ftn Associates Ltd.
water resources / environmental consultants
3 Innwood Circle, Suite 220 • Little Rock, AR 72211-2449 • (501) 225-7779 • Fax (501) 225-6738

May 4, 2010

MAY 10 2010
AR 2:46

Mr. Bryan Leamons, PE
Engineer Supervisor
Solid Waste Management Division
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317

RE: Submittal of Construction Quality Assurance (CQA) Report for the Waste Cell 14 Bottom Liner System, Mississippi County Landfill, Permit No. 0136-S1-R3, AFIN 47-00124
FTN No. 4355-301

Dear Mr. Leamons:

On behalf of Mississippi County, FTN Associates, Ltd. (FTN) is submitting the CQA report for the bottom liner system construction of Waste Cell 14. The enclosed CD contains the CQA report in Adobe PDF.

The construction of the new disposal area began in August 2009 and was completed in March 2010. The construction was conducted in accordance with the project construction documents (July 2009) and the facility permit.

If you have any questions or comments regarding this submittal, please do not hesitate to contact me or Paul Crawford, PE, PG at (501) 225-7779.

Respectfully submitted,
FTN ASSOCIATES, LTD.

Jason J. Ghidotti, PE
Project Manager

AFIN: 47-00124
Pmt #: 0136-S1-R3
REC'D
SCAN ☒ MAY 11 2010
Doc ID#: 57631
To: PL Zfile

S
W
M
D

JJG/rml

Enclosure

CC: Honorable Steve McGuire, Mississippi County Judge (without enclosure)
Gary Carmichael, Landfill Manager; Mississippi County Landfill (with enclosure)

R:\WP_FILES\4355-301\CORRESPONDENCE\L-B LEAMONS 05-04-10\DRAFT L-B LEAMONS 05-03-10.DOC

CONSTRUCTION QUALITY ASSURANCE CERTIFICATION REPORT

MISSISSIPPI COUNTY
CLASS 1 LANDFILL
CELL 14
BOTTOM LINER SYSTEM CONSTRUCTION

MAY 4, 2010

CONSTRUCTION QUALITY ASSURANCE CERTIFICATION REPORT

MISSISSIPPI COUNTY
CLASS 1 LANDFILL
CELL 14
BOTTOM LINER SYSTEM CONSTRUCTION

Prepared for

Mississippi County
200 West Walnut, RM 204
Blytheville, AR 72315

Prepared by

FTN Associates, Ltd.
3 Innwood Circle, Suite 220
Little Rock, AR 72211

FTN No. 4355-301

May 4, 2010

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 General

Mississippi County (the County) owns and operates a Class 1 solid waste landfill near Luxora, Arkansas. The landfill is permitted by the Arkansas Department of Environmental Quality under Solid Waste Permit No. 0136-S1-R3 (September 2003). The facility is permitted for disposal of both Class 1 and Class 4 wastes. The site consists of 80 acres, of which 30 acres are permitted for disposal of Class 1 wastes and about 9 acres are permitted for disposal of Class 4 wastes (under a separate permit).

The Mississippi County landfill site is located approximately 4 miles northwest of Luxora and approximately 1.6 miles east of Interstate 55. Figure 1 (Appendix A) presents the location of the landfill facility on an Arkansas State Highway and Transportation Department county highway map (Mississippi County).

The County contracted with FTN Associates, Ltd. (FTN) to provide Construction Quality Assurance (CQA) services associated with the construction of the bottom liner system for Cell 14 of the Class 1 landfill.

This document summarizes the construction activities associated with the development of Cell 14. This includes excavation and preparation of the subgrade, construction of the compacted clay liner, installation of the geomembrane liner, installation of the leachate drainage layer and the soil protective cover layer, and installation of leachate collection and transmission system. Correspondence, details, quality control test results, and certification associated with the construction are also provided. This document is intended to satisfy the requirements of Regulation 22, §22.428(i).

1.2 Site Description

The total permitted area of the County Landfill is approximately 80 acres. The original topography of the landfill site was nearly level terrain that is moderately dissected by dendritic streams. As shown on Figure 2 (Appendix A), the County has developed 13 of the 14 disposal areas permitted for Class 1 wastes. The facility has two large stormwater detention ponds located

on the east and west sides of the Class 1 Landfill. The eastern pond was modified in 2007 to expand the pond south of the Class 4 Landfill. Administrative offices are located in the Scale House, which is northeast of the Landfill. Leachate from Cells 1-13 is collected in each disposal area's collection system and drains via gravity pipelines to collection sumps. The leachate is then pumped to one of six 1,000-gallon holding tanks before it is removed from the facility and taken to West Memphis for disposal.

At the time of the construction project, the active disposal area was in Cells 10 through 13, which still have some disposal capacity.

1.3 Project Description

This project involved the construction and CQA monitoring of the bottom liner system, and leachate collection and transmission, for Cell 14 of the Class 1 landfill, which covers approximately 3.3 acres. Figure 3 (Appendix A) presents the construction plan for the project.

The sequence of construction activities included:

1. Survey of construction area prior to excavation;
2. Excavation to the designed subgrade for the disposal cell, density and moisture testing, and general site preparation;
3. Exposure of tie-in for the bottom liner system between Cells 13 and 14 (to the west) and Cells 1, 2 and 3 (to the north);
4. Preparation, installation, and testing of 24-inch compacted clay liner;
5. Installation and testing of smooth and textured 60-mil high density polyethylene (HDPE) geomembrane liner and geocomposite;
6. Installation of a minimum 12-inch thick sand leachate drainage layer over the geocomposite on the bottom of the disposal cell;
7. Installation of leachate drainage pipe and trench;
8. Installation of 12-inch thick soil protective cover layer on slopes of disposal area;
9. Installation of stormwater containment berms;
10. Construction of new access roads; and
11. Installation and testing of leachate transmission system including side-slope riser pipe, pump, pump control system, and dual-contained leachate transmission piping.

Appendix B provides a photographic log of the construction project, and daily field logs of construction activities are included as Appendix C.

1.4 Project Personnel

Owner:

Mississippi County
Project Manager: Billy Buck, Mississippi County Landfill Foreman

Design Engineer:

FTN Associates, Ltd.
Project Manager: Mr. Paul Crawford, PE, PG

Project Engineer: Mr. Jason Ghidotti, PE

CQA Consultant:

FTN Associates, Ltd.
Project Manager: Mr. Paul Crawford, PE, PG
Project Engineers: Mr. Jason Ghidotti, PE
Mr. Will Granich, EI

CQA Monitor: Mr. Jim Craig

Survey Control: Harmon Surveying, Inc.
Dodd Harmon, PLS

Field Soil Testing: Anderson Engineering Consultants, Inc.

Geotechnical Laboratory: Golder Associates, Inc.

Earthwork Contractor:

Mann Land Leveling
Project Manager: Mr. Mark Mann

Geomembrane and HDPE Piping Contractor:

American Environmental Group
Project Manager: Mr. Tom Sparks

Site Supervisor: Mr. Vibol Sary

Leachate Pumping System Contractor:

Reich Company
Project Manager: Mr. Charles Reich

1.5 Project Documents

The construction of the liner system for Cell 14 of the landfill was conducted in accordance with the following documents:

- "Contract Documents, Cell 14 Construction, Mississippi County, Class 1 Landfill, Cell 14 Construction", FTN, July 2009.
- Construction Drawings, "Mississippi County, Class 1 Landfill, Cell 14 Construction" (Drawings), FTN, July 2009.
- "Regulation Number 22, Solid Waste Management", Arkansas Department of Pollution Control and Ecology (ADPCE), March 2007.

2.0 SUBGRADE PREPARATION

2.1 Clearing and Grubbing

2.1.1 Project Specifications

The project specifications required that the construction area be cleared and grubbed. This included removing grass and other vegetative material resting on or protruding through the ground surface in those areas delineated for disposal cell, access roads, soil stockpile areas, and stormwater facilities on the construction drawings.

2.1.2 Construction Procedures

Because the area had already been partially excavated for intermediate cover material for landfill operations prior to the beginning of cell construction, it was not necessary for the area to be cleared or grubbed.

2.2 Excavation and Subgrade Preparation

2.2.1 Project Specifications

Project specifications required that overburden soils and areas of unsatisfactory materials within the project limits be excavated. Unsatisfactory materials include soft or compressible soils or materials judged by the CQA Consultant to be unsuitable for foundations or the placement of compacted soils. Suitable soils for construction were to be stockpiled separately from the unsuitable soils.

Subgrade elevations were to be verified through an independent survey. In addition, the subgrade surface was required to be scarified and compacted to the same density and moisture requirements of the subsequent layer/material (i.e., 90% of the Standard Proctor density and above the optimum moisture content (OMC) for the disposal cell area).

2.2.2 Subgrade Construction Procedures

The subgrade excavation and preparation for compacted clay liner occurred during August 2009. During this period, the construction activities consisted of excavation of the soils

from the project area and preparation of the subgrade surface for installation of the clay liner. The excavated soils were segregated into two stockpiles: one for suitable clay liner material and one for general fill material, protective cover layer soil, or cover soil for the landfill facility. The subgrade elevations were verified by an independent survey conducted by Harmon Surveying, Inc. Figure 4 (Appendix A) shows final subgrade elevations of the disposal cell. The subsurface was prepared in accordance with the construction plans.

Photo 1 in Appendix C presents subgrade preparation activities. Photo 2 presents exposure of the Cell 13 (to the west) tie-in for the clay and geomembrane liner systems.

2.2.3 Subgrade Testing

A total of 16 density and moisture tests were conducted using a nuclear densiometer. According to the field density and moisture tests, the subgrade surface met the project specifications. Pre-construction laboratory test reports of the subgrade soils and a summary of the field tests performed on the subgrade are included as Appendix E.

3.0 COMPACTED CLAY LINER INSTALLATION

This section of the report summarizes the construction activities associated with the compacted clay liner. Clay liner construction began in late August 2009 and was completed in early October 2009 and consisted of placement of approximately 12,000 cubic yards (cy) of clay soil.

3.1 Project Specifications

The project specifications required that a 24-inch thick compacted clay liner be constructed within the disposal cell limits. The compacted clay liner was specified to be constructed in four uniform, loose lifts of 9 inches (or 6 inches compacted).

The clay liner material and completed clay liner had the following requirements:

1. Unified Soil Classification System (USCS) classification of CL, CH, or SC;
2. A minimum of 30% passing the No. 200 United States Standard Sieve;
3. A Plasticity Index (PI) greater than or equal to 10;
4. Each lift compacted to a minimum 95% of the maximum dry density with a corresponding moisture content above the OMC, as determined by the Standard Proctor test (ASTM D 698); and
5. The in-place permeability of each lift was required to be 1×10^{-7} cm/sec or less.

3.2 Clay Liner Material Conformance Testing

Project Specifications required one pre-construction sample of the clay liner material for every 20,000 cy and one construction sample for every 5,000 cy to be used in the project. The estimated volume of clay to be used was approximately 12,000 cy, so prior to construction of the disposal cell, six soil samples (two pre-construction and four construction) of the clay liner material were obtained from a soil stockpile from soils excavated from Cell 14. Table 3.1 presents a summary of the test results of the pre-construction sample, and Table 3.2 presents a summary of the test results of the construction samples. Based on the pre-construction and construction test results, the stockpiled soils met the project specifications. Laboratory test

summaries of the pre-construction and construction soil samples are included as Appendices E and F, respectively.

Table 3.1. Clay liner material pre-construction test summary.

Sample ID	USCS Classification	% Passing #200 Sieve	Atterberg Limits			Dry Density (lbs/ft^3)	OMC (%)	Coefficient of Permeability (cm/sec)
			Liquid Limit	Plastic Limit	PI			
MSCOLF TP-1	CH	97.9	63	28	35	93.4	25.5	4.3×10^{-8}
MSCOLF TP-2	CH	95.5	63	26	37	94.2	23.0	4.9×10^{-8}

Table 3.2. Clay liner material construction test summary.

Sample ID	USCS Classification	% Passing #200 Sieve	Atterberg Limits			Dry Density (lbs/ft^3)	OMC (%)	Coefficient of Permeability (cm/sec)
			Liquid Limit	Plastic Limit	PI			
MSCOLF TP-3	CH	97.7	65	32	33	97.2	22.6	3.1×10^{-8}
MSCOLF TP-4	CH	98.2	60	28	32	97.5	22.5	3.5×10^{-8}
MSCOLF TP-5	CH	95.6	54	22	32	101.7	21.2	2.1×10^{-8}
MSCOLF TP-6	CH	94.0	58	24	34	103.9	21.3	5.9×10^{-9}

3.3 Compacted Clay Liner Construction Procedures

After the test pad was constructed and approved, the remaining portion of the clay liner was installed. In accordance with the project specifications and using the procedures established during the construction of the clay liner test pad, the soils were placed and compacted in four 6-inch lifts to the top of liner elevations. Photos 3 and 4 (Appendix B) present construction activities of the compacted clay liner.

3.4 Compacted Clay Liner Testing

Construction and performance testing was conducted on each successive lift according to project specifications and Regulation 22 requirements. Sixteen density and moisture tests were conducted per lift. There was one failure (Lift 2) and all others passed. The failure area was reworked and retested. The reworked area passed testing. Table 3.3 presents a summary range of

field test measurements of each of the four compacted lifts of the clay liner and the results of the tests.

Four permeability samples were collected per completed lift. The samples were submitted to Golder Associates, Inc. for analysis. All 16 samples met the project requirements. Table 3.4 presents a summary of the permeability test results for each of the four lifts of the compacted clay liner.

Summaries of the field test results are included as Appendix G and summaries of the in-place permeability test results are included as Appendix H. Figures 5 and 6 (Appendix A) present the field testing locations and permeability sampling locations during the construction of the clay liner.

The final elevations were verified through an independent survey conducted by Harmon Surveying, Inc. Figure 4 (Appendix A) shows the final grades of the clay liner. Based on the survey, the top of the clay liner was constructed with the 0.1-ft tolerance limits.

Table 3.3. Summary of compacted clay liner field tests.

Lift Number	Number of Tests	Range of Measured Compaction (%)	Range of Measured Moisture above OMC (%)	Results of Tests
Lift No. 1	16	95.8 – 100+	1.6 – 8.5	All tests passed.
Lift No. 2	16	95.6 – 100+	-0.8 – 4.2	One failure, which was reworked and then retested and passed; all others passed.
Lift No. 3	16	96.8 – 100+	0.6 – 5.9	All tests passed.
Lift No. 4	16	96.2 – 100	0.7– 4.8	All tests passed.

Table 3.4. Summary of compacted clay liner in-place permeability results.

Sample ID	Lift Number	Measured Permeability (cm/s)	Comment
P-1-1A	1	1.4×10^{-8}	Pass
P-1-2A	1	1.0×10^{-8}	Pass
P-1-3A	1	1.2×10^{-8}	Pass
P-1-4A	1	1.4×10^{-8}	Pass
P-2-1A	2	1.0×10^{-8}	Pass
P-2-2A	2	1.3×10^{-8}	Pass
P-2-3A	2	1.1×10^{-8}	Pass
P-2-4A	2	1.2×10^{-8}	Pass
P-3-1A	3	1.2×10^{-8}	Pass
P-3-2A	3	1.7×10^{-8}	Pass
P-3-3A	3	1.3×10^{-8}	Pass
P-3-4A	3	1.1×10^{-8}	Pass
P-4-1A	4	1.2×10^{-8}	Pass
P-4-2A	4	1.0×10^{-8}	Pass
P-4-3A	4	1.2×10^{-8}	Pass
P-4-4A	4	3.8×10^{-8}	Pass

4.0 GEOMEMBRANE LINER INSTALLATION

This section of the report summarizes the construction activities associated with the installation and testing of the geomembrane liner. Geomembrane construction activities consisted of the installation and testing of 159,000 sq ft of smooth and textured 60-mil HDPE liner material. Installation of the geomembrane liner began on October 20, 2009, and was completed on October 26, 2009. Photos 5 through 8 in Appendix B present geomembrane installation activities.

4.1 Project Specifications

The project specifications required that a 60-mil smooth HDPE geomembrane liner be installed on the bottom of the disposal cell and 60-mil textured HDPE geomembrane liner be installed on the side slopes of the disposal cell. The geomembrane was to be installed as shown on the project drawings and in accordance with the project specifications.

4.2 Submittals

4.2.1 Geomembrane Installation Company Qualifications

In accordance with the project specifications, the geomembrane installation company, American Environmental Group (AEG), submitted their company's qualifications for review by FTN. This included the company's experience, representative projects, experience of the field superintendent and master seamer, installation procedures, and approval by the geomembrane manufacturer to install their materials. The information provided by AEG demonstrated their qualifications to perform the work and they were approved by FTN. A copy of AEG's submittal information is included as Appendix I.

4.2.2 Manufacturer's Quality Control Certificates

Manufacturer's quality control certificates (roll certification reports) were submitted by AEG for comparison of the materials to be installed with the project specifications. Copies of the manufacturer's (SKAPS Industries) certificates for the geomembrane material supplied for the

project are included as Appendix J, and an inventory of the geomembrane rolls sent to the project site are included as Appendix K. Based on the information supplied by AEG, the material was approved for shipment to the project.

4.2.3 Material Conformance Testing

After acceptance of the roll certification reports, conformance test samples of both the smooth and the textured geomembrane material were sent directly from the manufacturing facility to Golder Associates, Inc. laboratory in Atlanta, Georgia for compliance testing. A copy of the laboratory test results is included as Appendix L. Based on the conformance test results, the geomembrane materials were approved for installation.

4.3 Construction Procedures

4.3.1 Deployment of Geomembrane

Prior to installation of the geomembrane liner, the AEG field superintendent and the FTN CQA Monitor reviewed the clay liner surface. Any defects in the surface were repaired prior to installation and the subgrade was accepted by both parties. Copies of the subgrade acceptance forms are included as Appendix M.

Deployment of the geomembrane was accomplished using a front-end loader, a four-wheeler, and manual labor to transport each geomembrane panels into place. An FTN employee monitored and documented the deployment of the geomembrane panels. The panels were reviewed and any defects were noted for repair. All sheets were temporarily anchored with sandbags to prevent wind damage. The panels were seamed and then permanently anchored on the south and east sides of the disposal cell. The daily deployment logs for the geomembrane installation are included as Appendix N. Figure 7 is a panel layout of the disposal cell.

4.3.2 Trial Seam Testing

In accordance with the project specifications, the fusion and extrusion welder operators were required to do trial seams before the startup of each seaming period. Coupons were cut from the trial seam and were tested in the field on a gauged tensiometer to check for seaming

machine failures or operator errors. The trial seams were tested for peel and shear strength, and had to exhibit a film tear bond and meet the project requirements for strength to be deemed acceptable. If the trial seam met the peel and shear strength requirements, the operator was allowed to begin seaming. A summary of the trial seam logs are included in Appendix O.

4.3.3 Geomembrane Seaming

The principle method for joining the geomembrane panels was through the use of an automated double-track fusion welder. Extrusion welders were used for seaming patches, repairs, intersections of seams, and seam reconstruction.

An FTN employee monitored and documented the seaming activities. Duties included visual observation of the seaming process, visual examination of the completed seam, and verification and documentation that the seam was welded for its entire length. Any seaming imperfections were marked by the FTN CQA Monitor or the AEG field superintendent and were repaired in accordance with the project specifications. The geomembrane production seaming log, which includes information on the geomembrane panel, seam number, seam length, and welding information, is included as Appendix P.

4.4 Testing Procedures

4.4.1 Non-Destructive Seam Testing and Repairing

All seams, seam repairs, and patches were non-destructively tested for continuity by the installer using an air pressure test for fusion welds or vacuum box techniques for extrusion welds. An FTN employee monitored and documented all field testing of the geomembrane seams to insure that the tests were performed in accordance with the project specifications. The seaming continuity log is presented with the production seaming log included in as Appendix P.

The location, size, and testing results of all seam repairs, patches, and defects were documented by an FTN employee. The geomembrane tie-in between Cell 14 and Cell 13, and between Cell 14 and Cells 1, 2 and 3 were torn in numerous locations when the overburden soils were removed. Information on the repairs made to the liner is included on the geomembrane liner defect and repair log which is included as Appendix Q.

4.4.2 Destructive Seam Strength Testing

In accordance with the project specifications, destructive samples were obtained at a minimum frequency of one sample per 500 linear feet of completed seam. Each destructive sample was divided into three equal-sized sections: one for field testing, one for laboratory testing, and one to be archived. Prior to shipment of the laboratory samples to Golder Associates, Inc., the field test sample was tested by AEG on their tensiometer for peel and shear strength to determine the seam's conformance with the project specifications. Summaries of the field and laboratory destructive seam strength testing are included as Appendix R. Table 4.1 presents a summary of the destructive tests and results.

Table 4.1. Summary of destructive test results for geomembrane seams.

Sample Number	Seam Number	Material Type	Field Testing	Laboratory Testing
DS-1	P1/P2	S/S	Pass	Pass
DS-2	P4/P6	S/S	Pass	Pass
DS-3	P9/P11	S/S	Pass	Pass
DS-4	P12/P14	S/S	Pass	Pass
DS-5	P17/P18	S/S	Pass	Pass
DS-6	P20/P21	S/S	Pass	Pass
DS-7	P26/P27	S/S	Pass	Pass
DS-8	P35/P36	S/S	Pass	Pass
DS-9	P46/P47	S/S	Pass	Pass
DS-10	P9/P49	S/S	Pass	Pass
DS-11	P24/P55	S/S	Pass	Pass
DS-12	P59/P60	S/S	Pass	Pass
DS-13	P63/P64	S/S	Pass	Pass
DS-14	P51/P52	S/S	Pass	Pass

PXX = Panel number
S = Smooth geomembrane

5.0 LEACHATE COLLECTION SYSTEM INSTALLATION

5.1 Geocomposite Drainage Layer

5.1.1 Project Specifications

The project specifications required the installation of a double-sided geocomposite drainage layer to be placed over the smooth 60-mil HDPE geomembrane liner on the bottom of the waste cell. The geocomposite was to be conformance tested prior to installation.

5.1.2 Construction Procedures

AEG submitted quality control certificates of the geocomposite material to FTN for approval. In addition, samples of the geocomposite were shipped to Golder for conformance testing prior to shipment of the material to the site. Based on the quality control information and the laboratory results of the conformance testing, the material was approved for installation and was shipped to the project site. Copies of the quality control data are included as Appendix S, the geocomposite inventory list is included as Appendix T, and the conformance test results are included as Appendix U.

After the geomembrane was installed, tested, and approved, the geocomposite layer was installed on the bottom of the cell. Photo 9 in Appendix B presents the geocomposite layer installation.

5.2 Leachate Collection Trench and Sump

5.2.1 Project Specifications

The project specifications required the leachate collection trench to consist of a 6-inch diameter standard dimension ration (SDR) 17 HDPE perforated pipe to be placed in a washed gravel bed and wrapped in a 6 oz non-woven geotextile fabric. The perforated pipe was specified to have ½-inch diameter holes spaced on 6-inch centers. The washed gravel was specified to be approximately 1-1/2 inches diameter and less, with 95% passing the ¾-inch Standard Sieve and a maximum of 2% passing the No. 200 Standard Sieve.

On the northeast end of the disposal cell, a 6-inch diameter solid wall SDR 17 HDPE leachate collection cleanout riser pipe was to be connected to the perforated collection pipe. The cleanout riser pipe was specified to be installed into a concrete headwall to be constructed at the top of the waste cell slope.

An 18-inch diameter SDR 17 HDPE leachate pump riser pipe was specified to be installed on the eastern slope of the disposal cell and to rest in the base of the leachate collection sump. The lower 3 feet of the riser pipe were specified to be perforated with ½-inch diameter holes on 6-inch centers. The leachate pump riser pipe was to be installed into the concrete headwall along with the cleanout riser pipe.

5.2.2 Construction Procedures

Construction of the leachate collection trench was done the month of November 2009. The leachate collection trench was constructed in accordance with the project drawings and specifications. Initially, AEG placed the geotextile fabric in the base of the v-shaped trenches and the sump, and then placed approximately 6 inches of gravel on top of the geotextile in the trenches. The County then welded the leachate collection pipes together (including the solid wall cleanout pipes at the ends of the pipeline) and the County placed the pipe in the trench. The County then installed the 18-inch diameter HDPE riser pipe in the collection sump and then covered the collection pipe and sump with gravel up to the required depth. The geotextile was then wrapped over the top of the gravel.

Laboratory analysis results of the washed gravel are included in Appendix V. Conformance test results for the geotextile are included in Appendix W. Photos 10 through 14 in Appendix B present the construction of the leachate collection system.

5.3 Leachate Drainage and Protective Cover Layer

5.3.1 Project Specifications

The project specifications required a minimum of 12 inches of sand for the leachate drainage layer and a minimum of 12 inches of soil for the protective cover layer on the side slopes. The sand material was specified to be classified as a SW, SP, GW, or GP in accordance

with the USCS, and have a minimum of 95% passing the ¼-inch Standard Sieve and a maximum of 2% passing the No. 200 Standard Sieve. In addition, the sand was to have a maximum calcium carbonate content of 15% and a minimum permeability of 1×10^{-4} cm/s. The soil material for the protective cover layer was to be from onsite sources and free of debris, foreign objects, large rock fragments, roots, and organic material.

Placement of the leachate drainage and protective cover layers was specified to be done with low ground pressure equipment to minimize pressure on the underlying geosynthetic materials. Equipment was not supposed to be operated over the geosynthetic materials with less than 12 inches of sand or soil.

5.3.2 Construction Procedures

The leachate drainage and protective cover layers were installed in accordance with the project drawings and specifications. Installation of the leachate drainage layer was done from early November 2009 through mid-November 2009. The leachate drainage layer was started on the southwestern side of the landfill and worked to the northeastern side. The leachate collection trenches were completed after the landfill bottom had been covered. This allowed the County to haul gravel to the leachate collection trench and minimized pressure on the underlying geomembrane.

The protective cover layer (soil) was placed on the side slopes (north, south, and east sides of the disposal cell) to the required depth during November 2009.

Laboratory analysis results of the leachate drainage layer are included in Appendix X. Photo 15 in Appendix B presents the protective cover layer construction activities.

5.4 Leachate Pump System

5.4.1 Project Specifications

The specified leachate pump system for the Cell 14 disposal cell consisted of side-slope riser pump (EPG Companies, Inc. Model WSDPT 30-3, size 8) and associated materials, a pump control panel, and dual-contained HDPE leachate transmission piping.

The pump control panel system was specified to control the pump for Cell 14, display pumping rates and total flow, and have a red light alarm on the top of the panel. The transmission piping was specified to be 3-inch inner diameter SDR 17 HDPE pipe and 6-inch outer diameter SDR 26 HDPE pipe.

The pumping system and the transmission piping were to be tested upon completion of installation.

5.4.2 Construction Procedures

Installation of the leachate pumping system was performed in accordance with the project drawings and specifications. Mississippi County installed the dual-contained HDPE pipeline from the top of the eastern slope to the leachate storage tanks on the western side of the landfill. In accordance with the project specifications, the dual-contained pipeline was air tested for potential leaks and the pipeline met the project requirements.

Reich Company installed the EPG Companies pumping system during the week of December 7, 2009. The system was successfully tested on March 4, 2010, and performs as specified.

6.0 CONCLUSIONS

Construction of Cell 14 of the Mississippi County Class 1 Landfill began in August 2009 and was substantially complete in December 2009. Cell 14 was constructed according to the project specifications, the facility CQA Plan, and Arkansas Regulation 22. Required field and laboratory testing was performed and successfully completed as detailed in this report. Elevations of respective components of the cell liner system were within the project specifications as indicated on the Record Drawings.

The Professional Engineering certification for the construction of Cell 14 of the landfill is included in Section 7.0 of this report.

7.0 PROFESSIONAL ENGINEERING CERTIFICATION

"I certify that, to the best of my professional engineering judgment, Cell 14 of the Mississippi County Class 1 Landfill (Permit No. 0136-S1-R3) was constructed in accordance with the project plans and specifications, the facility permit documents, and Arkansas Regulation 22. This CQA Report has been prepared based upon my (or my designated representative) observations of construction and the constructed facility, survey data provided by Harmon Surveying, Inc., and materials testing data provided by Anderson Engineering Consultants, Inc. and Golder Associates, Inc. This certification is contingent on the fact that all information supplied, up to the date of this certification, is unquestionably accurate and was provided in good faith."

Jason J. Ghidotti, PE
Arkansas PE License #10031

05-04-10
Date

APPENDIX A

Figures

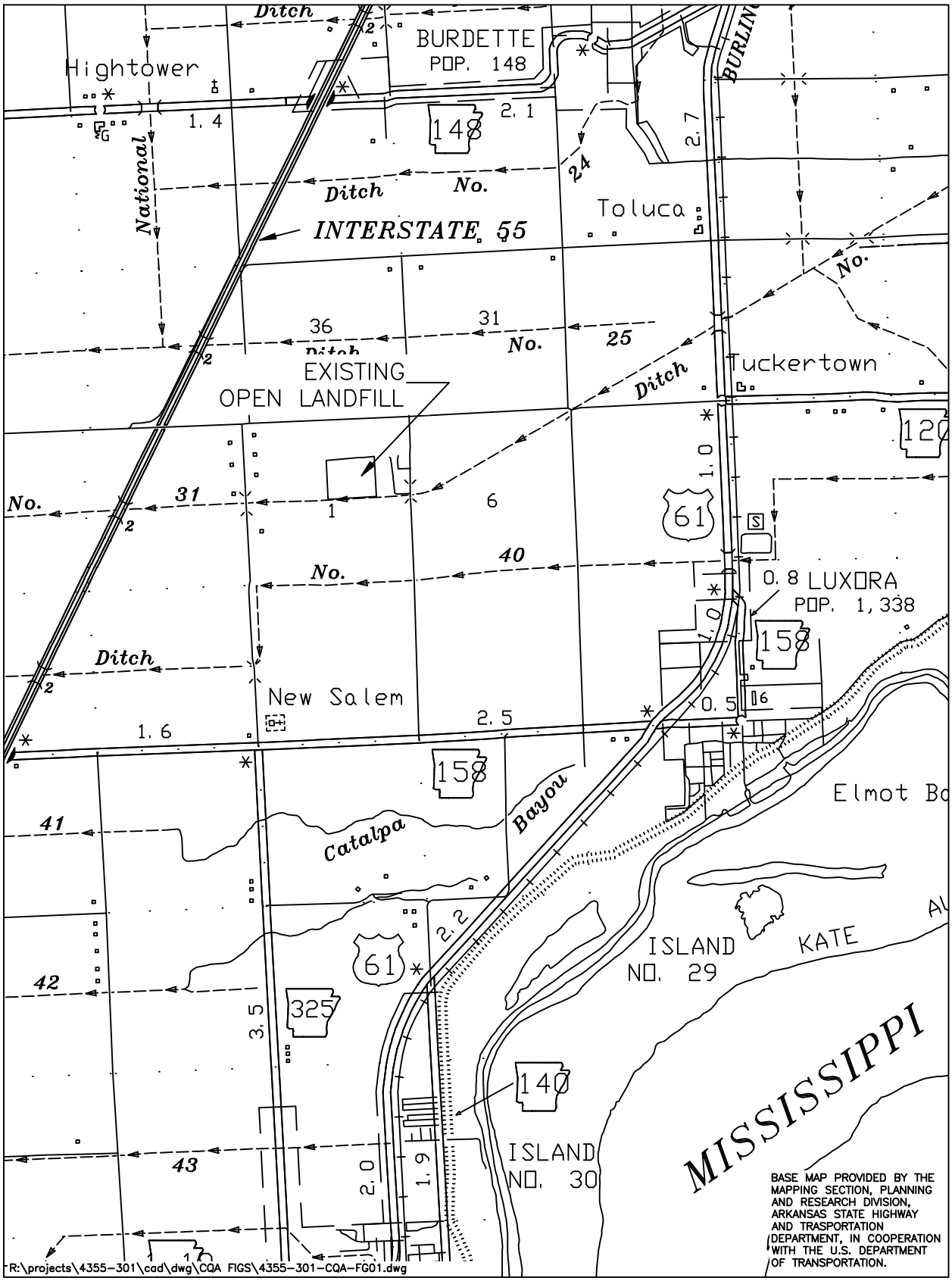
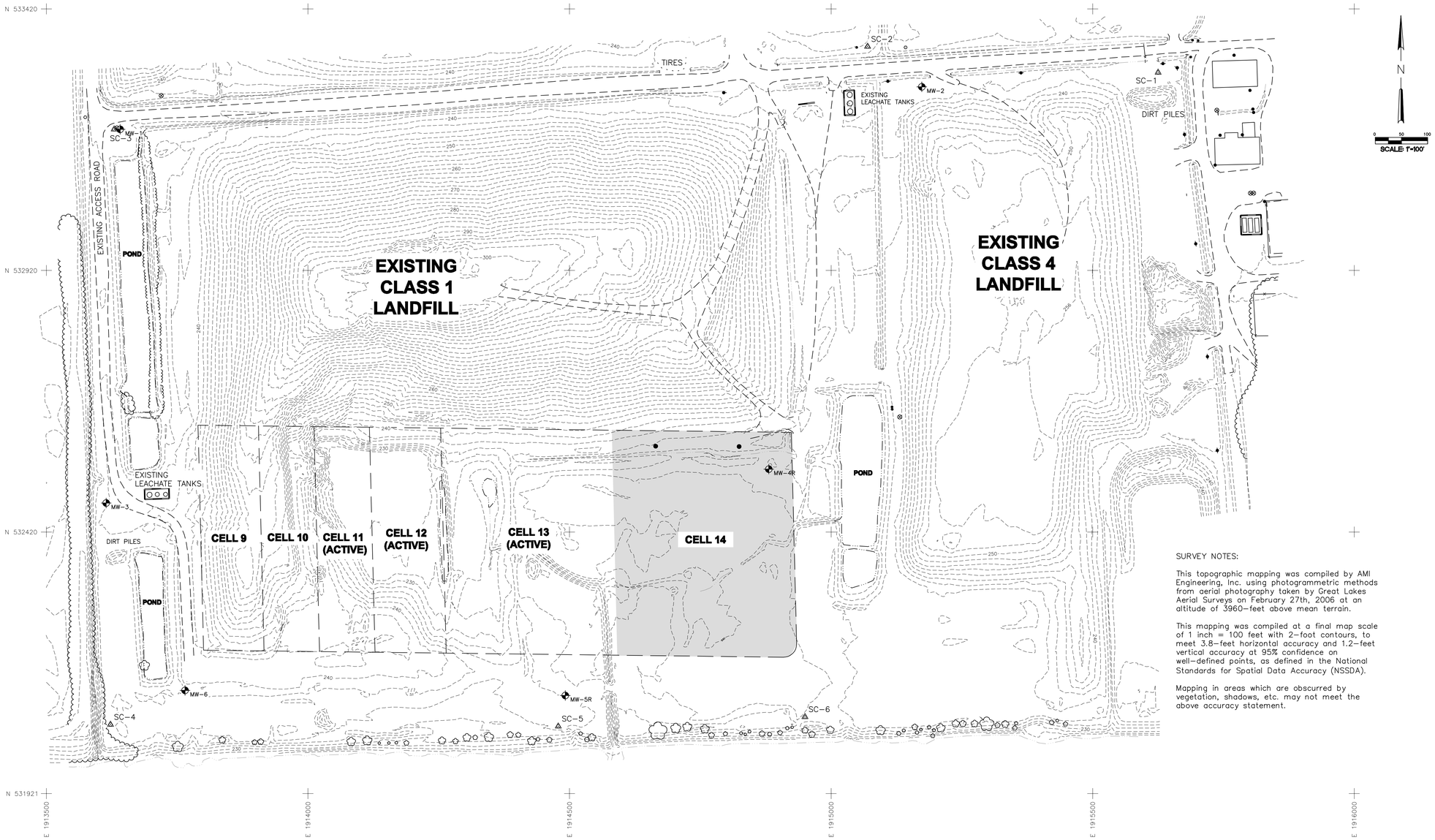


Figure 1. Site Location Map



SURVEY NOTES:

This topographic mapping was compiled by AMI Engineering, Inc. using photogrammetric methods from aerial photography taken by Great Lakes Aerial Surveys on February 27th, 2006 at an altitude of 3960-feet above mean terrain.

This mapping was compiled at a final map scale of 1 inch = 100 feet with 2-foot contours, to meet 3.8-feet horizontal accuracy and 1.2-feet vertical accuracy at 95% confidence on well-defined points, as defined in the National Standards for Spatial Data Accuracy (NSSDA).

Mapping in areas which are obscurred by vegetation, shadows, etc. may not meet the above accuracy statement.

SURVEY INFORMATION

NO.	NORTHING	EASTING	ELEVATION
SC-1	533298.50	1915625.05	236.04
SC-2	533348.02	1915069.74	235.70
SC-3	533190.95	1913629.78	235.04
SC-4	532051.87	1913622.44	237.22
SC-5	532048.56	1914478.35	236.50
SC-6	532066.50	1914950.00	232.84

LEGEND

- EXISTING INTERMEDIATE CONTOURS
- 240 EXISTING INDEX CONTOURS
- EXISTING ACCESS ROAD
- EXISTING TREELINE
- EXISTING TREE
- SC-1 EXISTING SURVEY CONTROL MONUMENT
- MW-1 EXISTING MONITORING WELL
- WASTE CELL BOUNDARY

FTN Associates, Ltd. water resources / environmental consultants

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 10031 JASON J. GHIDOTTI 04-30-10

CERTIFICATE OF AUTHORIZATION FTN Associates, Ltd. No. 63 ARKANSAS ENGINEER

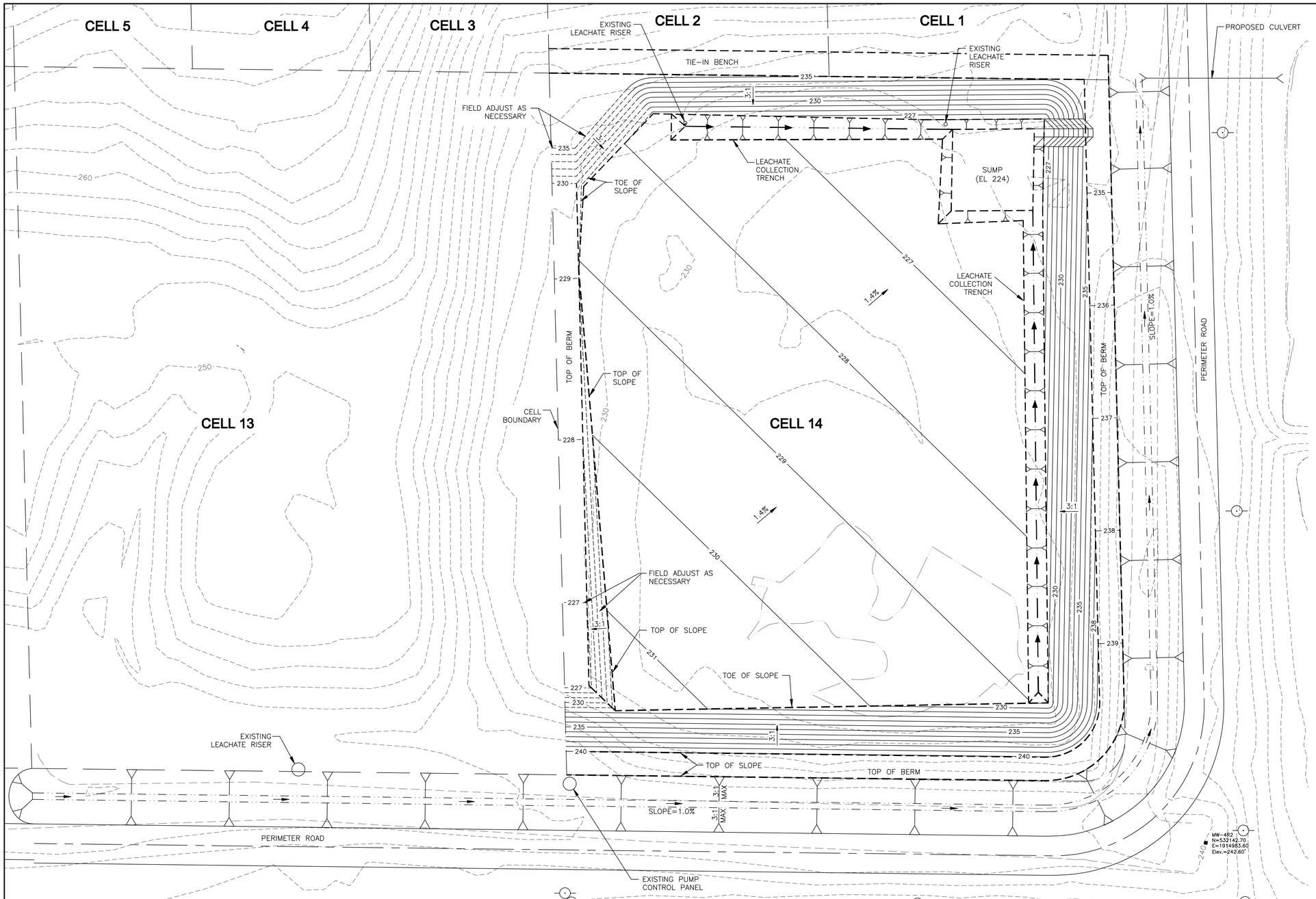
MISSISSIPPI COUNTY CLASS 1 LANDFILL
CELL 14 CONSTRUCTION CQA REPORT

LUXORA, ARKANSAS

FIGURE 2
EXISTING CONDITIONS

DRAWN BY: WLB	FILE NAME: CQA-FG02.DWG
APPROVED: PWC	PROJECT NO. 4355-301
SCALE: 1" = 100'	DATE: 1/13/10
SHEET NO. 1 OF 1	

R:\CAD\CAD_PROJ\4355-301\DWG\CQA FIGS\4355-301-CQA-FG02.DWG



NOTES:

1. ELEVATIONS SHOWN IN CONSTRUCTION AREA ARE TOP OF COMPACTED CLAY AND GEOMEMBRANE LINER SYSTEM.

FTN ASSOCIATES, LTD.
water resources environmental consultants

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 10031
JASON J. GHIDOTTI
04-30-10

CERTIFICATE OF AUTHORIZATION
FTN Associates, Ltd.
No. 63
ARKANSAS - ENGINEER

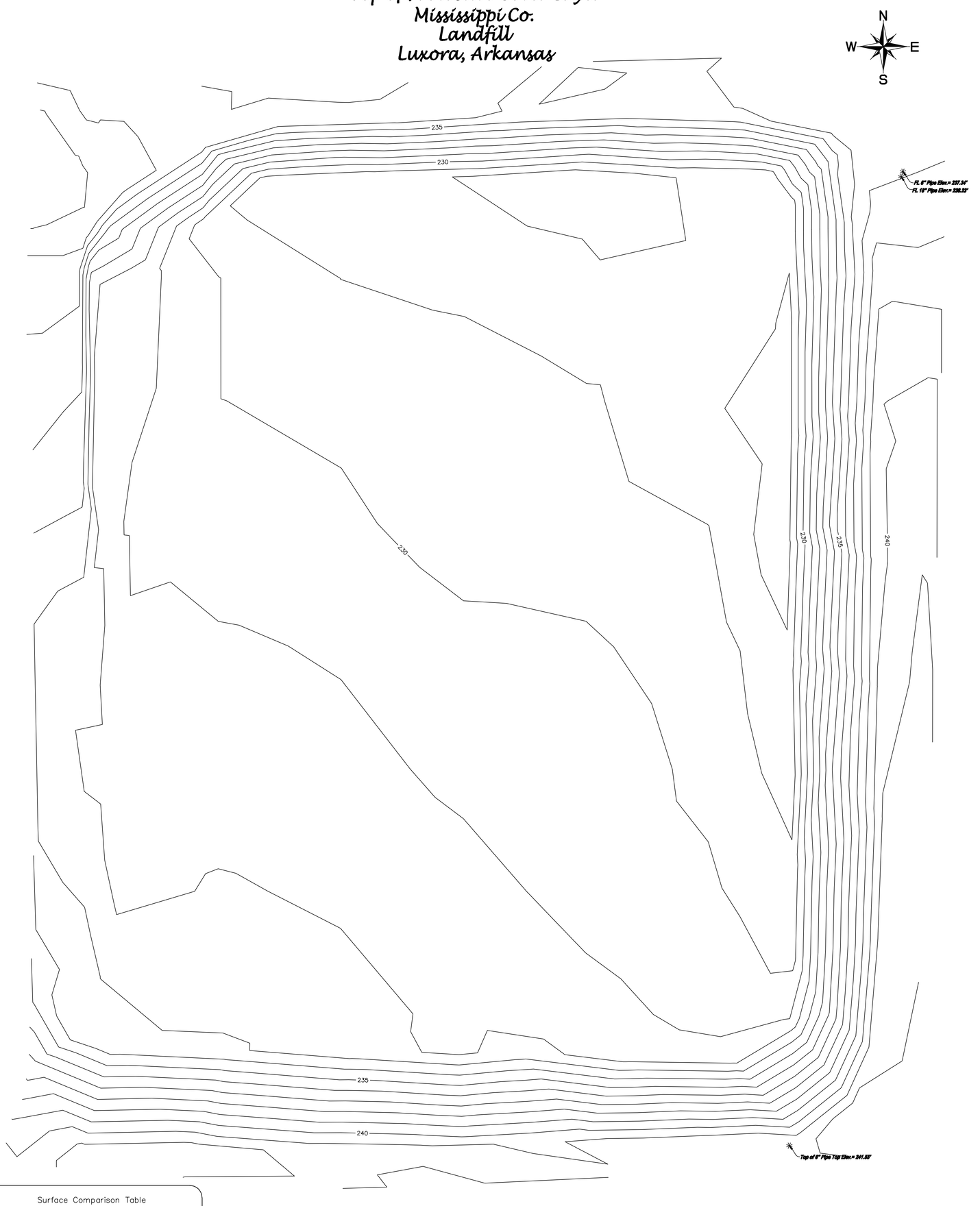
MISSISSIPPI COUNTY CLASS 1 LANDFILL
CELL 14 CONSTRUCTION CQA REPORT
LUXORA, ARKANSAS

FIGURE 3
CONSTRUCTION PLAN

DRAWN BY: WAB	FILE NAME: CQA-FG03.DWG
APPROVED: JJG	PROJECT NO. 4355-301
SCALE: 1"=30'	DATE: 1/12/10
SHEET NO. 1 OF 1	

R:\PROJECTS\4355-301\CAD\DWG\CQA FIGS\4355-301-CQA-FG03.DWG

Top of Protective Cover Layer
Mississippi Co.
Landfill
Luxora, Arkansas



Surface Comparison Table

Pt. No.	Northing	Easting	Sub.	Top of Clay	Prot. Cover
301	532198.46	1914650.70	236.49	238.56	240.97
302	532198.38	1914700.70	235.66	237.88	240.35
303	532198.30	1914750.70	235.79	237.96	239.96
304	532198.22	1914800.70	235.79	237.83	240.76
305	532198.14	1914850.70	235.72	237.86	241.19
306	532198.06	1914900.70	237.10	239.12	242.32
308	532248.46	1914650.78	229.04	230.95	232.83
309	532248.38	1914700.78	228.67	230.81	232.39
310	532248.30	1914750.78	228.02	230.00	231.74
311	532248.22	1914800.78	227.92	229.90	231.34
312	532248.14	1914850.78	227.06	229.25	230.72
313	532248.06	1914900.78	231.01	233.06	235.21
315	532298.46	1914650.86	228.57	230.61	232.11
316	532298.38	1914700.86	228.04	230.11	231.83
317	532298.30	1914750.86	227.81	229.75	231.37
318	532298.22	1914800.86	227.44	229.49	230.66
319	532298.14	1914850.86	226.51	228.65	230.16
320	532298.06	1914900.86	229.77	232.08	234.58
322	532348.46	1914650.94	228.11	230.02	231.49
323	532348.38	1914700.94	227.53	229.63	231.33
324	532348.30	1914750.94	227.13	229.12	230.75
325	532348.22	1914800.94	226.63	228.72	230.55
326	532348.14	1914850.94	225.56	227.97	229.77
327	532348.06	1914900.94	229.99	232.18	234.91
329	532398.46	1914651.02	227.52	229.68	231.16
330	532398.38	1914701.02	227.10	229.08	230.88
331	532398.30	1914751.02	226.60	228.58	230.29
332	532398.22	1914801.02	226.13	228.05	230.14
333	532398.14	1914851.02	225.32	227.45	229.52
334	532398.06	1914901.02	230.32	232.35	234.18
336	532448.46	1914651.10	226.63	228.88	230.35
337	532448.38	1914701.10	226.14	228.30	230.21
338	532448.30	1914751.10	225.70	227.76	229.51
339	532448.22	1914801.10	225.61	227.65	229.47
340	532448.14	1914851.10	224.94	227.08	228.99
341	532448.06	1914901.10	230.35	232.41	234.30
343	532498.46	1914651.18	226.34	228.43	230.02
344	532498.38	1914701.18	225.82	227.75	229.75
345	532498.30	1914751.18	225.48	227.56	229.59
346	532498.22	1914801.18	225.08	226.99	229.15
347	532498.14	1914851.18	224.46	226.45	228.12
348	532498.06	1914901.18	229.94	231.86	233.93
350	532548.46	1914651.26	225.97	228.32	230.02
351	532548.38	1914701.26	225.30	227.20	228.99
352	532548.30	1914751.26	224.66	226.75	228.74
353	532548.22	1914801.26	224.44	226.43	228.11
354	532548.14	1914851.26	221.70	223.74	228.30
355	532548.06	1914901.26	229.44	231.91	233.43
356	532598.46	1914651.34	228.47	230.71	233.80
357	532598.38	1914701.34	227.47	229.52	231.22
358	532598.30	1914751.34	225.91	228.56	230.68
359	532598.22	1914801.34	225.30	227.95	229.72
360	532598.14	1914851.34	225.18	227.91	230.34
361	532598.06	1914901.34	230.47	232.62	234.59

Certification:
I hereby certify this drawing represents work completed in the field by me or under my supervision, the information shown on this drawing is true and correct to the best of my knowledge.

03-25-09
Justin Dodd Harmon AR P.L.S. #1356 Date

This survey conforms with state regulatory authority tolerance on horizontal and vertical accuracy and was completed using a Trimble 5603, Robotic Total Station based on site monumentation.

HARMON SURVEYING, INC. CERTIFICATE OF AUTHORIZATION ARKANSAS SURVEYOR No. 1449

REGISTERED STATE OF ARKANSAS No. 1356 SIGNATURE JUSTIN D. HARMON PROFESSIONAL LAND SURVEYOR

10' 0' 20' 40'

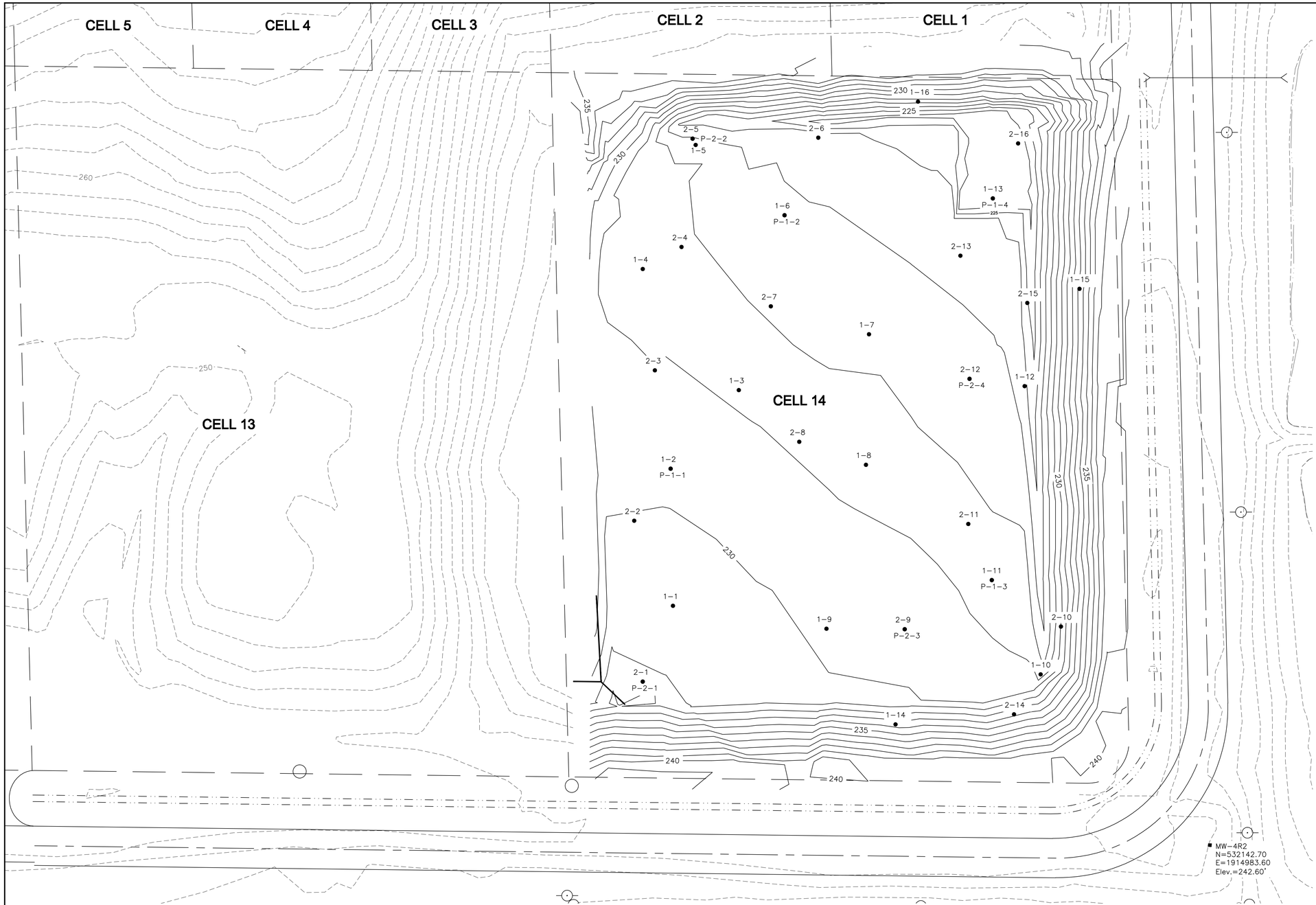
FOR USE AND BENEFIT OF: FTN Associates LTD.

Drawn By: D. Harmon
Checked By: D. Harmon
SCALE: 1"= 20'
DATE: 11/20/09

HARMON SURVEYING, INC.
P.O. Box 691
Conway, AR 72033
Phone: (501) 730-1518
Fax: (501) 730-0637

HARMON SURVEYING INCORPORATED

FIGURE 4



LEGEND

- EXISTING SUBGRADE INTER. CONTOURS (1')
- 250 EXISTING SUBGRADE INDEX CONTOURS (5')
- EXISTING POWER POLE
- EXISTING WATER
- EXISTING CULVERT
- PROPOSED DITCH
- CELL BOUNDARY
- 1–6 LIFT 1 MOISTURE/DENSITY TEST LOCATION
- P–1–4 LIFT 1 PERMEABILITY TEST LOCATION
- 2–6 LIFT 2 MOISTURE/DENSITY TEST LOCATION
- P–2–4 LIFT 2 PERMEABILITY TEST LOCATION
- 250 CONSTRUCTED TOP OF CLAY (5')
- CONSTRUCTED TOP OF CLAY (1')

NOTES:

1. REFER TO CQA REPORT FOR INFORMATION ON SOIL TEST RESULTS.
2. TEST LOCATIONS ARE APPROXIMATE.

FTN ASSOCIATES, LTD. water resources / environmental consultants

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 10031 JASON J. GHIDOTTI

04-30-10

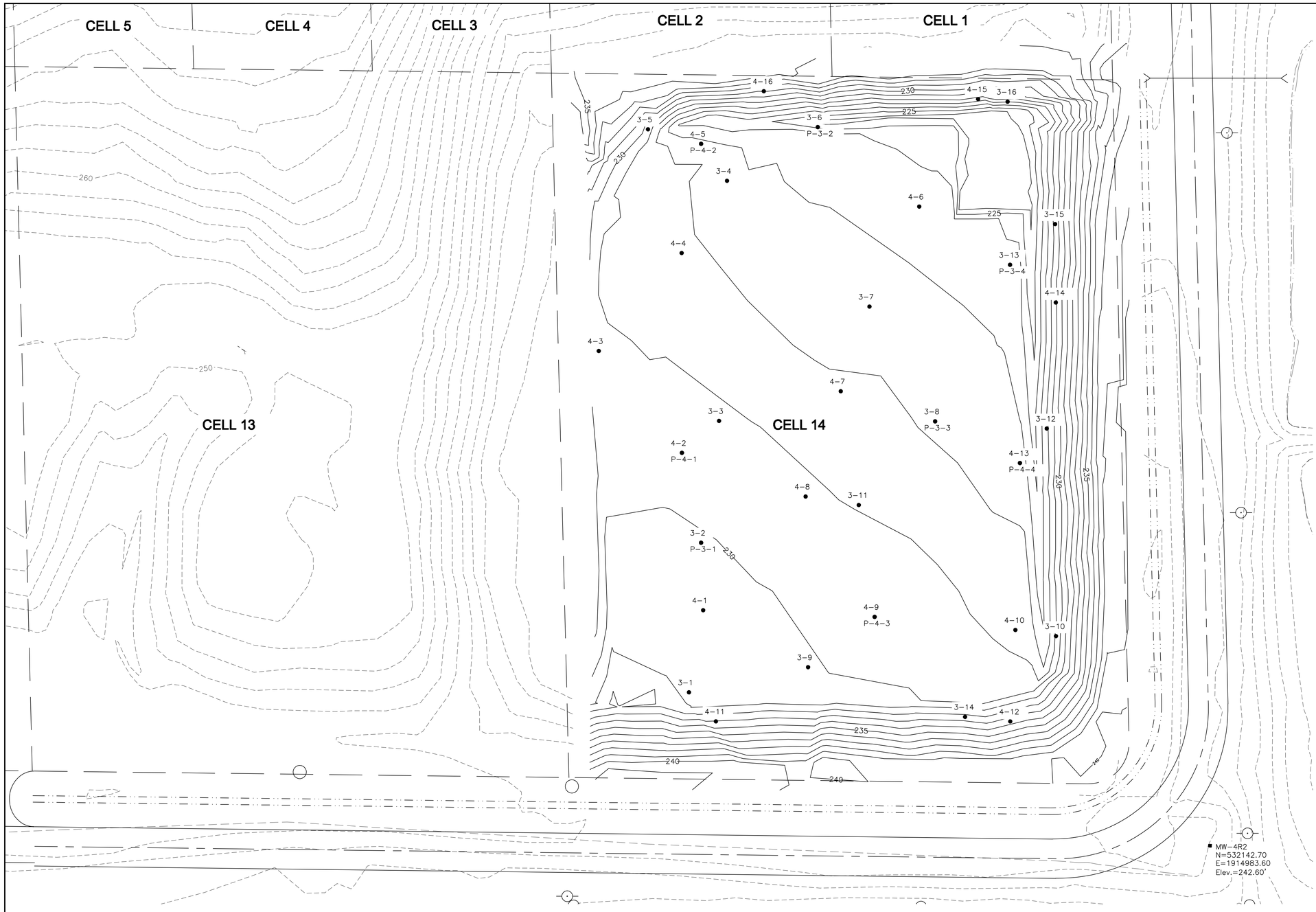
CERTIFICATE OF AUTHORIZATION NO. FTN Associates, Ltd. No. 63 ARKANSAS - ENGINEER

MISSISSIPPI COUNTY CLASS 1 LANDFILL
CELL 14 CONSTRUCTION CQA REPORT
LUXORA, ARKANSAS

FIGURE 5
CLAY LINER LIFTS 1 & 2 TESTING LOCATIONS

DRAWN BY: WAB	FILE NAME: CQA-FG05.DWG
APPROVED: JJG	PROJECT NO. 4355-301
SCALE: 1"=30'	DATE: 1/12/10
SHEET NO. 1 OF 1	

R:\PROJECTS\4355-301\CAD\DWG\CQA FIGS\4355-301-CQA-FG05.DWG



LEGEND

- EXISTING SUBGRADE INTER. CONTOURS (1')
- EXISTING SUBGRADE INDEX CONTOURS (5')
- EXISTING POWER POLE
- EXISTING WATER
- EXISTING CULVERT
- PROPOSED DITCH
- CELL BOUNDARY
- 3-6 LIFT 3 MOISTURE/DENSITY TEST LOCATION
- P-3-4 LIFT 3 PERMEABILITY TEST LOCATION
- 4-6 LIFT 4 MOISTURE/DENSITY TEST LOCATION
- P-4-4 LIFT 4 PERMEABILITY TEST LOCATION
- 250 CONSTRUCTED TOP OF CLAY (5')
- CONSTRUCTED TOP OF CLAY (1')

NOTES:

1. REFER TO CQA REPORT FOR INFORMATION ON SOIL TEST RESULTS.
2. TEST LOCATIONS ARE APPROXIMATE.

FTN ASSOCIATES, LTD. water resources/environmental consultants

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No. 10031 JASON J. GHIDOTTI

04-30-10

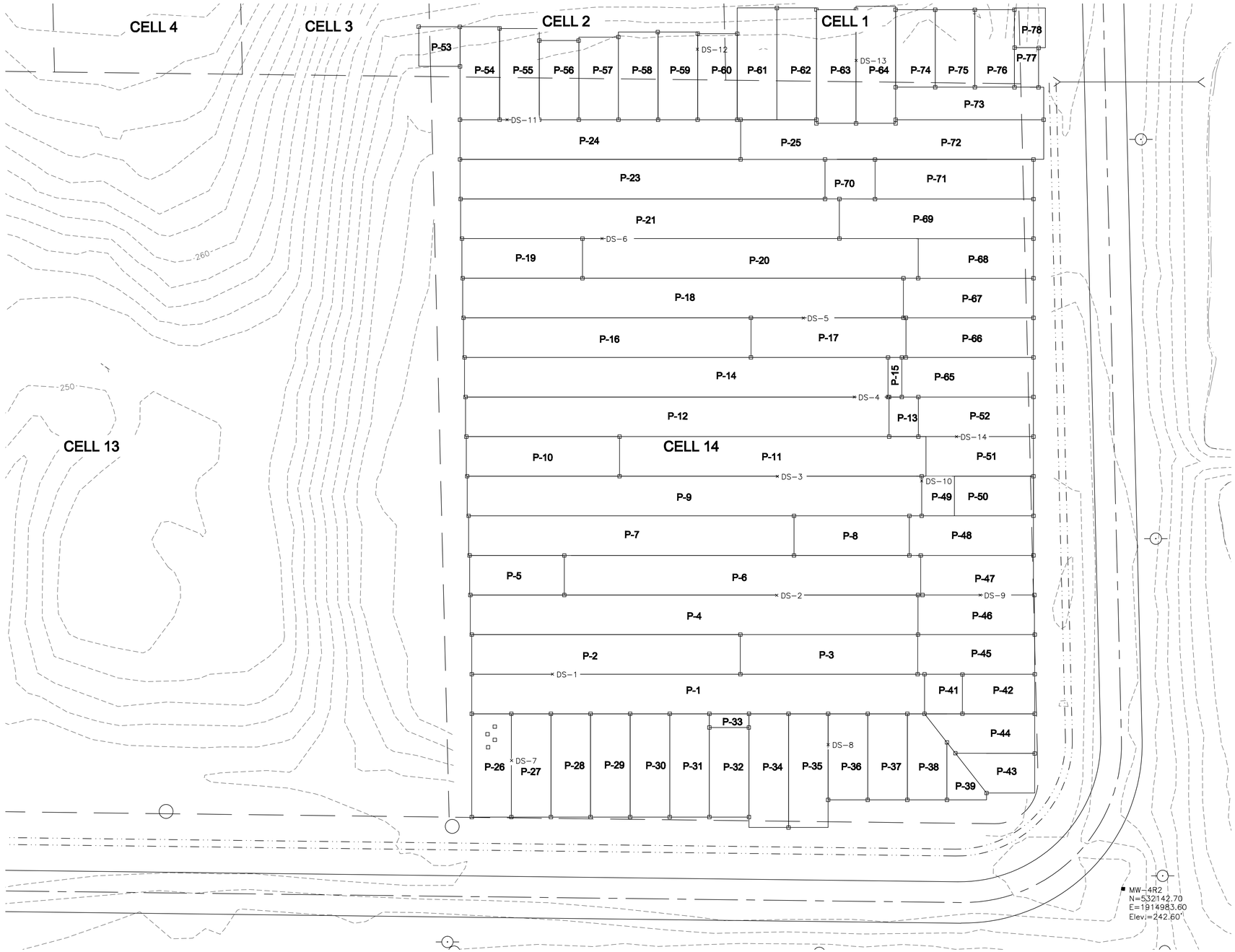
CERTIFICATE OF AUTHORIZATION FTN Associates, Ltd. No. 63 ARKANSAS - ENGINEER

MISSISSIPPI COUNTY CLASS 1 LANDFILL
CELL 14 CONSTRUCTION CQA REPORT
LUXORA, ARKANSAS

FIGURE 6
CLAY LINER LIFTS 3 & 4 TESTING LOCATIONS

DRAWN BY: WAS	FILE NAME: CQA-FG06.DWG
APPROVED: PWC	PROJECT NO. 4355-301
SCALE: 1"=30'	DATE: 1/12/10
SHEET NO. 1 OF 1	

R:\PROJECTS\4355-301\CAD\DWG\CQA FIGS\4355-301-CQA-FG06.DWG



N

0 15 30
SCALE: 1"=30'

LEGEND

- EXISTING INTER. CONTOURS (1')
- 250 EXISTING INDEX CONTOURS (5')
- EXISTING POWER POLE
- EXISTING WATER
- EXISTING CULVERT
- PROPOSED DITCH
- GEOMEMBRANE WELDED SEAM
- REPAIR LOCATION
- ×DS-6 DESTRUCT NUMBER AND LOCATION
- P-25 GEOMEMBRANE PANEL NUMBER
- CELL BOUNDARY

FTN ASSOCIATES, LTD. water resources | environmental consultants

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 10031
JASON J. GHIDOTTI
04-30-10

CERTIFICATE OF AUTHORIZATION NO.
FTN Associates, Ltd.
No. 63
ARKANSAS - ENGINEER

MISSISSIPPI COUNTY CLASS 1 LANDFILL
CELL 14 CONSTRUCTION CQA REPORT
LUXORA, ARKANSAS

FIGURE 7
GEOMEMBRANE PANEL LAYOUT AND DESTRUCT/REPAIR TEST LOCATIONS

DRAWN BY: WAB	FILE NAME: CQA-FG07.DWG
APPROVED: PWC	PROJECT NO. 4355-301
SCALE: 1"=30'	DATE: 1/12/10
SHEET NO. 1 OF 1	

R:\PROJECTS\4355-301\CAD\DWG\CQA FIGS\4355-301-CQAFG07.DWG

APPENDIX B

Photographic Log

Photo 1. Looking south: subgrade preparation.

Photo 2. Looking north: pulling back Cell 13 geomembrane for tie-in to Cell 14.

Photo 3. Looking north: clay liner installation.

Photo 4. Looking north: clay liner installation in the leachate collection trench.

Photo 5. Looking west: installation of smooth geomembrane.

Photo 6. Fusion seaming on the geomembrane liner.

Photo 7. Looking southwest: completed geomembrane layout.

Photo 8. Looking northeast: geomembrane tie-in of Cell 13 with Cell 14.

Photo 9. Looking west: installation of geotextile.

Photo 10. Looking west: installation of leachate drainage layer.

Photo 11. Looking south: installation of leachate drainage layer.

Photo 12. Looking north: installation of leachate collection pipe.

Photo 13. Installation of gravel on top of leachate collection trench.

Photo 14. Installation of leachate collection riser pipe.

Photo 15. Looking west: installation of the protective cover layer.

APPENDIX C

Daily Field Logs

PROJECT DAILY FIELD REPORT

Date 08/18/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.0in.	Work Day #	1

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	2					Excavator	**1**
County Employees	Various					Dozer	**2**
Surveyor						Water Truck	**0**
Liner Crew & Superv.						Compactor	**0**
Truck Drivers						Tractor and Disk	**0**
						Grader	**0**
						Tri-Axle Dump	**0**
						Tractor and Pan/s	**2**
						Other	

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**72º**		**x**		**x**			
Weather	pm	**90º**			**x**		**x**		

Time	
0700	Arrived on site and checked in at office with Billy and Gary.
0730	Mann is preparing to start moving soils per Billy's direction.
0810	I have walked site and there is a need for additional survey staking in cell floor and other areas.
0930	I have called Harmon Survey and requested staking. Surveyor will be on site tomorrow morning.
1000	Filling in a sump in the South East corner of cell floor that was used to collect storm water.
	Pans are bringing clay from borrow area to fill the sump excavation. Compacting with loaded pans.
1030	Excavator working in Northwest corner of cell floor excavating to uncover old liner and to remove excess
	overburden.
1300	Using spoils from trackhoe to build the bench along the north side for the tie-in at old liner.
1520	Purchased three bags of bentonite chips from Tristate Testing out of Memphis and the dropped the bentonite
	off in Osceola.
1600	Pans continue to move soil for north bench. Awaiting surveyor to stake bottom tomorrow morning to utilize
	pans fully.
1645	Off site for today to purchase project supplies. There is lightning and thunder in the area.

PROJECT DAILY FIELD REPORT

Date 08/19/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.0in.	Work Day #	2

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	2					Excavator	**1**
County Employees	Various					Dozer	**2**
Surveyor						Water Truck	**0**
Liner Crew & Superv.						Compactor	**0**
Truck Drivers						Tractor and Disk	**0**
						Grader	**0**
						Tri-Axle Dump	**0**
						Tractor and Pan/s	**2**
						Other	

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**73º**		**x**		**x**			
Weather	pm	**87º**			**x**		**x**		

Time	
0700	On site and Mann is preparing to start moving clay. Met with Billy and Gary at office to discuss todays work.
0800	Tractors and pans continue to move clay from North end of cell floor to the South end. Waiting on surveyor.
0915	Billy has excavator and city pans hauling wet blue clay out to replace with good clay all along toe of
	South slope.
1025	Surveyor on site and setting up.
1045	We have discussed our need for construction staking with Alex with Harmon Surveying. Survey in progress.
	Survey in Progress
	I contacted Anderson Engineers in Joneboro and requested of them to furnish density and moisture testing
	technicians and test equipment as required.
1700	Construction staking complete and surveyor is off site.

PROJECT DAILY FIELD REPORT

Date 08/20/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	3

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	0					Excavator	**1**
County Employees	Various					Dozer	**2**
Surveyor						Water Truck	**0**
Liner Crew & Superv.						Compactor	**0**
Truck Drivers						Tractor and Disk	**0**
						Grader	**0**
						Tri-Axle Dump	**0**
						Tractor and Pan/s	**2**
						Other	

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**70º**			**X**	**X**			
Weather	pm	**84º**		**X**			**X**		

Time	
	RAINED OUT TODAY
	Note: City employees will begin drying up the cell floor in the afternoon.
1000	Returning to Little Rock

PROJECT DAILY FIELD REPORT

Date 08/21/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	4

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	0					Excavator	**1**
County Employees	Various					Dozer	**2**
Surveyor						Water Truck	**0**
Liner Crew & Superv.						Compactor	**0**
Truck Drivers						Tractor and Disk	**0**
						Grader	**0**
						Tri-Axle Dump	**0**
						Tractor and Pan/s	**2**
						Other	

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**72º**		**X**		**X**			
Weather	pm	**84º**		**X**			**X**		

Time	
	RAINED OUT TODAY
	Note: In contact with project via telephone. City employees continue to mop up wet areas of cell floor

PROJECT DAILY FIELD REPORT

Date 08/22/09 Saturday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	5

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	2					Excavator	**1**
County Employees	Various					Dozer	**2**
Surveyor						Water Truck	**0**
Liner Crew & Superv.						Compactor	**0**
Truck Drivers						Tractor and Disk	**0**
						Grader	**0**
						Tri-Axle Dump	**0**
						Tractor and Pan/s	**2**
						Other	

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	º							
Weather	pm	º							

Time	
Note:	Mann will run both sets of pans today to grade cell floor for subgrade verification
	and city employees will assist as required. FTN will not be on site today but will be in standing by to
	assist with any questions or concerns.

PROJECT DAILY FIELD REPORT

Date 08/24/09 Monday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	6

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Grader	**0**
Tri-Axle Dump	**0**
Tractor and Pan/s	**2**
Other	

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**66º**			**X**			**X**	
Weather	pm	**85º**		**X**			**X**		

Time	
0515	Departed Little Rock for Landfill.
0710	Arrived on site and Mann is running pan on cell floor to compact and grade. Pans will be moving cover
	material to working face of landfill while county employees complete various tasks to complete this
	phase of cell 14 construction.
0745	Excavator operator and employees are installing smooth bucket to begin removing spoils at tie-in of cells
	on the North side.
0800	Small dozer grading berm on South and East sides.
0830	Billy has opted to relocate North leachate extraction ditch and has pans excavating material.
1200	Work continues as described above
1700	City employees to remain late to clean tie-in area on North end of cell.

PROJECT DAILY FIELD REPORT

Date 08/25/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	7

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Grader	**0**
Tri-Axle Dump	**0**
Tractor and Pan/s	**2**
Other	

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**66º**			**X**			**X**	
Weather	pm	**86º**		**X**			**X**		

Time	
0700	Arrived on site and pans are hauling daily cover soil to working face of landfill.
0800	Excavator and crew are in corner of cell and junction of various cells digging garbage and soils to locate
	tie-in of the cells.
	A small quantity of clear water has seeped into trench at North toe and city employees are pumping the
	water. Pan tractor will place clay material after it is discovered that trench needs filled to get back up to
	subgrade elevations. The seep will be eliminated with the clay plug and compaction by tractor and
	loaded pan.
1000	The city team has located the old liner junction at cells 2, 3, & 13. Removing additional spoils to make the work
	area safe for people to be in the area to work.
1100	Trackhoe and crew moving to South berm to begin excavation of overburder on old liner in cell 13 for
	the tie-in of HDPE liners.
1400	Contacted Harmon Survey and resheduled subgrade certification to Thursday morning.
1700	Trackhoe and crew continue to expose old liner in cell 13.

PROJECT DAILY FIELD REPORT

Date 08/26/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	8

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**2**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Grader	**0**
Tri-Axle Dump	**0**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**1**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**66º**		**x**					
Weather	pm	**88º**		**x**			**x**		

Time	
0645	Arrived on site and pans are hauling daily cover soil to working face of landfill.
0730	Excavator and groundman are removing soil and plywood between cells 13 and 14 for tie-in of liners.
	Trackloader is removing soil, and stockpiling material, along North toe and sump area. The existing
	8" PVC pipes from other cells prohibit using tractors and pans.
0830	One set of pans continue to construct the leachate trench on North side of cell.
1130	small dozer working on the North berm cutting the 3:1 slope and bench.
1300	Work continues in the same areas.
1400	Crew is laying old HDPE liner back to expose tie-in area along East side of cell 13.
1445	Rescheduled certification survey for Friday morning as city has several loose ends to complete prior to.
1540	Liner is pulled back and crew is moving to North end to begin laying that old liner material back.
1630	Old liner at South end of cells 1 and 2 has been rolled back and stakes placed to hold it in place.
	Work Day Over

PROJECT DAILY FIELD REPORT

Date 08/27/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	9

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**2**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**1**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**72º**			**x**				
Weather	pm	**88º**		**x**					

Time	
0700	Arrived on site and pans are hauling cover soil to working face of landfill.
0720	Walking with Billy and Gary along North berm discussing todays needs to get slope prepared for
	certification survey. Dozers will work on leachate ditch and tie-in of soils on North bench,
0800	Water wagon and compactor will be working on cell floor after pans have regraded cell floor.
0810	Mann has removed frost bite from one pan and he will regrade cell floor.
	Excavator is removing soil as needed in various areas.
1200	Work continues as described above.
1310	Billy is laying out sump and leachate extraction riser up the East berm. Equipment will excavate this for
	subgrade survey. Will need to excavate extraction riser up South slope prior to survey.
1400	Survey has been rescheduled for Friday and density tests are scheduled also.
1550	Compactor and water wagon continue to hydrate and roll cell floor.

PROJECT DAILY FIELD REPORT

Date 08/28/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	10

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor	1				
Liner Crew & Superv.					
Truck Drivers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**2**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**1**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**73º**			**x**				
Weather	pm	**90º**		**x**					

Time	
0700	Arrived on site and met with Billy and Gary and discussed todays activities.
0830	Harmon Survey on site and setting up equipment.
0900	Called Andersons in Jonesboro and requested tech. For 1200 hours today.
0945	Cell floor has a high area and I called PWC to discuss this. The pans will have to come back to cell and
	cut high stations and other as directed by surveyor.
1000	Working with surveyor in various locations to achieve as-bilt survey stations along West side of cell 14.
1130	Pans are still cutting the cell floor and Alex checks progress as time permits.
1210	Pans have cell floor graded and survey is completed on floor. Anderson is on site and we will begin
	density and moisture testing on cell floor and berms.
1330	Anderson is done and density tests went well with no failures noted.
1400	Some rework is required in the NW corner of cell near tie-in area of the various cells.
1515	Subgrade survey is complete and Alex is breaking down his equipment.
1530	Water tank is watering leachate trench and cell floor near the East leachate trench. Pans are standing
	by to bring clay from borrow area in to fill trenches and sump.

PROJECT DAILY FIELD REPORT

Date 08/29/09 Saturday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	11

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**2**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**65º**			**x**				
Weather	pm	**84º**		**x**					

Time	
0700	Arrived on site and pans are working in the borrow area while the county crew is servicing equipment
	and filling the water wagon.
0800	Work continues filling the leachate tenches and sump to bring them up to grade with cell floor.
1330.	This work will consume the entire day.

PROJECT DAILY FIELD REPORT

Date 08/31/09 Monday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	12

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	2					Excavator	**1**
County Employees	Various					Dozer	**2**
Surveyor						Water Truck	**0**
Liner Crew & Superv.						Compactor	**0**
Truck Drivers						Tractor and Disk	**0**
						Tractor and Water Tnk	**1**
						Tractor & Compactor	**1**
						Tractor and Pan/s	**2**
						Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**62º**			**x**				
Weather	pm	**84º**		**x**					

Time	
0700	Arrived on site and pans are working in the borrow area while the county crew is servicing equipment
	and filling the water wagon.
0800	Pans are bringing clay liner to cell to begin lift 1. The city has scarified and watedr the subgrade to get
	ahead of the dirt pans.
	Watering subgrade and clay liner as the pans place the material across the cell floor.
1400	The work continues but there is a problem with lift depths and blending is not going as needed. I will
	discuss the problems with Billy Buck. Andersons have been cancelled and rescheduled for tomorrow.

