Permit No.	Date	DIN
1812	**February 4, 2011**	**12845**

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APPROVED DOCUMENT
Division of Waste Management
Solid Waste Section
Date **March 7, 2011** By **LY Frost**

January 31, 2011

North Carolina Department of Environment and Natural Resources
Solid Waste Section, Division of Waste Management
Asheville Regional Office
2090 US Highway 70
Swannanoa, North Carolina 28778

Attention: Mr. Larry Frost

Reference: Cells 1 and 2 Construction Certification Report – Permit ID No. 18-12
Marshall Steam Station Industrial Landfill No. 1
Duke Energy Marshall Steam Station
8320 Highway 150 East, Terrell, Catawba County, North Carolina
S&ME Project No. 1356-08-122
North Carolina P.E. Firm License No. F-0176

Dear Mr. Frost:

On behalf of Duke Energy, S&ME is pleased to submit the *Cells 1 and 2 Construction Certification Report* for the Marshall Steam Station Industrial Landfill No. 1 in Terrell, North Carolina. This certification report provides documentation that Cells 1 and 2 were constructed in accordance with the Permit to Construct, Issued February 25, 2010 (NCDENR DIN 9571) and related, approved documents.

Please note that on behalf of Duke Energy, S&ME is also submitting a revised Operations Plan under separate cover from the certification report and attached to this letter. Noteworthy revisions to the Operations Plan include changes to the following sections:

- Filling Sequence: modified from operating Cell 1 and then Cell 2 , to operating Cell 2 and then Cell 1 followed by operating both cells simultaneously;
- Waste Handling: includes provisions for other approved wastes (asbestos, gypsum, etc.); and,
- Pump On/Off Levels: both leachate collection system (LCS) and leak detection system (LDS) pump on/off level were adjusted due to manufacturer recommendations and installed conditions.

Other minor changes were made including format and grammar changes.

To address the technical aspect of changes to the filling sequence and pump on/off levels, the calculation package "Leachate Force Main" was revised and is attached with this letter. In summary, this calculation demonstrates compliance with the 72-hour drawdown requirement after said modifications.

S&ME and Duke Energy appreciate your attention to this matter. Please contact us should you have any questions or require additional information.

Respectfully Submitted,
S&ME, Inc.

William M. Harrison, E.I.
Staff Professional

Kenneth R. Daly
Senior Project Engineer
Engineer of Record

NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALY
1/31/11

Attachments:

-Cells 1 and 2 Construction Certification Report (3 Volumes)
-Operations Plan (Revised January 31, 2011)
-Calculation Package: Leachate Force Main

Cc: Dean Snyder, Duke Energy
Ed Sullivan, Duke Energy

Permit No.	Date	DIN
1812	**February 4, 2011**	**12845**

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February 3, 2011
Solid Waste Section
Asheville Regional Office

CELLS 1 AND 2 CONSTRUCTION CERTIFICATION REPORT
INDUSTRIAL LANDFILL NO. 1
MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

S&ME Project No. 1356-08-122 Ph. 7

Prepared for:
Duke Energy
526 South Church Street
Charlotte, North Carolina 28202

Prepared by:
S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273
S&ME Engineering License No. F-0176

January 31, 2011

CONSTRUCTION CERTIFICATION STATEMENT
FOR
DUKE ENERGY – MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
CELLS 1 AND 2 CONSTRUCTION CERTIFICATION REPORT

OWNER: DUKE ENERGY
OPERATOR: DUKE ENERGY

by:

S&ME, Inc.
9751 Southern Pine Boulevard
Charlotte, North Carolina 28273-5560

I hereby certify that the results of construction quality assurance activities conducted by S&ME Inc., as summarized in this report, indicate that the Marshall Steam Station Industrial Landfill No. 1 Cells 1 and 2 liner system was constructed in general accordance with the requirements of the approved Construction Quality Assurance (CQA) Plan.

NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALY

1/31/11

Kenneth R. Daly, P.E.
N.C. Registration No. 032153

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1. INTRODUCTION

1.1 Project Description

The Industrial Landfill No.1 is owned and will be operated by Duke Energy. The facility is located at Marshall Steam Station in Terrell, North Carolina. The Industrial Landfill No. 1 was permitted for Phase I (Cells 1 through 4) construction under Permit No. 18-12. This Certification Report documents the construction of the Cells 1 and 2 double liner system in accordance with the "Permit to Construct Application" (PTC) dated February 25, 2010 as approved by the North Carolina Department of Environment and Natural Resources (NCDENR). Construction was performed in general accordance with technical specifications, drawings, and the Construction Quality Assurance (CQA) Plan included within the "Permit to Construct Application."

The double liner system consists of from top to bottom:

- 2-ft thick protective cover layer;
- geocomposite drainage layer (leachate collection system (LCS));
- primary 60-mil thick double-sided textured high density polyethylene (HDPE) geomembrane;
- geocomposite drainage layer (leak detection system (LDS));
- secondary 60-mil thick double-sided HDPE geomembrane;
- geosynthetic clay liner (GCL); and,
- 18-inch thick compacted soil liner (CSL) - permeability no greater than $1x10^{-5}$ cm/s.

Remaining consistent with, and as was referenced in the PTC and other documents submitted to NCDENR, Phase 1 of the landfill development has been planned in the following six stages:

- Stage 1: Cells 1 and 2 subgrade preparation (clearing and grubbing);
- Stage 2: Structural Fill to Cells 1 and 2 subgrade (compliant with .1700 rule regulations);
- Stage 3: Cells 1 and 2 construction and operation;
- Stage 4: Cells 3 and 4 subgrade preparation (clearing and grubbing);
- Stage 5: Structural Fill to Cells 3 and 4 subgrade (compliant with .1700 rule regulations); and,
- Stage 6: Cells 3 and 4 construction and operation.

At the time of this report, the Construction Certification Report for Cells 1 and 2, Stages 1 and 2 have been completed and Stage 3 is underway, with this report representing the completion of Cells 1 and 2 construction. This will be followed, under the same Stage 3 designation, by Cells 1 and 2 operation, or filling. We note that notification for both Stages 2 and 5 .1700 Rules fill has already been provided in the "Structrual Fill Facility

Notification" dated May 29, 2010 and that Duke Energy will begin, by necessity, stages subsequent to Stage 3 prior to completion of Stage 3.

The Construction Certification Report for the Cells 1 and 2 is organized into the following four sections:

- Section 1 – Provides a brief overview of the site and project;
- Section 2 – Discusses CQA documentation during earthworks construction including subgrade fill, structural fill, compacted soil liner, and protective cover;
- Section 3 – Discusses geosynthetics CQA documentation related to geosynthetic clay liner (GCL), high density polyethylene (HDPE) geomembrane, and geocomposite drainage layers;
- Section 4 – Discusses leachate management measures and ancillary facilities such as primary and secondary power supply, physical security and visual screening and zoning compliance; and,
- Section 5 – Summarizes project documentation, including construction photographs, field reports, meeting minutes, and notices of change.

Pertinent CQA documentation, including earthworks field and laboratory test results, geosynthetics manufacturer's quality control (MQC) and conformance test results, geosynthetics installation CQA documentation, record drawings, and project documentation are included in the Appendices.

For reference, the Industrial Landfill No. 1 construction work was generally performed in the following three areas: 1) the Landfill Area, 2) the Stockpile Area, and 3) the Borrow Area. These areas are connected to one another by an existing haul road. The site figure Landfill Work Areas (Figure 1) attached to this report illustrates these areas.

1.2 Landfill Area

As shown on Figure 1, the Landfill Area for Cells 1 and 2 is located at the north end of the Marshall Steam Station property south of Island Point Road. Construction activities within the Landfill Area included earthworks excavation, fill for subgrade, structural fill, compacted soil liner, and protective cover, as well as geosynthetics installation. Some excavated material was stockpiled within the Landfill Area and used for structural fill or compacted soil liner construction, if suitable. The majority of material excavated from the Landfill Area was placed in the Stockpile Area. Some of the material placed in the Stockpile Area was used as protective cover material. Soil material brought into the Landfill Area originated either from the Stockpile Area or the Borrow Area.

1.3 Stockpile Area

As shown on Figure 1, the Stockpile Area for Cells 1 and 2 construction is located at the southeastern corner of the inactive ash basin. Construction activities within the Stockpile Area included stockpiling of material excavated from the Landfill Area as well as

excavation from the Stockpile Area of material suitable for use as protective cover material for Cells 1 and 2 construction.

1.4 Borrow Area

As shown on Figure 1, the Borrow Area is located generally between the Landfill Area and the Stockpile Area. Material taken from the Borrow Area was used mainly for compacted soil liner material for Cells 1 and 2 construction. The Borrow Area was originally a stockpile area created for future landfill construction activities during Stage 1 construction (a previous and preparatory stage of construction). Construction activities within the Borrow Area generally consisted of maintaining previously installed erosion and sediment control measures, excavating soil, grading for drainage, and seeding.

1.5 Earthworks Construction

Earthworks construction activities generally involved excavation and placement of subgrade fill, structural fill, compacted soil liner, and protective cover. Subgrade fill was performed in accordance with .1700 rules by South East Fly Ash, Inc. (SEFA) beginning in August 2009 and ending in July 2010. Subgrade fill operations performed by SEFA were monitored by Shield Engineering, Inc. Excavation, subgrade fine grading, and construction of the structural fill, compacted soil liner, and protective cover was performed by Earnhardt Grading, Inc. beginning in March 2010 and ending in October 2010. S&ME, Inc. (S&ME) monitored construction activities and provided testing services during earthworks operations.

1.6 Geosynthetics Installation

S&ME coordinated and verified pre-qualification and conformance testing for geosynthetics prior to installation. Geosynthetics installation consisted of GCL, HDPE geomembrane, and geocomposite drainage layers with installation of the secondary liner followed by installation of the primary liner.

Geosynthetics installation was performed by Environmental Solutions, Inc. (ESI) beginning in June 2010 with Cell 1 and ending in July 2010 with Cell 2. S&ME monitored geosynthetics installation activities and performed testing services during geosynthetics installation.

1.7 Certification

Observation and testing results indicated that the earthworks construction and geosynthetics installation was completed in general accordance with the approved CQA Plan. A Construction Certification Statement signed and sealed by the Engineer of Record for design and construction, a registered Professional Engineer in the State of North Carolina, is included as an upfront document in this report.

2. EARTHWORKS

Earthworks construction activities included excavation and/or fill of four material types: subgrade fill; structural fill; compacted soil liner; and protective cover materials. Material descriptions and general construction procedures for the four material types are summarized in Sections 2.1 through 2.4. Earthworks construction observation and testing activities are summarized in Section 2.5.

2.1 Subgrade Fill

The subgrade fill material definition and subgrade fill general construction procedures are summarized in this section. Observation and testing results are reported in Section 2.5.

2.1.1 Material

Subgrade fill is defined as compacted fill placed to achieve proposed liner system subgrade elevations. Subgrade fill primarily consisted of conditioned ash from the silos near the plant.

2.1.2 Construction

Subgrade fill construction was performed by SEFA beginning in August 2009 and ending in July 2010 in accordance with the .1700 rules. Based on the information provided in the "Structural Fill Facility Notification", approximately 385,000 cubic yards of material were placed to complete the Cells 1 and 2 subgrade fill. The subgrade fill was compacted to meet the requirements specified in the referenced notification. Perimeter subgrade fill slopes (south and west slopes) were constructed at 3 horizontal to 1 vertical (3H:1V).

2.2 Structural Fill

The structural fill material definition and general construction procedures are summarized in this section. Observation and testing results are reported in Section 2.5.

2.2.1 Material

Structural fill is defined as compacted soil required for perimeter berms, surface water control systems, roadways, fill areas not within the landfill cells, or other systems not intended to function as a migration barrier. Structural fill consisted of on-site borrow soils that were free of organic material, refuse or debris. Ash was not used as structural fill.

2.2.2 Construction

Structural fill construction for Cells 1 and 2 was performed by Earnhardt Grading beginning in March 2010 and ending in May 2010. Based on the engineer's quantity estimate, approximately 3,300 cubic yards of soil were placed as structural fill required for Cells 1 and 2 construction. The structural fill was compacted to meet the specified project requirements. The majority of structural fill was constructed in perimeter berms along the north perimeter, west perimeter, and south perimeter of, and in between Cells 1 and 2.

2.3 Compacted Soil Liner

The compacted soil liner material definition and general construction procedures are summarized in this section. Observation and testing results are reported in Section 2.5.

2.3.1 Material

Compacted soil liner is defined as low permeability (less than or equal to 1.0 x 10^{-5} cm/sec) soil constructed in the liner system. The compacted soil liner consisted of on-site borrow soils that were free of organic material, refuse, debris, and large rocks or clods consistent with technical specification requirements. The compacted soil liner material consisted of a combination of fine grained materials previously excavated and stockpiled in the Borrow Area for CSL construction and materials excavated from the upper soil profile in the Landfill Area.

2.3.2 Construction

Construction of the compacted soil liner for Cells 1 and 2 was performed by Earnhardt Grading beginning in early April 2010 with the construction of a 35 foot by 100 foot compacted soil liner test pad and ending with the full-scale compacted soil liner that was completed in July 2010. Based on the engineer's quantity estimate, approximately 48,000 cubic yards of soil was placed to complete the Cells 1 and 2 compacted soil liner.

The compacted soil liner was constructed in three lifts. For both Cells 1 and 2, the first lift was built with an approximate 8-inch thick lift to minimize compacted soil liner material mixing with the underlying subgrade ash while disking. The second and third lifts were approximately 6-inches thick resulting in an overbuilt compacted soil liner. Constructing the compacted soil liner with an overbuilt thickness aided in maintaining the appropriate moisture conditioning within the compacted soil liner. Prior to geosynthetics installation, the compacted soil liner was fine graded with the final compacted soil liner achieving a minimum 18-inch compacted soil liner thickness.

2.4 Protective Cover

The protective cover material definition and general construction procedures are summarized in this section. Observation and testing results are reported in Section 2.5.

2.4.1 Material

Protective cover is defined as soil fill placed over the geosynthetics liner system to protect it from landfill operations equipment. Protective cover fill consisted of on-site borrow soil that is free of organic material, refuse, or debris.

2.4.2 Construction

Earnhardt Grading placed protective cover from July 2010 through September 2010. Based on the engineer's quantity estimate, approximately 64,000 cubic yards of material was placed to complete the Cells 1 and 2 protective cover. Protective cover was constructed in one uniform lift to a thickness of at least 24 inches on top of the LCS geocomposite drainage layer. Protective cover construction extends to the liner system limit at the anchor trench on the perimeter of Cells 1 and 2.

2.5 Observation & Testing

S&ME observed, monitored, and provided field and laboratory testing during earthworks construction. Borrow soils used during construction were monitored to evaluate that the materials conformed to the project specifications.

Field and laboratory testing were performed at the specified frequencies summarized in this section. Field and laboratory testing frequency requirements are stated per volume of material and are based on lift area and thickness requirements provided in the specifications. Tables 1 and 2 summarize frequency verification for field and laboratory testing of earthworks.

2.5.1 Field Observation & Testing - Subgrade and Structural Fill

Field testing consisted of performing field density tests using the drive cylinder method (ASTM D2937) and moisture content tests (ASTM D2216). Shield Engineering, Inc. monitored subgrade fill operations and S&ME monitored structural fill operations. Field density tests were performed at the following frequency with the specified moisture-density requirements:

Soil Type	Frequency	Moisture Requirement	Density Requirement
Subgrade Fill	1 test per 5,000 CY	±3% of OMC[2]	95% Standard Proctor MDD[3]
Structural Fill	1 test per 807 CY[1]	±3% of OMC[2]	95% Standard Proctor MDD[3]

[1]Frequency based on one test every lift 43,560 square feet in area, and with a thickness of 0.5 feet
[2]Optimum moisture content
[3]Maximum dry density

Field density test results for the subgrade and structural fill are included in Appendix I, Sections 1 and 2, respectively. The subgrade density test results are summarized in a series of "Summary Report" documents, prepared by Shield Engineering, Inc. issued for testing performed from August 2009 through June 2010. Copies of these reports are included in Appendix I, Section 1. The subgrade density test locations are included in the "Summary Report" documents.

Two-hundred and eighty-seven (287) field density tests were performed on the subgrade fill that met both density and moisture requirements. An additional one-hundred and thirty-eight (138) field density tests met density requirements but not moisture requirements. Shield Engineering, Inc. allowed exceptions to the moisture content compaction criteria provided that the density requirements were achieved. Allowance was provided on field density test results compaction and moisture criteria during bridge lift construction in the first few days of subgrade fill operations. Referencing Table 1, the

number of passing tests exceeded the seventy-seven (77) tests required to meet the specified frequency.

Fifteen (15) field density tests were performed on the structural fill that met both density and moisture requirements. An additional six (6) field density tests met density requirements but not moisture requirements. S&ME allowed exceptions to the moisture content compaction criteria provided that the density requirements were achieved. Referencing Table 1, the number of passing tests exceeded the four (4) tests required to meet the specified frequency.

Based on in-place material quantities, the number of passing field tests, as reported in Table 1, met the required testing frequencies for subgrade and structural fill.

2.5.2 Laboratory Testing (Subgrade and Structural Fill)

Subgrade fill testing was generally performed at a frequency of one suite of tests per 20,000 cubic yards and structural fill laboratory testing was performed at a frequency of approximately one suite of tests per 10,000 cubic yards of material placed. Shield Engineering, Inc. monitored subgrade fill operations and S&ME monitored structural fill operations. In general, each suite of tests included the following:

- Water (Moisture) Content (ASTM D2216);
- Particle Size (ASTM D422);
- Liquid Limit, Plastic Limit, and Plasticity Index (ASTM D4318); and
- Standard Proctor Compaction (ASTM D698).

Laboratory test results for the subgrade and structural fill are included in Appendix I, Sections 1 and 2, respectively. The subgrade laboratory test results are provided in a series of "Summary Report" documents, prepared by Shield Engineering, Inc. issued for testing performed from August 2009 through June 2010. Copies of these reports are included in Appendix I, Section 1. The quantity of subgrade and structural fill material placed and the number of laboratory tests conducted are reported in Table 2. Approximately 385,000 cubic yards of subgrade fill was placed. By frequency, 20 tests would be required; however, due to the consistency of the subgrade fill material test results, only 14 test suites were performed.

Approximately 3,300 cubic yards of structural fill were placed, a relatively small quantity compared to subgrade fill, compacted soil liner, and protective cover quantities. Structural fill was obtained as-needed during construction from the same source as material used for compacted soil liner and protective cover. As such, laboratory testing suites for structural fill alone were not performed; instead, laboratory test results for compacted soil liner and protective cover were used.

2.5.3 Field Observation & Testing (Compacted Soil Liner)

With the compacted soil liner being a more critical aspect of the liner construction, a compacted soil liner test pad was constructed prior to full-scale construction. Field

testing was performed during the compacted soil liner test pad construction and full-scale compacted soil liner construction. Field testing consisted of performing field density tests in general accordance with the drive cylinder method (ASTM D2937) and moisture content (ASTM D2216) test procedures. Field density tests were performed at the following frequency with the specified moisture-density requirements:

Soil Type	Frequency	Moisture Requirement	Density Requirement
Compacted Soil Liner	1 test per 370 CY	OMC[1] to +5% of OMC	95% Standard Proctor MDD[2]

[1]Optimum moisture content
[2]Maximum dry density

The compacted soil liner field density test results met the density and moisture requirements. Field density test results for the compacted soil liner test pad construction and full-scale construction are included in Appendix I, Section 3. Approximate field density test locations were referenced to a 100-foot by 100-foot grid system as shown on drawings in Appendix I, Section 3[i]. One-hundred and forty-eight (148) passing field density tests were performed on the compacted soil liner. Based on the engineer's quantity estimates, the number of field tests performed, as reported in Table 1, met the required testing frequencies for compacted soil liner.

The minimum 18-inch compacted soil liner thickness for Cells 1 and 2 was verified by comparing the elevations of final subgrade survey points to final compacted soil liner survey points at similar northing and easting locations and calculating the elevation difference. Donnie Lawrence & Associates provided survey points that were taken on an approximate 50-foot by 50-foot grid with survey points also taken at slope breaks in laterals, berms, and the sump area. The thickness verification data for Cells 1 and 2 are included in Appendix I, Section 3[ii], and it indicates that the minimum 18-inch compacted soil liner thickness was achieved.

[i] Specifically, these drawings can be found in Appendix I, Section 3, Subsections Cell 1 Compacted Soil Liner Field Density Test Locations and Cell 2 Compacted Soil Liner Field Density Test Locations.
[ii] Specifically, these drawings can be found in Appendix I, Section 3, Subsections Cell 1 Compacted Soil Liner As-Built Drawing and Cell 2 Compacted Soil Liner As-Built Drawing.

2.5.4 Laboratory Testing (Compacted Soil Liner)

Laboratory testing was performed during compacted soil liner test pad construction on each lift of the test pad. In general, each suite included the following tests:

- Water (Moisture) Content (ASTM D2216);
- Particle Size (ASTM D422);
- Liquid Limit, Plastic Limit, and Plasticity Index (ASTM D4318);
- Standard Proctor Compaction (ASTM D698);
- Remolded Flexible Wall Permeability (ASTM D5084); and
- Undisturbed Flexible Wall Permeability (ASTM D5084).

Laboratory test results for the compacted soil liner test pad construction are provided in Appendix I, Section 3. A summary table of compacted soil liner test pad laboratory test results is also provided in Appendix I, Section 3.

Undisturbed flexible wall permeability tests were performed on samples collected from each of the three lifts of the test pad. Permeability test results on the undisturbed samples from each lift met the minimum specified permeability (i.e. hydraulic conductivity) of 1.0 x 10^{-5} cm/sec.

Additionally, remolded flexible wall permeability tests were performed on bulk samples collected from each of the three lifts during test pad construction. Permeability samples were remolded to target molding conditions of approximately 2 percent wet of OMC and 95 percent compaction of its standard Proctor MDD. Remolded permeability test results for the three lifts met the minimum specified permeability. The test pad was removed and the material was re-worked to begin full-scale construction of the compacted soil liner.

Compacted soil liner laboratory testing during full-scale construction was performed at a frequency of approximately one suite of tests per 3,000 cubic yards of material placed. In general, each suite included the following tests:

- Water (Moisture) Content (ASTM D2216);
- Particle Size (ASTM D422);
- Liquid Limit, Plastic Limit, and Plasticity Index (ASTM D4318);
- Standard Proctor Compaction (ASTM D698); and
- Remolded Flexible Wall Permeability (ASTM D5084).

Remolded permeability tests were conducted to verify that compacted soil liner material met the specified 1.0 x 10^{-5} cm/sec permeability requirement. With a limited amount of borrow soil to be used as compacted soil liner, a portion of the remolded permeability tests were conducted on bulk samples collected in the excavation area within the Landfill

Area, while the remainder of the permeability tests were conducted on bulk samples collected in the Borrow Area. Bulk samples were generally collected on a grid system in the excavation area within the Landfill Area and the Borrow Area, which is referenced in the laboratory test results summary table and shown on the drawing provided in Appendix I, Section 3[i].

Permeability samples were remolded to target molding conditions of 2 percent wet of OMC and 95 percent of its standard Proctor MDD. Remolded permeability tests were conducted at net confining pressures of approximately 2.5 pounds per square inch (psi) and gradients ranging from 3.5 to 5. The net confining pressure of 2.5 psi used for permeability testing is relatively low in comparison to the confining pressures that will be experienced during landfill use. Permeability requirements were met for compacted soil liner samples. Summary tables and laboratory test results for compacted soil liner test pad and full-scale construction are included in Appendix I, Section 3. Based on estimated material quantities and the number of laboratory tests performed as reported in Table 2, the required testing frequencies for the compacted soil liner were satisfied.

Based on the laboratory permeability test results satisfying permeability requirements, the in-place density test results meeting moisture and density requirements, and the compacted soil liner thickness verification, we conclude that the compacted soil liner satisfies the approved CQA Plan requirements.

2.5.5 Field Observation & Testing (Protective Cover)

S&ME observed, monitored, and provided laboratory testing during protective cover construction. S&ME personnel observed construction traffic during protective cover construction to verify that there was no construction traffic directly on the geosynthetics. S&ME personnel also observed protective cover placement for the presence of wrinkles in the geosynthetics during placement with any wrinkles being “walked out” prior to additional cover material placement. Lift thicknesses were observed to verify a minimum lift thickness of 12 inches and a total thickness of at least 24 inches. Protective cover material was observed to verify that the material was free of organic material, refuse, and debris.

Protective cover thickness was also verified through surveying. The protective cover thickness was verified by comparing the elevations of compacted soil liner survey points with protective cover survey points at similar northing and easting locations and calculating the elevation difference. Donnie Lawrence & Associates provided survey data that was obtained on an approximate 50-foot by 50-foot grid with individual survey points also obtained at slope breaks in laterals, berms, and the sump area. Protective cover thickness verification as-built drawings and summary tables are included in

[i] Specifically, these drawings can be found in Appendix I, Section 3, Subsection Compacted Soil Liner Lab Test Sample Location Reference Map.

Appendix I, Section 4. The thickness verification data indicates that the minimum 24-inch thick protective cover thickness was achieved.

2.5.6 Laboratory Testing (Protective Cover)

Protective cover laboratory testing was performed at a frequency of approximately one suite of tests per 10,000 cubic yards of material placed. In general, each suite included the following tests:

- Particle Size (ASTM D422); and
- Liquid Limit, Plastic Limit, and Plasticity Index (ASTM D4318).

A summary table and laboratory test results for the protective cover are included in Appendix I, Section 4. Based on estimated material quantities and the number of laboratory tests performed as reported in Table 2, the required testing frequencies for the protective cover were satisfied.

3. GEOSYNTHETICS

Geosynthetics manufacturer quality control (MQC) testing and conformance testing were conducted prior to liner system construction to verify material conformance with the project requirements. MQC testing was performed and reported by the manufacturer. Conformance testing was performed by an independent laboratory on representative samples at a specified frequency. Materials tested included the GCL, HDPE geomembrane, and geocomposite drainage layer.

3.1 Pre-Installation Testing

Pre-installation testing consisted of MQC testing performed by the material manufacturers and conformance testing performed by a third party testing laboratory on samples collected from the manufacturing facility.

3.1.1 Manufacturer Quality Control (MQC) Testing

MQC test samples were collected at the manufacturing plant and tested in accordance with the approved plans and specifications. The MQC testing results and material certifications for GCL, geomembrane, and geocomposite are included in the attached Appendix II, Sections 1, 2, and 3. Review of the MQC test results indicates that the geosynthetic material properties satisfy the project requirements. Tables 4 through 7 summarize the required MQC tests, testing frequency, and the number of actual tests performed for the various geosynthetics. The information provided in Tables 4 through 7 indicates that the required testing frequencies were met.

3.1.2 Conformance Testing

Conformance test samples were collected at the factory and sent to Geotechnics, Inc. for conformance testing in accordance with the approved plans and specifications. In-plant sampling was coordinated by Geotechnics, Inc. Conformance test results are presented in Appendix II, Sections 1, 2, and 3. Review of the conformance test results indicates the geosynthetic material properties satisfy the project requirements. Tables 3 through 7 summarize the required conformance tests, testing frequency, and the number of actual tests performed for the various geosynthetics. The information provided in Tables 3 through 7 indicates that the required testing frequencies were satisfied.

3.2 Geosynthetic Clay Liner (GCL)

3.2.1 Material

The geosynthetic clay liner (GCL) used was a product called Bentomat ST, which consists of a layer of sodium bentonite between a woven geotextile base fabric and non-woven geotextile cover fabric that are needle-punched together. The Bentomat ST was manufactured by CETCO Lining Technologies of Cartersville, Georgia. Approximately 1,000,000 square feet of GCL was manufactured and delivered for the project.

3.2.2 Subgrade Certification

Prior to the placement of GCL and geomembrane, S&ME personnel and the Geosynthetic Installer's superintendent observed the subgrade condition of the compacted soil liner. The subgrade was observed to make sure that it was smooth-rolled and free of unacceptable cracks, ruts, or protrusions, such as rocks, roots, debris, or other foreign matter. The subgrade was monitored and accepted for GCL installation on a daily basis referencing the secondary geomembrane panels installed for the day. S&ME personnel and the Geosynthetic Installer's superintendent signed a Subgrade Certification CQA form as presented in Appendix II, Sections 5 and 7 for Cells 1 and 2, respectively.

3.2.3 Installation

The GCL was installed by ESI. The GCL was deployed using a rubber-tired front-end loader or a track-mounted backhoe. The loader or backhoe supported a steel rod with straps attached to the rod that inserted into the ends of each roll and allowed the material to be pulled directly off of the roll while suspended above the ground. The material was aligned utilizing manpower with wrinkles being removed during placement. Rolls were overlapped with a minimum of 6 inches overlap in the longitudinal direction with overlap seams being sealed by the SuperGroove™ seal technique. The SuperGroove™ consists of a cut in the nonwoven geotextile that allows bentonite to more freely extrude in the overlap zone. Rolls were overlapped with a minimum of 24 inches overlap at the end of roll with overlap seams being sealed with additional granular bentonite. The GCL was shingled in the direction of stormwater flow. Daily GCL deployment was covered by a secondary HDPE geomembrane to prevent hydration from rainfall or other surface water run-on.

3.3 Geomembrane

3.3.1 Material

The geomembrane consisted of a 60-mil thick HDPE double-sided textured geomembrane. The geomembrane product, "Microspike™", was manufactured by Agru America of Georgetown, South Carolina. Approximately 1,916,000 square feet of geomembrane was manufactured and delivered for the project.

3.3.2 Deployment

The HDPE geomembrane was installed by ESI. Rolls were deployed using a rubber-tired front-end loader or a track-mounted backhoe. The loader or backhoe supported a steel rod with straps attached to the rod that inserted into the ends of each roll and allowed the material to be pulled directly off of the roll while suspended above the ground. The material was aligned utilizing manpower. Two geomembrane layers were installed. The secondary geomembrane was deployed on top of the GCL. The primary geomembrane was deployed on top of the LDS, 330-mil or, as an alternate, 350-mil geocomposite drainage layer.

Generally, geomembrane rolls were deployed in long, straight stretches wherever possible. However, due to geometry, this was not always possible. Therefore, rolls were cut and reused, which resulted in one or more geomembrane panels from a geomembrane roll. Each panel was assigned a panel number sequentially numbered in the order that the panel was

placed. The panel number, length, manufacturer's geomembrane roll number, and date were recorded and documented on the Geomembrane Deployment Report CQA forms included in Appendix II, Sections 5, 6, 7 and 8. In general, the panels were then overlapped approximately four inches in preparation for seaming.

3.3.3 Field Seaming

Panel to panel field seams were predominantly bonded by double-hot-wedge-fusion welds although some seams were bonded by extrusion welds. Trial seams were performed and recorded prior to welding. The Geomembrane Trial Seam Log CQA forms are included in Appendix II, Sections 5, 6, 7 and 8.

At the beginning of each field seam, the welding machine number, welding technician's initials, welding speed and temperature, and the time for beginning the seam were recorded on the geomembrane and in the Geomembrane Seam Log CQA forms. Upon completion of each seam, the seam was non-destructively tested in accordance with the project requirements. Fusion welds were air pressure tested and extrusion welds were vacuum box tested. The non-destructive testing results were also recorded on the Geomembrane Seam Log CQA forms. The CQA forms for the geomembrane field seaming are included in Appendix II, Sections 5, 6, 7 and 8.

3.3.4 Laboratory Destructive Testing

Laboratory Destructive Test (LDT) samples were obtained at approximately every 500 linear feet of field seaming. The cumulative seam lengths were tracked daily. Through construction of primary and secondary geomembrane for both Cells1 and 2, approximately 83,475 linear feet of seam were welded. LDT samples were taken from 170 test locations and tested by S&ME on-site using a calibrated tensiometer. This exceeds the 167 tests required by frequency.

Ten 1-inch wide specimens were cut from each LDT sample. For each LDT test, five specimens were tested for peel adhesion and the other five tested for bonded shear strength. Performance criteria according to Table 02670-D of the technical specifications requires a peel strength of 91 lb/in for fusion seams and 78 lb/in for extrusion seams and a shear strength of 120 lb/in for both fusion and extrusion seams. These values are required for 4 out of 5 test specimens with the 5th specimen requiring a value as low as 80% of the aforementioned value. LDT results met and exceeded both fusion and extrusion weld performance criteria.

3.3.5 Defects and Repairs

S&ME personnel observed panel deployment and field seaming activities and recorded defects and repairs resulting from installation damage, laboratory destructive test sampling, improper welding techniques, or seam ends and intersections. Defects found on the panels were identified and repaired as documented on the Geomembrane Defect Log CQA forms, which are included in Appendix II, Sections 5, 6, 7 and 8.

Defects that did not fully penetrate the liner were repaired with a "grind-and-weld" repair. Repairs were patched using geomembrane pieces by grinding the periphery of the area to be patched; using a heat gun to “tack” the patch over the defect; and extrusion welding the patch over the defect. Repairs were then vacuum box tested as recorded in the Geomembrane Repair Testing Log CQA forms, which are included in Appendix II, Sections 5, 6, 7 and 8.

3.3.6 Geomembrane As-Built Drawing

Geomembrane as-built drawings are included for reference. Figures 1 through 4 show the location of panels, seams, and repairs for the corresponding geomembrane layer for both primary and secondary geomembranes for both Cells 1 and 2. Geomembrane as-built drawings were developed by S&ME with GPS locations provided by Earnhardt Grading.

3.4 Geocomposite Drainage Layer

3.4.1 Material

The geocomposite drainage layers consisted of a 330-mil thick geocomposite for both the LCS and LDS with additional approved alternate material consisting of 350-mil thick geocomposite. The geocomposites consisted of a Transnet HDPE geonet drainage core with GE180 8 oz/sy non-woven geotextiles heat bonded to each side. The geonet drainage core was manufactured by Engineered Synthetic Products, Inc. of Birmingham, Alabama, while the geotextiles were manufactured by Skaps Industries of Commerce, Georgia. Approximately 1,996,000 square feet of 330-mil geocomposite drainage layer was manufactured and delivered for the project including approximately 92,000 square feet of 350-mil alternate material.

3.4.2 Installation

The geocomposite was deployed using a rubber-tired front-end loader or a track-mounted backhoe. The loader or backhoe supported a steel rod with straps attached to the rod that inserted into the ends of each roll and allowed the material to be pulled directly off of the roll while suspended above the ground. The material was aligned utilizing manpower. Where possible, the geocomposite was shingled in the direction of stormwater flow. Two geocomposite drainage layers were installed. The 330-mil thick product and the 350-mil alternate, which were parts of the LDS system, were deployed on top of the secondary geomembrane. The 330-mil thick product, which was a part of the LCS system, was also deployed on top of the primary geomembrane.

Once the panels were placed, each panel was overlapped approximately 4 inches side-to-side and 12 inches end-to-end. The geonet component was tied using plastic fasteners. During installation of both the LDS and the LCS systems, the top geotextile component from adjacent panels was sewn. Wrinkles in the geocomposite drainage layer were repaired by manually straightening the panels. Holes or tears were repaired by laying 8 oz/sy nonwoven geotextile on top of the holes or tears and tack-bonding it to the nonwoven geotextile of the geocomposite.

3.5 LCS and LDS Piping

3.5.1 Material

The LCS and LDS piping consisted of perforated and solid wall HDPE SDR 17 pipe. 10-inch diameter header pipes running the full length of the cell floors were installed for both the LCS and LDS of both Cells 1 and 2. Eighteen (18)-inch diameter riser pipes and perforated sump pipes running to and into the LCS and LDS sumps were installed for both the LCS and LDS of both Cells 1 and 2.

LCS modifications included the addition of chimney drains composed of 18-inch diameter perforated corrugated HDPE riser pipes surrounded by an aggregate filter and additional segments of perforated 10-inch diameter solid wall HDPE SDR 17 pipe. The chimney drains are positioned over the LCS corridor and are to be used during landfill operations to promote contact water drainage.

3.5.2 Installation

The pipes were butt fusion welded together by Plastic Fusion, Inc., except for those installed as part of the LCS modification. Elbows prefabricated by Plastic Fusion were provided for the connection of the riser pipes to the sump pipes. Ten (10)-inch diameter header pipes were covered with drainage aggregate as shown in the construction drawings. Cell 1 and 2 LCS and LDS piping As-Built drawings are provided in Appendix II, Sections 10 and 11. Jet cleaning and camera inspection of LCS and LDS piping was performed for Cells 1 and 2 by Jetclean America. A jet cleaning and camera inspection report is provided in Appendix II, Section 12. The camera inspection found the LCS and LDS piping in both Cells 1 and 2 generally clean and defect free.

The LCS was modified for both Cells 1 and 2 to include 3 riser pipes and infiltration zones in each cell. These modifications were performed after protective cover installation and included careful removal of protective cover and replacement with drainage aggregate and pipes.

4. ANCILLARY FACILITIES

Ancillary facilities in the Landfill Area were constructed to manage leachate from the landfill, provide primary and back-up power supply to the site, provide physical security to the site, and provide visual screening for the site.

4.1 Leachate Management

Crowder Construction Company installed leachate discharge pipes that are joined together in underground leachate manifold vaults to transfer leachate into a common forcemain pipe. Crowder Construction Company installed and buried a forcemain pipe that runs south of the landfill in a southerly direction and discharges into the active ash basin. Crowder Construction Company also installed and constructed the control panel areas for both Cells 1 and 2, which consisted of concrete masonry unit retaining walls, underground vaults containing the leachate piping, and control panels connected to the electrical supply.

GunnCo Pump and Control, Inc. manufactured and installed pumps within the side slope riser pipes to remove leachate from the Cells 1 and 2 LCS and LDS sumps. The control panels are also equipped with high level, phase fault, and overload alarms which monitor leachate levels in the sump area, power supply, and pump performance. The pumping systems are equipped with flow meters that monitor leachate flow. The GunnCo pump submittal providing pumping system information is included in Appendix III, Section 1.

4.2 Primary and Back-Up Power Supply

As part of Electrical/Mechanical work for the landfill, Crowder Construction Company installed the electrical supply that feeds from a Duke Energy distribution line along Island Point Road. This feeds into a power distribution panel which can be alternatively powered by a back-up, emergency generator, which was also installed as part of the landfill project. Power cables run in buried conduits from the power distribution panel to both Cells 1 and 2. Cells 1 and 2 pumps and the control panels can be powered through automatic transfer switches by either the primary power supply or, in the event of an emergency which disables the primary power supply, with the back-up generator. The Electrical/Mechanical Drawing Set is attached in Appendix III, Section 2.

4.3 Physical Security

To provide security for the landfill site, Duke Energy contracted Gaston Fence Company, Inc. to install a 6-ft high chain link fence topped with 3-strands of barbed wire along the northern and western edge of the Marshall Steam Station property. The fencing work was completed in December of 2010. The Fencing Plan Drawing Set is attached in Appendix III, Section 3.

4.4 Visual Screening and Zoning Compliance

For Catawba County zoning compliance, a visual vegetative screen was installed along the northern and eastern perimeter of Phase 1. The screen consists of planted double and

single rows of Leyland Cypress, as well as vegetated berms planted with a variety of species. Upon review, Catawba County Planning, Parks, and Development accepted the screening measures and issued a Zoning Compliance Certificate on 11/1/2010. The visual screening plan and Zoning Compliance Certificate are attached in Appendix III, Section 4.

5. PROJECT DOCUMENTATION

Construction activities and project progress were documented throughout construction. While on site, S&ME engineering staff and technicians observed and documented construction activities as summarized in daily field reports and photographs. Project meetings were conducted periodically and were documented in meeting minutes. Changes to the project plans and specifications were documented with a Notice of Change. The project documentation information is included in Appendix IV.

Figures

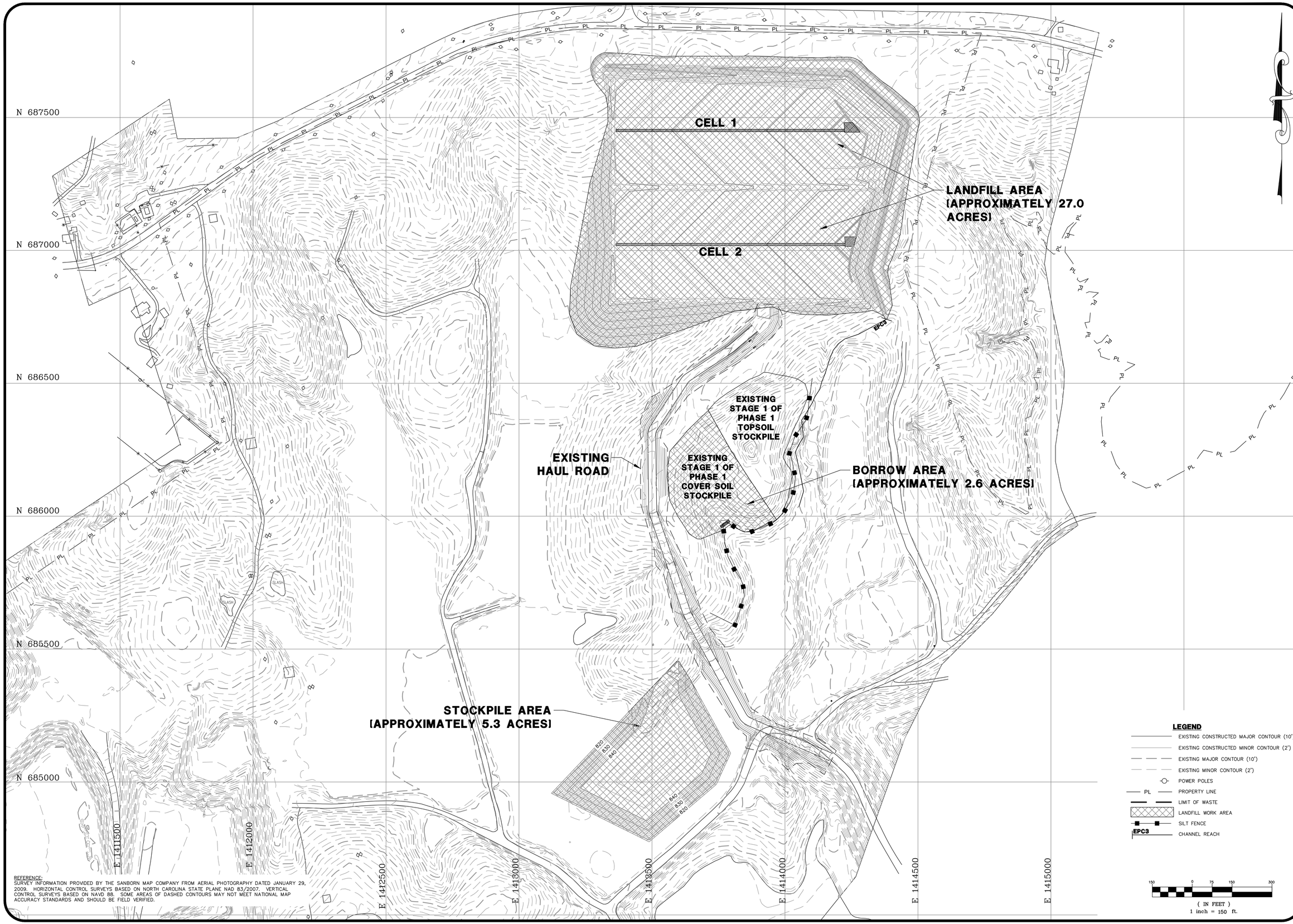
Figure 1: Landfill Work Areas

Figure 2: Cell 1 Secondary Geomembrane As-Built Drawing

Figure 3: Cell 1 Primary Geomembrane As-Built Drawing

Figure 4: Cell 2 Secondary Geomembrane As-Built Drawing

Figure 5: Cell 2 Primary Geomembrane As-Built Drawing



REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. SOME AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED.

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NO.	DATE	DESCRIPTION	BY

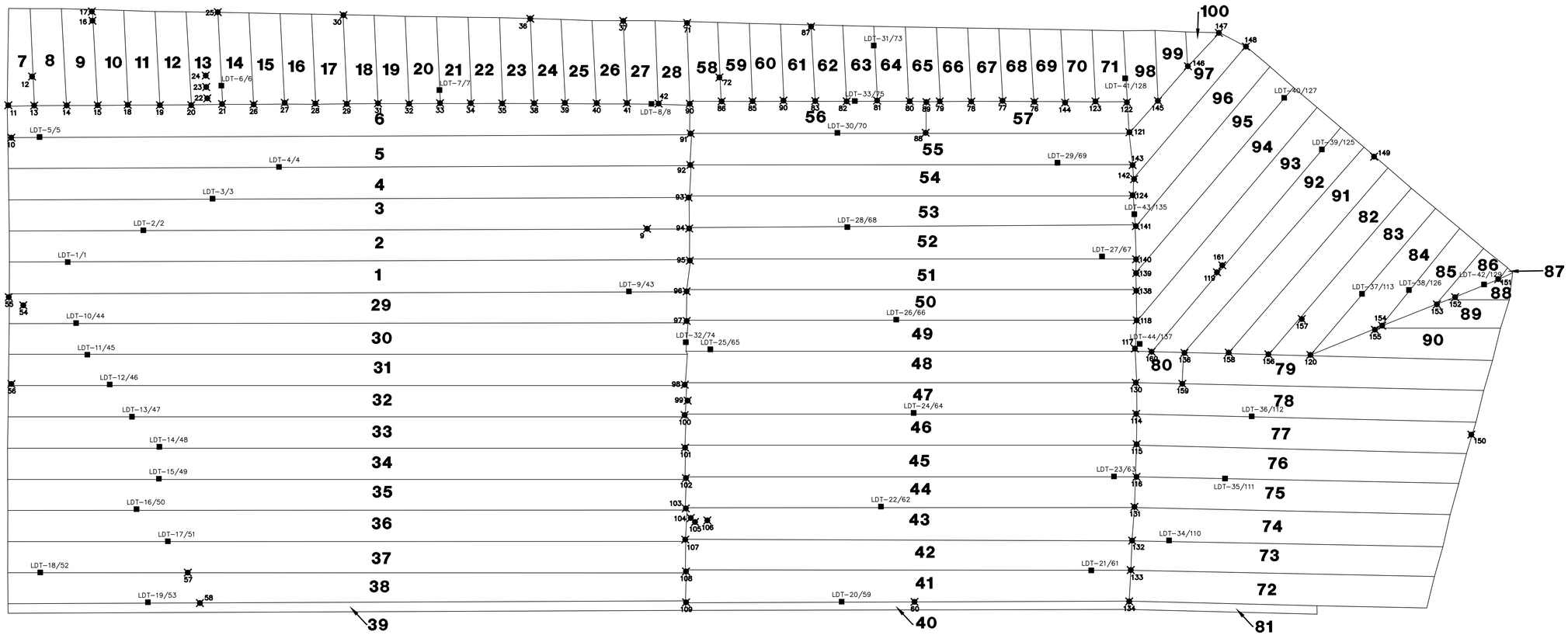
LANDFILL WORK AREAS CELLS 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: WMH
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-08-122	
SCALE: 1" = 60'	DATE: 12-8-2010
FIGURE: 1	OF: 5

DRAWING PATH: S:\1356\PROJECTS\2009\356-09-222 Marshall Industrial Landfill\Construction\Certification Reports and\1 Work Areas.dwg S:\1356\PROJECTS\2009\356-09-222 MARSHALL INDUSTRIAL LANDFILL\CONSTRUCTION\CERTIFICATION REPORTS AND\1_WORK AREAS.DWG



LEGEND

- ■ LABORATORY DESTRUCTIVE TEST SAMPLE / REPAIR LOCATION
- ✖ REPAIR LOCATION
- **81** GEOMEMBRANE PANEL NUMBER

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)

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NO.	DATE	DESCRIPTION	BY

CELL 1 SECONDARY GEOMEMBRANE AS-BUILT DRAWING

MARSHALL STEAM STATION TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	WMH
DESIGNED BY:	APPROVED BY:
WMH	KRD

PROJECT NUMBER 1356-08-122

SCALE:	DATE:
1" = 40'	12-8-2010

FIGURE:	OF:
2	5

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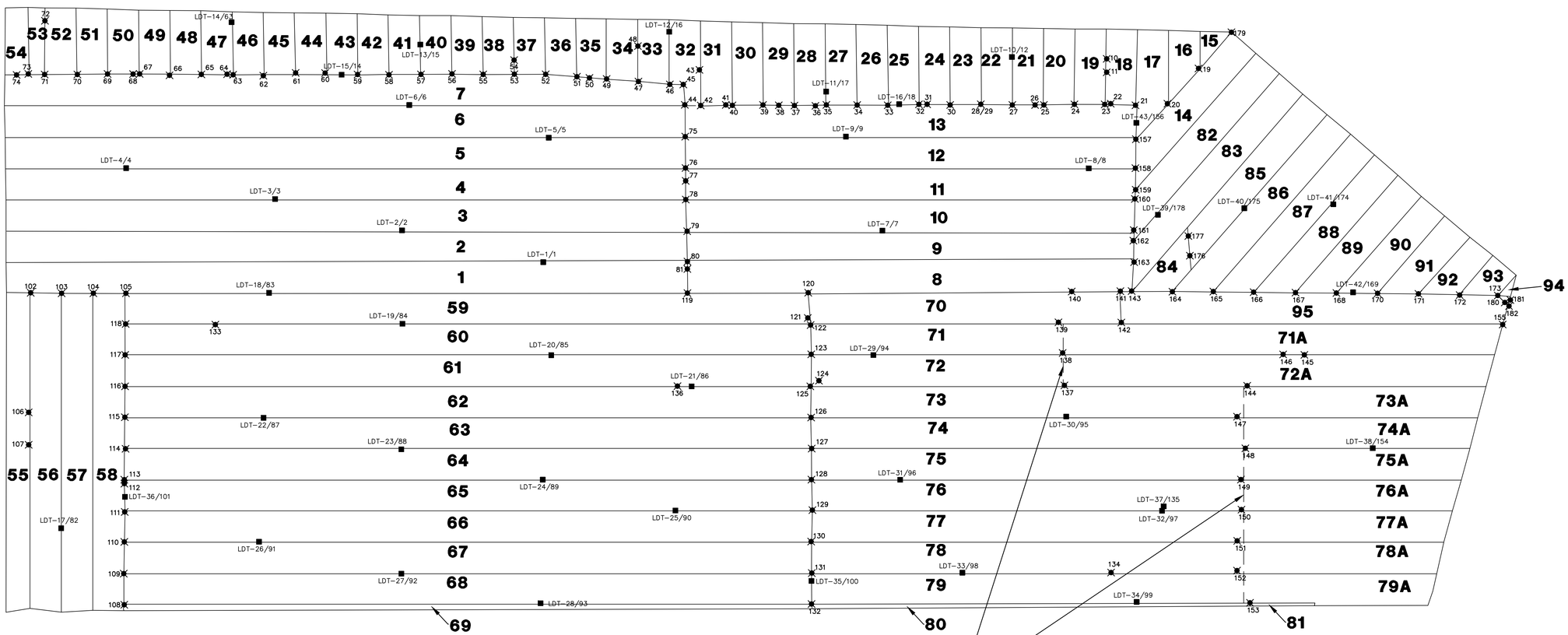

LEGEND

- ■ LABORATORY DESTRUCTIVE TEST SAMPLE / REPAIR LOCATION
- ✖ REPAIR LOCATION
- **81** GEOMEMBRANE PANEL NUMBER

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)

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NO.	DATE	DESCRIPTION	BY

CELL 1 PRIMARY GEOMEMBRANE AS-BUILT DRAWING

MARSHALL STEAM STATION TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	WMH
DESIGNED BY:	APPROVED BY:
WMH	KRD

PROJECT NUMBER 1356-08-122

SCALE:	DATE:
1" = 40'	12-8-2010
FIGURE:	OF:
3	5

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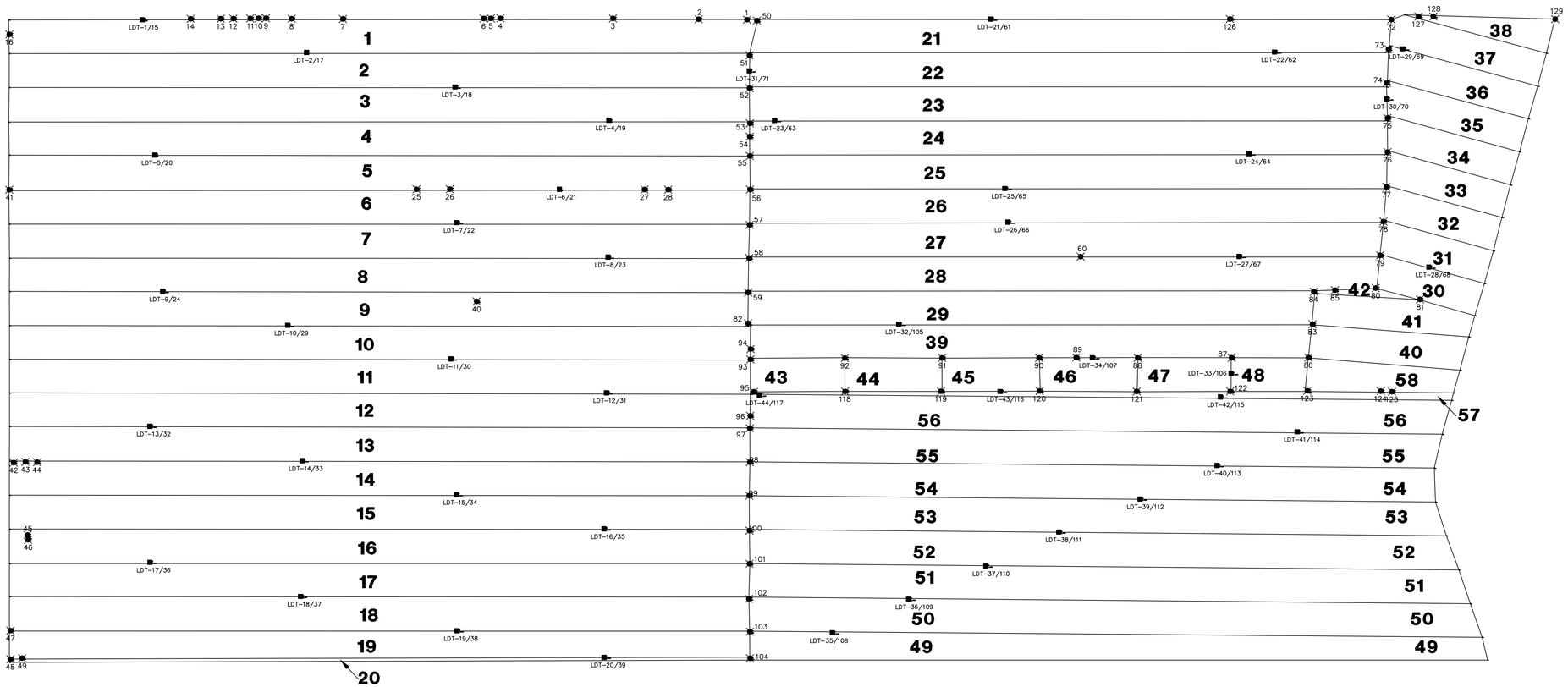

LEGEND

- ■ LABORATORY DESTRUCTIVE TEST SAMPLE / REPAIR LOCATION
- ✖ REPAIR LOCATION
- **49** GEOMEMBRANE PANEL NUMBER

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)

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NO.	DATE	DESCRIPTION	BY

CELL 2 SECONDARY GEOMEMBRANE AS-BUILT DRAWING

MARSHALL STEAM STATION TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	WMH
DESIGNED BY:	APPROVED BY:
WMH	KRD

PROJECT NUMBER: 1356-08-122

SCALE:	DATE:
AS SHOWN	12-8-2010

FIGURE:	OF:
4	5

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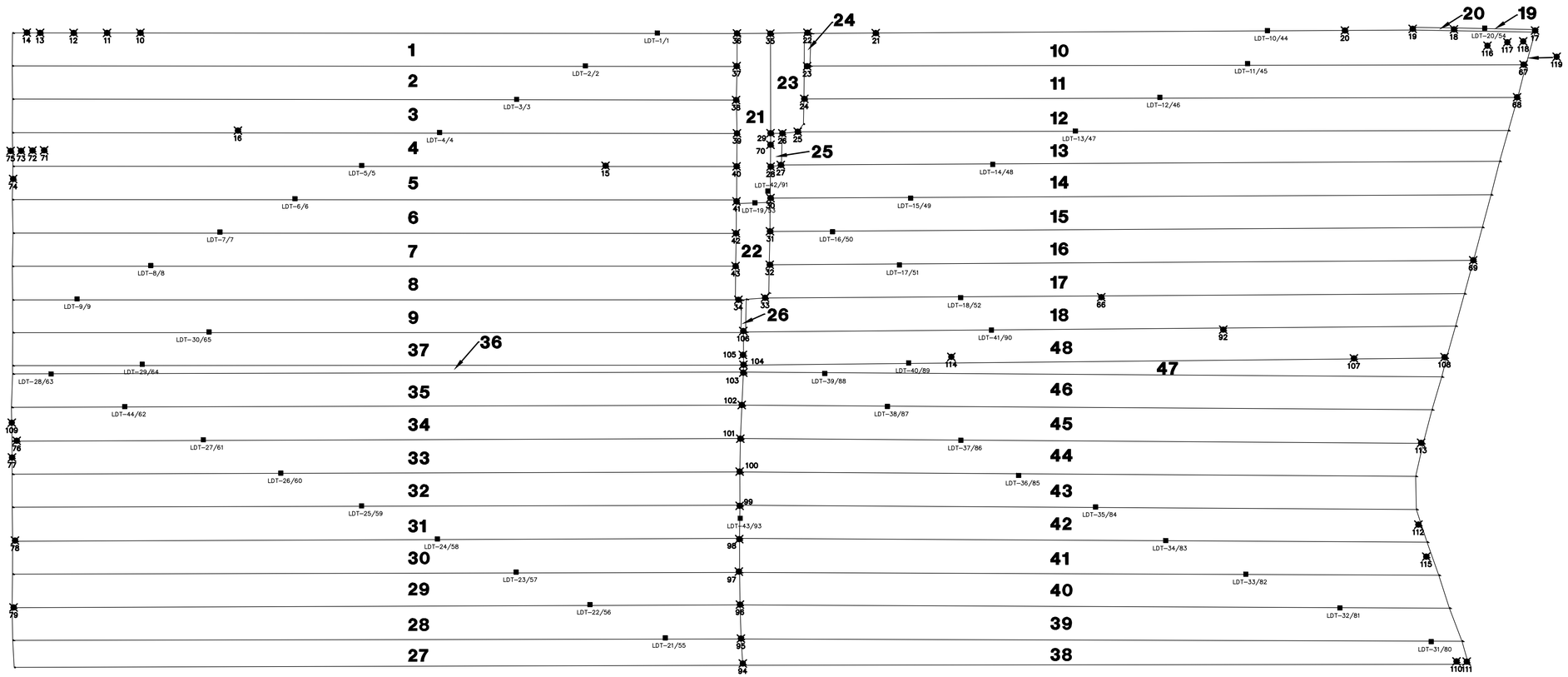

LEGEND

- ■ LABORATORY DESTRUCTIVE TEST SAMPLE / REPAIR LOCATION
- REPAIR LOCATION
- **48** GEOMEMBRANE PANEL NUMBER

GRAPHIC SCALE

40 0 20 40 80

(IN FEET)

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(704)523-4726

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NO.	DATE	DESCRIPTION	BY

CELL 2 PRIMARY GEOMEMBRANE AS-BUILT DRAWING

MARSHALL STEAM STATION TERRELL , NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	WMH
DESIGNED BY:	APPROVED BY:
WMH	KRD

PROJECT NUMBER: 1356-08-122

SCALE:	DATE:
AS SHOWN	12-8-2010
FIGURE:	OF:
5	5

DRAWING PATH: Q:\1356\DUKE ENERGY\08-122 Marshall ILF #1\DWG\Industrial Landfill As-Built Info\Cell 2 Primary Liner Asbuilt 8-2-10.dwg

Tables

Table 1: Earthworks Field Testing Frequency Verification

Table 2: Earthworks Laboratory Testing Frequency Verification

Table 3: Interface Friction Laboratory Test Summary

Table 4: Geosynthetic Clay Liner Laboratory Test Summary

Table 5: 60-Mil, Textured HDPE Geomembrane Laboratory Testing Summary

Table 6: 330-Mil, Leachate Collection System (LCS) Geocomposite Testing Summary

Table 7: 330-Mil, Leak Detection System (LDS) Geocomposite Alternate Testing Summary

Table 8: Geomembrane Laboratory Destructive Testing (LDT) Frequency Verification

APPENDIX I – EARTHWORKS

Section 1 – Subgrade
Section 2 – Structural Fill
Section 3 – Compacted Soil Liner
Section 4 – Protective Cover

TABLE 1

EARTHWORKS FIELD TESTING FREQUENCY VERIFICATION

DESCRIPTION	TEST STANDARD	CELLS 1 AND 2 IN-PLACE VOLUME ESTIMATE (CY)	PROJECT SPECIFICATIONS	FIELD TEST FREQUENCY (1 test per X CY)	NUMBER OF TESTS IN CELLS 1 AND 2	
					REQUIRED	PASSING
Subgrade Fill (.1700 Rules Fill)						
Nuclear or Drive-Cyliner Density	ASTM D 6938 (previously D 2922) or ASTM D 2937	385,000[1]	95% Standard Proctor MDD	5,000	77	436[5]
Moisture Content	ASTM D 2216		+ or - 3% of OMC			298[5]
Structural Fill						
Nuclear or Drive-Cyliner Density	ASTM D 6938 (previously D 2922) or ASTM D 2937	3,300[2]	95% Standard Proctor MDD	807[3]	4	21
Moisture Content	ASTM D 2216		+ or - 3% of OMC			15
Compacted Soil Liner						
Drive-Cyliner Density	ASTM D 2937	47,927[2]	95% Standard Proctor MDD	370[4]	130	148
Moisture Content	ASTM D 2216		OMC to + 5% of OMC			148

1. Quantity based on quantity estimate provided in .1700 Rules Structural Fill Notification.
2. Quantity based on pre-construction (bid) engineer's quantity estimate.
3. Frequency based on 1 test every lift 43,560 square feet in area, and with a thickness of 0.5 feet.
4. Frequency based on 6 tests within 4 grids of 100 foot length and width, and with a thickness of 1.5 feet.
5. Number of tests meeting density and moisture requirements, respectively. Some tests meeting density criteria did not meet moisture content criteria. A total of 493 tests were performed, including retests. 287 tests met both compaction and moisture content requirements.

TABLE 2

EARTHWORKS LABORATORY TESTING FREQUENCY VERIFICATION

DESCRIPTION	TEST STANDARD	CELLS 1 AND 2 IN-PLACE VOLUME ESTIMATE (CY)	LAB TEST FREQUENCY (per CY)	NUMBER OF TESTS IN CELLS 1 AND 2	
				REQUIRED	PASSING
Subgrade Fill (.1700 Rules Fill)					
Moisture Content	ASTM D 2216	385,000[1]	20,000	20	N/R
Grain-size with Hydrometer	ASTM D 422			20	14[3]
Atterberg Limits	ASTM D 4318			20	14[3]
Standard Proctor	ASTM D 698			20	14[3]
Structural Fill					
Moisture Content	ASTM D 2216	3,300[2]	10,000	1	27[4]
Grain-size with Hydrometer	ASTM D 422			1	29[4]
Atterberg Limits	ASTM D 4318			1	29[4]
Standard Proctor	ASTM D 698			1	27[4]
Compacted Soil Liner					
Grain-size with Hydrometer	ASTM D 422	47,927[2]	3,000	16	22
Atterberg Limits	ASTM D 4318			16	22
Standard Proctor	ASTM D 698			16	20
Remolded Permeability	ASTM D 5084			16	20
Protective Cover					
Grain-size with Hydrometer	ASTM D 422	63,902[2]	10,000	7	7
Atterberg Limits	ASTM D 4318			7	7

1. Quantity based on quantity estimate provided in .1700 Rules Structural Fill Notification.
2. Quantity based on pre-construction (bid) engineer's quantity estimate.
3. Owing to consistency of subgrade fill test results, fewer tests than specified was deemed acceptable. 11 additional standard proctor tests were referenced in the summary of density tests which are not counted in the total as they were performed prior to beginning of .1700 Rules Subgrade Fill.
4. Includes tests performed on Compacted Soil Liner and Protective Cover material as the Structural Fill material came from excavation areas within the landfill footprint (the same source of Protective Cover and Compacted Soil Liner material).

TABLE 3

INTERFACE FRICTION LABORATORY TEST SUMMARY

INTERFACE 1	INTERFACE 2	PEAK FRICTION ANGLE[1,2] (degrees)	PEAK ADHESION[1,2] (psf)	LARGE DISPLACEMENT FRICTION ANGLE[2] (degrees)	LARGE DISPLACEMENT ADHESION[2] (psf)
Compacted Soil Liner	GCL (woven geotextile - black side)	24.7	217	19	367
Compacted Soil Liner	GCL (nonwoven geotextile - white side)	26.4	233	23.7	319
GCL (woven geotextile - black side)	Geomembrane (top side)	36.9	445	13.8	292
GCL (woven geotextile - black side)	Geomembrane (bottom side)	20.4	943	11.2	385
GCL (nonwoven geotextile - white side)	Geomembrane (top side)	34.9	293	4.7	1150
GCL (nonwoven geotextile - white side)	Geomembrane (bottom side)	25.2	682	11.1	468
Geomembrane (top side)	Geocomposite	27.1	894	11	354
Geomembrane (bottom side)	Geocomposite	21.7	358	11.8	186

1. Minimum project interface shear strength requirements were met. Peak shear strength envelope is characterized by peak friction angle and peak adhesion; see appendices for peak shear strength envelope plots.
2. Interface friction laboratory tests performed in general accordance with ASTM D6243. Tests performed under 1,000, 4,000, 8,000, and 12,000 psf normal loads at a strain rate of 0.04 in/min.

TABLE 4

GEOSYNTHETIC CLAY LINER LABORATORY TESTING SUMMARY

DESCRIPTION	TEST STANDARD	PROJECT SPECIFICATIONS	TEST FREQUENCY		NUMBER OF TESTS			
					REQUIRED		PASSING	
			MANF. QC	CONF. QA (ft^2)	MANF. QC	CONF. QA	MANF. QC	CONF. QA
Bentonite								
Bentonite Swell Index (mL/2g)	ASTM D 5890	>24	50 tons	N/A	9	N/A	12	N/A
Bentonite Fluid Loss (mL)	ASTM D 5891	<18	50 tons	N/A	9	N/A	12	N/A
Geotextile								
Bentonite Mass/Area (lb/ft^2)	ASTM D 5993	>0.75	40,000 ft^2	100,000	26	11	32	12
Grab Tensile Strength (lb/in)	ASTM D 6768	>30	200,000 ft^2	100,000	6	11	32	12
Peel Strength (lb/in)	ASTM D 6496	>3.5	40,000 ft^2	100,000	26	11	32	12
Index Flux ($m^3/m^2/sec$)	ASTM D 5887	$<1.0 \times 10^{-8}$	Periodic	100,000	N/A	N/A	N/R	12
Hydraulic Conductivity (cm/sec)	ASTM D 5887	$<5.0 \times 10^{-9}$	Periodic	100,000	N/A	11	N/R	12
Hydrated Internal Shear Strength (psf)	ASTM D 6243	>500 @ 200 psf	Periodic	N/A	N/A	N/A	N/R	N/A

Total Number of Rolls Delivered to Site:	447
Total Area of Rolls Delivered to Site (ft^2):	1,005,750
Total Weight of Rolls Delivered to Site (lbs):	1,201,258
Total Weight of Rolls Delivered to Site (tons):	601
Total Weight of Bentonite According to Mass/Area (tons):	429

TABLE 5

60-MIL, TEXTURED HDPE GEOMEMBRANE LABORATORY TESTING SUMMARY

DESCRIPTION	TEST STANDARD	PROJECT SPECIFICATIONS	TEST FREQUENCY		NUMBER OF TESTS			
					REQUIRED		PASSING	
			MANF. QC (lbs)	CONF. QA (ft^2)	MANF. QC	CONF. QA	MANF. QC	CONF. QA
Thickness (mil)	ASTM D 5994	60	each roll	100,000	165	20	165	20
Asperity Height (mil)	GM 12	10	every 2nd roll	N/A	83	N/A	165	N/A
Density (g/cm^3)	ASTM D 792 /	0.940	200,000	100,000	4	20	4	20
Yield Strength (lb/in)	ASTM D 6693	126	20,000	100,000	32	20	165	20
Yield Elongation (%)	ASTM D 6693	12	20,000	100,000	32	20	165	20
Break Strength (lb/in)	ASTM D 6693	90	20,000	100,000	32	20	165	20
Break Elongation (%)	ASTM D 6693	100	20,000	100,000	32	20	165	20
Tear Resistance (lb)	ASTM D 1004	42	45,000	100,000	14	20	17	20
Puncture Resistance (lb)	ASTM D 4833	90	45,000	N/A	14	N/A	17	N/A
Carbon Black Content (%)	ASTM D 4218	2 - 3	20,000	100,000	32	20	44	20
Carbon Black Dispersion	ASTM D 5596	9 in Categories 1 or 2	45,000	N/A	14	N/A	33	N/A
Oxidative Inductive Time - Standard (min)	ASTM D 3895	100	200,000	N/A	4	N/A	4	N/A
Oxidative Inductive Time - High Pressure (min)	ASTM D 5885	400	200,000	N/A	4	N/A	N/R	N/A
Oven Aging at 85° C - Standard (%)	ASTM D 3895	55	ea. formulation	N/A	4	N/A	N/R	N/A
Oven Aging at 85° C - High Pressure (%)	ASTM D 5885	80	ea. formulation	N/A	4	N/A	N/R	N/A

Total Number of Rolls Delivered to Site:	165
Total Area of Rolls Delivered to Site (ft^2):	1,916,475
Total Weight of Geomembrane Delivered to Site (lbs):	623,558
Total Number of Formulations:	4

TABLE 6

330-MIL, LEACHATE COLLECTION SYSTEM (LCS) AND LEAK DETECTION SYSTEM (LDS) GEOCOMPOSITE TESTING SUMMARY

DESCRIPTION	TEST STANDARD	PROJECT SPECIFICATIONS	TEST FREQUENCY		NUMBER OF TESTS			
					REQUIRED		PASSING	
			MANF. QC (ft^2)	CONF. QA (ft^2)	MANF. QC	CONF. QA	MANF. QC	CONF. QA
Geonet								
Thickness (mil)	ASTM D 5199	330	50,000	100,000	40	20	45	20
Density (g/cm^3)	ASTM D 1505	0.94	50,000	100,000	40	20	45	20
Tensile Strength (lb/in)	ASTM D 5035	75	50,000	N/A	40	N/A	45	N/A
Carbon Black Content (%)	ASTM D 4218	2 - 3	50,000	N/A	40	N/A	45	N/A
Resin								
Polymer Density (g/cm^3)	ASTM D 1505	0.94	once per lot	N/A	2	N/A	5	N/A
Melt Flow Index (g/10 min)	ASTM D 1238	1	once per lot	N/A	2	N/A	5	N/A
Geotextile								
Mass per Unit Area (oz/yd^2)	ASTM D 5261	8	100,000	N/A	20	N/A	46	N/A
Grab Tensile Strength (lb)	ASTM D 4632	200	100,000	N/A	20	N/A	46	N/A
Puncture (lb)	ASTM D 4833	80	100,000	N/A	20	N/A	46	N/A
AOS, US Sieve	ASTM D 4751	80	540,000	N/A	4	N/A	46	N/A
Water Flow Rate (cm/s)	ASTM D 4491	$5.0x10^{-5}$	540,000	N/A	4	N/A	46	N/A
UV Resistance (%/hrs)	ASTM D 4355	70/500	once per resin formulation	N/A	2	N/A	N/R	N/A
Geonet Composite								
Ply Adhesion (lb/in)	ASTM D7005	1	50,000	100,000	40	20	45	20
Transmissivity ($m^3/m/s$)	ASTM D 4716	$3.45x10^{-3}$	540,000	100,000	4	20	4	20

Total Number of Rolls Delivered to Site: 891
Total Area of Rolls Delivered to Site (ft^2): 1,995,840
Total Number of Formulations: 2

TABLE 7

350-MIL, LEAK DETECTION SYSTEM (LDS) GEOCOMPOSITE ALTERNATE TESTING SUMMARY

DESCRIPTION	TEST STANDARD	PROJECT SPECIFICATIONS	TEST FREQUENCY		NUMBER OF TESTS			
					REQUIRED		PASSING	
			MANF. QC (ft^2)	CONF. QA (ft^2)	MANF. QC	CONF. QA	MANF. QC	CONF. QA
Geonet								
Thickness (mil)	ASTM D 5199	350	50,000	100,000	2	1	7	1
Density (g/cm^3)	ASTM D 1505	0.94	50,000	100,000	2	1	2	1
Tensile Strength (lb/in)	ASTM D 5035	75	50,000	N/A	2	N/A	7	N/A
Carbon Black Content (%)	ASTM D 4218	2 - 3	50,000	N/A	2	N/A	7	N/A
Resin								
Polymer Density (g/cm^3)	ASTM D 1505	0.94	once per lot	N/A	1	N/A	1	N/A
Melt Flow Index (g/10 min)	ASTM D 1238	1	once per lot	N/A	1	N/A	1	N/A
Geotextile								
Mass per Unit Area (oz/yd^2)	ASTM D 5261	8	100,000	N/A	1	N/A	8	N/A
Grab Tensile Strength (lb)	ASTM D 4632	200	100,000	N/A	1	N/A	8	N/A
Puncture (lb)	ASTM D 4833	80	100,000	N/A	1	N/A	8	N/A
AOS, US Sieve	ASTM D 4751	80	540,000	N/A	1	N/A	8	N/A
Water Flow Rate (cm/s)	ASTM D 4491	$5.0x10^{-5}$	540,000	N/A	1	N/A	8	N/A
UV Resistance (%/hrs)	ASTM D 4355	70/500	once per resin formulation	N/A	1	N/A	N/R	N/A
Geonet Composite								
Ply Adhesion (lb/in)	ASTM D7005	1	50,000	100,000	2	1	3	1
Transmissivity ($m^3/m/s$)	ASTM D 4716	$3.45x10^{-3}$	540,000	100,000	1	1	N/R	1

Total Number of Rolls Delivered to Site: 41
Total Area of Rolls Delivered to Site (ft^2): 91,840
Total Number of Formulations: 1

TABLE 8

GEOMEMBRANE LABORATORY DESTRUCTIVE TESTING (LDT) FREQUENCY VERIFICATION

LINER TYPE	SEAM TYPE	PROJECT SPECIFICATIONS [1]		LENGTH WELDED (FT)	TESTS REQUIRED [2]	TESTS PERFORMED	FAILING TESTS
		PEEL (LB/IN)	SHEAR (LB/IN)				
Cells 1and 2 Secondary and Primary	Fusion	91	120	83,908	168	170	0
Cells 1and 2 Secondary and Primary	Extrusion	78	120	N/A[3]	None[3]	4	0

[1] Value listed for peel and shear strengths are for 4 out of 5 test specimens (ASTM D6392); the 5th specimen can be as low as 80% of the listed values.

[2] Estimated by dividing the length welded by the specified frequency of 1 test per 500 feet of seam.

[3] Extrusion weld LDT testing frequency was not specified. As extrusion welds were used for repairs, the Engineer opted to locate and test one LDT sample for each liner type for each cell.

APPENDIX I – EARTHWORKS
Section 1 – Subgrade

Monthly Subgrade Laboratory and Field Testing Summary Reports (Prepared by Shield Engineering, Inc.)
Cell 1 Final Subgrade As-Built Drawing
Cell 2 Final Subgrade As-Built Drawing

Monthly Subgrade Laboratory and Field Testing Summary Reports (Prepared by Shield Engineering, Inc.)

SHIELD ENGINEERING, INC.

September 15, 2009

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 1 - Month of August 2009
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of August. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Jeremy T. Horton, E.I.T.
Staff Professional

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\Reports\2009\Ash Landfill\1002083-03 Marshall Ash Landfill 2009-08.doc

4301 Taggart Creek Road
Charlotte, NC 28208

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SHIELD ENGINEERING, INC.
4301 Taggart Creek Road, Charlotte, North Carolina 28208
Phone 704-394-6913 Fax 704-394-6968

Monthly Summary Report - No. 1

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	September 15, 2009	**Page:**	1 of 2
Report By:	Jeremy T. Horton, E.I.T.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of August.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on August 7, 14, 18, 21 and 25, 2009 to perform field density tests of the ash landfill material. The ash had not been compacted and was not ready for testing on the August 7 and August 14 visits. The in-place density tests labeled DT-1 to DT-18 were performed during this period. See Table 1 for preliminary results and locations.

Based on a review of the field test results, several of the early test results completed during this period did not pass. The initial ash placement lifts were in areas requiring "bridge" lifts over the subgrade making compaction difficult. This was primarily limited to the first day of testing. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

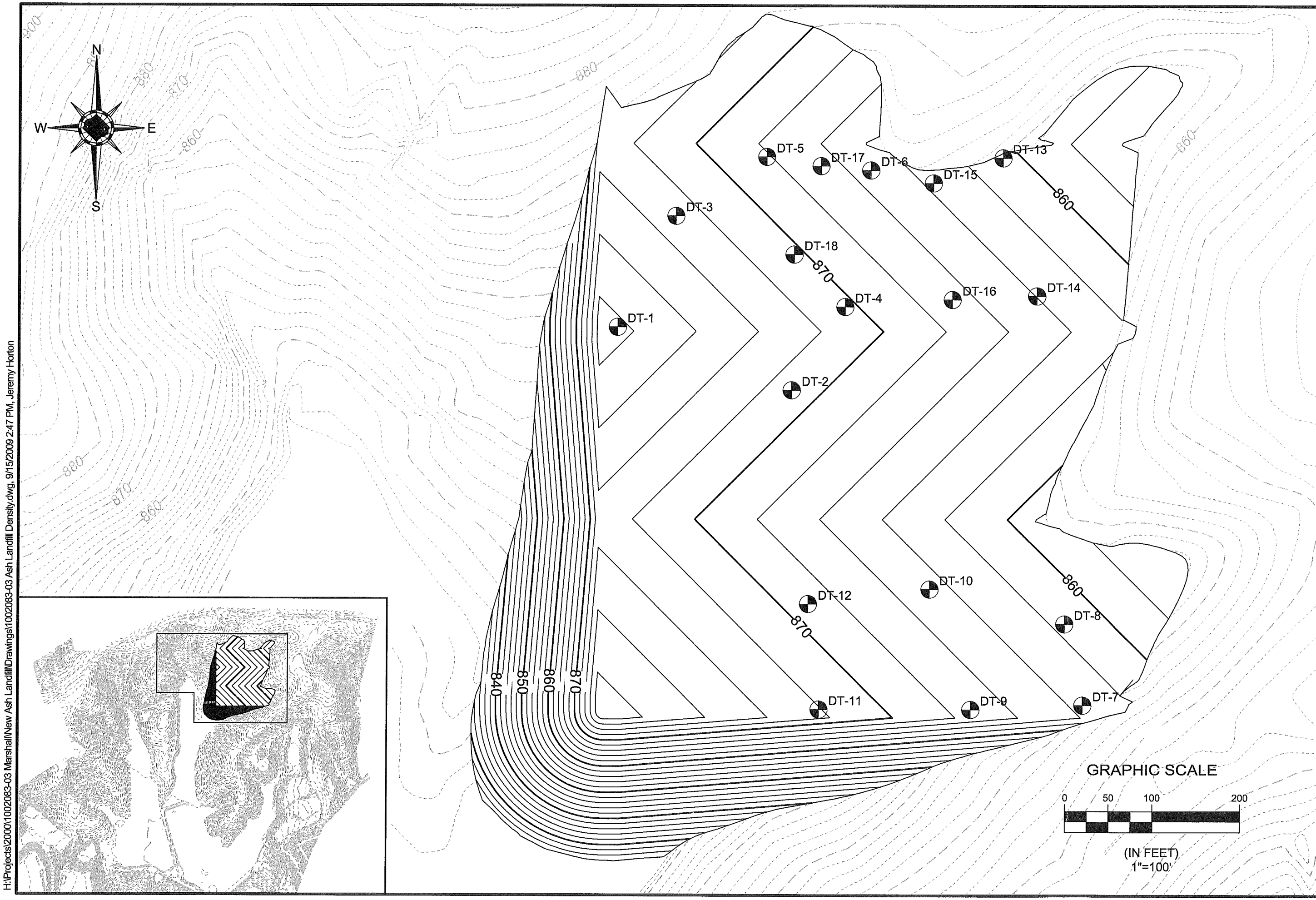
4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
FLY ASH														
DT-1	08/18/09	See location plan	6		53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6		58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6		57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6		57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6		61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6		64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6		61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6		57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6		54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6		74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6		67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6		60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6		85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6		86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6		88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6		82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6		86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6		90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope



H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 9/15/2009 2:47 PM, Jeremy Horton

SHIELD
ENGINEERING, INC.
704-394-6913
704-394-6958 fax
www.shieldengineering.com
4301 TAGGART CREEK ROAD
CHARLOTTE, NC 28208

The drawings, specifications and other documents prepared by Shield engineering for this project are instruments of Shield Engineering for use solely with respect to this project and, unless otherwise provided, Shield shall be deemed the author of these documents and shall retain all common law, statutory and other reserved rights, including copyright.

PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density.dwg
DRAWN BY: JTH
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: 9/15/09

SHEET TITLE:
DENSITY TEST LOCATION PLAN FOR ASH AUGUST 2009

SHEET:
1

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL STEAM STATION	**Shield No.:** 1002083-03	**Client No.:**
Client Name: Duke Energy	**Task No.:** 0002	**Date:** 8-14-09
Inspection of: ASH - Density	**Technician:** C. Cagle	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION

Traveled to site & met with Tommy & Chris about new area, dumping now to build bridge for trucks, no more to be hauled to old site.
None ready, probly ready 8-18-09.

3 hrs.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Printed Name

C. Cagle
Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall Steam Station	**Shield No.:** 1002083	**Client No.:**
Client Name: Duke Energy	**Task No.:** 0002	**Date:** 8/18/09
Inspection of: Ash Density	**Technician:** C. Cagle	

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Drive Tube\Nuclear Density Data

Test No.	1	2	3	4	5	6		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	3.08	3.00	3.28	2.94	3.10	3.16		
Wt. Mold	1.30	1.04	1.38	1.04	1.06	1.02		
Wt. Wet soil	1.78	1.96	1.90	1.90	2.04	2.14		
Volume Mold	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333		
Wet Density	53.5	58.9	57.1	57.1	61.3	64.3		
Wt. Wet soil & Pan	229.1	228.1	210.2	230.3	210.4	217.5		
Wt. Dry soil & Pan	205.1	207.3	194.9	210.6	189.5	194.5		
Wt. Pan	117.2	115.5	117.5	109.6	109.1	108.9		
Moisture Lost	24.0	20.8	15.3	19.7	20.9	23.0		
Wt. Dry soil	87.9	91.8	77.4	101.0	79.9	85.6		
% Moisture	27.3	22.7	19.8	19.5	26.2	26.8		
Dry Density	42.0	48.0	47.6	47.7	48.6	50.7		
Maximum Dry Density	61.8	→						
Optimum Moisture	32.3	→						
% Compaction	68.0	77.7	77.0	77.3	78.6	82.1		
Meets Criteria (Y\N)	N	N	N	N	N	N		

1 Point Proctor Data

Wt. Wet Soil & Mold		
Wt. Mold		
Wt. Wet soil		
Volume Mold		
Wet Density		
Wt. Wet soil & Pan		
Wt. Dry soil & Pan		
Wt. Pan		
Moisture Lost		
Wt. Dry soil		
% Moisture		
Dry Density		

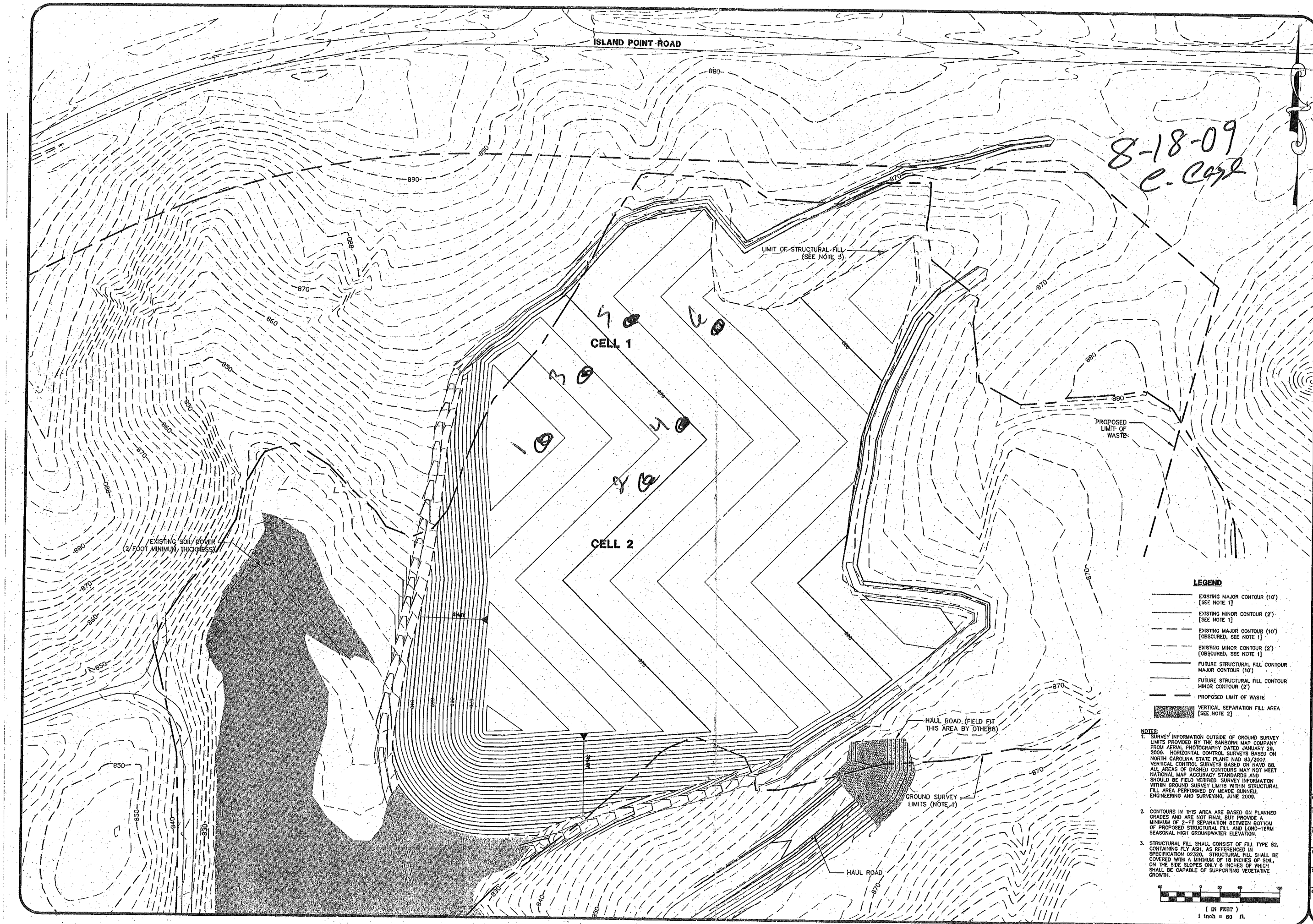
Additional Project Data

BAS-22 61.8 @ 32.3

C. Cagle
Printed Name

Signature

JMP



Duke Energy®

S&ME
9751 SOUTHERN PINE BLVD.
CHARLOTTE, N.C. 28273
(704)523-4726
WWW.SMEINC.COM

NORTH CAROLINA PROFESSIONAL SEAL 022153 ENGINEER KENNETH R. DULY

NO.	DATE	DESCRIPTION	BY
0	7-20-09	ISSUED FOR CONSTRUCTION	KRD

CELL 1 & 2 STRUCTURAL FILL
ROUGH SUBGRADE WITHIN PERIMETER DITCHES

DUKE ENERGY MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD

PROJECT NUMBER: 1356-08-122

SCALE: 1" = 60'	DATE: 7-20-09
DRAWING: 1	OF: 2

DRAWING PATH: Q:\1356\DUKE ENERGY\08-122 Marshall NPDES\Grading Cell\STRUCTURAL FILL NOTE\rough subgrade with channel_1_2_GRADING\ROUGH SUBGRADE WITH CHANNEL_1_2_GRADING

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall Steam Station	**Shield No.:** 1002083-03	**Client No.:**	
Client Name: Duke Energy	**Task No.:** 0002	**Date:** 8/21/09	
Inspection of: Ash	**Technician:** C. Cagle		

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Drive Tube\Nuclear Density Data

Test No.	7	8	9	10	11	12		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	3.10	3.22	3.20	3.50	3.32	3.02		
Wt. Mold	1.04	1.30	1.38	1.02	1.08	1.02		
Wt. Wet soil	2.06	1.92	1.82	2.48	2.24	2.00		
Volume Mold	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333		
Wet Density	61.8	57.7	54.7	74.5	67.3	60.1		
Wt. Wet soil & Pan	253.1	260.8	254.9	286.7	300.8	274.4		
Wt. Dry soil & Pan	219.4	225.1	218.8	249.5	258.6	239.5		
Wt. Pan	107.7	110.6	109.2	111.2	105.1	106.9		
Moisture Lost	33.7	35.7	36.1	37.2	42.2	34.9		
Wt. Dry soil	111.7	114.5	109.6	138.3	153.5	132.6		
% Moisture	30.2	31.2	32.9	26.9	27.5	26.3		
Dry Density	47.5	44.0	41.1	58.7	52.8	47.5		
Maximum Dry Density	61.8	→						
Optimum Moisture	32.3	→						
% Compaction	76.8	71.2	66.6	95.0	85.4	77.0		
Meets Criteria (Y\N)	N	N	N	Y	N	N		

1 Point Proctor Data

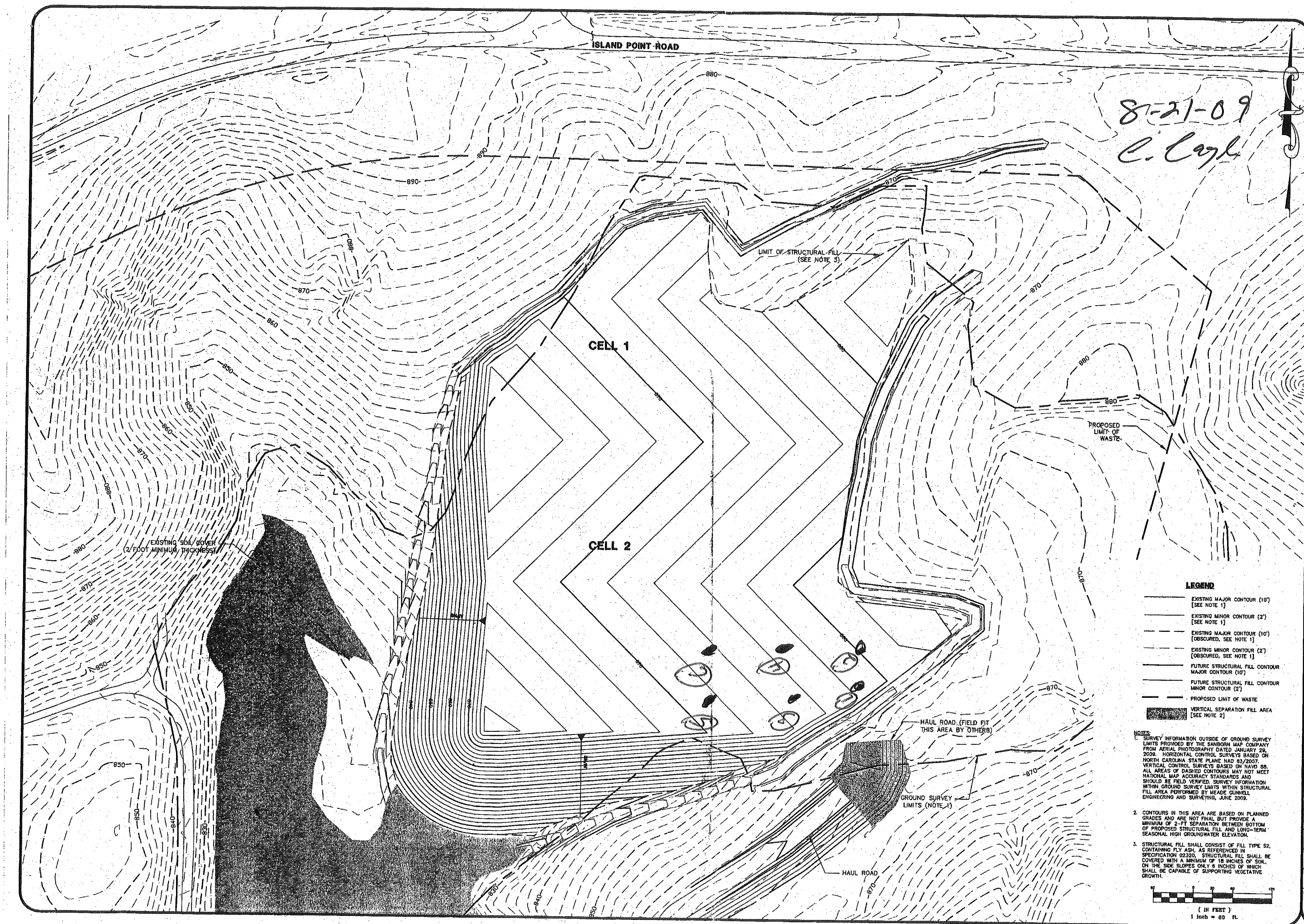
Wt. Wet Soil & Mold		
Wt. Mold		
Wt. Wet soil		
Volume Mold		
Wet Density		
Wt. Wet soil & Pan		
Wt. Dry soil & Pan		
Wt. Pan		
Moisture Lost		
Wt. Dry soil		
% Moisture		
Dry Density		

Additional Project Data

BAS-22 61.8 @ 32.3

C. Cagle
Printed Name

Signature JMC



NOTES:

1. SURVEY INFORMATION OUTSIDE OF GROUND SURVEY LIMITS PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.
2. CONTOURS IN THIS AREA ARE BASED ON PLANNED GRADES AND ARE NOT FINAL BUT PROVIDE A MINIMUM OF 2-FT SEPARATION BETWEEN BOTTOM OF PROPOSED STRUCTURAL FILL AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATION.
3. STRUCTURAL FILL SHALL CONSIST OF FILL TYPE S2, CONTAINING FLY ASH, AS REFERENCED IN SPECIFICATION 02320. STRUCTURAL FILL SHALL BE COVERED WITH A MINIMUM OF 18 INCHES OF SOIL, ON THE SIDE SLOPES ONLY 6 INCHES OF WHICH SHALL BE CAPABLE OF SUPPORTING VEGETATIVE GROWTH.

