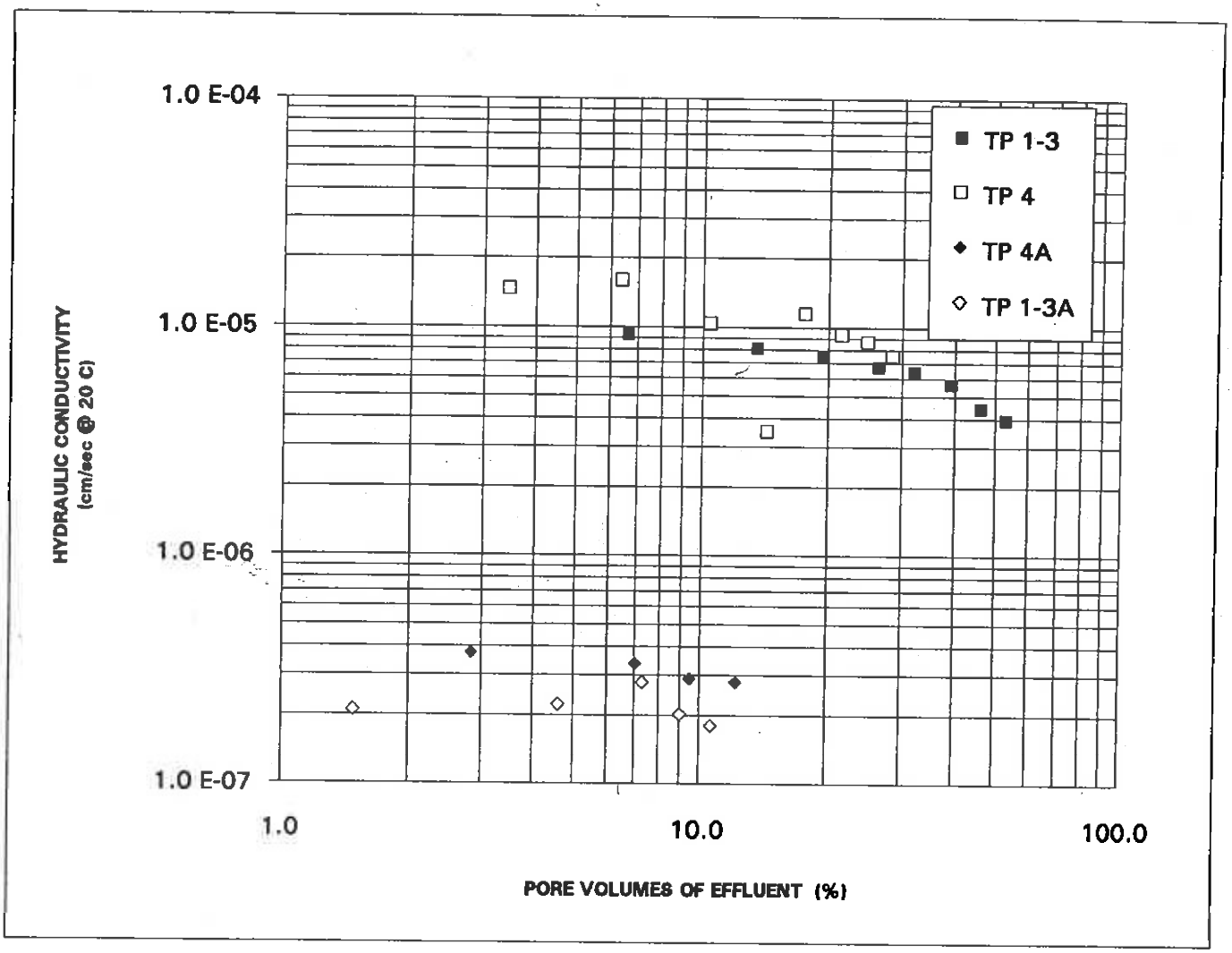
Test pit terminated at 5.0 feet.
No ground water encountered.

HYDRAULIC CONDUCTIVITY
LABORATORY TEST RESULTS

GEOHYDRO

Project Name: CrOH Landfill
Project Number: 115-93-20901
Test Method: ASTM D-5086

Date: 3/3/93
Performed By: J. Stevenson
Reviewed By: B. Grove



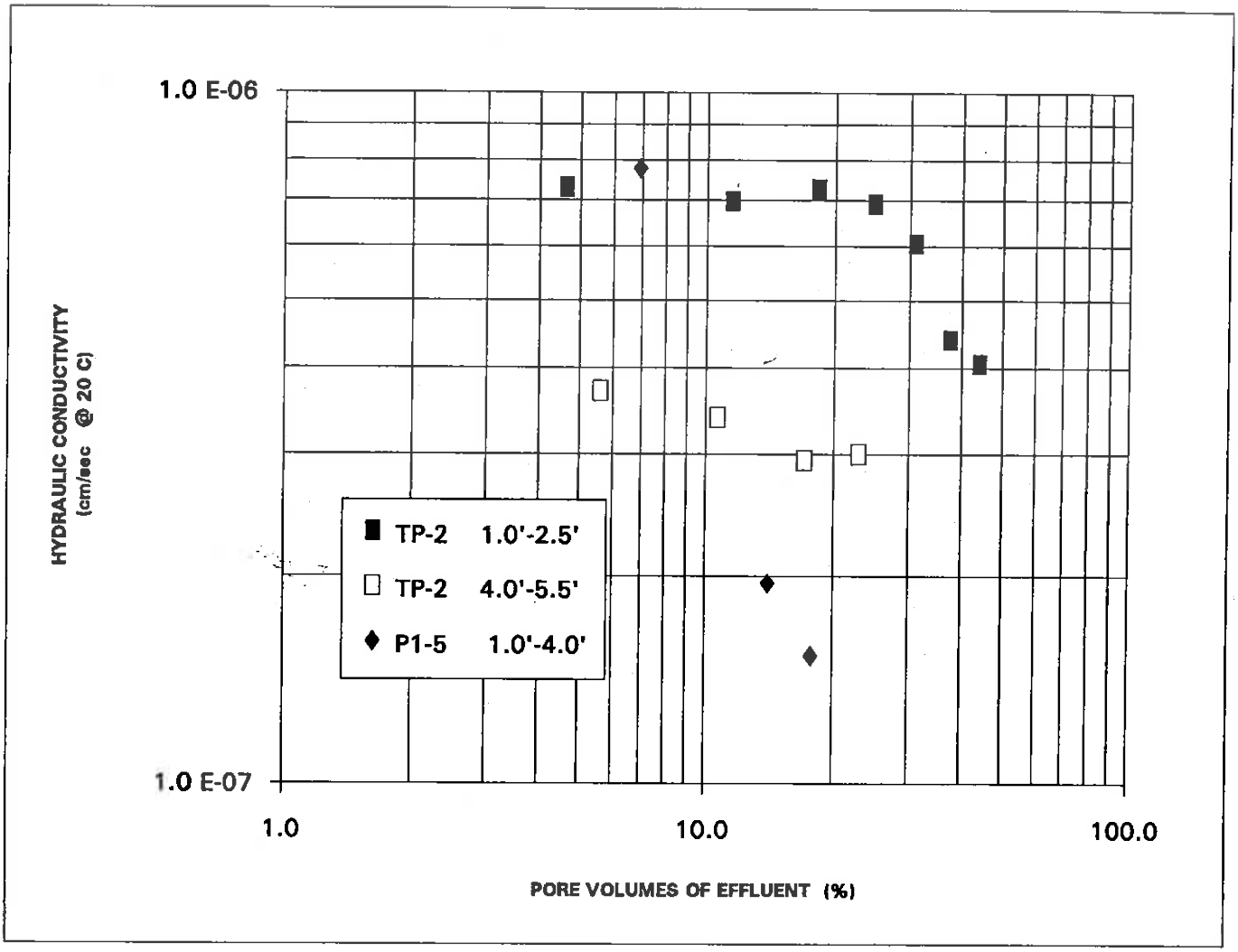
Sample Identification	TP 1-3 Orange brown silty clay (CH)	TP-4 Orange brown clayey silt (MH)	TP 1-3A Orange brown silty clay (CH)	TP-4A Orange brown clayey silt (MH)	
Depth (feet)	1.0 to 2.0	0.5 to 1.2	1.0 to 2.0	0.5 to 1.2	
Sample Type	REMOLD	REMOLD	REMOLD	REMOLD	
Diameter (cm)	7.30	7.29	7.30	7.29	
Length (cm)	10.23	10.20	10.23	10.20	
Initial Moisture Content (%)	31.2	35.9	33.8	39.2	
Specific Gravity (assumed)	2.7	2.7	2.7	2.7	
Dry Unit Weight (pcf)	82.5	78.4	83.3	78.0	
Percent Proctor Max Dry Density (%)	91.7	92.3	92.6	91.9	
Void Ratio	1.043	1.149	1.022	1.160	
Porosity (%)	51.1	53.4	50.4	53.7	
Hydraulic Conductivity (cm/sec @ 20 C)	6.5 E-6	1.0 E-5	2.2 E-7	3.1 E-7	

HYDRAULIC CONDUCTIVITY
LABORATORY TEST RESULTS

GEOHYDRO

Project Name: CROH Landfill
Project Number: 115-93-20901
Test Method: ASTM D-5086

Date: 6/1/93
Performed By: S Hutchings
Reviewed By: B. Grove



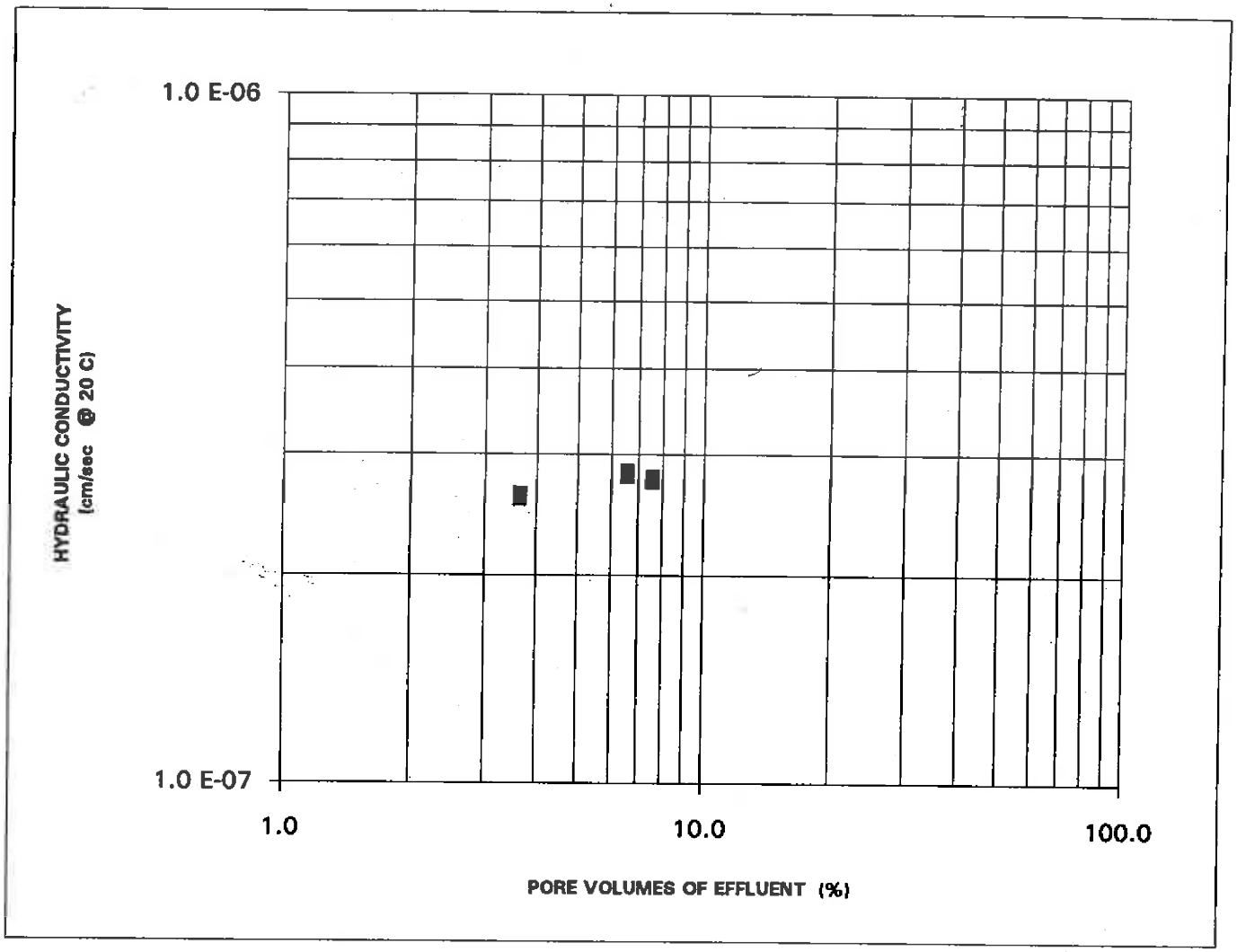
Sample Identification	TP-2 1.0'-2.5'	TP-2 4.0'-5.5'	P1-5 1.0'-4.0'		
Sample Description	Red Brown Silty Clay (CL)	Red Brown Clayey Silt (MH)	Red Brown Silty Clay (CH)		
Sample Type	REMOLD	REMOLD	REMOLD		
Diameter (cm)	7.29	7.21	7.25		
Length (cm)	10.15	10.17	10.31		
Initial Moisture Content (%)	26.8	27.4	24.2		
Specific Gravity (assumed)	2.7	2.7	2.7		
Dry Unit Weight (pcf)	91.2	93.1	100.4		
Void Ratio	0.848	0.810	0.678		
Porosity (%)	45.9	44.7	40.4		
Hydraulic Conductivity (cm/sec @ 20 C)	6.0 E-07	3.0 E-07	2 E-07		

HYDRAULIC CONDUCTIVITY
LABORATORY TEST RESULTS

GEOHYDRO

Project Name: CROH Landfill
Project Number: 115-93-20902
Test Method: ASTM D-5086

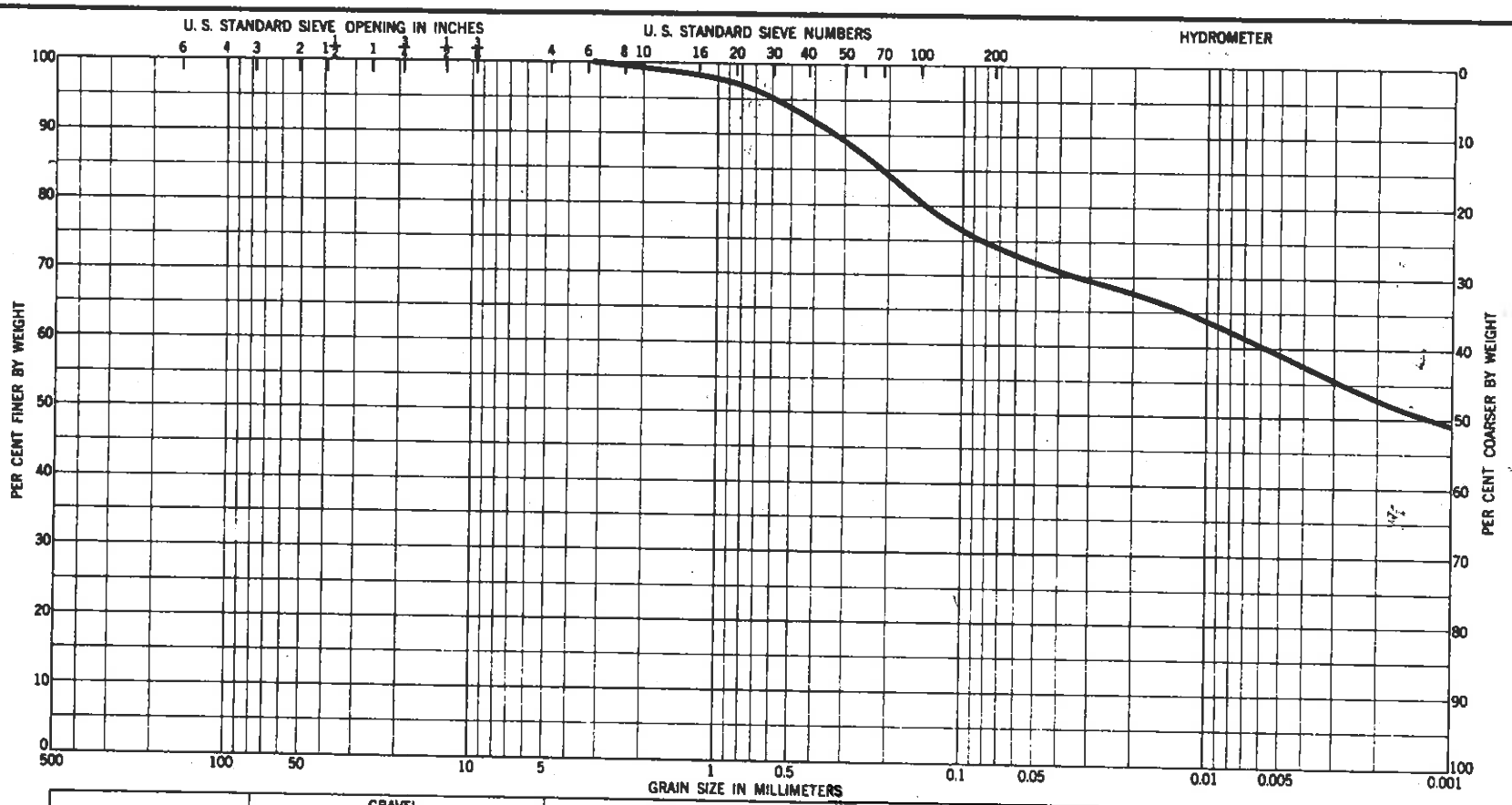
Date: 6/8/93
Performed By: S. Hutchings
Reviewed By: B. Grove



Sample Identification	TP5-8				
Sample Description	Red Brown Silty Clay (CH)				
Sample Type	REMOLD				
Diameter (cm)	7.28				
Length (cm)	10.29				
Initial Moisture Content (%)	32.2				
Specific Gravity (assumed)	2.7				
Dry Unit Weight (pcf)	88.6				
Void Ratio	0.903				
Porosity (%)	47.4				
Hydraulic Conductivity (cm/sec @ 20 C)	2.8 E-07				

Project William L. Bonnell Co. CrOH Landfill Job No. 115-93-20901

Date 2/25/93



Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
TP 1-3 *	--	1 ft.	Orange-brown silty clay (CH)	--	72	30	42

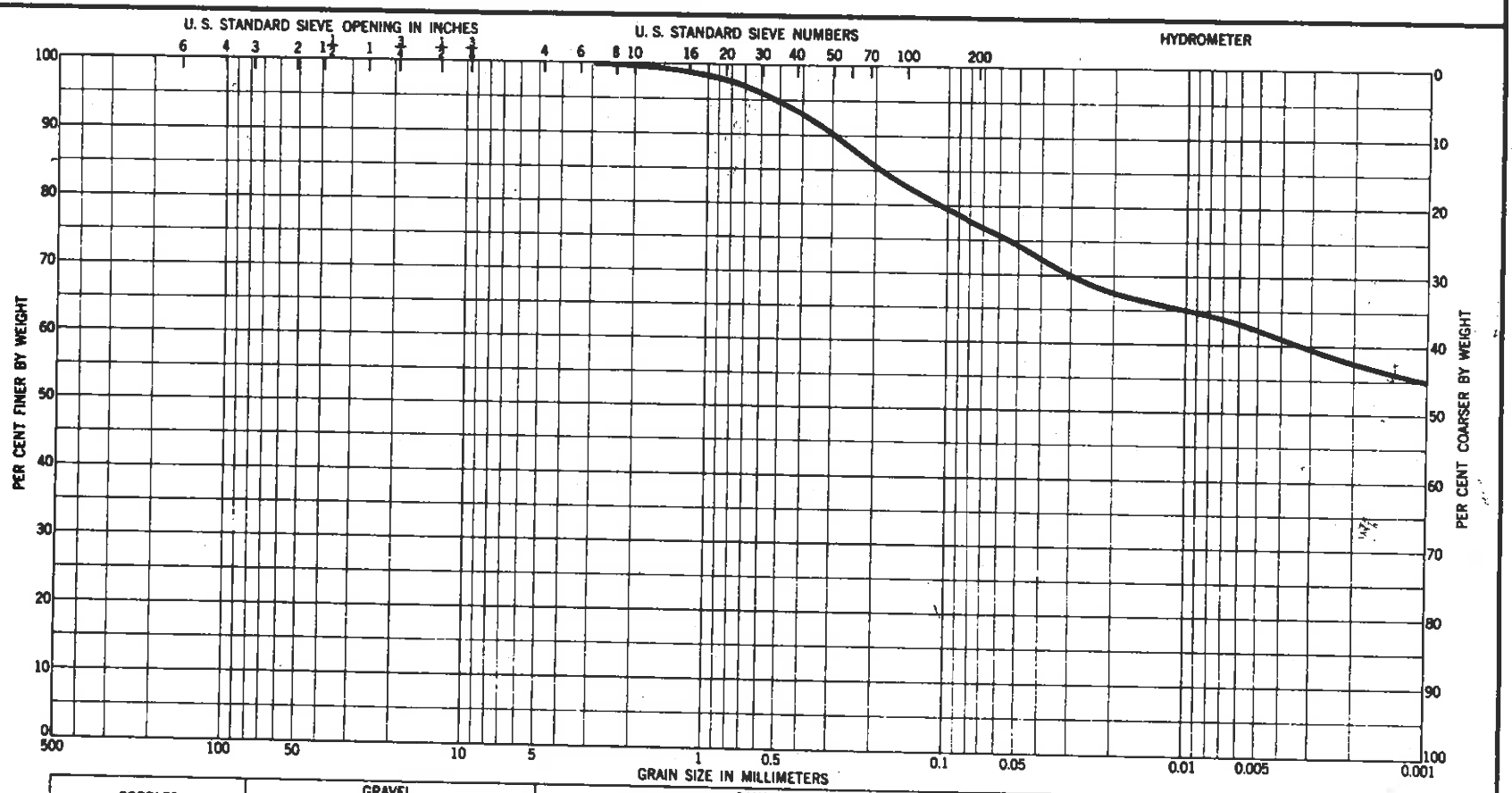
GRADATION CURVES

GEOHYDRO

*Goodwyn Road Borrow Site

Project William L. Bonnell Co. CrOH Landfill Job No. 115-93-20901

Date 2/25/93



Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
TP-4 *	--	1 ft.	Orange-brown clayey silt (MH)	--	80	37	43

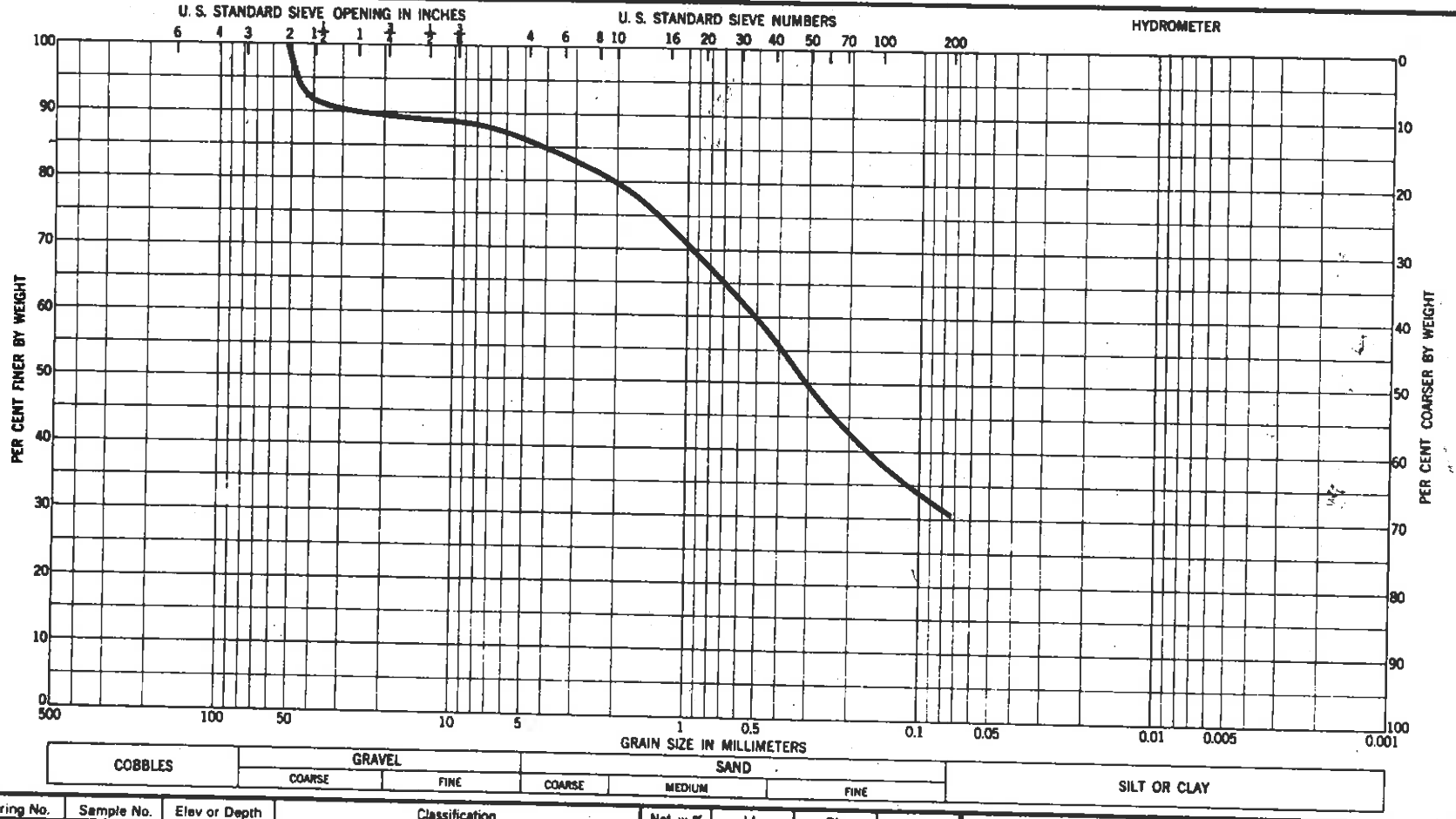
GRADATION CURVES

GEOHYDRO

*Goodwyn Road Borrow Site

Project William L. Bonnell Co. CrOH Landfill Job No. 115-93-20901

Date 2/25/93



Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
--- *		Topsoil	Brown silty fine to coarse sand (SM) with rock fragments	--	41	31	10