PROJECT DAILY FIELD REPORT

Date 09/01/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	13

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**2**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**63º**			**x**				
Weather	pm	**84º**			**x**				

Time	
0700	Arrived on site and pans are working in the borrow area while the county crew is servicing equipment
	and filling the water wagon.
	I have walked cell floor over to determine the condition of the clay liner. There is a need to regrade the
	in-place soils and it needs further blending. I will discuss with Billy Buck when he arrives.
0800	I could not get Andersons Tech. Called off prior to her arrival. She will go to another job site and check in
	with us later this morning.
0820	Dirt pans are regrading cell floor and water wagon is standing by.
0900	Billy Buck has a plan to rectify the unblended soils and they are processing the clay liner.
0944	Rescheduled Anderson for 1300 hours for density testing of lift #1.
	8
1100	Dirt pans continue to bring clay liner to complete lift one.
1330	Anderson technician is on site and we are going to do some test locations to determine depth of lift
	and we will do several FYI density tests to check progress of compaction and moisture of soils.
1515	Performed 6 informational density and moisture tests and discovered higher than normal moisture
	levels and the compaction will require some additional effort with compactor.
1600	Anderson tech will return tomorrow morning and we will take density and moisture tests and record
	the results.

PROJECT DAILY FIELD REPORT

Date 09/02/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	14

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	2					Excavator	**1**
County Employees	Various	1-1	P-1-1	WPT 103		Dozer	**1**
Surveyor		thru	thru	WPT 104		Water Truck	**1**
Liner Crew & Superv.		1-13	P-1-4	WPT 105		Compactor	**0**
Truck Drivers				WPT 106		Tractor and Disk	**0**
Anderson Engineers	1					Tractor and Water Tnk	**1**
						Tractor & Compactor	**1**
						Tractor and Pan/s	**2**
						Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**54º**			**x**				
Weather	pm	**80º**		**x**					

Time	
0700	Arrived on site and one dirt pan is grading cell floor prior to density testing. Second pan set is hauling
	daily cover material to working face.
0815	Anderson Tech is on site and warming up her gauge.
0945	13 density tests completed and they have passed. Tech is off site.
1000	I have collected 4 ea shelby tubes and processed for shipping.
1030	Dirt pans have begun laying lift number two and water wagon is watering in front of pans.
1100	Work continues with lift two
	Placing clay and watering as needed and compacting to blend soils and bond lifts.
	Resheduled Anderson Tech. For tomorrow morning at 0800 for density and moisture verification.
1500	Rental water truck is on site and being set up to hydrate the slopes.
*	Email from JJG, sand samples have passed testing and county will begin importing more sand.
	for drainage layer when bid process is completed.
1630	Off site to purchase sampling supplies.

PROJECT DAILY FIELD REPORT

Date 09/03/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	15

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	2					Excavator	**1**
County Employees	Various	2-1	P-2-1	WPT 107		Dozer	**1**
Surveyor		thru	thru	WPT 108		Water Truck	**1**
Liner Crew & Superv.		2-13B	P-2-4	WPT 109		Compactor	**0**
Truck Drivers				WPT 110		Tractor and Disk	**0**
Anderson Engineers	1					Tractor and Water Tnk	**1**
						Tractor & Compactor	**1**
						Tractor and Pan/s	**2**
						Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**57º**			**x**				
Weather	pm	**85º**		**x**					

Time	
0700	Arrived on site and dirt pans are grading cell floor prior to density and moisture testing.
0800	Anderson Technician on site and warming up troxler gauge.
0820	Begin density tests.
0930	Density test completed on the cell floor. Test 2-13 was to dry but compacted. City crew scarified and
	watered an area 50 x 75 and recompacted and retested with troxler. Test 2-13B was a passing test for
	moisture and compaction.
1000	Collected 4 ea. Shelby tubes and prepared for shipment.
1100	Dirt pans and other equipment are placing clay for lift three on the cell floor. The berms will be done
	after the cell floor is completed.
↓	
Thru	
↓	
1600	Work continues.
	Contacted Golder to make preparations for Saturday pickup of shelby tubes if required.
	Contacted FTN about conformance sampling of geotextile.
↓	

PROJECT DAILY FIELD REPORT

Date 09/04/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	16

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various	3-1	P-3-1	WPT 111	
Surveyor		thru	thru	WPT 112	
Liner Crew & Superv.		3-13	P-3-4	WPT 113	
Truck Drivers				WPT 114	
Anderson Engineers	1				

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**65º**			**x**				
Weather	pm	**87º**		**x**					

Time	
0700	Arrived on site and walked the cell floor to observe the lift. The clay has been over watered by county at the end
	end of work Thursday. When crews arrive I will meet with Billy and Wink to discuss.
0745	Crew is opening up the lift to allow for some drying. The disk will be used if scarification can't be done with
	equipment on hand.
0830	Lift has been opened up and we will let it air out for at least two hours. Overcast conditions will not
	help with the drying so it may take longer. Cancelled Anderson and rescheduled for later today.
1000	Clay is still wet so we will retry after lunch. Pans are hauling soils to working face for county.
1300	East half of cell is dryer than West so pans will beging grading on thet side at this time.
Note:	PWC and JJG on site for engineering inspection of progress.
1450	Anderson's tech on site and warming up gauge.
1530	Density tests (13 ea.) are completed
1630	Shelby tubes have been taken for lift 3 and prepared for shipment to Golder.
1700	Pans are hauling clay for lift 4 beginning on West side.

PROJECT DAILY FIELD REPORT

Date 09/05/09 Saturday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.2 in.	Work Day #	17

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	2					Excavator	**1**
County Employees	Various	4-1	P-4-1			Dozer	**1**
Surveyor		thru	thru			Water Truck	**1**
Liner Crew & Superv.		4-7	P-4-2			Compactor	**0**
Truck Drivers						Tractor and Disk	**0**
Anderson Engineers	1					Tractor and Water Tnk	**1**
						Tractor & Compactor	**1**
						Tractor and Pan/s	**2**
						Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**67º**		**x**					
Weather	pm	**86º**			**x**				

Time	
0700	Arrived on site and walked the cell floor. Discovered some organic material in one location and marked it for
	removal by dirt pans.
0730	Requested that county apply water in front of dirt pans ASAP.
0800	Pans placing clay liner and county is processing clay soils behind pans to make the lift.
	Anderson will return between 1100 and 1200 for density testing. Have discussed weekend watering with Billy
	and Wink. They are discussing a stop time for today and I have made mention that someone will need
	to water cell floor on Sunday.
1130	Pans continue placing clay liner and county is processing clay soils behind pans to make the lift.
1215	Tech. on site to perform density and moisture tests. Dirt pans have placed one half of cell floor and
	county has processed clay liner. Plan to perform 7 ea. Tests and gather two shelby tubes after density tests.
1300	Andersons tech is done and I have prepared shelby tubes for shipment. Crew has decided to knock off
	for the weekend. I will deliver tubes to FedEx in Little Rock. Employees have been scheduled to come out on
	Sunday and water cell twice.

PROJECT DAILY FIELD REPORT

Date 09/07/09 Monday *Labor Day*

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	18

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers	0				

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**65º**		**x**					
Weather	pm	**86º**			**x**				

Time	
0700	Arrived on site and walked the cell floor. Dirt pans are hauling cover material to working face for county prior
	to moving soils to cell. County is filling water truck to begin hydrating cell floor.
0745	Cell floor has been watered and pans are placing clay liner materials.
0900	There will not be any density and moisture tests today due to holiday schedule at Anderson Engineers.
	Anticipate completing the cell floor this morning and processing the lift.
1000	County is preparing to begin watering the North berm and tie-in are prior to placing clay liner on berm.
1230	Dirt pans are laying clay along the toe of the North berm and dozer will push clay up slope and place in 6" lift.
1345	Rain is coming down but I do not think it will impact work at this time.
1400	Estimate that .25"fallen on the work site. Conditions were dry and quite a bit of the water was needed and
	by the clay liner. Some repair and mopping up in the lower areas will need to be done.
1500	Continue to place soils and grade North berm at Tie-in.
1600	Cell floor will be mopped up and regraded tomorrow prior to final density tests.
1700	Dirt pans are preparing the South berm for clay liner installation.
1800	Placing clay liner on South berm as dozer finishes the North berm.

PROJECT DAILY FIELD REPORT

Date 09/08/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	19

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	2					Excavator	**1**
County Employees	Various	4-8	P-4-3			Dozer	**1**
Surveyor		thru	thru			Water Truck	**1**
Liner Crew & Superv.		4-13	P-4-4			Compactor	**0**
Truck Drivers						Tractor and Disk	**0**
Anderson Engineers	1	See Below				Tractor and Water Tnk	**1**
						Tractor & Compactor	**1**
						Tractor and Pan/s	**2**
						Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**73º**		**x**					
Weather	pm	**86º**			**x**				

Time	
0700	Arrived on site and walked the cell floor. It is still quite wet and the pans are drying up the clay liner and
	grading.
0810	Collected samples CL-3 and CL-4 and prepared for shipping by FedEx.
0910	Pans continue to place clay on South berm and the dozer is grading.
1015	Placing clay on East berm at this time as dozer grades South berm.
1200	Processing and compacting berms in anticipation of performing density and moisture tests on berms.
1245	Anderson tech on site and we have discussed test needs and locations.
1330	Density test completed and shelby tubes hsve been pushed and processed for transport and shipping.
1400	Pans are placing soils again on the North berm.
1515	Mann has shut down dirt pans for mechanical problesm. County will haul clay after the landfill has closed
	and working face is covered.
1637	County continues to haul clay. There are several storms in the area and a small squall has just ended
	at the project with no impact to the liner.
	Note: Density and Moisture tests: 1-14 thri 1-16, 2-14 thru 2-16 These tests were completed on the berms.
1645	One contracted dirt pan is back in service and the counties rig is also hauling clay to the cell.

PROJECT DAILY FIELD REPORT

Date 09/09/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	20

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
Mann Land Leveling	2					Excavator	**1**
County Employees	Various	3-14				Dozer	**1**
Surveyor		thru				Water Truck	**1**
Liner Crew & Superv.		3-16				Compactor	**0**
Truck Drivers		4-14				Tractor and Disk	**0**
Anderson Engineers	1	thru				Tractor and Water Tnk	**1**
		4-16				Tractor & Compactor	**1**
						Tractor and Pan/s	**2**
						Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**71º**		**x**					
Weather	pm	**90º**			**x**				

Time	
0700	Arrived on site and walked the cell floor to observe conditions and also walked the three berms to
	check on moisture and coverage.
0745	Pans are placing clay on North berm.
0915	Work continues placing clay on berms. North berm is being graded and processed while the dirt pans are
	lining the East berm.
1200	Resheduled final density testing untill 1500 with Anderson Engineers.
1245	Nearing completion on clay liner placement on East berm and pans will be placing soils on South berm
	after it is watered by the county.
1320	Notified by PWC that all perms have passed up to lift four.
	Work continues placing clay on berms. East berm is being graded and processed while the dirt pans are
	lining the South berm.
1520	Anderson is on site and we will begin density tests.
1615	Completed density tests and all went well.
1700	Pans are doing fill outside of cell scope for county on South side to prepare an area to
	store materials.

PROJECT DAILY FIELD REPORT

Date 09/10/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	21

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor	1				
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**1**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**69º**			**x**				
Weather	pm	**85º**			**x**				

Time	
0700	Arrived on site and dirt pans are stockpiling soil at working face for county.
0745	Met with Billy Buck and discussed the survey and final grading that is still needed. I requested information on supplier of the aggregates as samples will be required.
0900	Grading the East berm is in progress to get it ready for survey certification. Tractor is bringing clay as needed to fill a low area.
1000	Repair of ejector dirt pan is in progress as it will be needed to get a final grade on the cell floor and berms where it can operate.
	The county has men working to clean up loose soil and clods of clay along the tie-in are on West side to have a clear area for future HDPE welding operations by AEG.
1200	Work continues to prepare clay for certification survey.
1545	Surveyor is on site.
	Surveying Cell
1930	Several low areas have been discovered in cell floor. Will repair in the morning and resurvey.

PROJECT DAILY FIELD REPORT

Date 09/11/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	22

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor	1				
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**66º**		**x**					
Weather	pm	**85º**		**x**					

Time	
0700	Arrived on site and dirt pan operator was preparing to bring soils into cell to regrade cell floor in various
	location and two locations on East and South berm. Waiting on the county to water prior to clay placement.
0800	Watering is in progress and pan is loading soils in the borrow.
0845	
	The surveyor is on site to complete some station verifications .
	Dirt pan continues to fill areas. County will process and compact soils.
1330	Engineer (PWC) was on site this morning to observe progress.
	Tractor has some mechanical problems and we may not complete lift 4 today.
	Tractor Down will continue tomorrow.

PROJECT DAILY FIELD REPORT

Date 09/12/09 Saturday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.7	Work Day #	23

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**65º**		**x**					
Weather	pm	**84º**		**x**					

Time	
0700	Rained during the night - To wet to work.

PROJECT DAILY FIELD REPORT

Date 09/14/09 Monday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	24

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling					
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**66º**			**X**				
Weather	pm	**xxº**							

Time	
0700	Arrived on site and it is raining.
1200	Work called off due to weather returning to Little Rock.

PROJECT DAILY FIELD REPORT

Date 09/15/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	25

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling					
County Employees					
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
	TO WET TO WORK TODAY

PROJECT DAILY FIELD REPORT

Date 09/16/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	26

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling					
County Employees					
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
	TO WET TO WORK TODAY

PROJECT DAILY FIELD REPORT

Date 09/17/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	27

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling					
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
	TO WET TO WORK TODAY

PROJECT DAILY FIELD REPORT

Date 09/18/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	28

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling					
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
	TO WET TO WORK TODAY DUE TO EVENING RAINFALL

PROJECT DAILY FIELD REPORT

Date 09/21/09 Monday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	29

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling					
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
	TO WET TO WORK TODAY DUE TO EVENING RAINFALL

PROJECT DAILY FIELD REPORT

Date 09/22/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	30

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	1				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**0**
Tractor & Compactor	**0**
Tractor and Pan/s	**1**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**69º**			**x**				
Weather	pm	**82º**		**x**					

Time	
0415	Departed Little Rock for Luxora.
0700	Arrived on site and checked in at scale house. Observed no serious damage upon inspection of
	clay liner as the amount of rainfall was only enough to allow tire slippage and it had stopped work.
	Mann is servicing equipent and will soon begin to grade cell floor.
	Tractor and pan is carefully filling low areas as marked by surveyor and county is compacting
	and watering as needed.
	Dozer is performing work in berms
1700	

PROJECT DAILY FIELD REPORT

Date 09/23/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.45	Work Day #	31

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	1				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**0**
Tractor & Compactor	**1**
Tractor and Pan/s	**1**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**71º**		**x**					
Weather	pm	**82º**			**x**				

Time	
0700	Arrived on site and met with Billy and Wink to discuss project. Aggregate vendor has supplied
	county with sample of washed gravel.
0800	Prepared sample for shipment and called FedEx to pickup sample.
0900	Tractor and pan is carefully filling low areas as marked by surveyor and county is compacting
	and watering as needed.
	Work is slow and tedious as Mann is shooting grade to get elevations corrected.
	Dozer is performing work in berms
1700	

PROJECT DAILY FIELD REPORT

Date 09/24/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.55	Work Day #	32

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**71º**							
Weather	pm	**80º**							

Time	
0700	Rained during the night and it is to wet for equipment to get on clay liner.
	Waiting at project to see if the weather will clear and work can proceed in afternoon.
1200	Returning to Little Rock.

PROJECT DAILY FIELD REPORT

Date 09/25/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.68	Work Day #	33

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling					
County Employees					
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**66º**							
Weather	pm	**78º**							

Time	
	TO WET TO WORK TODAY DUE TO RAIN

PROJECT DAILY FIELD REPORT

Date 09/28/09 Monday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.68	Work Day #	34

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling					
County Employees					
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**75º**		**x**					

Time	
0700	Arrived on site and met with Billy and Wink to discuss project.
	Tractor and pan is continues to fill low areas as marked by surveyor and county is compacting
	and watering as needed.
	Called Harmon Survey and requested some staking on Tuesday in a the SW corner
	and also some points on the berms.
	Mann will complete grading of cell floor this morning and will then haul soils to working face.
	Watering liner to keep it hydrated.
1700	End of work day.

PROJECT DAILY FIELD REPORT

Date 09/29/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.68	Work Day #	35

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	1				
County Employees	Various				
Surveyor	1				
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**46º**		**x**					
Weather	pm	**72º**			**x**				

Time	
0700	Arrived on site and met with Billy and Wink to discuss survey needs.
0800	On hold for surveyor
1030	Surveyor on site and setting up equipment.
	The day has been consumed with survey of various points. The pans will continue to haul other
	soils for landfill today.
	Compiling field data and purchasing supplies.
1700	End of work day.

PROJECT DAILY FIELD REPORT

Date 09/30/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.68	Work Day #	36

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**66º**		**x**					
Weather	pm	**78º**		**x**					

Time	
0700	Arrived on site and met with Billy and Wink to discuss project.
	Mann and county equipment will complete the liner preparation and grading today.
	County is completing the excavation of trenches and the sump area.
	Pan tractor is removing spoils from trench excavation and hauling to working face.
	Surveyor is due back on Thursday to perform certification survey.
	This work has consumed the entire work day.
1700	End of work day.

PROJECT DAILY FIELD REPORT

Date 10/01/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.68	Work Day #	37

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	2				
County Employees	Various				
Surveyor	1				
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**66º**		**x**					
Weather	pm	**78º**		**x**					

Time	
0700	Arrived on site and met with Billy and Wink to discuss project.
	Completing the final excavation of trences and sump and extraction riser ditch.
	Tractor and pan hauling off trench spoils.
	Water truck is lightly watering cell floor to maintain moisture levels and prevent the desiccation of clay.
1000	Surveyor on site and setting up.
1430	Survey is completed and all is good. Will email Little Rock and tell engineers.
	Rain is in the forecast for tomorrow.
1700	End of work day.

PROJECT DAILY FIELD REPORT

Date 10/02/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	38

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/05/09 Monday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	39

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.
	Traveled to Luxora to observe conditions and to collect field equipment to return to FTN.

PROJECT DAILY FIELD REPORT

Date 10/06/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	40

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/07/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	41

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/08/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	42

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/09/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	43

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/12/09 Monday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	1.79	Work Day #	44

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**0**
Dozer	**0**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**0**
Tractor & Compactor	**0**
Tractor and Pan/s	**0**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/13/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	1.79	Work Day #	45

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**0**
Dozer	**0**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**0**
Tractor & Compactor	**0**
Tractor and Pan/s	**0**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/14/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	1.79	Work Day #	46

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**0**
Dozer	**0**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**0**
Tractor & Compactor	**0**
Tractor and Pan/s	**0**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/15/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	1.79	Work Day #	47

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**0**
Dozer	**0**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**0**
Tractor & Compactor	**0**
Tractor and Pan/s	**0**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/16/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	1.79	Work Day #	48

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**0**
Dozer	**0**
Water Truck	**0**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**0**
Tractor & Compactor	**0**
Tractor and Pan/s	**0**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**xx°**							
Weather	pm	**xx°**							

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/05/09 Monday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	49

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/06/09 Tuesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	50

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/07/09 Wednesday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	51

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/08/09 Thursday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	52

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 10/09/09 Friday

Project **Mississippi County Landfill - Waste Cell 14 Construction**

General Contractor: **Self**

Rainfall	0.79	Work Day #	53

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s
Mann Land Leveling	0				
County Employees	0				
Surveyor					
Liner Crew & Superv.					
Truck Drivers					
Anderson Engineers					

Equipment on Site:	Ea.
Excavator	**1**
Dozer	**1**
Water Truck	**1**
Compactor	**0**
Tractor and Disk	**0**
Tractor and Water Tnk	**1**
Tractor & Compactor	**1**
Tractor and Pan/s	**2**
Rubber Tired Hoe	**0**

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	**52º**		**x**					
Weather	pm	**73º**			**x**				

Time	
0700	Rained out today.

PROJECT DAILY FIELD REPORT

Date 3-3-10

Project Mississippi Co. L.F. 4355-301

General Contractor: A.E.G.

Rainfall	Work Day #

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
General Contractor	2					Excavator	
City Employees						Dozer	
Surveyor						Water Truck	
Liner Crew & Superv.						Compactor	
Truck Drivers						Tractor and Disk	
						Grader	
						Tri-Axle Dump	
						Tractor and Pan/s	
						Other	

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	28			PC				X
Weather	pm								

FIELD NOTES

Time	
0400	LEFT FOR JOB SITE. ARRIVED & TALKED TO BILLY.
	CONTRACTORS SHOWED UP. STARTED PULLING PIPE OVER TO TRENCH
	STARTED HOOKING EVERYTHING UP. JASON CAME UP.
1630	STARTED AIR TEST ON PIPE. DECIDED TO LEAVE ARR ON PIPE
	ALL NIGHT.
1800	JOB COMPLETE FOR THE DAY.
	14 HRS

PROJECT DAILY FIELD REPORT

Date 3-4-10

Project Mississippi Co. L.F. 4355-301

General Contractor: A.E.G.

Rainfall	Work Day #

Personnel on Site:	Each	D&M Tests	Shelby Tubes	GPS Locations	Photo Number/s	Equipment on Site:	Ea.
General Contractor	2					Excavator	
City Employees						Dozer	
Surveyor						Water Truck	
Liner Crew & Superv.						Compactor	
Truck Drivers						Tractor and Disk	
						Grader	
						Tri-Axle Dump	
						Tractor and Pan/s	
						Other	

		Temp.	Rain	Clear	Cloudy	Warm	Hot	Cool	Windy
Weather	am	29		X					
Weather	pm								

FIELD NOTES

Time	
0530	LEFT FOR JOB SITE. ARRIVED AT SITE AND TALKED TO
	BILLY. WENT OUT TO PIPE TO CHECK ON AIR PRESSURE. IT HELD
	ALL NIGHT. WORKING ON CONNECTING PIPE TO EXISTING TEE.
1030	LEFT JOB SITE FOR LITTLE ROCK.
1330	ARRIVED AT LITTLE ROCK. JOB COMPLETE FOR THE DAY.
	8 HRS

APPENDIX D

Subgrade Surface Laboratory and Field Test Reports

NUCLEAR DENSITY AND MOISTURE TEST SUMMARY

Project Name: Miss. Cnty LF - Waste Cell 14 Construction

Project Location: Luxora, AR

FTN Project Number: 4355-301

Proctor Number	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
1	93.4	25.5
2	94.2	23.0
3	97.2	22.6
4	97.5	22.5
5	101.7	21.2
6	103.9	21.3
0	0.0	0.0

Description of Area Tested and General Remarks: **SUBGRADE**

Test Number	Date Tested	Test Location	Proctor Number	Depth Tested	Dry Density (pcf)		Compaction (%)		Water Content (%)			Pass or Fail	Perm Sample ID	Permeability (cm/s)	FTN QC Rep	Comments
					Field	Max.	Field	Req'd	Field	OMC	Min. Req'd					
SG-1	8/28/09	See Drawing	5	6"	99.5	101.7	97.8%	90%	24.8	21.2	<OMC	P			JAC	
SG-2	8/28/09	See Drawing	6	6"	105.1	103.9	100.0%	90%	15.9	21.3	<OMC	P			JAC	
SG-3	8/28/09	See Drawing	5	6"	101.5	101.7	99.6%	90%	17.0	21.2	<OMC	P			JAC	
SG-4	8/28/09	See Drawing	6	6"	102.5	103.9	98.7%	90%	19.8	21.3	<OMC	P			JAC	
SG-5	8/28/09	See Drawing	4	6"	95.3	97.5	97.1%	90%	19.5	22.5	<OMC	P			JAC	
SG-6	8/28/09	See Drawing	4	6"	93.2	97.5	95.5%	90%	26.3	22.5	<OMC	P			JAC	
SG-7	8/28/09	See Drawing	6	6"	106.2	103.9	100.0%	90%	19.2	21.3	<OMC	P			JAC	
SG-8	8/28/09	See Drawing	5	6"	100.8	101.7	99.1%	90%	22.2	21.2	<OMC	P			JAC	
SG-9	8/28/09	See Drawing	6	6"	102.4	103.9	98.6%	90%	16.6	21.3	<OMC	P			JAC	
SG-10	8/28/09	See Drawing	6	6"	102.3	103.9	98.4%	90%	17.4	21.3	<OMC	P			JAC	
SG-11	8/28/09	See Drawing	6	6"	103.5	103.9	99.6%	90%	16.2	21.3	<OMC	P			JAC	
SG-12	8/28/09	See Drawing	6	6"	106.5	103.9	100.0%	90%	18.0	21.3	<OMC	P			JAC	
SG-13	8/28/09	See Drawing	6	6"	103.0	103.9	99.7%	90%	13.5	21.3	<OMC	P			JAC	
SG-14	8/28/09	See Drawing	5	6"	101.5	101.7	99.8%	90%	21.2	21.2	<OMC	P			JAC	
SG-15	8/28/09	See Drawing	5	6"	99.9	101.7	98.2%	90%	22.0	21.2	<OMC	P			JAC	
SG-16	8/28/09	See Drawing	6	6"	103.2	103.9	99.3%	90%	18.3	21.3	<OMC	P			JAC	

APPENDIX E

Clay Liner Material Pre-Construction Reports

FTN/MISSISSIPPI COUNTY LF-CELL 14/AR
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
MSCOLF TP-1	Bulk	0.0-3.0'	CH	35.2	63	28	35	0.21	100.0	97.9	-	93.4	25.5	-	27.7	88.9	4.3E-08	-
MSCOLF TP-2	Bulk	0.0-3.0'	CH	37.5	63	26	37	0.31	100.0	95.5	-	94.2	23.0	-	25.4	90.4	4.9E-08	-
MSCOLF TP-3	Bulk	0.0-3.0'	CH	32.5	65	32	33	0.03	100.0	97.7	-	97.2	22.6	2.72	24.6	93.2	3.1E-08	-
MSCOLF TP-4	Bulk	0.0-3.0'	CH	28.4	60	28	32	0.01	100.0	98.2	-	97.5	22.5	2.71	24.4	93.5	3.5E-08	-
MSCOLF TP-5	Bulk	0.0-3.0'	CH	27.3	54	22	32	0.17	100.0	95.6	-	101.7	21.2	-	23.6	96.8	2.1E-08	-
MSCOLF TP-6	Bulk	0.0-3.0'	CH	24.3	58	24	34	0.00	100.0	94.0	-	103.9	21.3	-	24.2	98.9	5.9E-09	-

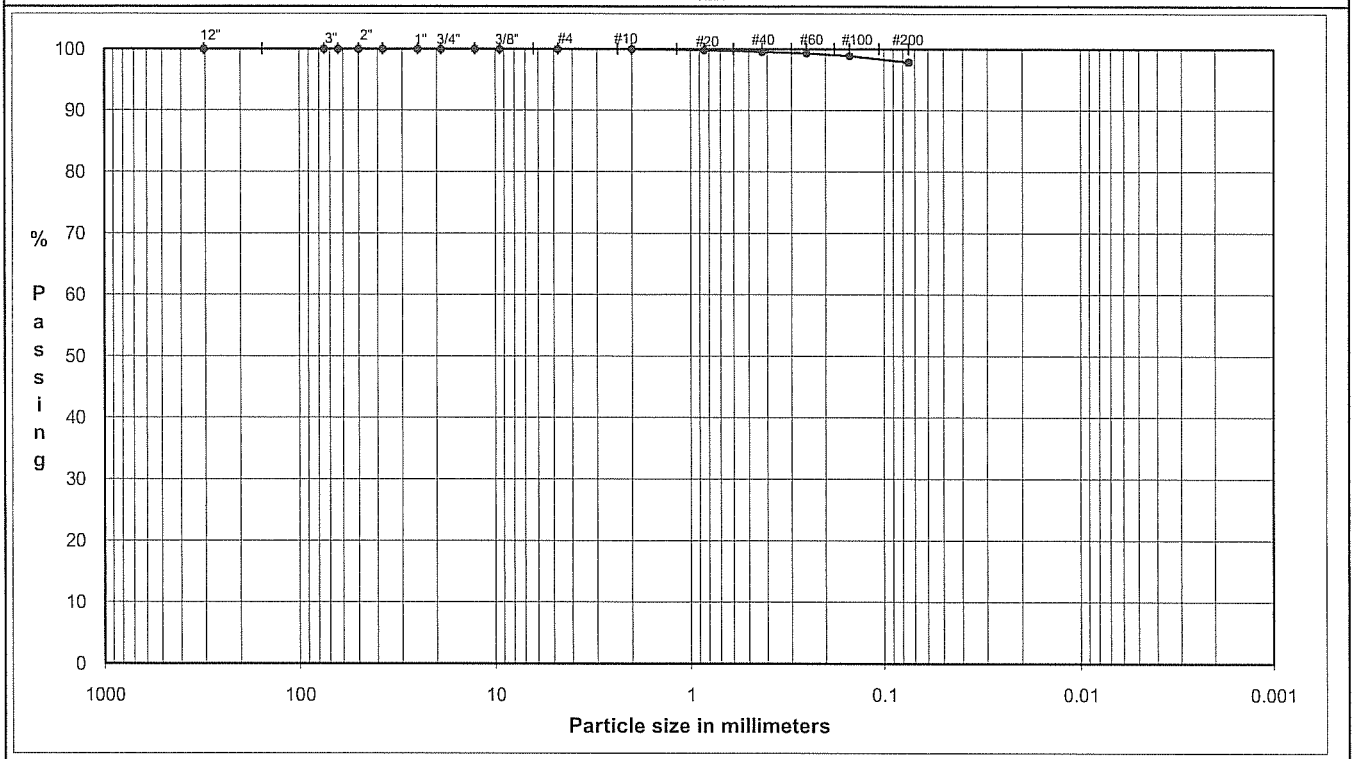
ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

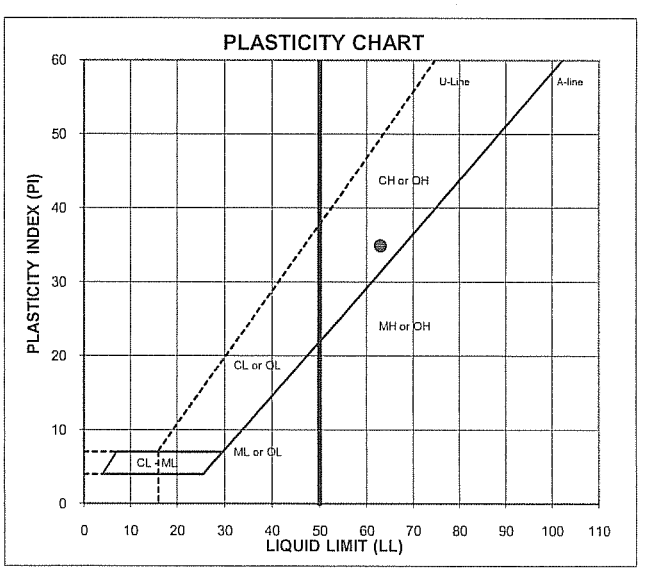
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-1 Depth: 0.0-3.0'
TYPE: Bulk



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.03**
#20	0.85	**99.8**		
#40	0.43	**99.6**	Medium Sand	**0.41**
#60	0.25	**99.3**		
#100	0.15	**98.9**		
#200	0.075	**97.9**	Fine Sand	**1.69**
			Fines	**97.87**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
35.2	63	28	35	0.21

DESCRIPTION: Grayish Brown, SILTY CLAY, trace medium to fine sand.
USCS: CH

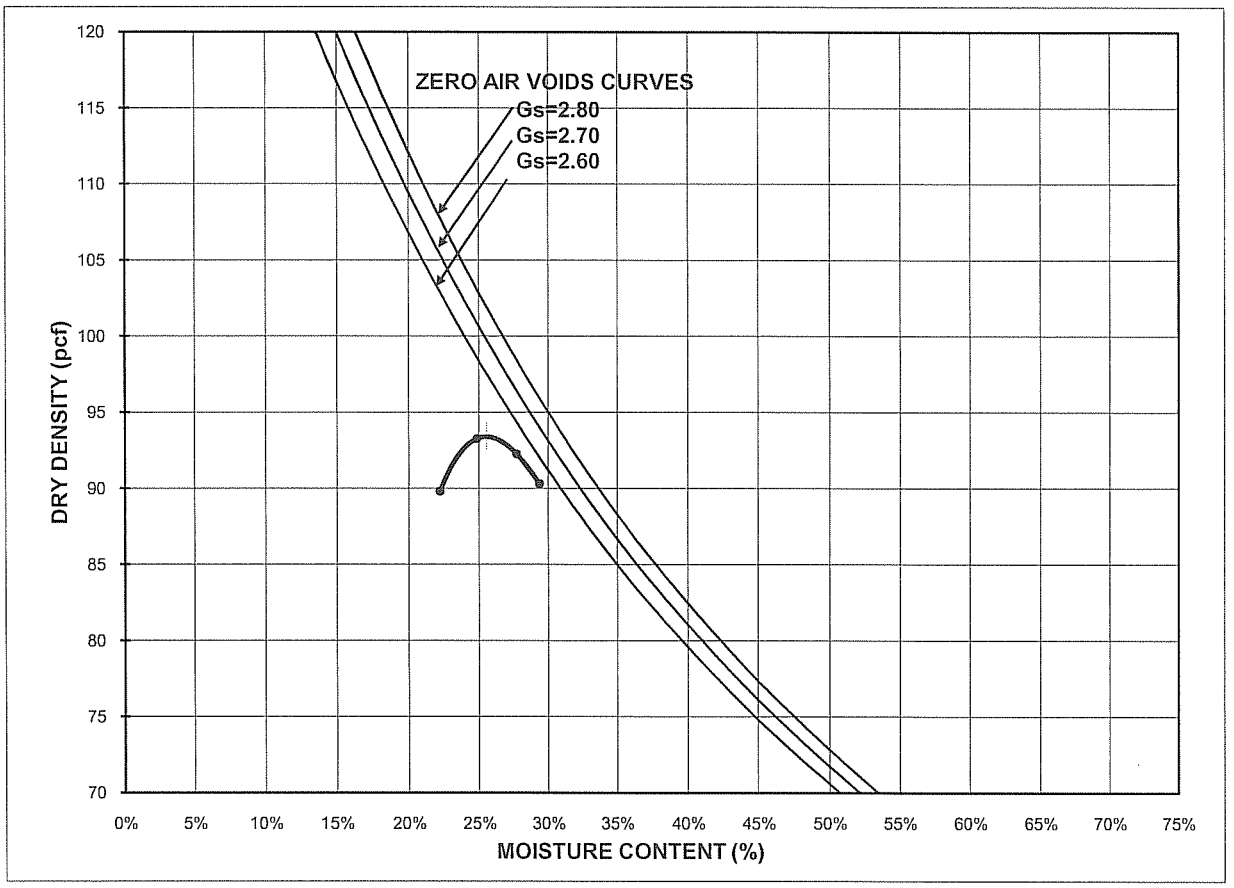
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	TJ/PR
DATE	6/25/09
CHECK	MK
REVIEW	PWM

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
PROJECT NUMBER: **093-90145**
SAMPLE ID: **MSCOLF TP-1** DEPTH: **0.0-3.0'** SAMPLE TYPE: **Bulk**



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	89.8	22.2%
2	93.3	24.8%
3	92.3	27.7%
4	90.3	29.4%

Maximum Dry Density (pcf)	93.5
Optimum Moisture (%)	25.5
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	35.2%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION Grayish Brown, SILTY CLAY, trace medium to fine sand.

USCS CH

CHECK AK
REVIEW PWM

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	5	COMMENTS: The sample was remolded to 95.2% of the Maximum Dry Density and OPTM + 2.2% (using ASTM D 698).
PROJECT NUMBER	093-90145		Flow Pump	2	
SAMPLE ID	MSCOLF TP-1	0.0-3.0'	Flow Pump Speed	10	
SAMPLE TYPE	Bulk		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.998	B-Value, f	0.96	Height, inches	3.035
Diameter, inches	2.790	Cell Pres.	90.0	Diameter, inches	2.824
Area, cm²	39.44	Bot. Pres.	80.0	Area, cm²	40.41
Volume, cm³	300.35	Top Pres.	80.0	Volume, cm³	311.52
Mass, g	546.46	Tot. B.P.	80.0	Mass, g	572.18
Moisture Content, %	27.70	Head, max.	99.88	Moisture Content, %	33.71
Dry Density, pcf	88.91	Head, min.	99.88	Dry Density, pcf	85.72
Spec. Gravity(assumed)	2.700	Max. Grad.	12.96	Volume Solids, cm³	158.49
Volume Solids, cm³	158.49	Min. Grad.	12.96	Volume Voids, cm³	153.02
Volume Voids, cm³	141.86			Void Ratio	0.97
Void Ratio	0.90			Saturation, %	94.3%
Saturation, %	83.6%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	546.46	580.22
Wt Soil & Tare, f	g	427.93	436.03
Wt Tare	g	0.00	8.26
Wt Moisture Lost	g	118.53	144.19
Wt Dry Soil	g	427.93	427.77
Water Content	%	27.70%	33.71%

DESCRIPTION: Grayish Brown, SILTY CLAY, trace medium to fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/30/09	39994	9	50	20.4	0	0	0	0	1.42	99.88	12.96	4.3E-08
06/30/09	39994	9	55	20.4	5	5	300	300	1.42	99.88	12.96	4.3E-08
06/30/09	39994	10	0	20.4	5	10	300	600	1.42	99.88	12.96	4.3E-08
06/30/09	39994	10	5	20.4	5	15	300	900	1.42	99.88	12.96	4.3E-08 *
06/30/09	39994	10	10	20.4	5	20	300	1200	1.42	99.88	12.96	4.3E-08 *
06/30/09	39994	10	15	20.4	5	25	300	1500	1.42	99.88	12.96	4.3E-08 *
06/30/09	39994	10	20	20.4	5	30	300	1800	1.42	99.88	12.96	4.3E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.3E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 6/30/09

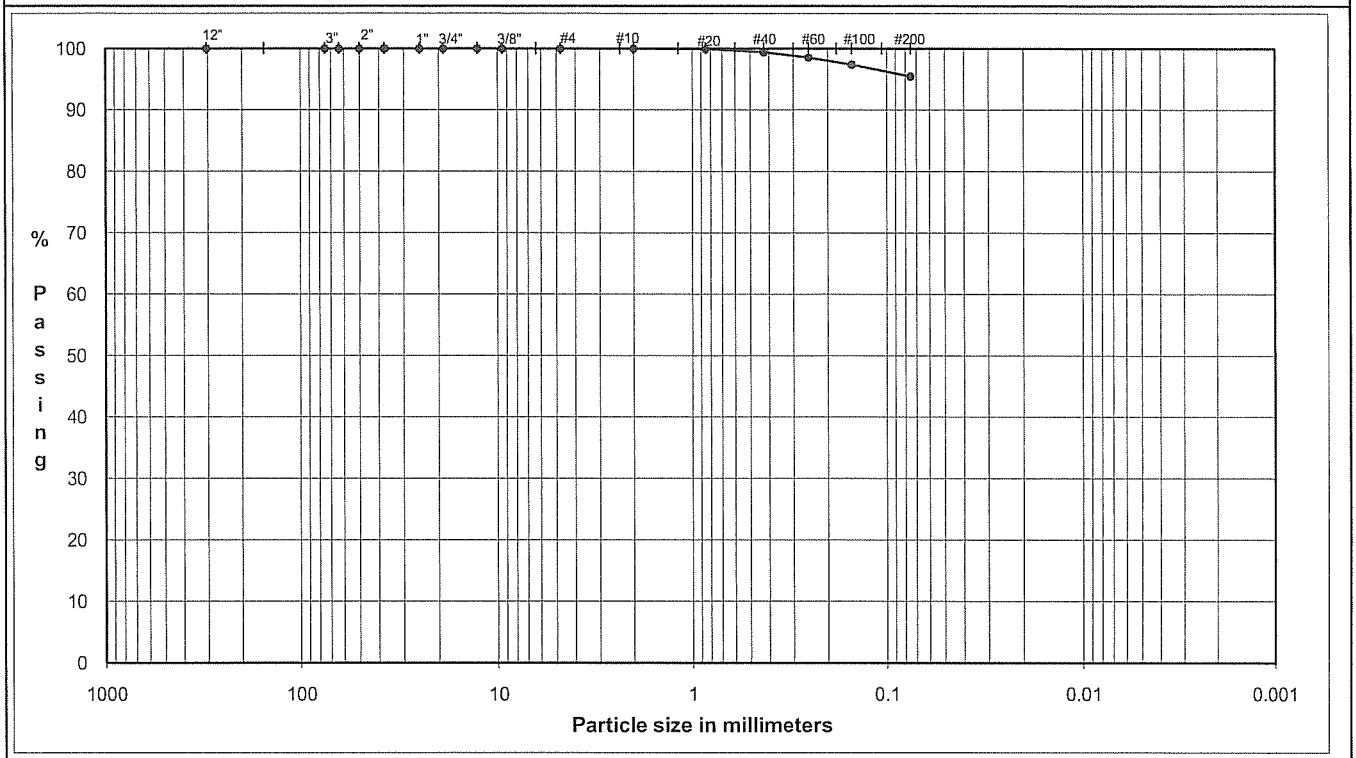
CHECK AK

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

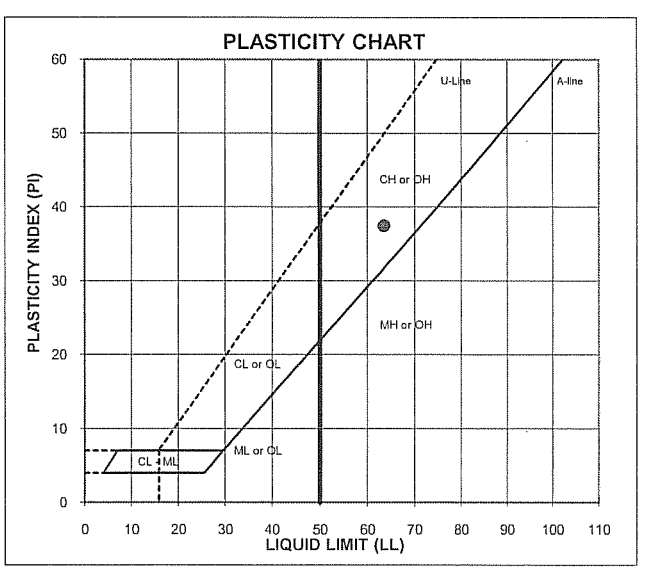
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-2 Depth: 0.0-3.0'
TYPE: Bulk



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.00**
#20	0.85	**99.9**		
#40	0.43	**99.4**	Medium Sand	**0.60**
#60	0.25	**98.5**		
#100	0.15	**97.4**		
#200	0.075	**95.5**	Fine Sand	**3.95**
			Fines	**95.45**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
37.5	63	26	37	0.31

DESCRIPTION: Grayish Brown, SILTY CLAY, trace medium to fine sand.
USCS: CH

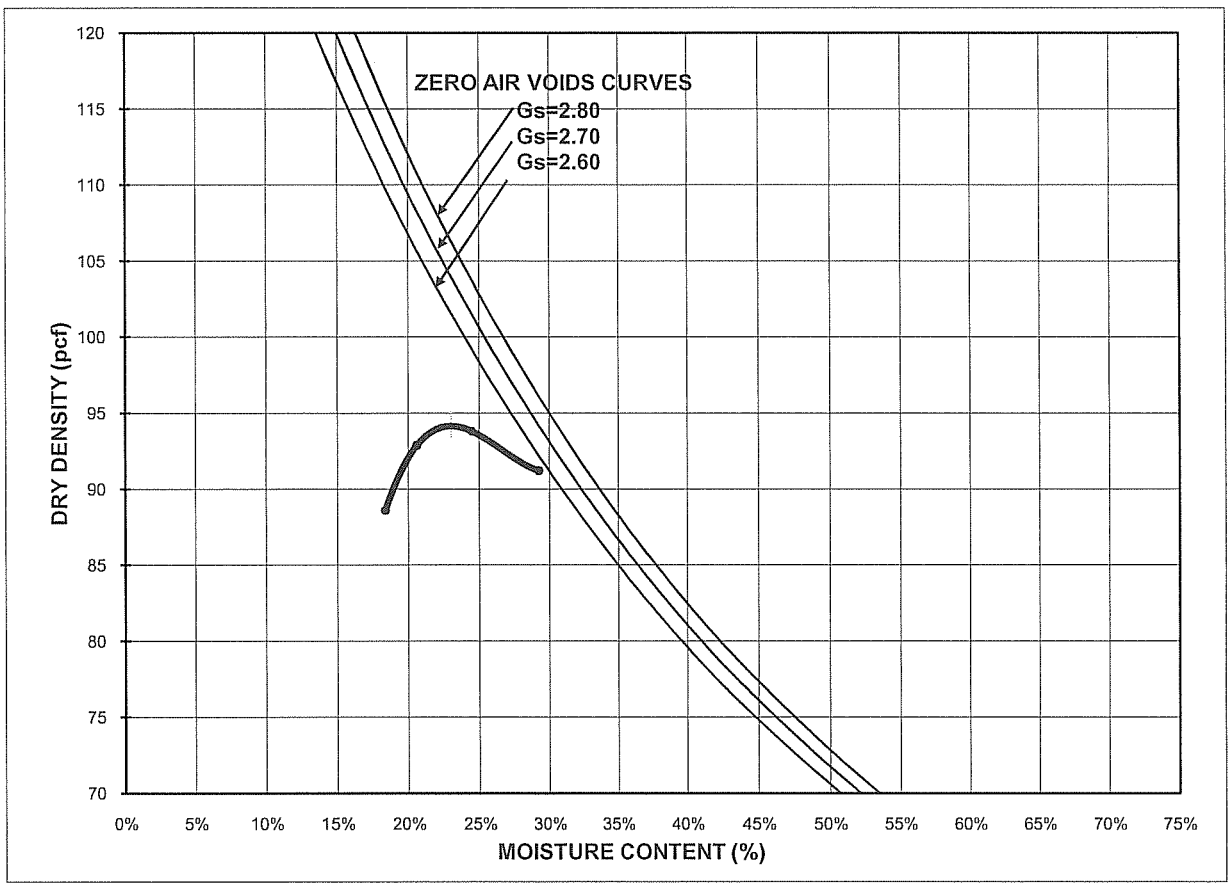
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH PR/TJ
DATE 6/25/09
CHECK AK
REVIEW

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
PROJECT NUMBER: **093-90145**
SAMPLE ID: **MSCOLF TP-2** DEPTH: **0.0-3.0'** SAMPLE TYPE: **Bulk**



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	88.6	18.4%
2	92.9	20.6%
3	93.8	24.5%
4	91.2	29.2%

Maximum Dry Density (pcf)	94.2
Optimum Moisture (%)	23.0
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	37.5%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION Grayish Brown, SILTY CLAY, trace medium to fine sand.

USCS CH

CHECK AK
REVIEW [illegible]

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	9
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	MSCOLF TP-2 0.0-3.0'	Flow Pump Speed	10
SAMPLE TYPE	Bulk	Technician	TW

COMMENTS: The sample was remolded to 96.0% of the Maximum Dry Density and OPTM + 2.4% (using ASTM D 698).

Sample Data, Initial			
Height, inches	3.007	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	90.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.25	Top Pres.	80.0
Mass, g	547.13	Tot. B.P.	80.0
Moisture Content, %	25.38	Head, max.	90.04
Dry Density, pcf	90.39	Head, min.	90.04
Spec. Gravity(assumed)	2.700	Max. Grad.	11.42
Volume Solids, cm³	161.63	Min. Grad.	11.42
Volume Voids, cm³	139.63		
Void Ratio	0.86		
Saturation, %	79.3%		

Sample Data, Final	
Height, inches	3.104
Diameter, inches	2.797
Area, cm²	39.64
Volume, cm³	312.53
Mass, g	579.86
Moisture Content, %	32.88
Dry Density, pcf	87.13
Volume Solids, cm³	161.63
Volume Voids, cm³	150.91
Void Ratio	0.93
Saturation, %	95.1%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	547.13	587.81
Wt Soil & Tare, f	g	436.39	444.41
Wt Tare	g	0.00	8.24
Wt Moisture Lost	g	110.74	143.40
Wt Dry Soil	g	436.39	436.17
Water Content	%	25.38%	32.88%

DESCRIPTION: Grayish Brown, SILTY CLAY, trace medium to fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/30/09	39994	13	55	20.4	0	0	0	0	1.28	90.04	11.42	4.9E-08
06/30/09	39994	14	0	20.4	5	5	300	300	1.28	90.04	11.42	4.9E-08
06/30/09	39994	14	5	20.4	5	10	300	600	1.28	90.04	11.42	4.9E-08
06/30/09	39994	14	10	20.4	5	15	300	900	1.28	90.04	11.42	4.9E-08 *
06/30/09	39994	14	15	20.4	5	20	300	1200	1.28	90.04	11.42	4.9E-08 *
06/30/09	39994	14	20	20.4	5	25	300	1500	1.28	90.04	11.42	4.9E-08 *
06/30/09	39994	14	25	20.4	5	30	300	1800	1.28	90.04	11.42	4.9E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.9E-08 cm/sec **

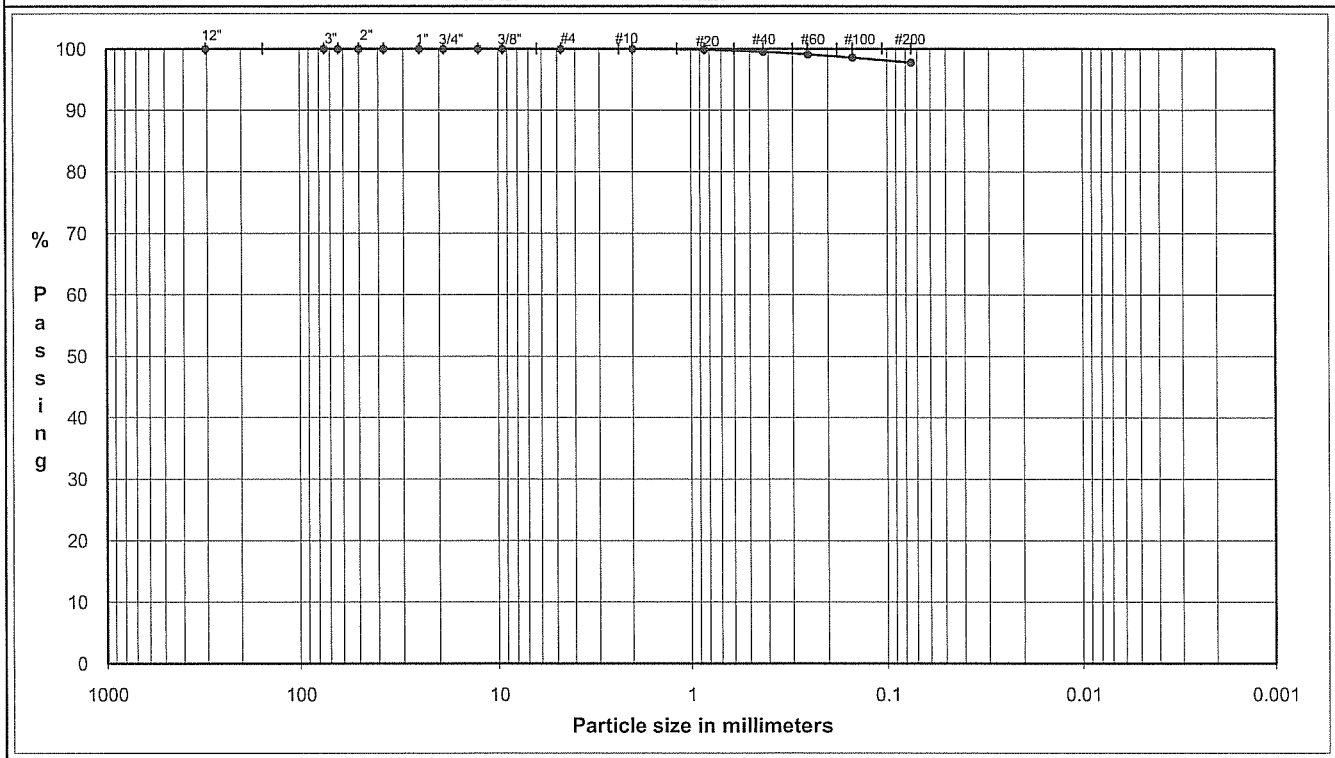
PERMEANT: Deaired Tap Water

DATE 6/30/09
CHECK
REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

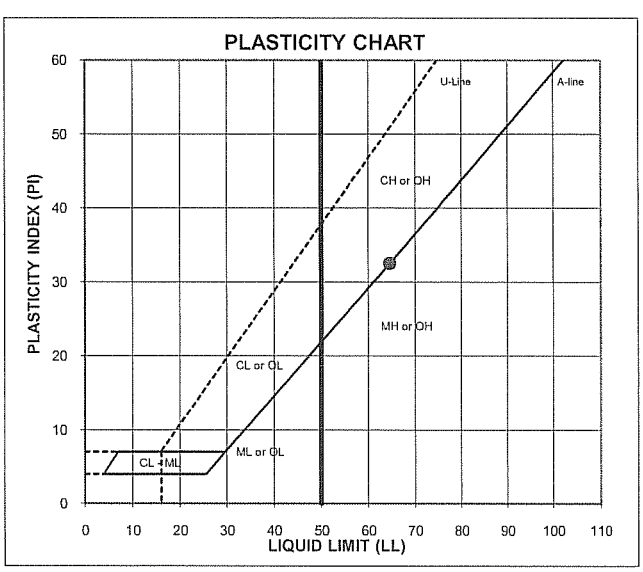
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-3 Depth: 0.0-3.0'
TYPE: Bulk



COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.00**
#20	0.85	**99.9**		
#40	0.43	**99.5**	Medium Sand	**0.48**
#60	0.25	**99.1**		
#100	0.15	**98.6**		
#200	0.075	**97.7**	Fine Sand	**1.80**
			Fines	**97.72**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
32.5	65	32	33	0.03

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

USCS: CH

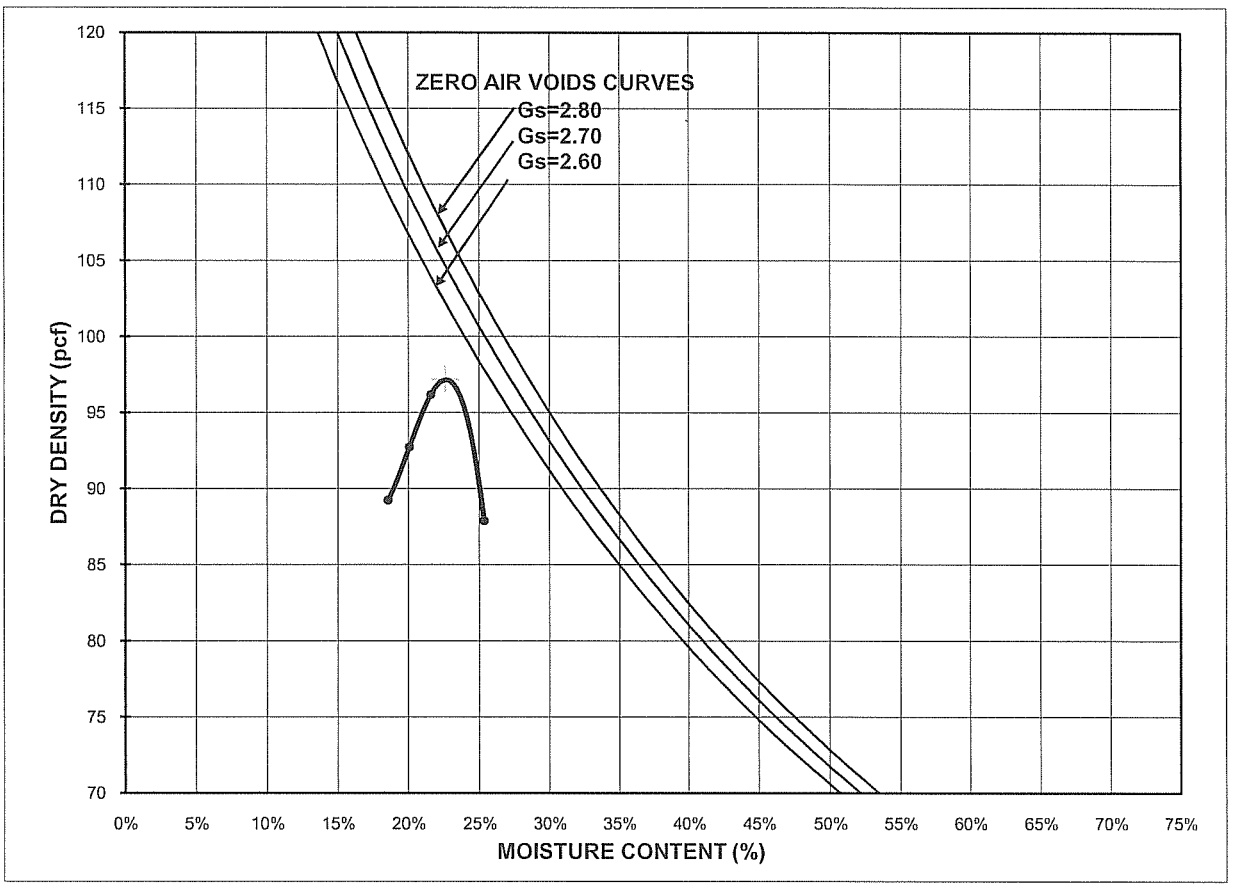
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	PR/TJ
DATE	6/25/09
CHECK	AK
REVIEW	

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
PROJECT NUMBER: **093-90145**
SAMPLE ID: **MSCOLF TP-3** DEPTH: **0.0-3.0'** SAMPLE TYPE: **Bulk**



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	89.2	18.6%
2	92.7	20.1%
3	96.2	21.6%
4	87.9	25.3%

Maximum Dry Density (pcf)	97.2
Optimum Moisture (%)	22.6
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	32.5%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION Gray, SILTY CLAY, trace medium to fine sand.

USCS CH

CHECK AH
REVIEW PWM

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	5
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	MSCOLF TP-3 0.0-3.0'	Flow Pump Speed	10
SAMPLE TYPE	Bulk	Technician	AK

COMMENTS: The sample was remolded to 95.9% of the Maximum Dry Density and OPTM + 2.0% (using ASTM D 698).

Sample Data, Initial			
Height, inches	3.002	B-Value, f	0.96
Diameter, inches	2.790	Cell Pres.	90.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.75	Top Pres.	80.0
Mass, g	559.79	Tot. B.P.	80.0
Moisture Content, %	24.64	Head, max.	144.20
Dry Density, pcf	93.18	Head, min.	144.20
Spec. Gravity	2.721	Max. Grad.	18.45
Volume Solids, cm³	165.05	Min. Grad.	18.45
Volume Voids, cm³	135.70		
Void Ratio	0.82		
Saturation, %	81.6%		

Sample Data, Final	
Height, inches	3.077
Diameter, inches	2.803
Area, cm²	39.81
Volume, cm³	311.15
Mass, g	589.54
Moisture Content, %	31.27
Dry Density, pcf	90.07
Volume Solids, cm³	165.05
Volume Voids, cm³	146.09
Void Ratio	0.89
Saturation, %	96.1%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	559.79	597.97
Wt Soil & Tare, f	g	449.11	457.54
Wt Tare	g	0.00	8.43
Wt Moisture Lost	g	110.68	140.43
Wt Dry Soil	g	449.11	449.11
Water Content	%	24.64%	31.27%

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/28/09	39992	14	25	20.2	0	0	0	0	2.05	144.20	18.45	3.1E-08
06/28/09	39992	14	30	20.2	5	5	300	300	2.05	144.20	18.45	3.1E-08
06/28/09	39992	14	35	20.2	5	10	300	600	2.05	144.20	18.45	3.1E-08
06/28/09	39992	14	40	20.2	5	15	300	900	2.05	144.20	18.45	3.1E-08 *
06/28/09	39992	14	45	20.2	5	20	300	1200	2.05	144.20	18.45	3.1E-08 *
06/28/09	39992	14	50	20.2	5	25	300	1500	2.05	144.20	18.45	3.1E-08 *
06/28/09	39992	14	55	20.2	5	30	300	1800	2.05	144.20	18.45	3.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.1E-08 cm/sec **

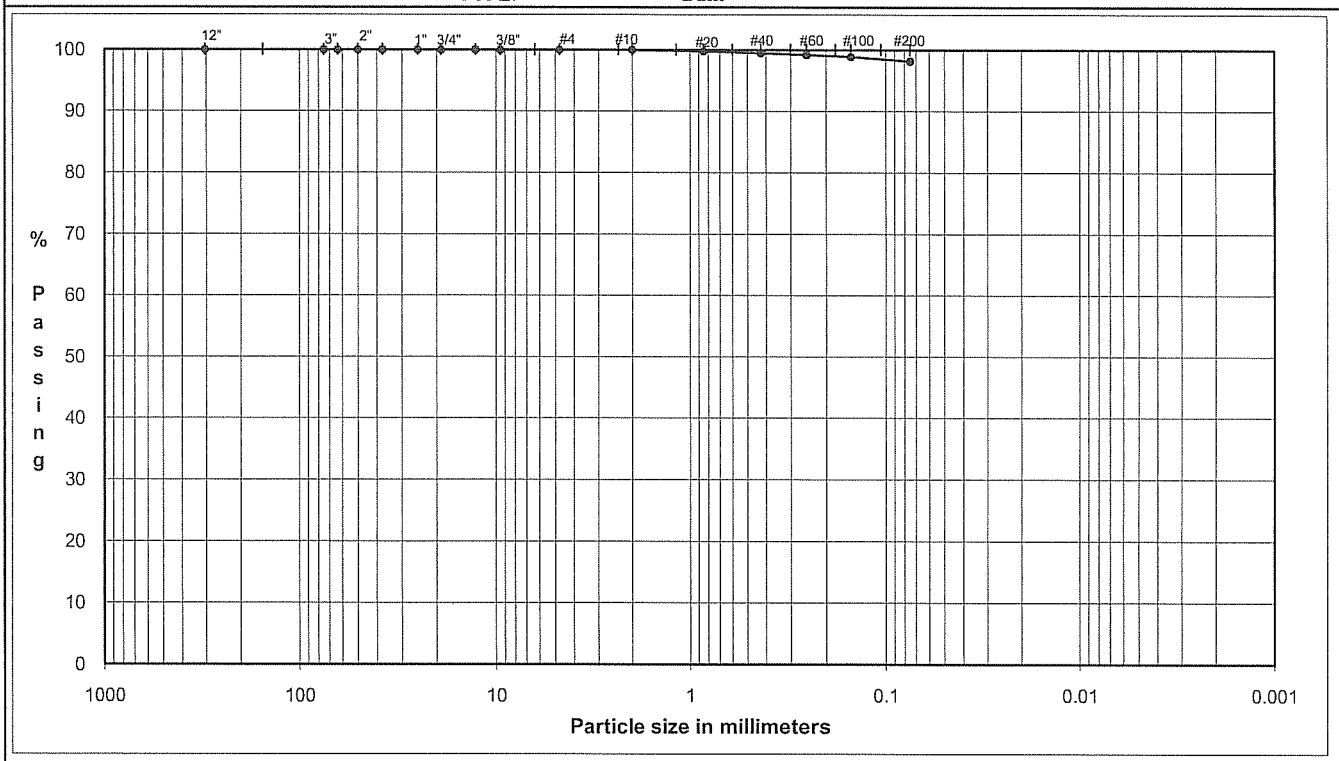
PERMEANT: Deaired Tap Water

DATE 6/28/09
CHECK AK
REVIEW [illegible]

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

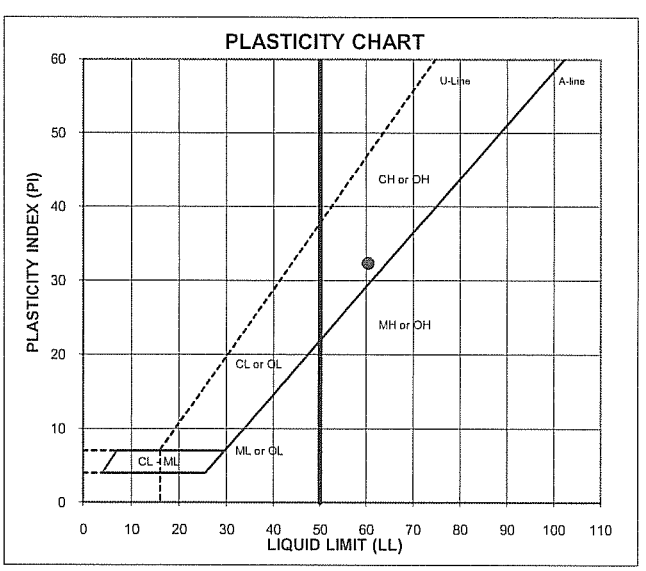
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-4 Depth: 0.0-3.0'
TYPE: Bulk



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.02**
#20	0.85	**99.8**		
#40	0.43	**99.5**	Medium Sand	**0.52**
#60	0.25	**99.2**		
#100	0.15	**98.9**		
#200	0.075	**98.2**	Fine Sand	**1.29**
			Fines	**98.17**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
28.4	**60**	**28**	**32**	**0.01**

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

USCS: CH

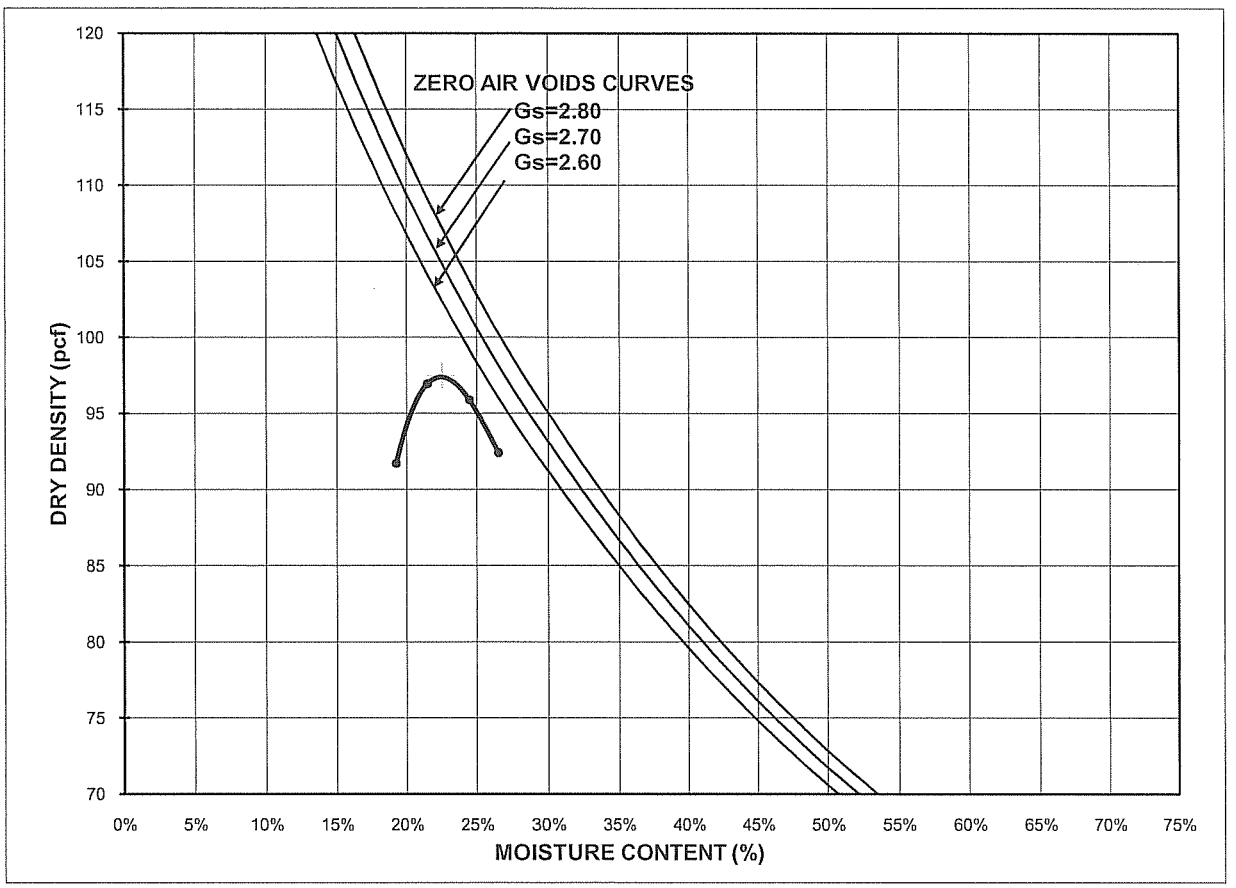
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	PR/TJ
DATE	6/25/09
CHECK	AIL
REVIEW	PWM

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
PROJECT NUMBER: 093-90145
SAMPLE ID: MSCOLF TP-4 DEPTH: 0.0-3.0' SAMPLE TYPE: Bulk



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	91.7	19.2%
2	96.9	21.5%
3	95.9	24.5%
4	92.4	26.6%

Maximum Dry Density (pcf)	97.5
Optimum Moisture (%)	22.5
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	28.4%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

USCS: CH

CHECK: AK
REVIEW: MWM

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	6
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	MSCOLF TP-4 0.0-3.0'	Flow Pump Speed	10
SAMPLE TYPE	Bulk	Technician	AK

COMMENTS: The sample was remolded to 95.9% of the Maximum Dry Density and OPTM + 1.9% (using ASTM D 698).

Sample Data, Initial			
Height, inches	3.007	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	90.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.25	Top Pres.	80.0
Mass, g	561.29	Tot. B.P.	80.0
Moisture Content, %	24.41	Head, max.	124.50
Dry Density, pcf	93.45	Head, min.	124.50
Spec. Gravity	2.708	Max. Grad.	15.99
Volume Solids, cm³	166.61	Min. Grad.	15.99
Volume Voids, cm³	134.65		
Void Ratio	0.81		
Saturation, %	81.8%		

Sample Data, Final	
Height, inches	3.065
Diameter, inches	2.798
Area, cm²	39.67
Volume, cm³	308.83
Mass, g	586.25
Moisture Content, %	29.94
Dry Density, pcf	91.16
Volume Solids, cm³	166.61
Volume Voids, cm³	142.22
Void Ratio	0.85
Saturation, %	95.0%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	561.29	594.65
Wt Soil & Tare, f	g	451.17	459.57
Wt Tare	g	0.00	8.41
Wt Moisture Lost	g	110.12	135.08
Wt Dry Soil	g	451.17	451.16
Water Content	%	24.41%	29.94%

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/28/09	39992	15	45	20.3	0	0	0	0	1.77	124.50	15.99	3.5E-08
06/28/09	39992	15	50	20.3	5	5	300	300	1.77	124.50	15.99	3.5E-08
06/28/09	39992	15	55	20.3	5	10	300	600	1.77	124.50	15.99	3.5E-08
06/28/09	39992	16	0	20.3	5	15	300	900	1.77	124.50	15.99	3.5E-08 *
06/28/09	39992	16	5	20.3	5	20	300	1200	1.77	124.50	15.99	3.5E-08 *
06/28/09	39992	16	10	20.3	5	25	300	1500	1.77	124.50	15.99	3.5E-08 *
06/28/09	39992	16	15	20.3	5	30	300	1800	1.77	124.50	15.99	3.5E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.5E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 6/28/09

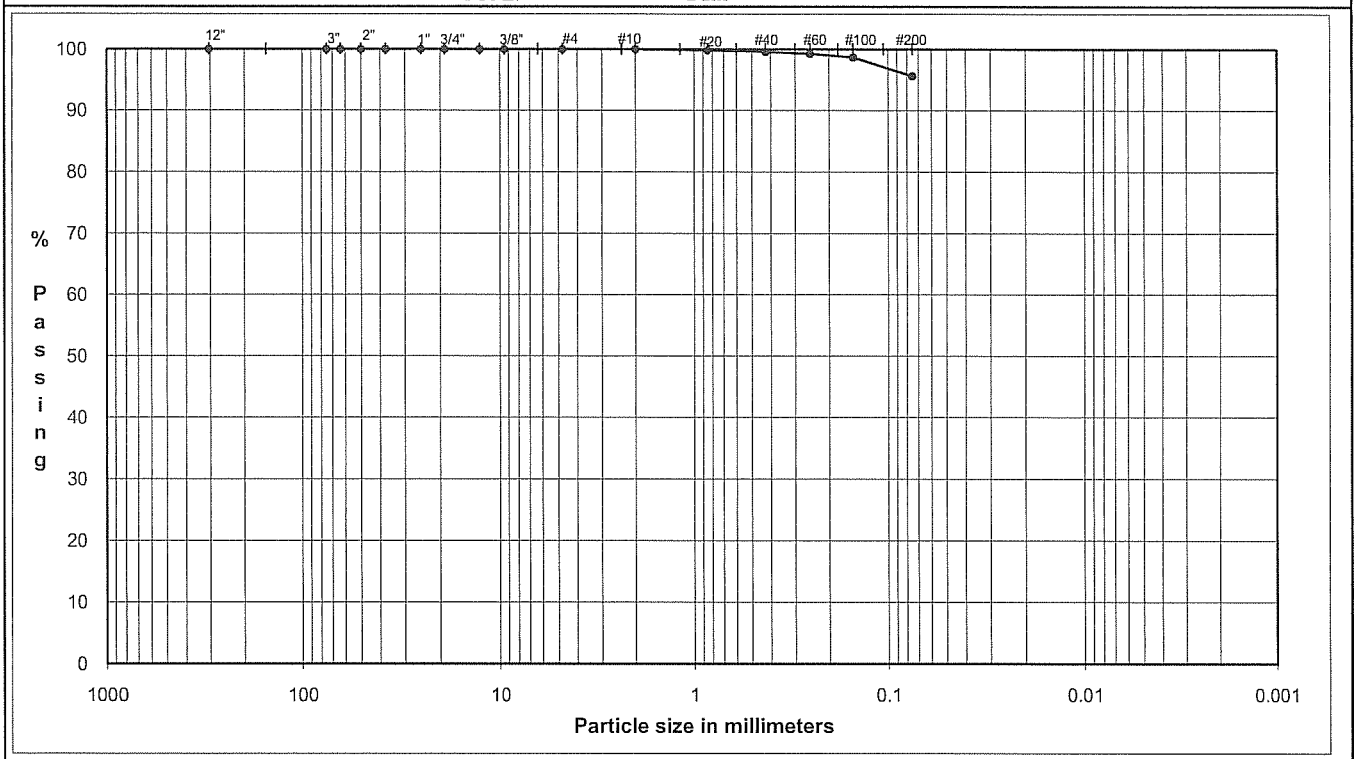
CHECK AK

REVIEW RWL

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

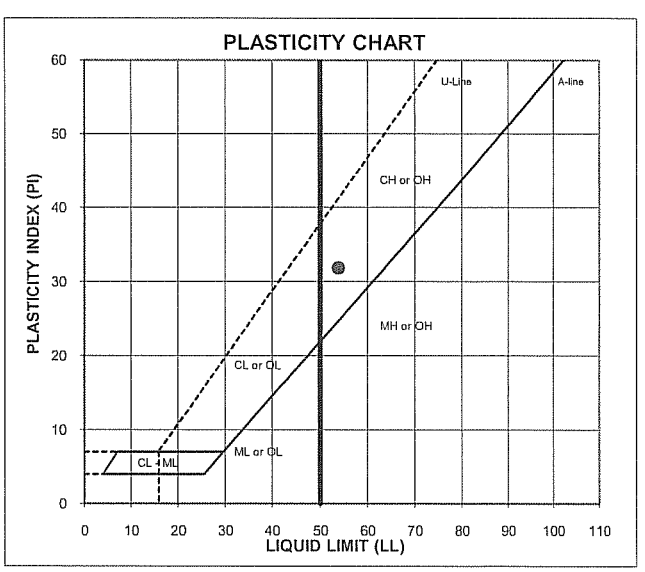
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-5 Depth: 0.0-3.0'
TYPE: Bulk



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.00**
#20	0.85	**99.8**		
#40	0.43	**99.6**	Medium Sand	**0.41**
#60	0.25	**99.3**		
#100	0.15	**98.7**		
#200	0.075	**95.6**	Fine Sand	**3.96**
			Fines	**95.62**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
27.3	54	22	32	0.17

DESCRIPTION: Grayish Brown, SILTY CLAY, trace fine sand.

USCS: CH

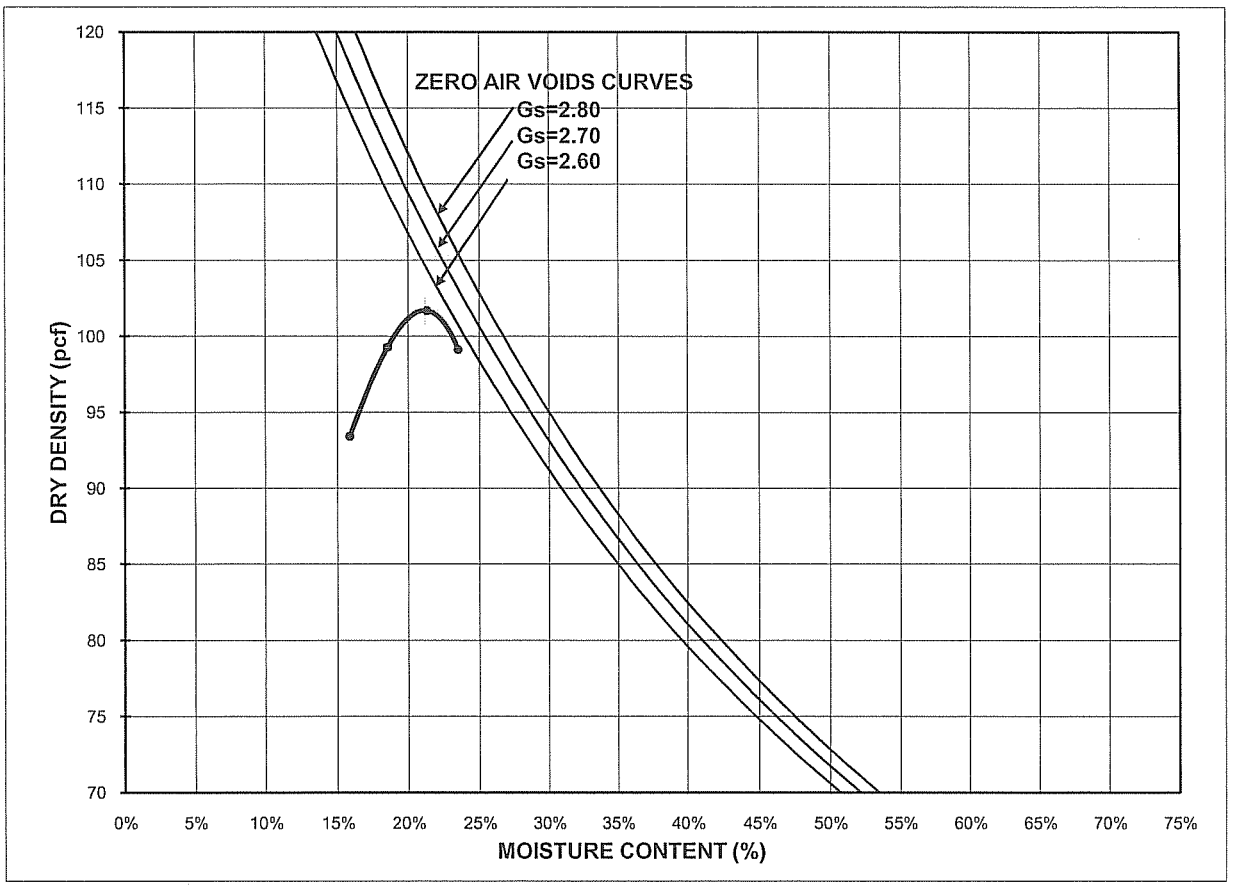
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH TJ/PR
DATE 6/25/09
CHECK AK
REVIEW

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
PROJECT NUMBER: **093-90145**
SAMPLE ID: **MSCOLF TP-5** DEPTH: **0.0-3.0'** SAMPLE TYPE: **Bulk**



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	93.4	15.9%
2	99.3	18.5%
3	101.7	21.3%
4	99.1	23.5%

Maximum Dry Density (pcf)	**101.7**
Optimum Moisture (%)	**21.2**
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	**27.3%**
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION Grayish Brown, SILTY CLAY, trace fine sand.