Duke Energy®

S&ME
9751 SOUTHERN PINE BLVD.
CHARLOTTE, N.C. 28273
(704)523-4726
WWW.SMEINC.COM

NORTH CAROLINA PROFESSIONAL SEAL 022355 ENGINEER KENNETH R. DILLY

NO.	DATE	DESCRIPTION	BY
0	7-20-09	ISSUED FOR CONSTRUCTION	

CELL 1 & 2 STRUCTURAL FILL

ROUGH SUBGRADE WITHIN PERIMETER DITCHES

DUKE ENERGY MARSHALL STEAM STATION

TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: P-0176

DRAWN BY: CLD	CHECKED BY: KJJ
DESIGNED BY: WMH	APPROVED BY: KJJ
PROJECT NUMBER: 1356-08-122	
SCALE: 1" = 60'	DATE: 7-20-09
DRAWING: 1	OF: 2

DRGBMC PLANE G:\USA\DUKE ENERGY\08-122 Marshall EFP\Drg\Redlined Layouts (F)\STRUCTURAL FILL NOTE\rough subgrade with dimed_1_2_DRAWING\CELL 1_2_STRUCTURAL FILL NOTE\rough subgrade with dimed_1_2_DRAWING

ISLAND POINT ROAD

CELL 1

CELL 2

LIMIT OF STRUCTURAL FILL (SEE NOTE 3)

PROPOSED LIMIT OF WASTE

EXISTING SOIL COVER (2 FOOT MINIMUM THICKNESS)

HAUL ROAD (FIELD FIT THIS AREA BY OTHERS)

GROUND SURVEY LIMITS (NOTE 1)

HAUL ROAD

8-25-09
E. Cagle

LEGEND

- EXISTING MAJOR CONTOUR (10') [SEE NOTE 1]
- EXISTING MINOR CONTOUR (2') [SEE NOTE 1]
- EXISTING MAJOR CONTOUR (10') [OBSCURED, SEE NOTE 1]
- EXISTING MINOR CONTOUR (2') [OBSCURED, SEE NOTE 1]
- FUTURE STRUCTURAL FILL CONTOUR MAJOR CONTOUR (10')
- FUTURE STRUCTURAL FILL CONTOUR MINOR CONTOUR (2')
- PROPOSED LIMIT OF WASTE
- VERTICAL SEPARATION FILL AREA [SEE NOTE 2]

NOTES:

1. SURVEY INFORMATION OUTSIDE OF GROUND SURVEY LIMITS PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.
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3. STRUCTURAL FILL SHALL CONSIST OF FILL TYPE S2, CONTAINING FLY ASH, AS REFERENCED IN SPECIFICATION 02320. STRUCTURAL FILL SHALL BE COVERED WITH A MINIMUM OF 18 INCHES OF SOIL, ON THE SIDE SLOPES ONLY 6 INCHES OF WHICH SHALL BE CAPABLE OF SUPPORTING VEGETATIVE GROWTH.

60 0 30 60 120
(IN FEET)
1 inch = 60 ft.

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9751 SOUTHERN PINE BLVD.
CHARLOTTE, N.C. 28273
(704)523-1726
WWW.SMEINC.COM

NORTH CAROLINA PROFESSIONAL SEAL 022185 ENGINEER KENNETH R. DAY

NO.	DATE	DESCRIPTION	BY
0	7-20-09	ISSUED FOR CONSTRUCTION	KRD

CELL 1 & 2 STRUCTURAL FILL
ROWAN SUBGRADE WITHIN PERIMETER DITCHES

DUKE ENERGY MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD
CHECKED BY: KRD
DESIGNED BY: WMH
APPROVED BY: KRD

PROJECT NUMBER: 1356-08-122

SCALE: 1" = 60'
DATE: 7-20-09

DRAWING: 1 OF: 2

DRAWING PATH: G:\USA\DATA\DUKE ENERGY\08-122 Marshall S.F.F\DWG\Marshall Layout\01 STRUCTURAL FILL NOTE\rowan subgrade with Cell 1_2 CHANGES\1356 DUKE ENERGY(08-122 MARSHALL S.F.F)(RW)(ROWAN

SHIELD ENGINEERING, INC.

October 1, 2009

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 2 - Month of September 2009
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of September. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Jeremy T. Horton, E.I.T.
Staff Professional

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\1002083-03 Marshall Ash Landfill 2009-09.doc

4301 Taggart Creek Road
Charlotte, NC 28208

www.shieldengineering.com

Telephone 704.394.6913
Fax 704.394.6968

SHIELD ENGINEERING, INC.
4301 Taggart Creek Road, Charlotte, North Carolina 28208
Phone 704-394-6913 Fax 704-394-6968

Monthly Summary Report - No. 2

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	October 1, 2009	**Page:**	1 of 2
Report By:	Jeremy T. Horton, E.I.T.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of September.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on September 1, 9, 11, 14, 15, 17, 22, 24 and 30, 2009 to perform field density tests of the ash landfill material. The ash was too wet for testing on the September 17 visit. The in-place density tests labeled DT-19 to DT-67 were performed during this period. See Table 1 for preliminary results and locations.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Based on a review of the field test results, a few of the test results completed during this period were slightly below 95% compaction. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	MEETS ACCEPTANCE COMPACTION CRITERIA NO	MOISTURE BIAS (%)
FLY ASH														
DT-1	08/18/09	See location plan	6		53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6		58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6		57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6		57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6		61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6		64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6		61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6		57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6		54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6		74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6		67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6		60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6		85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6		86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6		88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6		82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6		86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6		90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6		95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6		91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6		90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6		95.1	45.8	65.8	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6		91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6		87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6		91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6		88.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6		84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6		85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6		84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6		85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6		83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6		84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6		88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6		87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6		87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6		91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6		86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6		85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6		82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6		80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6		88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6		84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6		82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6		82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6		79.2	25.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6		84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6		93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6		98.1	33.1	73.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

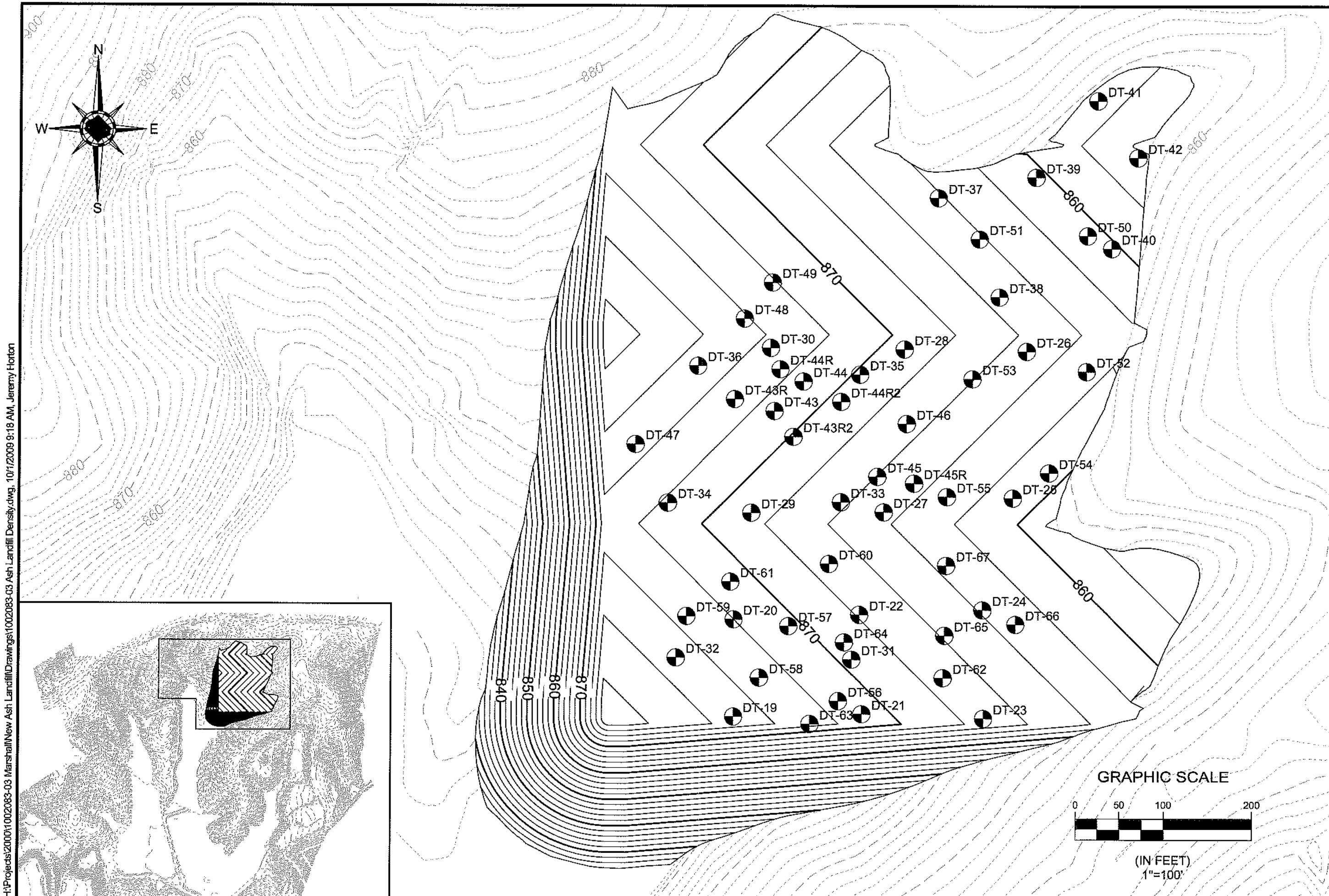
4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-45R	09/15/09	See location plan	6		94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6		94.5	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6		91.9	31.6	69.8	68.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6		94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6		94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6		93.7	35.8	68.8	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6		94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6		93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6		92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6		93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6		88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6		95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6		93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6		91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6		91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6		88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6		87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6		89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6		93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6		93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope



H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 10/1/2009 9:18 AM, Jeremy Horton

SHIELD ENGINEERING, INC.
704-394-6913
704-394-9988 fax
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4301 TAGGART CREEK ROAD
CHARLOTTE, NC 28208

The drawings, specifications and other documents prepared by Shield engineering for this project are instruments of Shield Engineering for use solely with respect to this project and, unless otherwise provided, Shield shall be deemed the author of these documents and shall retain all common law, statutory and other reserved rights, including copyright.

PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density.dwg
DRAWN BY: JTH
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: 10/01/09

SHEET TITLE:
DENSITY TEST LOCATION PLAN FOR ASH SEPTEMBER 2009

SHEET:
1

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL STEAM STATION		Shield No.:	Client No.:
Client Name: Duke Energy		Task No.:	Date: 9-1-09
Inspection of: ASH		Technician: C. Cagle	

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Drive Tube\Nuclear Density Data

	19	20	21	22	23	24		
Test No.								
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.22	4.50	4.36	4.24	4.39	4.20		
Wt. Mold	1.04	1.44	1.36	1.04	1.34	1.28		
Wt. Wet soil	3.18	3.06	3.00	3.20	3.05	2.92		
Volume Mold	.0333	.0333	.0333	.0333	.0333	.0333		
Wet Density	95.4	91.8	90.0	96.0	91.6	87.7		
Wt. Wet soil & Pan	239.6	205.9	215.1	230.2	224.4	209.9		
Wt. Dry soil & Pan	207.5	181.1	191.2	196.1	188.2	180.3		
Wt. Pan	110.4	117.1	108.4	121.7	117.7	110.9		
Moisture Lost	32.1	24.8	23.9	34.1	36.2	29.6		
Wt. Dry soil	97.1	64.0	82.8	74.4	70.5	69.4		
% Moisture	33.1	38.8	28.8	45.8	51.3	42.6		
Dry Density	71.6	66.2	69.8	65.8	60.5	61.5		
Maximum Dry Density	66.6	→						
Optimum Moisture	30.2	→						
% Compaction	~~108~~ 107.9	99.4	~~104.8~~ 105.0	98.8	90.8	92.3		
Meets Criteria (Y\N)	Y	Y	Y	Y	N	N		

1 Point Proctor Data

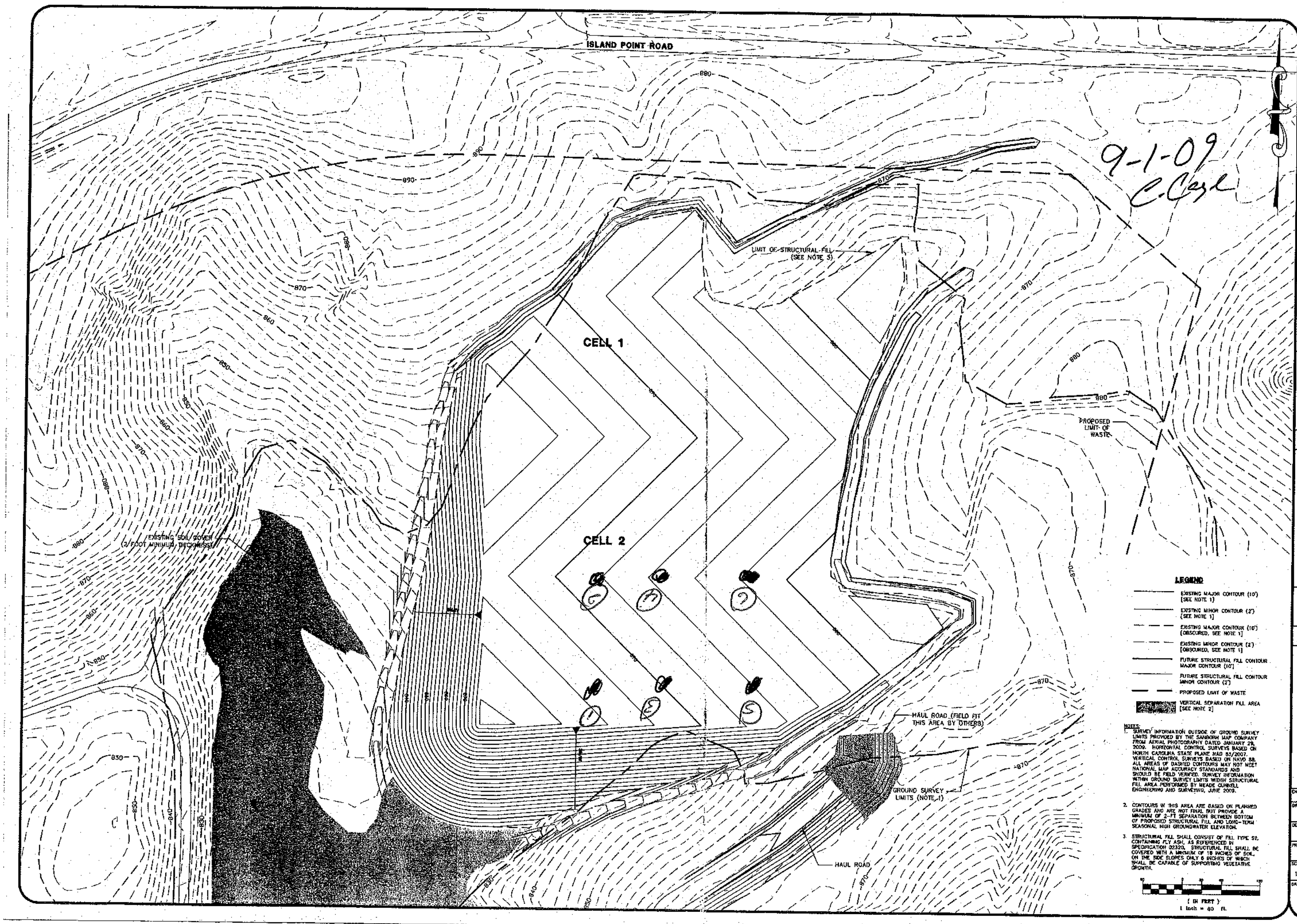
Wt. Wet Soil & Mold	15.52	
Wt. Mold	11.36	
Wt. Wet soil	4.16	
Volume Mold	~~.0330~~	0.0478
Wet Density	126.0	87.0
Wt. Wet soil & Pan	311.2	
Wt. Dry soil & Pan	264.1	
Wt. Pan	117.5	
Moisture Lost	47.1	
Wt. Dry soil	146.6	
% Moisture	32.1	
Dry Density	~~95.3~~	63.9

Additional Project Data

BAS 21 → 66.6 @ 30.2

Printed Name

C. Cagle
Signature



LEGEND

- EXISTING MAJOR CONTOUR (10') [SEE NOTE 1]
- EXISTING MINOR CONTOUR (2') [SEE NOTE 1]
- EXISTING MAJOR CONTOUR (10') [OBSCURED, SEE NOTE 1]
- EXISTING MINOR CONTOUR (2') [OBSCURED, SEE NOTE 1]
- FUTURE STRUCTURAL FILL CONTOUR MAJOR CONTOUR (10')
- FUTURE STRUCTURAL FILL CONTOUR MINOR CONTOUR (2')
- PROPOSED LIMIT OF WASTE
- VERTICAL SEPARATION FILL AREA [SEE NOTE 2]

NOTES:

1. SURVEY INFORMATION OUTSIDE OF GROUND SURVEY LIMITS PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE CUNNOLL ENGINEERING AND SURVEYING, JUNE 2009.
2. CONTOURS IN THIS AREA ARE BASED ON PLANNED GRADES AND ARE NOT FINAL BUT PROVIDE A MINIMUM OF 2-FT SEPARATION BETWEEN BOTTOM OF PROPOSED STRUCTURAL FILL AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATION.
3. STRUCTURAL FILL SHALL CONSIST OF FILL TYPE S2, CONTAINING FLY ASH, AS REFERENCED IN SPECIFICATION 02320. STRUCTURAL FILL SHALL BE COVERED WITH A MINIMUM OF 18 INCHES OF SOIL, ON THE SIDE SLOPES ONLY 6 INCHES OF WHICH SHALL BE CAPABLE OF SUPPORTING VEGETATIVE GROWTH.

10 0 20 40 80
(IN FEET)
1 inch = 80 ft.

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NORTH CAROLINA PROFESSIONAL SEAL 022165 ENGINEER KEITH B. DAVEY

NO.	DATE	DESCRIPTION	BY
0	7-20-09	ISSUED FOR CONSTRUCTION	KBD

CELL 1 & 2 STRUCTURAL FILL
BOUNDARY SURVEY WITHIN PERIMETER DITCHES

DUKE ENERGY MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD
CHECKED BY: KBD
DESIGNED BY: WMH
APPROVED BY: KBD

PROJECT NUMBER: 1356-08-122
SCALE: 1" = 60'
DATE: 7-20-09
DRAWING: 1 OF: 2

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name:	MARSHALL STEAM STATION	Shield No.: 1002083-03	Client No.:
Client Name:	DUKE Energy	Task No.: 0802	Date: 9/9/09
Inspection of:	ASH Density	Technician:	C. Cagle

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Drive Tube/Nuclear Density Data

Test No.	25	26	27	28	29	30		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.34	4.22	4.20	4.18	4.16	3.88		
Wt. Mold	1.28	1.34	1.38	1.32	1.34	1.02		
Wt. Wet soil	3.06	2.88	2.82	2.86	2.82	2.86		
Volume Mold	.0333	.0333	.0333	.0333	.0333	.0333		
Wet Density	91.89	86.45	84.67	85.89	84.67	85.89		
Wt. Wet soil & Pan	294.1	251.8	281.2	291.6	253.7	276.5		
Wt. Dry soil & Pan	241.8	217.6	244.6	250.2	224.2	246.2		
Wt. Pan	117.5	116.4	110.2	110.8	108.0	121.3		
Moisture Lost	52.3	34.2	36.6	41.4	29.5	30.3		
Wt. Dry soil	124.3	101.2	134.4	139.4	116.2	124.9		
% Moisture	42.1 142.0	33.7	27.2	29.6	25.5	24.2 24.3		
Dry Density	64.69	64.6	66.56	66.2	67.5	69.81		
Maximum Dry Density	70.0 [redacted]	70.0	70.0	70.0	70.0	70.0		
Optimum Moisture	32.5	32.5	32.5	32.5	32.5	32.5		
% Compaction	92.4	92.4	93.1	94.6	96.5	98.7		
Meets Criteria (Y\N)	N	N	Y	N	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.04	
Wt. Mold	9.24	
Wt. Wet soil	2.80	
Volume Mold	.0332	
Wet Density	84.3	
Wt. Wet soil & Pan	277.1	
Wt. Dry soil & Pan	240.7	
Wt. Pan	117.8	
Moisture Lost	36.4 [redacted]	
Wt. Dry soil	122.9	
% Moisture	29.6	
Dry Density	65.0	

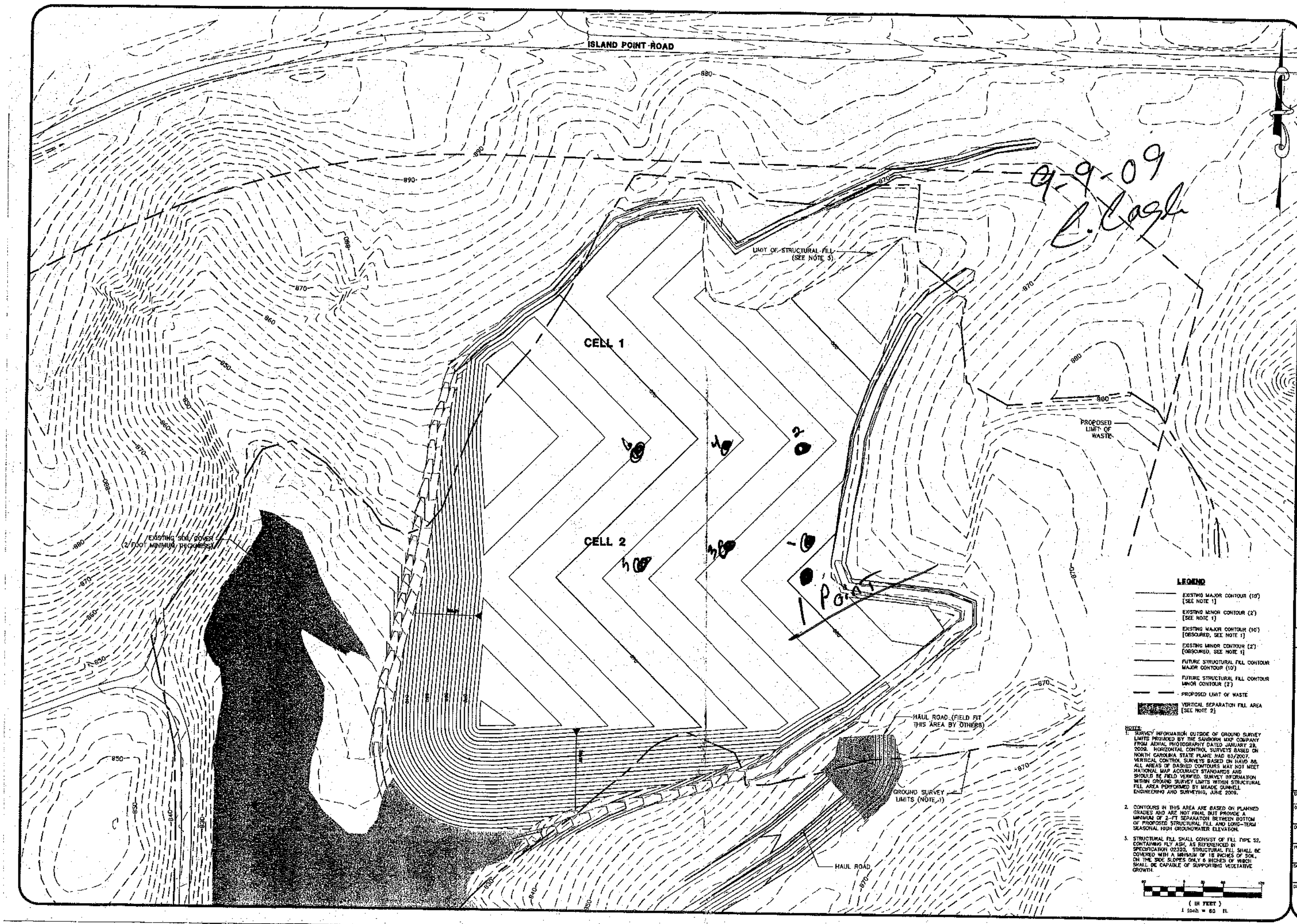
Additional Project Data

New Proctor 76.3 @ 30.7

⇒ BAS-24 70.0 32.5

Printed Name

C. Cagle
Signature



LEGEND

- EXISTING MAJOR CONTOUR (10') [SEE NOTE 1]
- EXISTING MINOR CONTOUR (2') [SEE NOTE 1]
- EXISTING MAJOR CONTOUR (10') [OBSCURED, SEE NOTE 1]
- EXISTING MINOR CONTOUR (2') [OBSCURED, SEE NOTE 1]
- FUTURE STRUCTURAL FILL CONTOUR MAJOR CONTOUR (10')
- FUTURE STRUCTURAL FILL CONTOUR MINOR CONTOUR (2')
- PROPOSED LIMIT OF WASTE
- VERTICAL SEPARATION FILL AREA [SEE NOTE 2]

NOTES:

1. SURVEY INFORMATION OUTSIDE OF GROUND SURVEY LIMITS PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF BASELID CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE DUNNELL ENGINEERING AND SURVEYING, JUNE 2009.
2. CONTOURS IN THIS AREA ARE BASED ON PLANNED GRADES AND ARE NOT FINAL BUT PROVIDE A MINIMUM OF 2-FT SEPARATION BETWEEN BOTTOM OF PROPOSED STRUCTURAL FILL AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATION.
3. STRUCTURAL FILL SHALL CONSIST OF FILL TYPE S2, CONTAINING FLY ASH, AS REFERENCED IN SPECIFICATION 02320. STRUCTURAL FILL SHALL BE COVERED WITH A MINIMUM OF 18 INCHES OF SOIL, ON THE SIDE SLOPES ONLY 6 INCHES OF WHICH SHALL BE CAPABLE OF SUPPORTING VEGETATIVE GROWTH.

(IN FEET)
1 inch = 60 ft.

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NORTH CAROLINA PROFESSIONAL SEAL 022135 ENGINEER KENNETH B. HOYLE

NO.	DATE	DESCRIPTION	BY
0	7-20-09	ISSUED FOR CONSTRUCTION	

CELL 1 & 2 STRUCTURAL FILL

ROUNDED BOUNDARIES WITHIN PERIMETER DITCHES

DUKE ENERGY MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KBH
DESIGNED BY: WMH	APPROVED BY: KBH
PROJECT NUMBER: 1356-08-122	
SCALE: 1" = 60'	DATE: 7-20-09
DRAWING: 1	OF: 2

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		Shield No.:	Client No.:
Client Name: Duke		Task No.:	Date: 9-11-09
Inspection of: Fill		Technician: CC + JS	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers an cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.

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Drive Tube/Nuclear Density Data

Test No.	31	32	33	34	35	36		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.06	4.16	4.00	4.30	4.28	4.40		
Wt. Mold	1.28	1.34	1.04	1.38	1.36	1.34		
Wt. Wet soil	2.78	2.82	2.96	2.92	2.92	3.06		
Volume Mold	.0332	.0332	.0332	.0332	.0332	.0332		
Wet Density	83.7	84.9	89.1	87.9	87.9	92.2		
Wt. Wet soil & Pan	311.9	299.5	297.1	272.5	293.1	269.4		
Wt. Dry soil & Pan	269.8	259.6	252.9	233.8	253.9	233.1		
Wt. Pan	121.0	117.5	108.0	113.5	116.4	110.1		
Moisture Lost	42.1	39.9	44.2	38.7	39.2	36.3		
Wt. Dry soil	148.8	142.1	144.9	120.3	137.5	123.0		
% Moisture	28.3	28.1	30.5	32.2	28.5	29.5		
Dry Density	65.2	66.3	68.3	66.5	68.4	71.2		
Maximum Dry Density	67.7							
Optimum Moisture	28.5							
% Compaction	96.3	97.9	100.9	98.2	101	105.2		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.24	
Wt. Mold	9.24	
Wt. Wet soil	3.0	
Volume Mold	.0332	
Wet Density	90.4	
Wt. Wet soil & Pan	255.6	
Wt. Dry soil & Pan	225.9	
Wt. Pan	121.5	
Moisture Lost	29.8	
Wt. Dry soil	104.3	
% Moisture	28.6	
Dry Density	70.3	

Additional Project Data

67.7 @ 28.5 BAS-12

Josh S

Printed Name

Signature

ISLAND POINT ROAD

LIMIT OF STRUCTURAL FILL (SEE NOTE 3)

CELL 1

CELL 2

EXISTING SOIL COVER (2 FOOT MINIMUM THICKNESS)

PROPOSED LIMIT OF WASTE

HAUL ROAD (FIELD FIT THIS AREA BY OTHERS)

GROUND SURVEY LIMITS (NOTE 1)

HAUL ROAD

LEGEND

- EXISTING MAJOR CONTOUR (10') [SEE NOTE 1]
- EXISTING MINOR CONTOUR (2') [SEE NOTE 1]
- EXISTING MAJOR CONTOUR (10') [OBSCURED, SEE NOTE 1]
- EXISTING MINOR CONTOUR (2') [OBSCURED, SEE NOTE 1]
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- FUTURE STRUCTURAL FILL CONTOUR MINOR CONTOUR (2')
- PROPOSED LIMIT OF WASTE
- VERTICAL SEPARATION FILL AREA [SEE NOTE 2]

NOTES:

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2. CONTOURS IN THIS AREA ARE BASED ON PLANNED GRADES AND ARE NOT FINAL BUT PROVIDE A MINIMUM OF 2-FT SEPARATION BETWEEN BOTTOM OF PROPOSED STRUCTURAL FILL AND LONG-TERM SEASONAL HIGH GROUNDWATER ELEVATION.
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(IN FEET)
1 inch = 60 ft.

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NORTH CAROLINA PROFESSIONAL SEAL 022213 ENGINEER KENNETH B. CUNDELL

NO.	DATE	DESCRIPTION	BY
0	7-20-09	ISSUED FOR CONSTRUCTION	

CELL 1 & 2 STRUCTURAL FILL

RICHARD SUBBRANCH WATERSHED IMPOUNDMENT OUTCROSS

DUKE ENERGY MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO. F-0176

DRAWN BY: CLD	CHECKED BY: KTS
DESIGNED BY: WMH	APPROVED BY: KTS

PROJECT NUMBER: 1356-08-122

SCALE:	DATE:
1" = 60'	7-20-09

DRAWING: 1 OF: 2

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall Steam Station	Shield No.: 1002083-03	Client No.:
Client Name: Duke Energy	Task No.: 0002	Date: 9-14-09
Inspection of: ASH- Density	Technician: C. Cagle	

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Drive Tube\Nuclear Density Data

Test No.	37	38	39	40	41	42		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.24	4.22	3.80	4.04	4.30	4.08		
Wt. Mold	1.36	1.36	1.04	1.36	1.34	1.28		
Wt. Wet soil	2.88	2.86	2.76	2.68	2.96	2.80		
Volume Mold	.0333	.0333	.0333	.0333	.0333	.0333		
Wet Density	86.4	85.8	82.8	80.4	88.8	84.0		
Wt. Wet soil & Pan	283.1	251.3	243.6	257.6	261.1	262.9		
Wt. Dry soil & Pan	244.7	217.8	214.4	229.8	234.3	233.4		
Wt. Pan	112.9	107.6	110.1	121.2	117.4	116.2		
Moisture Lost	38.4	33.5	29.2	27.3	26.8	29.5		
Wt. Dry soil	131.8	110.2	104.3	108.6	116.9	117.2		
% Moisture	32.5	30.3	27.9	25.5	29.2	25.1		
Dry Density	65.2	65.8	64.7	64.0	68.7	67.1		
Maximum Dry Density	66.6	66.6	66.6	66.6	66.6 OK	66.6 OK		
Optimum Moisture	30.2	30.2	30.2	30.2	30.2 OK	30.2 OK		
% Compaction	97.8	98.7	97.1	96.0	103.2	100.8		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		D/B

1 Point Proctor Data

Wt. Wet Soil & Mold	12.20	
Wt. Mold	9.26	
Wt. Wet soil	2.94	
Volume Mold	.0332	
Wet Density	88.5	
Wt. Wet soil & Pan	280.3	
Wt. Dry soil & Pan	242.2	
Wt. Pan	113.2	
Moisture Lost	38.1	
Wt. Dry soil	129.0	
% Moisture	29.5	
Dry Density	64.0	

Additional Project Data

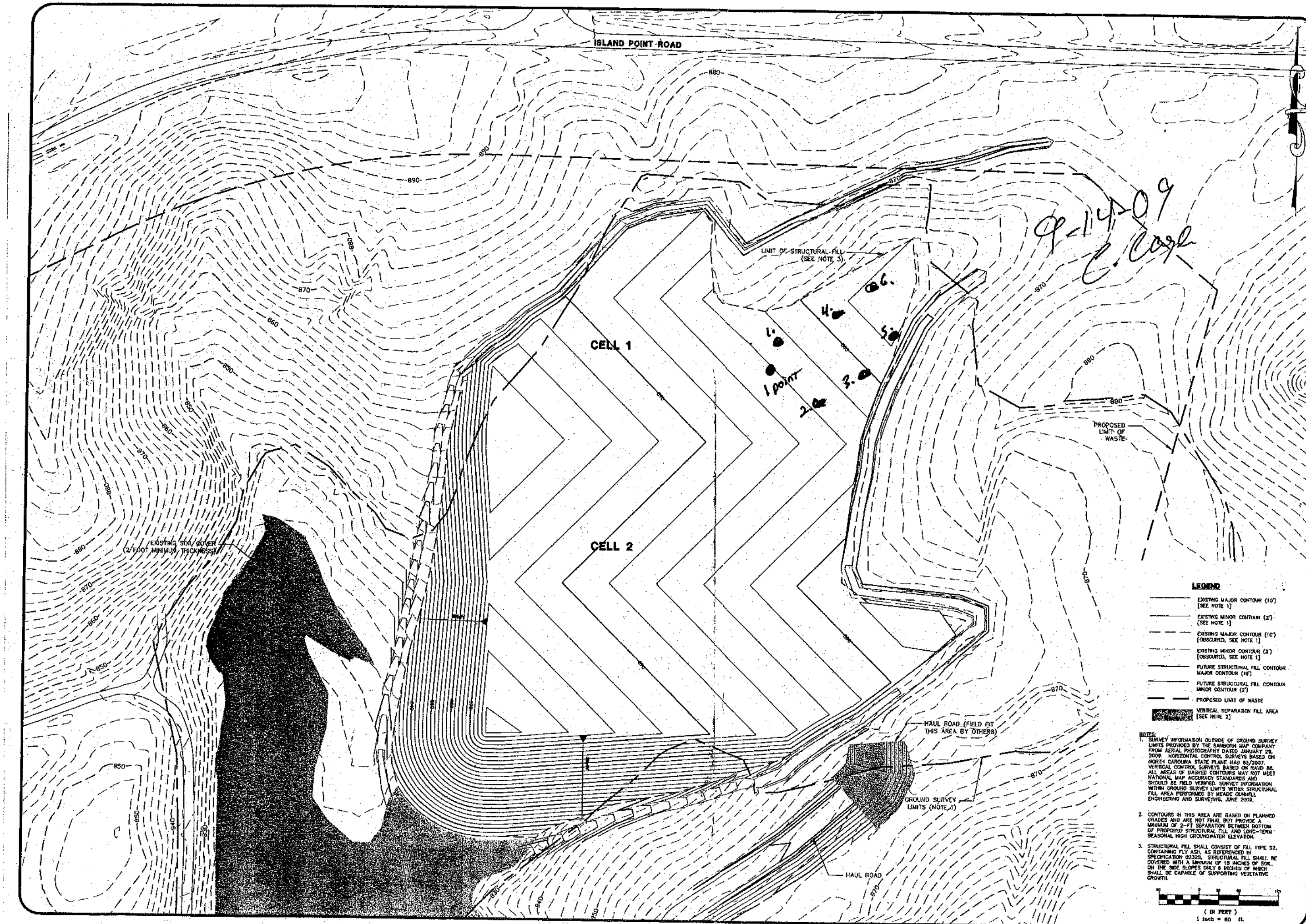
66.6 @ 30.2 % BAS 21 Fly Ash

~~72.8 @ 23.5 BAS 13~~

~~67.0 @ 24.0 BAS 9~~

Printed Name

C. Cagle
Signature



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NORTH CAROLINA PROFESSIONAL SEAL 002185 ENGINEER

NO.	DATE	DESCRIPTION	DRN	BY
0	7-20-09	ISSUED FOR CONSTRUCTION		

CELL 1 & 2 STRUCTURAL FILL
BOTTOM BARRIERS WITHIN PERIMETER DITCHES

DUKE ENERGY MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO. F-0176
DRAWN BY: CLD
CHECKED BY: KJB
DESIGNED BY: WMH
APPROVED BY: KJB
PROJECT NUMBER: 1356-08-122
SCALE: 1" = 60'
DATE: 7-20-09
DRAWING: 1
OF: 2

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		**Shield No.:**	**Client No.:**
Client Name: Duke		**Task No.:** 1002084-03	**Date:** 9-15-09
Inspection of: Landfill Density		**Technician:** J SLUSARCZYK	

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Shield on-site at 8:00 a.m. to meet Carlton. Carlton forgot about meeting, went to landfill for testing. Used BAS-24 proctor. Ash was dry and not well compacted. Multiple rolls and watering was needed.

(Page 1 of 2)

Drive Tube\Nuclear Density Data

	43	44	43R 1-1	44R 2-1	45	46	45R	43R2
Test No.	1	2	3	4	3	4	3-1	1-2
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.04	3.94	4.04	4.10	4.50	4.45	4.43	4.40
Wt. Mold	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31
Wt. Wet soil	2.73	2.63	2.73	2.79	3.19	3.14	3.12	3.07
Volume Mold	.0332	.0333	.0332	.0332	.0332	.0332	.0332	.0332
Wet Density	82.0	79.2	82.0	84.0	96.1	94.6	94.0	93.1
Wt. Wet soil & Pan	324.2	337.2	318.2	350.4	442.3	349.9	327.7	347.3
Wt. Dry soil & Pan	286.6	295.2	280.2	304.1	366.4	299.5	285.0	301.7
Wt. Pan	137.2	136.9	137.5	137.4	137.4	137.8	137.6	137.7
Moisture Lost	37.6	42.0	38.0	46.3	75.9	49.4	42.7	45.6
Wt. Dry soil	149.4	158.3	142.7	166.7	229.0	161.7	147.4	164
% Moisture	25.2	26.5	26.6	27.8	33.1	30.5	29.0	27.8
Dry Density	65.5	62.6	64.8	65.7	72.2	72.5	72.9	72.8
Maximum Dry Density	76.3	—	—	—	—	76.3	—	—
Optimum Moisture	30.7	—	—	—	—	30.7	—	—
% Compaction					94.6	95.0	95.5	95.5
Meets Criteria (Y\N)	Y	Y	Y	N	Y	Y	Y	Y

1 Point Proctor Data

Wt. Wet Soil & Mold	12.296	
Wt. Mold	9.326	
Wt. Wet soil	2.97	
Volume Mold	.0333	
Wet Density	89.9	
Wt. Wet soil & Pan	369.33	
Wt. Dry soil & Pan	327.38	
Wt. Pan	179.40	
Moisture Lost	41.95	
Wt. Dry soil	147.98	
% Moisture	28.3	
Dry Density	70.0	

Additional Project Data

76.3 @ 30.7

66.6 @ 30.0

Josh Slusarczyk
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		**Shield No.:** 100 2084-03	**Client No.:**
Client Name: Duke		**Task No.:**	**Date:** 9-15-09
Inspection of: Landfill Density		**Technician:** J SLUSARCZYK	

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(Page 2 of 2)

Drive Tube\Nuclear Density Data								
	97	44 22 2-2	46	49				
Test No.	5	6	6	7				
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.36	4.42	4.44	4.40				
Wt. Mold	1.31	1.31	1.31	1.31				
Wt. Wet soil	3.05	3.11	3.13	3.09				
Volume Mold	.0332	.0332	.0332	.0332				
Wet Density	91.9	93.7	94.3	93.1				
Wt. Wet soil & Pan	367.4	317.2	315.3	314.2				
Wt. Dry soil & Pan	312.2	276.9	274.5	275.9				
Wt. Pan	137.6	137.8	137.5	138.1				
Moisture Lost	55.2	40.3	40.8	38.3				
Wt. Dry soil	174.6	139.1	137.0	137.8				
% Moisture	31.6	29.0	29.8	27.8				
Dry Density	69.8	72.6	72.7	72.8				
Maximum Dry Density	66.6	76.3	→	→				
Optimum Moisture	30.0	30.7	→	→				
% Compaction	100+	95.2	95.2	95.5				
Meets Criteria (Y\N)	Y	Y	Y	Y				

1 Point Proctor Data		
Wt. Wet Soil & Mold		
Wt. Mold		
Wt. Wet soil		
Volume Mold		
Wet Density		
Wt. Wet soil & Pan		
Wt. Dry soil & Pan		
Wt. Pan		
Moisture Lost		
Wt. Dry soil		
% Moisture		
Dry Density		

Additional Project Data

BAS 24 76.3 @ 30.7

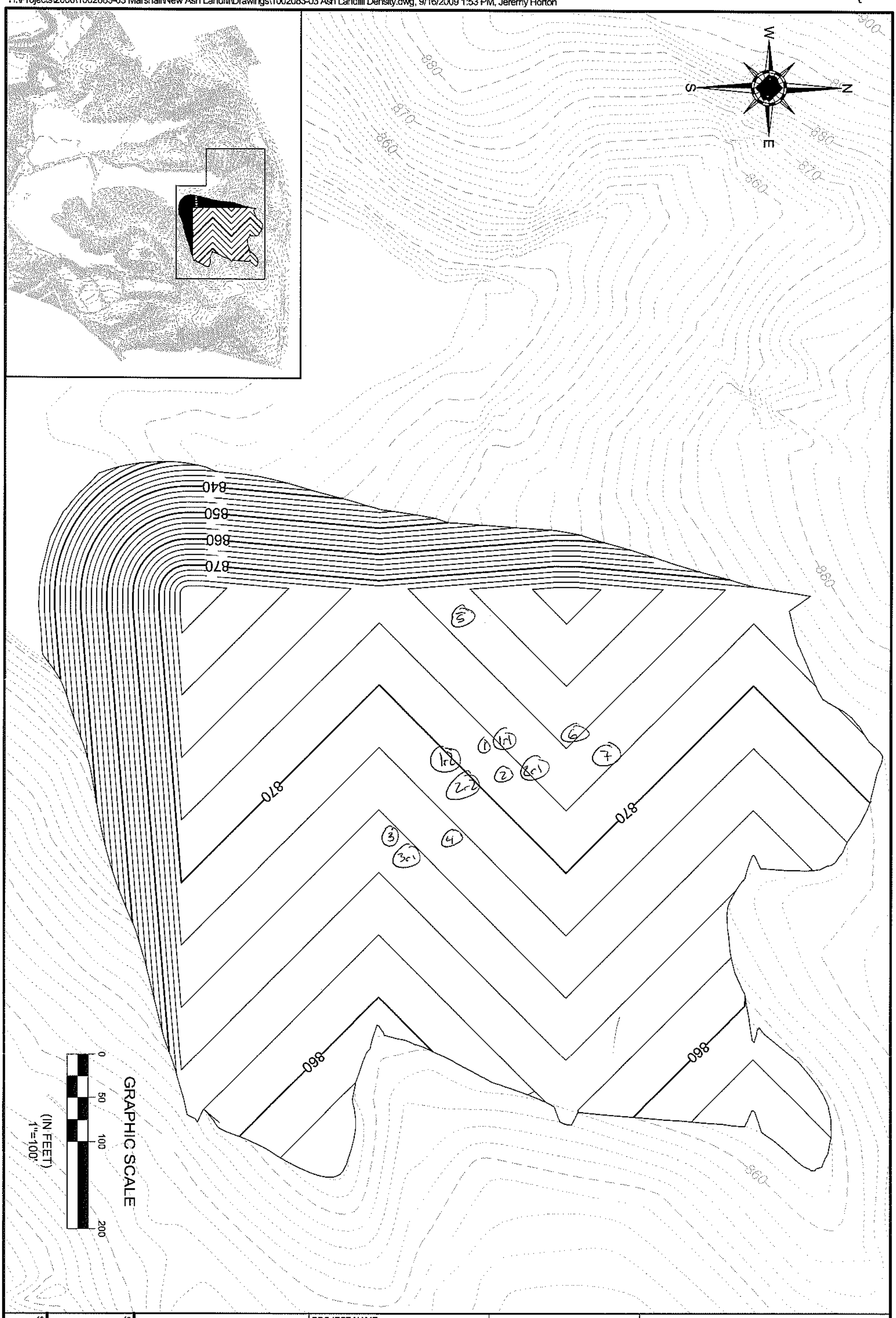
BAS 21 66.6 @ 30.0

Josh Slusarczyk
Printed Name

Signature

9-15-09

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 9/16/2009 1:53 PM, Jeremy Horton



SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION 8320 EAST NC HIGHWAY 150 TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name:	MARSHALL	**Shield No.:**	1002083-03	**Client No.:**	
Client Name:	DUKE	**Task No.:**	0002	**Date:**	9-17-09
Inspection of:	FILL	**Technician:**	J SLUSARCZYK		

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Shield onsite at 11:00 am. Rainy + overcast day, called Chris Green to confirm that ash was being placed. It was so left for testing. Upon arrival ash was too wet to get truck into the landfill and the area that was ready for testing was too wet. Tapping the top of the compacted ash with a boot brought water to the surface.

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Pink Copy: Inspector or Superintendent

Josh Slusarczyk
Printed Name

Signature

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Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:** 1002083-03	**Client No.:**
Client Name: Duke	**Task No.:** 0002	**Date:** 9-22-09
Inspection of: Fill	**Technician:** J SLUSARCZYK	

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Shield onsite at 8:30 am. An additional one foot of material has been placed across the entire landfill since last visit (testing wise) on 9-15. 2 samples were taken for lab testing. BAS-25 was taken near area where drive tubes were driven and BAS-26 is newer material being brought in. Drive tubes showed moisture at or above optimum moisture.

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Josh Slusarczyk
Printed Name

Signature

f:\doc\forms\daily report.doc

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Project Name: Marshall		**Shield No.:** 1002083-03	**Client No.:**
Client Name: Duke		**Task No.:** 0002	**Date:** 9-22-09
Inspection of: Fill		**Technician:** J SLUSARCZUK	

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Drive Tube/Nuclear Density Data

	50	51	52	53	54	55		
Test No.	~~49~~ 4	~~2~~ 50	~~3~~ 51	~~4~~ 52	~~5~~ 53	~~6~~ 54		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.45	4.42	4.43	4.40	4.37	4.41		
Wt. Mold	1.31	1.31	1.31	1.31	1.31	1.31		
Wt. Wet soil	3.14	3.11	3.12	3.09	3.06	3.10		
Volume Mold	.0332	.0332	.0332	.0333	.0332	.0332		
Wet Density	94.6	93.7	94.0	93.1	92.2	93.4		
Wt. Wet soil & Pan	363.1	349.2	375.2	395.2	388.9	405.1		
Wt. Dry soil & Pan	~~186.1~~ 316.8	309.5	329.7	343.1	338.5	355.3		
Wt. Pan	186.1	201.2	201.3	186.3	186.5	201.3		
Moisture Lost	47.4	39.7	45.5	156.8	50.4	49.8		
Wt. Dry soil	129.9	108.3	128.4	52.1	152	153.8		
% Moisture	5.1 ~~36.5~~	36.6	35.4	33.2	33.2	32.4		
Dry Density	19.1 69.3	68.56	69.4	69.9	69.2	70.5		
Maximum Dry Density	71.6							
Optimum Moisture	33.7							
% Compaction	96.8	95.7	96.9	97.6	96.7	98.5		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.46	12.36
Wt. Mold	9.27	9.27
Wt. Wet soil	3.19	3.09
Volume Mold	.0333	.0333
Wet Density	95.8	92.8
Wt. Wet soil & Pan	430.6	391.9
Wt. Dry soil & Pan	365.2	346.3
Wt. Pan	186.3	201.3
Moisture Lost	65.4	45.6
Wt. Dry soil	~~186~~ 178.9	145.0
% Moisture	36.5	31.4
Dry Density	70.1	70.6

Additional Project Data

~~86-19~~ 71.6 @ 33.7

Josh Slusarczuk
Printed Name

Signature

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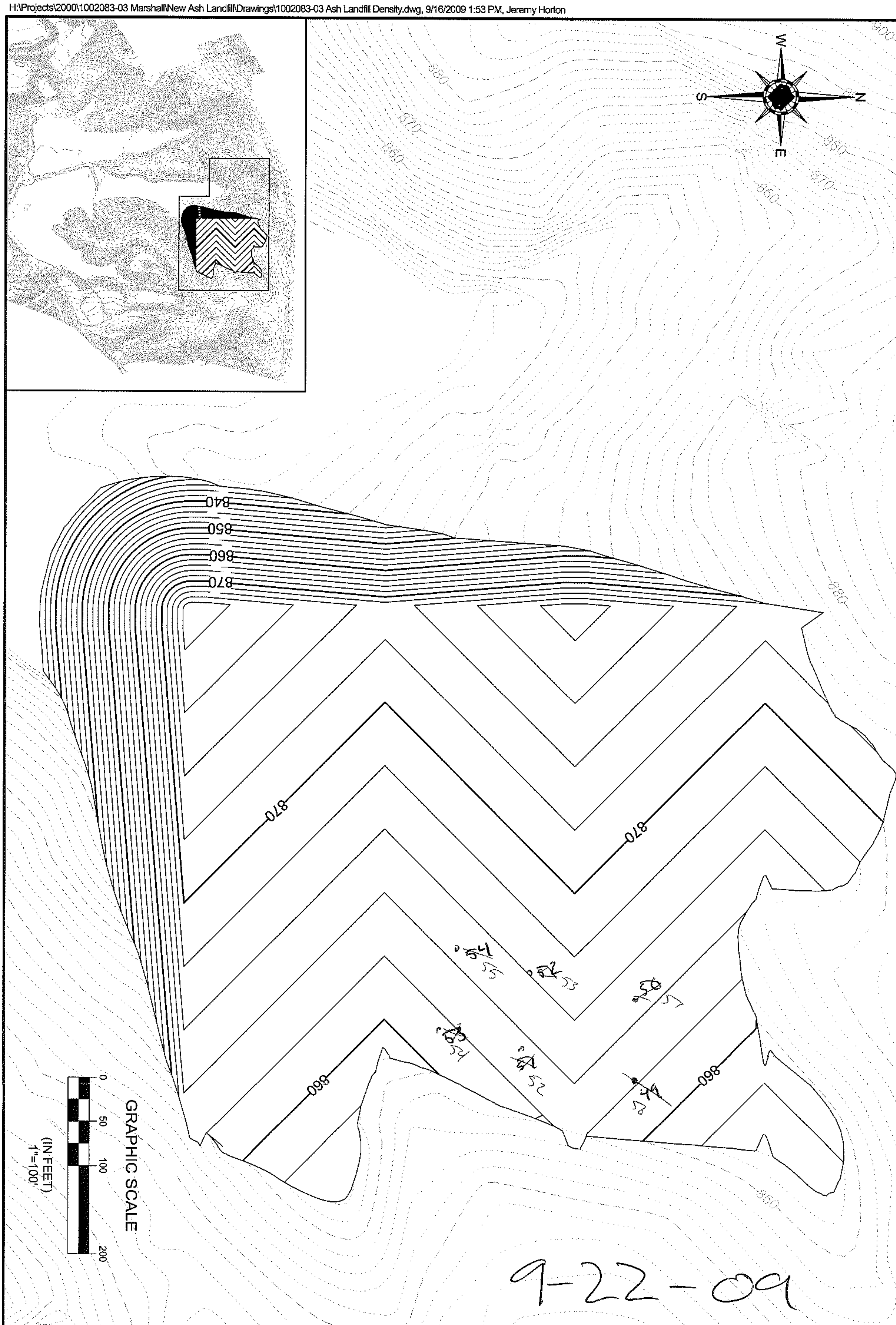

SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION 8320 EAST NC HIGHWAY 150 TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
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Telephone 704-394-6913 Fax 704-394-6968

Project Name:	Marshall	**Shield No.:**	1002085-03	**Client No.:**	
Client Name:	Duke	**Task No.:**	002	**Date:**	9-24-09
Inspection of:	Fill	**Technician:**	J SLUSARCZYK		

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Shield onsite at 10:00 a.m. 6 DT's were taken and compared to 71.6 @ 33.7%. ~~After reporting grade tests,~~ ALL DT's passed.

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JOSH SLUSARCZYK
Printed Name

Signature

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4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		**Shield No.:** 1002083-03	**Client No.:**
Client Name: Duke		**Task No.:** 0002	**Date:** 9-24-09
Inspection of: Fill		**Technician:** J SLUSARCZYK	

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Drive Tube/Nuclear Density Data

	56	57	58	59	60	61		
Test No.	55	56	57	58	59	60		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.25	4.49	4.41	4.38	4.33	4.35		
Wt. Mold	1.31	1.31	1.31	1.31	1.31	1.31		
Wt. Wet soil	2.94	3.18	3.10	3.07	3.02	3.04		
Volume Mold	.0332	.0332	.0332	.0332	.0332	.0332		
Wet Density	88.5	95.8	93.4	92.5	91.0	91.6		
Wt. Wet soil & Pan	359.1	360.4	363.8	390.8	399.2	357.8		
Wt. Dry soil & Pan	323.3	316.8	321.9	345.0	348.0	317.5		
Wt. Pan	201.3	186.5	186.3	201.2	201.2	186.4		
Moisture Lost	35.8	43.6	41.9	45.8	47.2	40.3		
Wt. Dry soil	122.0	130.3	135.6	143.8	146.8	131.1		
% Moisture	29.3	33.5	30.9	31.8	32.1	30.7		
Dry Density	68.4	71.8	71.4	70.2	68.9	70.1		
Maximum Dry Density	71.6							
Optimum Moisture	33.7							
% Compaction	95.5	100.0	99.6	98.0	96.2	97.8		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.46	
Wt. Mold	9.28	
Wt. Wet soil	3.18	
Volume Mold	.0333	
Wet Density	95.5	
Wt. Wet soil & Pan	379.6	
Wt. Dry soil & Pan	331.4	
Wt. Pan	186.1	
Moisture Lost	48.2	
Wt. Dry soil	145.3	
% Moisture	33.2	
Dry Density	71.7	

Additional Project Data

85-19 71.6 @ 33.7

Josh Slusarczyk
Printed Name

Signature

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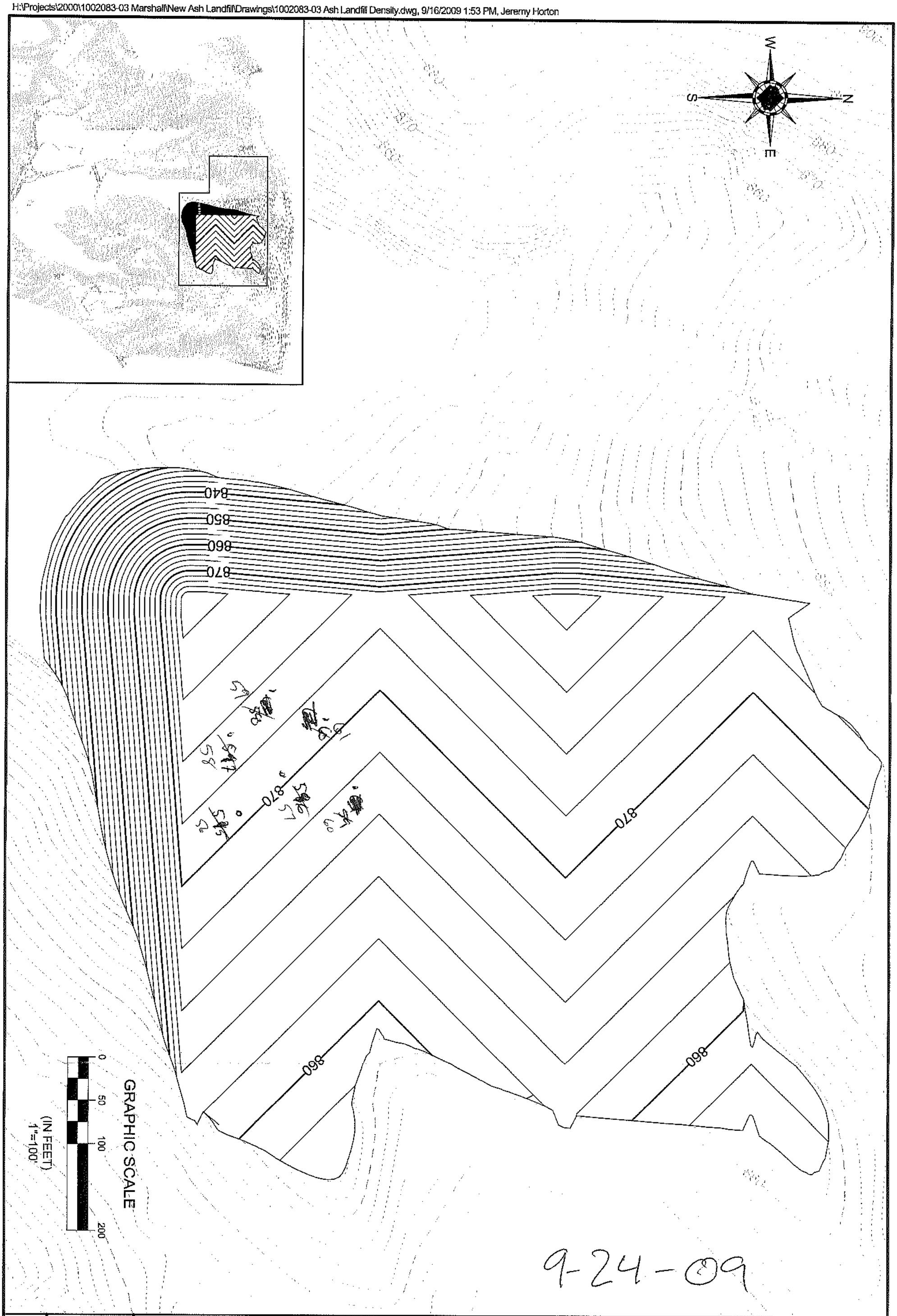

9-24-09

SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION, 8320 EAST NC HIGHWAY 150, TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
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Telephone 704-394-6913 Fax 704-394-6968

Project Name:	Marshall	**Shield No.:**	1002085-03	**Client No.:**	
Client Name:	Duke	**Task No.:**	0008	**Date:**	9-30-09
Inspection of:	Fill	**Technician:**	J SLUSARCZYK		

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Shield on-site @ 10:00 am. No ash was being placed. All DT's passed. No elevations had been found at the time of site-visit. 3 HAB's were done to find the depth of ash that had been placed. Depth's were as follows:

HAB # 1 → 8.5'
HAB # 2 → 5.0'
HAB # 5 → 2.0'

White Copy: Shield Representative
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Pink Copy: Inspector or Superintendent

Josh Slusarczyk
Printed Name

Signature

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Project Name: Marshall		**Shield No.:** 1002083-03	**Client No.:**
Client Name: Duke		**Task No.:** 0008	**Date:** 9-30-09
Inspection of: fill		**Technician:** S SLUSARCZYK	

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Drive Tube/Nuclear Density Data

	62	63	64	65	66	67		
Test No.	~~61~~	~~62~~	~~63~~	~~64~~	~~65~~	~~66~~		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.25	4.20	4.27	4.38	4.40	4.42		
Wt. Mold	1.31	1.31	1.31	1.31	1.31	1.31		
Wt. Wet soil	2.94	2.89	2.96	3.07	3.09	3.11		
Volume Mold	.0332	.0332	.0332	~~.0332~~ .0332	~~.0332~~ .0332	.0332		
Wet Density	86.5	87.0	89.2	92.5	93.1	93.7		
Wt. Wet soil & Pan	305.5	419.0	411.9	378.6	386.9	426.4		
Wt. Dry soil & Pan	277.7	369.5	363.1	332.2	337.9	374.8		
Wt. Pan	186.2	201.2	201.2	186.3	185.8	200.7		
Moisture Lost	27.8	48.5	48.8	46.4	49.0	51.6		
Wt. Dry soil	91.5	168.3	~~145.9~~ 146.1	145.9	152.1	174.1		
% Moisture	30.4	29.4	~~29.7~~ 29.8	31.8	32.2	29.6		
Dry Density	67.9	67.2	68.5	70.2	70.4	72.3		
Maximum Dry Density	71.6	—	—	—	—	—		
Optimum Moisture	33.7	—	—	—	—	—		
% Compaction	94.8	~~94.0~~ 93.8	96.2 95.8	98.2 98.0	98.5 98.4	101.1		
Meets Criteria (Y\N)	~~Y~~ N	~~N~~ Y	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.31	
Wt. Mold	9.28	
Wt. Wet soil	3.03	
Volume Mold	.0333	
Wet Density	91.0	
Wt. Wet soil & Pan	387.1	
Wt. Dry soil & Pan	347.9	
Wt. Pan	201.2	
Moisture Lost	44.2	
Wt. Dry soil	146.7	
% Moisture	31.2	
Dry Density	69.4	

Additional Project Data

AS-19

Scott Slusarczyk
Printed Name

Signature

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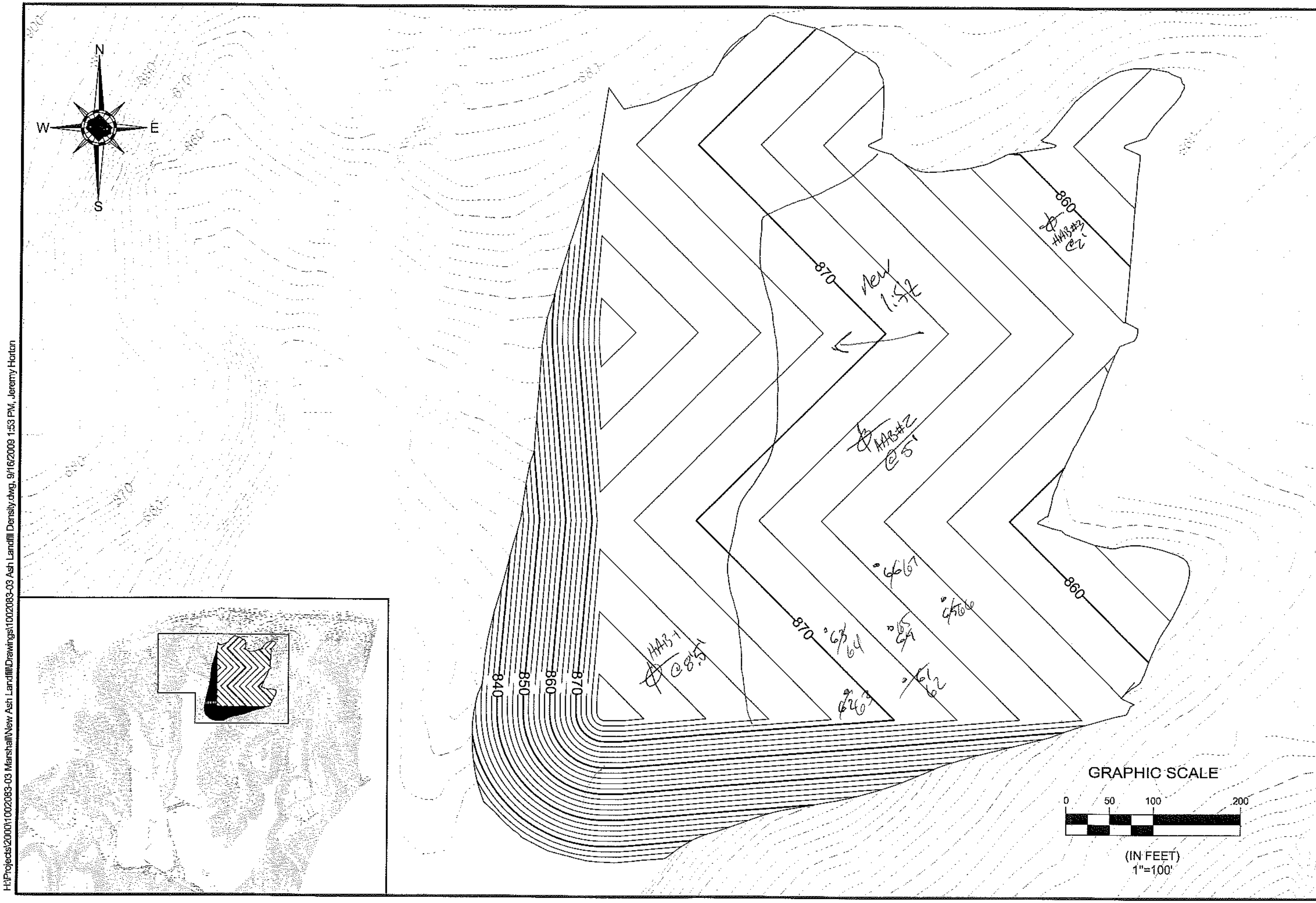

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

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DRAWN BY:
FILE NUMBER:
CHECKED BY:
SCALE:
DATE:

SHEET TITLE:

SHEET:

SHIELD ENGINEERING, INC.

November 9, 2009

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 3 - Month of October 2009
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of October. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Jeremy T. Horton, E.I.T.
Staff Professional

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\1002083-03 Marshall Ash Landfill 2009-10.doc

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Monthly Summary Report - No. 3

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	November 9, 2009	**Page:**	1 of 2
Report By:	Jeremy T. Horton, E.I.T.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of October.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on October 2, 7, 13, 21, 22, 23 and 29, 2009 to perform field density tests of the ash landfill material. The ash was too wet for testing on the October 17 visit. The in-place density tests labeled DT-68 to DT-97 were performed during this period. See Table 1 for preliminary results and locations.

The compaction results of these samples were in accordance with instructions provided by Duke Energy representatives. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road. Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
FLY ASH														
DT-1	08/18/09	See location plan	6		53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6		58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6		57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6		57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6		61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6		64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6		61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6		57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6		54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6		74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6		67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6		60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6		85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6		86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6		88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6		82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6		86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6		90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6		95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6		91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6		90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6		96.1	45.8	65.9	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6		91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6		87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6		91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6		86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6		84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6		85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6		84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6		85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6		83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6		84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6		88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6		87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6		87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6		91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6		86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6		85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6		82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6		80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6		88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6		84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6		82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6		82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6		79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6		84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6		93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6		96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4501 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
DT-45R	09/15/09	See location plan	6		94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6		94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6		91.9	31.6	69.8	66.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6		94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6		94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6		93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6		94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6		93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6		92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6		93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6		88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6		95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6		93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6		91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6		91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6		88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6		87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6		89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6		93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6		93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6		91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6		93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.9
DT-70	10/02/09	See location plan	6		91.9	30.6	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6		93.7	36.0	68.9	71.6	33.7	BAS-19	96.2	X		2.3
DT-72	10/02/09	See location plan	6		93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6		94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6		89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6		88.9	30.1	68.3	70.0	32.5	BAS-8	97.6	X		-2.4
DT-76	10/07/09	See location plan	6		92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6		95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6		94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6		90.1	26.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6		91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6		87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6		93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6		88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6		90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6		86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6		93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6		93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6		90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6		91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6		93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6		91.2	29.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6		93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6		88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6		92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6		92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0
DT-96	10/23/09	See location plan	6		96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6		98.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
FLY ASH														
DT-1	08/18/09	See location plan	6		53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6		58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6		57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6		57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6		61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6		64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6		61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6		57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6		54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6		74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6		67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6		60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6		85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6		86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6		88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6		82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6		86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6		90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6		95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6		91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6		90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6		96.1	45.8	65.9	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6		91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6		87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6		91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6		86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6		84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6		85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6		84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6		85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6		83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6		84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6		88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6		87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6		87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6		91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6		86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6		85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6		82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6		80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6		88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6		84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6		82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6		82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6		79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6		84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6		93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6		96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
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SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

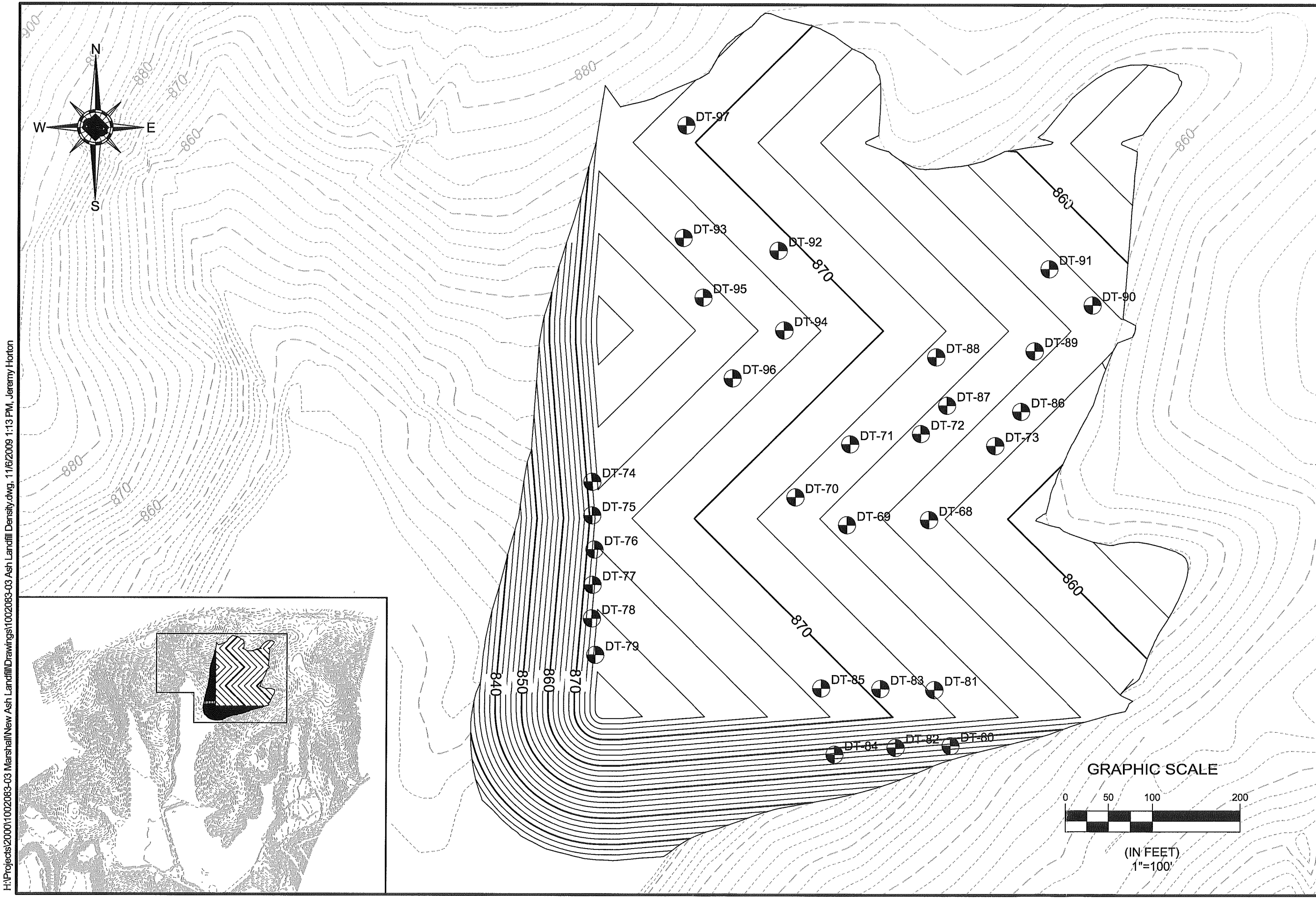
TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-45R	09/15/09	See location plan	6		94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6		94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6		91.9	31.6	69.8	66.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6		94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6		94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6		93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6		94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6		93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6		92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6		93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6		88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6		95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6		93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6		91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6		91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6		88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6		87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6		89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6		93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6		93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6		91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6		93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.9
DT-70	10/02/09	See location plan	6		91.9	30.6	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6		93.7	36.0	68.9	71.6	33.7	BAS-19	96.2	X		2.3
DT-72	10/02/09	See location plan	6		93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6		94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6		89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6		88.9	30.1	68.3	70.0	32.5	BAS-8	97.6	X		-2.4
DT-76	10/07/09	See location plan	6		92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6		95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6		94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6		90.1	26.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6		91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6		87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6		93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6		88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6		90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6		86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6		93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6		93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6		90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6		91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6		93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6		91.2	29.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6		93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6		88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6		92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6		92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0
DT-96	10/23/09	See location plan	6		96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6		98.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL



H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 11/6/2009 1:13 PM, Jeremy Horton

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density.dwg
DRAWN BY: JTH
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: ---

SHEET TITLE:
DENSITY TEST LOCATION PLAN FOR ASH OCTOBER 2009

SHEET:
1

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:** 1002083-03	**Client No.:**
Client Name: Duke	**Task No.:** 0008	**Date:** 10-2-09
Inspection of: Fill	**Technician:** J SLUSARCZYK	

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Shield on-site to take 6 drive tube's.
All tubes were taken on the + 9.5' 1.5t
from ~~[illegible]~~ deepest part of ash.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

JOSH SLUSARCZYK
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		**Shield No.:** 1002083-03	**Client No.:**
Client Name: Duke		**Task No.:** 0003	**Date:** 10-2-09
Inspection of: Fill		**Technician:** J SLUSARCZYK	

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Drive Tube/Nuclear Density Data

Test No.	68	69	70	71	72	73		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.36	4.40	4.36	4.42	4.42	4.45		
Wt. Mold	1.31	1.31	1.31	1.31	1.31	1.31		
Wt. Wet soil	3.05	3.09	3.05	3.11	3.11	3.14		
Volume Mold	.0332	.0332	.0332	.0332	.0332	.0332		
Wet Density	91.9	93.1	91.9	93.7	93.7	94.6		
Wt. Wet soil & Pan	369.6	369.9	301.7	376.4	342.5	322.0		
Wt. Dry soil & Pan	346.5	326.6	274.6	326.0	300.5	291.5		
Wt. Pan	200.7	186.0	186.0	186.2	186.3	190.7		
Moisture Lost	43.1	43.3	27.1	50.4	42.0	30.5		
Wt. Dry soil	144.8	140.6	88.6	139.8	114.2	90.8		
% Moisture	29.86	30.8	30.6	36.0	36.7	33.6		
Dry Density	70.8	71.2	70.4	68.9	68.5	70.8		
Maximum Dry Density	~~71.5~~ @	71.6						
Optimum Moisture	~~33.1~~	33.6						
% Compaction	99.0	99.84	98.43	96.82	95.87	~~99~~ 98.9		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.40	
Wt. Mold	9.28	
Wt. Wet soil	3.12	
Volume Mold	.0333	
Wet Density	93.7	
Wt. Wet soil & Pan	402.4	
Wt. Dry soil & Pan	354.8	
Wt. Pan	200.9	
Moisture Lost	47.6	
Wt. Dry soil	153.9	
% Moisture	30.9	
Dry Density	71.6	

Additional Project Data

~~71.5 @ 33.1~~
71.6 @ 33.6
B15-19

Printed Name: [illegible]

Signature: Josh Slusarczyk

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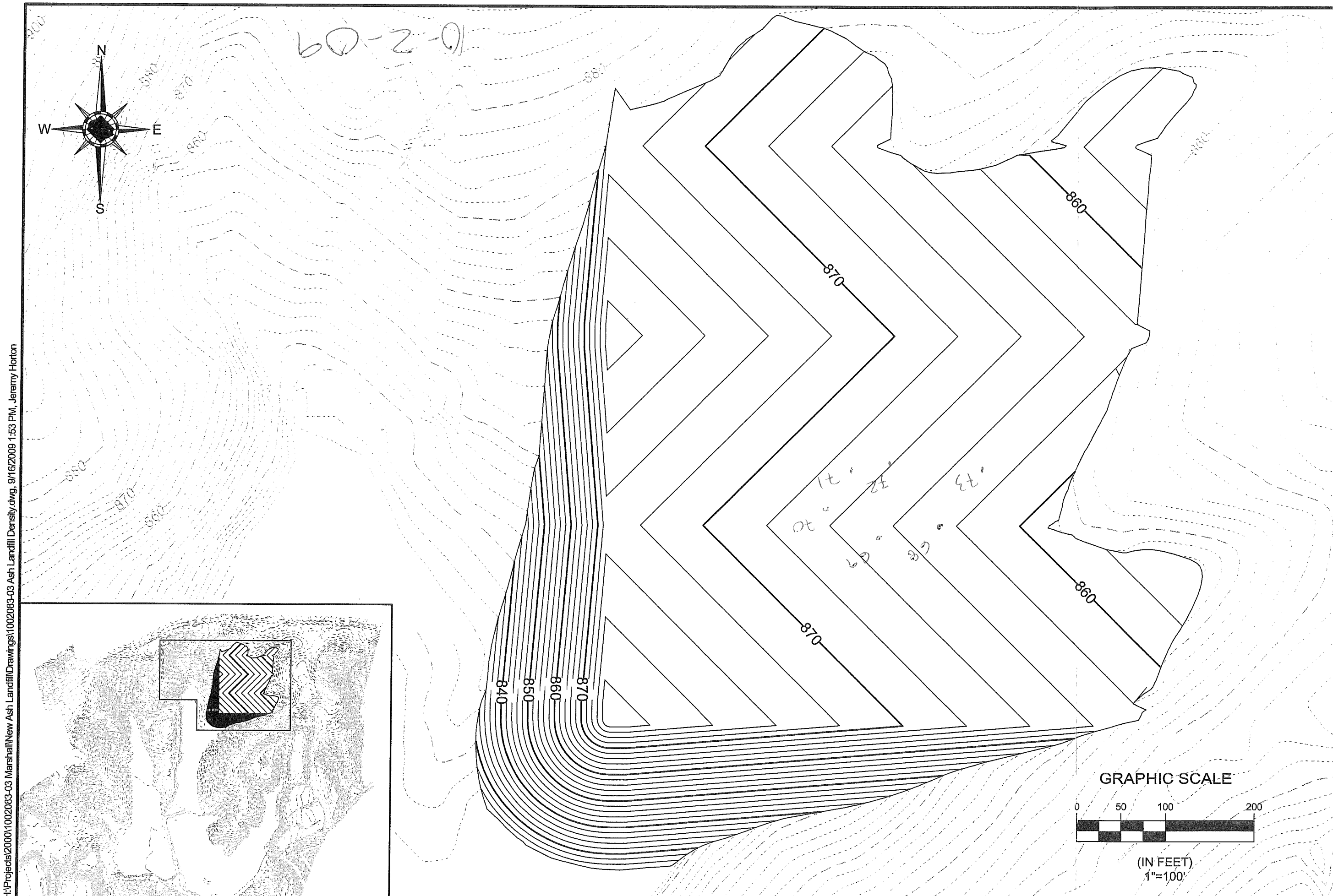

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME:
DRAWN BY:
FILE NUMBER:
CHECKED BY:
SCALE:
DATE:

SHEET TITLE:

SHEET:

Shield Engineering, Inc.
4301 Taggart Creek Rd, Charlotte NC 28208
Telephone 704-394-6913 Fax 704-394-6968

DAILY REPORT

Project Name: Marshall Steam Station **Client's Name:** Duke Energy **Observation of:** Ash Landfill Fill Density	**Contractor:** SEFA **SHIELD Job No.** 1002083-03 **Rev:** 0 **Date:** 10-7-09 Wed

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Onsite: 11:00 am **Off Site: 4:00 pm**

Weather: Overcast, 75-83 degrees
Personnel on site: Richard A. Meerholz, Technician

Shield on site to inspect ash fill placement density by Drive Tube method to determine the compaction of lifts of ash placement.

Called and met Carlton Allred of Duke Energy. He led me to the new ash landfill. Met with the Dozer Operator to determine test location for today. A 200ft strip was selected along the west side of the landfill approximately halfway on that side at about 50ft from the edge. Six drive tubes and a 1-point proctor was perfomed. Also met briefly with the water truck operator.

A few pictures were taken and will be placed in the project folder.

On site Observations:

- No elevation stakes could be found to verify the pad elevation at the test location. Water truck operator stated that there is about 2 feet of material at the test location today.
- A few loads of bottom ash was brought in but placed in a corner of the pad and not mixed with the fly ash.

Attachments: Tests data sheet & sketch
Reviewed by: Jeremy Horton & Keith Anthony
Position: Project Engineers
Company: Shield Engineering, Inc.
Report by: Richard A. Meerholz

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL STEAM STATION	**Shield No.:** 102083-03	**Client No.:**
Client Name: DUKE ENERGY	**Task No.:** 0002	**Date:** 10/7/09 WED.
Inspection of: ASH LANDFILL DENSITY-NEW LANDFILL	**Technician:** RICHARD A. MEERHOLZ	

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Drive Tube\Nuclear Density Data

	1	2	3	4	5	6		
Test No.	DT-74	DT-75	DT-76	DT-77	DT-78	DT-79		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.32	4.26	4.40	4.50	4.48	4.36		
Wt. Mold	1.34	1.30	1.32	1.32	1.34	1.36		
Wt. Wet soil	2.98	2.96	3.08	3.18	3.14	3.00		
Volume Mold	.0333	.0333	.0333	.0333	.0333	.0333		
Wet Density	89.5	88.9	92.5	95.5	94.3	90.1		
Wt. Wet soil & Pan	483.7	480.5	427.9	413.3	422.5	415.2		
Wt. Dry soil & Pan	434.3	430.3	388.4	376.7	383.5	381.6		
Wt. Pan	260.3	263.5	257.3	259.0	248.8	256.3		
Moisture Lost	49.4	50.2	39.50	36.6	39.0	33.6		
Wt. Dry soil	174.0	166.8	131.1	117.7	134.7	125.3		
% Moisture	28.4	30.1	30.1	31.1	29.0	26.8		
Dry Density	69.7	68.3	71.1	72.8	73.1	71.0		
Maximum Dry Density	72.0	70.0	74.0	74.0	74.0	72.0		
Optimum Moisture	26.3	32.5	32.5	32.5	32.5	26.3		
% Compaction	96.8	97.6	96.1	98.4	98.8	98.8		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.34	
Wt. Mold	9.28	
Wt. Wet soil	3.06	
Volume Mold	.0332	
Wet Density	92.2	
Wt. Wet soil & Pan	404.1	
Wt. Dry soil & Pan	373.5	
Wt. Pan	261.4	
Moisture Lost	30.6	
Wt. Dry soil	112.1	
% Moisture	27.3	
Dry Density	72.4	

DT-74

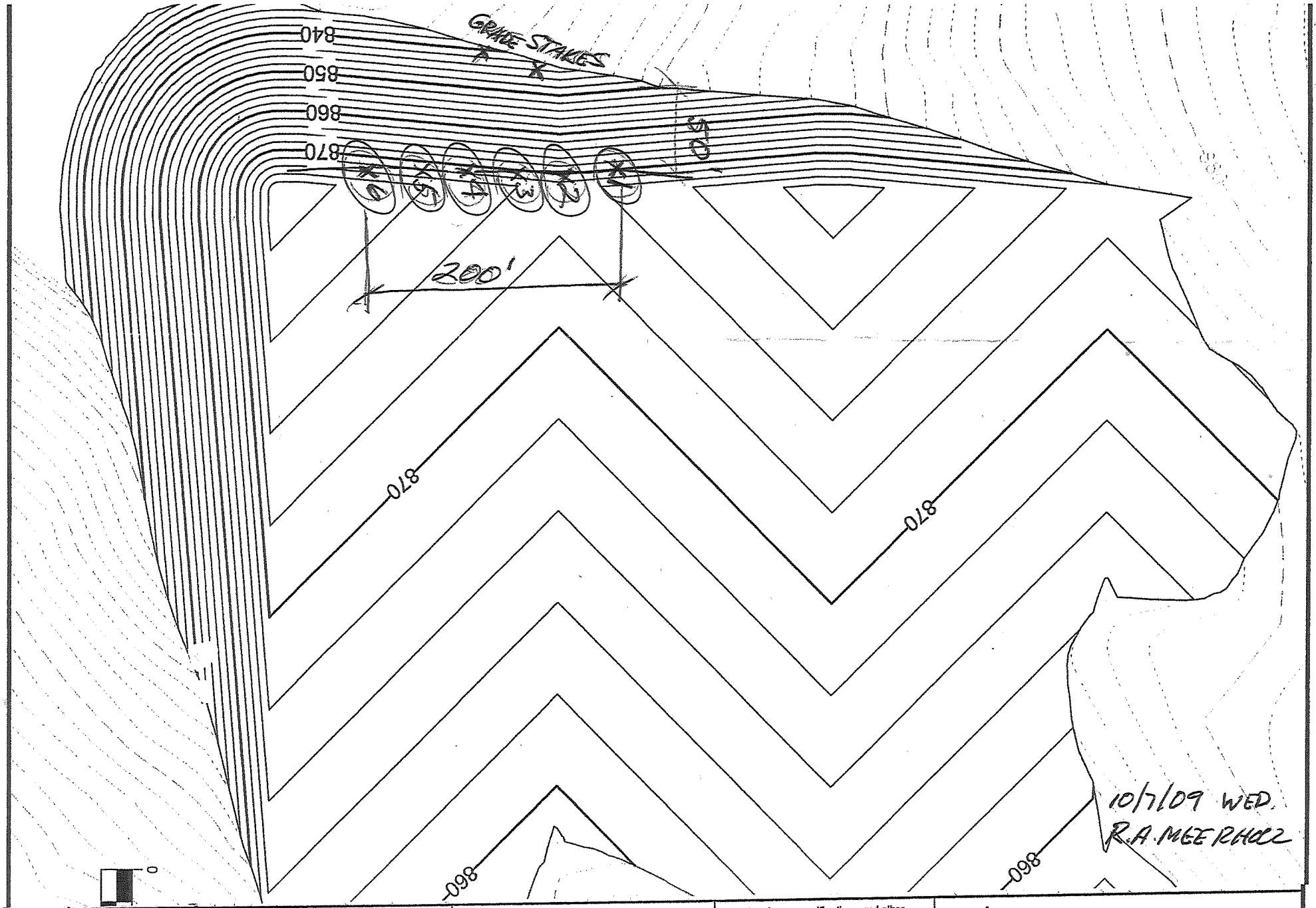
Additional Project Data

PROCTORS

BAS-25 74.0 pcf @ 32.5 % mc
BAS-14 72.0 pcf @ 26.3 % mc
BAS-8 70.0 pcf @ 32.5 % mc

RICHARD A. MEERHOLZ
Printed Name

Signature



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		FILE NUMBER:		
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*	
		SCALE:		
		DATE:		

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Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL STEAM STATION	**Shield No.:** 1002083-01	**Client No.:**
Client Name: DUKE ENERGY	**Task No.:** 0002	**Date:** 10/13/09 TUE.
Inspection of: NEW ASH LANDFILL DENSITY	**Technician:** RICHARD A. MEERHOLZ	

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ON SITE: 12:25 P.M. OFF SITE: 4:40 P.M.

SHIELD ON SITE TO INSPECT ASH FILL PLACEMENT DENSITY BY DRIVE TUBE METHOD TO DETERMINE THE COMPACTION OF LIFTS OF ASH PLACEMENT.

MET WITH WATER TRUCK OPERATOR TO DETERMINE TEST LOCATION. TEST LOCATION APPROXIMATELY 140' X 116'. AREA AROUND TEST LOCATION WAS ROLLED WITH WATER TRUCK (NO DRUM ROLLER ON SITE).

SIX DRIVE TUBES PROCESSED & A 1-POINT.

PERSONNEL ON SITE:
RICHARD MEERHOLZ, SHIELD ENG.
SEFA: 5 OPERATORS (DOZER, WATER TRUCK + 3 DUMP TRUCKS)
JERRY OF SEFA ON SITE.