GRADATION CURVES

GEOHYDRO

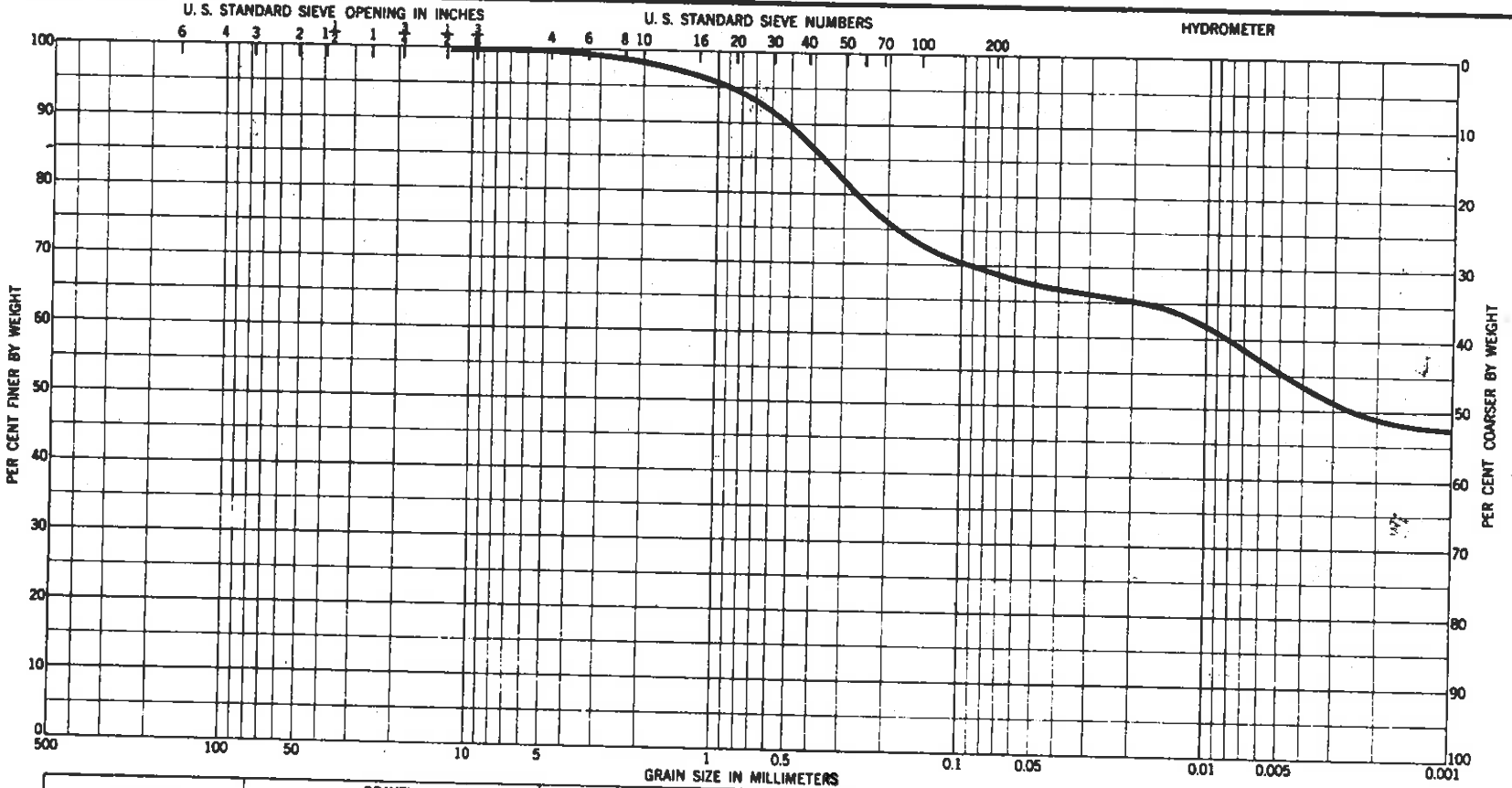
*William L. Bonnell Plant Stockpile

Project CrOH Landfill Closure

Job No. 111-93-20901

William L. Bonnell Company, Newnan, GA

Date 4/7/93



Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
	*		Orange-brown silty clay (CH)		67	29	38

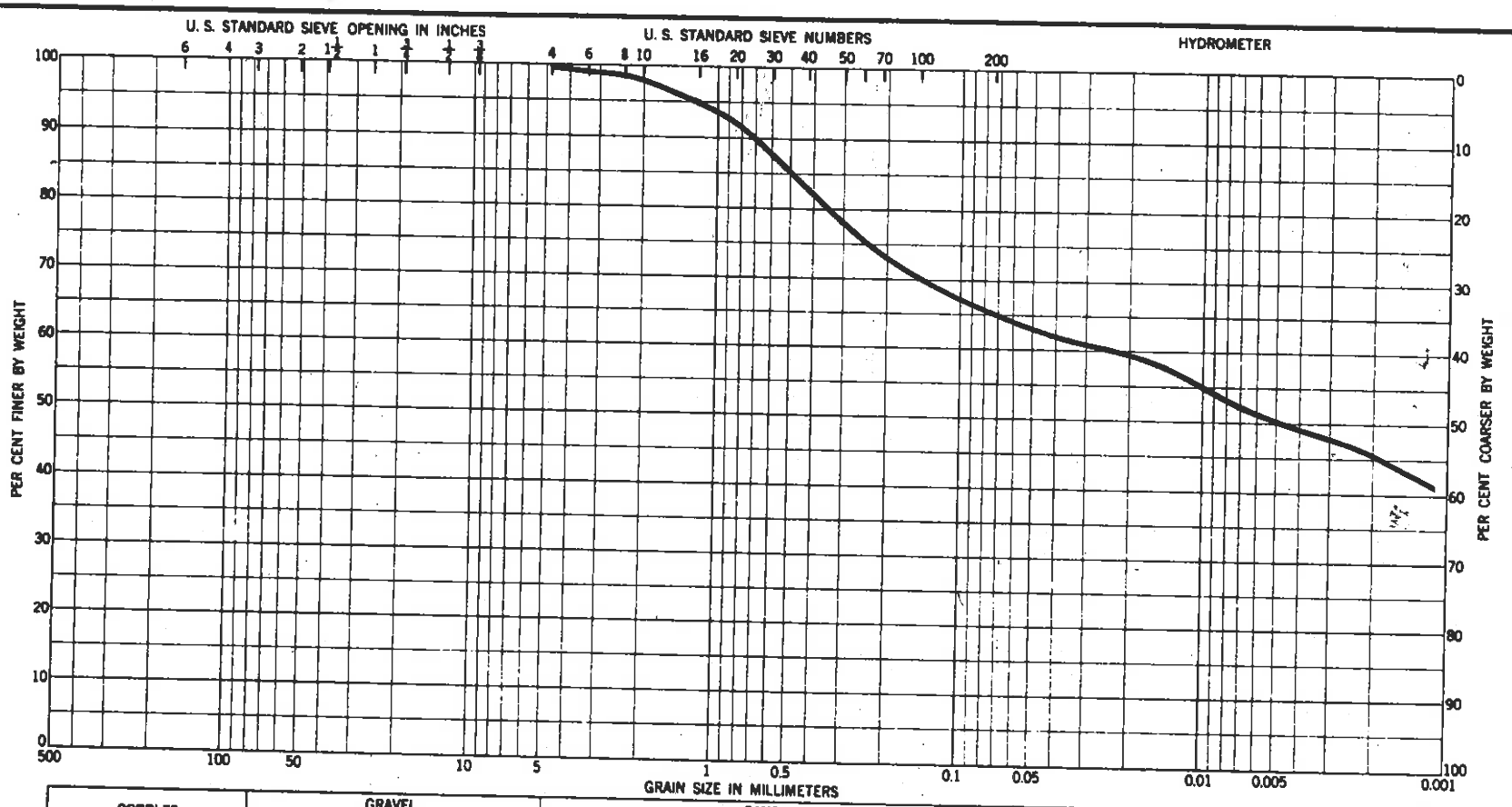
GRADATION CURVES

GEOHYDRO

*Sample from Clay Subgrade Material in Place

Project CrOH Landfill Closure Job No. 115-93-20901

William L. Bonnell Co., Newnan, Georgia Date 5/19/93



Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
	TP5-8 *	.5'-2.5'	Red brown silty clay (CH)	--	63	30	33

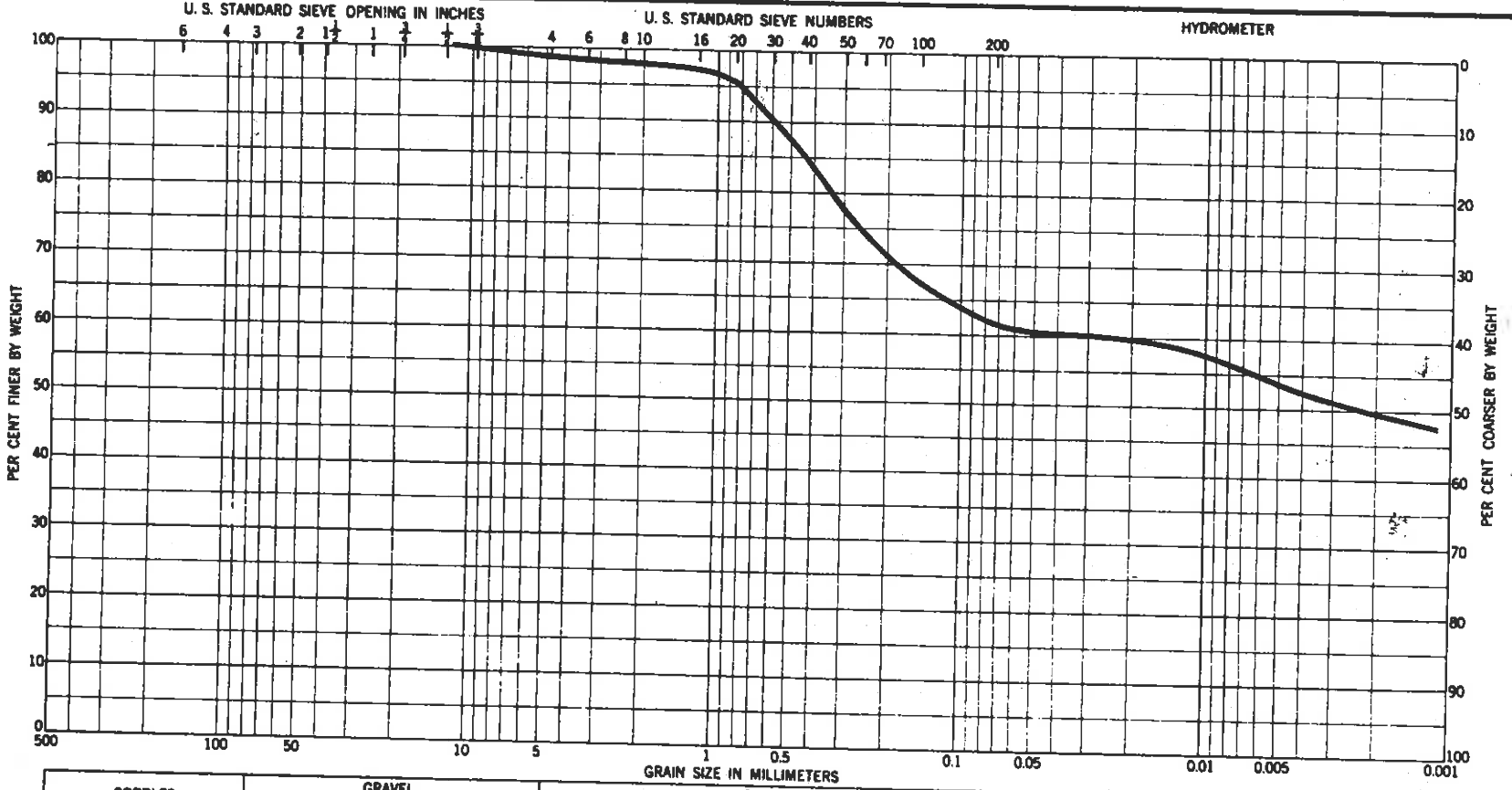
GRADATION CURVES

GEOHYDRO

*Bonnell Plant Borrow Site Composite

Project CrOH Landfill Closure Job No. 111-93-20901

William L. Bonnell Co., Newnan, Georgia Date 5/19/93



Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
	TP-2 *	1'-2.5'	Red brown silty clay (CL)	--	47	20	27

GRADATION CURVES

GEOHYDRO

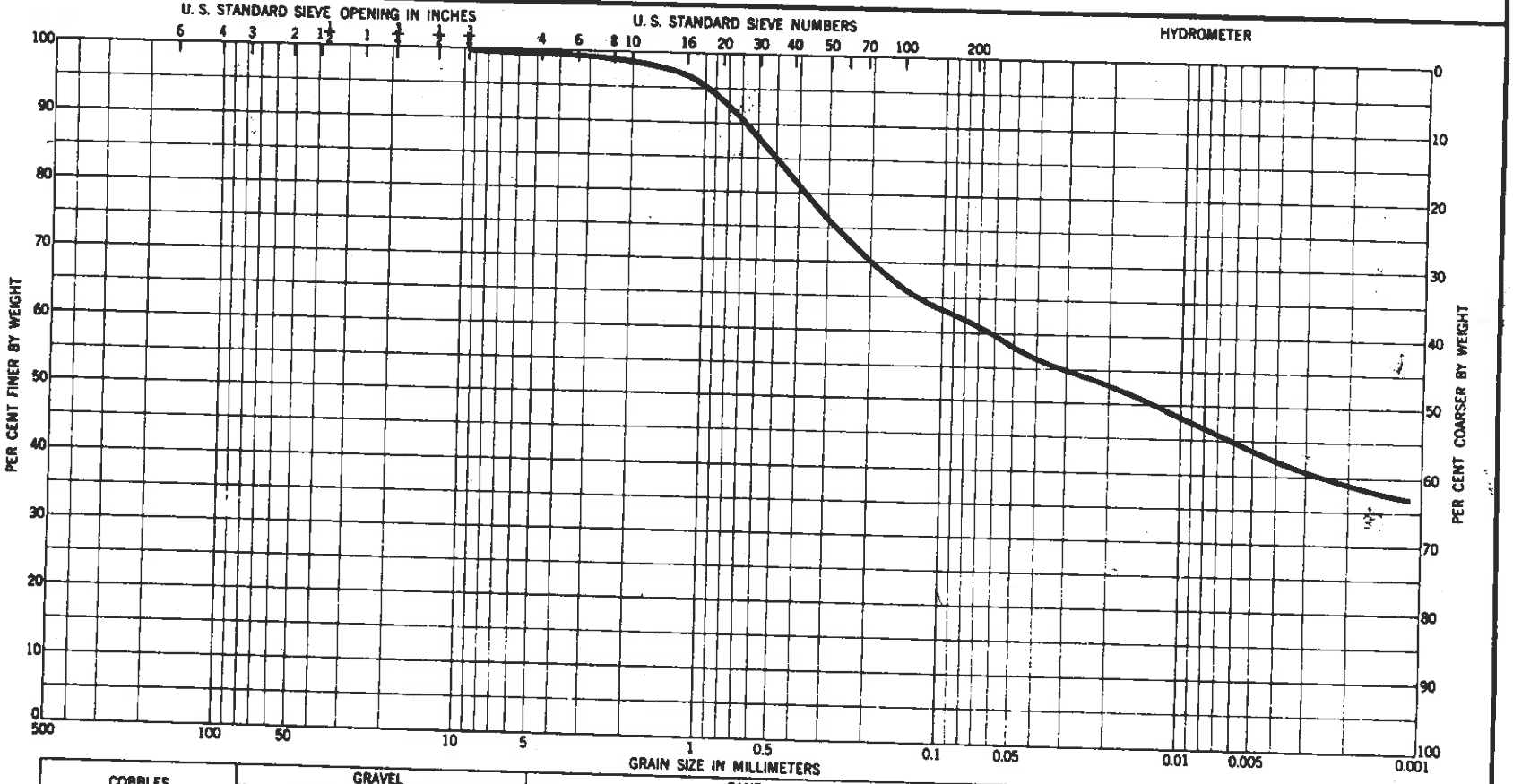
*Newton Road Borrow Site

Project CrOH Landfill Closure

Job No. 111-93-20901

William L. Bonnell Co., Newnan, Georgia

Date 5/19/93



Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
	TP-2 *	4'-5.5'	Red brown clayey silt (MH)	--	55	30	25

GRADATION CURVES

GEOHYDRO

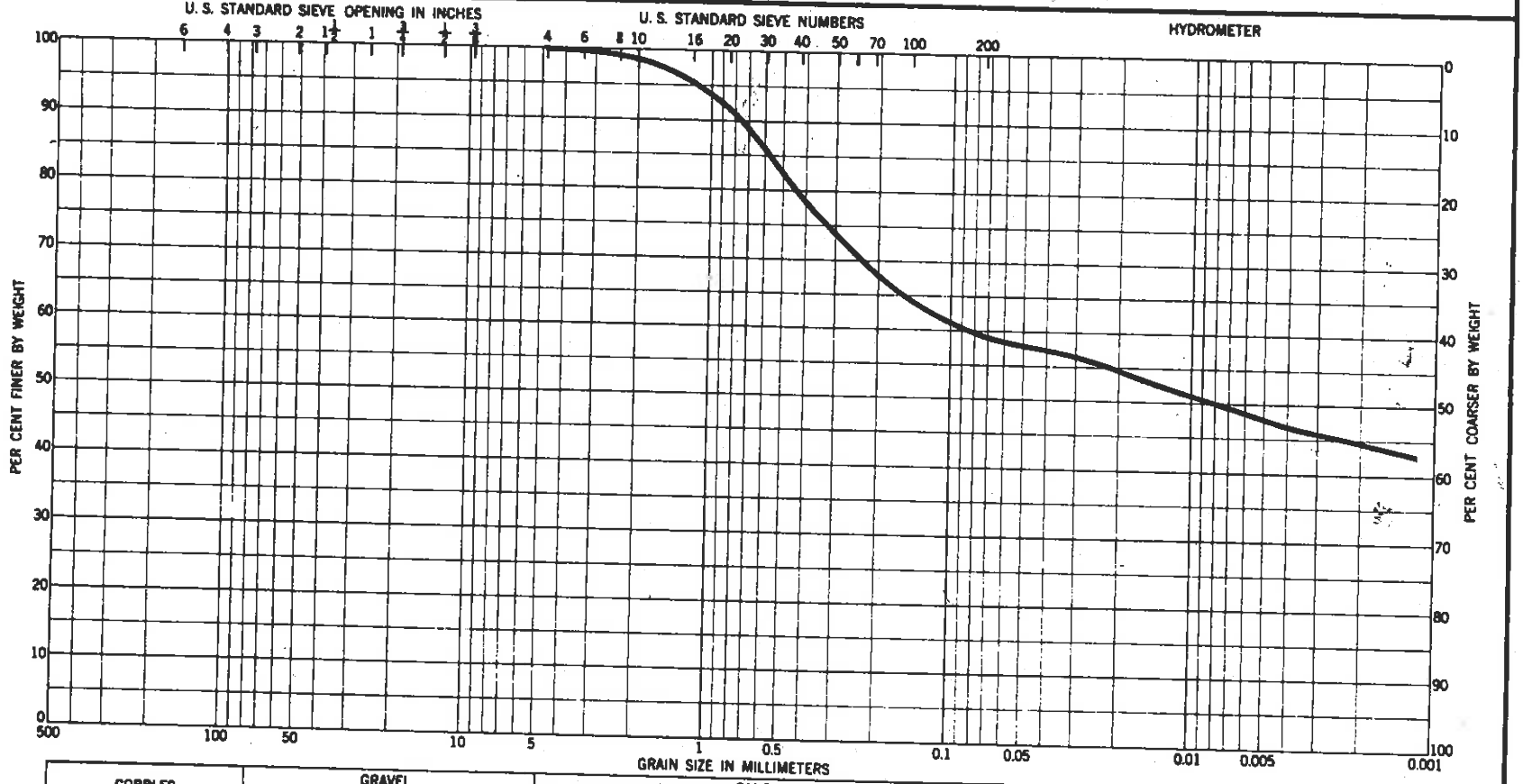
*Newton Road Borrow Site

Project CrOH Landfill Closure

Job No. 115-93-20901

William L. Bonnell Co., Newnan, Georgia

Date 5/19/93



Boring No.	Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
	P1-5 *	1' - 4'	Red brown silty clay (CH)	--	56	26	30

GRADATION CURVES

GEO-HYDRO

*Payton Property Borrow Site Composite

LOCATION Goodwyn Road Borrow Site
Coweta County, Georgia

GEOHYDRO

SAMPLE ID TP1-3 Composite

DESCRIPTION Orange-brown silty clay (CH)

NATURAL MOISTURE CONTENT --

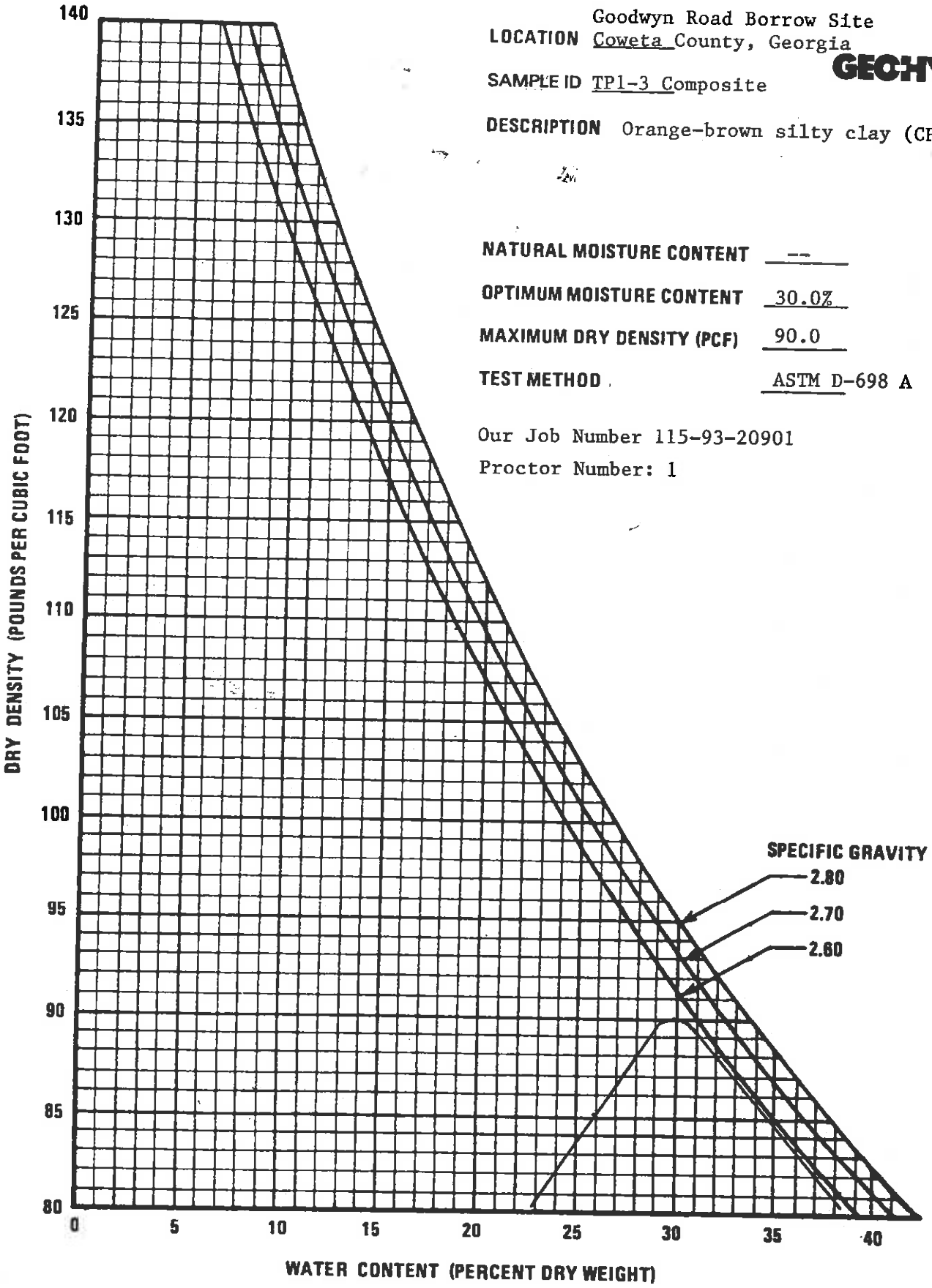
OPTIMUM MOISTURE CONTENT 30.0%

MAXIMUM DRY DENSITY (PCF) 90.0

TEST METHOD ASTM D-698 A

Our Job Number 115-93-20901

Proctor Number: 1



PROCTOR TEST RESULTS

LOCATION Goodwyn Road Borrow Site
Coweta County, Georgia

GEOHYDRO

SAMPLE ID TP-4

DESCRIPTION Orange-brown clayey silt (MH)

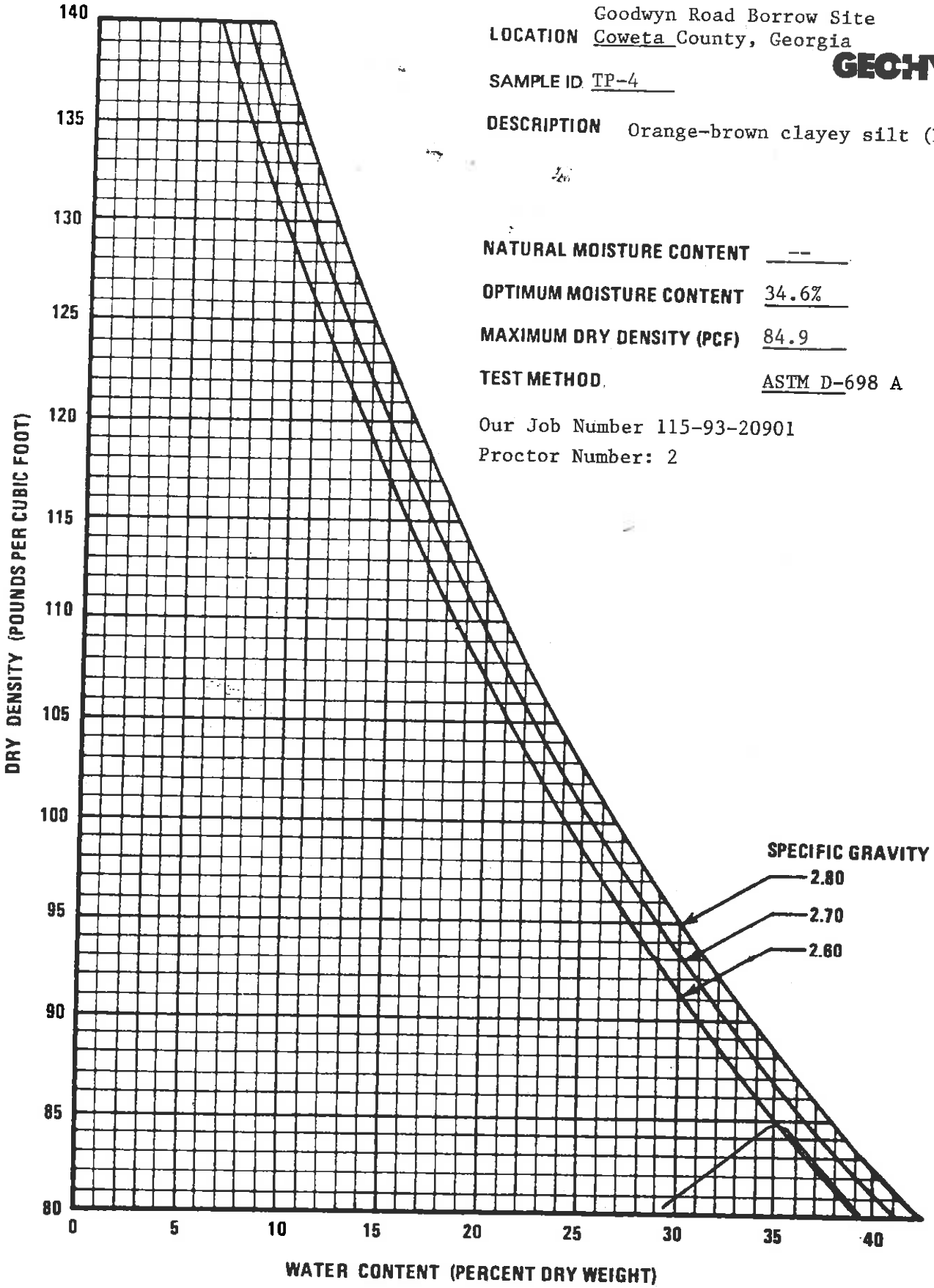
NATURAL MOISTURE CONTENT --

OPTIMUM MOISTURE CONTENT 34.6%

MAXIMUM DRY DENSITY (PCF) 84.9

TEST METHOD ASTM D-698 A

Our Job Number 115-93-20901
Proctor Number: 2



PROCTOR TEST RESULTS

LOCATION William L. Bonnell Co. Plant
Newnan, Georgia

GEO-HYDRO

SAMPLE ID Topsoil Stockpile, Surface

DESCRIPTION Brown silty fine to coarse sand (SM) with rock fragments

NATURAL MOISTURE CONTENT ---

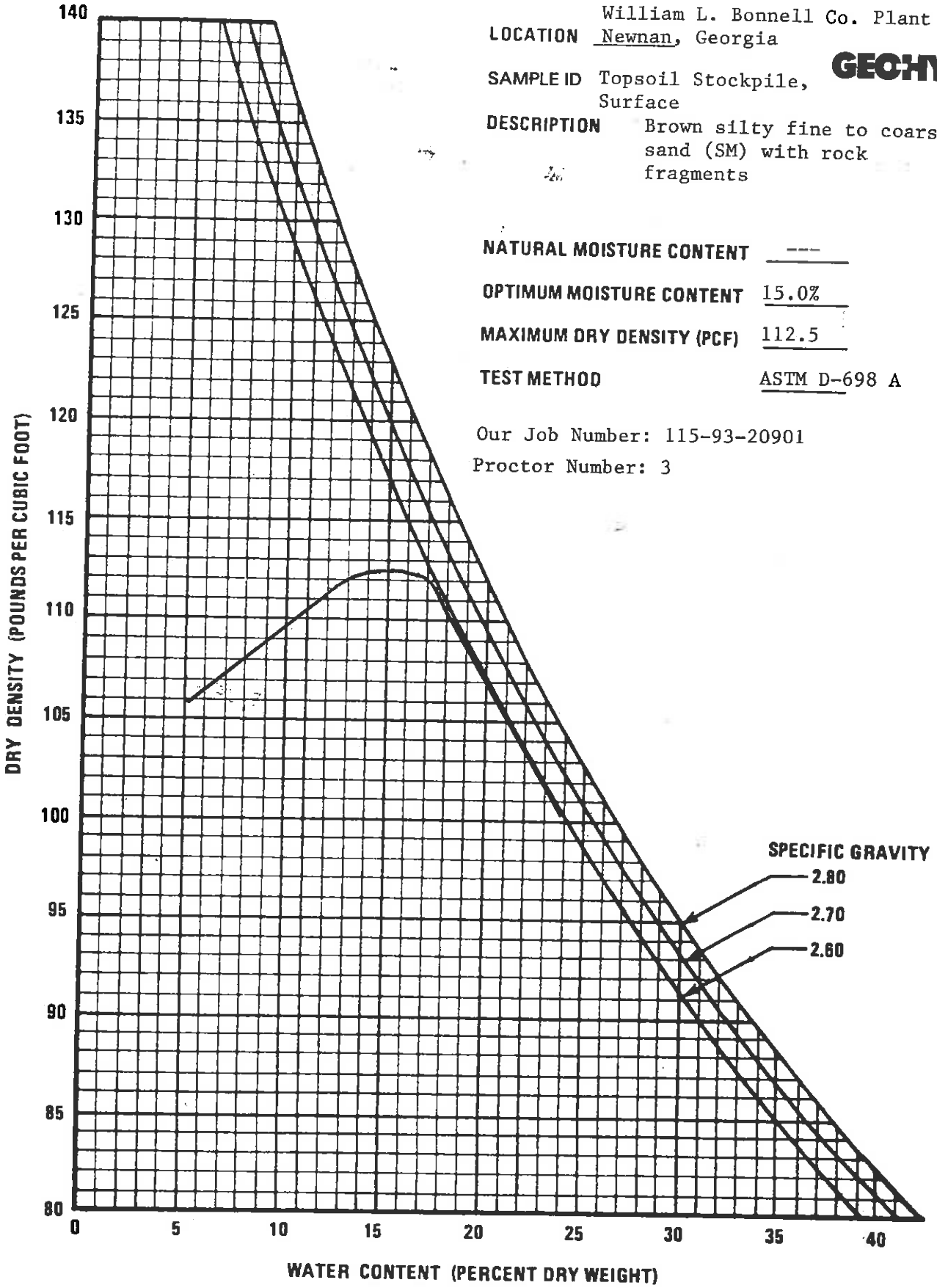
OPTIMUM MOISTURE CONTENT 15.0%

MAXIMUM DRY DENSITY (PCF) 112.5

TEST METHOD ASTM D-698 A

Our Job Number: 115-93-20901

Proctor Number: 3



PROCTOR TEST RESULTS

LOCATION TP 5-8 Composite (Bonnell Plant Borrow Site)