USCS CH

CHECK AK
REVIEW

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	6	COMMENTS: The sample was remolded to 95.2% of the Maximum Dry Density and OPTM + 2.4% (using ASTM D 698).
PROJECT NUMBER	093-90145		Flow Pump	2	
SAMPLE ID	MSCOLF TP-5	0.0-3.0'	Flow Pump Speed	10	
SAMPLE TYPE	Bulk		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.001	B-Value, f	1.00	Height, inches	3.040
Diameter, inches	2.790	Cell Pres.	90.0	Diameter, inches	2.803
Area, cm²	39.44	Bot. Pres.	80.0	Area, cm²	39.81
Volume, cm³	300.65	Top Pres.	80.0	Volume, cm³	307.40
Mass, g	576.53	Tot. B.P.	80.0	Mass, g	594.48
Moisture Content, %	23.58	Head, max.	209.61	Moisture Content, %	27.43
Dry Density, pcf	96.82	Head, min.	209.61	Dry Density, pcf	94.70
Spec. Gravity(assumed)	2.700	Max. Grad.	27.15	Volume Solids, cm³	172.78
Volume Solids, cm³	172.78	Min. Grad.	27.15	Volume Voids, cm³	134.62
Volume Voids, cm³	127.87			Void Ratio	0.78
Void Ratio	0.74			Saturation, %	95.1%
Saturation, %	86.0%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	576.53	602.52
Wt Soil & Tare, f	g	466.51	474.60
Wt Tare	g	0.00	8.28
Wt Moisture Lost	g	110.02	127.92
Wt Dry Soil	g	466.51	466.32
Water Content	%	23.58%	27.43%

DESCRIPTION: Grayish Brown, SILTY CLAY, trace fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/30/09	39994	12	30	20.4	0	0	0	0	2.98	209.61	27.15	2.1E-08
06/30/09	39994	12	35	20.4	5	5	300	300	2.98	209.61	27.15	2.1E-08
06/30/09	39994	12	40	20.4	5	10	300	600	2.98	209.61	27.15	2.1E-08
06/30/09	39994	12	45	20.4	5	15	300	900	2.98	209.61	27.15	2.1E-08 *
06/30/09	39994	12	50	20.4	5	20	300	1200	2.98	209.61	27.15	2.1E-08 *
06/30/09	39994	12	55	20.4	5	25	300	1500	2.98	209.61	27.15	2.1E-08 *
06/30/09	39994	13	0	20.4	5	30	300	1800	2.98	209.61	27.15	2.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 2.1E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 6/30/09

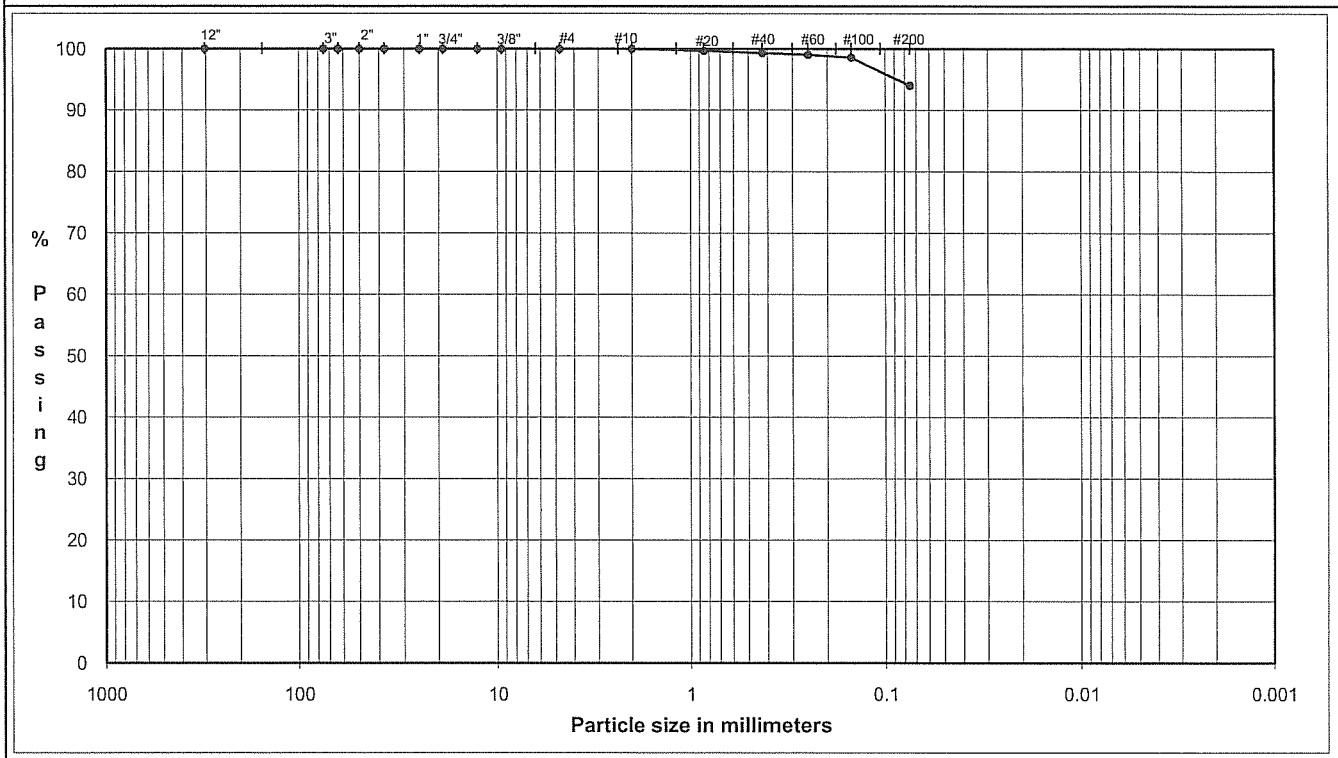
CHECK AK

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

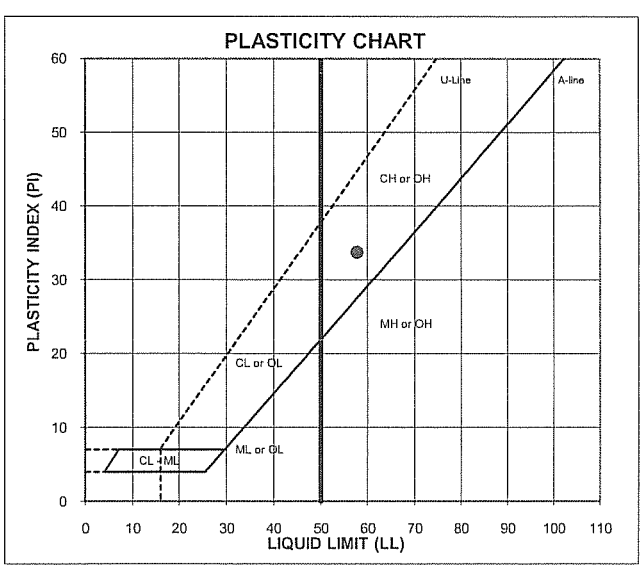
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-6 Depth: 0.0-3.0'
TYPE: Bulk



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.04**
#20	0.85	**99.6**		
#40	0.43	**99.3**	Medium Sand	**0.64**
#60	0.25	**99.0**		
#100	0.15	**98.6**		
#200	0.075	**94.0**	Fine Sand	**5.31**
			Fines	**94.01**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.3	58	24	34	0.00

DESCRIPTION: Gtayish Brown, SILTY CLAY, little medium to fine sand.
USCS: CH

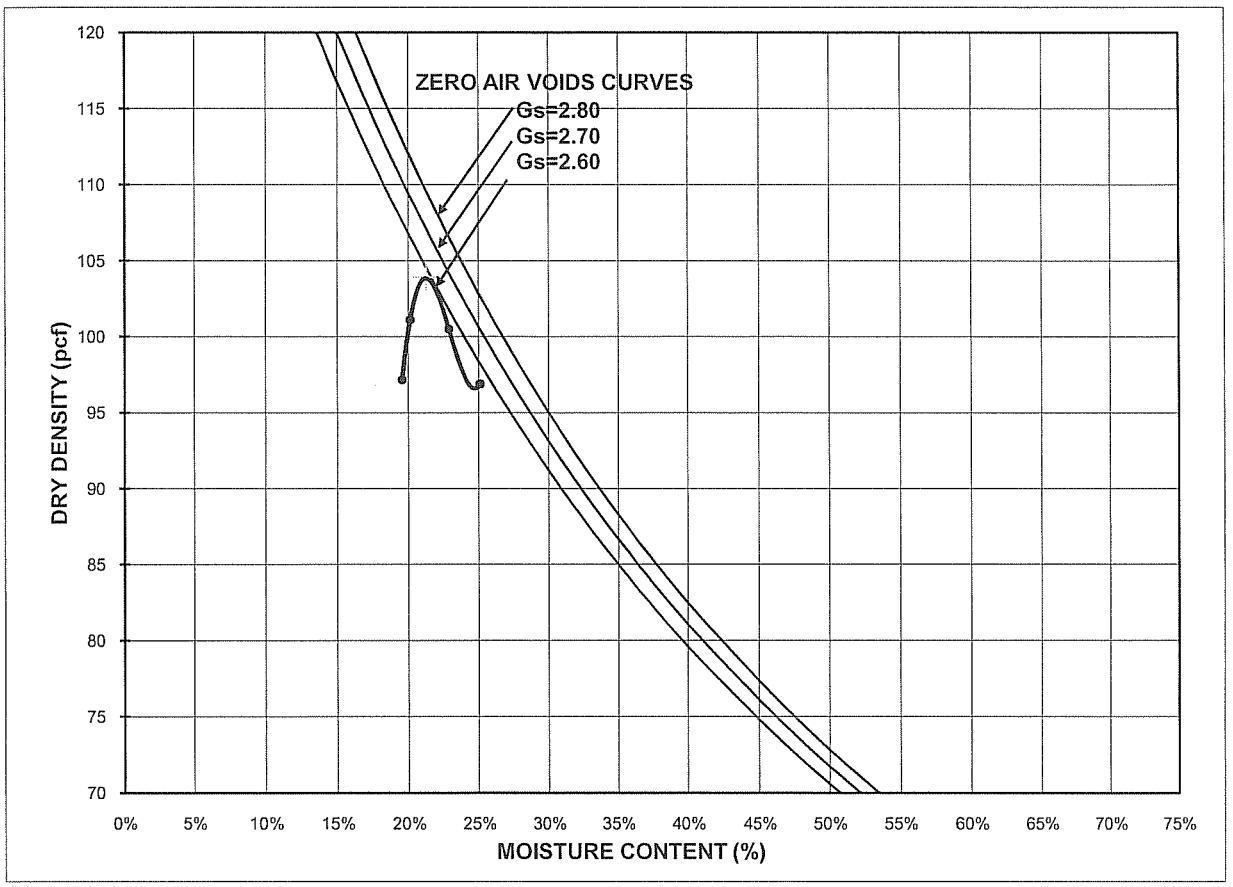
LL (oven-dried) / < 0.75 - ORGANIC (OL/OH)

TECH TJ/PR
DATE 6/25/09
CHECK
REVIEW

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
PROJECT NUMBER: 093-90145
SAMPLE ID: MSCOLF TP-6 DEPTH: 0.0-3.0' SAMPLE TYPE: Bulk



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	97.2	19.6%
2	101.1	20.1%
3	100.5	22.9%
4	96.9	25.1%

Maximum Dry Density (pcf)	103.9
Optimum Moisture (%)	21.3
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	24.3%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION: Gtayish Brown, SILTY CLAY, little medium to fine sand.

USCS: CH

CHECK: AR
REVIEW: [signature]

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	7
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	MSCOLF TP-6 0.0-3.0'	Flow Pump Speed	12
SAMPLE TYPE	Bulk	Technician	TW

COMMENTS: The sample was remolded to 95.2% of the Maximum Dry Density and OPTM + 2.9% (using ASTM D 698).

Sample Data, Initial			
Height, inches	3.002	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	90.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.75	Top Pres.	80.0
Mass, g	591.64	Tot. B.P.	80.0
Moisture Content, %	24.16	Head, max.	142.09
Dry Density, pcf	98.87	Head, min.	142.09
Spec. Gravity(assumed)	2.700	Max. Grad.	18.25
Volume Solids, cm³	176.48	Min. Grad.	18.25
Volume Voids, cm³	124.27		
Void Ratio	0.70		
Saturation, %	92.6%		

Sample Data, Final	
Height, inches	3.066
Diameter, inches	2.812
Area, cm²	40.07
Volume, cm³	312.03
Mass, g	606.49
Moisture Content, %	27.28
Dry Density, pcf	95.29
Volume Solids, cm³	176.48
Volume Voids, cm³	135.54
Void Ratio	0.77
Saturation, %	95.9%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	591.64	614.23
Wt Soil & Tare, f	g	476.51	484.36
Wt Tare	g	0.00	8.26
Wt Moisture Lost	g	115.13	129.87
Wt Dry Soil	g	476.51	476.10
Water Content	%	24.16%	27.28%

DESCRIPTION: Gtayish Brown, SILTY CLAY, little medium to fine sand.

Flow Pump Rate: 4.35E-06 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/30/09	39994	13	25	20.4	0	0	0	0	2.02	142.09	18.25	5.9E-09
06/30/09	39994	13	30	20.4	5	5	300	300	2.02	142.09	18.25	5.9E-09
06/30/09	39994	13	35	20.4	5	10	300	600	2.02	142.09	18.25	5.9E-09
06/30/09	39994	13	40	20.4	5	15	300	900	2.02	142.09	18.25	5.9E-09 *
06/30/09	39994	13	45	20.4	5	20	300	1200	2.02	142.09	18.25	5.9E-09 *
06/30/09	39994	13	50	20.4	5	25	300	1500	2.02	142.09	18.25	5.9E-09 *
06/30/09	39994	13	55	20.4	5	30	300	1800	2.02	142.09	18.25	5.9E-09 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.9E-09 cm/sec **

PERMEANT: Deaired Tap Water

DATE 6/30/09
CHECK AL
REVIEW

APPENDIX F

Clay Liner Material Construction Reports

FTN/MISSISSIPPI COUNTY LF-CELL 14/AR
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
MSCOLF TP-1	Bulk	0.0-3.0'	CH	35.2	63	28	35	0.21	100.0	97.9	-	93.4	25.5	-	27.7	88.9	4.3E-08	-
MSCOLF TP-2	Bulk	0.0-3.0'	CH	37.5	63	26	37	0.31	100.0	95.5	-	94.2	23.0	-	25.4	90.4	4.9E-08	-
MSCOLF TP-3	Bulk	0.0-3.0'	CH	32.5	65	32	33	0.03	100.0	97.7	-	97.2	22.6	2.72	24.6	93.2	3.1E-08	-
MSCOLF TP-4	Bulk	0.0-3.0'	CH	28.4	60	28	32	0.01	100.0	98.2	-	97.5	22.5	2.71	24.4	93.5	3.5E-08	-
MSCOLF TP-5	Bulk	0.0-3.0'	CH	27.3	54	22	32	0.17	100.0	95.6	-	101.7	21.2	-	23.6	96.8	2.1E-08	-
MSCOLF TP-6	Bulk	0.0-3.0'	CH	24.3	58	24	34	0.00	100.0	94.0	-	103.9	21.3	-	24.2	98.9	5.9E-09	-

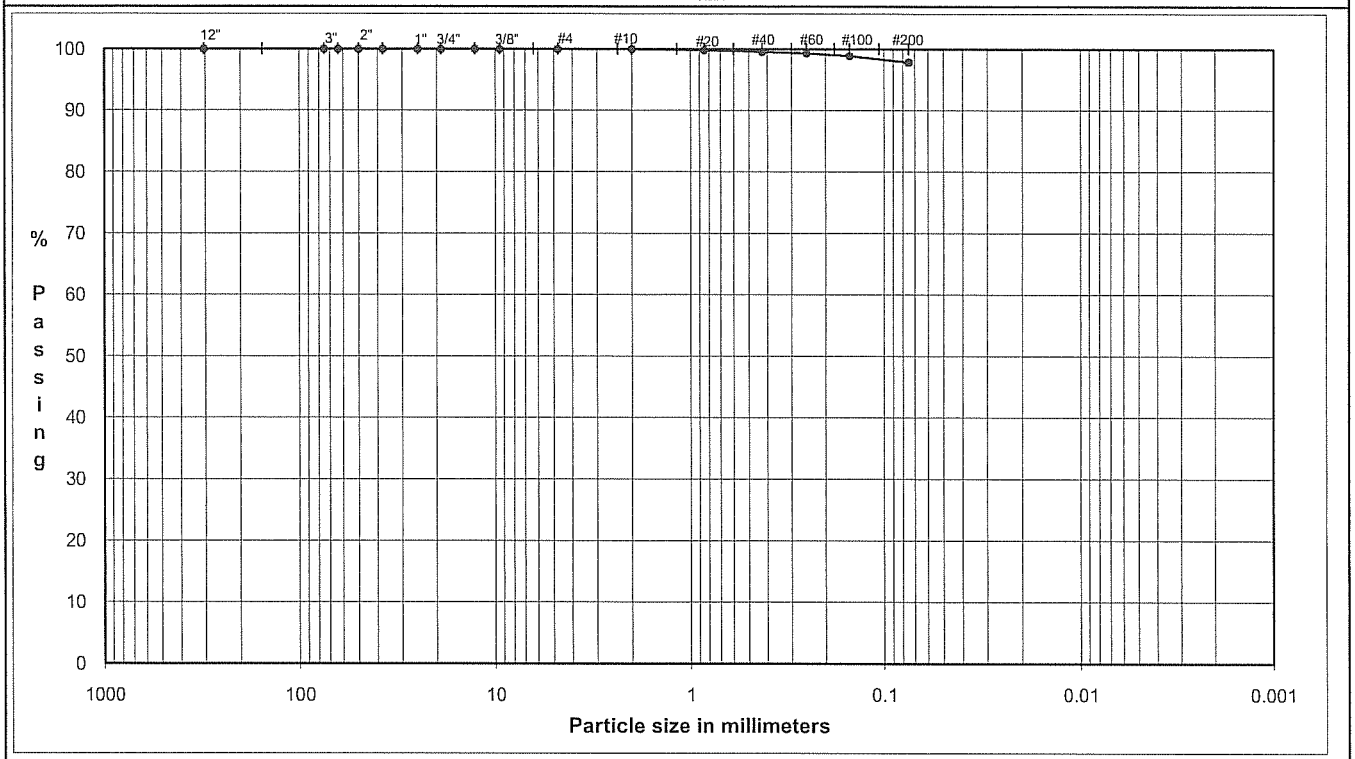
ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

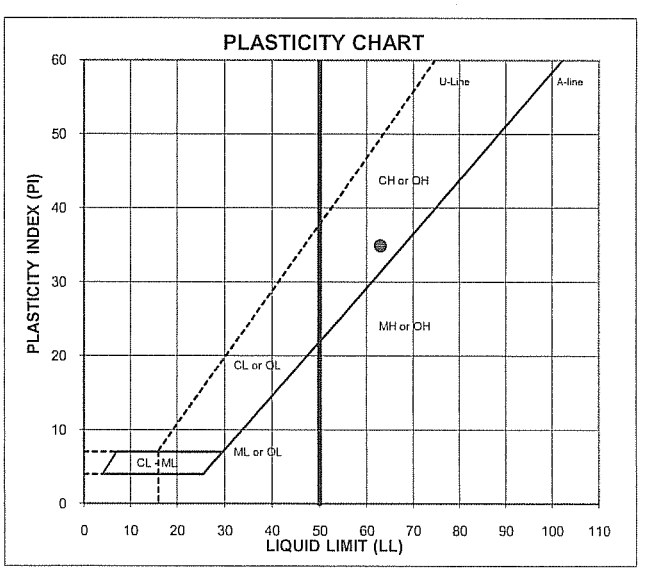
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-1 Depth: 0.0-3.0'
TYPE: Bulk



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.03**
#20	0.85	**99.8**		
#40	0.43	**99.6**	Medium Sand	**0.41**
#60	0.25	**99.3**		
#100	0.15	**98.9**		
#200	0.075	**97.9**	Fine Sand	**1.69**
			Fines	**97.87**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
35.2	63	28	35	0.21

DESCRIPTION: Grayish Brown, SILTY CLAY, trace medium to fine sand.
USCS: CH

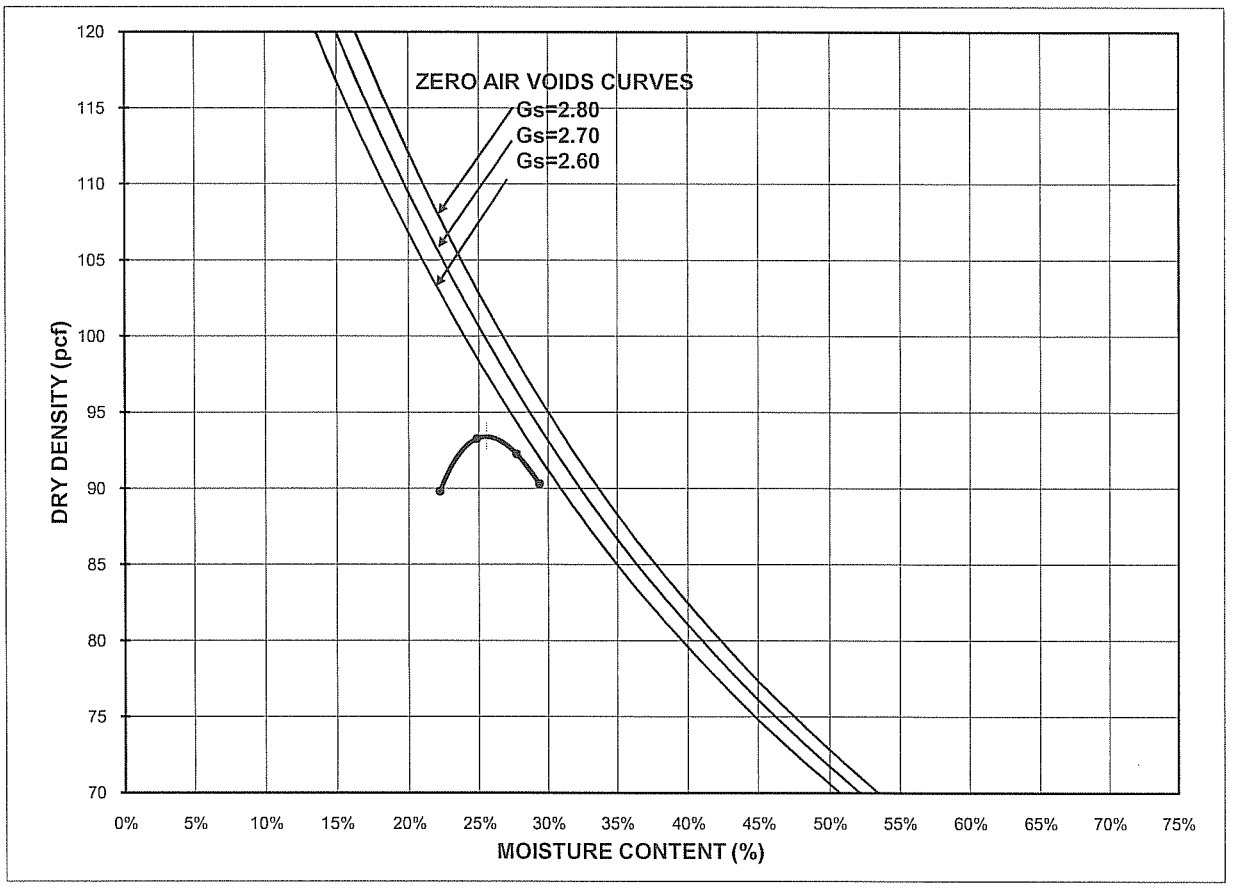
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	TJ/PR
DATE	6/25/09
CHECK	MK
REVIEW	PWM

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
PROJECT NUMBER: **093-90145**
SAMPLE ID: **MSCOLF TP-1** DEPTH: **0.0-3.0'** SAMPLE TYPE: **Bulk**



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	89.8	22.2%
2	93.3	24.8%
3	92.3	27.7%
4	90.3	29.4%

Maximum Dry Density (pcf)	93.5
Optimum Moisture (%)	25.5
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	35.2%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION Grayish Brown, SILTY CLAY, trace medium to fine sand.

USCS CH

CHECK AK
REVIEW PWM

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	5	COMMENTS: The sample was remolded to 95.2% of the Maximum Dry Density and OPTM + 2.2% (using ASTM D 698).
PROJECT NUMBER	093-90145		Flow Pump	2	
SAMPLE ID	MSCOLF TP-1	0.0-3.0'	Flow Pump Speed	10	
SAMPLE TYPE	Bulk		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.998	B-Value, f	0.96	Height, inches	3.035
Diameter, inches	2.790	Cell Pres.	90.0	Diameter, inches	2.824
Area, cm²	39.44	Bot. Pres.	80.0	Area, cm²	40.41
Volume, cm³	300.35	Top Pres.	80.0	Volume, cm³	311.52
Mass, g	546.46	Tot. B.P.	80.0	Mass, g	572.18
Moisture Content, %	27.70	Head, max.	99.88	Moisture Content, %	33.71
Dry Density, pcf	88.91	Head, min.	99.88	Dry Density, pcf	85.72
Spec. Gravity(assumed)	2.700	Max. Grad.	12.96	Volume Solids, cm³	158.49
Volume Solids, cm³	158.49	Min. Grad.	12.96	Volume Voids, cm³	153.02
Volume Voids, cm³	141.86			Void Ratio	0.97
Void Ratio	0.90			Saturation, %	94.3%
Saturation, %	83.6%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	546.46	580.22
Wt Soil & Tare, f	g	427.93	436.03
Wt Tare	g	0.00	8.26
Wt Moisture Lost	g	118.53	144.19
Wt Dry Soil	g	427.93	427.77
Water Content	%	27.70%	33.71%

DESCRIPTION: Grayish Brown, SILTY CLAY, trace medium to fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/30/09	39994	9	50	20.4	0	0	0	0	1.42	99.88	12.96	4.3E-08
06/30/09	39994	9	55	20.4	5	5	300	300	1.42	99.88	12.96	4.3E-08
06/30/09	39994	10	0	20.4	5	10	300	600	1.42	99.88	12.96	4.3E-08
06/30/09	39994	10	5	20.4	5	15	300	900	1.42	99.88	12.96	4.3E-08 *
06/30/09	39994	10	10	20.4	5	20	300	1200	1.42	99.88	12.96	4.3E-08 *
06/30/09	39994	10	15	20.4	5	25	300	1500	1.42	99.88	12.96	4.3E-08 *
06/30/09	39994	10	20	20.4	5	30	300	1800	1.42	99.88	12.96	4.3E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.3E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 6/30/09

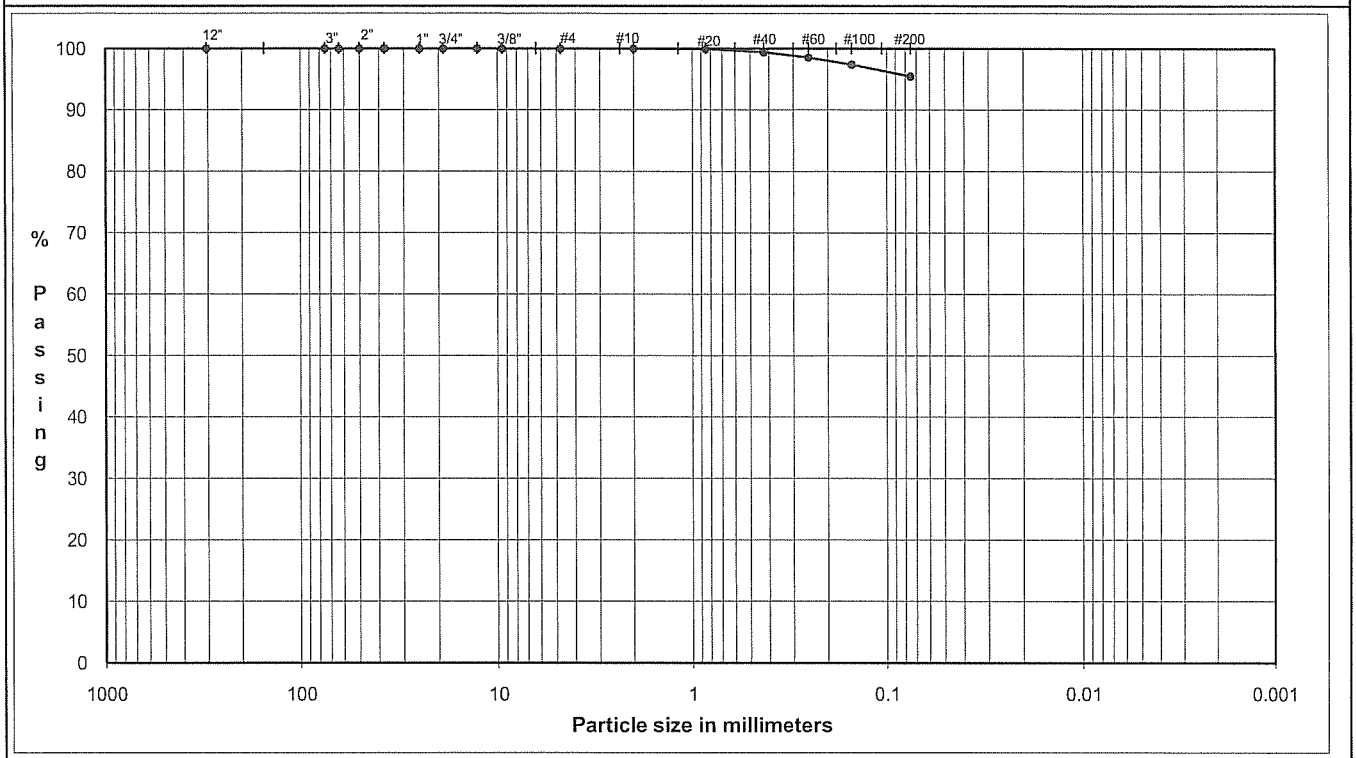
CHECK AK

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

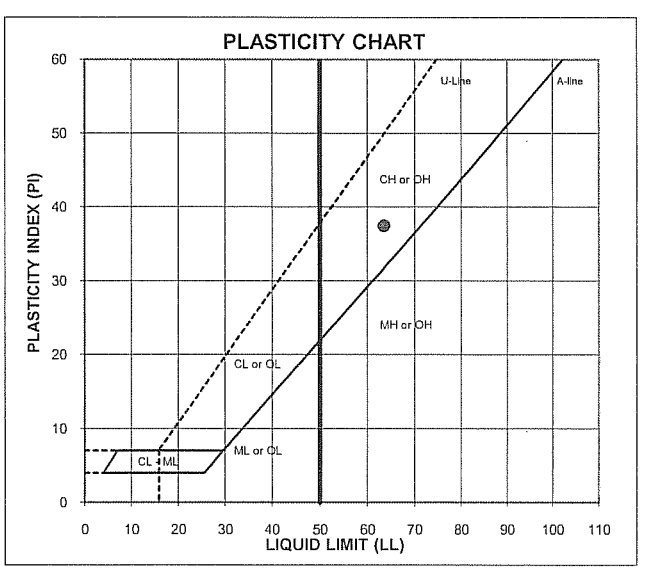
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-2 Depth: 0.0-3.0'
TYPE: Bulk



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.00**
#20	0.85	**99.9**		
#40	0.43	**99.4**	Medium Sand	**0.60**
#60	0.25	**98.5**		
#100	0.15	**97.4**		
#200	0.075	**95.5**	Fine Sand	**3.95**
			Fines	**95.45**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
37.5	63	26	37	0.31

DESCRIPTION: Grayish Brown, SILTY CLAY, trace medium to fine sand.
USCS: CH

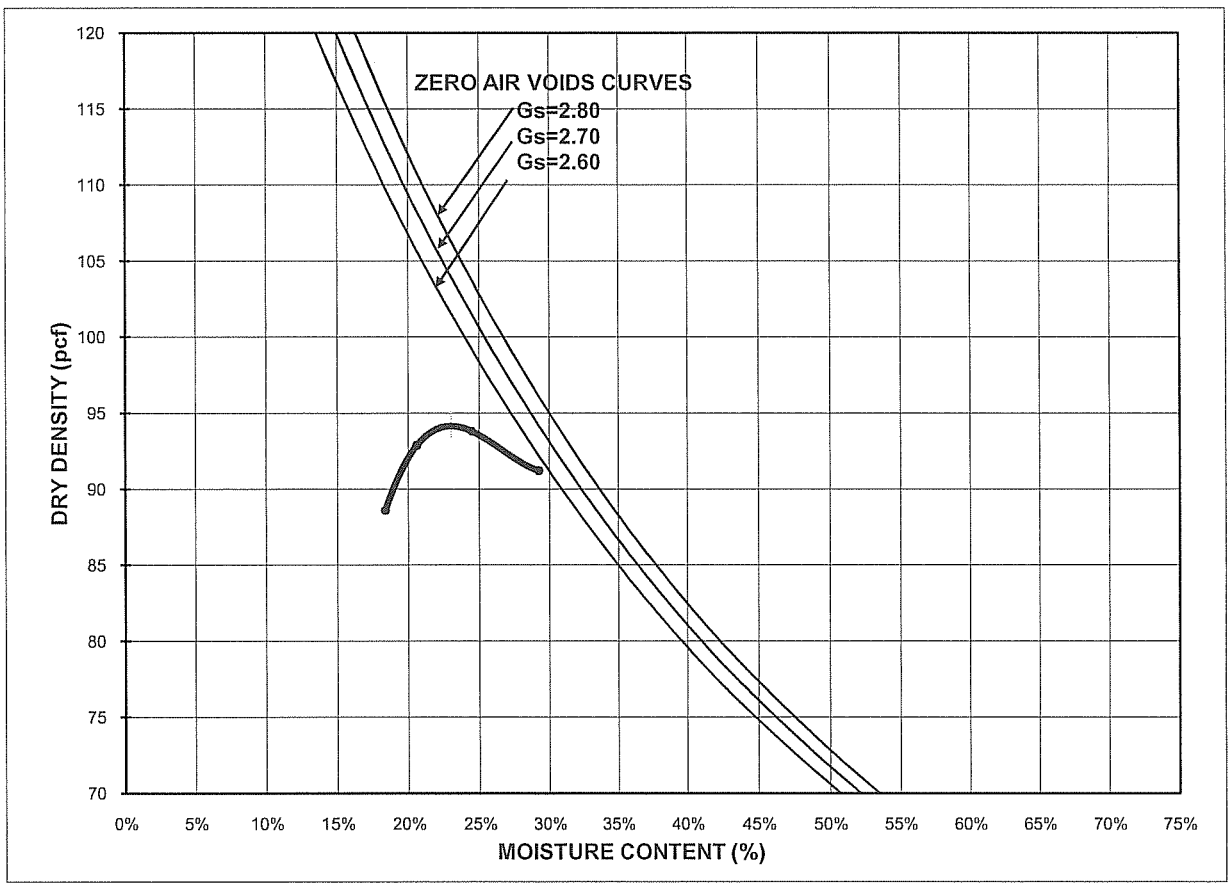
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH PR/TJ
DATE 6/25/09
CHECK AK
REVIEW

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
PROJECT NUMBER: **093-90145**
SAMPLE ID: **MSCOLF TP-2** DEPTH: **0.0-3.0'** SAMPLE TYPE: **Bulk**



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	88.6	18.4%
2	92.9	20.6%
3	93.8	24.5%
4	91.2	29.2%

Maximum Dry Density (pcf)	94.2
Optimum Moisture (%)	23.0
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	37.5%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION Grayish Brown, SILTY CLAY, trace medium to fine sand.

USCS CH

CHECK AK
REVIEW [illegible]

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	9
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	MSCOLF TP-2 0.0-3.0'	Flow Pump Speed	10
SAMPLE TYPE	Bulk	Technician	TW

COMMENTS: The sample was remolded to 96.0% of the Maximum Dry Density and OPTM + 2.4% (using ASTM D 698).

Sample Data, Initial			
Height, inches	3.007	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	90.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.25	Top Pres.	80.0
Mass, g	547.13	Tot. B.P.	80.0
Moisture Content, %	25.38	Head, max.	90.04
Dry Density, pcf	90.39	Head, min.	90.04
Spec. Gravity(assumed)	2.700	Max. Grad.	11.42
Volume Solids, cm³	161.63	Min. Grad.	11.42
Volume Voids, cm³	139.63		
Void Ratio	0.86		
Saturation, %	79.3%		

Sample Data, Final	
Height, inches	3.104
Diameter, inches	2.797
Area, cm²	39.64
Volume, cm³	312.53
Mass, g	579.86
Moisture Content, %	32.88
Dry Density, pcf	87.13
Volume Solids, cm³	161.63
Volume Voids, cm³	150.91
Void Ratio	0.93
Saturation, %	95.1%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	547.13	587.81
Wt Soil & Tare, f	g	436.39	444.41
Wt Tare	g	0.00	8.24
Wt Moisture Lost	g	110.74	143.40
Wt Dry Soil	g	436.39	436.17
Water Content	%	25.38%	32.88%

DESCRIPTION: Grayish Brown, SILTY CLAY, trace medium to fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/30/09	39994	13	55	20.4	0	0	0	0	1.28	90.04	11.42	4.9E-08
06/30/09	39994	14	0	20.4	5	5	300	300	1.28	90.04	11.42	4.9E-08
06/30/09	39994	14	5	20.4	5	10	300	600	1.28	90.04	11.42	4.9E-08
06/30/09	39994	14	10	20.4	5	15	300	900	1.28	90.04	11.42	4.9E-08 *
06/30/09	39994	14	15	20.4	5	20	300	1200	1.28	90.04	11.42	4.9E-08 *
06/30/09	39994	14	20	20.4	5	25	300	1500	1.28	90.04	11.42	4.9E-08 *
06/30/09	39994	14	25	20.4	5	30	300	1800	1.28	90.04	11.42	4.9E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 4.9E-08 cm/sec **

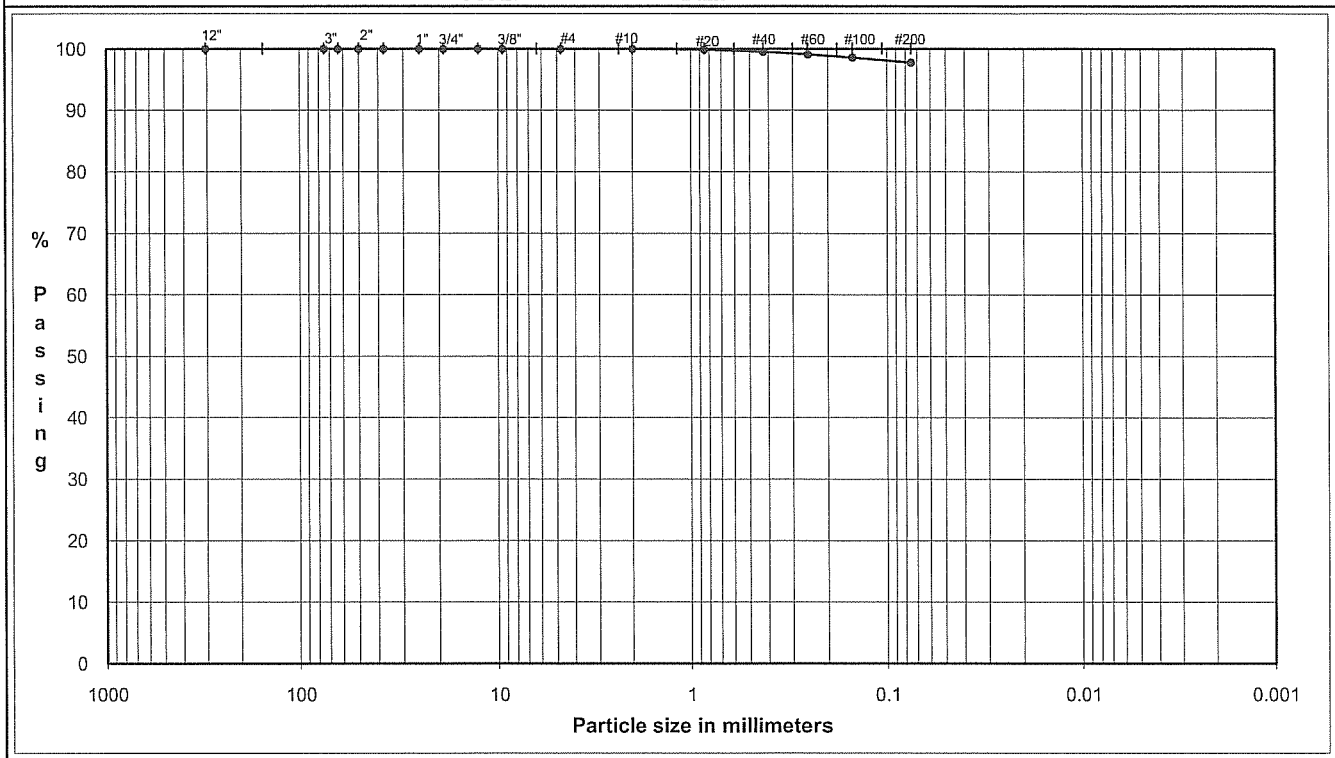
PERMEANT: Deaired Tap Water

DATE 6/30/09
CHECK
REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

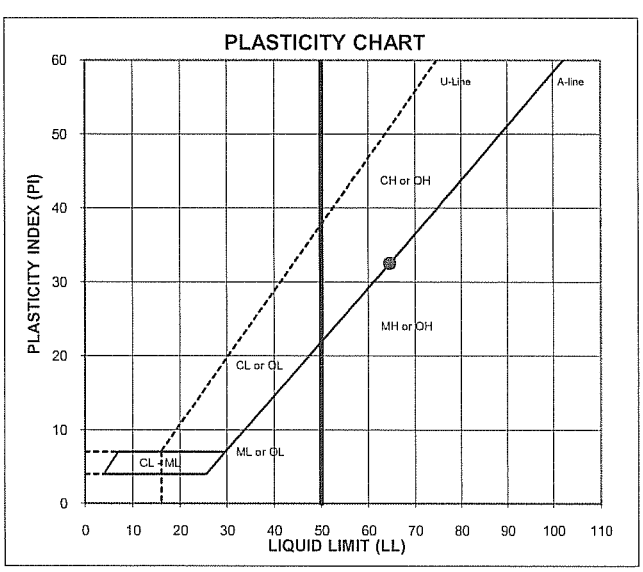
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-3 Depth: 0.0-3.0'
TYPE: Bulk



COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.00**
#20	0.85	**99.9**		
#40	0.43	**99.5**	Medium Sand	**0.48**
#60	0.25	**99.1**		
#100	0.15	**98.6**		
#200	0.075	**97.7**	Fine Sand	**1.80**
			Fines	**97.72**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
32.5	65	32	33	0.03

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

USCS: CH

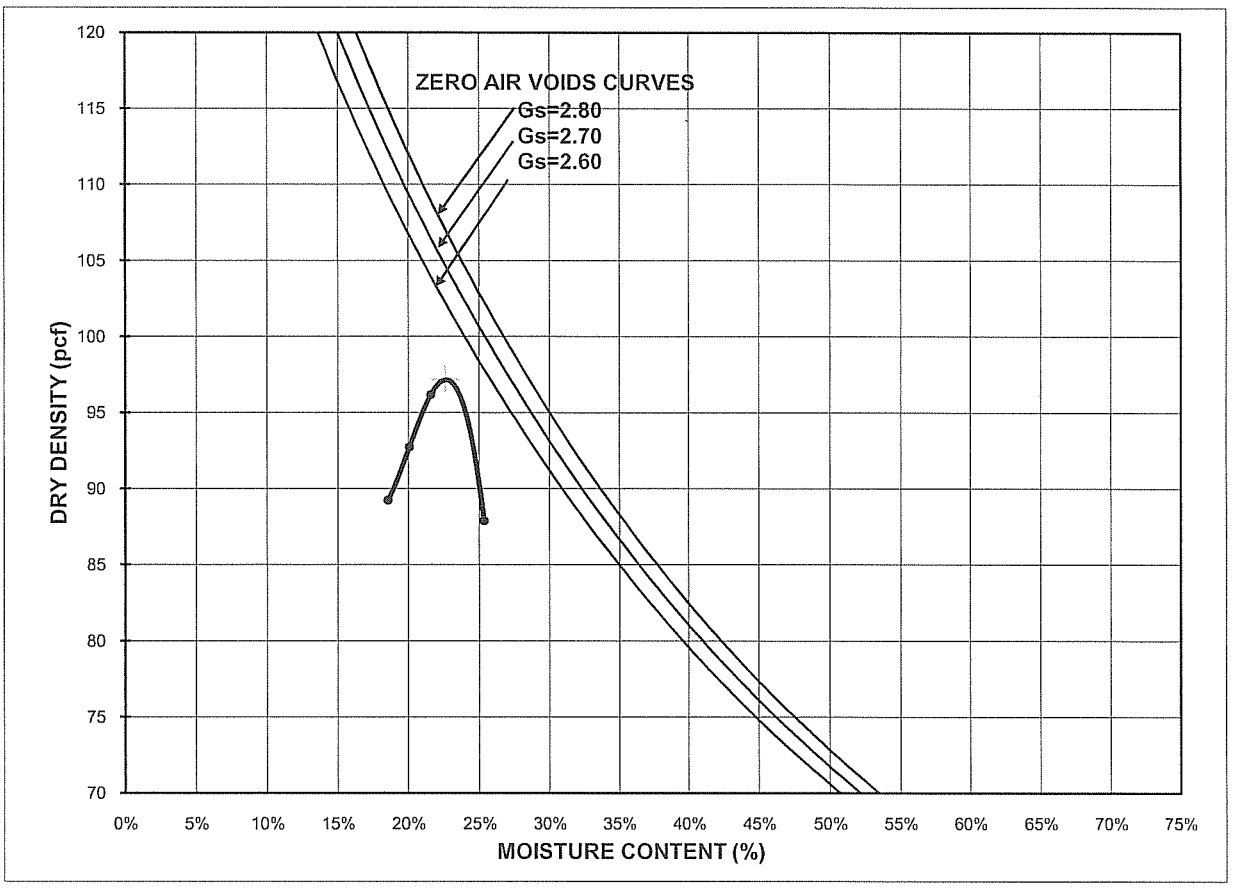
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	PR/TJ
DATE	6/25/09
CHECK	AK
REVIEW	

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
PROJECT NUMBER: **093-90145**
SAMPLE ID: **MSCOLF TP-3** DEPTH: **0.0-3.0'** SAMPLE TYPE: **Bulk**



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	89.2	18.6%
2	92.7	20.1%
3	96.2	21.6%
4	87.9	25.3%

Maximum Dry Density (pcf)	97.2
Optimum Moisture (%)	22.6
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	32.5%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION Gray, SILTY CLAY, trace medium to fine sand.

USCS CH

CHECK AH
REVIEW PWM

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	5
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	MSCOLF TP-3 0.0-3.0'	Flow Pump Speed	10
SAMPLE TYPE	Bulk	Technician	AK

COMMENTS: The sample was remolded to 95.9% of the Maximum Dry Density and OPTM + 2.0% (using ASTM D 698).

Sample Data, Initial			
Height, inches	3.002	B-Value, f	0.96
Diameter, inches	2.790	Cell Pres.	90.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.75	Top Pres.	80.0
Mass, g	559.79	Tot. B.P.	80.0
Moisture Content, %	24.64	Head, max.	144.20
Dry Density, pcf	93.18	Head, min.	144.20
Spec. Gravity	2.721	Max. Grad.	18.45
Volume Solids, cm³	165.05	Min. Grad.	18.45
Volume Voids, cm³	135.70		
Void Ratio	0.82		
Saturation, %	81.6%		

Sample Data, Final	
Height, inches	3.077
Diameter, inches	2.803
Area, cm²	39.81
Volume, cm³	311.15
Mass, g	589.54
Moisture Content, %	31.27
Dry Density, pcf	90.07
Volume Solids, cm³	165.05
Volume Voids, cm³	146.09
Void Ratio	0.89
Saturation, %	96.1%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	559.79	597.97
Wt Soil & Tare, f	g	449.11	457.54
Wt Tare	g	0.00	8.43
Wt Moisture Lost	g	110.68	140.43
Wt Dry Soil	g	449.11	449.11
Water Content	%	24.64%	31.27%

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/28/09	39992	14	25	20.2	0	0	0	0	2.05	144.20	18.45	3.1E-08
06/28/09	39992	14	30	20.2	5	5	300	300	2.05	144.20	18.45	3.1E-08
06/28/09	39992	14	35	20.2	5	10	300	600	2.05	144.20	18.45	3.1E-08
06/28/09	39992	14	40	20.2	5	15	300	900	2.05	144.20	18.45	3.1E-08 *
06/28/09	39992	14	45	20.2	5	20	300	1200	2.05	144.20	18.45	3.1E-08 *
06/28/09	39992	14	50	20.2	5	25	300	1500	2.05	144.20	18.45	3.1E-08 *
06/28/09	39992	14	55	20.2	5	30	300	1800	2.05	144.20	18.45	3.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.1E-08 cm/sec **

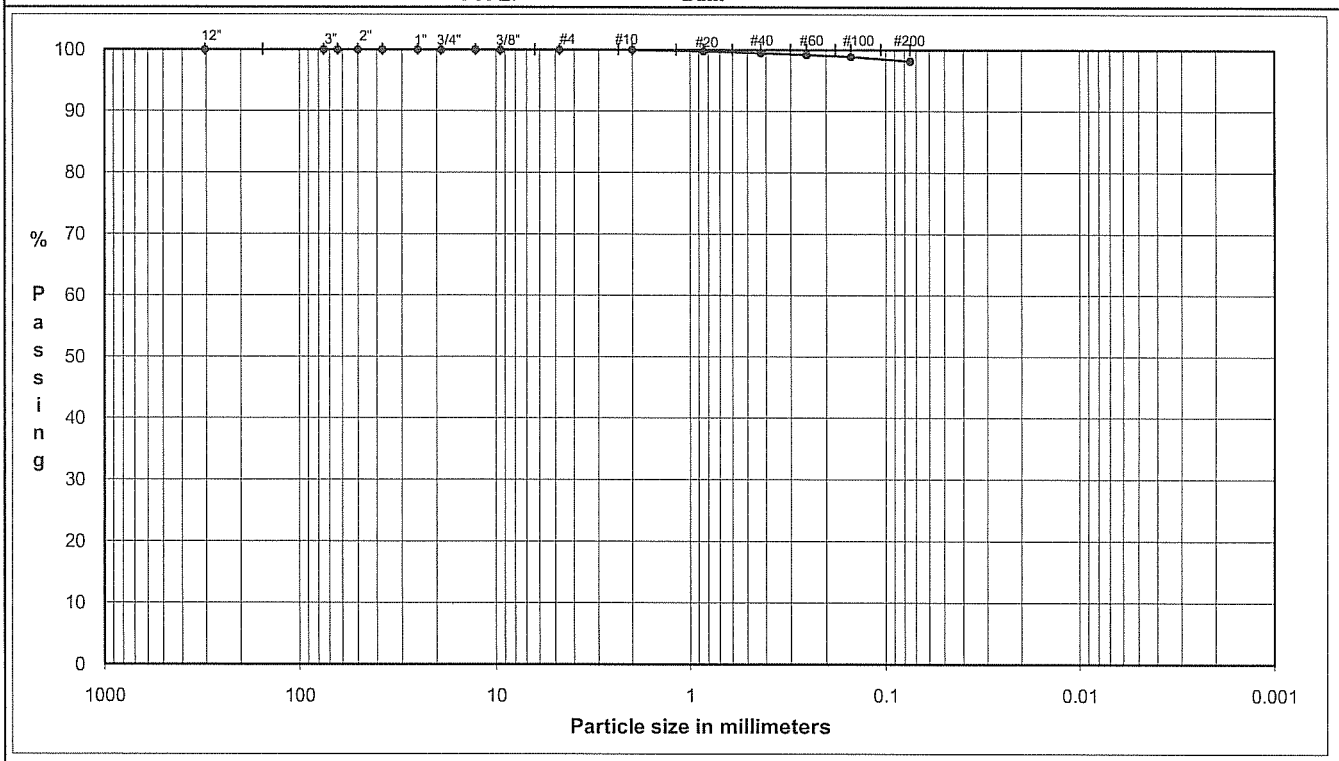
PERMEANT: Deaired Tap Water

DATE 6/28/09
CHECK AK
REVIEW [illegible]

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

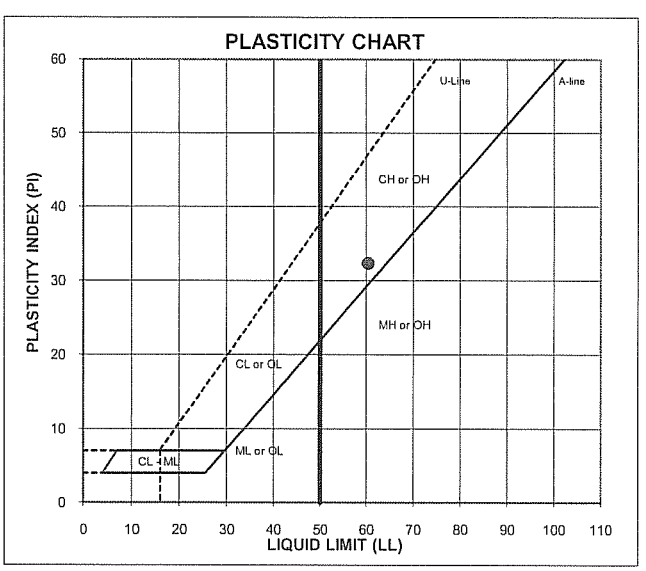
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-4 Depth: 0.0-3.0'
TYPE: Bulk



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.02**
#20	0.85	**99.8**		
#40	0.43	**99.5**	Medium Sand	**0.52**
#60	0.25	**99.2**		
#100	0.15	**98.9**		
#200	0.075	**98.2**	Fine Sand	**1.29**
			Fines	**98.17**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
28.4	**60**	**28**	**32**	**0.01**

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

USCS: CH

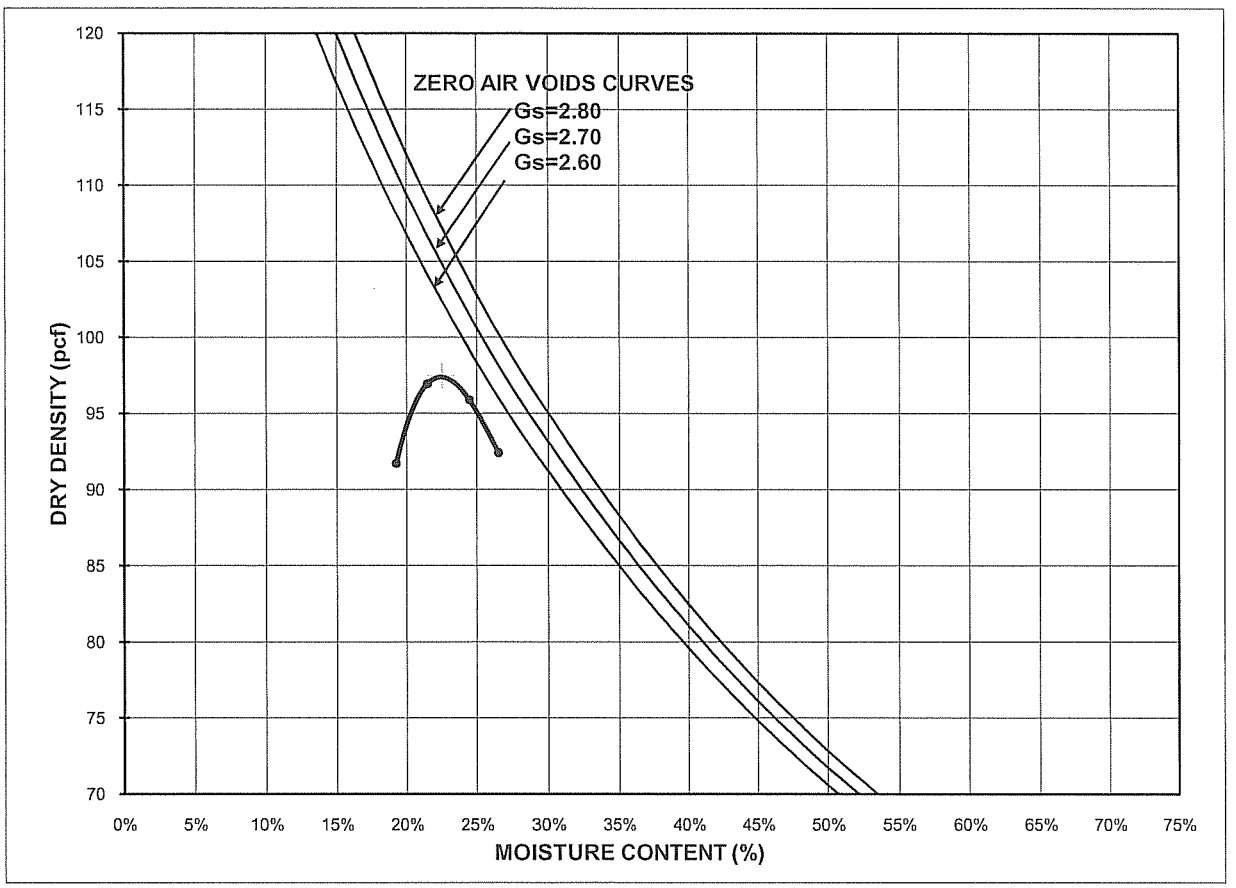
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	PR/TJ
DATE	6/25/09
CHECK	AIL
REVIEW	PWM

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
PROJECT NUMBER: 093-90145
SAMPLE ID: MSCOLF TP-4 DEPTH: 0.0-3.0' SAMPLE TYPE: Bulk



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	91.7	19.2%
2	96.9	21.5%
3	95.9	24.5%
4	92.4	26.6%

Maximum Dry Density (pcf)	97.5
Optimum Moisture (%)	22.5
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	28.4%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

USCS: CH

CHECK: AK
REVIEW: MWM

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	6
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	MSCOLF TP-4 0.0-3.0'	Flow Pump Speed	10
SAMPLE TYPE	Bulk	Technician	AK

COMMENTS: The sample was remolded to 95.9% of the Maximum Dry Density and OPTM + 1.9% (using ASTM D 698).

Sample Data, Initial			
Height, inches	3.007	B-Value, f	0.98
Diameter, inches	2.790	Cell Pres.	90.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	301.25	Top Pres.	80.0
Mass, g	561.29	Tot. B.P.	80.0
Moisture Content, %	24.41	Head, max.	124.50
Dry Density, pcf	93.45	Head, min.	124.50
Spec. Gravity	2.708	Max. Grad.	15.99
Volume Solids, cm³	166.61	Min. Grad.	15.99
Volume Voids, cm³	134.65		
Void Ratio	0.81		
Saturation, %	81.8%		

Sample Data, Final	
Height, inches	3.065
Diameter, inches	2.798
Area, cm²	39.67
Volume, cm³	308.83
Mass, g	586.25
Moisture Content, %	29.94
Dry Density, pcf	91.16
Volume Solids, cm³	166.61
Volume Voids, cm³	142.22
Void Ratio	0.85
Saturation, %	95.0%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	561.29	594.65
Wt Soil & Tare, f	g	451.17	459.57
Wt Tare	g	0.00	8.41
Wt Moisture Lost	g	110.12	135.08
Wt Dry Soil	g	451.17	451.16
Water Content	%	24.41%	29.94%

DESCRIPTION: Gray, SILTY CLAY, trace medium to fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/28/09	39992	15	45	20.3	0	0	0	0	1.77	124.50	15.99	3.5E-08
06/28/09	39992	15	50	20.3	5	5	300	300	1.77	124.50	15.99	3.5E-08
06/28/09	39992	15	55	20.3	5	10	300	600	1.77	124.50	15.99	3.5E-08
06/28/09	39992	16	0	20.3	5	15	300	900	1.77	124.50	15.99	3.5E-08 *
06/28/09	39992	16	5	20.3	5	20	300	1200	1.77	124.50	15.99	3.5E-08 *
06/28/09	39992	16	10	20.3	5	25	300	1500	1.77	124.50	15.99	3.5E-08 *
06/28/09	39992	16	15	20.3	5	30	300	1800	1.77	124.50	15.99	3.5E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 3.5E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 6/28/09

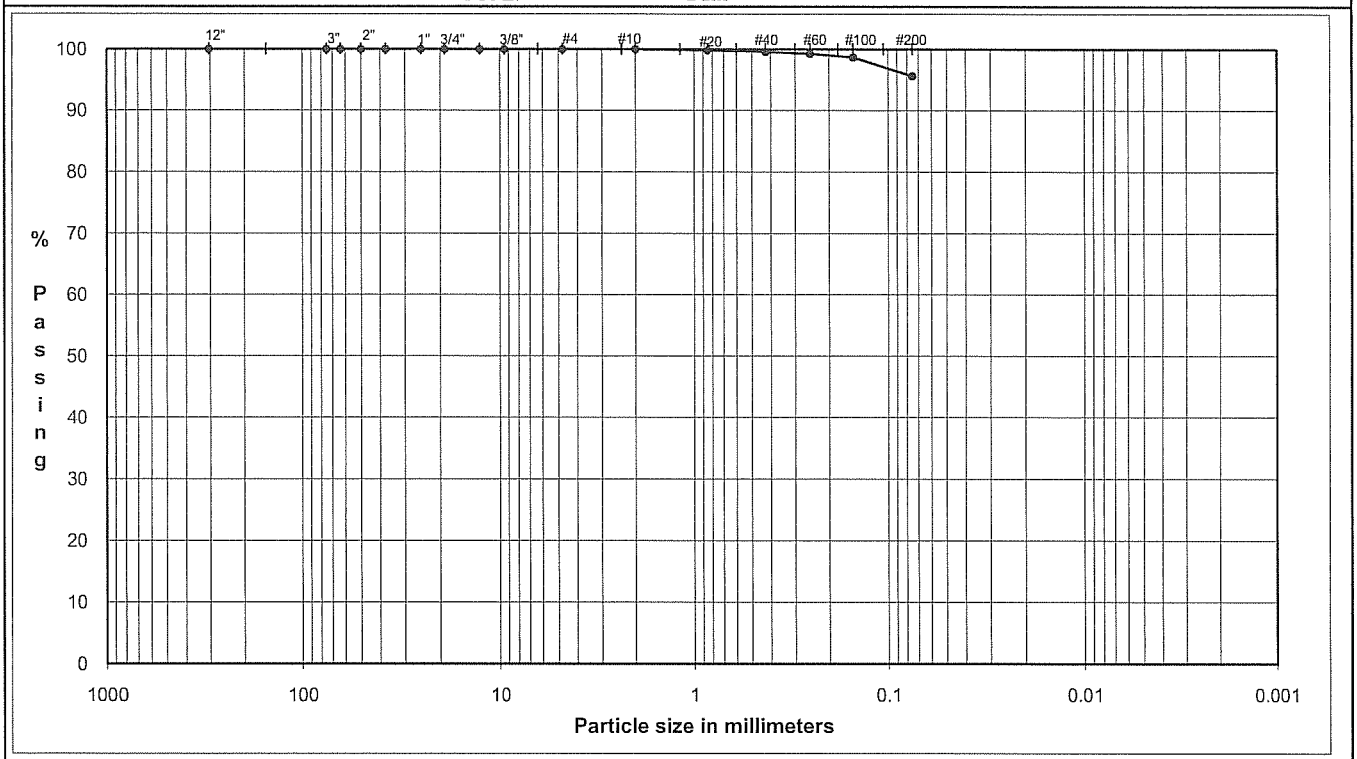
CHECK AK

REVIEW RWL

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

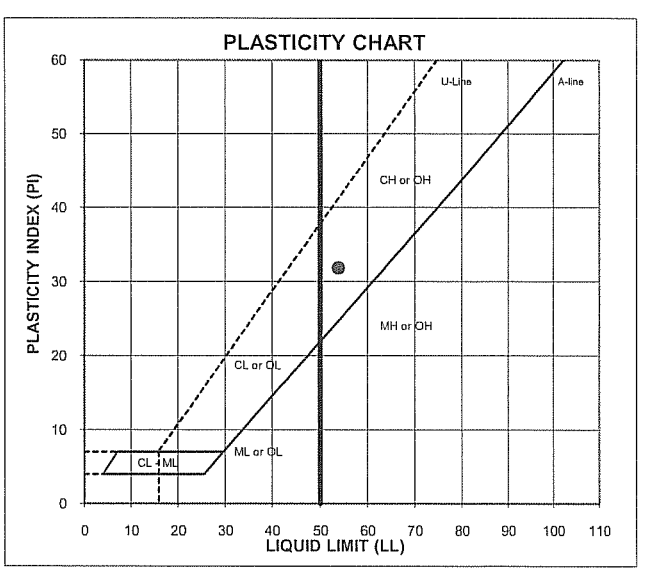
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-5 Depth: 0.0-3.0'
TYPE: Bulk



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.00**
#20	0.85	**99.8**		
#40	0.43	**99.6**	Medium Sand	**0.41**
#60	0.25	**99.3**		
#100	0.15	**98.7**		
#200	0.075	**95.6**	Fine Sand	**3.96**
			Fines	**95.62**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
27.3	54	22	32	0.17

DESCRIPTION: Grayish Brown, SILTY CLAY, trace fine sand.

USCS: CH

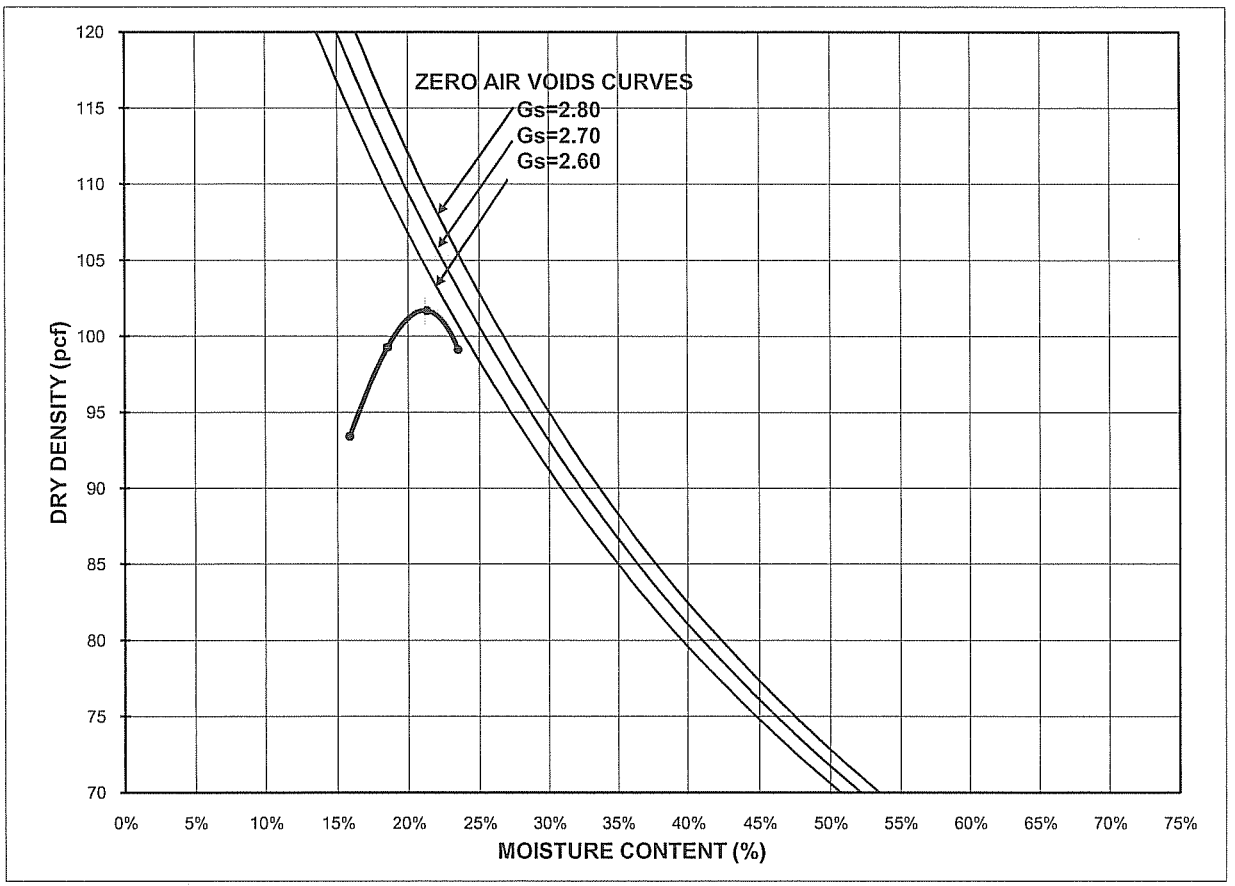
LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH TJ/PR
DATE 6/25/09
CHECK AK
REVIEW

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
PROJECT NUMBER: **093-90145**
SAMPLE ID: **MSCOLF TP-5** DEPTH: **0.0-3.0'** SAMPLE TYPE: **Bulk**



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	93.4	15.9%
2	99.3	18.5%
3	101.7	21.3%
4	99.1	23.5%

Maximum Dry Density (pcf)	**101.7**
Optimum Moisture (%)	**21.2**
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	**27.3%**
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION Grayish Brown, SILTY CLAY, trace fine sand.

USCS CH

CHECK AK
REVIEW

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	6	COMMENTS: The sample was remolded to 95.2% of the Maximum Dry Density and OPTM + 2.4% (using ASTM D 698).
PROJECT NUMBER	093-90145		Flow Pump	2	
SAMPLE ID	MSCOLF TP-5	0.0-3.0'	Flow Pump Speed	10	
SAMPLE TYPE	Bulk		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	3.001	B-Value, f	1.00	Height, inches	3.040
Diameter, inches	2.790	Cell Pres.	90.0	Diameter, inches	2.803
Area, cm²	39.44	Bot. Pres.	80.0	Area, cm²	39.81
Volume, cm³	300.65	Top Pres.	80.0	Volume, cm³	307.40
Mass, g	576.53	Tot. B.P.	80.0	Mass, g	594.48
Moisture Content, %	23.58	Head, max.	209.61	Moisture Content, %	27.43
Dry Density, pcf	96.82	Head, min.	209.61	Dry Density, pcf	94.70
Spec. Gravity(assumed)	2.700	Max. Grad.	27.15	Volume Solids, cm³	172.78
Volume Solids, cm³	172.78	Min. Grad.	27.15	Volume Voids, cm³	134.62
Volume Voids, cm³	127.87			Void Ratio	0.78
Void Ratio	0.74			Saturation, %	95.1%
Saturation, %	86.0%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	576.53	602.52
Wt Soil & Tare, f	g	466.51	474.60
Wt Tare	g	0.00	8.28
Wt Moisture Lost	g	110.02	127.92
Wt Dry Soil	g	466.51	466.32
Water Content	%	23.58%	27.43%

DESCRIPTION: Grayish Brown, SILTY CLAY, trace fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/30/09	39994	12	30	20.4	0	0	0	0	2.98	209.61	27.15	2.1E-08
06/30/09	39994	12	35	20.4	5	5	300	300	2.98	209.61	27.15	2.1E-08
06/30/09	39994	12	40	20.4	5	10	300	600	2.98	209.61	27.15	2.1E-08
06/30/09	39994	12	45	20.4	5	15	300	900	2.98	209.61	27.15	2.1E-08 *
06/30/09	39994	12	50	20.4	5	20	300	1200	2.98	209.61	27.15	2.1E-08 *
06/30/09	39994	12	55	20.4	5	25	300	1500	2.98	209.61	27.15	2.1E-08 *
06/30/09	39994	13	0	20.4	5	30	300	1800	2.98	209.61	27.15	2.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 2.1E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 6/30/09

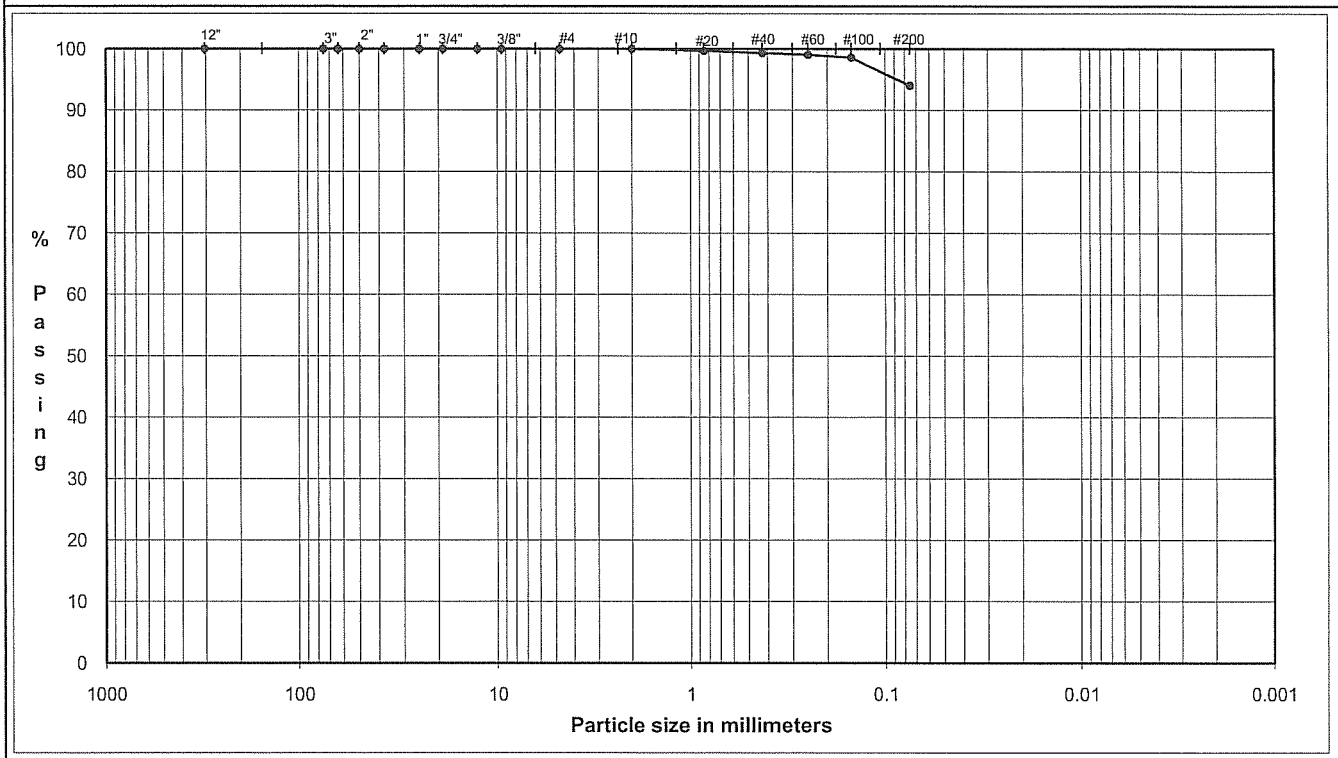
CHECK AK

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

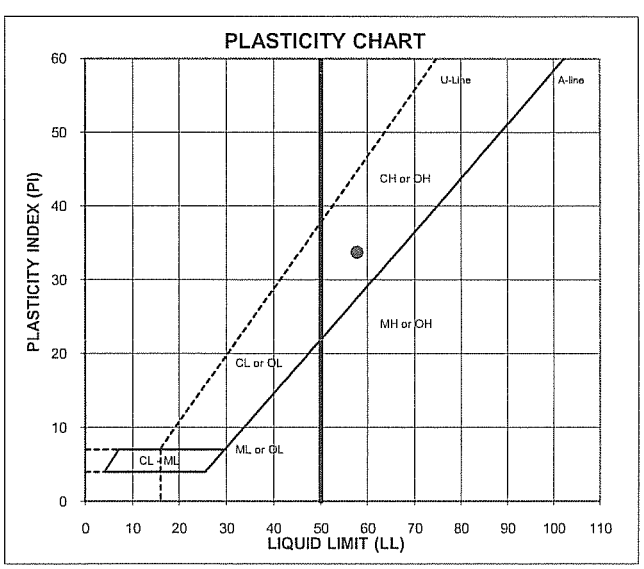
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: MSCOLF TP-6 Depth: 0.0-3.0'
TYPE: Bulk



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**100.0**	Coarse Sand	**0.04**
#20	0.85	**99.6**		
#40	0.43	**99.3**	Medium Sand	**0.64**
#60	0.25	**99.0**		
#100	0.15	**98.6**		
#200	0.075	**94.0**	Fine Sand	**5.31**
			Fines	**94.01**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.3	58	24	34	0.00

DESCRIPTION: Gtayish Brown, SILTY CLAY, little medium to fine sand.
USCS: CH

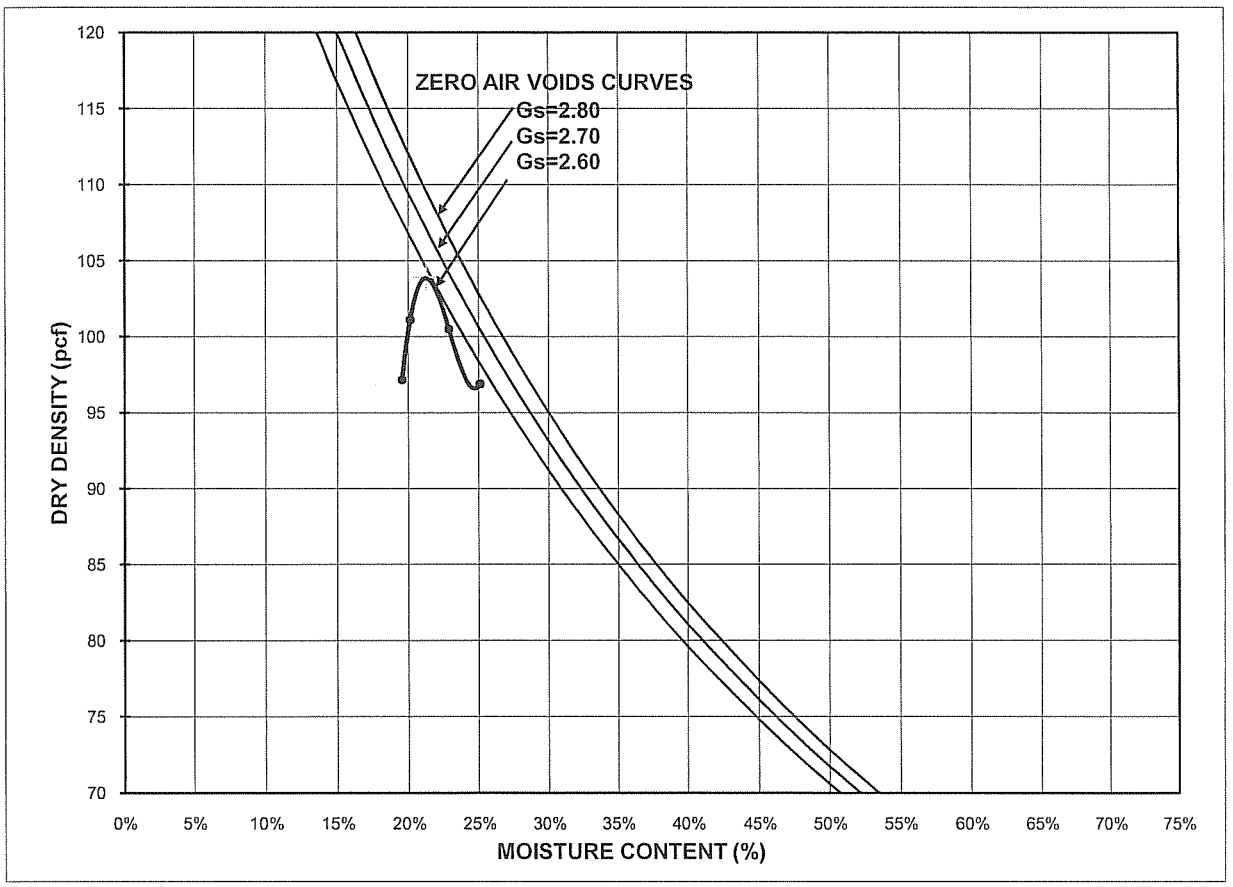
LL (oven-dried) / < 0.75 - ORGANIC (OL/OH)

TECH TJ/PR
DATE 6/25/09
CHECK
REVIEW

MOISTURE / DRY DENSITY CURVE
ASTM D 698 Method A

Mechanical	Standard	Wet Method

PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
PROJECT NUMBER: 093-90145
SAMPLE ID: MSCOLF TP-6 DEPTH: 0.0-3.0' SAMPLE TYPE: Bulk



COMPACTION POINTS		
Specimen Number	Dry Density (pcf)	Moisture Content (%)
1	97.2	19.6%
2	101.1	20.1%
3	100.5	22.9%
4	96.9	25.1%

Maximum Dry Density (pcf)	103.9
Optimum Moisture (%)	21.3
Corrected Maximum Dry Density (pcf)	
Corrected Optimum Moisture (%)	
As-Received Moisture Content	24.3%
% Retained on # 4 sieve	
% Retained on 3/8" sieve	
% Retained on 3/4" sieve	

DESCRIPTION: Gtayish Brown, SILTY CLAY, little medium to fine sand.