WEATHER: CLEAR, COOL, LIGHT BREEZE, 65-70°

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

RICHARD A. MEERHOLZ
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL STEAM STATION	Shield No.: 1002083-01	Client No.:
Client Name: DUKE ENERGY	Task No.: 0002	Date: 10/13/09 TUE.
Inspection of: NEW LANDFILL ASH DENSITY	Technician: RICHARD A. MEBRHOLZ	

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Drive Tube\Nuclear Density Data

	1	2	3	4	5	6		
Test No.	DT-80	DT-81	DT-82	DT-83	DT-84	DT-85		
Grade or Elevation								
Location	SOUTHEAST SIDE	→	→	→	→	→		
Wt. Wet Soil & Mold	4.38	4.24	4.36	4.24	4.34	4.22		
Wt. Mold	1.32	1.34	1.26	1.28	1.34	1.34		
Wt. Wet soil	3.06	2.90	3.10	2.96	3.00	2.88		
Volume Mold	.0333	.0333	.0333	.0333	.0333	.0333		
Wet Density	91.9	87.1	93.1	88.9	90.1	86.5		
Wt. Wet soil & Pan	448.2	441.8	415.8	446.5	435.3	421.6		
Wt. Dry soil & Pan	404.3	401.9	377.1	404.4	393.7	385.7		
Wt. Pan	260.3	259.0	257.3	261.4	257.3	260.3		
Moisture Lost	43.9	39.9	38.7	42.1	41.6	35.9		
Wt. Dry soil	144.0	142.9	119.8	143.0	136.4	125.4		
% Moisture	30.5	27.9	32.3	29.4	30.5	28.6		
Dry Density	70.4	68.1	70.4	68.7	69.0	67.3		
Maximum Dry Density	74.0	70.2	74.0	70.2	70.2	70.2		
Optimum Moisture	32.2	28.3	32.2	28.3	28.3	28.3		
% Compaction	95.1	97.0	95.1	97.9	98.4	95.8		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.26	
Wt. Mold	9.28	
Wt. Wet soil	2.98	
Volume Mold	.0332	
Wet Density	89.8	
Wt. Wet soil & Pan	407.2	
Wt. Dry soil & Pan	371.4	
Wt. Pan	257.3	
Moisture Lost	35.8	
Wt. Dry soil	114.1	
% Moisture	31.4	
Dry Density	68.3	

AT DT-82

Additional Project Data

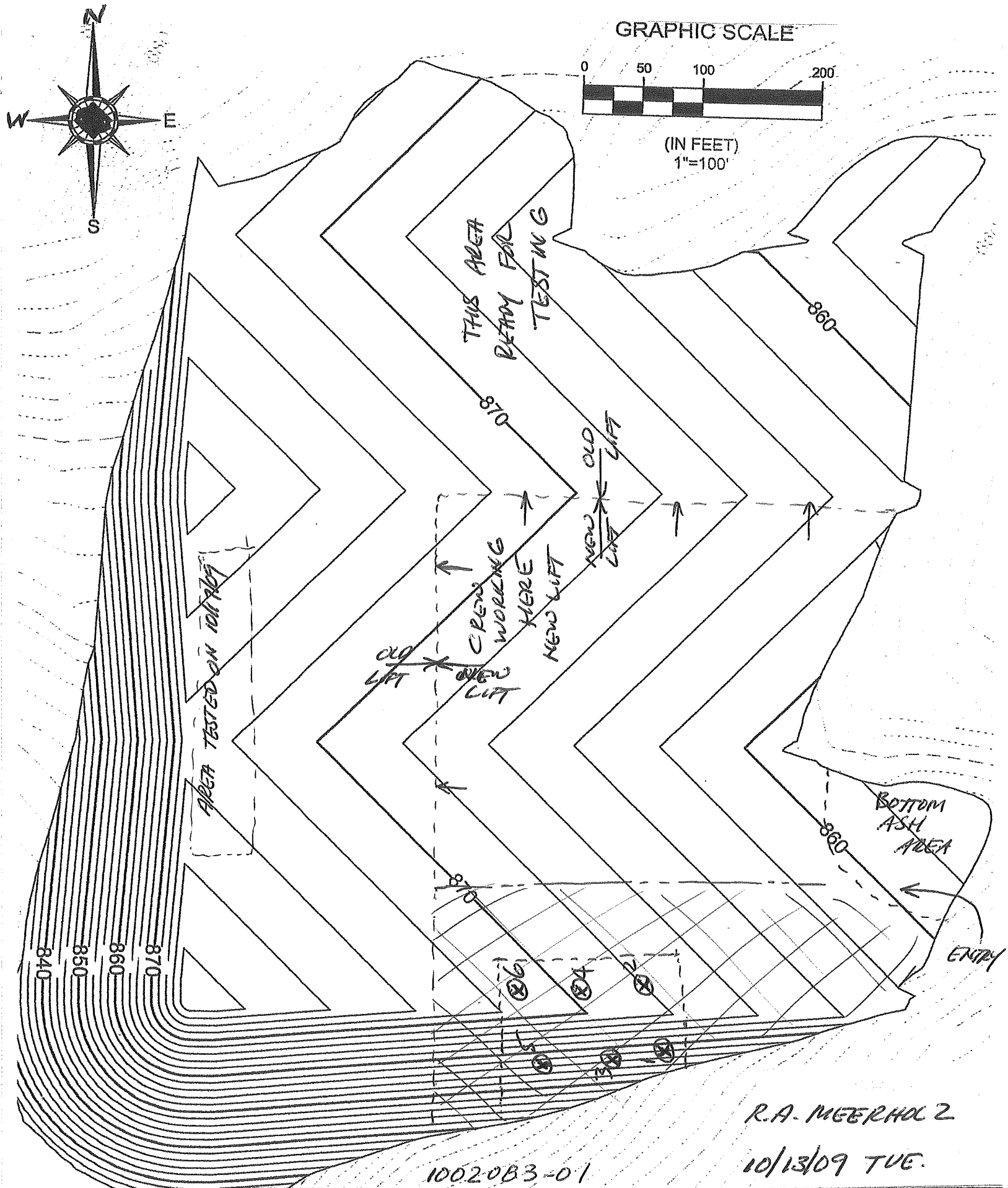
PROCTORS

BAS-25 74.0 PCF @ 32.2

BAS-11 70.2 PCF @ 28.3

RICHARD A. MEBRHOLZ
Printed Name

Signature



PROJECT NAME:

MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:

DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150

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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:** 1002087-03	**Client No.:**
Client Name: Duke	**Task No.:** 0008	**Date:** 10-21-09
Inspection of: Fill	**Technician:** JRS	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Upon arrival no fill equipment was in truck # 146. Returned back to the office.

checked elevations ~~at~~ in landfill.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

JOSH SLUSARCZYK
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshburn	**Shield No.:** 100208501	**Client No.:**
Client Name:	**Task No.:** 0088	**Date:** 10-22-09
Inspection of:	**Technician:** JRS	

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+ 10.0'

Drive Tube\Nuclear Density Data

Test No.	86	87	88	89	90	91		
Grade or Elevation								
Location	LCB	SOL	SBD	GDI	TUBE	ODB		
Wt. Wet Soil & Mold	4.425	4.479	4.354	4.367	4.515	4.516		
Wt. Mold	1.308	1.386	1.348	1342	1.399	1.369		
Wt. Wet soil	3.117	3.093	3.006	3.025	3.116	3.037		
Volume Mold	.0332	.0332	.0332	.0332	.0332	.0332		
Wet Density	93.88	93.16	90.54	91.11	93.9	91.17		
Wt. Wet soil & Pan	1595.79	1103.75	1545.98	1543.73	1599.86	1560.01		
Wt. Dry soil & Pan	1287.36	899.21	1255.94	1240.27	1269.19	1248.92		
Wt. Pan	189.40	195.14	187.52	188.87	187.09	189.28		
Moisture Lost	308.43	204.54	290.04	303.46	330.67	311.09		
Wt. Dry soil	1097.96	704.07	1068.42	1051.40	1082.10	1059.64		
% Moisture	28.1	29.0	27.1	28.9	30.6	29.4		
Dry Density	73.3	72.2	71.3	70.7	71.9	70.5		
Maximum Dry Density	74.0							
Optimum Moisture	32.2							
% Compaction	99.0	97.6	96.3	95.5	97.2	95.3		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold		
Wt. Mold		
Wt. Wet soil		
Volume Mold		
Wet Density		
Wt. Wet soil & Pan		
Wt. Dry soil & Pan		
Wt. Pan		
Moisture Lost		
Wt. Dry soil		
% Moisture		
Dry Density		

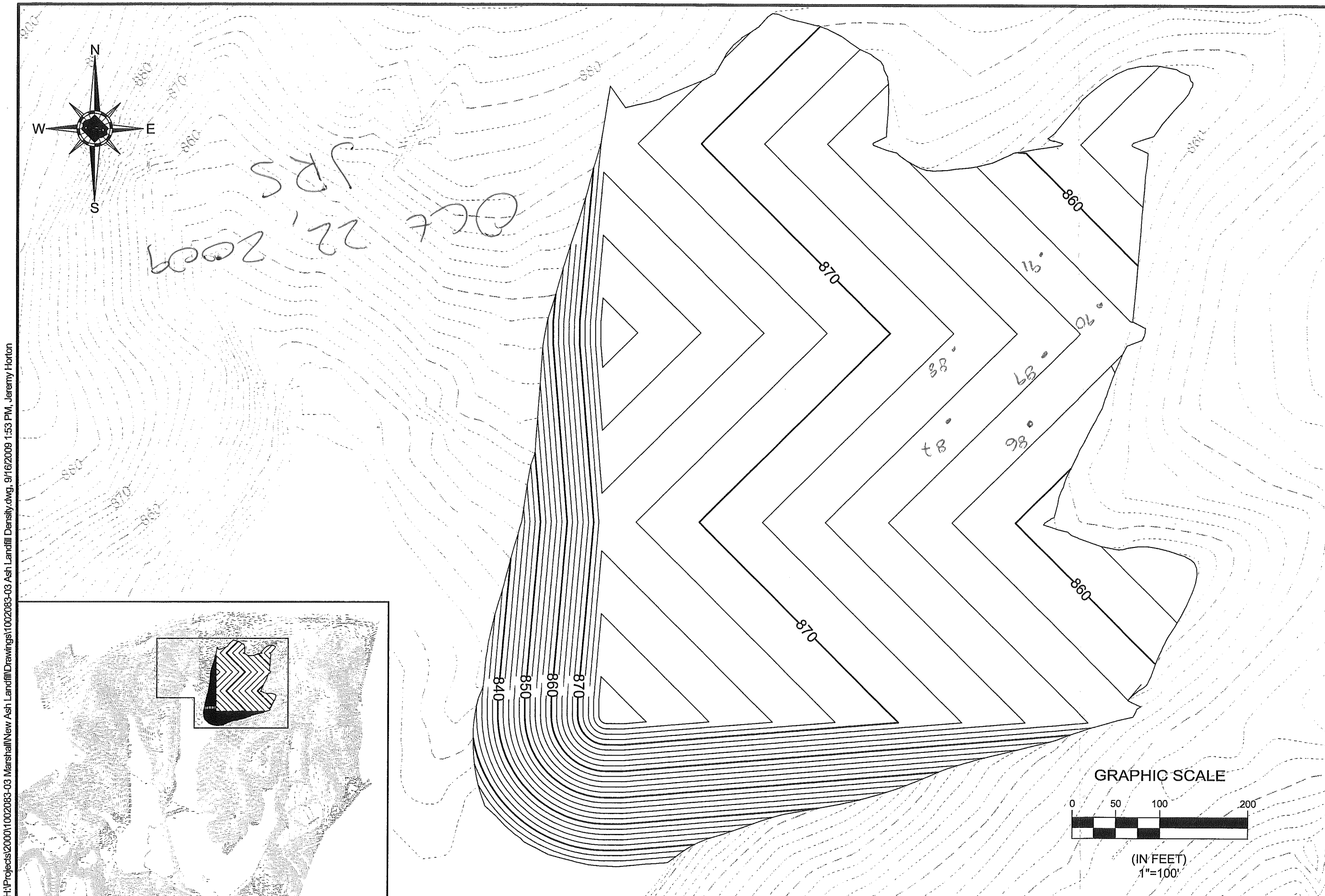
Additional Project Data

74.0 @ 32.2

Josh Sosarczyk
Printed Name

Signature

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 9/16/2009 1:53 PM, Jeremy Horton



Oct 22, 2009
JRS

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www.shieldengineering.com
4301 TAGGART CREEK ROAD
CHARLOTTE, NC 28208

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME:
DRAWN BY:
FILE NUMBER:
CHECKED BY:
SCALE:
DATE:

SHEET TITLE:

SHEET:

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		**Shield No.:** 1002083-03	**Client No.:**
Client Name: Duke		**Task No.:** 0008	**Date:** 10-23-09
Inspection of: Fill		**Technician:** JRS	

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+10.0' of fill

Tried calling Carlton @ Duke to get evaluations, phone called not returned.

Drive Tube\Nuclear Density Data

Test No.	92	93	94	95	96	97		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.40	4.25	4.36	4.38	4.50	4.56		
Wt. Mold	1.30	1.30	1.30	1.30	1.30	1.30		
Wt. Wet soil	3.10	2.95	3.06	3.08	3.20	3.26		
Volume Mold	.0332	.0332	.0332	.0332	.0332	.0332		
Wet Density	93.4	88.9	92.2	92.8	96.4	98.2		
Wt. Wet soil & Pan	429.5	392.7	324.1	353.3	329.0	331.4		
Wt. Dry soil & Pan	380.5	348.5	294.6	318.1	295.0	300.1		
Wt. Pan	201.2	186.2	186.2	201.7	186.1	201.8		
Moisture Lost	49.0	44.2	29.5	35.2	34.0	31.3		
Wt. Dry soil	179.3	162.3	108.4	116.4	108.9	98.3		
% Moisture	27.3	27.2	27.2	30.2	31.3	31.8		
Dry Density	73.3	69.9	72.5	71.3	72.4	74.5		
Maximum Dry Density	74.0	~~70.2~~	~~70.2~~	→		→		
Optimum Moisture	32.2	~~25.3~~	~~28.3~~ 28	→		→		
% Compaction	99.1	94.4	~~97.9~~	96.3	99.2	100.6		
Meets Criteria (Y\N)	Y	N	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.42	
Wt. Mold	9.28	
Wt. Wet soil	3.14	
Volume Mold	.0333	
Wet Density	94.3	
Wt. Wet soil & Pan	412.7	
Wt. Dry soil & Pan	365.8	
Wt. Pan	201.7	
Moisture Lost	46.9	
Wt. Dry soil	164.1	
% Moisture	28.6	
Dry Density	73.3	

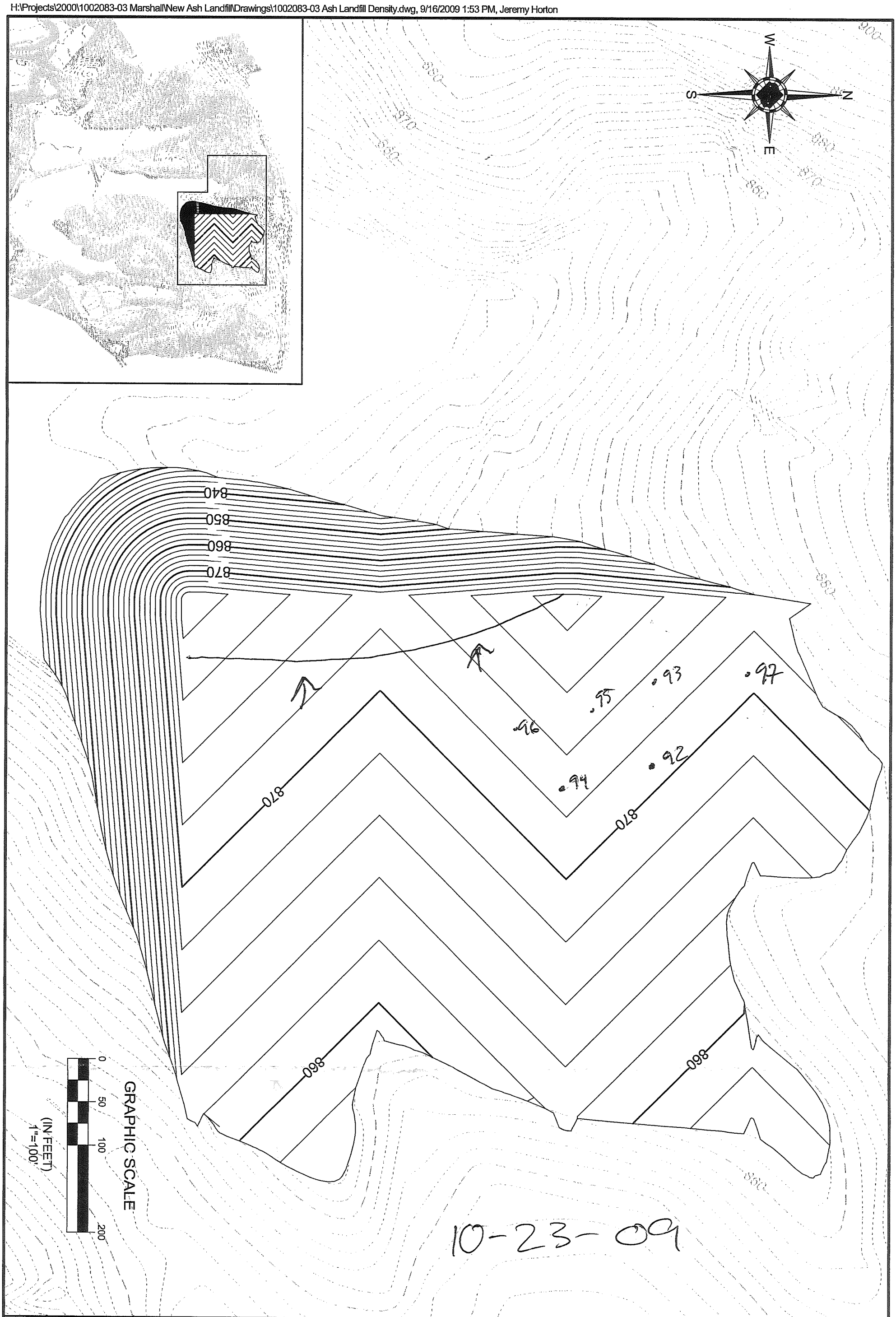
Additional Project Data

74.0 @ 32.2

JOSH SLUSARCZYK
Printed Name

Signature

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 9/16/2009 1:53 PM, Jeremy Horton



SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION 8320 EAST NC HIGHWAY 150 TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:** 1002083-03	**Client No.:**
Client Name: Duke	**Task No.:** 0008	**Date:** 10-29-09
Inspection of: Fill	**Technician:** JRS	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield on-site at 10:30 am. No-one was onsite and no ash was being moved. Entire cell was wet. Went to dig out the side of the embankment to get a sample of material that was first placed to run proctor on, trying to get Coleman's #'s to pass.

It appears that the cell is being constructed now in sections. ~~The~~ There are three distinct lifts that are exposed. Going to question site personell on Friday (10-30-09)

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

JOSH SLUSARCZYK
Printed Name

Signature

SHIELD ENGINEERING, INC.

December 9, 2009

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

Attached is the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of November 2009. Please note that the approximate elevation information for the density tests is not complete. Our field technicians have established a grade stake and are documenting approximate localized elevations based on our grade stake. It is our understanding that a site elevation datum from SEFA has recently been marked and we can equate our local elevations to the approximate site elevation when we are next on site.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Janette M Prosser

Janette M. Prosser, P.E.
Senior Engineer

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\Cover Letter 2009-11.doc

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Monthly Summary Report - No. 4

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	December 9, 2009	**Page:**	1 of 2
Report By:	Janette M. Prosser, P.E.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of November.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on November 3, 6, 17, 20 and 25, 2009 to perform field density tests of the ash landfill material. The ash was too wet for testing during the week of November 9, 2009. The in-place density tests labeled DT-98 to DT-127 were performed during this period. See Table 1 for preliminary results and locations.

Laboratory Conformance Test:

1. Conformance laboratory samples for the ash structural fill material previously performed during the beginning of this project are included (BAS-23 through BAS-28).

2. Conformance laboratory sample labeled BAS-29 was collected from the ash structural fill material during this period. See attached Moisture-Density Relationship test and additional required conformance test results.

The compaction results of these samples were in accordance with instructions provided by Duke Energy representatives. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
FLY ASH														
DT-1	08/18/09	See location plan	6		53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6		58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6		57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6		57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6		61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6		64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6		61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6		57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6		54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6		74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6		67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6		60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6		85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6		86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6		88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6		82.8	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6		86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6		90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6		95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6		91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6		90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6		98.1	45.8	65.9	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6		91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6		87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/08/09	See location plan	6		91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6		86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6		84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6		85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6		84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6		85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6		83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6		84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6		88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6		87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6		67.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6		91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6		88.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6		85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6		82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6		80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6		88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6		84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6		82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6		82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6		79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6		84.0	27.6	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6		93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6		96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6911

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
DT-45R	09/15/09	See location plan	6		94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6		94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6		91.9	31.6	69.8	68.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6		94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6		94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6		93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6		94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6		93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6		92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6		93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6		88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6		96.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6		93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6		91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6		91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6		88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6		87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6		89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6		93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6		93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6		91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6		93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.8
DT-70	10/02/09	See location plan	6		91.9	30.8	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6		93.7	36.0	68.9	71.6	33.7	BAS-19	96.2	X		2.3
DT-72	10/02/09	See location plan	6		93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6		94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6		89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6		88.9	30.1	68.3	70.0	32.5	BAS-8	97.6	X		-2.4
DT-76	10/07/09	See location plan	6		92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6		95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6		94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6		90.1	28.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6		91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6		87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6		93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6		88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6		90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6		86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6		93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6		93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6		90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6		91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6		93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6		91.2	28.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6		93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6		88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6		92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6		92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0
DT-96	10/23/09	See location plan	6		96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6		98.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4
DT-98	11/03/09	See location plan	6		90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-99	11/03/09	See location plan	6		91.3	28.9	70.8	71.5	33.1	BAS-26	99.1	X		-4.2
DT-100	11/03/09	See location plan	6		94.9	32.6	71.6	71.5	33.1	BAS-26	100+	X		-0.5
DT-101	11/03/09	See location plan	6		97.3	35.5	71.8	71.5	33.1	BAS-26	100+	X		2.4
DT-102	11/03/09	See location plan	6		97.9	35.3	72.4	71.5	33.1	BAS-26	100+	X		2.2
DT-103	11/03/09	See location plan	6		96.1	31.9	72.9	71.5	33.1	BAS-26	100+	X		-1.2
DT-104	11/06/09	See location plan	6		92.8	31.1	70.8	74.0	32.2	BAS-25	96.7	X		-1.1
DT-105	11/06/09	See location plan	6		89.8	31.5	68.3	74.0	32.2	BAS-25	92.3		X	-0.7
DT-105R	11/06/09	See location plan	6		92.8	31.8	70.4	74.0	32.2	BAS-25	95.1	X		-0.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

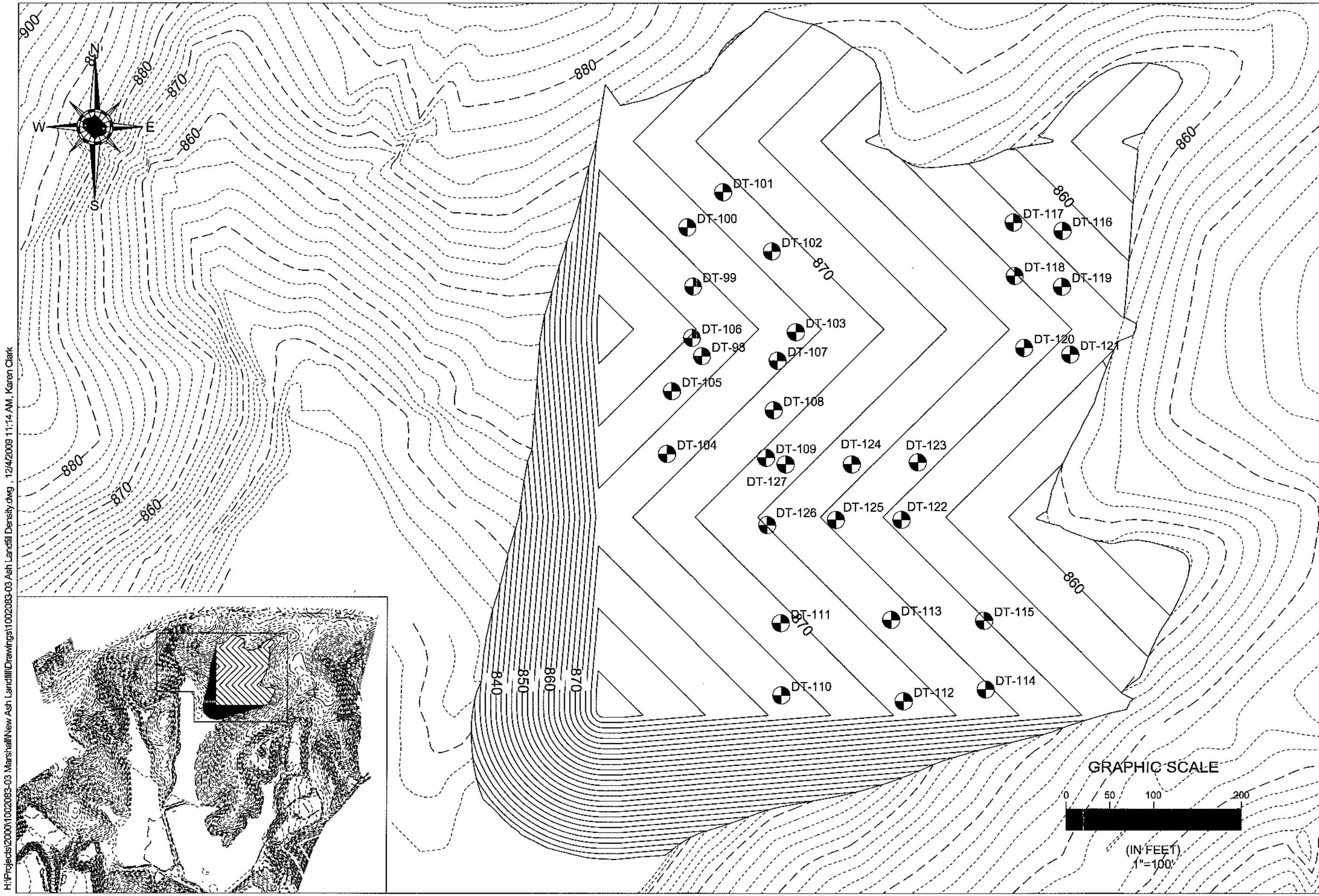
4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
DT-106	11/06/09	See location plan	6		94.3	28.2	73.6	74.0	32.2	BAS-25	99.4	X		-4.0
DT-107	11/06/09	See location plan	6		95.2	30.8	72.8	74.0	32.2	BAS-25	98.4	X		-1.4
DT-108	11/06/09	See location plan	6		97.6	30.9	74.6	74.0	32.2	BAS-25	100+	X		-1.3
DT-109	11/06/09	See location plan	6		94.6	30.6	72.4	74.0	32.2	BAS-25	97.9	X		-1.6
DT-110	11/17/09	See location plan	6		88.0	29.9	67.7	70.2	28.3	BAS-11	96.5	X		1.6
DT-111	11/17/09	See location plan	6		89.8	28.7	69.8	70.2	28.3	BAS-11	99.4	X		0.4
DT-112	11/17/09	See location plan	6		91.3	26.1	72.4	72.0	26.3	BAS-14	100+	X		-0.2
DT-113	11/17/09	See location plan	6		91.9	26.9	72.4	72.0	26.3	BAS-14	100+	X		0.6
DT-114	11/17/09	See location plan	6		89.2	27.1	70.2	72.0	26.3	BAS-14	97.5	X		0.8
DT-115	11/17/09	See location plan	6		88.0	26.1	69.8	72.0	26.3	BAS-14	96.9	X		-0.2
DT-116	11/20/09	See location plan	6		90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-117	11/20/09	See location plan	6		90.4	30.8	69.1	71.5	33.1	BAS-26	96.7	X		-2.3
DT-118	11/20/09	See location plan	6		90.7	32.3	68.6	71.5	33.1	BAS-26	95.9	X		-0.8
DT-119	11/20/09	See location plan	6		91.9	31.0	70.2	71.5	33.1	BAS-26	98.1	X		-2.1
DT-120	11/20/09	See location plan	6		95.8	31.2	73.0	71.5	33.1	BAS-26	100+	X		-1.9
DT-121	11/20/09	See location plan	6		89.2	30.7	68.2	71.5	33.1	BAS-26	95.5	X		-2.4
DT-122	11/25/09	See location plan	6		94.9	28.9	73.6	76.3	30.7	BAS-24	96.5	X		-1.8
DT-123	11/25/09	See location plan	6		96.4	32.2	72.9	76.3	30.7	BAS-24	95.6	X		1.5
DT-124	11/25/09	See location plan	6		95.8	31.2	73.0	76.3	30.7	BAS-24	95.7	X		0.5
DT-125	11/25/09	See location plan	6		94.1	27.9	73.6	76.3	30.7	BAS-24	96.4	X		-2.8
DT-126	11/25/09	See location plan	6		92.8	27.5	72.8	76.3	30.7	BAS-24	95.4	X		-3.2
DT-127	11/25/09	See location plan	6		97.0	30.7	74.2	76.3	30.7	BAS-24	97.3	X		0.0

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope



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SHIELD ENGINEERING, INC.
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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density.dwg
DRAWN BY: JTH
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: 12/03/09

SHEET TITLE:

DENSITY TEST LOCATION PLAN FOR ASH NOVEMBER 2009

SHEET:
1

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:** 1002083-03	**Client No.:**	
Client Name: Duke	**Task No.:** 0008	**Date:** 11-3-07	
Inspection of: Fill	**Technician:** JKS		

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers an cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.

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+12.0'

Drive Tube/Nuclear Density Data

Test No.	~~92~~	~~93~~	~~94~~	~~95~~	~~96~~	~~97~~		
Grade or Elevation	98	99	100	101	102	103		
Location								
Wt. Wet Soil & Mold	4.32	4.34	4.46	4.54	4.56	4.50		
Wt. Mold	1.31	1.31	1.31	1.31	1.31	1.31		
Wt. Wet soil	3.01	3.03	3.15	3.23	3.25	3.19		
Volume Mold	.0332	.0332	.0332	.0332	.0332	.0332		
Wet Density	90.7 ✓	91.3 ✓	94.9 ✓	97.3 ✓	97.9 ✓	96.1 ✓		
Wt. Wet soil & Pan	405.4	342.3	336.0	333.0	382.3	354.2		
Wt. Dry soil & Pan	356.6	307.3	302.8	294.5	335.0	315.5		
Wt. Pan	201.0	186.1	201.1	186.1	201.1	186.1		
Moisture Lost	48.8	35.0	33.2	38.5	47.3	40.7		
Wt. Dry soil	155.6	121.2	101.7	108.4	133.9	127.4		
% Moisture	31.4 ✓	28.9 ✓	32.6 ✓	35.5 ✓	35.3 ✓	31.9 ✓		
Dry Density	69.0 ✓	70.9 ✓	71.5 ✓	71.8 ✓	72.3 ✓	72.8 ✓		
Maximum Dry Density	71.5	→						
Optimum Moisture	33.1	→						
% Compaction	96.5	99.0	100.0	100.4	101.1	101.8		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.39	
Wt. Mold	9.22	
Wt. Wet soil	3.16	
Volume Mold	.0333	
Wet Density	94.9	
Wt. Wet soil & Pan	320.5	
Wt. Dry soil & Pan	290.4	
Wt. Pan	202.1	
Moisture Lost	30.1	
Wt. Dry soil	88.3	
% Moisture	34.1	
Dry Density	70.7	

Additional Project Data

71.5 @ 33.1

BAS-26

Josh Slusarczak
Printed Name

Signature

JMP

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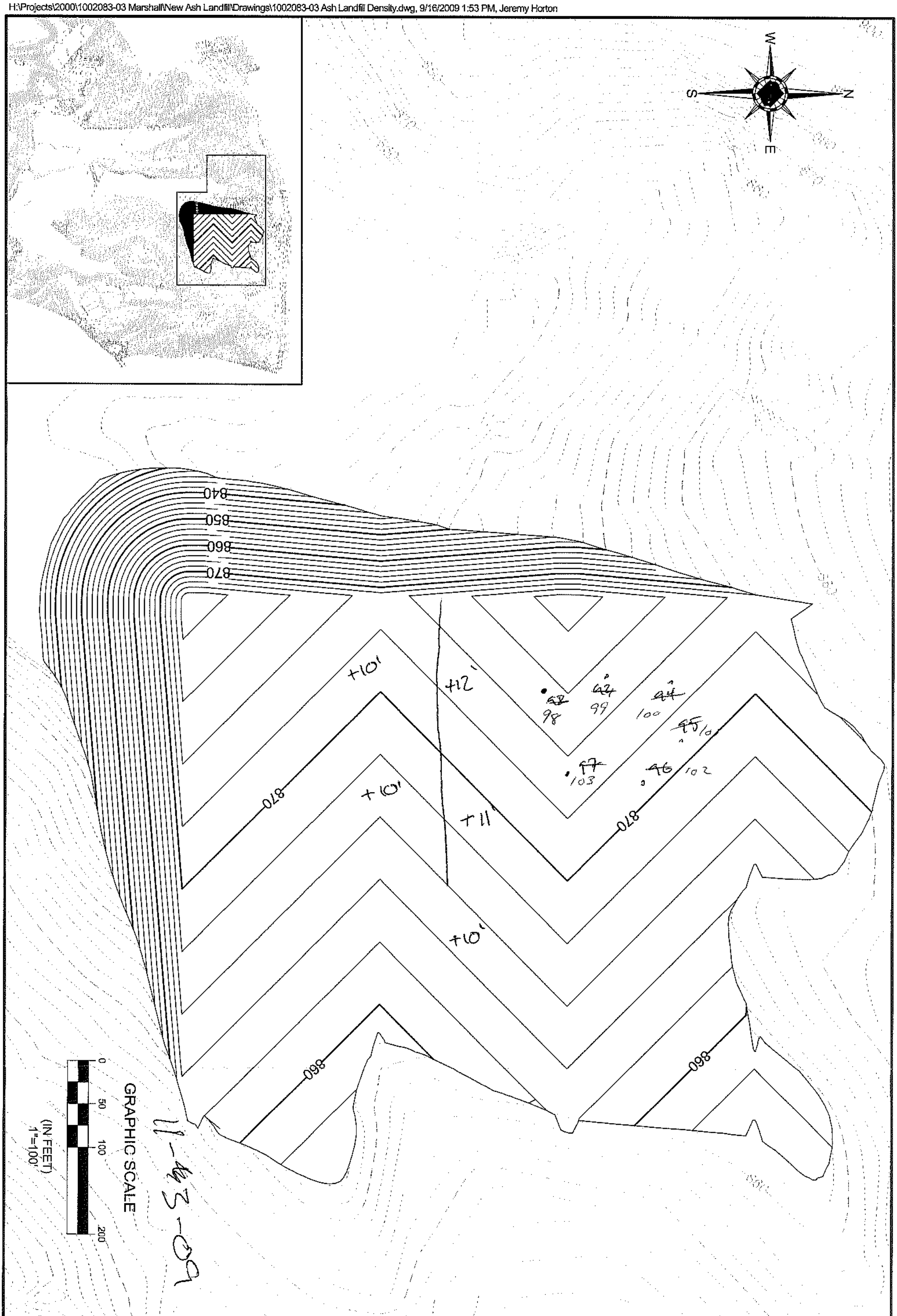

SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION 8320 EAST NC HIGHWAY 150 TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
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Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL Steam Station	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 11-6-09
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to performed Fill density test at MARSHALL Steam Station.

Josh SLUSACZYK was on site. He recommended to performed test at Layer + 12.5.

All test meets Criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall Steam Station		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 11-6-09
Inspection of: Fill Fly Ash		**Technician:** Elis Rojas	

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Drive Tube\Nuclear Density Data	104	105	106	107	108	109	105R
Test No.	98	97	100	101	102	103	99
Grade or Elevation	112.5						
Location							
Wt. Wet Soil & Mold	4.41	4.30	4.45	4.50	4.46	4.56	4.46	4.40
Wt. Mold	1.32	1.32	1.32	1.34		1.32	1.32	1.32
Wt. Wet soil	3.08	2.98	3.13	3.16		3.24	3.14	3.08
Volume Mold	0.0332							
Wet Density	92.8	89.8	94.3	95.2		97.6	94.6	92.8
Wt. Wet soil & Pan	607	484.7	601.7	487.3	559.7	604.2	490.2	490.6
Wt. Dry soil & Pan	552.9	431.9	552.7	434.8		551.1	437.2	435.9
Wt. Pan	379.1	264.1	379.1	264.1	379.1	379.1	264.1	264.1
Moisture Lost	54.1	52.8	49	52.5		53.1	53	54.7
Wt. Dry soil	173.8	167.8	173.6	170.7		172	173.1	171.8
% Moisture	31.1	31.5	28.2	30.8		30.9	30.6	31.8
Dry Density	70.8	68.2	73.6	72.8		74.6	72.4	70.4
Maximum Dry Density	74.0							
Optimum Moisture	32.2							
% Compaction	95.7	92.2	99.5	98.4		100.8	97.8	95.1
Meets Criteria (Y\N)								

1 Point Proctor Data		
Wt. Wet Soil & Mold	12.33	12.33
Wt. Mold	9.32	9.32
Wt. Wet soil		3.01
Volume Mold	0.0331	0.0331
Wet Density		90.9
Wt. Wet soil & Pan	379.1	592.1
Wt. Dry soil & Pan		540.5
Wt. Pan	379.1	379.1
Moisture Lost		51.6
Wt. Dry soil		161.4
% Moisture		32
Dry Density		68.9

Additional Project Data

LAB Proctor 74.0 at 32.2

Elis Rojas
Printed Name

Signature

JMP

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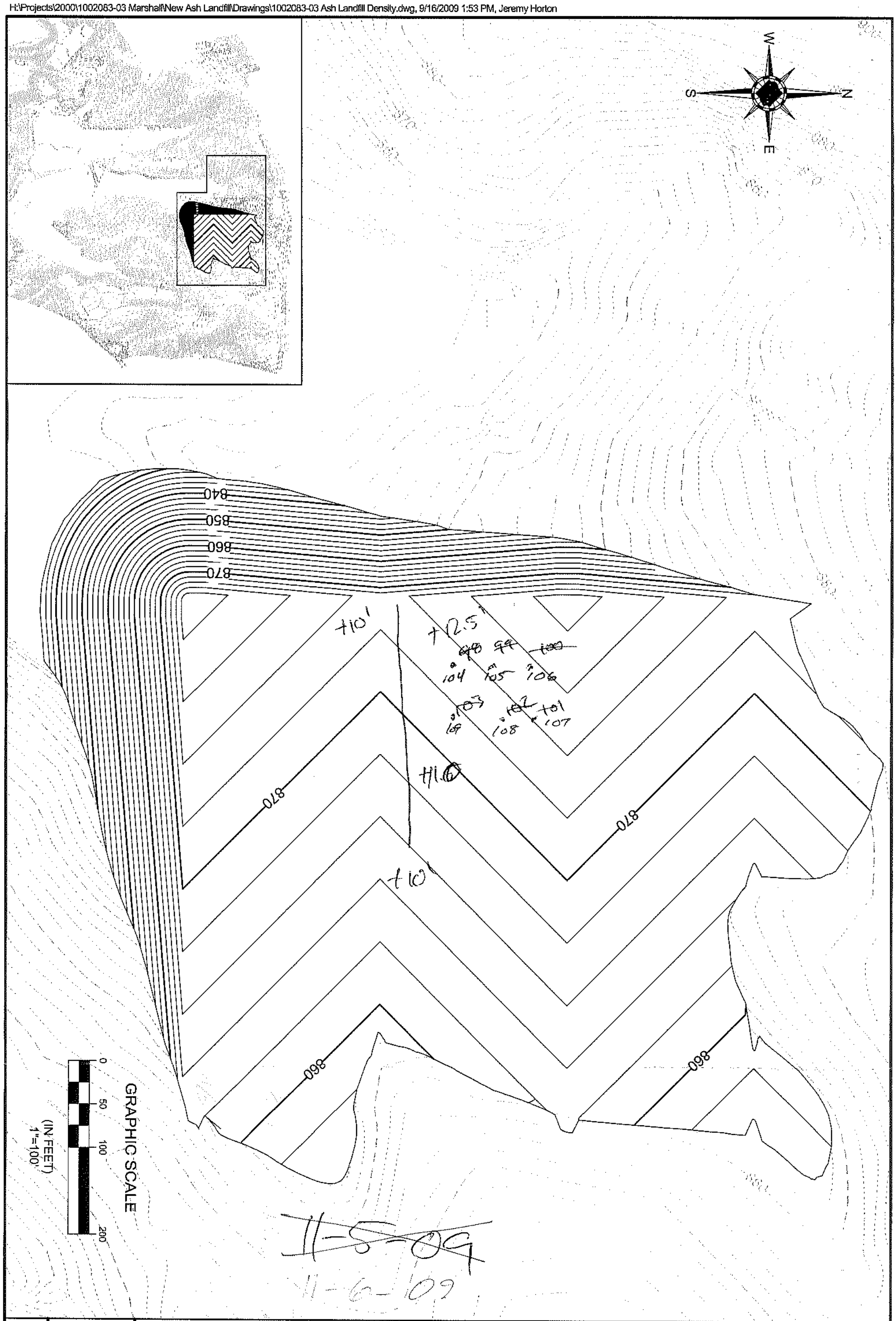

SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION 8320 EAST NC HIGHWAY 150 TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall Steam Station	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 11-17-09
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed fill at Marshall Steam Station.

Shield informed Carlton Allport when Shield arrived on site.

Shield observed that crew placed fill in another location. Crew said that first location was to wet to work with ash fly.

At new location Shield could not find out current crack. Shield observed that Top of Slop was close to same level from regular ground. Also, Shield notice Stake that exists from Top of Slope 37.5'

All test meets Criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
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Project Name: MAYSPAIL		**Shield No.:**	**Client No.:**
Client Name: DUKE POWER		**Task No.:**	**Date:** 11-17-09
Inspection of: Fill-Ash Fly		**Technician:** Elis Pena	

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Drive Tube\Nuclear Density Data

	110	111	112	113		114	115
Test No.	104	105	106	107	108	109	108
Grade or Elevation							
Location							
Wt. Wet Soil & Mold	4.24	4.30	4.35	4.30	4.26	4.28	4.26
Wt. Mold	1.32	1.32	1.32	1.32	1.34	1.32	1.34
Wt. Wet soil	2.92	2.98	3.03	3.05	2.92	2.96	2.92
Volume Mold	0.0332						
Wet Density	88	89.8	91.3	91.9	88	89.2	86
Wt. Wet soil & Pan	485.3	610.8	484.9	601.6	439.3	600.3	487.6
Wt. Dry soil & Pan	424.6	559.1	439.3	554.5		553.1	441.5
Wt. Pan	264.8	379.1	264.8	379.1	264.8	379.1	264.8
Moisture Lost	60.7	51.7	45.6	47.1		47.2	46.1
Wt. Dry soil	169.8	180	174.5	175.4		174	176.7
% Moisture	29.9	28.7	26.1	26.9		27.1	26.1
Dry Density	67.7	69.8	72.4	72.4		70.3	69.8
Maximum Dry Density	~~72.0~~	~~72.0~~	72.0			72.0	
Optimum Moisture	70.2 28.3 ~~26.3~~	~~26.3~~ 70.2 28.3	26.3			28.3 26.3	
% Compaction	96.5 94	~~96.9~~ 96.9	100.6	100.6		97.5	96.9
Meets Criteria (Y\N)							

1 Point Proctor Data

Wt. Wet Soil & Mold	12.29	
Wt. Mold	9.30	
Wt. Wet soil	2.99	
Volume Mold	0.0331	
Wet Density	90.3	
Wt. Wet soil & Pan	590.9	
Wt. Dry soil & Pan	544.1	
Wt. Pan	379.1	
Moisture Lost	46.8	
Wt. Dry soil	165	
% Moisture	28.4	
Dry Density	70.3	

Additional Project Data

70.2 28.3 BAS-11

71.5 33.1 BAS-26

72.0 26.3 BAS-14

Elis Pena
Printed Name

Signature

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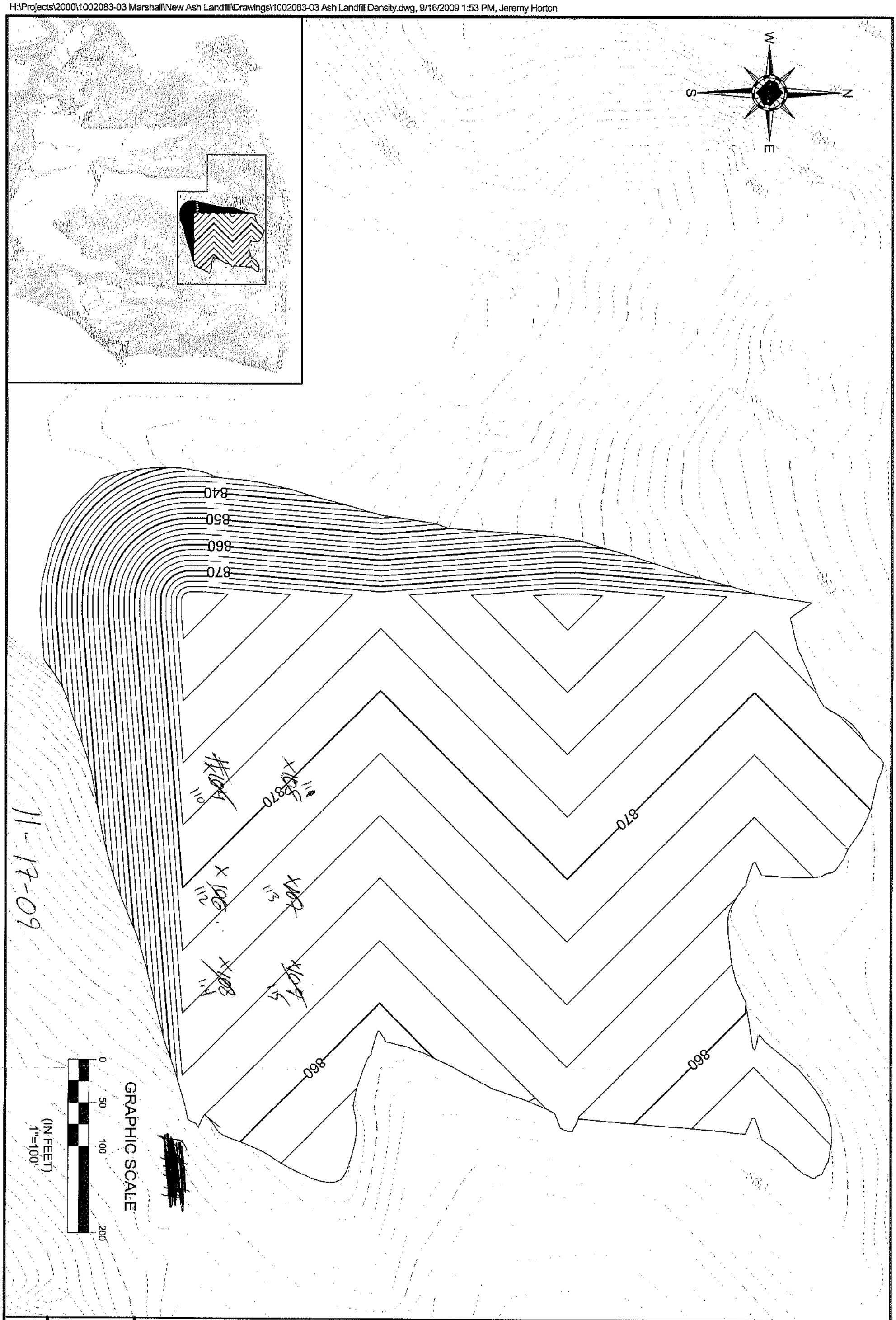

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		DRAWN BY:	
		FILE NUMBER:	
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Project Name: Marshall	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 11-20-09
Inspection of: Fill Ash Fly	**Technician:** Elis Rojas	

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Shield on site to observed fill at Marshall Steam Station.
Shield arrived around 9:30Am.
Crew was working. Crew recommended Shield to performed test at South East Fill area.
Shield performed 6 test. All test meets criteria.
Josh Shusaczyk call out Shield to bring proctor for JAB. (BAS-29)

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Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: DUKE POWER	Task No.:	Date: 11-20-09
Inspection of: FILL ASH FILL	Technician: ELIS PEÑAS	

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Drive Tube\Nuclear Density Data	116	117	118	119	120	121		
Test No.	109	110	111	112	113	114		
Grade or Elevation	714							
Location								
Wt. Wet Soil & Mold	4.33	4.32	4.33	4.38	4.32	4.29		
Wt. Mold	1.32	1.32	1.32	1.33	1.34	1.33		
Wt. Wet soil	3.01	3	3.01	3.05	3.18	2.96		
Volume Mold	0.0332							
Wet Density	90.7	90.4	90.7	91.9	95.8	89.2		
Wt. Wet soil & Pan	486.7	603.4	433.7	604.4	481.5	607.9		
Wt. Dry soil & Pan	433.9	550.7	430.4	551.1	430.1	554.3		
Wt. Pan	265.6	379.7	265.6	379.7	265.6	379.7		
Moisture Lost	52.8	52.7	53.3	53.3	51.4	53.6		
Wt. Dry soil	168.3	171	164.8	171.4	164.5	174.6		
% Moisture	31.4	30.8	32.3	31	31.2	30.7		
Dry Density	69	69.1	68.6	70.2	73	68.2		
Maximum Dry Density	71.5							
Optimum Moisture	33.1							
% Compaction	96.5	96.6	95.9	98.2	102.1	95.3		
Meets Criteria (Y\N)	Y					Y		

1 Point Proctor Data		
Wt. Wet Soil & Mold	12.28	
Wt. Mold	9.30	
Wt. Wet soil	2.98	
Volume Mold	0.0331	
Wet Density	90	
Wt. Wet soil & Pan	607.7	
Wt. Dry soil & Pan	557.9	
Wt. Pan	379.7	
Moisture Lost	51.8	
Wt. Dry soil	178.2	
% Moisture	29.1	
Dry Density	69.7	

Additional Project Data

LAB 71.5 at 33.1 OMC

ELIS PEÑAS
Printed Name

Signature

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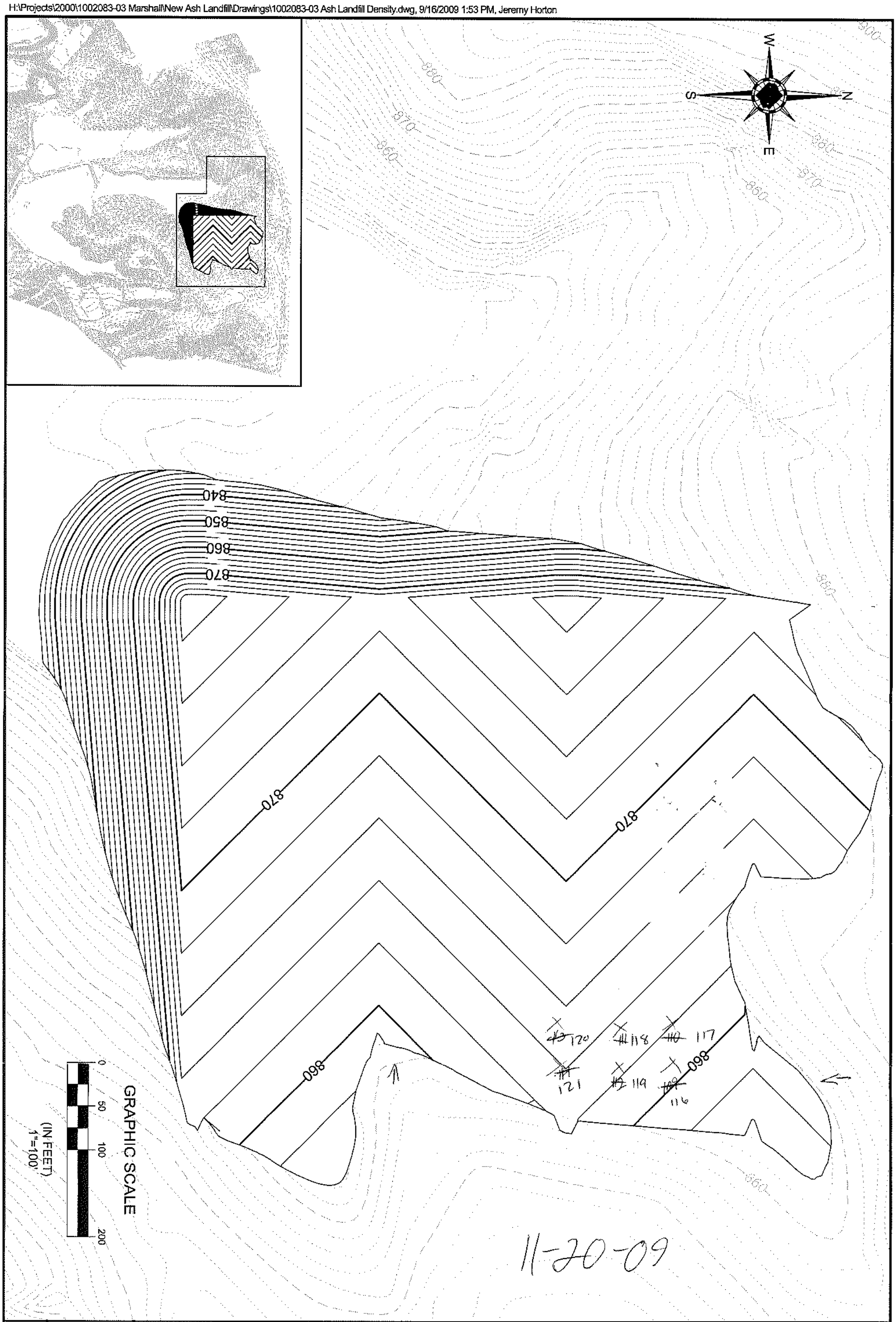

SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION, 8320 EAST NC HIGHWAY 150, TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
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Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 11-25-09
Inspection of: FILL FLY ASH	**Technician:** ELIS ROJAS	

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Shield on site to observed ~~Fill~~ Fill at MARSHALL Steam Station.

Shield performed six test. All test meets criteria.

Shield observed that test location was near to ~~area~~ area that Shield tested before. Crew did not have new area Fill to work. The area that Shield tested before ~~was~~ was performed at (11-17-09). Shield moved 100' from old test and performed more testing.

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Pink Copy: Inspector or Superintendent

ELIS ROJAS
Printed Name

Signature

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Project Name: MAX SHALL	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 11-25-09
Inspection of: Fill Fly Ash	Technician: Elis Rojas	

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Drive Tube/Nuclear Density Data	122	123	124	125	126	127
Test No.	~~115~~	~~116~~	~~117~~	~~118~~	~~119~~	~~120~~
Grade or Elevation						
Location						
Wt. Wet Soil & Mold	4.47	4.52	4.51	4.44	4.48	4.54
Wt. Mold	1.32	1.32	1.33	1.32	1.32	1.32
Wt. Wet soil	3.15	3.2	3.18	3.12	3.08	3.22
Volume Mold	0.0332		0.0332			
Wet Density	94.9	96.4	95.8	92.8	92.8	97
Wt. Wet soil & Pan	489.1	590.3	485	592.2	479.9	608.6
Wt. Dry soil & Pan	439	539.4	431.3	550.4	433.7	555.1
Wt. Pan	265.6	381.1	265.6	381.1	265.6	381.1
Moisture Lost	50.1	50.9	51.7	47.3	46.2	53.5
Wt. Dry soil	173.4	168.3	165.7	169.8	168.1	174
% Moisture	28.9	30.2	31.2	27.9	27.5	30.7
Dry Density	73.6	72.9	73	73.5	72.8	74.2
Maximum Dry Density	~~73.0~~ 76.3					
Optimum Moisture	~~35~~ 30.7					
% Compaction	~~100.8~~	~~99.9~~	~~100~~	~~100.7~~	~~99.7~~	~~101.6~~
Meets Criteria (Y\N)	96.5	95.6	95.7	96.4	95.4	97.3

1 Point Proctor Data	
Wt. Wet Soil & Mold	12.49
Wt. Mold	9.30
Wt. Wet soil	3.19
Volume Mold	0.0331
Wet Density	96.4
Wt. Wet soil & Pan	596.1
Wt. Dry soil & Pan	547.6
Wt. Pan	381.1
Moisture Lost	48.5
Wt. Dry soil	166.5
% Moisture	29.1
Dry Density	74.7

Additional Project Data

~~2.43~~
~~[illegible]~~

∴ BAS-24 76.3 30.7

Elis Rojas
Printed Name

Elis Rojas
Signature

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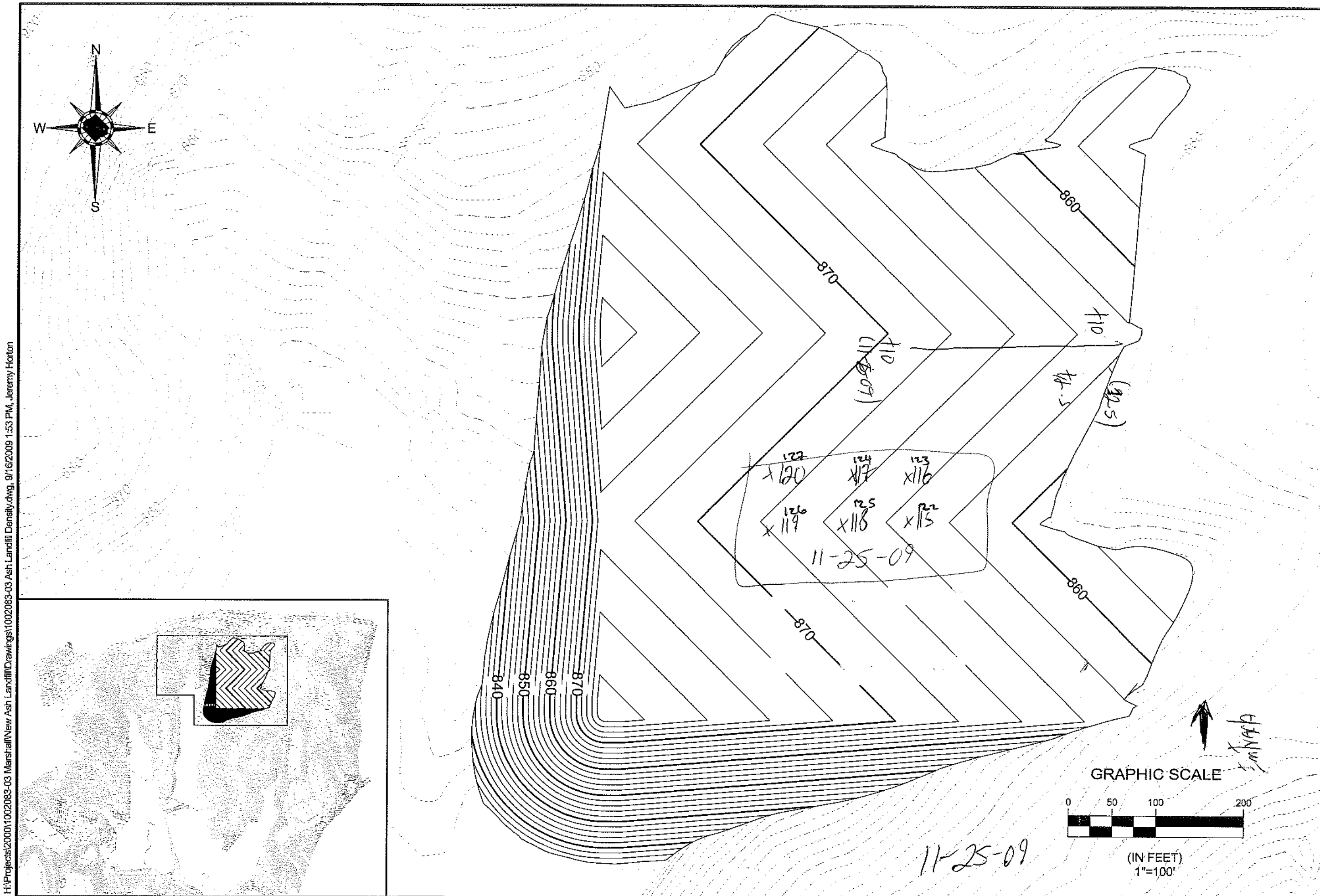

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28692

DRAWING NAME:
DRAWN BY:
FILE NUMBER:
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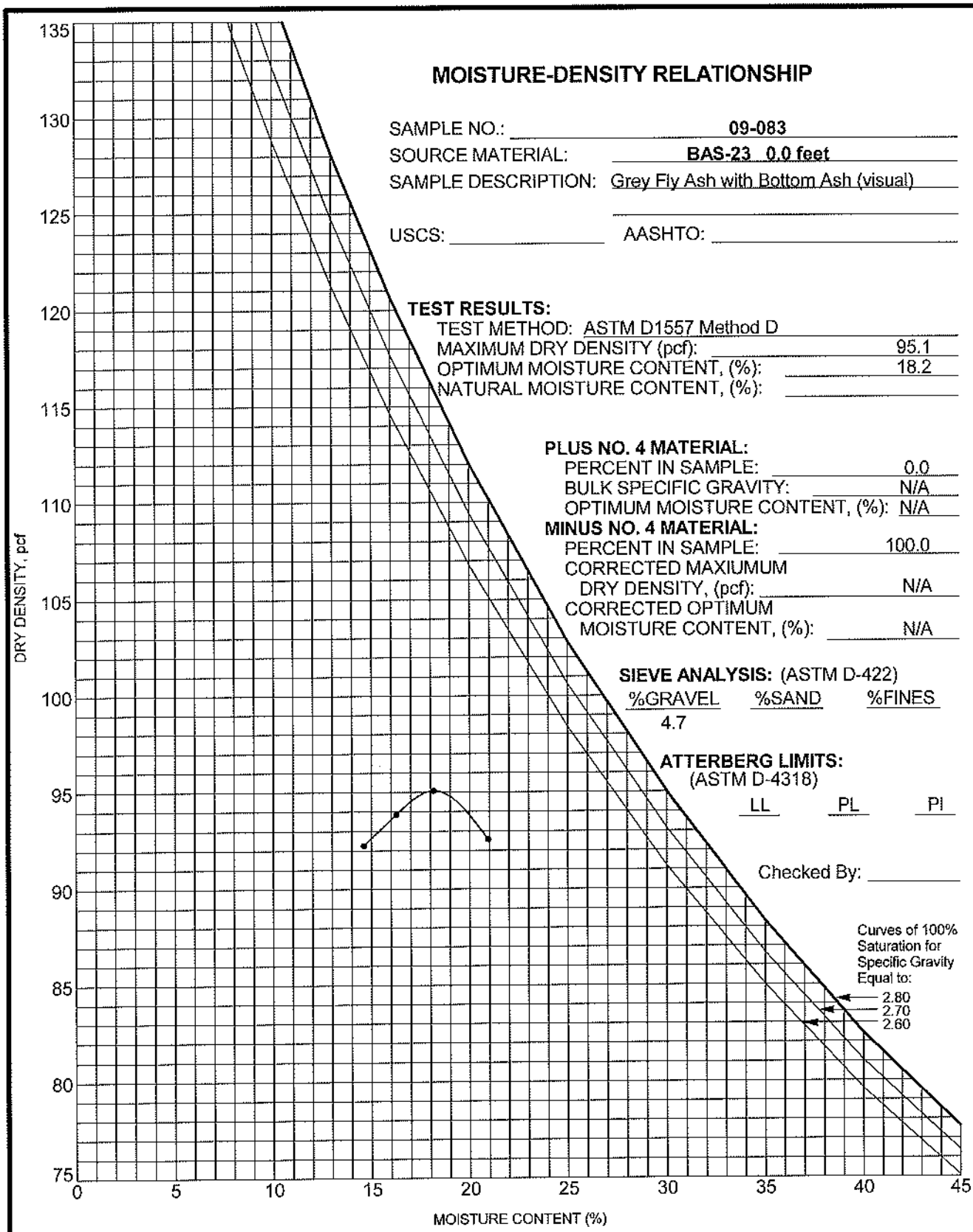
SHEET TITLE:

SHEET:

LABORATORY CONFORMANCE TEST RESULTS

BAS -23 through BAS-29



MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: 09-083
SOURCE MATERIAL: BAS-23 0.0 feet
SAMPLE DESCRIPTION: Grey Fly Ash with Bottom Ash (visual)

USCS: _____ AASHTO: _____

TEST RESULTS:
TEST METHOD: ASTM D1557 Method D
MAXIMUM DRY DENSITY (pcf): 95.1
OPTIMUM MOISTURE CONTENT, (%): 18.2
NATURAL MOISTURE CONTENT, (%): _____

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
4.7		

ATTERBERG LIMITS:
(ASTM D-4318)

LL	PL	PI

Checked By: _____

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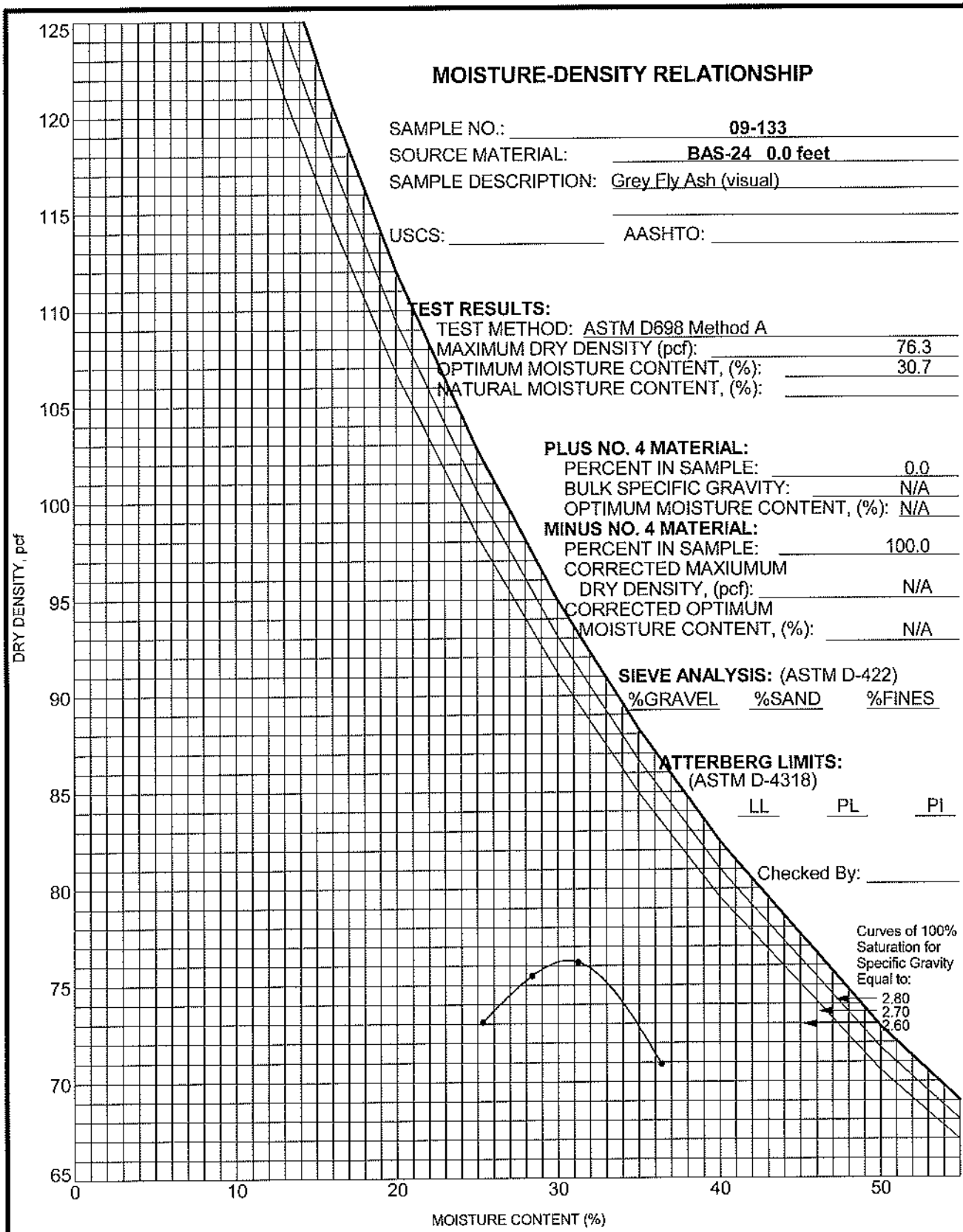
Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03



MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: 09-133
SOURCE MATERIAL: BAS-24 0.0 feet
SAMPLE DESCRIPTION: Grey Fly Ash (visual)

USCS: _____ AASHTO: _____

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 76.3
OPTIMUM MOISTURE CONTENT, (%): 30.7
NATURAL MOISTURE CONTENT, (%): _____

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

SIEVE ANALYSIS: (ASTM D-422)
%GRAVEL %SAND %FINES

ATTERBERG LIMITS:
(ASTM D-4318)
LL PL PI

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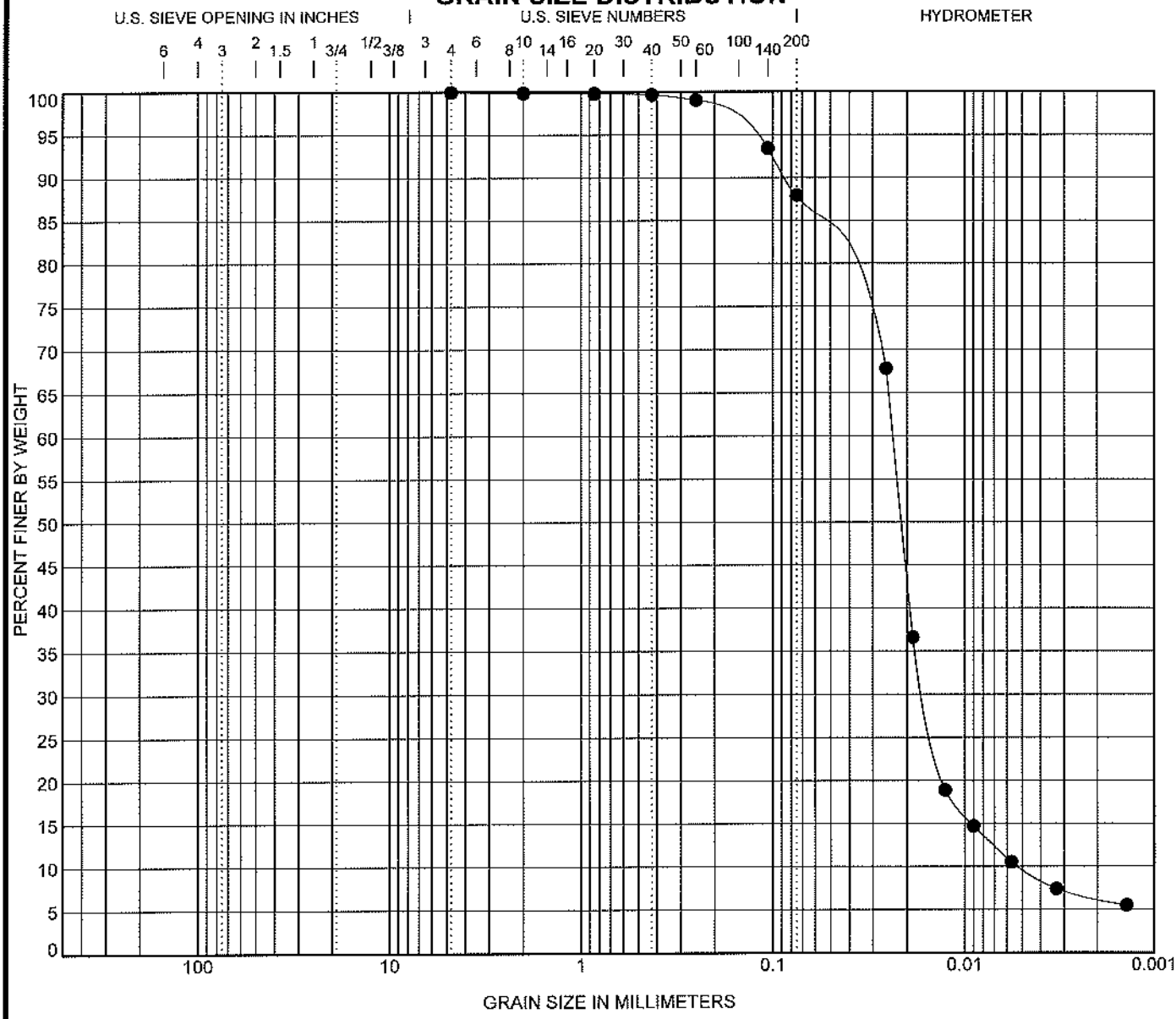
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● BAS-24	0.0	SILT(ML)	34	NP	NP	2.10	4.53

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BAS-24	0.0	4.75	0.024	0.016	0.005	0.0	12.0	78.2	9.8

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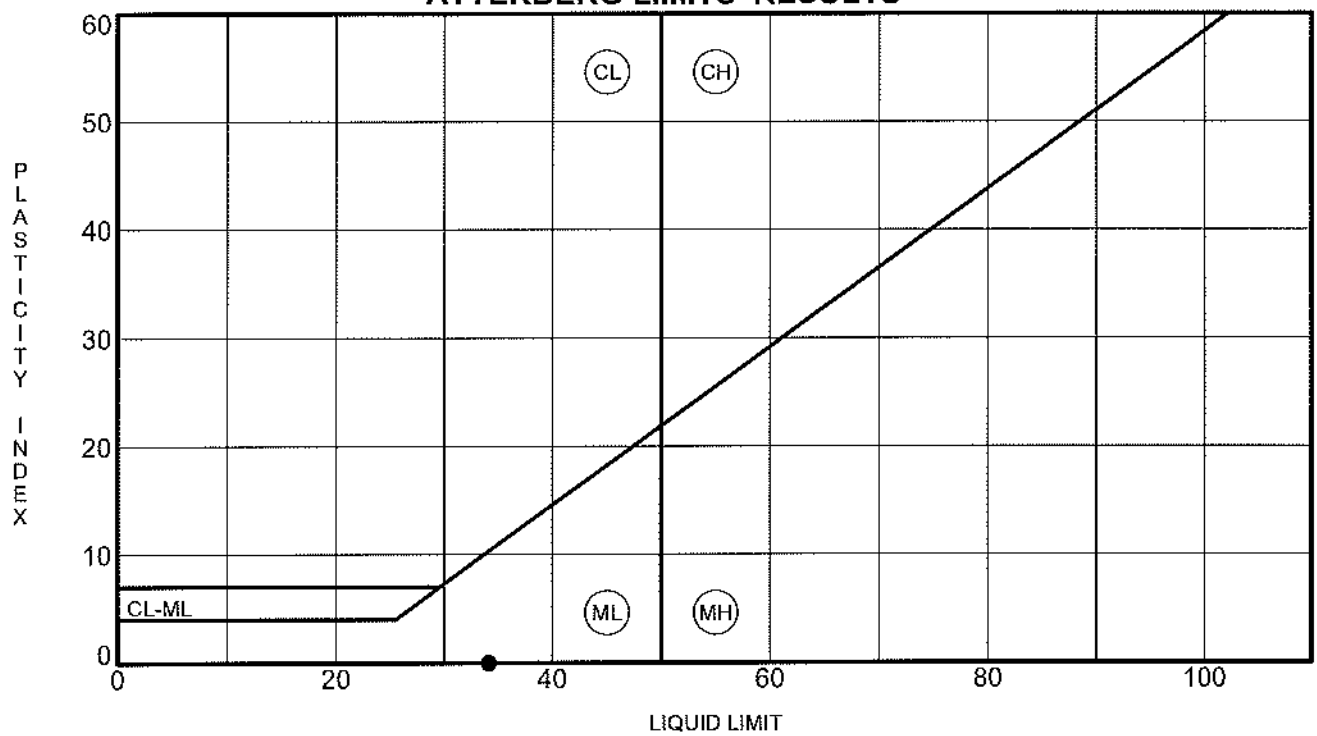
Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	BAS-24	0.0	34	NP	NP	88	SILT(ML)

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Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: 09-142
SOURCE MATERIAL: BAS-25 0.0 feet
SAMPLE DESCRIPTION: Dark Grey FLY ASH (visual)

USCS: ML AASHTO:

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 74.0
OPTIMUM MOISTURE CONTENT, (%): 32.2
NATURAL MOISTURE CONTENT, (%):

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

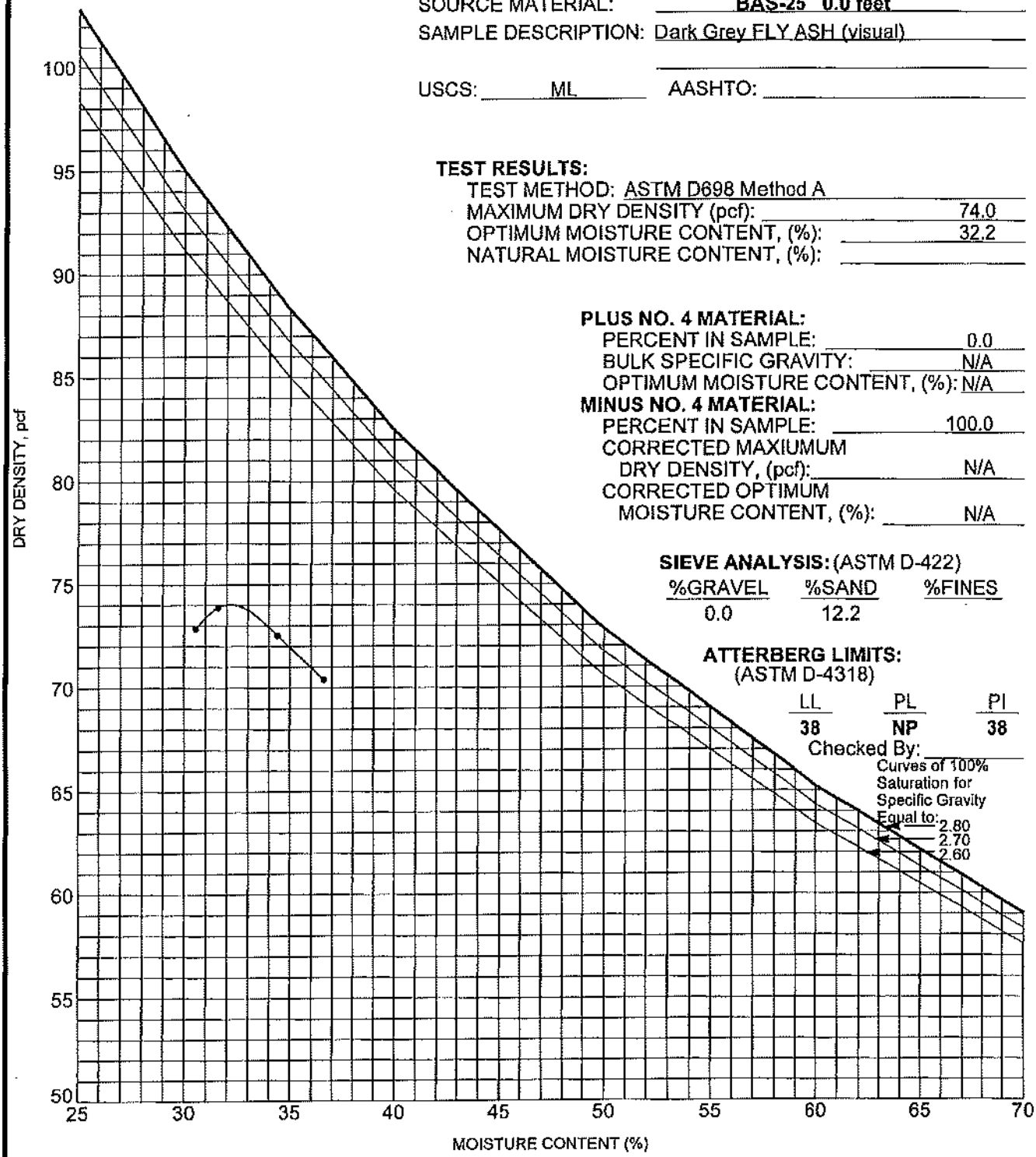
SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	12.2	

ATTERBERG LIMITS:
(ASTM D-4318)

LL	PL	PI
38	NP	38

Checked By:



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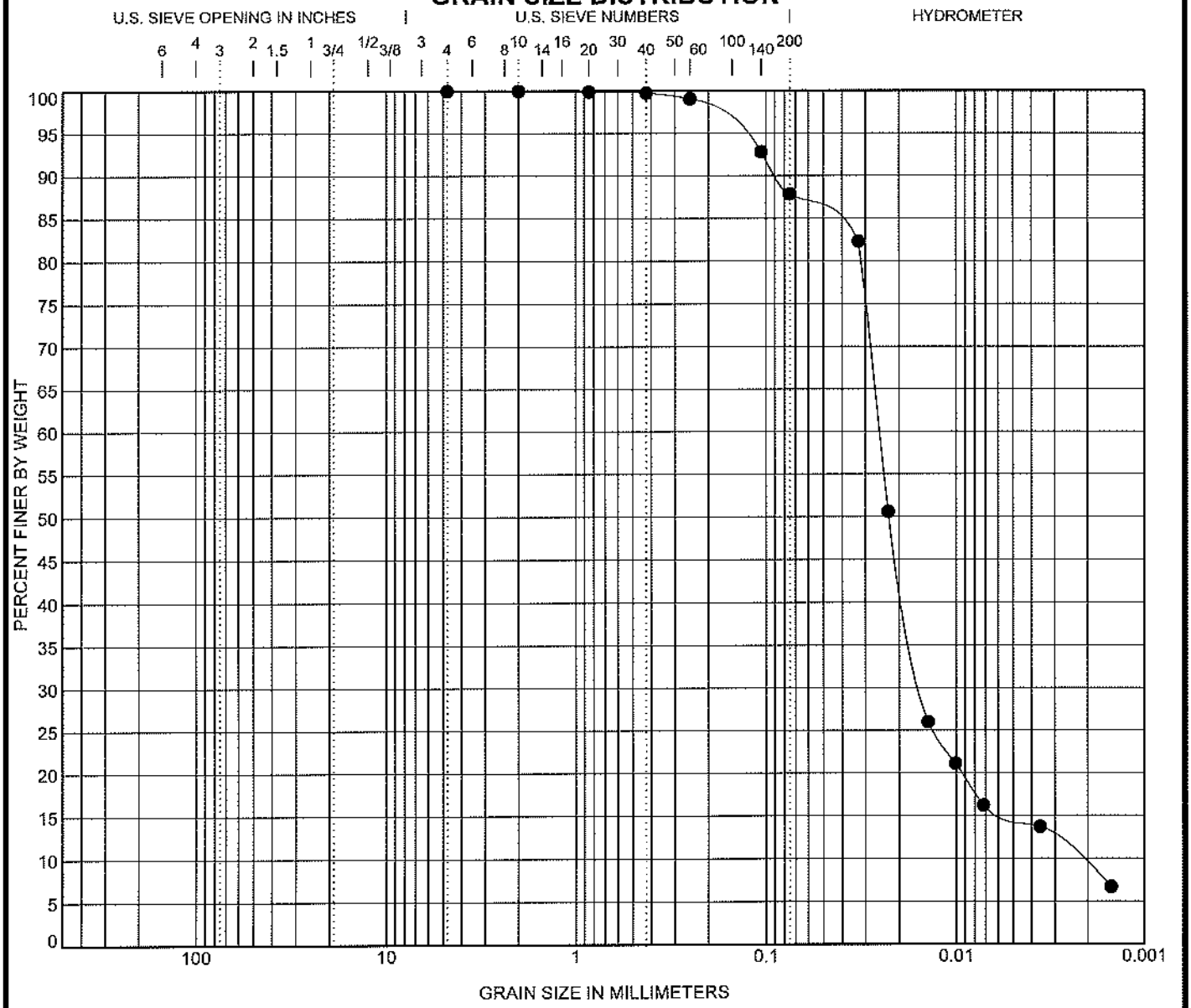
GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● BAS-25	0.0	SILT(ML)	38	NP	NP	4.04	11.20

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BAS-25	0.0	4.75	0.025	0.015	0.002	0.0	12.2	73.0	14.9

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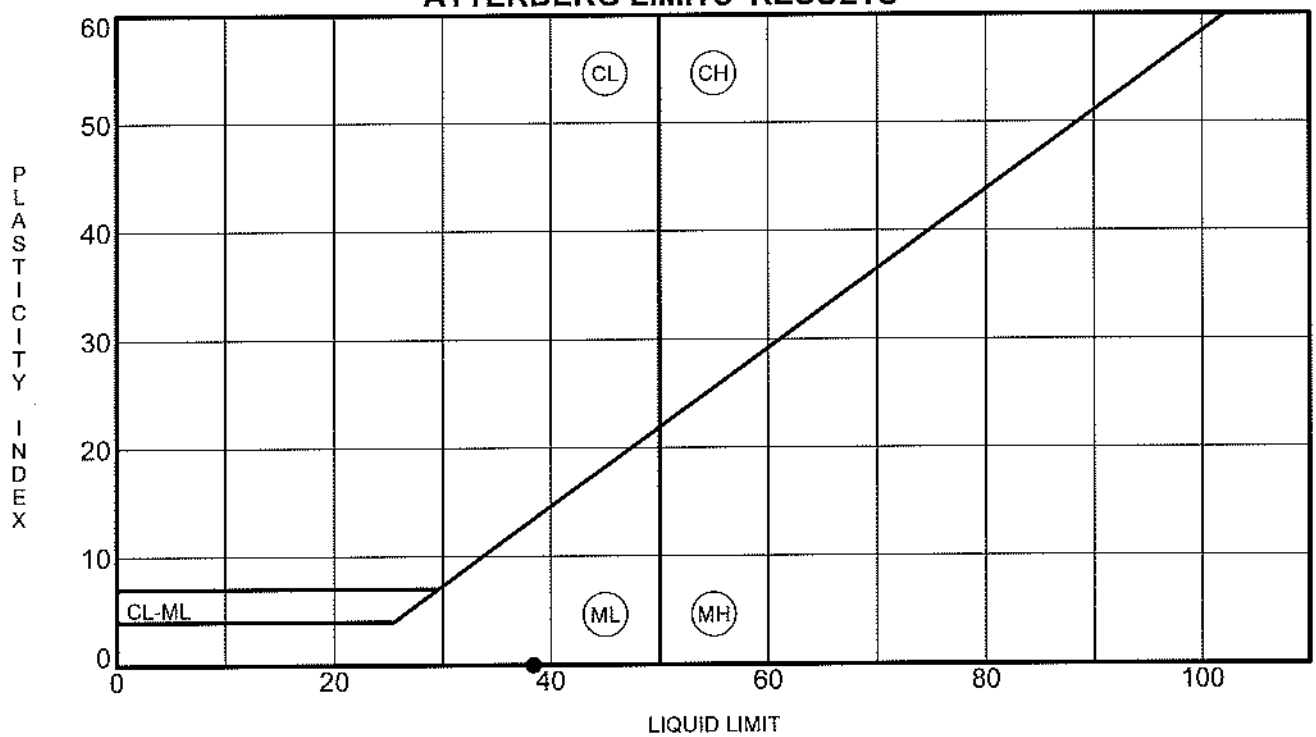
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



Specimen Identification		LL	PL	PI	Fines	Classification
● **BAS-25**	**0.0**	**38**	**NP**	**NP**	**88**	**SILT(ML)**

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Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: 09-142
SOURCE MATERIAL: BAS-26 0.0 feet
SAMPLE DESCRIPTION: Grey FLY ASH (visual)

USCS: ML AASHTO:

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 71.5
OPTIMUM MOISTURE CONTENT, (%): 33.1
NATURAL MOISTURE CONTENT, (%):

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

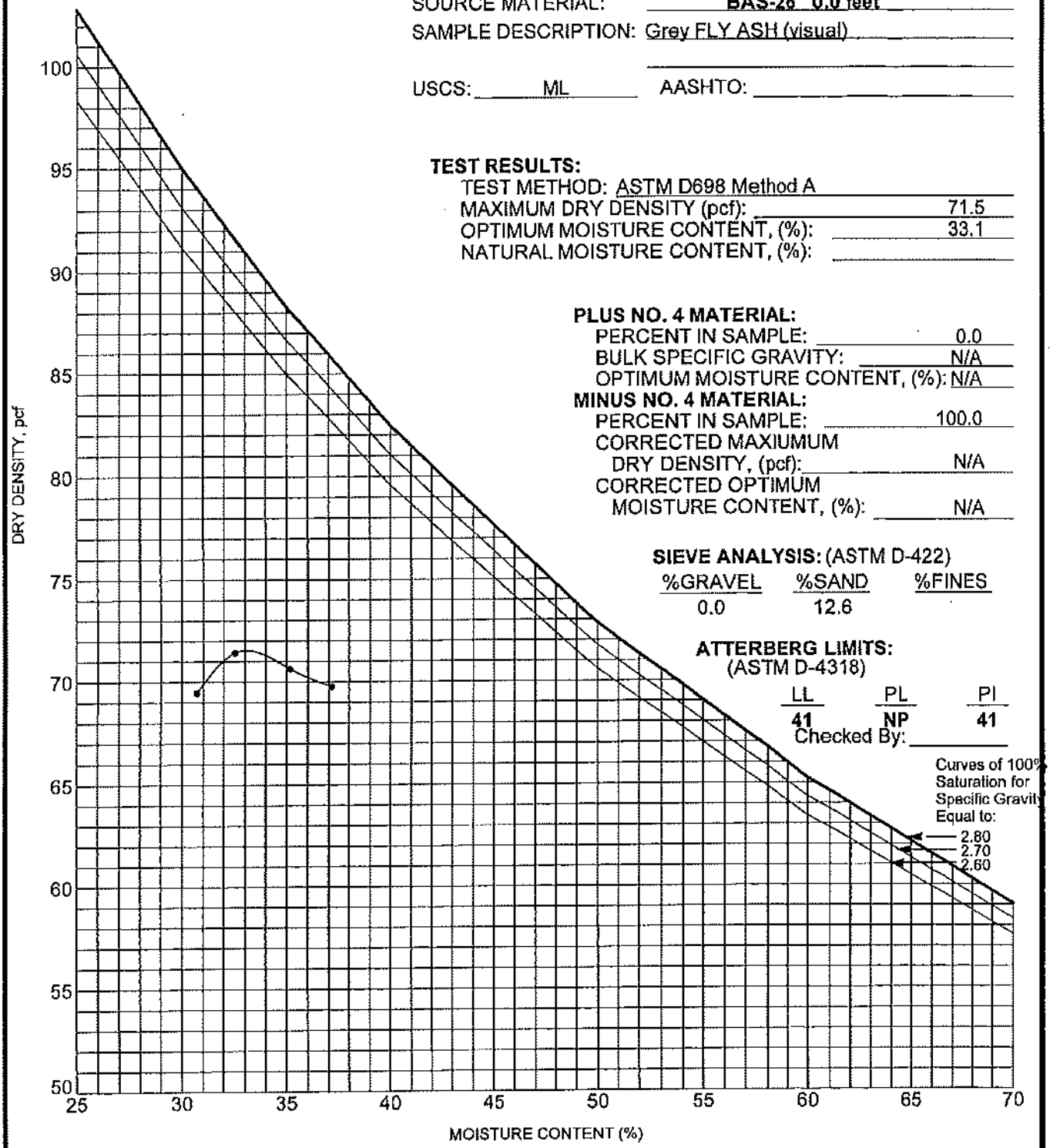
SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	12.6	

ATTERBERG LIMITS: (ASTM D-4318)

LL	PL	PI
41	NP	41

Checked By:



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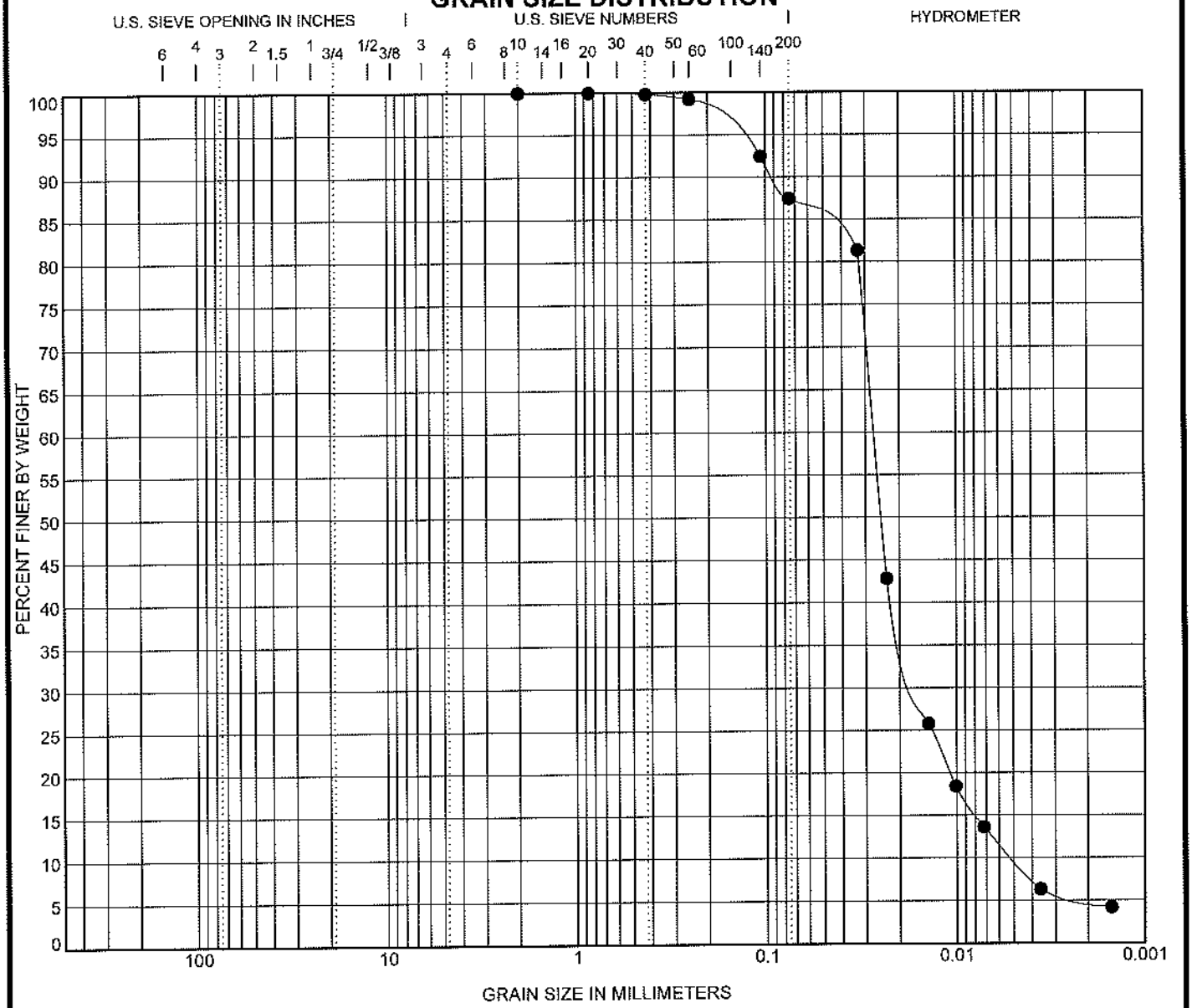
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-26**	**0.0**	**SILT(ML)**	**41**	**NP**	**NP**	**1.84**	**5.31**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-26**	**0.0**	**2**	**0.027**	**0.016**	**0.005**	**0.0**	**12.6**	**77.7**	**9.8**