DEPTH 0.5' - 2.5'

DESCRIPTION Red brown silty clay (CH)

GEOHYDRO

NATURAL MOISTURE CONTENT _____

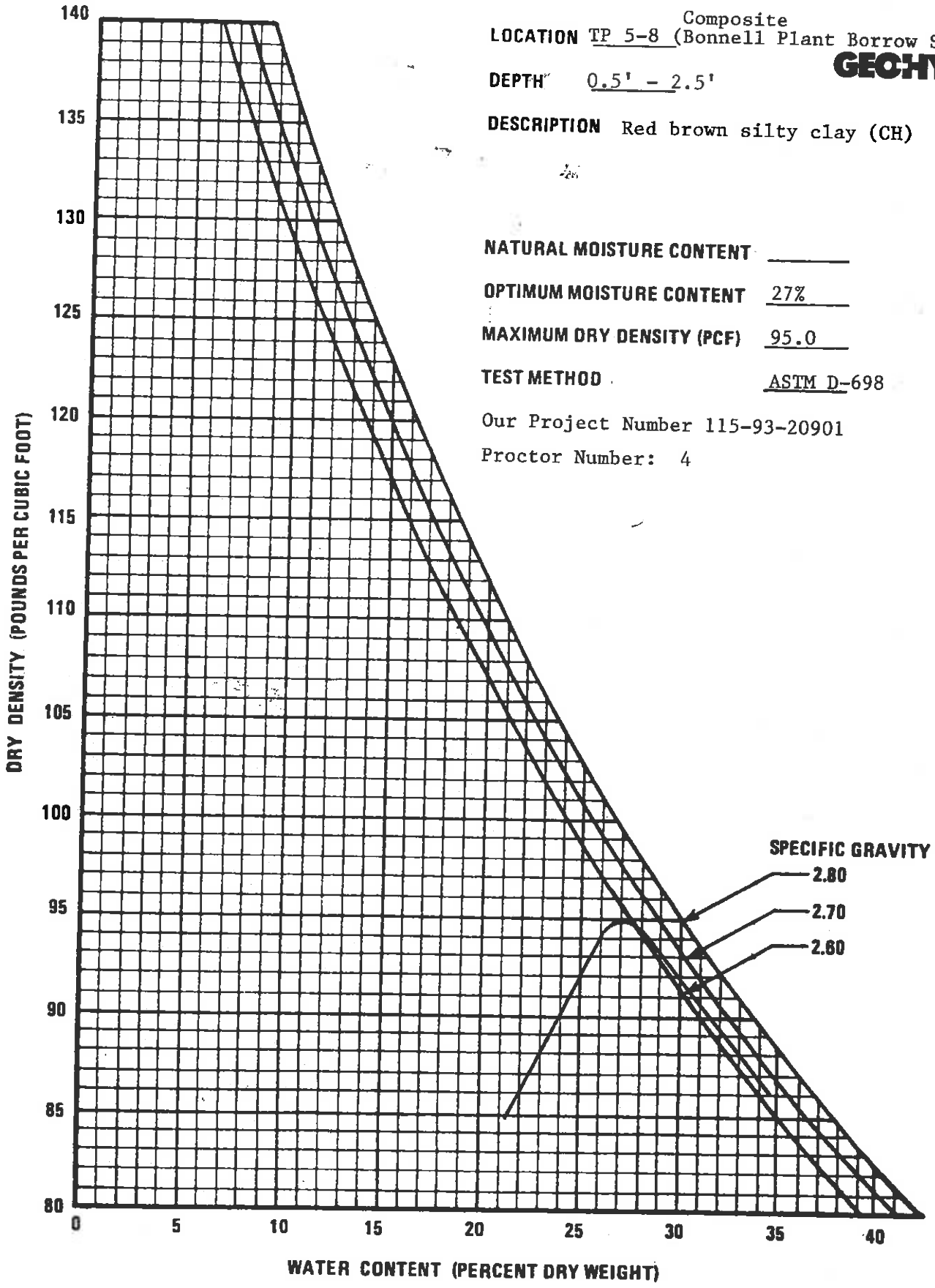
OPTIMUM MOISTURE CONTENT 27%

MAXIMUM DRY DENSITY (PCF) 95.0

TEST METHOD ASTM D-698

Our Project Number 115-93-20901

Proctor Number: 4



PROCTOR TEST RESULTS

LOCATION TP-2 (Newton Rd. Borrow Site)

DEPTH 1.0' - 2.5'

GEOHYDRO

DESCRIPTION Red brown silty clay (CL)

NATURAL MOISTURE CONTENT _____

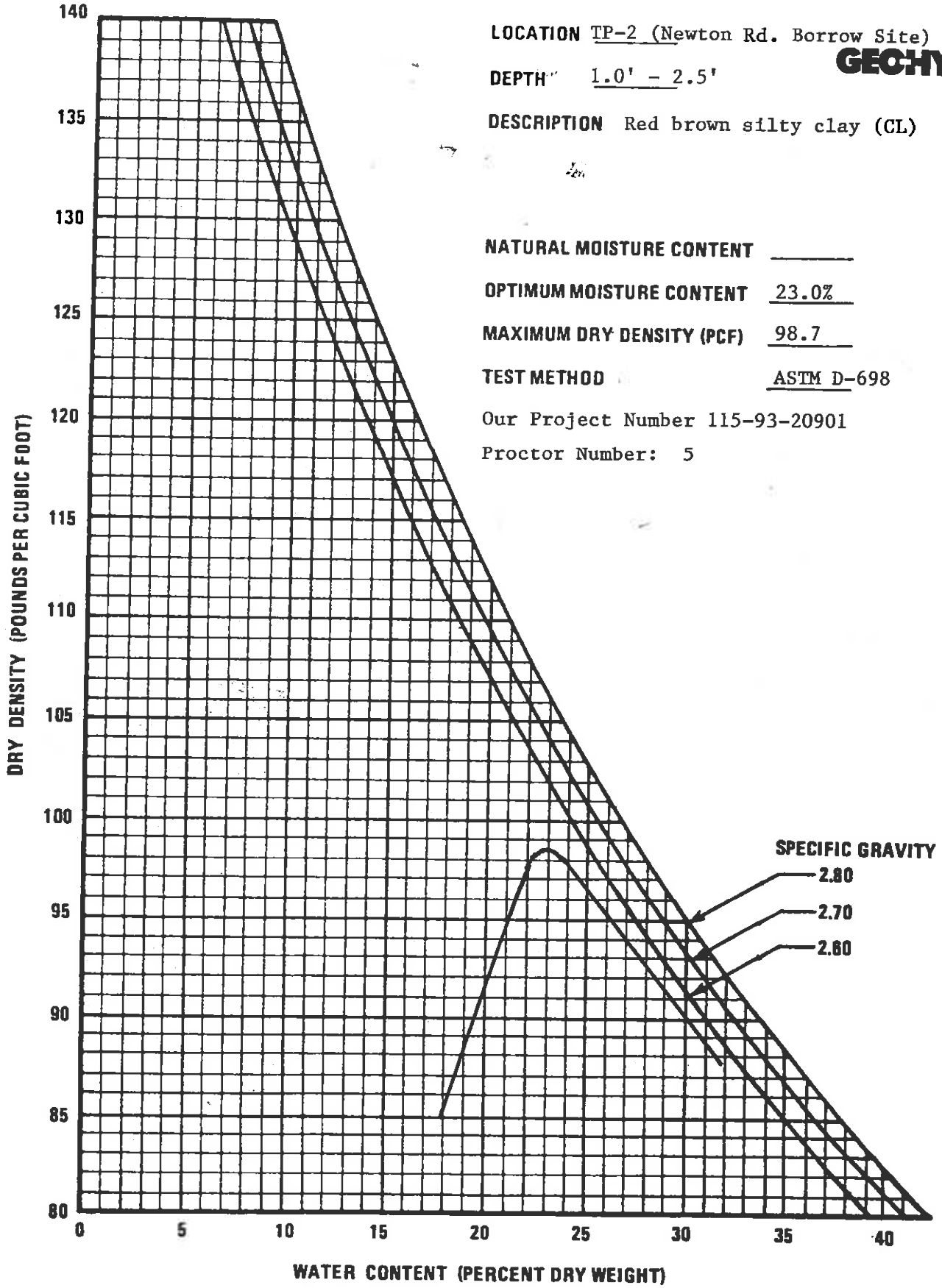
OPTIMUM MOISTURE CONTENT 23.0%

MAXIMUM DRY DENSITY (PCF) 98.7

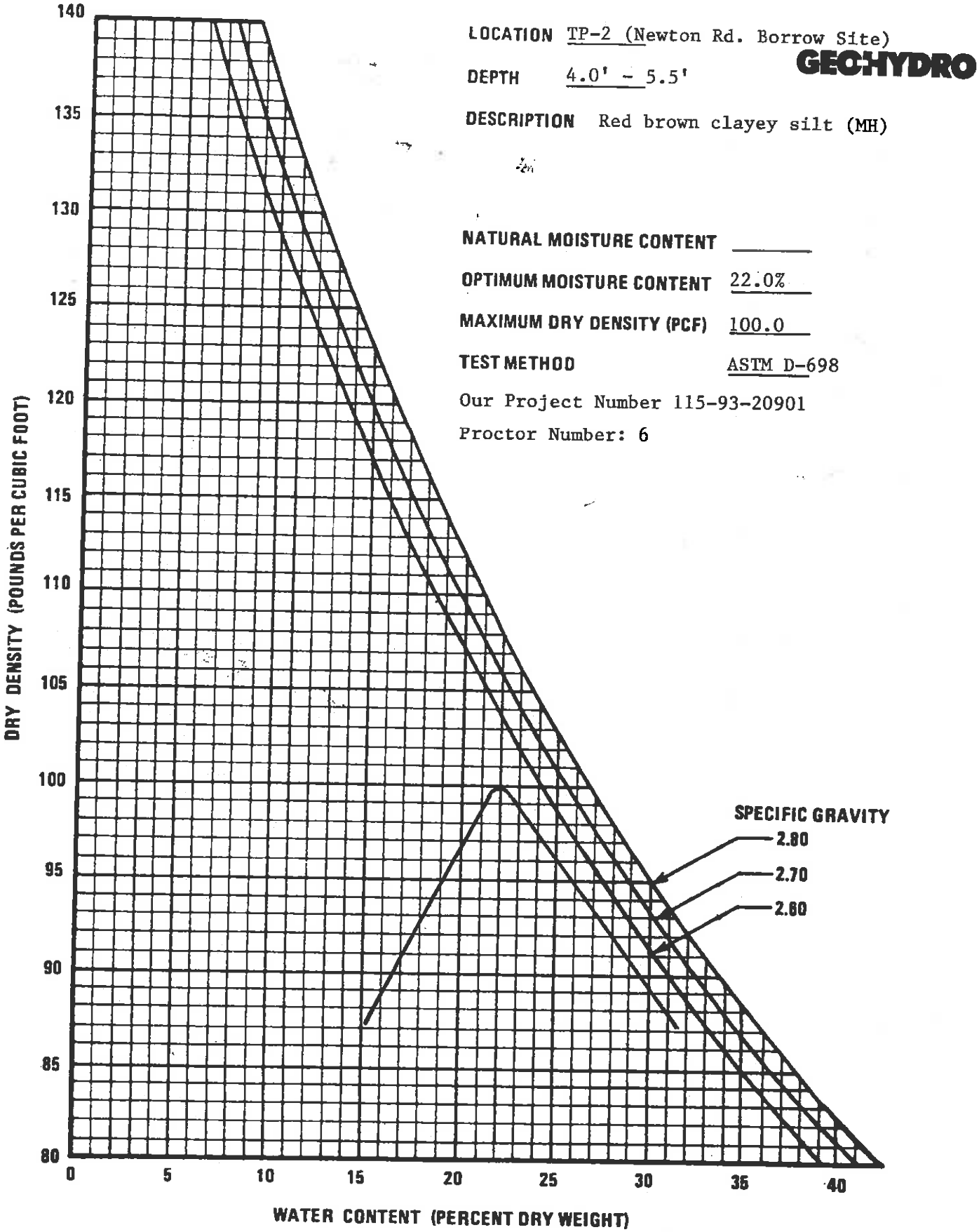
TEST METHOD ASTM D-698

Our Project Number 115-93-20901

Proctor Number: 5



PROCTOR TEST RESULTS



PROCTOR TEST RESULTS

(Composite Sample)

LOCATION P1-5 (Payton Property)

GEO-HYDRO

DEPTH 1.0' - 4.0'

DESCRIPTION Red brown silty clay (CH)

NATURAL MOISTURE CONTENT _____

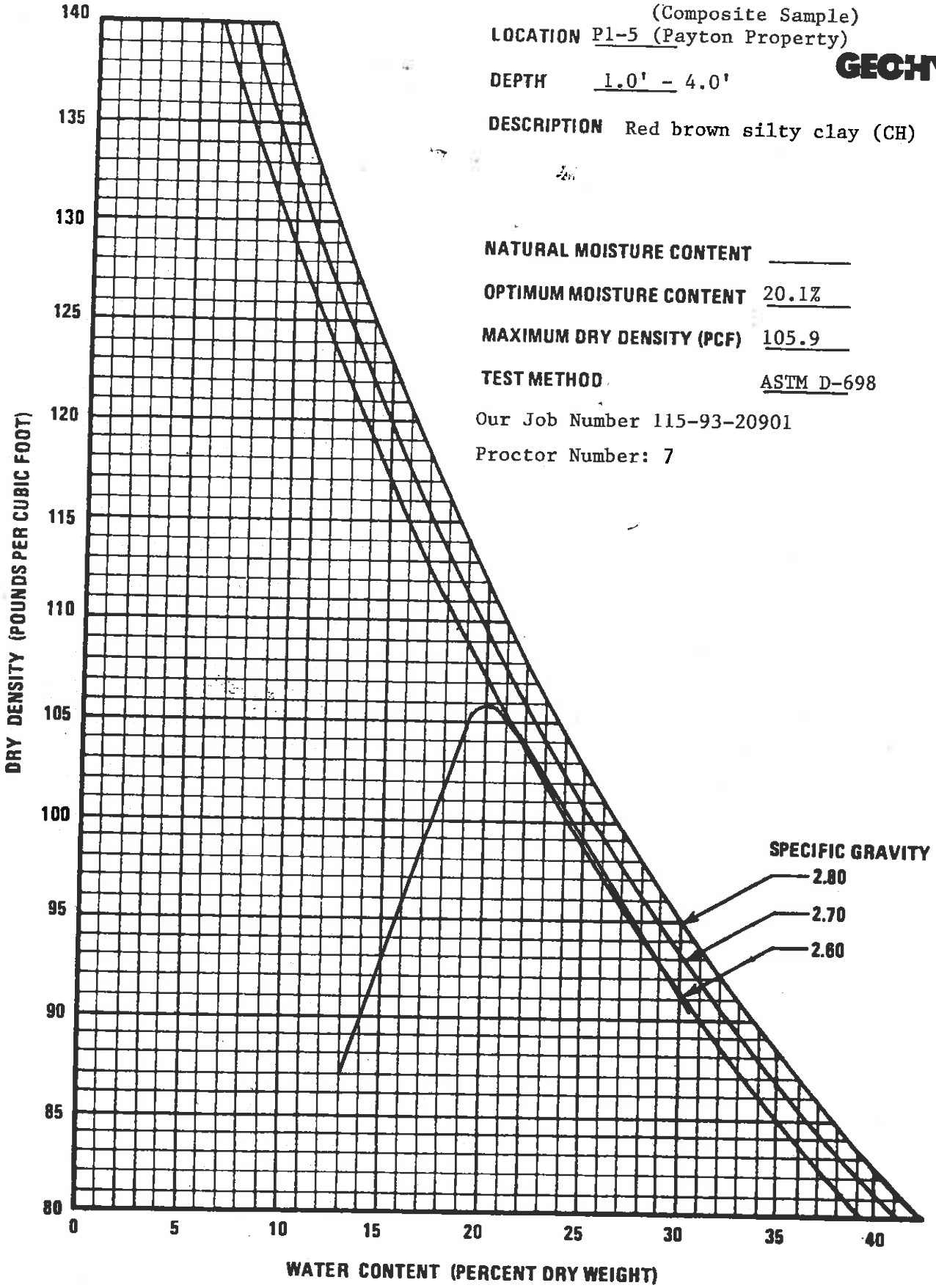
OPTIMUM MOISTURE CONTENT 20.1%

MAXIMUM DRY DENSITY (PCF) 105.9

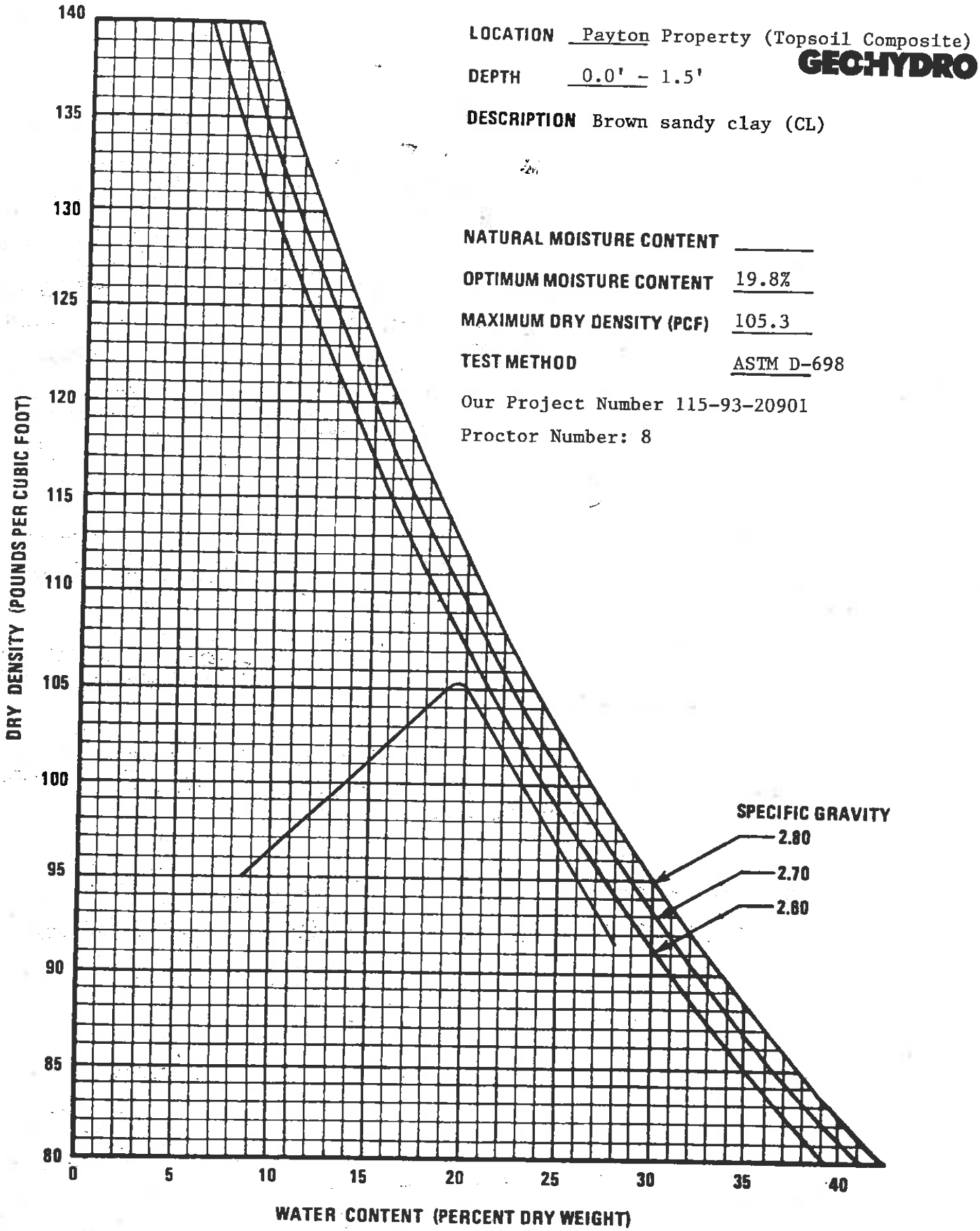
TEST METHOD ASTM D-698

Our Job Number 115-93-20901

Proctor Number: 7



PROCTOR TEST RESULTS



PROCTOR TEST RESULTS

June 16, 1993

GEO-HYDRO

William L. Bonnell Co., Inc.
25 Bonnell Street
P.O. Box 428
Newnan, Georgia 30264

Attention: Mr. Terry D. Snell, P.E.

Summary Letter
Construction Materials Testing
CrOH Landfill Closure
William L. Bonnell Co., Inc. Plant
Newnan, Georgia
Our Project Number 111-93-20902

Gentlemen:

Geo-Hydro Engineers, Inc. has completed the required density testing for the clay subgrade layer at the above referenced project. Our letter dated April 6, 1993 outlined test results for in-place density tests performed on clay subgrade materials placed within the originally planned landfill boundaries. Changes in the project required the expansion of the landfill beyond the original boundaries. To accomplish this expansion additional clay subgrade material was placed. A total of 6 in-place density tests were performed to verify density requirements within the additional clay subgrade area. All density test results were above 95% of maximum dry density as determined by standard Proctor test (ASTM D-698). Moisture content of the clay subgrade material at the time of testing ranged from -3.0% to +5.3% of optimum.

Daily reports containing density test results and test locations for the clay subgrade have been provided to you under separate cover. The attached Table 1 presents a summary of all in-place density test results performed on the clay subgrade. The attached Figure 1 shows the approximate locations of the density tests performed.

After placement of the HDPE liner, a soil cover was placed as required by the project closure plan. A total of 24 in-place density tests were performed. All density test results were above 92% of maximum dry density as determined by standard Proctor test (ASTM D-698). Moisture content of the cover soils at the time of testing ranged from -0.2% to +5.5% of optimum.

Daily reports containing density test results and test locations for the soil cover have been provided to you under separate cover. The attached Table 2 presents a summary of all in-place density test results performed on the soil cover. The attached Figure 2 shows the approximate locations of the density tests performed.

GEO-HYDRO ENGINEERS, INC.
1000 Cobb Place Boulevard
Suite 290
Kennesaw, Georgia 30144-3684
(404) 426-7100

GEO-HYDRO

We have appreciated the opportunity to work with you on this project. If you have any questions concerning this letter or any of our services, please call us.

Sincerely,

GEO-HYDRO ENGINEERS, INC.