USCS: CH

CHECK: AR
REVIEW: [signature]

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	7
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	MSCOLF TP-6 0.0-3.0'	Flow Pump Speed	12
SAMPLE TYPE	Bulk	Technician	TW

COMMENTS: The sample was remolded to 95.2% of the Maximum Dry Density and OPTM + 2.9% (using ASTM D 698).

Sample Data, Initial			
Height, inches	3.002	B-Value, f	0.99
Diameter, inches	2.790	Cell Pres.	90.0
Area, cm²	39.44	Bot. Pres.	80.0
Volume, cm³	300.75	Top Pres.	80.0
Mass, g	591.64	Tot. B.P.	80.0
Moisture Content, %	24.16	Head, max.	142.09
Dry Density, pcf	98.87	Head, min.	142.09
Spec. Gravity(assumed)	2.700	Max. Grad.	18.25
Volume Solids, cm³	176.48	Min. Grad.	18.25
Volume Voids, cm³	124.27		
Void Ratio	0.70		
Saturation, %	92.6%		

Sample Data, Final	
Height, inches	3.066
Diameter, inches	2.812
Area, cm²	40.07
Volume, cm³	312.03
Mass, g	606.49
Moisture Content, %	27.28
Dry Density, pcf	95.29
Volume Solids, cm³	176.48
Volume Voids, cm³	135.54
Void Ratio	0.77
Saturation, %	95.9%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	591.64	614.23
Wt Soil & Tare, f	g	476.51	484.36
Wt Tare	g	0.00	8.26
Wt Moisture Lost	g	115.13	129.87
Wt Dry Soil	g	476.51	476.10
Water Content	%	24.16%	27.28%

DESCRIPTION: Gtayish Brown, SILTY CLAY, little medium to fine sand.

Flow Pump Rate: 4.35E-06 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
06/30/09	39994	13	25	20.4	0	0	0	0	2.02	142.09	18.25	5.9E-09
06/30/09	39994	13	30	20.4	5	5	300	300	2.02	142.09	18.25	5.9E-09
06/30/09	39994	13	35	20.4	5	10	300	600	2.02	142.09	18.25	5.9E-09
06/30/09	39994	13	40	20.4	5	15	300	900	2.02	142.09	18.25	5.9E-09 *
06/30/09	39994	13	45	20.4	5	20	300	1200	2.02	142.09	18.25	5.9E-09 *
06/30/09	39994	13	50	20.4	5	25	300	1500	2.02	142.09	18.25	5.9E-09 *
06/30/09	39994	13	55	20.4	5	30	300	1800	2.02	142.09	18.25	5.9E-09 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 5.9E-09 cm/sec **

PERMEANT: Deaired Tap Water

DATE 6/30/09
CHECK AL
REVIEW

APPENDIX G

Clay Liner Field Test Reports

NUCLEAR DENSITY AND MOISTURE TEST SUMMARY

Project Name: Miss. Cnty LF - Waste Cell 14 Construction

Project Location: Luxora, AR

FTN Project Number: 4355-301

Proctor Number	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
1	93.4	25.5
2	94.2	23.0
3	97.2	22.6
4	97.5	22.5
5	101.7	21.2
6	103.9	21.3
0	0.0	0.0

Description of Area Tested and General Remarks: **LIFT 1**

Test Number	Date Tested	Test Location	Proctor Number	Depth Tested	Dry Density (pcf)		Compaction (%)		Water Content (%)			Pass or Fail	Perm Sample ID	Permeability (cm/s)	FTN QC Rep	Comments
					Field	Max.	Field	Req'd	Field	OMC	Min. Req'd					
1-1	9/2/09	See Drawing	2	6"	93.7	94.2	99.5%	95%	27.3	23.0	>OMC	P			JAC	
1-2	9/2/09	See Drawing	2	6"	90.2	94.2	95.8%	95%	31.5	23.0	>OMC	P			JAC	
1-3	9/2/09	See Drawing	2	6"	91.9	94.2	97.5%	95%	29.4	23.0	>OMC	P			JAC	
1-4	9/2/09	See Drawing	2	6"	95.3	94.2	100+%	95%	26.3	23.0	>OMC	P			JAC	
1-5	9/2/09	See Drawing	2	6"	95.9	94.2	100+%	95%	25.3	23.0	>OMC	P			JAC	
1-6	9/2/09	See Drawing	2	6"	95.4	94.2	100+%	95%	27.2	23.0	>OMC	P			JAC	
1-7	9/2/09	See Drawing	5	6"	99.5	101.7	97.8%	95%	23.6	21.2	>OMC	P			JAC	
1-8	9/2/09	See Drawing	2	6"	93.8	94.2	99.6%	95%	27.3	23.0	>OMC	P			JAC	
1-9	9/2/09	See Drawing	5	6"	97.6	101.7	96.0%	95%	25.2	21.2	>OMC	P			JAC	
1-10	9/2/09	See Drawing	3	6"	95.8	97.2	98.6%	95%	26.4	22.6	>OMC	P			JAC	
1-11	9/2/09	See Drawing	2	6"	94.9	94.2	100+%	95%	27.4	23.0	>OMC	P			JAC	
1-12	9/2/09	See Drawing	2	6"	95.4	94.2	100+%	95%	27.6	23.0	>OMC	P			JAC	
1-13	9/2/09	See Drawing	5	6"	99.0	101.7	97.3%	95%	23.7	21.2	>OMC	P			JAC	
1-14	9/8/09	See Drawing	1	6"	91.3	93.4	97.8%	95%	29.7	25.5	>OMC	P			JAC	
1-15	9/8/09	See Drawing	3	6"	96.0	97.2	98.8%	95%	24.2	22.6	>OMC	P			JAC	
1-16	9/8/09	See Drawing	5	6"	97.5	101.7	95.9%	95%	23.6	21.2	>OMC	P			JAC	
													P-1-1	1.4×10^{-8}		
													P-1-2	1.0×10^{-8}		
													P-1-3	1.2×10^{-8}		
													P-1-4	1.4×10^{-8}		

NUCLEAR DENSITY AND MOISTURE TEST SUMMARY

Project Name: Miss. Cnty LF - Waste Cell 14 Construction

Project Location: Luxora, AR

FTN Project Number: 4355-301

Proctor Number	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
1	93.4	25.5
2	94.2	23.0
3	97.2	22.6
4	97.5	22.5
5	101.7	21.2
6	103.9	21.3
0	0.0	0.0

Description of Area Tested and General Remarks: **LIFT 2**

Test Number	Date Tested	Test Location	Proctor Number	Depth Tested	Dry Density (pcf)		Compaction (%)		Water Content (%)			Pass or Fail	Perm Sample ID	Permeability (cm/s)	FTN QC Rep	Comments
					Field	Max.	Field	Req'd	Field	OMC	Min. Req'd					
2-1	9/3/09	See Drawing	5	6"	98.0	101.7	96.4%	95%	23.8	21.2	>OMC	P			JAC	
2-2	9/3/09	See Drawing	2	6"	95.2	94.2	100+%	95%	25.0	23.0	>OMC	P			JAC	
2-3	9/3/09	See Drawing	5	6"	97.2	101.7	95.6%	95%	24.6	21.2	>OMC	P			JAC	
2-4	9/3/09	See Drawing	5	6"	97.9	101.7	96.3%	95%	22.8	21.2	>OMC	P			JAC	
2-5	9/3/09	See Drawing	5	6"	99.7	101.7	98.0%	95%	23.0	21.2	>OMC	P			JAC	
2-6	9/3/09	See Drawing	5	6"	98.6	101.7	97.0%	95%	25.3	21.2	>OMC	P			JAC	
2-7	9/3/09	See Drawing	5	6"	101.4	101.7	99.7%	95%	22.3	21.2	>OMC	P			JAC	
2-8	9/3/09	See Drawing	6	6"	102.1	103.9	98.3%	95%	21.8	21.3	>OMC	P			JAC	
2-9	9/3/09	See Drawing	5	6"	99.2	101.7	97.5%	95%	24.2	21.2	>OMC	P			JAC	
2-10	9/3/09	See Drawing	5	6"	100.3	101.7	98.6%	95%	23.1	21.2	>OMC	P			JAC	
2-11	9/3/09	See Drawing	5	6"	98.1	101.7	96.5%	95%	24.4	21.2	>OMC	P			JAC	
2-12	9/3/09	See Drawing	2	6"	93.0	94.2	98.7%	95%	27.2	23.0	>OMC	P			JAC	
2-13	9/3/09	See Drawing	6	6"	102.9	103.9	99.0%	95%	20.5	21.3	>OMC	F			JAC	Add H_2O and
2-13 B	9/3/09	See Drawing	6	6"	100.7	103.9	96.9%	95%	21.7	21.3	>OMC	P			JAC	recompact
2-14	9/8/09	See Drawing	1	6"	91.2	93.4	97.6%	95%	28.9	25.5	>OMC	P			JAC	
2-15	9/8/09	See Drawing	2	6"	93.6	94.2	99.4%	95%	25.0	23.0	>OMC	P			JAC	
2-16	9/8/09	See Drawing	5	6"	99.8	101.7	98.1%	95%	22.8	21.2	>OMC	P			JAC	
													P-2-1	1.0×10^{-8}		
													P-2-2	1.3×10^{-8}		
													P-2-3	1.1×10^{-8}		
													P-2-4	1.2×10^{-8}		

NUCLEAR DENSITY AND MOISTURE TEST SUMMARY

Project Name: Miss. Cnty LF - Waste Cell 14 Construction

Project Location: Luxora, AR

FTN Project Number: 4355-301

Proctor Number	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
1	93.4	25.5
2	94.2	23.0
3	97.2	22.6
4	97.5	22.5
5	101.7	21.2
6	103.9	21.3
0	0.0	0.0

Description of Area Tested and General Remarks: **LIFT 3**

Test Number	Date Tested	Test Location	Proctor Number	Depth Tested	Dry Density (pcf)		Compaction (%)		Water Content (%)			Pass or Fail	Perm Sample ID	Permeability (cm/s)	FTN QC Rep	Comments
					Field	Max.	Field	Req'd	Field	OMC	Min. Req'd					
3-1	9/4/09	See Drawing	2	6"	94.6	94.2	100+%	95%	25.8	23.0	>OMC	P			JAC	
3-2	9/4/09	See Drawing	5	6"	99.2	101.7	97.6%	95%	24.1	21.2	>OMC	P			JAC	
3-3	9/4/09	See Drawing	3	6"	96.8	97.2	99.6%	95%	25.6	22.6	>OMC	P			JAC	
3-4	9/4/09	See Drawing	3	6"	95.1	97.2	97.8%	95%	25.9	22.6	>OMC	P			JAC	
3-5	9/4/09	See Drawing	2	6"	93.3	94.2	99.0%	95%	27.0	23.0	>OMC	P			JAC	
3-6	9/4/09	See Drawing	5	6"	100.2	101.7	98.5%	95%	22.7	21.2	>OMC	P			JAC	
3-7	9/4/09	See Drawing	5	6"	100.2	101.7	98.6%	95%	23.7	21.2	>OMC	P			JAC	
3-8	9/4/09	See Drawing	5	6"	98.5	101.7	96.9%	95%	24.9	21.2	>OMC	P			JAC	
3-9	9/4/09	See Drawing	5	6"	101.9	101.7	100+%	95%	22.9	21.2	>OMC	P			JAC	
3-10	9/4/09	See Drawing	2	6"	92.4	94.2	98.1%	95%	28.1	23.0	>OMC	P			JAC	
3-11	9/4/09	See Drawing	2	6"	93.5	94.2	99.3%	95%	26.7	23.0	>OMC	P			JAC	
3-12	9/4/09	See Drawing	5	6"	98.5	101.7	96.8%	95%	24.2	21.2	>OMC	P			JAC	
3-13	9/4/09	See Drawing	2	6"	92.7	94.2	98.4%	95%	28.9	23.0	>OMC	P			JAC	
3-14	9/9/09	See Drawing	3	6"	95.1	97.2	97.8%	95%	23.2	22.6	>OMC	P			JAC	
3-15	9/9/09	See Drawing	2	6"	94.1	94.2	99.9%	95%	27.2	23.0	>OMC	P			JAC	
3-16	9/9/09	See Drawing	3	6"	95.8	97.2	98.5%	95%	26.2	22.6	>OMC	P			JAC	
													P-3-1	1.2×10^{-8}		
													P-3-2	1.7×10^{-8}		
													P-3-3	1.3×10^{-8}		
													P-3-4	1.1×10^{-8}		

NUCLEAR DENSITY AND MOISTURE TEST SUMMARY

Project Name: Miss. Cnty LF - Waste Cell 14 Construction

Project Location: Luxora, AR

FTN Project Number: 4355-301

Proctor Number	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
1	93.4	25.5
2	94.2	23.0
3	97.2	22.6
4	97.5	22.5
5	101.7	21.2
6	103.9	21.3
0	0.0	0.0

Description of Area Tested and General Remarks: **LIFT 4**

Test Number	Date Tested	Test Location	Proctor Number	Depth Tested	Dry Density (pcf)		Compaction (%)		Water Content (%)			Pass or Fail	Perm Sample ID	Permeability (cm/s)	FTN QC Rep	Comments
					Field	Max.	Field	Req'd	Field	OMC	Min. Req'd					
4-1	9/5/09	See Drawing	4	6"	97.5	97.5	100.0%	95%	23.8	22.6	>OMC	P			JAC	
4-2	9/5/09	See Drawing	4	6"	94.3	97.5	96.9%	95%	27.4	22.6	>OMC	P			JAC	
4-3	9/5/09	See Drawing	4	6"	97.3	97.5	99.8%	95%	25.7	22.6	>OMC	P			JAC	
4-4	9/5/09	See Drawing	4	6"	95.7	97.5	98.1%	95%	25.9	22.6	>OMC	P			JAC	
4-5	9/5/09	See Drawing	4	6"	95.9	97.5	98.4%	95%	27.0	22.6	>OMC	P			JAC	
4-6	9/5/09	See Drawing	5	6"	101.2	101.7	99.5%	95%	23.2	22.5	>OMC	P			JAC	
4-7	9/5/09	See Drawing	4	6"	96.1	97.5	98.6%	95%	24.9	22.6	>OMC	P			JAC	
4-8	9/8/09	See Drawing	6	6"	102.8	103.9	98.9%	95%	22.2	21.3	>OMC	P			JAC	
4-9	9/8/09	See Drawing	6	6"	102.0	103.9	98.2%	95%	22.2	21.3	>OMC	P			JAC	
4-10	9/8/09	See Drawing	6	6"	101.4	103.9	97.6%	95%	22.3	21.3	>OMC	P			JAC	
4-11	9/8/09	See Drawing	5	6"	98.3	101.7	96.7%	95%	23.8	22.5	>OMC	P			JAC	
4-12	9/8/09	See Drawing	6	6"	102.8	103.9	98.9%	95%	23.0	21.3	>OMC	P			JAC	
4-13	9/8/09	See Drawing	6	6"	102.2	103.9	98.4%	95%	22.1	21.3	>OMC	P			JAC	
4-14	9/9/09	See Drawing	5	6"	97.9	101.7	96.2%	95%	24.4	22.5	>OMC	P			JAC	
4-15	9/9/09	See Drawing	3	6"	96.1	97.2	98.8%	95%	23.5	19.5	>OMC	P			JAC	
4-16	9/9/09	See Drawing	4	6"	97.5	97.5	100.0%	95%	24.9	22.6	>OMC	P			JAC	
													P-4-1	1.2×10^{-8}		
													P-4-2	1.0×10^{-8}		
													P-4-3	1.2×10^{-8}		
													P-4-4	3.8×10^{-8}		

APPENDIX H

Clay Liner Performance Test Reports

FTN/MISSISSIPPI COUNTY LF-CELL 14/AR
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
P-1-1A	UD	-	MH	32.3	60	32	28	0.01	100.0	94.2	-	-	-	-	32.3	88.9	1.4E-08	
P-1-2A	UD	-	MH	30.3	51	30	21	0.03	100.0	93.8	-	-	-	-	30.3	91.1	1.0E-08	
P-1-3A	UD	-	CH	29.0	54	21	33	0.24	100.0	95.5	-	-	-	-	29.0	92.0	1.2E-08	
P-1-4A	UD	-	CH	29.3	53	22	31	0.23	100.0	94.9	-	-	-	-	29.3	93.2	1.4E-08	-
P-2-1A	UD	-	CL	30.6	49	19	30	0.38	100.0	86.7	-	-	-	-	30.6	90.1	1.0E-08	-
P-2-2A	UD	-	CH	28.9	54	22	32	0.22	100.0	94.4	-	-	-	-	28.9	92.0	1.3E-08	-
P-2-3A	UD	-	CH	24.3	54	26	28	-0.07	100.0	90.4	-	-	-	-	24.3	100.7	1.1E-08	-
P-2-4A	UD	-	CH	25.4	55	23	32	0.08	100.0	90.3	-	-	-	-	25.4	97.0	1.2E-08	-
P-3-1A	UD	6.0"	CH	24.9	52	22	30	0.09	100.0	87.9	-	-	-	2.67	24.9	99.5	1.2E-08	-
P-3-2A	UD	6.0"	CH	23.1	51	21	30	0.08	100.0	86.7	-	-	-	-	23.1	101.8	1.7E-08	-
P-3-3A	UD	6.0"	CL	23.2	44	26	18	-0.14	100.0	84.3	-	-	-	2.67	23.2	102.3	1.3E-08	-
P-3-4A	UD	6.0"	CH	25.9	54	20	34	0.18	100.0	86.9	-	-	-	-	25.9	97.3	1.1E-08	-
P-4-1A	UD	6.0"	CL	24.9	44	21	23	0.17	100.0	84.9	-	-	-	-	24.9	99.2	1.2E-08	-
P-4-2A	UD	6.0"	CH	24.1	52	21	31	0.10	100.0	80.7	-	-	-	-	24.1	99.5	1.0E-08	-
P-4-3A	UD	-	CL	27.5	44	20	24	0.32	100.0	94.3	-	-	-	-	27.5	96.0	1.2E-08	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

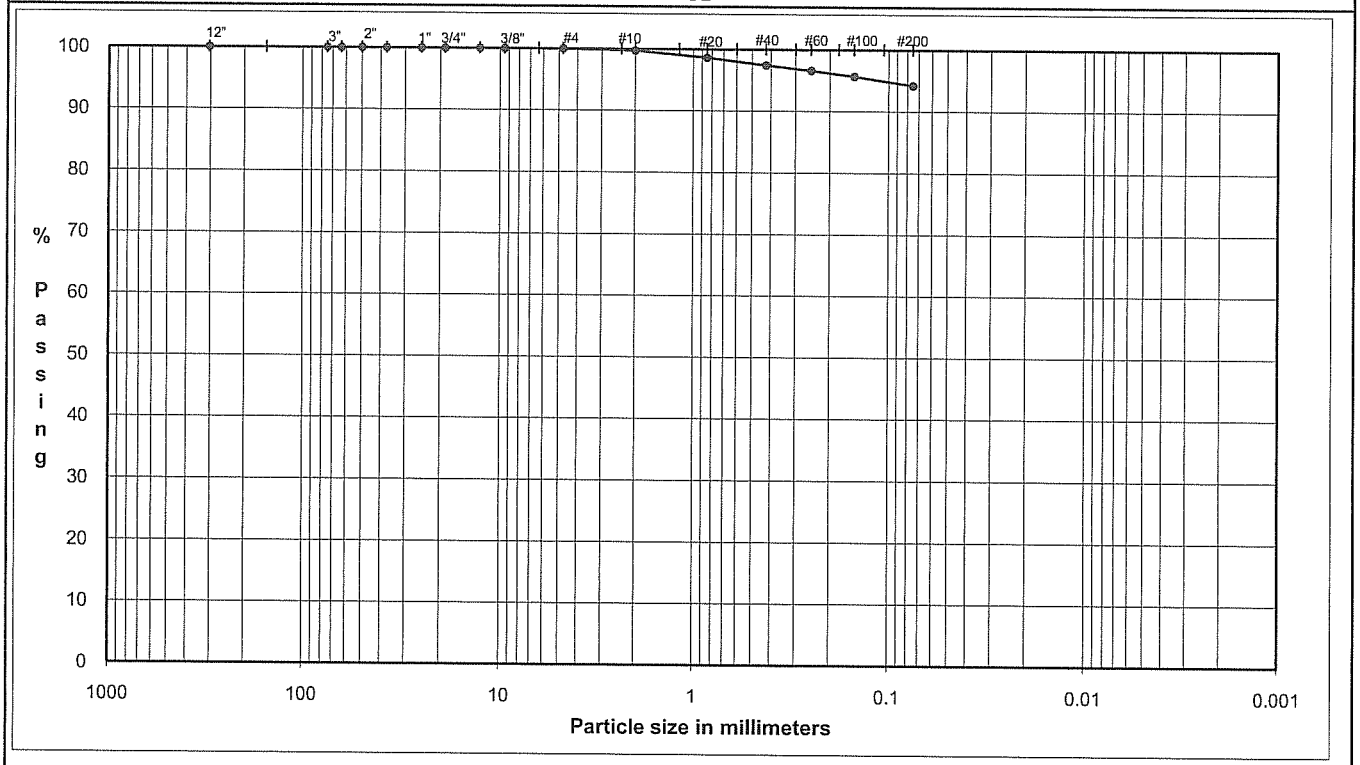
SEPTEMBER 2009

093-90145

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

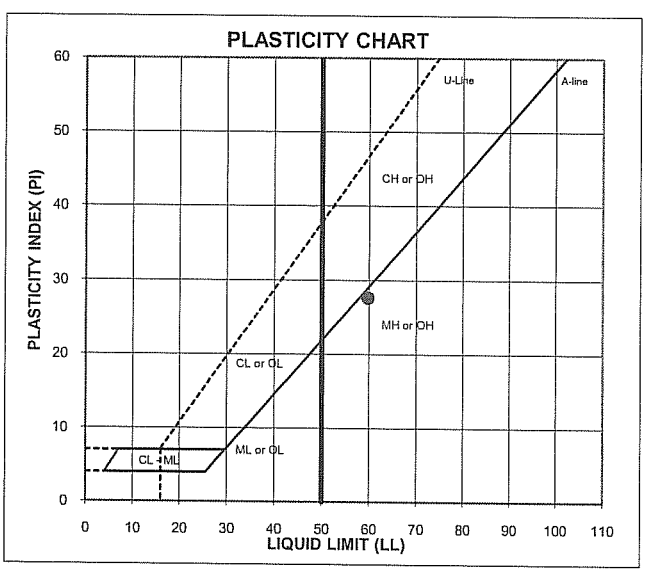
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-1-1A** Depth: -
TYPE: **UD**



	Coarse	Fine	Coarse	Medium	Fine	
COBBLES	GRAVEL		SAND			Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.7**	Coarse Sand	**0.30**
#20	0.85	**98.6**		
#40	0.43	**97.4**	Medium Sand	**2.25**
#60	0.25	**96.6**		
#100	0.15	**95.6**		
#200	0.075	**94.2**	Fine Sand	**3.24**
			Fines	**94.21**



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
32.3	**60**	**32**	**28**	**0.01**

DESCRIPTION: Grayish Brown, CLAYEY SILT, little medium to fine sand.

USCS: MH

LL (oven-dried) / <0.75 = ORGANIC (OL/OH)

TECH	TJ/BW.RF
DATE	9/3/09
CHECK	DA
REVIEW	

Golder Associates Inc.

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	4	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	2	
SAMPLE ID	P-1-1A	-	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.903	B-Value, f	0.96	Height, inches	2.903
Diameter, inches	2.827	Cell Pres.	90.0	Diameter, inches	2.827
Area, cm²	40.50	Bot. Pres.	80.0	Area, cm²	40.50
Volume, cm³	298.60	Top Pres.	80.0	Volume, cm³	298.60
Mass, g	562.42	Tot. B.P.	80.0	Mass, g	563.73
Moisture Content, %	32.26	Head, max.	151.23	Moisture Content, %	32.57
Dry Density, pcf	88.86	Head, min.	151.23	Dry Density, pcf	88.86
Spec. Gravity(assumed)	2.700	Max. Grad.	20.51	Volume Solids, cm³	157.49
Volume Solids, cm³	157.49	Min. Grad.	20.51	Volume Voids, cm³	141.11
Volume Voids, cm³	141.11			Void Ratio	0.90
Void Ratio	0.90			Saturation, %	98.2%
Saturation, %	97.2%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	562.42	571.73
Wt Soil & Tare, f	g	425.22	433.30
Wt Tare	g	0.00	8.31
Wt Moisture Lost	g	137.20	138.43
Wt Dry Soil	g	425.22	424.99
Water Content	%	32.26%	32.57%

DESCRIPTION: Grayish Brown, CLAYEY SILT, little medium to fine sand.

Flow Pump Rate: 1.18E-05 cm³/sec

USCS: MH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/04/09	40060	9	20	21.5	0	0	0	0	2.15	151.23	20.51	1.4E-08
09/04/09	40060	9	25	21.5	5	5	300	300	2.15	151.23	20.51	1.4E-08
09/04/09	40060	9	30	21.5	5	10	300	600	2.15	151.23	20.51	1.4E-08
09/04/09	40060	9	35	21.5	5	15	300	900	2.15	151.23	20.51	1.4E-08 *
09/04/09	40060	9	40	21.5	5	20	300	1200	2.15	151.23	20.51	1.4E-08 *
09/04/09	40060	9	45	21.5	5	25	300	1500	2.15	151.23	20.51	1.4E-08 *
09/04/09	40060	9	50	21.5	5	30	300	1800	2.15	151.23	20.51	1.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.4E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/4/09
CHECK DA
REVIEW PWM

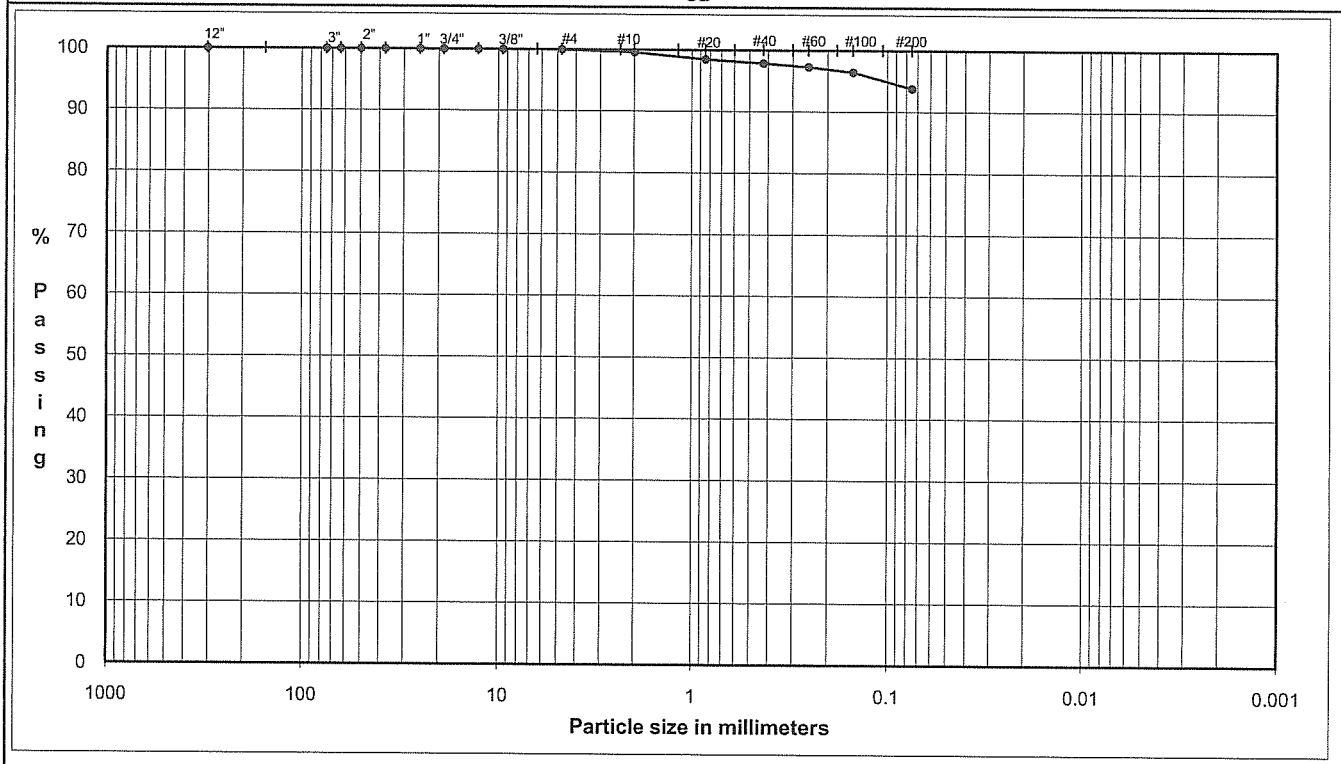
SEPTEMBER 2009

093-90145

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

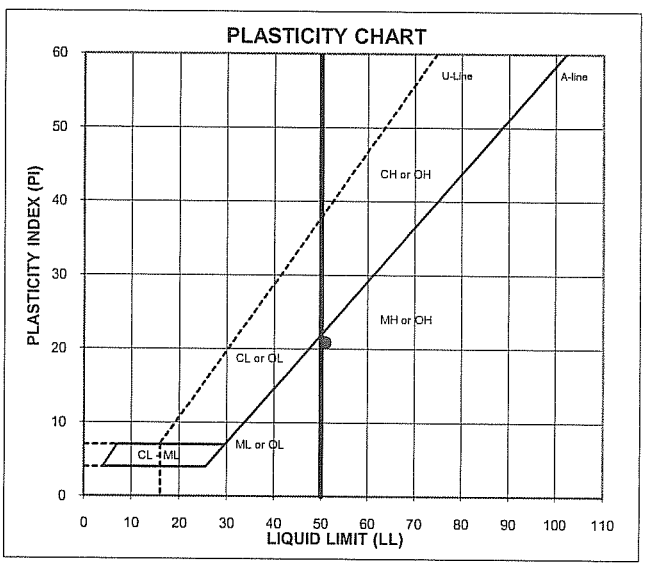
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-1-2A** Depth: -
TYPE: **UD**



	Coarse	Fine	Coarse	Medium	Fine	
COBBLES	GRAVEL		SAND			Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.6**	Coarse Sand	**0.43**
#20	0.85	**98.5**		
#40	0.43	**97.9**	Medium Sand	**1.72**
#60	0.25	**97.3**		
#100	0.15	**96.5**		
#200	0.075	**93.8**	Fine Sand	**4.05**
			Fines	**93.80**



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
30.3	**51**	**30**	**21**	**0.03**

DESCRIPTION: Grayish Brown, CLAYEY SILT, little medium to fine sand.

USCS: MH

LL (oven-dried) / <0.75 = ORGANIC (OL/OH)

TECH	TJ/RF
DATE	9/3/09
CHECK	DA
REVIEW	MW

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	5
PROJECT NUMBER	093-90145	Flow Pump	1
SAMPLE ID	P-1-2A -	Flow Pump Speed	11
SAMPLE TYPE	UD	Technician	TW

COMMENTS

Sample Data, Initial			
Height, inches	2.902	B-Value, f	0.97
Diameter, inches	2.844	Cell Pres.	90.0
Area, cm²	40.98	Bot. Pres.	80.0
Volume, cm³	302.10	Top Pres.	80.0
Mass, g	574.85	Tot. B.P.	80.0
Moisture Content, %	30.30	Head, max.	221.57
Dry Density, pcf	91.13	Head, min.	221.57
Spec. Gravity(assumed)	2.700	Max. Grad.	30.10
Volume Solids, cm³	163.40	Min. Grad.	30.10
Volume Voids, cm³	138.70		
Void Ratio	0.85		
Saturation, %	96.4%		

Sample Data, Final	
Height, inches	2.898
Diameter, inches	2.846
Area, cm²	41.04
Volume, cm³	302.11
Mass, g	576.13
Moisture Content, %	30.59
Dry Density, pcf	91.13
Volume Solids, cm³	163.40
Volume Voids, cm³	138.70
Void Ratio	0.85
Saturation, %	97.3%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	574.85	584.23
Wt Soil & Tare, f	g	441.19	449.38
Wt Tare	g	0.00	8.50
Wt Moisture Lost	g	133.66	134.85
Wt Dry Soil	g	441.19	440.88
Water Content	%	30.30%	30.59%

DESCRIPTION: Grayish Brown, CLAYEY SILT, little medium to fine sand.

Flow Pump Rate: 1.27E-05 cm³/sec

USCS: MH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/04/09	40060	9	20	21.5	0	0	0	0	3.15	221.57	30.10	1.0E-08
09/04/09	40060	9	25	21.5	5	5	300	300	3.15	221.57	30.10	1.0E-08
09/04/09	40060	9	30	21.5	5	10	300	600	3.15	221.57	30.10	1.0E-08
09/04/09	40060	9	35	21.5	5	15	300	900	3.15	221.57	30.10	1.0E-08 *
09/04/09	40060	9	40	21.5	5	20	300	1200	3.15	221.57	30.10	1.0E-08 *
09/04/09	40060	9	45	21.5	5	25	300	1500	3.15	221.57	30.10	1.0E-08 *
09/04/09	40060	9	50	21.5	5	30	300	1800	3.15	221.57	30.10	1.0E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.0E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/4/09

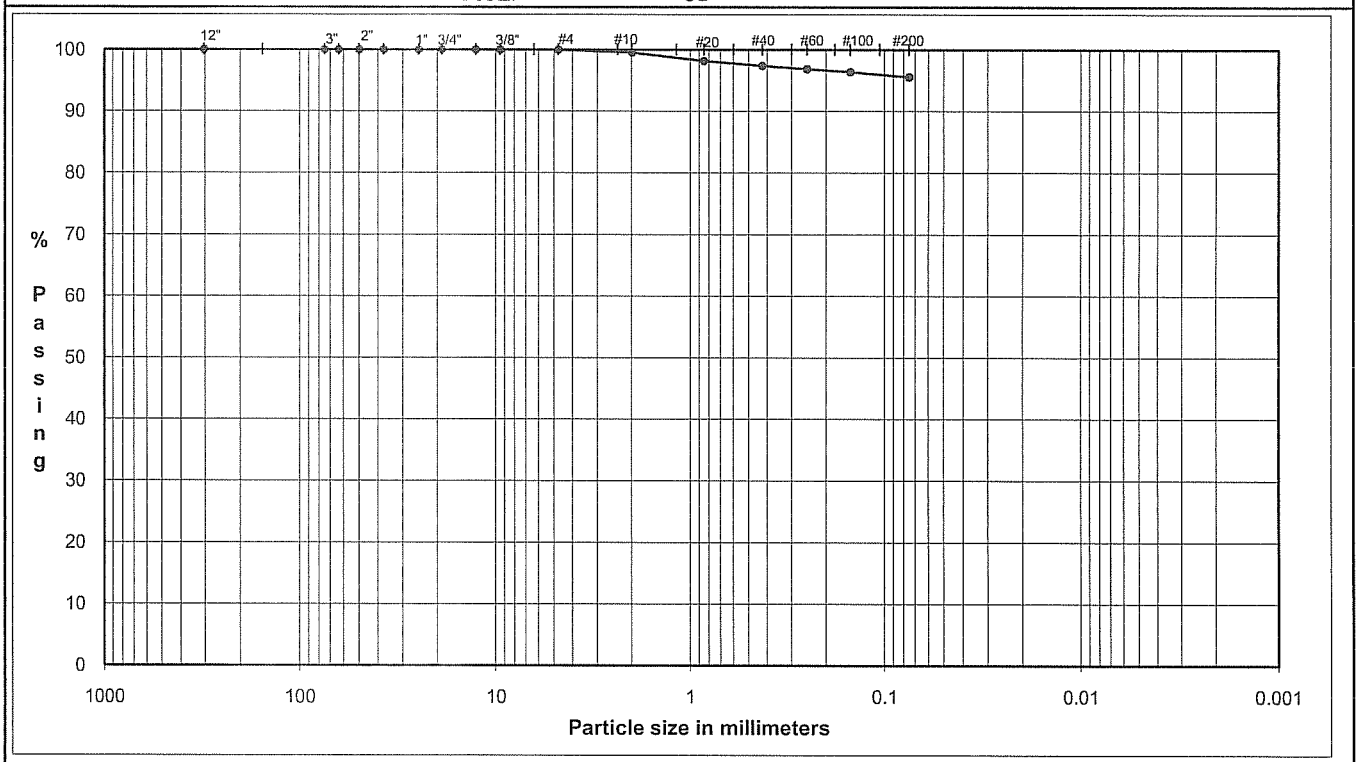
CHECK

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

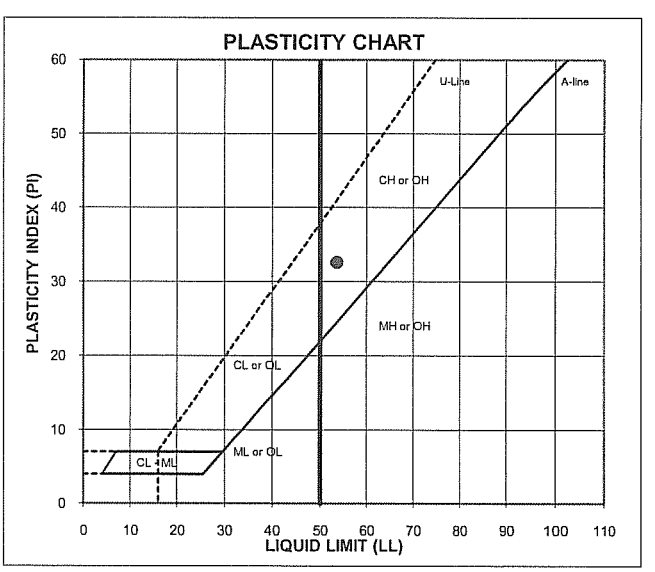
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-1-3A** Depth: -
TYPE: **UD**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.00
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.00
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.00
#10	2.00	99.5	Coarse Sand	0.49
#20	0.85	98.2		
#40	0.43	97.4	Medium Sand	2.15
#60	0.25	96.9		
#100	0.15	96.4		
#200	0.075	95.5	Fine Sand	1.81
			Fines	95.55



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
29.0	54	21	33	0.24

DESCRIPTION: Grayish Brown, SILTY CLAY, trace coarse to fine sand.
USCS: CH

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	RF/TJ
DATE	9/3/09
CHECK	DH
REVIEW	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	2	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	1	
SAMPLE ID	P-1-3A	-	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.904	B-Value, f	0.97	Height, inches	2.884
Diameter, inches	2.860	Cell Pres.	90.0	Diameter, inches	2.859
Area, cm^2	41.45	Bot. Pres.	80.0	Area, cm^2	41.42
Volume, cm^3	305.72	Top Pres.	80.0	Volume, cm^3	303.40
Mass, g	581.63	Tot. B.P.	80.0	Mass, g	585.20
Moisture Content, %	29.04	Head, max.	180.77	Moisture Content, %	29.83
Dry Density, pcf	92.00	Head, min.	180.77	Dry Density, pcf	92.70
Spec. Gravity(assumed)	2.700	Max. Grad.	24.68	Volume Solids, cm^3	166.94
Volume Solids, cm^3	166.94	Min. Grad.	24.68	Volume Voids, cm^3	136.46
Volume Voids, cm^3	138.78			Void Ratio	0.82
Void Ratio	0.83			Saturation, %	98.5%
Saturation, %	94.3%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	581.63	593.27
Wt Soil & Tare, f	g	450.73	458.85
Wt Tare	g	0.00	8.30
Wt Moisture Lost	g	130.90	134.42
Wt Dry Soil	g	450.73	450.55
Water Content	%	29.04%	29.83%

DESCRIPTION: Grayish Brown, SILTY CLAY, trace coarse to fine sand.

Flow Pump Rate: 1.27E-05 cm^3/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (^{0}C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/04/09	40060	8	25	21.5	0	0	0	0	2.57	180.77	24.68	1.2E-08
09/04/09	40060	8	30	21.5	5	5	300	300	2.57	180.77	24.68	1.2E-08
09/04/09	40060	8	35	21.5	5	10	300	600	2.57	180.77	24.68	1.2E-08
09/04/09	40060	8	40	21.5	5	15	300	900	2.57	180.77	24.68	1.2E-08 *
09/04/09	40060	8	45	21.5	5	20	300	1200	2.57	180.77	24.68	1.2E-08 *
09/04/09	40060	8	55	21.5	10	30	600	1800	2.57	180.77	24.68	1.2E-08 *
09/04/09	40060	9	0	21.5	5	35	300	2100	2.57	180.77	24.68	1.2E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.2E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/4/09

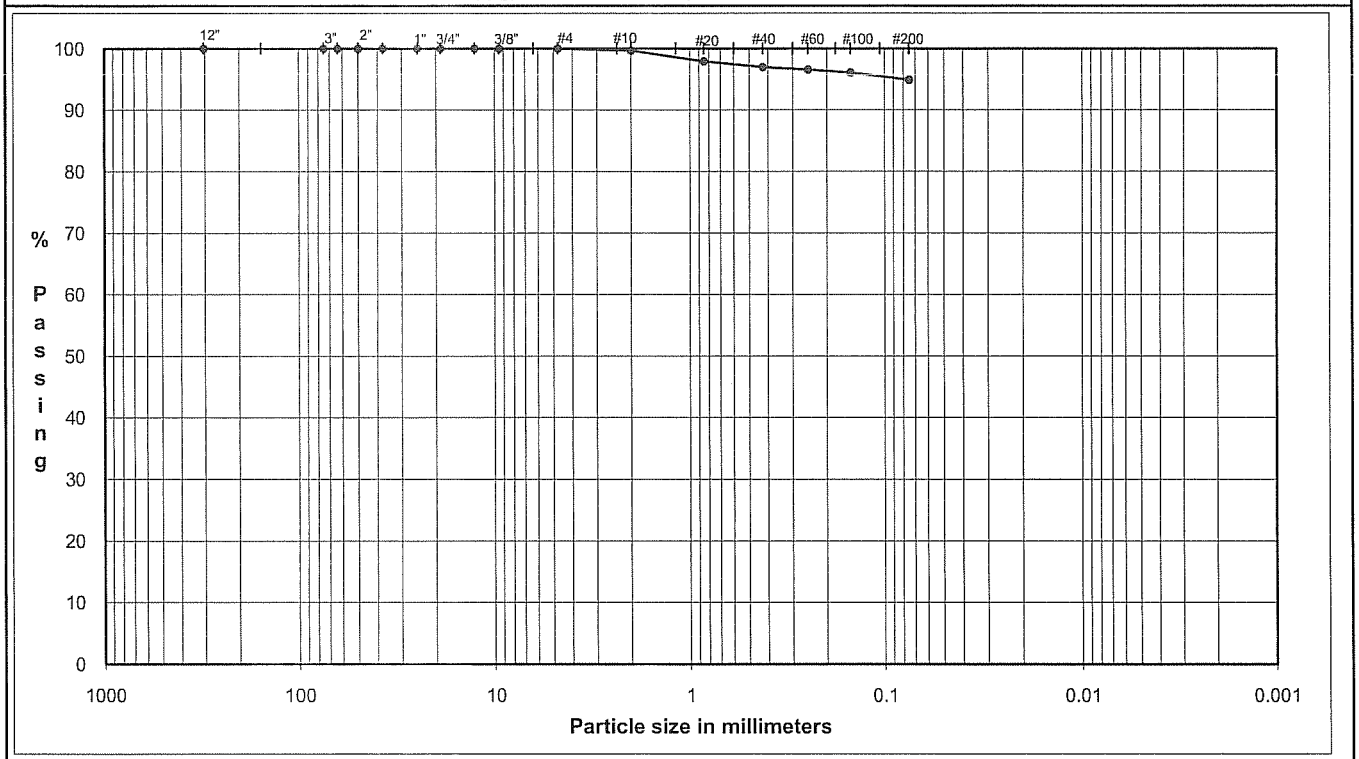
CHECK

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

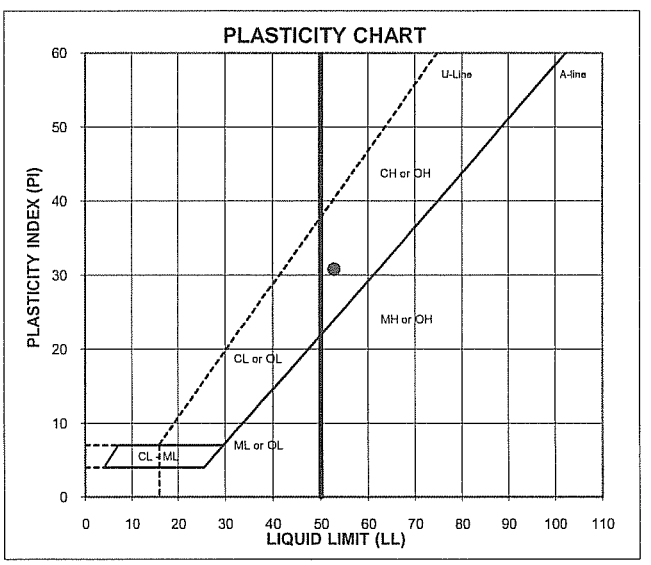
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-1-4A** Depth: -
TYPE: **UD**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.00
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.00
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.00
#10	2.00	99.6	Coarse Sand	0.36
#20	0.85	97.9		
#40	0.43	97.0	Medium Sand	2.65
#60	0.25	96.5		
#100	0.15	96.1		
#200	0.075	94.9	Fine Sand	2.09
			Fines	94.90



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
29.3	53	22	31	0.23

DESCRIPTION: Grayish Brown, SILTY CLAY, little medium to fine sand.
USCS: CH

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	TJ/RF
DATE	9/3/09
CHECK	DH
REVIEW	TWM

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	3	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	2	
SAMPLE ID	P-1-4A	-	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.914	B-Value, f	0.98	Height, inches	2.914
Diameter, inches	2.839	Cell Pres.	90.0	Diameter, inches	2.852
Area, cm²	40.84	Bot. Pres.	80.0	Area, cm²	41.22
Volume, cm³	302.28	Top Pres.	80.0	Volume, cm³	305.06
Mass, g	583.39	Tot. B.P.	80.0	Mass, g	586.97
Moisture Content, %	29.29	Head, max.	141.38	Moisture Content, %	30.08
Dry Density, pcf	93.15	Head, min.	141.38	Dry Density, pcf	92.30
Spec. Gravity(assumed)	2.700	Max. Grad.	19.10	Volume Solids, cm³	167.12
Volume Solids, cm³	167.12	Min. Grad.	19.10	Volume Voids, cm³	137.93
Volume Voids, cm³	135.16			Void Ratio	0.83
Void Ratio	0.81			Saturation, %	98.4%
Saturation, %	97.8%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	583.39	594.87
Wt Soil & Tare, f	g	451.23	459.22
Wt Tare	g	0.00	8.28
Wt Moisture Lost	g	132.16	135.65
Wt Dry Soil	g	451.23	450.94
Water Content	%	29.29%	30.08%

DESCRIPTION
Grayish Brown, SILTY CLAY, little medium to fine sand.

Flow Pump Rate 1.18E-05 cm³/sec

USCS CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/04/09	40060	8	30	21.5	0	0	0	0	2.01	141.38	19.10	1.4E-08
09/04/09	40060	8	35	21.5	5	5	300	300	2.01	141.38	19.10	1.4E-08
09/04/09	40060	8	40	21.5	5	10	300	600	2.01	141.38	19.10	1.4E-08
09/04/09	40060	8	45	21.5	5	15	300	900	2.01	141.38	19.10	1.4E-08 *
09/04/09	40060	8	50	21.5	5	20	300	1200	2.01	141.38	19.10	1.4E-08 *
09/04/09	40060	8	55	21.5	5	25	300	1500	2.01	141.38	19.10	1.4E-08 *
09/04/09	40060	9	0	21.5	5	30	300	1800	2.01	141.38	19.10	1.4E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.4E-08 cm/sec **

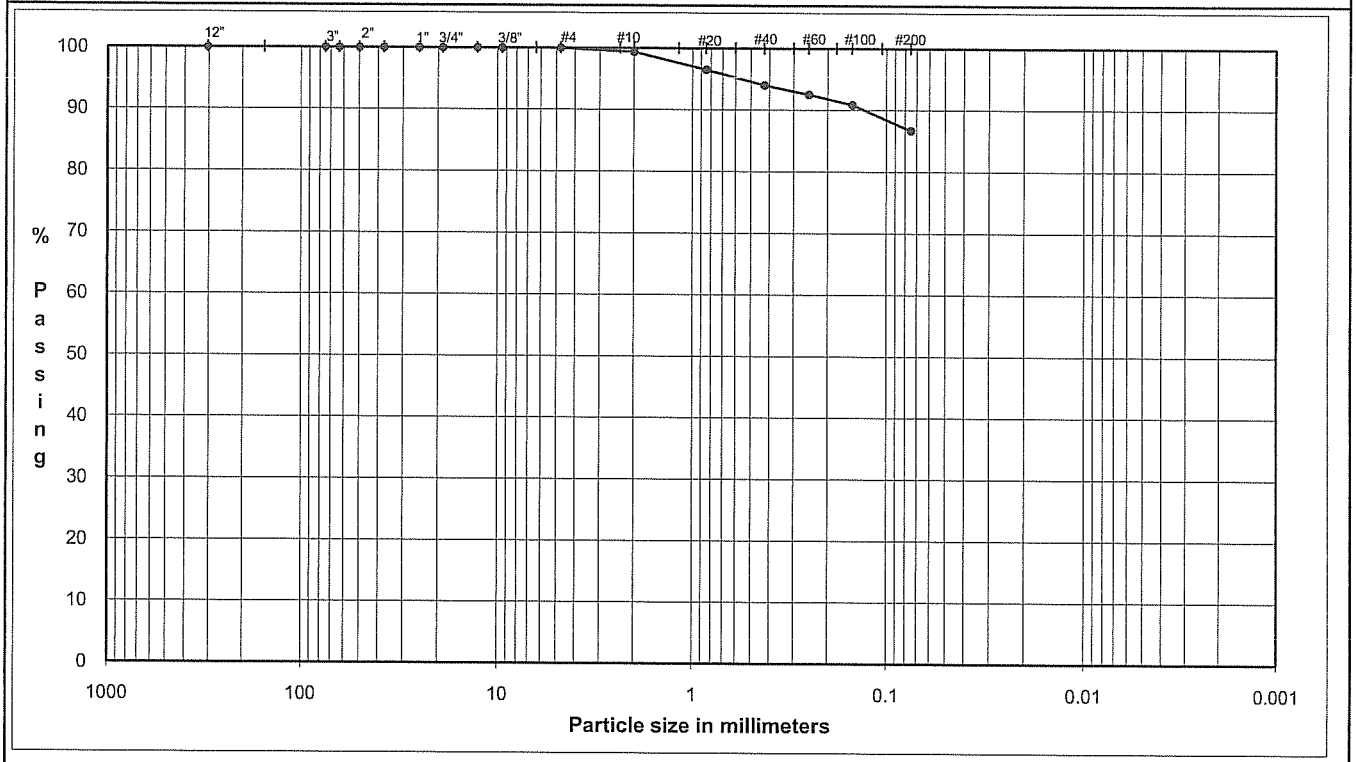
PERMEANT: Deaired Tap Water

DATE 9/4/09
CHECK DA
REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

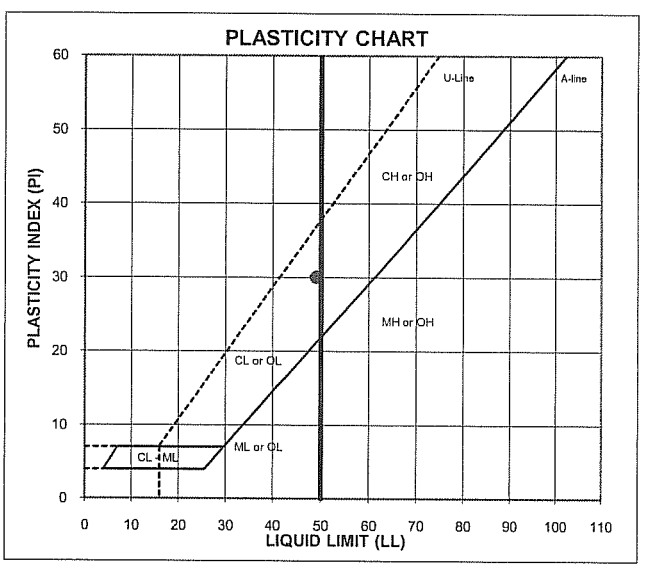
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-2-1A** Depth: -
TYPE: **UD**



	Coarse	Fine	Coarse	Medium	Fine	
COBBLES	GRAVEL		SAND			Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.3**	Coarse Sand	**0.65**
#20	0.85	**96.5**		
#40	0.43	**94.0**	Medium Sand	**5.34**
#60	0.25	**92.5**		
#100	0.15	**90.9**		
#200	0.075	**86.7**	Fine Sand	**7.33**
			Fines	**86.67**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
30.6	**49**	**19**	**30**	**0.38**

DESCRIPTION: Grayish Brown, SILTY CLAY, some medium to fine sand.

USCS: CL

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	DW/RF
DATE	9/4/09
CHECK	DA
REVIEW	TWM

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	6	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	1	
SAMPLE ID	P-2-1A	-	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	AK	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.928	B-Value, f	0.99	Height, inches	2.900
Diameter, inches	2.856	Cell Pres.	90.0	Diameter, inches	2.843
Area, cm²	41.33	Bot. Pres.	80.0	Area, cm²	40.96
Volume, cm³	307.38	Top Pres.	80.0	Volume, cm³	301.68
Mass, g	580.00	Tot. B.P.	80.0	Mass, g	581.30
Moisture Content, %	30.64	Head, max.	218.76	Moisture Content, %	30.93
Dry Density, pcf	90.13	Head, min.	218.76	Dry Density, pcf	91.83
Spec. Gravity(assumed)	2.700	Max. Grad.	29.70	Volume Solids, cm³	164.44
Volume Solids, cm³	164.44	Min. Grad.	29.70	Volume Voids, cm³	137.24
Volume Voids, cm³	142.95			Void Ratio	0.83
Void Ratio	0.87			Saturation, %	100.1%
Saturation, %	95.2%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	580.00	589.72
Wt Soil & Tare, f	g	443.98	452.40
Wt Tare	g	0.00	8.43
Wt Moisture Lost	g	136.02	137.32
Wt Dry Soil	g	443.98	443.97
Water Content	%	30.64%	30.93%

DESCRIPTION: Grayish Brown, SILTY CLAY, some medium to fine sand.

Flow Pump Rate: 1.27E-05 cm³/sec

USCS: CL

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/07/09	40063	10	55	21.5	0	0	0	0	3.11	218.76	29.70	1.0E-08
09/07/09	40063	11	0	21.5	5	5	300	300	3.11	218.76	29.70	1.0E-08
09/07/09	40063	11	5	21.5	5	10	300	600	3.11	218.76	29.70	1.0E-08
09/07/09	40063	11	10	21.5	5	15	300	900	3.11	218.76	29.70	1.0E-08 *
09/07/09	40063	11	15	21.5	5	20	300	1200	3.11	218.76	29.70	1.0E-08 *
09/07/09	40063	11	20	21.5	5	25	300	1500	3.11	218.76	29.70	1.0E-08 *
09/07/09	40063	11	25	21.5	5	30	300	1800	3.11	218.76	29.70	1.0E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.0E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/7/09

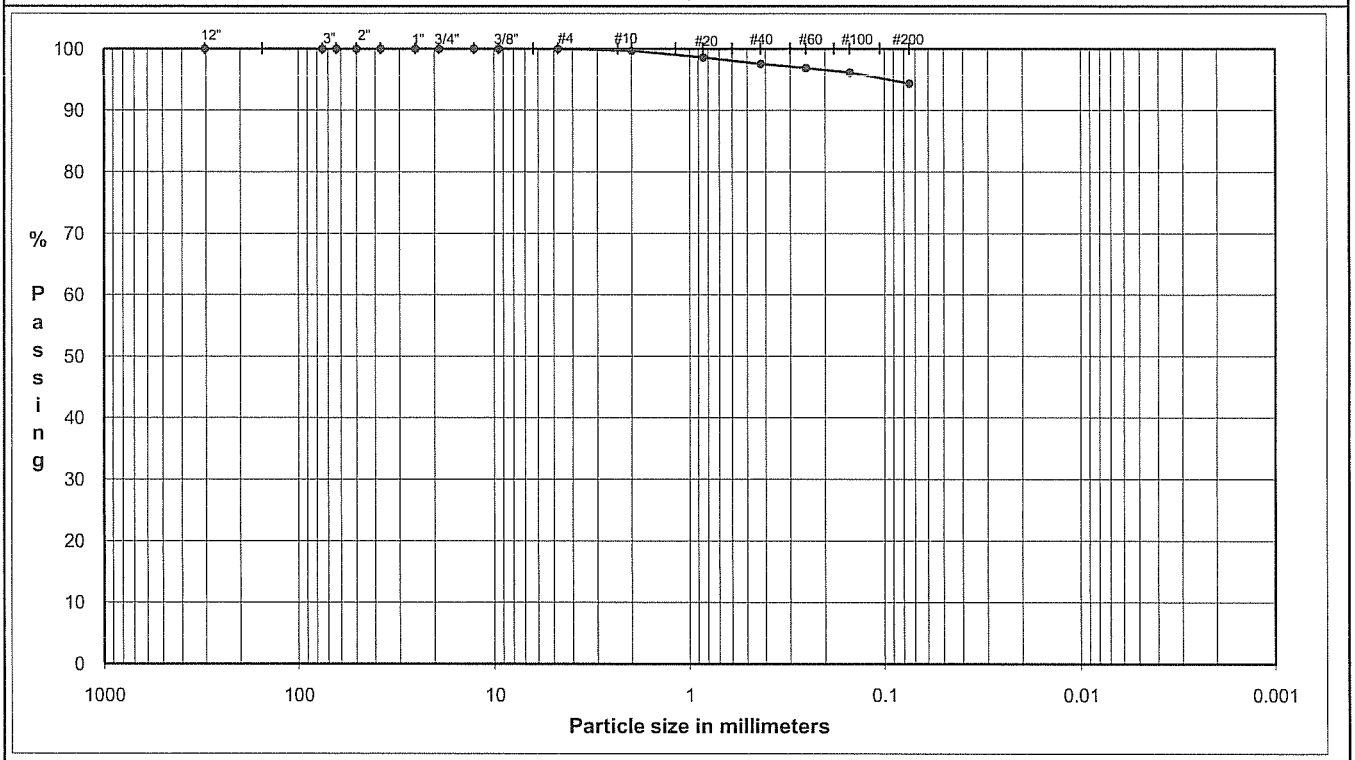
CHECK DA

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

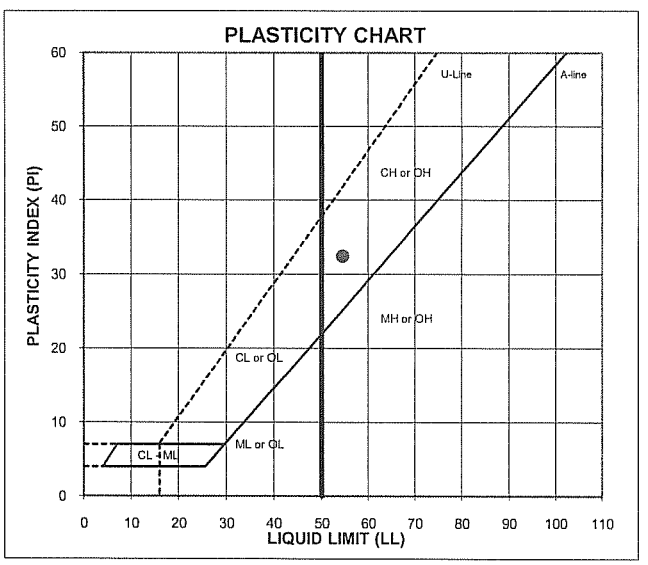
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-2-2A** Depth: -
TYPE: **UD**



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.7**	Coarse Sand	**0.32**
#20	0.85	**98.6**		
#40	0.43	**97.5**	Medium Sand	**2.13**
#60	0.25	**96.9**		
#100	0.15	**96.2**		
#200	0.075	**94.4**	Fine Sand	**3.19**
			Fines	**94.36**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
28.9	**54**	**22**	**32**	**0.22**

DESCRIPTION: Grayish Brown, SILTY CLAY, little medium to fine sand.
USCS: CH

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	DW/RF
DATE	9/4/09
CHECK	
REVIEW	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	2	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	1	
SAMPLE ID	P-2-2A	-	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.919	B-Value, f	0.97	Height, inches	2.910
Diameter, inches	2.857	Cell Pres.	90.0	Diameter, inches	2.848
Area, cm²	41.36	Bot. Pres.	80.0	Area, cm²	41.10
Volume, cm³	306.65	Top Pres.	80.0	Volume, cm³	303.78
Mass, g	582.44	Tot. B.P.	80.0	Mass, g	586.93
Moisture Content, %	28.90	Head, max.	164.60	Moisture Content, %	29.89
Dry Density, pcf	91.95	Head, min.	164.60	Dry Density, pcf	92.81
Spec. Gravity(assumed)	2.700	Max. Grad.	22.27	Volume Solids, cm³	167.35
Volume Solids, cm³	167.35	Min. Grad.	22.27	Volume Voids, cm³	136.43
Volume Voids, cm³	139.30			Void Ratio	0.82
Void Ratio	0.83			Saturation, %	99.0%
Saturation, %	93.7%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	582.44	594.92
Wt Soil & Tare, f	g	451.85	459.95
Wt Tare	g	0.00	8.46
Wt Moisture Lost	g	130.59	134.97
Wt Dry Soil	g	451.85	451.49
Water Content	%	28.90%	29.89%

DESCRIPTION: Grayish Brown, SILTY CLAY, little medium to fine sand.

Flow Pump Rate: 1.27E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/05/09	40061	11	15	21.4	0	0	0	0	2.34	164.60	22.27	1.3E-08
09/05/09	40061	11	20	21.4	5	5	300	300	2.34	164.60	22.27	1.3E-08
09/05/09	40061	11	25	21.4	5	10	300	600	2.34	164.60	22.27	1.3E-08
09/05/09	40061	11	30	21.4	5	15	300	900	2.34	164.60	22.27	1.3E-08 *
09/05/09	40061	11	35	21.4	5	20	300	1200	2.34	164.60	22.27	1.3E-08 *
09/05/09	40061	11	40	21.4	5	25	300	1500	2.34	164.60	22.27	1.3E-08 *
09/05/09	40061	11	45	21.4	5	30	300	1800	2.34	164.60	22.27	1.3E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.3E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/5/09

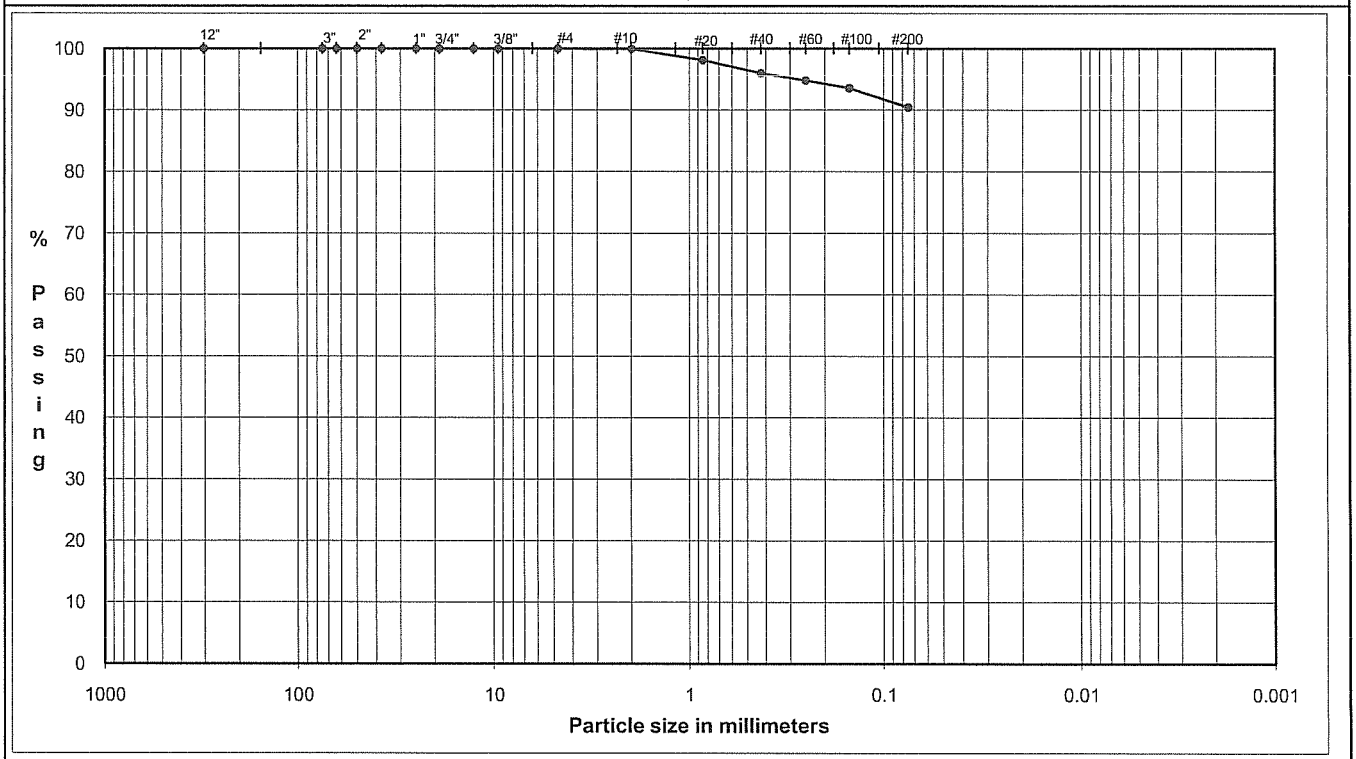
CHECK DA

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

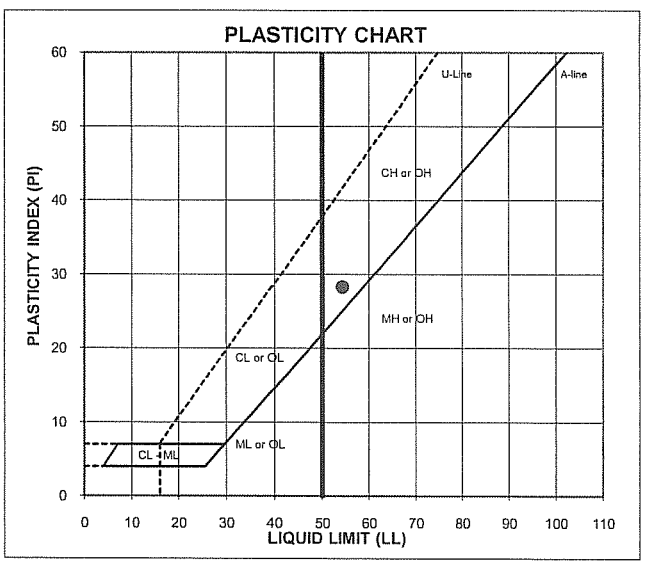
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-2-3A** Depth: -
TYPE: **UD**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.9**	Coarse Sand	**0.07**
#20	0.85	**98.1**		
#40	0.43	**96.0**	Medium Sand	**3.92**
#60	0.25	**94.8**		
#100	0.15	**93.6**		
#200	0.075	**90.4**	Fine Sand	**5.57**
			Fines	**90.44**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.3	54	26	28	-0.07

DESCRIPTION: Grayish Brown, SILTY CLAY, little medium to fine sand.
USCS: CH

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	DW/RF
DATE	9/4/09
CHECK	DA
REVIEW	DWR

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	13	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	2	
SAMPLE ID	P-2-3A	-	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	AK	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.924	B-Value, f	0.98	Height, inches	2.930
Diameter, inches	2.857	Cell Pres.	90.0	Diameter, inches	2.859
Area, cm²	41.36	Bot. Pres.	80.0	Area, cm²	41.42
Volume, cm³	307.18	Top Pres.	80.0	Volume, cm³	308.24
Mass, g	615.95	Tot. B.P.	80.0	Mass, g	624.70
Moisture Content, %	24.27	Head, max.	185.70	Moisture Content, %	26.04
Dry Density, pcf	100.69	Head, min.	185.70	Dry Density, pcf	100.34
Spec. Gravity(assumed)	2.700	Max. Grad.	24.95	Volume Solids, cm³	183.57
Volume Solids, cm³	183.57	Min. Grad.	24.95	Volume Voids, cm³	124.67
Volume Voids, cm³	123.60			Void Ratio	0.68
Void Ratio	0.67			Saturation, %	103.5%
Saturation, %	97.3%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	615.95	633.07
Wt Soil & Tare, f	g	495.65	504.02
Wt Tare	g	0.00	8.39
Wt Moisture Lost	g	120.30	129.05
Wt Dry Soil	g	495.65	495.63
Water Content	%	24.27%	26.04%

Flow Pump Rate: 1.18E-05 cm³/sec

USCS: CH

DESCRIPTION: Grayish Brown, SILTY CLAY, little medium to fine sand.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/07/09	40063	11	10	21.5	0	0	0	0	2.64	185.70	24.95	1.1E-08
09/07/09	40063	11	15	21.5	5	5	300	300	2.64	185.70	24.95	1.1E-08
09/07/09	40063	11	20	21.5	5	10	300	600	2.64	185.70	24.95	1.1E-08
09/07/09	40063	11	25	21.5	5	15	300	900	2.64	185.70	24.95	1.1E-08 *
09/07/09	40063	11	30	21.5	5	20	300	1200	2.64	185.70	24.95	1.1E-08 *
09/07/09	40063	11	35	21.5	5	25	300	1500	2.64	185.70	24.95	1.1E-08 *
09/07/09	40063	11	40	21.5	5	30	300	1800	2.64	185.70	24.95	1.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.1E-08 cm/sec **

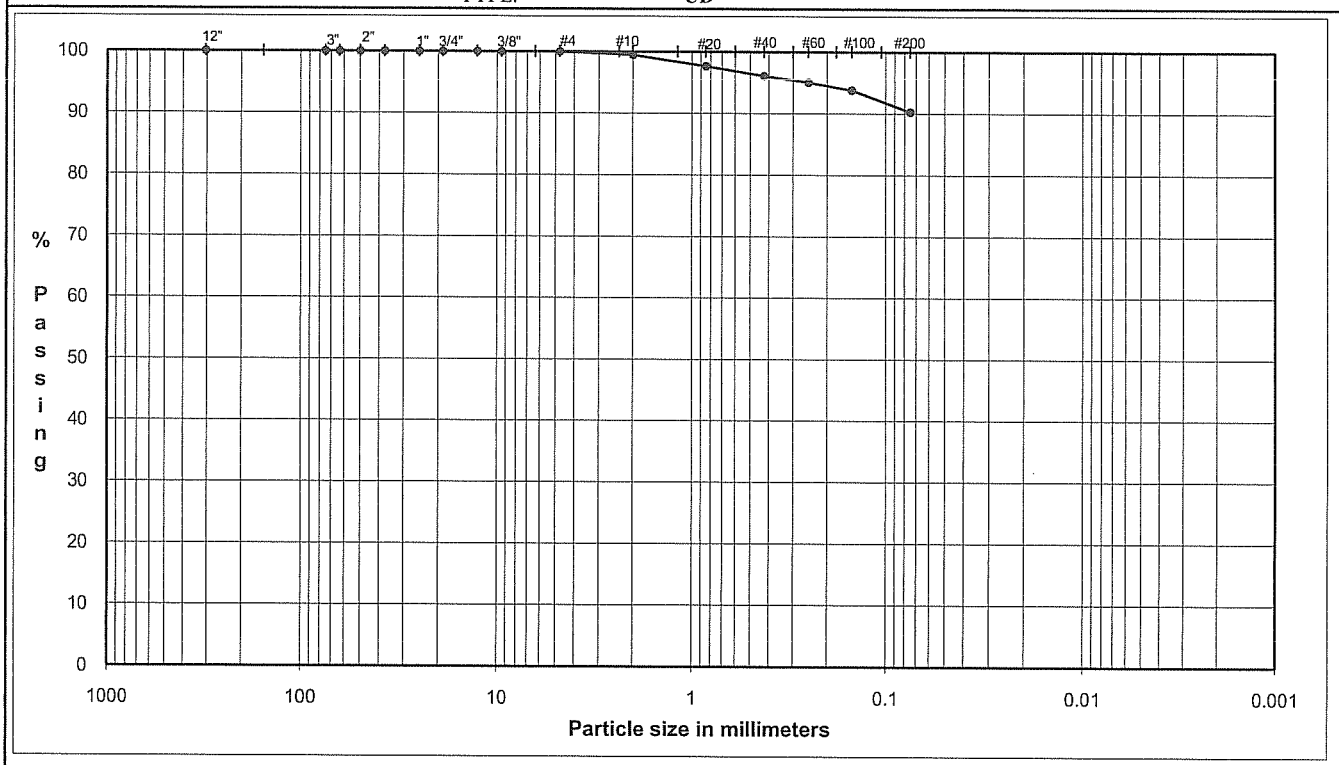
PERMEANT: Deaired Tap Water

DATE 9/7/09
CHECK DA
REVIEW TWH

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

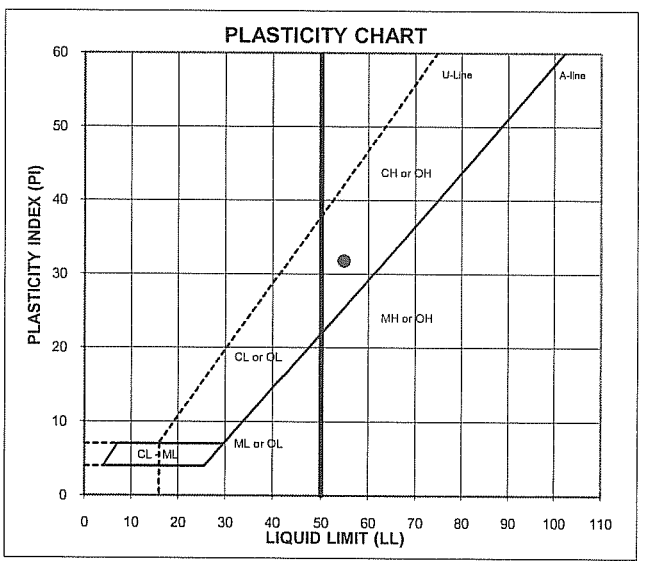
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-2-4A** Depth: -
TYPE: **UD**



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.5**	Coarse Sand	**0.53**
#20	0.85	**97.6**		
#40	0.43	**96.1**	Medium Sand	**3.41**
#60	0.25	**95.0**		
#100	0.15	**93.8**		
#200	0.075	**90.3**	Fine Sand	**5.78**
			Fines	**90.28**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
25.4	55	23	32	0.08

DESCRIPTION: Grayish Brown, SILTY CLAY, little medium to fine sand.