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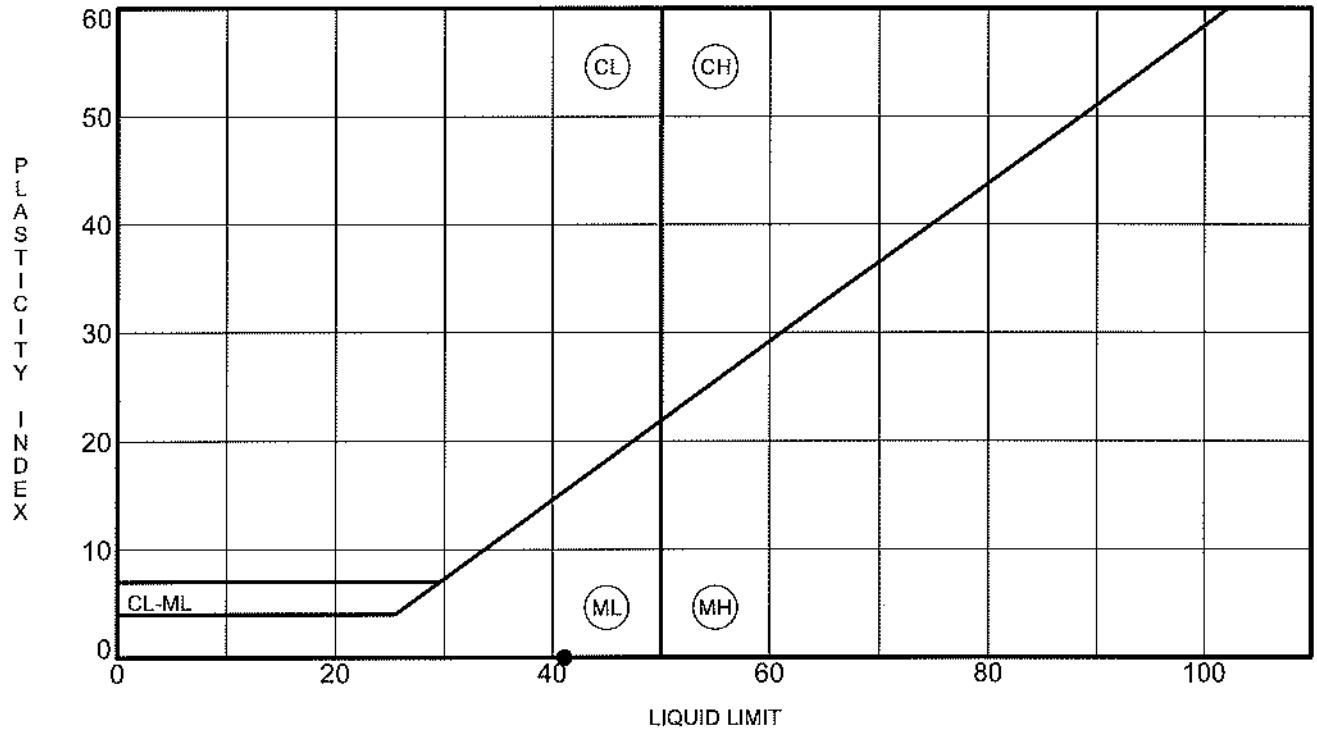
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**BAS-26**	**0.0**	**41**	**NP**	**NP**	**87**	**SILT(ML)**

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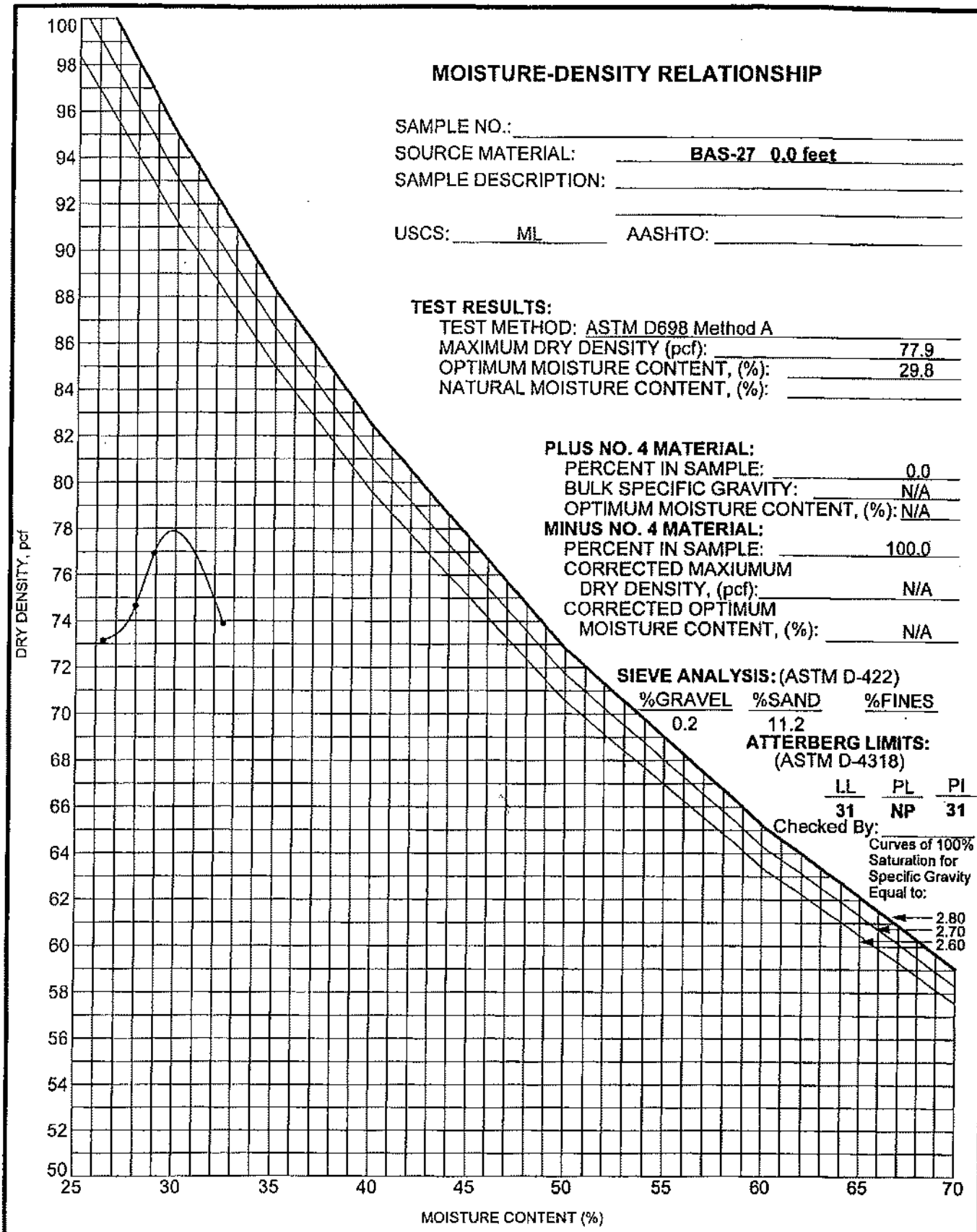

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: _____

SOURCE MATERIAL: BAS-27 0.0 feet

SAMPLE DESCRIPTION: _____

USCS: ML AASHTO: _____

TEST RESULTS:

TEST METHOD: ASTM D698 Method A

MAXIMUM DRY DENSITY (pcf): 77.9

OPTIMUM MOISTURE CONTENT, (%): 29.8

NATURAL MOISTURE CONTENT, (%): _____

PLUS NO. 4 MATERIAL:

PERCENT IN SAMPLE: 0.0

BULK SPECIFIC GRAVITY: N/A

OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:

PERCENT IN SAMPLE: 100.0

CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A

CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.2	11.2	

ATTERBERG LIMITS: (ASTM D-4318)

LL	PL	PI
31	NP	31

Checked By: _____

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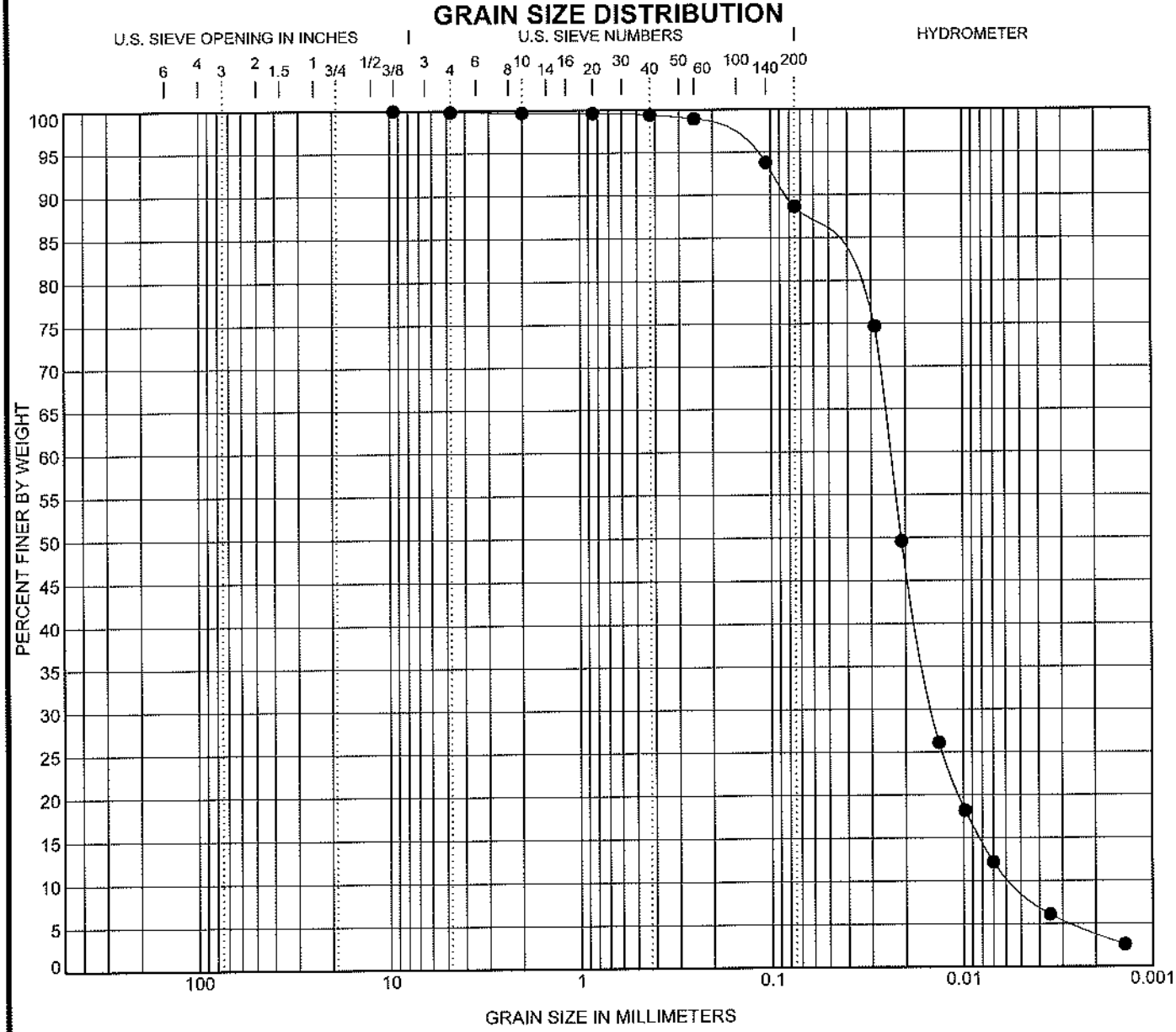
Catawba, North Carolina
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-27**	**0.0**	**SILT(ML)**	**31**	**NP**	**NP**	**1.60**	**4.37**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-27**	**0.0**	**9.525**	**0.024**	**0.014**	**0.005**	**0.2**	**11.2**	**79.4**	**9.2**

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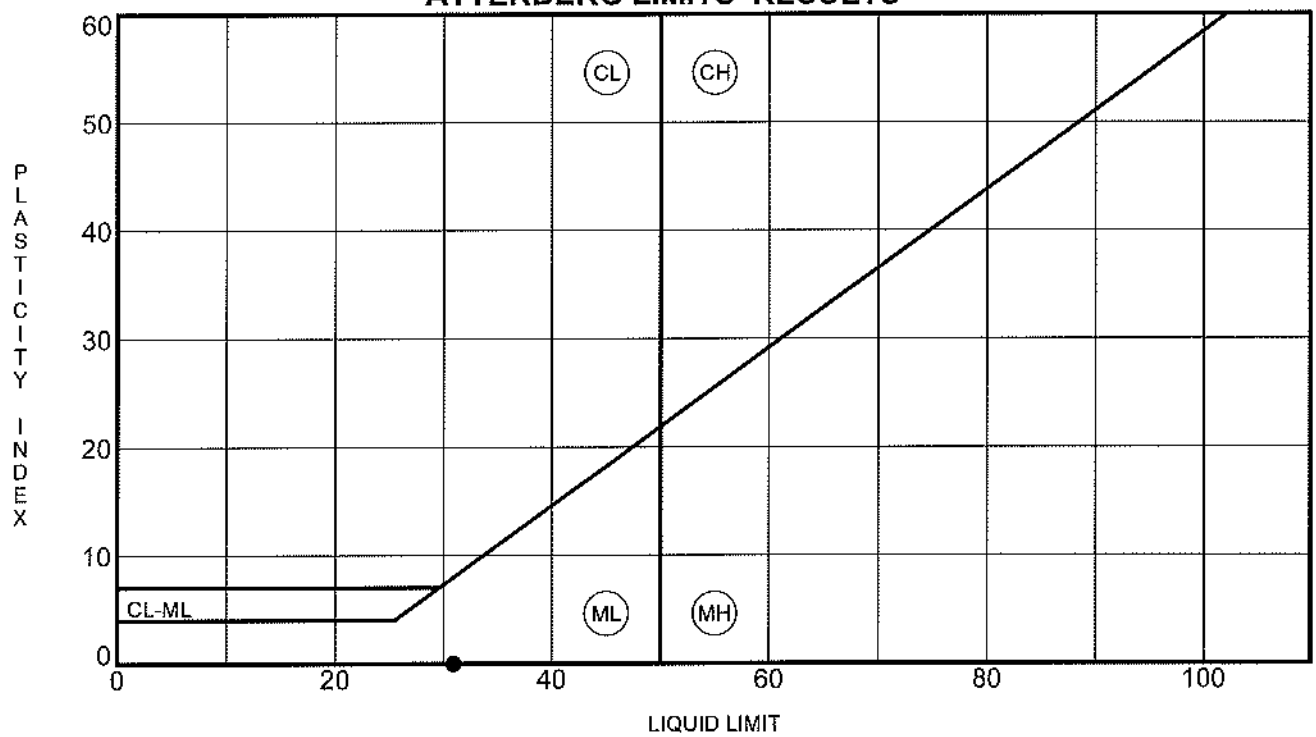
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	BAS-27	0.0	31	NP	NP	89	SILT(ML)

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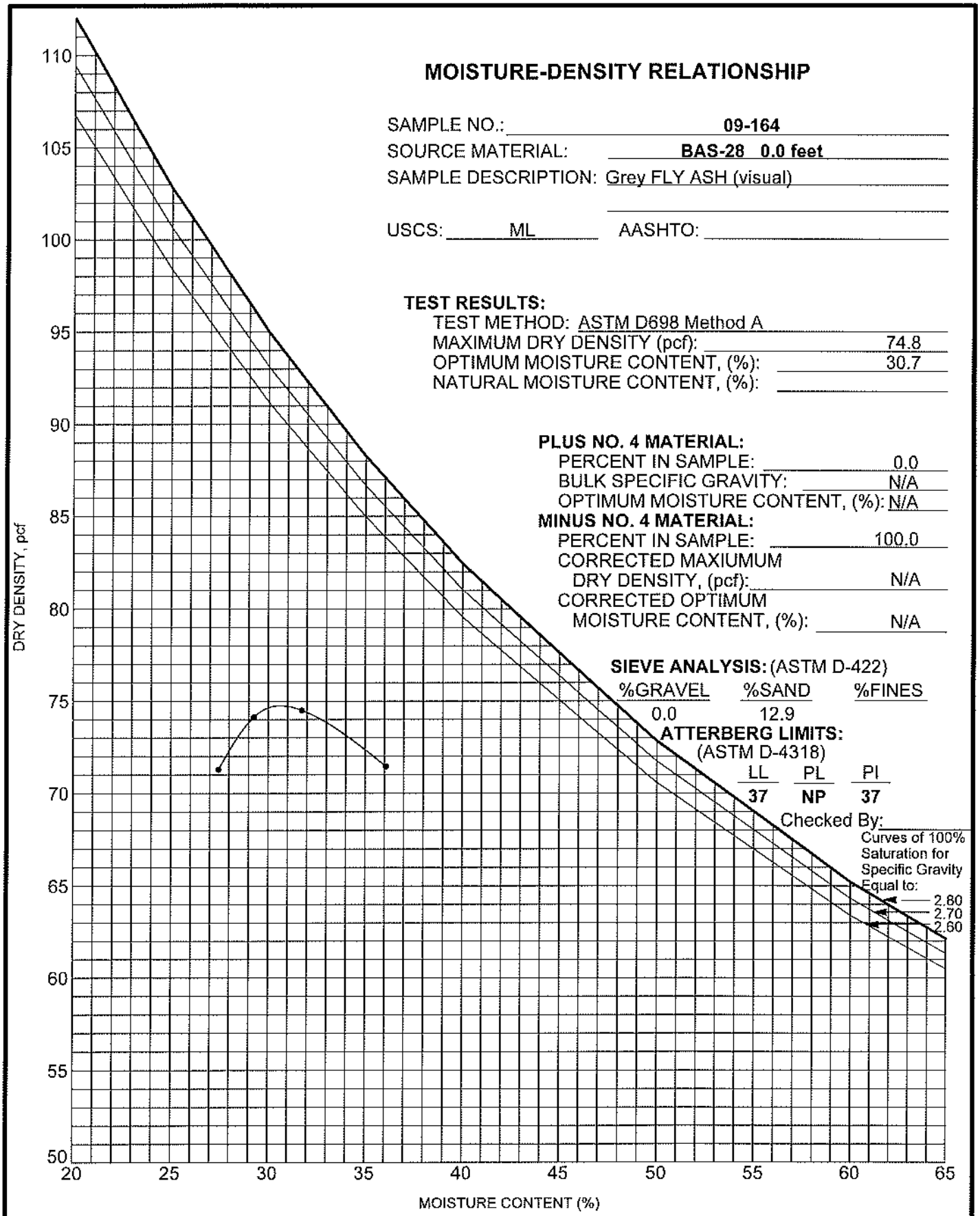

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: **09-164**
SOURCE MATERIAL: **BAS-28 0.0 feet**
SAMPLE DESCRIPTION: Grey FLY ASH (visual)

USCS: ML AASHTO:

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 74.8
OPTIMUM MOISTURE CONTENT, (%): 30.7
NATURAL MOISTURE CONTENT, (%):

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	12.9	

ATTERBERG LIMITS: (ASTM D-4318)

LL	PL	PI
37	**NP**	**37**

Checked By:

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Marshall Steam Station
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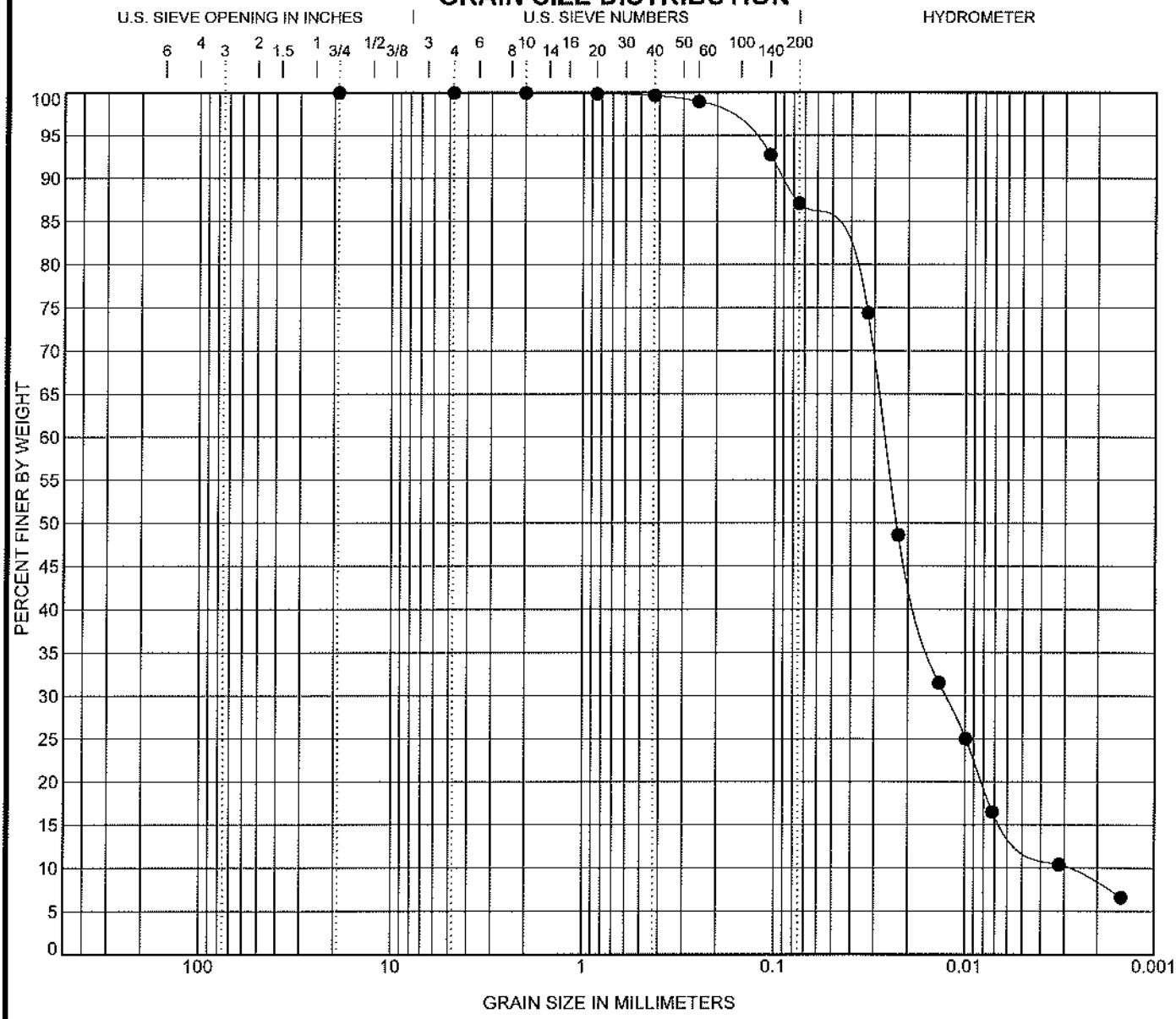
Catawba, North Carolina
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-28**	**0.0**	**SILT(ML)**	**37**	**NP**	**NP**	**2.07**	**8.96**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-28**	**0.0**	**19**	**0.026**	**0.013**	**0.003**	**0.0**	**12.9**	**73.3**	**13.8**

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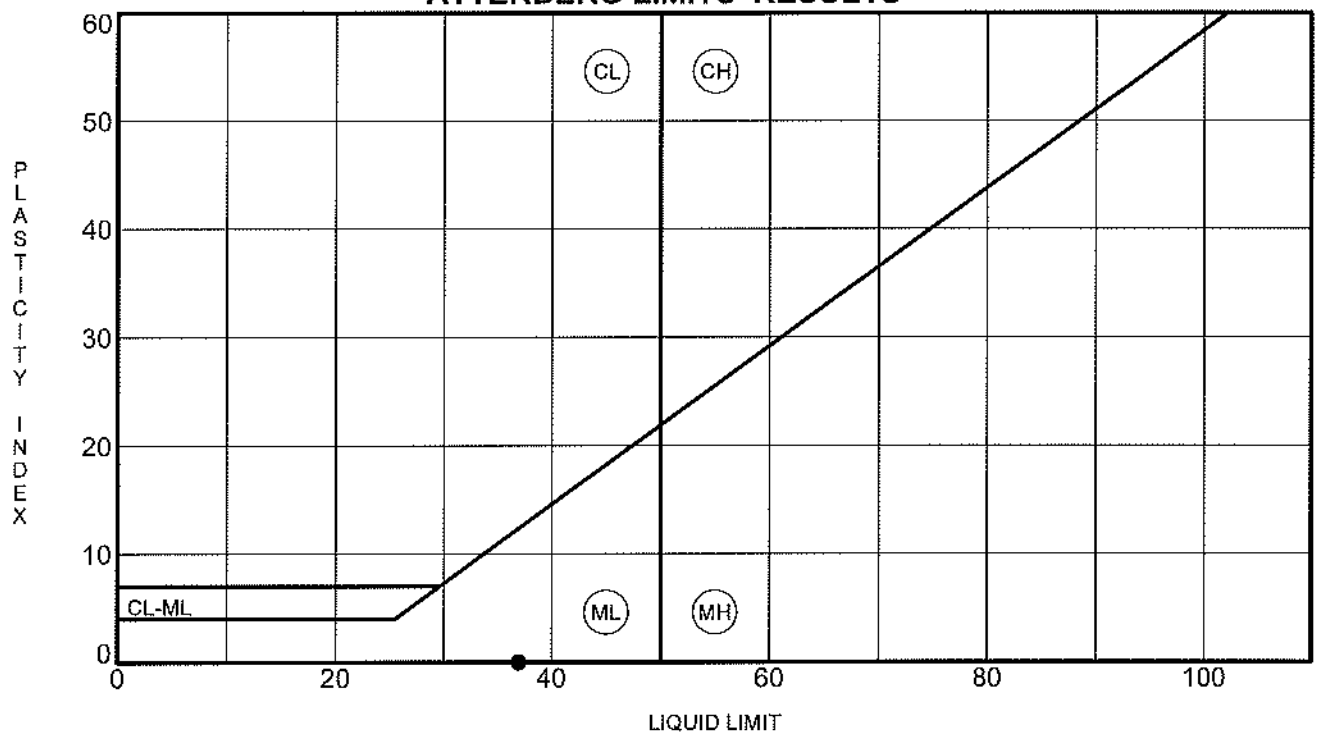
ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	BAS-28	0.0	37	NP	NP	87	SILT(ML)

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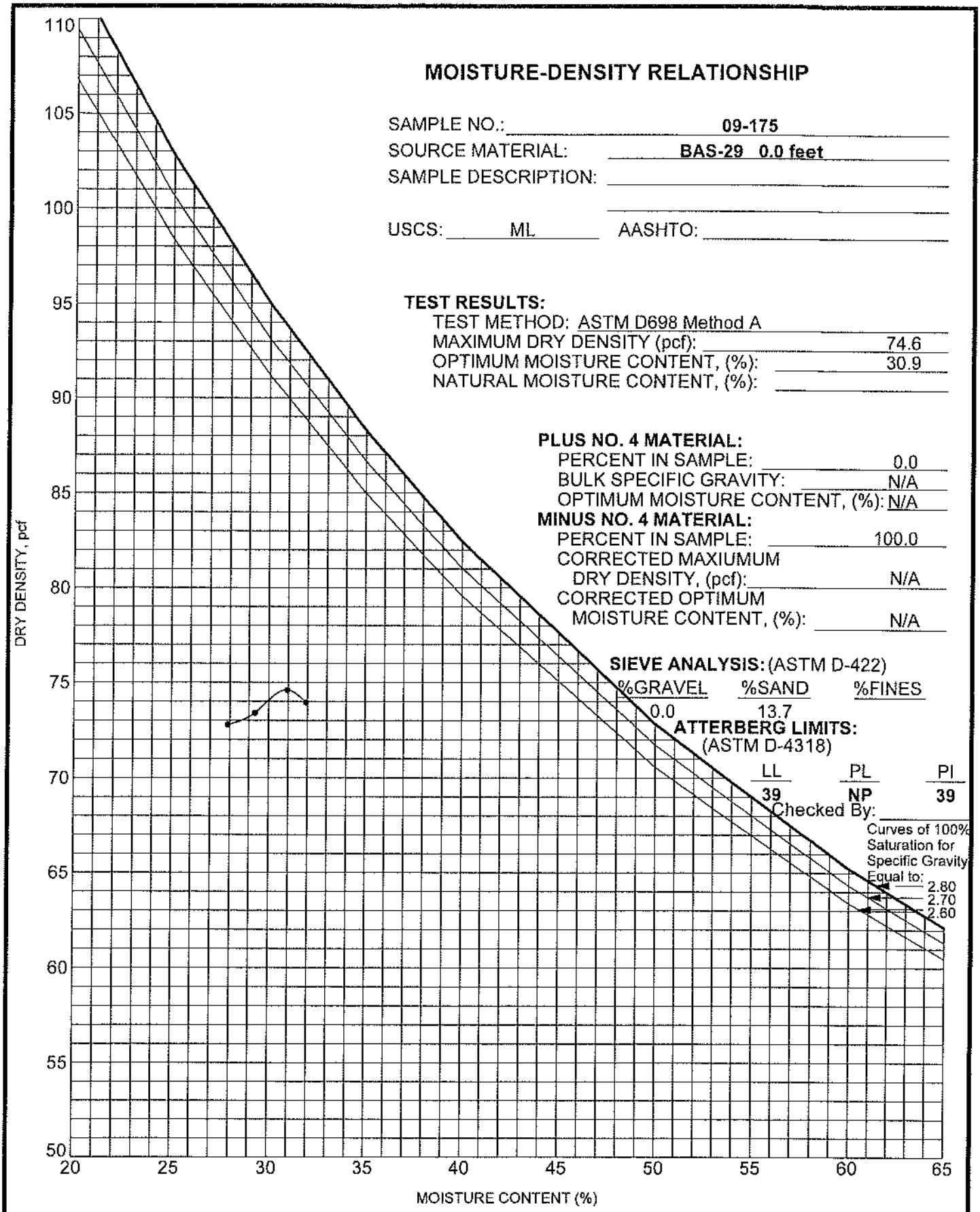

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: 09-175
SOURCE MATERIAL: BAS-29 0.0 feet
SAMPLE DESCRIPTION:

USCS: ML AASHTO:

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 74.6
OPTIMUM MOISTURE CONTENT, (%): 30.9
NATURAL MOISTURE CONTENT, (%):

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	13.7	

ATTERBERG LIMITS: (ASTM D-4318)

LL	PL	PI
39	NP	39

Checked By:

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Marshall Steam Station
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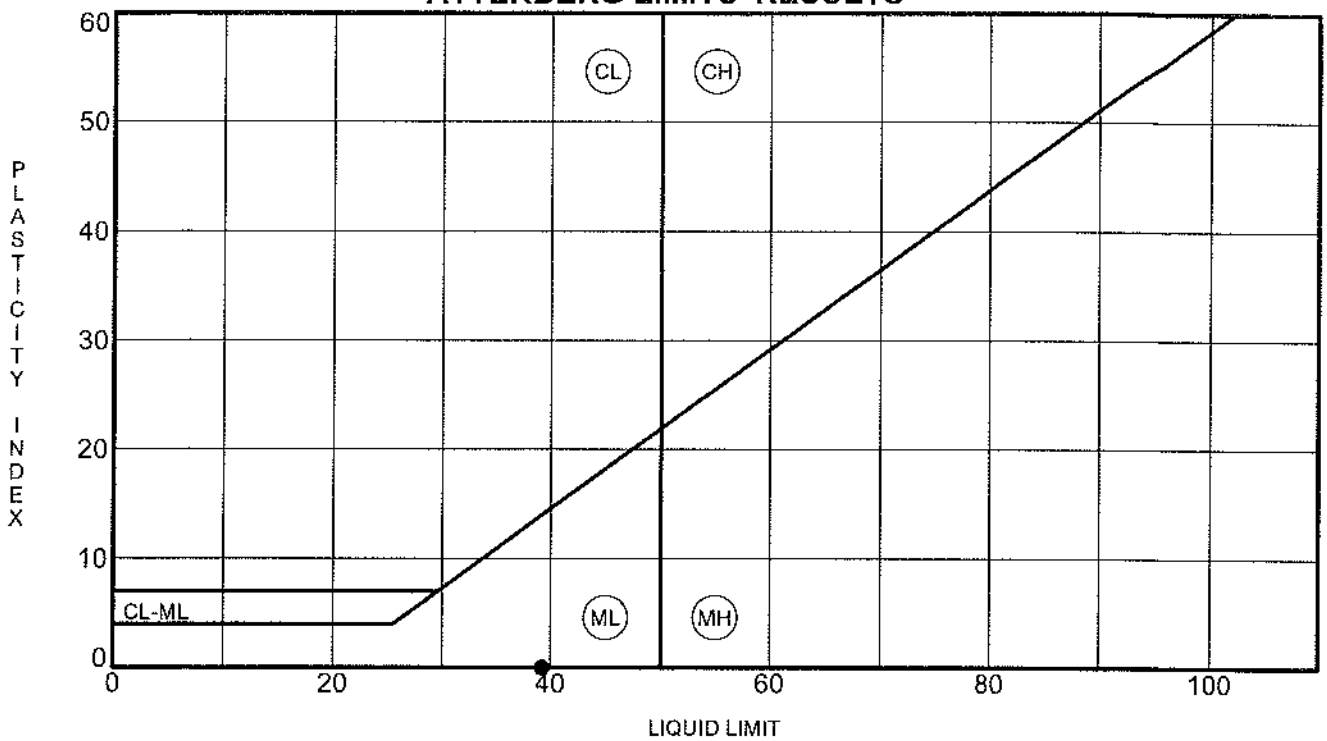
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	BAS-29	0.0	39	NP	NP	86	SILT(ML)

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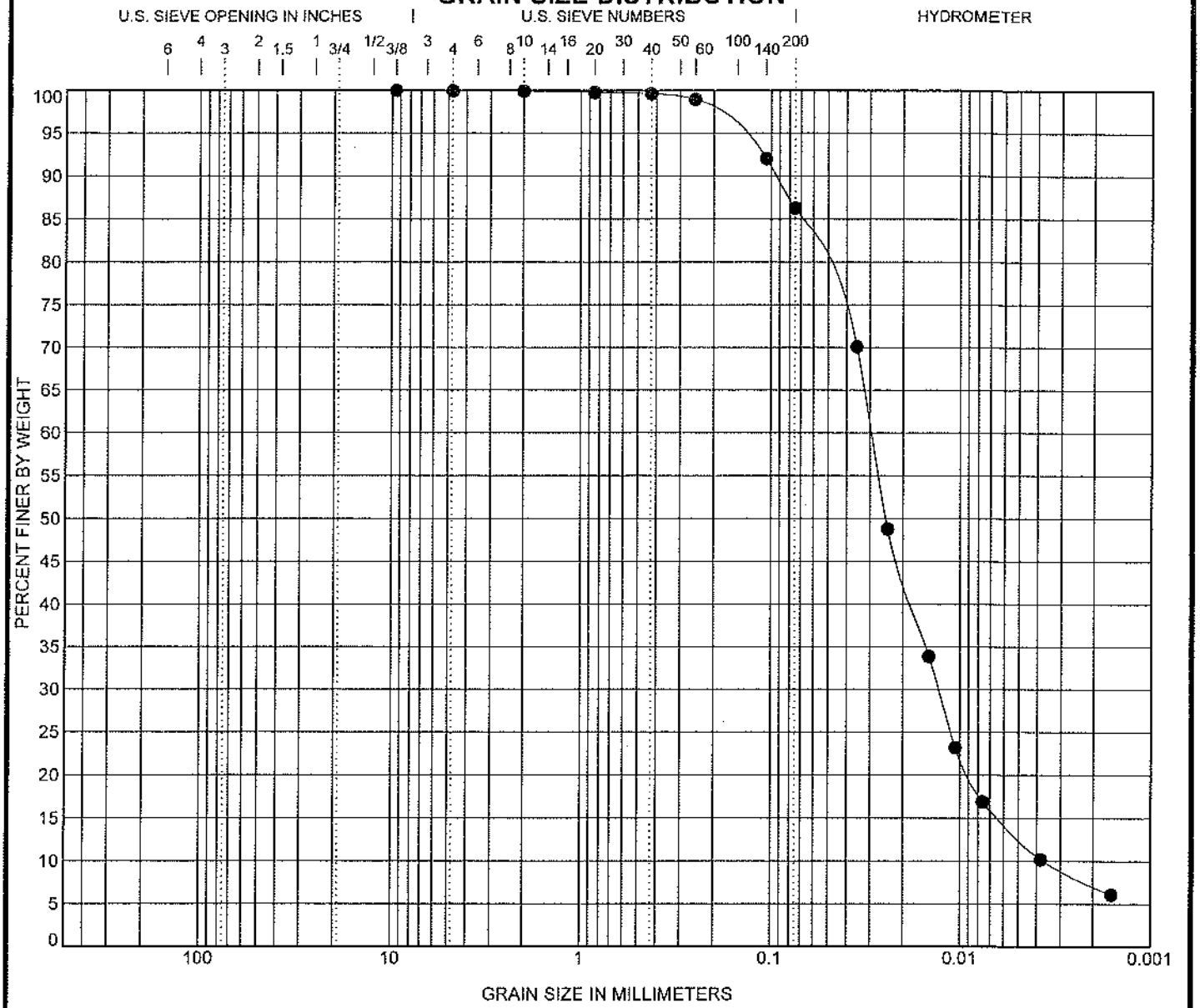
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-29**	**0.0**	**SILT(ML)**	**39**	**NP**	**NP**	**1.57**	**8.09**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-29**	**0.0**	**9.5**	**0.029**	**0.013**	**0.004**	**0.0**	**13.7**	**73.4**	**12.9**

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Shield Project No.: 1002083-03

SHIELD ENGINEERING, INC.

January 12, 2010

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 5 - Month of December 2009
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of December. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Jeremy T. Horton, E.I.T.
Staff Professional

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\1002083-03 Marshall Ash Landfill 2009-12.doc

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Monthly Summary Report - No. 5

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	January 12, 2010	**Page:**	1 of 2
Report By:	Jeremy T. Horton, E.I.T.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of December.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on December 2, 7, 10, 16, 21, 23, 28, 29 and 30, 2009 to perform field density tests of the ash landfill material. During the December 10 visit, Shield technicians worked to establish the elevation of the fill and did not perform density tests. The in-place density tests labeled DT-128 to DT-175 were performed during this period. See Table 1 for preliminary results and locations.

Laboratory Conformance Test:

1. Conformance laboratory samples labeled BAS-30 and BAS-31 were collected from the ash structural fill material during this period. See attached Moisture-Density Relationship test and additional required conformance test results.

The compaction results of these samples were in accordance with instructions provided by Duke Energy representatives. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
FLY ASH														
DT-1	08/18/09	See location plan	6		53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/19/09	See location plan	6		58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6		57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/19/09	See location plan	6		57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6		61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6		64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6		61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6		57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6		54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6		74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6		67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6		60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6		85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6		86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6		88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6		82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6		86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6		90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6		95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6		91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6		90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6		96.1	45.8	65.9	66.6	30.2	BAS-21	98.0	X		15.6
DT-23	09/01/09	See location plan	6		91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6		87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6		91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6		86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6		84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6		85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6		84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6		85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6		83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6		84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6		88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6		87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6		87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6		91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6		86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6		85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6		82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6		80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6		88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6		84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6		82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.6
DT-43R	09/15/09	See location plan	6		82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6		79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6		84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6		93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6		96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
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DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
DT-45R	09/15/09	See location plan	6		94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6		94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6		91.9	31.6	69.8	66.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6		94.3	29.6	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6		93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6		94.5	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6		93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6		94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6		93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6		92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6		93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6		88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6		95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6		93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6		91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6		91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6		88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6		87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6		89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6		92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6		93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6		93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6		91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6		93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.9
DT-70	10/02/09	See location plan	6		91.9	30.6	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6		93.7	36.0	68.9	71.6	33.7	BAS-19	96.2	X		2.3
DT-72	10/02/09	See location plan	6		93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6		94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6		89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6		88.9	30.1	68.3	70.0	32.5	BAS-8	97.6	X		-2.4
DT-76	10/07/09	See location plan	6		92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6		95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6		94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6		90.1	26.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6		91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6		87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6		93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6		88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6		90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6		86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6		93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6		93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6		90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6		91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6		93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6		91.2	29.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6		93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6		88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6		92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6		92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0
DT-96	10/23/09	See location plan	6		96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6		99.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4
DT-98	11/03/09	See location plan	6		90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-99	11/03/09	See location plan	6		91.3	28.9	70.8	71.5	33.1	BAS-26	99.1	X		-4.2
DT-100	11/03/09	See location plan	6		94.9	32.6	71.6	71.5	33.1	BAS-26	100+	X		-0.5
DT-101	11/03/09	See location plan	6		97.3	35.5	71.8	71.5	33.1	BAS-26	100+	X		2.4
DT-102	11/03/09	See location plan	6		97.8	35.3	72.4	71.5	33.1	BAS-26	100+	X		2.2
DT-103	11/03/09	See location plan	6		96.1	31.9	72.9	71.5	33.1	BAS-26	100+	X		-1.2
DT-104	11/06/09	See location plan	6		92.8	31.1	70.8	74.0	32.2	BAS-25	95.7	X		-1.1
DT-105	11/06/09	See location plan	6		89.8	31.5	68.3	74.0	32.2	BAS-25	92.3		X	-0.7

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SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
DT-105R	11/06/09	See location plan	6		92.8	31.8	70.4	74.0	32.2	BAS-25	95.1	X		-0.4
DT-106	11/06/09	See location plan	6		94.3	28.2	73.6	74.0	32.2	BAS-25	99.4	X		-4.0
DT-107	11/06/09	See location plan	6		95.2	30.8	72.8	74.0	32.2	BAS-25	98.4	X		-1.4
DT-108	11/06/09	See location plan	6		97.6	30.9	74.6	74.0	32.2	BAS-25	100+	X		-1.3
DT-109	11/06/09	See location plan	6		94.6	30.6	72.4	74.0	32.2	BAS-25	97.8	X		-1.6
DT-110	11/17/09	See location plan	6		88.0	29.9	67.7	70.2	28.3	BAS-11	96.5	X		1.6
DT-111	11/17/09	See location plan	6		89.8	28.7	69.8	70.2	28.3	BAS-11	99.4	X		0.4
DT-112	11/17/09	See location plan	6		91.3	26.1	72.4	72.0	26.3	BAS-14	100+	X		-0.2
DT-113	11/17/09	See location plan	6		91.9	26.9	72.4	72.0	26.3	BAS-14	100+	X		0.6
DT-114	11/17/09	See location plan	6		89.2	27.1	70.2	72.0	26.3	BAS-14	97.5	X		0.8
DT-115	11/17/09	See location plan	6		88.0	26.1	69.8	72.0	26.3	BAS-14	96.9	X		-0.2
DT-116	11/20/09	See location plan	6		90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-117	11/20/09	See location plan	6		90.4	30.8	69.1	71.5	33.1	BAS-26	96.7	X		-2.3
DT-118	11/20/09	See location plan	6		90.7	32.3	68.6	71.5	33.1	BAS-26	95.9	X		-0.8
DT-119	11/20/09	See location plan	6		91.9	31.0	70.2	71.5	33.1	BAS-26	98.1	X		-2.1
DT-120	11/20/09	See location plan	6		95.6	31.2	73.0	71.5	33.1	BAS-26	100+	X		-1.9
DT-121	11/20/09	See location plan	6		89.2	30.7	68.2	71.5	33.1	BAS-26	95.5	X		-2.4
DT-122	11/25/09	See location plan	6		94.9	28.9	73.6	76.3	30.7	BAS-24	96.5	X		-1.8
DT-123	11/25/09	See location plan	6		96.4	32.2	72.9	76.3	30.7	BAS-24	95.6	X		1.5
DT-124	11/25/09	See location plan	6		95.8	31.2	73.0	76.3	30.7	BAS-24	95.7	X		0.5
DT-125	11/25/09	See location plan	6		94.1	27.9	73.6	76.3	30.7	BAS-24	96.4	X		-2.8
DT-126	11/25/09	See location plan	6		92.8	27.5	72.8	76.3	30.7	BAS-24	95.4	X		-3.2
DT-127	11/25/09	See location plan	6		97.0	30.7	74.2	76.3	30.7	BAS-24	97.3	X		0.0
DT-128	12/02/09	See location plan	6		84.3	26.5	66.6	70.2	28.3	BAS-11	94.9		X	-1.8
DT-129	12/02/09	See location plan	6		85.8	27.2	67.5	70.2	28.3	BAS-11	96.1	X		-1.1
DT-130	12/02/09	See location plan	6		90.4	26.5	71.5	70.2	28.3	BAS-11	100+	X		-1.8
DT-131	12/02/09	See location plan	6		91.0	28.1	71.0	70.2	28.3	BAS-11	100+	X		-0.2
DT-132	12/02/09	See location plan	6		89.5	30.0	68.8	70.2	28.3	BAS-11	98.1	X		1.7
DT-133	12/02/09	See location plan	6		88.6	27.2	69.7	70.2	28.3	BAS-11	99.2	X		-1.1
DT-134	12/07/09	See location plan	6		88.9	27.4	69.8	70.2	28.3	BAS-11	99.4	X		-0.9
DT-135	12/07/09	See location plan	6		88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-136	12/07/09	See location plan	6		86.4	26.4	68.4	70.2	28.3	BAS-11	97.4	X		-1.9
DT-137	12/07/09	See location plan	6		84.9	25.1	67.9	70.2	28.3	BAS-11	96.7	X		-3.2
DT-138	12/07/09	See location plan	6		86.7	28.6	67.4	70.2	28.3	BAS-11	96.0	X		0.3
DT-139	12/07/09	See location plan	6		88.9	29.2	68.8	70.2	28.3	BAS-11	98.0	X		0.9
DT-140	12/16/09	See location plan	6		83.1	25.9	66.0	67.0	24.0	BAS-7	98.5	X		1.9
DT-141	12/16/09	See location plan	6		84.3	24.5	67.7	67.0	24.0	BAS-7	100+	X		0.5
DT-142	12/16/09	See location plan	6		80.4	24.9	64.4	67.0	24.0	BAS-7	96.1	X		0.9
DT-143	12/16/09	See location plan	6		81.3	26.1	64.5	67.0	24.0	BAS-7	96.2	X		2.1
DT-144	12/16/09	See location plan	6		84.0	25.6	66.9	67.0	24.0	BAS-7	99.8	X		1.6
DT-145	12/16/09	See location plan	6		86.7	26.0	68.8	67.0	24.0	BAS-7	100+	X		2.0
DT-146	12/21/09	See location plan	6		94.3	32.6	71.1	71.6	33.7	BAS-19	99.3	X		-1.1
DT-147	12/21/09	See location plan	6		94.0	33.6	70.4	71.6	33.7	BAS-19	98.3	X		-0.1
DT-148	12/21/09	See location plan	6		97.0	34.0	72.4	71.6	33.7	BAS-19	100+	X		0.3
DT-149	12/21/09	See location plan	6		95.8	34.2	71.4	71.6	33.7	BAS-19	99.7	X		0.5
DT-150	12/21/09	See location plan	6		93.7	34.1	69.9	71.6	33.7	BAS-19	97.6	X		0.4
DT-151	12/21/09	See location plan	6		94.9	31.0	72.4	71.6	33.7	BAS-19	100+	X		-2.7
DT-152	12/23/09	See location plan	6		86.4	26.7	68.2	70.2	28.3	BAS-11	97.1	X		-1.6
DT-153	12/23/09	See location plan	6		88.3	25.6	70.3	70.2	28.3	BAS-11	100+	X		-2.7
DT-154	12/23/09	See location plan	6		85.2	26.4	67.4	70.2	28.3	BAS-11	96.0	X		-1.9
DT-155	12/23/09	See location plan	6		85.8	28.6	66.7	70.2	28.3	BAS-11	95.0	X		0.3
DT-156	12/23/09	See location plan	6		87.3	27.6	68.4	70.2	28.3	BAS-11	97.5	X		-0.7
DT-157	12/23/09	See location plan	6		86.4	29.5	66.7	70.2	28.3	BAS-11	95.0	X		1.2
DT-158	12/28/09	See location plan	6		86.0	33.7	65.8	70.0	32.5	BAS-11	94.0		X	1.2
DT-159	12/28/09	See location plan	6		91.3	34.8	67.7	70.0	32.5	BAS-11	96.8	X		2.3
DT-160	12/28/09	See location plan	6		92.8	32.0	70.3	70.0	32.5	BAS-11	100+	X		-0.5
DT-161	12/28/09	See location plan	6		91.0	32.8	69.5	70.0	32.5	BAS-11	97.9	X		0.3
DT-162	12/28/09	See location plan	6		90.1	31.7	68.4	70.0	32.5	BAS-11	97.7	X		-0.8
DT-163	12/28/09	See location plan	6		91.6	33.2	68.8	70.0	32.5	BAS-11	98.2	X		0.7
DT-164	12/29/09	See location plan	6		97.6	32.3	73.8	76.3	30.7	BAS-24	96.7	X		1.6
DT-165	12/29/09	See location plan	6		95.8	26.0	76.0	76.3	30.7	BAS-24	99.6	X		-4.7

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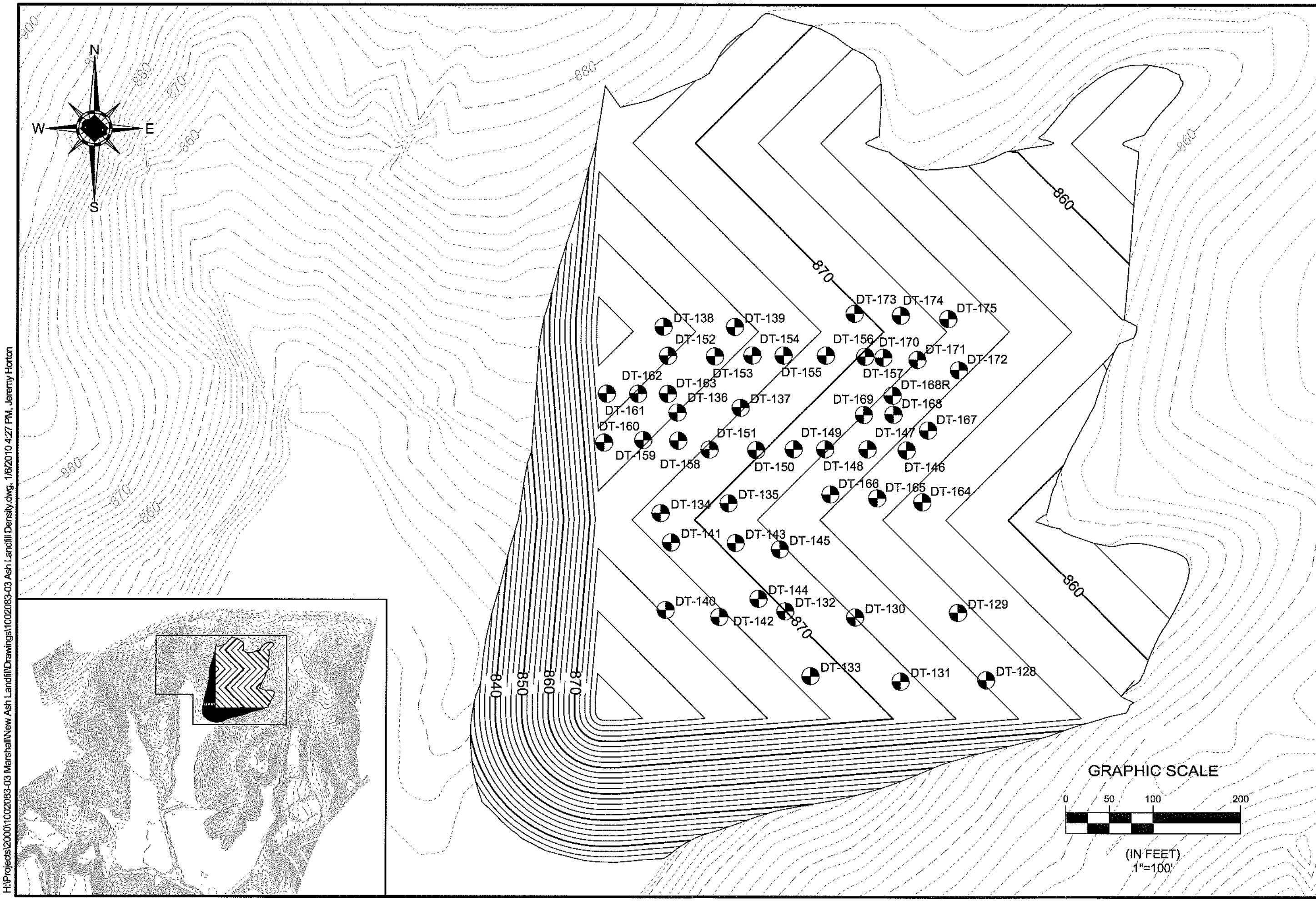
SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-166	12/29/09	See location plan	6		96.1	27.3	75.5	76.3	30.7	BAS-24	98.9	X		-3.4
DT-167	12/29/09	See location plan	6		97.9	27.3	76.9	76.3	30.7	BAS-24	100+	X		-3.4
DT-168	12/29/09	See location plan	6		98.8	25.8	78.5	76.3	30.7	BAS-24	100+	X		-4.9
DT-168R	12/29/09	See location plan	6		96.1	27.0	75.7	76.3	30.7	BAS-24	99.2	X		-3.7
DT-169	12/29/09	See location plan	6		98.4	26.9	76.0	76.3	30.7	BAS-24	99.6	X		-3.8
DT-170	12/30/09	See location plan	6		88.3	24.1	71.2	72.0	26.3	BAS-14	98.8	X		-2.2
DT-171	12/30/09	See location plan	6		86.7	21.8	71.2	72.0	26.3	BAS-14	98.9	X		-4.5
DT-172	12/30/09	See location plan	6		86.1	24.2	69.3	72.0	26.3	BAS-14	96.3	X		-2.1
DT-173	12/30/09	See location plan	6		87.3	22.5	71.3	72.0	26.3	BAS-14	99.0	X		-3.8
DT-174	12/30/09	See location plan	6		86.7	21.9	71.1	72.0	26.3	BAS-14	98.8	X		-4.4
DT-175	12/30/09	See location plan	6		86.4	23.0	70.2	72.0	26.3	BAS-14	97.6	X		-3.3

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope



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SHIELD ENGINEERING, INC.

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4301 TAGGART CREEK ROAD
CHARLOTTE, NC 28208

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density.dwg
DRAWN BY: JTH
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: 1/6/10

SHEET TITLE:

DENSITY TEST
LOCATION PLAN
FOR ASH
DECEMBER 2009

SHEET:
1

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall Steam Station	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 12-2-09
Inspection of: Fill Fly Ash	**Technician:** Eli's Pegas	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield on site to performed drive tube test and are point at Marshall Steam Station.

All test meets Criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Eli's Pegas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		Shield No.:	Client No.:
Client Name: DUKE POWER		Task No.:	Date: 12-2-09
Inspection of: Fill Fly Ash		Technician: Elis Rojas	

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One point was collect from test #121

Drive Tube\Nuclear Density Data	128 (~~127~~)	129 (~~128~~)	130 (~~129~~)	131 (~~130~~)	132 (~~131~~)	133 (~~132~~)		
Test No.	~~121~~	~~122~~	~~123~~	~~124~~	~~125~~	~~126~~		
Grade or Elevation	716.5							
Location								
Wt. Wet Soil & Mold	4.24	4.27	4.32	4.35	4.29	4.26		
Wt. Mold	1.34	1.32	1.32	1.33	1.32	1.32		
Wt. Wet soil	2.90	2.85	3	3.02	2.97	2.94		
Volume Mold	0.0332							
Wet Density	84.5	85.8	90.4	91	89.5	88.6		
Wt. Wet soil & Pan	475.9	603.3	483.6	600.6	477.3	601.4		
Wt. Dry soil & Pan	432.2	556	438.2	552.7	428.7	554.5		
Wt. Pan	267.2	382.1	267.2	382.1	267.2	382.1		
Moisture Lost	43.7	47.3	45.4	47.9	48.6	46.9		
Wt. Dry soil	165	173.9	171	170.6	161.5	172.4		
% Moisture	26.5	27.2	26.5	28.1	30	27.2		
Dry Density	66.6	67.5	71.4	71	68.8	67.3	69.6	
Maximum Dry Density	70.2							
Optimum Moisture	28.3							
% Compaction	94.9	96.2	101.7	101.1	98	95.9		
Meets Criteria (Y\N)								

1 Point Proctor Data	
Wt. Wet Soil & Mold	12.14
Wt. Mold	9.30
Wt. Wet soil	2.84
Volume Mold	0.0331
Wet Density	85.8
Wt. Wet soil & Pan	600.9
Wt. Dry soil & Pan	555.3
Wt. Pan	382.1
Moisture Lost	45.6
Wt. Dry soil	173.2
% Moisture	26.3
Dry Density	67.9

Additional Project Data

LAB Proctor 70.2 at 28.3

Elis Rojas
Printed Name

Signature

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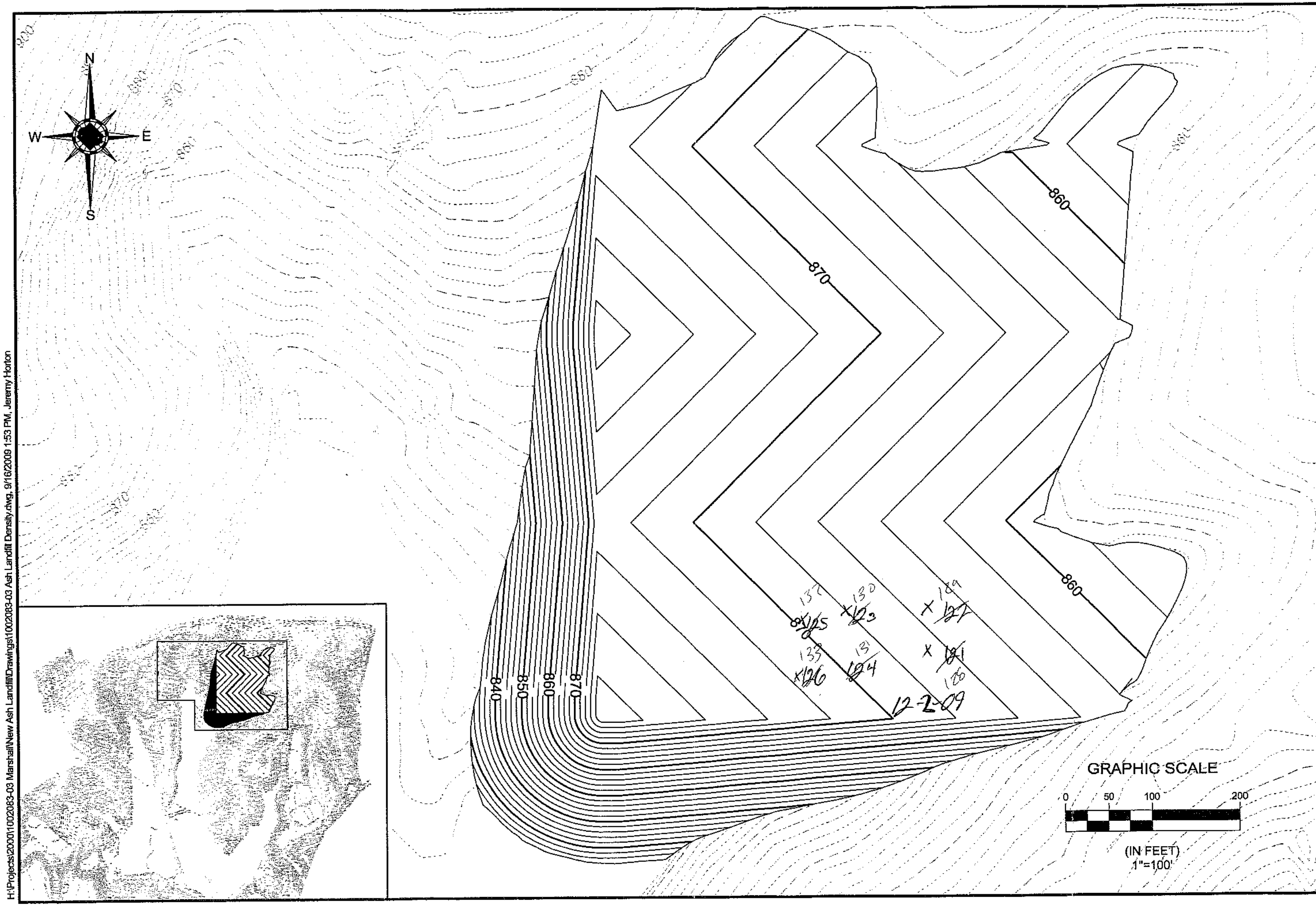

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8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME:
DRAWIN BY:
FILE NUMBER:
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SCALE:
DATE:

SHEET TITLE:

SHEET:

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 12-7-09
Inspection of: FILL FLY ASH	**Technician:** ELIS REYES	

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Shield on site to observed Fill at MARSHALL Steam Station.

Shield performed six test. All test meets Criteria.

One point was collect from test # 137

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Pink Copy: Inspector or Superintendent

ELIS REYES
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: DUKE POWER	Task No.:	Date: 12-7-09
Inspection of: Fill Fly Ash	Technician: ELIS PEÑA	

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One point was collect from test # 137

Drive Tube/Nuclear Density Data								
	134 ~~133~~	135 ~~134~~	136 ~~135~~	137 ~~136~~			138 ~~137~~	139 ~~138~~
Test No.	~~133~~	~~134~~	~~135~~	~~136~~	~~137~~	~~138~~	~~137~~	~~138~~
Grade or Elevation	?							
Location								
Wt. Wet Soil & Mold	4.27	4.24	4.19	4.15	4.20	4.27	4.20	4.27
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
Wt. Wet soil	2.95	2.92	2.87	2.82			2.88	2.95
Volume Mold	0.033							
Wet Density	88.9	88	86.4	84.9			86.7	88.9
Wt. Wet soil & Pan	487.9	481.4	481.3	486.8	483.3	480.6	483.3	480.6
Wt. Dry soil & Pan	434.7	430.8	430.9	437.6	430.6		429.2	426.6
Wt. Pan	240.3	241.6	240.3	241.6	240.3	241.6	240.3	241.6
Moisture Lost	53.2	50.6	50.4	49.2			54.1	54
Wt. Dry soil	194.4	189.2	190.6	196			188.9	185
% Moisture	27.4	26.7	26.4	25.1			28.6	29.2
Dry Density	69.8	69.5	68.4	67.9			67.4	68.8
Maximum Dry Density								
Optimum Moisture								
% Compaction	99.4	99	97.4	96.7			96.0	98
Meets Criteria (Y\N)								

1 Point Proctor Data	
Wt. Wet Soil & Mold	12.24
Wt. Mold	9.30
Wt. Wet soil	2.94
Volume Mold	0.033
Wet Density	88.8
Wt. Wet soil & Pan	485.4
Wt. Dry soil & Pan	432
Wt. Pan	240.3
Moisture Lost	53.4
Wt. Dry soil	191.7
% Moisture	27.9
Dry Density	69.4

Additional Project Data

70.2 at 28.3
110

ELIS PEÑA
Printed Name

Signature

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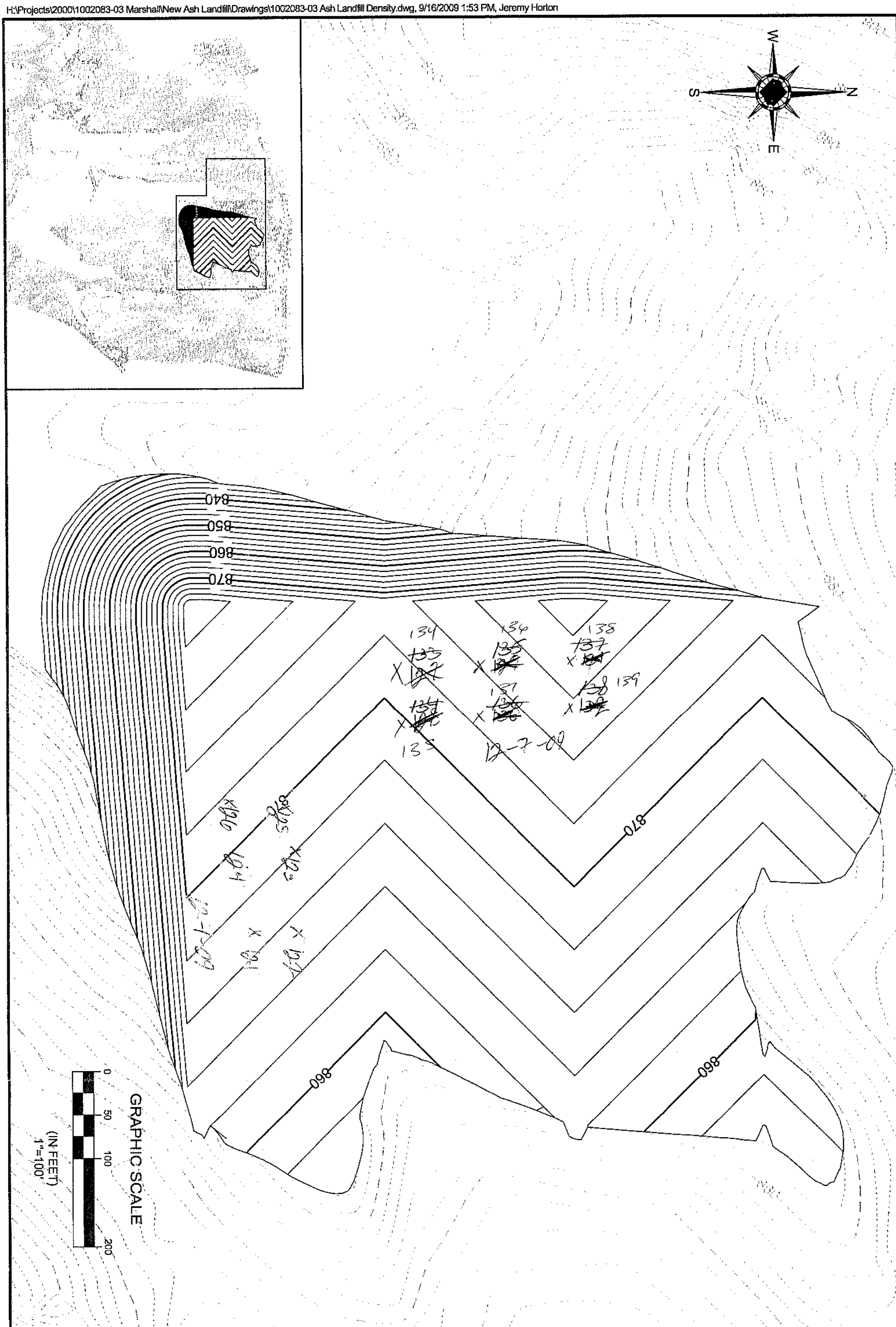

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4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 12-10-09
Inspection of: Grading Check	**Technician:** Elis Reyes	

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Shield on site to observed grading with Josh SLUSACZYK. Shield worked to figure out crack on Cell Fly Ash.

Shield observed that Cell was crack with Stakes inside of cell.

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Pink Copy: Inspector or Superintendent

Elis Reyes
Printed Name

Signature

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Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL Steam Station	**Shield No.:**	**Client No.:**
Client Name: Elis Rojas	**Task No.:**	**Date:** 12-~~18~~ 16-09
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed Fill at MARSHALL Steam Station.

Shield performed a test. All test meets criteria.

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Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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Project Name: MARSHALL		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 12-16-09
Inspection of: Fill		Technician: Elis Rojas	

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One point was collect from Test #139

Ft 2155'

Drive Tube/Nuclear Density Data								
		140	141		143	144	145	142
	10'	1	2	3	4	5	6	3
Test No.	?	139	~~140~~	141	142	143	144	141
Grade or Elevation								
Location								
Wt. Wet Soil & Mold		4.08	4.12	~~3.99~~	4.02	4.11	4.22	3.99
Wt. Mold		1.32	1.32	~~1.30~~	1.32	1.32	1.34	1.32
Wt. Wet soil		2.76	2.8		2.7	2.79	2.88	2.67
Volume Mold		0.0332						
Wet Density		83.1	84.3	~~84.4~~	81.3	84	86.7	80.4
Wt. Wet soil & Pan		588.2	466.3	~~576.4~~	483.5	599.4	473.2	586.6
Wt. Dry soil & Pan		546.4	401.2		433.3	555.7	425.3	546.3
Wt. Pan		384.7	240.9	~~88~~	240.9	384.7	240.9	384.7
Moisture Lost		41.8	44.1		50.2	43.7	47.9	40.3
Wt. Dry soil		161.7	180.3		192.4	171	184.4	161.6
% Moisture		25.9	24.5		26.1	25.6	26	24.9
Dry Density		66	67.7		64.5	66.9	68.8	64.4
Maximum Dry Density		67.0						
Optimum Moisture		24						
% Compaction		98.5	101		96.2	99.9	102.7	96.1
Meets Criteria (Y\N)								

1 Point Proctor Data	
Wt. Wet Soil & Mold	2.05
Wt. Mold	1.30
Wt. Wet soil	2.75
Volume Mold	0.0331
Wet Density	83.1
Wt. Wet soil & Pan	576.7
Wt. Dry soil & Pan	540.2
Wt. Pan	384.7
Moisture Lost	36.7
Wt. Dry soil	155.5
% Moisture	23.6
Dry Density	67.2

Additional Project Data

67.0 at 24%

Elis Rojas
Printed Name

Signature

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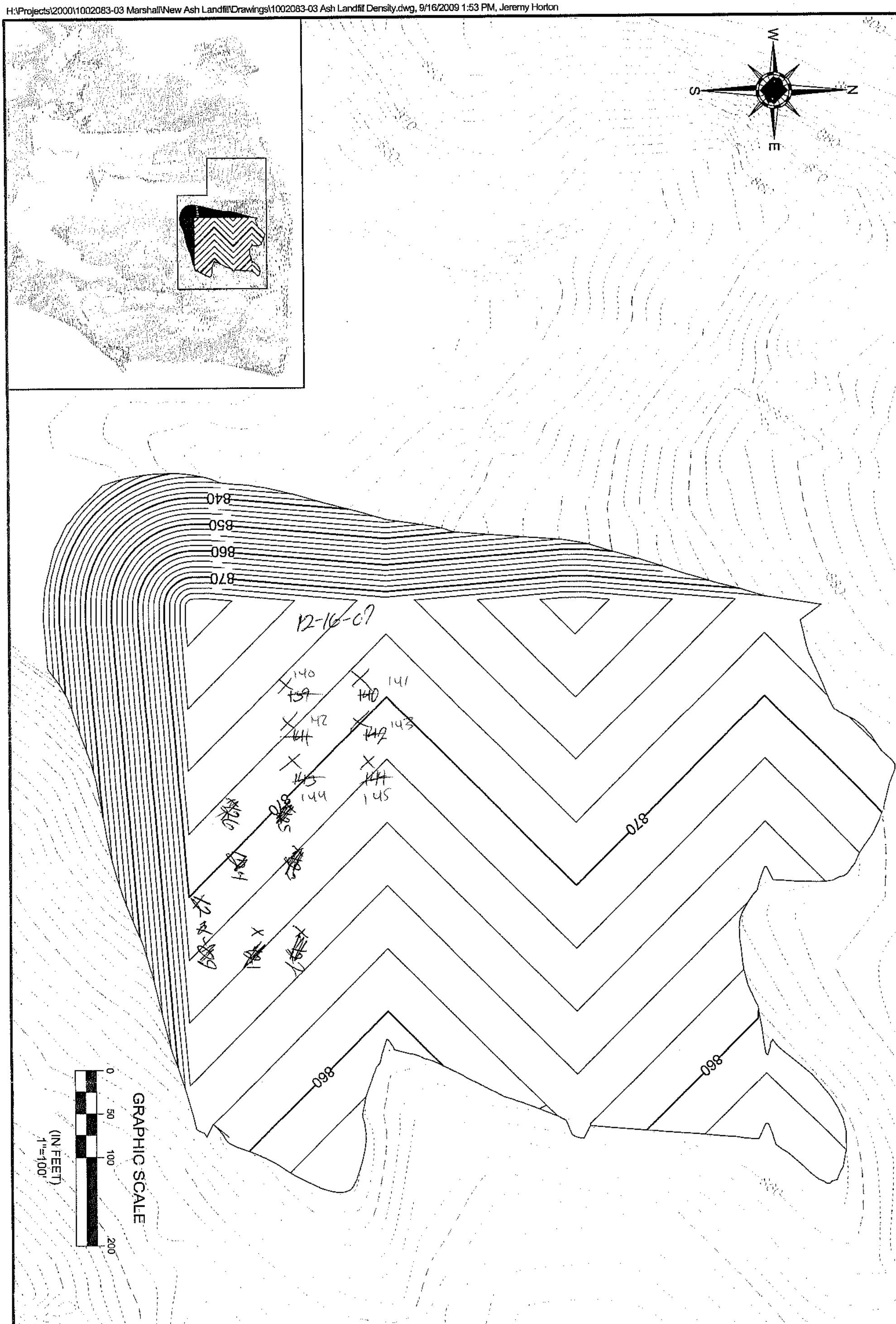

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4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 12-21-09
Inspection of: Fill Fly Ash	Technician: Elis Rojas	

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Shield on site to observed fill at Marshall steam Station.

When Shield arrived at 8:30 Am. All cell was cover Shield informed Josh Slusaczyk. He call [illegible] Mosley. She recommended to removed snow with Track loaders on fly ash top.

Shield performed a test. All test meets criteria

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Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: DUKE POWER	Task No.:	Date: 12-21-09
Inspection of: FILL	Technician: Elis Rosa	

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~~Rocky~~ One point was collect from # 146

Drive Tube/Nuclear Density Data

	146	147	148	149	150	151		
Test No.	~~145~~	~~146~~	~~147~~	~~148~~	~~149~~	~~150~~		
Grade or Elevation ?								
Location								
Wt. Wet Soil & Mold	4.45	4.40	4.64	4.50	4.43	4.47		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	3.13	~~3.08~~	3.32	3.18	3.11	3.15		
Volume Mold	0.0332							
Wet Density	94.3	~~92.8~~ 94.0	97	95.8	93.7	94.9		
Wt. Wet soil & Pan	472.6	467.5	479	471.8	478.2	471.5		
Wt. Dry soil & Pan	415.7	410.8	418.6	413.3	417.9	417.3		
Wt. Pan	241	242.3	241	242.3	241	242.3		
Moisture Lost	56.9	56.7	60.4	58.5	60.3	54.2		
Wt. Dry soil	174.7	168.5	177.6	171	176.9	175		
% Moisture	32.6	33.6	34	34.2	34.1	31		
Dry Density	71.1	~~69.5~~ 70.3	72.4	71.4	69.9	72.4		
Maximum Dry Density	71.6							
Optimum Moisture	33.7							
% Compaction	99.3	97.1	101.1	99.7	97.6	101.1		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.37	
Wt. Mold	9.30	
Wt. Wet soil	3.07	
Volume Mold	0.0331	
Wet Density	92.7	
Wt. Wet soil & Pan	582.3	
Wt. Dry soil & Pan	529.3	
Wt. Pan 378.9	~~430~~	
Moisture Lost	53	
Wt. Dry soil	150.4	
% Moisture	35.2	
Dry Density	68.6	

Additional Project Data

LAB
71.6 @ 33.7

Elis Rosa
Printed Name

Signature

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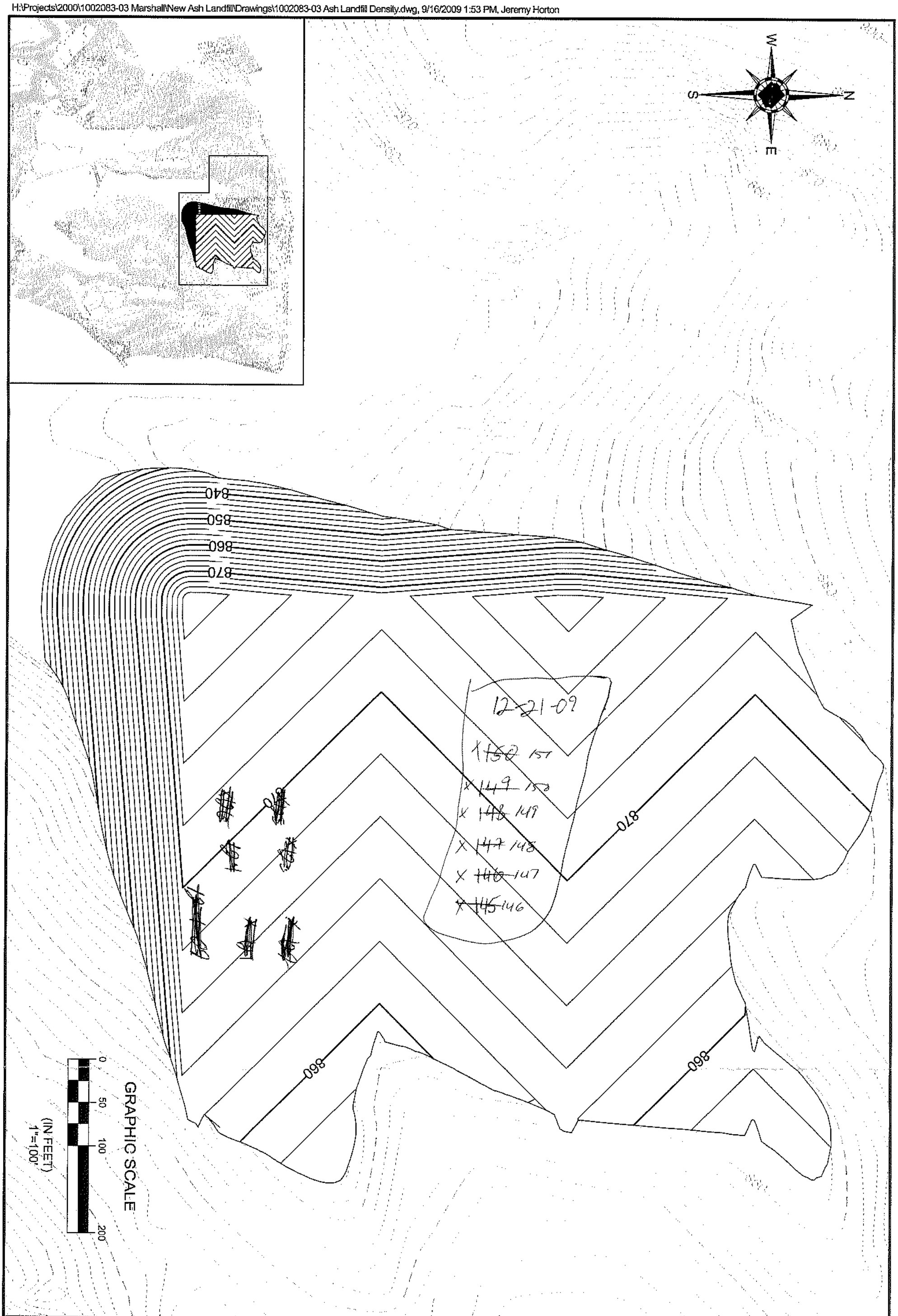

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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 12-23-07
Inspection of: FILL FLY ASH	**Technician:** ELIS PEGAS	

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THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION

Shield on site to observed Fill at MARSHALL Steam Station.

Shield performed 1 test. All test meets Criteria

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS PEGAS
Printed Name

Signature

E:\doc\forms\daily report.doc

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 12-23-09
Inspection of: Fly Ash		Technician: Eric Pegg	

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One point was collect from test # 152.

Drive Tube/Nuclear Density Data

	152 NDS	153 NDS	154 NDS	155 NDS	156 NDS	157 NDS		
Test No.	~~151~~	~~152~~	~~153~~	~~154~~	~~155~~	~~156~~		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.19	4.25	4.15	4.17	4.22	4.19		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	2.87	2.93	2.83	2.85	2.9	2.87		
Volume Mold	0.0332							
Wet Density	86.4	88.3	85.2	85.8	87.3	86.4		
Wt. Wet soil & Pan	481.6	483.2	478.3	479	473.2	480.3		
Wt. Dry soil & Pan	431.3	434.3	429.2	426.5	423.4	426.2		
Wt. Pan	243	243	243	243	243	243		
Moisture Lost	50.3	48.9	49.1	52.5	49.8	54.1		
Wt. Dry soil	188.3	191.3	186.2	183.5	180.4	183.2		
% Moisture	26.7	25.6	26.4	28.6	27.6	29.5		
Dry Density	68.2	70.3	67.4	66.7	68.4	66.7		
Maximum Dry Density	70.2							
Optimum Moisture	28.3							
% Compaction	97.2	100	96	95	97.4	95		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	4.29	
Wt. Mold	1.30	
Wt. Wet soil	2.99	
Volume Mold	0.0331	
Wet Density	90.3	
Wt. Wet soil & Pan	580.8	
Wt. Dry soil & Pan	533.8	
Wt. Pan	371.2	
Moisture Lost	47	
Wt. Dry soil	162.6	
% Moisture	28.9	
Dry Density	70.1	

Additional Project Data

LAB
70.2 at 28.3

Eric Pegg
Printed Name

Signature

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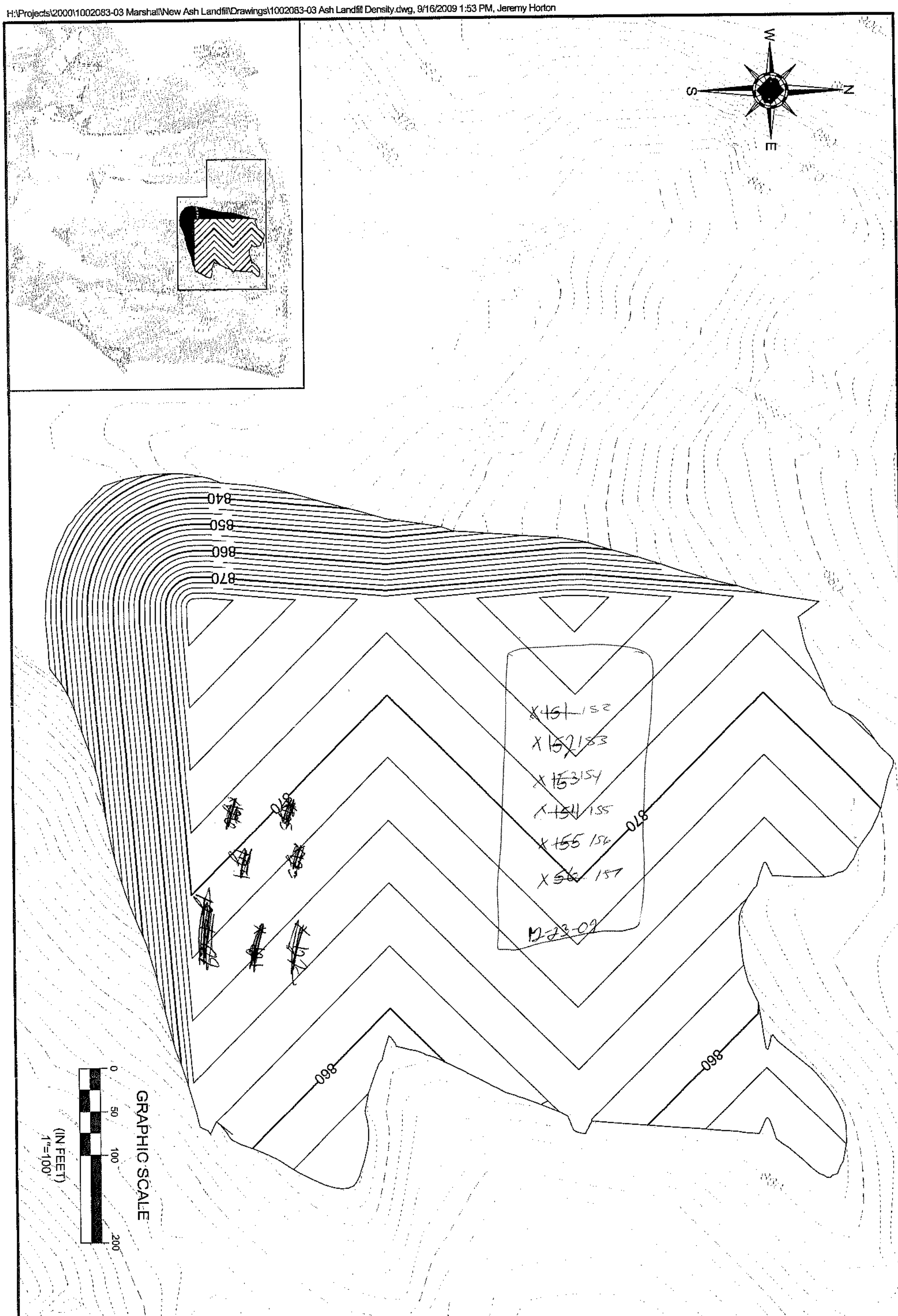

SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION 8320 EAST NC HIGHWAY 150 TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 12-28-09
Inspection of: FILL FLY ASH	**Technician:** ELIS REYES	

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Shield on site to observed Fill at MARSHALL Steam Station.

Shield performed 6 Test. All test meets criteria.

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Pink Copy: Inspector or Superintendent

ELIS REYES — Printed Name

Signature

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Shield Engineering, Inc.
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Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	Shield No.:	Client No.:	
Client Name: DUC River	Task No.:	Date: 12-28-09	
Inspection of: Fill Fly Ash	Technician: Elis Rojas		

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One Point was Collect from Test # 157

Drive Tube\Nuclear Density Data								
	158	159	160	161	162	163		
	~~155~~ 1	~~156~~ 2	~~157~~ 3	~~158~~ 4	~~159~~ 5	~~160~~ 6		
Test No.	~~157~~	~~158~~	~~159~~	~~160~~	~~161~~	~~162~~		
Grade or Elevation	?							
Location								
Wt. Wet Soil & Mold	4.24	4.35	4.40	4.34	4.32	4.38		
Wt. Mold	1.32	1.32	1.32	1.32	1.33	1.34		
Wt. Wet soil	2.92	3.03	3.08	3.02	2.99	3.04		
Volume Mold	0.0332							
Wet Density	88	91.3	92.8	91	90.1	91.6		
Wt. Wet soil & Pan	480.1	478	488.3	482.5	478.2	478		
Wt. Dry soil & Pan	420.1	417.5	428.6	423.5	421.3	419.5		
Wt. Pan	242	243.5	242	243.5	242	243.5		
Moisture Lost	60	60.5	59.7	59	56.9	58.5		
Wt. Dry soil	178.1	174	186.6	180	179.3	176		
% Moisture	33.7	34.8	32	32.8	31.7	33.2		
Dry Density	65.8	67.7	70.3	68.5	68.4	68.8		
Maximum Dry Density	70							
Optimum Moisture	32.5							
% Compaction	94	96.7	100.4	97.9	97.7	98.3		
Meets Criteria (Y\N)								

1 Point Proctor Data		
Wt. Wet Soil & Mold	12.41	
Wt. Mold	9.30	
Wt. Wet soil	3.11	
Volume Mold	0.0331	
Wet Density	93.7	
Wt. Wet soil & Pan	578.5	
Wt. Dry soil & Pan	523.9	
Wt. Pan 371.1	~~371.1~~	
Moisture Lost	54.6	
Wt. Dry soil	152.8	
% Moisture	35.7	
Dry Density	69	

Additional Project Data

LL 70 of 32.5

Elis Rojas
Printed Name

Signature

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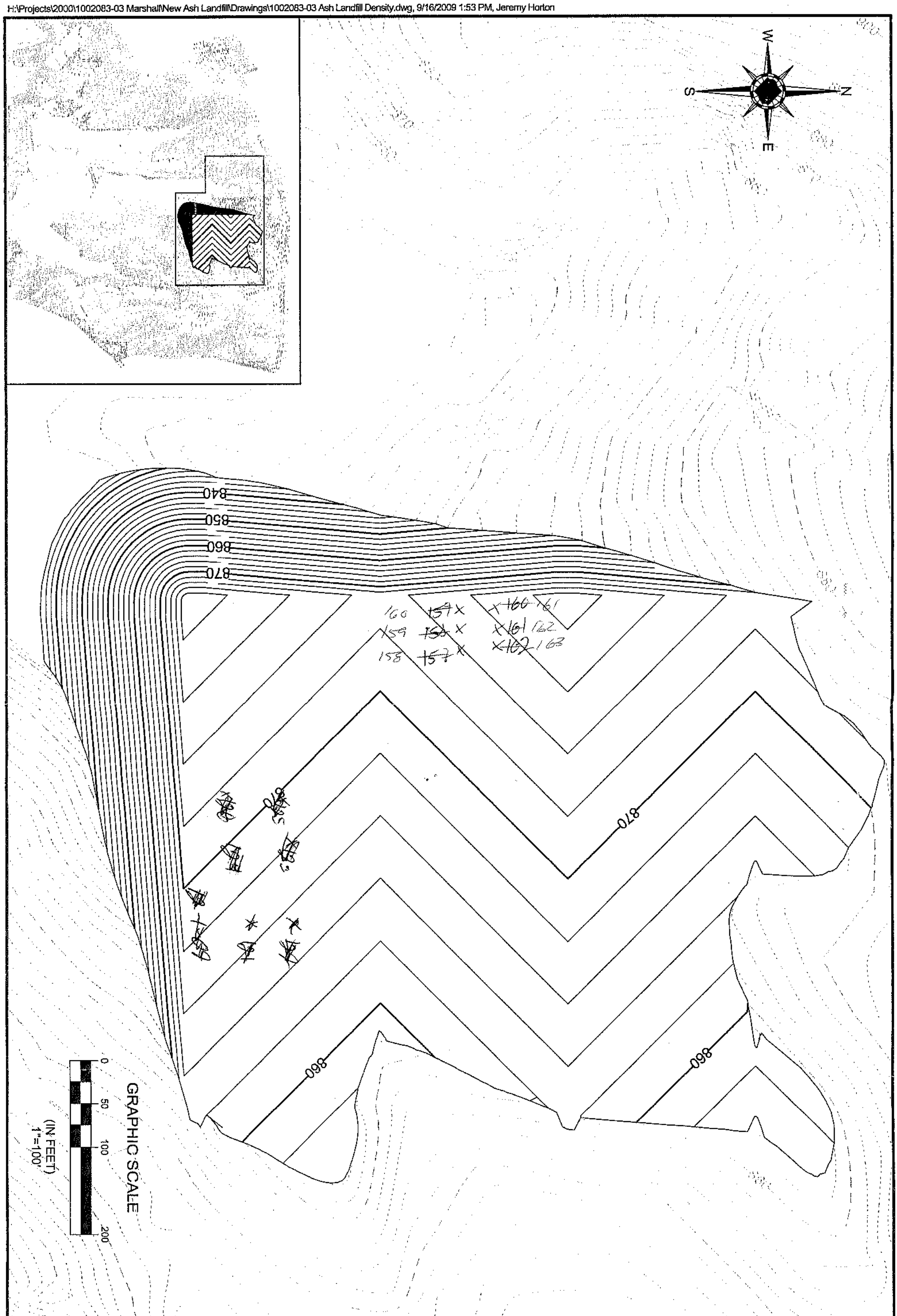

SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION, 8320 EAST NC HIGHWAY 150, TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC.* *8320 EAST NC HIGHWAY 150* *TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall Steam Station	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 12-29-09
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed Fill at Marshall Steam Station. Shield observed that area chosen by cracking crew was frozen.
Shield observed stake near testing area. Shield ask crew what was the crack. Crew responded that crack from top of stake was 12'. Shield estimates mesuring stake 8' of Fill.
All test meets Criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
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Telephone 704-394-6913 Fax 704-394-6968

Project Name: Max Shaw	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 12-29-09
Inspection of: Fill Fly Ash	Technician: Elis Reyes	

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One point was collect from test # 163

Drive Tube\Nuclear Density Data	164	165	166	167	168	169	168R
	NBK	WBK	WBK	WBK	WBK	NBK	WBK Re-Test
Test No.	~~163~~	164	165	166	167	168	167
Grade or Elevation	+8						
Location							
Wt. Wet Soil & Mold	4.56	4.50	4.52	4.59	4.60	4.52	4.53
Wt. Mold	1.32	1.32	1.33	1.34	1.32	1.32	1.34
Wt. Wet soil	3.24	3.18	3.19	3.25	3.28	3.2	3.19
Volume Mold	0.0332						
Wet Density	97.6	95.8	96.1	97.9	98.8	96.4	96.1
Wt. Wet soil & Pan	485.4	482.5	476.4	477.7	469.7	471.9	469.3
Wt. Dry soil & Pan	426.2	434.1	426.4	427.7	423.3	423.7	421.3
Wt. Pan	243.2	244.3	243.2	244.3	243.2	244.3	243.2
Moisture Lost	59.2	49.4	50	50	46.4	48.2	48
Wt. Dry soil	183	189.8	183.2	183.4	180.1	179.4	178.1
% Moisture	32.3	26	27.3	27.3	25.8	26.9	27
Dry Density	73.8	76	75.5	76.9	78.5	76	75.7
Maximum Dry Density	76.3						
Optimum Moisture	30.7						
% Compaction	96.7	99.6	98.3	100.8	102.9	99.6	99.2
Meets Criteria (Y\N)					Y		

1 Point Proctor Data	
Wt. Wet Soil & Mold	12.55
Wt. Mold	9.30
Wt. Wet soil	3.25
Volume Mold	0.0331
Wet Density	98.2
Wt. Wet soil & Pan	581.3
Wt. Dry soil & Pan	535
Wt. Pan	370.2
Moisture Lost	46.3
Wt. Dry soil	164.8
% Moisture	28.1
Dry Density	76.7

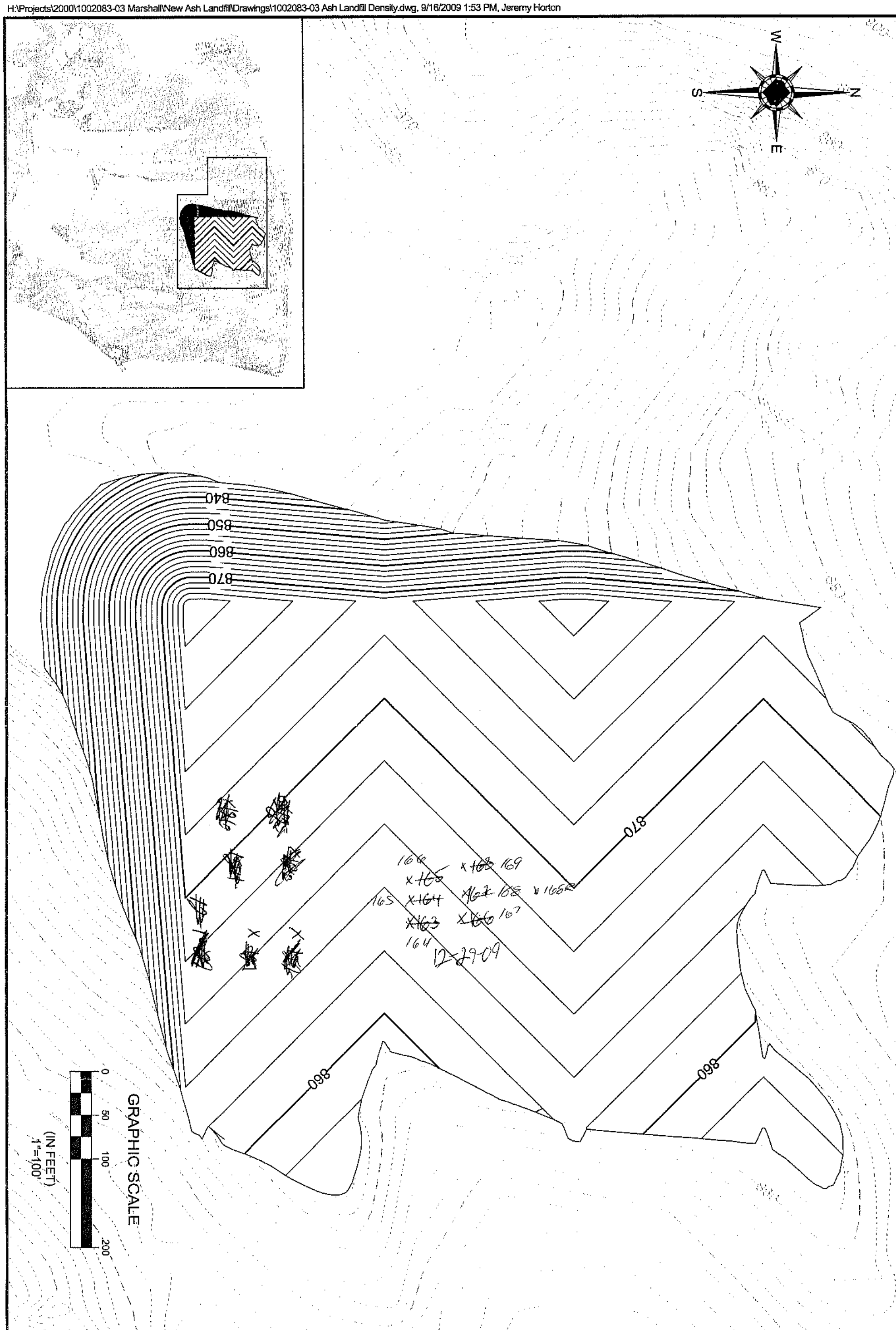
Additional Project Data

LAB - 76.3 at 30.7

Elis Reyes
Printed Name

Signature

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 9/16/2009 1:53 PM, Jeremy Horton



SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION 8320 EAST NC HIGHWAY 150 TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 12-30-09
Inspection of: Fill Fly Ash	**Technician:** Eli's Rojas	

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Shield on site to observe fill at Marshall Steam Station.