Luis E. Babler, E.I.T.
Geotechnical Engineer

Milton O. Schreiber, P.E.
Senior Geotechnical Engineer

LEB\ig\CMT209002L4

GEOHYDRO

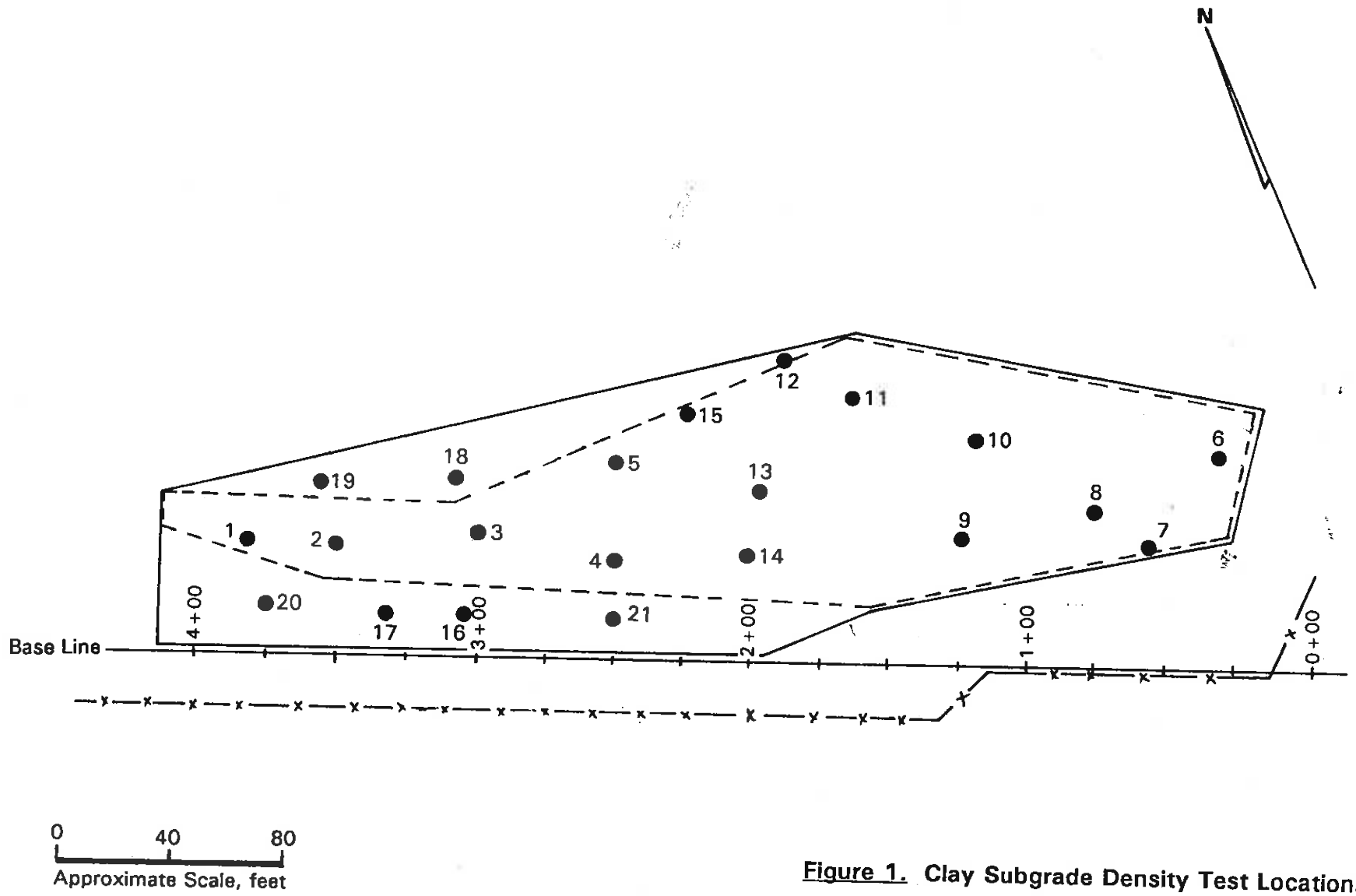


Figure 1. Clay Subgrade Density Test Locations

LEGEND: ● Clay Subgrade Density Test Location

– – – – Original Landfill Boundary

——— Final Landfill Boundary

PROJECT: CrOH Landfill Closure
William L. Bonnell Co. Plant
Newnan, Georgia
Our Project Number 111-93-20902

GEOHYDRO

Table 1.
FIELD DENSITY TEST SUMMARY
CLAY SUBGRADE
CrOH Landfill Closure
William L. Bonnell Company
Newnan, Georgia
Our Project Number 111-93-20902

Test No.	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Proctor No.	Test Method	% Comp.	% Req'd.	Date of Test	Location Description
1	120.0	35.3	88.7	1	D.R.	99	95	3/29/93	3+85 & 45' N of Baseline
2	119.0	34.0	88.8	1	D.R.	99	95	3/29/93	3+50 & 40' N of Baseline
3	120.0	32.6	90.5	1	D.R.	100	95	3/29/93	3+00 & 45' N of Baseline
4	119.2	33.0	89.6	1	D.R.	100	95	3/29/93	2+50 & 30' N of Baseline
5	119.8	32.8	90.2	1	D.R.	100	95	3/29/93	2+50 & 70' N of Baseline
CP1	117.3	29.6	90.5	1	C.P.	N/A	N/A	3/29/93	N/A
6	117.6	34.1	87.7	1	D.R.	97	95	3/30/93	0+30 & 75' N of Baseline
7	119.6	33.5	89.6	1	D.R.	99	95	3/30/93	0+55 & 40' N of Baseline
8	120.1	32.5	90.6	1	D.R.	100	95	3/30/93	0+75 & 55' N of Baseline
9	120.3	33.2	90.3	1	D.R.	100	95	3/30/93	1+25 & 45' N of Baseline
10	116.9	34.3	87.0	1	D.R.	97	95	3/30/93	1+20 & 80' N of Baseline
11	118.2	34.5	87.9	1	D.R.	97	95	3/30/93	1+65 & 95' N of Baseline
12	118.4	32.2	89.6	1	D.R.	100	95	3/30/93	1+85 & 110' N of Baseline
13	120.4	33.7	90.1	1	D.R.	100	95	3/30/93	1+95 & 60' N of Baseline
14	117.2	32.9	88.2	1	D.R.	98	95	3/30/93	2+00 & 40' N of Baseline
15	117.7	34.3	87.6	1	D.R.	97	95	3/30/93	2+25 & 90' N of Baseline
16	112.8	24.0	91.0	4	D.R.	96	95	4/27/93	3+06 & 15' N of Baseline
17	117.4	26.0	93.2	4	D.R.	98	95	4/27/93	3+35 &15' N of Baseline
18	120.6	29.0	93.5	4	D.R.	98	95	4/27/93	3+09 & 63' N of Baseline
19	120.5	28.2	94.0	4	D.R.	99	95	4/27/93	3+56 & 63' N of Baseline
20	119.9	26.4	94.8	4	D.R.	100	95	4/27/93	3+75 & 17' N of Baseline
21	120.9	28.0	94.5	4	D.R.	99	95	4/27/93	2+50 & 15' N of Baseline

Proctor No.	Proctor Spec.	Max. Dry Density (pcf)	Optimum Moisture Content (%)
1	ASTM D-698	90.0	30.0
4	ASTM D-698	95.0	27.0

C.P. = Proctor Check Point
D.R. = Drive Ring

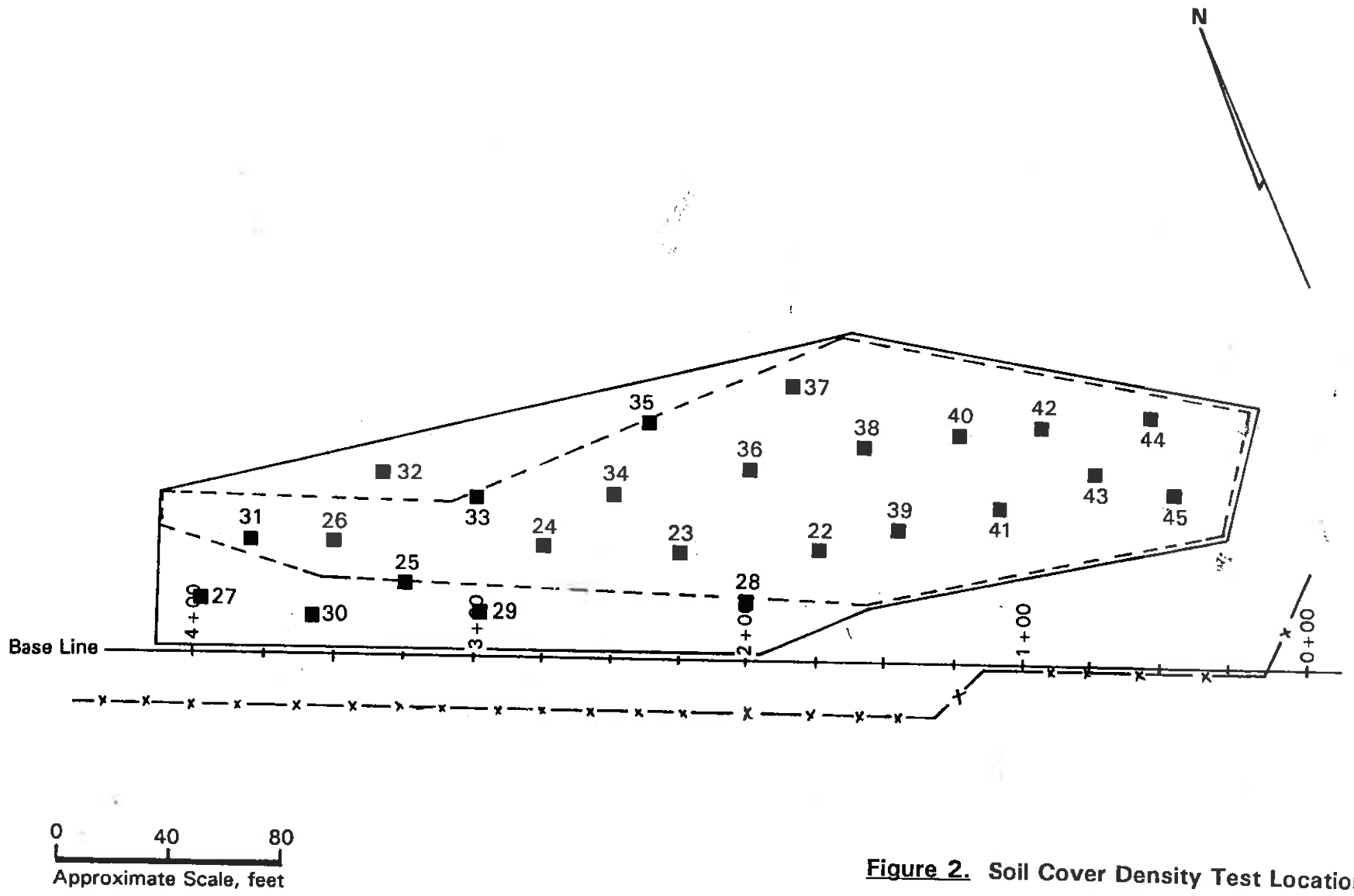


Figure 2. Soil Cover Density Test Locations

LEGEND:
- ■ Soil Cover Density Test Location
- – – – – Original Landfill Boundary
- ——— Final Landfill Boundary

PROJECT: **CrOH Landfill Closure**
William L. Bonnell Co. Plant
Newnan, Georgia
Our Project Number 111-93-20902

GEOHYDRO

Table 2.
FIELD DENSITY TEST SUMMARY
SOIL COVER
CrOH Landfill Closure
William L. Bonnell Company
Newnan, Georgia
Our Project Number 111-93-20902

Test No.	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Proctor No.	Test Method	% Comp.	% Req'd.	Date of Test	Location Description
22	120.6	26.7	95.2	5	D.R.	96	92	5/25/93	1+75 & 39' N of Baseline
23	121.8	28.2	95.0	5	D.R.	96	92	5/25/93	2+25 & 38' N of Baseline
24	122.7	28.6	95.4	5	D.R.	97	92	5/25/93	2+75 & 40' N of Baseline
25	123.3	28.6	95.9	5	D.R.	97	92	5/25/93	3+25 & 25' N of Baseline
26	121.7	29.2	94.2	4	D.R.	95	92	5/25/93	3+50 & 40' N of Baseline
27	120.6	28.2	94.1	4	D.R.	99	92	5/25/93	3+95 & 20' N of Baseline
28	117.9	25.7	93.8	5	D.R.	99	92	5/25/93	2+00 & 20' N of Baseline
29	120.6	27.3	94.7	5	D.R.	96	92	5/25/93	2+97 & 17' N of Baseline
30	121.2	26.3	96.0	5	D.R.	97	92	5/25/93	3+60 & 15' N of Baseline
31	120.9	26.8	95.3	4	D.R.	97	92	5/25/93	3+80 & 41' N of Baseline
32	117.9	24.8	94.5	5	D.R.	99	92	5/25/93	3+35 & 65' N of Baseline
33	123.0	28.4	95.8	4	D.R.	97	92	5/25/93	3+00 & 57' N of Baseline
34	121.0	28.6	94.1	5	D.R.	99	92	5/25/93	2+50 & 59' N of Baseline
35	122.7	27.5	96.2	5	D.R.	97	92	5/25/93	2+35 & 85' N of Baseline
36	121.5	27.4	95.4	5	D.R.	97	92	5/25/93	2+00 & 68' N of Baseline
37	120.9	26.8	95.3	5	D.R.	97	92	5/25/93	1+85 & 98' N of Baseline
38	120.6	27.2	94.8	5	D.R.	96	92	5/25/93	1+60 & 77' N of Baseline
39	119.7	26.9	94.3	4	D.R.	99	92	5/25/93	1+45 & 48' N of Baseline
40	118.8	25.4	94.7	5	D.R.	96	92	5/25/93	1+25 & 81' N of Baseline
41	120.9	26.1	95.9	5	D.R.	97	92	5/25/93	1+10 & 57' N of Baseline
42	122.7	27.4	96.3	5	D.R.	98	92	5/25/93	0+95 & 87' N of Baseline
43	120.0	27.8	93.9	4	D.R.	99	92	5/25/93	0+75 & 70' N of Baseline
44	121.5	28.5	94.6	5	D.R.	96	92	5/25/93	0+60 & 89' N of Baseline
45	121.3	27.2	95.4	5	D.R.	97	92	5/25/93	0+45 & 63' N of Baseline

Proctor No.	Proctor Spec.	Max. Dry Density (pcf)	Optimum Moisture Content (%)
4	ASTM D-698	95.0	27.0
5	ASTM D-698	98.7	23.1

D.R. = Drive Ring

April 6, 1993

GEO-HYDRO

William L. Bonnell Co., Inc.
25 Bonnell Street
P.O. Box 428
Newnan, Georgia 302634

Attention: Mr. Terry D. Snell, P.E.

Summary Letter
Construction Materials Testing
CrOH Landfill Closure
William L. Bonnell Co., Inc. Plant
Newnan, Georgia
Our Project Number 111-93-20902

Gentlemen:

Geo-Hydro Engineers, Inc. has completed the required density testing for the clay subgrade layer at the above referenced project. A total of 15 in-place density tests were performed, and the clay subgrade thickness was measured at each test location. All density test results were above 95% of maximum dry density as determined by standard Proctor test (ASTM D-698). Moisture content of the subgrade soil at the time of testing ranged from 2.2% to 5.3% above optimum. Subgrade thickness at the test locations ranged from about 8.5 inches to over 16.0 inches.

We have provided you with daily reports containing density test results and test locations for this phase of the project. The attached table presents a summary of test results. The attached plan shows the approximate locations of the density tests performed.

Please call us if you have any questions.

Sincerely,

GEO-HYDRO ENGINEERS, INC.

Luis E. Babler, E.I.T.
Geotechnical Engineer

Chris L. Mings, P.E.
Geotechnical Engineer

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GEO-HYDRO ENGINEERS, INC.
1000 Cobb Place Boulevard
Suite 290
Kennesaw, Georgia 30144-3684
(404) 426-7100

GEO-HYDRO

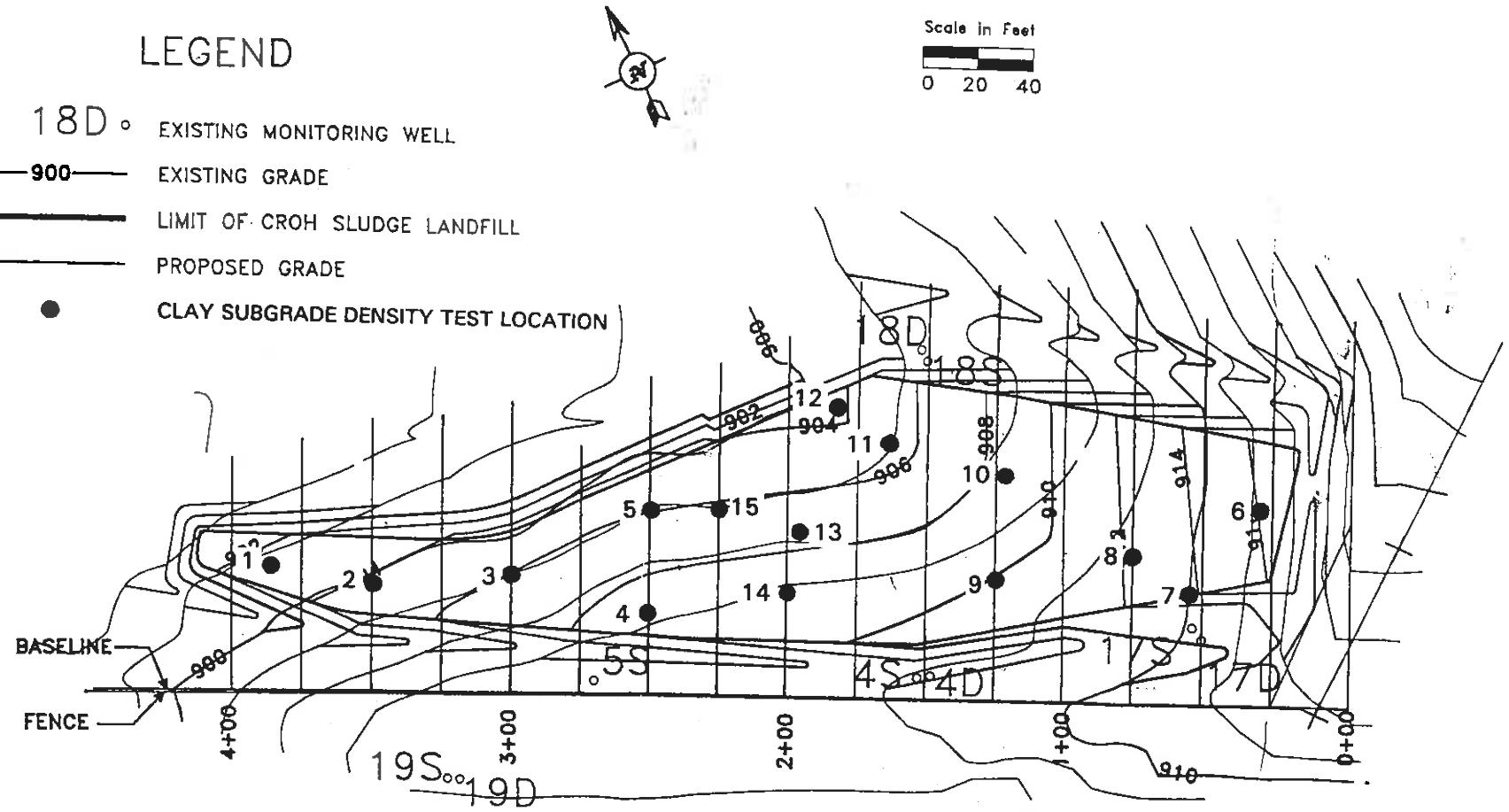
FIELD DENSITY TEST SUMMARY
Clay Subgrade
CrOH Landfill Closure
William L. Bonnell Company
Newnan, Georgia
Our Project Number 111-93-20902

Test No.	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	Proctor No.	Test Method	% Comp.	% Req'd.	Date of Test	Location Description	Clay Subgrade Thickness (inches)
1	120.0	35.3	88.7	1	D.R.	99	95	3/29/93	3+85 & 45' N of Baseline	9
2	119.0	34.0	88.8	1	D.R.	99	95	3/29/93	3+50 & 40' N of Baseline	10
3	120.0	32.6	90.5	1	D.R.	100	95	3/29/93	3+00 & 45' N of Baseline	12
4	119.2	33.0	89.6	1	D.R.	100	95	3/29/93	2+50 & 30' N of Baseline	10
5	119.8	32.8	90.2	1	D.R.	100	95	3/29/93	2+50 & 70' N of Baseline	10
CP1	117.3	29.6	90.5	1	C.P.	N/A	N/A	3/29/93	N/A	N/A
6	117.6	34.1	87.7	1	D.R.	97	95	3/30/93	0+30 & 75' N of Baseline	11
7	119.6	33.5	89.6	1	D.R.	99	95	3/30/93	0+55 & 40' N of Baseline	11
8	120.1	32.5	90.6	1	D.R.	100	95	3/30/93	0+75 & 55' N of Baseline	14
9	120.3	33.2	90.3	1	D.R.	100	95	3/30/93	1+25 & 45' N of Baseline	8.5
10	116.9	34.3	87.0	1	D.R.	97	95	3/30/93	1+20 & 80' N of Baseline	16+
11	118.2	34.5	87.9	1	D.R.	97	95	3/30/93	1+65 & 95' N of Baseline	16+
12	118.4	32.2	89.6	1	D.R.	100	95	3/30/93	1+85 & 110' N of Baseline	11
13	120.4	33.7	90.1	1	D.R.	100	95	3/30/93	1+95 & 60' N of Baseline	12
14	117.2	32.9	88.2	1	D.R.	98	95	3/30/93	2+00 & 40' N of Baseline	10
15	117.7	34.3	87.6	1	D.R.	97	95	3/30/93	2+25 & 90' N of Baseline	16+

Proctor No.	Proctor Spec.	Max. Dry Density (pcf)	Optimum Moisture Content (%)
1	ASTM D-698	90.0	30.0

C.P. = Proctor Check Point
D.R. = Drive Ring

GEOHYDRO



PROJECT: **CrOH Landfill Closure**
William L. Bonnell Co., Plant
Newnan, Georgia
Our Project Number 111-93-20902

GEO-HYDRO

Page 1 of 1

DAILY REPORT

Project: CROH Land Fill Closure Job #: 111-93-20902

Day: Thurs. Date: 3-8-93

Weather: ~~Clear~~ | ~~Ptly. Cloudy~~ | Overcast | Rain

Representative: W. Saunders

Temp: To 32° | 32-50° | ~~50-70°~~ | 70-90° | 90°+

Time of Arrival: _____ Mileage: _____

Total Hours: _____ Standby: _____

Remarks: As requested, a representative of Geo-Hydro was present at the above site to observe mining of clay type material from an on-site borrow area. The ~~area~~ borrow area was located just south of the perimeter fence, adjacent to the landfill, and extending in a southernly direction Approx 25' and between Station points 2+00 and 3+00. Approx 1½' vertical ~~feet~~ of clay type material was excavated and stockpiled just inside the perimeter fence, to be used in the select fill cap over the proposed ~~expansion~~ landfill expansion.

Action Required: _____

Geo-Hydro Representative: _____ Recd. by: _____

GEO-HYDRO

DAILY REPORT

Project: CROH Landfill (mining ~~operations~~ phase) Job #: 111-93-20902

Day: FRI. Date: 3/19/93

Weather: Clear | ~~Ptly. Cloudy~~ | Overcast | Rain

Representative: W. Saunders

Temp: To 32° | ~~32-50°~~ | 50-70° | 70-90° | 90°+

Time of Arrival: _____ Mileage: _____

Total Hours: _____ Standby: _____

Remarks: As requested, a representative was present at the borrow site to observe mining of ~~cut~~ clay type material to be used as the Select Fill over the CROH Landfill. The contr. removed all ~~the~~ vegetative cover (trees, brush, grass, etc.) from the borrow site with a Cat. 963 loader, and removed a small zone of unsuitable organic surficial soils. The clay type materials were just underlying the surficial soils. The contr. began loading trucks @ Approx 2:00 PM using four trucks and hauling the select clay type soils to the landfill and stockpiled just outside the perimeter Fence. ~~Some~~ A fifth truck was added approx. 1½ hours later. Several large rock formations were encountered, and were either removed or worked around. As a result of the rock formations, some incidental loading may have occured of the rock fragments which may require removing prior to completion of the Select Fill zone. 25 trucks were loaded this day.

~~Action Required~~:

Geo-Hydro Representative: _____ Recd. by: _____

GEOHYDRO

DAILY REPORT

Project: CROH Landfill Job #: 111-93-20907

Day: Sat. Date: 3/20/93

Weather: Clear | Ptly. Cloudy | ~~Overcast~~ | Rain

Representative: W. Snowders

Temp: To 32° | 32-50° | ~~50-70°~~ | 70-90° | 90°+

Time of Arrival: _____ Mileage: _____

Total Hours: _____ Standby: _____

Remarks: As requested, a representative of Geo-Hydro was present at the borrow site to observe mining of clay type materials to be used as select fill over the CROH Landfill. The contr. began loading trucks at 8:30 AM using six trucks and a Cat 963 Loader. An additional truck was added @ 11:30 AM. Approx 30 trucks were loaded this day and * hauled to the landfill to be stockpiled. Some incidental loading of rock fragments may have occured that may require removing prior to compaction over the landfill. The undersigned observed stockpiling of clay type soils at the borrow area to be loaded the next day and delivered to the landfill. Approx 15 truck loads were stockpiled.

Action Required: _____

Geo-Hydro Representative: _____ Recd. by: _____

GEO-HYDRO

DAILY REPORT

Project: CRO H Landfill Closure Job #: 111-93-20902

William L. Bonnell Co., Inc. Newnan, GA. Day: Thurs Date: 3/25/93

Weather: ~~Clear~~ | Ptly. Cloudy | Overcast | Rain

Representative: W. Saunders

Temp: To 32° | 32-50° | 50-70° | ~~70-90°~~ | 90°+

Time of Arrival: ______ Mileage: ______

Total Hours: ______ Standby: ______

Remarks: As requested, a representative of Geo-Hydro was present at the above site to observe placement and compaction of the select fill zone just underlying the H.D.P. liner. After arriving, the contr. had Approx. 80% of select fill zone in-place and had approx 30% compacted. It appeared the contr. had plowed the ~~[illegible]~~ existing capp to the landfill with the use of a harrow. The condition of the in-place soils used for fill were between 2% 4% under optimum moisture content. The moisture will need to be increased, either by a water truck or natural weathering, to between 2% to 4% over optimum moisture content, homogeniously mixed and recompacted.

Action Required: ______

Geo-Hydro Representative: Wayne Saunders Recd. by: [signature] S.E.

GEO-HYDRO

DAILY REPORT

Project: CROH Landfill closure Job #: 111-93-7090Z

Day: MON Date: 3/29/93

Weather: ~~Clear~~ | Ptly. Cloudy | Overcast | Rain

Representative: W. Saunders

Temp: To 32° | 32-50° | ~~50-70°~~ | 70-90° | 90°+

Time of Arrival: _____ Mileage: _____

Total Hours: _____ Standby: _____

Remarks: As requested, a representative of Geo-Hydro was present at the above site to observe fill placement of the select fill zone and to perform random in-place density test. A series of density test were performed. The test results indicated that the tested areas met the required project compaction spec's. and that the moisture contents varied from 2.6% to 5.3% over optimum moisture content. Refer to the density summary for specifics of the tests and for locations of the test.

Action Required: _____

Geo-Hydro Representative: _____ Recd. by: _____

GEOHYDRO

FIELD DENSITY REPORT

Date 3/29/93

Time Arrived _____

Project: CROH Land Fill Closure Job # 111-93-2090Z

Special Instructions: _____ Standby Time: _____

Test No.	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	★	Test Method	% Comp.	% Reqd.	Location Description	Depth / Elev.
1	120.0	35.3	88.7	1	D.R.	99	95	3+85 + 45'N of Baseline	9"
2	119.0	34.0	88.8	1	D.R.	99	95	3+50 + 40'N of Baseline	10"
3	120.0	32.6	90.5	1	D.R.	100	95	3+00 + 45'N of Baseline	12"
4	119.2	33.0	89.6	1	D.R.	100	95	2+50 + 30'N of Baseline	10"
5	119.8	32.8	90.2	1	D.R.	100	95	2+50 + 70'N of Baseline	10"
—	117.3	29.6	90.5	1	C.P.	—	—	Check Point Area #3	

Note: Test locations and elevations are approximate.

(1) Test locations selected by: _____ Contractor ✓ Technician

(2) Depth of tests selected by: _____ Contractor ✓ Technician

Depth or elevation reference obtained from depth measured from existing cap.*

(3) Fill placement observed by technician: ✓ yes _____ no

Remarks: The depths given are the actual depths of the select fill zone

* Measured thickness of clay type subgrade

*Proctor No.	Proctor Spec.	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
1	D698	90.0	30.0

Technician: Wayne Saunders Submitted to: Brad Underwood

GEO-HYDRO

Page 1 of 1

DAILY REPORT

Project: CRO H landfill Closure Job #: 11F93-20707

Day: TUES Date: 3/30/93

Weather: [Clear] [Ptly. Cloudy] [Overcast] [Rain]

Representative: W. Saunders

Temp: [To 32°] [32-50°] [50-70°] [70-90°] [90°+]

Time of Arrival: _____ Mileage: _____

Total Hours: 8.5 Standby: 3.0

Remarks: A representative of Geo-hydro was present at the above site to observe fill placement and to perform in-place density test in the clay type subgrade capping the existing landfill. The Contr. and a representative of Emcon decided to use the remainder of the clay type material to fill in a swell and other low areas over the existing landfill; which resulted in a delay in finishing the required total of tests. The fill was placed properly and compacted, after which, a sieres of density test were performed. The test results indicated that the tested areas met the required project compaction specs, and that the moisture contents varied between 2.2% to 4.5% over optimum moisture content.