USCS: CH

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH):

TECH	DW/RF/TJ
DATE	9/4/09
CHECK	DA
REVIEW	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	14	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	1	
SAMPLE ID	P-2-4A	-	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	AK	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.902	B-Value, f	0.99	Height, inches	2.894
Diameter, inches	2.852	Cell Pres.	90.0	Diameter, inches	2.848
Area, cm²	41.22	Bot. Pres.	80.0	Area, cm²	41.10
Volume, cm³	303.80	Top Pres.	80.0	Volume, cm³	302.11
Mass, g	592.05	Tot. B.P.	80.0	Mass, g	595.87
Moisture Content, %	25.39	Head, max.	184.29	Moisture Content, %	26.20
Dry Density, pcf	96.99	Head, min.	184.29	Dry Density, pcf	97.53
Spec. Gravity(assumed)	2.700	Max. Grad.	25.07	Volume Solids, cm³	174.88
Volume Solids, cm³	174.88	Min. Grad.	25.07	Volume Voids, cm³	127.23
Volume Voids, cm³	128.92			Void Ratio	0.73
Void Ratio	0.74			Saturation, %	97.2%
Saturation, %	93.0%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	592.05	604.14
Wt Soil & Tare, f	g	472.18	480.45
Wt Tare	g	0.00	8.27
Wt Moisture Lost	g	119.87	123.69
Wt Dry Soil	g	472.18	472.18
Water Content	%	25.39%	26.20%

DESCRIPTION: Grayish Brown, SILTY CLAY, little medium to fine sand.

Flow Pump Rate: 1.27E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/07/09	40063	11	40	21.6	0	0	0	0	2.62	184.29	25.07	1.2E-08
09/07/09	40063	11	45	21.6	5	5	300	300	2.62	184.29	25.07	1.2E-08
09/07/09	40063	11	50	21.6	5	10	300	600	2.62	184.29	25.07	1.2E-08
09/07/09	40063	11	55	21.6	5	15	300	900	2.62	184.29	25.07	1.2E-08 *
09/07/09	40063	12	0	21.6	5	20	300	1200	2.62	184.29	25.07	1.2E-08 *
09/07/09	40063	12	5	21.6	5	25	300	1500	2.62	184.29	25.07	1.2E-08 *
09/07/09	40063	12	10	21.6	5	30	300	1800	2.62	184.29	25.07	1.2E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.2E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/7/09

CHECK DA

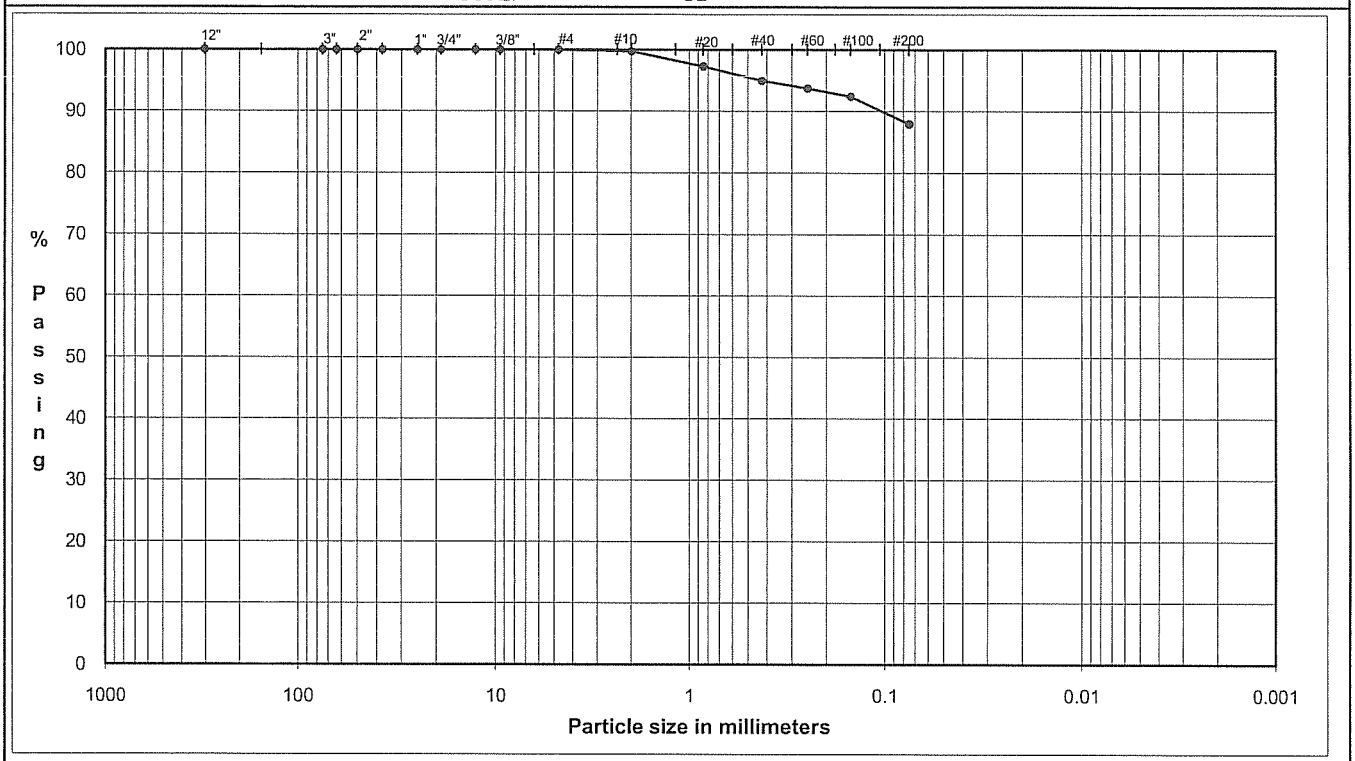
REVIEW

SEPTEMBER 2009 093-90145

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

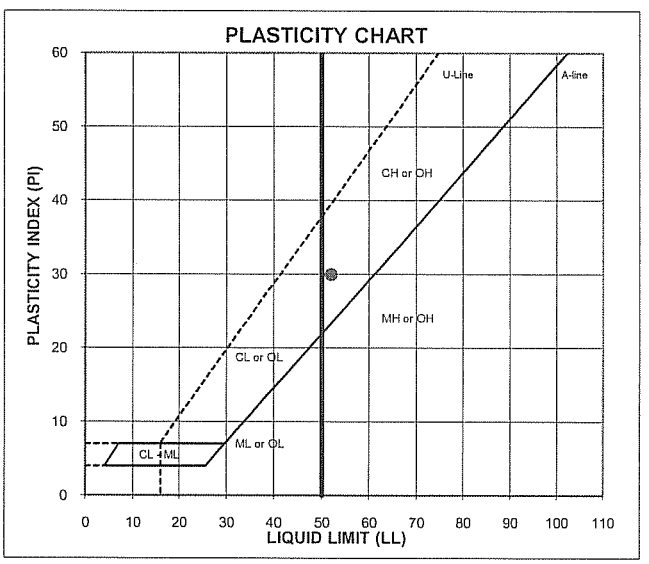
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-3-1A** Depth: **6.0"**
TYPE: **UD**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.7**	Coarse Sand	**0.30**
#20	0.85	**97.3**		
#40	0.43	**95.0**	Medium Sand	**4.73**
#60	0.25	**93.7**		
#100	0.15	**92.4**		
#200	0.075	**87.9**	Fine Sand	**7.05**
			Fines	**87.92**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.9	52	22	30	0.09

DESCRIPTION: Dark Brown, SILTY CLAY, some medium to fine sand.
USCS: CH

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	TW/RF/TJ
DATE	9/5/09
CHECK	DA
REVIEW	[illegible]

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	3
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	P-3-1A 6.0"	Flow Pump Speed	11
SAMPLE TYPE	UD	Technician	AK

COMMENTS

Sample Data, Initial				Sample Data, Final	
Height, inches	2.919	B-Value, f	0.99	Height, inches	2.919
Diameter, inches	2.853	Cell Pres.	90.0	Diameter, inches	2.856
Area, cm²	41.24	Bot. Pres.	80.0	Area, cm²	41.33
Volume, cm³	305.79	Top Pres.	80.0	Volume, cm³	306.44
Mass, g	608.67	Tot. B.P.	80.0	Mass, g	612.75
Moisture Content, %	24.89	Head, max.	173.04	Moisture Content, %	25.72
Dry Density, pcf	99.45	Head, min.	173.04	Dry Density, pcf	99.25
Spec. Gravity	2.670	Max. Grad.	23.34	Volume Solids, cm³	182.54
Volume Solids, cm³	182.54	Min. Grad.	23.34	Volume Voids, cm³	123.90
Volume Voids, cm³	123.25			Void Ratio	0.68
Void Ratio	0.68			Saturation, %	101.2%
Saturation, %	98.4%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	608.67	621.05
Wt Soil & Tare, f	g	487.38	495.69
Wt Tare	g	0.00	8.34
Wt Moisture Lost	g	121.29	125.36
Wt Dry Soil	g	487.38	487.35
Water Content	%	24.89%	25.72%

DESCRIPTION: Dark Brown, SILTY CLAY, some medium to fine sand.

Flow Pump Rate: 1.18E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/07/09	40063	9	15	21.6	0	0	0	0	2.46	173.04	23.34	1.2E-08
09/07/09	40063	9	20	21.6	5	5	300	300	2.46	173.04	23.34	1.2E-08
09/07/09	40063	9	25	21.6	5	10	300	600	2.46	173.04	23.34	1.2E-08
09/07/09	40063	9	30	21.6	5	15	300	900	2.46	173.04	23.34	1.2E-08 *
09/07/09	40063	9	35	21.6	5	20	300	1200	2.46	173.04	23.34	1.2E-08 *
09/07/09	40063	9	40	21.6	5	25	300	1500	2.46	173.04	23.34	1.2E-08 *
09/07/09	40063	9	45	21.6	5	30	300	1800	2.46	173.04	23.34	1.2E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.2E-08 cm/sec **

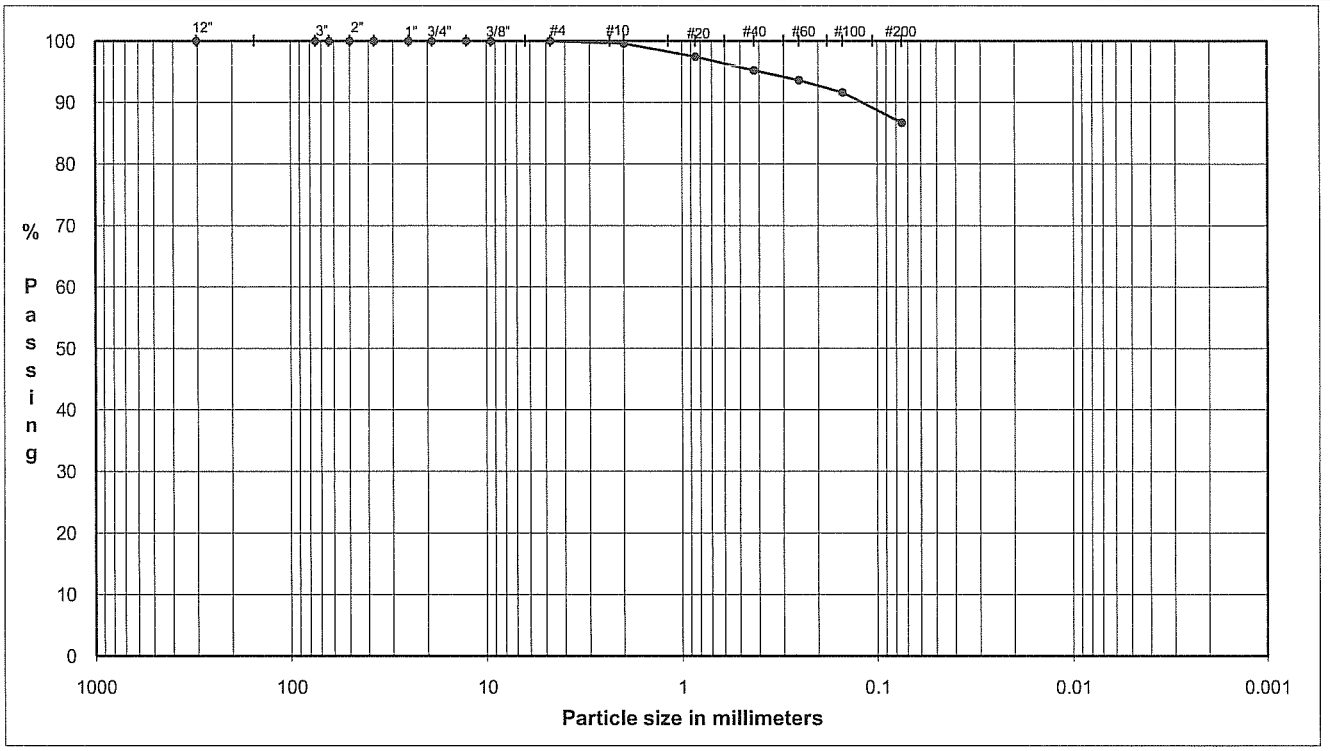
PERMEANT: Deaired Tap Water

DATE 9/7/09
CHECK DA
REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

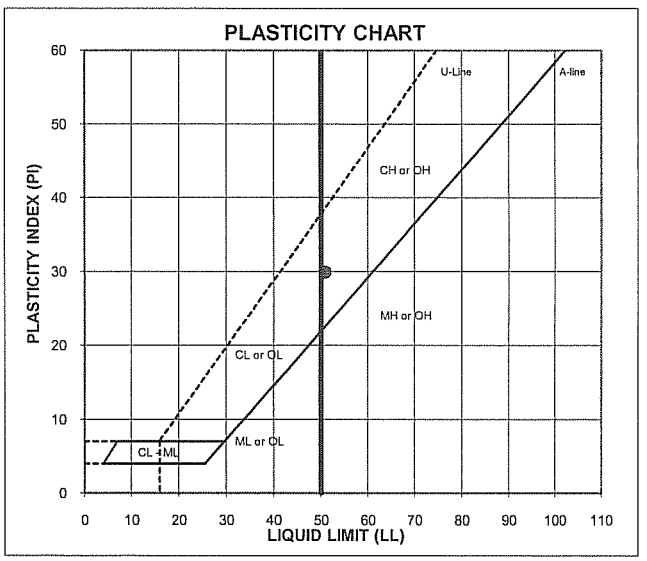
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-3-2A** Depth: **6.0"**
TYPE: **UD**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.6**	Coarse Sand	**0.41**
#20	0.85	**97.5**		
#40	0.43	**95.2**	Medium Sand	**4.39**
#60	0.25	**93.6**		
#100	0.15	**91.6**		
#200	0.075	**86.7**	Fine Sand	**8.52**
			Fines	**86.67**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
23.1	**51**	**21**	**30**	**0.08**

DESCRIPTION: Dark Brown, SILTY CLAY, some medium to fine sand.
USCS: CH

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	TW/RF
DATE	9/5/09
CHECK	DA
REVIEW	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	2	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	1	
SAMPLE ID	P-3-2A	6.0"	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	AK	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.900	B-Value, f	0.98	Height, inches	2.906
Diameter, inches	2.851	Cell Pres.	90.0	Diameter, inches	2.859
Area, cm²	41.19	Bot. Pres.	80.0	Area, cm²	41.42
Volume, cm³	303.38	Top Pres.	80.0	Volume, cm³	305.71
Mass, g	608.76	Tot. B.P.	80.0	Mass, g	616.52
Moisture Content, %	23.06	Head, max.	128.72	Moisture Content, %	24.63
Dry Density, pcf	101.75	Head, min.	128.72	Dry Density, pcf	100.97
Spec. Gravity(assumed)	2.700	Max. Grad.	17.44	Volume Solids, cm³	183.22
Volume Solids, cm³	183.22	Min. Grad.	17.44	Volume Voids, cm³	122.49
Volume Voids, cm³	120.16			Void Ratio	0.67
Void Ratio	0.66			Saturation, %	99.5%
Saturation, %	94.9%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	608.76	624.92
Wt Soil & Tare, f	g	494.69	503.10
Wt Tare	g	0.00	8.44
Wt Moisture Lost	g	114.07	121.82
Wt Dry Soil	g	494.69	494.66
Water Content	%	23.06%	24.63%

DESCRIPTION: Dark Brown, SILTY CLAY, some medium to fine sand.

Flow Pump Rate: 1.27E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/07/09	40063	9	10	21.6	0	0	0	0	1.83	128.72	17.44	1.7E-08
09/07/09	40063	9	15	21.6	5	5	300	300	1.83	128.72	17.44	1.7E-08
09/07/09	40063	9	20	21.6	5	10	300	600	1.83	128.72	17.44	1.7E-08
09/07/09	40063	9	25	21.6	5	15	300	900	1.83	128.72	17.44	1.7E-08 *
09/07/09	40063	9	30	21.6	5	20	300	1200	1.83	128.72	17.44	1.7E-08 *
09/07/09	40063	9	35	21.6	5	25	300	1500	1.83	128.72	17.44	1.7E-08 *
09/07/09	40063	9	40	21.6	5	30	300	1800	1.83	128.72	17.44	1.7E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.7E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/7/09

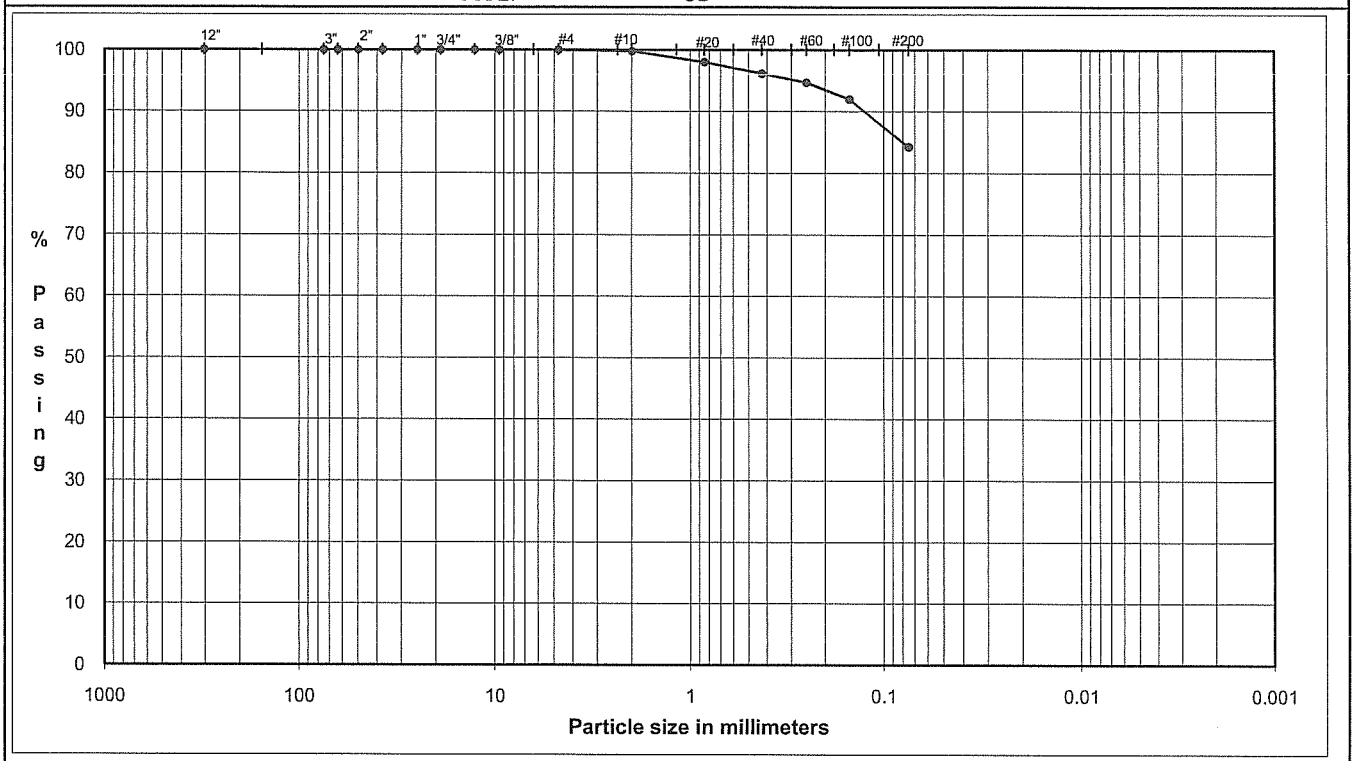
CHECK DH

REVIEW PWM

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

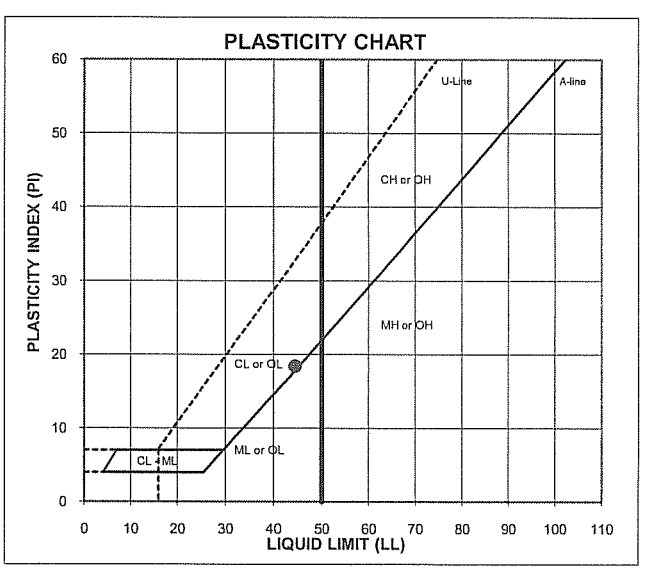
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-3-3A** Depth: **6.0"**
TYPE: **UD**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.8**	Coarse Sand	**0.25**
#20	0.85	**98.0**		
#40	0.43	**96.2**	Medium Sand	**3.60**
#60	0.25	**94.7**		
#100	0.15	**92.0**		
#200	0.075	**84.3**	Fine Sand	**11.88**
			Fines	**84.27**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
23.2	44	26	18	-0.14

DESCRIPTION: Grayish Brown, SILTY CLAY, some medium to fine sand.
USCS: CL

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	TW/RF/TJ
DATE	9/5/09
CHECK	DA
REVIEW	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	4	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	1	
SAMPLE ID	P-3-3A	6.0"	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.920	B-Value, f	0.99	Height, inches	2.918
Diameter, inches	2.851	Cell Pres.	90.0	Diameter, inches	2.860
Area, cm²	41.19	Bot. Pres.	80.0	Area, cm²	41.45
Volume, cm³	305.47	Top Pres.	80.0	Volume, cm³	307.19
Mass, g	616.94	Tot. B.P.	80.0	Mass, g	621.52
Moisture Content, %	23.17	Head, max.	166.00	Moisture Content, %	24.08
Dry Density, pcf	102.32	Head, min.	166.00	Dry Density, pcf	101.75
Spec. Gravity	2.668	Max. Grad.	22.40	Volume Solids, cm³	187.74
Volume Solids, cm³	187.74	Min. Grad.	22.40	Volume Voids, cm³	119.45
Volume Voids, cm³	117.73			Void Ratio	0.64
Void Ratio	0.63			Saturation, %	101.0%
Saturation, %	98.6%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	616.94	629.67
Wt Soil & Tare, f	g	500.90	509.09
Wt Tare	g	0.00	8.38
Wt Moisture Lost	g	116.04	120.58
Wt Dry Soil	g	500.90	500.71
Water Content	%	23.17%	24.08%

DESCRIPTION: Grayish Brown, SILTY CLAY, some medium to fine sand.

Flow Pump Rate: 1.27E-05 cm³/sec

USCS: CL

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/08/09	40064	9	20	21.6	0	0	0	0	2.36	166.00	22.40	1.3E-08
09/08/09	40064	9	25	21.6	5	5	300	300	2.36	166.00	22.40	1.3E-08
09/08/09	40064	9	30	21.6	5	10	300	600	2.36	166.00	22.40	1.3E-08
09/08/09	40064	9	35	21.6	5	15	300	900	2.36	166.00	22.40	1.3E-08 *
09/08/09	40064	9	40	21.6	5	20	300	1200	2.36	166.00	22.40	1.3E-08 *
09/08/09	40064	9	45	21.6	5	25	300	1500	2.36	166.00	22.40	1.3E-08 *
09/08/09	40064	9	50	21.6	5	30	300	1800	2.36	166.00	22.40	1.3E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.3E-08 cm/sec **

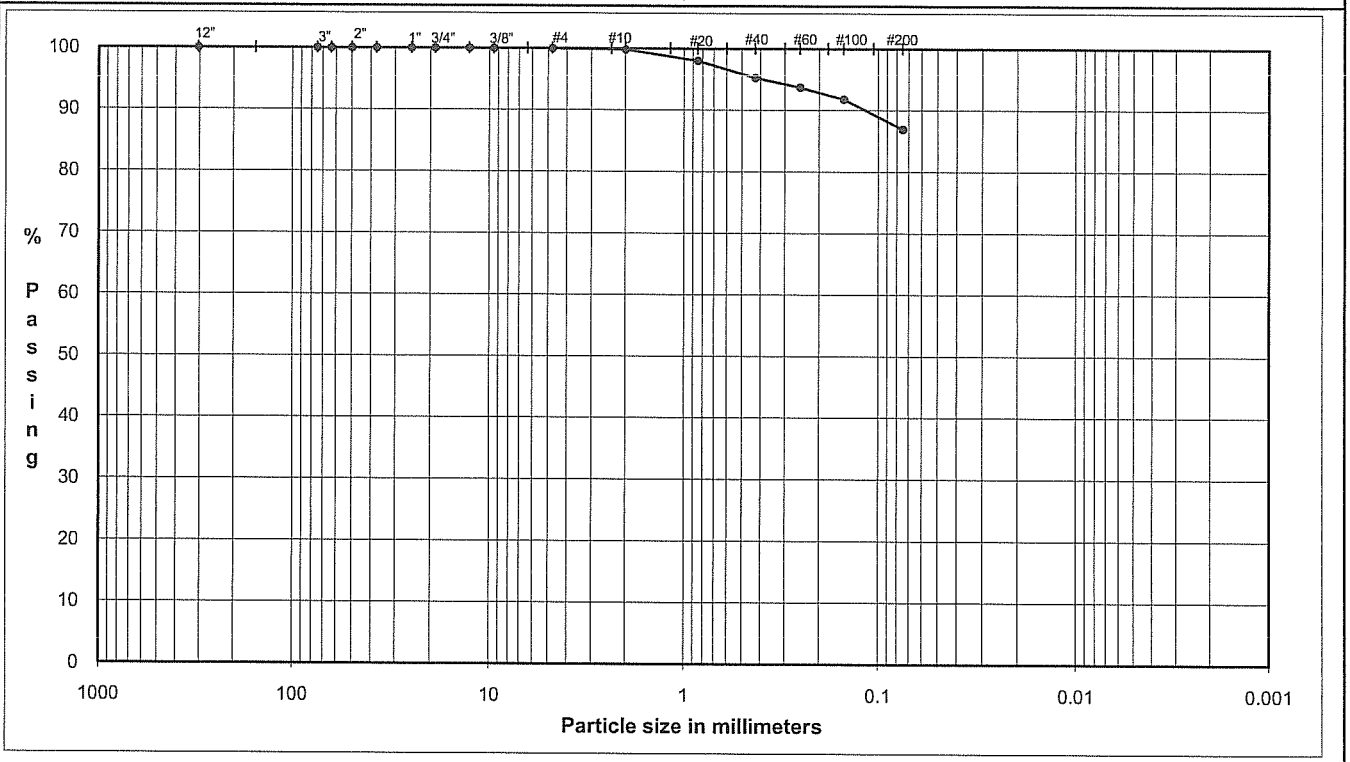
PERMEANT: Deaired Tap Water

DATE 9/8/09
CHECK DA
REVIEW RWH

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

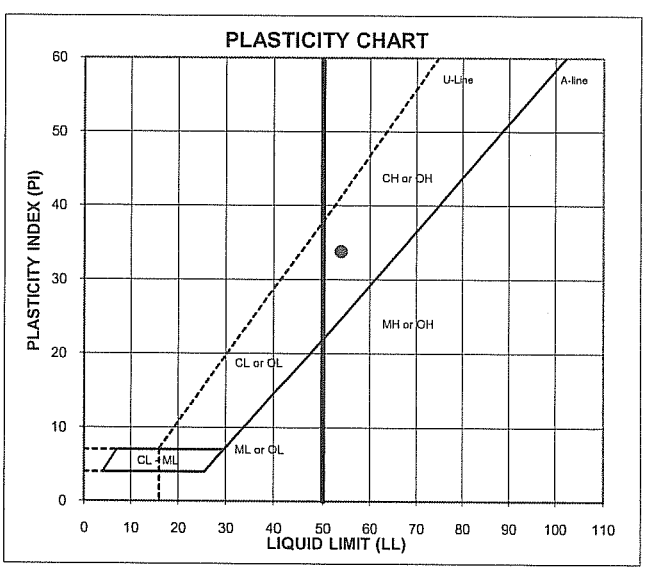
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-3-4A** Depth: **6.0"**
TYPE: **UD**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.8**	Coarse Sand	**0.18**
#20	0.85	**98.0**		
#40	0.43	**95.3**	Medium Sand	**4.54**
#60	0.25	**93.7**		
#100	0.15	**91.8**		
#200	0.075	**86.9**	Fine Sand	**8.41**
			Fines	**86.88**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
25.9	**54**	**20**	**34**	**0.18**

DESCRIPTION: Dark Brown, SILTY CLAY, some medium to fine sand.

USCS: CH

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	TW/RF
DATE	9/5/09
CHECK	DH
REVIEW	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	5
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	P-3-4A 6.0"	Flow Pump Speed	11
SAMPLE TYPE	UD	Technician	TW

COMMENTS

Sample Data, Initial			
Height, inches	2.914	B-Value, f	0.99
Diameter, inches	2.832	Cell Pres.	90.0
Area, cm²	40.64	Bot. Pres.	80.0
Volume, cm³	300.79	Top Pres.	80.0
Mass, g	590.49	Tot. B.P.	80.0
Moisture Content, %	25.94	Head, max.	186.40
Dry Density, pcf	97.27	Head, min.	186.40
Spec. Gravity(assumed)	2.700	Max. Grad.	25.09
Volume Solids, cm³	173.66	Min. Grad.	25.09
Volume Voids, cm³	127.13		
Void Ratio	0.73		
Saturation, %	95.7%		

Sample Data, Final	
Height, inches	2.925
Diameter, inches	2.839
Area, cm²	40.84
Volume, cm³	303.42
Mass, g	598.62
Moisture Content, %	27.67
Dry Density, pcf	96.43
Volume Solids, cm³	173.66
Volume Voids, cm³	129.76
Void Ratio	0.75
Saturation, %	100.0%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	590.49	606.46
Wt Soil & Tare, f	g	468.88	476.83
Wt Tare	g	0.00	8.33
Wt Moisture Lost	g	121.61	129.63
Wt Dry Soil	g	468.88	468.50
Water Content	%	25.94%	27.67%

DESCRIPTION: Dark Brown, SILTY CLAY, some medium to fine sand.

Flow Pump Rate: 1.18E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/08/09	40064	9	25	21.6	0	0	0	0	2.65	186.40	25.09	1.1E-08
09/08/09	40064	9	30	21.6	5	5	300	300	2.65	186.40	25.09	1.1E-08
09/08/09	40064	9	35	21.6	5	10	300	600	2.65	186.40	25.09	1.1E-08
09/08/09	40064	9	40	21.6	5	15	300	900	2.65	186.40	25.09	1.1E-08 *
09/08/09	40064	9	45	21.6	5	20	300	1200	2.65	186.40	25.09	1.1E-08 *
09/08/09	40064	9	50	21.6	5	25	300	1500	2.65	186.40	25.09	1.1E-08 *
09/08/09	40064	9	55	21.6	5	30	300	1800	2.65	186.40	25.09	1.1E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.1E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/8/09

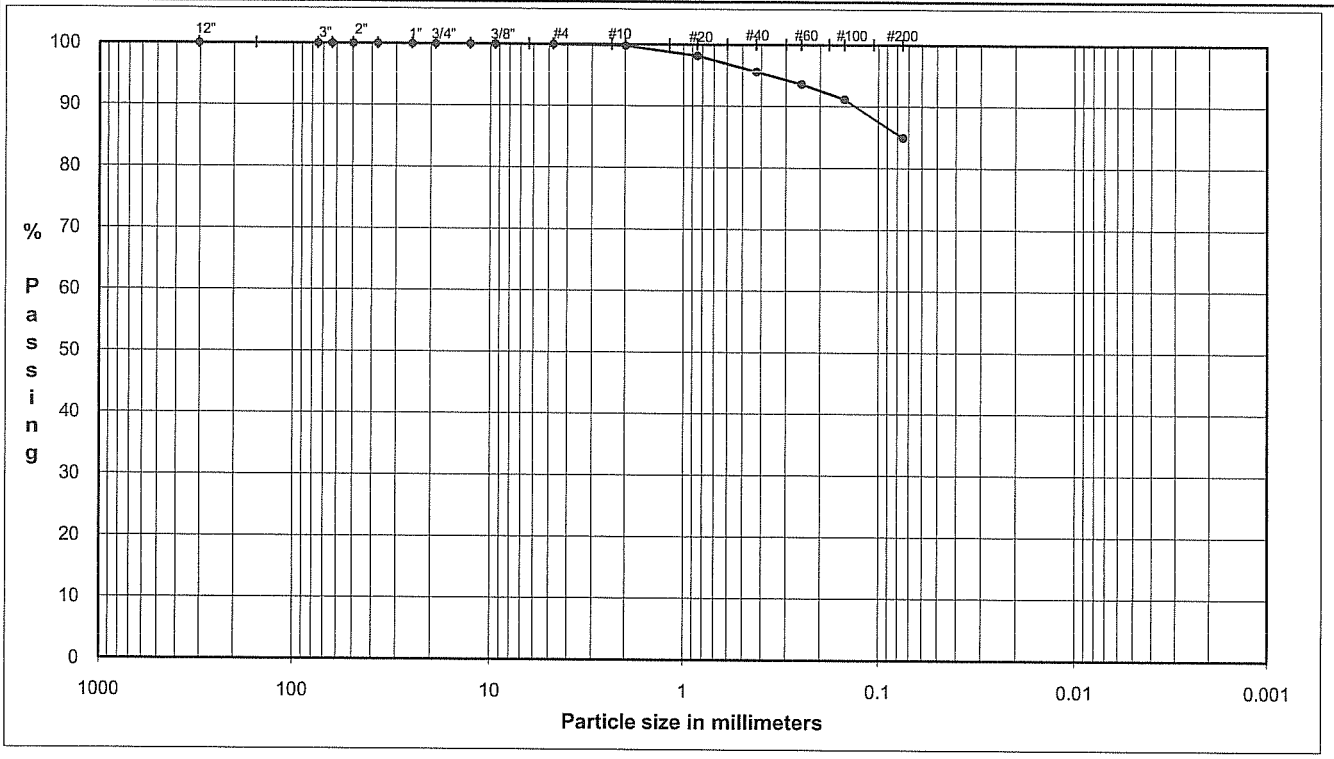
CHECK

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

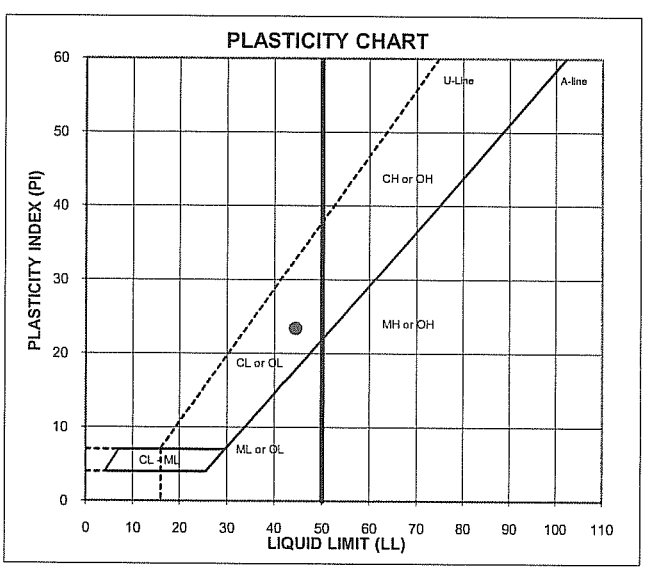
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-4-1A** Depth: **6.0"**
TYPE: **UD**



	Coarse	Fine	Coarse	Medium	Fine	
COBBLES	GRAVEL		SAND			Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.8**	Coarse Sand	**0.21**
#20	0.85	**98.2**		
#40	0.43	**95.6**	Medium Sand	**4.20**
#60	0.25	**93.6**		
#100	0.15	**91.2**		
#200	0.075	**84.9**	Fine Sand	**10.65**
			Fines	**84.93**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.9	**44**	**21**	**23**	**0.17**

DESCRIPTION: Light Olive Brown, SILTY CLAY, some medium to fine sand.
USCS: CL

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	DW/RF
DATE	9/8/09
CHECK	DH
REVIEW	TWN

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	4	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	2	
SAMPLE ID	P-4-1A	6.0"	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	AK	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.923	B-Value, f	0.99	Height, inches	2.924
Diameter, inches	2.859	Cell Pres.	90.0	Diameter, inches	2.866
Area, cm²	41.42	Bot. Pres.	80.0	Area, cm²	41.62
Volume, cm³	307.50	Top Pres.	80.0	Volume, cm³	309.12
Mass, g	610.91	Tot. B.P.	80.0	Mass, g	615.28
Moisture Content, %	24.94	Head, max.	165.30	Moisture Content, %	25.83
Dry Density, pcf	99.22	Head, min.	165.30	Dry Density, pcf	98.70
Spec. Gravity(assumed)	2.700	Max. Grad.	22.26	Volume Solids, cm³	181.10
Volume Solids, cm³	181.10	Min. Grad.	22.26	Volume Voids, cm³	128.02
Volume Voids, cm³	126.41			Void Ratio	0.71
Void Ratio	0.70			Saturation, %	98.7%
Saturation, %	96.5%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	610.91	623.28
Wt Soil & Tare, f	g	488.96	496.99
Wt Tare	g	0.00	8.15
Wt Moisture Lost	g	121.95	126.29
Wt Dry Soil	g	488.96	488.84
Water Content	%	24.94%	25.83%

Flow Pump Rate: 1.18E-05 cm³/sec

USCS: CL

DESCRIPTION: Light Olive Brown, SILTY CLAY, some medium to fine sand.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/09/09	40065	8	20	21.5	0	0	0	0	2.35	165.30	22.26	1.2E-08
09/09/09	40065	8	25	21.5	5	5	300	300	2.35	165.30	22.26	1.2E-08
09/09/09	40065	8	30	21.5	5	10	300	600	2.35	165.30	22.26	1.2E-08
09/09/09	40065	8	35	21.5	5	15	300	900	2.35	165.30	22.26	1.2E-08 *
09/09/09	40065	8	40	21.5	5	20	300	1200	2.35	165.30	22.26	1.2E-08 *
09/09/09	40065	8	45	21.5	5	25	300	1500	2.35	165.30	22.26	1.2E-08 *
09/09/09	40065	8	50	21.5	5	30	300	1800	2.35	165.30	22.26	1.2E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.2E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/9/09

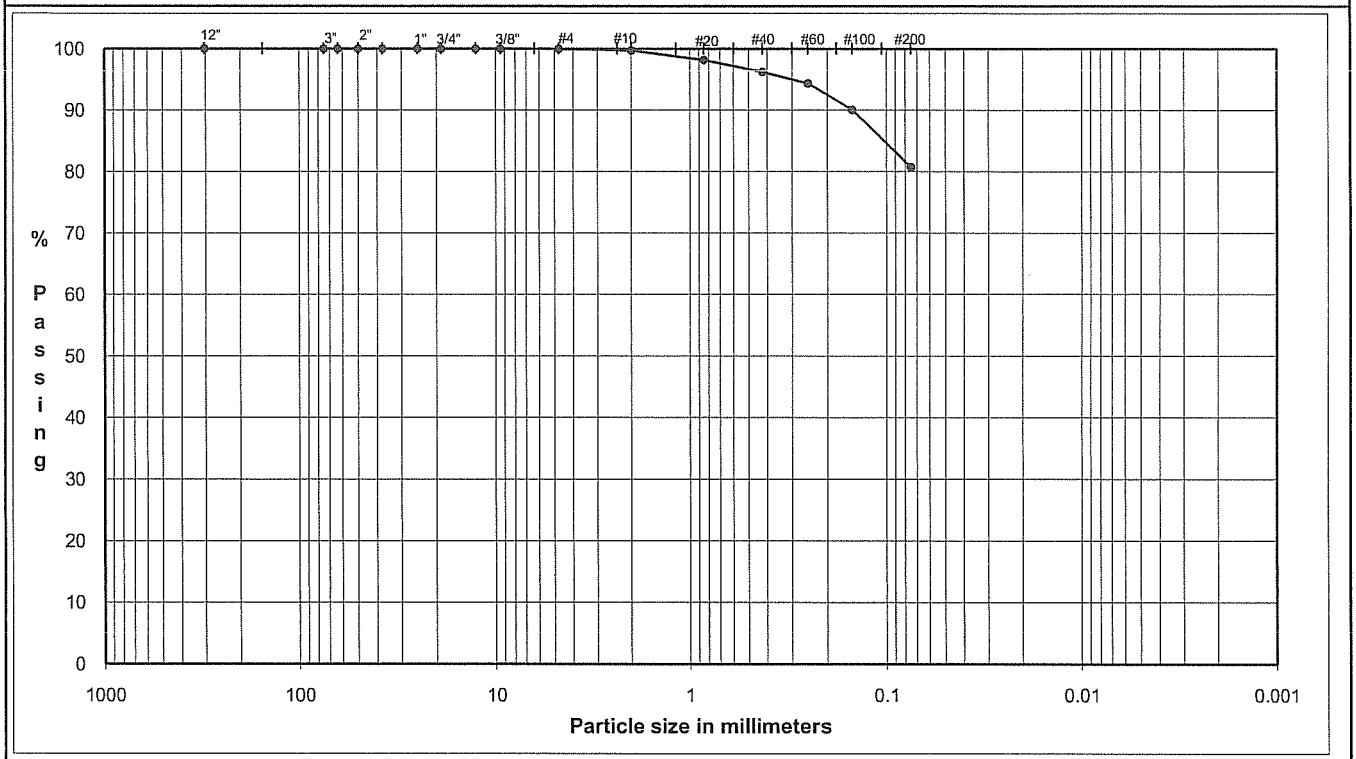
CHECK JA

REVIEW

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

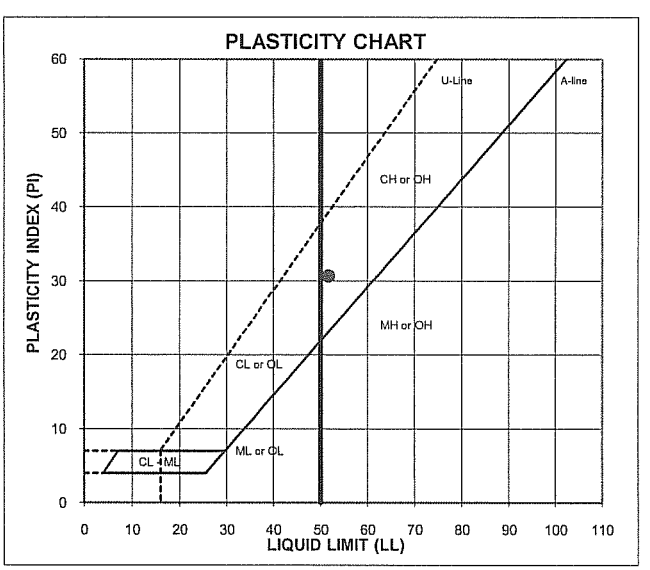
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-4-2A** Depth: **6.0"**
TYPE: **UD**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.7**	Coarse Sand	**0.28**
#20	0.85	**98.1**		
#40	0.43	**96.3**	Medium Sand	**3.47**
#60	0.25	**94.4**		
#100	0.15	**90.0**		
#200	0.075	**80.7**	Fine Sand	**15.53**
			Fines	**80.72**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.1	**52**	**21**	**31**	**0.10**

DESCRIPTION: Grayish Brown, SILTY CLAY, some medium to fine sand.
USCS: CH

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	DW/RF
DATE	9/8/09
CHECK	DA
REVIEW	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	3	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	2	
SAMPLE ID	P-4-2A	6.0"	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.918	B-Value, f	1.00	Height, inches	2.931
Diameter, inches	2.847	Cell Pres.	90.0	Diameter, inches	2.864
Area, cm²	41.07	Bot. Pres.	80.0	Area, cm²	41.56
Volume, cm³	304.40	Top Pres.	80.0	Volume, cm³	309.42
Mass, g	602.46	Tot. B.P.	80.0	Mass, g	611.23
Moisture Content, %	24.12	Head, max.	196.25	Moisture Content, %	25.93
Dry Density, pcf	99.50	Head, min.	196.25	Dry Density, pcf	97.88
Spec. Gravity(assumed)	2.700	Max. Grad.	26.36	Volume Solids, cm³	179.77
Volume Solids, cm³	179.77	Min. Grad.	26.36	Volume Voids, cm³	129.66
Volume Voids, cm³	124.64			Void Ratio	0.72
Void Ratio	0.69			Saturation, %	97.1%
Saturation, %	93.9%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	602.46	619.18
Wt Soil & Tare, f	g	485.37	493.39
Wt Tare	g	0.00	8.30
Wt Moisture Lost	g	117.09	125.79
Wt Dry Soil	g	485.37	485.09
Water Content	%	24.12%	25.93%

DESCRIPTION: Grayish Brown, SILTY CLAY, some medium to fine sand.

Flow Pump Rate: 1.18E-05 cm³/sec

USCS: CH

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/10/09	40066	8	25	21.3	0	0	0	0	2.79	196.25	26.36	1.0E-08
09/10/09	40066	8	30	21.3	5	5	300	300	2.79	196.25	26.36	1.0E-08
09/10/09	40066	8	35	21.3	5	10	300	600	2.79	196.25	26.36	1.0E-08
09/10/09	40066	8	40	21.3	5	15	300	900	2.79	196.25	26.36	1.0E-08 *
09/10/09	40066	8	45	21.3	5	20	300	1200	2.79	196.25	26.36	1.0E-08 *
09/10/09	40066	8	50	21.3	5	25	300	1500	2.79	196.25	26.36	1.0E-08 *
09/10/09	40066	8	55	21.3	5	30	300	1800	2.79	196.25	26.36	1.0E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.0E-08 cm/sec **

PERMEANT: Deaired Tap Water

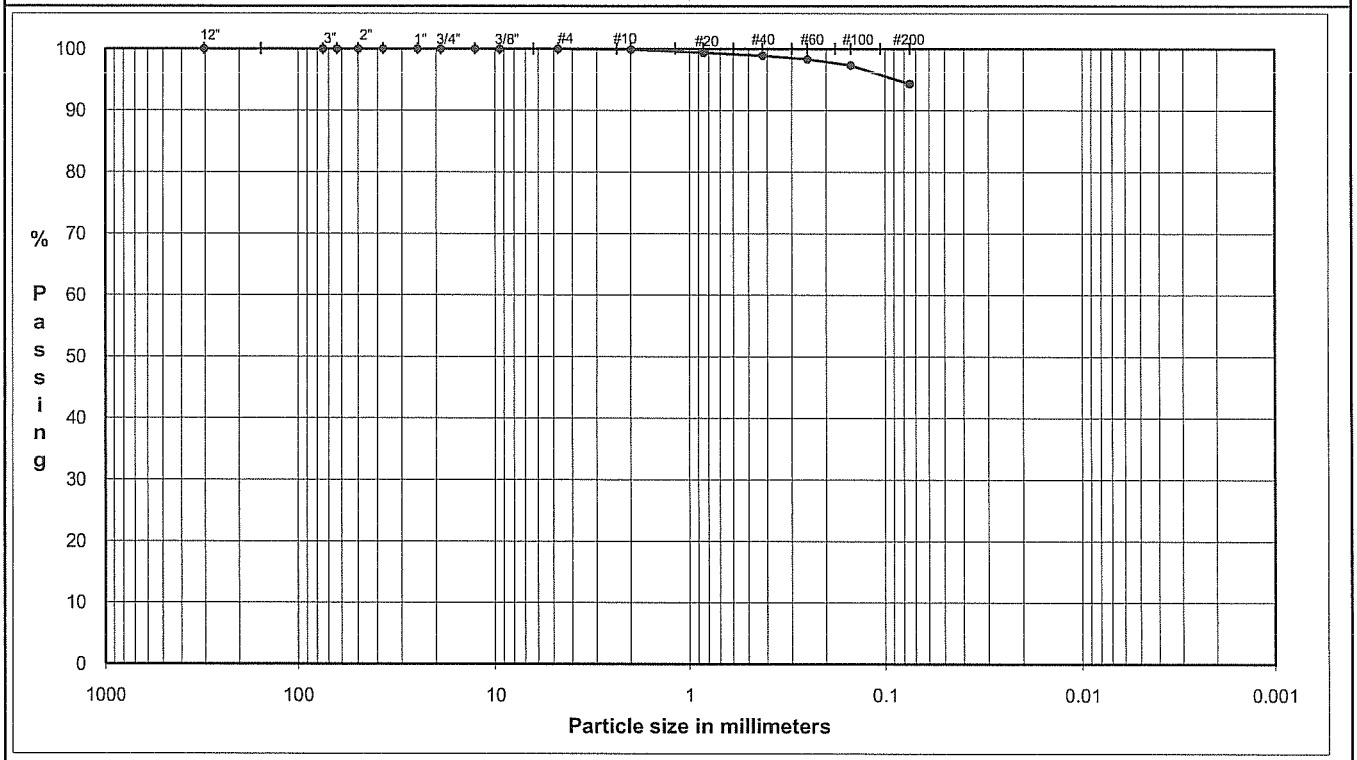
DATE 9/10/09
CHECK DA
REVIEW MWH

SEPTEMBER 2009 093-90145

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

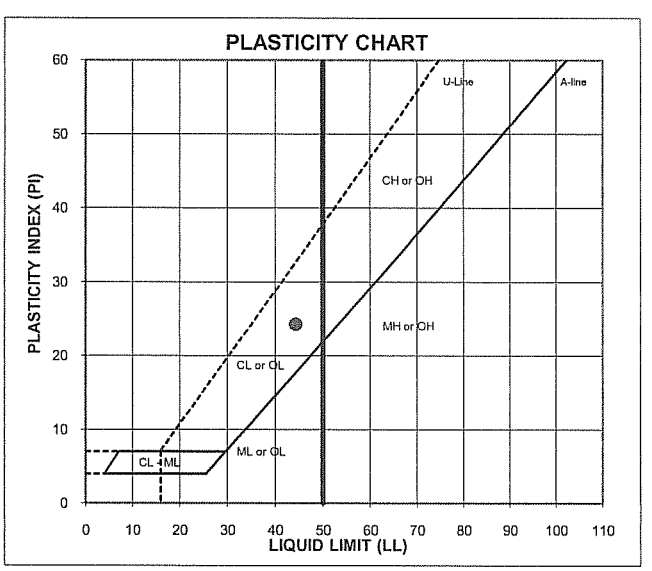
PROJECT NAME: FTN/MISSISSIPPI COUNTY LF - CELL 14/AR
SAMPLE ID: P-4-3A Depth: -
TYPE: UD



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.9**	Coarse Sand	**0.11**
#20	0.85	**99.4**		
#40	0.43	**98.9**	Medium Sand	**1.01**
#60	0.25	**98.3**		
#100	0.15	**97.3**		
#200	0.075	**94.3**	Fine Sand	**4.55**
			Fines	**94.33**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
27.5	44	20	24	0.32

DESCRIPTION: Yellowish Brown and Gray, SILTY CLAY, little coarse to fine sand.

USCS: CL

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	DA/TJ
DATE	9/9/09
CHECK	DA
REVIEW	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR		Board #	2	COMMENTS
PROJECT NUMBER	093-90145		Flow Pump	1	
SAMPLE ID	P-4-3A	-	Flow Pump Speed	11	
SAMPLE TYPE	UD		Technician	TW	

Sample Data, Initial				Sample Data, Final	
Height, inches	2.919	B-Value, f	0.99	Height, inches	2.914
Diameter, inches	2.847	Cell Pres.	90.0	Diameter, inches	2.850
Area, cm²	41.07	Bot. Pres.	80.0	Area, cm²	41.16
Volume, cm³	304.51	Top Pres.	80.0	Volume, cm³	304.63
Mass, g	597.12	Tot. B.P.	80.0	Mass, g	601.05
Moisture Content, %	27.50	Head, max.	186.40	Moisture Content, %	28.34
Dry Density, pcf	95.97	Head, min.	186.40	Dry Density, pcf	95.93
Spec. Gravity(assumed)	2.700	Max. Grad.	25.18	Volume Solids, cm³	173.45
Volume Solids, cm³	173.45	Min. Grad.	25.18	Volume Voids, cm³	131.18
Volume Voids, cm³	131.06			Void Ratio	0.76
Void Ratio	0.76			Saturation, %	101.2%
Saturation, %	98.3%				

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	597.12	609.07
Wt Soil & Tare, f	g	468.32	476.40
Wt Tare	g	0.00	8.29
Wt Moisture Lost	g	128.80	132.67
Wt Dry Soil	g	468.32	468.11
Water Content	%	27.50%	28.34%

Flow Pump Rate: 1.27E-05 cm³/sec

USCS: CL

DESCRIPTION: Yellowish Brown and Gray, SILTY CLAY, little coarse to fine sand.

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/10/09	40066	8	25	21.3	0	0	0	0	2.65	186.40	25.18	1.2E-08
09/10/09	40066	8	30	21.3	5	5	300	300	2.65	186.40	25.18	1.2E-08
09/10/09	40066	8	35	21.3	5	10	300	600	2.65	186.40	25.18	1.2E-08
09/10/09	40066	8	40	21.3	5	15	300	900	2.65	186.40	25.18	1.2E-08 *
09/10/09	40066	8	45	21.3	5	20	300	1200	2.65	186.40	25.18	1.2E-08 *
09/10/09	40066	8	50	21.3	5	25	300	1500	2.65	186.40	25.18	1.2E-08 *
09/10/09	40066	8	55	21.3	5	30	300	1800	2.65	186.40	25.18	1.2E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

PERMEABILITY REPORTED AS ** 1.2E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/10/09
CHECK DA
REVIEW

FTN/MISSISSIPPI COUNTY LF-CELL 14/AR
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classification	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
P-4-4A	UD	-	CL	22.6	46	24	22	-0.05	100.0	85.1	-	-	-	-	22.6	99.1	3.8E-08	-

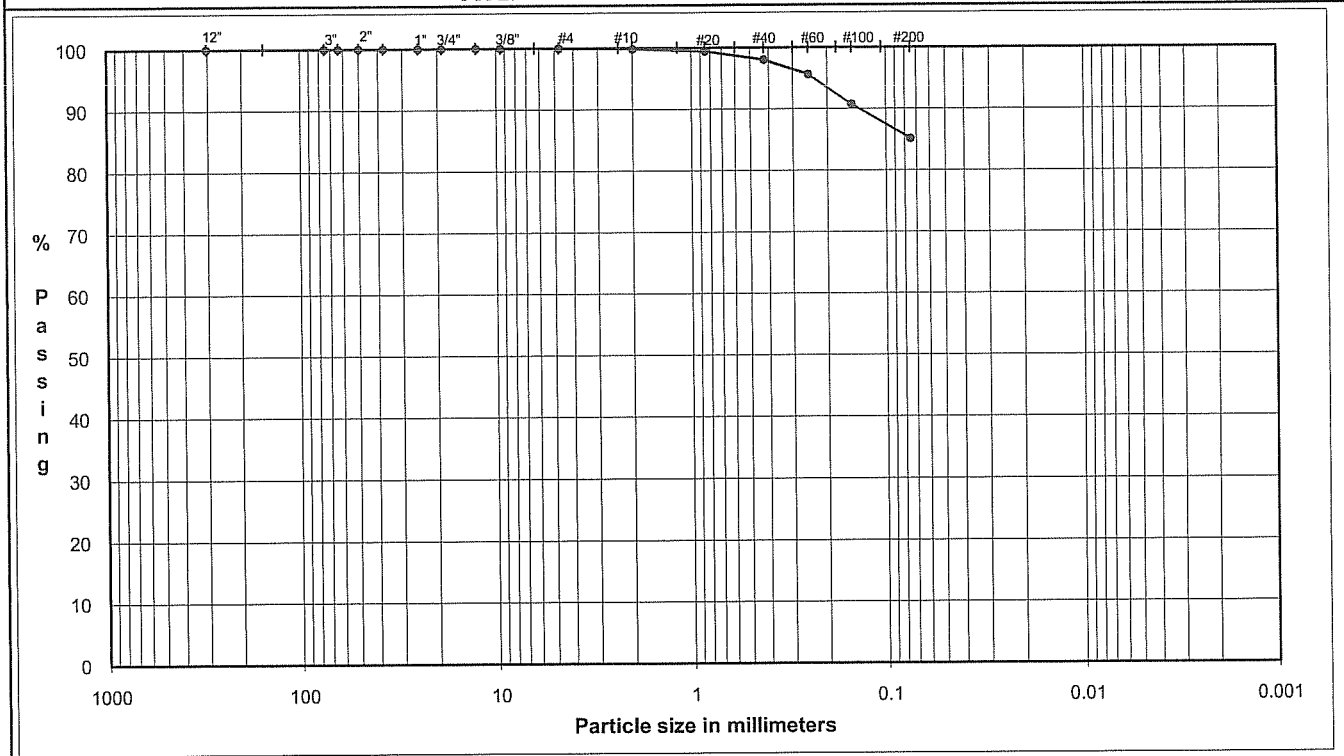
ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

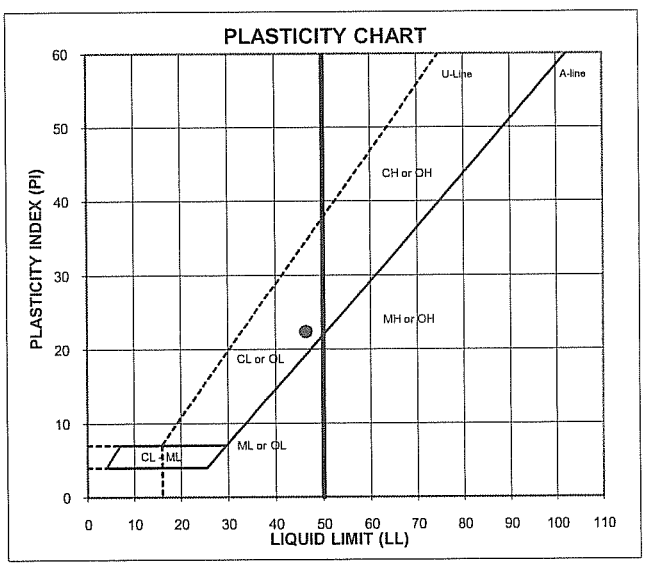
PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF - CELL 14/AR**
SAMPLE ID: **P-4-4A** Depth: -
TYPE: **UD**



COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.00**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.00**
#10	2.00	**99.8**	Coarse Sand	**0.15**
#20	0.85	**99.4**		
#40	0.43	**98.0**	Medium Sand	**1.86**
#60	0.25	**95.6**		
#100	0.15	**90.7**		
#200	0.075	**85.1**	Fine Sand	**12.85**
			Fines	**85.13**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
22.6	**46**	**24**	**22**	**-0.05**

DESCRIPTION: Yellowish Brown and Gray, SILTY CLAY, some medium to fine sand.

USCS: CL

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

TECH	TJ/DA
DATE	9/9//09
CHECK	
REVIEW	

FLEXIBLE WALL PERMEABILITY
ASTM D 5084
METHOD D, CONSTANT RATE OF FLOW

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF - CELL 14/AR	Board #	1
PROJECT NUMBER	093-90145	Flow Pump	2
SAMPLE ID	P-4-4A / -	Flow Pump Speed	10
SAMPLE TYPE	UD	Technician	TW

COMMENTS:

Sample Data, Initial			
Height, inches	2.918	B-Value, f	0.99
Diameter, inches	2.847	Cell Pres.	90.0
Area, cm²	41.07	Bot. Pres.	80.0
Volume, cm³	304.40	Top Pres.	80.0
Mass, g	592.76	Tot. B.P.	80.0
Moisture Content, %	22.60	Head, max.	101.99
Dry Density, pcf	99.11	Head, min.	101.99
Spec. Gravity(assumed)	2.700	Max. Grad.	13.59
Volume Solids, cm³	179.07	Min. Grad.	13.59
Volume Voids, cm³	125.33		
Void Ratio	0.70		
Saturation, %	87.2%		

Sample Data, Final	
Height, inches	2.954
Diameter, inches	2.871
Area, cm²	41.77
Volume, cm³	313.38
Mass, g	612.94
Moisture Content, %	26.77
Dry Density, pcf	96.27
Volume Solids, cm³	179.07
Volume Voids, cm³	134.30
Void Ratio	0.75
Saturation, %	96.4%

WATER CONTENTS		Sample Initial	Sample Final
Wt Soil & Tare, i	g	592.76	620.86
Wt Soil & Tare, f	g	483.50	491.50
Wt Tare	g	0.00	8.30
Wt Moisture Lost	g	109.26	129.36
Wt Dry Soil	g	483.50	483.20
Water Content	%	22.60%	26.77%

DESCRIPTION: Yellowish Brown and Gray, SILTY CLAY, some medium to fine sand.

Flow Pump Rate: 2.25E-05 cm³/sec

USCS: CL

TIME FUNCTIONS, SECONDS								dP				
DATE	DAY	HOUR	MIN	TEMP (°C)	dt (min)	dt,acc (min)	dt (sec)	dt,acc (sec)	Reading (psi)	Head (cm)	Gradient	Permeability (cm/sec)
09/10/09	40066	10	5	21.6	0	0	0	0	1.45	101.99	13.59	3.8E-08
09/10/09	40066	10	10	21.6	5	5	300	300	1.45	101.99	13.59	3.8E-08
09/10/09	40066	10	15	21.6	5	10	300	600	1.45	101.99	13.59	3.8E-08
09/10/09	40066	10	20	21.6	5	15	300	900	1.45	101.99	13.59	3.8E-08 *
09/10/09	40066	10	25	21.6	5	20	300	1200	1.45	101.99	13.59	3.8E-08 *
09/10/09	40066	10	30	21.6	5	25	300	1500	1.45	101.99	13.59	3.8E-08 *
09/10/09	40066	10	35	21.6	5	30	300	1800	1.45	101.99	13.59	3.8E-08 *

*TRANSCRIBED FROM ORIGINAL DATA SHEETS

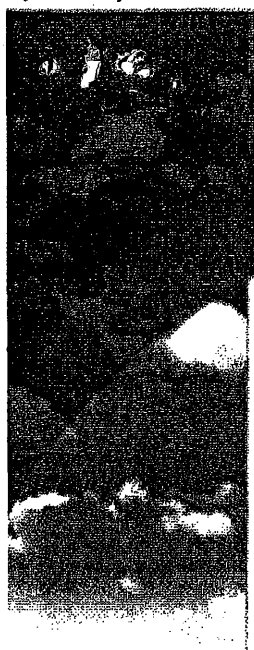
PERMEABILITY REPORTED AS ** 3.8E-08 cm/sec **

PERMEANT: Deaired Tap Water

DATE 9/10/09
CHECK DA
REVIEW

APPENDIX I

Geomembrane Installation Company Qualifications



American Environmental Group Ltd

1.0 Profile of the Company

American Environmental Group, Ltd. (AEGL) is an Ohio Limited Liability Company, founded in January of 2002, and dedicated to providing a unique and specialized set of services to the solid waste landfill industry.

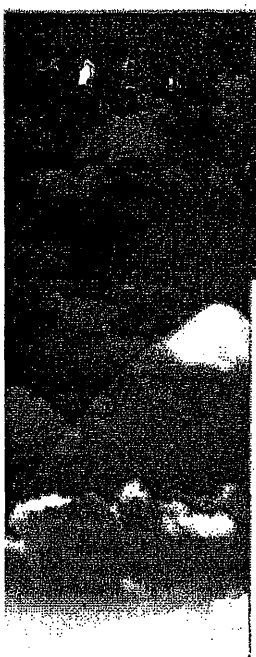
We are **builders and operators** of environmental control systems for landfills. AEGL **self-performs** most aspects of our projects, providing a level of **control, consistency of service, and quality** that often exceeds our client's expectations. Concentrating on our skill strengths, we focus on several complementary service areas, as follows:

- Landfill gas extraction well drilling and installation
- Landfill gas/leachate collection system construction
- Geosynthetics fabrication and installation
- Operations and maintenance – open and closed sites
- Construction management

AEGL serves a nationwide client base that includes both private and public landfill owner/operators, consulting/engineering firms, general and specialty contractors, alternate energy and landfill gas developers, and other environmental and industrial firms. As a field services organization, AEGL's crews follow the work, and that takes them to project sites throughout the United States. Our crews are qualified, trained, outfitted with the best equipment, and supported with an experienced office staff.

The five-member ownership team collectively possesses over 100 years of experience in the environmental construction industry. Our key employees add both additional years of industry experience and complementary skill sets to our team. Collectively, AEGL stands for **integrity, professionalism, and performance.**

In order to meet the complete needs of our clients, AEGL will often team with other companies, such as consulting, engineering, or contracting firms. As a result, services can be provided in a more seamless and cost-effective manner than in traditionally managed projects. While we believe that we are the best in our service niches, AEGL has an unwavering **client-centered focus**. Therefore, we welcome service partnerships, teaming relationships, and strategic alliances that create project synergies and extra value for our clients.



American Environmental Group Ltd

1.2 Company History

American Environmental Group, Ltd. (AEGL) was formed as an Ohio Limited Liability Company on January 8, 2002. The Charter/Registration Number for the firm is 1286263. The Corporate offices are located at 3600 Brecksville Road, Suite 100, Richfield, Ohio 44286.

The founding Members of AEGL (listed below) together have over 100 years of experience in the solid waste construction services business. Most of that experience was gained over the last 16 years on several thousand landfill construction projects throughout the US and Canada, as well as in Hong Kong. Details of their experience are outlined in their resumes, which are provided in Appendix C. Each Member possesses his own depth of expertise in one or more of the five service areas provided by the firm.

President	**Mark H. Shipps**
Secretary	**Carl J. Apicella**
Treasurer	**Peter J. Augustin**
Vice-Presidents	**Michael C. Maurer**
	James R. Helmick

AEGL has recruited a very strong team of key employees, most of who have worked with the founders while employed together at other firms. Resumes selected from that group are also attached. As of July 1, 2005, AEGL had 180+ full-time employees, deployed as follows:

- Four landfill gas drilling and installation crews,
- Six landfill gas system installation crews,
- Seven geosynthetics installation crews,
- Twenty landfill operations and maintenance (O&M) technicians,
- Two O&M small construction response teams,
- Fifteen construction/project supervisors,
- Three engineers,
- and a highly competent and efficient office staff.

AEGL has also established satellite operations in both the Chicago, IL and Louisville, KY areas.

In three and one half years of operations, AEGL completed approximately $50,000,000 of solid waste construction and environmental related work, including 250 landfill gas drilling/well installation projects, 200 landfill gas pipeline system installation projects, and 250 geosynthetics projects. Added to these totals are 60 ongoing O&M projects and nine construction management services contracts. At the close of 2004, AEGL also had approximately 40 projects underway with expected successful completion during the first quarter of 2005. A summary of those projects is included in Appendix A.

Additional accomplishments throughout the third year of AEGL's operations include:

- For the third year in a row, selection by a major solid waste firm for a significant role in a national landfill gas well drilling and installation, along with landfill gas collection/control system construction program. This contract award continues throughout the 2005 calendar year, and includes 30 sites and nearly 25,000 feet of drilling and well installation and nearly 20,000 feet of pipeline installation.
- Award of a competitively bid, landfill gas system installation project on a Superfund NPL site in southeastern Pennsylvania. This project included landfill gas and environmental monitoring well installation, a complete LFG collection system, flare equipment and controls, as well as site drainage and restoration work. The total project exceeded $1,500,000 when completed in 2004.
- Licensing as a specialized contractor in the states of Alabama, Florida, Georgia, Louisiana, Tennessee, and Virginia, with additional receipt of authority to conduct business in Alabama, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Texas, Utah and Virginia. Section 1.3 provides further information about AEGL's licenses and permits.
- Purchase of two IMT track mounted bucket auger drill rigs (early 2003). These rigs, together with AEGL's proprietary drilling technologies, position the company as one of the industry leaders in landfill gas drilling and well installation. AEGL also operates two other track mounted drill rigs under long term leases.
- As of July 1, 2005, successful installation of approximately 65,000,000 SF of geosynthetic materials. Projects have ranged in size from less than one acre to over 50 acres.
- Participation and support at the state, regional, and national level of both SWANA (Solid Waste Association of North America) and NSWMA (National Solid Waste Management Association). AEGL is also an Industry Partner in the US EPA's Landfill Methane Outreach Program (LMOP).
- As of July 1, 2005, receipt of Dun and Bradstreet (D&B) credit rating of IR2, and a Paydex score of 80, which indicates that AEGL has an overall good credit rating and pays its suppliers and subcontractors invoices on time and within terms. AEGL intends to maintain an excellent credit rating and a strong financial posture. Section 1.4 provides more information about AEGL's banking, credit, insurance, and bonding.

American Environmental Group Ltd

Resume of Qualifications

John Beeman

Professional Qualifications

John Beeman possesses over 19 years experience in the geosynthetics industry. He has supervised and installed over hundreds of millions of square feet of numerous types of geosynthetic material from all major manufacturers. He has performed and supervised projects ranging up to 10,000,000 square feet and has been named as an authorized/certified representative for several liner manufacturers. He has extensive experience in the installation of high and low density polyethylene, polyvinyl chloride, polypropylene, XR5, geotextiles, geocomposite and other related products. Mr. Beeman also managed a large scale fabrication facility producing over 10,000,000 square feet annually.

Mr. Beeman's technical experience includes research and development of state-of-the-art fusion and extrusion machines and welding techniques while working with a major equipment manufacturer.

Experience and Employment Background

03/02 – Present: American Environmental Group, Ltd., Richfield, Ohio
Operations Manager - Geosynthetics

1997 – 02/02: EMCON/OWT, a member of the IT Group, Brecksville, Ohio
Operations Manager (Liner Division)
Mr. Beeman played a key role in the substantial growth of the firm's geosynthetics fabrication and installation. He was responsible for hiring, scheduling, and supervising all employees in the geosynthetic installation division. He managed all estimating, procurement, and provided technical support and estimating services to other departments within the corporation. Mr. Beeman was also instrumental in the starting up and development of a fabrication facility.

1995 – 1997: Mid American Lining Company, Union City, TN
Construction Manager
Mr. Beeman was responsible for marketing, estimating and project management of a facility performing over $15,000,000 annually. Mr. Beeman procured numerous types of geosynthetic materials for field operations covering over 20 states and internationally, and he managed all aspects of a fabrication facility producing over 10,000,000 square feet of geosynthetics annually.

1989 – 1995: National Seal Company, Cranberry Township, PA
Positions of increasing responsibility to Construction Supt.
Mr. Beeman was responsible for marketing, estimating, and project management for liner installation crews. He supervised and managed installations on projects ranging up to 10,000,000 square feet with a crew of over 20 people. He was part of a research and development effort to modify and improve methods and techniques for liner seaming and welding.

Academic / Training Background

Pueblo Vocational Community College
Welding Technology 1989

NICET Certified (Level II Technician)

OSHA 40 Hour Training Course – CFR 1910.120

OSHA 8 hour Refresher Training – CFR 1910.120

OSHA 8 hour Competent Person Certificate, including Trench Safety Training

IAGI Certified Welding Technician

American Environmental Group Ltd

Resume of Qualifications

Tom Sparks

Professional Qualifications

Tom Sparks possesses over 16 years experience in the geosynthetics industry. He has managed project installations totaling hundreds of millions of square feet of geosynthetic materials for a major manufacturer and installer. He has extensive experience in the installation of high and low density polyethylene, geotextiles, geocomposites and other related products.

Mr. Sparks developed the submittal / technical process at Serrot International.

Experience and Employment Background

2003 – Present: American Environmental Group, Ltd., Richfield, Ohio
Project Manager - Geosynthetics

1994 – 2002: Serrot International Inc., Cranberry Twp., Pennsylvania
Project Manager / Technical Manager
As a Project Manager, Mr. Sparks was responsible for all aspects of construction on installation projects in his Midwest Region. Mr. Sparks managed between 2 and 6 geosynthetic crews on a continual basis. His duties included P&L management, materials management, crew scheduling, daily coordination with clients, invoicing of contract and extra work items. Mr. Sparks was responsible for overall client satisfaction.

Mr. Sparks led the transition to combine Serrot Corporation and National Seal Company Submittals / Technical procedures. Tasks included generating or revising material specifications, product manufacturing and installation guidelines, training technical personnel in other regional locations, and development of company wide submittal / technical standards and work flow processes.

As Technical Manager, Mr. Sparks was responsible for negotiating specifications with Clients, Engineers, or Representatives. He coordinated with internal and external laboratories for specific material testing requirements. He worked with the shipping department to ensure that materials shipped were in compliance with site specific requirements and coordinated the materials certification process with internal manufacturing and external vendors.

1992 – 1994: Golder Associates, Atlanta, Georgia
Senior Engineering Technician
Mr. Sparks was the on site manager overseeing the documentation of all relevant aspects of landfill construction. He reviewed material certifications to ensure compliance with project specifications. He coordinated daily with the owner, earthwork contractor, and installation contractor. He facilitated problem / resolution meetings as necessary. Mr. Sparks performed on-site testing of materials. He prepared documentation for inclusion into final reports for submittal to state regulatory agencies for approval.