Shield observed fly ash fill. Dry crew was working with truck water.

Shield performed CBR. All test meets criteria.

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Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Eli's Rojas
Printed Name

Signature

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Project Name: Marshall	Shield No.:	Client No.:
Client Name: Duke Energy	Task No.:	Date: 12-30-09
Inspection of: Fill Fly Ash	Technician: Elis Rojas	

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One point was collect from Test # 163

Drive Tube/Nuclear Density Data

	170	171	172	173	174	175		
Test No.	~~163~~	~~164~~	~~165~~	~~166~~	~~167~~	~~168~~		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.27	4.20	4.18	4.22	4.20	4.19		
Wt. Mold	1.34	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	2.93	2.88	2.86	2.9	2.88	2.87		
Volume Mold	0.0332							
Wet Density	88.3	86.7	86.1	87.3	86.7	86.4		
Wt. Wet soil & Pan	471.3	471.4	475.7	470.8	474.7	476.4		
Wt. Dry soil & Pan	427.2	430.7	430.6	429.1	433.2	432.9		
Wt. Pan	243.9	244	243.9	244	243.9	244		
Moisture Lost	44.1	40.7	45.1	41.7	41.5	43.5		
Wt. Dry soil	183.3	186.7	186.7	185.1	189.3	188.9		
% Moisture	24.1	21.8	24.2	22.5	21.9	23		
Dry Density	71.2	71.2	69.3	71.3	71.1	70.2		
Maximum Dry Density	72.0							
Optimum Moisture	26.3							
% Compaction	98.9	98.9	96.3	99	98.8	97.5		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.16
Wt. Mold	9.30
Wt. Wet soil	2.86
Volume Mold	0.0331
Wet Density	86.4
Wt. Wet soil & Pan	475.7
Wt. Dry soil & Pan	435.7
Wt. Pan	243.9
Moisture Lost	40
Wt. Dry soil	191.8
% Moisture	20.9
Dry Density	71.5

Additional Project Data

MDD 72.0 at 26.3

Elis Rojas
Printed Name

Signature

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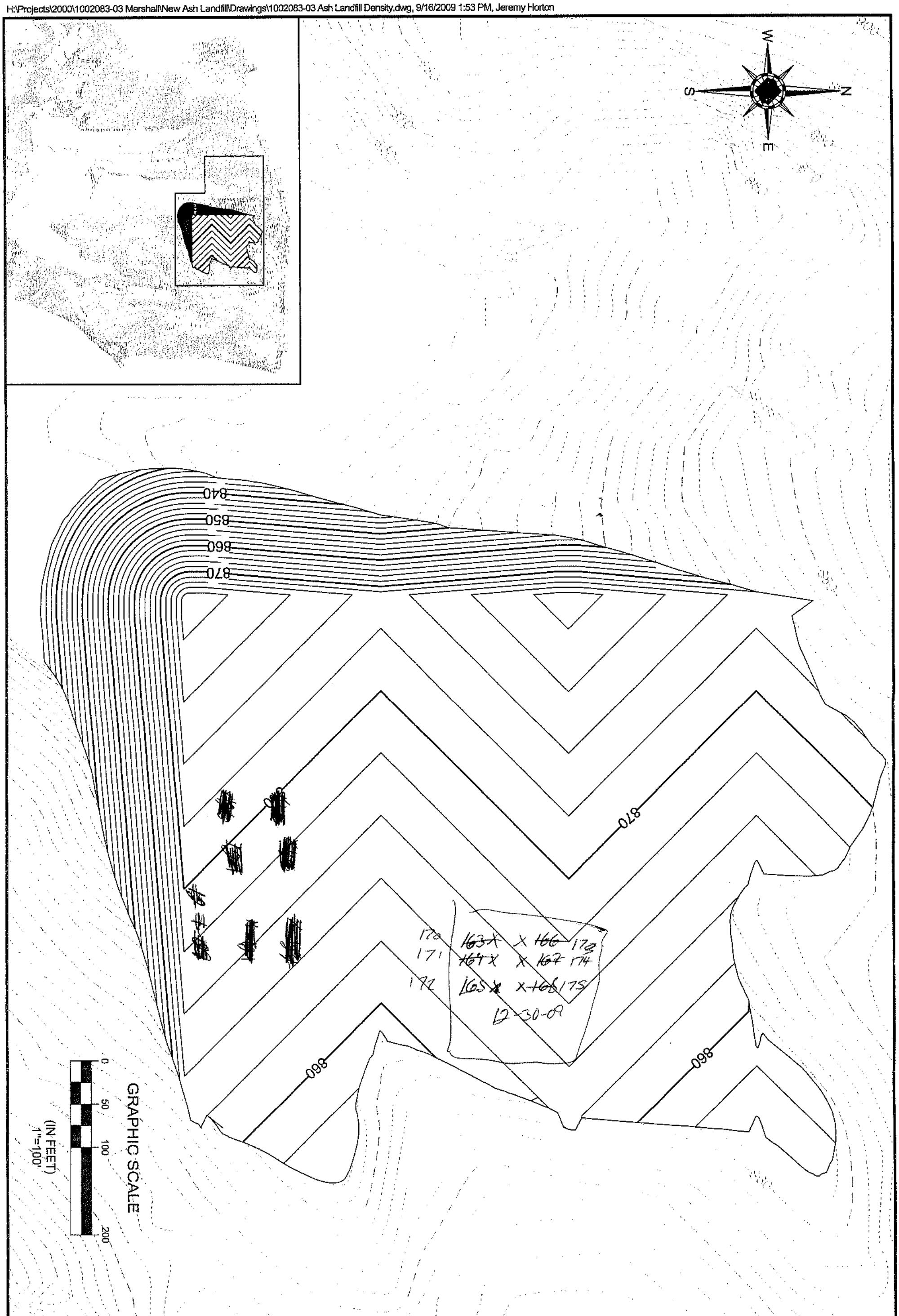

SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION, 8320 EAST NC HIGHWAY 150, TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
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LABORATORY CONFORMANCE TEST RESULTS

BAS-30 through BAS-31

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: 09-182
SOURCE MATERIAL: BAS-30 0.0 feet
SAMPLE DESCRIPTION:

USCS: ML AASHTO:

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 72.1
OPTIMUM MOISTURE CONTENT, (%): 31.2
NATURAL MOISTURE CONTENT, (%):

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

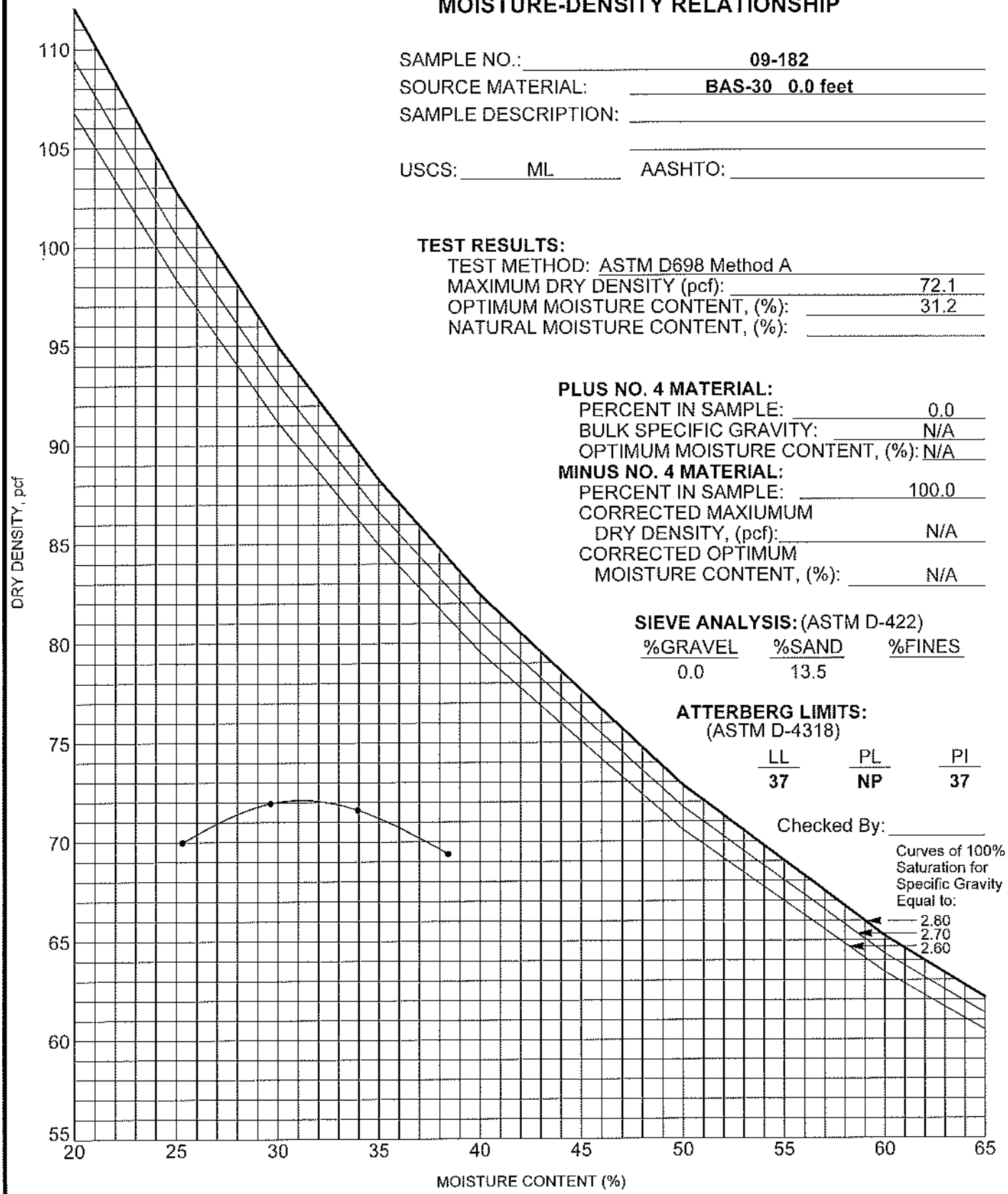
SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	13.5	

ATTERBERG LIMITS:
(ASTM D-4318)

LL	PL	PI
37	**NP**	**37**

Checked By:



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Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: 09-182
SOURCE MATERIAL: BAS-31 0.0 feet
SAMPLE DESCRIPTION:

USCS: ML AASHTO:

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 72.2
OPTIMUM MOISTURE CONTENT, (%): 33.9
NATURAL MOISTURE CONTENT, (%):

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

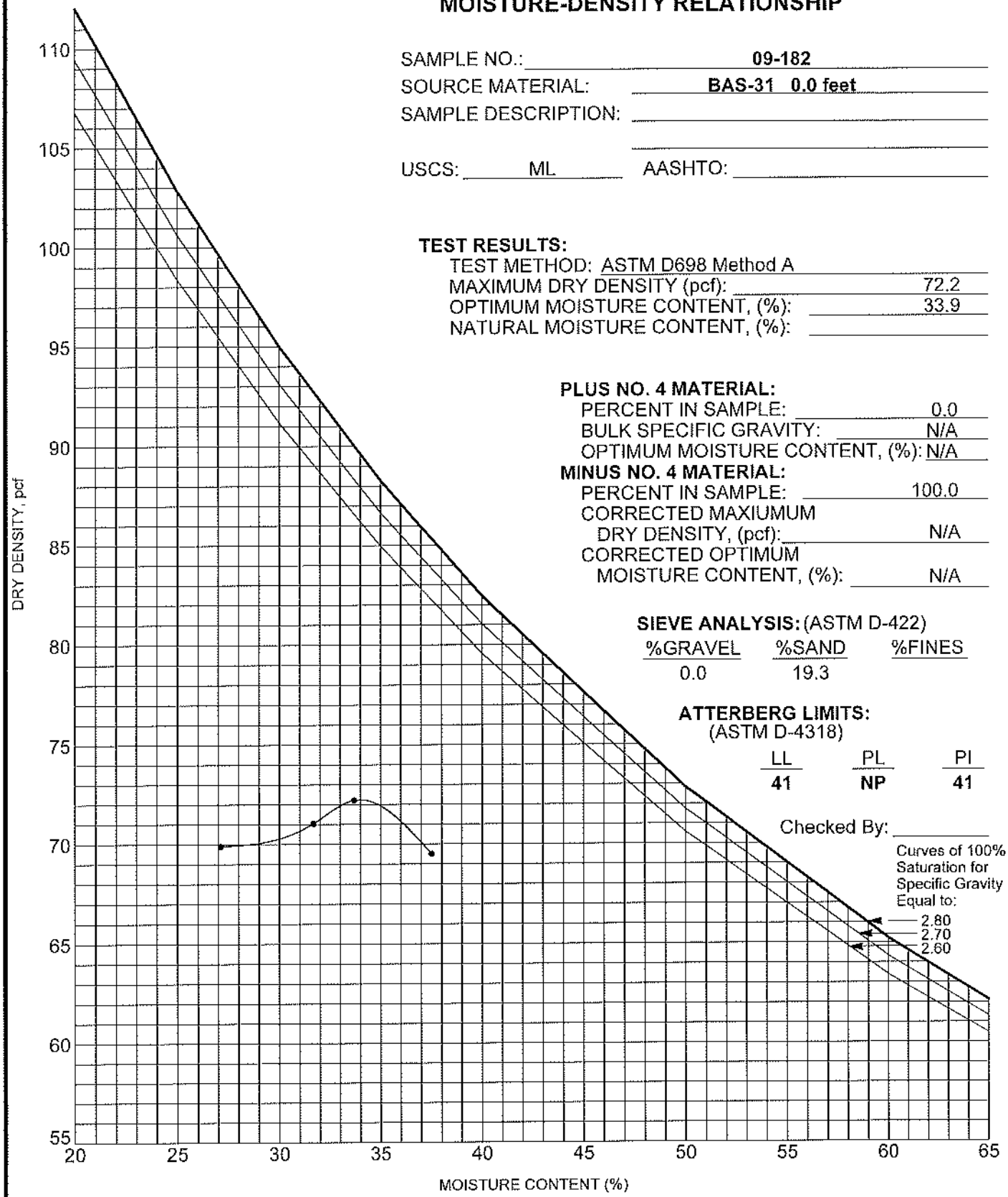
SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	19.3	

ATTERBERG LIMITS:
(ASTM D-4318)

LL	PL	PI
41	**NP**	**41**

Checked By:



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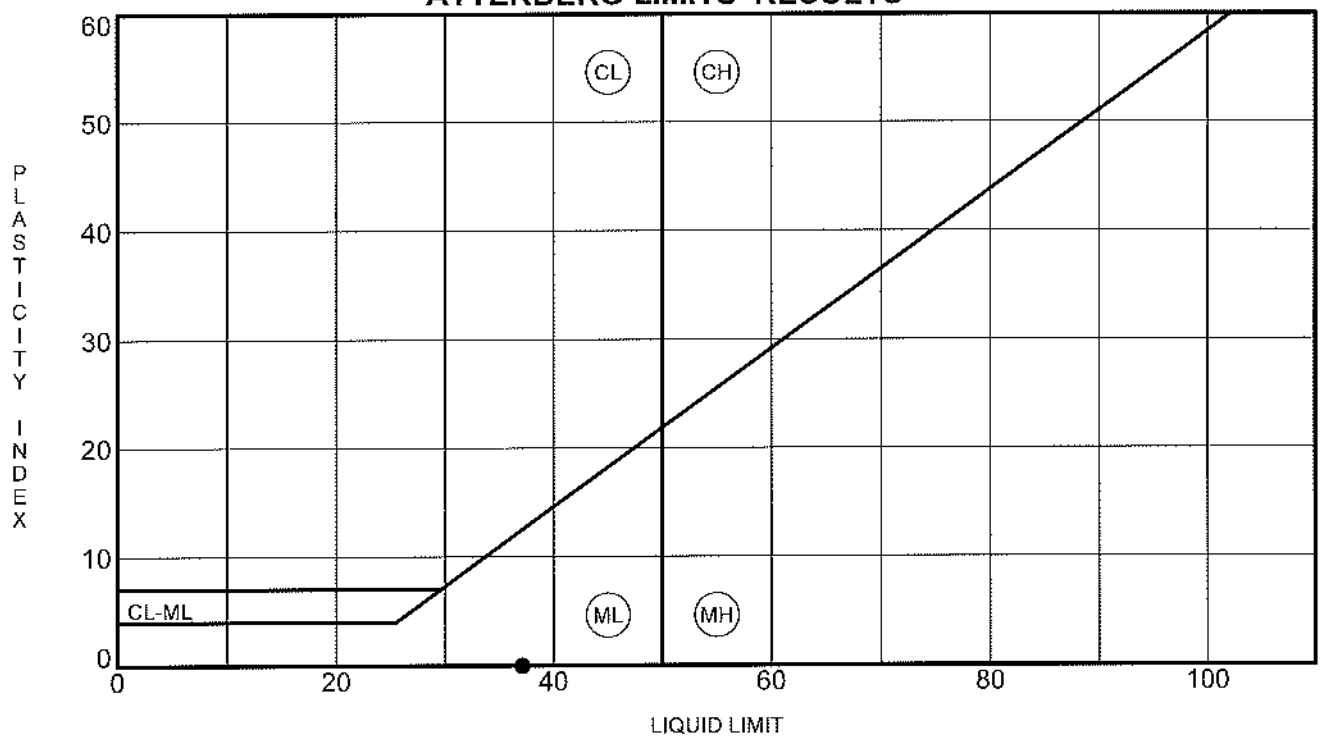
Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	BAS-30	0.0	37	NP	NP	86	SILT(ML)

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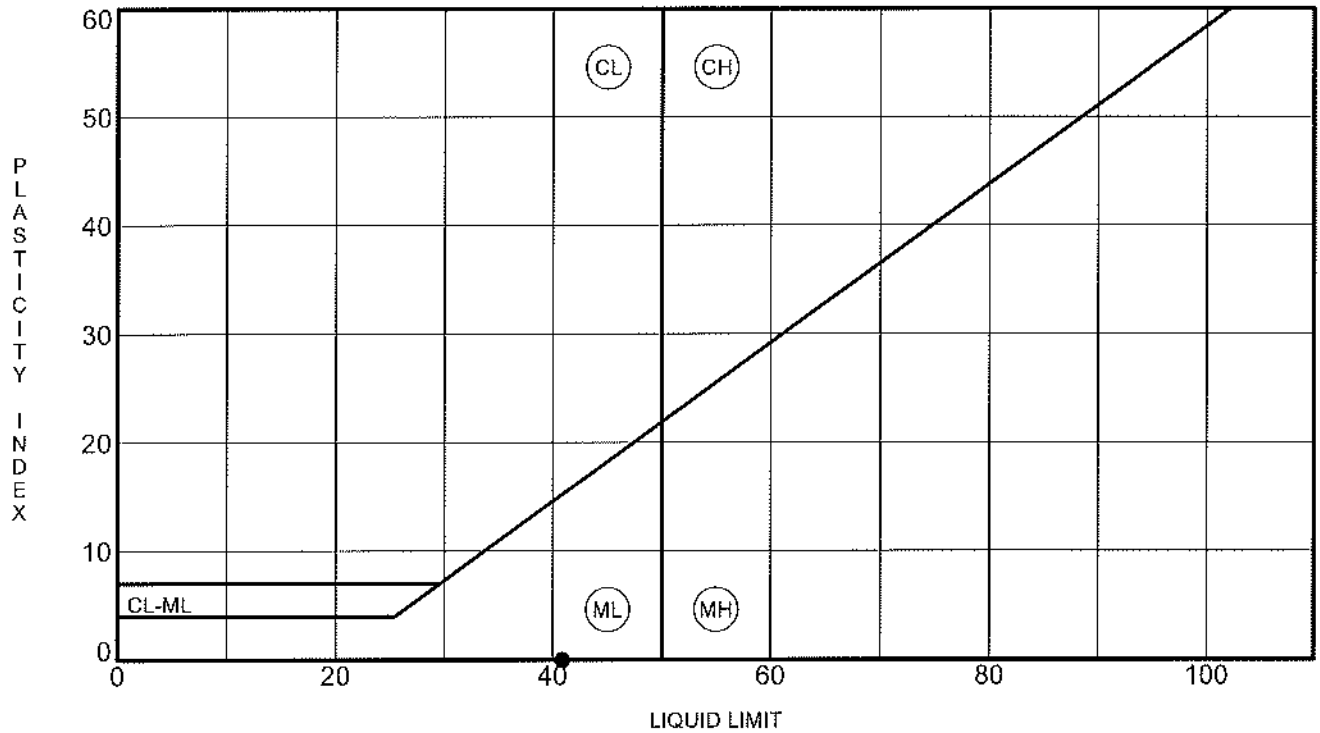
Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**BAS-31**	**0.0**	**41**	**NP**	**NP**	**81**	**SILT with SAND(ML)**

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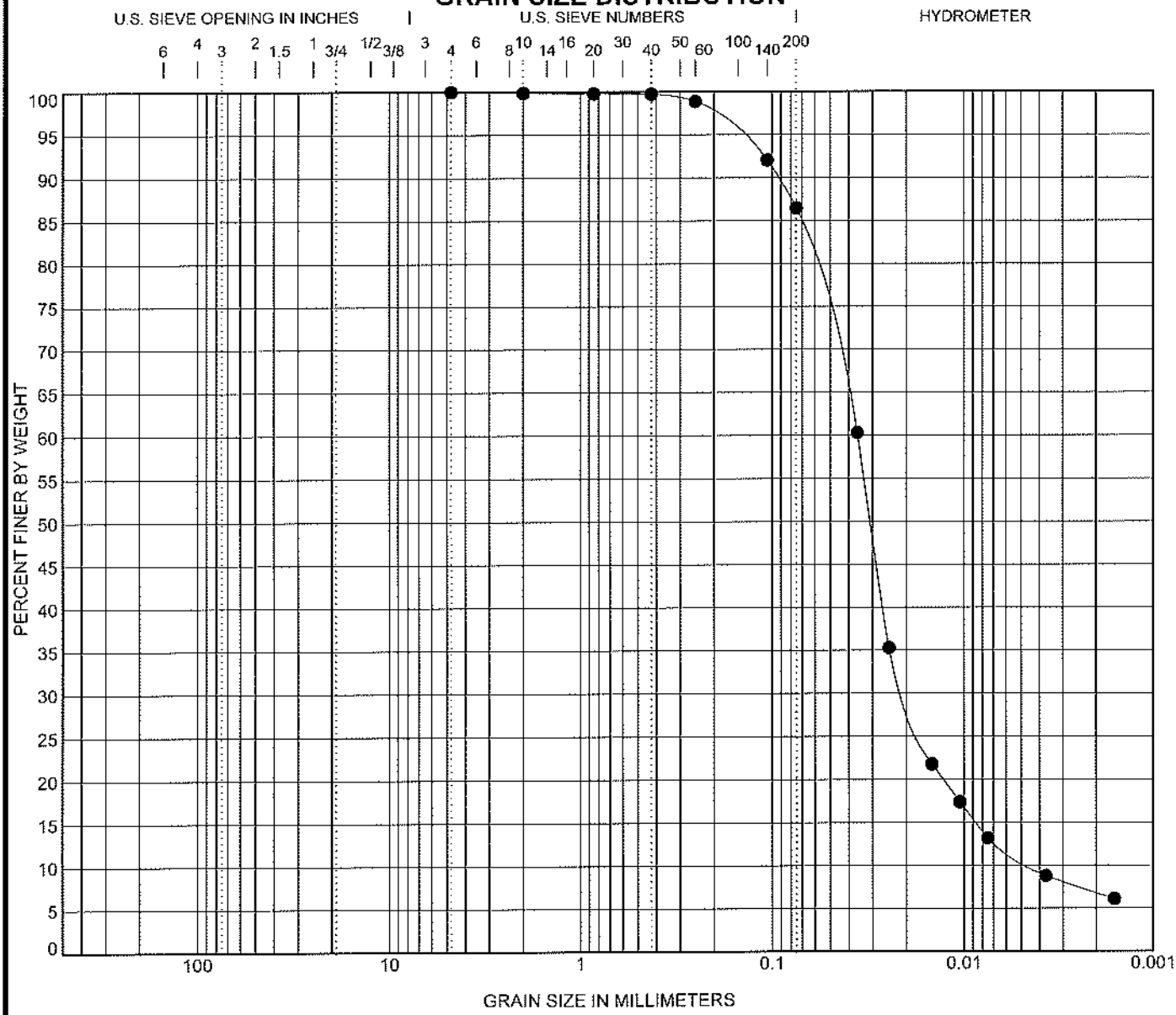
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-30**	**0.0**	**SILT(ML)**	**37**	**NP**	**NP**	**2.51**	**7.99**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-30**	**0.0**	**4.75**	**0.036**	**0.02**	**0.004**	**0.0**	**13.5**	**75.8**	**10.7**

SHIELD ENGINEERING, INC.
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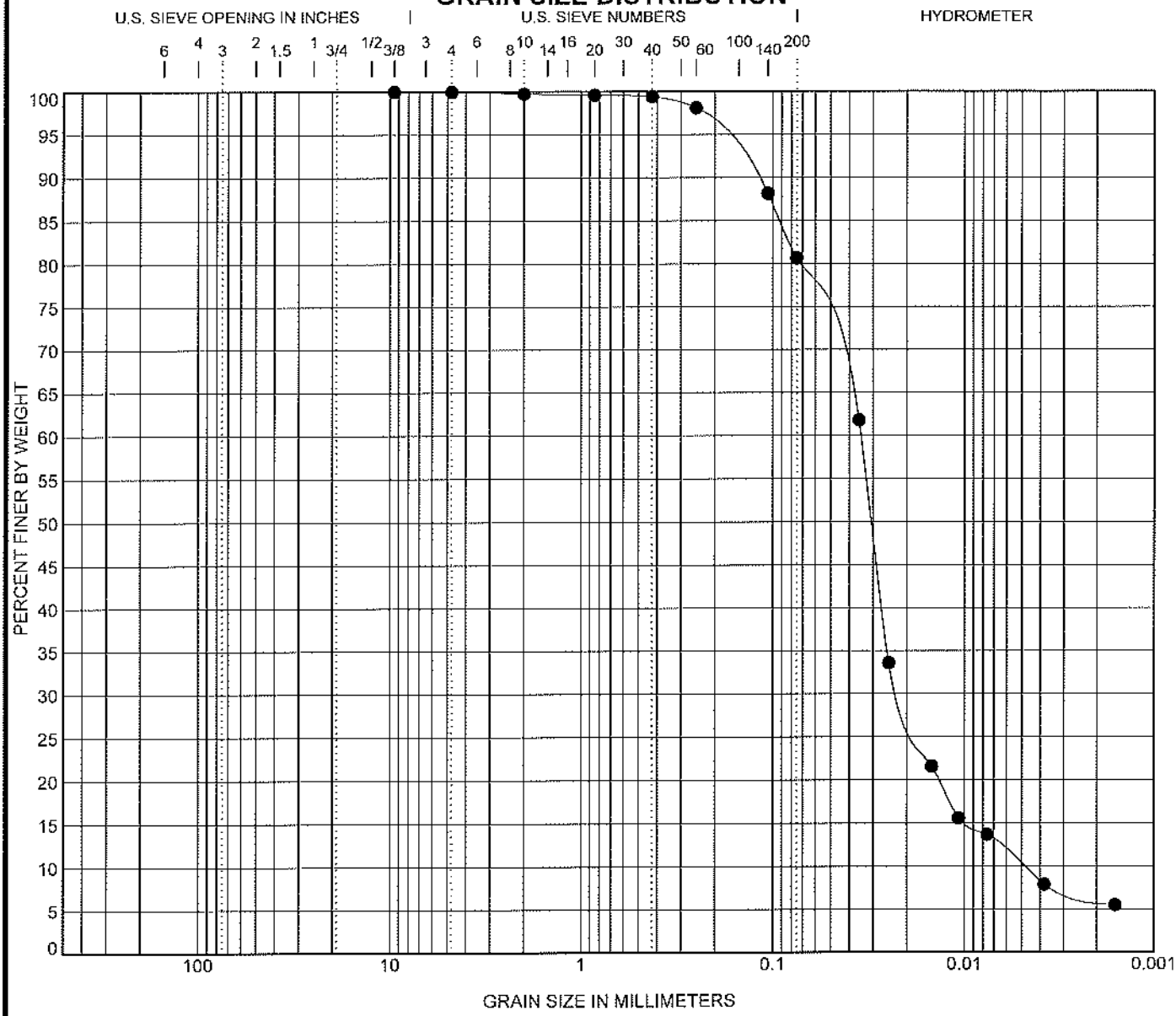
Toll Free: 800-395-5220
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-31**	**0.0**	**SILT with SAND(ML)**	**41**	**NP**	**NP**	**2.66**	**7.10**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-31**	**0.0**	**9.5**	**0.035**	**0.021**	**0.005**	**0.0**	**19.3**	**70.5**	**10.2**

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Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

SHIELD ENGINEERING, INC.

February 5, 2010

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 6 - Month of January 2010
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of January. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Janette Prosser /cet

Janette M. Prosser, P.E.
Senior Engineer

Keith A. Anthony

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\1002083-03 Marshall Ash Landfill 2010-01.doc

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Monthly Summary Report - No. 6

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	February 5, 2010	**Page:**	1 of 2
Report By:	Janette M. Prosser, P.E.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of January.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on January 6, 7, 8, 11, 13, 15, 19, 26, 27 and 29, 2010 to perform field density tests of the ash landfill material. During the January 11 visit, Shield technicians worked to re-establish the elevation of the fill and did not perform density tests due to frozen subgrade. Additionally, on January 26 and 27, new ash was not placed within the new Industrial Landfill #1, but within the Ash Structural Fill, Area 1C. Shield was unable to perform field density tests within the Ash Structural Fill, Area 1C due to inaccessibility of the entrance road. The in-place density tests labeled DT-176 to DT-217 were performed during this period. See Table 1 for preliminary results and locations.

Laboratory Conformance Test:

1. Conformance laboratory samples were not collected during this time period.

Summary:

The compaction results of these samples were in accordance with instructions provided by Duke Energy representatives. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
FLY ASH														
DT-1	08/18/09	See location plan	6	838.0	53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6	838.0	58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6	838.0	57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6	838.0	57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6	838.0	61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6	838.0	64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6	839.0	61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6	839.0	57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6	839.0	54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6	839.0	74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6	839.0	67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6	839.0	60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6	841.5	85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6	841.5	86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6	841.5	88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6	841.5	82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6	841.5	86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6	841.5	90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6	842.0	95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6	842.0	91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6	842.0	90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6	842.0	96.1	45.8	65.9	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6	842.0	91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6	842.0	87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6	842.5	91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6	842.5	86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6	842.5	84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6	842.5	85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6	842.5	84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6	842.5	85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6	842.5	83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6	842.5	84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6	842.5	88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6	842.5	87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6	842.5	87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6	842.5	91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6	843.0	86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6	843.0	85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6	843.0	82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6	843.0	80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6	843.0	88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6	843.0	84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6	843.5	82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6	843.5	82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6	843.5	79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6	843.5	84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6	843.5	93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6	843.5	96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

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SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-45R	09/15/09	See location plan	6	843.5	94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6	843.5	94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6	843.5	91.9	31.6	69.8	66.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6	843.5	94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6	844.5	94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6	844.5	93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6	844.5	94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6	844.5	93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6	844.5	92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6	844.5	93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6	844.5	88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6	844.5	95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6	844.5	93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6	844.5	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6	844.5	91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6	844.5	91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6	845.0	88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6	845.0	87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6	845.0	89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6	845.0	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6	845.0	93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6	845.0	93.7	29.5	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6	845.0	91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6	845.0	93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.9
DT-70	10/02/09	See location plan	6	845.0	91.9	30.6	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6	845.0	93.7	35.0	68.9	71.6	33.7	BAS-19	96.2	X		2.3
DT-72	10/02/09	See location plan	6	845.0	93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6	845.0	94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6	845.0	89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6	845.0	88.9	30.1	68.3	70.0	32.5	BAS-8	97.6	X		-2.4
DT-76	10/07/09	See location plan	6	845.0	92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6	845.0	95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6	845.0	94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6	845.0	90.1	26.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6	845.5	91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6	845.5	87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6	845.5	93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6	845.5	88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6	845.5	90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6	845.5	86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6	845.5	93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6	845.5	93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6	845.5	90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6	845.5	91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6	845.5	93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6	845.5	91.2	29.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6	845.5	93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6	845.5	88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6	845.5	92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6	845.5	92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

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SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
DT-96	10/23/09	See location plan	6	845.5	96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6	845.5	98.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4
DT-98	11/03/09	See location plan	6	847.0	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-99	11/03/09	See location plan	6	847.0	91.3	28.9	70.8	71.5	33.1	BAS-26	99.1	X		-4.2
DT-100	11/03/09	See location plan	6	847.0	94.9	32.6	71.6	71.5	33.1	BAS-26	100+	X		-0.5
DT-101	11/03/09	See location plan	6	847.0	97.3	35.5	71.8	71.5	33.1	BAS-26	100+	X		2.4
DT-102	11/03/09	See location plan	6	847.0	97.9	35.3	72.4	71.5	33.1	BAS-26	100+	X		2.2
DT-103	11/03/09	See location plan	6	847.0	96.1	31.9	72.9	71.5	33.1	BAS-26	100+	X		-1.2
DT-104	11/06/09	See location plan	6	847.5	92.8	31.1	70.8	74.0	32.2	BAS-25	95.7	X		-1.1
DT-105	11/06/09	See location plan	6	847.5	89.8	31.5	68.3	74.0	32.2	BAS-25	92.3		X	-0.7
DT-105R	11/06/09	See location plan	6	847.5	92.8	31.8	70.4	74.0	32.2	BAS-25	95.1	X		-0.4
DT-106	11/06/09	See location plan	6	847.5	94.3	28.2	73.6	74.0	32.2	BAS-25	99.4	X		-4.0
DT-107	11/06/09	See location plan	6	847.5	95.2	30.8	72.8	74.0	32.2	BAS-25	98.4	X		-1.4
DT-108	11/06/09	See location plan	6	847.5	97.6	30.9	74.6	74.0	32.2	BAS-25	100+	X		-1.3
DT-109	11/06/09	See location plan	6	847.5	94.6	30.6	72.4	74.0	32.2	BAS-25	97.9	X		-1.6
DT-110	11/17/09	See location plan	6	845.5	88.0	29.9	67.7	70.2	28.3	BAS-11	96.5	X		1.6
DT-111	11/17/09	See location plan	6	845.5	89.8	28.7	69.8	70.2	28.3	BAS-11	99.4	X		0.4
DT-112	11/17/09	See location plan	6	845.5	91.3	26.1	72.4	72.0	26.3	BAS-14	100+	X		-0.2
DT-113	11/17/09	See location plan	6	845.5	91.9	26.9	72.4	72.0	26.3	BAS-14	100+	X		0.6
DT-114	11/17/09	See location plan	6	845.5	89.2	27.1	70.2	72.0	26.3	BAS-14	97.5	X		0.8
DT-115	11/17/09	See location plan	6	845.5	88.0	26.1	69.8	72.0	26.3	BAS-14	96.9	X		-0.2
DT-116	11/20/09	See location plan	6	845.5	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-117	11/20/09	See location plan	6	845.5	90.4	30.8	69.1	71.5	33.1	BAS-26	96.7	X		-2.3
DT-118	11/20/09	See location plan	6	845.5	90.7	32.3	68.6	71.5	33.1	BAS-26	95.9	X		-0.8
DT-119	11/20/09	See location plan	6	845.5	91.9	31.0	70.2	71.5	33.1	BAS-26	98.1	X		-2.1
DT-120	11/20/09	See location plan	6	845.5	95.8	31.2	73.0	71.5	33.1	BAS-26	100+	X		-1.9
DT-121	11/20/09	See location plan	6	845.5	89.2	30.7	68.2	71.5	33.1	BAS-26	95.5	X		-2.4
DT-122	11/25/09	See location plan	6	845.5	94.9	28.9	73.6	76.3	30.7	BAS-24	96.5	X		-1.8
DT-123	11/25/09	See location plan	6	845.5	96.4	32.2	72.9	76.3	30.7	BAS-24	95.6	X		1.5
DT-124	11/25/09	See location plan	6	845.5	95.8	31.2	73.0	76.3	30.7	BAS-24	95.7	X		0.5
DT-125	11/25/09	See location plan	6	845.5	94.1	27.9	73.6	76.3	30.7	BAS-24	96.4	X		-2.8
DT-126	11/25/09	See location plan	6	845.5	92.8	27.5	72.8	76.3	30.7	BAS-24	95.4	X		-3.2
DT-127	11/25/09	See location plan	6	845.5	97.0	30.7	74.2	76.3	30.7	BAS-24	97.3	X		0.0
DT-128	12/02/09	See location plan	6	846.5	84.3	26.5	66.6	70.2	28.3	BAS-11	94.9		X	-1.8
DT-129	12/02/09	See location plan	6	846.5	85.8	27.2	67.5	70.2	28.3	BAS-11	96.1	X		-1.1
DT-130	12/02/09	See location plan	6	846.5	90.4	26.5	71.5	70.2	28.3	BAS-11	100+	X		-1.8
DT-131	12/02/09	See location plan	6	846.5	91.0	28.1	71.0	70.2	28.3	BAS-11	100+	X		-0.2
DT-132	12/02/09	See location plan	6	846.5	89.5	30.0	68.8	70.2	28.3	BAS-11	98.1	X		1.7
DT-133	12/02/09	See location plan	6	846.5	88.6	27.2	69.7	70.2	28.3	BAS-11	99.2	X		-1.1
DT-134	12/07/09	See location plan	6	848.0	88.9	27.4	69.8	70.2	28.3	BAS-11	99.4	X		-0.9
DT-135	12/07/09	See location plan	6	848.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-136	12/07/09	See location plan	6	848.0	86.4	26.4	68.4	70.2	28.3	BAS-11	97.4	X		-1.9
DT-137	12/07/09	See location plan	6	848.0	84.9	25.1	67.9	70.2	28.3	BAS-11	96.7	X		-3.2
DT-138	12/07/09	See location plan	6	848.0	86.7	28.6	67.4	70.2	28.3	BAS-11	96.0	X		0.3
DT-139	12/07/09	See location plan	6	848.0	88.9	29.2	68.8	70.2	28.3	BAS-11	98.0	X		0.9
DT-140	12/16/09	See location plan	6	845.5	83.1	25.9	66.0	67.0	24.0	BAS-7	98.5	X		1.9
DT-141	12/16/09	See location plan	6	845.5	84.3	24.5	67.7	67.0	24.0	BAS-7	100+	X		0.5
DT-142	12/16/09	See location plan	6	845.5	80.4	24.9	64.4	67.0	24.0	BAS-7	96.1	X		0.9
DT-143	12/16/09	See location plan	6	845.5	81.3	26.1	64.5	67.0	24.0	BAS-7	96.2	X		2.1
DT-144	12/16/09	See location plan	6	845.5	84.0	25.6	66.9	67.0	24.0	BAS-7	99.8	X		1.6
DT-145	12/16/09	See location plan	6	845.5	86.7	26.0	68.8	67.0	24.0	BAS-7	100+	X		2.0

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

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SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-146	12/21/09	See location plan	6	849.0	94.3	32.6	71.1	71.6	33.7	BAS-19	99.3	X		-1.1
DT-147	12/21/09	See location plan	6	849.0	94.0	33.6	70.4	71.6	33.7	BAS-19	98.3	X		-0.1
DT-148	12/21/09	See location plan	6	849.0	97.0	34.0	72.4	71.6	33.7	BAS-19	100+	X		0.3
DT-149	12/21/09	See location plan	6	849.0	95.8	34.2	71.4	71.6	33.7	BAS-19	99.7	X		0.5
DT-150	12/21/09	See location plan	6	849.0	93.7	34.1	69.9	71.6	33.7	BAS-19	97.6	X		0.4
DT-151	12/21/09	See location plan	6	849.0	94.9	31.0	72.4	71.6	33.7	BAS-19	100+	X		-2.7
DT-152	12/23/09	See location plan	6	850.0	86.4	26.7	68.2	70.2	28.3	BAS-11	97.1	X		-1.6
DT-153	12/23/09	See location plan	6	850.0	88.3	25.6	70.3	70.2	28.3	BAS-11	100+	X		-2.7
DT-154	12/23/09	See location plan	6	850.0	85.2	26.4	67.4	70.2	28.3	BAS-11	96.0	X		-1.9
DT-155	12/23/09	See location plan	6	850.0	85.8	28.6	66.7	70.2	28.3	BAS-11	95.0	X		0.3
DT-156	12/23/09	See location plan	6	850.0	87.3	27.6	68.4	70.2	28.3	BAS-11	97.5	X		-0.7
DT-157	12/23/09	See location plan	6	850.0	86.4	29.5	66.7	70.2	28.3	BAS-11	95.0	X		1.2
DT-158	12/28/09	See location plan	6	851.5	88.0	33.7	65.8	70.0	32.5	BAS-11	94.0		X	1.2
DT-159	12/28/09	See location plan	6	851.5	91.3	34.8	67.7	70.0	32.5	BAS-11	96.8	X		2.3
DT-160	12/28/09	See location plan	6	851.5	92.8	32.0	70.3	70.0	32.5	BAS-11	100+	X		-0.5
DT-161	12/28/09	See location plan	6	851.5	91.0	32.8	68.5	70.0	32.5	BAS-11	97.9	X		0.3
DT-162	12/28/09	See location plan	6	851.5	90.1	31.7	68.4	70.0	32.5	BAS-11	97.7	X		-0.8
DT-163	12/28/09	See location plan	6	851.5	91.5	33.2	68.8	70.0	32.5	BAS-11	98.2	X		0.7
DT-164	12/29/09	See location plan	6	852.5	97.6	32.3	73.8	76.3	30.7	BAS-24	96.7	X		1.6
DT-165	12/29/09	See location plan	6	852.5	95.8	26.0	76.0	76.3	30.7	BAS-24	99.6	X		-4.7
DT-166	12/29/09	See location plan	6	852.5	96.1	27.3	75.5	76.3	30.7	BAS-24	98.9	X		-3.4
DT-167	12/29/09	See location plan	6	852.5	97.9	27.3	76.9	76.3	30.7	BAS-24	100+	X		-3.4
DT-168	12/29/09	See location plan	6	852.5	98.8	25.8	78.5	76.3	30.7	BAS-24	100+	X		-4.9
DT-168R	12/29/09	See location plan	6	852.5	96.1	27.0	75.7	76.3	30.7	BAS-24	99.2	X		-3.7
DT-169	12/29/09	See location plan	6	852.5	96.4	26.9	76.0	76.3	30.7	BAS-24	99.6	X		-3.8
DT-170	12/30/09	See location plan	6	853.0	88.3	24.1	71.2	72.0	26.3	BAS-14	98.8	X		-2.2
DT-171	12/30/09	See location plan	6	853.0	86.7	21.8	71.2	72.0	26.3	BAS-14	98.9	X		-4.5
DT-172	12/30/09	See location plan	6	853.0	86.1	24.2	69.3	72.0	26.3	BAS-14	96.3	X		-2.1
DT-173	12/30/09	See location plan	6	853.0	87.3	22.5	71.3	72.0	26.3	BAS-14	99.0	X		-3.8
DT-174	12/30/09	See location plan	6	853.0	86.7	21.9	71.1	72.0	26.3	BAS-14	98.8	X		-4.4
DT-175	12/30/09	See location plan	6	853.0	86.4	23.0	70.2	72.0	26.3	BAS-14	97.6	X		-3.3
DT-176	01/06/10	See location plan	6	855.0	87.0	29.1	67.4	67.9	28.5	BAS-12	99.2	X		0.6
DT-177	01/06/10	See location plan	6	855.0	86.1	32.6	64.9	67.9	28.5	BAS-12	95.6	X		4.1
DT-178	01/06/10	See location plan	6	855.0	86.1	25.1	68.8	67.9	28.5	BAS-12	100+	X		-3.4
DT-179	01/06/10	See location plan	6	855.0	85.8	29.3	66.4	67.9	28.5	BAS-12	97.7	X		0.8
DT-180	01/06/10	See location plan	6	855.0	87.3	27.5	68.5	67.9	28.5	BAS-12	100+	X		-1.0
DT-181	01/06/10	See location plan	6	855.0	86.7	26.7	68.4	67.9	28.5	BAS-12	100+	X		-1.8
DT-182	01/07/10	See location plan	6	856.0	89.5	30.7	68.5	67.9	28.5	BAS-12	100+	X		2.2
DT-183	01/07/10	See location plan	6	856.0	85.8	30.1	65.9	67.9	28.5	BAS-12	97.1	X		1.6
DT-184	01/07/10	See location plan	6	856.0	86.1	27.8	67.4	67.9	28.5	BAS-12	99.2	X		-0.7
DT-185	01/07/10	See location plan	6	856.0	86.7	29.6	66.9	67.9	28.5	BAS-12	98.5	X		1.1
DT-186	01/07/10	See location plan	6	856.0	82.5	26.1	65.4	67.9	28.5	BAS-12	96.4	X		-2.4
DT-187	01/07/10	See location plan	6	856.0	83.1	22.9	67.6	67.9	28.5	BAS-12	99.6	X		-5.6
DT-188	01/08/10	See location plan	6	858.5	95.2	34.7	70.7	72.2	33.9	BAS-31	97.9	X		0.8
DT-189	01/08/10	See location plan	6	858.5	95.8	31.6	72.8	72.2	33.9	BAS-31	100+	X		-2.3
DT-190	01/08/10	See location plan	6	858.5	94.6	35.1	70.0	72.2	33.9	BAS-31	97.0	X		1.2
DT-191	01/08/10	See location plan	6	858.5	95.2	33.3	71.4	72.2	33.9	BAS-31	98.9	X		-0.6
DT-192	01/08/10	See location plan	6	858.5	94.3	32.7	71.1	72.2	33.9	BAS-31	98.4	X		-1.2
DT-193	01/08/10	See location plan	6	858.5	94.6	36.8	69.2	72.2	33.9	BAS-31	95.8	X		2.9
DT-194	01/13/10	See location plan	6	860.0	85.5	29.2	66.2	70.2	28.3	BAS-11	94.3		X	0.9
DT-195	01/13/10	See location plan	6	860.0	85.2	25.2	68.1	70.2	28.3	BAS-11	96.9	X		-3.1

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
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DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

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MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
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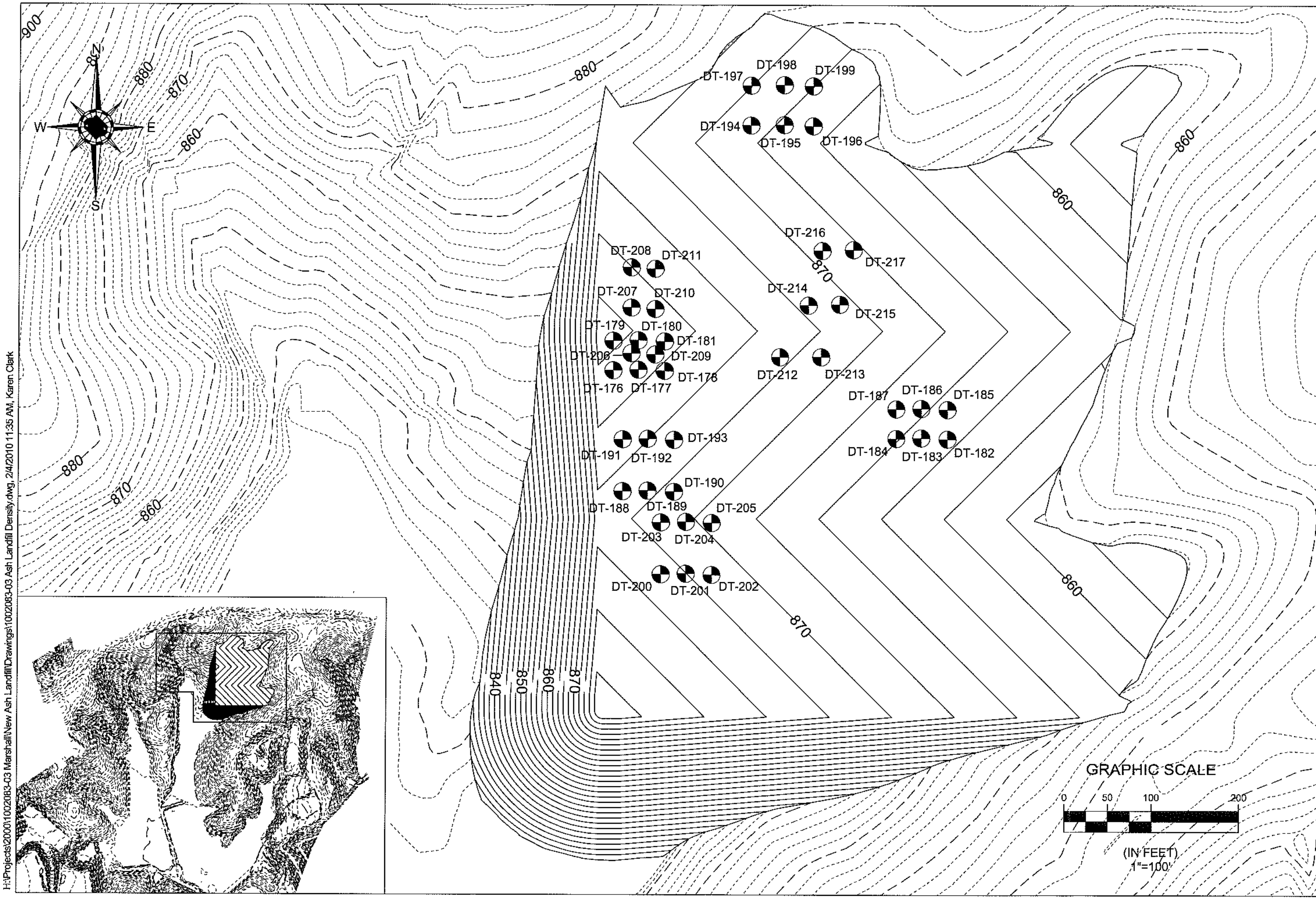
TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
DT-196	01/13/10	See location plan	6	860.0	85.2	27.0	67.1	70.2	28.3	BAS-11	95.6	X		-1.3
DT-197	01/13/10	See location plan	6	860.0	86.7	27.3	68.1	70.2	28.3	BAS-11	97.0	X		-1.0
DT-198	01/13/10	See location plan	6	860.0	86.7	25.1	69.3	70.2	28.3	BAS-11	98.7	X		-3.2
DT-199	01/13/10	See location plan	6	860.0	86.1	27.5	67.5	70.2	28.3	BAS-11	96.2	X		-0.8
DT-200	01/15/10	See location plan	6	868.5	86.1	24.5	69.2	70.2	28.3	BAS-11	98.5	X		-3.8
DT-201	01/15/10	See location plan	6	868.5	87.7	25.6	69.8	70.2	28.3	BAS-11	99.5	X		-2.7
DT-202	01/15/10	See location plan	6	868.5	87.3	26.8	68.8	70.2	28.3	BAS-11	98.1	X		-1.5
DT-203	01/15/10	See location plan	6	868.5	86.4	25.0	69.1	70.2	28.3	BAS-11	98.5	X		-3.3
DT-204	01/15/10	See location plan	6	868.5	86.7	25.8	68.9	70.2	28.3	BAS-11	98.2	X		-2.5
DT-205	01/15/10	See location plan	6	868.5	87.0	24.3	70.0	70.2	28.3	BAS-11	99.7	X		-4.0
DT-206	01/19/10	See location plan	6	871.5	93.4	31.0	71.3	71.5	33.1	BAS-26	99.7	X		-2.1
DT-207	01/19/10	See location plan	6	871.5	94.0	32.2	71.1	71.5	33.1	BAS-26	99.4	X		-0.9
DT-208	01/19/10	See location plan	6	871.5	92.8	32.6	70.0	71.5	33.1	BAS-26	97.9	X		-0.5
DT-209	01/19/10	See location plan	6	871.5	93.4	32.3	70.6	71.5	33.1	BAS-26	98.7	X		-0.8
DT-210	01/19/10	See location plan	6	871.5	94.3	35.2	69.7	71.5	33.1	BAS-26	97.6	X		2.1
DT-211	01/19/10	See location plan	6	871.5	94.3	33.5	70.6	71.5	33.1	BAS-26	98.8	X		0.4
DT-212	01/29/10	See location plan	6	861.0	94.6	31.5	71.9	74.6	30.9	BAS-29	96.4	X		0.6
DT-213	01/29/10	See location plan	6	861.0	95.2	31.4	72.5	74.6	30.9	BAS-29	97.1	X		0.5
DT-214	01/29/10	See location plan	6	861.0	95.5	29.4	73.8	74.6	30.9	BAS-29	98.9	X		-1.5
DT-215	01/29/10	See location plan	6	861.0	95.2	29.6	73.5	74.6	30.9	BAS-29	98.5	X		-1.3
DT-216	01/29/10	See location plan	6	861.0	95.8	31.2	73.0	74.6	30.9	BAS-29	97.9	X		0.3
DT-217	01/29/10	See location plan	6	861.0	96.1	30.4	73.7	74.6	30.9	BAS-29	98.8	X		-0.5

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum morsture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope



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PROJECT NAME:
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8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density
DRAWN BY: KJC
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: 02/03/10

SHEET TITLE:

DENSITY TEST
LOCATION PLAN
JANUARY 2010

SHEET:
1

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL Steam station	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 1-06-2010
Inspection of: Fill Fly Ash	**Technician:** Elis Pejas	

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THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION

Shield on site to observed Fill at Marshall Steam Station.

Shield performed 6 test. All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Pejas
Printed Name

Signature

f:\doc\forms\daily report.doc

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAJ SHALL	Shield No.:	Client No.: 10	
Client Name: Duke Power	Task No.:	Date: 1-6-~~20~~	
Inspection of: Fill Fly Ash	Technician: Elis Rojas	1-6-2010	

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Drive Tube\Nuclear Density Data	DT-176	177	178	179	180	181		
Test No.	~~169~~	~~170~~ 170	~~171~~	~~172~~	~~173~~	~~174~~		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.21	4.18	4.18	4.16	4.22	4.20		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	2.89	2.86	2.86	2.84	2.9	2.88		
Volume Mold	0.0332							
Wet Density 87.0	87	86.1	86.1	85.5	87.3	86.7		
Wt. Wet soil & Pan 471	~~426~~	471.6	476.9	480.3	475.4	474.6		
Wt. Dry soil & Pan	419.5	415.4	429.8	426.7	425.1	425.9		
Wt. Pan	242.5	243.2	242.5	243.2	242.5	243.2		
Moisture Lost	51.5	56.2	47.1	53.6	50.3	48.7		
Wt. Dry soil	177	172.2	187.3	183.5	182.6	182.7		
% Moisture	29.1	32.6	25.1	29.3	27.5	26.7		
Dry Density	67.4	64.9	68.8	66.1	68.5	66.4		
Maximum Dry Density	67.9							
Optimum Moisture	28.5							
% Compaction	99.3	95.6	101.3	97.4 97.3	100.9	100.9 100.7		
Meets Criteria (Y\N)	Y							

1 Point Proctor Data	
Wt. Wet Soil & Mold	12.45
Wt. Mold	9.30
Wt. Wet soil	3.15
Volume Mold	0.0331
Wet Density	94.9
Wt. Wet soil & Pan	476.6
Wt. Dry soil & Pan	418.6
Wt. Pan	242.5
Moisture Lost	58
Wt. Dry soil	176.1
% Moisture	32.9
Dry Density	71.2

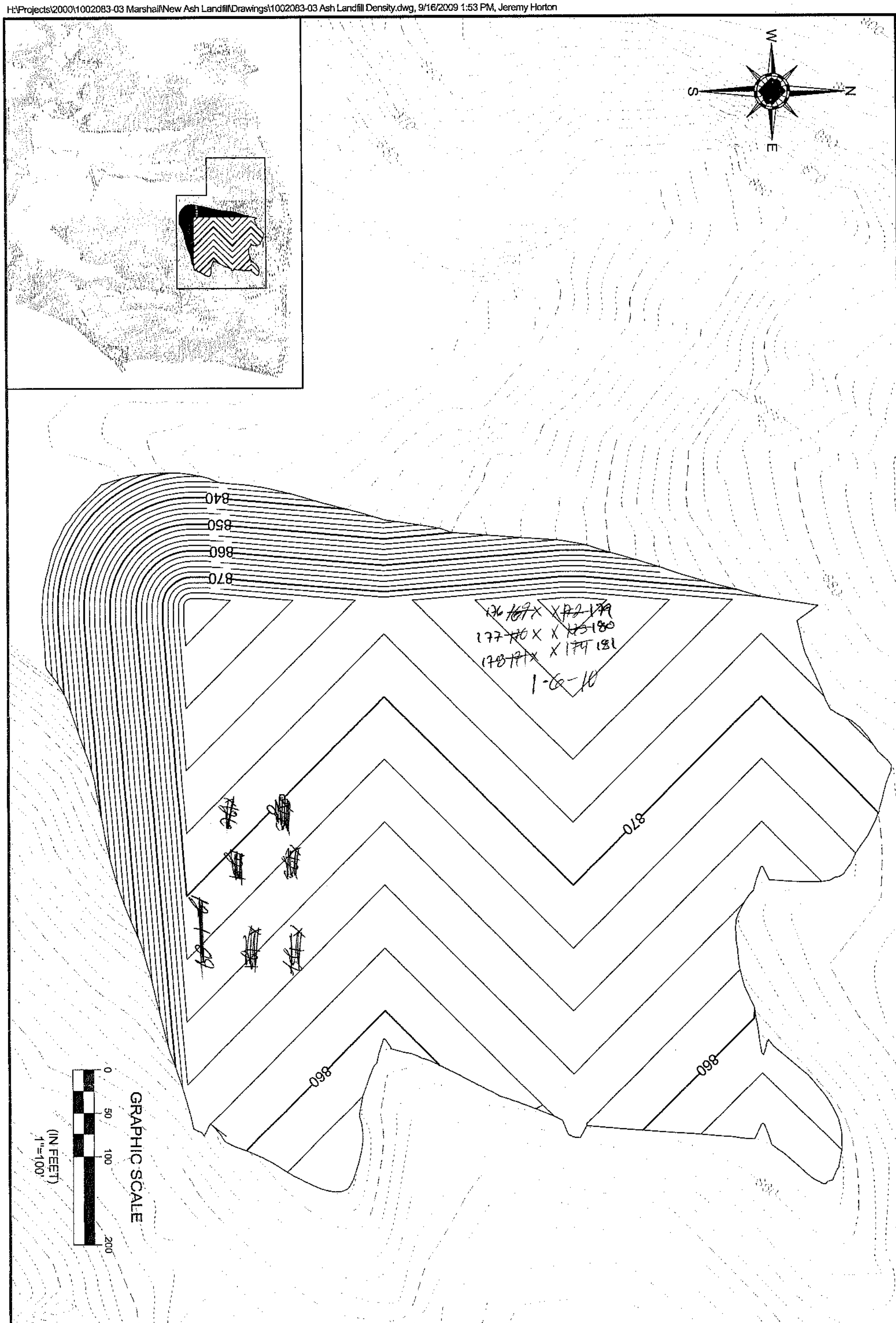
Additional Project Data

67.9 at 28.5
66.6 at 30.2
~~70.8~~ ~~32.5~~
BAS-12

Elis Rojas
Printed Name

Signature

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 9/16/2009 1:53 PM, Jeremy Horton



SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION 8320 EAST NC HIGHWAY 150 TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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www.shieldengineering.com

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAR SHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 1-7-~~09~~ 10
Inspection of: Fill Fly Ash	**Technician:** Eli Rojas	

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Shield on site to observed Fill Fly Ash at Mar Shall Steam Station.

Shield performed 6 test. Test #~~198~~ 185 Failed. Shield performed another test. Test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Eli S Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAX SHALL Steam Station		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 1-7-10
Inspection of: Fill Fly Ash		Technician: Elis Pegas	

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Old Point was collect from Bl # 175 182 185

NOT REQUIRED DUE TO % HIGH

Drive Tube/Nuclear Density Data	182	183	184	185	186	187	185R Retest
Test No.	175	176	177	178	179	180	178
Grade or Elevation							
Location							
Wt. Wet Soil & Mold	4.29	4.17	4.18	4.33	4.06	4.08	4.20
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32	1.32
Wt. Wet soil	2.97	2.85	2.86	3.01	2.74	2.76	2.88
Volume Mold	0.0332						
Wet Density	89.5	85.8	86.1	90.7	82.5	83.1	86.7
Wt. Wet soil & Pan	482.3	480.1	481.6	488.6	473	477.3	468.8
Wt. Dry soil & Pan	426.2	425.4	429.8	432.6	425.5	433.8	417.3
Wt. Pan	243.2	243.5	243.2	243.5	243.2	243.5	243.5
Moisture Lost	56.1	54.7	51.8	56	47.5	43.5	51.5
Wt. Dry soil	183	181.9	186.6	189.1	182.3	190.3	173.8
% Moisture	30.7	30.1	27.8	29.6	26.1	22.8	29.6
Dry Density	68.5	65.9	67.4	70	65.4	67.6	66.9
Maximum Dry Density		66.0			65.4	67.7	
Optimum Moisture							
% Compaction	100.9	97.7	99.3	103.1	96.3	99.6	98.5
Meets Criteria (Y\N)							

1 Point Proctor Data	
Wt. Wet Soil & Mold	4.21
Wt. Mold	1.30
Wt. Wet soil	2.91
Volume Mold	0.0331
Wet Density	87.9
Wt. Wet soil & Pan	483.1
Wt. Dry soil & Pan	432.3
Wt. Pan	243.2
Moisture Lost	50.8
Wt. Dry soil	189.1
% Moisture 26.7	26.7
Dry Density	69.4

Additional Project Data

67.9 at 28.5

Elis Pegas
Printed Name

Signature

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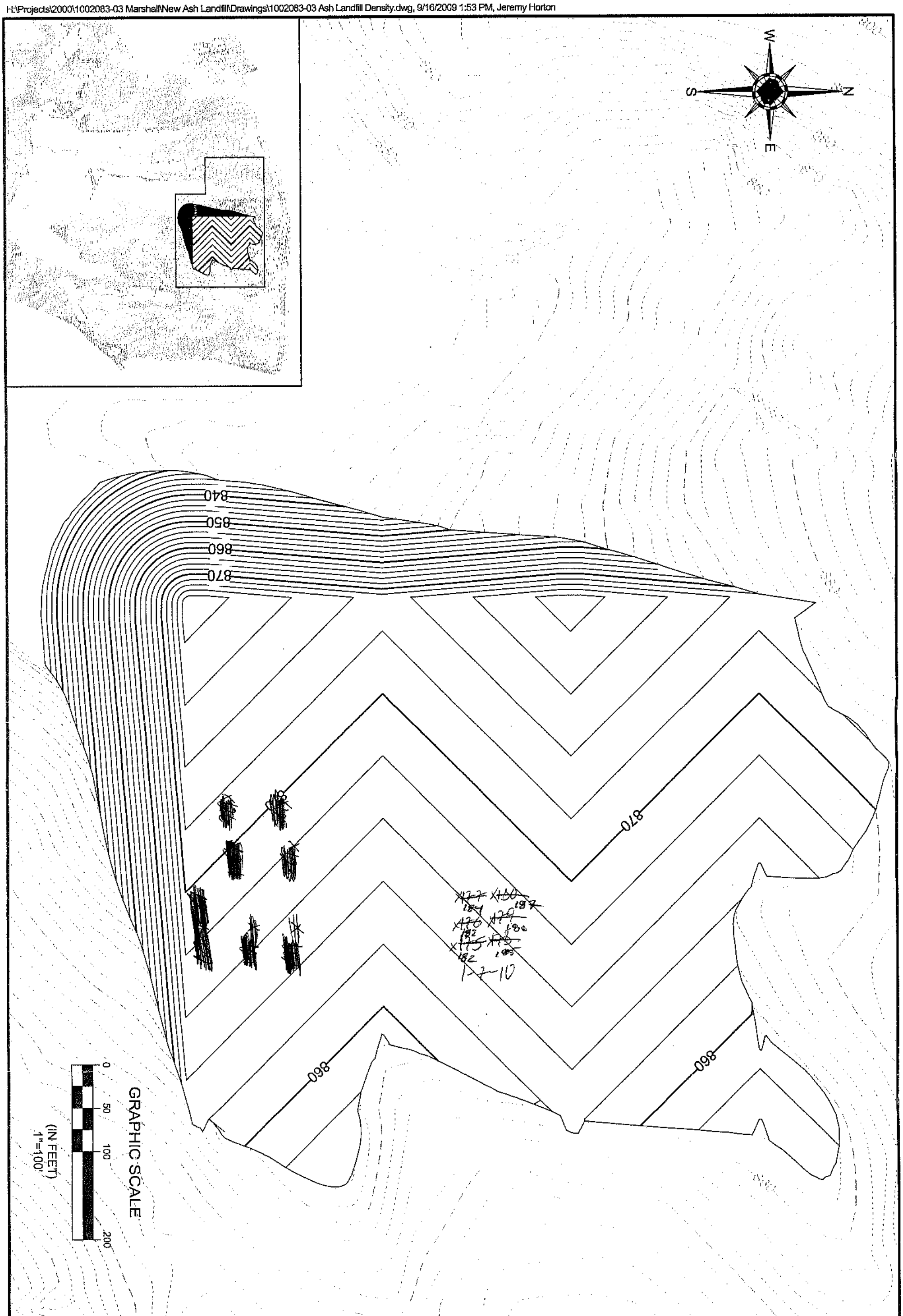

SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION, 8320 EAST NC HIGHWAY 150, TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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www.shieldengineering.com

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 1-8-10
Inspection of: FILL FLY ASH	**Technician:** ELIS PEJAS	

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Shield on site to observed fill at MARSHALL Steam Station.

Shield observed THAT FLY ASH WAS Frozen.

Shield performed a test. All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS PEJAS
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 1-8-2010
Inspection of: Fill Fly Ash		Technician:	

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One point was collect from test # ~~181~~ 188

Drive Tube/Nuclear Density Data	188	189	190	191	192	193		
Test No.	~~181~~	~~182~~	~~183~~	~~184~~	~~185~~	~~186~~		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.48	4.50	4.46	4.48	4.45	4.46		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	3.16	3.18	3.14	3.16	3.13	3.14		
Volume Mold	0.0332							
Wet Density	95.2	95.8	94.6	95.2	94.3	94.6		
Wt. Wet soil & Pan	490.6	491.5	481.5	490.6	470.5	476.1		
Wt. Dry soil & Pan	426.9	431.9	419.5	428.8	414.5	413.5		
Wt. Pan	243.1	243.3	243.1	243.3	243.1	243.3		
Moisture Lost	63.7	59.6	62	61.8	56	62.6		
Wt. Dry soil	183.8	188.6	176.4	185.5	171.4	170.2		
% Moisture	34.7	31.6	35.1	33.3	32.7	36.8		
Dry Density	70.7	72.8	70	71.4	71.1	69.2		
Maximum Dry Density	72.2							
Optimum Moisture	33.9							
% Compaction	97.9	100.8	97	98.9	98.5	95.8		
Meets Criteria (Y\N)								

1 Point Proctor Data	
Wt. Wet Soil & Mold	12.28
Wt. Mold	9.30
Wt. Wet soil	2.98
Volume Mold	0.0331
Wet Density	90
Wt. Wet soil & Pan	466.4
Wt. Dry soil & Pan	412.9
Wt. Pan	243.1
Moisture Lost	53.5
Wt. Dry soil	169.8
% Moisture	31.5
Dry Density	68.4

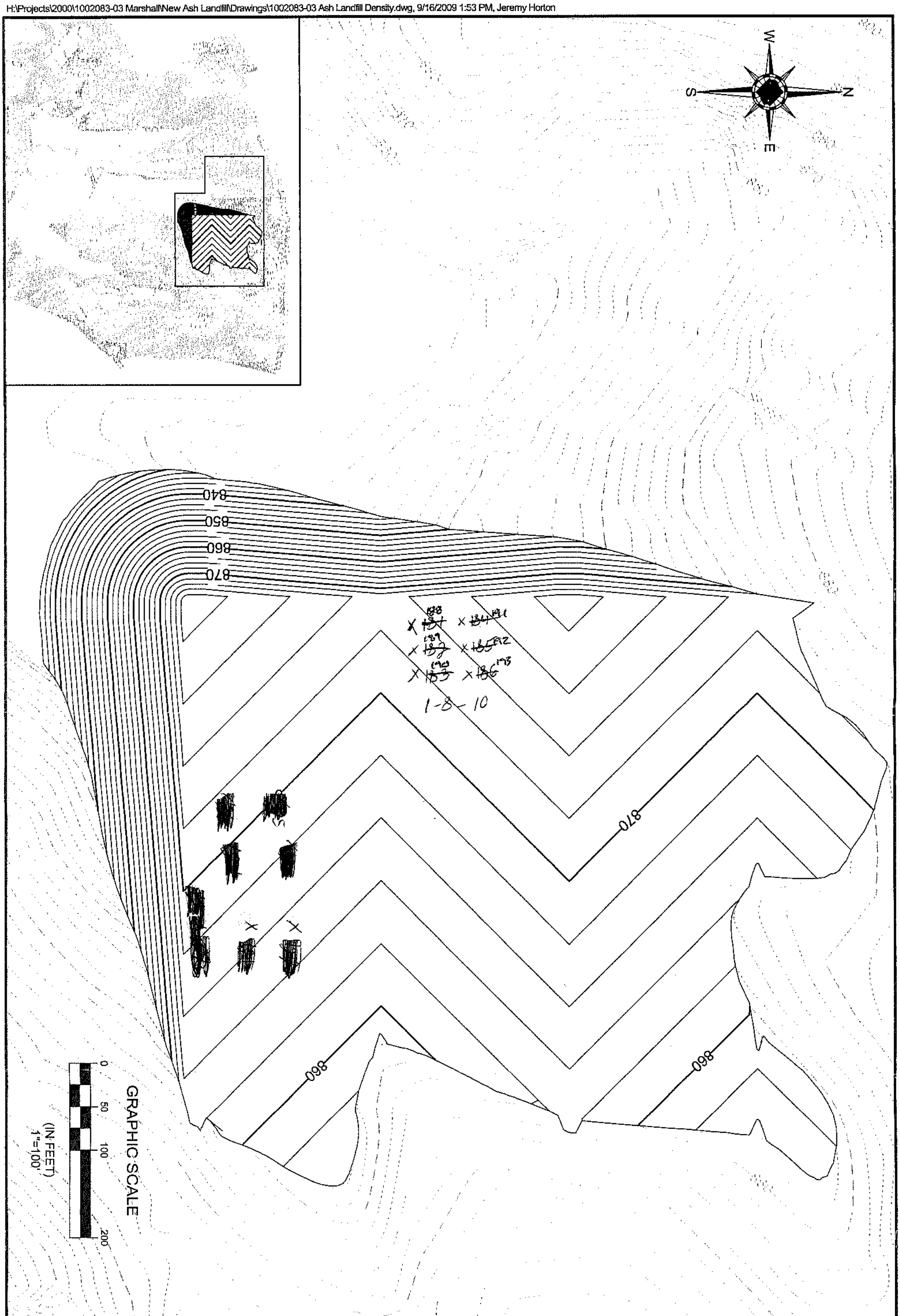
Additional Project Data

115 at 33.1
72.2 33.9
BA 3-31

Elis Rojas
Printed Name

Signature

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 9/16/2009 1:53 PM, Jeremy Horton



SHEET:	SHEET TITLE:	DRAWING NAME:	PROJECT NAME: MARSHALL STEAM STATION, 8320 EAST NC HIGHWAY 150, TERRELL, PRJ CNTY, NC
		DRAWN BY:	
		FILE NUMBER:	
		CHECKED BY:	CLIENT NAME: *DUKE ENERGY CAROLINAS, INC. 8320 EAST NC HIGHWAY 150 TERRELL, NORTH CAROLINA 28682*
		SCALE:	
		DATE:	

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Shield Engineering, Inc.
4301 Taggart Creek Rd, Charlotte NC 28208
Telephone 704-394-6913 Fax 704-394-6968

DAILY REPORT

Project Name: Marshall Steam Station **Client's Name:** Duke Energy **Observation of:** Ash Fill Density	**Contractor:** SEFA **SHIELD Job No.** 1002083-03 **Rev:** 0 **Date:** 1-11-10 Mon

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Onsite: 12:30 am **Off Site: 3:30 pm**

Weather: Mostly Clear to Cloudy, cool to mild, 36 to 43 degrees
Personnel on site: Richard A. Meerholz, Technician
Elis Rojas, Technician

Shield on site to test compaction of ash on landfill and to verify the current landfill pad elevations. Upon arrival no work or personnel was on site. Several truck loads of ash were dumped on site but not spread. Area selected by Elis to be tested today was frozen. Probe rod penetration about an inch and a drive tube was attempted to be pushed but would only go about halfway. Compaction testing was aborted.

Two surveyor's elevation markers were found on site. The first was found on a tree about 30 yards north of the northeast edge of the pad. A yellow plastic tag was tagged to the tree with a special nail about 6 inches above the ground. Bands of yellow and orange ribbons were wrapped around the tree. The elevation on the tag was observed to be 871.95.

The second marker was found on the ground between 3 flagged wooded stakes on the southwest edge of the pad just to the left of the entrance. One of the stakes was marked with elevation 857.60.

Using a tape measure, a marked wooden stake and a sight level the current pad elevations at two locations were determined using the first elevation marker found on the north side tree.

GPS locations of both elevation markers were recorded and will be placed on the site map at Shield for future reference. Pictures were also taken of both markers for reference. GPS locations will be downloaded in the office but are listed below for reference:

Marker at 871.95
N 35° 37.392'
W 080° 58.360'

Marker at 857.60
N 35° 37.249'
W 080° 58.363'

PER CARLTON AT DUKE:
CREW WAS PLACING ASH FOR STRUCTURAL FILL ON ROADS ON SITE.
RAM
1/12/10

Testing Conducted: Density tests by drive tube method were aborted due to frozen pad.
Equipment Used: Probe Rod, Drive tube and drive tube hammer.
Reviewed by: Keith Anthony/Jeremy Horton
Position: Engineer/Staff Engineer
Company: Shield Engineering, Inc.
Report by: Richard A. Meerholz

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 1-11-10
Inspection of: Fill Fly Ash	**Technician:** Eli's Pepa	

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Shield on site to con crack elevation at Marshall Steam Station. Richard Meerholz was on site. He trained Eli's Pepa How to record crack elevation. Shield observed that on end of North side a mark was make by Crack company. This mark has like yellow that avels elevation 871.95.

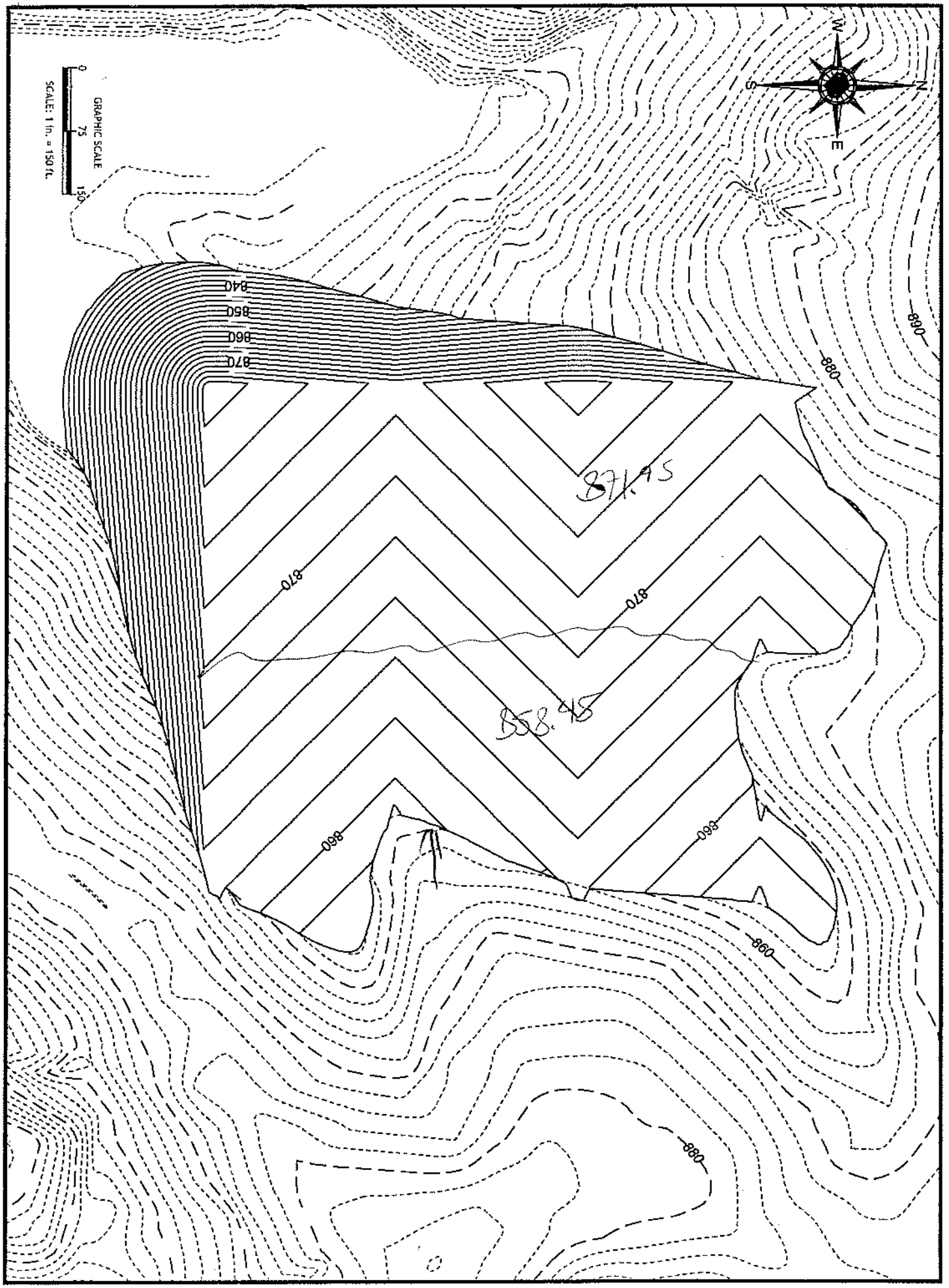
Richard Meerholz record location with Gps.

Shield could not performed Fy ash testing because it was Frozen.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Eli's Pepa
Printed Name

Signature


W
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GRAPHIC SCALE
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75
150
SCALE: 1 in. = 150 ft.
890
880
870
860
850
840
870
871.95
870
858.45
860
860
860
880

1-11-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 1-13-10
Inspection of: FILL FLY ASH	**Technician:** ELIS PEÑAS	

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Shield on site to observed Fill Fly Ash at MARSHALL Steam Station.