Action Required: _____

Geo-Hydro Representative: Wayne Saunders Recd. by: _____

GEOHYDRO

FIELD DENSITY REPORT

Date 3/30/93

Time Arrived _____

Project: CROH Land Fill Closure Job # 111-93-20902

Special Instructions: _____ Standby Time: _____

Test No.	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	★	Test Method	% Comp.	% Reqd.	Location Description	Depth / Elev. *
6	117.6	34.1	87.7	1	D.R.	97	95	0+30 ℄ 75'N of Baseline	11"
7	119.6	33.5	89.6	1	D.R.	99	95	0+55 ℄ 40'N of Baseline	11"
8	120.1	32.5	90.6	1	D.R.	100	95	0+75 ℄ 55'N of Baseline	14"
9	120.3	33.2	90.3	1	D.R.	100	95	1+25 ℄ 45'N of Baseline	8.5"
10	116.9	34.3	87.0	1	D.R.	97	95	1+20 ℄ 80'N of Baseline	16"+
11	118.2	34.5	87.9	1	D.R.	97	95	1+65 ℄ 95'N of Baseline	16"+
12	118.4	32.2	89.6	1	D.R.	100	95	1+85 ℄ 110'N of Baseline	11"
13	120.4	33.2	90.1	1	D.R.	100	95	1+95 ℄ 60'N of Baseline	12"
14	117.2	32.9	88.2	1	D.R.	98	95	2+00 ℄ 40'N of Baseline	10"
15	117.7	34.3	87.6	1	D.R.	97	95	2+25 ℄ 40'N Baseline	16"+

Note: Test locations and elevations are approximate.

(1) Test locations selected by: _____ Contractor ✓ Technician

(2) Depth of tests selected by: _____ Contractor ✓ Technician

~~Depth or elevation~~ thickness reference obtained from existing cap *

(3) Fill placement observed by technician: ✓ yes _____ no

Remarks:

* thickness of clay type subgrade actually measured at each test location and recorded in the depth/elevation column.

*Proctor No.	Proctor Spec.	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
1	D698	90.0	30.0

Technician: _____ Submitted to: _____

GEO-HYDRO

DAILY REPORT

Project: CROH LANDFILL Job #: 111-93-2092

Day: Monday Date: 4-12-93

Weather: (Clear) | Ptly. Cloudy | Overcast | Rain

Representative: M. Holmes

Temp: To 32° | 32-50° | 50-70° | (70-90°) | 90°+

Time of Arrival: 1030 Mileage: _____

Total Hours: _____ Standby: 0

Remarks: A Representative of Geo-Hydro was on site to check and observe moisture and compaction of the in place select fill over the existing landfill.

The moisture check turned out to be a 24.4% of 27% optimum. About 6in was cut off and the soil was "Broken-up and then leveled back off. The whole area was watered down to achieve "over optimum" so that it may be compacted to required percent.

Action Required: 6inches ~~was~~ Removed, soil "Broken-up" and water placed to achieve "over optimum" for compaction...

Geo-Hydro Representative: J. Michael Holmes Recd. by: _____

GEO-HYDRO

Page 1 of 1

DAILY REPORT

Project: CROH LANDFILL Job #: 2090Z

Day: Tuesday Date: 4-13-93

Weather: (Clear) | Ptly. Cloudy | Overcast | Rain

Representative: Mike Holmes

Temp: To 32° | 32-50° | 50-70° | (70-90°) | 90°+

Time of Arrival: 300 Mileage:

Total Hours: Standby: 0

Remarks: ARRived on site to observe WORK and moisture on closure site.

Soil APPEARED dry, CONTRACTOR WAS notifed and WATER would be placed over AREA's in question. The soils had been compacted, but NOT READY for test's yet.

More clay will be needed to finish the closure, due to test Results and old fence line. A NEW BARROW AREA may be used. Soils have been tested by another company. Geo-Hydro will be contacted about the NEW site.

Action Required: Soil had to be wet down, due to lack of moisture...

Geo-Hydro Representative: J. Michael Holmes Recd. by:

GEO-HYDRO

DAILY REPORT

Project: CROH LANDFILL Job #: 2090Z

Day: WEN. Date: 4-14-93

Weather: Clear | (Ptly. Cloudy) | Overcast | Rain

Representative:

Temp: To 32° | 32-50° | 50-70° | (70-90°) | 90°+

Time of Arrival: Mileage:

Total Hours: Standby:

Remarks: ARRIVED ON SITE TO OBSERVE THE STOCK PILING OF SOIL FROM NEW BARROW SITE. A TOTAL NUMBER OF 20 (TWENTY) TRUCKS WERE UNLOADED ONTO OLD CAP OF CLAY. ALL TRUCKS WERE CLAY, VERY LITTLE SAND WAS OFFLOADED ONTO SITE.

Action Required:

Geo-Hydro Representative: J. Michael Holmes Recd. by:

GEO-HYDRO

DAILY REPORT

Project: CROH LAND FILL Job #: 2902

Day: TUE. Date: 4-27-93

Weather: (Clear) | Ptly. Cloudy | Overcast | Rain

Representative: Mike Holmes

Temp: To 32° | 32-50° | 50-70° | (70-90°) | 90°+

Time of Arrival: 1 20 pm Mileage:

Total Hours: Standby: 0

Remarks: ARRIVED ON SITE by CONTRACTORS Request to perform in place density tests in the clay subgrade capping of the existing land fill.

A number of tests were performed on the areas not already tested. A moisture content of 24% to 29% with 26.9 being the average moisture content in this series of tests. Test results indicated that the tested areas met the required project compaction for this job (Spec's.)

For futher info, Please refer the the Daily-Density Report this date.

Action Required:

Geo-Hydro Representative: J. Michael Holmes Recd. by:

GEOHYDRO

FIELD DENSITY REPORT

Date 4-27-93

Time Arrived 1200 pm

Project: CROH LANDFILL Job # 2090Z

Special Instructions: Standby Time: 0

Test No.	Wet Density (pcf)	Moisture Content (%)	Dry Density (pcf)	★	Test Method	% Comp.	% Reqd.	Location Description	Depth / Elev.
16	112.8	24	91	4	DR	96	95	3+06 North 15'	Gain +- SG
17	117.4	26	93.2	4	DR	98	95	3+35 North 15'	Gain +- SG
18	120.6	29	93.5	4	DR	98	95	3+09 North 63'	Gain +- SG
19	120.5	28.2	94	4	DR	99	95	3+56 North 63'	Gain +- SG
20	119.8	26.4	94.8	4	DR	100	95	3+75 North 17'	Gain +- SG
21	120.9	28	94.5	4	DR	99	95	2+50 North 15'	Gain +- SG

Note: Test locations and elevations are approximate.

(1) Test locations selected by: _____ Contractor ✓ Technician

(2) Depth of tests selected by: _____ Contractor ✓ Technician

Depth or elevation reference obtained from _____

(3) Fill placement observed by technician: _____ yes ✓ no

Remarks: _____

*Proctor No.	Proctor Spec.	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
4		95	27

Technician: J. Michael Holmes

Submitted to: _____

GEO-HYDRO

DAILY REPORT

Project: CROH LAND FILL Job #: 2990Z

Day: 5-12-93 Date: WEN.

Weather: (Clear) | Ptly. Cloudy | Overcast | Rain

Representative: Mike Holmes

Temp: To 32° | 32-50° | 50-70° | (70-90°) | 90°+

Time of Arrival: 1:00pm Mileage: 117 miles

Total Hours: 3.75 Standby: 0

Remarks: ARRIVED ON SITE AT CONTRACTORS REQUEST TO PICK-UP A BULK SAMPLE OF TOPSOIL. SAMPLE WAS TAKEN FROM STOCK PILE ON SITE, AND TAKEN BACK TO GEO-HYDRO FOR TESTING. CONTRACTOR ADVISED ME OF THE POTENTIAL OF DENSITY TESTED THAT MAY BE NEEDED IN THE MIDDLE OF NEXT WEEK.

Action Required:

Geo-Hydro Representative: M. Michael Holmes Recd. by:

Federal Express

SERROT CORPORATION
5401 Argosy Ave.
Huntington Beach, California 92648
Phone (714) 895-3010 • FAX: (714) 895-0903

LETTER OF TRANSMITTAL

DATE: 04-12-93 JOB NO.: 3072

ATTENTION: Jerry Snell

RE: CTOH L.f.

TO: The William Bowner Co.
25 Bowner St
Newman, Georgia. 20263

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via ______ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ ______

COPIES	DATE	NO.	DESCRIPTION
1			QC REPORTS FROM GUNDLE

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit ____ copies for approval

☐ For your use ☐ Approved as noted ☐ Submit ____ copies for distribution

☐ As requested ☐ Returned for corrections ☐ Return ____ corrected prints

☐ For review and comment ☐ ______

☐ FOR BIDS DUE ______ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS ______

COPY TO ______

SIGNED: Doug Wells / A Sandoval

Gundle®

Quality Control Certificate

RAILCAR : ELTX394
MATERIAL : HDPE 060 MIL
BATCH # : 031293
ROLL # : 01020555

MANF. DATE : 03/12/1993
PROJECT NAME : SERROT/PECAN ROW LF.
MR NUMBER : 8589-01 PROJECT # :
LOCATION : VALDOSTA GA

TEST PARAMETER		TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness	(mils)	EVERY ROLL	60 min	61	D 1593
Carbon Black	(%)	15000SF	2.0 to 3.0	2.6	D 1603
Density	(g/cm3)	15000SF	0.940 min	0.946	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15000SF	126	156	D 638
T.S. Break	(ppi)	15000SF	228	311	Type IV
Elong. Yield	%	15000SF	13	14	2 ipm
Elong. Break	%	15000SF	700	910	
Puncture Resistance	(lbs)	30000SF	75	104	FTMS 101,Method 2065
Tear Resistance	(lbs)	60000SF	42	54	D 1004,Die C
Low Temp.Brittleness	degF	60000SF	-112 max	Pending	D 746
Environ.Stress Crack	hrs	60000SF	1500 min	Pending	D 1693
Dimensional Stability		30000SF	-2 to 2	Pending	D 1204 (212F,1 hour)

Notary Public In and For
The State of Texas

Norma Lee Smith
Commission Expires 1/16/94

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle®

Quality Control Certificate

RAILCAR : ELTX394
MATERIAL : HDPE 060 MIL
BATCH # : 031393
ROLL # : 01020562

MANF. DATE : 03/13/1993
PROJECT NAME : SERROT/PECAN ROW LF.
MR NUMBER : 8589-01 PROJECT # :
LOCATION : VALDOSTA GA

TEST PARAMETER		TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness	(mils)	EVERY ROLL	60 min	61	D 1593
Carbon Black	(%)	15000SF	2.0 to 3.0	2.6	D 1603
Density	(g/cm3)	15000SF	0.940 min	0.946	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15000SF	126	158	D 638
T.S. Break	(ppi)	15000SF	228	305	Type IV
Elong. Yield	%	15000SF	13	17	2 ipm
Elong. Break	%	15000SF	700	929	
Puncture Resistance	(lbs)	30000SF	75	107	FTMS 101,Method 2065
Tear Resistance	(lbs)	60000SF	42	50	D 1004,Die C
Low Temp.Brittleness	degF	60000SF	-112 max	Pending	D 746
Environ.Stress Crack	hrs	60000SF	1500 min	Pending	D 1693
Dimensional Stability		30000SF	-2 to 2	Pending	D 1204 (212F,1 hour)

Notary Public In and For
The State of Texas

Norma Lee Smith
Commission Expires 1/16/94

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle®

Quality Control Certificate

RAILCAR : ELTX394
MATERIAL : HDPE 060 MIL
BATCH # : 031393
ROLL # : 01020574

MANF. DATE : 03/13/1993
PROJECT NAME : SERROT/PECAN ROW LF.
MR NUMBER : 8589-01 PROJECT # :
LOCATION : VALDOSTA GA

TEST PARAMETER		TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)		EVERY ROLL	60 min	61	D 1593
Carbon Black	(%)	15000SF	2.0 to 3.0	2.5	D 1603
Density	(g/cm3)	15000SF	0.940 min	0.946	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15000SF	126	178	D 638
T.S. Break	(ppi)	15000SF	228	320	Type IV
Elong. Yield	%	15000SF	13	17	2 ipm
Elong. Break	%	15000SF	700	860	
Puncture Resistance (lbs)		30000SF	75	106	FTMS 101,Method 2065
Tear Resistance	(lbs)	60000SF	42	57	D 1004,Die C
Low Temp.Brittleness degF		60000SF	-112 max	Pending	D 746
Environ.Stress Crack hrs		60000SF	1500 min	Pending	D 1693
Dimensional Stability		30000SF	-2 to 2	Pending	D 1204 (212F,1 hour)

Notary Public In and For
The State of Texas

Norma Lee Smith
Commission Expires 1/16/94

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle®

Quality Control Certificate

RAILCAR : ELTX394
MATERIAL : HDPE 060 MIL
BATCH # : 031493
ROLL # : 01020579

MANF. DATE : 03/14/1993
PROJECT NAME : SERROT/PECAN ROW LF.
MR NUMBER : 8589-01 PROJECT # :
LOCATION : VALDOSTA GA

TEST PARAMETER		TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)		EVERY ROLL	60 min	61	D 1593
Carbon Black	(%)	15000SF	2.0 to 3.0	2.5	D 1603
Density	(g/cm3)	15000SF	0.940 min	0.945	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15000SF	126	162	D 638
T.S. Break	(ppi)	15000SF	228	314	Type IV
Elong. Yield	%	15000SF	13	17	2 ipm
Elong. Break	%	15000SF	700	928	
Puncture Resistance (lbs)		30000SF	75	114	FTMS 101,Method 2065
Tear Resistance	(lbs)	60000SF	42	57	D 1004,Die C
Low Temp.Brittleness degF		60000SF	-112 max	Pending	D 746
Environ.Stress Crack hrs		60000SF	1500 min	Pending	D 1693
Dimensional Stability		30000SF	-2 to 2	Pending	D 1204 (212F,1 hour)

Notary Public In and For
The State of Texas

Norma Lee Smith
Commission Expires 1/16/94

CERTIFIED BY:

R.J. Schaefer
Quality Manager

SOLVAY POLYMERS

Quality Polymers Through Technology and People

November 23, 1992

Gundle Lining Systems
Materials Manager
19103 Gundle Avenue
Houston, TX 77073
2306787

Listed below are the data on product shipments:

Product Type:	XF836
Railcar Number:	ELTX 394
Lot Number:	C21010F06A
Production Date:	10/10/92
Ship Date:	11/23/92
Quantity/Weight:	163,500
Customer PO Number:	017252
Solvay Order Number:	0C7635
Shipped To:	WESTFIELD, TX

TEST	METHOD	RESULT	UNITS
MELT INDEX	D1238 - 90B	0.10	G/10M
DENSITY	D4883 - 89	0.939	G/23C
ESCR	D1693 - 70(1988)	*	%F/HR

*ESCR incomplete, will advise after 1000 hours

Sincerely,

Richard O. Scharchburg

Richard D. Scharchburg
Quality Administration Manager
Phone: (713) 478-3772

sab

Solvay Polymers, Inc. - Technical Center
1230 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536 1-800-338-0489

Gundle®

GUNDLE LABORATORY
MELT INDEX / DENSITY

DATE TEST: FEBRUARY 18, 1993
RAIL CAR # ELTX394
PRODUCT CODE: XF836
MANUFACTURER: SOLVAY

	MELT INDEX ASTM D1238,E (G/10MIN.)	DENSITY ASTM D1505 (G/CC)
	TEST RESULTS	TEST RESULT:
1.	0.1	0.937
2.	0.09	0.936
3.	0.1	0.936
4.	0.1	0.937
5.	0.1	0.937
6.	0.1	0.936
7.	0.1	0.936
8.	0.1	0.936
AVG.	0.10	0.936
STD.	0.003	0.000

RATIO (N/E) 97.2

FEDERAL EXPRESS

LETTER OF TRANSMITTAL

SERROT CORPORATION
5401 Argosy Ave.
Huntington Beach, California 92648
Phone (714) 895-3010 • FAX: (714) 895-0903

DATE	JOB NO.
04-05-93	3072

ATTENTION: JERRY SNELL

RE: CROH L.F

TO THE WILLIAM BONNEL CO.
25 BONNEL ST.
NEWMAN, GEORGIA 20263.

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

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☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: Doug Wells / L. Skrotzki

Gundle®

Quality Control Certificate

RAILCAR : PSPX2286
MATERIAL : HDPE 060 MIL
BATCH # : 030493
ROLL # : 01020400

MANF. DATE : 03/04/1993
PROJECT NAME : SERROT CORPORATION
MR NUMBER : 8733-01 PROJECT # : 8733-01
LOCATION : HUNTINGTON BEACH CA 001

TEST PARAMETER	TESTING FREQUENCY	REQUIRED SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)	EVERY ROLL	60 min	60	D 1593
Carbon Black (%)	15,000 SF	2.0 to 3.0	2.5	D 1603
Carbon Black Dispersion	15,000 SF	A-1/A-2/B-1	A-1	D 3015
Density (g/cm3)	15,000 SF	0.940 min	0.947	D 1505 A
Tensile Properties:				
T.S. Yield (ppi)	15,000 SF	126 min	167	D 638
T.S. Break (ppi)	15,000 SF	228 min	276	Type IV
Elong. Yield %	15,000 SF	12 min	17	2 ipm
Elong. Break %	15,000 SF	700 min	782	
Puncture Resistance (lbs)	30,000 SF	72 min	113	FTMS 101,Method 2065
Tear Resistance (lbs)	60,000 SF	39 min	58	D 1004,Die C
Low Temp.Brittleness degF	60,000 SF	-60 max	Pending	D 746
Resistance-Soil Burial %	60,000 SF	-10 to 10	Pending	ASTM D3083
Dimensional Stability	30,000 SF	-2 to 2	Pending	D 1204 (212F,1 hour)

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle

Quality Control Certificate

RAILCAR : PSPX6021
MATERIAL : HDPE 060 MIL
BATCH # : 030593
ROLL # : 01020418

MANF. DATE : 03/05/1993
PROJECT NAME : SERROT CORPORATION
MR NUMBER : 8733-01 PROJECT # : 8733-01
LOCATION : HUNTINGTON BEACH CA 001

TEST PARAMETER	TESTING FREQUENCY	REQUIRED SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)	EVERY ROLL	60 min	61	D 1593
Carbon Black (%)	15,000 SF	2.0 to 3.0	2.6	D 1603
Carbon Black Dispersion	15,000 SF	A-1/A-2/B-1	A-1	D 3015
Density (g/cm3)	15,000 SF	0.940 min	0.946	D 1505 A
Tensile Properties:				
T.S. Yield (ppi)	15,000 SF	126 min	163	D 638
T.S. Break (ppi)	15,000 SF	228 min	288	Type IV
Elong. Yield %	15,000 SF	12 min	16	2 ipm
Elong. Break %	15,000 SF	700 min	808	
Puncture Resistance (lbs)	30,000 SF	72 min	108	FTMS 101,Method 2065
Tear Resistance (lbs)	60,000 SF	39 min	53	D 1004,Die C
Low Temp.Brittleness degF	60,000 SF	-60 max	Pending	D 746
Resistance-Soil Burial %	60,000 SF	-10 to 10	Pending	ASTM D3083
Dimensional Stability	30,000 SF	-2 to 2	Pending	D 1204 (212F,1 hour)

CERTIFIED BY:

R.J. Schaefer

Gundle®

Quality Control Certificate

RAILCAR : PSPX6021
MATERIAL : HDPE 060 MIL
BATCH # : 030593
ROLL # : 01020424

MANF. DATE : 03/05/1993
PROJECT NAME : SERROT CORPORATION
MR NUMBER : 8733-01 PROJECT # : 8733-01
LOCATION : HUNTINGTON BEACH CA 001

TEST PARAMETER	TESTING FREQUENCY	REQUIRED SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)	EVERY ROLL	60 min	61	D 1593
Carbon Black (%)	15,000 SF	2.0 to 3.0	2.6	D 1603
Carbon Black Dispersion	15,000 SF	A-1/A-2/B-1	A-1	D 3015
Density (g/cm3)	15,000 SF	0.940 min	0.946	D 1505 A
Tensile Properties:				
T.S. Yield (ppi)	15,000 SF	126 min	174	D 638
T.S. Break (ppi)	15,000 SF	228 min	296	Type IV
Elong. Yield %	15,000 SF	12 min	16	2 ipm
Elong. Break %	15,000 SF	700 min	810	
Puncture Resistance (lbs)	30,000 SF	72 min	116	FTMS 101,Method 2065
Tear Resistance (lbs)	60,000 SF	39 min	56	D 1004,Die C
Low Temp.Brittleness degF	60,000 SF	-60 max	Pending	D 746
Resistance-Soil Burial %	60,000 SF	-10 to 10	Pending	ASTM D3083
Dimensional Stability	30,000 SF	-2 to 2	Pending	D 1204 (212F,1 hour)

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle®

Quality Control Certificate

RAILCAR : PSPX6021
MATERIAL : HDPE 060 MIL
BATCH # : 030693
ROLL # : 01020429

MANF. DATE : 03/06/1993
PROJECT NAME : SERROT CORPORATION
MR NUMBER : 8733-01 PROJECT # : 8733-01
LOCATION : HUNTINGTON BEACH CA 001

TEST PARAMETER	TESTING FREQUENCY	REQUIRED SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)	EVERY ROLL	60 min	63	D 1593
Carbon Black (%)	15,000 SF	2.0 to 3.0	2.5	D 1603
Carbon Black Dispersion	15,000 SF	A-1/A-2/B-1	A-1	D 3015
Density (g/cm3)	15,000 SF	0.940 min	0.945	D 1505 A
Tensile Properties:				
T.S. Yield (ppi)	15,000 SF	126 min	157	D 638
T.S. Break (ppi)	15,000 SF	228 min	249	Type IV
Elong. Yield %	15,000 SF	12 min	16	2 ipm
Elong. Break %	15,000 SF	700 min	764	
Puncture Resistance (lbs)	30,000 SF	72 min	107	FTMS 101,Method 2065
Tear Resistance (lbs)	60,000 SF	39 min	52	D 1004,Die C
Low Temp.Brittleness degF	60,000 SF	-60 max	Pending	D 746
Resistance-Soil Burial %	60,000 SF	-10 to 10	Pending	ASTM D3083
Dimensional Stability	30,000 SF	-2 to 2	Pending	D 1204 (212F,1 hour)

CERTIFIED BY:

R.J. Schaefer

PHILLIPS 66 COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
PASADENA, TEXAS 77501-0792
BOX 792 PHONE: 713-475-3886

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

February 22, 1993

JHV# 1488-93

FAX: 713-875-6010

UPDATED COPY

Type

Gundle Lining Systems Inc.
1340 East Richey Road
Houston, TX 77073

ATTN: Steve Severson

This letter will certify that the Marlex* resin shown below, as supplied by Phillips 66 Company, conforms to our manufacturing specification.

Type:	HHM TR-400
Lot Number:	7130129
P.O. Number:	S-020069
Date shipped:	02/19/93
Package:	PSPK 6021
Quantity:	178950 lbs.
Melt Index:	.10 gm/10 min.
Density:	.938 gm/cc

J. H. Vaden
Quality Assurance Manager
PHILLIPS 66 COMPANY

JHV:PSN:ad

* Reg. U.S. Pat. Off.

cc: QA-File-RC
E. E. Fogle

Gundle®

GUNDLE LABORATORY
MELT INDEX / DENSITY

DATE TEST: MARCH 3, 1993
RAIL CAR # PSPX6021
PRODUCT CODE: TR400
MANUFACTURER: PHILLIPS

	MELT INDEX ASTM D1238,E (G/10MIN.) TEST RESULTS	DENSITY ASTM D1505 (G/CC) TEST RESULTS
1.	0.1	0.939
2.	0.1	0.938
3.	0.09	0.94
4.	0.1	0.939
5.	0.1	0.939
6.	0.1	0.939
7.	0.09	0.938
8.	0.09	939
AVG.	0.10	0.939
STD.	0.005	0.001

RATIO (N/E) 94.5

PHILLIPS 66 COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY

PASADENA, TEXAS 77501-0792
BOX 792 PHONE: 713-475-3666

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

January 6, 1993

JHV# 38-93

FAX: 713-875-6010

Gundle Lining Systems Inc.
1340 East Richey Road
Houston, TX 77073

ATTN: Steve Severson

This letter will certify that the Marlex* resin shown below, as supplied by Phillips 66 Company, conforms to our manufacturing specification.

Type:	HHM TR-400
Lot Number:	7120840
P.O. Number:	S017244
Date shipped:	01/04/93
Package:	PSPX 2286
Quantity:	172250 lbs
Density:	.938 gm/cc
ESCR, F/50, Cond. B:	>1000 hrs **
LT Brit. (ASTM D746):	<-118 degrees C **
Ash-IR:	.02 %
HLMI/MI Ratio:	96.
Melt Index:	.10 gm/10 min.
HLMI:	9.600 gm/10 min.

J. H. Vaden
Quality Assurance Manager
PHILLIPS 66 COMPANY

JHV:PSN:ad

* Reg. U.S. Pat. Off.
** Nominal Value

cc: QA-File-RC
E. B. Fogle

Gundle®

GUNDLE LABORATORY
MELT INDEX / DENSITY

DATE TEST: FEBRUARY 23 1993
RAIL CAR # PSPX2286
PRODUCT CODE: TR400
MANUFACTURER: PHILLIPS

	MELT INDEX ASTM D1238,E (G/10MIN.) TEST RESULTS	DENSITY ASTM D1505 (G/CC) TEST RESULTS
1.	0.09	0.936
2.	0.09	0.935
3.	0.09	0.936
4.	0.09	0.936
5.	0.08	0.937
6.	0.09	0.936
7.	0.08	0.937
8.	0.08	0.935
AVG.	0.09	0.9360
STD.	0.005	0.001

RATIO (N/E) 101.3

Gundle®

GUNDLE LABORATORY
WELDING ROD

DATE TEST : 03/29/93
BATCH NO #: 32993
RAILCAR NO #: GOCX58486

MELT INDEX ASTM D1238,E (G/10MIN)	DENSITY ASTM D1505 (G/CC)	CARBON BLACK ASTM D1603 (%)
TEST RESULT	TEST RESULT	TEST RESULT
0.17	0.947	2.5

Chevron

November 17, 1992

Gundle Lining Systems
19103 Gundle Road
Houston, Texas 77073
FAX: 713-875-6010

Attention: Steve Severson - Gundle Materials Manager

CERTIFICATE OF RAILCAR ANALYSIS

Product Type	9642T
Railcar Number	GOCX58486
Lot Number	B101394
Ship Date	11-16-92
Quantity/Weight	185,300
Customer P. O. #	017246
Chevron Order #	CRN69047

Following is the data on the subject material as determined by the Quality Control Department:

TEST RESULTS

Property	ASTM Method	Value	Units
Density	D1505	0.9395	gms/cc
Melt Index	D1238 Cond. E	0.19	gms/10 min.

ESCR incomplete, we will advise after 500 hours.

The data set forth herein has been carefully compiled by Chevron Chemical Company. However, there is no warranty of any kind, either express or implied, applicable to its use and the user assumes all risk and liability in connection therewith.

Sincerely,

G. G. Bertin
Supervisor
Quality Control

GGB\gc

cc: Rick Schaefer - Gundle Lab Manager

Gundle®

GUNDLE LABORATORY
MELT INDEX / DENSITY

DATE TEST: DECEMBER 8, 1992
RAIL CAR # GOCX58486
PRODUCT CODE: 9642T
MANUFACTURER: CHEVRON

	MELT INDEX ASTM D1238,E (G/10MIN.) TEST RESULTS	DENSITY ASTM D1505 (G/CC) TEST RESULTS
1.	0.15	0.936
2.	0.15	0.937
3.	0.16	0.937
4.	0.16	0.937
5.	0.15	0.937
6.	0.16	0.937
7.	0.16	0.937
8.	0.15	0.937
AVG.	0.16	0.9369
STD.	0.005	0.000

RATIO (N/E): N/A

FEDERAL EXPRESS.

LETTER OF TRANSMITTAL

SERROT CORPORATION
5401 Argosy Ave.
Huntington Beach, California 92648
Phone (714) 895-3010 • FAX: (714) 895-0903

DATE	JOB NO.
04-05-93	3072
ATTENTION: JERRY SNELL.	
RE: CROH L.F.	

TO THE WILLIAM BONNEL CO.
25 BONNEL ST
NEWMAN, GEORGIA 20263.

WE ARE SENDING YOU ☑ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			QC REPORTS FROM TENSAR.