Academic / Training Background

B.B.A. – Georgia State University, 1992

IAGI Certified Welding Technician

Glenn Beeman – Supervisor		
Company History	**Years Experience**	**Materials**
American Environmental Group, LTD.	2003 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Geo-Synthetic, Inc.	2001 – 2003	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Mid-American Lining	2000 – 2001	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

Trevor Simmons (Superintendent & all around nice guy)

Work History

Trevor Simmons		
Experience	**Years Experience**	**Material**
NATIONAL SEAL COMPANY	1 YEAR	VARIOUS PRODUCTS, HDPE, LLDPE, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES
GEOSYNTEC CONSULTANTS	2 YEARS	CQA
NATIONAL SEAL COMPANY / SERROT INTERNATIONAL, INC	10 YEARS	VARIOUS PRODUCTS, HDPE, LLDPE, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES
COMANCO ENVIRONMENTAL CORPORATION	1 YEAR	VARIOUS PRODUCTS, HDPE, LLDPE, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES
GEO-SYNTHETICS, INC.	1 YEAR	VARIOUS PRODUCTS, HDPE, LLDPE, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES
AMERICAN ENVIRONMENTAL GROUP LTD.	APRIL 2005	VARIOUS PRODUCTS, HDPE, LLDPE, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES

Richard Meier - Supervisor		
Company History	**Years Experience**	**Materials**
American Environmental Group, LTD.	2002 – Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Landsaver Environmental, Inc.	2000 – 2002	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
National Seal Company	1991 – 2000	Geomembrane HDPE, VLDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

Richard Meier (Supervisor)

Work History

Richard Meier		
Experience	**Quantities Installed**	**Material**
SCOTTIES CONSTR./GLASGOW GLASGOW, KY.	281,060 SF 23,982 SF	60 MIL TN 3002/1120
CITY MGMT./CARLETON FARMS CELL 6 CARLETON, MI.	300,600 SF 51,570 SF 49,590 SF 300,150 SF 301,500 SF	80 MIL 80 MIL FRICTION TN 3002 PN 3000 TREVIRA 1145
EAGLE VALLEY RDF ORION, MI.	51,071 SF 333,978 SF 41,587 SF 36,173 SF 167,608 SF 184,468 SF	60 MIL 60 MIL F/1 PN 3000 TN 3002 BENTOFIX GEOTEXTILES
EVERGREEN CELL 9B NORTHWOOD, OH.	377,248 SF 386,266 SF	60 MIL TREVIRA 1155
RANDOLPH LANDFILL RANDOLPH, VT.	408,574 SF 26,120 SF	60 MIL BENTOFIX
EAGLE VALLEY CELL 5B ORION, MI.	779,600 SF 34,900 SF 432,727 SF 34,900 SF 371,330 SF 421,269 SF	60 MIL 60 MIL F/1 PN 3000 TN 3001/1125 BENTOFIX GEOTEX
PIONEER CROSSING (HALF) BIRDSBORO, PA.	500,743 SF 501,318 SF	60 MIL 80 MIL
WOODLAND MEADOWS RDF WAYNE, MI.	1,028,882 SF	60 MIL
BERKLEY LANDFILL BERKLEY, MA.	563,000 SF 311,442 SF 556,761 SF 275, 996 SF	40 MIL 40 MIL F/2 TN 3001/1135 TN 3002/1135
GREENBRIER SOLID WASTE LEWISBURG, WV.	207,246 SF 102,723 SF 244,810 SF 92,525 SF 71, 616 SF	60 MIL 60 MIL FRICTION BENTOFIX PN 3000 TREVIRA 1125
GRAND CENTRAL LANDFILL PEN ARGYL, PA.	647,862 SF 312,431 SF 328,578 SF 79,648 SF 449,306 SF 1,053,738 SF	60 MIL FRICTION 40 MIL FRICTION BENTOFIX TN 3002/1125 PN 3000 GEOTEXTILES
POTTSTOWN LANDFILL POTTSTOWN, PA.	426,461 SF 427,569 SF 855,692 SF	40 MIL PN 3000 GEOTEXTILE

Eddie Keodouansgy (Construction Foreman)

Work History

Eddie Keodouansgy		
Experience	**Years Experience**	**Material**
SERROT/NATIONAL SEAL CORPORATION	8 years	VARIOUS PRODUCTS, HDPE, VLDPE, PP, PVC, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES
GSE HOUSTON, TX	8 years	VARIOUS PRODUCTS, HDPE, VLDPE, PP, PVC, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES
AMERICAN ENVIRONMENTAL GROUP LTD.	< 1 YEAR	VARIOUS PRODUCTS, HDPE, LLDPE, PP, PVC, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES
WABASH VALLEY LANDFILL IN.	225,000 SF 225,000 SF	40 MIL. LLDPE TEXT. DS COMPOSITE
BABB'S CREEK PA.	30,000 SF 60,000 SF	30 MIL. PVC GEOTEXTILE
AEROSPACE PARKWAY CLEVELAND, OH.	40,000 SF	30 MIL. PVC
FORD MOTOR COMPANY BEACH, VA.	2,000,000 SF	DS COMPOSITE
FORD MOTOR COMPANY BEACH, VA.	45,000 SF	DS COMPOSITE
WABASH VALLEY LANDFILL IN.	220,000 SF 220,000 SF	60 MIL. HDPE TEXT. DS COMPOSITE
SHREWSBURY LANDFILL SHREWSBURY, MA.	330,000 SF 1,520 LF	40 MIL. LLDPE TEXT. TIE-IN SEAM/EXTRUSION
PUTNAM ASH LANDFILL TECHNOLOGIES, INC. CT.	450,000 SF 450,000 SF 450,000 SF 4,000 LF	60 MIL. HDPE SECONDARY DS GEOCOMPOSITE 60 MIL HDPE PRIMARY TIE-IN SEAM/EXTRUSION
CARLETON FARMS LANDFILL CARLETON, MI.	1,400,000 SF 1,400,000 SF 800,000 SF	GCL 80 MIL. HDPE (S & T) GEOCOMPOSITE (SS & DS)
BP TANK FARM TOLEDO, OH.	80,000 SF 1,300 LF	40 MIL. HDPE BATTEN BAR
ELK RUN LANDFILL ONAWAY, MI.	220,000 SF 220,000 SF 220,000 SF 240,000 SF 260,000 SF 80,000 SF 3,000 LF	GCL SECONDARY 60 MIL. HDPE SECONDARY DS GEOCOMPOSITE GCL PRIMARY 60 MIL. HDPE PRIMARY PRIMARY GEOCOMPOSITE TIE-IN SEAM/EXTRUSION

Eddie Keodouangsy - Supervisor		
Company History	**Years Experience**	**Materials**
American Environmental Group, LTD.	2003 – Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Serrot Corporation / National Seal Company	1995 – 2003	Geomembrane HDPE, VLDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Gundle Lining Systems	1987 – 1995	Geomembrane HDPE, VLDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

Chan Inthavong - Supervisor		
Company History	**Years Experience**	**Materials**
American Environmental Group, LTD.	2004 - Present	Geomembrane HDPE, LLDPE, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Environmental Design & Construction, Inc.	2000 – 2004	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
M. Putterman Company (MPC)	1996 - 2000	Geomembrane HDPE, VLDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

Chan Inthavong (Construction Foreman)

Work History

Chan Inthavong		
Experience	**Years Experience**	**Material**
GSE HOUSTON, TX	16 YEARS	VARIOUS PRODUCTS, HDPE, VLDPE, PP, PVC, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES
AMERICAN ENVIRONMENTAL GROUP LTD.	< 1 YEAR	VARIOUS PRODUCTS, HDPE, LLDPE, PP, PVC, GCL, GEOTEXTILES, GEONET, GEOCOMPOSITES
CARLETON FARMS LANDFILL CARLETON, MI.	1,400,000 SF 1,400,000 SF 800,000 SF	GCL 80 MIL. HDPE (S & T) GEOCOMPOSITE (SS & DS)
BP TANK FARM TOLEDO, OH.	80,000 SF 1,300 LF	40 MIL. HDPE BATTEN BAR
ELK RUN LANDFILL ONAWAY, MI.	220,000 SF 220,000 SF 220,000 SF 240,000 SF 260,000 SF 80,000 SF 3,000 LF	GCL SECONDARY 60 MIL. HDPE SECONDARY DS GEOCOMPOSITE GCL PRIMARY 60 MIL. HDPE PRIMARY PRIMARY GEOCOMPOSITE TIE-IN SEAM/EXTRUSION
LIMA C-5 LANDFILL CLOSURE LIMA, OH.	150,000 SF 70,000 SF 150,000 SF 90,000 SF	40 MIL. LLDPE TEXT. SUPERGRIP LLDPE TEXT. GEOCOMPOSITE (DS) 10 OZ. GEOTEXTILE
HOLCIM, INC. DUNDEE, MI.	1,400,000 SF 1,600,000 SF	40 MIL. LLDPE TEXT. GEOCOMPOSITE (DS)
BP NORTH POND TOLEDO, OH.	180,000 SF 180,000 SF	40 MIL. LLDPE GEOCOMPOSITE
BRENT RUN LANDFILL MONTROSE, MI.	300,000 SF 250,000 SF	40 MIL. LLDPE GCL
LAKE COUNTY LANDFILL PAINSEVILLE, OH.	540,000 SF 270,000 SF	60 MIL. HDPE (S & T) GEOCOMPOSITE (DS)
NEW PARIS PIKE LANDFILL RICHMOND, IN.	480,000 SF 480,000 SF	60 MIL. HDPE GEOTEXTILE
FORT GRATIOT LANDFILL PORT HURON, MI.	850,000 SF 850,000 SF	40 MIL. LLDPE TEXT. GEOCOMPOSITE (DS)
SUNNY FARMS LANDFILL FOSTORIA, OH.	200,000 SF 45,000 SF 45,000 SF 200,000 SF	60 MIL. HDPE SMOOTH 60 MIL HDPE TEXT. GEOCOMPOSITE (DS) GEOCOMPOSITE (SS)
CASTING SERVICES LAPORTE, IN.	106,000 SF	12 MIL. BBR
PARIS ISLAND S.C.	272,000 SF 40,500 SF 42,000 SF	40 MIL. LLDPE TEXT. 12 OZ. GEOTEXTILE GEOCOMPOSITE (DS)

Deth Phakonekham - Supervisor		
Company History	**Years Experience**	**Materials**
American Environmental Group, LTD.	2005 – Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
GSI	2002 - 2005	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
GSE	2002	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
National Seal	1992 – 2002	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

Eleazar Garza - Supervisor		
Company History	**Years Experience**	**Materials**
American Environmental Group, LTD.	2005 - Present	Geomembrane HDPE, LLDPE, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Comanco Environmental Corporation	2003 - 2005	Geomembrane HDPE, LLDPE, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Environmental Specialties International, Inc.	1998 - 2003	Geomembrane HDPE, LLDPE, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
National Seal	1994 - 1997	Geomembrane HDPE, LLDPE, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

Thephakone Inthirathvongsa – Master Seamer		
Company History	**Years Experience**	**Materials**
American Environmental Group, LTD.	2002 – Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Serrot Corporation / National Seal Company	1998 – 2002	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Geo-Synthetic, Inc.	1997 – 1998	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Ground Safe Incorporated	1996 – 1997	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

Phetsamone Khittiyavong – Master Seamer		
Company History	**Years Experience**	**Materials**
American Environmental Group, LTD.	2002 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Serrot Corporation / National Seal Company	1995 – 2002	Geomembrane HDPE, VLDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

Bounnong Viengrouthasane – Master Seamer		
Company History	**Years Experience**	**Materials**
American Environmental Group, LTD.	2002 - Present	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
Geo-Synthetic, Inc.	2000 – 2002	Geomembrane HDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles
National Seal Company	1995 – 2000	Geomembrane HDPE, VLDPE, LLDPE, XR-5, PVC, Geosynthetic Clay Liner (GCL), Geonet, Geocomposite, Geotextiles

American Environmental Group Ltd.

Professional References

Geosynthetics Installation

• Kevin Harshberger (R.B. Jergens, OH)	937-760-7676
• Steve Nitching, (Republic Services, NC)	336-364-3699
• Nick Marotta (Onyx Waste Services, GA)	205-640-9428
• Steve Sieracke (Melco, Inc., OH)	419-446-9106
• Elena Goodhall, P.E. (Allied Waste Industries, OH)	419-396-3581
• Todd Hamilton, (Republic Services, OH)	330-874-3855
• David Marthaler, CM (Onyx Waste Services, WI)	414-479-7809
• Steve Wintheiser (CTI & Associates, MI)	248-486-5100
• Dallas Day (Fox Contractors, IN)	219-747-7461
• Chip Simmons (Republic Services, KY)	859-223-3824
• Christina Pearse-Bossick (Allied Waste Industries, MI)	734-397-2790
• Brian Ezyk, P.E. (Republic Services, MI)	734-654-1158
• David List, P.E. (Golder Associates, AZ)	517-482-2262
• Tony Walker (Allied Waste Industries, OH)	480-627-7088
• Glenn Wallace (Oasis Construction Services, Inc., GA)	770-642-2838
• George Waters (Allied Waste Industries, GA)	770-514-2960
• Steven Melloni, P.E. (Brown and Caldwell, MA)	508-923-0879

agru america

Technology in Plastics

American Environmental Group, Ltd.

This is to confirm that America Environmental Group, Ltd. is a recognized installer of Agru America's Geomembrane Liner and that the manufacturer's qualifications have also been achieved.
This is to confirm that Agru America, Inc. recognizes American Environmental Group, Ltd's liner installation procedures and their QA/QC manual as acceptable standards for our industry.

Paul W. Barker
Technical Director
Agru America, Inc.

Date: September 16, 2005

Executive Offices: 500 Garrison Road, Georgetown, SC 29440 • 843 546-0600 • 800 321-1379 • Fax 843 546-0516
Sales Office: 700 Rockmead, Suite 150, Kingwood, TX 77339 • 281 358-4741 • 800 373-2478 • Fax 281 358-5297
Email: salesmkg@agruamerica.com

Promoting Industry Growth • Providing Better Quality Workmanship

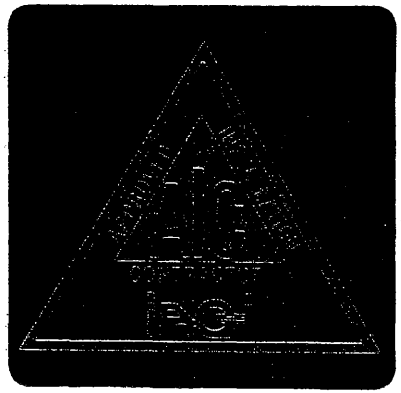
Approved Installation Contractor

This Certificate Recognizes That

American Enviromental Group, Ltd..

Has achieved Approved Installation Contractor status through
the International Association of Geosynthetic Installers.

Valid through February 1, 2008



Dennis W. O'Brien
President, IAGI

Laurie Honnigford
Managing Director, IAGI

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2008

Project Name/Location	Client	Description	Qty. Installed	Units	Materials	Completion Date
Countywide LF Cell East Sparta, OH	Republic Services, Inc. Todd Hamilton 330-874-3855	Cell 8C	21,307	SF	GCL Geomembrane	January-08
Valencia, County LF Los Lunas, NM	C.S. & W. Contractors, Inc. Jeff Salvatore 602-266-7000	Cap		LF	Downschute Installation	January-08
Giant Wetsern Refinery Grafton, VA	Envirocon, Inc. Harry Foreman 406-523-1150	Geosynthetic Material Supply & Installation	209,642 37,500 217,000 192,161 1	SF SF SF SF EA	60 mil HDPE Textured (Install) 8 oz. Non-woven Geotextile (Install) Gas Collection 300 mil Geocomposite DS 8 oz. (Supply) 300 mil Geocomposite DS 8 oz. (Install) Pipe Penetration 4"	March-08
Bartow County Landfill Cartersville, GA	Delmonico Restoration & Dev. Anthony Nievera 678-275-4075	BCL-SR 294 Subtitle D Landfill Ph 3 Step 1A Addition	119,045 128,800 113,943 818	SF SF SF SF	Install 60 mil Textured HDPE Geocomposite DS 6 oz. GCL Tie-in to Existing Weld	April-08
Countywide LF East Sparta, OH	Republic Services, Inc. Todd Hamilton 330-874-3855	Supply Only	16,200	SY	16 oz. Geosynthetic Supply	April-08
Plainwell Impoundment Plainwll, MI	Terra Contracting, LLC. Rich Anson 269-720-3428	Cap Repair Work & Supply	42,067 13,000 72,000 66,395	SF SY SF SF	Supply 40 mil HDPE Textured Supply 12 oz. Non Woven Geotextile Installed Geotextile Installed Geomembrane	April-08
DeJong Dairy Freemont, IN	Verba-Hoff Dairy Development, LLC. Karen Miller 419-337-5000	Dairy Ponds	13,942 174,094 40,850 13,942 1,065	SF SF SF SF LF	40 mil HDPE Textured Installation 60 mil HDPE Textured Installation Geocomposite DS 6 oz. Installation 8 oz. Non-woven Geotextile Installation Rub Sheet Welds (in 40 mil price)	April-09
Duval Canal Outfall Impoundment Greenvalley, AZ	C.S. & W. Contractors, Inc. Vivian Solorio 602-266-7000 x239	Duval Impoundment	69,284 77,824	SF SF	Install 16 oz Geotextile Install 60 mil HDPE	June-08
CLOW Landfill Coshocton, OH	Independent Excavating, Inc Jeff Salvatore 216-524-1700	Cell 2 Closure	1 1	LS LS	Install 60 mil Textured LLDPE Gundseal Preparation of existing lining	June-08
Uwharrie Landfill Mt Gilead, NC	Republic Services, Inc. Ray Hoffman 336-364-3699	Geosynthetic Installation	770,190 784,218 55,637 779,520 2,717 1,358	SF SF SF SF LF LF	Install GCL Install 60 mil Textured HDPE Install 60 mil Smooth HDPE Install 12 oz. Non-woven Geotextile Weld Berm-flap Tie-in to Existing	June-08
Adrian LF Adrian, MI	Ryan Incorporated Central John Burt 608-754-2291	Adrian Rain Cover	25,200	SF	Dura Skrim 12 mil BV (Install)	July-08
Adrian LF Adrian, MI	Allied Waste Jim Adams 517-265-2800	Cell 6B	84,830 85,594 84,830 85,183 93,682 85,183 382 100 1,186	SF SF SF SF SF SF LF LF LF	Install GCL over Subgrade (Secondary) Install 60 mil Textured HDPE over GCL (Sec.) Install DS Geocomposite over Textured HDPE (Secondary) Install GCL over Geocomposite (Primary) Install 60 mil Textured HDPE over GCL (Pri.) Install DS Geocomposite over Textured HDPE (Primary) Primary to Secondary Weld Rain Flap Weld Tie-in to Existing Weld	July-08
BP Toledo Toledo, OH	Geo. Gradel Co. George Hoodlebrink 419-262-5272	Refinery Trench	90,586 87,750 87,500 90,000 78,300 78,300 78,300 78,300 1	SF SF SF SF SF SF SF SF EA	40 mil LLDPE Textured (Supply) GCL (Supply) Geocomposite SS 12 oz. (Supply) Geotextile W-300 (Supply) 40 mil LLDPE Texture (Install) GCL (Install) Geocomposite SS 12 oz. (Install) Geotextile W-300 (Install) Pipe Penetrations 3'	July-08
Oakland Heights LF Auburn Hills , MI	Allied Waste Christina Pearse/Bossick 734-397-2790	Cell 2008	26,203 13,728 7,803	SF SF SF	GCL over sudgrade 60 mil HDPE textured Install 8 oz. DS Geocomposite (Slope)	August-08

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2008

Project Name/Location	Client	Description	Qty. Installed	Units	Materials	Completion Date
			1	EA	Boots 2" - 12"	
Citizens LF Grand Blanc, MI	Allied Waste Christina Pearse/Bossick 734-397-2790	Landfill	1	EA	General Conditions	August-08
			78,075	SF	Install GCL over subgrade	
			78,075	SF	Install 60 mil Textured HPDE over GCL	
			78,075	SF	Install DS 8 oz Geocomposite over Textured HDPE	
			607	LF	Tie-in Weld to Exitsing	
Ottawa County Landfill Port Clinton, OH	Allied Waste Jim Adams 517-265-2800	Landfill	303,725	SF	Install 40 mil Textured LLDPE	August-08
			303,725	SF	Install 6 oz. DS Geocomposite	
			1,185	LF	Tie-in to existing liner	
			8	EA	Boots 2" - 12"	
Brickyard Landfill Danville, IL	Allied Waste Terry Bent 217-522-7797	Cell 6 A/B	288,663	SF	Install 8 oz. Geotextile over Sand	August-08
Manistee Landfill Manistee, MI	Allied Waste Debbie Nurmi 616-837-7316	Temp. Cap Closure	318,268	SF	Install 40 mil Textured LLDPE over Subgrade	August-08
			1,280	LF	Tie-in to Existing Cap	
			30	EA	2" to 12" Pipe Boots	
Sierrita Mines Green Valley, AZ	C.S. & W. Contractors, Inc. Bob Griesinger 602-266-7000	Headwall No. 5 Upgrades	76,500	SF	Pond GCL (Supply)	August-08
			69,900	SF	Pond GCL (Install)	
			82,984	SF	Pond Primary Liner (Supply 80 mil HDPE Textured)	
			69,900	SF	Pond Primary Liner (Install 80 mil HDPE Textured)	
			78,300	SF	Pond Geonet (Supply)	
			69,900	SF	Pond Geonet (Install)	
			79,200	SF	Pond Secondary Liner (Supply 80 mil HDPE Smooth)	
			69,900	SF	Pond Secondary Liner (Install 80 mil HDPE Smooth)	
			47,500	SF	Poulet Channel GCL (Supply)	
			41,500	SF	Outlet Channel GCL (Install)	
			50,400	SF	Outlet Channel Liner (Supply 80 mil HDPE Smooth)	
			41,500	SF	Outlet Channel Liner (Install 80 mil HDPE Smooth)	
			2,250	SF	Headwall GCL (Supply)	
			2,050	SF	Headwall GCL (Install)	
			5,625	SF	Headwall Liner (Supply 100 mil HDPE Liner Smooth)	
			2,050	SF	Headwall Liner (Install 100 mil HDPE Liner Smooth)	
			170	LF	Emdedment Channel	
			48	LF	Emdedment Channel Welds	
			9,450	SF	Collection Sump Liner (Supply 60 mil HDPE Liner Smooth)	
			2,400	SF	Collection Sump Liner (Install 60 mil HDPE Liner Smooth)	
			1	EA	Pipe Penetration 12" (80 mil)	
			2	EA	Pipe Penetration 24" (100 mil)	
D.J. Group Beverly, Ohio	D.J. Group Jerry Welch 740-984-1707	Supply Only	37,800	SF	3 Rolls 60 mil HDPE (Smooth)	August-08
Orchard Hill Landfill Watervliet, MI	Orchard Hill Landfill Tralph Balkema 269-463-5588	Geosynthetic Material Installation / Closure	203,307	SF	40 mil LLDPE Textured (Install)	August-08
			22	EA	6" Pipe Boots	
			3	EA	2" to 4" Pipe Boots	
Defiance Co. Landfill Defiance, OH	Melco, Inc. Scott Rogers 419-446-9106	Phase 2 BAT Cell	15,544	SF	60 mil HDPE Smooth	August-08
			7,387	SF	60 mil HDPE Textured	
			23	LF	Phase 1B Tie-in	
			5,915	SF	8 oz. Non Woven Bedding Geotextile	
			430,731	SF	8 oz. Non Woven Filter Geotextile	
			9,616	SF	4 oz. Non Woven Geotextile (Install)	
Defiance County Landfill Defiance, Ohio	CETCO Tim Houck 419-782-5442	Material Supply only	189,560	SF	Geocomposite Supply Only	August-09
Sanitation Services, Inc. Freeport, Bahamas	Sanitation Services Lou Carroll 242-652-9721	Pond Installation	848,250	SF	40 mil HDPE Smooth (Supply)	August-08
			1	LS	Dura Skrim 12 mil BBR (1 roll 24' X 500')	
			1	LS	40 mil Geomembrane Restocking Fee @ 10%	
Show Me Regional Landfill Warrensburg, MO	Allied Waste Darrin Kemper 573-634-3307	Cell 7C	66,798	SF	Install 60 mil Textured HDPE over Subgrade	September-08
			62,100	SF	Install 8 oz. Geotextile over HDPE Liner	
			445	LF	Rainflap Weld	
			507	LF	Tie-in to Existing Cell	
Lemons East Sanitary LF Dexter, MO	Allied Waste Allen Steinkamp 314-739-5099	Cells 8 & 9A	246,886	SF	Install 60 mil Textured HDPE over Subgrade	September-08
			18,993	SF	Install 60 mil Textured HDPE Rainflap	
			2,320	LF	Rainflap Weld (includes rain berm welding)	

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2008

Project Name/Location	Client	Description	Qty. Installed	Units	Materials	Completion Date
			1,085	LF	Tie-in to Existing Cell	
			1	EA	2" to 12" pipe boot	
Noble Road Landfill Shiloh, OH	Allied Waste Chris Jaquet 419-895-0058	Cell 4B-N	128,550	SF	Install 60 mil HDPE Textured over Subgrade	September-08
			128,550	SF	Install 8 oz. Non-woven Geotextile	
			880	LF	Tie-in Weld to Existing	
Envirosafe Services of Ohio Oregon, OH	Envirosafe Services of Ohio Don Steyer 419-698-3200	Envirosafe Facility Closure	19,633	SF	40 mil HDPE Textured Supply & Install	September-08
			24,515	SF	200 mil DS Geocomposite 8 oz.	
			33	LF	Tie-in to Existing	
			4,882	SF	40 mil HDPE Textured Install Only	
Countywide LF East Sparta, OH	Republic Services, Inc. Todd Hamilton 330-874-3855	Geosynthetic Installation Services Cell 15 & 16	386,250	SF	Installation of GCL	September-08
			386,250	SF	Installation of 60 mil HDPE Text	
			400,000	SF	Installation of DS Geocomposite - Sewn	
			550,000	SF	Installation of Geotextile - Sewn	
Rogue Industrial Atlanta, Mi 49709	Rogue Industrial	Supply Only	2	EA	Supply 2 roll 60 mil HDPE Textured	September-08
Courtney Ridge LF Sugar Creek, MO	Allied Waste Brad Zimmerman 816-257-7999	Cell 6 B	194,450	SF	Install 60 mil Textured HDPE over Subgrade	September-09
			194,450	SF	Install DS Geocomposite over Textured HDPE	
			194,450	SF	Install GCL over Geocomposite	
			194,450	SF	Install 60 mil Textured HDPE over GCL	
			184,314	SF	Install DS Geocomposite on Slope (5' Runout)	
			35,800	SF	Install 6 oz. Geotextile over Soil Layer	
			11,000	SF	Install 60 mil Textured HDPE Rainflap	
			8,345	SF	Install 60 mil Textured HDPE Sump Pad	
			300	LF	Sump Pad Weld	
			450	LF	Rainflap Weld	
			860	LF	Tie-in to Existing Cell	
Land Comp Landfill Ottawa, IL	Allied Waste Eric Dippon 847-507-3123	Cell 2N	175,500	SF	Install 8 oz. Geotextile over Drainage Layer	October-08
NRI Niagara / NEWCO Niagara Falls, NY	Allied Waste Ralph Larimore 734-397-4624	Pine Avenue Landfill	167,200	SF	Install 60 mil Smooth HDPE over Subgrade	October-08
			571	LF	Transition Weld	
			600	LF	Tie-in to Existing Cell	
Prairie View Landfill Lamar, MO	Allied Waste Darrin Kemper 573-291-8973	Cell 4B	546,150	SF	Install 6 oz. Geotextile over soil	October-08
County Environmental of Clarion Leeper, PA	Allied Waste Allen Bradburn 814-744-8220	Final Cover 2008	184,200	SF	Install 8 oz. Non-woven Geotextile	October-08
			184,200	SF	Install 40 mil Textured LLDPE	
			184,200	SF	Install 6 oz. DS Geocomposite (300 + mils)	
			1,150	LF	Tie-in to existing geomembrane	
			26	EA	Boots 2" - 12"	
Charles Chrin Companies Easton, PA	Charles Chrin Companies Corey Rosenberger	Supply Only	390,000	SF	DuraSkrim R12BBR (Supply Only)	October-08
Chrin Brothers Sanitary Landfill Easton, PA 18042	Charles Chrin Companies Corey Rosenberger 610-258-8737	Stage 3E / 3C Final Cover	225,785	SF	Install Textured 40 mil LLDPE Cap Geomembrane	October-08
			9	EA	Fabricate & Install Field Fabricated Pipe Boots	
			1,090	LF	Tie-in to Existing Liner System	
			225,785	SF	Install Double-sided Drainage Composite	
			225,785	SF	Install Loose 10 oz. Non-woven Geotextile	
			3,000	EA	Supply Sandbags	
J. R. Whiting Plant Jackson, MI	Consumers Energy Dick Oliver 517-262-1112	Geosynthetic Materials Installation	265,000	SF	Non Union Installation	October-08
			481	LF	Tie-in Welding	
Newton County Landfill Crown Point, IN.	Allied Waste Derrek Mauntel 219-661-3107	Phase 17B/21B	1,653	SF	Install 60 mil Smooth HDPE over Subgrade	November-08
			29	LF	Tie-in to Existing Cell	
			1,400	LF	Rainflap Weld	
Rockwood Landfill Newport, MI	Allied Waste Christina Pearse/Bossick 734-397-2790	Cell 15 Construction	18,410	SF	Install 60 mil HDPE Textured over Subgrade	November-08
			17,310	SF	Install 6 oz. DS Geocomposite over Textured HDPE	
			17,310	SF	Install GCL over DS 6 oz. Geocomposite	
			17,310	SF	Install 60 mil HDPE Textured over GCL	
			15,110	SF	Install 6 oz. DS Geocomposite over Textured HDPE	
			104	LF	Tie-in to existing geomembrane	
			105	LF	Primary to Secondary Weld	
			32	LF	Weld Berm / Rain Flap	
			11,000	SF	Install 60 mil HDPE Textured Berm Flap	

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2008

Project Name/Location	Client	Description	Qty. Installed	Units	Materials	Completion Date
Lake County C&D Lowell, IN	Lake County Derrek Mauntel 219-661-3107	Cell 6	164,575 80,625 238,900 246,900 1,025 1,150	SF SF SF SF LF LF	Install 60 mil Textured HDPE over Subgrade Install 60 mil Smooth HDPE over Subgrade Install 16 oz. Geotextile over Geomembrane Install 6 oz. Geotextile over Soil Layer Transition Weld "V" Notch Ditch-Extrusion Weld	November-08
Imperial Landfill Imperial, PA	Allied Waste Tim Nytra 724-685-0900	Phase IV-D Construction	8,000 31,210 292 3,000 11,900	SF SF LF SY SF	Install 10 oz. DS Geocomposite over Textured HDPE Install 60 mil HDPE Textured over Subgrade Tie-in to existing geomembrane 16 oz Geotextile Additional Gecomposite 220/2/10 Additional	November-08
Forest View Landfill Kansas City , KS	Allied Waste Brad Zimmerman 816-257-7999	Final Cover 2008	748,745 718,795 2,270 50	SF SF LF	Install 40 mil Textured LLDPE over Subgrade Install DS Geocomposite over Textured LLDPE Tie-in to Existing Cap Pipe Boot 2" - 12"	November-09
GM Bedford Bedford, IN	ENTACT & Associates Edgar Longstreet 812-277-1854	GM Powertrain Cap	29,768 23,021 5 6,121	SY SY EA SY	60 mil LLDPE Textured (Install) Geocomposite (Install) Pipe Penetrations Power Poles 24" - 28" Re-install Geocomposite	November-08
Stickney Avenue Landfill Toledo, OH	Miller Brothers John Gehle 419-466-9106	Geosynthetic Material Installation	172,500 34,500 162,000 133,500 72 1 24	SF SF SF SF LF EA EA	40 mil LLDPE Textured Supply 60 mil HDPE Smooth Supply 6 oz. Non-woven Geotextile Supply 40 mil LLDPE Textured Install Batten Attachments Pipe Penetrations Additional Pipe Penetrations	November-08
Crawford County Landfill Bucyrus, OH	Miller Brothers Scott Rogers 419-445-1015	Geosynthetic Material Supply & Installation Services	120,262 187,500 173,035 176,450 13,935 712 30	SF SF SF SF SF EA EA	DS Geocomposite 60 mil HDPE Textured Geotextile 8 oz. - Cushion Geotextile 8 oz. - Filter DS Geocomposite Tie-in to Existing Weld Rain-Flap Weld	November-08
Resource Recovery Landfill Cherryvale, KS	Allied Waste Darrin Kemper 573-291-8973	Barrier Liner	255,850 221,830 222,375 225,650 1,100 2,000 375 8 1	SF SF SF SF LF LF LF EA EA	40 mil GSE GundSeal Material Supply Install 40 mil Textured GundSeal (clay side up) Install 60 mil Textured HDPE (over GCL) Install DS Geocomposite (330 mil geocomposite) Tie-in to Existing Cell GundSeal Butt Seam Extrusion Welding Rainflap Weld Gas Vents 6" Pipe Boots	November-08
Franklin County Landfill Grove City, OH	R.B.Jergens Kevin Harshberer 937-669-9799	Cells H2A & H2B	10,580 195,580 5,282 350,282 5,282 350,282 566 528 1,142 126	SF SF SF SF SF SF LF LF SF LF	GCL (Supply) GCL (Installation) 60 mil HDPE Textured (Supply) 60 mil HDPE Textured (Installation) Drainage Geocomposite (Supply) Drainage Geocomposite (Installation) Tie-in to Existing Phase H2A Tie-in to Existing Phase Additional Geomembrane for material in sump Welding Geomembrane in sump	November-08
Contractors Landfill Barberton, OH	R.B.Jergens Kevin Harshberer 937-669-9799	Geosynthetic Material Installation	2,530 288 2,530 14,514	SY SY SY SY	40 mil Smooth Geomembrane 40 mil Textured Geomembrane Single-Sided Geocomposite 6 oz. Geotextile	December-08
Ford Meter Box Landfill Wabash, IN	Liberty Construction, Inc. Clyde Pendergrass	Geosynthetic Material Installation	119,495	SF	40 mil Textured LLDPE Textured	December-08

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2007

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Great Lakes Ethanol	Anderzack - Pitzen	Secondary Containment	29,334	SF	60 mil HDPE Textured	January-07
Riga,MI	Construction, Inc.		29,334	SF	Geotextile Sewn	
			880	LF	Weld in to Embedment strip	
Joliet Ammunition Plant	MWH Constructors, Inc.	Landfill Cap	157,618	SF	GCL Bentomat SDN	January-07
Elwood, IL			157,618	SF	40 mil LLDPE Textured	
			157,617	SF	160 mil DS 7oz.Geocomposite	
Noble Road Landfill	AWIN	Landfill Slope	33,717	SF	40 mil Geomembrane	February-07
Shiloh, OH			33,717	SF	60 mil Geomembrane	
Railroad Ave Disposal	Waste Connections	Landfill	153,000	SF	GCL	March-07
Olive Branch, MS						
Anadarko Plant	MWH Constructors	Tanks	11,500	SF	60 mil HDPE Text. Geomembrane	April-07
Vernal, UT			450	LF	Embedment Strip	
Envirosafe Facility	Envirosafe Services	Tanks	24,085	SF	Geomembrane	April-07
Oregon, OH			865	SF	8 oz. Non-Woven Geotextile	
Brighton Block & Concrete	Brighton Block&	Concrete Plant	20,250	SF	GCL	April-07
Brighton, MI	Concrete Plant					
Upper Piedmont Landfill	Republic Services	Landfill	20,250	SF	GCL	April-07
			252,719	SF	60 mil Geomembrane Textured	
			247,500	SF	Geotextile	
			1,295	LF	Tie In Liner	
			555	LF	Rain flap Weld	
Dam Impoundment	American Acreage,LLC	River Pond	43,875	SF	40 mil HDPE Smooth	May-07
Jefferson County, WV						
Manistee County Landfill	AWIN	Sanitary Landfill	104,162	SF	GCL	May-07
Manistee, MI			104,162	SF	GCL over Geosynthetics	
			208,324	SF	60 mil HDPE Textured	
			100,750	SF	8oz. SS Geocomposite	
			1,132	LF	Tie In Liner	
			717	LF	Prime to Sec Weld	
Star Ridge Landfill	Veolia	Landfill Cell	398,880	SF	60 mil Secondary liner	June-07
Moody, AL			22,500	SF	GCL	
			401,580	SF	Geocomposite	
			900	LF	Tie In	
			393,811	SF	60 mil Primary	
			900	LF	Tie In-Liner	
			424,350	SF	Fabric	
			1,990	LF	Primary Weld to Secondary	
BP Lima Repair	MEL CO	Sea Wall Repair	6,100	SF	60 mil HDPE Geomembrane	June-07
Lima, OH			1,100	SF	Geotextile	
JH Campbell Landfill	Ryan, Inc.	Landfill Cap	161,900	SF	40 mil LLDPE Textured	June-07
West olive, MI			8,700	SF	200 mil Geocomposite SS 8oz.	
			4,500	SF	8 oz. Geotextile	
			220	LF	Tie In Liner	
BFI Fall River	AWIN	Landfill Cell C	241,286	SF	60 mil Textured HDPE	June-07
Fall River, MA			189,730	SF	8oz. DS Geocomposite	
			121,087	SF	Bentomat	
			121,087	SF	Bentomat over Geosynthetics	
			1,400	LF	Tie In Liner	
		Landfill Cap	158,000	SF	40 mil Textured HDPE	July-07
			3,000	SF	8oz. DS Geocomposite	
			1,150	LF	Tie- In Liner	
Central Waste	Transload America, Inc	Landfill	427,134	SF	60 mil HDPE Textured	July-07
Alliance, OH			235,896	SF	Geocomposite DS	
			205,026	SF	Geotextile Cushion layer	
			197,121	SF	Geotextile Filter Layer	
			1,131		Tie- In Liner	
Santa Clara Landfill	Geo-Con	Landfill	34,500	SF	80 mil HDPE Smooth	July-07
Santa Clara, CA			34,500	SF	60 mil HDPE Textured	

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2007

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Cove Landfill Bad Axe, MI	Richfield Management	Landfill Closure	60,000	SF	200 mil DS Geocomposite	August-07
Salem Air Park Salem, OH	MELCO	Pond	246,510 139,448 235,801 365,424	SF SF SF SF	60 mmil HDPE HDPE Smooth 60 mil HDPE Textured 8 oz. Non-woven Bedding Geotextile 8 oz. Non-Woven Filter Geotextile	August-07
Pactolus Landfill Kingsport, TN	Eastman Chemical Co.	Landfill	818,117 727,000 198,000 43,000 134,203	SF SF SF SF SF	30 mil PVC Liner Geocomposite Geotextile Additional Geocomposite Additional 30 mil PVC Liner	August-07
Elk Run Landfill Onaway, MI	Republic Services	Landfill	470,831 126,859 343,972 59,947 170,075 1,911	SF SF SF SF SF LF	GCL 60 mil Textured Geomembrane 60 mil Smooth Geomembrane DS Geocomposite SS Geocomposite Tie In Liner	August-07
Adrian Landfill Adrian, MI	AWIN	Landfill Cell 6A	101,661 101,661 209,108 101,661 101,661 778 187	SF SF SF SF SF LF LF	GCL over Sub grade GCL over Primary 60 mil HDPE Textured DS Geocomposite Secondary DS Geocomposite Primary Tie In Liner Berm Flap	August-07
Citizen Disposal Grand Blanc, MI	AWIN	Landfill Cell 3	121,776 139,765 119,148 957 432	SF SF SF LF LF	GCL 60 mil HDPE Textured 8oz. DS Geocomposite Tie In Liner Berm Flap	August-07
Rockwood Landfill Newport, MI	AWIN	Landfill	328,620 736,402 654,713 2,850 1,586 1,087	SF SF SF LF LF LF	GCL Geosynthetics 60 mil HDPE Textured DS Geocomposite Tie In Liner Primary to Secondary Sump Weld	August-07
Persons County -Oak Lane Elementary Roxboro, NC	Persons County	Pond Project	8,100 8,514	SF SF	Rufco 4000B 60 mil HDPE Textured	August-07
Sunny Farms Landfill Fostoria, OH	Ryan Incorporated Central	Landfill Cell Landfill Cap	445,500 445,500 1,490 377,834 377,834 1,585	SF SF LF SF SF LF	60 mil HDPE Textured 8 oz. DS Geocomposite Tie-in to Existing Lining 40 mil LLDPE Textured 6 oz. DS Geocomposite Tie-in to Existing Lining	August-07
SE Berrien County LF Buchanan, MI	S.E. Berrien County Authority	County Landfill	297,877 294,976 328,041 297,730 623,243 1,446 11,790	SF SF SF SF SF LF LF	60 mil Secondary 60 mil Primary GCL Geocomposite DS Geocomposite SS Tie In Liner PVC	August-07
Chrin Stage 6 Easton, PA	Charles Chrin Companies	Sanitary Landfill	213,752 149,023 70,714 213,752 213,752 219,737	SF SF SF SF SF SF	60 mil HDPE Text DS Geocomposite SS Geocomposite GCL 60 mil Geomembrane HDPE DS Geocomposite	August-07
Ottawa County Farms Coopersville, MI	AWIN	Landfill	231,400 131,229 104,171 995	SF SF SF LF	GCL 60 mil HDPE Textured 60 mil HDPE Smooth Tie In Liner	August-07

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2007

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Congress Landfill Hillside, IL	Congress Development	Landfill	248,600	SF	DS Geocomposite	August-07
Ottawa County Landfill Port Clinton, OH	AWIN	Landfill Cell	250,719	SF	60 mil HDPE Textured	August-07
			190,172	SF	6oz. SS Geocomposite	
			30,047	SF	6oz. DS Geocomposite	
			917	LF	Tie In Liner	
			1,453	LF	Berm Flap Weld	
		Landfill Cap	1,320,500	SF	40 mil Textured LLDPE	
			1,278,500	SF	6oz.DS Geocomposite	
			4,500	LF	Tie-In Liner	
			4,000	LF	Geocomposite Tie-In	
Defiance Co. Landfill Archbold, OH	MELCO, Inc.	Landfill Cell	246,510	SF	60 mil HDPE Smooth	August-07
			139,448	SF	60 mil HDPE Textured	
			235,801	SF	8 oz. Non-Woven Geotextile	
			365,424	SF	8 oz. Non-Woven Filter	
New Lyme Landfill Ashtabula, OH	Brown & Caldwell	Superfund Site	14,450	SF	40 mil HDPE Geomembrane	August-07
			14,450	SF	Geonet 220	
			14,500	SF	Geotextile 180	
Sauk Trail Hills Development Canton, MI	AWIN	Landfill	193,575	SF	GCL	September-07
			182,410	SF	60 mil Textured HDPE	
			196,000	SF	DS Geocomposite	
			1,575	LF	Tie-In Liner	
City of Midland Midland, MI	City of Midland	Landfill	1,006,680	SF	GCL	September-07
			204,113	SF	60 mil HDPE Text Geomembrane	
			791,467	SF	60 mil HDPE Smooth Geomembrane	
			393,979	SF	SS Geocomposite	
			614,301	SF	DS Geocomposite	
			1,270	LF	East Berm	
Foothills Environmental Landfill Lenoir, NC	Republic Services	Landfill	187,940	SF	GCL	September-07
			220,571	SF	60 mil Textured Geomembrane	
			187,940	SF	Geotextile	
			927	LF	Tie In Liner	
			1,517	LF	Rain Flap	
Poet Bio Refining Plant Marion, OH	MELCO	Tank Farm	277,506	SF	60 mil HDPE Textured	September-07
			226,200	SF	8 oz. Geotextile	
		Pond	19,754	LF	60 mil HDPE Textured	
JH Campbell Pond West olive, MI	Ryan Incorporated, Inc.	Ash Pond	443,699	SF	60 mil HDPE Smooth	September-07
			103,239	SF	60 mil HDPE Textured	
			283,171	SF	GCL	
			272,439	SF	Geocomposite SS	
			2,141	LF	Prime to Sec Weld	
			4,841	SF	Rub Sheet	
Hancock County LF Findlay, OH	Hancock County Board Of Commissioners	County Landfill	385,000	SF	40 mil LLDPE Textured	September-07
			385,000	SF	Geocomposite 8 oz. DS	
			2,300	LF	Perforated Piping	
			220	LF	Solid Piping	
			200	LF	Tie In Liner	
Ormet Landfill Hannibal, OH	Kemrom Environmental Services	Cap Repair	8,880	SF	40 mil HDPE Textured	September-07
			8,880	SF	Geocomposite SS 8 oz.	
			480	LF	Weld 40 mil HDPE Berm Flap	
Short Creek Landfill Wheeling, WV	AWIN	Sanitary Landfill	98,200	SF	Geocomposite Underdrain	October-07
			120,100	SF	60 mil HDPE Textured	
			102,100	SF	8oz. Non-Woven Geotextile	
			670	LF	Tie-In Liner	
			776	LF	Berm Flap Weld	
Conestoga Lanfill Morgantown, PA	AWIN	Landfill Cap	271,800	SF	40 mil Textured LLDPE	October-07
			271,800	SF	6oz. DS Geocomposite 250 mil	
			17,550	SF	10oz. Geotextile	
			1,200	LF	Tie- In Liner	

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2007

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Former Okmulgee Refinery	Envirocon, Inc	Landfill Cell	1,011,198	SF	60 mil HDPE Smooth	October-07
Okmulgee, OK			83,618	SF	60 mil HDPE Textured	
			1,011,198	SF	GCL - Unreinforced	
			87,708	SF	GCL - Reinforced	
			1,153	LF	Tie-in to Existing Lining	
		Landfill Cap	420,804	SF	40 mil HDPE Smooth	
			420,804	SF	GCL - Unreinforced	
Chrin Repair	Charles Chrin CO.	High Wall	145,540	SF	40 mil LLDPE Geomembrane	October-07
Easton, PA			1,247	LF	Tie In Liner	
			152,840	SF	DS Composite	
			146,540	SF	10oz. Non-Woven Geotextile	
County Environmental of Wyandot	AWIN	Landfill	42,750	SF	Non-Woven Geotextile	October-07
Carey, OH			105,300	SF	PS 200 Woven Geotextile	
Vienna Junction Landfill	AWIN	Landfill	850,635	SF	60 mil HDPE Textured	October-07
Toledo, OH			271,627	SF	6oz. SS Geocomposite	
			147,108	SF	6oz. DS Geocomposite	
			418,735	SF	GCL	
			1,175	LF	Tie In Liner	
			581	LF	Primary to Secondary	
			940	LF	Temporary Berm Flap	
			1,063	LF	Berm Flap	
			198	LF	Sump Weld	
GM Powertrain	Entact- GM Bedford	Landfill Cap	639,200	SF	60 mil LLDPE Textured	October-07
Bedford, IN			734,700	SF	Geocomposite	
Plainwell Impoundment	ARCADIAS	Staging Pads	157,472	SF	40 mil HDPE Textured	October-07
Plainwell, MI			314,944	SF	12 oz. Geotextile	
Meadow Branch Landfill	Environmental Trust Co.	Landfill	431,225	SF	60 mil Micro Spike	October-07
Athens, TN			434,652	SF	Non-Woven Geotextile	
			758	LF	Tie- In Liner	
			30,972	SF	Rain Flap	
			1,057	LF	Extrusion Weld Rain Flap	
Chrin Landfill Cap	Charles Chrin Company	Landfill Cap	145,540	SF	40 mil Textured LLDPE	October-07
Easton, PA			1,247	LF	Tie- In Liner	
			152,840	SF	DS Composite	
			146,540	SF	10 oz. Non-Woven Geotextile	
Smith's Creek Landfill	MELCO	Landfill Cell	237,075	SF	GCL	October-07
Kimball, MI			230,153	SF	60 mil HDPE Textured	
			274,725	SF	8oz. DS Geocomposite	
			1,089	LF	Tie -In Liner	
			3,516	SF	weld (cell 3)	
Carbon Limestone	AWIN	Landfill Cell	649,186	SF	60 mil HDPE Micro spike	October-07
Lowellville, OH			566,621	SF	60 mil HDPE Smooth	
			608,489	SF	7oz. DS Geocomposite	
			584,193	SF	7oz. SS Geocomposite	
			1,214,855	SF	GCL	
			1,259	LF	Berm Flap	
			320	LF	Sump Weld	
			813	LF	Tie- In Liner	
Niagara Pine Ave	AWIN	Landfill	478,566	SF	60 mil HDPE Textured	October-07
Niagara Falls, NY			258,258	SF	12oz. Geotextile	
			239,283	SF	8oz. Ds Geocomposite	
			1,790	LF	Tie In Liner	
			1,600	LF	Prime to Sec Weld	
			1,050	LF	Berm Flap	

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2007

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Countywide Landfill	Republic	Landfill Cell	790,820	SF	GCL	
East Sparts, OH			790,820	SF	60 mil HDPE Textured	
			613,465	SF	DS Geocomposite	
			144,200	SF	Geotextile-Sewn	
			1,313	LF	Tie-In Liner	
Whitefeather Landfill	Republic	Landfill	284,366	SF	40 mil Liner	November-07
Pinconning, MI			1,024	LF	Tie- In Liner	
Carver Marion Landfill	Covanta Semass	Landfill Cell	192,420	SF	Secondary GCL	November-07
Carver, MA			192,266	SF	Secondary 60 mil Textured	
			980	LF	Tie -In Liner	
			143,949	SF	Secondary Geocomposite	
Orchard Hill Sanitary Landfill	Orchard Hill Landfill	Sanitary Landfill Cell	509,249	SF	60 mil HDPE Smooth	November-07
Watervliet, MI			301,823	SF	60 mil HDPE Textured	
			150,448	SF	6 oz. DS Geocomposite	
			255,480	SF	6 oz. SS Geocomposite	
			4,200	SF	Geonet	
			405,928	SF	GCL	
			1,352	LF	Tie -In Liner	
Royalton Road Landfill	Norton Environmental	Landfill Closure	743,932	SF	40 mil LLDPE Textured Geo	November-07
Broadview Heights, OH	Services		735,498	SF	Geocomposite	
			1,115	LF	Tie In	
Kerr McGee Oil	MWH Constructors	Well Pads	138,732	SF	40 mil Smooth (Pri-Sec)	November-07
Vernal, UT			69,450	SF	200 mil Geonet	
			69,400	SF	16oz. Non- Woven Geotextile	
		Ponds	3,154,725	SF	60 mil HDPE Smooth	
			1,712,555	SF	300 mil Geonet	
			1,872,373	SF	8 oz. Geotextile	
Bonanza, UT		Closure	39,210	SF	60 mil Textured Geomembrane	
Cedar Hill Landfill	Veolia	Landfill	142,454	SF	Geosynthetic Clay Liner	November-07
			142,454	SF	60 mil HDPE Textured	
			142,454	SF	16 oz Non- Woven Geotextile	
			1,511	SF	Tie In	
Lake County Cell	R.B. Jergens	Landfill Cell C4	690,696	SF	60 mil HDPE	November-07
Painesville, OH			1,650	LF	Tie In	
			134,910	SF	Geocomposite DS 8 oz.	
Ashland Project	Shaw Environmental Inc.	Landfill	46,376	SF	40 mil liner	November-07
Martha, KY						
Asarco Pond	Entact, LLC.	Pond	47,500	SF	GCL	November-07
El Paso, TX			48,250	SF	60 mil Smooth	
			48,250	SF	SS Geocomposite	
Imperial Landfill	AWIN	Landfill Cap	212,500	SF	6oz. Non-Woven Geotextile	November-07
Imperial, PA			212,500	SF	40 mil textured LLDPE	
			183,000	SF	6oz. DS Geocomposite	
			780	LF	Tie-In Liner	
		Landfill Cell	147,590	SF	60 mil Textured HDPE	
			104,045	SF	10oz. DS Geocomposite	
			860	LF	Tie-In Liner	
		Temporary Cap	174,240	SF	40 mil Temporary Geomembrane	
Countywide Landfill	Republic	Landfill Cell	21,307	SF	GCL	December-07
East Sparta, OH			21,307	SF	Geomembrane	
Millennium Landfill	R.B. Jergens	Landfill	432	LF	60 mil HDPE Anchor Trench	December-07
Ashtabula, OH			432	LF	Geocomposite Anchor Trench	
			420,000	SF	60 mil HDPE Textured	
			435	LF	Tie In	
County Environmental of Clarion	AWIN	Landfill Cap	175,950	SF	8oz. Non-Woven Geotextile	December-07
Leeper, PA			162,088	SF	40 mil Textured LLDPE	
			1,020	LF	Tie In	

AMERICAN ENVIRONMENTAL GROUP LTD.

PARTIAL GEOSYNTHETIC PROJECT LIST 2007

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Cardinal Health Building	Trucco Construction, Inc.	Pond	65,250	SF	30 mil PVC Geomembrane	December-07
Dublin, OH			65,250	SF	6 oz. Geotextile	
			90	LF	Aluminum Bar	
Meskar Park Zoo	Cemrock	Ponds	57,150	LF	30 mil PVC	December-07
Evansville, IN						
Franklin County Cell	R.B. Jergens	Landfill Cell H2A	279,950	SF	GCL	December-07
Grove City, OH			458,780	SF	60 mil HDPE Textured	
			458,780	SF	Drainage Geocomposite	
			650	LF	Berm Flap	
			1,422	LF	Tie In	
Rushville Lagoons	Zemba Brothers, Inc.	Lagoons	130,915	SF	60 mil HDPE Geomembrane	December-07
Rushville, OH			255	LF	Batten Bar	
Rio Rancho Landfill	CSW Contractors	Landfill	46,384	SF	60 mil HDPE Textured	December-07
Rio Rancho, NM			240	LF	Batten Bar	
River Bend Prairie Landfill	Land and Lakes	Landfill	407,587	SF	60 mil HDPE Textured	December-08
Dolton, IL			460,000	SF	8oz. Non-Woven Geotextile	
			85,000	SF	8oz. Non-Woven Geotextile	
			188,424	SF	8oz. Non-Woven Geotextile	

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2006

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Cedar Hill - Ragland, AL	Onyx Waste Services	Landfill Temporary Cover	240,570	SF	6BBR Geomembrane	February-06
Whitefeather - Pinconning, MI	Republic Services, Inc.	Landfill Cell	113,972	SF	GCL	February-06
			92,435	SF	60 mil HDPE Textured	
			27,300	SF	60 mil HDPE Smooth	
Sunoco - Columbus, OH	Ohio Track, Inc.	Holding Pond	11,500	SF	60 mil HDPE Smooth	March-06
			22,500	SF	8 oz. Geotextile	
Avery Dennison - Lock Haven, PA	M&R Contracting	Liner	4,400	SF	20 mil HDPE Repair	April-06
Bedford Ave - Nashville, TN	Jen Hill Inc.	Pond	17,100	SF	Base Liner Geomembrane	April-06
Conewago - Frederick, MD	Conewago Enterprises	Pond Liner	5,035	SF	Base Liner Geomembrane	April-06
Tallawanda School - Oxford, OH	Triton Services	Retention Pond Lagoon	47,779	SF	XR5 8130 Geomembrane	April-06
Okmulgee - Okmulgee, OK	Envirocon, Inc.	Containment Cell	241,792	SF	60 mil HDPE Smooth	April-06
			51,500	SF	60 mil HDPE Textured	
			165,000	SF	200 R Floor - phase 2	
			76,792	SF	GCL Floor 200 R	
			30,297	SF	GCL Bentomat	
Continental Steel - Kokomo, IN	HIS Construction	Pond	384,436	SF	16 oz. Geotextile	April-06
			384,436	SF	30 mil PVC	
			1,200	SF	Geogrid	
Chrin Brothers - Easton, PA	Chrin Brothers, Inc.	Landfill Closure Stage 3	282,062	SF	40 mil LLDPE Textured	May-06
			282,062	SF	10 oz. Non Woven Geonet	
			291,960	SF	DS Geocomposite	
City View - Garfield Heights, OH	Darden Company	Vapor Barrier	409,183	SF	30 mil PVC	May-06
G M Powertrain - Bedford, IN	Sevenson Services. Incorporation	Landfill Cell	296,704	SF	GCL	May-06
			296,621	SF	60 mil HDPE Textured	
			200,267	SF	Geocomposite	
			141,936	SF	8 oz. Geotextile	
			228,936	SF	8 oz. Geotextile Sew Vault	
			191,929	SF	60 mil LLDPE Textured	
			26,961	SF	Geocomposite	
Evergreen Landfill - Valdosta, GA	Onyx Waste Services	Landfill Cell	9,450	SF	60 mil HDPE Smooth	May-06
			37,720	SF	60 mil HDPE Textured	
			49,400	SF	10 oz. Geotextile	
City View Wal-Mart - Garfield Heights, OH	B&B Contractors	Vapor Barrier	147,090	SF	PVC	May-06
Sarasota Landfill - Nokomis, FL	Onyx Waste Services	Landfill Rain Cover	253,500	SF	6 BBR Geomembrane	May-06
Conestoga Landfill - Morgantown, PA	Conestoga Landfill	Landfill Closure	198,456	SF	40 mil LLDPE Textured	May-06
			242,046	SF	6 oz. DS Geocomposite	
			15,840	SF	Geomembrane Rub sheet	
			21,600	SF	Fabric Cushion	
Imperial Sanitary Landfill - Imperial, PA	Imperial Landfill Corporation	Landfill Cap	361,864	SF	6 oz. NW Geotextile	June-06
			361,864	SF	40 mil LLDPE Textured	
			361,864	SF	6 oz. DS Geocomposite	
Deerfield Beach - Deerfield Beach, FL	Kaufmann Lynn, Inc.	Vapor Barrier Retention Pond	262,671	SF	40 mil HDPE	June-06
			91,237	SF	Geocomposite	
Uwharrie Landfill - Mt. Gilead, NC	Republic services Inc.	Landfill Cell	652,527	SF	GCL Geotextile	June-06
			696,254	SF	60 mil Geomembrane Text.	
Greenridge Reclamation - Scottsdale, PA	AWIN	Landfill Closure	194,133	SF	10 oz. NW Geotextile	June-06
			188,313	SF	40 mil LLDPE Textured	
			198,313	SF	10 oz. DS Geocomposite	
Seneca Landfill - Mars, PA	Vogel Disposal	Landfill Closure	360,113	SF	40 mil LLDPE Textured	June-06
			401,929	SF	200 mil 6 oz.DS Geocomposite	
			377,800	SF	10 oz. Geotextile	
Whittier Metro park - Vandalia, OH	R.B.Jergens	Retention Pond	152,250	SF	Bentomat DN	June-06
			106,575	SF	Bentomat CL	
Environmental County of Wyandot Carey, OH	AWIN	Landfill Closure	229,976	SF	40 mil LLDPE Textured	July-07
			223,418	SF	8 oz. DS Geocomposite	

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2006

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Bavarian Landfill - Walton, KY	Bavarian landfill	Landfill Cell	346,975	SF	Geo Clay Liner	July-07
			346,975	SF	60 mil HDPE	
			344,778	SF	6 oz. DS Geocomposite	
Mentor High School - Mentor, OH	JTO Services	FB Field Vapor Barrier	100,000	SF	20 mil PVC	July-07
Carbon Limestone - Lowellville, OH	AWIN	Landfill Cell	203,643	SF	60 mil HDPE Smooth	July-07
			237,184	SF	60 mil HDPE Textured	
			484,910	SF	8 oz. DS Geocomposite	
			440,827	SF	Bentomat	
Noble Road Landfill - Shiloh, OH	AWIN	Landfill Cell	208,390	SF	60 mil HDPE Textured	July-07
			42,000	SF	Protective Geomembrane	
			2,250	SF	GCL	
Tunnel Hill Landfill - New Lexington, OH	Tunnel Hill Reclamation LLC.	Landfill Cell	575,000	SF	Geosynthetic Clay Liner	July-07
			527,000	SF	60 mil HDPE Textured	
			1,055,000	SF	6 oz. NW Geotextile	
Ashtabula River Clean Up - Ashtabula, OH	R.B. Jergens	Remedial Action Cell Construction	1,395,000	SF	60 mil HDPE Textured	August-06
			697,500	SF	GCL Bentomat	
			1,566,000	SF	Geocomposite	
Sunny Farms - Fostoria, OH	Ryan Incorporate Central	Landfill Cell	942,401	SF	60 mil HDPE Textured	August-06
			942,401	SF	8 oz. DS Geocomposite 250m	
			130,767	SF	40 mil LLDPE	
			130,767	SF	6 oz. DS Geocomposite 250m	
Pine Ave - Niagara Falls, NY	NRI Niagara NEWCO	Landfill Cell	259,990	SF	60 mil HDPE Textured	August-06
			997,312	SF	60 mil HDPE Smooth	
			625,000	SF	8 oz. DS Geocomposite 250m	
			627,459	SF	8 oz. Geotextile	
County Environmental of Clarion Leeper, PA	AWIN	Landfill Closure	275,745	SF	40 mil LLDPE Textured	August-06
			275,745	SF	8 oz. Geotextile	
			292,065	SF	8 oz. Geocomposite	
Perry Ridge Landfill - Carol Stream, IL	Perry Ridge Landfill Incorporation		47,971	SF	60 mil HDPE Textured	August-06
			134,642	SF	60 mil HDPE Smooth	
			850	SF	Tie-in to Existing Liner	
Cove Landfill - Bad Axe, MI	Richfield Management	Landfill Piggyback Style	150,820	SF	GCL ST Bentomat	September-06
			150,820	SF	60 mil HDPE Smooth	
			150,820	SF	Tie-in to Existing Liner	
Leachate Treatment Plant - Cynthia, KY	R.B. Jergens	Retention Pond	244,304	SF	60 mil HDPE Textured	September-06
			122,170	SF	220 Geocomposite 2"-6"	
Putnam Phase IV - Putnam, CT	R.J. Tindle	Landfill Cell	398,866	SF	60 mil HDPE Textured	September-06
			398,866	SF	8 oz. DS Geocomposite	
			403,306	SF	60 mil HDPE Textured Prime	
			16,713	SF	60 mil Berm Flap Primary	
			1,196	SF	GCL Sump HDPE Textured	
			1,301	SF	GCL Berm Flap	
East Bethel - East Bethel, MN	Ames Construction	Landfill Closure	1,219,732	SF	40 mil LLDPE Textured	September-06
			182,000	SF	40 mil LLDPE Smooth	
			14,820	SF	GCL	
			14,820	SF	40 mil Flap	
			1,170,481	SF	Geocomposite	
U S Steel - Gary, IN	Sevenson Services Incorporation	Landfill Cell	567,350	SF	Geogrid	September-06
			627,400	SF	GCL Bentomat DN	
			656,000	SF	60 mil HDPE Textured	
			656,000	SF	Geotextile Type A	
			60,750	SF	Geotextile Type B	

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2006

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
J H Campbell	Ryan Incorporated	Landfill Closure	610,210	SF	40 mil LLDPE Textured	September-06
West Olive, MI			35,000	SF	200 mil Geocomposite	
Short Creek - Wheeling, WV	AWIN	Landfill Cell	291,264	SF	60 mil HDT	October-06
			271,951	SF	8 oz. DS Geocomposite	
			274,567	SF	8 oz. Geotextile	
			219,880	SF	GCL	
Lorain County II Landfill Closure	AWIN	Landfill Closure	47,916	SF	40 mil LLDPE Smooth	October-06
Oberlin, OH			910,404	SF	40 mil LLDPE Textured	
			958,320	SF	6 oz. DS Geocomposite	
Paul Mitchell Plant - Cresap, WV	Industrial Contractors, Incorporation	Retention Pond	49,446	SF	60 mil HDPE Textured	October-06
			49,446	SF	12 oz. NW Geotextile	
Pine Belt - Ovett, MS	Kevin Coleman Construction	Landfill Cell	500,800	SF	60 mil HDPE Smooth (S&I)	October-06
			46,500	SF	60 mil HDPE Textured (S&I)	
			32,050	SF	60 mil HDPE Smooth Flume	
			542,360	SF	7 oz. Geotextile (S&I)	
			67,500	SF	UV - Resistant Fabric Supply	
Congress Development - Hillside, IL	Congress Develop.	Temporary Cover	425,000	SF	40 mil LLDPE Textured	October-06
Arvin Meritor Project - Heath, OH	R.B. Jergens	Retention Pond	297,303	SF	40 mil LLDPE Textured	October-06
			75,000	SF	8 oz. 200 mil Geocomposite	
			18,000	SF	6 oz. Geotextile	
Keer McGee Oil - Vernal, UT	MWH Constructors	Evaporation Ponds	3,440,000	SF	60 mil HDPE Smooth	November-06
			1,710,000	SF	300 mil Geonet	
			1,810,000	SF	8 oz. Geotextile	
Eastman Chemical	Eastman Chemical	Landfill Closure Cap	1,151,000	SF	Geocomposite	November-06
Kingsport, TN	Pactolus, Landfill		1,151,000	SF	30 mil PVC	
Orchard Hill - Watervliet, MI	Golder Associates, Inc.	Landfill Cell	408,860	SF	60 mil HDPE Smooth	November-06
			246,860	SF	60 mil HDPE Textured	
			123,430	SF	6 oz. DS Geocomposite	
			204,430	SF	6 oz. SS Geocomposite	
			3,630	SF	Geonet	
			327,860	SF	GCL	
Carbon Limestone - Lowellville, OH	AWIN	Landfill Closure Cap	1,296,441	SF	40 mil LLDPE Textured	November-06
			1,296,441	SF	8 oz. DS Geocomposite	
Alma Ash Landfill - Alma, WI	Carl Bolander & Sons	Landfill Cell	70,767	SF	60 mil HDPE Textured	November-06
			147,653	SF	60 mil HDPE Smooth	
			190,724	SF	Geosynthetic Clay Liner	
			16,635	SF	12 oz. NW Geotextile	
Envirosafe Cap - Oregon, OH	Envirosafe Services	Final Cover	181,890	SF	40 mil HDPE Smooth	November-06
			155,810	SF	6 oz. Ds 200 mil Geocomposite	
			27,920	SF	Tenax 70-2 TN	
Chevron - Breckenridge, MI	ENTACT	Oil Refineries Fields	87,125	SF	40 mil HDPE Smooth	November-06
			81,000	SF	8 oz. Geotextile	
Countywide Landfill - East Sparta, OH	Republic	Landfill Cell	555,088	SF	60 mil HDPE Textured	December-06
			337,950	SF	8 oz. DS Geocomposite	
			312,169	SF	GCL	
			299,450	SF	8 oz. Geotextile	
Asarco Landfill - El Paso, TX	ENTACT	Remedial Action Cell	184,800	SF	60 mil HDPE Textured	December-06
			182,625	SF	GCL Reinforced	
			183,682	SF	GCL Unreinforced R 200	
			183,682	SF	40 mil LLDPE	
			183,682	SF	8 oz. 200mil SS	
US Ceramics - East Sparta, OH	Civil Engineering Consultants	Final Cover System	245,860	SF	GCL	December-06
			245,860	SF	40 mil HDPE Textured	
			245,860	SF	6 oz.DS 200 mil Geocomposite	

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2006

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
County Environmental Of Wyandot	AWIN	Landfill Cap	395,348	SF	60 mil HDPE Textured	December-06
Carey, OH			357,440	SF	7 oz. NW GT Filter	
			357,440	SF	9 oz. NW Cushion	
			1,398	SF	Tie-in to Existing Liner	
			1,048	SF	Cell Divider Berm Weld	
			332	SF	Rain Flap Weld	
Summit Ethanol Plant - Leipsic, OH	Fox Contractors	Sed Pond	304,900	SF	60 mil HDPE Textured	December-06
			389,169	SF	8 oz. Geotextile	
			266,787	SF	60 mil HDPE GM Textured	
Carleton Farms Landfill - New Boston, MI	Republic Services	Landfill Cell	767,503	SF	GCL	December-06
			767,503	SF	80 mil HDPE Textured	
			351,335	SF	Geocomposite	
			1,811	SF	Tie-in to Existing Liner	
City of Glasgow - Glasgow, KY	R.B. Jergens	C&D Landfill	151,100	SF	GCL	December-06
			131,140	SF	6 oz. DS Geocomposite	
CMW Covanta - Carver, MA	American Ref-Fuel	Landfill Closure	450,800	SF	8 oz. Geocomposite	December-06
Covanta Haverhill, MA	American Ref-Fuel	Landfill Closure	162,000	SF	8 oz. DS Geocomposite	December-06

American Environmental Group Ltd.

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2005

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
16 Section LF - Grenada, MS	Compass Environmental	Landfill Cap	207,500	SF	GCL	January-05
			207,500	SF	60 mil LLDPE Textured	
			207,500	SF	Tri-Planner Composite	
DHL Wilmington, OH	R.B. Jergens	Storage Pond	165,000	SF	40 mil HDPE Textured	January-05
			165,000	SF	DS Geocomposite	
Richland Creek Landfill - Buford, GA	AWIN	Landfill Cap	219,000	SF	40 mil LLDPE Textured	January-05
			209,000	SF	DS Geocomposite	
			1,700,000	SF	50 mil LLDPE Super grip Net	
Smith's Creek Landfill - Kimball, MI	CTI	Landfill Cap	126,000	SF	GCL	April-05
			126,000	SF	60 mil HDPE Textured	
			126,000	SF	DS Geocomposite	
Camp Lejuene Landfill - Jacksonville, NC	Delmonico Restoration & Dev.	Landfill Cap	410,000	SF	40 mil LLDPE Textured	May-05
			100,000	SF	40 mil LLDPE Smooth	
			410,000	SF	DS Geocomposite	
			100,000	SF	Geotextile	
Cytex Industries - Marietta, OH	BBL	Landfill Cap	255,000	SF	GCL	May-05
			255,000	SF	40 mil LLDPE Textured	
			255,000	SF	DS Geocomposite	
Franklin County Landfill - Grove City, OH	R.B. Jergens	Landfill Cell	800,000	SF	60 mil HDPE Textured	May-05
			800,000	SF	DS Geocomposite	
			500,000	SF	GCL	
Hickory Ridge Landfill - Conley, GA	AWIN	Landfill Cap	681,468	SF	40 mil LLDPE Textured	
			719,415	SF	DS Geocomposite	May-05
City view Plaza - Garfield Heights, OH	C.J. Natale	Geotextile Installation	500,000	SF	6 oz. Geotextile	May-05
			500,000	SF	8 oz. Geotextile	
Gateway Landfill - Ringhold, GA	AWIN	Landfill Closure	780,000	SF	40 mil LLDPE Textured	May-05
			780,000	SF	DS Geocomposite	
Ottawa County Farms Landfill Coopersville, MI	AWIN	Landfill Cell	320,000	SF	60 mil HDPE Textured	May-05
			320,000	SF	Geocomposite	
			320,000	SF	GCL	
Fayette WWTP - Fayette, MI	Perry Township	Geosynthetic Installation	10,557	SF	60 mil HDPE Micro spike	May-05
City of Massillon - Massillon, OH	Wenger Excavating	Pond Instillation	23,000	SF	20 mil PVC	June-05
Wyandot Landfill - Carey, OH	AWIN	Landfill Cell	75,618	SF	60 mil HDPE Textured	June-05
			81,900	SF	7 oz. Geotextile	
			75,618	SF	9 oz. Geotextile	
			756	SF	Tie- in to Existing Liner	
Memphis Zoo - Memphis, TN	Cemroc Landscapes	Ponds	25,000	SF	30 mil PVC	July-05
Citizens Disposal Grand Blanc, MI	AWIN	Landfill Cell	236,000	SF	Bentomat ST GCL	July-05
			236,000	SF	60 mil HDPE Textured	
			500	SF	Tie- in to Cell	
St Vincent / St MHS Field - Akron, OH	St. Vincent MHS	Geosynthetic Installation	34,000	SF	30 mil PVC	July-05
Ottawa County Landfill - Port Clinton, OH	AWIN	Landfill Cell	255,600	SF	60 mil Smooth HDPE	July-05
			56,500	SF	60 mil Textured HDPE	
			240,300	SF	SS Geocomposite	
			56,500	SF	DS Geocomposite	
			1,300	SF	Tie -in to Existing Liner	
Vienna Junction - Erie, MI	AWIN	Landfill Closure	220,000	SF	40 mil Textured HDPE	July-05
			220,000	SF	DS Geocomposite	
			960	SF	Tie-in to Existing Liner	
Chagrin Falls Football Field, OH	Marous Brothers	Geosynthetic Installation	91,000	SF	20 mil PVC	July-05
CSU Krenzler Field - Cleveland. OH	Marous Brothers	Geosynthetic Installation	115,000	SF	40 mil Smooth HDPE	July-05
			125,250	SF	GT 116 Geotextile	
Oakland Heights Landfill - Auburn Hills, MI	AWIN	Landfill Closures	387,000	SF	40 mil LLDPE Textured	August-05
			387,000	SF	DS Geocomposite	
			3,117	LF	Tie - in to Cell	

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2005

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Rockwood Landfill Newport, MI	AWIN	Landfill Cell	487,700	SF	Bentomat ST GCL	August-05
			967,700	SF	60 mil HDPE Textured	
			960,000	SF	DS Geocomposite	
			3,445	LF	Tie -in to Cell	
Ottawa County Farms Landfill	AWIN	Landfill Closure	413,150	SF	40 mil Textured LLDPE	August-05
Port Clinton, OH			413,150	SF	DS Geocomposite	
			1,800	LF	Tie-in to Existing Liner	
Brush Wellman - Elmore, OH	MELCO	Geosynthetic Installation	34,200	SF	60 mil Smooth HDPE	August-05
			34,200	SF	Bentomat GCL	
			29,200	SF	SS 8oz. Geocomposite	
Carbon Limestone - Lowellville, OH	AWIN	Landfill Closure	676,100	SF	40 mil Textured LLDPE	August-05
			676,100	SF	DS Geocomposite	
Lorain County II Landfill	AWIN	Geosynthetic Installation	692,300	SF	40 mil Smooth LLDPE	August-05
Lowellville, OH			173,500	SF	40 mil Textured LLDPE	
			522,100	SF	SS Geocomposite	
			1,250	LF	Tie-in to Existing Liner	
Sunny Farms Landfill - Fostoria, OH	Regus Industries, Inc.	Geosynthetics Installation	110,000	SF	60 mil Smooth HDPE	August-05
			113,000	SF	SS Geocomposite	
Adrian Landfill - Adrian, MI	Adrian Landfill	Landfill Cell	454,675	SF	Bentomat DN GCL	September-05
			471,555	SF	60 mil HDPE Textured	
			460,500	SF	DS Geocomposite	
Vienna Junction - Erie, PA	AWIN	Landfill Cell	114,110	SF	60 mil HDPE Secondary	September-05
			66,140	SF	60 mil Textured Secondary	
			12,000	SF	DS 6 oz. Geocomposite	
			1,015	LF	Tie-in to Existing Liner	
			124,350	SF	200 mil Geonet	
			124,340	SF	6 oz. Geotextile	
			66,150	SF	DS 6 oz. Geocomposite	
			128,950	SF	60 mil Smooth HDPE	
			58,150	SF	60 mil Textured HDPE	
			1,015	LF	Tie- in to Existing Liner	
Cedar Hill Landfill - Ragland, AL	Onyx Waste Services	Landfill Cell	355,600	SF	Bentomat GCL	September-05
			356,100	SF	60 mil HDPE Micro spike	
			355,000	SF	16 oz. Geotextile	
Bavarian landfill - Walton, KY	Bavarian Landfill	Landfill Cell	841	SF	DS 6 oz. Geocomposite	September-05
			95,000	SF	60 mil Textured HDPE	
			92,500	SF	60 mil Smooth HDPE	
			3,400	SF	GCL	
Imperial Landfill - Imperial, PA	AWIN	Landfill Cell	139,570	SF	Bentomat GCL	September-05
			288,820	SF	60 mil HDPE Textured	
			139,600	SF	16 oz. Geotextile	
			139,900	SF	10 oz. DS Geocomposite	
			1,520	LF	Tie-in to Existing Liner	
Consumers Energy - Erie, PA	Consumers Energy	Ponds	423,500	SF	40 mil Smooth	September-05
Cap Containment Systems - Kent, OH	Environmental Barrier	Geosynthetics Installation	90,000	SF	40 mil HDPE Smooth	September-05
			90,000	SF	DS 6 oz. Geocomposite	
Wicomico County Landfill - Salisbury, MD	Wicomico County	Tank Impoundment	11,316	SF	40 mil HDPE Textured	October-05
			66,000	SF	80 mil HDPE	
			31,360	SF	DS Geocomposite	
			31,500	SF	Non - Woven Geotextile	
Sauk Trail Hills - Canton, OH	AWIN	Landfill Closure	600,000	SF	40 mil LLDPE Textured	October-05
			600,000	SF	DS Geocomposite	
			450	LF	Tie - in to Cell	
Huron Landfill - Flat Rock, MI	Anglin Civil Contractors	Landfill Closure	350,000	SF	60 mil Smooth HDPE	October-05
Cove Landfill - Bad Axe, MI	Richfield Management	Landfill Cell	330,000	SF	Bentomat GCL	October-05
			100,000	SF	60 mil HDPE Textured	
			575,000	SF	60 mil Smooth HDPE	
			110,000	SF	DS Geocomposite	
			575,000	SF	SS Geocomposite	

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2005

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Foothills Landfill - Lenoir, NC	Republic Services	Landfill Cell	233,200	SF	GCL	October-05
			255,000	SF	60 mil HDPE Textured	
			231,600	SF	Bentofix	
Trash Roll - Off - Panama City, FL	Trash Roll - Off, Inc.	Landfill Cell	276,500	SF	60 mil HDPE	October-05
			82,000	SF	SS Geocomposite	
DHL Express - Willington, OH	Hi-Way Paving	Geosynthetic Installation	35,000	SF	40 mil HDPE Textured	October-05
			98,000	SF	45 mil Reinf. Polypropylene	
			360	LF	Tie- in to Existing Liner	
Sunny Farms Landfill - Fostoria, OH	Regus Industries	Landfill Cell and Closure	405,000	SF	60 mil Textured	November-05
			405,000	SF	DS Geocomposite	
			766,500	SF	40 mil HDPE Textured	
			766,500	SF	DS Geocomposite	
Envirosafe - Oregon, OH	Envirosafe Services	Landfill Cell	88,100	SF	60 mil HDPE Textured	November-05
			88,100	SF	Geonet Tri-Planer	
			88,000	SF	80 mil HDPE Textured	
			88,000	SF	Geonet Bi-Planer	
			88,000	SF	6 oz. Geotextile	
			88,000	SF	16 oz. Geotextile	
			1,850	LF	Tie - in to Existing Liner	
Newton County Landfill - Brook, IN	Poly-Flex	Landfill Cell	466,700	SF	60 mil HDPE Textured	November-05
			354,000	SF	60 mil HDPE Smooth	
			9,000	SF	GCL	
			782,000	SF	16 oz. Geotextile	
			1,500	LF	Tie - in to Existing Liner	
Farmers Market - Bristol, CT	Clean Harbors	Geosynthetics Installation	17,250	SF	40 mil HDPE Smooth	November-05
Smith's Creek Landfill - Port Huron, MI	DeAnngelis Contractor	Landfill Cell	320,300	SF	GCL	December-05
			564,600	SF	60 mil HDPE Textured	
			175,000	SF	DS Geocomposite	
			270,100	SF	Geonet	
			1,700	LF	Tie- in to Existing Liner	
			66,300	SF	40 mil LLDPE Textured	
			617	LF	Tie-in to Existing Liner	
Imperial Landfill - Imperial, PA	AWIN	Landfill Closure	493,510	SF	6 oz. Geotextile	December-05
			493,510	SF	40 mil LLDPE Textured	
			493,510	SF	DS Geocomposite	
			2,000	LF	Tie-in to Existing Liner	

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2004

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Metro Environmental - Monroe, MI	Metro Environmental	Vapor Barrier	92,000	SF	30 mil HDPE	March-04
			8,500	SF	80 mil HDPE	
King & Queen LF King George, MD	WMI	Odor Control Barrier	4,000	SF	Pipe and Geosynthetic Work	March-04
			1,600	SF	Pipe and Geosynthetic Work	
Pecan Row Landfill	Onyx Waste	Landfill Cell	226,420	SF	60 mil HDPE Smooth	April-04
Valdosta, GA			162,030	SF	60 mil HDPE Textured	
			160,005	SF	DS Geocomposite	
			216,940	SF	SS Geocomposite	
			4,500	SF	GCL	
Allied Waste Industries, Inc.	AWIN	Landfill Cell	697,500	SF	60 mil HDPE Textured	April-04
Mauk, GA			697,500	SF	GCL	
U.S. Army - Fort Polk, TX	Texas Environmental	Storage Pond	63,400	SF	60 mil HDPE Smooth	June-04
	Plastics		160,000	SF	60 mil HDPE Textured	
			132,600	SF	DS Geocomposite	
CMW Landfill West Waareham, MA	American Re-fuel	Landfill Cell	252,770	SF	GCL	July-04
			438,240	SF	60 mil HDPE Textured	
Forest Lawn Landfill	Republic Services	Landfill Cap	276,662	SF	60 mil HDPE Textured	July-04
Three Oaks, MI			276,662	SF	40 mil HDPE Textured	
			276,662	SF	GCL Secondary	
			287,862	SF	DS Geocomposite Sewn Over	
			285,864	SF	Primary GCL over Geocomp.	
			276,662	SF	DS Geocomposite Sewn Over	
JR Whitting Plant - Erie, MI	Consumers Energy	Landfil Cap	360,000	SF	40 mil HDPE	July-04
Solon City Schools	Vaxco Asphalt	Football Field	112,000	LF	20 mil PVC	August-04
Carleton Farms- Carleton, MI	Republic Services	Landfill Cell	321,600	SF	GCL	August-04
			301,000	SF	80 mil HDPE S&T	
Promenade Park-Huntington Beach, CA	BBL Environmental	Vapor Barrier	85,400	SF	60 mil HDPE Smooth	August-04
			170,800	SF	DS Geocomposite	
Wayne Disposal Landfill	B&V Construction, Inc.	Landfill Cap	144,900	SF	60 mil HDPE Textured	August-04
Wayne, MI			4,900	SF	80 mil HDPE Textured	
			8,000	SF	DS Gecomposite	
Ford - Kingford Site	Terra Contracting	Landfill Cap	72,700	SF	60 mil HDPE Smooth	August-04
Iron Mountain, MI			118,000	SF	40 mil HDPE Smooth	
Erie County Landfill	MELCO	Landfill Cell	241,600	SF	60 mil HDPE Textured	August-04
Milan, OH			71,000	SF	DS Geocomposite	
			171,200	SF	Geotextile	
Carelton Farms- Carelton, MI	Republic Services	Landfill Cell	321,648	SF	GCL	August-04
			320,057	SF	80 mil HDPE S&T	
			320,057	SF	Geocompsite Sewn S&T	
Promenade Park - Huntington Beach, CA	BBL Environmental	Vapor Barrier	85,400	SF	60 mil LLDPE Smooth	August-04
			170,800	SF	DS Geocomposite	
			238,179	SF	40 nil LLDPE Textured	
			238,179	SF	Geocomposite	
Wayne Disposal Landfill	B&V Construction, Inc.	Landfill Cap	144,900	SF	60 mil HDPE Textured	August-04
Wayne, MI			4,900	SF	80 mil HDPE Textured	
			8,000	SF	DS Geocomposite	
Ford - Kingford Site	Terra Contracting	Landfill Cap	72,700	SF	60 mil HDPE Smooth	August-04
Iron Mountain, MI			118,000	SF	40 mil HDPE Smooth	
Erie County Landfill	MELCO	Landfill Cell	241,600	SF	60 mil HDPE Textured	August-04
Milan, OH			71,000	SF	DS Geocomposite	
			171,200	SF	Geotextile	
Honda - Marysville, OH	R.D.Jones Exc. Inc.	Pond Liners	400,000	SF	60 mil HDPE Textured	August-04
City Of Oberlin , OH	Nerone & Sons, Inc.	Pond Liners	47,700	SF	60 mil HDPE Smooth	August-04
			47,700	SF	DS Geocomposite	

Grady Road Landfill - Rockmart, GA	Waste Connections	Rain Cover	165,000	SF	8 mil Sewn Rain Cover	August-04
CMW Landfill West Wareham, MA	American Re-fuel	LandfillClosure	252,770	SF	40 mil LLDPE Textured	September-04
Countywide Landfill	Republic Services	Landfill Cell	1,097,195	SF	GCL	September-04
Bolivar, OH			1,123,841	SF	60 mil HDPE Textured	
			578,025	SF	DS Geocomposite Sewn	
			543,540	SF	Geotextile Sewn	
			601,620	SF	Install Geotextile Filter Sewn	
			1,045	LF	Tie in existing	
Southern States - Mauk, GA	AWIN	Landfill Cap	725,000	SF	40 mil LLDPE Textured	September-04
			725,000	SF	DS Geocomposite	
BP - Toledo, OH	BP Toledo	Stormwater Ditch	7,500	SF	XR5 8130	September-04
Residual Ash Cell	R. Bates & Sons	Landfill Cell	250,000	SF	GCL	September-04
Covanta Energy			500,000	SF	60 mil HDPE Textured	
Haverhill, MA			250,000	SF	Gunseal - 30 mil	
Putnam Ash Landfill - Putnam, CT	Boggard Construction	Landfill Cap	382,988	SF	40 mil HDPE Textured	September-04
Wheelabrator Technologies, Inc.	Corp.		1,983	LF	Tie in weld	
Whitefeather Landfill	Republic Services	Landfill Cell	142,000	SF	60 mil HDPE S&T	October-04
Pinconning, MI			142,000	SF	GCL	
Brent Run Landfill	Republic Services	Landfill Cell	270,000	SF	60 mil HDPE Textured	October-04
Montrose, MI			270,000	SF	GCL	
Smiths Creek Landfill	Smiths Creek	Landfill	22,000	SF	Tie in Geotextile	October-04
Norfolk Southern Railroad - Bellevue, OH	U.S. Equipment	Secondary Containment	40,000	SF	XR5 8130	November-04
Michigan Chloride - St. Louis, MI	Michigan Chloride	Storage Tank	35,000	SF	XR5 8130	November-04
Page Street Landfill - Stoughton, MA	Mass Environmental	Storage Pond	95,000	SF	40 mil HDPE Textured	November-04

American Environmental Group Ltd.