Shield performed 6 test. ALL test meets criteria

Elevation was 859.95

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS PEÑAS
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 1-13-10
Inspection of: Fill Fly Ash	Technician: Elis Rojas	

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One point was collect from test # ~~187~~ 194

Drive Tube\Nuclear Density Data

	194	195	196	197	198	199		
Test No.	~~187~~	~~188~~	189	190	~~191~~	~~192~~		
Grade or Elevation	859.95							
Location								
Wt. Wet Soil & Mold	4.16	4.15	4.15	4.20	4.20	4.18		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	2.84	2.83	2.83	2.88	2.88	2.86		
Volume Mold	0.0332							
Wet Density	85.5	85.2	85.2	86.7	86.7	86.1		
Wt. Wet soil & Pan	472.8	453.6	471.1	480.1	464.3	473.1		
Wt. Dry soil & Pan	420.9	411.5	422.6	429.5	419.9	423.8		
Wt. Pan	243.3	244.4	243.3	244.4	243.3	244.4		
Moisture Lost	51.9	42.1	48.5	50.6	44.4	49.3		
Wt. Dry soil	177.6	167.1	179.3	185.1	176.6	179.4		
% Moisture	29.2	25.2	27	27.3	25.1	27	27.5	
Dry Density	66.2	68.1	67.1	68.1	69.3	67.8	67.6	
Maximum Dry Density	70.2							
Optimum Moisture	28.3							
% Compaction	94.3	97	95.6	97	98.7	96.6	96.3	
Meets Criteria (Y\N)								

1 Point Proctor Data

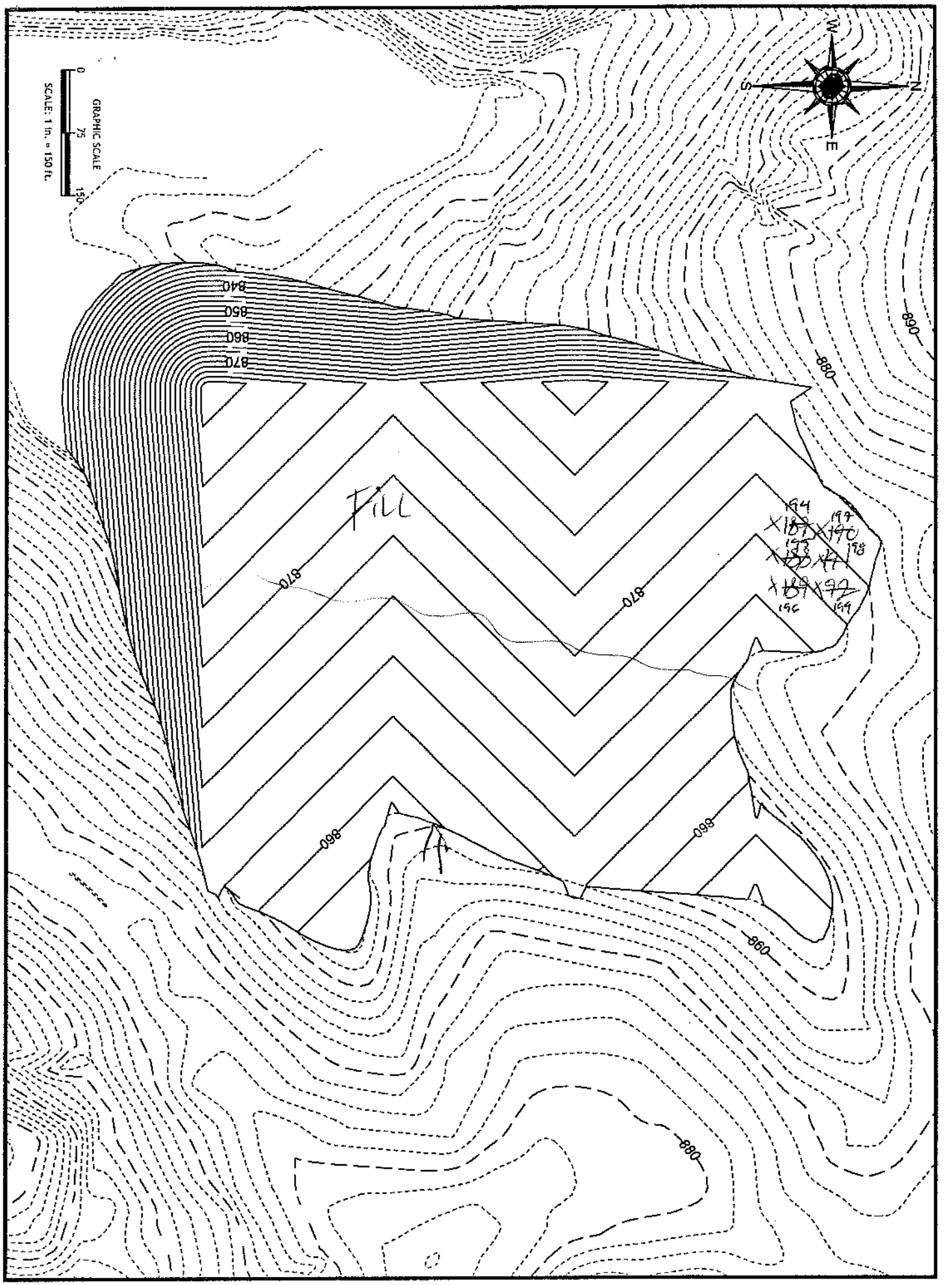
Wt. Wet Soil & Mold	12.45	
Wt. Mold	9.30	
Wt. Wet soil	3.15	
Volume Mold	0.0331	
Wet Density	95.2	
Wt. Wet soil & Pan	470.3	
Wt. Dry soil & Pan	416	
Wt. Pan	243.3	
Moisture Lost	54.3	
Wt. Dry soil	172.7	
% Moisture	31.4	
Dry Density	72.5	

Additional Project Data

70.2 at 28.3 BAS-11 Fly Ash

Elis Rojas
Printed Name

Signature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GRAPHIC SCALE
0
75
150
SCALE: 1 in. = 150 ft.
840
860
880
870
890
FILL
194
197
198
199
196

1-

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 1-15-10
Inspection of: Fill Fly Ash	**Technician:** Elis Pizzi	

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Shield on site to observed Fill Fly Ash at MARSHALL.
Shield performed six test. All test meets criteria

One Point was performed from test # 1 & 3. 200
Proctor used BAS-11 702 at 28.3%.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Pizzi
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAX SHALL		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 1-15-10
Inspection of: Fill Fly Ash		Technician: Elis Pepas	

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One Point was performed from Test # 193 200

Drive Tube\Nuclear Density Data

	200	201	202	203	204	205		
Test No.	193	194	195	196	197	198		
Grade or Elevation	868.45							
Location								
Wt. Wet Soil & Mold	4.16	4.23	4.22	4.19	4.20	4.21		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	2.86	2.91	2.9	2.87	2.88	2.89		
Volume Mold	0.0332							
Wet Density	86.1	87.7	87.3	86.4	86.7	87		
Wt. Wet soil & Pan	470.1	470.3	486.1	474.3	470.1	469.6		
Wt. Dry soil & Pan	425.6	424.3	434.8	428.4	423.6	425.7		
Wt. Pan	243.6	244.7	243.6	244.7	243.6	244.7		
Moisture Lost	44.5	46	51.3	45.9	46.5	43.9		
Wt. Dry soil	182	177.6	191.2	183.7	180	181		
% Moisture	24.5	25.6	26.8	25	25.8	24.3		
Dry Density	69.2	69.8	68.8	69.1	68.9	70	70.1	
Maximum Dry Density	70.2			69.2				
Optimum Moisture	28.3%							
% Compaction	98.6	99.4	98	98.4	98.1	99.7		
Meets Criteria (Y\N)			98.1	98.5	98.2	99.8		

1 Point Proctor Data

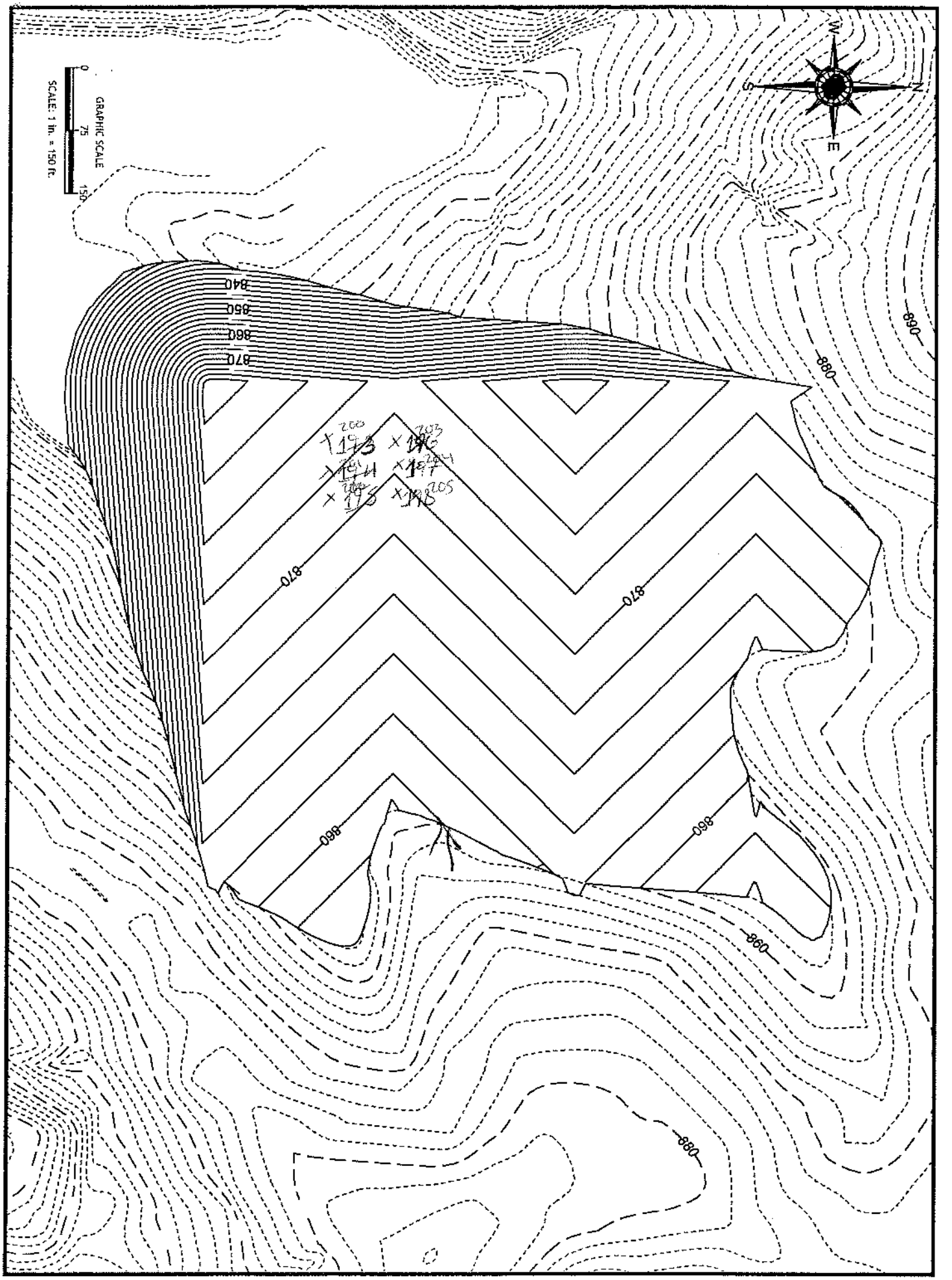
Wt. Wet Soil & Mold	4.16	
Wt. Mold	1.30	
Wt. Wet soil	2.86	
Volume Mold	0.0331	
Wet Density	86.4	
Wt. Wet soil & Pan	470.7	
Wt. Dry soil & Pan	443.5	
Wt. Pan	243.6	
Moisture Lost	27.2	
Wt. Dry soil	199.9	
% Moisture	23.6	
Dry Density	69.9	

Additional Project Data

BAS-11 70.2 @ 28.3%

Elis Pepas
Printed Name

Signature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1-15-10

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

4 11.9

Project Name: MAY SHALL		Shield No.:	Client No.:
Client Name: DUKE ENERGY		Task No.:	Date: 1-17-16
Inspection of: FILL FOR ASH		Technician: ELIS PEGAS	

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All test meets criteria

Drive Tube/Nuclear Density Data

	208	207	208	209	210	211		
Test No.	199	200	201	202	203	204		
Grade or Elevation	871.95							
Location								
Wt. Wet Soil & Mold	4.42	4.44	4.40	4.42	4.45	4.45		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	3.1	3.12	3.08	3.1	3.13	3.13		
Volume Mold	0.0332							
Wet Density	93.4	94	92.8	93.4	94.3	94.3		
Wt. Wet soil & Pan	477.6	473.3	469.5	468.7	470.5	468.3		
Wt. Dry soil & Pan	422.2	418.1	414	414.5	411.5	412.6		
Wt. Pan	243.7	246.5	243.7	246.5	243.7	246.5		
Moisture Lost	55.4	55.2	55.5	54.2	59	55.7		
Wt. Dry soil	178.5	171.6	170.3	168	167.8	166.1		
% Moisture	31	32.2	32.6	32.3	35.2	33.5		
Dry Density	71.3	71.1	70	70.6	69.8	70.6		
Maximum Dry Density	71.5							
Optimum Moisture	33.1							
% Compaction	99.7	99.4	97.9	98.7	97.7	98.7		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.38	
Wt. Mold	9.30	
Wt. Wet soil	3.08	
Volume Mold	0.0331	
Wet Density	93.1	
Wt. Wet soil & Pan	467.3	
Wt. Dry soil & Pan	411.6	
Wt. Pan	243.7	
Moisture Lost	55.7	
Wt. Dry soil	167.9	
% Moisture	33.2	
Dry Density	69.9	

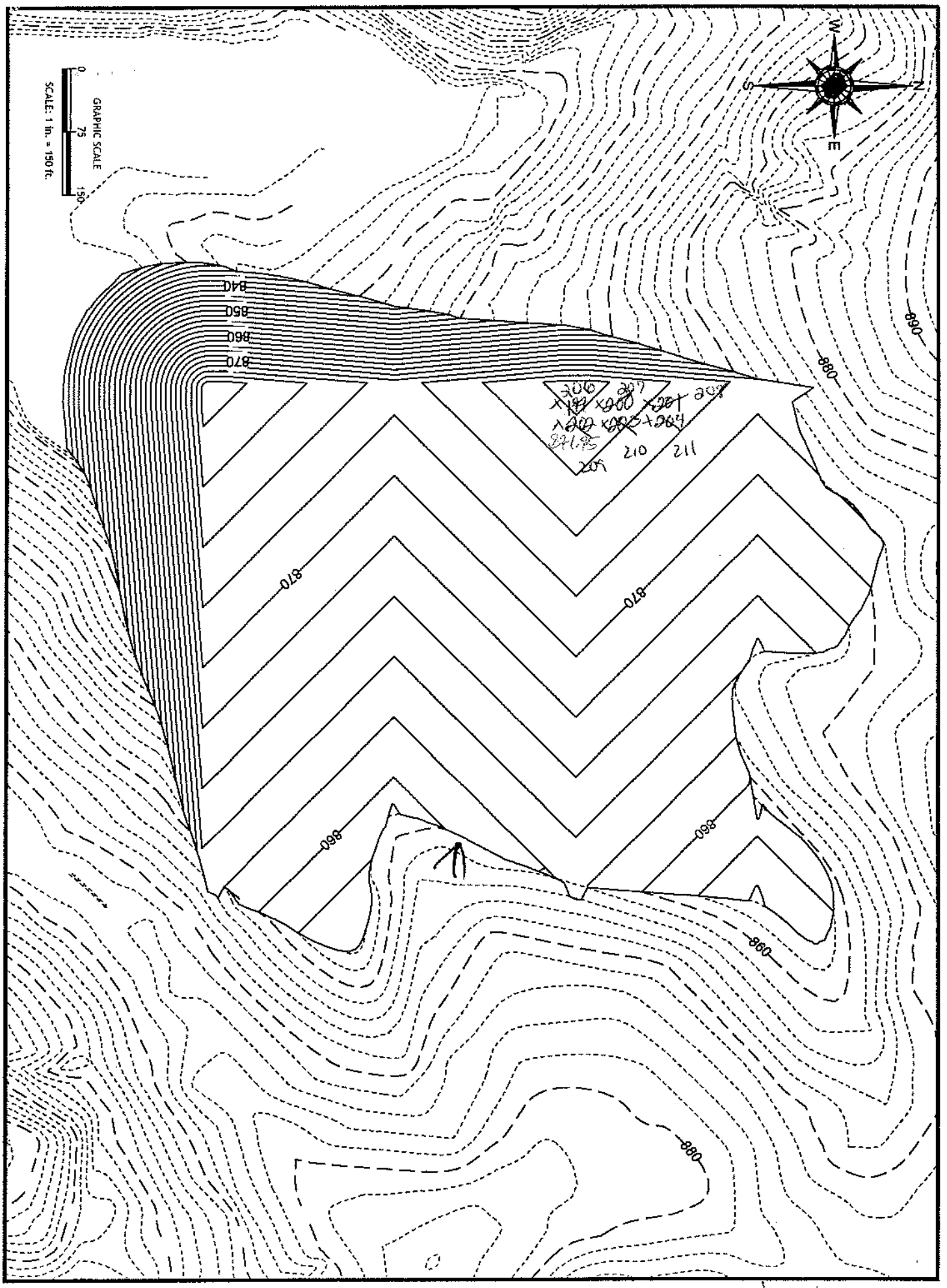
Additional Project Data

71.5 at 33.1 B45-26

JMP

ELIS PEGAS
Printed Name

Signature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1/19/10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL STEAM STATION	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 1-26-10
Inspection of: FILL FLY ASH	**Technician:** ELIS PEGAS	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield on site to observed Fill Fly Ash at Duke power MARSHALL Steam Station.

When Shield Arrived next to silos. Crew was working on gravel road. Crew informed Shield that for a few days Crew could not work at new pond Fill due to road conditions.

Shield management to drive to ~~[illegible]~~ near to entrance (500'). Shield observed that it was impossible for 4X4 Truck to drive inside.

Shield informed Janette Rosser. She recommended to write ~~[illegible]~~ a note on daily.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS PEGAS
Printed Name

Signature

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 1-27-10
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed fill at Marshall Steam Station.

For second day Shield could not performed test. Road was close. Shield contact Clayton Adcock. He said that crew was working at old landfill. Also Shield contact Ronny Tractor operator cell 704-902-0808. He informed Shield that probably crew will not work this week at new landfill. If crew will work Ronny will contact Elis Rojas with Shield.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Max Shall	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 1-29-10
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to performed test at old Landfill. When Shield arrival to cilos. Shield observed crew going to new Landfill. Shield performed testing at new Landfill because crew was working there. All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAI SHALL	Shield No.:	Client No.:
Client Name: DUKE POWER	Task No.:	Date: 1-29-10
Inspection of: FILL FLY ASH	Technician: ELIS PEGAS	

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Drive Tube\Nuclear Density Data								
	210	213	219	215	218	217		
Test No.	~~206~~	~~206~~	~~207~~	~~208~~	~~209~~	~~210~~		
Grade or Elevation	360.95							
Location								
Wt. Wet Soil & Mold	4.46	4.48	4.49	4.48	4.50	4.51		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	3.14	3.16	3.17	3.16	3.18	3.19		
Volume Mold	0.0332							
Wet Density	94.6	95.2	95.5	95.2	95.8	96.1		
Wt. Wet soil & Pan	482.9	483.8	472.2	471.9	472.2	473.2		
Wt. Dry soil & Pan	423.1	426.5	419.8	419.8	417.3	419.7		
Wt. Pan	241.5	243.9	241.5	243.9	241.5	243.9		
Moisture Lost	57.8	57.3	52.4	52.1	54.9	53.5		
Wt. Dry soil	182.6	182.6	178.3	175.9	175.8	175.8		
% Moisture	31.5	31.4	29.4	29.6	31.2	30.4		
Dry Density	71.9	72.54	73.8	73.54	73	73.7		
Maximum Dry Density	74.6							
Optimum Moisture	30.9							
% Compaction	96.4	97.2	98.9	98.5	97.9	98.8		
Meets Criteria (Y\N)								

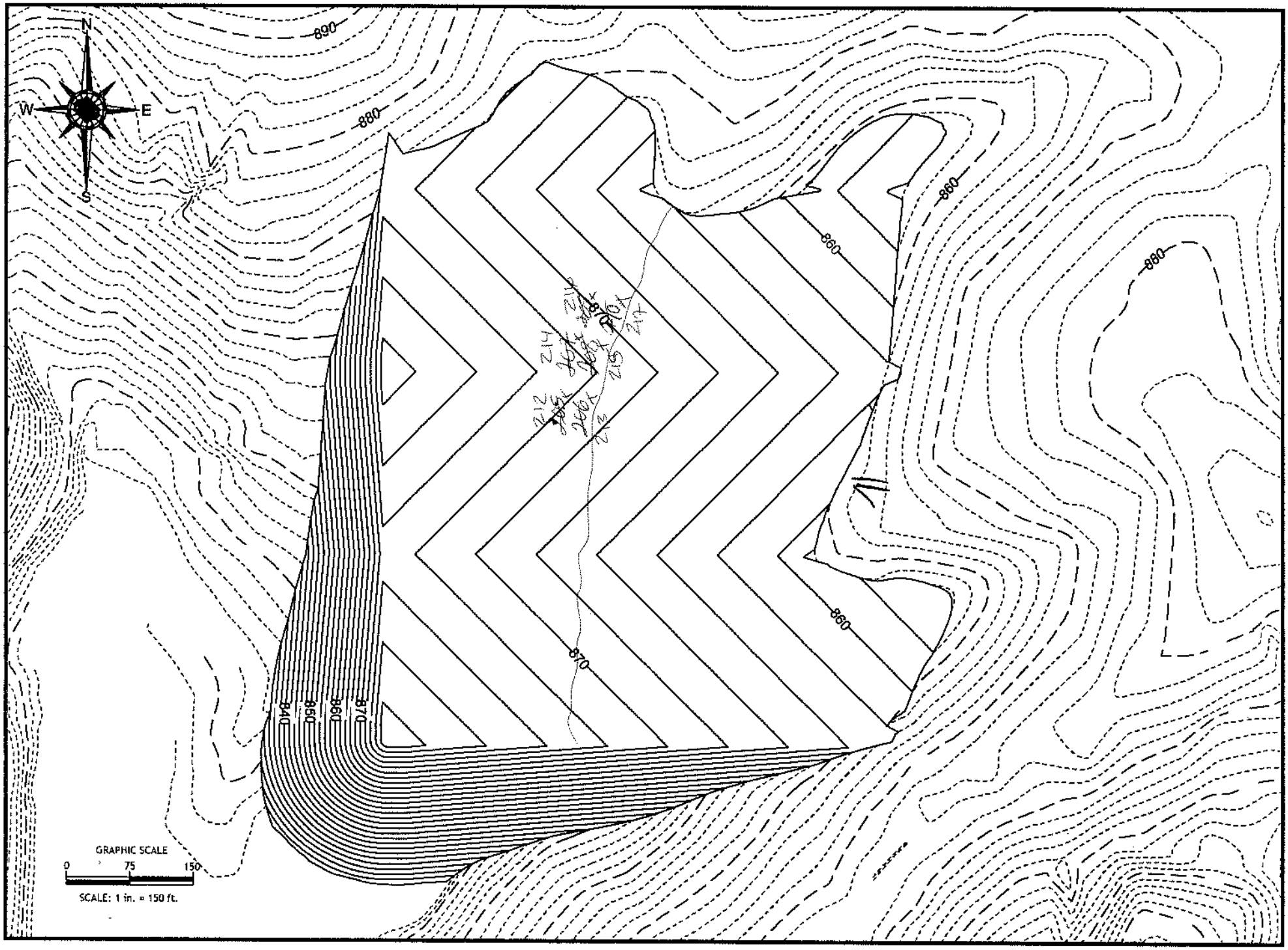
1 Point Proctor Data	
Wt. Wet Soil & Mold	6.52
Wt. Mold	4.30
Wt. Wet soil	3.22
Volume Mold	0.0321
Wet Density	97.3
Wt. Wet soil & Pan	477.5
Wt. Dry soil & Pan	420.9
Wt. Pan	241.5
Moisture Lost	56.6
Wt. Dry soil	179.4
% Moisture	31.5
Dry Density	94

Additional Project Data

74.6 at 30.9 BAS-29

ELIS PEGAS
Printed Name

Signature



Marshall
Vizalo

SHIELD ENGINEERING, INC.

March 11, 2010

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 7 - Month of February 2010
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of February. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Janette M Prosser

Janette M. Prosser, P.E.
Senior Engineer

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\1002083-03 Marshall Ash Landfill 2010-02.doc

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SHIELD ENGINEERING, INC.
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Monthly Summary Report - No. 7

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	March 11, 2010	**Page:**	1 of 2
Report By:	Janette M. Prosser, P.E.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of February.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on February 4, 8, 10, 12, 19, 23 and 25, 2010 to perform field density tests of the ash landfill material. On February 8 and 25, Shield was unable to perform field density tests within the Ash Structural Fill, Area 1C due to inaccessibility of the entrance road. The in-place density tests labeled DT-218 to DT-247 were performed during this period. See Table 1 for preliminary results and locations.

Laboratory Conformance Test:

1. Conformance laboratory samples (BAS-32 and BAS-33) were collected during this time period. See attached Moisture-Density Relationship test and additional required conformance test results.

Summary:

The compaction results of these samples were in accordance with instructions provided by Duke Energy representatives. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
FLY ASH														
DT-1	08/18/09	See location plan	6	838.0	53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6	838.0	58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6	838.0	57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6	838.0	57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6	838.0	61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6	838.0	64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6	839.0	61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6	839.0	57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6	839.0	54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6	839.0	74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6	839.0	67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6	839.0	60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6	841.5	85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6	841.5	86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6	841.5	88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6	841.5	82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6	841.5	86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6	841.5	90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6	842.0	95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6	842.0	91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6	842.0	90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6	842.0	96.1	45.8	65.9	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6	842.0	91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6	842.0	87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6	842.5	91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6	842.5	86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6	842.5	84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6	842.5	85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6	842.5	84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6	842.5	85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6	842.5	83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6	842.5	84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6	842.5	88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6	842.5	87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6	842.5	87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6	842.5	91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6	843.0	86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6	843.0	85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6	843.0	82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6	843.0	80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6	843.0	88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6	843.0	84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6	843.5	82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6	843.5	82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6	843.5	79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6	843.5	84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6	843.5	93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6	843.5	96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-45R	09/15/09	See location plan	6	843.5	94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6	843.5	94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6	843.5	91.9	31.6	69.8	66.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6	843.5	94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6	844.5	94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6	844.5	93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6	844.5	94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6	844.5	93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6	844.5	92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6	844.5	93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6	844.5	88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6	844.5	95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6	844.5	93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6	844.5	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6	844.5	91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6	844.5	91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6	845.0	88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6	845.0	87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6	845.0	89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6	845.0	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6	845.0	93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6	845.0	93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6	845.0	91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6	845.0	93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.9
DT-70	10/02/09	See location plan	6	845.0	91.9	30.6	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6	845.0	93.7	36.0	68.9	71.6	33.7	BAS-19	96.2	X		2.3
DT-72	10/02/09	See location plan	6	845.0	93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6	845.0	94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6	845.0	89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6	845.0	88.9	30.1	68.3	70.0	32.5	BAS-8	97.6	X		-2.4
DT-76	10/07/09	See location plan	6	845.0	92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6	845.0	95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6	845.0	94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6	845.0	90.1	26.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6	845.5	91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6	845.5	87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6	845.5	93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6	845.5	88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6	845.5	90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6	845.5	86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6	845.5	93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6	845.5	93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6	845.5	90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6	845.5	91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6	845.5	93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6	845.5	91.2	29.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6	845.5	93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6	845.5	88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6	845.5	92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6	845.5	92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
DT-96	10/23/09	See location plan	6	845.5	96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6	845.5	98.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4
DT-98	11/03/09	See location plan	6	847.0	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-99	11/03/09	See location plan	6	847.0	91.3	28.9	70.8	71.5	33.1	BAS-26	99.1	X		-4.2
DT-100	11/03/09	See location plan	6	847.0	94.9	32.6	71.6	71.5	33.1	BAS-26	100+	X		-0.5
DT-101	11/03/09	See location plan	6	847.0	97.3	35.5	71.8	71.5	33.1	BAS-26	100+	X		2.4
DT-102	11/03/09	See location plan	6	847.0	97.9	35.3	72.4	71.5	33.1	BAS-26	100+	X		2.2
DT-103	11/03/09	See location plan	6	847.0	96.1	31.9	72.9	71.5	33.1	BAS-26	100+	X		-1.2
DT-104	11/06/09	See location plan	6	847.5	92.8	31.1	70.8	74.0	32.2	BAS-25	95.7	X		-1.1
DT-105	11/06/09	See location plan	6	847.5	89.8	31.5	68.3	74.0	32.2	BAS-25	92.3		X	-0.7
DT-105R	11/06/09	See location plan	6	847.5	92.8	31.8	70.4	74.0	32.2	BAS-25	95.1	X		-0.4
DT-106	11/06/09	See location plan	6	847.5	94.3	28.2	73.6	74.0	32.2	BAS-25	99.4	X		-4.0
DT-107	11/06/09	See location plan	6	847.5	95.2	30.8	72.8	74.0	32.2	BAS-25	98.4	X		-1.4
DT-108	11/06/09	See location plan	6	847.5	97.6	30.9	74.6	74.0	32.2	BAS-25	100+	X		-1.3
DT-109	11/06/09	See location plan	6	847.5	94.6	30.6	72.4	74.0	32.2	BAS-25	97.9	X		-1.6
DT-110	11/17/09	See location plan	6	845.5	88.0	29.9	67.7	70.2	28.3	BAS-11	96.5	X		1.6
DT-111	11/17/09	See location plan	6	845.5	89.8	28.7	69.8	70.2	28.3	BAS-11	99.4	X		0.4
DT-112	11/17/09	See location plan	6	845.5	91.3	26.1	72.4	72.0	26.3	BAS-14	100+	X		-0.2
DT-113	11/17/09	See location plan	6	845.5	91.9	26.9	72.4	72.0	26.3	BAS-14	100+	X		0.6
DT-114	11/17/09	See location plan	6	845.5	89.2	27.1	70.2	72.0	26.3	BAS-14	97.5	X		0.8
DT-115	11/17/09	See location plan	6	845.5	88.0	26.1	69.8	72.0	26.3	BAS-14	96.9	X		-0.2
DT-116	11/20/09	See location plan	6	845.5	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-117	11/20/09	See location plan	6	845.5	90.4	30.8	69.1	71.5	33.1	BAS-26	96.7	X		-2.3
DT-118	11/20/09	See location plan	6	845.5	90.7	32.3	68.6	71.5	33.1	BAS-26	95.9	X		-0.8
DT-119	11/20/09	See location plan	6	845.5	91.9	31.0	70.2	71.5	33.1	BAS-26	98.1	X		-2.1
DT-120	11/20/09	See location plan	6	845.5	95.8	31.2	73.0	71.5	33.1	BAS-26	100+	X		-1.9
DT-121	11/20/09	See location plan	6	845.5	89.2	30.7	68.2	71.5	33.1	BAS-26	95.5	X		-2.4
DT-122	11/25/09	See location plan	6	845.5	94.9	28.9	73.6	76.3	30.7	BAS-24	96.5	X		-1.8
DT-123	11/25/09	See location plan	6	845.5	96.4	32.2	72.9	76.3	30.7	BAS-24	95.6	X		1.5
DT-124	11/25/09	See location plan	6	845.5	95.8	31.2	73.0	76.3	30.7	BAS-24	95.7	X		0.5
DT-125	11/25/09	See location plan	6	845.5	94.1	27.9	73.6	76.3	30.7	BAS-24	96.4	X		-2.8
DT-126	11/25/09	See location plan	6	845.5	92.8	27.5	72.8	76.3	30.7	BAS-24	95.4	X		-3.2
DT-127	11/25/09	See location plan	6	845.5	97.0	30.7	74.2	76.3	30.7	BAS-24	97.3	X		0.0
DT-128	12/02/09	See location plan	6	846.5	84.3	26.5	66.6	70.2	28.3	BAS-11	94.9		X	-1.8
DT-129	12/02/09	See location plan	6	846.5	85.8	27.2	67.5	70.2	28.3	BAS-11	96.1	X		-1.1
DT-130	12/02/09	See location plan	6	846.5	90.4	26.5	71.5	70.2	28.3	BAS-11	100+	X		-1.8
DT-131	12/02/09	See location plan	6	846.5	91.0	28.1	71.0	70.2	28.3	BAS-11	100+	X		-0.2
DT-132	12/02/09	See location plan	6	846.5	89.5	30.0	68.8	70.2	28.3	BAS-11	98.1	X		1.7
DT-133	12/02/09	See location plan	6	846.5	88.6	27.2	69.7	70.2	28.3	BAS-11	99.2	X		-1.1
DT-134	12/07/09	See location plan	6	848.0	88.9	27.4	69.8	70.2	28.3	BAS-11	99.4	X		-0.9
DT-135	12/07/09	See location plan	6	848.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-136	12/07/09	See location plan	6	848.0	86.4	26.4	68.4	70.2	28.3	BAS-11	97.4	X		-1.9
DT-137	12/07/09	See location plan	6	848.0	84.9	25.1	67.9	70.2	28.3	BAS-11	96.7	X		-3.2
DT-138	12/07/09	See location plan	6	848.0	86.7	28.6	67.4	70.2	28.3	BAS-11	96.0	X		0.3
DT-139	12/07/09	See location plan	6	848.0	88.9	29.2	68.8	70.2	28.3	BAS-11	98.0	X		0.9
DT-140	12/16/09	See location plan	6	845.5	83.1	25.9	66.0	67.0	24.0	BAS-7	98.5	X		1.9
DT-141	12/16/09	See location plan	6	845.5	84.3	24.5	67.7	67.0	24.0	BAS-7	100+	X		0.5
DT-142	12/16/09	See location plan	6	845.5	80.4	24.9	64.4	67.0	24.0	BAS-7	96.1	X		0.9
DT-143	12/16/09	See location plan	6	845.5	81.3	26.1	64.5	67.0	24.0	BAS-7	96.2	X		2.1
DT-144	12/16/09	See location plan	6	845.5	84.0	25.6	66.9	67.0	24.0	BAS-7	99.8	X		1.6
DT-145	12/16/09	See location plan	6	845.5	86.7	26.0	68.8	67.0	24.0	BAS-7	100+	X		2.0

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MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
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TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-146	12/21/09	See location plan	6	849.0	94.3	32.6	71.1	71.6	33.7	BAS-19	99.3	X		-1.1
DT-147	12/21/09	See location plan	6	849.0	94.0	33.6	70.4	71.6	33.7	BAS-19	98.3	X		-0.1
DT-148	12/21/09	See location plan	6	849.0	97.0	34.0	72.4	71.6	33.7	BAS-19	100+	X		0.3
DT-149	12/21/09	See location plan	6	849.0	95.8	34.2	71.4	71.6	33.7	BAS-19	99.7	X		0.5
DT-150	12/21/09	See location plan	6	849.0	93.7	34.1	69.9	71.6	33.7	BAS-19	97.6	X		0.4
DT-151	12/21/09	See location plan	6	849.0	94.9	31.0	72.4	71.6	33.7	BAS-19	100+	X		-2.7
DT-152	12/23/09	See location plan	6	850.0	86.4	26.7	68.2	70.2	28.3	BAS-11	97.1	X		-1.6
DT-153	12/23/09	See location plan	6	850.0	88.3	25.6	70.3	70.2	28.3	BAS-11	100+	X		-2.7
DT-154	12/23/09	See location plan	6	850.0	85.2	26.4	67.4	70.2	28.3	BAS-11	96.0	X		-1.9
DT-155	12/23/09	See location plan	6	850.0	85.8	28.6	66.7	70.2	28.3	BAS-11	95.0	X		0.3
DT-156	12/23/09	See location plan	6	850.0	87.3	27.6	68.4	70.2	28.3	BAS-11	97.5	X		-0.7
DT-157	12/23/09	See location plan	6	850.0	86.4	29.5	66.7	70.2	28.3	BAS-11	95.0	X		1.2
DT-158	12/28/09	See location plan	6	851.5	88.0	33.7	65.8	70.0	32.5	BAS-11	94.0		X	1.2
DT-159	12/28/09	See location plan	6	851.5	91.3	34.8	67.7	70.0	32.5	BAS-11	96.8	X		2.3
DT-160	12/28/09	See location plan	6	851.5	92.8	32.0	70.3	70.0	32.5	BAS-11	100+	X		-0.5
DT-161	12/28/09	See location plan	6	851.5	91.0	32.8	68.5	70.0	32.5	BAS-11	97.9	X		0.3
DT-162	12/28/09	See location plan	6	851.5	90.1	31.7	68.4	70.0	32.5	BAS-11	97.7	X		-0.8
DT-163	12/28/09	See location plan	6	851.5	91.6	33.2	68.8	70.0	32.5	BAS-11	98.2	X		0.7
DT-164	12/29/09	See location plan	6	852.5	97.6	32.3	73.8	76.3	30.7	BAS-24	96.7	X		1.6
DT-165	12/29/09	See location plan	6	852.5	95.8	26.0	76.0	76.3	30.7	BAS-24	99.6	X		-4.7
DT-166	12/29/09	See location plan	6	852.5	96.1	27.3	75.5	76.3	30.7	BAS-24	98.9	X		-3.4
DT-167	12/29/09	See location plan	6	852.5	97.9	27.3	76.9	76.3	30.7	BAS-24	100+	X		-3.4
DT-168	12/29/09	See location plan	6	852.5	98.8	25.8	78.5	76.3	30.7	BAS-24	100+	X		-4.9
DT-168R	12/29/09	See location plan	6	852.5	96.1	27.0	75.7	76.3	30.7	BAS-24	99.2	X		-3.7
DT-169	12/29/09	See location plan	6	852.5	96.4	26.9	76.0	76.3	30.7	BAS-24	99.6	X		-3.8
DT-170	12/30/09	See location plan	6	853.0	88.3	24.1	71.2	72.0	26.3	BAS-14	98.8	X		-2.2
DT-171	12/30/09	See location plan	6	853.0	86.7	21.8	71.2	72.0	26.3	BAS-14	98.9	X		-4.5
DT-172	12/30/09	See location plan	6	853.0	86.1	24.2	69.3	72.0	26.3	BAS-14	96.3	X		-2.1
DT-173	12/30/09	See location plan	6	853.0	87.3	22.5	71.3	72.0	26.3	BAS-14	99.0	X		-3.8
DT-174	12/30/09	See location plan	6	853.0	86.7	21.9	71.1	72.0	26.3	BAS-14	98.8	X		-4.4
DT-175	12/30/09	See location plan	6	853.0	86.4	23.0	70.2	72.0	26.3	BAS-14	97.6	X		-3.3
DT-176	01/06/10	See location plan	6	855.0	87.0	29.1	67.4	67.9	28.5	BAS-12	99.2	X		0.6
DT-177	01/06/10	See location plan	6	855.0	86.1	32.6	64.9	67.9	28.5	BAS-12	95.6	X		4.1
DT-178	01/06/10	See location plan	6	855.0	86.1	25.1	68.8	67.9	28.5	BAS-12	100+	X		-3.4
DT-179	01/06/10	See location plan	6	855.0	85.8	29.3	66.4	67.9	28.5	BAS-12	97.7	X		0.8
DT-180	01/06/10	See location plan	6	855.0	87.3	27.5	68.5	67.9	28.5	BAS-12	100+	X		-1.0
DT-181	01/06/10	See location plan	6	855.0	86.7	26.7	68.4	67.9	28.5	BAS-12	100+	X		-1.8
DT-182	01/07/10	See location plan	6	856.0	89.5	30.7	68.5	67.9	28.5	BAS-12	100+	X		2.2
DT-183	01/07/10	See location plan	6	856.0	85.8	30.1	65.9	67.9	28.5	BAS-12	97.1	X		1.6
DT-184	01/07/10	See location plan	6	856.0	86.1	27.8	67.4	67.9	28.5	BAS-12	99.2	X		-0.7
DT-185	01/07/10	See location plan	6	856.0	86.7	29.6	66.9	67.9	28.5	BAS-12	98.5	X		1.1
DT-186	01/07/10	See location plan	6	856.0	82.5	26.1	65.4	67.9	28.5	BAS-12	96.4	X		-2.4
DT-187	01/07/10	See location plan	6	856.0	83.1	22.9	67.6	67.9	28.5	BAS-12	99.6	X		-5.6
DT-188	01/08/10	See location plan	6	858.5	95.2	34.7	70.7	72.2	33.9	BAS-31	97.9	X		0.8
DT-189	01/08/10	See location plan	6	858.5	95.8	31.6	72.8	72.2	33.9	BAS-31	100+	X		-2.3
DT-190	01/08/10	See location plan	6	858.5	94.6	35.1	70.0	72.2	33.9	BAS-31	97.0	X		1.2
DT-191	01/08/10	See location plan	6	858.5	95.2	33.3	71.4	72.2	33.9	BAS-31	98.9	X		-0.6
DT-192	01/08/10	See location plan	6	858.5	94.3	32.7	71.1	72.2	33.9	BAS-31	98.4	X		-1.2
DT-193	01/08/10	See location plan	6	858.5	94.6	36.8	69.2	72.2	33.9	BAS-31	95.8	X		2.9
DT-194	01/13/10	See location plan	6	860.0	85.5	29.2	66.2	70.2	28.3	BAS-11	94.3		X	0.9
DT-195	01/13/10	See location plan	6	860.0	85.2	25.2	68.1	70.2	28.3	BAS-11	96.9	X		-3.1

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-196	01/13/10	See location plan	6	860.0	85.2	27.0	67.1	70.2	28.3	BAS-11	95.6	X		-1.3
DT-197	01/13/10	See location plan	6	860.0	86.7	27.3	68.1	70.2	28.3	BAS-11	97.0	X		-1.0
DT-198	01/13/10	See location plan	6	860.0	86.7	25.1	69.3	70.2	28.3	BAS-11	98.7	X		-3.2
DT-199	01/13/10	See location plan	6	860.0	86.1	27.5	67.5	70.2	28.3	BAS-11	96.2	X		-0.8
DT-200	01/15/10	See location plan	6	868.5	86.1	24.5	69.2	70.2	28.3	BAS-11	98.5	X		-3.8
DT-201	01/15/10	See location plan	6	868.5	87.7	25.6	69.8	70.2	28.3	BAS-11	99.5	X		-2.7
DT-202	01/15/10	See location plan	6	868.5	87.3	26.6	68.8	70.2	28.3	BAS-11	98.1	X		-1.5
DT-203	01/15/10	See location plan	6	868.5	86.4	25.0	69.1	70.2	28.3	BAS-11	98.5	X		-3.3
DT-204	01/15/10	See location plan	6	868.5	86.7	25.8	68.9	70.2	28.3	BAS-11	98.2	X		-2.5
DT-205	01/15/10	See location plan	6	868.5	87.0	24.3	70.0	70.2	28.3	BAS-11	99.7	X		-4.0
DT-206	01/19/10	See location plan	6	871.5	93.4	31.0	71.3	71.5	33.1	BAS-26	99.7	X		-2.1
DT-207	01/19/10	See location plan	6	871.5	94.0	32.2	71.1	71.5	33.1	BAS-26	99.4	X		-0.9
DT-208	01/19/10	See location plan	6	871.5	92.6	32.6	70.0	71.5	33.1	BAS-26	97.9	X		-0.5
DT-209	01/19/10	See location plan	6	871.5	93.4	32.3	70.6	71.5	33.1	BAS-26	98.7	X		-0.8
DT-210	01/19/10	See location plan	6	871.5	94.3	35.2	69.7	71.5	33.1	BAS-26	97.6	X		2.1
DT-211	01/19/10	See location plan	6	871.5	94.3	33.5	70.6	71.5	33.1	BAS-26	98.8	X		0.4
DT-212	01/29/10	See location plan	6	861.0	94.6	31.5	71.9	74.6	30.9	BAS-29	96.4	X		0.6
DT-213	01/29/10	See location plan	6	861.0	95.2	31.4	72.5	74.6	30.9	BAS-29	97.1	X		0.5
DT-214	01/29/10	See location plan	6	861.0	95.5	29.4	73.8	74.6	30.9	BAS-29	98.9	X		-1.5
DT-215	01/29/10	See location plan	6	861.0	95.2	29.6	73.5	74.6	30.9	BAS-29	98.5	X		-1.3
DT-216	01/29/10	See location plan	6	861.0	95.8	31.2	73.0	74.6	30.9	BAS-29	97.9	X		0.3
DT-217	01/29/10	See location plan	6	861.0	96.1	30.4	73.7	74.6	30.9	BAS-29	98.8	X		-0.5
DT-218	02/04/10	See location plan	6	866.5	93.7	32.6	70.7	74.0	32.2	BAS-25	95.5	X		0.4
DT-219	02/04/10	See location plan	6	866.5	97.0	30.1	74.6	74.0	32.2	BAS-25	100+	X		-2.1
DT-220	02/04/10	See location plan	6	866.5	89.2	31.5	67.8	74.0	32.2	BAS-25	91.7		X	-0.7
DT-220R	02/04/10	See location plan	6	866.5	95.2	30.3	73.1	74.0	32.2	BAS-25	98.7	X		-1.9
DT-221	02/04/10	See location plan	6	866.5	88.6	32.1	67.1	74.0	32.2	BAS-25	90.6		X	-0.1
DT-221R	02/04/10	See location plan	6	866.5	96.4	30.4	73.9	74.0	32.2	BAS-25	99.9	X		-1.8
DT-222	02/04/10	See location plan	6	866.5	94.3	32.6	71.1	74.0	32.2	BAS-25	96.1	X		0.4
DT-223	02/04/10	See location plan	6	866.5	97.6	32.7	73.5	74.0	32.2	BAS-25	99.4	X		0.5
DT-224	02/10/10	See location plan	6	866.5	92.6	27.2	73.0	74.0	32.2	BAS-25	98.6	X		-5.0
DT-225	02/10/10	See location plan	6	866.5	91.0	27.4	71.4	74.0	32.2	BAS-25	96.5	X		-4.8
DT-226	02/10/10	See location plan	6	866.5	93.4	27.8	73.1	74.0	32.2	BAS-25	98.8	X		-4.4
DT-227	02/10/10	See location plan	6	866.5	91.6	27.5	71.8	74.0	32.2	BAS-25	97.1	X		-4.7
DT-228	02/10/10	See location plan	6	866.5	93.7	27.3	73.6	74.0	32.2	BAS-25	99.5	X		-4.9
DT-229	02/10/10	See location plan	6	866.5	92.2	26.7	72.8	74.0	32.2	BAS-25	98.3	X		-5.5
DT-230	02/12/10	See location plan	6	866.5	89.5	26.5	71.3	72.0	26.3	BAS-14	99.0	X		-0.8
DT-231	02/12/10	See location plan	6	866.5	88.9	24.5	71.4	72.0	26.3	BAS-14	99.2	X		-1.8
DT-232	02/12/10	See location plan	6	866.5	88.3	24.6	70.9	72.0	26.3	BAS-14	98.4	X		-1.7
DT-233	02/12/10	See location plan	6	866.5	88.6	24.6	71.1	72.0	26.3	BAS-14	98.8	X		-1.7
DT-234	02/12/10	See location plan	6	866.5	89.8	25.6	71.5	72.0	26.3	BAS-14	99.3	X		-0.7
DT-235	02/12/10	See location plan	6	866.5	90.4	26.3	71.6	72.0	26.3	BAS-14	99.4	X		0.0
DT-236	02/19/10	See location plan	6	848.8	87.7	24.4	70.5	72.0	26.3	BAS-14	97.9	X		-1.9
DT-237	02/19/10	See location plan	6	848.8	89.8	26.3	71.1	72.0	26.3	BAS-14	98.8	X		0.0
DT-238	02/19/10	See location plan	6	848.8	88.0	22.9	71.6	72.0	26.3	BAS-14	99.4	X		-3.4
DT-239	02/19/10	See location plan	6	848.8	89.2	23.3	72.3	72.0	26.3	BAS-14	100+	X		-3.0
DT-240	02/19/10	See location plan	6	848.8	88.3	21.6	72.6	72.0	26.3	BAS-14	100+	X		-4.7
DT-241	02/19/10	See location plan	6	848.8	88.9	22.3	72.7	72.0	26.3	BAS-14	100+	X		-4.0
DT-242	02/23/10	See location plan	6	848.8	96.4	31.0	73.6	74.8	30.7	BAS-28	98.4	X		0.3
DT-243	02/23/10	See location plan	6	848.8	97.3	30.9	74.3	74.8	30.7	BAS-28	99.4	X		0.2
DT-244	02/23/10	See location plan	6	848.8	95.5	30.2	73.3	74.8	30.7	BAS-28	98.1	X		-0.5

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

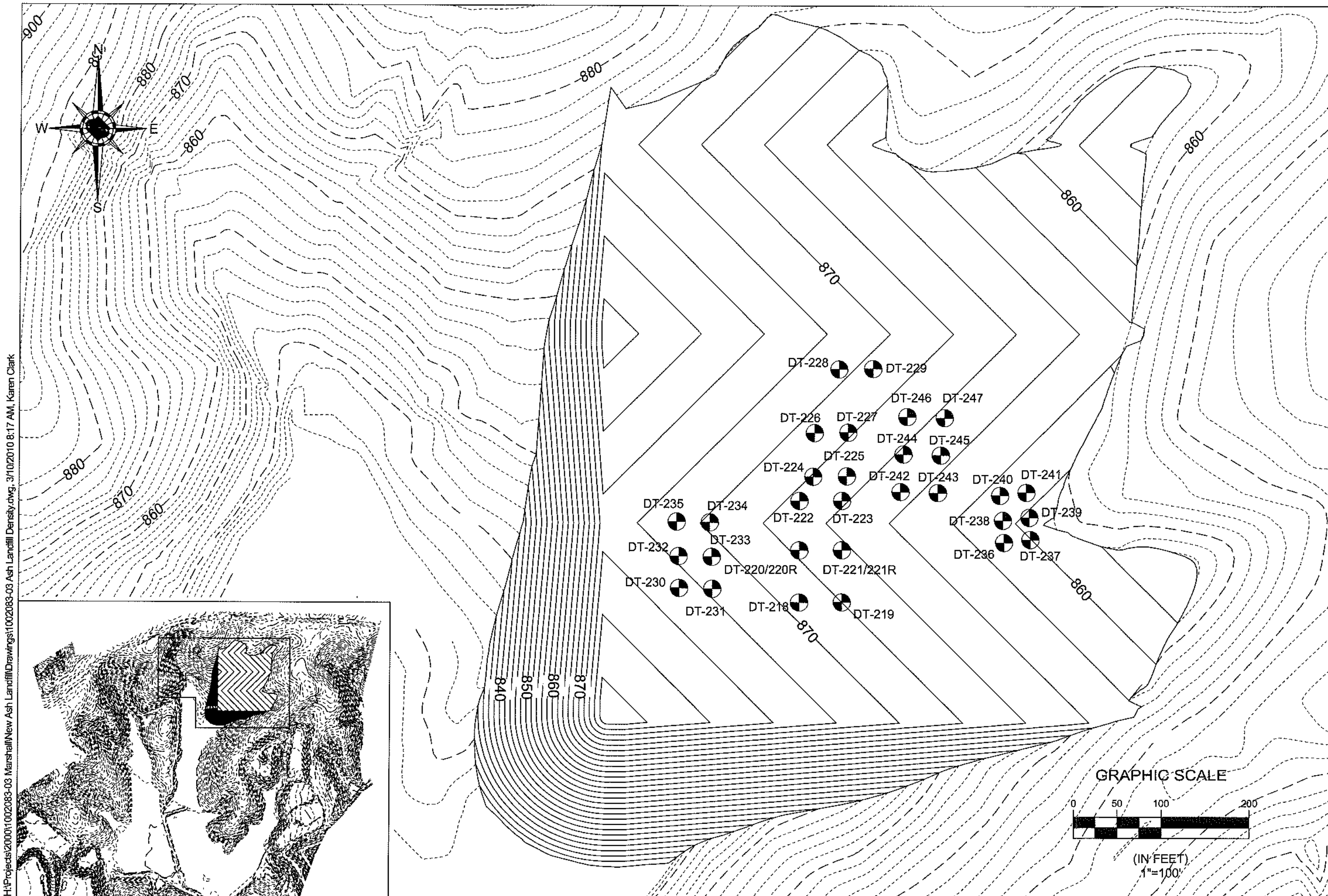
4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-245	02/23/10	See location plan	6	848.8	97.3	31.2	74.2	74.8	30.7	BAS-28	99.1	X		0.5
DT-246	02/23/10	See location plan	6	848.8	95.8	30.4	73.5	74.8	30.7	BAS-28	98.2	X		-0.3
DT-247	02/23/10	See location plan	6	848.8	94.9	29.5	73.3	74.8	30.7	BAS-28	98.0	X		-1.2

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope



H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 3/10/2010 8:17 AM, Karen Clark

SHIELD
ENGINEERING, INC.
704-394-6913
704-394-5998 fax
www.shieldengineering.com
4301 TAGGART CREEK ROAD
CHARLOTTE, NC 28206

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density.dwg
DRAWN BY: KJC
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: 03/10/10

SHEET TITLE:

DENSITY TEST
LOCATION PLAN
FEBRUARY 2010

SHEET:
1

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 2-4-10
Inspection of: Fill Fly Ash	**Technician:** Elis Rejas	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield on site to performed Fill test at Marshall Steam Station.

Shield performed six test. Test # 220 and 221, Failed.

Shield re-test #220-221. Test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rejas
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 3-4-10
Inspection of: Fill Fly Ash		**Technician:** Elis Rojas	

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Drive Tube/Nuclear Density Data

Test No.	~~211~~ 218	~~212~~ 219	~~213~~ 220	~~214~~ 221	~~215~~ 222	~~216~~ 223	220 Retest	221 Retest
Grade or Elevation	866.45							
Location								
Wt. Wet Soil & Mold	4.43	4.54	4.28	4.26	4.46	4.56	4.48	4.52
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
Wt. Wet soil	3.11	3.22	2.96	2.94	3.13	3.24	3.16	3.2
Volume Mold	0.0332							
Wet Density	93.7	97	89.2	88.6	94.3	97.6	95.2	96.4
Wt. Wet soil & Pan	476.6	479.5	473.0	472.6	473.6	469.3	472.8	473.4
Wt. Dry soil & Pan	418.7	424.8	417.4	416.9	416.4	413.6	418.9	419.7
Wt. Pan	241.1	243.2	241.1	243.2	241.1	243.2	241.1	243.2
Moisture Lost	57.9	54.7	55.6	55.7	57.2	55.7	53.4	53.7
Wt. Dry soil	177.6	181.6	176.3	173.7	175.3	170.4	177.8	176.5
% Moisture	32.6	30.1	31.5	32.1	32.6	32.7	30.3	30.4
Dry Density	70.8	74.6	67.8	67.1	71.1	73.5	73.1	73.9
Maximum Dry Density	74.0							
Optimum Moisture	32.2							
% Compaction	95.6	100.8	91.6	90.7	96.1	99.3	98.8	99.9
Meets Criteria (Y\N)			Y	Y				

1 Point Proctor Data

Wt. Wet Soil & Mold	12.47	
Wt. Mold	9.31	
Wt. Wet soil	3.16	
Volume Mold	0.0231	
Wet Density	95.2	
Wt. Wet soil & Pan	475.9	
Wt. Dry soil & Pan	422.1	
Wt. Pan	241.1	
Moisture Lost	53.8	
Wt. Dry soil	181.	
% Moisture	29.7	
Dry Density	73.4	

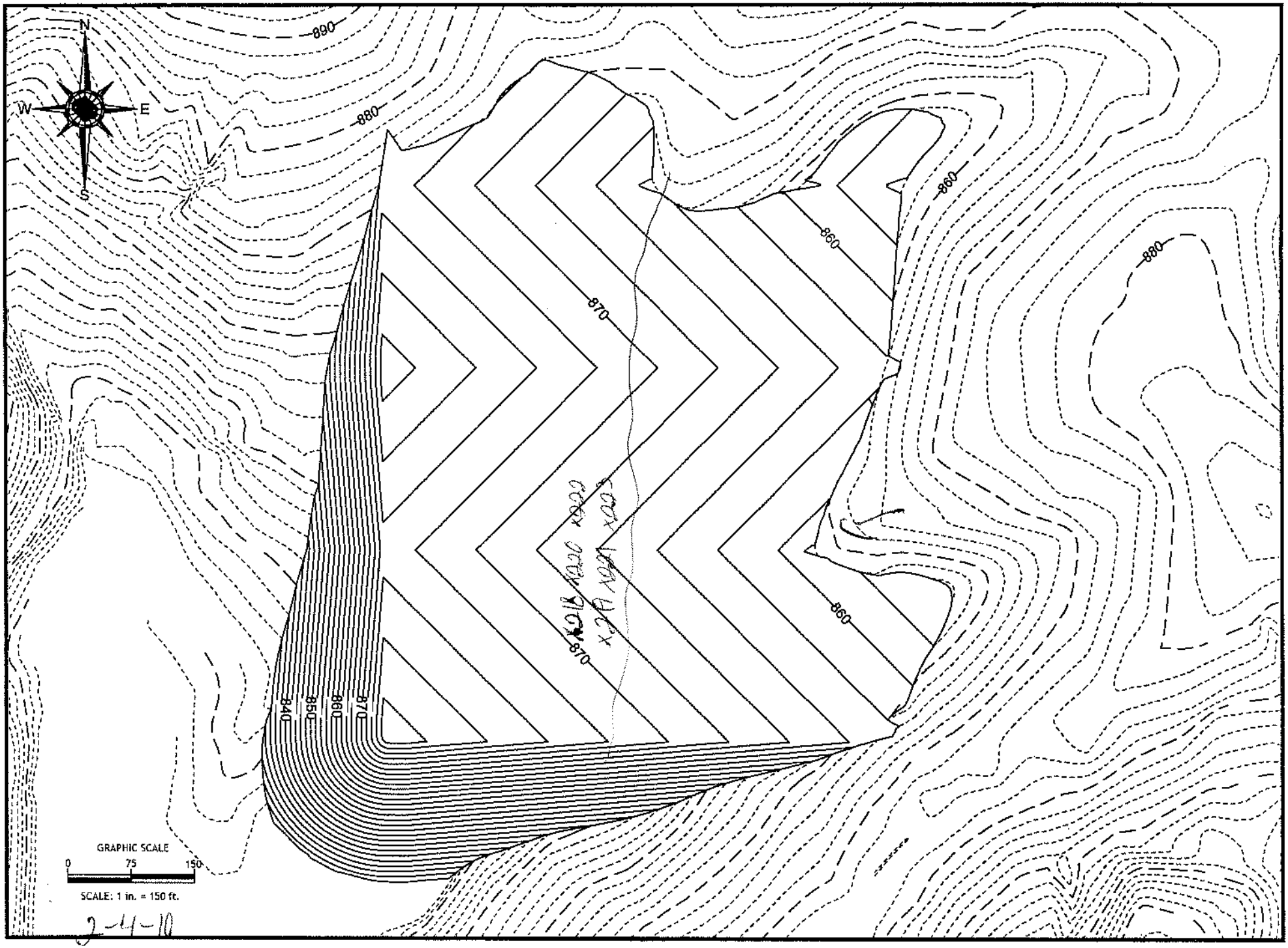
Additional Project Data

740 at 32.2 BAS-25

Elis Rojas
Printed Name

Elis Rojas
Signature

JMP


N
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E
S
890
880
870
860
860
880
870
860
840
850
860
870
GRAPHIC SCALE
0
75
150
SCALE: 1 in. = 150 ft.
2-4-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 2-8-10
Inspection of: Fill Fly Ash	**Technician:** Eli Sykes	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield on site to observed Fill Fly Ash.
Road conditions to land fill were very bad. Shield observed a lot mud and holes. Shield asked crew if it was possible to get to new land fill. Crew recommended to wait for better road conditions. Crew said that road will be better day to come back.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Eli Sykes
Printed Name

Signature

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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 2-10-10
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield on site to performed QT test at Marshall Steam Power Station.

Due to whether conditions strong winds. Shield could not lock Fly Ash on site. Shield informed Jannette Rossy about whether conditions. She recommended to bring QT to lab.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 2-10-10
Inspection of: Fill Fly Ash	Technician: Jr's Pow	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers an cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.

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Drive Tube\Nuclear Density Data

	GdT	CHRWL	ODB	Lucy	SOL	Tube		
Test No.	224	225	226	227	228	229		
Grade or Elevation	866.45							
Location								
Wt. Wet Soil & Mold	4.40	4.35	4.42	4.36	4.43	4.38		
Wt. Mold	1.32	1.33	1.32	1.32	1.32	1.32		
Wt. Wet soil	3.08	3.02	3.1	3.04	3.11	3.06		
Volume Mold	0.0332							
Wet Density	92.8	91	93.4	91.6	93.7	92.2		
Wt. Wet soil & Pan	1565.37	1553.08	1577.16	1566.14	1589.87	1550.90		
Wt. Dry soil & Pan	1271.11	1259.34	1275.33	1269.09	1290.39	1263.42		
Wt. Pan	188.70	188.33	189.34	189.12	195.22	187.10		
Moisture Lost	294.26	293.74	301.83	297.01	299.48	287.48		
Wt. Dry soil	1082.41	1071.01	1085.99	1077.97	1095.17	1076.32		
% Moisture	27.2	27.4	27.8	27.5	27.3	26.7		
Dry Density	73	71.4	73.1	71.8	73.6	72.8		
Maximum Dry Density	74.0							
Optimum Moisture	30.7							
% Compaction	98.6	96.5	98.9	97	99.5	98.4		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.29	
Wt. Mold	9.50	
Wt. Wet soil	2.79	
Volume Mold	0.0331	
Wet Density	84.3	
Wt. Wet soil & Pan	1474.40	
Wt. Dry soil & Pan	1205.19	
Wt. Pan 188.40	188.40	
Moisture Lost	269.21	
Wt. Dry soil	1016.79	
% Moisture	26.5	
Dry Density	66.6	

Additional Project Data

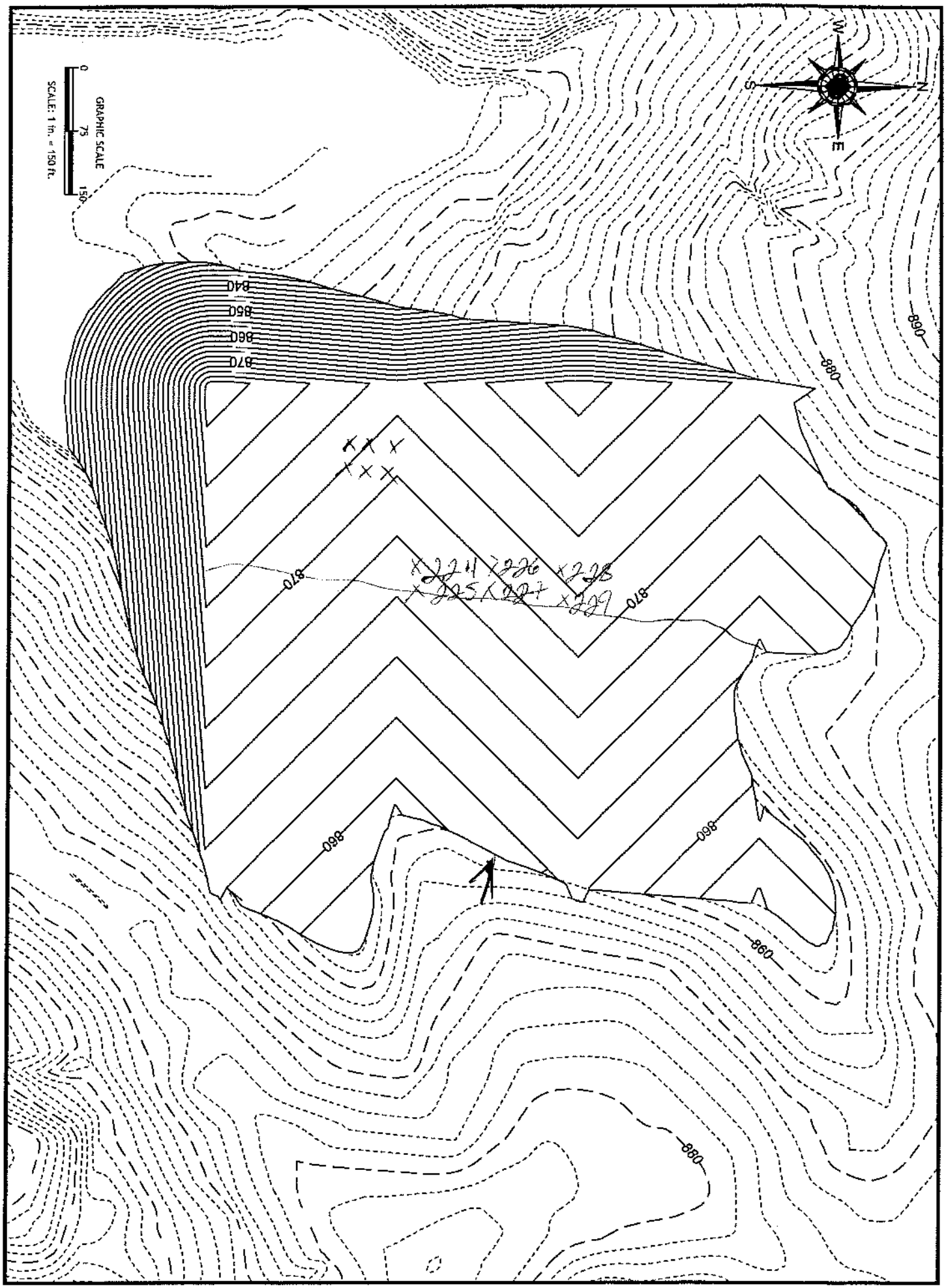
~~740 at 30.7%~~ ~~BAS-24~~
763 @ 30.7 BAS-24
~~704~~ @ 32.2 BAS-25 ←
74.0

Blonde

Printed Name

Signature

JMP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2-10-14

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 2-12-10
Inspection of: Fill Fly Ash	**Technician:** ELIS PEGAI	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION

Shield onsite to observed Fill Fly Ash at MARSHALL.

All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS PEGAI
Printed Name

Signature

F:\doc\forms\daily report.doc

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 2-12-10
Inspection of: Fill Fly Ash	Technician: Elis Rojas	

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All test meets criteria

Drive Tube\Nuclear Density Data

Test No.	230	231	232	233	234	235		
Grade or Elevation	866.45							
Location								
Wt. Wet Soil & Mold	4.29	4.27	4.25	4.26	4.30	4.32		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	2.97	2.95	2.93	2.94	2.98	3		
Volume Mold	0.0332							
Wet Density	89.5	88.9	88.3	88.6	89.8	90.4		
Wt. Wet soil & Pan	486.2	479.9	474.3	473.4	475.2	471.3		
Wt. Dry soil & Pan	436.8	433.5	428.7	428.1	427.8	426.4		
Wt. Pan	243	244.2	243	244.2	243	244.2		
Moisture Lost	49.2	46.4	45.6	45.3	47.4	47.9		
Wt. Dry soil	193	189.3	185.7	183.9	184.8	182.2		
% Moisture	25.5	24.5	24.6	24.6	25.6	26.3		
Dry Density	71.3	71.4	70.9	71.1	71.5	71.6		
Maximum Dry Density	72							
Optimum Moisture	26.3							
% Compaction	99	99.2	98.5	98.8	99.3	99.4		
Meets Criteria (Y\N)								

1 Point Proctor Data

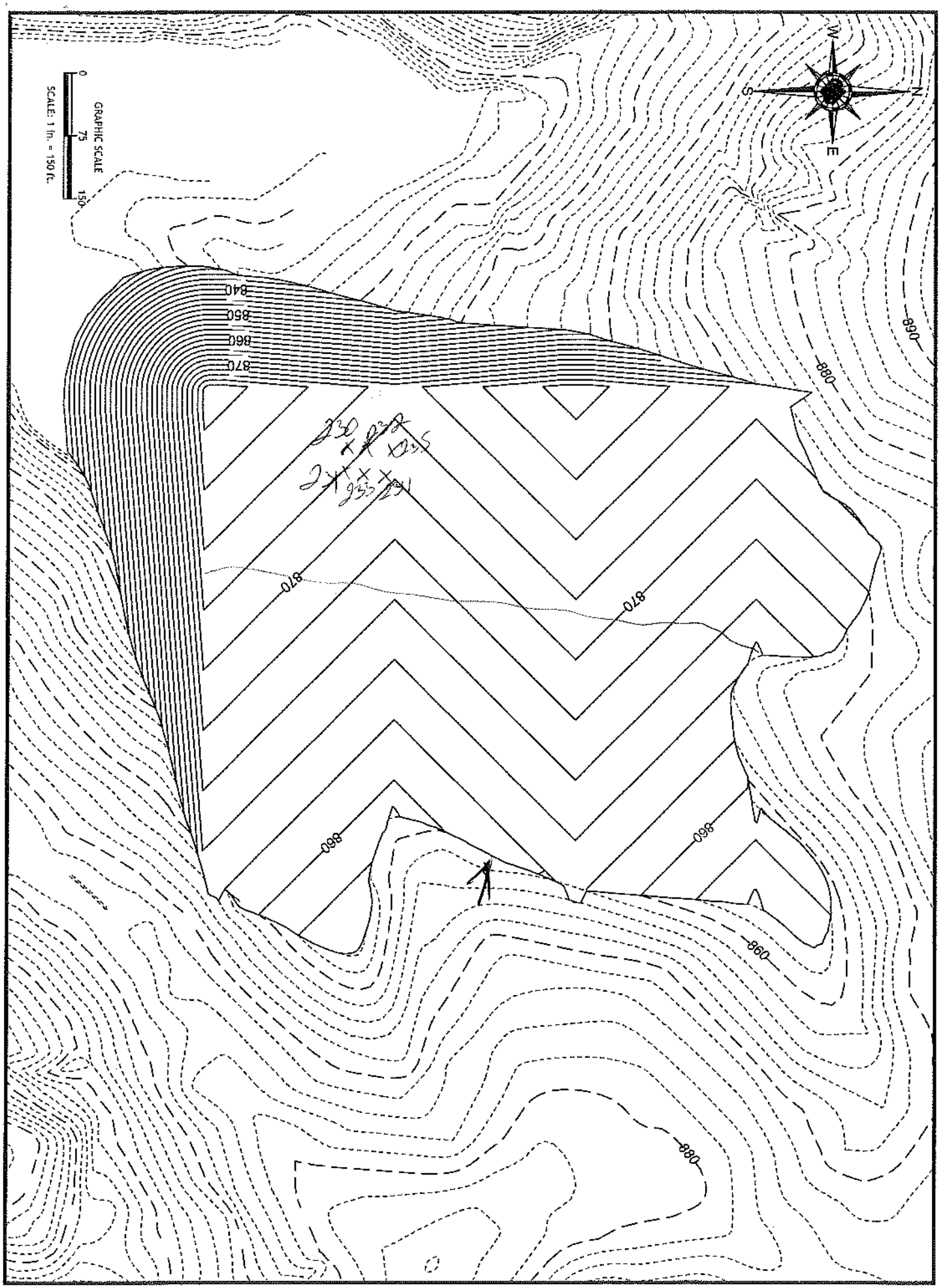
Wt. Wet Soil & Mold	12.41	
Wt. Mold	9.30	
Wt. Wet soil	3.11	
Volume Mold	0.0331	
Wet Density	~~94.23~~	
Wt. Wet soil & Pan	557.5	
Wt. Dry soil & Pan	489.1	
Wt. Pan	243	
Moisture Lost	68.4	
Wt. Dry soil	246.1	
% Moisture	27.8	
Dry Density	~~78.~~ 73.6	

Additional Project Data

72 at 26.3 BAS-14

Elis Rojas
Printed Name

Signature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2-12-16

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 2-19-10
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed Fill Fly Ash at Mar Shall.

Shield observed that crew was working opsite side of Land Fill (Lower site).

Contracting company was working on site. Shield ok for elevation opsite site. 857.60.

Shield performed six test. All test meets Criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 2-19-10
Inspection of: Fill Finish		Technician: Elis Rojas	

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Drive Tube\Nuclear Density Data

Test No.	236	237	238	239	240	241		
Grade or Elevation	848.82							
Location								
Wt. Wet Soil & Mold	4.23	4.30	4.24	4.28	4.25	4.27		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	2.91	2.98	2.92	2.96	2.93	2.95		
Volume Mold	0.0332							
Wet Density	87.7	89.8	88	89.2	88.3	88.9		
Wt. Wet soil & Pan	469.1	471.8	485.4	479.7	467.6	466.5		
Wt. Dry soil & Pan	424.5	424.1	440	434.9	427.4	425.6		
Wt. Pan	241.5	242.4	241.5	240.4	241.5	242.4		
Moisture Lost	44.6	47.7	45.4	45	40.2	40.9		
Wt. Dry soil	183	181.7	198.5	192.5	185.9	183.2		
% Moisture	24.4	26.3	22.9	23.3	21.6	22.3		
Dry Density	70.5	71.1	71.6	72.3	72.6	72.7		
Maximum Dry Density	72.0							
Optimum Moisture	26.3							
% Compaction	97.9	98.8	99.4	100.4	100.8	100.9		
Meets Criteria (Y\N)								

1 Point Proctor Data

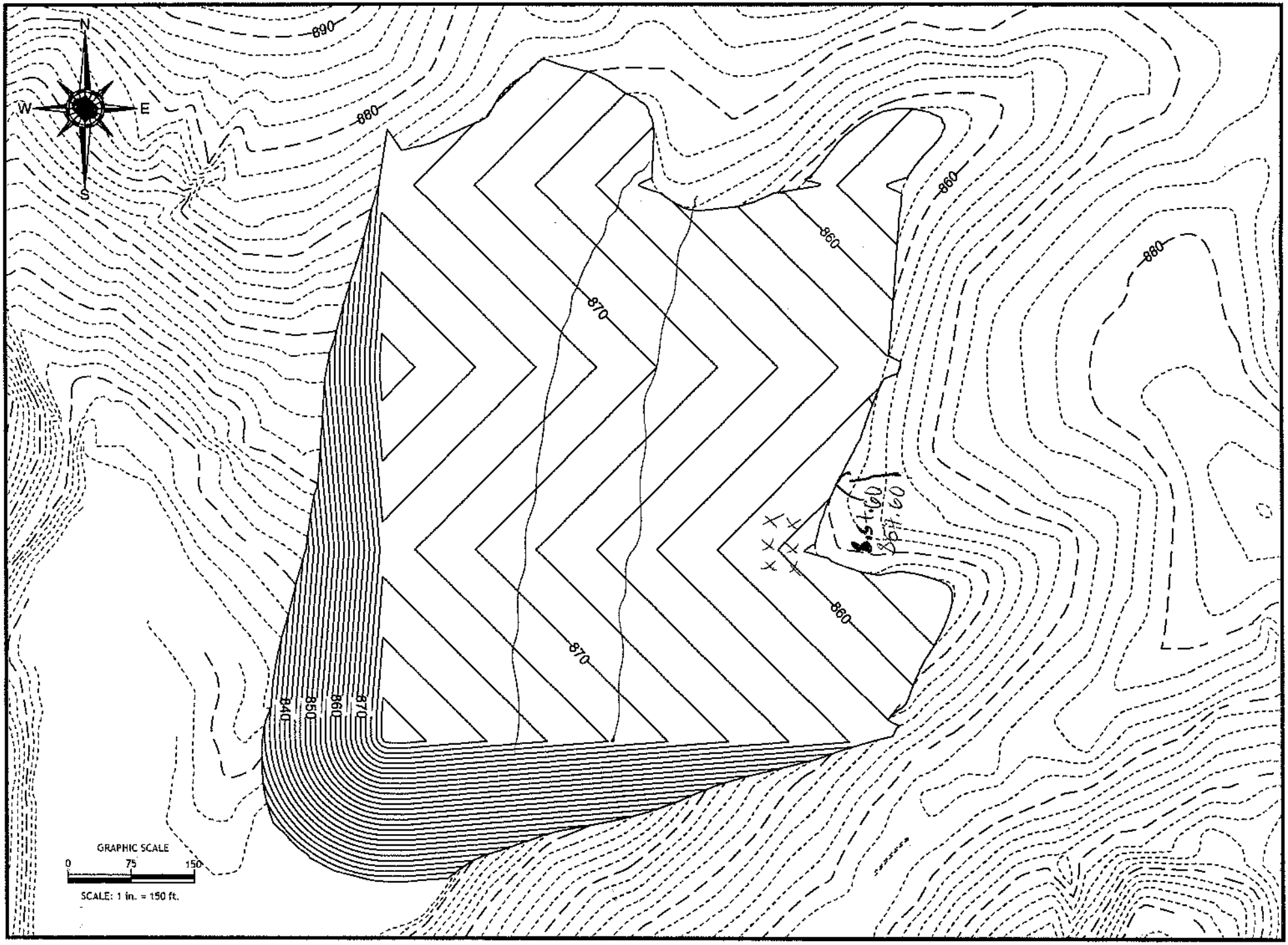
Wt. Wet Soil & Mold	4.29
Wt. Mold	1.30
Wt. Wet soil	2.99
Volume Mold	0.0331
Wet Density	90.3
Wt. Wet soil & Pan	464.4
Wt. Dry soil & Pan	419.9
Wt. Pan	241.5
Moisture Lost	44.5
Wt. Dry soil	178.4
% Moisture	24.9
Dry Density	72.3

Additional Project Data

72.0 at 26.3 B-14

Elis Rojas
Printed Name

Signature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SCALE: 1 in. = 150 ft.

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 2-23-10
Inspection of: Fill Fly Ash	**Technician:** Elis Reyes	

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Shield on site to observed Fill Fly Ash at MARSHALL

Shield performed six test. All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Reyes
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 2-23-10
Inspection of: Fill Fly Ash	Technician: Elis Rojas	

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THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

Drive Tube\Nuclear Density Data

Test No.	242	243	244	245	246	247		
Grade or Elevation	848.82							
Location								
Wt. Wet Soil & Mold	4.52	4.55	4.49	4.55	4.50	4.47		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	3.2	3.23	3.17	3.23	3.18	3.15		
Volume Mold	0.0332							
Wet Density	96.4	97.3	95.5	97.3	95.8	94.9		
Wt. Wet soil & Pan	488.1	488.8	475.8	477.7	478.9	480.1		
Wt. Dry soil & Pan	430.1	430.7	421.7	421.8	423.9	426		
Wt. Pan	243.1	242.8	243.1	242.8	243.1	242.8		
Moisture Lost	58	58.1	54.1	55.9	55	54.1		
Wt. Dry soil	187	187.9	178.6	179	180.8	183.2		
% Moisture	31	30.9	30.2	31.2	30.4	29.5		
Dry Density	73.6	74.3	73.3	74.2	73.5	73.3		
Maximum Dry Density	74.8							
Optimum Moisture	30.7							
% Compaction	98.4	99.3	98	99.2	98.3	98		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.59	
Wt. Mold	9.30	
Wt. Wet soil		
Volume Mold	0.0331	
Wet Density		
Wt. Wet soil & Pan	484.1	
Wt. Dry soil & Pan	426.8	
Wt. Pan	243.1	
Moisture Lost		
Wt. Dry soil		
% Moisture		
Dry Density		

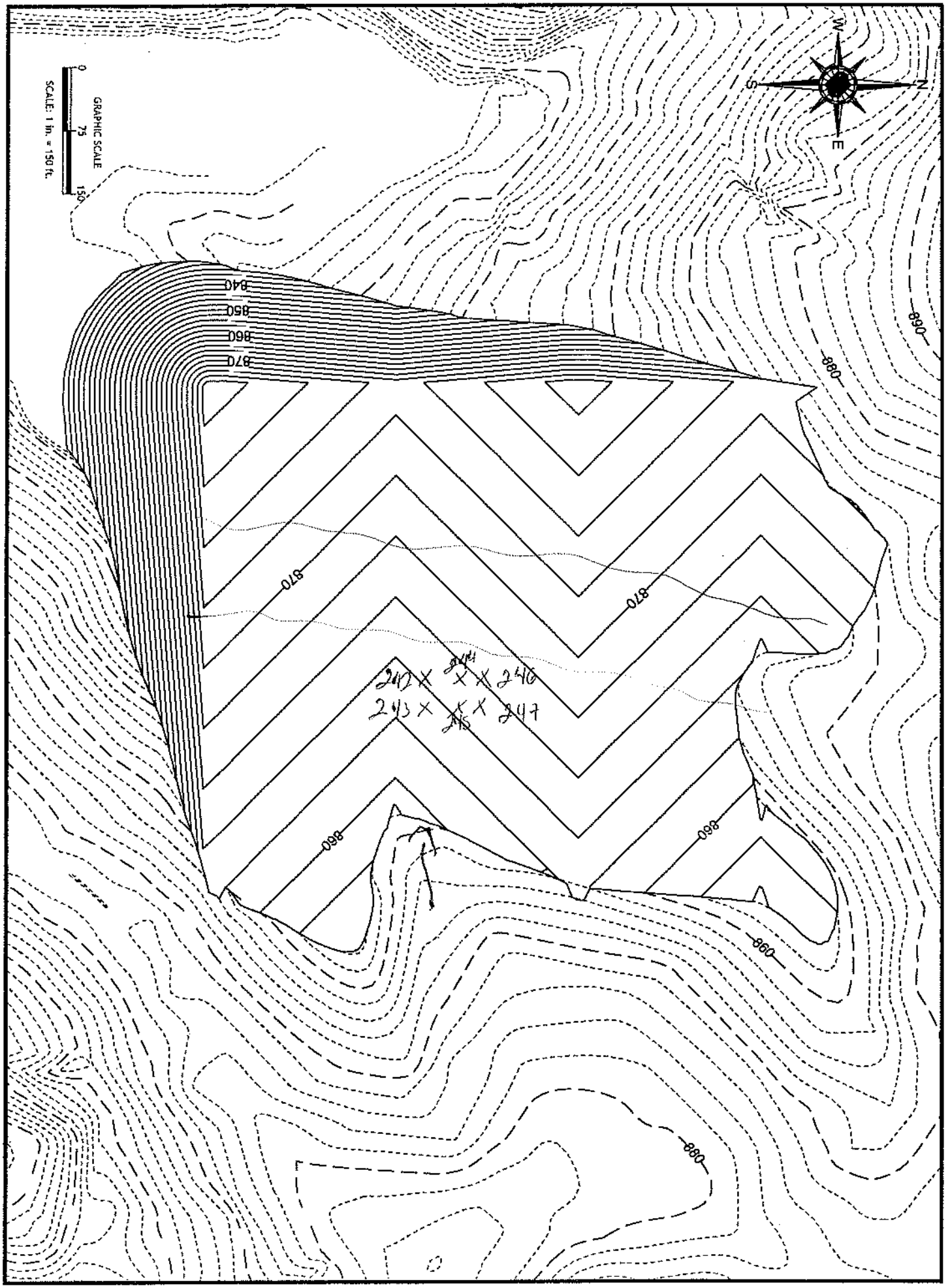
Additional Project Data

74.8 at 30.7% BAS-28

Elis Rojas
Printed Name

Signature

JMP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2-23-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 2-25-10
Inspection of: Fill Fly Ash	**Technician:** Elis Pefa	

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Shield on site to observed fill at Marshall Power Steam Station.

The conditions of road ~~were~~ were very bad.

Shield try to call Carlton Allred. He did not answer. After one hour Carlton Allred call Shield. He was informed that Shield was on site. Jimmy (Track Loader) operator was on trailer. He I informed Shield that road was bad.

Shield informed Janette Rosser

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

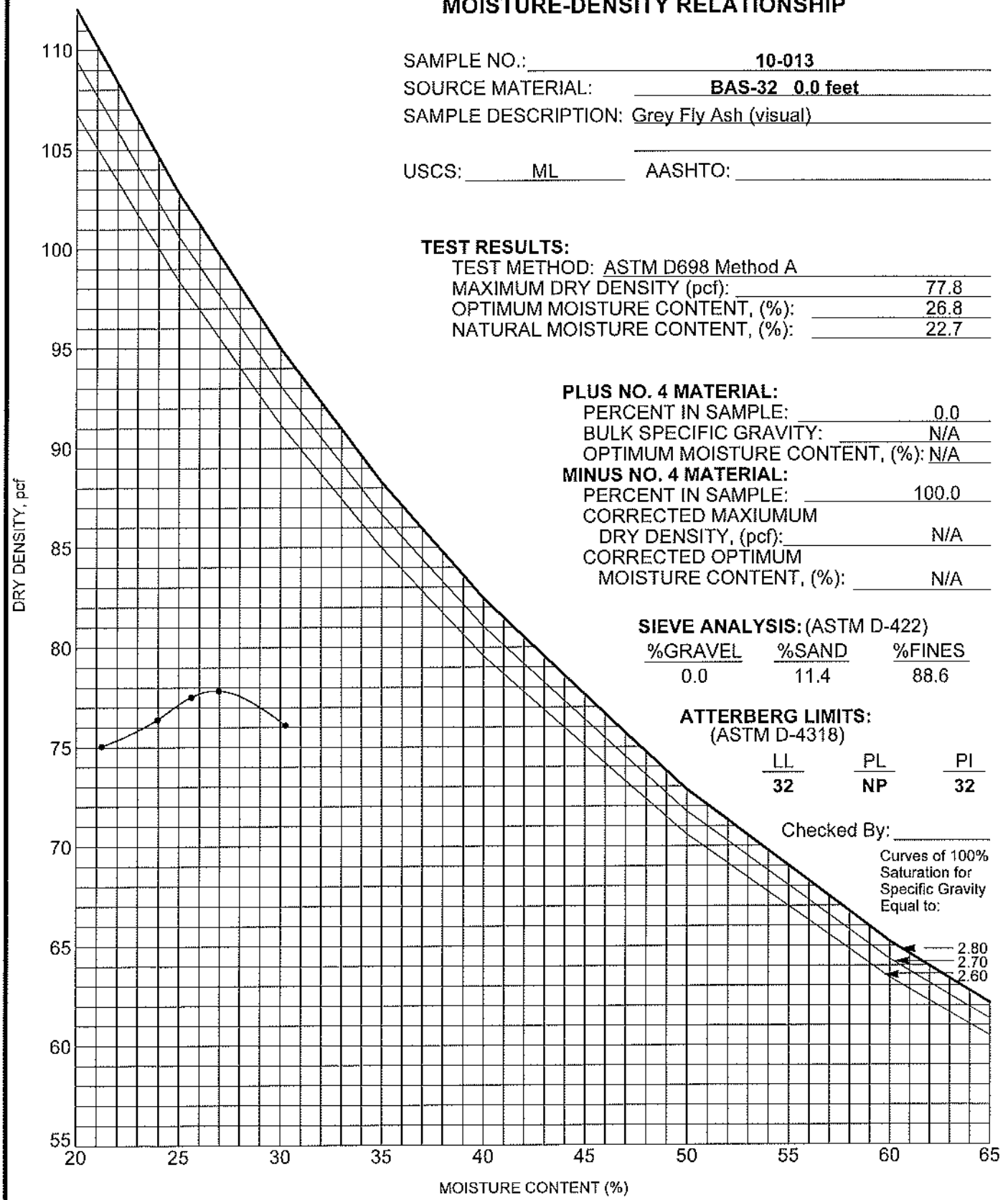
Elis Pefa
Printed Name

Signature

LABORATORY CONFORMANCE TEST RESULTS

BAS-32 through BAS-33

MOISTURE-DENSITY RELATIONSHIP



SAMPLE NO.: **10-013**

SOURCE MATERIAL: **BAS-32 0.0 feet**

SAMPLE DESCRIPTION: Grey Fly Ash (visual)

USCS: ML AASHTO:

TEST RESULTS:

TEST METHOD: ASTM D698 Method A

MAXIMUM DRY DENSITY (pcf): 77.8

OPTIMUM MOISTURE CONTENT, (%): 26.8

NATURAL MOISTURE CONTENT, (%): 22.7

PLUS NO. 4 MATERIAL:

PERCENT IN SAMPLE: 0.0

BULK SPECIFIC GRAVITY: N/A

OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:

PERCENT IN SAMPLE: 100.0

CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A

CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	11.4	88.6

ATTERBERG LIMITS:
(ASTM D-4318)

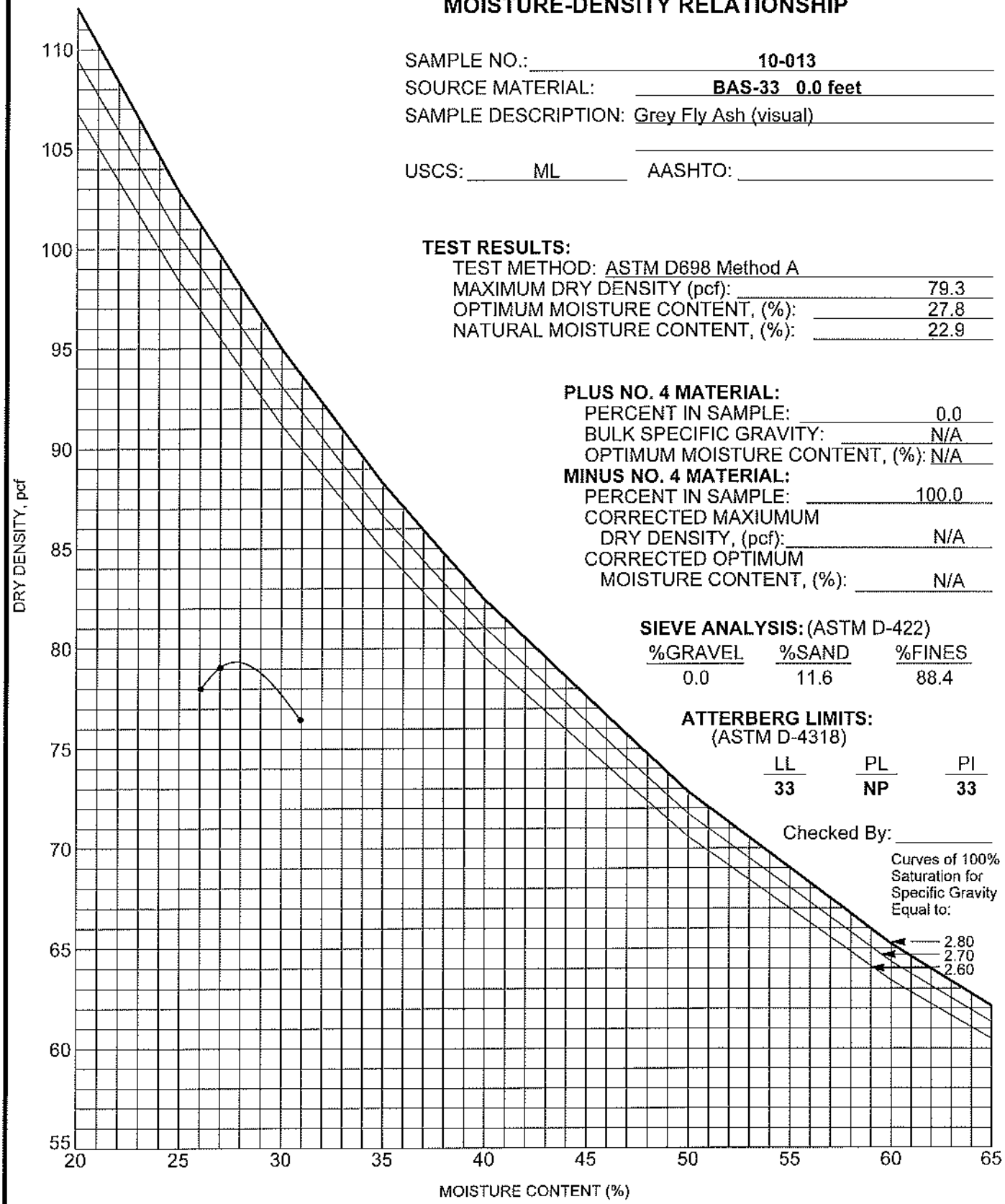
LL	PL	PI
32	**NP**	**32**

Checked By:

SHIELD ENGINEERING, INC.
4301 Taggart Creek Road
Charlotte, NC 28208
Telephone: 704-394-6913
Toll Free: 800-395-5220
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

MOISTURE-DENSITY RELATIONSHIP



SAMPLE NO.: **10-013**

SOURCE MATERIAL: **BAS-33 0.0 feet**

SAMPLE DESCRIPTION: Grey Fly Ash (visual)

USCS: ML AASHTO:

TEST RESULTS:

TEST METHOD: ASTM D698 Method A

MAXIMUM DRY DENSITY (pcf): 79.3

OPTIMUM MOISTURE CONTENT, (%): 27.8

NATURAL MOISTURE CONTENT, (%): 22.9

PLUS NO. 4 MATERIAL:

PERCENT IN SAMPLE: 0.0

BULK SPECIFIC GRAVITY: N/A

OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:

PERCENT IN SAMPLE: 100.0

CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A

CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	11.6	88.4

ATTERBERG LIMITS: (ASTM D-4318)

LL	PL	PI
33	**NP**	**33**

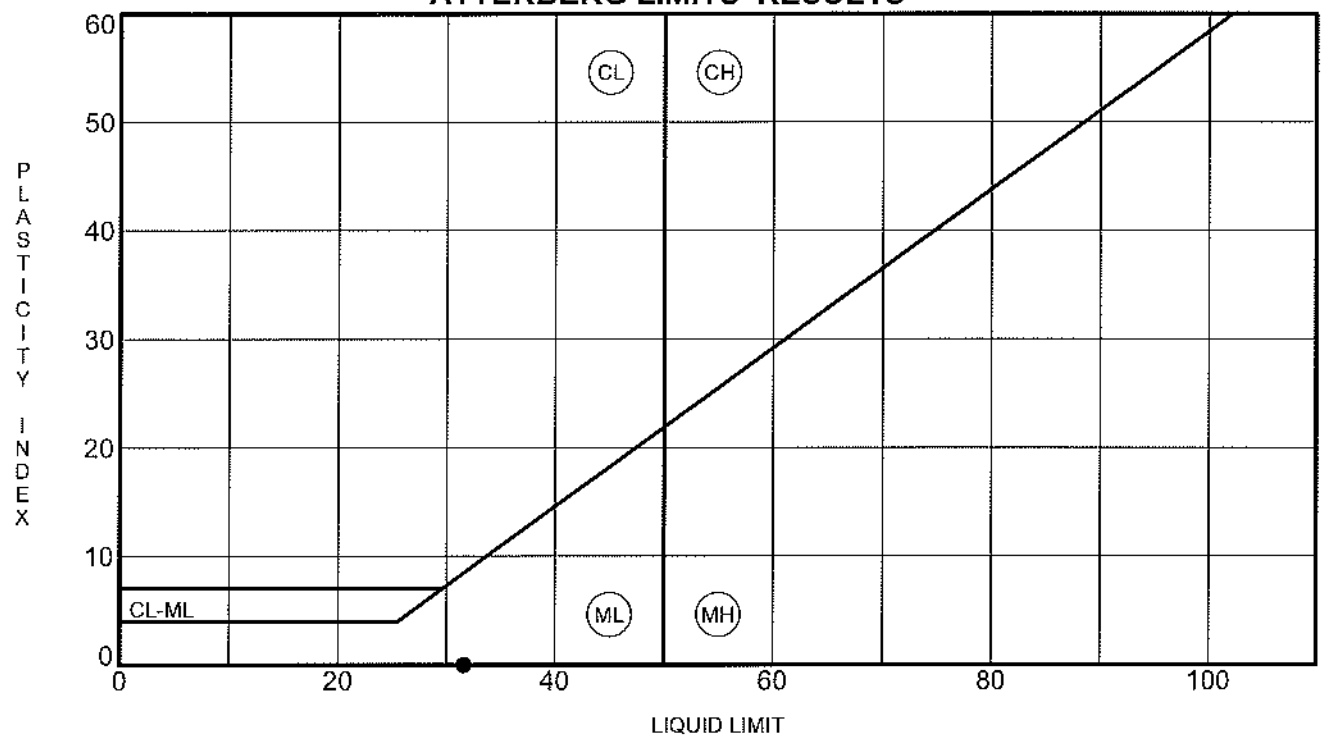
Checked By:

SHIELD ENGINEERING, INC.