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit_____copies for approval
☐ For your use ☐ Approved as noted ☐ Submit_____copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return_____corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: ~~DOUG~~ WELLS / J. SANDOVAL

Tensar

The Tensar Corporation

1210 Citizens Parkway
Morrow, Georgia 30260
Tel. (404) 968-3255

MARCH 31, 1993

SERROT CORPORATION
5401 ARGOSY
HUNTINGTON BCH, CA 92648

REFERENCE: TENSAR ORDER NUMBER: 400044
PURCHASE ORDER NUMBER: 11797
BILL OF LADING NUMBER: 142304

SOLD TO: SERROT CORPORATION
5401 ARGOSY

HUNTINGTON BCH, CA 92648

SHIP TO: CROH LANDFILL
WILLIAM BONNELL CO
25 BONNELL ST

NEWNAN, GA 30263

This is to certify that TENSAR DC420557 geocomposite as manufactured by the TENSAR Corporation, meets the characteristics and properties per the attached specification sheet. Actual lot number(s) shipped of the core material, NS140575 are as indicated:

LOT NUMBER	NO. ROLLS	THICKNESS (mm)	TENSILE STRENGTH (lb/ft)	% CB
930217	6	5.50	610.0	2.30
930218	7	5.36	589.5	2.30
930227	12	5.20	597.7	2.16
930228	11	5.20	595.0	2.07
930301	7	5.23	622.4	2.30
930304	9	5.27	662.1	2.30

Sincerely,

Kenneth W. Miller
Manager of Process Engineering
and Quality Control

Notary Public, Clayton County, Georgia
My Commission Expires August 28, 1993.

BL no. 142304

DC 4205-57

Qty	Lot no.	Roll no.
6	930228	13 A, B, C, D, E, F
4	930227	06 A, B, C G
3	930227	03 E F G
6	930217	13 B, C, D, E, F, G
5	930228	09 A, B, C, D, E
7	930301	10 A, B, C, D, E, F, G
3	930304	20 E, F, G
6	930304	21 A, B, C, D, E, F
5	930227	04 A, B, C, D, E
7	930218	12 A, B, C, D, E, F, G
52		

930217	930218	930227	930228	930301	930304
6	7	12	11	7	9

Werkstoff

Polyfelt

October 22, 1991

THE TENSAR CORPORATION
Ms. Ann Shockley
1210 Citizens Parkway
Marrow, GA 30260

Subj: Polyfelt TS 600 Geotextile

Dear Ms. Shockley:

Polyfelt TS 600 is a U.V. stabilized, spunbonded, continuous filament, needlepunched, polypropylene, nonwoven geotextile with the following average roll properties.

FABRIC PROPERTY	TEST PROCEDURE	AVERAGE VALUE TYPICAL	MINIMUM	
Weight	ASTM D 3776	6.3		oz/yd2
Thickness	ASTM D 1777	80		Mil
Grab Strength	ASTM D 4632	180	150	lbs.
Grab Elongation	ASTM D 4632	>50	50	%
Tear Strength	ASTM D 4533	80	70	lbs.
Mullen Burst	ASTM D 3786	260	220	psi
Puncture Resistance	ASTM D 4833	85	75	lbs.
A.O.S.	ASTM D 4751	100-70		US Sieve
Permittivity	ASTM D 4491	2.3		sec-1
Water Permeability	ASTM D 4491	0.5		cm/sec
Water Flow Rate	ASTM D 4491	170		gpm/ft2
U.V. Resistance (500 hrs)	ASTM D 4355	>85		%
pH		2-13		

Upon the buyer's request, Polyfelt, Inc. will provide a letter of certification at the time of shipment. Should you need any additional information, please do not hesitate to call this office.

Very truly yours,

Rachel C. Salter

Rachel C. Salter
Polyfelt Customer Service

Polyfelt, Inc.
P.O. Box 727
200 Miller T. Sellers Drive
Evergreen, Alabama 36401
Tel. 205-578-4758
Fax 205-578-4963

DRAINAGE COMPOSITE DC4205

The drainage composite shall consist of a geotextile bonded to both sides of a drainage net. The drainage composite shall hav a low compressibility in order to maintain high flow capacity over a wide range of confining pressures. The bonding process sha not introduce adhesives or other foreign products. The strength of the bond between the drainage net and the geotextile shall b greater than the friction developed between the geotextile and a soil. The drainage composite shall maintain a high flow under lon term loading conditions and shall be resistant to all forms of biological or chemical degradation normally encountered in a so environment. The drainage composite shall be made from the drainage net and geotextile products whose property requirement are listed below.

PROPERTY	TEST METHOD	NOTES	UNITS	VALUE
Drainage Net		1,5		
Flow Capacity				
@ Gradient of 1 @ 500 psf	ASTM 4716		$x10^{-3}ft^2/sec$ (gpm/ft)	21 (9.55)
@ 10,000 psf			$x10^{-3}ft^2/sec$ (gpm/ft)	16 (7.24)
Mechanical Properties		1,5		
• Compression: @ 20,000 psf	ASTM	2	%	50
• Peak Tensile Strength-MD	ASTM D638 Modified	3	lbs/ft	575
• Thickness	O.D. Calipered	3,4	inches	0.20
Material				
• Polyethylene Polymer				
- Specific Gravity	ASTM D1505		g/cm^3	0.940
- Carbon Black Stabilization	ASTM D4218		%	2.5
Geotextile		7,8		
• Grab Tensile Strength	ASTM D4632		lbs.	110
• EOS	ASTM D4751		U.S. Std. Sv.	70
• Weight	ASTM D3776		oz/sy	6.0
Dimensions - Finished Product				
• Roll Length			ft	100
• Roll Width (drainage net)			ft	6.3
• Roll Weight			lbs	140
• Unit Weight			oz/sy	33

Notes

1. Test values are for drainage net prior to bonding process.
2. Compression tests are performed on a 2-inch square sample loaded at a 1mm/minute constant rate of strain.
3. Minimum value.
4. Thickness is measured by placing the specimen flat on a comparator base and lowering a round 1/2 inch diameter flat end contact surface squarely over a junction.
5. All test values are nominal, unless otherwise indicated.
6. MD - Machine (roll) Direction.
7. Geotextile shall be Trevira, QuLine, Amoco, or Polyfelt.
8. Geotextile splices within each roll of finished goods shall be considered acceptable product. The splicing methods shall include, but are not limited to, stitching or heat bonding. The finished splice shall maintain the continuity of the filtration function of the geotextile. These methods will be considered viable and acceptable unless otherwise specified.

The Tensar Corporation
1210 Citizens Parkway
Morrow, GA 30260
800-845-4453

SERROT CORPORATION
Protective Linings Products & Installations

SUBGRADE ACCEPTANCE

SUPERINTENDENT : J. RENSHAW

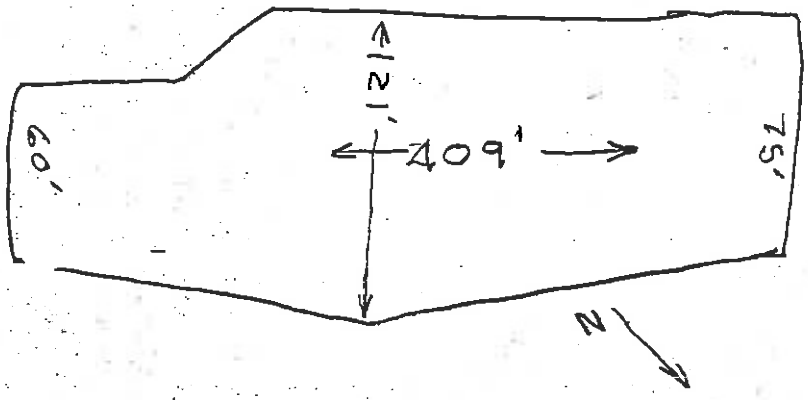
DATE : 4-29-93

PROJECT MANAGER: F. STRNAD

PROJECT NO. : 3072

PROJECT NAME: WILLIAM BONNELL

Location and size of area of subgrade to be accepted.
Describe and sketch here:



I the undersigned, an authorized representitive of Serrot Corporation, accept the above described subgrade as suitable to be lined.

Name	Signature	Title	Date
J. GRAYDON RENSHAW	J. Graydon Renshaw	SUPT	4-29-93

SERROT
CORPORATION
GEOMEMBRANE LINING SYSTEMS

P.O. Box 1519
5401 Argosy Drive
Huntington Beach
CA 92649

(714) 895-3010
(800) 624-2437
FAX: (714) 895-0903

----------FAX COVER SHEET----------

TO: Joe Louis

COMPANY: Emcon SE. DATE: 4/28/93

FAX # 404 - 355 - 3217 # PAGES 17 (Including Cover)

FROM: Doug Wells

The original document [] is [] is not Being sent by [] 1st class mail [] Federal Express

If you do not receive all pages. or if you do not receive all pages clearly call back as soon as possible.

REMARKS: The William Bonnel Co

Attached are the QC reports for the 7 rolls of 60mil for this job.

Call me if you have any questions.

Doug

Gundle®

Quality Control Certificate

RAILCAR : PSPX2286
MATERIAL : HDPE 060 MIL
BATCH # : 030493
ROLL # : 01020400

MANF. DATE : 03/04/1993
PROJECT NAME : SERROT CORPORATION
MR NUMBER : 8733-01 PROJECT # : 8733-01
LOCATION : HUNTINGTON BEACH CA 001

TEST PARAMETER		TESTING FREQUENCY	REQUIRED SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)		EVERY ROLL	60 min	60	D 1593
Carbon Black	(%)	15,000 SF	2.0 to 3.0	2.5	D 1603
Carbon Black Dispersion		15,000 SF	A-1/A-2/B-1	A-1	D 3015
Density	(g/cm3)	15,000 SF	0.940 min	0.947	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15,000 SF	126 min	167	D 638
T.S. Break	(ppi)	15,000 SF	228 min	276	Type IV
Elong. Yield	%	15,000 SF	12 min	17	2 ipm
Elong. Break	%	15,000 SF	700 min	782	
Puncture Resistance (lbs)		30,000 SF	72 min	113	FTMS 101,Method 2065
Tear Resistance	(lbs)	60,000 SF	39 min	58	D 1004,Die C
Low Temp.Brittleness degF		60,000 SF	-60 max	Pending	D 746
Resistance-Soil Burial %		60,000 SF	-10 to 10	Pending	ASTM D3083
Dimensional Stability		30,000 SF	-2 to 2	Pending	D 1204 (212F,1 hour)

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle®

Quality Control Certificate

RAILCAR : PSPX6021
MATERIAL : HDPE 060 MIL
BATCH # : 030593
ROLL # : 01020418

MANF. DATE : 03/05/1993
PROJECT NAME : SERROT CORPORATION
MR NUMBER : 8733-01 PROJECT # : 8733-01
LOCATION : HUNTINGTON BEACH CA 001

TEST PARAMETER	TESTING FREQUENCY	REQUIRED SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)	EVERY ROLL	60 min	61	D 1593
Carbon Black (%)	15,000 SF	2.0 to 3.0	2.6	D 1603
Carbon Black Dispersion	15,000 SF	A-1/A-2/B-1	A-1	D 3015
Density (g/cm3)	15,000 SF	0.940 min	0.946	D 1505 A
Tensile Properties:				
T.S. Yield (ppi)	15,000 SF	126 min	163	D 638
T.S. Break (ppi)	15,000 SF	228 min	288	Type IV
Elong. Yield %	15,000 SF	12 min	16	2 ipm
Elong. Break %	15,000 SF	700 min	808	
Puncture Resistance (lbs)	30,000 SF	72 min	108	FTMS 101,Method 2065
Tear Resistance (lbs)	60,000 SF	39 min	53	D 1004,Die C
Low Temp.Brittleness degF	60,000 SF	-60 max	Pending	D 746
Resistance-Soil Burial %	60,000 SF	-10 to 10	Pending	ASTM D3083
Dimensional Stability	30,000 SF	-2 to 2	Pending	D 1204 (212F,1 hour)

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle®

Quality Control Certificate

RAILCAR : PSPX6021
MATERIAL : HDPE 060 MIL
BATCH # : 030593
ROLL # : 01020424

MANF. DATE : 03/05/1993
PROJECT NAME : SERROT CORPORATION
MR NUMBER : 8733-01 PROJECT # : 8733-01
LOCATION : HUNTINGTON BEACH CA 001

TEST PARAMETER		TESTING FREQUENCY	REQUIRED SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness	(mils)	EVERY ROLL	60 min	61	D 1593
Carbon Black	(%)	15,000 SF	2.0 to 3.0	2.6	D 1603
Carbon Black Dispersion		15,000 SF	A-1/A-2/B-1	A-1	D 3015
Density	(g/cm3)	15,000 SF	0.940 min	0.946	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15,000 SF	126 min	174	D 638
T.S. Break	(ppi)	15,000 SF	228 min	296	Type IV
Elong. Yield	%	15,000 SF	12 min	16	2 ipm
Elong. Break	%	15,000 SF	700 min	810	
Puncture Resistance	(lbs)	30,000 SF	72 min	116	FTMS 101,Method 2065
Tear Resistance	(lbs)	60,000 SF	39 min	56	D 1004,Die C
Low Temp.Brittleness	degF	60,000 SF	-60 max	Pending	D 746
Resistance-Soil Burial	%	60,000 SF	-10 to 10	Pending	ASTM D3083
Dimensional Stability		30,000 SF	-2 to 2	Pending	D 1204 (212F,1 hour)

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle®

Quality Control Certificate

RAILCAR : PSPX6021
MATERIAL : HDPE 060 MIL
BATCH # : 030693
ROLL # : 01020429

MANF. DATE : 03/06/1993
PROJECT NAME : SERROT CORPORATION
MR NUMBER : 8733-01 PROJECT # : 8733-01
LOCATION : HUNTINGTON BEACH CA 001

TEST PARAMETER		TESTING FREQUENCY	REQUIRED SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness	(mils)	EVERY ROLL	60 min	63	D 1593
Carbon Black	(%)	15,000 SF	2.0 to 3.0	2.5	D 1603
Carbon Black Dispersion		15,000 SF	A-1/A-2/B-1	A-1	D 3015
Density	(g/cm3)	15,000 SF	0.940 min	0.945	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15,000 SF	126 min	157	D 638
T.S. Break	(ppi)	15,000 SF	228 min	249	Type IV
Elong. Yield	%	15,000 SF	12 min	16	2 ipm
Elong. Break	%	15,000 SF	700 min	764	
Puncture Resistance	(lbs)	30,000 SF	72 min	107	FTMS 101,Method 2065
Tear Resistance	(lbs)	60,000 SF	39 min	52	D 1004,Die C
Low Temp.Brittleness	degF	60,000 SF	-60 max	Pending	D 746
Resistance-Soil Burial	%	60,000 SF	-10 to 10	Pending	ASTM D3083
Dimensional Stability		30,000 SF	-2 to 2	Pending	D 1204 (212F,1 hour)

CERTIFIED BY:

R.J. Schaefer
Quality Manager

PHILLIPS 66 COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY

PASADENA, TEXAS 77501-0792
BOX 792 PHONE: 713-475-3686

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

February 22, 1993

JHV# 1488-93

FAX: 713-875-6010

UPDATED COPY

Type

Gundle Lining Systems Inc.
1340 East Richey Road
Houston, TX 77073

ATTN: Steve Severson

This letter will certify that the Marlex* resin shown below, as supplied by Phillips 66 Company, conforms to our manufacturing specification.

Type:	HHM TR-400
Lot Number:	7130129
P.O. Number:	S-020069
Date shipped:	02/19/93
Package:	PSPX 6021
Quantity:	178950 lbs.
Melt Index:	.10 gm/10 min.
Density:	.938 gm/cc

J. H. Vaden
Quality Assurance Manager
PHILLIPS 66 COMPANY

JHV:PSN:ad

* Reg. U.S. Pat. Off.

cc: QA-File-RC
E. E. Fogle

Gundle®

GUNDLE LABORATORY
MELT INDEX / DENSITY

DATE TEST: MARCH 3, 1993
RAIL CAR # PSPX6021
PRODUCT CODE: TR400
MANUFACTURER: PHILLIPS

	MELT INDEX ASTM D1238,E (G/10MIN.) TEST RESULTS	DENSITY ASTM D1505 (G/CC) TEST RESULTS
1.	0.1	0.939
2.	0.1	0.938
3.	0.09	0.94
4.	0.1	0.939
5.	0.1	0.939
6.	0.1	0.939
7.	0.09	0.938
8.	0.09	939
AVG.	0.10	0.939
STD.	0.005	0.001

RATIO (N/E) 94.5

PHILLIPS 66 COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY

PASADENA, TEXAS 77503-0792
BOX 792 PHONE: 713-475-3888

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

January 6, 1993

JHV# 38-93

FAX: 713-875-6010

Gundle Lining Systems Inc.
1340 East Richey Road
Houston, TX 77073

ATTN: Steve Severson

This letter will certify that the Marlex* resin shown below, as supplied by Phillips 66 Company, conforms to our manufacturing specification.

Type:	HHM TR-400
Lot Number:	7120840
P.O. Number:	S017244
Date shipped:	01/04/93
Package:	PSPX 2286
Quantity:	172250 lbs.
Density:	.938 gm/cc
ESCR, F/S0, Cond. B:	>1000 hrs **
LT Brit. (ASTM D746):	<-118 degrees C **
Ash-IR:	.02 %
HLMI/MI Ratio:	96.
Melt Index:	.10 gm/10 min.
HLMI:	9.600 gm/10 min.

J. H. Vaden
Quality Assurance Manager
PHILLIPS 66 COMPANY

JHV:PSN:ad

* Reg. U.S. Pat. Off.
** Nominal Value

cc: QA-File-RC
E. E. Fogle

Gundle®

GUNDLE LABORATORY
MELT INDEX / DENSITY

DATE TEST: FEBRUARY 23 1993
RAIL CAR # PSPX2286
PRODUCT CODE: TR400
MANUFACTURER: PHILLIPS

	MELT INDEX ASTM D1238,E (G/10MIN.) TEST RESULTS	DENSITY ASTM D1505 (G/CC) TEST RESULTS
1.	0.09	0.936
2.	0.09	0.935
3.	0.09	0.936
4.	0.09	0.936
5.	0.08	0.937
6.	0.09	0.936
7.	0.08	0.937
8.	0.08	0.935
AVG.	0.09	0.9360
STD.	0.005	0.001

RATIO (N/E) 101.3

Gundle®

GUNDLE LABORATORY
WELDING ROD

DATE TEST : 03/29/93
BATCH NO #: 32993
RAILCAR NO #: GOCX58486

MELT INDEX ASTM D1238,E (G/10MIN)	DENSITY ASTM D1505 (G/CC)	CARBON BLACK ASTM D1603 (%)
TEST RESULT	TEST RESULT	TEST RESULT
0.17	0.947	2.5

Chevron

November 17, 1992

Gundle Lining Systems
19103 Gundle Road
Houston, Texas 77073
FAX: 713-875-6010

Attention: Steve Severson - Gundle Materials Manager

CERTIFICATE OF RAILCAR ANALYSIS

Product Type	9642T
Railcar Number	GOCX58486
Lot Number	B101394
Ship Date	11-16-92
Quantity/Weight	185,300
Customer P. O. #	017246
Chevron Order #	CRN69047

Following is the data on the subject material as determined by the Quality Control Department:

TEST RESULTS

Property	ASTM Method	Value	Units
Density	D1505	0.9395	gms/cc
Melt Index	D1238 Cond. E	0.19	gms/10 min.

ESCR incomplete, we will advise after 500 hours.

The data set forth herein has been carefully compiled by Chevron Chemical Company. However, there is no warranty of any kind, either express or implied, applicable to its use and the user assumes all risk and liability in connection therewith.

Sincerely,

G B Bertin/gc

G. G. Bertin
Supervisor
Quality Control

GGB\gc

cc: Rick Schaefer - Gundle Lab Manager

Gundle®

GUNDLE LABORATORY
MELT INDEX / DENSITY

DATE TEST: DECEMBER 8, 1992
RAIL CAR # GOCX58486
PRODUCT CODE: 9642T
MANUFACTURER: CHEVRON

	MELT INDEX ASTM D1238,E (G/10MIN.) TEST RESULTS	DENSITY ASTM D1505 (G/CC) TEST RESULTS
1.	0.15	0.936
2.	0.15	0.937
3.	0.16	0.937
4.	0.16	0.937
5.	0.15	0.937
6.	0.16	0.937
7.	0.16	0.937
8.	0.15	0.937
AVG.	0.16	0.9369
STD.	0.005	0.000

RATIO (N/E): N/A

Gundle®

Quality Control Certificate

RAILCAR : ELTX394
MATERIAL : HDPE 060 MIL
BATCH # : 031393
ROLL # : 01020562

MANF. DATE : 03/13/1993
PROJECT NAME : SERROT/PECAN ROW LF.
MR NUMBER : 8589-01 PROJECT # :
LOCATION : VALDOSTA GA

TEST PARAMETER		TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)		EVERY ROLL	60 min	61	D 1593
Carbon Black	(%)	15000SF	2.0 to 3.0	2.6	D 1603
Density	(g/cm3)	15000SF	0.940 min	0.946	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15000SF	126	158	D 638
T.S. Break	(ppi)	15000SF	228	305	Type IV
Elong. Yield	%	15000SF	13	17	2 ipm
Elong. Break	%	15000SF	700	929	
Puncture Resistance (lbs)		30000SF	75	107	FTMS 101,Method 2065
Tear Resistance	(lbs)	60000SF	42	50	D 1004,Die C
Low Temp.Brittleness degF		60000SF	-112 max	Pending	D 746
Environ.Stress Crack hrs		60000SF	1500 min	Pending	D 1693
Dimensional Stability		30000SF	-2 to 2	Pending	D 1204 (212F,1 hour)

Notary Public In and For
The State of Texas

Norma Lee Smith
Commission Expires 1/16/94

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle®

Quality Control Certificate

RAILCAR : ELTX396
MATERIAL : HDPE 060 MIL
BATCH # : 031493
ROLL # : 01020579

MANF. DATE : 03/14/1993
PROJECT NAME : SERROT/PECAN ROW LF.
MR NUMBER : 8589-01 PROJECT # :
LOCATION : VALDOSTA GA

TEST PARAMETER		TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)		EVERY ROLL	60 min	61	D 1593
Carbon Black	(%)	15000SF	2.0 to 3.0	2.5	D 1603
Density	(g/cm3)	15000SF	0.940 min	0.945	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15000SF	126	162	D 638
T.S. Break	(ppi)	15000SF	228	314	Type IV
Elong. Yield	%	15000SF	13	17	2 ipm
Elong. Break	%	15000SF	700	928	
Puncture Resistance (lbs)		30000SF	75	114	FTMS 101,Method 2065
Tear Resistance	(lbs)	60000SF	42	57	D 1004,Die C
Low Temp.Brittleness	degF	60000SF	-112 max	Pending	D 746
Environ.Stress Crack	hrs	60000SF	1500 min	Pending	D 1693
Dimensional Stability		30000SF	-2 to 2	Pending	D 1204 (212F,1 hour)

Notary Public In and For
The State of Texas

Norma Lee Smith
Commission Expires 1/16/94

CERTIFIED BY:

R.J. Schaefer
Quality Manager

Gundle®

Quality Control Certificate

RAILCAR : ELTX394
MATERIAL : HDPE 060 MIL
BATCH # : 031393
ROLL # : 01020574

MANF. DATE : 03/13/1993
PROJECT NAME : SERROT/PECAN ROW LF.
MR NUMBER : 8589-01 PROJECT # :
LOCATION : VALDOSTA GA

TEST PARAMETER		TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mils)		EVERY ROLL	60 min	61	D 1593
Carbon Black	(%)	15000SF	2.0 to 3.0	2.5	D 1603
Density	(g/cm3)	15000SF	0.940 min	0.946	D 1505 A
Tensile Properties:					
T.S. Yield	(ppi)	15000SF	126	178	D 638
T.S. Break	(ppi)	15000SF	228	320	Type IV
Elong. Yield	%	15000SF	13	17	2 ipm
Elong. Break	%	15000SF	700	860	
Puncture Resistance (lbs)		30000SF	75	106	FTMS 101,Method 2065
Tear Resistance	(lbs)	60000SF	42	57	D 1004,Die C
Low Temp.Brittleness degF		60000SF	-112 max	Pending	D 746
Environ.Stress Crack	hrs	60000SF	1500 min	Pending	D 1693
Dimensional Stability		30000SF	-2 to 2	Pending	D 1204 (212F,1 hour)

Notary Public In and For
The State of Texas

Norma Lee Smith
Commission Expires 1/16/94

CERTIFIED BY:

R.J. Schaefer
Quality Manager

SOLVAY POLYMERS

Quality Polymers Through Technology and People

November 23, 1992

Gundle Lining Systems
Materials Manager
19103 Gundle Avenue
Houston, TX 77073
2306787

Listed below are the data on product shipments:

Product Type:	XF836
Railcar Number:	ELTX 394
Lot Number:	C21010F06A
Production Date:	10/10/92
Ship Date:	11/23/92
Quantity/Weight:	163,500
Customer PO Number:	017252
Solvay Order Number:	0C7635
Shipped To:	WESTFIELD, TX

TEST	METHOD	RESULT	UNITS
MELT INDEX	D1238 - 90B	0.10	G/10M
DENSITY	D4883 - 89	0.939	G/23C
ESCR	D1693 - 70(1988)	*	%F/HR

*ESCR incomplete, will advise after 1000 hours

Sincerely,

Richard O. Scharchburg

Richard D. Scharchburg
Quality Administration Manager
Phone: (713) 478-3772

sab

Solvay Polymers, Inc. - Technical Center
1230 Battleground Road, Deer Park, Texas 77536 Mailing Address: P.O. Box 1000, Deer Park, Texas 77536

Gundle®

GUNDLE LABORATORY
MELT INDEX / DENSITY

DATE TEST: FEBRUARY 18, 1993
RAIL CAR # ELTX394
PRODUCT CODE: XF836
MANUFACTURER: SOLVAY

	MELT INDEX ASTM D1238,E (G/10MIN.) TEST RESULTS	DENSITY ASTM D1505 (G/CC) TEST RESULT:
1.	0.1	0.937
2.	0.09	0.936
3.	0.1	0.936
4.	0.1	0.937
5.	0.1	0.937
6.	0.1	0.936
7.	0.1	0.936
8.	0.1	0.936
AVG.	0.10	0.936
STD.	0.003	0.000

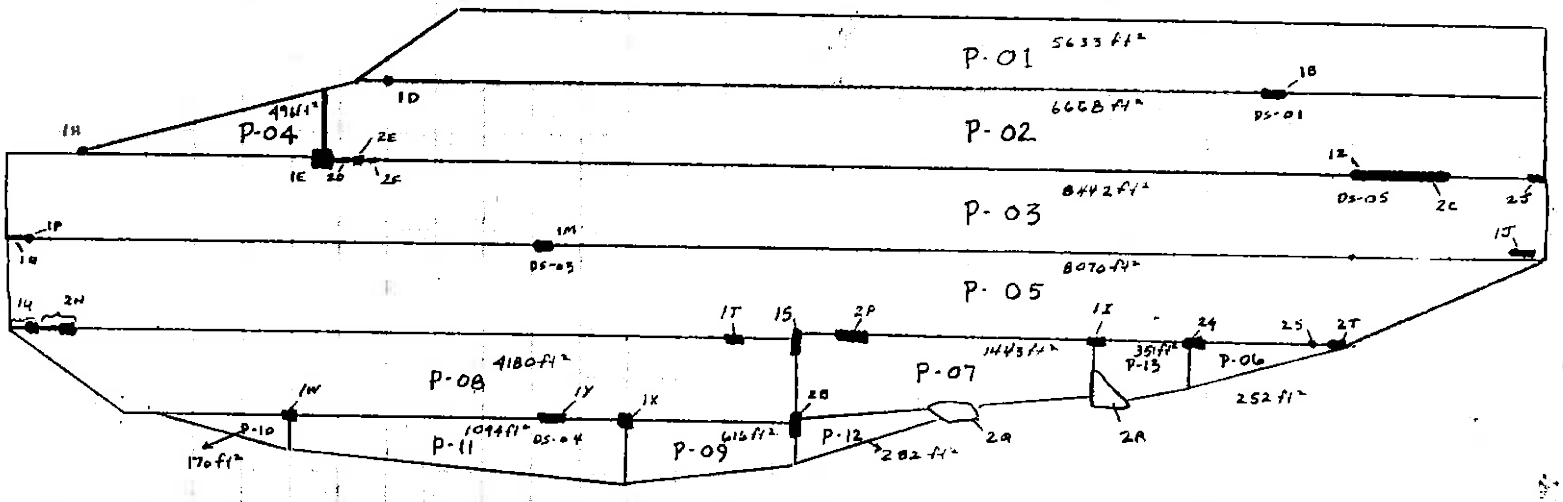
RATIO (N/E) 97.2

S

50 SCALE (APPROX)

Z

* NOT ALL REPAIRS ARE REPRESENTED ON DRAWING



37697 ft² Net coverage

2308 ft² in Anchor trench

40005 ft²

42458 ft² Area based on deployment (6% scrap)

E

N

SERROT CORPORATION

Page of

File

By

Date

DEPLOYMENT SUMMARY

Chattahoochee Geotechnical Consultants, Inc.