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2003

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
General Motors - Parma Engine Plant	Independence Exc.	HDPE Liner Work		SF	40 mil HDPE Liner	January-03
WCI Steel - Warren, OH	WCI Steel	Storm water Lagoon	35,000	SF	XR5 8130 - Geotextile	January-03
Commercial Alloys - Twinsburg, OH	Commercial Alloys	Storm water Lagoon	5,000	SF	XR5 8130 - Geotextile	February-03
UPS Jet Fuel Containment - Louisville, KY	Sullivan & Cozart	Jet Fuel Containment	30,000	SF	XR5 8130 - Geotextile	March-03
Lee Villa - Adrian, MI	Heritage Industrial	Wastewater Treatment	75,000	SF	GCL	March-03
	Services	Lagoon	75,000	SF	60 mil HDPE	
CSX Diesel Fuel Tank - Cleveland, OH	Envirocon, Inc.	Diesel Fuel Containment	27,000	SF	XR5 8130	April-03
Geo Pacific Paper -Kalamazoo, MI	Terra Contracting	Cap Repair	15,000	SF	30 mil PVC	April-03
Babb's Creek - Clearfield, PA	E.M. Brown	Pond Liners	30,000	SF	30 mil PVC	May-03
			60,000	SF	10 oz. Geotextile	
Wabash Valley Landfill - Wabash, IN	Republic Services	Landfill Closure	225,000	SF	40 mil LLDPE Textured	May-03
			225,000	SF	DS Geocomposite	
Royalton Road Landfill - North Royalton, OH	Norton Environmental	Landfill Closure	358,800	SF	40 mil LLDPE Textured	May-03
			358,800	SF	DS Geocomposite	
Ford Motor Company - Virginia Beach, VA	PSE	Temporary Parking Lot	2,000,000	SF	DS Geocomposite	June-03
Aerospace Parkway - Cleveland, OH	Great Lakes	Road Liner	40,000	SF	30 mil PVC	June-03
Brunswick City Schools - Brunswick, OH	Marous Brothers	Football Field	112,000	SF	20 mil PVC	July-03
Shrewsbury Landfill - Shrewbury, MA	R. Bates & Sons	Landfill Closure	330,000	SF	40 mil LLDPE Liner	July-03
	Wheelabrator		1,520	SF	Tie In Seam	
Wabash Valley Landfill - Wabash, IN	Republic Services	Landfill Cell	220,000	SF	60 mil HDPE Textured	July-03
			220,000	SF	DS Geocomposite	
Carleton Farms Landfill	Republic Services	Landfill Cell	1,400,000	SF	GCL	August-03
Carleton, MI			1,400,000	SF	80 mil HDPE S&T	
			800,000	SF	Geocomposite	
Bourke Site - Oak Creek, WI	Envirocon, Inc.	Over liner	50,000	SF	12 oz. Geotextile	
			50,000	SF	40 mil HDPE Smooth	August-03
Putnam Ash Landfill - Putnam, CT	B&M Excavating	Residual Ash Cell	450,000	SF	60 mil HDPE Secondary	August-03
			450,000	SF	DS Geocomposite	
Elk Run Landfill - Onaway, MI	Republic Services	Landfill Cell	220,000	SF	GCL Secondary	September-03
			220,000	SF	60 mil HDPE Secondary	
BP Tank Farm - Toledo, OH	MELCO, Inc.	Secondary Containment	80,000	SF	40 mil HDPE	September-03
			1,300	LF	Batten Bar	
US Steel - Clarington, PA	Land Saver	Landfill closure	250,000	SF	DS Geocomposite	September-03
	Environmental			SF		
BP North Pond - Toledo, OH	MELCO	Landfill Cap	180,000	SF	40 mil LLDPE	October-03
			180,000	SF	SS Geocomposite	
Holcim, Inc. Dundee, MI	BBL/GSI	Landfill Cap	1,400,000	SF	40 mil LLDPE	October-03
			1,600,000	SF	DS Geocomposite	
Lima C-5 Landfill closure - Lima, OH	MELCO	Landfill Cap	150,000	SF	40 mil LLDPE Textured	October-03
			70,000	SF	Textured LLDPE	
			150,000	SF	DS Geocomposite	
Rockwood Landfill - Rockwood, MI	Great Lakes	Secondary Containment	6,300	SF	60 mil HDPE	November-03
Pairs Island, South Carolina	ECC	Landfill Cap	272,000	SF	40 mil LLDPE Textured	November-03
			40,500	SF	12 oz. Geotextile	
New Paris Pike Landfill - Richmond, IN	Fox Contractors	Landfill Cell	480,000	SF	60 mil HDPE	November-03
			480,000	SF	16 oz. Geotextile	
Lake County Landfill - Painesville, OH	Independence	Landfill Cell	540,000	SF	60 mil HDPE S&T	November-03
	Excavating		270,000	SF	DS Geocomposite	
Brent Run Landfill - Montrose, MI	Republic Services	Landfill Cell	300,000	SF	40 mil LLDPE	November-03
			250,000	SF	GCL	
Fort Gratiot Landfill -Port Huron, MI	Algin Contractors	Landfill Closure	400,000	SF	40 mil LLDPE Textured	December-03
			750,000	SF	DS Geocomposite	
Sunny Farms Landfill - Fostoria, OH	MELCO	Landfill Cell	200,000	SF	60 mil HDPE Smooth	
			45,000	SF	60 mil HDPE Textured	December-03

AMERICAN ENVIRONMENTAL GROUP LTD.

GEOSYNTHETIC PROJECT LIST 2002

Project Name/Location	Client	Description	Qty.'s Installed	Unit's	Materials	Completion Date
Casting Services - Laporte, IN	Fox Contractors	Landfill Cap	220,000	SF	40 mil LLDPE	April-02
Willow Run - Belleville, MI	PSE	Temporary Parking Lot	1,200,000	SF	DS Geocomposite	June-02
Oakland Heights Landfill - Auburn Hills, MI	Poly-Flex	Landfill Cap	190,000	SF	40 mil LLDPE Textured	July-02
			190,000	SF	Geocomposite	
Brush High School - Willoughby, OH	Marous Brothers Con.	Athletic Field	125,000	LF	40 mil PVC	July-02
Carelton Farms Landfill - Carelton, MI	Republic Services	Landfill Cell	576,000	SF	GCL	July-02
			576,000	SF	80 mil HDPE S&T	
Tem Park - Romulus, MI	PSE	Temporary Parking Lot	60,000	SF	DS Geocomposite	August-02
Penn State Campus - Reading, PA	PSE	Temporary Parking Lot	84,000	SF	DS Geocomposite	August-02
Sauk Trails landfill - Belleville, MI	Allied Waste	Leachate Tank			80 mil HDPE 48ft Tank Liner	August-02
Green Valley Landfill - Naperville, IL	Allied Waste	Liner Repair and Installation			60 mil HDPE Boots & Repair	August-02
Mallard Lake Landfill - Hanover Park, IL	Allied Waste	Boot Repairs/Fabrication			40/60 mil LLDPE/HDPE Boots	September-02
Sunrise Landfill - Wayland, MI	Envirocon	Landfill Cell	440,000	SF	40 mil LLDPE S&T	September-02
			420,000	SF	Geotextile	
Upper Sandusky Reservoir - Sandusky, OH	MELCO	Geotextile Installation	10,000	LF	Geotextile Sewing	October-02
Hancock County Landfill - Findlay, OH	Hancock County	Drainage Channel Liner	2,100	SF	40 mil HDPE Textured	October-02
Erie County Landfill - Milan, OH	R.B.Jergens	Landfill Cell	300,000	SF	60 mil HDPE Textured	October-02
			100,000	SF	Geocomposite	
CEMEX - Charlevoix, MI	KGL & Associates	Landfill Cell	425,000	SF	GCL	October-02
			402,000	SF	60 mil HDPE S&T	
Brent Run Landfill - Montrose, MI	Republic Services	Landfill Cell	160,000	SF	GCL	November-02
			190,000	SF	60 mil HDPE S&T	
Little Mill Creek QAMD Abatement	Neiswonger Const.	Treatment Cells	65,000	SF	30 mil PVC	November-02
			55,000	SF	40 mil HDPE Textured	
			185,000	SF	Geotextile	
Maxey Flats - Hillsboro, KY	The Shaw Group	Polyprophylene Repair	50,000	SF	Polyprophlene Extursion	November-02
Shewsbury Landfill - Shewsbury, MA	R. Bates & Sons	Landfill Cell	260,000	SF	GCL	December-02
	Wheelabrator		260,000	SF	60 mil HDPE Textured	

APPENDIX J

Geomembrane Manufacturer's QC Certificates

agru america
quality control dept

quality certificate

ROLL # **339443-09** Lot #: **8190369** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.71**	mm	**67**	mil
Asperity ASTM D7466: **33/33** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.61**	mm	**63**	mil

Thickness.....	**1.5**	**mm**	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**181**	

					TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc			**.946**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190°C /2160 g	g/10 min			**.26**	
Carbon Black Content ASTM D4218	Range	%			**2.35**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**29** N/mm (kN/m)	**168** ppi		**2,648**	psi
	Average Strength @ Break	**32** N/mm (kN/m)	**185** ppi		**2,917**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%			**16.92**	
	Average Elongation @ Break	%			**444.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.66**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**263.5** N			**59.240**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**462.8** N			**104.05**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**620.0** N			**139.38**	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			**CERTIFIED**	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			**ONGOING**	

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date:..... **9-23-09**

Signature.....

Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america
quality control dep't

quality certificate

ROLL # **339444-09** Lot #: **8190369** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	1.49	mm	59	mil
	MAX:	1.69	mm	67	mil
Asperity ASTM D7466: 32/35 mil	AVE:	1.59	mm	63	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	1.5 mm	60 mil	
Length.....	125 m	410.1	feet
Width.....	7.00 m;	23.0	feet

OIT(Standard) ASTM D3895 minutes 181

					TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc			.946	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190°C /2160 g	g/10 min			.26	
Carbon Black Content ASTM D4218	Range	%			2.35	
Carbon Black Dispersion ASTM D5596	Category				10 In Cat 1	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	29 N/mm (kN/m)	166 ppi		2,648	psi
	Average Strength @ Break	32 N/mm (kN/m)	183 ppi		2,917	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			16.92	
Lo = 2.0" Break	Average Elongation @ Break	%			444.6	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			-0.66	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	263.5 N			59.240	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	462.8 N			104.05	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	620.0 N			139.38	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			ONGOING	

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **9-23-09**

Signature.....

Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america
quality control dept

quality certificate

ROLL # **339452-09** Lot #: **8190369** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	1.53	mm	60	mil
	MAX:	1.69	mm	67	mil
Asperity ASTM D7466: 33/34 mil	AVE:	1.61	mm	63	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	1.5 mm	60 mil	
Length.....	125 m	410.1	feet
Width.....	7.00 m;	23.0	feet

OIT(Standard) ASTM D3895 minutes **181**

					TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc			.946	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190°C /2160 g	g/10 min			.26	
Carbon Black Content ASTM D4218	Range	%			2.26	
Carbon Black Dispersion ASTM D5596	Category				10 In Cat 1	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	30 N/mm (kN/m)	173 ppi		2,737	psi
	Average Strength @ Break	36 N/mm (kN/m)	204 ppi		3,216	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			16.75	
Lo = 2.0" Break	Average Elongation @ Break	%			484.6	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			-0.66	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	266.7 N			59.958	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	427.0 N			95.988	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	617.0 N			138.72	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			ONGOING	

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **9-24-09**

Signature: *M. Holmes*

Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america
quality control dept

quality certificate

ROLL # **339453-09** Lot #: **8190369** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.50**	mm	**59**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity ASTM D7466: **35/36** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **181**

					TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc			**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190°C /2160 g	g/10 min			**.26**	
Carbon Black Content ASTM D4218	Range	%			**2.44**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**30** N/mm (kN/m)	**169** ppi		**2,712**	psi
	Average Strength @ Break	**33** N/mm (kN/m)	**186** ppi		**2,993**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**16.86**	
Lo = 2.0" Break	Average Elongation @ Break	%			**454.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.66**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**257.2** N			**57.823**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.8** N			**96.404**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**603.0** N			**135.56**	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			**CERTIFIED**	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			**ONGOING**	

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **9-24-09**

Signature.....

Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america
quality control dept

quality certificate

ROLL # **339455-09** Lot #: **8190369** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity ASTM D7466: **30/35** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	**mm**	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**181**	

					TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc		**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190°C /2160 g		g/10 min		**.26**	
Carbon Black Content ASTM D4218	Range		%		**2.44**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**30** N/mm (kN/m)		**171** ppi	**2,712**	psi
	Average Strength @ Break	**33** N/mm (kN/m)		**189** ppi	**2,993**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		%		**16.86**	
	Average Elongation @ Break		%		**454.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%		**-0.66**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**257.2**	N		**57.823**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.8**	N		**96.404**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**603.0**	N		**135.56**	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			**CERTIFIED**	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			**ONGOING**	

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **9-24-09**

Signature.....

Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept

quality certificate

ROLL # **423240-09** Lot # **8190345** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.486**	mm	**59**	mil
	MAX:	**1.632**	mm	**64**	mil
	AVE:	**1.549**	mm	**61**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**190**	

Specific Gravity ASTM D792		Density	g/cc			**.945**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	- g /10 min			**.23**
Carbon Black Content ASTM D4218		Range	%			**2.38**
Carbon Black Dispersion ASTM D5596		Category				**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**27** N/mm (kN/m)	**152** ppi	**2,539**	psi
		Average Strength @ Break	**48** N/mm (kN/m)	**277** ppi	**4,612**	psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break		Average Elongation @ Yield	%		**17.72**	
		Average Elongation @ Break	%		**841.1**	
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change	%		**-0.20**	
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance	**255** N		**57.324**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load	**441** N		**99.141**	lbs
Puncture Resistance ASTM D4833 (Modified)		Load	**586** N		**131.71**	lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs		**CERTIFIED**	
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs		**PASS**	

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-2-09**

Signature: .....

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america quality control dept

quality certificate

ROLL # **423243-09** Lot # **8190345** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.403**	mm	**55**	mil
	MAX:	**1.65**	mm	**65**	mil
	AVE:	**1.544**	mm	**61**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**190**	

Specific Gravity ASTM D792		Density		g/cc			**.945**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	-	g /10 min			**.23**
Carbon Black Content ASTM D4218		Range		%			**2.39**
Carbon Black Dispersion ASTM D5596		Category					**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**27**	N/mm (kN/m)	**152**	ppi	**2,539** psi
		Average Strength @ Break	**48**	N/mm (kN/m)	**277**	ppi	**4,612** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break		Average Elongation @ Yield		%			**17.72**
		Average Elongation @ Break		%			**841.1**
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change		%			**-0.20**
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance		**255** N			**57.324** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load		**441** N			**99.141** lbs
Puncture Resistance ASTM D4833 (Modified)		Load		**586** N			**131.71** lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs				**CERTIFIED**
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs				**PASS**

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-2-09**

Signature: .....

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america quality control dept

quality certificate

ROLL # **423244-09** Lot # **8190345** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.441**	mm	**57**	mil
	MAX:	**1.603**	mm	**63**	mil
	AVE:	**1.528**	mm	**60**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**190**	

Specific Gravity ASTM D792		Density		g/cc			**.945**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	-	g /10 min			**.23**
Carbon Black Content ASTM D4218		Range		%			**2.39**
Carbon Black Dispersion ASTM D5596		Category					**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**27**	N/mm (kN/m)	**152**	ppi	**2,539** psi
		Average Strength @ Break	**48**	N/mm (kN/m)	**277**	ppi	**4,612** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield		Average Elongation @ Yield		%			**17.72**
Lo = 2.0" Break		Average Elongation @ Break		%			**841.1**
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change		%			**-0.20**
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance		**255** N			**57.324** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load		**441** N			**99.141** lbs
Puncture Resistance ASTM D4833 (Modified)		Load		**586** N			**131.71** lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs				**CERTIFIED**
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs				**PASS**

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-2-09**

Signature: .....

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america quality control dept

quality certificate

ROLL # **423252-09** Lot # **8190345** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.446**	mm	**57**	mil
	MAX:	**1.626**	mm	**64**	mil
	AVE:	**1.543**	mm	**61**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**190**	

Specific Gravity ASTM D792		Density	g/cc			**.945**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	- g /10 min			**.23**
Carbon Black Content ASTM D4218		Range	%			**2.45**
Carbon Black Dispersion ASTM D5596		Category				**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**28** N/mm (kN/m)	**159** ppi	**2,643**	psi
		Average Strength @ Break	**48** N/mm (kN/m)	**276** ppi	**4,603**	psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break		Average Elongation @ Yield	%		**16.86**	
		Average Elongation @ Break	%		**820.2**	
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change	%		**-0.20**	
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance	**262** N		**58.792**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load	**430** N		**96.713**	lbs
Puncture Resistance ASTM D4833 (Modified)		Load	**562** N		**126.30**	lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs		**CERTIFIED**	
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs		**PASS**	

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-2-09**

Signature.....

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america
quality control dept

quality certificate

ROLL # **423253-09** Lot # **8190345** **Liner Type:SMOOTH HDPE**

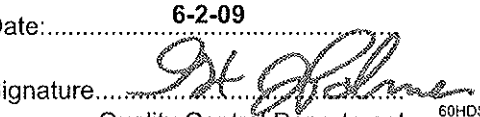
		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.474**	mm	**58**	mil
	MAX:	**1.619**	mm	**64**	mil
	AVE:	**1.548**	mm	**61**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**190**	

Specific Gravity ASTM D792		Density		g/cc			**.945**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	-	g /10 min			**.23**
Carbon Black Content ASTM D4218		Range		%			**2.48**
Carbon Black Dispersion ASTM D5596		Category					**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**28**	N/mm (kN/m)	**159**	ppi	**2,643** psi
		Average Strength @ Break	**48**	N/mm (kN/m)	**276**	ppi	**4,603** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break		Average Elongation @ Yield		%			**16.86**
		Average Elongation @ Break		%			**820.2**
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change		%			**-0.20**
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance			**262**	N	**58.792** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load			**430**	N	**96.713** lbs
Puncture Resistance ASTM D4833 (Modified)		Load			**562**	N	**126.30** lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs				**CERTIFIED**
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs				**PASS**

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-2-09**

Signature: 

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america quality control dept

quality certificate

ROLL # **423254-09** Lot # **8190345** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.434**	mm	**56**	mil
	MAX:	**1.639**	mm	**65**	mil
	AVE:	**1.552**	mm	**61**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**190**	

Specific Gravity ASTM D792		Density		g/cc			**.945**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	-	g /10 min			**.23**
Carbon Black Content ASTM D4218		Range		%			**2.48**
Carbon Black Dispersion ASTM D5596		Category					**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**28**	N/mm (kN/m)	**159**	ppi	**2,643** psi
		Average Strength @ Break	**48**	N/mm (kN/m)	**276**	ppi	**4,603** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield		Average Elongation @ Yield		%			**16.86**
Lo = 2.0" Break		Average Elongation @ Break		%			**820.2**
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change		%			**-0.20**
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance			**262**	N	**58.792** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load			**430**	N	**96.713** lbs
Puncture Resistance ASTM D4833 (Modified)		Load			**562**	N	**126.30** lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs				**CERTIFIED**
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs				**PASS**

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-2-09**

Signature.....

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america quality control dept

quality certificate

ROLL # **423376-09** Lot # **8190342** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.479**	mm	**58**	mil
	MAX:	**1.609**	mm	**63**	mil
	AVE:	**1.534**	mm	**60**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**188**	

Specific Gravity ASTM D792		Density		g/cc			**.946**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	-	g /10 min			**.24**
Carbon Black Content ASTM D4218		Range		%			**2.45**
Carbon Black Dispersion ASTM D5596		Category					**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**26**	N/mm (kN/m)	**150**	ppi	**2,497** psi
		Average Strength @ Break	**44**	N/mm (kN/m)	**253**	ppi	**4,212** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break		Average Elongation @ Yield		%			**17.34**
		Average Elongation @ Break		%			**790.0**
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change		%			**-0.27**
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance		**269** N			**60.423** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load		**457** N			**102.64** lbs
Puncture Resistance ASTM D4833 (Modified)		Load		**585** N			**131.58** lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs				**CERTIFIED**
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs				**PASS**

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-3-09**

Signature: _____

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america quality control dept

quality certificate

ROLL # **423491-09** Lot # **8190342** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.413**	mm	**56**	mil
	MAX:	**1.613**	mm	**64**	mil
	AVE:	**1.549**	mm	**61**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**188**	

Specific Gravity ASTM D792		Density		g/cc			**.946**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	-	g /10 min			**.24**
Carbon Black Content ASTM D4218		Range		%			**2.54**
Carbon Black Dispersion ASTM D5596		Category					**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**27**	N/mm (kN/m)	**156**	ppi	**2,600** psi
		Average Strength @ Break	**47**	N/mm (kN/m)	**267**	ppi	**4,447** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield		Average Elongation @ Yield		%			**17.24**
Lo = 2.0" Break		Average Elongation @ Break		%			**793.2**
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change		%			**-0.27**
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance		**286** N			**64.330** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load		**466** N			**104.83** lbs
Puncture Resistance ASTM D4833 (Modified)		Load		**599** N			**134.71** lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs				**CERTIFIED**
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs				**PASS**

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-4-09**

Signature: .....

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america quality control dept

quality certificate

ROLL # **423492-09** Lot # **8190342** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.467**	mm	**58**	mil
	MAX:	**1.641**	mm	**65**	mil
	AVE:	**1.566**	mm	**62**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**188**	

Specific Gravity ASTM D792		Density		g/cc			**.946**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	-	g /10 min			**.24**
Carbon Black Content ASTM D4218		Range		%			**2.54**
Carbon Black Dispersion ASTM D5596		Category					**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**27**	N/mm (kN/m)	**156**	ppi	**2,600** psi
		Average Strength @ Break	**47**	N/mm (kN/m)	**267**	ppi	**4,447** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield		Average Elongation @ Yield		%			**17.24**
Lo = 2.0" Break		Average Elongation @ Break		%			**793.2**
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change		%			**-0.27**
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance			**286**	N	**64.330** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load			**466**	N	**104.83** lbs
Puncture Resistance ASTM D4833 (Modified)		Load			**599**	N	**134.71** lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs				**CERTIFIED**
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs				**PASS**

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-4-09**

Signature: _____

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america quality control dept

quality certificate

ROLL # **423493-09** Lot # **8190342** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.437**	mm	**57**	mil
	MAX:	**1.645**	mm	**65**	mil
	AVE:	**1.554**	mm	**61**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**188**	

Specific Gravity ASTM D792		Density		g/cc			**.946**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	-	g /10 min			**.24**
Carbon Black Content ASTM D4218		Range		%			**2.50**
Carbon Black Dispersion ASTM D5596		Category					**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**27**	N/mm (kN/m)	**156**	ppi	**2,600** psi
		Average Strength @ Break	**47**	N/mm (kN/m)	**267**	ppi	**4,447** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield		Average Elongation @ Yield		%			**17.24**
Lo = 2.0" Break		Average Elongation @ Break		%			**793.2**
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change		%			**-0.27**
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance		**286** N			**64.330** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load		**466** N			**104.83** lbs
Puncture Resistance ASTM D4833 (Modified)		Load		**599** N			**134.71** lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs				**CERTIFIED**
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs				**PASS**

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-4-09**

Signature: _____

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

agru america quality control dept

quality certificate

ROLL # **423494-09** Lot # **8190342** **Liner Type:SMOOTH HDPE**

		METRIC		ENGLISH	
Thickness Measurement ASTM D5199 (Modified)	MIN:	**1.402**	mm	**55**	mil
	MAX:	**1.65**	mm	**65**	mil
	AVE:	**1.55**	mm	**61**	mil

Thickness	**1.5mm**		**60mil**	
Length	**128**	m	**420**	feet
Width	**7.00**	m	**23.0**	feet
OIT(Standard) ASTM D3895		minutes	**188**	

Specific Gravity ASTM D792		Density		g/cc			**.946**
MFI ASTM D1238 COND. E GRADE:	**K307**	Melt Flow Index 190°C /2160 g	-	g /10 min			**.24**
Carbon Black Content ASTM D4218		Range		%			**2.50**
Carbon Black Dispersion ASTM D5596		Category					**10 In Cat 1**
Tensile Strength ASTM D6693 (2 inches / minute)		Average Strength @ Yield	**27**	N/mm (kN/m)	**156**	ppi	**2,600** psi
		Average Strength @ Break	**47**	N/mm (kN/m)	**267**	ppi	**4,447** psi
Tensile Elongation ASTM D6693 (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break		Average Elongation @ Yield		%			**17.24**
		Average Elongation @ Break		%			**793.2**
Dimensional Stability ASTM D1204 (Modified)		Average Dimensional Change		%			**-0.27**
Tear Resistance ASTM D1004 (Modified)		Average Tear Resistance		**286** N			**64.330** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)		Load		**466** N			**104.83** lbs
Puncture Resistance ASTM D4833 (Modified)		Load		**599** N			**134.71** lbs
ESCR ASTM D1693		Minimum Hrs w / o Failures	1500 hrs				**CERTIFIED**
Notched Constant Tensile Load ASTM D5397		pass / fail @ 30%	300 hrs				**PASS**

Customer: **American Environmental**
PO: **30309072 Mississippi Co. Landfill**
Destination **Luxora, AR**

Date: **6-4-09**

Signature: _____

Quality Control Department

60HDSM.FRM
REV 06
12/23/05

Chevron Phillips Chemical Company LP

CoA Date: 03/31/2009

Certificate of Analysis

Shipped To: AGRU AMERICA INC
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

CPC Delivery #: 87834891
PO #: 4962
Weight: 187600 LB
Ship Date: 03/31/2009
Package: BULK
Mode: Hopper Car
Car #: PSPX006848
Seal No: 259671

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 8190369

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.260	g/10mi
HLMI Flow Rate	ASTM D1238	20.00	g/10mi
Density	ASTM D1505	0.9370	g/cm3
Pellet Count	P02.08.03	31.000	pel/g
Production Date		03/19/2009	

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

Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1-832-813-4637

Chevron Phillips Chemical Company LP

CoA Date: 03/29/2009

Certificate of Analysis

Shipped To: AGRU AMERICA INC
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

CPC Delivery #: 87834414
PO #: 4962
Weight: 184400 LB
Ship Date: 03/29/2009
Package: BULK
Mode: Hopper Car
Car #: PSPX006111
Seal No: 259505

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 8190345

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.230	g/10mi
HLMI Flow Rate	ASTM D1238	23.00	g/10mi
Density	ASTM D1505	0.9370	g/cm3
Pellet Count	P02.08.03	35.000	pel/g
Production Date		03/15/2009	

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

Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1-832-813-4637

Chevron Phillips Chemical Company LP

CoA Date: 03/29/2009

Certificate of Analysis

Shipped To: AGRU AMERICA INC
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

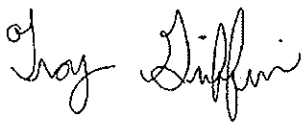
CPC Delivery #: 87834410
PO #: 4962
Weight: 183800 LB
Ship Date: 03/29/2009
Package: BULK
Mode: Hopper Car
Car #: PSPX006562
Seal No: 259504

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 8190342

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.240	g/10mi
HLMI Flow Rate	ASTM D1238	23.00	g/10mi
Density	ASTM D1505	0.9380	g/cm3
Pellet Count	P02.08.03	31.000	pel/g
Production Date		03/14/2009	

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



Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1-832-813-4637

agru america
quality control dept

quality certificate

ROLL # **335104-09** Lot #: **7190275** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.63**	mm	**64**	mil
Asperity ASTM D7466: **31/32** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

					TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc			**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190°C /2160 g	g/10 min			**.24**	
Carbon Black Content ASTM D4218	Range	%			**2.37**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**27** N/mm (kN/m)	**154** ppi		**2,468**	psi
	Average Strength @ Break	**34** N/mm (kN/m)	**195** ppi		**3,134**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**22.05**	
Lo = 2.0" Break	Average Elongation @ Break	%			**461.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.86**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**229.5** N			**51.595**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**421.6** N			**94.787**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**614.3** N			**138.11**	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			**CERTIFIED**	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			**pass**	

Customer: **American Environmental**
PO: **email Mississippi Co. Landfill adds**
Destination **Luxora, AR**

Date: **8-21-09**

Signature:

Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept

quality certificate

ROLL # **335105-09** Lot #: **7190275** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity ASTM D7466: **33/35** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.60**	mm	**63**	mil

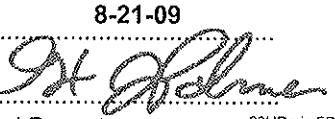
Thickness.....	**1.5**	**mm**	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

					TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc			**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190°C /2160 g	g/10 min			**.24**	
Carbon Black Content ASTM D4218	Range	%			**2.37**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**27** N/mm (kN/m)	**155** ppi		**2,468**	psi
	Average Strength @ Break	**35** N/mm (kN/m)	**197** ppi		**3,134**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**22.05**	
Lo = 2.0" Break	Average Elongation @ Break	%			**461.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.86**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**229.5** N			**51.595**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**421.6** N			**94.787**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**614.3** N			**138.11**	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			**CERTIFIED**	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			**pass**	

Customer: **American Environmental**
PO: **email Mississippi Co. Landfill adds**
Destination **Luxora, AR**

Date: **8-21-09**

Signature: 

Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america
quality control dept

quality certificate

ROLL # **339456-09** Lot #: **8190369** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	1.48	mm	58	mil
	MAX:	1.69	mm	67	mil
Asperity ASTM D7466: 35/37 mil ODD # : TOP EVEN #: BOTTOM	AVE:	1.58	mm	62	mil

Thickness.....	1.5 mm	60 mil	
Length.....	125 m	410.1	feet
Width.....	7.00 m;	23.0	feet
OIT(Standard) ASTM D3895 minutes	181		

					TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc			.945	
MFI ASTM D1238 COND. E GRADE: K307	Melt Flow Index 190°C /2160 g	g/10 min			.26	
Carbon Black Content ASTM D4218	Range	%			2.05	
Carbon Black Dispersion ASTM D5596	Category				10 In Cat 1	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	30 N/mm (kN/m)	169 ppi		2,712	psi
	Average Strength @ Break	33 N/mm (kN/m)	186 ppi		2,993	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			16.86	
Lo = 2.0" Break	Average Elongation @ Break	%			454.5	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			-0.66	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	257.2 N			57.823	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	428.8 N			96.404	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	603.0 N			135.56	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs			CERTIFIED	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs			pass	

Customer: **American Environmental**
PO: **email Mississippi Co. Landfill adds**
Destination **Luxora, AR**

Date: **9-24-09**

Signature: _____

Quality Control Department

60HDmic.FRM
REV 03
12/23/05

Chevron Phillips Chemical Company LP

CoA Date: 03/06/2009

Certificate of Analysis

Shipped To: AGRU AMERICA:RAINS
MILEPOST SH317
RAINS SC 29589
USA

Recipient: PALMER
Fax:

CPC Delivery #: 87823651
PO #: 4960
Weight: 194300 LB
Ship Date: 03/06/2009
Package: BULK
Mode: Hopper Car
Car #: PSPX006018
Seal No: 262868

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 7190275

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.240	g/10mi
HLMI Flow Rate	ASTM D1238	20.00	g/10mi
Density	ASTM D1505	0.9360	g/cm3

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

Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1-832-813-4637

CoA Date: 03/31/2009

Certificate of Analysis

Shipped To: AGRU AMERICA INC
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

CPC Delivery #: 87834891
PO #: 4962
Weight: 187600 LB
Ship Date: 03/31/2009
Package: BULK
Mode: Hopper Car
Car #: PSPX006848
Seal No: 259671

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 8190369

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.260	g/10mi
HLMI Flow Rate	ASTM D1238	20.00	g/10mi
Density	ASTM D1505	0.9370	g/cm3
Pellet Count	P02.08.03	31.000	pel/g
Production Date		03/19/2009	

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

Troy Griffin
Quality Systems Coordinator

For CoA questions contact Customer Service Representative at +1-832-813-4637

APPENDIX K

Geomembrane Inventory Listing

AEG MS Cty LF doc 12811

Luxora, AR

PO# 30309072

				5 rolls 60 HD microspike				5			left
	METRIC DIMENSIONS			11 rolls 60 HD smooth				11			left
roll #	width	length	area	check weld rod qty							
(K)339443 .09	7	125	875	60HD	micro	5tot	1	3398	sqs	8190369	
(K)339444 .09	7	125	875	60HD	micro	5tot	2	3416		8190369	
(K)339452 .09	7	125	875	60HD	micro	5tot	3	3328		8190369	
(K)339453 .09	7	125	875	60HD	micro	5tot	4	3330		8190369	
(K)339455 .09	7	125	875	60HD	micro	5tot	5	3330		8190369	
								16802			
(K)423240 .09	7.00	128	896.0	60HD	smooth	11tot	1	2948	stage 1ft	8190345	
(K)423243 .09	7.00	128	896.0	60HD	smooth	11tot	2	2942		8190345	
(K)423244 .09	7.00	128	896.0	60HD	smooth	11tot	3	2942		8190345	
(K)423252 .09	7.00	128	896.0	60HD	smooth	11tot	4	2938		8190345	
(K)423253 .09	7.00	128	896.0	60HD	smooth	11tot	5	2942		8190345	
(K)423254 .09	7.00	128	896.0	60HD	smooth	11tot	6	2940		8190345	
(K)423376 .09	7.00	128	896.0	60HD	smooth	11tot	7	2940		8190342	
(K)423491 .09	7.00	128	896.0	60HD	smooth	11tot	8	2942		8190342	
(K)423492 .09	7.00	128	896.0	60HD	smooth	11tot	9	2944		8190342	
(K)423493 .09	7.00	128	896.0	60HD	smooth	11tot	10	2942		8190342	
(K)423494 .09	7.00	128	896.0	60HD	smooth	11tot	11	2940	stage 1ft	8190342	
								32360			

microspike liner
HDPE
60 mil

AEG MS Cty LF adds doc 12965
Luxora, AR
3 rolls 60 HD microspike

PO#	email

	METRIC DIMENSIONS								
roll #	width	length	area						
(K)335104 .09	7	125	875	AEG	MS	Cty	extra	3186	stage sqs golder	7190275
(K)335105 .09	7	125	875	AEG	MS	Cty	extra	3190		7190275
(K)339456 .09	7	125	875	AEG	MS	Cty	extra	3336		8190369

9712

GEOSYNTHETICS INVENTORY RECORD

Project Name: MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION

Project Location: LUXORA, AR

Project Number: 4355-301

ftn Associates Ltd.
water resources / environmental consultants

Roll Number	Batch Number	Date Received	Date Deployed	Length (Feet)	Width (Feet)	Area (S.F.)	Material Type	Certification Approved	Conformance Sample Taken	Conformance Results Approved	CQA Monitor
423420-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423243-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423244-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423254-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423252-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423253-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423376-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423491-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423492-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423493-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
423494-09		10/11/09	10/20/2009	420	23	9645	60 **S**				JAC
339443-09		10/11/09	10/21/2009	410	23	9419	60 **T**				JAC
339444-09		10/11/09	10/21/2009	410	23	9419	60 **T**				JAC
339452-09		10/11/09	10/21/2009	410	23	9419	60 **T**				JAC
339453-09		10/11/09	10/21/2009	410	23	9419	60 **T**				JAC
339455-09		10/11/09	10/21/2009	410	23	9419	60 **T**				JAC
335104-09		10/22/09	10/25/2009	410	23	9419	60 **T**				JAC
335105-09		10/22/09	10/25/2009	410	23	9419	60 **T**				JAC
339456-09		10/22/09	10/25/2009	410	23	9419	60 **T**				JAC

Material Type Legend:
60S - 60-Mil Smooth HDPE Geomembrane
60T - 60-Mil Textured HDPE Geomembrane

APPENDIX L

Geomembrane Conformance Test Report

SEPTEMBER 2009

093-90145
4355-301

GEOMEMBRANE TEST RESULTS

PROJECT NUMBER: 093-90145
PROJECT NAME: FTN/MISSISSIPPI CO LF-CELL 14/AR
SAMPLE NUMBER: 339443-09

	THICKNESS (mils)	TEAR RESISTANCE (lbs) MD	TEAR RESISTANCE (lbs) TD	CARBON BLACK DISPERSION (category)	CARBON BLACK DISPERSION (µm)
1.	61.2	63.3	54.1	1	10
2.	63.7	60.4	53.9	1	15
3.	64.0	67.0	57.7	1	20
4.	63.7	65.1	58.7	1	10
5.	66.9	65.7	57.3	1	15
6.	66.9	64.3	55.9	1	15
7.	62.7	56.5	54.9	3	90
8.	67.5	57.1	52.3	1	10
9.	64.9	57.8	54.4	1	15
10.	63.1	59.3	54.9	1	10
AVG	64.5	61.7	55.4	1	21

	DENSITY (g/cc)	CARBON BLACK CONTENT (%)
1.	0.946	2.49
2.	0.946	2.53
3.	0.946	
AVG	0.946	2.51

	YIELD STRENGTH (lb/in. width) MD	YIELD STRENGTH (lb/in. width) TD	ELONGATION AT YIELD (%) MD	ELONGATION AT YIELD (%) TD	BREAK STRENGTH (lb/in. width) MD	BREAK STRENGTH (lb/in. width) TD	ELONGATION AT BREAK (%) MD	ELONGATION AT BREAK (%) TD
1.	164.3	171.2	19.5	13.9	205.0	156.5	479.2	439.3
2.	168.7	174.2	19.0	10.5	211.6	182.7	422.3	519.5
3.	180.0	193.6	19.2	14.6	225.8	208.5	429.3	566.5
4.	162.7	179.2	19.0	13.9	210.4	177.8	446.3	477.8
5.	164.2	175.1	18.7	14.9	195.5	206.2	428.8	590.0
AVG	168.0	178.7	19.1	13.6	209.7	186.3	441	519

SEPTEMBER 2009

093-90145
4355-301

SUMMARY OF TEXTURED GEOMEMBRANE CONFORMANCE TEST RESULTS

FTN ASSOCIATES, INC.
MISSISSIPPI COUNTY LANDFILL - CELL 14
ARKANSAS

ROLL DESIGNATION	Reference Value	339443 -09	-	-	-	-	-	-	-	-	-
THICKNESS (mils) ASTM D5994	>=60	64.5	-	-	-	-	-	-	-	-	-
TEAR RESISTANCE (lbs)(MD/TD)(1)	>=42	61.7	-	-	-	-	-	-	-	-	-
ASTM D1004	>=42	55.4	-	-	-	-	-	-	-	-	-
DENSITY (g/cc) ASTM D1505	>=0.94	0.946	-	-	-	-	-	-	-	-	-
CARBON BLACK CONTENT (%) ASTM D1603	2.0-3.0	2.51	-	-	-	-	-	-	-	-	-
CARBON BLACK DISPERSION (category)	1 or 2	1	-	-	-	-	-	-	-	-	-
(µm) ASTM D5596		21	-	-	-	-	-	-	-	-	-
STRENGTH AT YIELD (ppi)	>=126	168.0	-	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D6693	>=126	178.7	-	-	-	-	-	-	-	-	-
STRENGTH AT BREAK (ppi)	>=90	209.7	-	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D6693	>=90	186.3	-	-	-	-	-	-	-	-	-
ELONGATION AT YIELD (%)	>=12	19.1	-	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D6693	>=12	13.6	-	-	-	-	-	-	-	-	-
ELONGATION AT BREAK (%)	>=100	441	-	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D6693	>=100	519	-	-	-	-	-	-	-	-	-

(1) MD/TD corresponds to Machine Direction / Transverse Direction.

OCTOBER 2009 093-90145
4355-301

GEOMEMBRANE TEST RESULTS

PROJECT NUMBER: 093-90145
PROJECT NAME: FTN/MISSISSIPPI CO LF-CELL 14/AR
SAMPLE NUMBER: 423420-09

	THICKNESS (mils)	TEAR RESISTANCE (lbs) MD	TEAR RESISTANCE (lbs) TD	CARBON BLACK DISPERSION (category)	CARBON BLACK DISPERSION (µm)
1.	63.4	53.4	49.6	1	25
2.	62.8	53.2	50.5	1	25
3.	61.8	52.0	49.1	1	15
4.	61.2	52.2	48.7	1	15
5.	58.7	48.1	46.4	1	20
6.	56.0	48.2	46.9	1	15
7.	60.1	52.0	47.8	1	15
8.	60.3	51.5	49.0	1	10
9.	62.3	53.5	51.1	1	15
10.	62.2	53.4	50.8	1	20
AVG	60.9	51.7	49.0	1	18

	DENSITY (g/cc)	CARBON BLACK CONTENT (%)
1.	0.947	2.51
2.	0.947	2.47
3.	0.947	
AVG	0.947	2.49

	YIELD STRENGTH (lb/in. width) MD	YIELD STRENGTH (lb/in. width) TD	ELONGATION AT YIELD (%) MD	ELONGATION AT YIELD (%) TD	BREAK STRENGTH (lb/in. width) MD	BREAK STRENGTH (lb/in. width) TD	ELONGATION AT BREAK (%) MD	ELONGATION AT BREAK (%) TD
1.	172.6	169.5	16.7	16.2	293.7	287.0	836.5	908.7
2.	165.0	167.7	16.4	15.1	278.8	286.8	798.0	923.8
3.	154.3	154.6	16.9	15.9	230.3	252.2	750.0	856.3
4.	162.4	161.6	17.2	16.4	242.7	282.1	718.0	920.5
5.	165.2	163.0	15.9	15.6	285.1	279.4	807.7	895.5
AVG	163.9	163.3	16.6	15.8	266.1	277.5	782	901

OCTOBER 2009

093-90145
4355-301

GEOMEMBRANE TEST RESULTS

PROJECT NUMBER: 093-90145
PROJECT NAME: FTN/MISSISSIPPI CO LF-CELL 14/AR
SAMPLE NUMBER: 423494-09

	THICKNESS (mils)	TEAR RESISTANCE (lbs) MD	TEAR RESISTANCE (lbs) TD	CARBON BLACK DISPERSION (category)	CARBON BLACK DISPERSION (µm)
1.	63.4	53.6	50.6	1	15
2.	63.3	53.2	50.1	1	20
3.	61.2	50.9	48.8	1	20
4.	60.9	50.7	48.4	1	10
5.	56.0	47.1	45.2	1	10
6.	57.0	47.4	47.1	1	20
7.	61.3	50.9	48.2	1	20
8.	60.0	50.5	48.2	1	15
9.	63.0	53.7	50.2	1	20
10.	62.5	53.0	49.5	1	25
AVG	60.9	51.1	48.6	1	18

	DENSITY (g/cc)	CARBON BLACK CONTENT (%)
1.	0.947	2.55
2.	0.946	2.42
3.	0.947	
AVG	0.947	2.49

	YIELD STRENGTH (lb/in. width) MD	YIELD STRENGTH (lb/in. width) TD	ELONGATION AT YIELD (%) MD	ELONGATION AT YIELD (%) TD	BREAK STRENGTH (lb/in. width) MD	BREAK STRENGTH (lb/in. width) TD	ELONGATION AT BREAK (%) MD	ELONGATION AT BREAK (%) TD
1.	163.1	171.2	18.5	16.4	296.8	301.7	819.2	940.8
2.	159.5	166.5	18.2	15.9	264.2	286.4	760.0	918.8
3.	144.8	147.3	17.7	17.4	267.0	237.6	854.5	839.3
4.	157.2	161.8	18.5	16.2	262.2	279.8	752.2	908.7
5.	160.8	164.7	18.2	16.4	271.9	260.7	748.7	824.2
AVG	157.1	162.3	18.2	16.5	272.4	273.2	787	886

OCTOBER 2009

SUMMARY OF SMOOTH GEOMEMBRANE
CONFORMANCE TEST RESULTS

FTN ASSOCIATES, INC.
MISSISSIPPI COUNTY LANDFILL - CELL 14
ARKANSAS

093-90145
4355-301

ROLL DESIGNATION	Reference Value	423420 -09	423494 -09	-	-	-	-	-	-	-	-
THICKNESS (mils) ASTM D5199	>=60	60.9	60.9	-	-	-	-	-	-	-	-
TEAR RESISTANCE (lbs)(MD/TD)(1)	>=42	51.7	51.1	-	-	-	-	-	-	-	-
ASTM D1004	>=42	49.0	48.6	-	-	-	-	-	-	-	-
CARBON BLACK DISPERSION (category)	1 or 2	1	1	-	-	-	-	-	-	-	-
(µm) ASTM D5596		18	18	-	-	-	-	-	-	-	-
DENSITY (g/cc) ASTM D1505	>=0.94	0.947	0.947	-	-	-	-	-	-	-	-
CARBON BLACK CONTENT (%) ASTM D1603	2.0-3.0	2.49	2.49	-	-	-	-	-	-	-	-
STRENGTH AT YIELD (ppi)	>=126	163.9	157.1	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D6693	>=126	163.3	162.3	-	-	-	-	-	-	-	-
STRENGTH AT BREAK (ppi)	>=228	266.1	272.4	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D6693	>=228	277.5	273.2	-	-	-	-	-	-	-	-
ELONGATION AT YIELD (%)	>=12	16.6	18.2	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D6693	>=12	15.8	16.5	-	-	-	-	-	-	-	-
ELONGATION AT BREAK (%)	>=700	782	787	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D6693	>=700	901	886	-	-	-	-	-	-	-	-

(1) MD/TD corresponds to Machine Direction / Transverse Direction.

APPENDIX M

Geomembrane Subgrade Acceptance Certificates

American Environmental Group Ltd.

CERTIFICATE OF SOIL SURFACE ACCEPTANCE

GEOSYNTHETIC INSTALLER

COMPANY: American Environmental Group, Ltd.

ADDRESS: 3600 Brecksville Rd, Suite 100

Richfield, OH 44286

PROJECT

OWNER: Mississippi County, AR

PROJECT: Mississippi County Landfill Cell 14

LOCATION: Luxora, AR

PROJECT # 30309072

I the Undersigned, a duly authorized representative of American Environmental Group, Ltd.

do hereby accept the area of soil surface bounded by Panel 1 thur Panel 25

on 10/20/09

as an acceptable surface on which to install geosynthetic materials.

NAME	SIGNATURE	TITLE	DATE
Vibol Sary		CQA	10/20/09

CERTIFICATE OF ACCEPTANCE RECEIVED BY CQA RESIDENT MANAGER

NAME	SIGNATURE	TITLE	DATE
		FTW	10/20/09

CERTIFICATE OF ACCEPTANCE RECEIVED BY THE OWNER

NAME	SIGNATURE	TITLE	DATE

American Environmental Group Ltd.

CERTIFICATE OF SOIL SURFACE ACCEPTANCE

GEOSYNTHETIC INSTALLER		PROJECT	
COMPANY:	American Environmental Group, Ltd.	OWNER:	Mississippi County, AR
ADDRESS:	3600 Brecksville Rd, Suite 100	PROJECT:	Mississippi County Landfill Cell 14
	Richfield, OH 44286	LOCATION:	Luxora, AR
		PROJECT #	30309072

I the Undersigned, a duly authorized representative of American Environmental Group, Ltd.
do hereby accept the area of soil surface bounded by Panel 26 thur Panel 64 on 10/21/09.

as an acceptable surface on which to install geosynthetic materials.

NAME	SIGNATURE	TITLE	DATE
Vibol Sary	Vibol Sary	CQA	10/21/09

CERTIFICATE OF ACCEPTANCE RECEIVED BY CQA RESIDENT MANAGER

NAME	SIGNATURE	TITLE	DATE
Jim	Jim	FTN	10/21/09

CERTIFICATE OF ACCEPTANCE RECEIVED BY THE OWNER

NAME	SIGNATURE	TITLE	DATE

American Environmental Group Ltd.

CERTIFICATE OF SOIL SURFACE ACCEPTANCE

GEOSYNTHETIC INSTALLER		PROJECT	
COMPANY:	American Environmental Group, Ltd.	OWNER:	Mississippi County, AR
ADDRESS:	3600 Brecksville Rd, Suite 100	PROJECT:	Mississippi County Landfill Cell 14
	Richfield, OH 44286	LOCATION:	Luxora, AR
		PROJECT #	30309072

I the Undersigned, a duly authorized representative of American Environmental Group, Ltd.
do hereby accept the area of soil surface bounded by Panel 65 thur Panel 78 on 10/25/09.

as an acceptable surface on which to install geosynthetic materials.

NAME	SIGNATURE	TITLE	DATE
VIBOL SARY	Vibol Sary	CQA	10/25/09

CERTIFICATE OF ACCEPTANCE RECEIVED BY CQA RESIDENT MANAGER

NAME	SIGNATURE	TITLE	DATE
		RM	10/25/09

CERTIFICATE OF ACCEPTANCE RECEIVED BY THE OWNER

NAME	SIGNATURE	TITLE	DATE

APPENDIX N

Geomembrane Deployment Logs

GEOMEMBRANE DEPLOYMENT LOG

Project Name: **MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION**

Project Location: **Luxora, AR**

Project Number: **4355-301**

ftn Associates Ltd.
water resources / environmental consultants

Date	Panel ID	Roll Number	Weather Conditions		Material Type	Approximate Panel Dimensions		Panel Visually Inspected (Y or N)	CQA Monitor
			Ambient Temp (F)	Weather Conditions/ Wind		Width (Feet)	Length (Feet)		
10/20/09	P-1	423254-09	55° TO 65°	Clear/Gusty	60 S	23	263	Y	JAC
10/20/09	P-2	423254-09	55° TO 65°	Clear/Gusty	60 S	23	156	Y	JAC
10/20/09	P-3	423244-09	55° TO 65°	Clear/Gusty	60 S	23	103	Y	JAC
10/20/09	P-4	423244-09	55° TO 65°	Clear/Gusty	60 S	23	260	Y	JAC
10/20/09	P-5	423244-09	55° TO 65°	Clear/Gusty	60 S	23	55	Y	JAC
10/20/09	P-6	423376-09	55° TO 65°	Clear/Gusty	60 S	23	207	Y	JAC
10/20/09	P-7	423376-09	55° TO 65°	Clear/Gusty	60 S	23	189	Y	JAC
10/20/09	P-8	423494-09	55° TO 65°	Clear/Gusty	60 S	23	67	Y	JAC
10/20/09	P-9	423494-09	55° TO 65°	Clear/Gusty	60 S	23	264	Y	JAC
10/20/09	P-10	423494-09	55° TO 65°	Clear/Gusty	60 S	23	89	Y	JAC
10/20/09	P-11	423491-09	55° TO 65°	Clear/Gusty	60 S	23	178	Y	JAC
10/20/09	P-12	423491-09	55° TO 65°	Clear/Gusty	60 S	23	246	Y	JAC
10/20/09	P-13	423494-09	55° TO 65°	Clear/Gusty	60 S	23	17	Y	JAC
10/20/09	P-14	423420-09	55° TO 65°	Clear/Gusty	60 S	23	246	Y	JAC
10/20/09	P-15	423491-09	55° TO 65°	Clear/Gusty	60 S	23	8	Y	JAC
10/20/09	P-16	423240-09	55° TO 65°	Clear/Gusty	60 S	23	167	Y	JAC
10/20/09	P-17	423253-09	55° TO 65°	Clear/Gusty	60 S	23	90	Y	JAC
10/20/09	P-18	423253-09	55° TO 65°	Clear/Gusty	60 S	23	256	Y	JAC
10/20/09	P-19	423253-09	55° TO 65°	Clear/Gusty	60 S	23	70	Y	JAC
10/20/09	P-20	423493-09	55° TO 65°	Clear/Gusty	60 S	23	195	Y	JAC
10/20/09	P-21	423493-09	55° TO 65°	Clear/Gusty	60 S	23	220	Y	JAC
10/20/09	P-22	423492-09	55° TO 65°	Clear/Gusty	60 S	23	44	Y	JAC

Material Type Legend:

60S - 60-Mil Smooth HDPE Geomembrane

GEOMEMBRANE DEPLOYMENT LOG

Project Name: **MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION**

Project Location: **Luxora, AR**

Project Number: **4355-301**

Date	Panel ID	Roll Number	Weather Conditions		Material Type	Approximate Panel Dimensions		Panel Visually Inspected (Y or N)	CQA Monitor
			Ambient Temp (F)	Weather Conditions/ Wind		Width (Feet)	Length (Feet)		
10/20/09	P-23	423492-09	55° TO 65°	Clear/Gusty	60 S	23	212	Y	JAC
10/20/09	P-24	423492-09	55° TO 65°	Clear/Gusty	60 S	23	163	Y	JAC
10/20/09	P-25	423252-09	55° TO 65°	Clear/Gusty	60 S	23	56	Y	JAC
10/21/09	P-26	339444-09	45° TO 70°	Clear/None	60 T	23	60	Y	JAC
10/21/09	P-27	339444-09	45° TO 70°	Clear/None	60 T	23	60	Y	JAC
10/21/09	P-28	339444-09	45° TO 70°	Clear/None	60 T	23	60	Y	JAC
10/21/09	P-29	339444-09	45° TO 70°	Clear/None	60 T	23	60	Y	JAC
10/21/09	P-30	339444-09	45° TO 70°	Clear/None	60 T	23	60	Y	JAC
10/21/09	P-31	339444-09	45° TO 70°	Clear/None	60 T	23	60	Y	JAC
10/21/09	P-32	339444-09	45° TO 70°	Clear/None	60 T	23	52	Y	JAC
10/21/09	P-33	339443-09	45° TO 70°	Clear/None	60 T	23	17	Y	JAC
10/21/09	P-34	339443-09	45° TO 70°	Clear/None	60 T	23	66	Y	JAC
10/21/09	P-35	339443-09	45° TO 70°	Clear/None	60 T	23	66	Y	JAC
10/21/09	P-36	339443-09	45° TO 70°	Clear/None	60 T	23	50	Y	JAC
10/21/09	P-37	339443-09	45° TO 70°	Clear/None	60 T	23	50	Y	JAC
10/21/09	P-38	339443-09	45° TO 70°	Clear/None	60 T	23	50	Y	JAC
10/21/09	P-39	339443-09	45° TO 70°	Clear/None	60 T	23	44	Y	JAC
10/21/09	P-40	339443-09	45° TO 70°	Clear/None	60 T	23	34	Y	JAC
10/21/09	P-41	339455-09	45° TO 70°	Clear/None	60 T	23	22	Y	JAC
10/21/09	P-42	339455-09	45° TO 70°	Clear/None	60 T	23	42	Y	JAC
10/21/09	P-43	339455-09	45° TO 70°	Clear/None	60 T	23	34	Y	JAC
10/21/09	P-44	339455-09	45° TO 70°	Clear/None	60 T	23	62	Y	JAC

Material Type Legend:

60S - 60-Mil Smooth HDPE Geomembrane

60T - 60-Mil Textured HDPE Geomembrane

GEOMEMBRANE DEPLOYMENT LOG

Project Name: **MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION**

Project Location: **Luxora, AR**

Project Number: **4355-301**

Date	Panel ID	Roll Number	Weather Conditions		Material Type	Approximate Panel Dimensions		Panel Visually Inspected (Y or N)	CQA Monitor
			Ambient Temp (F)	Weather Conditions/ Wind		Width (Feet)	Length (Feet)		
10/21/09	P-45	339455-09	45° TO 70°	Clear/None	60 T	23	65	Y	JAC
10/21/09	P-46	339455-09	45° TO 70°	Clear/None	60 T	23	65	Y	JAC
10/21/09	P-47	339455-09	45° TO 70°	Clear/None	60 T	23	65	Y	JAC
10/21/09	P-48	339455-09	45° TO 70°	Clear/None	60 T	23	65	Y	JAC
10/21/09	P-49	339455-09	45° TO 70°	Clear/None	60 T	23	25	Y	JAC
10/21/09	P-50	339452-09	45° TO 70°	Clear/None	60 T	23	46	Y	JAC
10/21/09	P-51	339452-09	45° TO 70°	Clear/None	60 T	23	68	Y	JAC
10/21/09	P-52	339452-09	45° TO 70°	Clear/None	60 T	23	68	Y	JAC
10/21/09	P-53	339452-09	45° TO 70°	Clear/None	60 T	23	24	Y	JAC
10/21/09	P-54	339452-09	45° TO 70°	Clear/None	60 T	23	54	Y	JAC
10/21/09	P-55	339452-09	45° TO 70°	Clear/None	60 T	23	53	Y	JAC
10/21/09	P-56	339452-09	45° TO 70°	Clear/None	60 T	23	46	Y	JAC
10/21/09	P-57	339452-09	45° TO 70°	Clear/None	60 T	23	48	Y	JAC
10/21/09	P-58	339453-09	45° TO 70°	Clear/None	60 T	23	51	Y	JAC
10/21/09	P-59	339453-09	45° TO 70°	Clear/None	60 T	23	51	Y	JAC
10/21/09	P-60	339453-09	45° TO 70°	Clear/None	60 T	23	50	Y	JAC
10/21/09	P-61	339453-09	45° TO 70°	Clear/None	60 T	23	65	Y	JAC
10/21/09	P-62	339453-09	45° TO 70°	Clear/None	60 T	23	65	Y	JAC
10/21/09	P-63	339453-09	45° TO 70°	Clear/None	60 T	23	66	Y	JAC
10/21/09	P-64	339453-09	45° TO 70°	Clear/None	60 T	23	68	Y	JAC
10/25/09	P-65	335105-09	45° TO 58°	Clear/None	60 T	23	77	Y	JAC
10/25/09	P-66	335105-09	45° TO 58°	Clear/None	60 T	23	75	Y	JAC

Material Type Legend:

60S - 60-Mil Smooth HDPE Geomembrane

60T - 60-Mil Textured HDPE Geomembrane

GEOMEMBRANE DEPLOYMENT LOG

Project Name: **MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION**

Project Location: **Luxora, AR**

Project Number: **4355-301**

Date	Panel ID	Roll Number	Weather Conditions		Material Type	Approximate Panel Dimensions		Panel Visually Inspected (Y or N)	CQA Monitor
			Ambient Temp (F)	Weather Conditions/ Wind		Width (Feet)	Length (Feet)		
10/25/09	P-67	335105-09	45° TO 70°	Clear/None	60 T	23	77	Y	JAC
10/25/09	P-68	335105-09	45° TO 70°	Clear/None	60 T	23	77	Y	JAC
10/25/09	P-69	335105-09	45° TO 70°	Clear/None	60 T	23	77	Y	JAC
10/25/09	P-70	335105-09	45° TO 70°	Clear/None	60 T	23	32	Y	JAC
10/25/09	P-71	335104-09	45° TO 70°	Clear/None	60 T	23	92	Y	JAC
10/25/09	P-72	335104-09	45° TO 70°	Clear/None	60 T	23	120	Y	JAC
10/25/09	P-73	335104-09	45° TO 70°	Clear/None	60 T	23	87	Y	JAC
10/25/09	P-74	335104-09	45° TO 70°	Clear/None	60 T	23	45	Y	JAC
10/25/09	P-75	335104-09	45° TO 70°	Clear/None	60 T	23	45	Y	JAC
10/25/09	P-76	339456-09	45° TO 70°	Clear/None	60 T	23	45	Y	JAC
10/25/09	P-77	339456-09	45° TO 70°	Clear/None	60 T	23	14	Y	JAC
10/25/09	P-78	339456-09	45° TO 70°	Clear/None	60 T	23	18	Y	JAC

Material Type Legend:

60S - 60-Mil Smooth HDPE Geomembrane

60T - 60-Mil Textured HDPE Geomembrane

APPENDIX O

Geomembrane Trial Seam Logs

FUSION AND EXTRUSION TRIAL SEAM LOG

Project Name: **MISSISSIPPI COUNTY LANDFILL CELL 14**

Project Location: **LUXORA, AR**

Project Number: **4355-301**

Project Specifications:

Fusion Welds: Peel: 90 Shear: 120

Extrusion Welds: Peel: 78 Shear: 120

				Seaming Machine Settings					Peel Tests						Shear Tests						
Fusion/ Extrusion (F orE)	Material/ Material (S or T)	Date	Time	Ambient Temp (F)	Operator ID	Machine ID	Machine Temp or Ext. P.H.	Speed	Side	1 A/B (psi)	2 A/B (psi)	3 A/B (psi)	4 A/B (psi)	5 A/B (psi)	1 (psi)	2 (psi)	3 (psi)	4 (psi)	5 (psi)	Pass/ Fail	CQA Monitor
E	S/S	10/20/09	1010	58°	KS	D-8	800°	6.0	A	134	113	117			165	189	166			P	JAC
									B	134	147	121									
E	S/S	10/20/09	1030	58°	MS	D-46	800°	7.5	A	136	130	135			165	162	162			P	JAC
									B	127	129	128									
E	S/S	10/20/09	1045	58°	VF	W-48	800°	7.2	A	128	116	127			152	154	152			P	JAC
									B	123	120	109									
E	S/S	10/20/09	1300	64°	MS	D-46	800°	7.5	A	134	140	138			158	157	162			P	JAC
									B	146	140	125									
E	S/S	10/20/09	1300	64°	VF	W-48	800°	7.2	A	128	120	126			156	154	152			P	JAC
									B	128	121	124									
E	S/S	10/20/09	1300	64°	KS	D-8	800°	6.0	A	121	111	109			134	136	146			P	JAC
									B	117	109	104									
E	S/S	10/21/09	0715	48°	VF	W-48	800°	7.2	A	130	125	110			174	177	169			P	JAC
									B	129	120	122									
E	S/S	10/21/09	0720	48°	KS	D-8	800°	6.0	A	137	110	147			180	175	184			P	JAC
									B	140	123	141									
E	S/S	10/21/09	0730	48°	MS	D-46	800°	7.5	A	152	158	149			187	185	183			P	JAC
									B	155	150	154									
E	T/T	10/21/09	0800	50°	KS	D-8	800°	6.0	A	148	128	115			192	193	198			P	JAC
									B	163	163	172									
E	S/S	10/21/09	0900	54°	KS	D-8	800°	6.0	A	125	137	141			160	160	167			P	JAC
									B	118	130	108									
E	T/T	10/21/09	0930	60°	MS	D-46	800°	7.5	A	148	152	149			151	191	188			P	JAC
									B	150	142	156									
E	S/S	10/21/09	1310	66°	KS	D-8	800°	6.0	A	130	126	125			159	154	159			P	JAC
									B	132	130	94									
E	S/S	10/21/09	1315	66°	MS	D-46	800°	7.5	A	119	115	113			158	157	160			P	JAC
									B	134	124	117									

Material Type Legend:

S - 60-Mil Smooth HDPE Geomembrane

T - 60-Mil Textured HDPE Geomembrane

FUSION AND EXTRUSION TRIAL SEAM LOG

Project Name: **MISSISSIPPI COUNTY LANDFILL CELL 14**

Project Location: **LUXORA, AR**

Project Number: **4355-301**

Project Specifications:

Fusion Welds:		Extrusion Welds:	
Peel:	90	Peel:	78
Shear:	120	Shear:	120

				Seaming Machine Settings					Peel Tests						Shear Tests						
Fusion/ Extrusion (F orE)	Material/ Material (S or T)	Date	Time	Ambient Temp (F)	Operator ID	Machine ID	Machine Temp or Ext. P.H.	Speed	Side	1 A/B (psi)	2 A/B (psi)	3 A/B (psi)	4 A/B (psi)	5 A/B (psi)	1 (psi)	2 (psi)	3 (psi)	4 (psi)	5 (psi)	Pass/ Fail	CQA Monitor
F	S/T	10/21/09	1325	66°	VF	G-67	530° 530°		A B	101	105	116			137	135	137			P	JAC
E	S/T	10/21/09	1315	66°	MS	D-46	800°	7.5	A B	139 132	95 134	128 115			145	139	147			P	JAC
E	S/T	10/21/09	1311	66°	KS	D-8	800°	6.0	A B	117 130	137 141	122 132			143	139	139			P	JAC
F	T/T	10/21/09	1440	66°	WAT	G-69	500° 500°		A B	141	106	140			164	153	155			P	JAC
F	S/S	10/23/09	0730	47°	KS	G-66	500° 480°		A B	95	96	110			157	164	166			P	JAC
F	S/S	10/23/09	0800	47°	WAT	G-69	500° 500°		A B	102	152	116			176	171	178			P	JAC
F	S/S	10/23/09	1300	55°	KS	G-66	500° 500°		A B	131	121	124			173	174	170			P	JAC
F	S/S	10/23/09	1300	55°	WAT	G-69	500° 500°		A B	100	90	130			172	154	177			P	JAC
F	S/S	10/24/09	0730	45°	WAT	G-69	500° 500°		A B	114	117	106			209	207	208			P	JAC
F	S/S	10/24/09	0730	45°	KS	G-66	500° 500°		A B	107	109	114			169	185	182			P	JAC
F	S/S	10/24/09	1305	55°	WAT	G-69	500° 500°		A B	132	133	133			143	151	154			P	JAC
F	S/S	10/24/09	1310	55°	KS	G-66	500° 500°		A B	106	102	119			165	171	165			P	JAC
E	S/S	10/25/09	0800	46°	KS	D-8	800°	6.0	A B	138 139	118 130	135 126			201	197	201			P	JAC
E	S/S	10/25/09	0800	46°	MS	D-46	800°	7.5	A B	137 136	131 142	126 139			201	192	193			P	JAC

Material Type Legend:

S - 60-Mil Smooth HDPE Geomembrane

T - 60-Mil Textured HDPE Geomembrane

FUSION AND EXTRUSION TRIAL SEAM LOG

Project Name: **MISSISSIPPI COUNTY LANDFILL CELL 14**

Project Location: **LUXORA, AR**

Project Number: **4355-301**

Project Specifications:

Fusion Welds:		Extrusion Welds:	
Peel:	90	Peel:	78
Shear:	120	Shear:	120

				Seaming Machine Settings					Peel Tests						Shear Tests						
Fusion/ Extrusion (F orE)	Material/ Material (S or T)	Date	Time	Ambient Temp (F)	Operator ID	Machine ID	Machine Temp or Ext. P.H.	Speed	Side	1 A/B (psi)	2 A/B (psi)	3 A/B (psi)	4 A/B (psi)	5 A/B (psi)	1 (psi)	2 (psi)	3 (psi)	4 (psi)	5 (psi)	Pass/ Fail	CQA Monitor
F	S/S	10/25/09	0930	49°	WAT	G-69	500° 500°		A	138	135	111			162	168	181			P	JAC
									B												
E	S/S	10/25/09	1025	53°	MS	D-48	800°	6.5	A	123	181	136			169	155	166			P	JAC
									B	141	134	127									
F	S/S	10/25/09	1150	55°	KS	G-66	500° 480°		A	148	136	135			151	157	156			P	JAC
									B												
F	S/T	10/26/09	0745	49°	VF	G-67	540° 540°		A	107	130	148			194	189	196			P	JAC
									B												
F	S/S	10/26/09	0730	49°	KS	G-66	500° 500°		A	118	115	126			171	190	185			P	JAC
									B												

Material Type Legend:
S - 60-Mil Smooth HDPE Geomembrane
T - 60-Mil Textured HDPE Geomembrane

APPENDIX P

Geomembrane Seam Continuity Test Logs

GEOMEMBRANE PRODUCTION SEAMING AND CONTINUITY TEST LOG

PROJECT NAME: MISSISSIPPI COUNTY LANDFILL CELL 14 CONST.

PROJECT LOCATION: LUXORA, AR

PROJECT NUMBER: 4355-301

SEAM NUMBER	MATERIAL/ MATERIAL	WELD DATE	SEAM LENGTH	OPERATOR ID	MACHINE ID	TEST DATE	START TIME - PRESSURE	END TIME - PRESSURE	PASS/ FAIL	CQA MONITOR
P-1 / P-2	S/S	10/20/09	156	KS	D-8	10/20/09	1114 / 30	1119 / 30	P	JAC
P-1 / P-3	S/S	10/20/09	103	VF	W-48	10/20/09	1129 / 30	1134 / 30	P	JAC
P-2 / P-3	S/S	10/20/09	22.5	MS	D-46	10/20/09	1130 / 30	1135 / 30	P	JAC
P-2 / P-4	S/S	10/20/09	156	KS	D-8	10/20/09	1141 / 30	1146 / 29	P	JAC
P-3 / P-4	S/S	10/20/09	103	VF	W-48	10/20/09	1145 / 30	1150 / 30	P	JAC
P-4 / P-5	S/S	10/20/09	55	MS	D-46	10/20/09	1148 / 30	1153 / 30	P	JAC
P-4 / P-6	S/S	10/20/09	207	KS	D-8	10/20/09	1154 / 30	1159 / 30	P	JAC
P-5 / P-6	S/S	10/20/09	22.5	VF	W-48	10/20/09	1235 / 30	1240 / 30	P	JAC
P-5 / P-7	S/S	10/20/09	55	MS	D-46	10/20/09	1238 / 30	1243 / 30	P	JAC
P-6 / P-7	S/S	10/20/09	140	KS	D-8	10/20/09	1242 / 30	1247 / 30	P	JAC
P-6 / P-8	S/S	10/20/09	67	VF	W-48	10/20/09	1245 / 30	1250 / 29	P	JAC
P-7 / P-9	S/S	10/20/09	189	MS	D-46	10/20/09	1249 / 30	1254 / 30	P	JAC
P-8 / P-9	S/S	10/20/09	67	KS	D-8	10/20/09	1253 / 30	1258 / 30	P	JAC
P-7 / P-8	S/S	10/20/09	22.5	VF	W-48	10/20/09	1255 / 30	1260 / 30	P	JAC
P-9 / P-10	S/S	10/20/09	89	MS	D-46	10/20/09	1300 / 30	1305 / 30	P	JAC
P-9 / P-11	S/S	10/20/09	178	KS	D-8	10/20/09	1304 / 30	1309 / 30	P	JAC
P-10 / P-12	S/S	10/20/09	89	VF	W-48	10/20/09	1307 / 30	1312 / 30	P	JAC
P-11 / P-12	S/S	10/20/09	161	MS	D-46	10/20/09	1311 / 30	1316 / 30	P	JAC
P-11 / P-13	S/S	10/20/09	17	KS	D-8	10/20/09	1315 / 30	1320 / 30	P	JAC
P-12 / P-14	S/S	10/20/09	238	VF	W-48	10/20/09	1322 / 30	1327 / 30	P	JAC
P-10 / P-11	S/S	10/20/09	22.5	VF	D-46	10/20/09	1327 / 30	1332 / 30	P	JAC
P-12 / P-13	S/S	10/20/09	22.5	VF	D-8	10/20/09	1335 / 30	1340 / 30	P	JAC
P-13 / P-14	S/S	10/20/09	9	VF	W-48	10/20/09	1339 / 31	1344 / 30	P	JAC
P-13 / P-15	S/S	10/20/09	8	MS	D-46	10/20/09	1405 / 30	1410 / 29	P	JAC
P-14 / P-16	S/S	10/20/09	167	KS	D-8	10/20/09	1410 / 30	1415 / 30	P	JAC
P-14 / P-17	S/S	10/20/09	82	VF	W-48	10/20/09	1412 / 30	1417 / 30	P	JAC
P-15 / P-17	S/S	10/20/09	8	MS	D-46	10/20/09	1418 / 30	1423 / 30	P	JAC
P-14 / P-15	S/S	10/20/09	22.5	VF	D-8	10/20/09	1424 / 30	1429 / 30	P	JAC
P-16 / P-17	S/S	10/20/09	22.5	VF	W-48	10/20/09	1429 / 30	1434 / 30	P	JAC
P-16 / P-18	S/S	10/20/09	167	MS	D-46	10/20/09	1433 / 30	1438 / 30	P	JAC
P-17 / P-18	S/S	10/20/09	90	MS	D-46	10/20/09	1440 / 30	1445 / 30	P	JAC

GEOMEMBRANE PRODUCTION SEAMING AND CONTINUITY TEST LOG

PROJECT NAME: MISSISSIPPI COUNTY LANDFILL CELL 14 CONST.

PROJECT LOCATION: LUXORA, AR

PROJECT NUMBER: 4355-301

SEAM NUMBER	MATERIAL/ MATERIAL	WELD DATE	SEAM LENGTH	OPERATOR ID	MACHINE ID	TEST DATE	START TIME - PRESSURE	END TIME - PRESSURE	PASS/ FAIL	CQA MONITOR
P-18 / P-19	S/S	10/20/09	70	KS	D-8	10/20/09	1530 / 30	1535 / 30	P	JAC
P-19 / P-20	S/S	10/20/09	22.5	VF	W-48	10/20/09	1538 / 30	1543 / 30	P	JAC
P-18 / P-20	S/S	10/20/09	195	MS	D-46	10/20/09	1544 / 30	1549 / 30	P	JAC
P-19 / P-21	S/S	10/20/09	70	KS	D-8	10/20/09	1558 / 30	1563 / 30	P	JAC
P-20 / P-21	S/S	10/20/09	151	VF	W-48	10/20/09	1608 / 30	1613 / 29	P	JAC
P-21 / P-23	S/S	10/20/09	212	MS	D-46	10/20/09	1616 / 30	1621 / 30	P	JAC
P-21 / P-22	S/S	10/20/09	44	KS	D-8	10/20/09	1620 / 30	1625 / 30	P	JAC
P-23 / P-22	S/S	10/20/09	22.5	VF	W-48	10/20/09	1622 / 30	1627 / 30	P	JAC
P-23 / P-24	S/S	10/20/09	163	MS	D-46	10/20/09	1626 / 30	1631 / 30	P	JAC
P-23 / P-25	S/S	10/20/09	56	KS	D-8	10/20/09	1636 / 30	1641 / 30	P	JAC
P-24 / P-25	S/S	10/20/09	22.5	VF	W-48	10/20/09	1644 / 30	1649 / 30	P	JAC
P-22 / P-25	S/S	10/20/09	12	MS	D-46	10/20/09	1648 / 30	1653 / 30	P	JAC
P-26 / P-27	S/S	10/21/09	60	VF	W-48	10/21/09	0810 / 30	0815 / 30	P	JAC
P-27 / P-28	S/S	10/21/09	60	MS	D-46	10/21/09	0814 / 30	0819 / 30	P	JAC
P-28 / P-29	S/S	10/21/09	60	KS	D-8	10/21/09	0819 / 30	0824 / 30	P	JAC
P-29 / P-30	S/S	10/21/09	60	VF	W-48	10/21/09	0824 / 30	0829 / 29	P	JAC
P-30 / P-31	S/S	10/21/09	60	MS	D-46	10/21/09	0830 / 30	0835 / 30	P	JAC
P-31 / P-32	S/S	10/21/09	52	KS	D-8	10/21/09	0838 / 30	0843 / 30	P	JAC
P-31 / P-33	S/S	10/21/09	17	VF	W-48	10/21/09	0845 / 30	0850 / 30	P	JAC
P-32 / P-33	S/S	10/21/09	22.5	VF	W-48	10/21/09	0846 / 30	0851 / 30	P	JAC
P-32 / P-34	S/S	10/21/09	52	KS	D-8	10/21/09	0855 / 30	0900 / 30	P	JAC
P-33 / P-34	S/S	10/21/09	17	VF	W-48	10/21/09	0855 / 30	0900 / 30	P	JAC
P-34 / P-35	S/S	10/21/09	60	MS	D-46	10/21/09	0902 / 30	0907 / 30	P	JAC
P-35 / P-36	S/S	10/21/09	60	KS	D-8	10/21/09	0908 / 30	0913 / 30	P	JAC
P-36 / P-37	S/S	10/21/09	60	VF	W-48	10/21/09	0912 / 30	0917 / 30	P	JAC
P-37 / P-38	S/S	10/21/09	60	MS	D-46	10/21/09	0916 / 30	0921 / 30	P	JAC
P-38 / P-39	S/S	10/21/09	60	KS	D-8	10/21/09	0921 / 30	0926 / 30	P	JAC
P-39 / P-40	S/S	10/21/09	40	VF	W-48	10/21/09	1005 / 30	1010 / 30	P	JAC
P-41 / P-42	S/S	10/21/09	22.5	MS	D-46	10/21/09	1010 / 30	1015 / 29	P	JAC
P-43 / P-44	S/S	10/21/09	42	KS	D-8	10/21/09	1014 / 30	1019 / 30	P	JAC
P-44 / P-42	S/S	10/21/09	44	KS	D-9	10/21/09	1020 / 30	1025 / 30	P	JAC

GEOMEMBRANE PRODUCTION SEAMING AND CONTINUITY TEST LOG

PROJECT NAME: MISSISSIPPI COUNTY LANDFILL CELL 14 CONST.