4301 Taggart Creek Road
Charlotte, NC 28208
Telephone: 704-394-6913
Toll Free: 800-395-5220
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**BAS-32**	**0.0**	**32**	**NP**	**NP**	**89**	**Grey Fly Ash (visual)**

SHIELD ENGINEERING, INC.
4301 Taggart Creek Road
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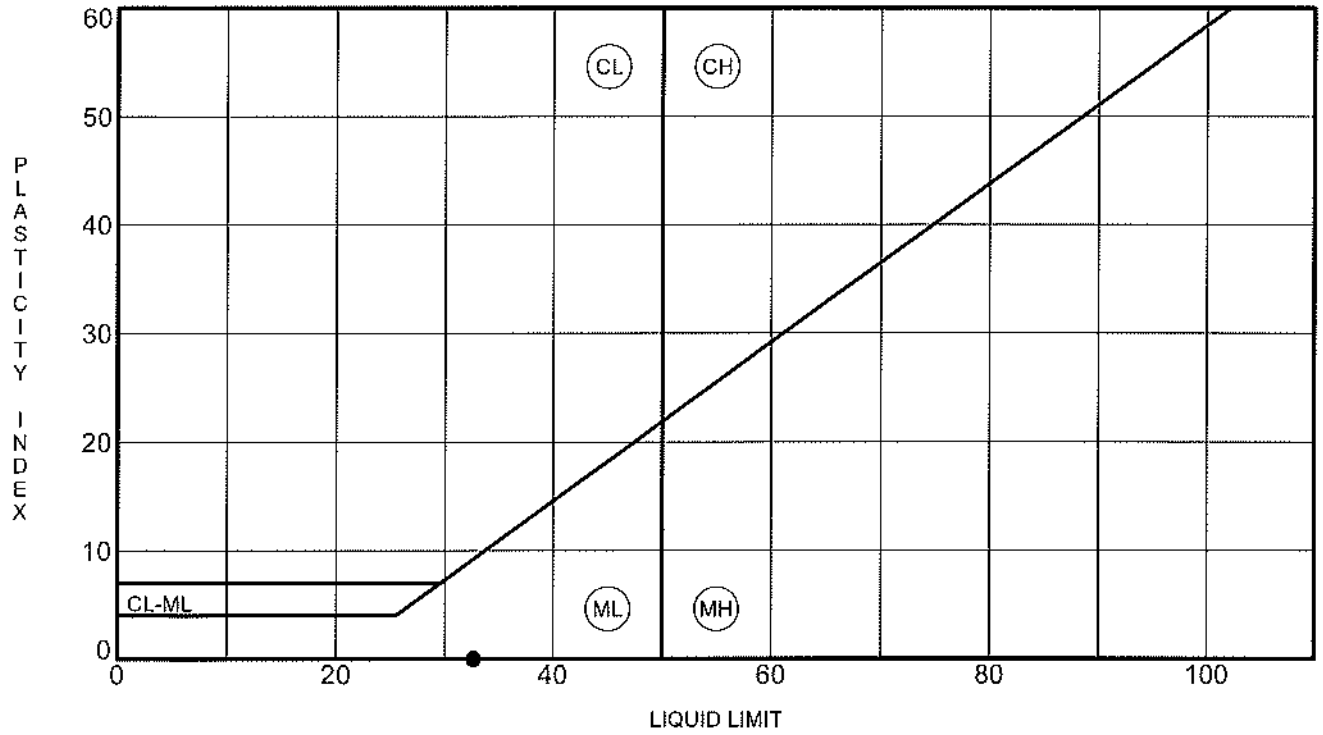
Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS

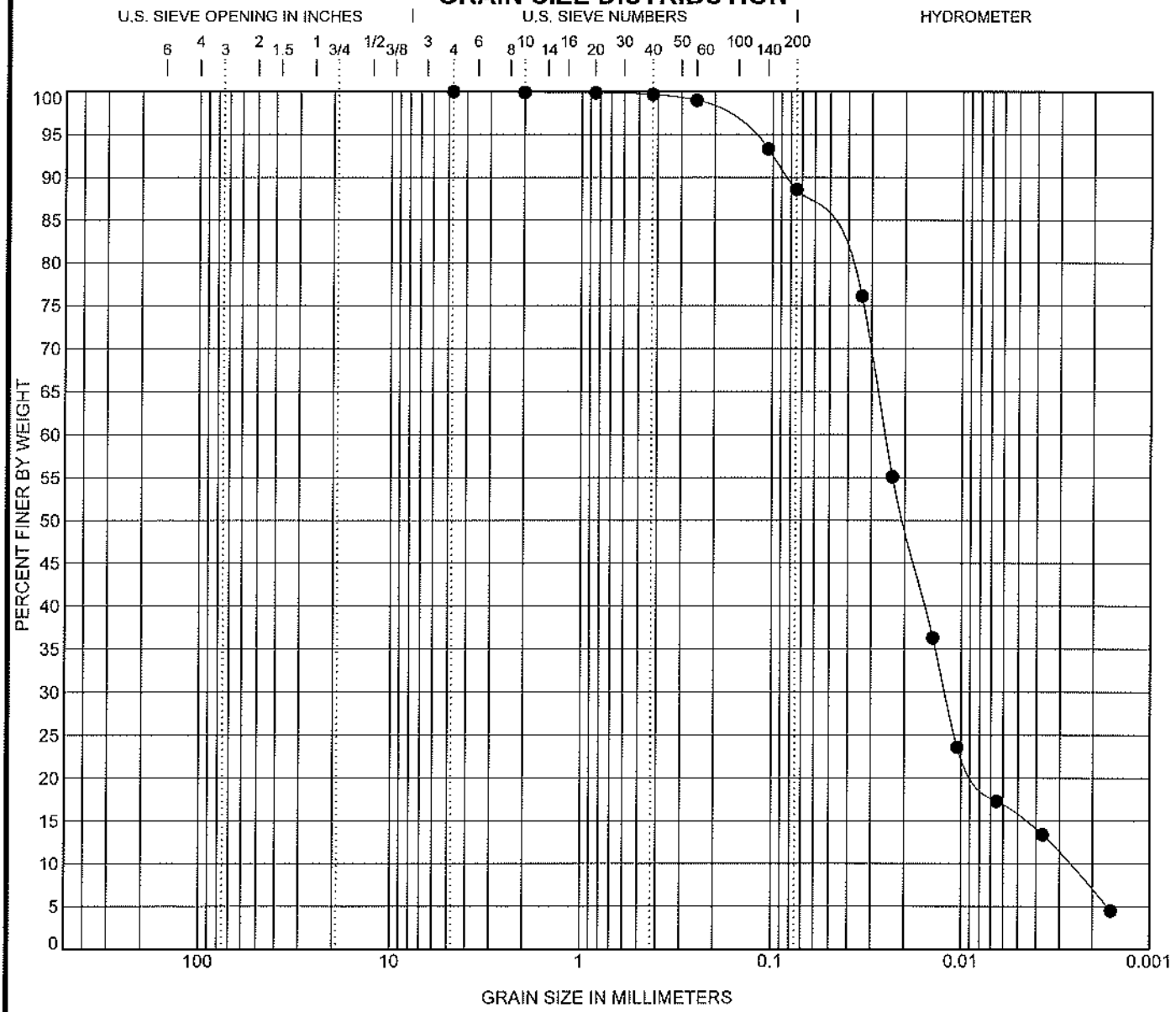


	Specimen Identification		LL	PL	PI	Fines	Classification
●	**BAS-33**	**0.0**	**33**	**NP**	**NP**	**88**	**Grey Fly Ash (visual)**

SHIELD ENGINEERING, INC.
4301 Taggart Creek Road
Charlotte, NC 28208
Telephone: 704-394-6913
Toll Free: 800-395-5220
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

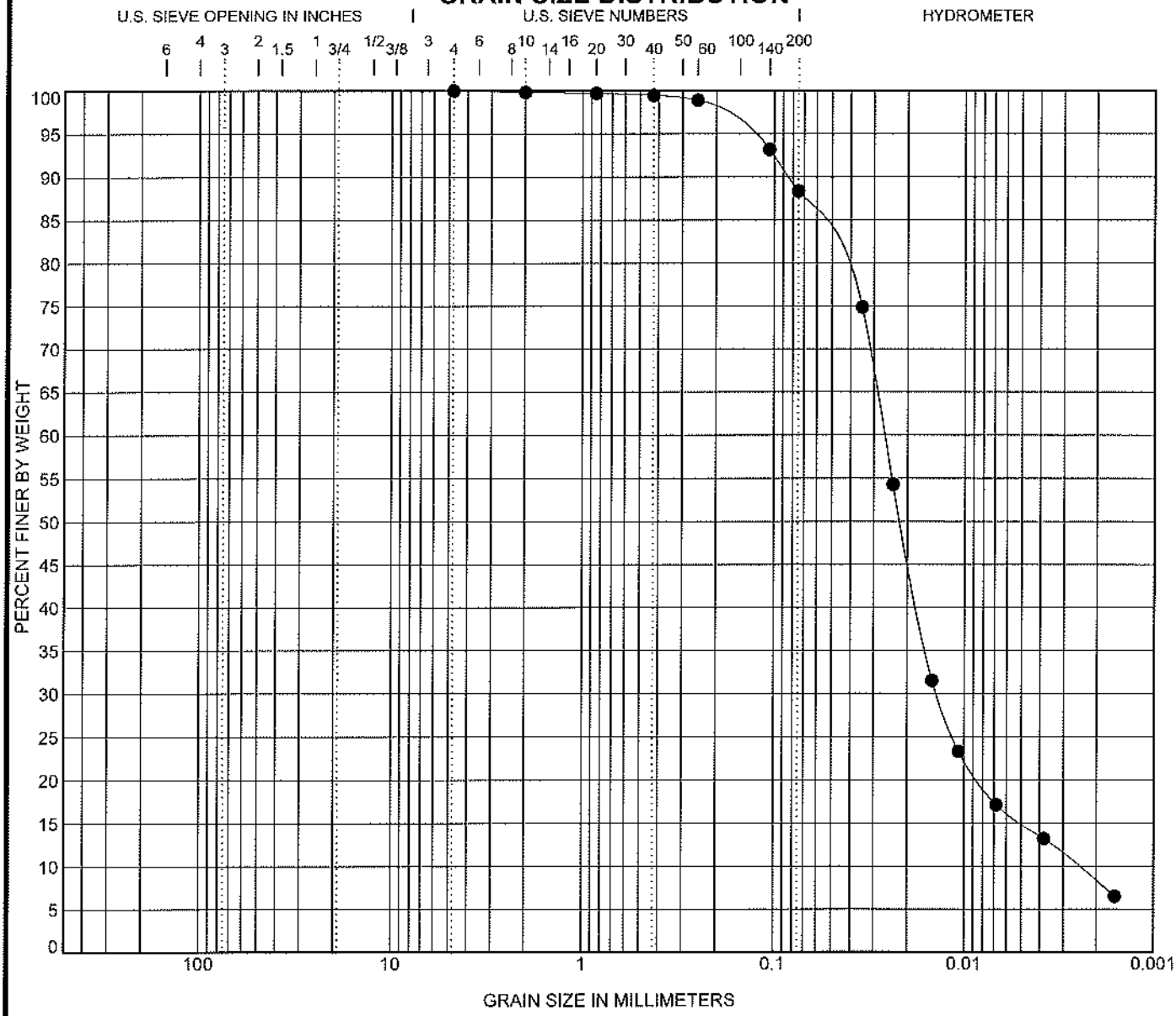
	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-32**	**0.0**	**Grey Fly Ash (visual)**	**32**	**NP**	**NP**	**2.20**	**9.43**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-32**	**0.0**	**4.75**	**0.025**	**0.012**	**0.003**	**0.0**	**11.4**	**73.1**	**15.5**

SHIELD ENGINEERING, INC.
4301 Taggart Creek Road
Charlotte, NC 28208
Telephone: 704-394-6913
Toll Free: 800-395-5220
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-33**	**0.0**	**Grey Fly Ash (visual)**	**33**	**NP**	**NP**	**2.93**	**10.51**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-33**	**0.0**	**4.75**	**0.026**	**0.014**	**0.003**	**0.0**	**11.6**	**73.3**	**15.0**

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Charlotte, NC 28208
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Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

SHIELD ENGINEERING, INC.

April 9, 2010

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 8 - Month of March 2010
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of March. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Janette M. Prosser, P.E.
Senior Engineer

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\1002083-03 Marshall Ash Landfill 2010-03.doc

4301 Taggart Creek Road
Charlotte, NC 28208

www.shieldengineering.com

Telephone 704.394.6913
Fax 704.394.6968

SHIELD ENGINEERING, INC.
4301 Taggart Creek Road, Charlotte, North Carolina 28208
Phone 704-394-6913 Fax 704-394-6968

Monthly Summary Report - No. 8

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	April 9, 2010	**Page:**	1 of 2
Report By:	Janette M. Prosser, P.E.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of March.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on March 4, 8, 12, 17, 18, 19, 22, 23 and 25, 2010 to perform field density tests of the ash landfill material. The in-place density tests labeled DT-248 to DT-301 were performed during this period. Based on a review of the field test results, a few of the test results completed during this period were slightly below the required 95 percent compaction requirement, however, these isolated test results (94.1 to 94.7 percent) are not anticipated to affect the structural integrity of the overall fill. See Table 1 for preliminary results and locations.

Laboratory Conformance Test:

1. Conformance laboratory samples (BAS-34) were collected during this time period. See attached Moisture-Density Relationship test and additional required conformance test results.

Summary:

The compaction results of these samples were in accordance with instructions provided by Duke Energy representatives. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	MEETS ACCEPTANCE COMPACTION CRITERIA NO	MOISTURE BIAS (%)
FLY ASH														
DT-1	08/18/09	See location plan	6	838.0	53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6	838.0	58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6	838.0	57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6	838.0	57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6	838.0	61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6	838.0	64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6	839.0	61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6	839.0	57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6	839.0	54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6	839.0	74.5	25.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6	839.0	67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6	839.0	60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6	841.5	85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6	841.5	86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6	841.5	88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6	841.5	82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6	841.5	86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6	841.5	90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6	842.0	95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6	842.0	91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6	842.0	90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6	842.0	96.1	45.8	65.9	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6	842.0	91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6	842.0	87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6	842.5	91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6	842.5	86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6	842.5	84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6	842.5	85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6	842.5	84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6	842.5	85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6	842.5	83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6	842.5	84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6	842.5	88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6	842.5	87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6	842.5	87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6	842.5	91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6	843.0	86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6	843.0	85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6	843.0	82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6	843.0	80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6	843.0	88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6	843.0	84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6	843.5	82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6	843.5	82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6	843.5	79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6	843.5	84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6	843.5	93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6	843.5	96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

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SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-45R	09/15/09	See location plan	6	843.5	94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6	843.5	94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6	843.5	91.9	31.6	69.8	66.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6	843.5	94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6	844.5	94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6	844.5	93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6	844.5	94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6	844.5	93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6	844.5	92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6	844.5	93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6	844.5	88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6	844.5	95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6	844.5	93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6	844.5	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6	844.5	91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6	844.5	91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6	845.0	88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6	845.0	87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6	845.0	89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6	845.0	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6	845.0	93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6	845.0	93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6	845.0	91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6	845.0	93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.9
DT-70	10/02/09	See location plan	6	845.0	91.9	30.6	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6	845.0	93.7	36.0	68.9	71.6	33.7	BAS-19	95.2	X		2.3
DT-72	10/02/09	See location plan	6	845.0	93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6	845.0	94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6	845.0	89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6	845.0	88.9	30.1	68.3	70.0	32.5	BAS-8	97.5	X		-2.4
DT-76	10/07/09	See location plan	6	845.0	92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6	845.0	95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6	845.0	94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6	845.0	90.1	26.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6	845.5	91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6	845.5	87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6	845.5	93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6	845.5	88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6	845.5	90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6	845.5	86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6	845.5	93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6	845.5	93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6	845.5	90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6	845.5	91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6	845.5	93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6	845.5	91.2	29.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6	845.5	93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6	845.5	88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6	845.5	92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6	845.5	92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0

DT - Indicates Drive Tube Density Test
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DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

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SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-96	10/23/09	See location plan	6	845.5	96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6	845.5	98.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4
DT-98	11/03/09	See location plan	6	847.0	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-99	11/03/09	See location plan	6	847.0	91.3	28.9	70.8	71.5	33.1	BAS-26	99.1	X		-4.2
DT-100	11/03/09	See location plan	6	847.0	94.9	32.6	71.6	71.5	33.1	BAS-26	100+	X		-0.5
DT-101	11/03/09	See location plan	6	847.0	97.3	35.5	71.8	71.5	33.1	BAS-26	100+	X		2.4
DT-102	11/03/09	See location plan	6	847.0	97.9	35.3	72.4	71.5	33.1	BAS-26	100+	X		2.2
DT-103	11/03/09	See location plan	6	847.0	96.1	31.9	72.9	71.5	33.1	BAS-26	100+	X		-1.2
DT-104	11/06/09	See location plan	6	847.5	92.8	31.1	70.8	74.0	32.2	BAS-25	95.7	X		-1.1
DT-105	11/06/09	See location plan	6	847.5	89.8	31.5	68.3	74.0	32.2	BAS-25	92.3		X	-0.7
DT-105R	11/06/09	See location plan	6	847.5	92.8	31.8	70.4	74.0	32.2	BAS-25	95.1	X		-0.4
DT-106	11/06/09	See location plan	6	847.5	94.3	28.2	73.6	74.0	32.2	BAS-25	99.4	X		-4.0
DT-107	11/06/09	See location plan	6	847.5	95.2	30.8	72.8	74.0	32.2	BAS-25	98.4	X		-1.4
DT-108	11/06/09	See location plan	6	847.5	97.6	30.9	74.6	74.0	32.2	BAS-25	100+	X		-1.3
DT-109	11/06/09	See location plan	6	847.5	94.6	30.6	72.4	74.0	32.2	BAS-25	97.9	X		-1.6
DT-110	11/17/09	See location plan	6	845.5	88.0	29.9	67.7	70.2	28.3	BAS-11	96.5	X		1.6
DT-111	11/17/09	See location plan	6	845.5	89.8	28.7	69.8	70.2	28.3	BAS-11	99.4	X		0.4
DT-112	11/17/09	See location plan	6	845.5	91.3	26.1	72.4	72.0	26.3	BAS-14	100+	X		-0.2
DT-113	11/17/09	See location plan	6	845.5	91.9	26.9	72.4	72.0	26.3	BAS-14	100+	X		0.6
DT-114	11/17/09	See location plan	6	845.5	89.2	27.1	70.2	72.0	26.3	BAS-14	97.5	X		0.8
DT-115	11/17/09	See location plan	6	845.5	88.0	26.1	69.8	72.0	26.3	BAS-14	96.9	X		-0.2
DT-116	11/20/09	See location plan	6	845.5	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-117	11/20/09	See location plan	6	845.5	90.4	30.8	69.1	71.5	33.1	BAS-26	96.7	X		-2.3
DT-118	11/20/09	See location plan	6	845.5	90.7	32.3	68.6	71.5	33.1	BAS-26	95.9	X		-0.8
DT-119	11/20/09	See location plan	6	845.5	91.9	31.0	70.2	71.5	33.1	BAS-26	98.1	X		-2.1
DT-120	11/20/09	See location plan	6	845.5	95.8	31.2	73.0	71.5	33.1	BAS-26	100+	X		-1.9
DT-121	11/20/09	See location plan	6	845.5	89.2	30.7	68.2	71.5	33.1	BAS-26	95.5	X		-2.4
DT-122	11/25/09	See location plan	6	845.5	94.9	28.9	73.6	76.3	30.7	BAS-24	96.5	X		-1.8
DT-123	11/25/09	See location plan	6	845.5	96.4	32.2	72.9	76.3	30.7	BAS-24	95.6	X		1.5
DT-124	11/25/09	See location plan	6	845.5	95.8	31.2	73.0	76.3	30.7	BAS-24	95.7	X		0.5
DT-125	11/25/09	See location plan	6	845.5	94.1	27.9	73.6	76.3	30.7	BAS-24	96.4	X		-2.8
DT-126	11/25/09	See location plan	6	845.5	92.8	27.5	72.8	76.3	30.7	BAS-24	95.4	X		-3.2
DT-127	11/25/09	See location plan	6	845.5	97.0	30.7	74.2	76.3	30.7	BAS-24	97.3	X		0.0
DT-128	12/02/09	See location plan	6	846.5	84.3	26.5	66.6	70.2	28.3	BAS-11	94.9		X	-1.8
DT-129	12/02/09	See location plan	6	846.5	85.8	27.2	67.5	70.2	28.3	BAS-11	96.1	X		-1.1
DT-130	12/02/09	See location plan	6	846.5	90.4	28.5	71.5	70.2	28.3	BAS-11	100+	X		-1.8
DT-131	12/02/09	See location plan	6	846.5	91.0	28.1	71.0	70.2	28.3	BAS-11	100+	X		-0.2
DT-132	12/02/09	See location plan	6	846.5	89.5	30.0	68.8	70.2	28.3	BAS-11	98.1	X		1.7
DT-133	12/02/09	See location plan	6	846.5	88.6	27.2	69.7	70.2	28.3	BAS-11	99.2	X		-1.1
DT-134	12/07/09	See location plan	6	848.0	88.9	27.4	69.8	70.2	28.3	BAS-11	99.4	X		-0.9
DT-135	12/07/09	See location plan	6	848.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-136	12/07/09	See location plan	6	848.0	86.4	26.4	68.4	70.2	28.3	BAS-11	97.4	X		-1.9
DT-137	12/07/09	See location plan	6	848.0	84.9	25.1	67.9	70.2	28.3	BAS-11	96.7	X		-3.2
DT-138	12/07/09	See location plan	6	848.0	86.7	28.6	67.4	70.2	28.3	BAS-11	96.0	X		0.3
DT-139	12/07/09	See location plan	6	848.0	88.9	29.2	68.8	70.2	28.3	BAS-11	98.0	X		0.9
DT-140	12/16/09	See location plan	6	845.5	83.1	25.9	66.0	67.0	24.0	BAS-7	98.5	X		1.9
DT-141	12/16/09	See location plan	6	845.5	84.3	24.5	67.7	67.0	24.0	BAS-7	100+	X		0.5
DT-142	12/16/09	See location plan	6	845.5	80.4	24.9	64.4	67.0	24.0	BAS-7	96.1	X		0.9
DT-143	12/16/09	See location plan	6	845.5	81.3	26.1	64.5	67.0	24.0	BAS-7	96.2	X		2.1
DT-144	12/16/09	See location plan	6	845.5	84.0	25.6	66.9	67.0	24.0	BAS-7	99.8	X		1.6
DT-145	12/16/09	See location plan	6	845.5	86.7	26.0	68.8	67.0	24.0	BAS-7	100+	X		2.0

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
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DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-146	12/21/09	See location plan	6	849.0	94.3	32.6	71.1	71.6	33.7	BAS-19	99.3	X		-1.1
DT-147	12/21/09	See location plan	6	849.0	94.0	33.6	70.4	71.6	33.7	BAS-19	98.3	X		-0.1
DT-148	12/21/09	See location plan	6	849.0	97.0	34.0	72.4	71.6	33.7	BAS-19	100+	X		0.3
DT-149	12/21/09	See location plan	6	849.0	95.8	34.2	71.4	71.6	33.7	BAS-19	99.7	X		0.5
DT-150	12/21/09	See location plan	6	849.0	93.7	34.1	69.9	71.6	33.7	BAS-19	97.6	X		0.4
DT-151	12/21/09	See location plan	6	849.0	94.9	31.0	72.4	71.6	33.7	BAS-19	100+	X		-2.7
DT-152	12/23/09	See location plan	6	850.0	86.4	26.7	68.2	70.2	28.3	BAS-11	97.1	X		-1.6
DT-153	12/23/09	See location plan	6	850.0	88.3	25.6	70.3	70.2	28.3	BAS-11	100+	X		-2.7
DT-154	12/23/09	See location plan	6	850.0	85.2	26.4	67.4	70.2	28.3	BAS-11	96.0	X		-1.9
DT-155	12/23/09	See location plan	6	850.0	85.8	28.6	66.7	70.2	28.3	BAS-11	95.0	X		0.3
DT-156	12/23/09	See location plan	6	850.0	87.3	27.6	68.4	70.2	28.3	BAS-11	97.5	X		-0.7
DT-157	12/23/09	See location plan	6	850.0	86.4	29.5	66.7	70.2	28.3	BAS-11	95.0	X		1.2
DT-158	12/28/09	See location plan	6	851.5	88.0	33.7	65.8	70.0	32.5	BAS-11	94.0		X	1.2
DT-159	12/28/09	See location plan	6	851.5	91.3	34.8	67.7	70.0	32.5	BAS-11	96.8	X		2.3
DT-160	12/28/09	See location plan	6	851.5	92.8	32.0	70.3	70.0	32.5	BAS-11	100+	X		-0.5
DT-161	12/28/09	See location plan	6	851.5	91.0	32.8	68.5	70.0	32.5	BAS-11	97.9	X		0.3
DT-162	12/28/09	See location plan	6	851.5	90.1	31.7	68.4	70.0	32.5	BAS-11	97.7	X		-0.8
DT-163	12/28/09	See location plan	6	851.5	91.6	33.2	68.8	70.0	32.5	BAS-11	98.2	X		0.7
DT-164	12/29/09	See location plan	6	852.5	97.6	32.3	73.8	76.3	30.7	BAS-24	96.7	X		1.6
DT-165	12/29/09	See location plan	6	852.5	95.8	26.0	76.0	76.3	30.7	BAS-24	99.6	X		-4.7
DT-166	12/29/09	See location plan	6	852.5	96.1	27.3	75.5	76.3	30.7	BAS-24	98.9	X		-3.4
DT-167	12/29/09	See location plan	6	852.5	97.9	27.3	76.9	76.3	30.7	BAS-24	100+	X		-3.4
DT-168	12/29/09	See location plan	6	852.5	98.8	25.8	78.5	76.3	30.7	BAS-24	100+	X		-4.9
DT-168R	12/29/09	See location plan	6	852.5	96.1	27.0	75.7	76.3	30.7	BAS-24	99.2	X		-3.7
DT-169	12/29/09	See location plan	6	852.5	96.4	26.9	76.0	76.3	30.7	BAS-24	99.6	X		-3.8
DT-170	12/30/09	See location plan	6	853.0	88.3	24.1	71.2	72.0	26.3	BAS-14	98.8	X		-2.2
DT-171	12/30/09	See location plan	6	853.0	86.7	21.8	71.2	72.0	26.3	BAS-14	98.9	X		-4.5
DT-172	12/30/09	See location plan	6	853.0	86.1	24.2	69.3	72.0	26.3	BAS-14	96.3	X		-2.1
DT-173	12/30/09	See location plan	6	853.0	87.3	22.5	71.3	72.0	26.3	BAS-14	99.0	X		-3.8
DT-174	12/30/09	See location plan	6	853.0	86.7	21.9	71.1	72.0	26.3	BAS-14	98.8	X		-4.4
DT-175	12/30/09	See location plan	6	853.0	86.4	23.0	70.2	72.0	26.3	BAS-14	97.6	X		-3.3
DT-176	01/06/10	See location plan	6	855.0	87.0	29.1	67.4	67.9	28.5	BAS-12	99.2	X		0.6
DT-177	01/06/10	See location plan	6	855.0	86.1	32.6	64.9	67.9	28.5	BAS-12	95.6	X		4.1
DT-178	01/06/10	See location plan	6	855.0	86.1	25.1	68.8	67.9	28.5	BAS-12	100+	X		-3.4
DT-179	01/06/10	See location plan	6	855.0	85.8	29.3	66.4	67.9	28.5	BAS-12	97.7	X		0.8
DT-180	01/06/10	See location plan	6	855.0	87.3	27.5	68.5	67.9	28.5	BAS-12	100+	X		-1.0
DT-181	01/06/10	See location plan	6	855.0	86.7	26.7	68.4	67.9	28.5	BAS-12	100+	X		-1.8
DT-182	01/07/10	See location plan	6	856.0	89.5	30.7	68.5	67.9	28.5	BAS-12	100+	X		2.2
DT-183	01/07/10	See location plan	6	856.0	85.8	30.1	65.9	67.9	28.5	BAS-12	97.1	X		1.6
DT-184	01/07/10	See location plan	6	856.0	86.1	27.8	67.4	67.9	28.5	BAS-12	99.2	X		-0.7
DT-185	01/07/10	See location plan	6	856.0	86.7	29.6	66.9	67.9	28.5	BAS-12	98.5	X		1.1
DT-186	01/07/10	See location plan	6	856.0	82.5	26.1	65.4	67.9	28.5	BAS-12	96.4	X		-2.4
DT-187	01/07/10	See location plan	6	856.0	83.1	22.9	67.6	67.9	28.5	BAS-12	99.6	X		-5.6
DT-188	01/08/10	See location plan	6	858.5	95.2	34.7	70.7	72.2	33.9	BAS-31	97.9	X		0.8
DT-189	01/08/10	See location plan	6	858.5	95.8	31.6	72.8	72.2	33.9	BAS-31	100+	X		-2.3
DT-190	01/08/10	See location plan	6	858.5	94.6	35.1	70.0	72.2	33.9	BAS-31	97.0	X		1.2
DT-191	01/08/10	See location plan	6	858.5	95.2	33.3	71.4	72.2	33.9	BAS-31	98.9	X		-0.6
DT-192	01/08/10	See location plan	6	858.5	94.3	32.7	71.1	72.2	33.9	BAS-31	98.4	X		-1.2
DT-193	01/08/10	See location plan	6	858.5	94.6	36.8	69.2	72.2	33.9	BAS-31	95.8	X		2.9
DT-194	01/13/10	See location plan	6	860.0	85.5	29.2	66.2	70.2	28.3	BAS-11	94.3		X	0.9
DT-195	01/13/10	See location plan	6	860.0	85.2	25.2	68.1	70.2	28.3	BAS-11	96.9	X		-3.1

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SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-196	01/13/10	See location plan	6	860.0	85.2	27.0	67.1	70.2	28.3	BAS-11	95.6	X		-1.3
DT-197	01/13/10	See location plan	6	860.0	86.7	27.3	68.1	70.2	28.3	BAS-11	97.0	X		-1.0
DT-198	01/13/10	See location plan	6	860.0	86.7	25.1	69.3	70.2	28.3	BAS-11	98.7	X		-3.2
DT-199	01/13/10	See location plan	6	860.0	86.1	27.5	67.5	70.2	28.3	BAS-11	96.2	X		-0.8
DT-200	01/15/10	See location plan	6	868.5	86.1	24.5	69.2	70.2	28.3	BAS-11	98.5	X		-3.8
DT-201	01/15/10	See location plan	6	868.5	87.7	25.6	69.8	70.2	28.3	BAS-11	99.5	X		-2.7
DT-202	01/15/10	See location plan	6	868.5	87.3	26.8	68.8	70.2	28.3	BAS-11	98.1	X		-1.5
DT-203	01/15/10	See location plan	6	868.5	86.4	25.0	69.1	70.2	28.3	BAS-11	98.5	X		-3.3
DT-204	01/15/10	See location plan	6	868.5	86.7	25.8	68.9	70.2	28.3	BAS-11	98.2	X		-2.5
DT-205	01/15/10	See location plan	6	868.5	87.0	24.3	70.0	70.2	28.3	BAS-11	99.7	X		-4.0
DT-206	01/19/10	See location plan	6	871.5	93.4	31.0	71.3	71.5	33.1	BAS-26	99.7	X		-2.1
DT-207	01/19/10	See location plan	6	871.5	94.0	32.2	71.1	71.5	33.1	BAS-26	99.4	X		-0.9
DT-208	01/19/10	See location plan	6	871.5	92.8	32.6	70.0	71.5	33.1	BAS-26	97.9	X		-0.5
DT-209	01/19/10	See location plan	6	871.5	93.4	32.3	70.6	71.5	33.1	BAS-26	98.7	X		-0.8
DT-210	01/19/10	See location plan	6	871.5	94.3	35.2	69.7	71.5	33.1	BAS-26	97.6	X		2.1
DT-211	01/19/10	See location plan	6	871.5	94.3	33.5	70.6	71.5	33.1	BAS-26	98.8	X		0.4
DT-212	01/29/10	See location plan	6	861.0	94.6	31.5	71.9	74.6	30.9	BAS-29	96.4	X		0.6
DT-213	01/29/10	See location plan	6	861.0	95.2	31.4	72.5	74.6	30.9	BAS-29	97.1	X		0.5
DT-214	01/29/10	See location plan	6	861.0	95.5	29.4	73.8	74.6	30.9	BAS-29	98.9	X		-1.5
DT-215	01/29/10	See location plan	6	861.0	95.2	29.6	73.5	74.6	30.9	BAS-29	98.5	X		-1.3
DT-216	01/29/10	See location plan	6	861.0	95.8	31.2	73.0	74.6	30.9	BAS-29	97.9	X		0.3
DT-217	01/29/10	See location plan	6	861.0	96.1	30.4	73.7	74.6	30.9	BAS-29	98.8	X		-0.5
DT-218	02/04/10	See location plan	6	866.5	93.7	32.6	70.7	74.0	32.2	BAS-25	95.5	X		0.4
DT-219	02/04/10	See location plan	6	866.5	97.0	30.1	74.6	74.0	32.2	BAS-25	100+	X		-2.1
DT-220	02/04/10	See location plan	6	866.5	89.2	31.5	67.8	74.0	32.2	BAS-25	91.7		X	-0.7
DT-220R	02/04/10	See location plan	6	866.5	95.2	30.3	73.1	74.0	32.2	BAS-25	98.7	X		-1.9
DT-221	02/04/10	See location plan	6	866.5	88.6	32.1	67.1	74.0	32.2	BAS-25	90.6		X	-0.1
DT-221R	02/04/10	See location plan	6	866.5	96.4	30.4	73.9	74.0	32.2	BAS-25	99.9	X		-1.8
DT-222	02/04/10	See location plan	6	866.5	94.3	32.6	71.1	74.0	32.2	BAS-25	96.1	X		0.4
DT-223	02/04/10	See location plan	6	866.5	97.6	32.7	73.5	74.0	32.2	BAS-25	99.4	X		0.5
DT-224	02/10/10	See location plan	6	866.5	92.8	27.2	73.0	74.0	32.2	BAS-25	98.6	X		-5.0
DT-225	02/10/10	See location plan	6	866.5	91.0	27.4	71.4	74.0	32.2	BAS-25	96.5	X		-4.8
DT-226	02/10/10	See location plan	6	866.5	93.4	27.8	73.1	74.0	32.2	BAS-25	98.8	X		-4.4
DT-227	02/10/10	See location plan	6	866.5	91.6	27.5	71.8	74.0	32.2	BAS-25	97.1	X		-4.7
DT-228	02/10/10	See location plan	6	866.5	93.7	27.3	73.6	74.0	32.2	BAS-25	99.5	X		-4.9
DT-229	02/10/10	See location plan	6	866.5	92.2	25.7	72.8	74.0	32.2	BAS-25	98.3	X		-5.5
DT-230	02/12/10	See location plan	6	866.5	89.5	25.5	71.3	72.0	26.3	BAS-14	99.0	X		-0.8
DT-231	02/12/10	See location plan	6	866.5	88.9	24.5	71.4	72.0	26.3	BAS-14	99.2	X		-1.8
DT-232	02/12/10	See location plan	6	866.5	88.3	24.6	70.9	72.0	26.3	BAS-14	98.4	X		-1.7
DT-233	02/12/10	See location plan	6	866.5	88.6	24.6	71.1	72.0	26.3	BAS-14	98.8	X		-1.7
DT-234	02/12/10	See location plan	6	866.5	89.8	25.6	71.5	72.0	26.3	BAS-14	99.3	X		-0.7
DT-235	02/12/10	See location plan	6	866.5	90.4	26.3	71.6	72.0	26.3	BAS-14	99.4	X		0.0
DT-236	02/19/10	See location plan	6	848.8	87.7	24.4	70.5	72.0	26.3	BAS-14	97.9	X		-1.9
DT-237	02/19/10	See location plan	6	848.8	89.8	26.3	71.1	72.0	26.3	BAS-14	98.8	X		0.0
DT-238	02/19/10	See location plan	6	848.8	88.0	22.9	71.6	72.0	26.3	BAS-14	99.4	X		-3.4
DT-239	02/19/10	See location plan	6	848.8	89.2	23.3	72.3	72.0	26.3	BAS-14	100+	X		-3.0
DT-240	02/19/10	See location plan	6	848.8	88.3	21.6	72.6	72.0	26.3	BAS-14	100+	X		-4.7
DT-241	02/19/10	See location plan	6	848.8	88.9	22.3	72.7	72.0	26.3	BAS-14	100+	X		-4.0
DT-242	02/23/10	See location plan	6	848.8	96.4	31.0	73.6	74.8	30.7	BAS-28	98.4	X		0.3
DT-243	02/23/10	See location plan	6	848.8	97.3	30.9	74.3	74.8	30.7	BAS-28	99.4	X		0.2
DT-244	02/23/10	See location plan	6	848.8	95.5	30.2	73.3	74.8	30.7	BAS-28	98.1	X		-0.5

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DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-245	02/23/10	See location plan	6	848.8	97.3	31.2	74.2	74.8	30.7	BAS-28	99.1	X		0.5
DT-246	02/23/10	See location plan	6	848.8	95.8	30.4	73.5	74.8	30.7	BAS-28	98.2	X		-0.3
DT-247	02/23/10	See location plan	6	848.8	94.9	29.5	73.3	74.8	30.7	BAS-28	98.0	X		-1.2
DT-248	03/04/10	See location plan	6	850.8	85.2	24.7	68.3	70.2	28.3	BAS-11	97.3	X		-3.6
DT-249	03/04/10	See location plan	6	850.8	86.1	26.3	68.2	70.2	28.3	BAS-11	97.1	X		-2.0
DT-250	03/04/10	See location plan	6	850.8	86.4	24.9	69.2	70.2	28.3	BAS-11	98.5	X		-3.4
DT-251	03/04/10	See location plan	6	850.8	87.3	24.1	70.3	70.2	28.3	BAS-11	100+	X		-4.2
DT-252	03/04/10	See location plan	6	850.8	86.7	25.7	69.0	70.2	28.3	BAS-11	98.3	X		-2.6
DT-253	03/04/10	See location plan	6	850.8	85.8	26.1	68.1	70.2	28.3	BAS-11	97.0	X		-2.2
DT-254	03/08/10	See location plan	6	850.2	94.3	26.2	74.7	76.1	28.1	BAS-18	98.2	X		-1.9
DT-255	03/08/10	See location plan	6	850.2	92.5	25.7	73.6	76.1	28.1	BAS-18	96.7	X		-2.4
DT-256	03/08/10	See location plan	6	850.2	93.1	24.4	74.8	76.1	28.1	BAS-18	98.3	X		-3.7
DT-257	03/08/10	See location plan	6	850.2	93.1	25.8	74.0	76.1	28.1	BAS-18	97.2	X		-2.3
DT-258	03/08/10	See location plan	6	850.2	92.5	24.4	74.4	76.1	28.1	BAS-18	97.7	X		-3.7
DT-259	03/08/10	See location plan	6	850.2	92.8	24.8	74.4	76.1	28.1	BAS-18	97.7	X		-3.3
DT-260	03/12/10	See location plan	6	852.1	93.1	27.5	73.0	74.8	30.7	BAS-28	97.6	X		-3.2
DT-261	03/12/10	See location plan	6	852.1	92.8	27.4	72.8	74.8	30.7	BAS-28	97.4	X		-3.3
DT-262	03/12/10	See location plan	6	852.1	92.2	25.1	73.7	74.8	30.7	BAS-28	98.5	X		-5.6
DT-263	03/12/10	See location plan	6	852.1	92.8	27.9	72.6	74.8	30.7	BAS-28	97.0	X		-2.8
DT-264	03/12/10	See location plan	6	852.1	91.6	25.9	72.8	74.8	30.7	BAS-28	97.3	X		-4.8
DT-265	03/12/10	See location plan	6	852.1	91.6	27.0	72.1	74.8	30.7	BAS-28	96.4	X		-3.7
DT-266	03/17/10	See location plan	6	852.1	90.7	25.2	72.4	72.0	26.3	BAS-14	100+	X		-1.1
DT-267	03/17/10	See location plan	6	852.1	87.7	28.7	68.1	72.0	26.3	BAS-14	94.6		X	2.4
DT-268	03/17/10	See location plan	6	852.1	87.0	24.0	70.2	72.0	26.3	BAS-14	97.4	X		-2.3
DT-269	03/17/10	See location plan	6	852.1	84.3	24.0	68.0	72.0	26.3	BAS-14	94.4		X	-2.3
DT-270	03/17/10	See location plan	6	852.1	86.1	23.2	69.9	72.0	26.3	BAS-14	97.1	X		-3.1
DT-271	03/17/10	See location plan	6	852.1	87.3	24.1	70.3	72.0	26.3	BAS-14	97.7	X		-2.2
DT-272	03/18/10	See location plan	6	872.0	82.5	25.3	65.8	67.0	24.0	BAS-7	98.3	X		1.3
DT-273	03/18/10	See location plan	6	872.0	83.4	24.7	66.9	67.0	24.0	BAS-7	99.8	X		0.7
DT-274	03/18/10	See location plan	6	872.0	83.4	22.7	68.0	67.0	24.0	BAS-7	100+	X		-1.3
DT-275	03/18/10	See location plan	6	872.0	83.1	27.9	65.0	67.0	24.0	BAS-7	97.0	X		3.9
DT-276	03/18/10	See location plan	6	872.0	82.2	22.4	67.2	67.0	24.0	BAS-7	100+	X		-1.6
DT-277	03/18/10	See location plan	6	872.0	83.7	22.4	68.4	67.0	24.0	BAS-7	100+	X		-1.6
DT-278	03/19/10	See location plan	6	872.0	86.1	24.9	68.9	70.2	28.3	BAS-11	98.2	X		-3.4
DT-279	03/19/10	See location plan	6	872.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-280	03/19/10	See location plan	6	872.0	86.7	23.4	70.3	70.2	28.3	BAS-11	100+	X		-4.9
DT-281	03/19/10	See location plan	6	872.0	88.3	27.2	69.4	70.2	28.3	BAS-11	98.9	X		-1.1
DT-282	03/19/10	See location plan	6	872.0	87.0	26.1	69.0	70.2	28.3	BAS-11	98.3	X		-2.2
DT-283	03/19/10	See location plan	6	872.0	88.3	29.0	68.4	70.2	28.3	BAS-11	97.5	X		0.7
DT-284	03/22/10	See location plan	6	852.1	89.8	31.4	68.3	67.9	28.5	BAS-12	100+	X		2.9
DT-285	03/22/10	See location plan	6	852.1	85.5	32.3	64.6	67.9	28.5	BAS-12	95.2	X		3.8
DT-286	03/22/10	See location plan	6	852.1	86.7	31.1	66.1	67.9	28.5	BAS-12	97.4	X		2.6
DT-287	03/22/10	See location plan	6	852.1	85.8	33.5	64.3	67.9	28.5	BAS-12	94.7		X	5.0
DT-288	03/22/10	See location plan	6	852.1	86.7	30.1	66.6	67.9	28.5	BAS-12	98.1	X		1.6
DT-289	03/22/10	See location plan	6	852.1	86.4	30.4	66.3	67.9	28.5	BAS-12	97.6	X		1.9
DT-290	03/23/10	See location plan	6	852.1	86.4	30.7	66.1	70.2	28.3	BAS-11	94.2		X	2.4
DT-291	03/23/10	See location plan	6	852.1	86.7	31.2	66.1	70.2	28.3	BAS-11	94.1		X	2.9
DT-292	03/23/10	See location plan	6	852.1	88.9	28.1	69.4	70.2	28.3	BAS-11	98.9	X		-0.2
DT-293	03/23/10	See location plan	6	852.1	88.0	32.7	66.3	70.2	28.3	BAS-11	94.5		X	4.4
DT-294	03/23/10	See location plan	6	852.1	87.7	26.9	69.1	70.2	28.3	BAS-11	98.4	X		-1.4
DT-295	03/23/10	See location plan	6	852.1	88.3	30.4	67.7	70.2	28.3	BAS-11	96.5	X		2.1

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

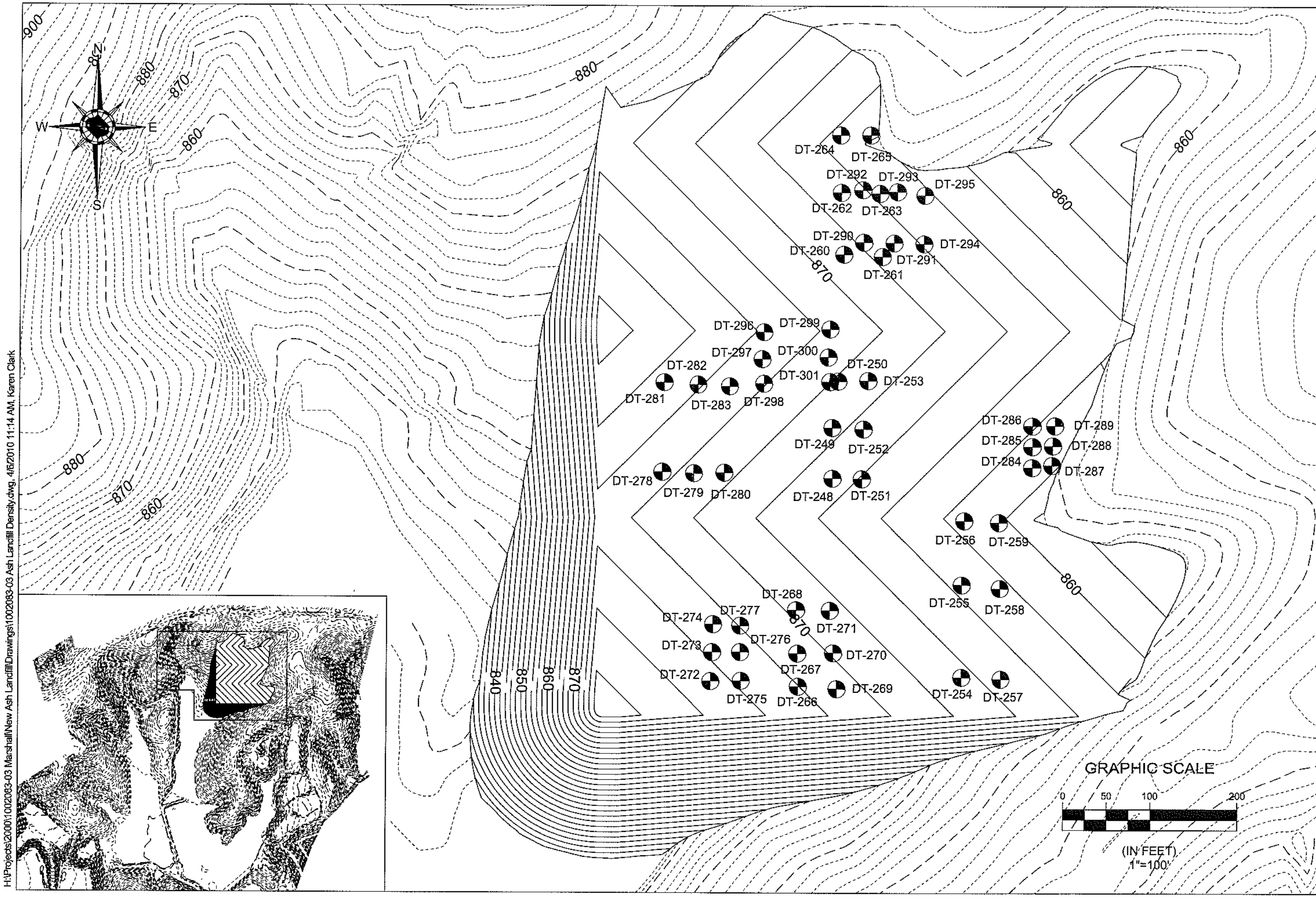
4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-296	03/25/10	See location plan	6	852.1	79.2	23.5	64.1	67.0	24.0	BAS-7	95.7	X		-0.5
DT-297	03/25/10	See location plan	6	852.1	84.0	22.6	68.5	67.0	24.0	BAS-7	100+	X		-1.4
DT-298	03/25/10	See location plan	6	852.1	78.9	23.2	64.0	67.0	24.0	BAS-7	95.6	X		-0.8
DT-299	03/25/10	See location plan	6	852.1	83.1	28.0	64.9	67.0	24.0	BAS-7	96.9	X		4.0
DT-300	03/25/10	See location plan	6	852.1	82.5	21.4	68.0	67.0	24.0	BAS-7	100+	X		-2.6
DT-301	03/25/10	See location plan	6	852.1	82.2	23.6	66.5	67.0	24.0	BAS-7	99.3	X		-0.4

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope



H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 4/6/2010 11:14 AM, Karen Clark

SHIELD ENGINEERING, INC.
4301 TAGGART CREEK ROAD
CHARLOTTE, NC 28208
704-394-5913
704-394-6886 fax
www.shieldengineering.com

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density.dwg
DRAWN BY: KJC
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: 04/06/10

SHEET TITLE:
DENSITY TEST LOCATION PLAN
MARCH 2010

SHEET:
1

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 3-4-10
Inspection of: FILL FLY ASH	**Technician:** ELIS REYES	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION

Shield on site to observed fill Fly Ash at MARSHALL Steam Station.

Shield notice that crew was moving Fly Ash from high side of level fill to lower side.

All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS REYES
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAYSHALL	Shield No.:	Client No.:
Client Name: DUKE POWER	Task No.:	Date: 3-4-10
Inspection of: FILL FLY ASH	Technician: ELIS REYES	

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Drive Tube/Nuclear Density Data

Test No.	248	247	250	251	252	253		
Grade or Elevation	860.82							
Location	8							
Wt. Wet Soil & Mold	4.15	4.18	4.11	4.22	4.20	4.17		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	2.83	2.86	2.87	2.9	2.88	2.85		
Volume Mold	0.0332							
Wet Density	85.2	86.1	86.4	87.3	86.7	85.8		
Wt. Wet soil & Pan	467.6	466.7	470.8	470.4	471.2	470.5		
Wt. Dry soil & Pan	423	420.2	425.3	426.3	424.5	423.5		
Wt. Pan	242.6	243.6	242.6	243.6	242.6	243.6		
Moisture Lost	44.6	46.5	45.5	44.1	46.7	47		
Wt. Dry soil	180.4	176.6	182.7	182.7	181.9	179.9		
% Moisture	24.7	26.3	24.9	24.1	25.7	26.1		
Dry Density	68.3	68.2	69.2	70.3	68	68.1		
Maximum Dry Density	70.2							
Optimum Moisture	28.3							
% Compaction	97.3	97.2	98.6	100.1	98.3	96.9		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	9.21	
Wt. Mold	9.20	
Wt. Wet soil	2.79	
Volume Mold	0.0331	
Wet Density	87.7	
Wt. Wet soil & Pan	1167.1	
Wt. Dry soil & Pan	1125	
Wt. Pan	242.6	
Moisture Lost	46.6	
Wt. Dry soil	179.9	
% Moisture	25.9	
Dry Density	69.7	

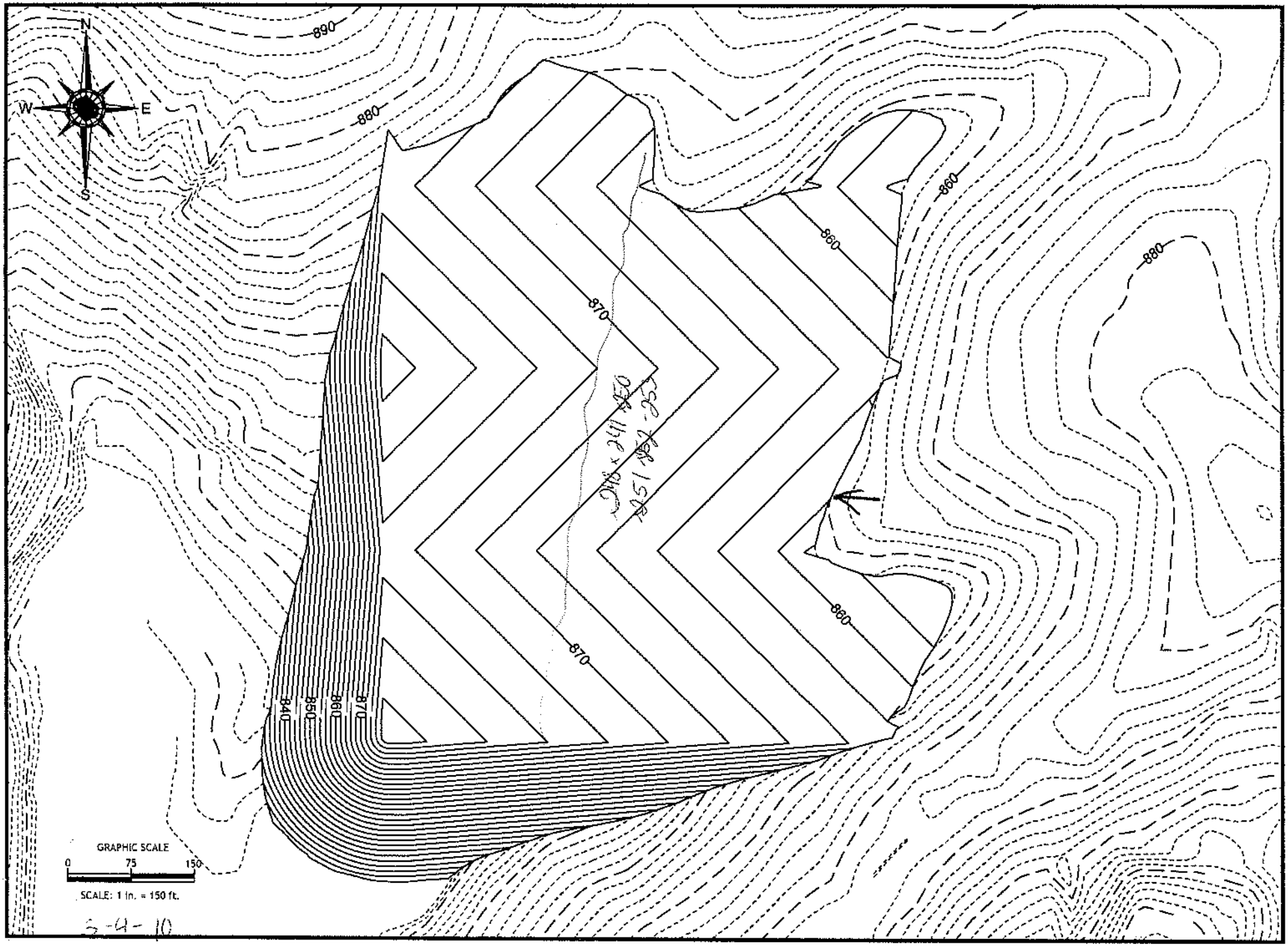
Additional Project Data

10.2 at 28.3 BAS-11

Elis Reyes
Printed Name

Signature

JMP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SCALE: 1 in. = 150 ft.
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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 3-8-10
Inspection of: FILL FLY ASH	**Technician:** ELIS ROJAS	

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Shield on site to observed Fill at MARSHALL.

ALL Test meets Criteria.

Shield delivery Proctor For LAB.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS ROJAS
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAN SHALL	Shield No.:	Client No.:
Client Name: DUKE POWER	Task No.:	Date: 3-8-10
Inspection of: FIELD FLY ASH	Technician: ELIS REYES	

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All test meets Criteria

JANETTE PROSEY informed Shield THAT Proctor was required for JAB.

Drive Tube/Nuclear Density Data

Test No.	254	255	256	257	258	259		
Grade or Elevation								
Location	850.2							
Wt. Wet Soil & Mold	4.45	4.39	4.41	4.41	4.39	4.40		
Wt. Mold	1.32	1.32	1.32	1.32	1.32	1.32		
Wt. Wet soil	3.13	3.07	3.09	3.09	3.07	3.08		
Volume Mold	0.0332							
Wet Density	94.3	92.5	93.1	93.1	92.5	92.8		
Wt. Wet soil & Pan	480.7	498.8	477.7	477.1	479.1	480		
Wt. Dry soil & Pan	430.1	445.7	430.4	428.2	431.5	432.1		
Wt. Pan	236.7	238.9	236.7	238.9	236.7	238.9		
Moisture Lost	50.6	53.1	47.3	48.9	47.6	47.9		
Wt. Dry soil	193.4	206.8	193.7	189.3	194.8	193.2		
% Moisture	26.2	25.7	24.4	25.8	24.4	24.8		
Dry Density	74.7	73.6	74.8	74	74.4	74.4		
Maximum Dry Density	76.1	76.1						
Optimum Moisture	28.1	28.1						
% Compaction	98.2	96.7	98.3	97.2	97.8	97.8		
Meets Criteria (Y\N)								

1 Point Proctor Data

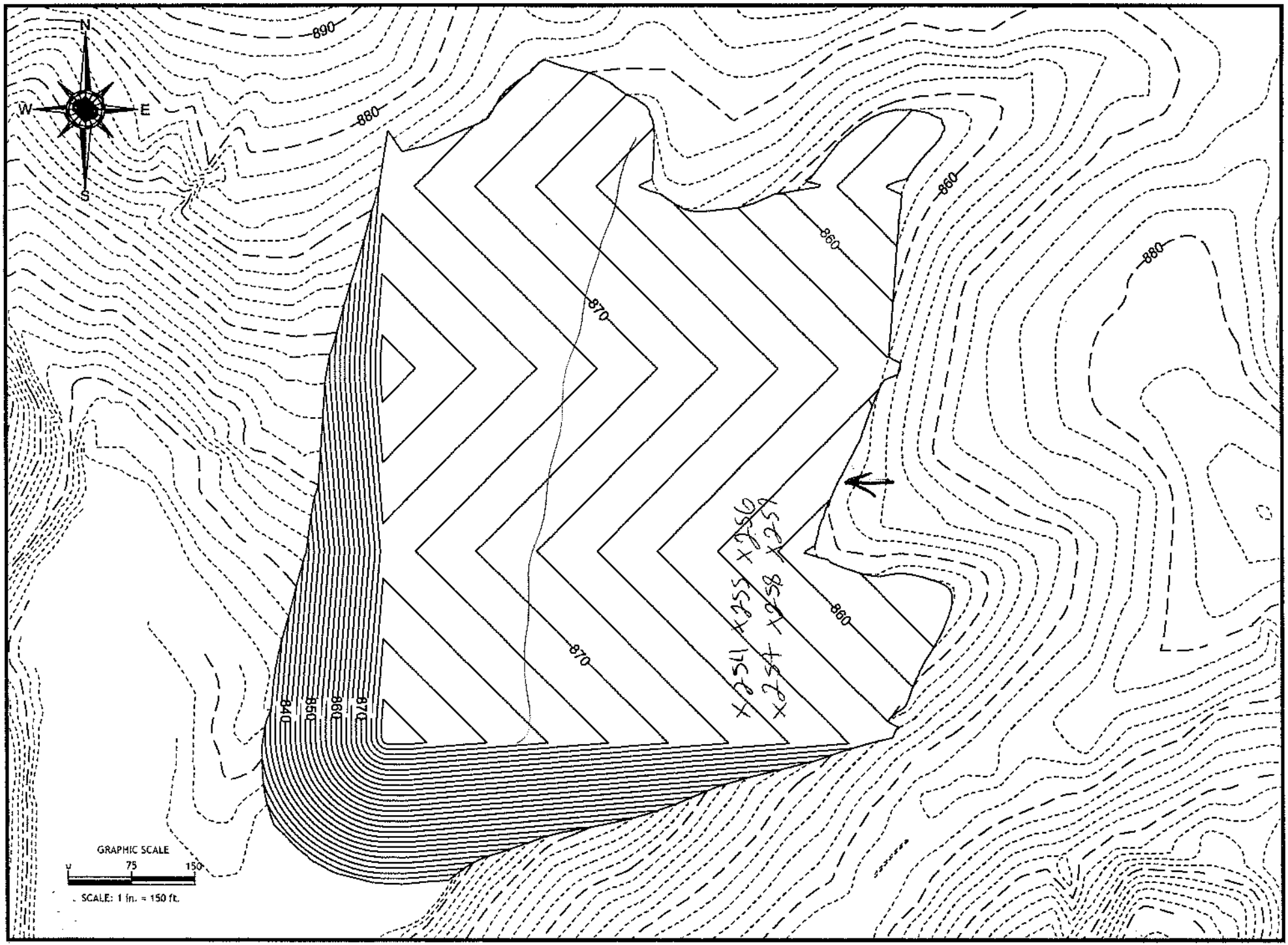
Wt. Wet Soil & Mold	12.38	
Wt. Mold	9.30	
Wt. Wet soil	3.08	
Volume Mold	0.0331	
Wet Density	93.1	
Wt. Wet soil & Pan	464.8	
Wt. Dry soil & Pan	416.3	
Wt. Pan	236.7	
Moisture Lost	48.5	
Wt. Dry soil	179.6	
% Moisture	27	
Dry Density	73.3	

Additional Project Data

76.1 28.1 BAS-18

ELIS REYES
Printed Name

Signature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GRAPHIC SCALE
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SCALE: 1 in. = 150 ft.

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 3-12-10
Inspection of: FILL FLY ASH	**Technician:** ELIS REJAS	

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Shield on site to observed Fill at MARSHALL STEAM POWER STATION.

ALL TEST meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS REJAS
Printed Name

Signature

f:\doc\forms\daily report.doc

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 3-12-10
Inspection of: Fill Flyash	Technician: Elis Potts	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers an cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.

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ALL Test meets criteria

Drive Tube\Nuclear Density Data

Test No.	260	261	262	263	262	263	264	265
Grade or Elevation	852.1							
Location								
Wt. Wet Soil & Mold	4.42	4.41			4.39	4.41	4.37	4.37
Wt. Mold	1.33	1.33			1.33	1.33		
Wt. Wet soil	3.09	3.08			3.06	3.08	3.04	3.04
Volume Mold	0.0332							
Wet Density	93.1	92.8			92.2	92.8	91.6	91.6
Wt. Wet soil & Pan	482.4	480.5	4.39	4.41	470.3	474.7	471.9	474.1
Wt. Dry soil & Pan	429.6	428.8			423.6	423.4	423.6	424.3
Wt. Pan	237.4	239.8	237.4	239.8	237.4	239.8	237.4	239.8
Moisture Lost	52.8	51.7			46.7	51.3	48.3	49.8
Wt. Dry soil	192.2	189			186.2	183.6	186.2	184.5
% Moisture	27.5	27.4			25.1	27.9	25.9	27
Dry Density	73	72.8			73.7	72.6	72.8	72.1
Maximum Dry Density	74.8							
Optimum Moisture	30.7							
% Compaction	97.6	97.3			98.5	97.1	97.3	96.4
Meets Criteria (Y\N)								

1 Point Proctor Data

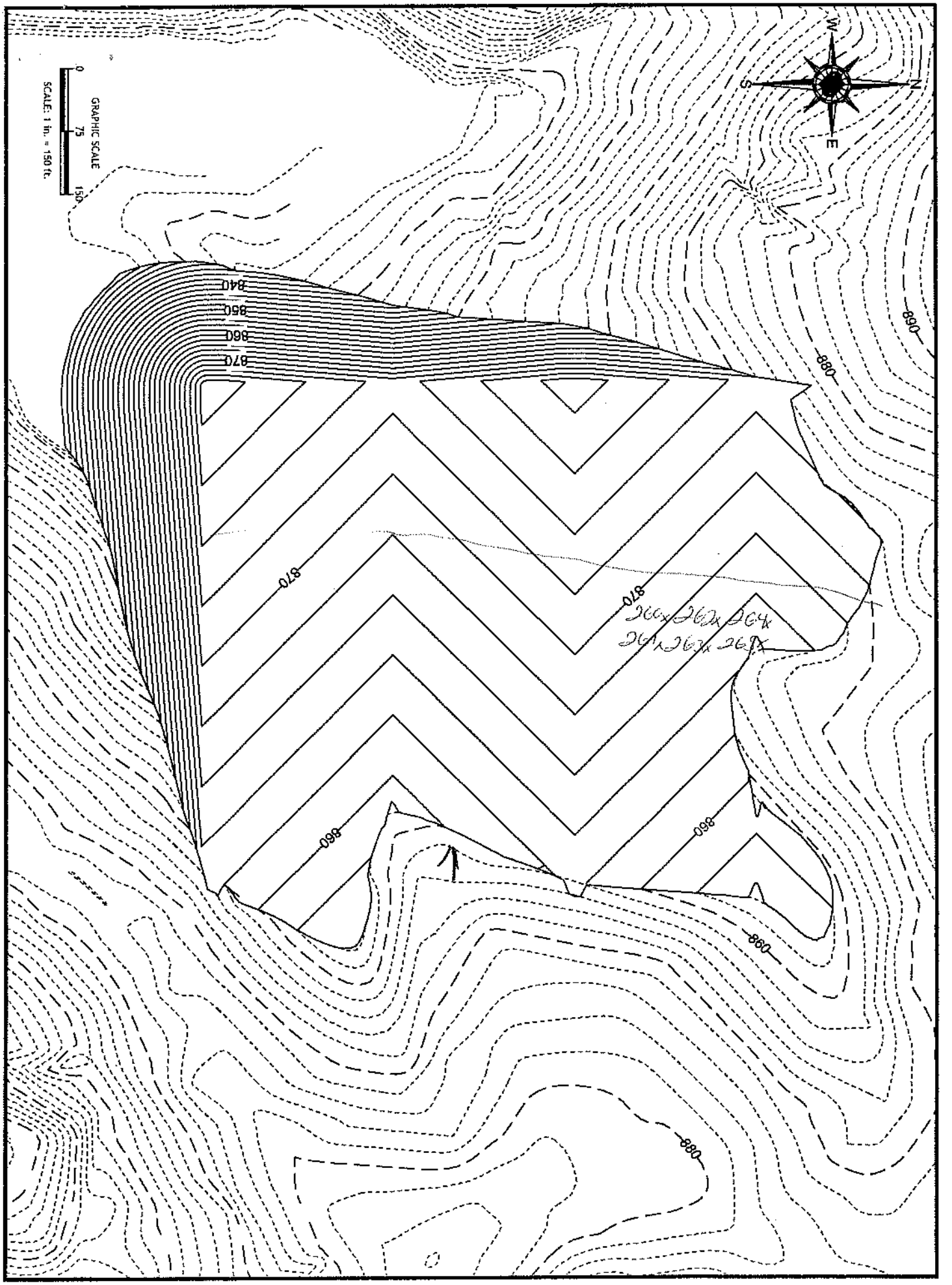
Wt. Wet Soil & Mold	12.36	
Wt. Mold	9.30	
Wt. Wet soil	3.06	
Volume Mold	0.0331	
Wet Density	92.2	
Wt. Wet soil & Pan	476.5	
Wt. Dry soil & Pan	426.5	
Wt. Pan	237.4	
Moisture Lost	50	
Wt. Dry soil	189.1	
% Moisture	26.4	
Dry Density	72.9	

Additional Project Data

72.0	26.3	BAS-14
70.2	28.3	BAS-11
74.8	30.7	BAS-28

Elis Potts
Printed Name

Signature


N
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GRAPHIC SCALE
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SCALE: 1 in. = 150 ft.
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266x 262x 264x
264x 262x 268x

3-12-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 3-17-10
Inspection of: FILL FLY ASH	**Technician:** ELIS REYES	

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Shield on site to observed fill at MARSHALL Power Steam Station.

All Test meets Criteria.

JMP

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS REYES
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 3-17-10
Inspection of: Fill Fly Ash	Technician: Elis Rojas	

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All Test meets Criteria.

Drive Tube\Nuclear Density Data

Test No.	266	267	268	269	270	271		
Grade or Elevation	852.1							
Location								
Wt. Wet Soil & Mold	4.29	4.26	4.17	4.14	4.20	4.18		
Wt. Mold	1.28	1.35	1.20	1.34	1.34	1.28		
Wt. Wet soil	3.01	2.91	2.89	2.8	2.86	2.9		
Volume Mold	0.0332							
Wet Density	90.7	87.7	87	84.3	86.1	87.3		
Wt. Wet soil & Pan	471.2	471.7	470.6	470.9	470.9	471.2		
Wt. Dry soil & Pan	425.3	420.4	426.7	426.5	428.1	426.6		
Wt. Pan	293.5	241.5	243.5	241.5	243.5	241.5		
Moisture Lost	45.9	51.3	43.9	44.4	42.8	44.6		
Wt. Dry soil	181.8	178.9	183.2	186	184.6	185.1		
% Moisture	25.2	28.7	24	24	23.2	24.1		
Dry Density	72.4	68.1	70.2	68	69.9	70.3		
Maximum Dry Density	72.0							
Optimum Moisture	26.3							
% Compaction	100.6	94.6	97.5	94.4	97.1	97.6		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1 Point Proctor Data

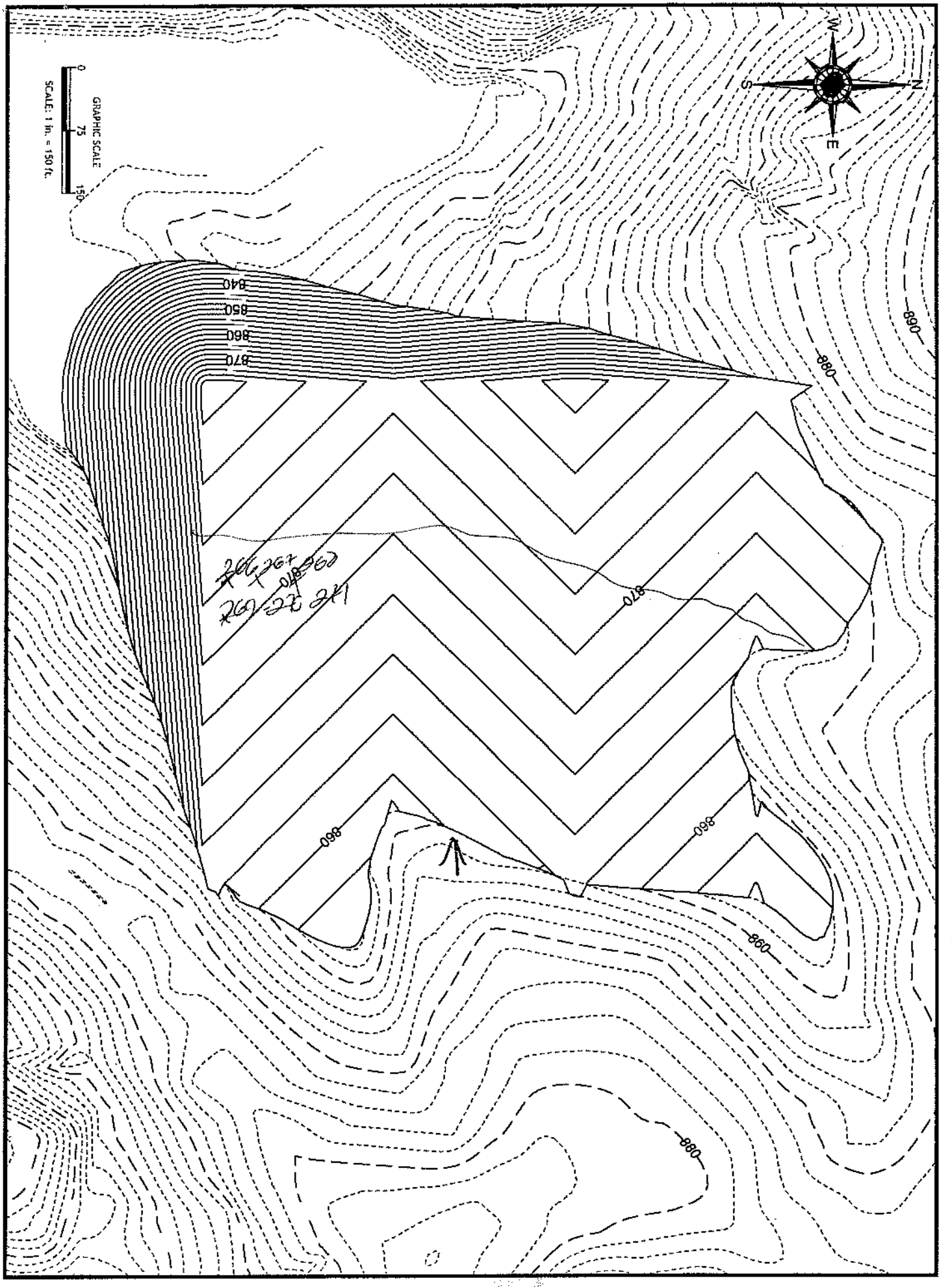
Wt. Wet Soil & Mold	2.24	
Wt. Mold	9.30	
Wt. Wet soil	3.04	
Volume Mold	0.0331	
Wet Density	91.8	
Wt. Wet soil & Pan	470.5	
Wt. Dry soil & Pan	423.6	
Wt. Pan	243.5	
Moisture Lost	46.9	
Wt. Dry soil	180.1	
% Moisture	26	
Dry Density	72.9	

Additional Project Data

72.0 at 26.3 BAS-14

Elis Rojas
Printed Name

Signature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GRAPHIC SCALE
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150
SCALE: 1 in. = 150 ft.
890
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3-12-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 3-18-10
Inspection of: FILL FLY ASH	**Technician:** ELIS POJAS	

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Shield on site to observed fill at MARSHALL Steam Power Station.

Shield notice that fill at end of cell (West South) was finish. Also, Shield observed that crew (contracting company) cut about 6' the week before.

Shield performed test at end left (West South). All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS POJAS
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		Shield No.:	Client No.:
Client Name: DUKE POWER		Task No.:	Date: 3-18-10
Inspection of: FILL FLY ASH		Technician: ELIS ROJAS	

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Drive Tube\Nuclear Density Data

Test No.	272	273	274	275	276	277		
Grade or Elevation	871.95							
Location								
Wt. Wet Soil & Mold	4.06	4.07	4.09	4.10	4.05	4.16		
Wt. Mold	1.32	1.32	1.32	1.34	1.32	1.32		
Wt. Wet soil	2.74	2.74	2.77	2.76	2.73	2.78		
Volume Mold	0.0332							
Wet Density	82.5	83.4	83.4	83.1	82.2	83.7		
Wt. Wet soil & Pan	473.2	473.4	473.3	552.9	473.8	433.5		
Wt. Dry soil & Pan	426.1	427.2	420.1	514.3	430.9	388.1		
Wt. Pan	239.6	240	185.5	376	239.6	185.5		
Moisture Lost	47.1	46.2	53.2	38.6	42.9	45.4		
Wt. Dry soil	186.5	187.2	234.6	138.3	191.3	202.6		
% Moisture	25.3	24.7	22.7	27.9	22.4	22.4		
Dry Density	65.8	66.9	68	65	67.2	68.4		
Maximum Dry Density	67							
Optimum Moisture	24							
% Compaction	98.2	99.9	101	97	100.3	102.1		
Meets Criteria (Y\N)								

1 Point Proctor Data

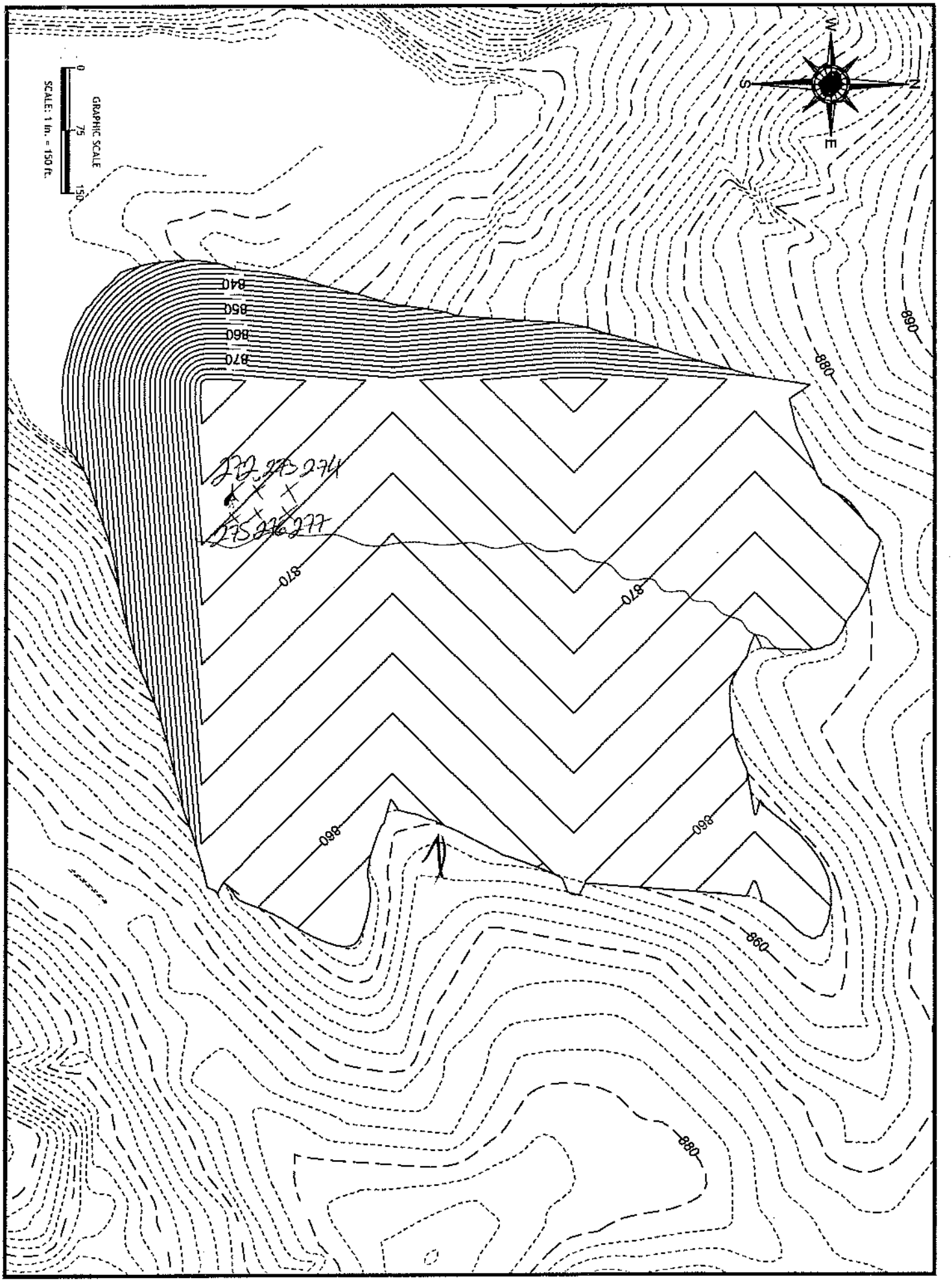
Wt. Wet Soil & Mold	12.12	
Wt. Mold	4.30	
Wt. Wet soil	2.82	
Volume Mold	0.0321	
Wet Density	85.2	
Wt. Wet soil & Pan	473	
Wt. Dry soil & Pan	427.8	
Wt. Pan	240	
Moisture Lost	45.2	
Wt. Dry soil	187.8	
% Moisture	24.1	
Dry Density	68.7	

Additional Project Data

67 at 24 BAS-7

ELIS ROJAS
Printed Name

Signature


GRAPHIC SCALE
0
75
150
SCALE: 1 in. = 150 ft.
W
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860
860
880
272 273 274
275 276 277

3-18-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHAL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 3-9-10
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed Fill at MARSHALL Steam Power Station.

Shield performed test at west side of cell.

Shield observed THAT crack Elevation was Final crack.

All test meets criteria

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: DUKE POWER	Task No.:	Date: 2-19-10
Inspection of: FILL FLY ASH	Technician: Elis Rojas	

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One Point was performed from Test 7

Drive Tube\Nuclear Density Data	278	279	280	281	282	283		
Test No.	272	273	274	275	276	277		
Grade or Elevation	871.95							
Location								
Wt. Wet Soil & Mold	4.18	4.24	4.20	4.27	4.21	4.25		
Wt. Mold	1.32	1.32	1.32	1.34	1.32	1.32		
Wt. Wet soil	2.86	2.92	2.88	2.93	2.89	2.93		
Volume Mold	0.0332							
Wet Density	86.1	88	86.7	88.3	87	88.3		
Wt. Wet soil & Pan	470.7	470.2	449.1	565.9	470.2	440.3		
Wt. Dry soil & Pan	424.7	421.7	397.1	525.3	422.5	383		
Wt. Pan	239.6	240	185.5	376	240	185.5		
Moisture Lost	46	48.5	50	40.6	47.7	57.3		
Wt. Dry soil	185.1	181.7	213.6	149.3	182.5	197.5		
% Moisture	24.9	26.7	23.4	27.2	26.1	29		
Dry Density	68.9	69.5	70.3	69.4	69	68.4		
Maximum Dry Density	70.2							
Optimum Moisture	28.3							
% Compaction	98.1	99	100	98.9	98.3	97.4		
Meets Criteria (Y\N)								

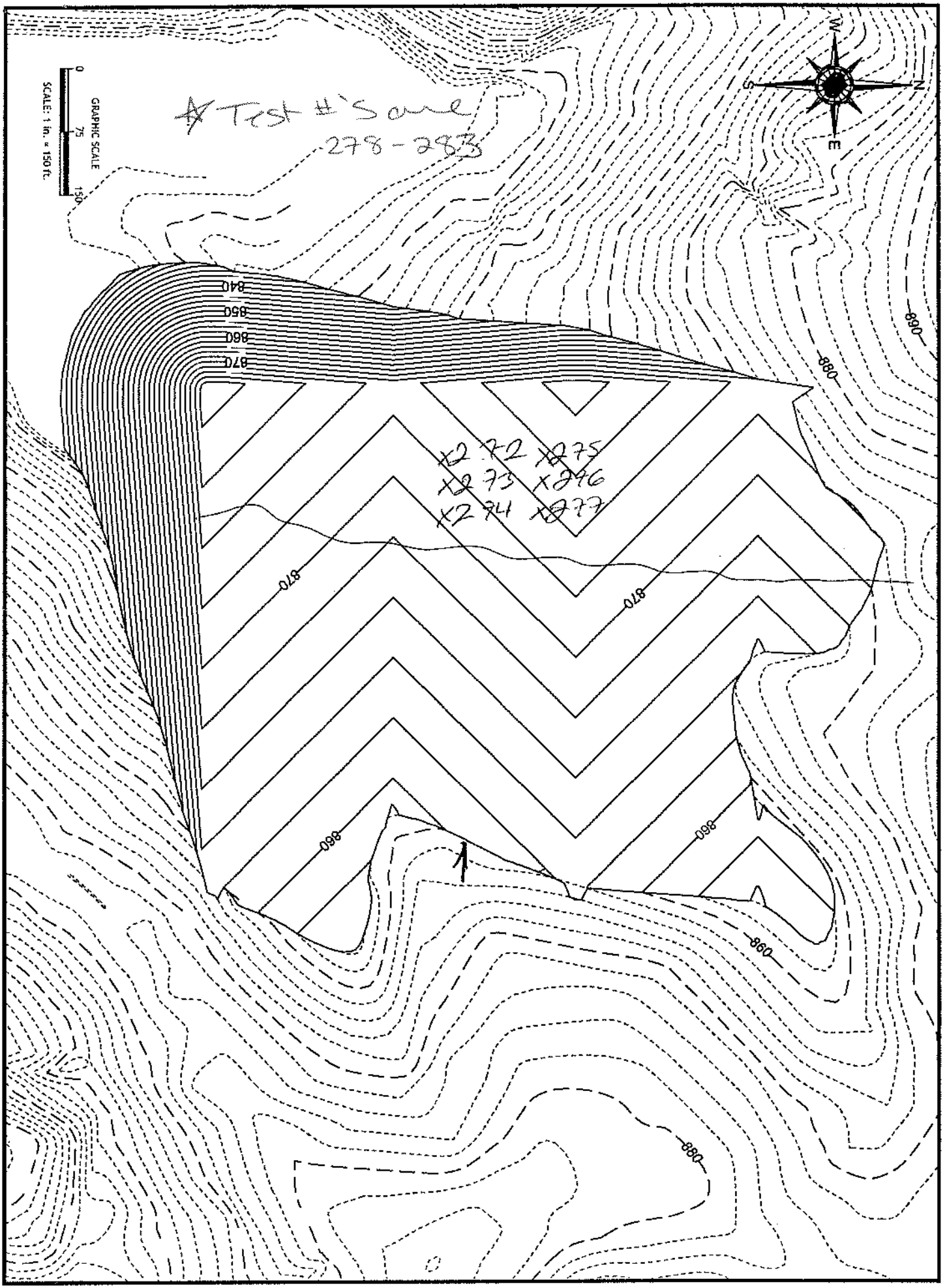
1 Point Proctor Data		
Wt. Wet Soil & Mold	2.23	
Wt. Mold	1.30	
Wt. Wet soil	2.93	
Volume Mold	0.0331	
Wet Density	88.5	
Wt. Wet soil & Pan	533.8	
Wt. Dry soil & Pan	475.0	
Wt. Pan	239.6	
Moisture Lost	58.8	
Wt. Dry soil	235.4	
% Moisture	25	
Dry Density	70.8	

Additional Project Data

70.2 at 28.3 BAS-11

Elis Rojas
Printed Name

Signature


Test #'s are
278 - 283
GRAPHIC SCALE
0
75
150
SCALE: 1 in. = 150 ft.
W
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E
840
850
860
870
880
890
870
870
860
860
860
880
1
X2 72 X275
X2 73 X276
X2 74 X277

3-19-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 3-22-10
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed fill at MARSHALL Steam Power station.

Shield performed 6 Drive Tubes. All test meets criteria except 1.

JMP

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAX SHALL		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 3-22-11
Inspection of: Fill Fly Ash		Technician: Elis Rojas	

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Drive Tube/Nuclear Density Data

	284	285	286	287	288	289		
Test No.	278	279	280	281	282	283		
Grade or Elevation	852.1							
Location								
Wt. Wet Soil & Mold	4.30	4.16	4.20	4.17	4.20	4.19		
Wt. Mold	1.32	1.32	1.32	1.34	1.32	1.32		
Wt. Wet soil	2.98	2.84	2.88	2.85	2.88	2.87		
Volume Mold	0.0332							
Wet Density	89.8	85.5	86.7	85.8	86.7	86.4		
Wt. Wet soil & Pan	471.8	471.3	430.6	535.9	470.9	470.3		
Wt. Dry soil & Pan	415.7	414.4	372.4	493.8	416.8	416.3		
Wt. Pan	236.9	238.5	185.5	368	236.9	238.5		
Moisture Lost	56.1	56.9	58.2	42.1	54.1	54		
Wt. Dry soil	178.8	175.9	186.9	125.8	179.9	177.8		
% Moisture	31.4	32.3	31.1	33.5	30.1	30.4		
Dry Density	68.3	64.6	65.4	64.3	66.6	66.3		
Maximum Dry Density	67.9		66.1					
Optimum Moisture	28.5							
% Compaction	100.5	95.1	96.3	94.7	98.1	97.6		
Meets Criteria (Y\N)	Y	Y	Y 37.4	N	Y	Y		

1 Point Proctor Data

Wt. Wet Soil & Mold	12.35
Wt. Mold	9.30
Wt. Wet soil	3.05
Volume Mold	0.0331
Wet Density	92.1
Wt. Wet soil & Pan	456.7
Wt. Dry soil & Pan	390.2
Wt. Pan	185.5
Moisture Lost	66.5
Wt. Dry soil	204.7
% Moisture	32.5
Dry Density	69.5

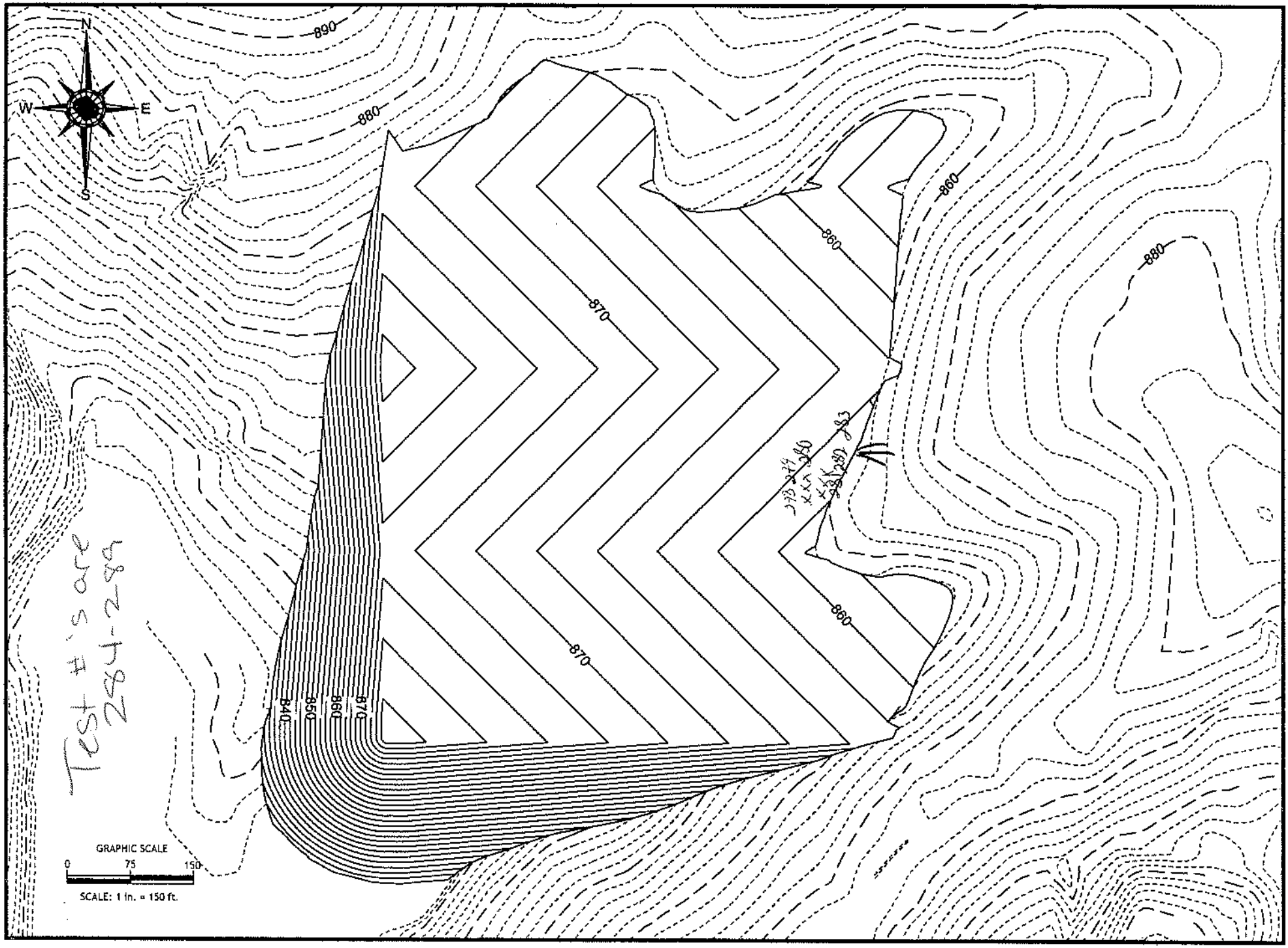
Additional Project Data

67.9 at 28.5 BAS-12

Elis Rojas
Printed Name

Signature

JMP


N
W
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890
880
860
870
840
850
GRAPHIC SCALE
0
75
150
SCALE: 1 in. = 150 ft.
Test #'s are 282-288

3-22-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 3-23-10
Inspection of: Fill Fly Ash	**Technician:** Eli's Reyes	

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Shield on site to observed Fly ash at Marshall Steam Station.

Shield Performed 6 Test. Also, ~~[illegible]~~ one Point.

~~All test~~ meets Criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Eli's Reyes
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 3-23-10
Inspection of: Fill Fly Ash		Technician: Elis Rojas	

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Drive Tube\Nuclear Density Data

	290	291	292	293	294	295
Test No.	284	285	286	287	288	289
Grade or Elevation	852.1					
Location						
Wt. Wet Soil & Mold	4.17	4.20	4.27	4.26	4.23	4.25
Wt. Mold	1.32			1.34	1.32	1.32
Wt. Wet soil	2.87	2.88	2.95	2.92	2.91	2.93
Volume Mold	0.0332					
Wet Density	86.4	86.7	88.9	88	87.7	88.3
Wt. Wet soil & Pan	472.4	471.6	469.4	545.2	470.6	472.3
Wt. Dry soil & Pan	417.5	416.5	407.2	501.6	421.5	418.1
Wt. Pan	239.9	239.8	185.9	368.1	238.8	239.8
Moisture Lost	54.9	55.1	62.2	43.6	49.1	54.2
Wt. Dry soil	178.6	176.7	221.3	133.5	182.6	178.3
% Moisture	30.7	31.2	28.1	32.7	26.9	30.4
Dry Density	66.1	66.1	69.4	66.3	69.1	67.7
Maximum Dry Density	70.2					
Optimum Moisture	28					
% Compaction	94.2	94.2	98.9	94.4	98.4	96.4
Meets Criteria (Y\N)	N	N	Y	N	Y	Y

1 Point Proctor Data

Wt. Wet Soil & Mold	4.17
Wt. Mold	1.30
Wt. Wet soil	2.87
Volume Mold	0.0331
Wet Density	86.7
Wt. Wet soil & Pan	597.2
Wt. Dry soil & Pan	548.3
Wt. Pan	368.1
Moisture Lost	48.9
Wt. Dry soil	180.2
% Moisture	27.1
Dry Density	68.2

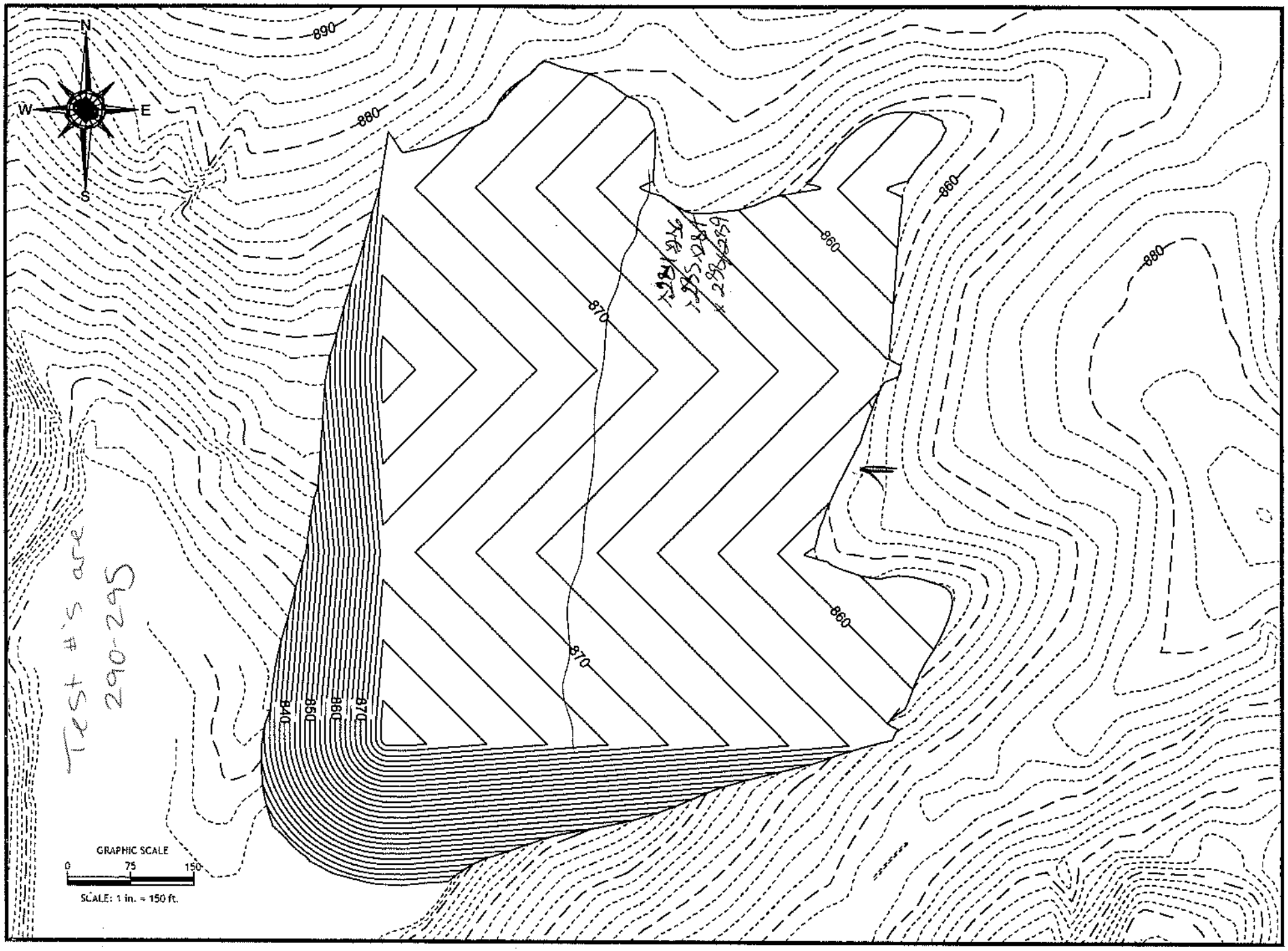
Additional Project Data

70.2 28.3 GAS-11

Elis Rojas
Printed Name

Signature

JMP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860
870
GRAPHIC SCALE
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75
150
SCALE: 1 in. = 150 ft.
Test #'s are
290-295

3-23-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAYSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 3-25-10
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed fill at MAYSHALL Power Steam Station.