Project : 2040.008.92
Project #: Bonnell

Panel Number	Roll Number	Length (Avg.) Ft.	Width (Avg.) Ft.	Area (Avg.) S.F.	Q.A. Init.	Comments
P-01	20400	~~[illegible]~~ 331'	22.5	7448	JH	~~[illegible] ft² Actual coverage (-) Anchor trench~~ 6589 ft² Actual coverage (-) Anchor trench
P-02	20562	327' ~~395~~	22.5	7358	JH	7227 ft² Actual coverage (-) Anchor trench
P-03	20574	420'	22.5	9450	JH	8844 ft² Actual coverage (-) Anchor trench
P-04	20562	68'	22.5	1530	JH	312 ft² Actual coverage (-) Anchor trench
P-05	20579	375' ~~420~~	22.5	9450	JH	~~[illegible] ft²~~ actual coverage (-) Anchor trench 8272 ft²
P-06	20579	25 ↓	15.5 ↓	↓ ↓	JH	~~[illegible] ft²~~ A.C. (Pie off of P-05) 39
P-07	20400	89'	22.5	(37,439) 2003	JH	1731 ft² actual coverage, thru pipe trench
P-08	20418	215'	22.5	4838	JH	4643 ft² actual coverage (-) anchor trench
P-09	20562	85'	22.5	1913	JH	42 15
P-10	20418	↓	↓	↓	JH	195 ft² actual coverage thru pipe trench 10 39 Pie from P08
P-11	20418	93'	22.5	2093	JH	
P-12	20562	45'	22.5	1013	JH	11 40 26
P-13	20400	scrap from P-07			JH	14

42458 ft²

Total Square Feet	42458

Reviewed By: 4-29-93 [signature]

Date: 4-29-93

TX = Extrusion
TF = Fusion

BONNELL CLOSURE

FIELD TRIAL SEAM LOG

Chattahoochee Geotechnical Consultants, Inc.

Project : Bonnell
Project #: 2440.000.92

Sample No.	Time	Amb Temp °F	Tech Init.	Machine No.	Temp Set °C	Temp Actual	Peel Tests In	Peel Tests Out	Peel Tests In	Peel Tests Out	Shear	Pass or Fail (P/F)	Q.A. Init.
3 peel / 3 shear TF-01	0850	55°	GR	68	440° ~~425°~~	SP-4.5 433°	121	104	118 135	110 143	166 174 168	P	JH
3peel / 3 shear TF-02	0850	55°	BS	47	480	Sample voided. Machine determined to be to hot previous to testing. New sample pending							JH
3peel / 3 shear TF-02A	0920	55°	BS	47	440°	SP-4.5 426	109	132	114 150	150 114	157 175 171	P	JH
3Peel / 3Shear TF-03	1320	69°	BS	68	440°	SP-4.5 440°	109	126	133 128	135 132	192 146 155	P	JH
~~3peel / 3shear TF-04~~													
Extrusion TX-01	1500	75°	GR	17	240°	240°	142	143	129	NA	134 133	P	JH

Date: 4-29-93

Reviewed By: JH

FIELD TRIAL SEAM LOG

Project : Bennett
Project #: 2040.008.92

Sample No.	Time	Amb Temp °F	Tech Init.	Machine No.	Temp Set °C	Temp Actual	Peel Tests In	Peel Tests Out	Peel Tests In	Peel Tests Out	Shear	Pass or Fail (P/F)	Q.A. Init.
TX-01	0815	65°	BS	17	240	240	101	92	146		167 177 180	P	JH
TX-02	1245	80°	GR	17	240	240	133	141	140		154 158 153	P	JH
TF-01	0920	70°	GR	68	SP-4.5 440	436	124	130	126 124	135 143	179 188 180	P	JH

Date: 4-30-13

Reviewed By: JH

SEAMING LOG
Chattahoochee Geotechnical Consultants, Inc.

Project : Bonnell
Project #: 2040.008.92

Seam No.	Machine Number	From	To	Length	Name of Welder	Mach. Temp °F	Q.A. Init.	Test Date	Comments
01/02	68	WEOS ~~WEOS~~	BEOS (1D)	310'	GR ~~BS~~	SP-4.5 441°	JMJ	4-29	(DS-01) start & finish tabs (Pass) 1005 ~~[illegible]~~ hrs ([illegible])
MACHINE # 47 WAS DETERMINED WITH THIS MACHINE ARE ~~02/03~~	~~47~~	CUT OUT ~~WEOS~~	TO BE ~~BEOS~~ AND RE ~~(1E)~~	FAULTY, ALL SEAMED, ~~323~~	SEAMS THAT HAVE ~~BS~~	~~457~~	BEEN ~~JMJ~~	WELDED ~~4-29~~	~~(DS-02)~~ ~~start~~ VOID 1045 hrs
03/04	68	WEOS	BEOS (1E)	68'	GR	SP-4.5 436	JMJ	4-29	([illegible]) start & finish tabs (Pass 1050 hrs ([illegible])
03/05	68	WEOS	BEOS (1P)	401	GR	SP-4.5 440°	JMJ	4-29	start & finish tabs (Pass) 1130 hrs (DS-03)
VOID ~~06/07~~	VOID ~~47~~	VOID ~~WEOS~~	VOID ~~BEOS~~	VOID ~~15'~~	VOID ~~BS~~	~~SP-4.5D~~ ~~432~~	VOID ~~JMJ~~	VOID ~~4-29~~	~~[illegible]~~ ~~start & finish tabs (Pass)~~ VOID ~~1200~~
VOID ~~05/06~~	VOID ~~47~~	VOID ~~WEOS~~	(VOID) ~~BEOS~~	VOID ~~64~~	VOID ~~BS~~	~~SP-4.5~~ ~~439~~	VOID ~~JMJ~~	VOID ~~4-29~~	~~start & finish tabs~~ pass VOID ~~1210 hrs~~
07/08	68	WEOS	BEOS	22'	GR	SP 4.5 440°	JMJ	4-29	start & finish tabs (Pass) 1330
+ RECORDED TWICE 05/07	68	(2I) WEOS	BEOS	82'	BS	SP-4.5 438	JMJ	4-29	start & finish (PASS) 1355
* 05/08	68	(1S) WEOS	(1U) BEOS	203'	BS	SP-4.5 436	JMJ	4-29	Start & finish tabs (Pass) 1410
10/11	68	WEOS	BEOS	10'	BS	SP4.5 432	JMJ	4-30	1450
09/11	68	WEOS	BEOS	16'	BS	SP-4.5 440	JMJ	4-30	start & finish (Pass) 1500
08/09	68	WEOS	(1X) BEOS	43'	BS	SP-4.5 438	JMJ	4-30	Start & finish tabs (Pass 1510
08/11	68	(1X) WEOS		87'	BS	SP-4.5 436°	JMJ	4-30	start & finish tabs (Pass 1525
+ 02/03	68	WEOS	2C ~~B~~	30'	BS	440°	JMJ	4-29	DS-05 start & finish (Pass) 1620

Date: 4-29-93

Reviewed By: JMJ

SEAMING LOG

Chattahoochee Geotechnical Consultants, Inc.

Project : Bonne II

Project #: 2040.008.92

Seam No.	Machine Number	From	To	Length	Name of Welder	Temp °F	Q.A. Init.	Test Date	Comments
07/12	68	WEOS	EEOS	~~100~~	BS	440°	JH	4-30	Start & finish tabs (Pass)
08/10	68	(1W) WEOS	EEOS	50'	BS	436	JH	4-30	start & finish tabs (Pass)
RECORDED TWICE 07/08	68	NEOS	EEOS	22'	BS	443	JH	4-29	Start & finish tabs (Pass) 1720
09/12	68	(2R) NEOS	SEOS	12'	BS	439°	JH	4-30	Start & finish tabs (Pass) 1730
+ 02/03	68	2C	1Z	10'	BS	440°	JH	4-29	Start & finish tabs (Pass) 1630
+ 02/03	68	1Z	~~EEOS~~ EEOS	280'	BS	432°	JH	4-29	Start & finish tabs (pass) 1640
07/13	17	SEOS	(2R) NEOS	15'	GR	240°	JH	4-30	
Extrusion 02/04	17	(1E) SEOS	NEOS	20'	GR	240°	JH	4-30	1720 EXTRUSION SEAM
06/13 ~~05/06~~	17	SEOS	NEOS	17'	GR	240°	JH	4-30	
05/06	68	WEOS	2A EEOS	41'	BS ~~GR~~	440°	JH	4-29	Start & finish Pass) 1730.
05/13	68	(2A) WEOS	(1I) EEOS	25'	BS	435°	JH	4-29	Start & finish (Pass 1740
05/07	68	(1I) WEOS	(1S) EEOS	80'	BS	441°	JH	4-29	Start & finish (pass) 1750
~~06/07~~	~~68~~	~~SEOS~~	~~NEOS~~						
~~5/10~~	~~68~~	~~WEOS~~	~~EEOS~~	~~50'~~	~~BS~~	~~440°~~	~~JH~~		

Date: 4-29-93

Reviewed By: JH

SEAMING LOG

Project : Bonne II
Project #: 7040.008.92

Seam No.	Machine Number	From	To	Length	Name of Welder	Temp °F	Q.A. Init.	Test Date	Comments
02/04	#17	NEOS	SEOS	20'	BS	80°	JH	4-30	
06/013	17	NEOS	SEOS	10'	BS	80°	JH	4-30	

Date: 4-30-93

Reviewed By: JH

DEFECT LOG #: 1 **Project:** Bonnell

Chattahoochee Geotechnical Consultants, Inc. **Project #:** 2040.008.92

Defect #	Defect Location	Defect Type	Log Date	Q.A. Init.	Repair Date	Test Date	Comments
A	P-01	P	4-29	JH	4-30	4-30	
B	01/02	P	4-29	JH	4-29	4-30	70' E of W.A.T. DS-01
C	02/03	B	4-29	JH	VOID	VOID	50' S of N.A.T. DS-02 VOID
D	01/02	P	4-29	JH	4-29	4-30	SEOS; 5' N of A.T.
E	03/04	P	4-29	JH	4-29	4-30	int @ P-02
F	01/02	B	4-29	JH	4-29	4-30	extrude from ID thru A.T.
G	03/04	P	4-29	JH	4-30	S.T. 4-30	SEOS (in anchor trench)
H	03/04	B	4-29	JH	4-30	S.T. 4-30	extrude from IG to End of panel
I	06/07 int @ 05	P	4-29	JH	4-30	4-30	
J	~~P-03~~ 03/05	P	4-29	JH	4-30	S.T. 4-30	~~6' West 03/04 not 5' of NEOS~~ 2' E of W.A.T.
K	03/05	P	4-29	JH	4-30	S.T. 4-30	in N. A. T.
M	03/05	P	4-29	JH	4-29	4-30	260' S of NEOS DS-03
N	P-05	P	4-29	JH	4-30	4-30	35' W of E.A.T; center of panel
P	03/05	P	4-29	JH	4-30	S.T. 4-30	8' N from S.A.T.
Q	03/05	B	4-29	JH	4-30	S.T. 4-30	Ext. from IP thru A.T.
R	P-08	B	4-29	JH	4-30	4-30	12' S of 07/08; mid panel
S	07/08	P	4-29	JH	4-30	4-30	int @ 05
T	05/08	P	4-29	JH	4-30	4-30	20' S of NEOS
U	05/08	P	4-29	JH	4-30	S.T. 4-30	2' N of S.A.T
W	10/11 int @ 08	P	4-29	JH	4-30	4-30	
X	09/11 int @ 08	P	4-29	JH	4-30	4-30	
Y	08/11	P	4-29	JH	4-30	4-30	DS-04 25' S of NEOS (1X)
Z	02/03	P	4-29	JH	4-29	4-30	DS-05 50' S of NEOS

B = Bead / C = Cap / D# = Destructive Sample Number / P = Patch / T = Three or More Panel Joint

Reviewed By: JH **Date:** 4-29-93

DEFECT LOG #: 2

Chattahoochee Geotechnical Consultants, Inc.

Project: Boone II

Project #: 2040.00B.92

Defect #	Defect Location	Defect Type	Log Date	Q.A. Init.	Repair Date	Test Date	Comments
A	~~02/03~~	~~P~~	4-29	JH	VOID		~~[illegible] 25' S of WEOS~~
B	VOID						
C	02/03	P	4-29	JH	4-29	4-30	25' S of WEOS covered by 12
D	02/03	B	4-29	JH	4-29	4-30	ext. between 1E & 2E
E	02/03	P	4-29	JH	4-29	4-30	8' N of EEOS (1E)
F	02/03	B	4-29	JH	4-29	4-30	ext from 2E, extending 3' North West
G	05/06	P	4-29	JH	4-30	4-30	Int @ 13
H	~~04/05~~ ~~05/06~~	~~P~~ ~~P~~	~~4-29~~ ~~4-29~~	~~JH~~ ~~JH~~	~~4-30~~ ~~VOID~~	~~4-30~~ ~~VOID~~	~~Int @ 05/06 10' S of WEOS~~
I	09/12	P	4-29	JH	4-30	4-30	Int @ 07/08 (4 panel Int.)
J	02/03	B	4-29	JH	4-30	S.T. 4-30	Crest of W.A.T; ext thru trench
K	P03	P	4-29	JH	4-30	4-30	20' N of E.A.T mid panel
M	P05	P	4-29	JH	4-30	4-30	20' N of E.A.T mid panel
N	05/08	P	4-29	JH	4-30	S.T. 4-30	10' N of E.A.T.
P	05/07	P	4-29	JH	4-30	4-30	18' N of EEOS (1S)
Q	07/12	P	4-30	JH	4-30	4-30	west end of P12
R	07/13	P	4-30	JH	4-30	4-30	N. edge of Issue
S	06/05	P	4-30	JH	4-30	S.T. 4-30	W end of seam 10' E of WEOS
T	06/05	P	4-30	JH	4-30	S.T. 4-30	3' E of WEOS
U	02/03	P	4-29	JH	4-29	4-30	Same as 2C 50' E of W.A.T Covered by 12
W							
X							
Y							
Z							

B = Bead / C = Cap / D# = Destructive Sample Number / P = Patch / T = Three or More Panel Joint

Reviewed By: JH

Date: 4-30-93

AGP Laboratories, Inc.
2004 E. Randol Mill, Suite 512
Arlington, Texas 76011
(817) 861-9090 • (800) AGP-6030
Fax: (817) 861-5400

April 30, 1993

Chattahoochee Geotechnical Consultants, Inc.
Attn: Mr. Jeff Hanson
1560 Oakbrook Drive, Suite 100
Norcross, GA 30093

RE: Client Job - Bonell Closure
AGP Project No. CGC1248.001

Dear Mr. Hanson:

Four (4) samples were received for testing. The samples were identified as follows:

SAMPLE I.D.	SEAM	AGP COMMENTS
* Entire seam in which DS-02 test was removed. DS-05 replaces DS-02		
DS-01	01/02	GMS/DHW
DS-03	03/05	GMS/DHW
DS-04	08/11	GMS/DHW
DS-05	02/03	GMS/DHW

The samples were tested in accordance with the test method listed below and industry accepted modifications (National Sanitation Foundation Standard 54, Appendix A) of that method:

1) ASTM D 4437 (As modified by NSF Standard 54, Appendix A), "Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes"

RESULTS:

Sample (Thickness, mil)	Specimen Number	PEEL ADHESION Lbs/in	PEEL ADHESION Type Failure	SHEAR Lbs/in	SHEAR Type Failure
			WELD A[1]		
DS-01 GMS/DHW 01/02	1	118	FTB/SE-1	161	FTB/BRK
	2	106	"	154	FTB/SE-1
	3	102	"	163	"
	4	109	"	149	FTB/BRK
	5	108	"	148	"
	AVG	109		155	
			WELD B[1]		
	1	113	FTB		
	2	119	"		
	3	108	"		
	4	118	"		
	5	113	"		
	AVG	114			
			WELD A[1]		
DS-03 GMS/DHW 03/05	1	113	FTB/SE-1	173	FTB/SE-1
	2	116	"	172	FTB/BRK
	3	113	"	174	FTB/SE-1
	4	111	"	166	"
	5	112	"	162	"
	AVG	113		169	
			WELD B[1]		
	1	124	FTB/SE-1		
	2	127	"		
	3	124	"		
	4	119	"		
	5	123	"		
	AVG	123			

Sample (Thickness, mil)	Specimen Number	PEEL ADHESION Lbs/in	PEEL ADHESION Type Failure	SHEAR Lbs/in	SHEAR Type Failure
		WELD A[1]			
DS-04 GMS/DHW 08/11	1	123	FTB/SE-1	186	FTB/SE-1
	2	127	"	187	"
	3	124	"	170	"
	4	121	"	168	"
	5	121	"	168	"
	AVG	123		176	
		WELD B[1]			
	1	133	FTB/SE-1		
	2	134	"		
	3	125	"		
	4	128	"		
	5	131	"		
	AVG	130			
		WELD A[1]			
DS-05 GMS/DHW 02/03	1	121	FTB/SE-1	153	FTB/SE-1
	2	115	"	154	"
	3	117	"	161	"
	4	116	"	157	"
	5	112	"	153	"
	AVG	116		156	
		WELD B[1]			
	1	119	FTB/SE-1		
	2	122	"		
	3	128	"		
	4	117	"		
	5	132	"		
	AVG	124			

[1] Lining of Waste Containment and Other Impoundment Facilities - Appendix N. 1988. EPA/600/2-88/052. Risk Reduction Engineering Laboratory Office of Research and Development. U.S. Environmental Protection Agency. Cincinnati, OH.

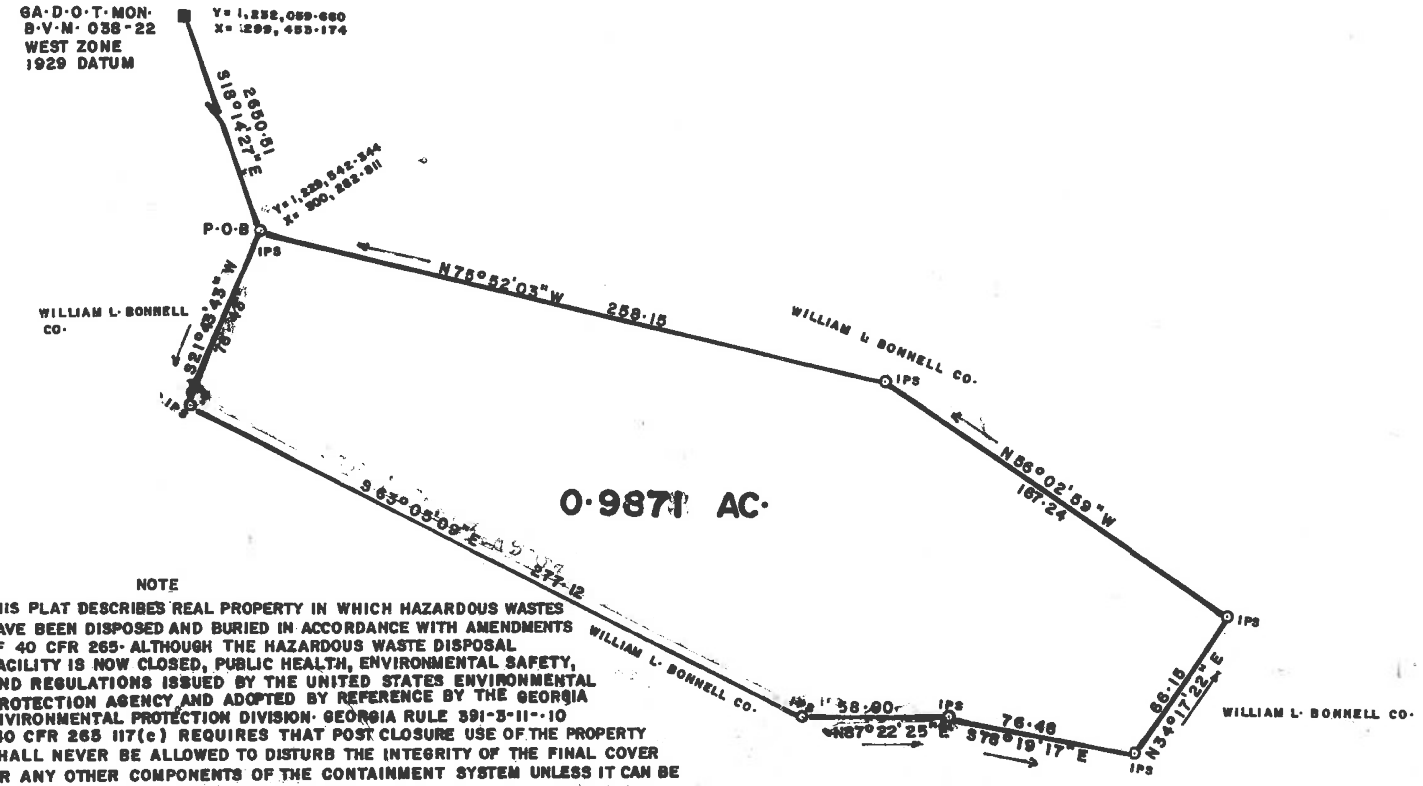
Samples were submitted by CHATTAHOOCHEE GEOTECHNICAL CONSULTANTS, INC. AGP Laboratories, Inc. has no specific knowledge as to conditioning, origin, sampling procedure, special use of material, or purpose of material. The testing listed herein is based upon accepted industry practice as well as by the test method listed. AGP Laboratories neither accepts nor makes claim as to final use and purpose of the material. This report only relays test methods and associated values. It does not comment on compliance of materials with specifications.

If there are any questions please contact us.

Respectfully yours,

Neelam Asher

for Rodney N. Crenwelge
Laboratory Director



NOTE

THIS PLAT DESCRIBES REAL PROPERTY IN WHICH HAZARDOUS WASTES HAVE BEEN DISPOSED AND BURIED IN ACCORDANCE WITH AMENDMENTS OF 40 CFR 265· ALTHOUGH THE HAZARDOUS WASTE DISPOSAL FACILITY IS NOW CLOSED, PUBLIC HEALTH, ENVIRONMENTAL SAFETY, AND REGULATIONS ISSUED BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AND ADOPTED BY REFERENCE BY THE GEORGIA ENVIRONMENTAL PROTECTION DIVISION· GEORGIA RULE 391-3-11-·10 (40 CFR 265 117(c) REQUIRES THAT POST CLOSURE USE OF THE PROPERTY SHALL NEVER BE ALLOWED TO DISTURB THE INTEGRITY OF THE FINAL COVER OR ANY OTHER COMPONENTS OF THE CONTAINMENT SYSTEM UNLESS IT CAN BE DEMONSTRATED THAT ANY PROPOSED DISTURBANCE WILL NOT INCREASE ANY RISK TO THE PUBLIC OR THE ENVIRONMENT·

In my opinion this is a true representation of the land platted and has been prepared in conformity with minimum standards and requirements of law.

Robert A. Moreland R.L.S. # 1891
Woodbury, Ga. 553-5283

GEORGIA REGISTERED No. 1891 PROFESSIONAL LAND SURVEYOR ROBERT A. MORELAND

PLAT FOR

WILLIAM L· BONNELL CO· OF FORMER CHROMIUM HYDROXIDE LANDFILL, IN CITY OF NEWNAN LL#38 5th L· D·

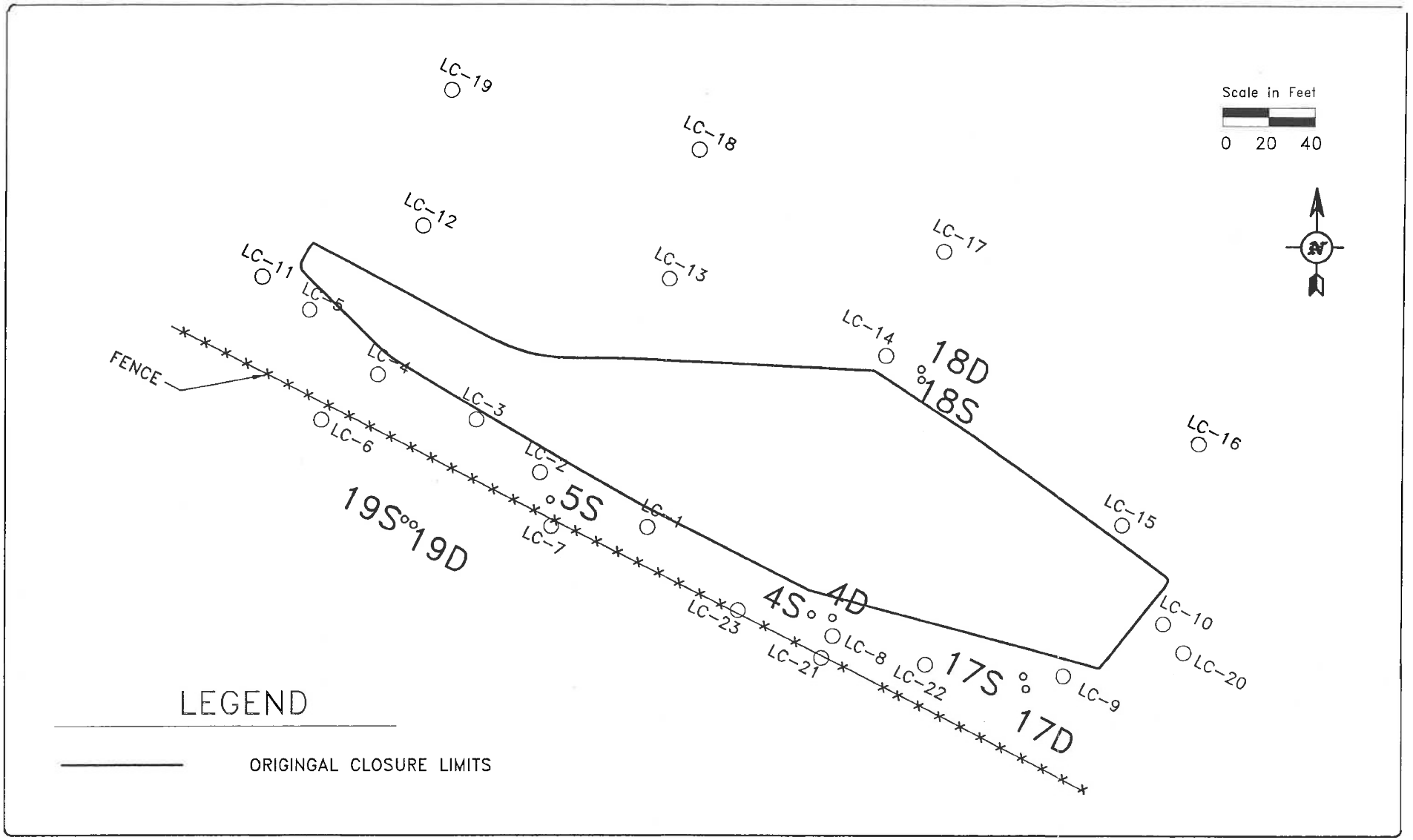
COWETA COUNTY GEORGIA

JUNE 23, 1993 SCALE 1" = 50'

Survey and Plat By
ROBERT A. MORELAND, R.L.S.
Woodbury, Ga. Phone 553-5283
Georgia License # 1891