PROJECT LOCATION: LUXORA, AR

PROJECT NUMBER: 4355-301

SEAM NUMBER	MATERIAL/ MATERIAL	WELD DATE	SEAM LENGTH	OPERATOR ID	MACHINE ID	TEST DATE	START TIME - PRESSURE	END TIME - PRESSURE	PASS/ FAIL	CQA MONITOR
P-44 / P-41	S/S	10/21/09	10	VF	W-48	10/21/09	1023 / 30	1028 / 29	P	JAC
P-40 / P-43	S/S	10/21/09	40	VF	W-48	10/21/09	1027 / 30	1032 / 30	P	JAC
P-44 / P-39	S/S	10/21/09	25	MS	D-46	10/21/09	1033 / 30	1038 / 30	P	JAC
P-44 / P-38	S/S	10/21/09	5	MS	D-46	10/21/09	1040 / 30	1045 / 30	P	JAC
P-41 / P-38	S/S	10/21/09	5	KS	D-8	10/21/09	1044 / 30	1049 / 30	P	JAC
P-42 / P-45	S/S	10/21/09	42	VF	W-48	10/21/09	1052 / 30	1057 / 30	P	JAC
P-45 / P-41	S/S	10/21/09	22	MS	D-46	10/21/09	1059 / 30	1064 / 30	P	JAC
P-45 / P-46	S/S	10/21/09	65	VF	W-48	10/21/09	1106 / 32	1111 / 31	P	JAC
P-46 / P-47	S/S	10/21/09	65	KS	D-8	10/21/09	1314 / 30	1319 / 30	P	JAC
P-47 / P-48	S/S	10/21/09	65	MS	D-46	10/21/09	1317 / 30	1322 / 30	P	JAC
P-48 / P-49	S/S	10/21/09	65	VF	W-48	10/21/09	1322 / 30	1327 / 30	P	JAC
P-48 / P-50	S/S	10/21/09	44	KS	D-8	10/21/09	1326 / 30	1331 / 30	P	JAC
P-48 / P-49	S/S	10/21/09	22	KS	D-9	10/21/09	1340 / 30	1345 / 30	P	JAC
P-49 / P-50	S/S	10/21/09	22.5	MS	D-46	10/21/09	1344 / 30	1349 / 30	P	JAC
P-50 / P-51	S/S	10/21/09	44	KS	D-8	10/21/09	1351 / 30	1356 / 30	P	JAC
P-49 / P-51	S/S	10/21/09	22	VF	W-48	10/21/09	1355 / 30	1360 / 29	P	JAC
P-51 / P-52	S/S	10/21/09	65	KS	D-8	10/21/09	1359 / 30	1364 / 30	P	JAC
P-54 / P-55	S/S	10/21/09	54	MS	D-46	10/21/09	1418 / 30	1423 / 30	P	JAC
P-55 / P-56	S/S	10/21/09	53	VF	W-48	10/21/09	1422 / 30	1427 / 30	P	JAC
P-56 / P-57	S/S	10/21/09	46	MS	D-46	10/21/09	1429 / 30	1434 / 30	P	JAC
P-57 / P-58	S/S	10/21/09	48	VF	W-48	10/21/09	1510 / 30	1515 / 30	P	JAC
P-58 / P-59	S/S	10/21/09	48	MS	D-46	10/21/09	1522 / 30	1527 / 30	P	JAC
P-59 / P-60	S/S	10/21/09	51	MS	D-46	10/21/09	1530 / 30	1535 / 30	P	JAC
P-60 / P-61	S/S	10/21/09	51	KS	D-8	10/21/09	1540 / 30	1545 / 30	P	JAC
P-61 / P-62	S/S	10/21/09	65	MS	D-46	10/21/09	1542 / 30	1547 / 30	P	JAC
P-62 / P-63	S/S	10/21/09	66	KS	D-8	10/21/09	1545 / 30	1550 / 30	P	JAC
P-63 / P-64	S/S	10/21/09	68	MS	D-46	10/21/09	1550 / 30	1555 / 30	P	JAC
P-53 / P-54	T/S	10/21/09	24	MS	D-46	10/21/09	1615 / 30	1620 / 30	P	JAC
P-53 / Tie-In	S/S	10/21/09	12	VF	W-48	10/21/09	1620 / 30	1625 / 30	P	JAC
P-53 / Tie-In	S/S	10/21/09	24	VF	W-48	10/21/09	1628 / 30	1633 / 30	P	JAC
P-53 / Tie-In	S/S	10/21/09	12	VF	W-48	10/21/09	1630 / 30	1635 / 30	P	JAC

GEOMEMBRANE PRODUCTION SEAMING AND CONTINUITY TEST LOG

PROJECT NAME: MISSISSIPPI COUNTY LANDFILL CELL 14 CONST.

PROJECT LOCATION: LUXORA, AR

PROJECT NUMBER: 4355-301

SEAM NUMBER	MATERIAL/ MATERIAL	WELD DATE	SEAM LENGTH	OPERATOR ID	MACHINE ID	TEST DATE	START TIME - PRESSURE	END TIME - PRESSURE	PASS/ FAIL	CQA MONITOR
P-1 / P-26	S/T	10/21/09	22.5	MS	D-46	10/23/09	1010 / 30	1015 / 30	P	JAC
P-1 / P-27	S/T	10/21/09	22.5	MS	D-46	10/23/09	1011 / 30	1016 / 30	P	JAC
P-1 / P-28	S/T	10/21/09	22.5	MS	D-46	10/23/09	1015 / 30	1020 / 29	P	JAC
P-1 / P-29	S/T	10/21/09	22.5	MS	D-46	10/23/09	1015 / 30	1020 / 30	P	JAC
P-1 / P-30	S/T	10/21/09	22.5	MS	D-46	10/23/09	1021 / 30	1026 / 30	P	JAC
P-1 / P-31	S/T	10/21/09	22.5	MS	D-46	10/23/09	1021 / 30	1026 / 30	P	JAC
P-1 / P-33	S/T	10/21/09	22.5	MS	D-46	10/23/09	1033 / 30	1038 / 30	P	JAC
P-1 / P-34	S/T	10/21/09	22.5	VF	W-48	10/23/09	1034 / 30	1039 / 30	P	JAC
P-1 / P-35	S/T	10/21/09	22.5	VF	W-48	10/23/09	1041 / 30	1046 / 30	P	JAC
P-1 / P-36	S/T	10/21/09	22.5	VF	W-48	10/23/09	1042 / 30	1047 / 30	P	JAC
P-1 / P-37	S/T	10/21/09	22.5	VF	W-48	10/23/09	1055 / 30	1060 / 30	P	JAC
P-1 / P-38	S/T	10/21/09	22.5	VF	W-48	10/23/09	1056 / 30	1061 / 30	P	JAC
P-1 / P-41	S/T	10/21/09	22.5	VF	W-48	10/23/09	1115 / 30	1120 / 30	P	JAC
P-3 / P-45	S/T	10/21/09	22.5	VF	W-48	10/23/09	1118 / 30	1123 / 30	P	JAC
P-4 / P-46	S/T	10/21/09	22.5	KS	D-8	10/23/09	1130 / 30	1135 / 30	P	JAC
P-6 / P-47	S/T	10/21/09	22.5	KS	D-8	10/23/09	1130 / 30	1135 / 30	P	JAC
P-8 / P-48	S/T	10/21/09	22.5	KS	D-8	10/23/09	1136 / 30	1141 / 30	P	JAC
P-9 / P-49	S/T	10/21/09	22.5	KS	D-8	10/23/09	1137 / 30	1142 / 30	P	JAC
P-11 / P-51	S/T	10/21/09	22.5	KS	D-8	10/23/09	1148 / 30	1153 / 30	P	JAC
P-13 / P-52	S/T	10/21/09	22.5	KS	D-8	10/23/09	1148 / 30	1153 / 30	P	JAC
P-15 / P-65	S/T	10/25/09	22.5	KS	D-8	10/25/09	1035 / 30	1040 / 30	P	JAC
P-17 / P-66	S/T	10/25/09	22.5	KS	D-8	10/25/09	1035 / 30	1040 / 30	P	JAC
P-18 / P-67	S/T	10/25/09	22.5	KS	D-8	10/25/09	1042 / 30	1047 / 30	P	JAC
P-20 / P-68	S/T	10/25/09	22.5	KS	D-8	10/25/09	1042 / 30	1047 / 30	P	JAC
P-21 / P-69	S/T	10/25/09	22.5	KS	D-8	10/25/09	1045 / 30	1050 / 30	P	JAC
P-24 / P-54	S/T	10/25/09	22.5	MS	D-46	10/25/09	1100 / 30	1105 / 30	P	JAC
P-24 / P-55	S/T	10/25/09	22.5	MS	D-46	10/25/09	1100 / 30	1105 / 30	P	JAC
P-24 / P-56	S/T	10/25/09	22.5	MS	D-46	10/25/09	1110 / 30	1115 / 30	P	JAC
P-24 / P-57	S/T	10/25/09	22.5	MS	D-46	10/25/09	1110 / 30	1115 / 30	P	JAC
P-24 / P-58	S/T	10/25/09	22.5	MS	D-46	10/25/09	1119 / 30	1124 / 30	P	JAC
P-24 / P-59	S/T	10/25/09	22.5	KS	D-8	10/25/09	1119 / 30	1124 / 30	P	JAC

GEOMEMBRANE PRODUCTION SEAMING AND CONTINUITY TEST LOG

PROJECT NAME: MISSISSIPPI COUNTY LANDFILL CELL 14 CONST.

PROJECT LOCATION: LUXORA, AR

PROJECT NUMBER: 4355-301

SEAM NUMBER	MATERIAL/ MATERIAL	WELD DATE	SEAM LENGTH	OPERATOR ID	MACHINE ID	TEST DATE	START TIME - PRESSURE	END TIME - PRESSURE	PASS/ FAIL	CQA MONITOR
P-24 / P-60	S/T	10/25/09	22.5	KS	D-8	10/25/09	1130 / 30	1135 / 30	P	JAC
P-24 / P-61	S/T	10/25/09	22.5	KS	D-8	10/25/09	1130 / 30	1135 / 29	P	JAC
P-25 / P-61	S/T	10/25/09	22.5	KS	D-8	10/25/09	1136 / 30	1141 / 30	P	JAC
P-25 / P-62	S/T	10/25/09	22.5	KS	D-8	10/25/09	1136 / 30	1141 / 30	P	JAC
P-25 / P-63	S/T	10/25/09	22.5	MS	D-46	10/25/09	1145 / 30	1150 / 30	P	JAC
P-72 / P-63	S/T	10/25/09	22.5	MS	D-46	10/25/09	1155 / 30	1160 / 30	P	JAC
P-72 / P-64	S/T	10/25/09	22.5	MS	D-46	10/25/09	1155 / 30	1200 / 30	P	JAC
P-73 / P-74	S/T	10/25/09	22.5	MS	D-46	10/25/09	1248 / 30	1253 / 30	P	JAC
P-73 / P-75	S/T	10/25/09	22.5	KS	D-8	10/25/09	1248 / 30	1253 / 30	P	JAC
P-73 / P-76	S/T	10/25/09	22.5	KS	D-8	10/25/09	1255 / 30	1300 / 30	P	JAC
P-73 / P-77	S/T	10/25/09	22.5	KS	D-8	10/25/09	1310 / 30	1315 / 30	P	JAC
P-76 / P-77	S/S	10/25/09	22.5	KS	D-8	10/25/09	1315 / 30	1320 / 30	P	JAC
P-76 / P-78	S/S	10/25/09	22.5	KS	D-8	10/25/09	1315 / 30	1320 / 30	P	JAC
P-77 / P-78	S/S	10/25/09	6	MS	D-46	10/25/09	1315 / 30	1320 / 30	P	JAC
P-52 / P-65	S/S	10/25/09	22.5	KS	D-8	10/25/09	0928 / 30	0933 / 30	P	JAC
P-65 / P-66	S/S	10/25/09	65	MS	D-46	10/25/09	0930 / 30	0935 / 30	P	JAC
P-66 / P-67	S/S	10/25/09	65	KS	D-8	10/25/09	0931 / 30	0936 / 30	P	JAC
P-67 / P-68	S/S	10/25/09	65	MS	D-46	10/25/09	0939 / 30	0944 / 30	P	JAC
P-68 / P-69	S/S	10/25/09	65	KS	D-8	10/25/09	0940 / 30	0945 / 30	P	JAC
P-69 / P-71	S/S	10/25/09	65	KS	D-8	10/25/09	0948 / 30	0953 / 30	P	JAC
P-70 / P-71	S/S	10/25/09	22.5	KS	D-8	10/25/09	0959 / 30	1004 / 30	P	JAC
P-71 / P-72	S/S	10/25/09	81	MS	D-46	10/25/09	1005 / 30	1010 / 30	P	JAC
P-72 / P-73	S/S	10/25/09	80	KS	D-8	10/25/09	1005 / 30	1010 / 30	P	JAC
P-64 / P-74	S/S	10/25/09	44	MS	D-46	10/25/09	1010 / 30	1015 / 30	P	JAC
P-74 / P-75	S/S	10/25/09	44	KS	D-8	10/25/09	1015 / 30	1020 / 30	P	JAC
P-75 / P-76	S/S	10/25/09	44	MS	D-46	10/25/09	1016 / 30	1021 / 30	P	JAC
P-76 / P-77	S/S	10/25/09	22.5	MS	D-46	10/25/09	1025 / 30	1030 / 30	P	JAC
P-76 / P-78	S/S	10/25/09	22.5	MS	D-46	10/25/09	1025 / 30	1030 / 30	P	JAC
P-73 / P-77	S/S	10/25/09	9	MS	D-46	10/25/09	1025 / 30	1030 / 30	P	JAC

APPENDIX Q

Geomembrane Defect, Repair, and Non-Destructive Test Log

GEOMEMBRANE DEFECT, REPAIR AND NON-DESTRUCTIVE TEST LOG

Project Name: MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION

Project Location: LUXORA, AR

Project Number: 4355-301

		Repair Information		Non-Destructive Test Data		
Panel and/or Seam Number	**Approximate Location**	**Repair Date**	**Repair Type**	**Date Vacuum Test Completed**	**Pass/ Fail**	**CQA Monitor**
P-1 @ Tie-In	24" x 24" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-1 & P-2 @ Tie-In	24" x 24" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P- 2 & P-4 @ Tie-In	24" x 48" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P- 4 & P-5 @ Tie-In	24" x 60" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-5 & P-7 @ Tie-In	24" x 48" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-7 & P-9 @ Tie-In	24" x 72" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-9 & P-10 @ Tie-In	24" x 48" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-10 & P-12 @ Tie-In	24" x 48" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-12 & P-16 @ Tie-In	24" x 26' patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-16 & P-18 @ Tie-In	24" x 36" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-18 & P-19 @ Tie-In	24" x 48" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-19 & P-21 @ Tie-In	24" x 48" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-21 & P-23 @ Tie-In	24" x 36" patch @ intersection of panels	10/23/09	P	10/25/09	P	JAC
P-23 & P-24 @ Tie-In	24" x 36" patch @ intersection of panels	10/23/09	P	10/23/09	P	JAC
P-1 & P-38 & P-41	24" x 48" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
P-1 & P-38 & P-44	24" x 36" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
P-38 & P-39 & P-44	24" x 36" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels-39, 44, 40, 43	36" x 36" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 41, 42, 44	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 41, 42, 45	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 1, 3, 41, 45	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 3, 4, 45, 46	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC

Repair Codes:

P = Patch B = Bead GW = Grind and Weld R = Reconstructed Seam T = Topping Along Fusion Seam

GEOMEMBRANE DEFECT, REPAIR AND NON-DESTRUCTIVE TEST LOG

Project Name: MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION

Project Location: LUXORA, AR

Project Number: 4355-301

		Repair Information		Non-Destructive Test Data		
Panel and/or Seam Number	**Approximate Location**	**Repair Date**	**Repair Type**	**Date Vacuum Test Completed**	**Pass/ Fail**	**CQA Monitor**
Panels- 4, 6, 46, 47	18" x 36" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels-1, 3, 41, 45	18" x 36" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels-6, 8, 47, 48	18" x 36" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels-8, 9, 48, 49	18" x 36" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels-9,11, 49, 51	18" x 36" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels-9,11, 49, 52	18" x 36" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels- 48, 49, 50	24" x 24" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels- 49, 50, 51	24" x 24" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels-11,13, 51, 52	24" x 24" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels-13,15, 52, 65	24" x 24" patch @ intersection of panels	10/24/09	P	10/25/09	P	JAC
Panels-15,17, 65, 66	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels-17,18, 66, 67	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels-18,20, 67, 68	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels-20,21, 68, 69	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 21, 69, 71	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 1, 26, 27	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 1, 27, 28	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 1, 28, 29	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 1, 29, 30	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 1, 30, 31	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 1, 31, 33	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC
Panels- 1, 33, 34	24" x 24" patch @ intersection of panels	10/25/09	P	10/25/09	P	JAC

Repair Codes:

P = Patch B = Bead GW = Grind and Weld R = Reconstructed Seam T = Topping Along Fusion Seam

GEOMEMBRANE DEFECT, REPAIR AND NON-DESTRUCTIVE TEST LOG

Project Name: MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION

Project Location: LUXORA, AR

Project Number: 4355-301

		Repair Information		Non-Destructive Test Data		
Panel and/or Seam Number	**Approximate Location**	**Repair Date**	**Repair Type**	**Date Vacuum Test Completed**	**Pass/ Fail**	**CQA Monitor**
Panels- 31, 32, 33	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 32, 33, 34	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 1, 34, 35	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 1, 35, 36	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 1, 36, 37	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 1, 37, 38	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P- 24 & P-54 @ Tie-In	24" x 36" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 24, 54, 55	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 24, 55, 56	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 24, 56, 57	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 24, 57, 58	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 24, 58, 59	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 24, 59, 60	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 24, 60, 61	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 24, 25, 61	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 24, 25, 23	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 25, 61, 62	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 25, 62, 63	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 73, 74, 75	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 73, 75, 76	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 73, 76, 77	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
Panels- 76, 77, 78	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC

Repair Codes:

P = Patch B = Bead GW = Grind and Weld R = Reconstructed Seam T = Topping Along Fusion Seam

GEOMEMBRANE DEFECT, REPAIR AND NON-DESTRUCTIVE TEST LOG

Project Name: MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION

Project Location: LUXORA, AR

Project Number: 4355-301

		Repair Information		Non-Destructive Test Data		
Panel and/or Seam Number	**Approximate Location**	**Repair Date**	**Repair Type**	**Date Vacuum Test Completed**	**Pass/ Fail**	**CQA Monitor**
P- 76 & P-78 @ Tie-In	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P- 53 @ Cells 13 & 3	48" x 60" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-53 @ Tie-In	24" x 36" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P- 53 & P-54 @ Tie-In	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-54 to P-57 @ Tie-In	Grind and Weld seam to tie in cells	10/25/09	GW	10/26/09	P	JAC
P-57 to P-61 @ Tie-In	Grind and Weld seam to tie in cells	10/25/09	GW	10/26/09	P	JAC
P-57 to P-61 @ Tie-In	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P- 56 & P-57 @ Tie-In	24" x 48" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P- 60 & P-61 @ Tie-In	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P- 61 & P-78 @ Tie-In	Grind and Weld seam to tie in cells	10/25/09	GW	10/26/09	P	JAC
Panels-63,24, 72, 73	30" x 25" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-1 & P-2 & P-3	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-1 & P-2 & P-4	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-4 & P-5 & P-6	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-5 & P-6 & P-7	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-6 & P-7 & P-8	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-7 & P-8 & P-9	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-9 & P-10 & P-11	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-10 & P-11 & P-12	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-11 & P-12 & P-13	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-12 & P-13 & P-14	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC
P-13 & P-14 & P-15	24" x 24" patch @ intersection of panels	10/25/09	P	10/26/09	P	JAC

Repair Codes:

P = Patch B = Bead GW = Grind and Weld R = Reconstructed Seam T = Topping Along Fusion Seam

GEOMEMBRANE DEFECT, REPAIR AND NON-DESTRUCTIVE TEST LOG

Project Name: MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION

Project Location: LUXORA, AR

Project Number: 4355-301

		Repair Information		Non-Destructive Test Data		
Panel and/or Seam Number	**Approximate Location**	**Repair Date**	**Repair Type**	**Date Vacuum Test Completed**	**Pass/ Fail**	**CQA Monitor**
P-14 & P-15 & P-17	24" x 24" patch @ intersection of panels	10/26/09	P	10/26/09	P	JAC
P-14 & P-16 & P-17	24" x 24" patch @ intersection of panels	10/26/09	P	10/26/09	P	JAC
P-16 & P-17 & P-18	24" x 48" patch @ intersection of panels	10/26/09	P	10/26/09	P	JAC
P-18 & P-19 & P-20	24" x 60" patch @ intersection of panels	10/26/09	P	10/26/09	P	JAC
P-19 & P-20 & P-21	24" x 48" patch @ intersection of panels	10/26/09	P	10/26/09	P	JAC
P-19 & P-20	18" x 18" patch @ middle of cross seam	10/26/09	P	10/26/09	P	JAC
P-12 & P-14	155' East of cell 13 on seam of panels	10/26/09	B	10/26/09	P	JAC
P-12 & P-14	16" dia. Patch 155' East of cell 13 on seam of panels	10/26/09	P	10/26/09	P	JAC
P-2 & P-4	DS-1 = 12" X 40" patch 41' East of cell 13	10/26/09	P	10/26/09	P	JAC
P-6 & P-7	DS-2 = 12" X 40" patch 45' west of P-8	10/26/09	P	10/26/09	P	JAC
P-9 & P-11	DS-3 = 12" X 40" patch 67' west of P-48	10/26/09	P	10/26/09	P	JAC
P-13 & P-15	DS-4 = 12" X 40" patch 25' west of cross seam of P-12 &13	10/26/09	P	10/26/09	P	JAC
P-17 & P-18	DS-5 = 12" X 40" patch 40' east of cross seam of P-16 &17	10/26/09	P	10/26/09	P	JAC
P-20 & P-21	DS-6 = 12" X 40" patch 13' east of cross seam of P-19 &20	10/26/09	P	10/26/09	P	JAC
P-26 & P-27	DS-7 = 12" X 40" patch 20' up south berm from P-1	10/26/09	P	10/26/09	P	JAC
P-35 & P-36	DS-8 = 12" X 40" patch 25' up south berm from P-1	10/26/09	P	10/26/09	P	JAC
P-46 & P-47	DS-9 = 12" X 40" patch 36' up east berm from P-4/6	10/26/09	P	10/26/09	P	JAC
P-9 & P-49	DS-10 = 12" X 40" patch 4' south of P-9 & P-11 & P-49	10/26/09	P	10/26/09	P	JAC
P-24 & P-55	DS-11 = 12" X 40" patch 5' east of P-54 & P-55	10/26/09	P	10/26/09	P	JAC
P-59 & P-60	DS-12 = 12" X 40" patch 30' north of P-59 & P-60 & P-24	10/26/09	P	10/26/09	P	JAC
P-63 & P-64	DS-13 = 12" X 40" patch 30' north of P-72	10/26/09	P	10/26/09	P	JAC
P-51 & P-52	DS-14 = 12" X 40" patch 25' west of anchor trench	10/26/09	P	10/26/09	P	JAC

Repair Codes:

P = Patch B = Bead GW = Grind and Weld R = Reconstructed Seam T = Topping Along Fusion Seam

GEOMEMBRANE DEFECT, REPAIR AND NON-DESTRUCTIVE TEST LOG

Project Name: MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION

Project Location: LUXORA, AR

Project Number: 4355-301

		Repair Information		Non-Destructive Test Data		
Panel and/or Seam Number	**Approximate Location**	**Repair Date**	**Repair Type**	**Date Vacuum Test Completed**	**Pass/ Fail**	**CQA Monitor**
P-56 & P-57	Fabricated HDPE Boot for 6" PVC pipe from Cell 2	10/25/09	GW	10/26/09	P	JAC
P-64	Fabricated HDPE Boot for 6" PVC pipe from Cell 1	10/25/09	GW	10/26/09	P	JAC
	(Note: See Plan Set for exact location of piping)					

Repair Codes:

P = Patch B = Bead GW = Grind and Weld R = Reconstructed Seam T = Topping Along Fusion Seam

APPENDIX R

Geomembrane Destructive Test Log

SUMMARY OF DESTRUCTIVE TEST RESULTS
FUSION METHOD

FTN ASSOCIATES, INC.
MISSISSIPPI COUNTY LANDFILL - CELL 14
ARKANSAS

SAMPLE NUMBER	SHEAR STRENGTH (ppi)	SHEAR BREAK CODE (3)	PEEL (1) STRENGTH (ppi)	PEEL (1) BREAK CODE (3)	PEEL (2) STRENGTH (ppi)	PEEL (2) BREAK CODE (3)	REMARKS
DS-1	172.5	BRK	130.7	SE 1	128.9	SE 1	-
	172.7	BRK	133.5	SE 1	132.1	SE 1	
	172.0	BRK	154.9	SE 1	147.5	SE 1	
	171.9	BRK	132.4	SE 1	130.3	SE 1	
	171.0	BRK	128.5	SE 1	138.9	SE 1	
DS-2	174.9	BRK	129.4	SE 1	120.0	SE 1	-
	174.4	BRK	128.2	SE 1	127.0	SE 1	
	175.6	BRK	127.5	SE 1	120.8	SE 1	
	176.2	BRK	129.5	SE 1	123.2	SE 1	
	175.9	BRK	130.0	SE 1	122.1	SE 1	
DS-3	175.7	BRK	129.1	SE 1	122.5	SE 1	-
	176.3	BRK	129.7	SE 1	121.2	SE 1	
	177.3	BRK	129.4	SE 1	123.5	SE 1	
	177.2	BRK	133.5	SE 1	122.1	SE 1	
	177.4	BRK	131.0	SE 1	122.5	SE 1	
DS-4	172.3	BRK	144.6	SE 1	127.1	SE 1	-
	172.5	BRK	146.5	SE 1	131.4	SE 1	
	173.7	BRK	124.4	SE 1	122.9	SE 1	
	173.4	BRK	147.2	SE 1	123.8	SE 1	
	173.9	BRK	128.9	SE 1	122.5	SE 1	
DS-5	171.9	BRK	129.0	SE 1	97.1	SE 1	-
	173.1	BRK	134.8	SE 1	144.4	SE 1	
	171.3	BRK	133.2	SE 1	121.4	SE 1	
	174.2	BRK	145.8	SE 1	118.4	SE 1	
	171.2	BRK	144.9	SE 1	117.0	SE 1	
DS-6	170.9	BRK	146.0	SE 1	116.0	SE 1	-
	173.5	BRK	151.2	SE 1	120.9	SE 1	
	174.1	BRK	149.5	SE 1	125.0	SE 1	
	175.5	BRK	125.1	SE 1	125.4	SE 1	
	174.6	BRK	127.3	SE 1	126.2	SE 1	
DS-7	193.8	BRK	131.9	SIP	152.6	SE 1	-
	198.9	BRK	132.1	SE 1	148.0	SE 1	
	198.7	BRK	135.4	SE 1	151.4	SE 1	
	198.2	BRK	143.3	SE 1	153.6	SE 1	
	196.3	BRK	130.2	SE 1	149.8	SE 1	

(1) PEEL (1) represents outer track or top flap.

(2) PEEL (2) represents inner track or bottom flap.

(3) BREAK CODES BASED ON MODES ILLUSTRATED IN ATTACHED FIGURE.

DFSUM

SUMMARY OF DESTRUCTIVE TEST RESULTS
FUSION METHOD

FTN ASSOCIATES, INC.
MISSISSIPPI COUNTY LANDFILL - CELL 14
ARKANSAS

SAMPLE NUMBER	SHEAR STRENGTH (ppi)	SHEAR BREAK CODE (3)	PEEL (1) STRENGTH (ppi)	PEEL (1) BREAK CODE (3)	PEEL (2) STRENGTH (ppi)	PEEL (2) BREAK CODE (3)	REMARKS
DS-8	193.6	BRK	133.9	SIP	135.0	SIP	-
	194.7	BRK	137.4	SIP	160.9	SE 1	
	197.5	BRK	156.7	SIP	147.8	SE 1	
	198.7	BRK	140.8	SE 1	136.6	SE 1	
	196.8	BRK	133.2	SIP	150.8	SE 1	
DS-9	183.7	BRK	155.9	SE 1	166.7	SE 1	-
	183.2	BRK	124.5	SE 1	171.6	SE 1	
	184.5	BRK	152.8	SE 1	157.9	SE 1	
	185.8	BRK	155.4	SE 1	167.3	SE 1	
	184.0	BRK	153.7	SE 1	170.8	SE 1	
DS-10	157.0	BRK	128.9	SE 1	154.2	SE 1	-
	157.8	BRK	128.7	SE 1	143.8	SE 1	
	157.4	BRK	132.2	SE 1	148.3	SE 1	
	156.2	BRK	132.1	SE 1	149.1	SE 1	
	157.4	BRK	138.4	SE 1	150.3	SE 1	
DS-11	161.6	BRK	127.1	SE 1	138.6	SE 1	-
	165.5	BRK	118.0	SE 1	156.7	SE 1	
	167.8	BRK	132.1	SE 1	138.3	SE 1	
	166.6	BRK	136.7	SE 1	156.5	SE 1	
	163.7	BRK	126.7	SE 1	149.4	SE 1	
DS-12	180.8	BRK	133.6	SE 1	137.9	SE 1	-
	183.1	BRK	121.8	SE 1	138.9	SE 1	
	183.3	BRK	126.2	SE 1	139.0	SE 1	
	182.7	BRK	131.9	SE 1	134.7	SE 1	
	183.1	BRK	122.8	SE 1	134.4	SE 1	
DS-13	186.3	BRK	131.0	SE 1	150.7	SE 1	-
	189.1	BRK	132.1	SE 1	154.5	SE 1	
	189.4	BRK	133.3	SE 1	154.2	SE 1	
	188.7	BRK	133.3	SE 1	131.5	SE 1	
	188.8	BRK	135.3	SE 1	156.7	SE 1	
DS-14	185.9	BRK	159.3	SE 1	154.7	SE 1	-
	189.2	BRK	128.2	SE 1	156.6	SE 1	
	188.2	BRK	125.3	SE 1	157.5	SE 1	
	187.4	BRK	124.8	SE 1	127.5	SE 1	
	186.4	BRK	133.7	SE 1	159.1	SE 1	

(1) PEEL (1) represents outer track or top flap.

DFSUM

(2) PEEL (2) represents inner track or bottom flap.

(3) BREAK CODES BASED ON MODES ILLUSTRATED IN ATTACHED FIGURE.

DESTRUCTIVE SAMPLE FIELD TEST LOG

Project Name: **MISSISSIPPI COUNTY LANDFILL CELL 14 CONSTRUCTION**

Project Location: **LUXORA, AR**

Project Number: **4355-301**

Project Specifications:

Fusion Welds: Peel: 90 Shear: 120

Extrusion Welds: Peel: 78 Shear: 120

					Seaming Machine Settings					Peel Tests						Shear Tests							
Sample Number	Seam Number P / P	Material/ Material	Date	Time	Ambient Temp (F)	Operator ID	Machine ID	Machine Temp or Ext. P.H.	Speed	Side	1 A/B (psi)	2 A/B (psi)	3 A/B (psi)	4 A/B (psi)	5 A/B (psi)	1 (psi)	2 (psi)	3 (psi)	4 (psi)	5 (psi)	Pass/ Fail Field	Pass/ Fail Lab	CQA Monitor
DS-1	P2 / P4	S/S	10/20/09	1010	58°	KS	D-8	800°	6.0	A	116	127	110	121	131	188	198	191	188	187	P	P	JAC
										B	125	147	111	120	119								
DS-2	P4 / P6	S/S	10/20/09	1010	58°	KS	D-8	800°	6.0	A	127	97	138	125	128	191	188	190	190	193	P	P	JAC
										B	130	128	126	127	116								
DS-3	P9 / P11	S/S	10/20/09	1010	58°	KS	D-8	800°	6.0	A	112	113	117	120	120	198	187	190	193	192	P	P	JAC
										B	121	119	116	120	119								
DS-4	P13 / P15	S/S	10/20/09	1030	58°	MS	D-46	800°	7.5	A	136	128	133	129	140	187	197	165	190	188	P	P	JAC
										B	127	130	126	131	129								
DS-5	P17 / P18	S/S	10/20/09	1300	64°	MS	D-46	800°	7.5	A	92	87	149	151	154	188	186	188	186	187	P	P	JAC
										B	128	129	137	129	156								
DS-6	P20 / P21	S/S	10/20/09	1300	64°	VF	W-48	800°	7.2	A	115	122	146	110	130	194	192	194	188	196	P	P	JAC
										B	120	123	142	121	115								
DS-7	P26 / P27	S/S	10/21/09	0715	48°	VF	W-48	800°	7.2	A	134	144	137	181	140	250	201	217	215	210	P	P	JAC
										B	157	157	135	171	156								
DS-8	P35 / P36	S/S	10/21/09	0720	48°	KS	D-8	800°	6.0	A	183	136	120	130	129	200	189	199	188	201	P	P	JAC
										B	130	110	121	136	155								
DS-9	P46 / P47	S/S	10/21/09	0720	48°	KS	D-8	800°	6.0	A	120	120	123	130	129	200	203	200	189	203	P	P	JAC
										B	119	120	145	130	121								
DS-10	P9 / P50	S/T	10/21/09	0720	48°	KS	D-8	800°	6.0	A	126	127	130	141	120	189	193	199	191	200	P	P	JAC
										B	126	137	129	140	130								
DS-11	P24 / P55	S/S	10/21/09	0930	60°	MS	D-46	800°	7.5	A	129	120	135	124	124	175	183	187	182	188	P	P	JAC
										B	123	137	130	121	126								
DS-12	P59 / P60	S/S	10/21/09	0930	60°	MS	D-46	800°	7.5	A	123	126	119	131	129	202	197	198	199	195	P	P	JAC
										B	163	118	115	124	121								
DS-13	P63 / P64	S/S	10/21/09	0930	60°	MS	D-46	800°	7.5	A	133	113	129	129	135	203	203	204	208	206	P	P	JAC
										B	150	130	145	158	137								
DS-14	P51 / P52	S/S	10/21/09	1315	66°	MS	D-46	800°	7.5	A	128	151	129	123	171	206	200	207	205	202	P	P	JAC
										B	175	157	156	120	167								

Material Type Legend:

S - 60-Mil Smooth HDPE Geomembrane

APPENDIX S

Geocomposite Manufacturer's QC Certificates

SKAPS Industries

Engineered Synthetic Products, Inc.

September 25, 2009
American Environmental Group, Ltd
3600 Brecksville Road, Suite 100
Richfield, OH 44286

Ref. : Mississippi County Landfill, AR
Customer P.O. # 30309072
Transnet 220-1-6

We certify that the Transnet 220-1-6 drainage composite, meets the project requirements as stated in the specifications. The properties listed in this section are:

Property	Test Method	Unit	Required Value	Qualifier
Geonet[4]				
Mass per Unit Area	ASTM D 5261	lbs/ft^2	0.162	Minimum
Thickness	ASTM D 5199	mil	220 $\pm$ 20	Range
Carbon Black	ASTM D 4218	%	2.0	Minimum
Tensile Strength	ASTM D 5035	lbs/in	32	Minimum
Melt Flow	ASTM D 1238[3]	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm^3	0.94	Minimum
Transmissivity[1]	ASTM D 4716	m^2/sec	1.0 x 10^{-3}	MARV[6]
Composite				
Ply Adhesion	ASTM D 7005	lb/in	1.0	MARV
Transmissivity[2]	ASTM D 4716	m^2/sec	1.0 x 10^{-4}	MARV
Geotextile[4 & 5]				
Fabric Weight	ASTM D 5261	oz/yd^2	6.0	MARV
Grab Strength	ASTM D 4632	lbs	160	MARV
Grab Elongation	ASTM D 4632	%	50	MARV
Tear Strength	ASTM D 4533	lbs	60	MARV
Puncture Resistance	ASTM D 4833	lbs	85	MARV
Permittivity	ASTM D 4491	sec^{-1}	1.3	MARV
AOS	ASTM D 4751	US Sieve	70	MARV
UV Resistance	ASTM D 4355	%/hrs	70/500	MARV

Notes:

1 Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 1 hour.

2 Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.

3 Condition 190/2.16

4 Geotextile and Geonet properties are prior to lamination.

5 Geotextile data is provided by the supplier.

6 MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.

Sincerely,

Nilay Patel

Nilay Patel
QA Manager

571 Industrial Parkway, Commerce, GA 30529 **Phone**: 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN220-1-6**
Project : **Mississippi County Landfill, AR**

We, the Geocomposite manufacturer, hereby certify the following for the material delievered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number	Ply Adhesion (lb/in)		Geocomposite Transmissivity* (m^2/sec)
			Top	Minimum	Average	
1	344110001	344110001 - N	3441.003	1.26	1.85	7.66×10^{-4}
2	344110002	344110002 - N	3441.003			
3	344110003	344110003 - N	3441.003			
4	344110004	344110004 - N	3441.003			
5	344110005	344110005 - N	3441.003			
6	344110006	344110006 - N	3441.003			
7	344110007	344110007 - N	3441.006			
8	344110008	344110008 - N	3441.006			
9	344110009	344110009 - N	3441.006			
10	344110010	344110010 - N	3441.006	1.55	2.19	
11	344110011	344110011 - N	3441.006			
12	344110012	344110012 - N	3441.006			
13	344110013	344110013 - N	3441.001			
14	344110014	344110014 - N	3441.001			
15	344110015	344110015 - N	3441.001			
16	344110016	344110016 - N	3441.001			
17	344110017	344110017 - N	3441.001			
18	344110018	344110018 - N	3441.001			
19	344110019	344110019 - N	3441.004			
20	344110020	344110020 - N	3441.004	1.34	1.92	7.83×10^{-4}
21	344110021	344110021 - N	3441.004			
22	344110022	344110022 - N	3441.004			
23	344110023	344110023 - N	3441.004			
24	344110024	344110024 - N	3441.004			
25	344110025	344110025 - N	3441.002			
26	344110026	344110026 - N	3441.002			
27	344110027	344110027 - N	3441.002			

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.

APPROVED 5 QA

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN220-1-6**
Project : **Mississippi County Landfill, AR**

We, the Geonet Manufacturer, hereby ceritify the following for the material sent to the above referenced project :

Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft^2)	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity* (m^2/sec)
344110001 - N	HCBX001695	0.9556	0.184	217	2.29	70	1.59×10^{-3}
344110002 - N	HCBX001695	0.9556					
344110003 - N	HCBX001695	0.9556					
344110004 - N	HCBX001695	0.9556					
344110005 - N	HCBX001695	0.9556					
344110006 - N	HCBX001695	0.9556					
344110007 - N	HCBX001695	0.9556					
344110008 - N	HCBX001695	0.9556					
344110009 - N	HCBX001695	0.9556					
344110010 - N	HCBX001695	0.9556	0.193	225	2.72	75	
344110011 - N	HCBX001695	0.9556					
344110012 - N	HCBX001695	0.9556					
344110013 - N	HCBX001695	0.9556					
344110014 - N	HCBX001695	0.9556					
344110015 - N	HCBX001695	0.9556					
344110016 - N	HCBX001695	0.9556					
344110017 - N	HCBX001695	0.9556					
344110018 - N	HCBX001695	0.9556					
344110019 - N	HCBX001695	0.9556					
344110020 - N	HCBX001695	0.9556	0.187	219	2.37	68	1.64×10^{-3}
344110021 - N	HCBX001695	0.9556					
344110022 - N	HCBX001695	0.9556					
344110023 - N	HCBX001695	0.9556					
344110024 - N	HCBX001695	0.9556					
344110025 - N	HCBX001695	0.9556					
344110026 - N	HCBX001695	0.9556					
344110027 - N	HCBX001695	0.9556					

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 1 hour.

APPROVED 5 QA

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN220-1-6**
Project : **Mississippi County Landfill, AR**

We, the Geocomposite manufacturer, hereby certify the following for the material delievered to the above referenced project :

Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number	Ply Adhesion (lb/in)		Geocomposite Transmissivity* (m^2/sec)
			Top	Minimum	Average	
1	344110028	344110028 - N	3441.002			
2	344110029	344110029 - N	3441.002			
3	344110030	344110030 - N	3441.002	1.48	2.07	
4	344110031	344110031 - N	3441.005			
5	344110032	344110032 - N	3441.005			
6	344110033	344110033 - N	3441.005			
7	344110034	344110034 - N	3441.005			
8	344110035	344110035 - N	3441.005			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 15 minutes.

APPROVED 5 QA

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN220-1-6**
Project : **Mississippi County Landfill, AR**

We, the Geonet Manufacturer, hereby ceritify the following for the material sent to the above referenced project :

Geonet Roll Number	Resin Lot Number	Geonet Density (gm/cc)	Mass Per Unit Area (lb/ft^2)	Thickness (mils)	Carbon Black (%)	Tensile Strength (MD) (lb/in)	Transmissivity* (m^2/sec)
344110028 - N	HCBX001695	0.9556					
344110029 - N	HCBX001695	0.9556					
344110030 - N	HCBX001695	0.9556	0.190	222	2.63	72	
344110031 - N	HCBX001695	0.9556					
344110032 - N	HCBX001695	0.9556					
344110033 - N	HCBX001695	0.9556					
344110034 - N	HCBX001695	0.9556					
344110035 - N	HCBX001695	0.9556					

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 1.0 and a confining pressure of 10000 psf between steel plates after 1 hour.

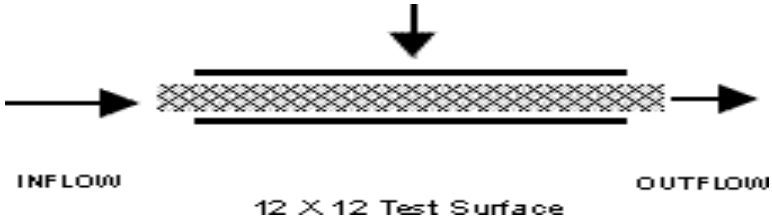
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	American Environmental Group, Ltd	**Job #**	3441
Project:	Mississippi County Landfill, AR		
Product:	TN220-1-6		

Test Configuration:



Test Information:

Boundary Conditions:	Steel Plate Geonet Steel Plate	**Normal Load:** **Gradient:** **Seating Time:** **Flow Direction:**	10000 psf 1.0 ft 1 hour MD

Test Results:

Roll No.	Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec
			1 hour
344110001 - N	10000	1.0	1.59×10^{-3}
344110020 - N			1.64×10^{-3}

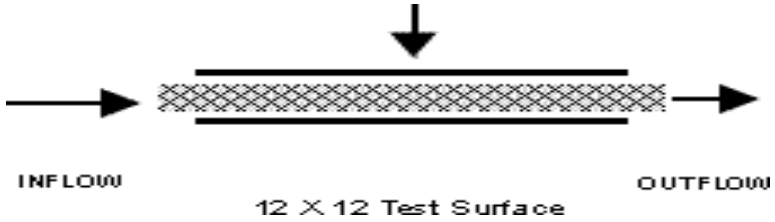
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	American Environmental Group, Ltd	**Job #**	3441
Project:	Mississippi County Landfill, AR		
Product:	TN220-1-6		

Test Configuration:



Test Information:

Boundary Conditions:	Steel Plate Geocomposite Steel Plate	**Normal Load:** **Gradient:** **Seating Time:** **Flow Direction:**	10000 psf 1.0 ft 15 minutes MD

Test Results:

Roll No.	Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec
			15 minutes
344110001	10000	1.0	7.66×10^{-4}
344110020			7.83×10^{-4}

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

POLYETHYLENE RESIN CERTIFICATION

Customer Name : American Environmental Group, Ltd
Project Name : Mississippi County Landfill, AR
Geocomposite Manufacturer : SKAPS Industries
Geocomposite Production Plant : Commerce, GA
Geocomposite Brand Name : TN220-1-6

We, the Geonet Manufacturer, hereby certify the following for the material delivered to the above referenced project:

Resin Supplier	Resin Production Plant	Resin Brand Name	Resin Lot Number	Property	Test Method	Units	Resin Supplier Value	Tested Value*
Chevron Phillips Chemical Company	Chevron, TX	HDPE	HCBX001695	Density	ASTM D 1505	gm/cc	0.9544	0.9512
				Melt Flow Index	ASTM D 1238[(a)]	gm/10 min	0.33	0.34

(a) Condition 190/2.16
* Data from SKAPS Quality Control

APPROVED 5 QA

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : TN220-1-6
Project : Mississippi County Landfill, AR

We, the Geocomposite Manufacturer, hereby certify the following for the material delivered to the above referenced project :

GEOCOMP ROLL#	FABRIC ROLL#	WEIGHT oz/sq yd	MD TENSILE lbs.	MD ELONG %	XMD TENSILE lbs.	XMD ELONG %	MD TRAP lbs.	XMD TRAP lbs.	PUNCTURE lbs.	AOS us sieve	PERM-ITY sec^{-1}
344110001	3441.003	6.36	164	69	172	77	74	87	99	70	1.80
344110020	3441.004	6.36	164	69	172	77	74	87	99	70	1.80

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

APPENDIX T

Geocomposite Inventory Listing

SKAPS Industries (Nonwoven Division)
335, Athena Drive
Athens, GA 30601 (U.S.A.)
Phone (706) 354-3700 Fax (706) 354-3737
E-mail: info@skaps.com

Sales Office:
Engineered Synthetic Product Inc.
Phone: (770)564-1857
Fax: (770)564-1818

September 28, 2009
American Environmental Group, Ltd
3600 Brecksville Road, Suite 100
Richfield, OH 44286
Ref : Mississippi County Landfill
PO : 30309072

Dear Sir/Madam:

This is to certify that SKAPS GE160 is a high quality needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, randomly networked to form a high strength dimensionally stable fabric. SKAPS GE160 resists ultraviolet deterioration, rotting, biological degradation. The fabric is inert to commonly encountered soil chemicals. Polypropylene is stable within a pH range of 2 to 13. SKAPS GE160 conforms to the property values listed below:

PROPERTY	TEST METHOD	UNITS	M.A.R.V. Minimum Average Roll Value
Weight	ASTM D 5261	oz/sy (g/m^2)	6.00 (203)
Grab Tensile	ASTM D 4632	lbs (kN)	160 (0.71)
Grab Elongation	ASTM D 4632	%	50
Trapezoidal Tear	ASTM D 4533	lbs (kN)	60 (0.27)
Puncture Resistance	ASTM D 4833	lbs (kN)	85 (0.38)
Permittivity*	ASTM D 4491	sec^{-1}	1.30
AOS*	ASTM D 4751	US Sieve (mm)	70 (0.21)
UV Resistance	ASTM D 4355	%/hrs	70/500

Notes:
* At the time of manufacturing. Handling may change these properties.

ANURAG SHAH
QUALITY CONTROL MANAGER

Product : GE160-15

ROLL # ASTM METHOD UNITS TARGET	WEIGHT D5261 oz/sq yd 6.00	MD TENSILE D4632 lbs. 160	MD ELONG D4632 % 50	XMD TENSILE D4632 lbs 160	XMD ELONG D4632 % 50	MD TRAP D4533 lbs. 60	XMD TRAP D4533 lbs 60	PUNCTURE D4833 lbs. 85	AOS D4751 US Sieve 70	PERMITTIVITY D4491 sec^{-1} 1.30
13495.01	6.22	164	69	178	77	74	88	97	70	1.79
13495.02	6.22	164	69	178	77	74	88	97	70	1.79
13495.03	6.22	164	69	178	77	74	88	97	70	1.79
13495.04	6.22	164	69	178	77	74	88	97	70	1.79
13495.05	6.41	168	73	180	81	74	88	97	70	1.79

* All value are MARV.

JOB# 3441 **PRODUCT: TN 220-1-6** **ESTIMATED SQ.FT.:** **Rolls: 4350**

JOB NAME: Mississipi County Landfill **NO OF ROLLS: 26** **TOTAL SQ FT.: 113,100**

Luxora, AR 72211

ROLL ID	SHIP	CERT	PRD.		ROLL ID	SHIP	CERT	PRD.	
1					2				
344110001					344110028				
344110002					344110029				
344110003					344110030				
344110004					344110031				
344110005					344110032				
344110006					344110033				
344110007					344110034				
344110008					344110035				
344110009									
344110010									
344110011									
344110012									
344110013									
344110014									
344110015									
344110016									
344110017									
344110018									
344110019									
344110020									
344110021									
344110022									
344110023									
344110024									
344110025									
344110026									
344110027									

APPENDIX U

Geocomposite Conformance Test Results

SEPTEMBER 2009 093-90145

GEOCOMPOSITE

Project Name: FTN/MISSISSIPPI CO LF-CELL 14/AR

SAMPLE NUMBER: 34411.0010

	ADHESION STRENGTH (ppi)	TRANSMISSIVITY[1] (m^2/sec)
1.	14.45	9.4E-04
2.	8.79	1.0E-03
3.	9.29	
4.	11.98	
5.	10.70	
AVG	11.0	9.9E-04

SAMPLE NUMBER: 34411.003

	ADHESION STRENGTH (ppi)	TRANSMISSIVITY[1] (m^2/sec)
1.	12.66	8.2E-04
2.	8.81	8.0E-04
3.	8.71	
4.	12.22	
5.	6.55	
AVG	9.8	8.1E-04

(1): Normal Load = 1000 psf; Gradient = 1.0; Seat Time = 1 hr; Configuration = Plate/GC/Plate

SEPTEMBER 2009

SUMMARY OF GEOCOMPOSITE CONFORMANCE TEST RESULTS

FTN ASSOCIATES, INC.
MISSISSIPPI COUNTY LANDFILL - CELL 14
ARKANSAS

093-90145
4355-301

SAMPLE DESIGNATION	Reference Value	34411. 0010	34411. 0030	-	-	-	-	-	-	-	-
ADHESION STRENGTH (ppi) T/B (1) ASTM D7005	-	11.0	9.8	-	-	-	-	-	-	-	-
TRANSMISSIVITY (m^2/sec) ASTM D4716	>=1.0E-04	9.9E-04	8.1E-04	-	-	-	-	-	-	-	-

(1) T/B corresponds to Top Fabric and Bottom Fabric.

APPENDIX V

Washed Gravel Test Reports

FTN/MISSISSIPPI COUNTY LF-CELL 14/AR
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classification	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Carbonate Content %	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %			Moisture %	Dry (lb/cuft)		
CS-1	Bulk	-	SP	3.6	-	-	-	-	99.6	2.0	-	-	-	-	-	-	102.0	2.7E-02	-
PCS-1	Bulk	-	SP	3.3	-	-	-	-	99.3	1.5	-	-	-	-	0.5	-	101.8	3.0E-02	-
PreConst. Washed Gravel	Bulk	-	GP	-	-	-	-	-	0.3	0.05	-	-	-	-	-	-	-	-	-
Const. Washed Gravel	Bulk	-	GP	-	-	-	-	-	0.3	0.05	-	-	-	-	-	-	-	-	-

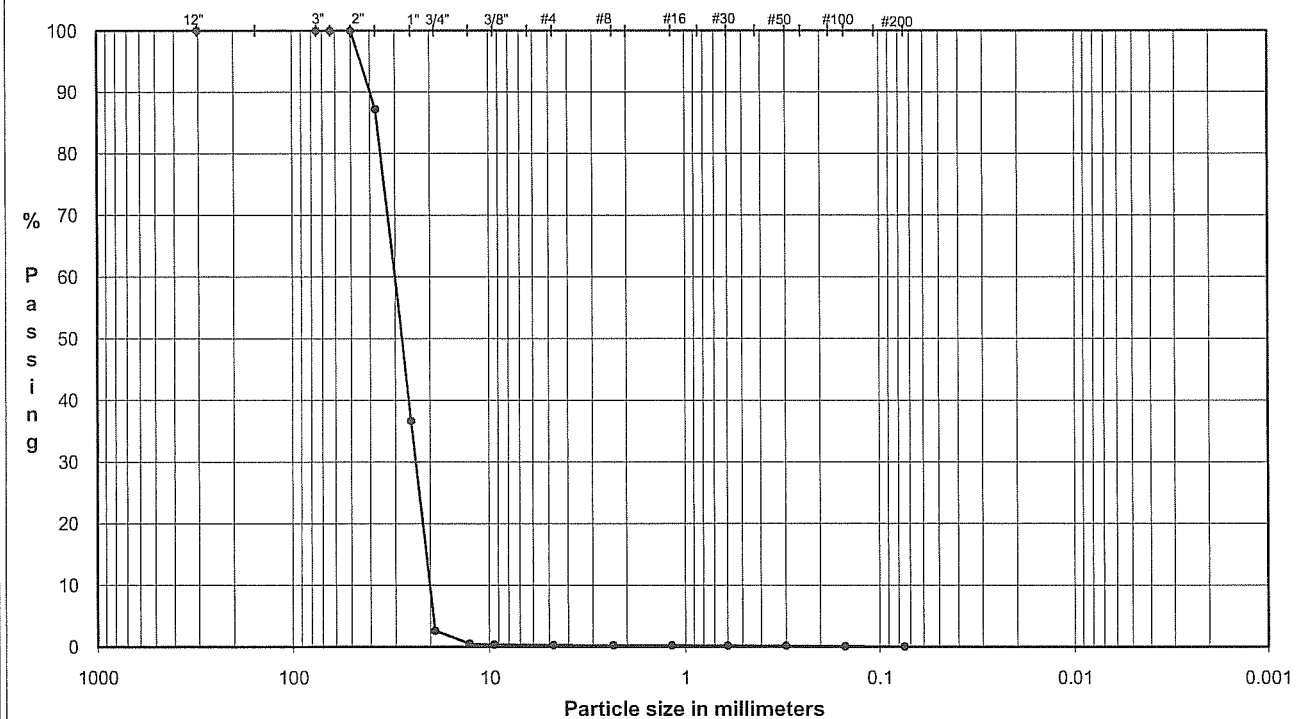
ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

PARTICLE SIZE DISTRIBUTION

ASTM C 136

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF-CELL 14/AR**
SAMPLE ID: **Pre Const. Washed Gravel** Depth: -
TYPE: **Bulk**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50	**100.0**		
1.5"	37.5	**87.2**		
1.0"	25	**36.7**		
0.75"	19	**2.7**	Coarse Gravel	**97.3**
0.50"	12.7	**0.5**		
0.375"	9.5	**0.4**		
#4	4.75	**0.3**	Fine Gravel	**2.4**
#8	2.36	**0.3**	Coarse Sand	**0.0**
#16	1.18	**0.2**		
#30	0.60	**0.2**	Medium Sand	**0.0**
#50	0.30	**0.2**		
#100	0.15	**0.1**		
#200	0.075	**0.1**	Fine Sand	**0.1**
			Fines	**0.1**

D_{60}= 0.4	D_{30}= 0.2	D_{10}= 0.2
Cu = D60/D10 =	**2.3**	< 4
Cc = D30^2/(D10*D60) =	**0.8**	< 1

DESCRIPTION: Brown, COARSE GRAVEL, trace coarse to fine sand, trace fines.

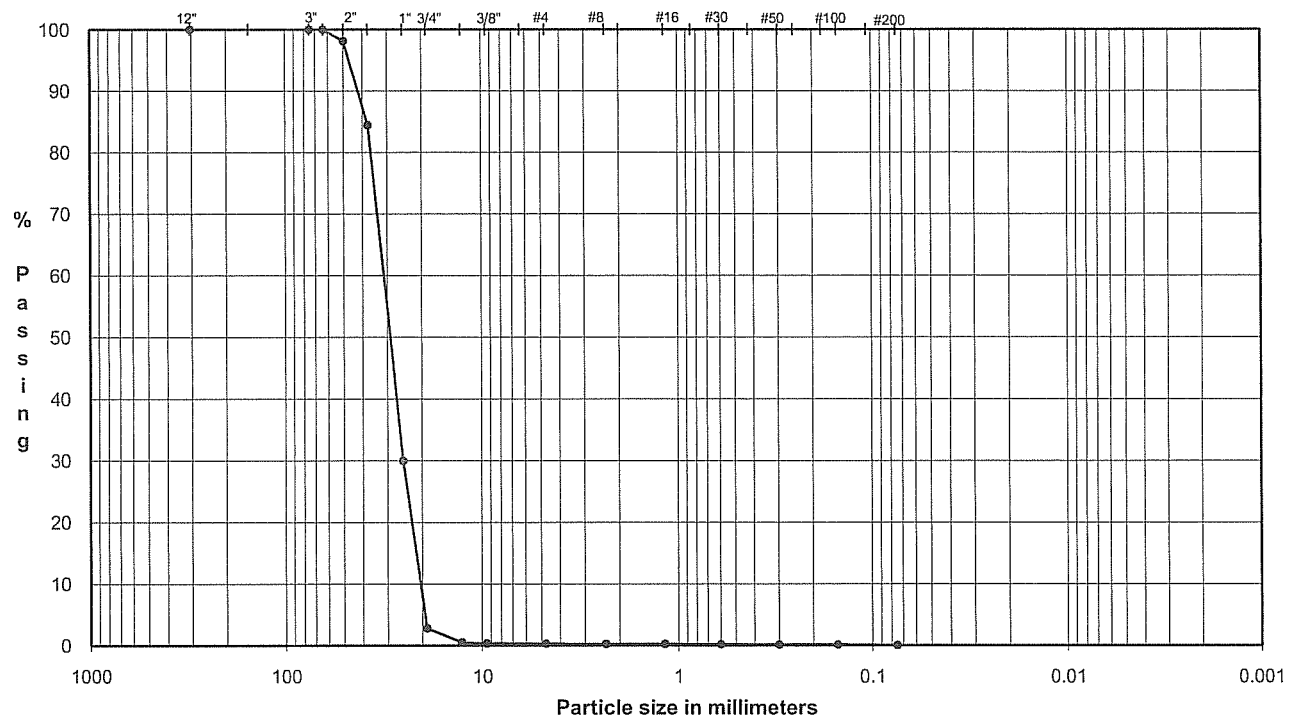
USCS: GP

TECH	DW
DATE	9/24/09
CHECK	DA
REVIEW	[illegible]

PARTICLE SIZE DISTRIBUTION

ASTM C 136

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF-CELL 14/AR**
SAMPLE ID: **Const. Washed Gravel** Depth: -
TYPE: **Bulk**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50	**98.1**		
1.5"	37.5	**84.5**		
1.0"	25	**30.0**		
0.75"	19	**2.8**	Coarse Gravel	**97.2**
0.50"	12.7	**0.5**		
0.375"	9.5	**0.4**		
#4	4.75	**0.3**	Fine Gravel	**2.5**
#8	2.36	**0.3**	Coarse Sand	**0.0**
#16	1.18	**0.2**		
#30	0.60	**0.2**	Medium Sand	**0.1**
#50	0.30	**0.2**		
#100	0.15	**0.1**		
#200	0.075	**0.0**	Fine Sand	**0.1**
			Fines	**0.0**

D_{60}= 0.4	D_{30}= 0.2	D_{10}= 0.2
Cu = D60/D10 =	**2.3**	< 4
Cc = D30^2/(D10*D60) =	**0.8**	< 1

DESCRIPTION: Brown, COARSE GRAVEL, trace coarse to fine sand, trace fines.

USCS: GP

TECH	DW
DATE	9/24/09
CHECK	DA
REVIEW	PWM

APPENDIX W

Geotextile Conformance Test Report

SEPTEMBER 2009 | 093-90145
4355-301

GEOTEXTILE TEST RESULTS

PROJECT NUMBER: 093-90145
PROJECT NAME: FTN/MISSISSIPPI CO LF-CELL 14/AR
SAMPLE ID: 339443-09

	MASS PER UNIT AREA (oz/yd²)	APPARENT OPENING SIZE (mm)	PERMITTIVITY (sec^{-1})
1.	7.10	0.137	2.16
2.	6.27	0.137	1.82
3.	6.71	0.126	2.17
4.	6.49	0.124	1.93
5.	7.19	0.134	
6.	6.49		2.02
7.	6.48	0.132	
8.	6.26		
9.	6.36	EQUIVALENT SIEVE SIZE	PERMEABILITY (cm/sec) / FLOW RATE (gal/min/ft²)
10.	6.61		
AVG	6.6	100	0.45 / 151.2

	GRAB STRENGTH (pounds)		GRAB ELONGATION (%)		TRAPEZOIDAL TEAR (pounds)		PUNCTURE STRENGTH (pounds)	
	MD	TD	MD	TD	MD	TD		
1.	234.5	191.0	58.7	72.3	91.3	81.8	113.3	110.8
2.	172.2	189.0	56.0	76.3	68.0	82.3	107.3	121.1
3.	194.0	191.5	61.7	66.0	65.3	93.5	96.9	110.0
4.	181.5	210.2	65.0	70.0	60.5	78.3	117.9	114.3
5.	206.2	195.2	68.7	65.7	66.8	88.0	102.4	89.0
6.	170.2	198.5	65.3	72.3	62.0	98.5	108.0	
7.	175.7	200.2	64.7	68.3	62.0	79.3	120.9	
8.	167.0	209.2	60.3	75.0	71.3	92.3	135.0	
9.	186.0	178.0	64.3	69.0	61.5	87.0	92.3	
10.	219.5	184.7	59.7	85.3	75.3	77.5	99.3	
AVG	190.7	194.8	62	72	68.4	85.8	109.2	

SEPTEMBER 2009

093-90145
4355-301

SUMMARY OF GEOTEXTILE CONFORMANCE TEST RESULTS

FTN ASSOCIATES, INC.
MISSISSIPPI COUNTY LANDFILL - CELL 14
ARKANSAS

ROLL DESIGNATION	REFERENCE VALUE	134-95.01	-	-	-	-	-	-	-	-	-
MASS/UNIT AREA (oz/yd^2) ASTM D5261	>=6	6.6	-	-	-	-	-	-	-	-	-
GRAB STRENGTH (lbs)	>=160	190.7	-	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D4632	>=160	194.8	-	-	-	-	-	-	-	-	-
GRAB ELONGATION (%)	>=50	62	-	-	-	-	-	-	-	-	-
MD/TD (1) ASTM D4632	>=50	72	-	-	-	-	-	-	-	-	-
TRAPEZOIDAL TEAR STRENGTH	>=60	68.4	-	-	-	-	-	-	-	-	-
(lbs) MD/TD (1) ASTM D4533	>=60	85.8	-	-	-	-	-	-	-	-	-
PUNCTURE STRENGTH (lbs) ASTM D4833	>=85	109	-	-	-	-	-	-	-	-	-
APPARENT OPENING SIZE (mm)	-	0.132	-	-	-	-	-	-	-	-	-
(U.S. SIEVE NO.) ASTM D4751	>=70	100	-	-	-	-	-	-	-	-	-
PERMITTIVITY (sec-1)	>=1.3	2.02	-	-	-	-	-	-	-	-	-
PERMEABILITY (cm/sec) (2)	-	0.45	-	-	-	-	-	-	-	-	-
FLOW RATE ($gal/min/ft^2$) ASTM D4491	-	151.2	-	-	-	-	-	-	-	-	-

(1) MD/TD corresponds to Machine Direction / Transverse Direction.
(2) Permeability calculated by multiplying measured thickness by permittivity.

TEXTSUM.XLS

APPENDIX X

Leachate Drainage Layer Test Reports

FTN/MISSISSIPPI COUNTY LF-CELL 14/AR
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Carbonate Content %	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)			
MSCOLF TP-1	Bulk	0.0-3.0'	CH	35.2	63	28	35	0.21	100.0	97.9	-	93.4	25.5	-	27.7	88.9	4.3E-08	-	-
MSCOLF TP-2	Bulk	0.0-3.0'	CH	37.5	63	26	37	0.31	100.0	95.5	-	94.2	23.0	-	25.4	90.4	4.9E-08	-	-
MSCOLF TP-3	Bulk	0.0-3.0'	CH	32.5	65	32	33	0.03	100.0	97.7	-	97.2	22.6	2.72	24.6	93.2	3.1E-08	-	-
MSCOLF TP-4	Bulk	0.0-3.0'	CH	28.4	60	28	32	0.01	100.0	98.2	-	97.5	22.5	2.71	24.4	93.5	3.5E-08	-	-
MSCOLF TP-5	Bulk	0.0-3.0'	CH	27.3	54	22	32	0.17	100.0	95.6	-	101.7	21.2	-	23.6	96.8	2.1E-08	-	-
MSCOLF TP-6	Bulk	0.0-3.0'	CH	24.3	58	24	34	0.00	100.0	94.0	-	103.9	21.3	-	24.2	98.9	5.9E-09	-	-
CS-1	Bulk	-	SP	3.6	-	-	-	-	99.6	2.0	-	-	-	-	-	102.0	2.7E-02	-	-
PCS-1	Bulk	-	SP	3.3	-	-	-	-	99.3	1.5	-	-	-	-	-	101.8	3.0E-02	0.5	-

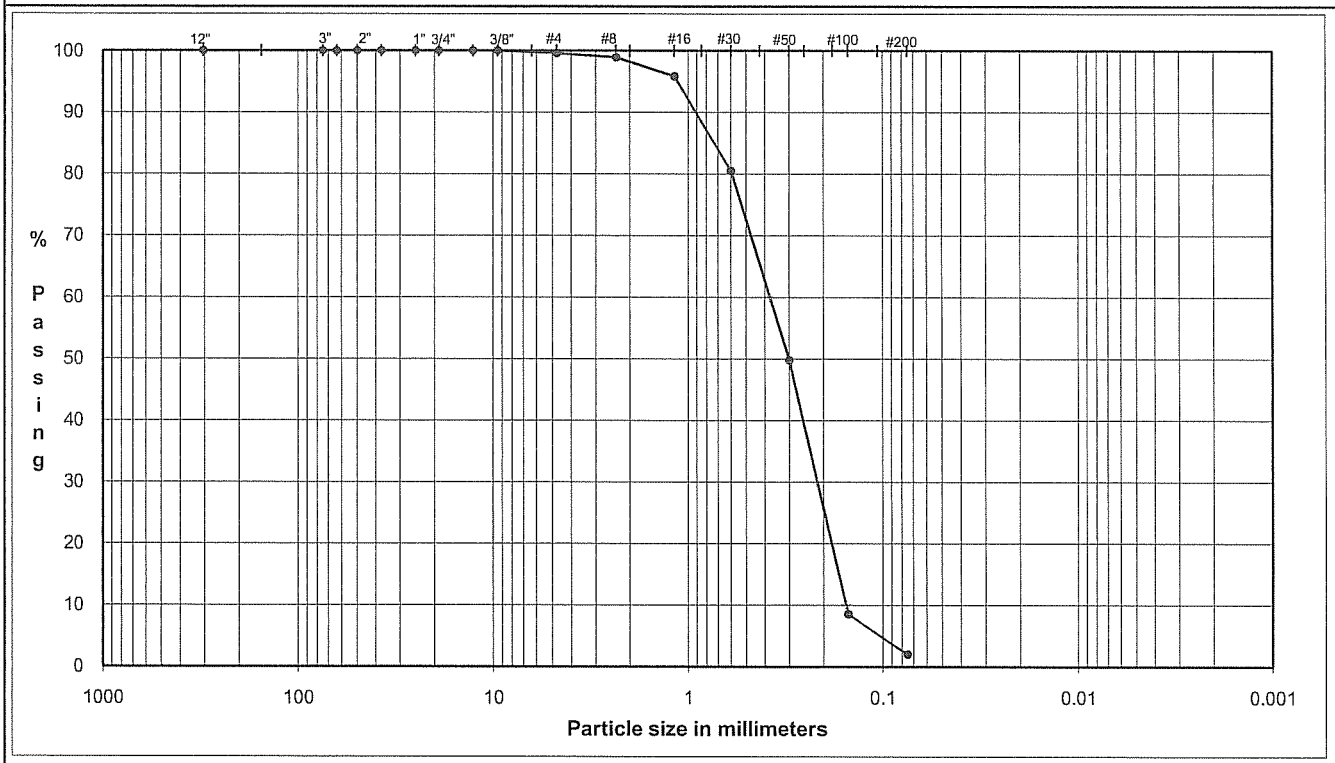
ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

PARTICLE SIZE DISTRIBUTION

ASTM C 136

PROJECT NAME: FTN/MISSISSIPPI COUNTY LF-CELL 14/AR
SAMPLE ID: CS-1 Depth: -
TYPE: Bulk



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25	**100.0**		
0.75"	19	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.75	**99.6**	Fine Gravel	**0.4**
#8	2.36	**98.9**	Coarse Sand	**1.4**
#16	1.18	**95.9**		
#30	0.60	**80.5**	Medium Sand	**33.0**
#50	0.30	**49.8**		
#100	0.15	**8.5**		
#200	0.075	**2.0**	Fine Sand	**63.3**
			Fines	**2.0**

D_{60}= 0.4	D_{30}= 0.2	D_{10}= 0.2
Cu = D60/D10 =	**2.5**	< 6
Cc = D30^2/(D10*D60) =	**0.8**	< 1

DESCRIPTION: Brown, MEDIUM TO FINE SAND, trace fines, trace fine gravel.

USCS: SP

TECH	TJ/RF
DATE	8/26/09
CHECK	AJL
REVIEW	[illegible]

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF-CELL 14/AR	SAMPLE ID	CS-1
PROJECT NUMBER	093-90145	SAMPLE TYPE	Bulk
REMARKS	-	SAMPLE DEPTH	-

	TIME (sec)	VOLUME (ml)	TEMP. (°C)	(ml/sec)	
1.	60.4	39	23.1	0.65	
2.	60.2	39	23.1	0.65	
3.	60.4	39	23.1	0.65	*
4.	60.4	39	23.1	0.65	*
5.	60.4	39	23.1	0.65	*
6.	60.4	39	23.1	0.65	*

UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	2451.1
APPARATUS WEIGHT (g):	1351.5
WET SAMPLE WEIGHT (g):	1099.6
SAMPLE HEIGHT (in):	5.81
SAMPLE DIAMETER (in):	3.00
SAMPLE AREA (in^2):	7.07
SAMPLE AREA (cm^2):	45.60
SAMPLE VOLUME (in^3):	41.06
SAMPLE VOLUME (cm^3):	672.87
WET DENSITY (pcf):	102.0
DRY DENSITY (pcf):	102.0

MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	
SPECIFIC GRAVITY:	2.7
VOLUME OF SOLIDS (cm^3):	407.25
VOLUME OF VOIDS (cm^3):	265.63

DISTANCE B/W MANOMETERS (cm):	7.62
AVERAGE Q VALUE:	0.52
AVERAGE TEMP:	18.5
TEMPERATURE CORRECTION:	1.04
HEAD OF WATER (cm):	3.30
HYDRAULIC GRADIENT (i):	0.433

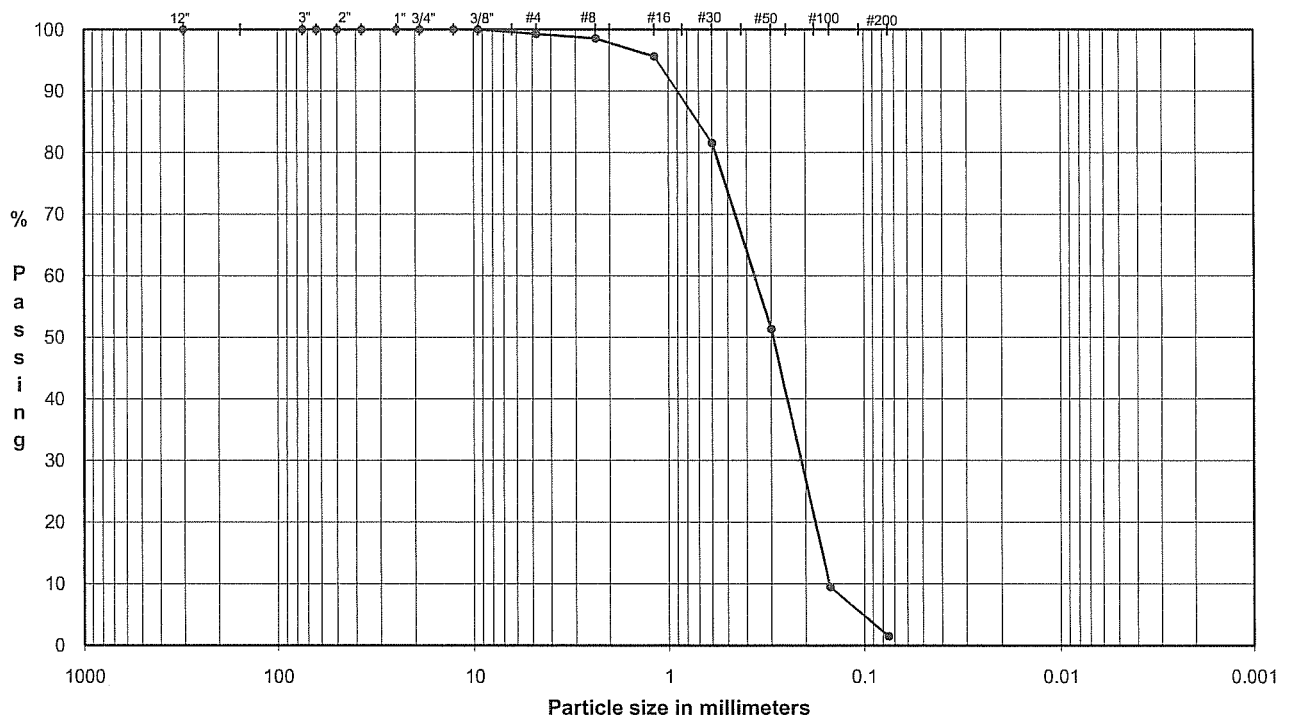
K VALUE CORRECTED FOR 20 °C = 2.7E-02 cm/sec

TECH	DW
DATE	8/27/09
CHECK	AW
REVIEW	AWay

PARTICLE SIZE DISTRIBUTION

ASTM C 136

PROJECT NAME: **FTN/MISSISSIPPI COUNTY LF-CELL 14/AR**
SAMPLE ID: **PCS-1** Depth: -
TYPE: **Bulk**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
3.0"	75	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25	**100.0**		
0.75"	19	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.75	**99.3**	Fine Gravel	**0.7**
#8	2.36	**98.6**	Coarse Sand	**1.4**
#16	1.18	**95.7**		
#30	0.60	**81.6**	Medium Sand	**31.4**
#50	0.30	**51.3**		
#100	0.15	**9.5**		
#200	0.075	**1.5**	Fine Sand	**65.0**
			Fines	**1.5**

D_{60}= 0.4	D_{30}= 0.2	D_{10}= 0.2
Cu = D60/D10 =	**2.3**	< 6
Cc = D30^2/(D10*D60) =	**0.8**	< 1

DESCRIPTION: Brown, MEDIUM TO FINE SAND, trace fines, trace fine gravel.

USCS: SP

TECH	TJ/BW
DATE	8/26/09
CHECK	AJL
REVIEW	[illegible]

CONSTANT HEAD PERMEABILITY TEST
ASTM D 2434

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF-CELL 14/AR	SAMPLE ID	PCS-1
PROJECT NUMBER	093-90145	SAMPLE TYPE	Bulk
REMARKS	-	SAMPLE DEPTH	-

	TIME (sec)	VOLUME (ml)	TEMP. (°C)	(ml/sec)	
1.	60.4	26	23.0	0.43	
2.	60.3	26	23.0	0.43	
3.	60.4	26	23.0	0.43	*
4.	60.5	26	23.0	0.43	*
5.	60.4	26	23.0	0.43	*
6.	60.3	26	23.0	0.43	*

UNIT WEIGHT DETERMINATION

APPARATUS & WET SAMPLE (g):	2468.3
APPARATUS WEIGHT (g):	1349.3
WET SAMPLE WEIGHT (g):	1119.0
SAMPLE HEIGHT (in):	5.92
SAMPLE DIAMETER (in):	3.00
SAMPLE AREA (in^2):	7.07
SAMPLE AREA (cm^2):	45.60
SAMPLE VOLUME (in^3):	41.87
SAMPLE VOLUME (cm^3):	686.08
WET DENSITY (pcf):	101.8
DRY DENSITY (pcf):	101.8

MOISTURE CONTENT

WET SAMPLE & TARE (g):	
DRY SAMPLE & TARE (g):	
WEIGHT OF TARE (g):	
WEIGHT OF WATER (g):	
DRY SAMPLE WEIGHT (g):	
MOISTURE CONTENT (%):	

SPECIFIC GRAVITY:	2.7
VOLUME OF SOLIDS (cm^3):	414.46
VOLUME OF VOIDS (cm^3):	271.62

DISTANCE B/W MANOMETERS (cm):	7.62
AVERAGE Q VALUE:	0.43
AVERAGE TEMP:	23.0
TEMPERATURE CORRECTION:	0.93
HEAD OF WATER (cm):	2.20
HYDRAULIC GRADIENT (i):	0.289

K VALUE CORRECTED FOR 20 °C = 3.0E-02 cm/sec

TECH	DW
DATE	8/27/09
CHECK	
REVIEW	

CARBONATE CONTENT
ASTM D 3042 - MODIFIED

PROJECT TITLE	FTN/MISSISSIPPI COUNTY LF-CELL 14/AR
PROJECT NUMBER	093-90145
SAMPLE ID	PCS-1

	1	2	3
Residue +Tare weight (g)	575.92	573.38	571.80
Tare Weight (g)	84.27	84.23	83.25
Residue weight (g)	491.65	489.15	488.55

After Acid Application and Wash

Residue + Tare weight (g)	573.34	570.42	569.62
Residue weight (g)	489.07	486.19	486.37
Carbonate Content (%)	0.5	0.6	0.4

Average Carbonate Content (%) **0.5**

REMARKS

SAMPLE DESCRIPTION Brown, MEDIUM TO FINE SAND, trace fines, trace fine gravel.

USCS SP

MODIFIED: Only the Plus No.200 Size material used in the test.

TECH	TJ
DATE	8/26/09
CHECK	
REVIEW	