FIGURE

1



M:\2040\LF-CAP

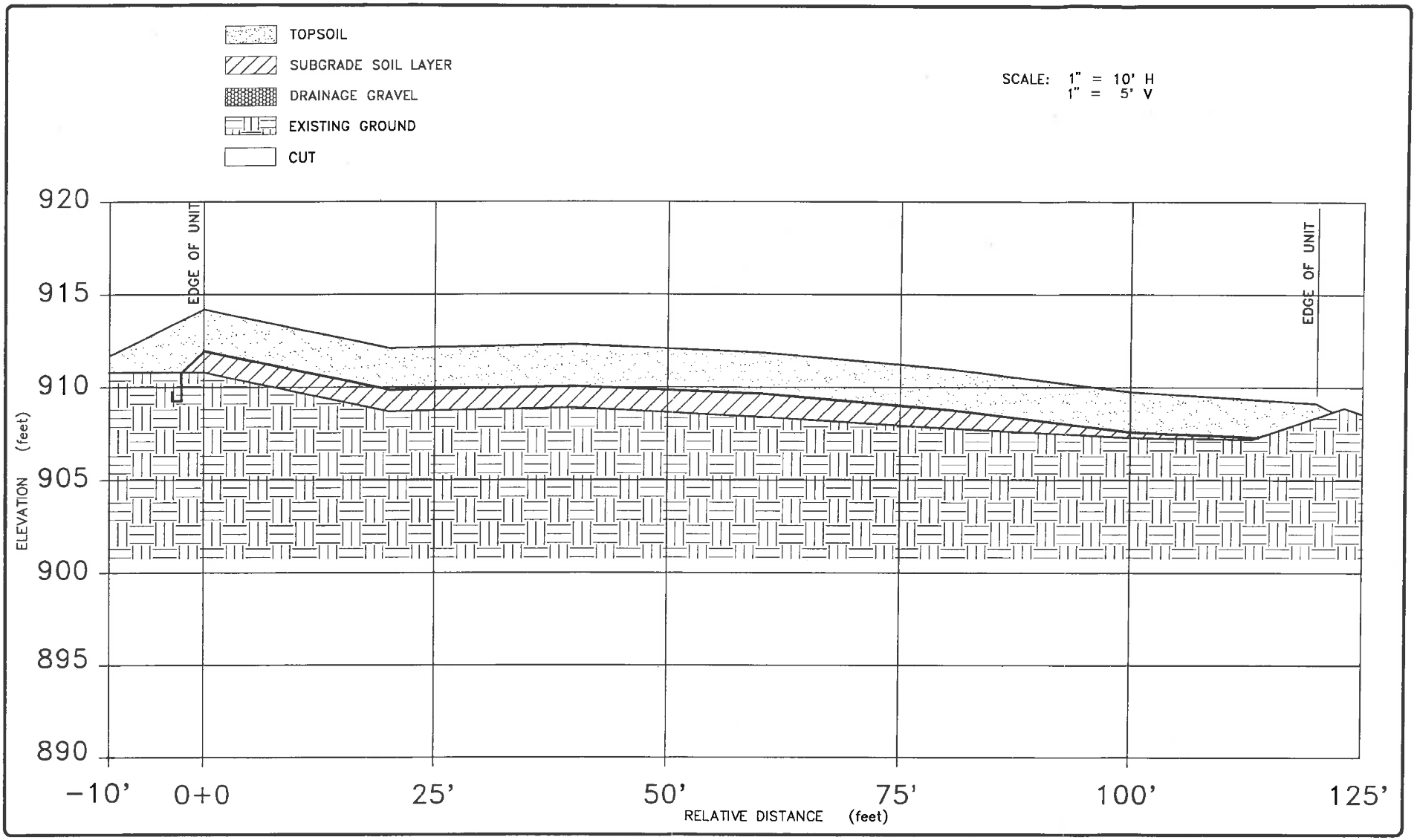
EMCON SOUTHEAST

SOIL SAMPLING LOCATIONS WITH RESPECT TO REVISED LANDFILL LIMITS APRIL 1993

THE WILLIAM L BONNELL COMPANY
CHROMIUM HYDROXIDE LANDFILL CLOSURE

FIGURE 1

PROJECT NO. 2040.008.92



EMCON SOUTHEAST

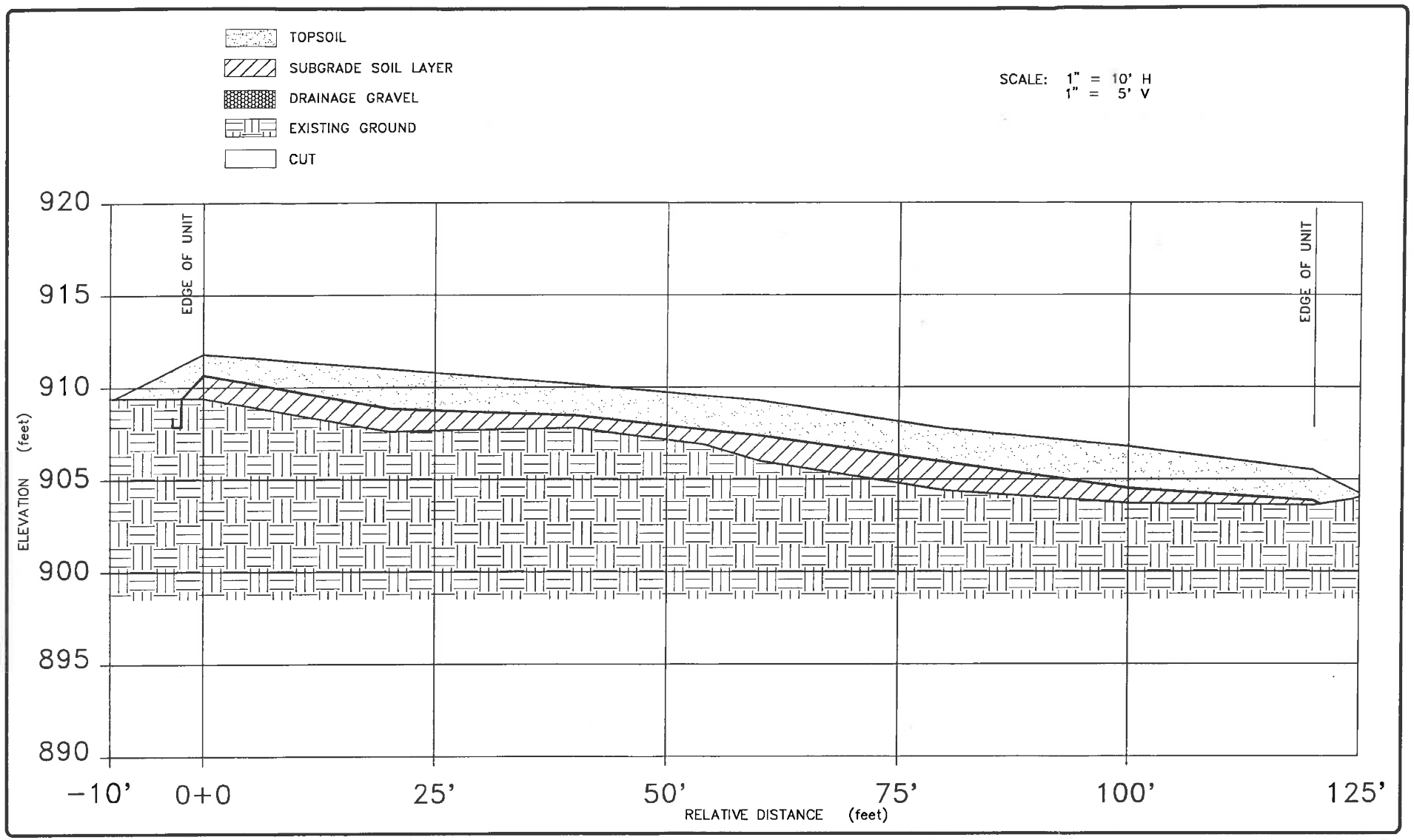
STA 0+75

THE WILLIAM L BONNELL COMPANY
CHROMIUM HYDROXIDE LANDFILL CLOSURE
CROSS-SECTIONS

FIGURE

PROJECT NO. 2040.008.92

m:\2040\008-92\CROH-LF\STA-75



emcon SOUTHEAST

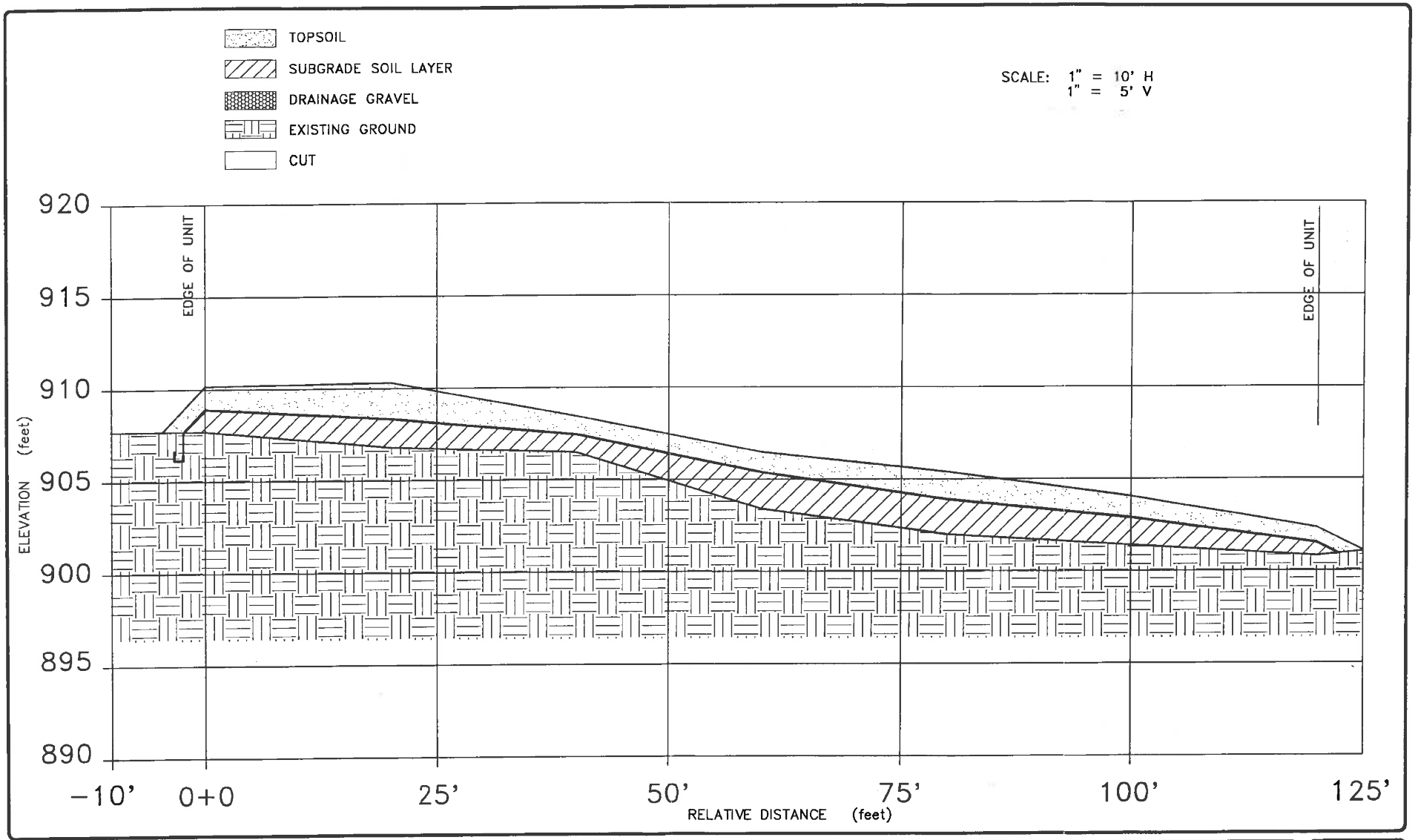
STA 1+25

THE WILLIAM L BONNELL COMPANY
CHROMIUM HYDROXIDE LANDFILL CLOSURE
CROSS-SECTIONS

FIGURE

PROJECT NO. 2040.008.92

m:\2040\008-92\CROH-LF\STA-125



EMCON SOUTHEAST

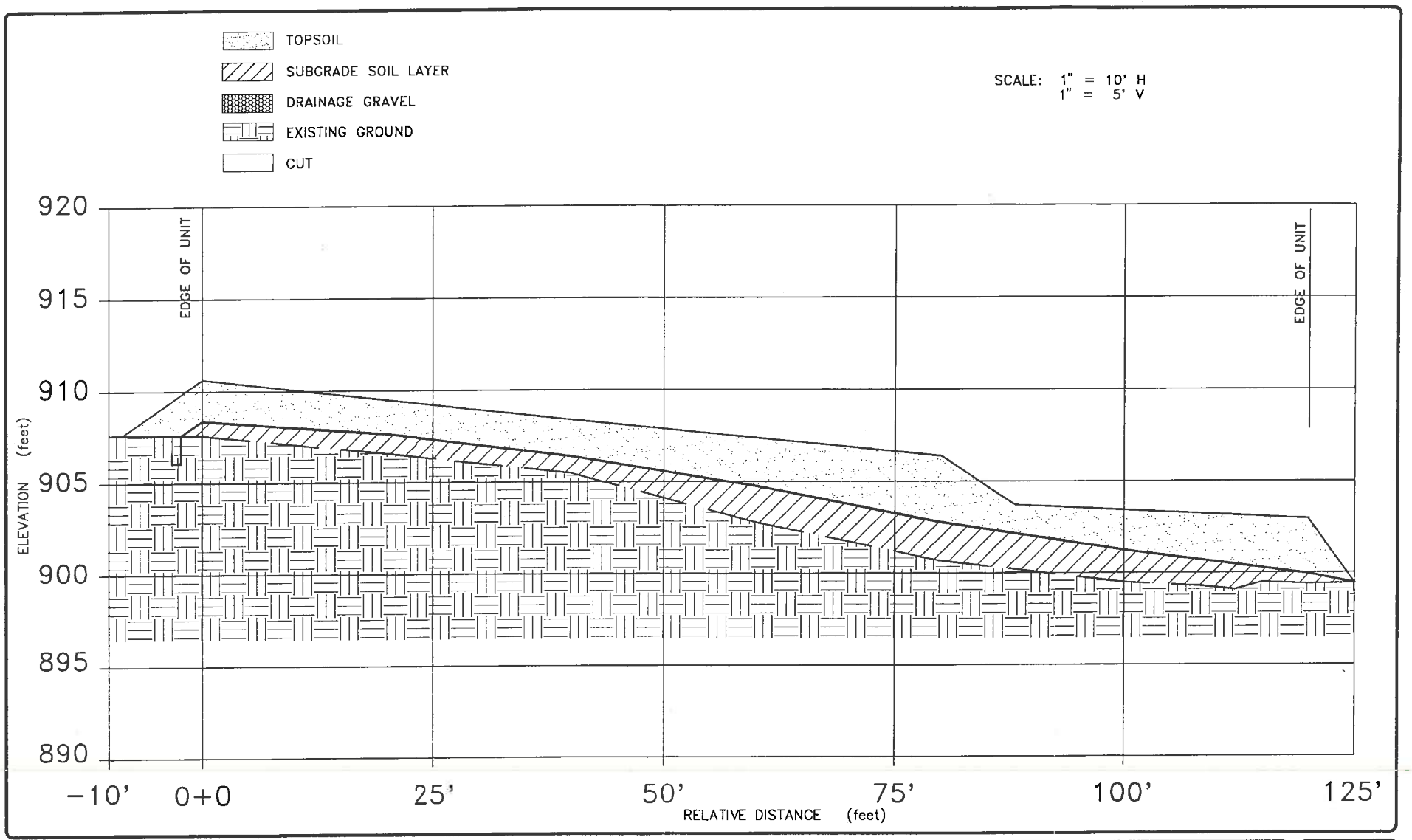
STA 1+75

THE WILLIAM L BONNELL COMPANY
CHROMIUM HYDROXIDE LANDFILL CLOSURE
CROSS-SECTIONS

FIGURE

PROJECT NO. 2040.008.92

m:\2040\008-92\CROH-LF\STA-175



emcon SOUTHEAST

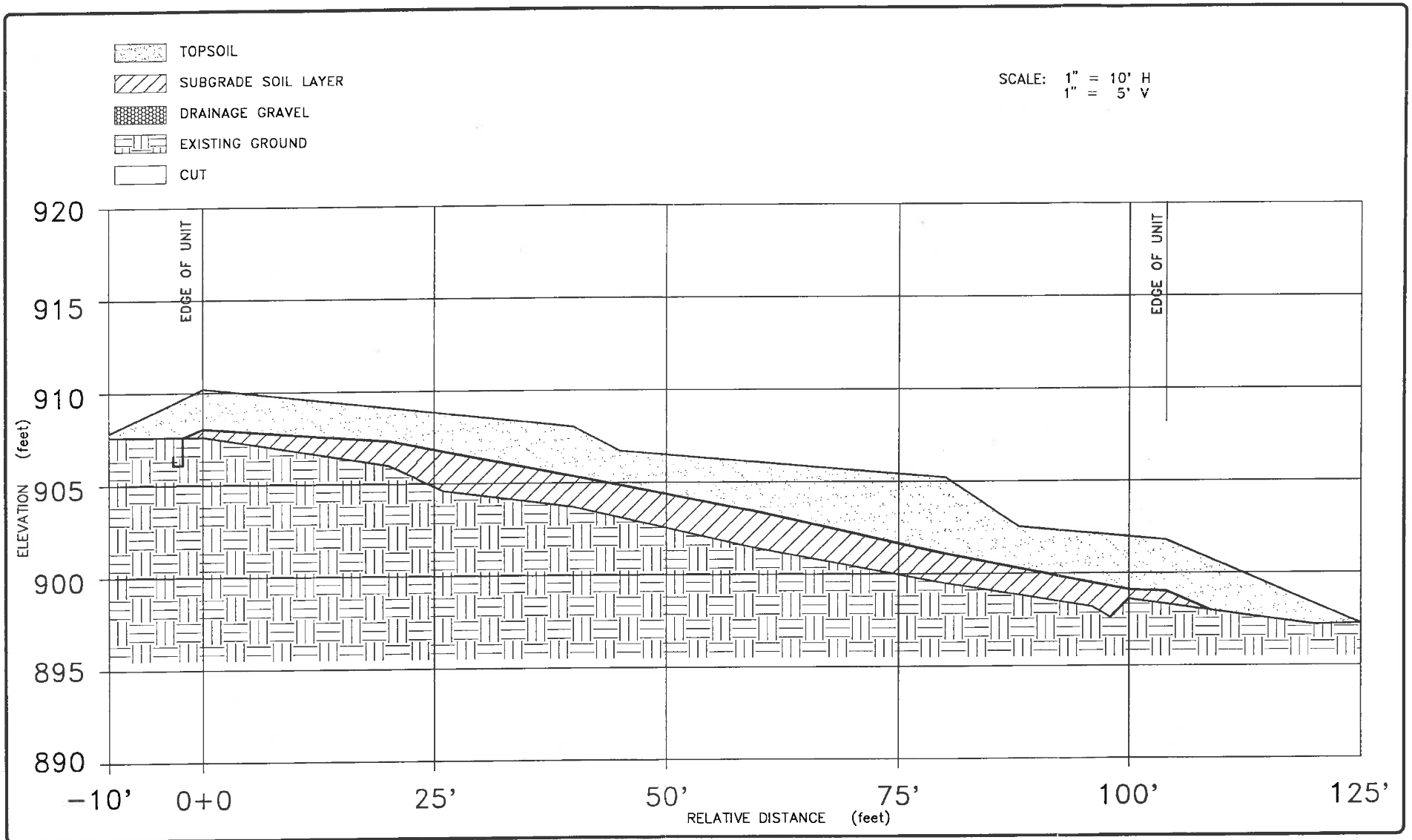
STA 2+25

THE WILLIAM L BONNELL COMPANY
CHROMIUM HYDROXIDE LANDFILL CLOSURE
CROSS-SECTIONS

FIGURE

PROJECT NO. 2040.008.92

m:\2040\008-92\CROH-LF\STA-225



EMCON SOUTHEAST

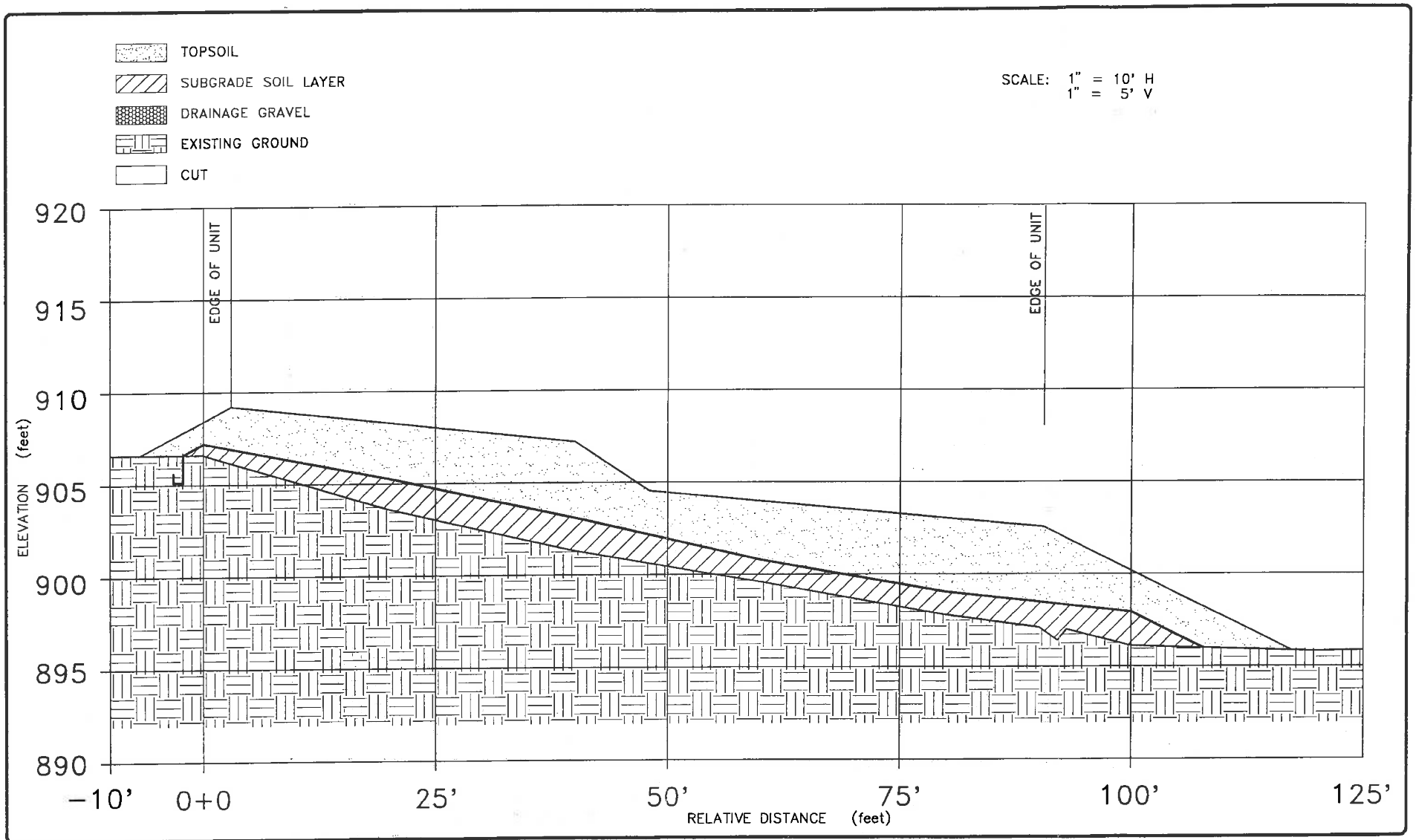
STA 2+75

THE WILLIAM L BONNELL COMPANY
CHROMIUM HYDROXIDE LANDFILL CLOSURE
CROSS-SECTIONS

FIGURE

PROJECT NO. 2040.008.92

m:\2040\008-92\CROH-LF\STA-275



emcon SOUTHEAST

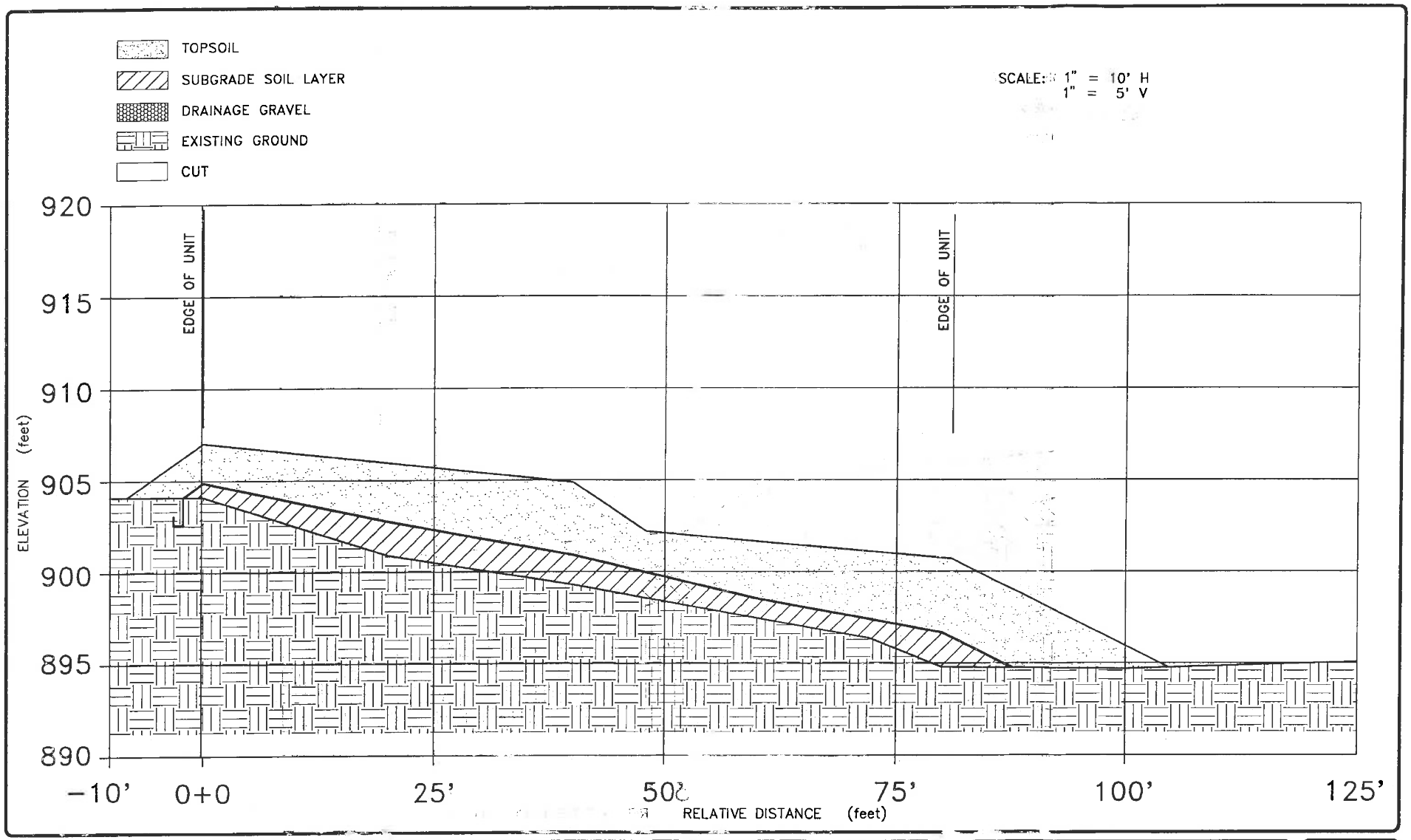
STA 3+25

THE WILLIAM L BONNELL COMPANY
CHROMIUM HYDROXIDE LANDFILL CLOSURE
CROSS-SECTIONS

FIGURE

PROJECT NO. 2040.008.92

m:\2040\008-92\CROH-LF\STA-325



m:\2040\008-92\CROH-LF\STA-375

emcon SOUTHEAST

STA 3+75

THE WILLIAM L BONNELL COMPANY
CHROMIUM HYDROXIDE LANDFILL CLOSURE
CROSS-SECTIONS

FIGURE

PROJECT NO.
2040.008.92