Shield performed six Drive Tube and one point.

All test meets criteria.

Shield observed Fill crew was working on road to Land Fill.

Water Truck was spray water on Land Fill (cell)

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

f:\doc\forms\daily report.doc

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	Shield No.:	Client No.:
Client Name: Duke Power	Task No.:	Date: 3-25-10
Inspection of: Fill Fly Ash	Technician: Eli's Rojas	

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Drive Tube/Nuclear Density Data

	296	297	298	299	300	301		
Test No.	290	291	292	293	294	295		
Grade or Elevation	852.1							
Location								
Wt. Wet Soil & Mold	3.95	4.11	3.95	4.10	4.06	4.05		
Wt. Mold	1.32	1.32	1.33	1.34	1.32	1.32		
Wt. Wet soil	2.63	2.79	2.62	2.76	2.74	2.73		
Volume Mold	0.0332							
Wet Density	79.2	84	78.9	83.1	82.5	82.2		
Wt. Wet soil & Pan	469.9	474.5	470.1	547.7	490.8	471.7		
Wt. Dry soil & Pan	426	431.1	416.6	502.5	450	427.2		
Wt. Pan	237.1	238.8	185.9	368.6	239.1	238.8		
Moisture Lost	43.9	43.4	53.5	39.2	40.8	44.5		
Wt. Dry soil	186.9	192.3	230.7	137.9	150.9	188.4		
% Moisture	23.5	22.6	23.2	28	27.4	23.6		
Dry Density	64.1	68.5	64	64.9	68	66.5		
Maximum Dry Density	67							
Optimum Moisture	24							
% Compaction	95.7	102.2	95.5	96.9	101.5	99.3		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.19	
Wt. Mold	9.32	
Wt. Wet soil	2.87	
Volume Mold	0.0331	
Wet Density	86.7	
Wt. Wet soil & Pan	424	
Wt. Dry soil & Pan	372.1	
Wt. Pan	185.9	
Moisture Lost	51.9	
Wt. Dry soil	186.2	
% Moisture	27.9	
Dry Density	67.8	

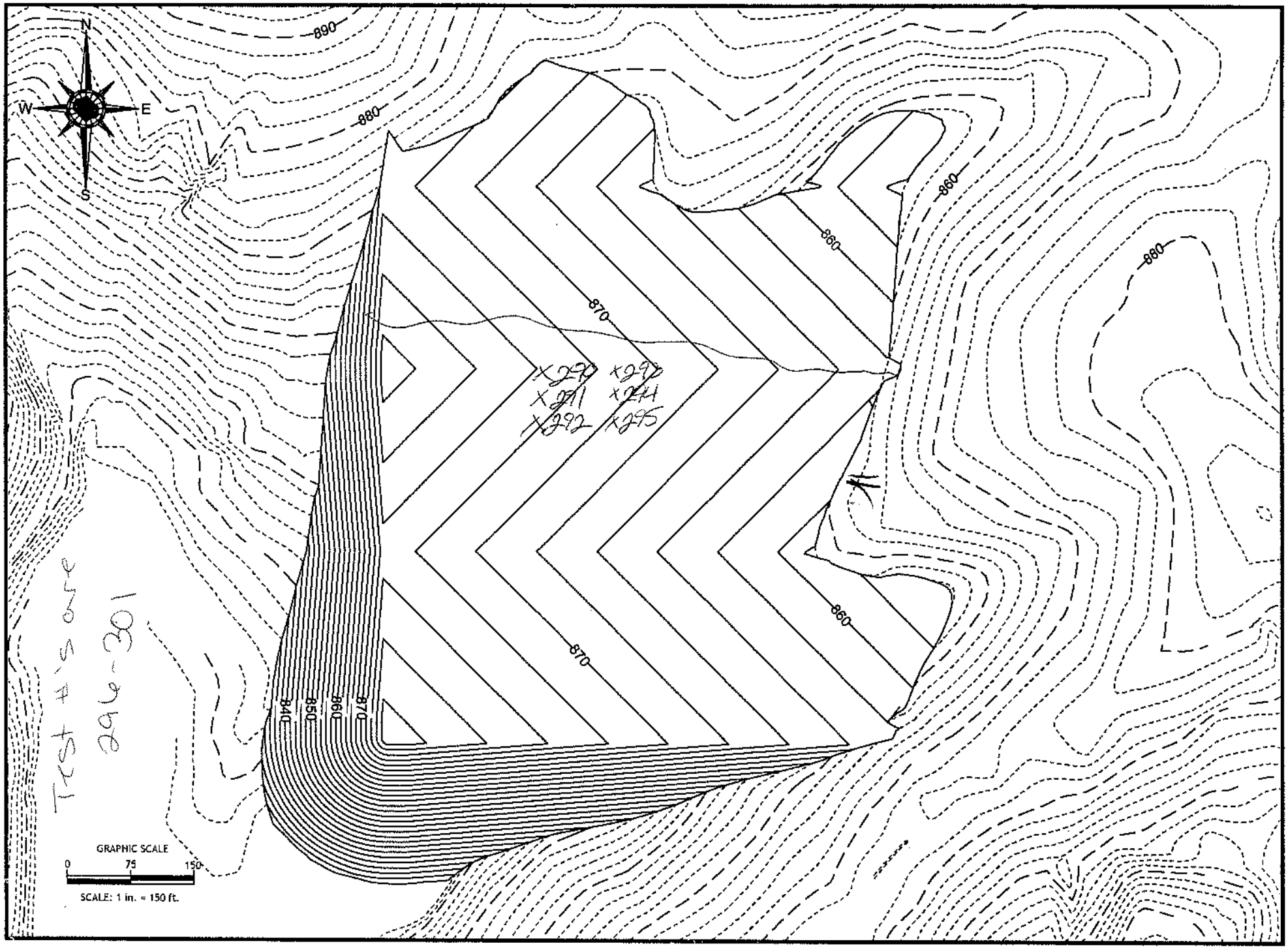
Additional Project Data

67.0 24.0 BA-7

Eli's Rojas
Printed Name

Signature

JMP


N
W
E
S
890
880
860
870
840
850
860
870
GRAPHIC SCALE
0
75
150
SCALE: 1 in. = 150 ft.
Test #'s are
294-301
X290
X291
X292
X293
X294
X295

3-25-10

LABORATORY CONFORMANCE TEST RESULTS

BAS-34

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: 10-028
SOURCE MATERIAL: BAS-34 0.0 feet
SAMPLE DESCRIPTION: Grey FLY ASH

USCS: ML AASHTO:

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 78.0
OPTIMUM MOISTURE CONTENT, (%): 28.6
NATURAL MOISTURE CONTENT, (%): 26.5

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

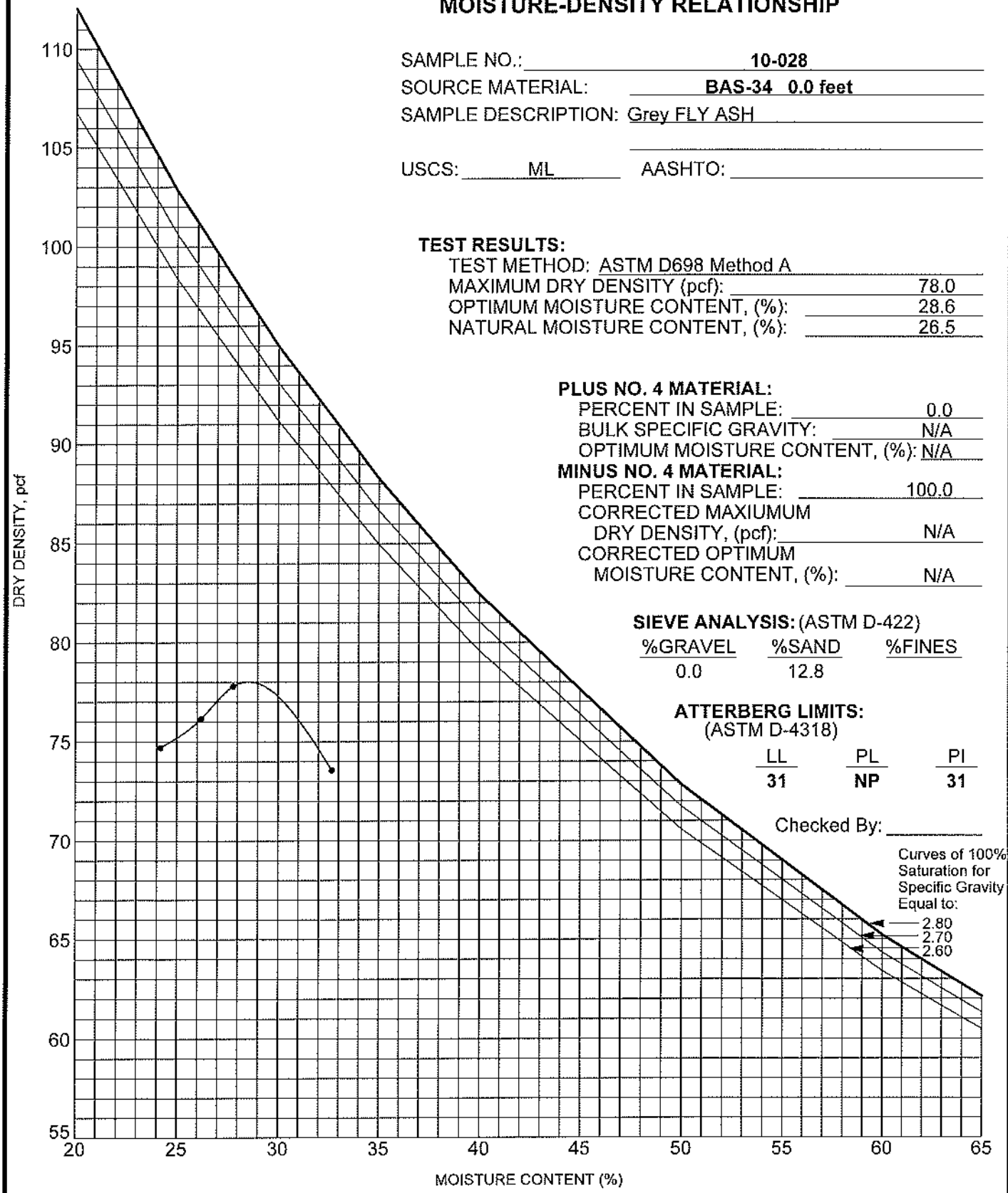
SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	12.8	

ATTERBERG LIMITS:
(ASTM D-4318)

LL	PL	PI
31	**NP**	**31**

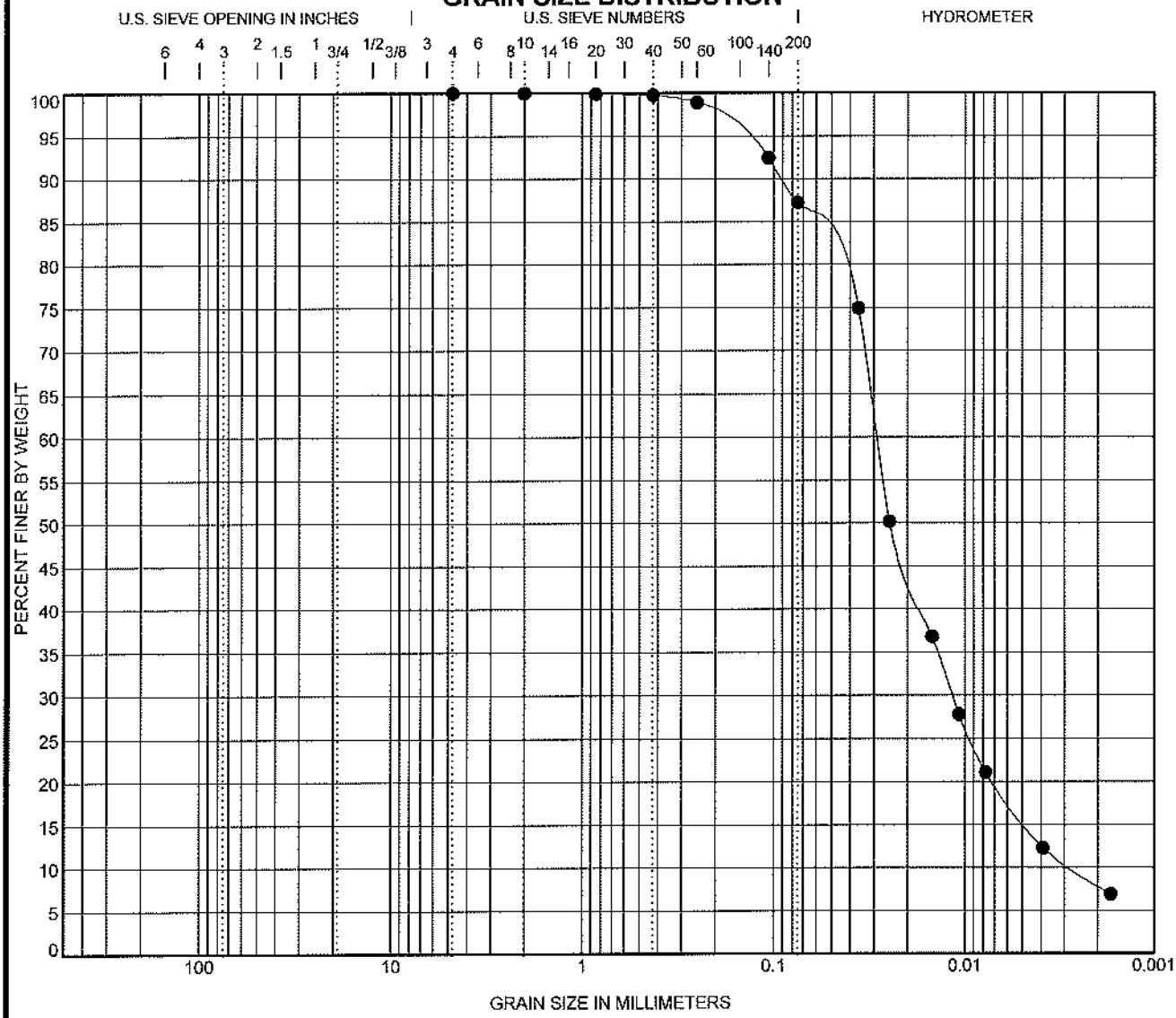
Checked By:



SHIELD ENGINEERING, INC.
4301 Taggart Creek Road
Charlotte, NC 28208
Telephone: 704-394-6913
Toll Free: 800-395-5220
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-34**	**0.0**	**SILT(ML)**	**31**	**NP**	**NP**	**1.73**	**10.51**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-34**	**0.0**	**4.75**	**0.029**	**0.012**	**0.003**	**0.0**	**12.8**	**71.8**	**15.5**

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(DUKE)
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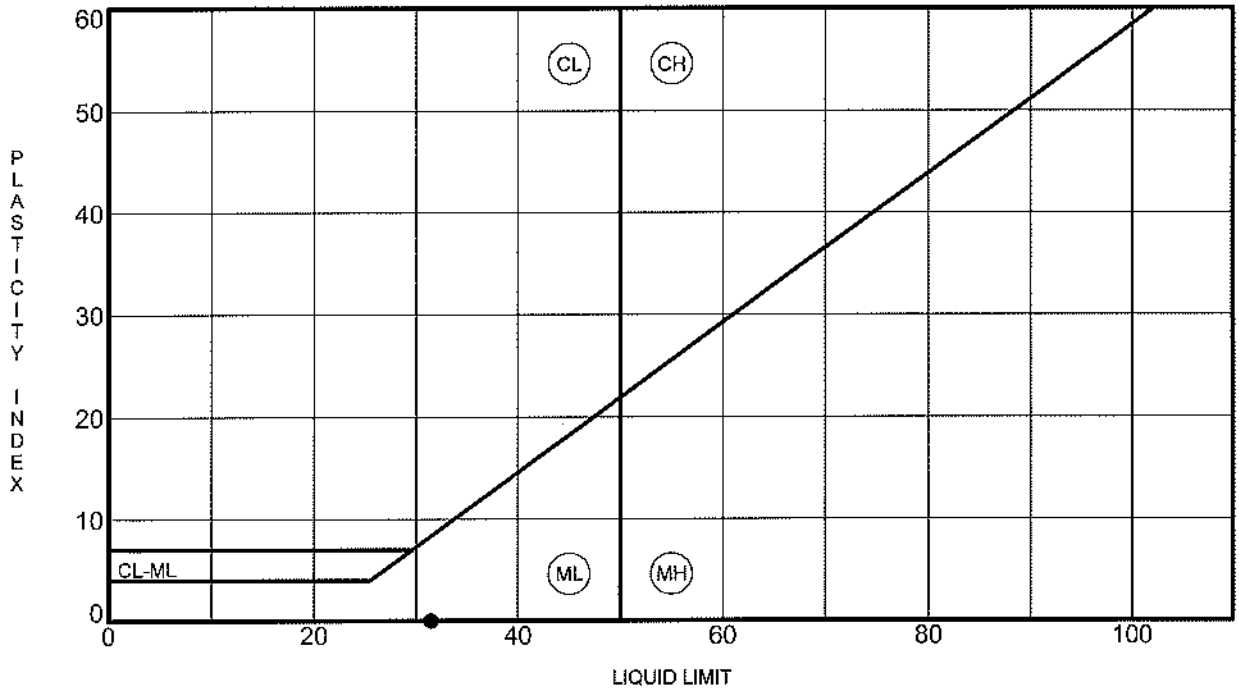
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**BAS-34**	**0.0**	**31**	**NP**	**NP**	**87**	**SILT(ML)**

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Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

SHIELD
ENGINEERING, INC.

May 13, 2010

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 9 - Month of April 2010
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of April. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Janette M. Prosser, P.E.
Senior Engineer

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\1002083-03 Marshall Ash Landfill 2010-04.doc

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Monthly Summary Report - No. 9

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	May 13, 2010	**Page:**	1 of 2
Report By:	Janette M. Prosser, P.E.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of March.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on April 9, 12, 13, 16, 19, 22, 26, 27 and 28, 2010 to perform field density tests of the ash landfill material. The in-place density tests labeled DT-302 to DT-353 were performed during this period. Based on a review of the field test results, a few of the test results completed during this period were slightly below the required 95 percent compaction requirement, however, these isolated test results (94.3 to 94.6 percent) are not anticipated to affect the structural integrity of the overall fill. See Table 1 for preliminary results and locations.

Laboratory Conformance Test:

1. A conformance laboratory sample (BAS-35) was collected during this time period. See attached Moisture-Density Relationship test and additional required conformance test results.

Summary:

The compaction results of these samples were in accordance with instructions provided by Duke Energy representatives. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA YES	NO	MOISTURE BIAS (%)
FLY ASH														
DT-1	08/18/09	See location plan	6	838.0	53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6	838.0	58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6	838.0	57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6	838.0	57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6	838.0	61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6	838.0	64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6	839.0	61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6	839.0	57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6	839.0	54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6	839.0	74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6	839.0	67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6	839.0	60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6	841.5	85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6	841.5	86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6	841.5	88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6	841.5	82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6	841.5	86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6	841.5	90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6	842.0	95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6	842.0	91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6	842.0	90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6	842.0	96.1	45.8	65.9	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6	842.0	91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6	842.0	87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6	842.5	91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6	842.5	86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6	842.5	84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6	842.5	85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6	842.5	84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6	842.5	85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6	842.5	83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6	842.5	84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6	842.5	88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6	842.5	87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6	842.5	87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6	842.5	91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6	843.0	86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6	843.0	85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6	843.0	82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6	843.0	80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6	843.0	88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6	843.0	84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6	843.5	82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6	843.5	82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6	843.5	79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6	843.5	84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6	843.5	93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6	843.5	96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-45R	09/15/09	See location plan	6	843.5	94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6	843.5	94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6	843.5	91.9	31.6	69.8	66.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6	843.5	94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6	844.5	94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6	844.5	93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6	844.5	94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6	844.5	93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6	844.5	92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6	844.5	93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6	844.5	88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6	844.5	95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6	844.5	93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6	844.5	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6	844.5	91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6	844.5	91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6	845.0	88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6	845.0	87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6	845.0	89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6	845.0	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6	845.0	93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6	845.0	93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6	845.0	91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6	845.0	93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.9
DT-70	10/02/09	See location plan	6	845.0	91.9	30.6	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6	845.0	93.7	36.0	68.9	71.6	33.7	BAS-19	96.2	X		2.3
DT-72	10/02/09	See location plan	6	845.0	93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6	845.0	94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6	845.0	89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6	845.0	88.9	30.1	68.3	70.0	32.5	BAS-8	97.6	X		-2.4
DT-76	10/07/09	See location plan	6	845.0	92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6	845.0	95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6	845.0	94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6	845.0	90.1	26.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6	845.5	91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6	845.5	87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6	845.5	93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6	845.5	88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6	845.5	90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6	845.5	86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6	845.5	93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6	845.5	93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6	845.5	90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6	845.5	91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6	845.5	93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6	845.5	91.2	29.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6	845.5	93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6	845.5	88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6	845.5	92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6	845.5	92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-96	10/23/09	See location plan	6	845.5	96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6	845.5	98.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4
DT-98	11/03/09	See location plan	6	847.0	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-99	11/03/09	See location plan	6	847.0	91.3	28.9	70.8	71.5	33.1	BAS-26	99.1	X		-4.2
DT-100	11/03/09	See location plan	6	847.0	94.9	32.6	71.6	71.5	33.1	BAS-26	100+	X		-0.5
DT-101	11/03/09	See location plan	6	847.0	97.3	35.5	71.8	71.5	33.1	BAS-26	100+	X		2.4
DT-102	11/03/09	See location plan	6	847.0	97.9	35.3	72.4	71.5	33.1	BAS-26	100+	X		2.2
DT-103	11/03/09	See location plan	6	847.0	96.1	31.9	72.9	71.5	33.1	BAS-26	100+	X		-1.2
DT-104	11/06/09	See location plan	6	847.5	92.8	31.1	70.8	74.0	32.2	BAS-25	95.7	X		-1.1
DT-105	11/06/09	See location plan	6	847.5	89.8	31.5	68.3	74.0	32.2	BAS-25	92.3		X	-0.7
DT-105R	11/06/09	See location plan	6	847.5	92.8	31.8	70.4	74.0	32.2	BAS-25	95.1	X		-0.4
DT-106	11/06/09	See location plan	6	847.5	94.3	28.2	73.6	74.0	32.2	BAS-25	99.4	X		-4.0
DT-107	11/06/09	See location plan	6	847.5	95.2	30.8	72.8	74.0	32.2	BAS-25	98.4	X		-1.4
DT-108	11/06/09	See location plan	6	847.5	97.6	30.9	74.6	74.0	32.2	BAS-25	100+	X		-1.3
DT-109	11/06/09	See location plan	6	847.5	94.6	30.6	72.4	74.0	32.2	BAS-25	97.9	X		-1.6
DT-110	11/17/09	See location plan	6	845.5	88.0	29.9	67.7	70.2	28.3	BAS-11	96.5	X		1.6
DT-111	11/17/09	See location plan	6	845.5	89.8	28.7	69.8	70.2	28.3	BAS-11	99.4	X		0.4
DT-112	11/17/09	See location plan	6	845.5	91.3	26.1	72.4	72.0	26.3	BAS-14	100+	X		-0.2
DT-113	11/17/09	See location plan	6	845.5	91.9	26.9	72.4	72.0	26.3	BAS-14	100+	X		0.6
DT-114	11/17/09	See location plan	6	845.5	89.2	27.1	70.2	72.0	26.3	BAS-14	97.5	X		0.8
DT-115	11/17/09	See location plan	6	845.5	88.0	26.1	69.8	72.0	26.3	BAS-14	96.9	X		-0.2
DT-116	11/20/09	See location plan	6	845.5	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-117	11/20/09	See location plan	6	845.5	90.4	30.8	69.1	71.5	33.1	BAS-26	96.7	X		-2.3
DT-118	11/20/09	See location plan	6	845.5	90.7	32.3	68.6	71.5	33.1	BAS-26	95.9	X		-0.8
DT-119	11/20/09	See location plan	6	845.5	91.9	31.0	70.2	71.5	33.1	BAS-26	98.1	X		-2.1
DT-120	11/20/09	See location plan	6	845.5	95.8	31.2	73.0	71.5	33.1	BAS-26	100+	X		-1.9
DT-121	11/20/09	See location plan	6	845.5	89.2	30.7	68.2	71.5	33.1	BAS-26	95.5	X		-2.4
DT-122	11/25/09	See location plan	6	845.5	94.9	28.9	73.6	76.3	30.7	BAS-24	96.5	X		-1.8
DT-123	11/25/09	See location plan	6	845.5	96.4	32.2	72.9	76.3	30.7	BAS-24	95.6	X		1.5
DT-124	11/25/09	See location plan	6	845.5	95.8	31.2	73.0	76.3	30.7	BAS-24	95.7	X		0.5
DT-125	11/25/09	See location plan	6	845.5	94.1	27.9	73.6	76.3	30.7	BAS-24	96.4	X		-2.8
DT-126	11/25/09	See location plan	6	845.5	92.8	27.5	72.8	76.3	30.7	BAS-24	95.4	X		-3.2
DT-127	11/25/09	See location plan	6	845.5	97.0	30.7	74.2	76.3	30.7	BAS-24	97.3	X		0.0
DT-128	12/02/09	See location plan	6	846.5	84.3	26.5	66.6	70.2	28.3	BAS-11	94.9		X	-1.8
DT-129	12/02/09	See location plan	6	846.5	85.8	27.2	67.5	70.2	28.3	BAS-11	96.1	X		-1.1
DT-130	12/02/09	See location plan	6	846.5	90.4	26.5	71.5	70.2	28.3	BAS-11	100+	X		-1.8
DT-131	12/02/09	See location plan	6	846.5	91.0	28.1	71.0	70.2	28.3	BAS-11	100+	X		-0.2
DT-132	12/02/09	See location plan	6	846.5	89.5	30.0	68.8	70.2	28.3	BAS-11	98.1	X		1.7
DT-133	12/02/09	See location plan	6	846.5	88.6	27.2	69.7	70.2	28.3	BAS-11	99.2	X		-1.1
DT-134	12/07/09	See location plan	6	848.0	88.9	27.4	69.8	70.2	28.3	BAS-11	99.4	X		-0.9
DT-135	12/07/09	See location plan	6	848.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-136	12/07/09	See location plan	6	848.0	86.4	26.4	68.4	70.2	28.3	BAS-11	97.4	X		-1.9
DT-137	12/07/09	See location plan	6	848.0	84.9	25.1	67.9	70.2	28.3	BAS-11	96.7	X		-3.2
DT-138	12/07/09	See location plan	6	848.0	86.7	28.6	67.4	70.2	28.3	BAS-11	96.0	X		0.3
DT-139	12/07/09	See location plan	6	848.0	88.9	29.2	68.8	70.2	28.3	BAS-11	98.0	X		0.9
DT-140	12/16/09	See location plan	6	845.5	83.1	25.9	66.0	67.0	24.0	BAS-7	98.5	X		1.9
DT-141	12/16/09	See location plan	6	845.5	84.3	24.5	67.7	67.0	24.0	BAS-7	100+	X		0.5
DT-142	12/16/09	See location plan	6	845.5	80.4	24.9	64.4	67.0	24.0	BAS-7	96.1	X		0.9
DT-143	12/16/09	See location plan	6	845.5	81.3	26.1	64.5	67.0	24.0	BAS-7	96.2	X		2.1
DT-144	12/16/09	See location plan	6	845.5	84.0	25.6	66.9	67.0	24.0	BAS-7	99.8	X		1.6
DT-145	12/16/09	See location plan	6	845.5	86.7	26.0	68.8	67.0	24.0	BAS-7	100+	X		2.0

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DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-146	12/21/09	See location plan	6	849.0	94.3	32.6	71.1	71.6	33.7	BAS-19	99.3	X		-1.1
DT-147	12/21/09	See location plan	6	849.0	94.0	33.6	70.4	71.6	33.7	BAS-19	98.3	X		-0.1
DT-148	12/21/09	See location plan	6	849.0	97.0	34.0	72.4	71.6	33.7	BAS-19	100+	X		0.3
DT-149	12/21/09	See location plan	6	849.0	95.8	34.2	71.4	71.6	33.7	BAS-19	99.7	X		0.5
DT-150	12/21/09	See location plan	6	849.0	93.7	34.1	69.9	71.6	33.7	BAS-19	97.6	X		0.4
DT-151	12/21/09	See location plan	6	849.0	94.9	31.0	72.4	71.6	33.7	BAS-19	100+	X		-2.7
DT-152	12/23/09	See location plan	6	850.0	86.4	26.7	68.2	70.2	28.3	BAS-11	97.1	X		-1.6
DT-153	12/23/09	See location plan	6	850.0	88.3	25.6	70.3	70.2	28.3	BAS-11	100+	X		-2.7
DT-154	12/23/09	See location plan	6	850.0	85.2	26.4	67.4	70.2	28.3	BAS-11	96.0	X		-1.9
DT-155	12/23/09	See location plan	6	850.0	85.8	28.6	66.7	70.2	28.3	BAS-11	95.0	X		0.3
DT-156	12/23/09	See location plan	6	850.0	87.3	27.6	68.4	70.2	28.3	BAS-11	97.5	X		-0.7
DT-157	12/23/09	See location plan	6	850.0	86.4	29.5	66.7	70.2	28.3	BAS-11	95.0	X		1.2
DT-158	12/28/09	See location plan	6	851.5	88.0	33.7	65.8	70.0	32.5	BAS-11	94.0		X	1.2
DT-159	12/28/09	See location plan	6	851.5	91.3	34.8	67.7	70.0	32.5	BAS-11	96.8	X		2.3
DT-160	12/28/09	See location plan	6	851.5	92.8	32.0	70.3	70.0	32.5	BAS-11	100+	X		-0.5
DT-161	12/28/09	See location plan	6	851.5	91.0	32.8	68.5	70.0	32.5	BAS-11	97.9	X		0.3
DT-162	12/28/09	See location plan	6	851.5	90.1	31.7	68.4	70.0	32.5	BAS-11	97.7	X		-0.8
DT-163	12/28/09	See location plan	6	851.5	91.6	33.2	68.8	70.0	32.5	BAS-11	98.2	X		0.7
DT-164	12/29/09	See location plan	6	852.5	97.6	32.3	73.8	76.3	30.7	BAS-24	96.7	X		1.6
DT-165	12/29/09	See location plan	6	852.5	95.8	26.0	76.0	76.3	30.7	BAS-24	99.6	X		-4.7
DT-166	12/29/09	See location plan	6	852.5	96.1	27.3	75.5	76.3	30.7	BAS-24	98.9	X		-3.4
DT-167	12/29/09	See location plan	6	852.5	97.9	27.3	76.9	76.3	30.7	BAS-24	100+	X		-3.4
DT-168	12/29/09	See location plan	6	852.5	98.8	25.8	78.5	76.3	30.7	BAS-24	100+	X		-4.9
DT-168R	12/29/09	See location plan	6	852.5	96.1	27.0	75.7	76.3	30.7	BAS-24	99.2	X		-3.7
DT-169	12/29/09	See location plan	6	852.5	96.4	26.9	76.0	76.3	30.7	BAS-24	99.6	X		-3.8
DT-170	12/30/09	See location plan	6	853.0	88.3	24.1	71.2	72.0	26.3	BAS-14	98.8	X		-2.2
DT-171	12/30/09	See location plan	6	853.0	86.7	21.8	71.2	72.0	26.3	BAS-14	98.9	X		-4.5
DT-172	12/30/09	See location plan	6	853.0	86.1	24.2	69.3	72.0	26.3	BAS-14	96.3	X		-2.1
DT-173	12/30/09	See location plan	6	853.0	87.3	22.5	71.3	72.0	26.3	BAS-14	99.0	X		-3.8
DT-174	12/30/09	See location plan	6	853.0	86.7	21.9	71.1	72.0	26.3	BAS-14	98.8	X		-4.4
DT-175	12/30/09	See location plan	6	853.0	86.4	23.0	70.2	72.0	26.3	BAS-14	97.6	X		-3.3
DT-176	01/06/10	See location plan	6	855.0	87.0	29.1	67.4	67.9	28.5	BAS-12	99.2	X		0.6
DT-177	01/06/10	See location plan	6	855.0	86.1	32.6	64.9	67.9	28.5	BAS-12	95.6	X		4.1
DT-178	01/06/10	See location plan	6	855.0	86.1	25.1	68.8	67.9	28.5	BAS-12	100+	X		-3.4
DT-179	01/06/10	See location plan	6	855.0	85.8	29.3	66.4	67.9	28.5	BAS-12	97.7	X		0.8
DT-180	01/06/10	See location plan	6	855.0	87.3	27.5	68.5	67.9	28.5	BAS-12	100+	X		-1.0
DT-181	01/06/10	See location plan	6	855.0	86.7	26.7	68.4	67.9	28.5	BAS-12	100+	X		-1.8
DT-182	01/07/10	See location plan	6	856.0	89.5	30.7	68.5	67.9	28.5	BAS-12	100+	X		2.2
DT-183	01/07/10	See location plan	6	856.0	85.8	30.1	65.9	67.9	28.5	BAS-12	97.1	X		1.6
DT-184	01/07/10	See location plan	6	856.0	86.1	27.8	67.4	67.9	28.5	BAS-12	99.2	X		-0.7
DT-185	01/07/10	See location plan	6	856.0	86.7	29.6	66.9	67.9	28.5	BAS-12	98.5	X		1.1
DT-186	01/07/10	See location plan	6	856.0	82.5	26.1	65.4	67.9	28.5	BAS-12	96.4	X		-2.4
DT-187	01/07/10	See location plan	6	856.0	83.1	22.9	67.6	67.9	28.5	BAS-12	99.6	X		-5.6
DT-188	01/08/10	See location plan	6	858.5	95.2	34.7	70.7	72.2	33.9	BAS-31	97.9	X		0.8
DT-189	01/08/10	See location plan	6	858.5	95.8	31.6	72.8	72.2	33.9	BAS-31	100+	X		-2.3
DT-190	01/08/10	See location plan	6	858.5	94.6	35.1	70.0	72.2	33.9	BAS-31	97.0	X		1.2
DT-191	01/08/10	See location plan	6	858.5	95.2	33.3	71.4	72.2	33.9	BAS-31	98.9	X		-0.6
DT-192	01/08/10	See location plan	6	858.5	94.3	32.7	71.1	72.2	33.9	BAS-31	98.4	X		-1.2
DT-193	01/08/10	See location plan	6	858.5	94.6	36.8	69.2	72.2	33.9	BAS-31	95.8	X		2.9
DT-194	01/13/10	See location plan	6	860.0	85.5	29.2	66.2	70.2	28.3	BAS-11	94.3		X	0.9
DT-195	01/13/10	See location plan	6	860.0	85.2	25.2	68.1	70.2	28.3	BAS-11	96.9	X		-3.1

DT - Indicates Drive Tube Density Test
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SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-196	01/13/10	See location plan	6	860.0	85.2	27.0	67.1	70.2	28.3	BAS-11	95.6	X		-1.3
DT-197	01/13/10	See location plan	6	860.0	86.7	27.3	68.1	70.2	28.3	BAS-11	97.0	X		-1.0
DT-198	01/13/10	See location plan	6	860.0	86.7	25.1	69.3	70.2	28.3	BAS-11	98.7	X		-3.2
DT-199	01/13/10	See location plan	6	860.0	86.1	27.5	67.5	70.2	28.3	BAS-11	96.2	X		-0.8
DT-200	01/15/10	See location plan	6	868.5	86.1	24.5	69.2	70.2	28.3	BAS-11	98.5	X		-3.8
DT-201	01/15/10	See location plan	6	868.5	87.7	25.6	69.8	70.2	28.3	BAS-11	99.5	X		-2.7
DT-202	01/15/10	See location plan	6	868.5	87.3	26.8	68.8	70.2	28.3	BAS-11	98.1	X		-1.5
DT-203	01/15/10	See location plan	6	868.5	86.4	25.0	69.1	70.2	28.3	BAS-11	98.5	X		-3.3
DT-204	01/15/10	See location plan	6	868.5	86.7	25.8	68.9	70.2	28.3	BAS-11	98.2	X		-2.5
DT-205	01/15/10	See location plan	6	868.5	87.0	24.3	70.0	70.2	28.3	BAS-11	99.7	X		-4.0
DT-206	01/19/10	See location plan	6	871.5	93.4	31.0	71.3	71.5	33.1	BAS-26	99.7	X		-2.1
DT-207	01/19/10	See location plan	6	871.5	94.0	32.2	71.1	71.5	33.1	BAS-26	99.4	X		-0.9
DT-208	01/19/10	See location plan	6	871.5	92.8	32.6	70.0	71.5	33.1	BAS-26	97.9	X		-0.5
DT-209	01/19/10	See location plan	6	871.5	93.4	32.3	70.6	71.5	33.1	BAS-26	98.7	X		-0.8
DT-210	01/19/10	See location plan	6	871.5	94.3	35.2	69.7	71.5	33.1	BAS-26	97.6	X		2.1
DT-211	01/19/10	See location plan	6	871.5	94.3	33.5	70.6	71.5	33.1	BAS-26	98.8	X		0.4
DT-212	01/29/10	See location plan	6	861.0	94.6	31.5	71.9	74.6	30.9	BAS-29	96.4	X		0.6
DT-213	01/29/10	See location plan	6	861.0	95.2	31.4	72.5	74.6	30.9	BAS-29	97.1	X		0.5
DT-214	01/29/10	See location plan	6	861.0	95.5	29.4	73.8	74.6	30.9	BAS-29	98.9	X		-1.5
DT-215	01/29/10	See location plan	6	861.0	95.2	29.6	73.5	74.6	30.9	BAS-29	98.5	X		-1.3
DT-216	01/29/10	See location plan	6	861.0	95.8	31.2	73.0	74.6	30.9	BAS-29	97.9	X		0.3
DT-217	01/29/10	See location plan	6	861.0	96.1	30.4	73.7	74.6	30.9	BAS-29	98.8	X		-0.5
DT-218	02/04/10	See location plan	6	866.5	93.7	32.6	70.7	74.0	32.2	BAS-25	95.5	X		0.4
DT-219	02/04/10	See location plan	6	866.5	97.0	30.1	74.6	74.0	32.2	BAS-25	100+	X		-2.1
DT-220	02/04/10	See location plan	6	866.5	89.2	31.5	67.8	74.0	32.2	BAS-25	91.7		X	-0.7
DT-220R	02/04/10	See location plan	6	866.5	95.2	30.3	73.1	74.0	32.2	BAS-25	98.7	X		-1.9
DT-221	02/04/10	See location plan	6	866.5	88.6	32.1	67.1	74.0	32.2	BAS-25	90.6		X	-0.1
DT-221R	02/04/10	See location plan	6	866.5	96.4	30.4	73.9	74.0	32.2	BAS-25	99.9	X		-1.8
DT-222	02/04/10	See location plan	6	866.5	94.3	32.6	71.1	74.0	32.2	BAS-25	96.1	X		0.4
DT-223	02/04/10	See location plan	6	866.5	97.6	32.7	73.5	74.0	32.2	BAS-25	99.4	X		0.5
DT-224	02/10/10	See location plan	6	866.5	92.8	27.2	73.0	74.0	32.2	BAS-25	98.6	X		-5.0
DT-225	02/10/10	See location plan	6	866.5	91.0	27.4	71.4	74.0	32.2	BAS-25	96.5	X		-4.8
DT-226	02/10/10	See location plan	6	866.5	93.4	27.8	73.1	74.0	32.2	BAS-25	98.8	X		-4.4
DT-227	02/10/10	See location plan	6	866.5	91.6	27.5	71.8	74.0	32.2	BAS-25	97.1	X		-4.7
DT-228	02/10/10	See location plan	6	866.5	93.7	27.3	73.6	74.0	32.2	BAS-25	99.5	X		-4.9
DT-229	02/10/10	See location plan	6	866.5	92.2	26.7	72.8	74.0	32.2	BAS-25	98.3	X		-5.5
DT-230	02/12/10	See location plan	6	866.5	89.5	25.5	71.3	72.0	26.3	BAS-14	99.0	X		-0.8
DT-231	02/12/10	See location plan	6	866.5	88.9	24.5	71.4	72.0	26.3	BAS-14	99.2	X		-1.8
DT-232	02/12/10	See location plan	6	866.5	88.3	24.6	70.9	72.0	26.3	BAS-14	98.4	X		-1.7
DT-233	02/12/10	See location plan	6	866.5	88.6	24.6	71.1	72.0	26.3	BAS-14	98.8	X		-1.7
DT-234	02/12/10	See location plan	6	866.5	89.8	25.6	71.5	72.0	26.3	BAS-14	99.3	X		-0.7
DT-235	02/12/10	See location plan	6	866.5	90.4	26.3	71.6	72.0	26.3	BAS-14	99.4	X		0.0
DT-236	02/19/10	See location plan	6	848.8	87.7	24.4	70.5	72.0	26.3	BAS-14	97.9	X		-1.9
DT-237	02/19/10	See location plan	6	848.8	89.8	26.3	71.1	72.0	26.3	BAS-14	98.8	X		0.0
DT-238	02/19/10	See location plan	6	848.8	88.0	22.9	71.6	72.0	26.3	BAS-14	99.4	X		-3.4
DT-239	02/19/10	See location plan	6	848.8	89.2	23.3	72.3	72.0	26.3	BAS-14	100+	X		-3.0
DT-240	02/19/10	See location plan	6	848.8	88.3	21.6	72.6	72.0	26.3	BAS-14	100+	X		-4.7
DT-241	02/19/10	See location plan	6	848.8	88.9	22.3	72.7	72.0	26.3	BAS-14	100+	X		-4.0
DT-242	02/23/10	See location plan	6	848.8	96.4	31.0	73.6	74.8	30.7	BAS-28	98.4	X		0.3
DT-243	02/23/10	See location plan	6	848.8	97.3	30.9	74.3	74.8	30.7	BAS-28	99.4	X		0.2
DT-244	02/23/10	See location plan	6	848.8	95.5	30.2	73.3	74.8	30.7	BAS-28	98.1	X		-0.5

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-245	02/23/10	See location plan	6	848.8	97.3	31.2	74.2	74.8	30.7	BAS-28	99.1	X		0.5
DT-246	02/23/10	See location plan	6	848.8	95.8	30.4	73.5	74.8	30.7	BAS-28	98.2	X		-0.3
DT-247	02/23/10	See location plan	6	848.8	94.9	29.5	73.3	74.8	30.7	BAS-28	98.0	X		-1.2
DT-248	03/04/10	See location plan	6	850.8	85.2	24.7	68.3	70.2	28.3	BAS-11	97.3	X		-3.6
DT-249	03/04/10	See location plan	6	850.8	86.1	26.3	68.2	70.2	28.3	BAS-11	97.1	X		-2.0
DT-250	03/04/10	See location plan	6	850.8	86.4	24.9	69.2	70.2	28.3	BAS-11	98.5	X		-3.4
DT-251	03/04/10	See location plan	6	850.8	87.3	24.1	70.3	70.2	28.3	BAS-11	100+	X		-4.2
DT-252	03/04/10	See location plan	6	850.8	86.7	25.7	69.0	70.2	28.3	BAS-11	98.3	X		-2.6
DT-253	03/04/10	See location plan	6	850.8	85.8	26.1	68.1	70.2	28.3	BAS-11	97.0	X		-2.2
DT-254	03/08/10	See location plan	6	850.2	94.3	26.2	74.7	76.1	28.1	BAS-18	98.2	X		-1.9
DT-255	03/08/10	See location plan	6	850.2	92.5	25.7	73.6	76.1	28.1	BAS-18	96.7	X		-2.4
DT-256	03/08/10	See location plan	6	850.2	93.1	24.4	74.8	76.1	28.1	BAS-18	98.3	X		-3.7
DT-257	03/08/10	See location plan	6	850.2	93.1	25.8	74.0	76.1	28.1	BAS-18	97.2	X		-2.3
DT-258	03/08/10	See location plan	6	850.2	92.5	24.4	74.4	76.1	28.1	BAS-18	97.7	X		-3.7
DT-259	03/08/10	See location plan	6	850.2	92.8	24.8	74.4	76.1	28.1	BAS-18	97.7	X		-3.3
DT-260	03/12/10	See location plan	6	852.1	93.1	27.5	73.0	74.8	30.7	BAS-28	97.6	X		-3.2
DT-261	03/12/10	See location plan	6	852.1	92.8	27.4	72.8	74.8	30.7	BAS-28	97.4	X		-3.3
DT-262	03/12/10	See location plan	6	852.1	92.2	25.1	73.7	74.8	30.7	BAS-28	98.5	X		-5.6
DT-263	03/12/10	See location plan	6	852.1	92.8	27.9	72.6	74.8	30.7	BAS-28	97.0	X		-2.8
DT-264	03/12/10	See location plan	6	852.1	91.6	25.9	72.8	74.8	30.7	BAS-28	97.3	X		-4.8
DT-265	03/12/10	See location plan	6	852.1	91.6	27.0	72.1	74.8	30.7	BAS-28	96.4	X		-3.7
DT-266	03/17/10	See location plan	6	852.1	90.7	25.2	72.4	72.0	26.3	BAS-14	100+	X		-1.1
DT-267	03/17/10	See location plan	6	852.1	87.7	28.7	68.1	72.0	26.3	BAS-14	94.6		X	2.4
DT-268	03/17/10	See location plan	6	852.1	87.0	24.0	70.2	72.0	26.3	BAS-14	97.4	X		-2.3
DT-269	03/17/10	See location plan	6	852.1	84.3	24.0	68.0	72.0	26.3	BAS-14	94.4		X	-2.3
DT-270	03/17/10	See location plan	6	852.1	86.1	23.2	69.9	72.0	26.3	BAS-14	97.1	X		-3.1
DT-271	03/17/10	See location plan	6	852.1	87.3	24.1	70.3	72.0	26.3	BAS-14	97.7	X		-2.2
DT-272	03/18/10	See location plan	6	872.0	82.5	25.3	65.8	67.0	24.0	BAS-7	98.3	X		1.3
DT-273	03/18/10	See location plan	6	872.0	83.4	24.7	66.9	67.0	24.0	BAS-7	99.8	X		0.7
DT-274	03/18/10	See location plan	6	872.0	83.4	22.7	68.0	67.0	24.0	BAS-7	100+	X		-1.3
DT-275	03/18/10	See location plan	6	872.0	83.1	27.9	65.0	67.0	24.0	BAS-7	97.0	X		3.9
DT-276	03/18/10	See location plan	6	872.0	82.2	22.4	67.2	67.0	24.0	BAS-7	100+	X		-1.6
DT-277	03/18/10	See location plan	6	872.0	83.7	22.4	68.4	67.0	24.0	BAS-7	100+	X		-1.6
DT-278	03/19/10	See location plan	6	872.0	86.1	24.9	68.9	70.2	28.3	BAS-11	98.2	X		-3.4
DT-279	03/19/10	See location plan	6	872.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-280	03/19/10	See location plan	6	872.0	86.7	23.4	70.3	70.2	28.3	BAS-11	100+	X		-4.9
DT-281	03/19/10	See location plan	6	872.0	88.3	27.2	69.4	70.2	28.3	BAS-11	98.9	X		-1.1
DT-282	03/19/10	See location plan	6	872.0	87.0	26.1	69.0	70.2	28.3	BAS-11	98.3	X		-2.2
DT-283	03/19/10	See location plan	6	872.0	88.3	29.0	68.4	70.2	28.3	BAS-11	97.5	X		0.7
DT-284	03/22/10	See location plan	6	852.1	89.8	31.4	68.3	67.9	28.5	BAS-12	100+	X		2.9
DT-285	03/22/10	See location plan	6	852.1	85.5	32.3	64.6	67.9	28.5	BAS-12	95.2	X		3.8
DT-286	03/22/10	See location plan	6	852.1	86.7	31.1	66.1	67.9	28.5	BAS-12	97.4	X		2.6
DT-287	03/22/10	See location plan	6	852.1	85.8	33.5	64.3	67.9	28.5	BAS-12	94.7		X	5.0
DT-288	03/22/10	See location plan	6	852.1	86.7	30.1	66.6	67.9	28.5	BAS-12	98.1	X		1.6
DT-289	03/22/10	See location plan	6	852.1	86.4	30.4	66.3	67.9	28.5	BAS-12	97.6	X		1.9
DT-290	03/23/10	See location plan	6	852.1	86.4	30.7	66.1	70.2	28.3	BAS-11	94.2		X	2.4
DT-291	03/23/10	See location plan	6	852.1	86.7	31.2	66.1	70.2	28.3	BAS-11	94.1		X	2.9
DT-292	03/23/10	See location plan	6	852.1	88.9	28.1	69.4	70.2	28.3	BAS-11	98.9	X		-0.2
DT-293	03/23/10	See location plan	6	852.1	88.0	32.7	66.3	70.2	28.3	BAS-11	94.5		X	4.4
DT-294	03/23/10	See location plan	6	852.1	87.7	26.9	69.1	70.2	28.3	BAS-11	98.4	X		-1.4
DT-295	03/23/10	See location plan	6	852.1	88.3	30.4	67.7	70.2	28.3	BAS-11	96.5	X		2.1

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-296	03/25/10	See location plan	6	852.1	79.2	23.5	64.1	67.0	24.0	BAS-7	95.7	X		-0.5
DT-297	03/25/10	See location plan	6	852.1	84.0	22.6	68.5	67.0	24.0	BAS-7	100+	X		-1.4
DT-298	03/25/10	See location plan	6	852.1	78.9	23.2	64.0	67.0	24.0	BAS-7	95.6	X		-0.8
DT-299	03/25/10	See location plan	6	852.1	83.1	28.0	64.9	67.0	24.0	BAS-7	96.9	X		4.0
DT-300	03/25/10	See location plan	6	852.1	82.5	21.4	68.0	67.0	24.0	BAS-7	100+	X		-2.6
DT-301	03/25/10	See location plan	6	852.1	82.2	23.6	66.5	67.0	24.0	BAS-7	99.3	X		-0.4
DT-302	04/09/10	See location plan	6	852.1	97.9	30.6	75.0	77.9	29.8	BAS-27	96.2	X		0.8
DT-303	04/09/10	See location plan	6	852.1	97.0	32.0	73.5	77.9	29.8	BAS-27	94.3		X	2.2
DT-304	04/09/10	See location plan	6	852.1	99.1	29.8	76.3	77.9	29.8	BAS-27	98.0	X		0.0
DT-305	04/09/10	See location plan	6	852.1	99.7	33.6	74.6	77.9	29.8	BAS-27	95.8	X		3.8
DT-306	04/09/10	See location plan	6	852.1	100.0	31.4	76.1	77.9	29.8	BAS-27	97.7	X		1.6
DT-307	04/09/10	See location plan	6	852.1	100.3	30.0	77.2	77.9	29.8	BAS-27	99.0	X		0.2
DT-308	04/12/10	See location plan	6	852.1	92.8	24.4	74.6	75.3	30.4	BAS-17	99.1	X		-6.0
DT-309	04/12/10	See location plan	6	852.1	93.4	26.5	73.8	75.3	30.4	BAS-17	98.1	X		-3.9
DT-310	04/12/10	See location plan	6	852.1	92.5	25.5	73.7	75.3	30.4	BAS-17	97.9	X		-4.9
DT-311	04/12/10	See location plan	6	852.1	91.3	28.2	71.2	75.3	30.4	BAS-17	94.6		X	-2.2
DT-312	04/12/10	See location plan	6	852.1	94.0	27.1	74.0	75.3	30.4	BAS-17	98.2	X		-3.3
DT-313	04/12/10	See location plan	6	852.1	95.5	26.5	75.5	75.3	30.4	BAS-17	100+	X		-3.9
DT-314	04/13/10	See location plan	6	852.1	80.7	22.3	66.0	67.0	24.0	BAS-7	98.5	X		-1.7
DT-315	04/13/10	See location plan	6	852.1	79.5	22.3	65.0	67.0	24.0	BAS-7	97.0	X		-1.7
DT-316	04/13/10	See location plan	6	852.1	78.3	19.8	65.4	67.0	24.0	BAS-7	97.6	X		-4.2
DT-317	04/13/10	See location plan	6	852.1	81.0	23.7	65.5	67.0	24.0	BAS-7	97.7	X		-0.3
DT-318	04/13/10	See location plan	6	852.1	78.6	22.3	64.3	67.0	24.0	BAS-7	95.9	X		-1.7
DT-319	04/13/10	See location plan	6	852.1	79.2	22.0	64.9	67.0	24.0	BAS-7	96.9	X		-2.0
DT-320	04/16/10	See location plan	6	852.1	80.4	22.1	65.8	67.0	24.0	BAS-7	98.3	X		-1.9
DT-321	04/16/10	See location plan	6	852.1	83.7	24.4	67.3	67.0	24.0	BAS-7	100+	X		0.4
DT-322	04/16/10	See location plan	6	852.1	82.8	23.0	67.3	67.0	24.0	BAS-7	100+	X		-1.0
DT-323	04/16/10	See location plan	6	852.1	81.9	26.0	65.0	67.0	24.0	BAS-7	97.0	X		2.0
DT-324	04/16/10	See location plan	6	852.1	81.9	24.1	66.0	67.0	24.0	BAS-7	98.5	X		0.1
DT-325	04/16/10	See location plan	6	852.1	81.6	23.4	66.1	67.0	24.0	BAS-7	98.7	X		-0.6
DT-326	04/19/10	See location plan	6	854.1	91.6	26.3	72.5	76.1	28.1	BAS-18	95.3	X		-1.8
DT-327	04/19/10	See location plan	6	854.1	93.1	26.7	73.5	76.1	28.1	BAS-18	96.6	X		-1.4
DT-328	04/19/10	See location plan	6	854.1	91.6	24.1	73.8	76.1	28.1	BAS-18	97.0	X		-4.0
DT-329	04/19/10	See location plan	6	854.1	92.8	27.5	72.8	76.1	28.1	BAS-18	95.6	X		-0.6
DT-330	04/19/10	See location plan	6	854.1	94.6	24.6	75.9	76.1	28.1	BAS-18	99.8	X		-3.5
DT-331	04/19/10	See location plan	6	854.1	94.0	23.9	75.9	76.1	28.1	BAS-18	99.7	X		-4.2
DT-332	04/22/10	See location plan	6	854.1	81.6	21.8	67.0	70.2	28.3	BAS-11	95.4	X		-6.5
DT-333	04/22/10	See location plan	6	854.1	81.0	20.7	67.1	70.2	28.3	BAS-11	95.6	X		-7.6
DT-334	04/22/10	See location plan	6	854.1	84.0	22.1	68.8	70.2	28.3	BAS-11	98.0	X		-6.2
DT-335	04/22/10	See location plan	6	854.1	83.1	22.5	67.8	70.2	28.3	BAS-11	96.6	X		-5.8
DT-336	04/22/10	See location plan	6	854.1	84.0	23.2	68.2	70.2	28.3	BAS-11	97.1	X		-5.1
DT-337	04/22/10	See location plan	6	854.1	84.6	22.9	68.8	70.2	28.3	BAS-11	98.1	X		-5.4
DT-338	04/26/10	See location plan	6	854.1	83.7	25.3	66.8	70.2	28.3	BAS-11	95.2	X		-3.0
DT-339	04/26/10	See location plan	6	854.1	83.7	24.2	67.4	70.2	28.3	BAS-11	96.0	X		-4.1
DT-340	04/26/10	See location plan	6	854.1	86.1	26.7	68.0	70.2	28.3	BAS-11	96.8	X		-1.6
DT-341	04/26/10	See location plan	6	854.1	86.7	30.8	66.3	70.2	28.3	BAS-11	94.4		X	2.5
DT-342	04/26/10	See location plan	6	854.1	84.3	25.8	67.0	70.2	28.3	BAS-11	95.5	X		-2.5
DT-343	04/26/10	See location plan	6	854.1	86.1	25.4	68.7	70.2	28.3	BAS-11	97.8	X		-2.9
DT-344	04/27/10	See location plan	6	854.1	83.4	23.9	67.3	67.0	24.0	BAS-7	100+	X		-0.1
DT-345	04/27/10	See location plan	6	854.1	84.3	24.6	67.7	67.0	24.0	BAS-7	100+	X		0.6
DT-346	04/27/10	See location plan	6	854.1	83.7	22.7	68.2	67.0	24.0	BAS-7	100+	X		-1.3

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

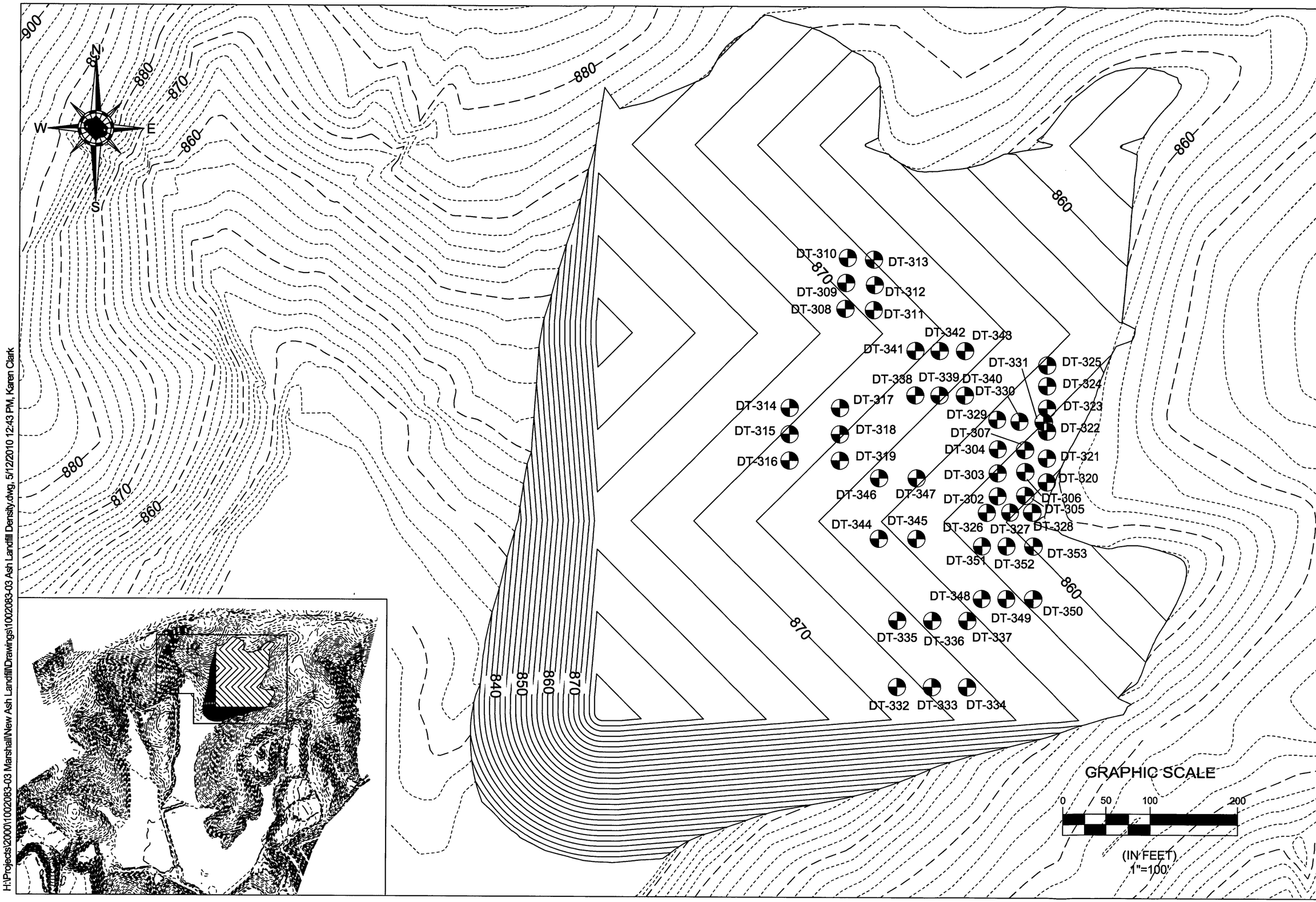
4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-347	04/27/10	See location plan	6	854.1	81.3	22.2	66.5	67.0	24.0	BAS-7	99.3	X		-1.8
DT-348	04/28/10	See location plan	6	854.1	88.0	25.5	70.1	70.2	28.3	BAS-11	99.9	X		-2.8
DT-349	04/28/10	See location plan	6	854.1	88.3	25.1	70.6	70.2	28.3	BAS-11	100+	X		-3.2
DT-350	04/28/10	See location plan	6	854.1	87.7	25.5	69.9	70.2	28.3	BAS-11	99.5	X		-2.8
DT-351	04/28/10	See location plan	6	854.1	85.5	27.5	67.1	70.2	28.3	BAS-11	95.5	X		-0.8
DT-352	04/28/10	See location plan	6	854.1	88.0	25.1	70.3	70.2	28.3	BAS-11	100+	X		-3.2
DT-353	04/28/10	See location plan	6	854.1	86.7	24.8	69.5	70.2	28.3	BAS-11	99.0	X		-3.5

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope



H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 5/12/2010 12:43 PM, Karen Clark

SHIELD ENGINEERING, INC.
4301 TAGGART CREEK ROAD
CHARLOTTE, NC 28208
704-394-6913
704-394-6968 fax
www.shieldengineering.com

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density.dwg
DRAWN BY: KJC
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: 05/12/10

SHEET TITLE:
DENSITY TEST LOCATION PLAN
APRIL 2010

SHEET:
1

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 4-9-10
Inspection of: Fill Fly Ash New Land Fill	**Technician:** Elis Rojas	

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Shield on site to observed fill at MARSHALL Power Steam station.

Shield arrived at old Land Fill. Crew was not on site. Crew was working at New Land fill.

Shield Notice another crew working on expansion on New Land Fill at east side.

Shield performed 6 test. All test meets criteria.
except #303 @ 94.3% compaction.
JNB

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Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAR SHALL		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 4-9-10
Inspection of: Fill Flyash New Land Fill		**Technician:** Elis Rojas	

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Drive Tube\Nuclear Density Data

Test No.	302	303	304	305	306	307		
Grade or Elevation	852.1							
Location								
Wt. Wet Soil & Mold	4.56	4.53	4.61	4.63	4.63	4.64		
Wt. Mold	1.31	1.31	1.32	1.32	1.31	1.31		
Wt. Wet soil	3.25	3.22	3.29	3.31	3.32	3.33		
Volume Mold	0.0337							
Wet Density	97.9	97	99.1	99.7	100	100.3		
Wt. Wet soil & Pan	461.5	459	407.7	515.5	460.1	461.8		
Wt. Dry soil & Pan	408.5	404.7	356.8	416.7	406.4	407.4		
Wt. Pan	235.5	235	185.8	355.5	235.5	235		
Moisture Lost	53	54.3	50.9	48.8 47.8	53.7	52.4		
Wt. Dry soil	173	169.7	171	161.2	170.9	174.4		
% Moisture	30.6	30.2 30.0	29.8	30.6	31.4	30		
Dry Density	74.7 75	74.5 73.5	76.3	74.6	76.1	77.2		
Maximum Dry Density	77.9							
Optimum Moisture	29.8							
% Compaction	96.3	95.6	97.7	95.1	97.7	99		
Meets Criteria (Y\N)		94.3						

1 Point Proctor Data

Wt. Wet Soil & Mold	8.50	
Wt. Mold	4.30	
Wt. Wet soil	4.2	
Volume Mold	0.0337	
Wet Density	124.7	
Wt. Wet soil & Pan	401.8	
Wt. Dry soil & Pan	351.8	
Wt. Pan	185.8	
Moisture Lost	50	
Wt. Dry soil	166	
% Moisture	30.1	✓
Dry Density	94.3	✓

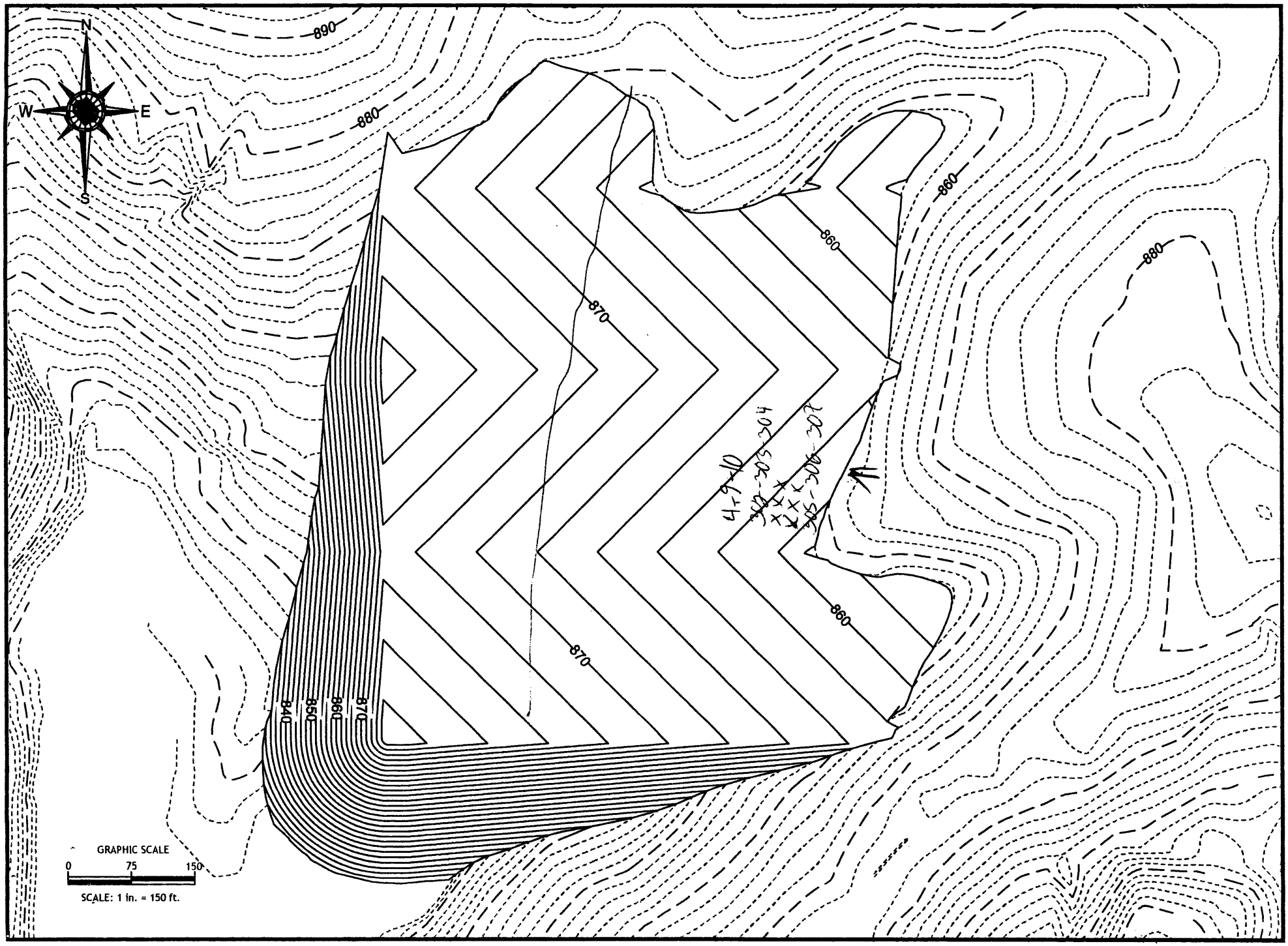
Additional Project Data

77.9 @ 29.8 BAS-27

JMP

Elis Rojas
Printed Name

Signature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GRAPHIC SCALE
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SCALE: 1 in. = 150 ft.

4-9-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 4-12-10
Inspection of: FILL FLY ASH NEW LANDFILL	**Technician:** ELIS ROJAS	

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Shield on site to Density Fill at new Land Fill

MARSHALL Power Steam Station.

Shield performed DT 6 Test plus one point.

All Test meets criteria. w/ exception of #311

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS ROJAS
Printed Name

Signature

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Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		Shield No.:	Client No.:
Client Name: DUKE POWER		Task No.:	Date: 4-12-10
Inspection of: Fill Land Fill Fly Ash		Technician: Elis Pejas	4-12-10

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Drive Tube\Nuclear Density Data

Test No.	308	309	310	311	312	313		
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.39	4.41	4.39	4.35	4.44	4.47		
Wt. Mold	1.31	1.31	1.32	1.32	1.32	1.32		
Wt. Wet soil	3.08	3.1	3.07	3.03	3.12	3.17		
Volume Mold	0.0332							
Wet Density	92.8	93.4	92.5	91.3	94	95.5		
Wt. Wet soil & Pan	468.3	454.3	397.6	555.4	440	462		
Wt. Dry soil & Pan	414.5	412.4	356.2	511.4	412	414.6		
Wt. Pan	235.1	235.7	186	355.5	235.1	235.7		
Moisture Lost	43.8	46.9	43.4	44	48	47.4		
Wt. Dry soil	179.4	176.7	170.2	155.9	176.9	178.9		
% Moisture	24.4	26.5	25.5	28.2	27.1	26.5		
Dry Density	74.6	73.8	73.7	71.2	74.4	75.5		
Maximum Dry Density	75.3							
Optimum Moisture	30.4							
% Compaction	99	98	97.9	94.6	98.3	100.3		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.30	
Wt. Mold	9.30	
Wt. Wet soil	3	
Volume Mold	0.0331	
Wet Density	90.6	
Wt. Wet soil & Pan	401.3	
Wt. Dry soil & Pan	360.3	
Wt. Pan	186	
Moisture Lost	41	
Wt. Dry soil	174.3	
% Moisture	23.5	
Dry Density	73.4	

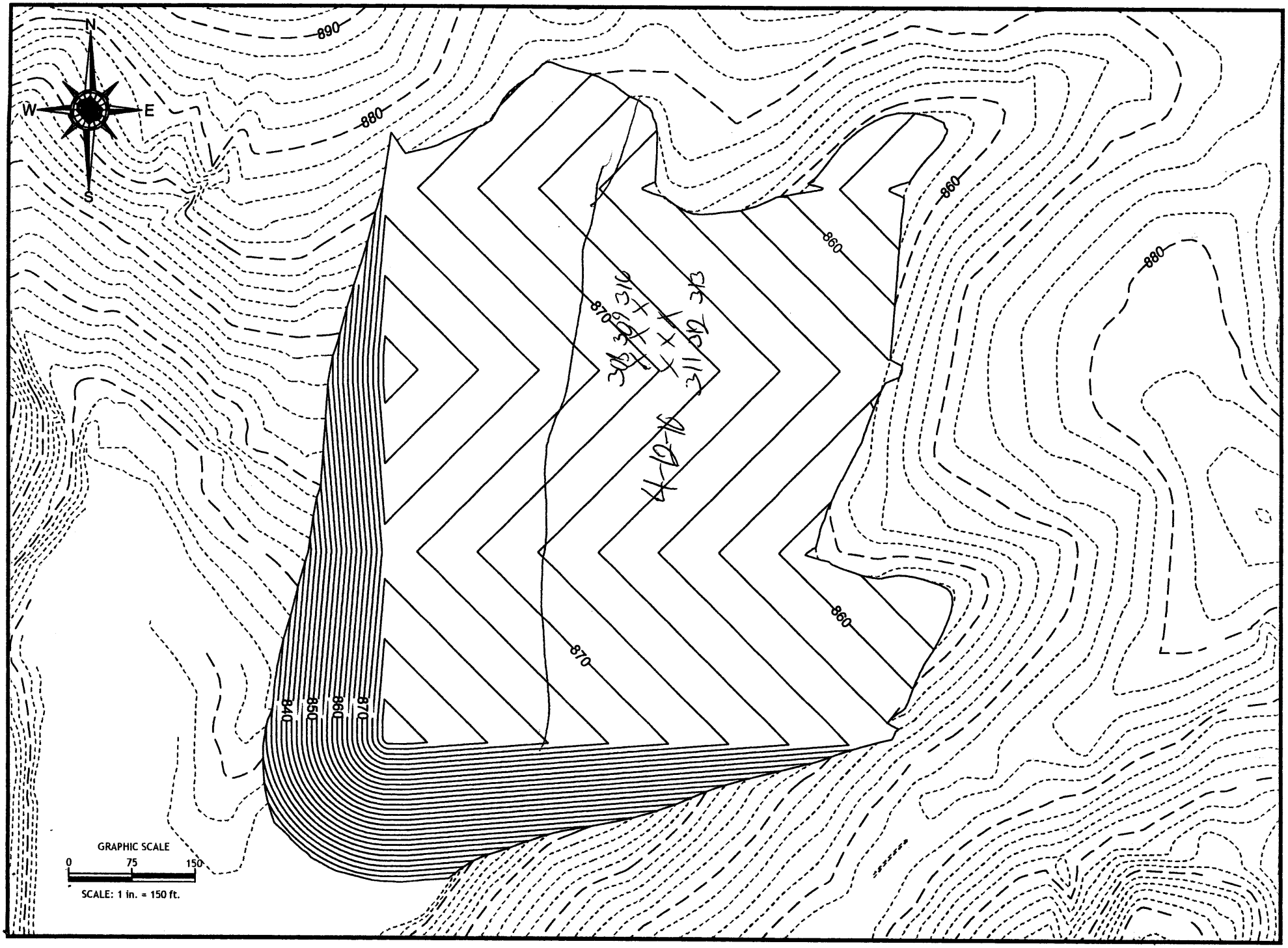
Additional Project Data

~~75.0 at 29.0~~

75.3 at 30.4 BAS-17

Elis Pejas
Printed Name

Signature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SCALE: 1 in. = 150 ft.

4-12-10

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 4-13-10
Inspection of: FILL FLY ASH NEW LANDFILL	**Technician:**	

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Shield on site to observed fill at new Landfill
Fill MARSHALL Power Steam Station.
Shield performed 6 Drive Tubes. All test meets Criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Eli's Rojas
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 4-13-10
Inspection of: New Land Fill FLY ASH		Technician: Elis Rojas	

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Drive Tube\Nuclear Density Data

Test No.	314	315	316	317	318	319		
Grade or Elevation	852.1							
Location								
Wt. Wet Soil & Mold	3.99	3.95	3.92	4.01	3.94	3.97		
Wt. Mold	1.31	1.31	1.32	1.32	1.33	1.34		
Wt. Wet soil	2.68	2.64	2.6	2.69	2.61	2.63		
Volume Mold	0.0332							
Wet Density	80.7	79.5	78.3	81	78.6	79.2		
Wt. Wet soil & Pan	462	461.1	400.7	577.5	460.4	460.5		
Wt. Dry soil & Pan	400.6	400.1	365	414.5	419.3	419.9		
Wt. Pan	235.1	235.5	185	355.5	235.1	235.5		
Moisture Lost	41.4	41	35.7	33	41.1	40.6		
Wt. Dry soil	165.5	164.6	180	139	184.2	184.4		
% Moisture	22.3	22.2	19.8	23.7	22.3	22		
Dry Density	66	65.1	65.4	65.5	64.3	64.9		
Maximum Dry Density	67							
Optimum Moisture	24							
% Compaction	98.5	97.2	97.6	97.8	96	96.9		
Meets Criteria (Y\N)								

1 Point Proctor Data

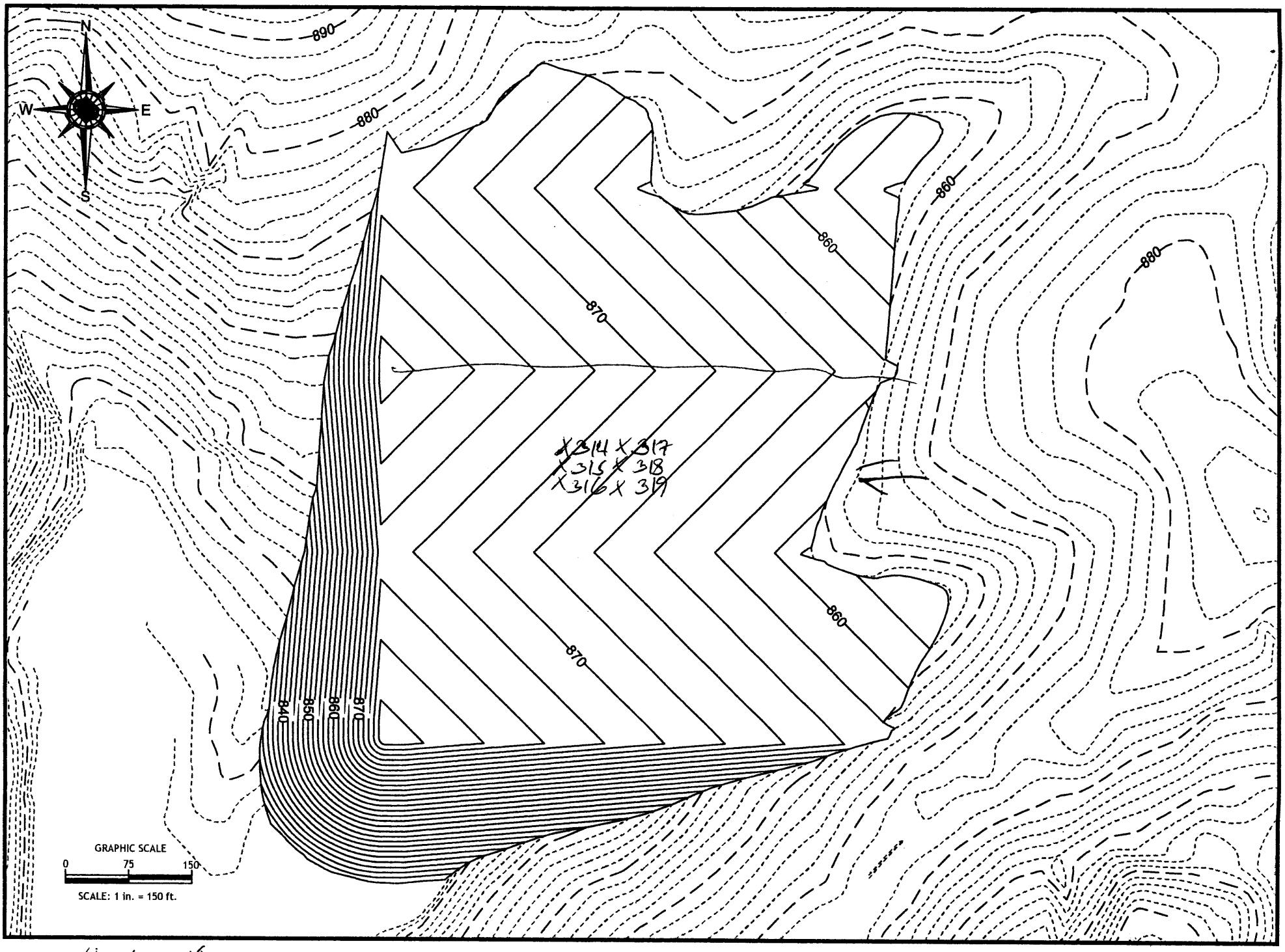
Wt. Wet Soil & Mold	12.03	
Wt. Mold	9.30	
Wt. Wet soil	2.73	
Volume Mold	0.0331	
Wet Density	82.5	
Wt. Wet soil & Pan	401.8	
Wt. Dry soil & Pan	361.8	
Wt. Pan	185	
Moisture Lost	40	
Wt. Dry soil	176.8	
% Moisture	22.6	
Dry Density	67.3	

Additional Project Data

67 24.0 BAS-7

Elis Rojas
Printed Name

Signature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GRAPHIC SCALE
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SCALE: 1 in. = 150 ft.

4-13-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:** 4-16-10
Client Name: Duke Power	**Task No.:**	**Date:** 4-16-10
Inspection of: Fill Fly Ash Mix Landfill	**Technician:** Elis Rojas	

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Shield on site to performed QT at at MARSHALL Power Steam Station.

Shield performed 6 test. All test meets Criteria.

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Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
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Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 4-16-10
Inspection of: Fill Fly Ash New Ground Fill		**Technician:** Elis Rios	

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Drive Tube\Nuclear Density Data

Test No.	320	321	322	323	324	325		
Grade or Elevation	852.1							
Location								
Wt. Wet Soil & Mold	4.00	4.09	4.09	4.03	4.04	4.03		
Wt. Mold	1.32	1.31	1.34	1.31	1.32	1.32		
Wt. Wet soil	2.67	2.78	2.75	2.72	2.72	2.71		
Volume Mold	0.0332			81.9				
Wet Density	80.4	83.7	82.8	2.72	81.9	81.6		
Wt. Wet soil & Pan	460.4	444.2	404.1	502.4	451.4	460.6		
Wt. Dry soil & Pan	419.4	403	363.3	471.6	407.2	417.7		
Wt. Pan	234	234.4	185.6	353.2	234	234.4		
Moisture Lost	41	41.2	40.8	30.8	42.2	42.9		
Wt. Dry soil	185.4	168.6	177.7	118.4	175.2	183.3		
% Moisture	22.1	24.4	23	26	24.1	23.4		
Dry Density	65.8	67.3	67.3	65	66	66.1		
Maximum Dry Density	67							
Optimum Moisture	24							
% Compaction	98.2	100.4	100.4	97	98.5	98.7		
Meets Criteria (Y\N)	Y							

1 Point Proctor Data

Wt. Wet Soil & Mold	6.16	
Wt. Mold	4.30	
Wt. Wet soil	2.86	
Volume Mold	0.0331	
Wet Density	86.4	
Wt. Wet soil & Pan	401.2	
Wt. Dry soil & Pan	356.5	
Wt. Pan	185.6	
Moisture Lost	44.7	
Wt. Dry soil	170.9	
% Moisture	26.2	
Dry Density	68.5	

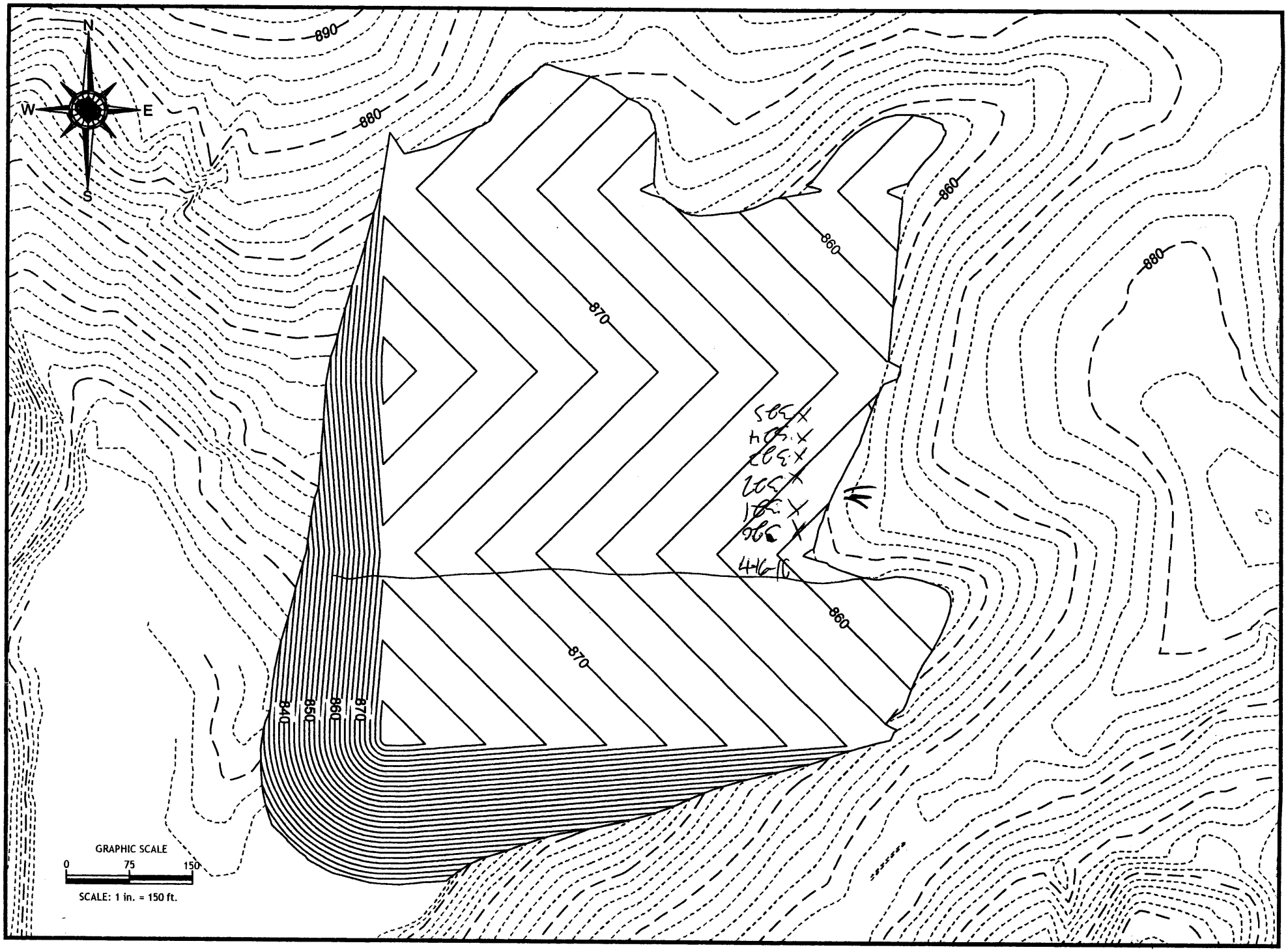
Additional Project Data

67 at 24 BAS-7

JMP

Elis Rios
Printed Name

Signature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SCALE: 1 in. = 150 ft.

4-16-10

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4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 4-19-10
Inspection of: Fill Fly Ash landfill	**Technician:** Elis Rojas	

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Shield on site to observed fill at MARSHALL Power Steam Station.

Shield performed 6 Test Drive Tubes and one point. All test meets Criteria.

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Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: DUKE POWER		**Task No.:**	**Date:** 4-19-10
Inspection of: FILL FLY ASH NEW LANDFILL		**Technician:** ELIS ROJAS	

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Drive Tube\Nuclear Density Data

Test No.	326	327	328	329	330	331		
Grade or Elevation	854.1							
Location								
Wt. Wet Soil & Mold	4.35	4.40	4.38	4.41	4.46	4.43		
Wt. Mold	1.31	1.31	1.34	1.33	1.31	1.31		
Wt. Wet soil	3.04	3.09	3.04	3.08	3.14	3.12		
Volume Mold	0.0332							
Wet Density	91.6	93.1	91.6	92.8	94.6	94		
Wt. Wet soil & Pan	464.8	465.3	377.9	502.3	457.6	458.6		
Wt. Dry soil & Pan	416.7	415	358.4	469.4	413.4	415.3		
Wt. Pan	233.6	234.2	186	349.6	233.6	234.2		
Moisture Lost	48.1	48.3	41.5	32.9	44.2	43.3		
Wt. Dry soil	183.1	180.8	172.4	120 119.8	179.8	181.1		
% Moisture	26.3	26.7	24.1	27.45	24.6	23.9		
Dry Density	72.5	73.5	73.8	72.8	75.9	75.9		
Maximum Dry Density	76.1							
Optimum Moisture	28.1							
% Compaction	95.3	96.6	97	95.7	99.7	99.7		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.27
Wt. Mold	9.30
Wt. Wet soil	2.97
Volume Mold	0.0332
Wet Density	89.5
Wt. Wet soil & Pan	402.4
Wt. Dry soil & Pan	361.4
Wt. Pan	186
Moisture Lost	41
Wt. Dry soil	175.4
% Moisture	23.4
Dry Density	72.5

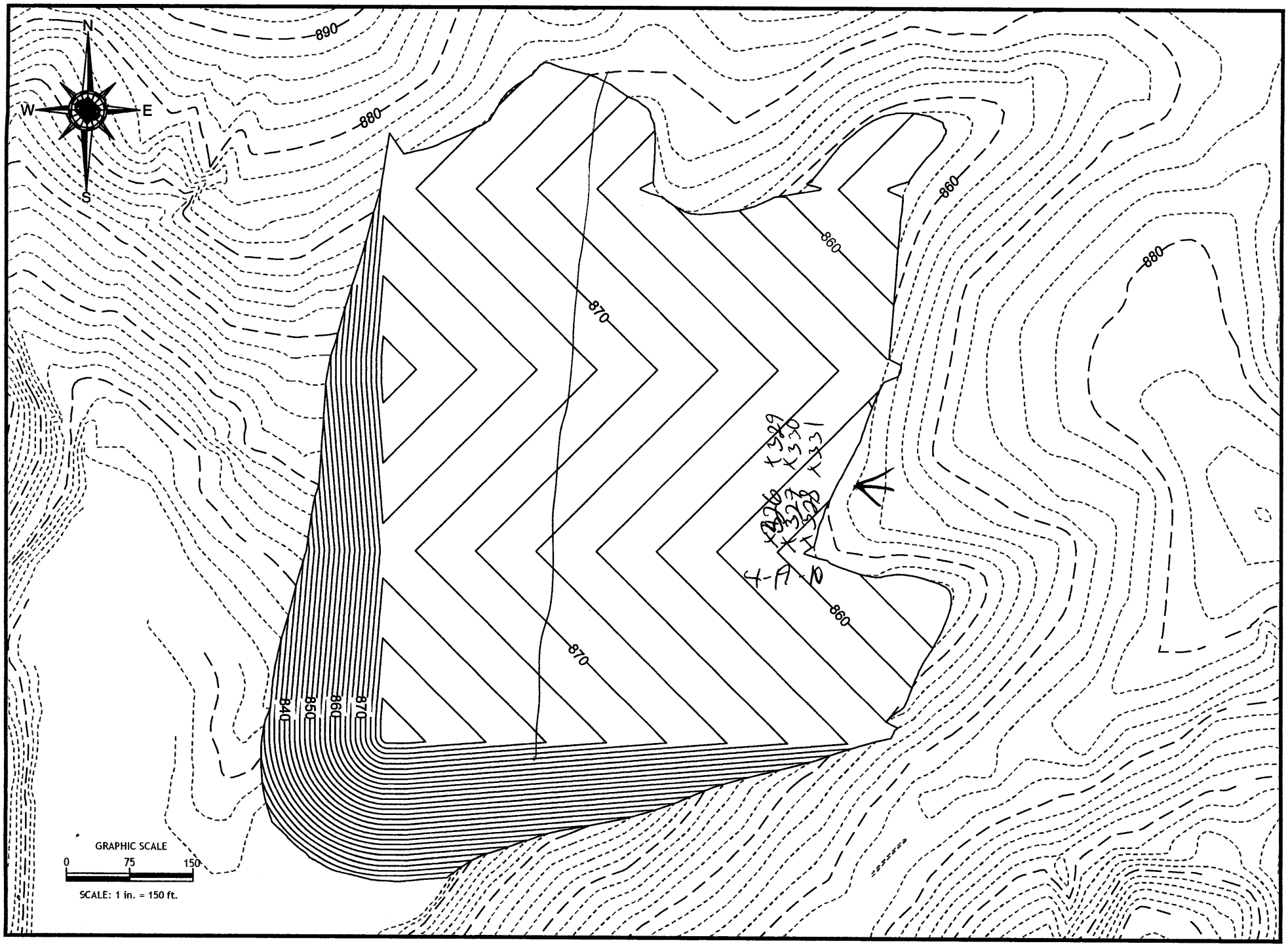
Additional Project Data

76.1 28.1 BAS-18

JMB

ELIS ROJAS
Printed Name

Signature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4-19-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 4-22-10
Inspection of: Fill Fly Ash New Land Fill	**Technician:** Elis Rojas	

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THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION

Shield on site to observed [redacted] Fill Fly Ash at MARSHALL Steam Power Station.

Shield observed that all test meets criteria.

Grading Company was not working at New Land Fill Also, Old Structure Land Fill.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: DUKE POWER	Task No.:	Date: 4-22-10
Inspection of: FILL FLY ASH	Technician: ELIS REYES	

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Drive Tube\Nuclear Density Data

Test No.	332	333	334	335	336	337		
Grade or Elevation	8541							
Location			4.12					
Wt. Wet Soil & Mold	4.02	4.00	4.12	4.10	4.10	4.12		
Wt. Mold	1.31	1.31	1.33	1.34	1.31	1.31		
Wt. Wet soil	2.71	2.69	2.79	2.76	2.79	2.81		
Volume Mold	0.0332							
Wet Density	81.6	81	84	83.1	84	84.6		
Wt. Wet soil & Pan	465.8	462.9	400.2	506.9	463.7	461.3		
Wt. Dry soil & Pan	424.4	424.1	363.1	478.4	420.5	419.5		
Wt. Pan	234.5	236.6	186.2	351.6	234.5	236.6		
Moisture Lost	41.4	38.8	39.1	28.5	43.2	41.8		
Wt. Dry soil	189.9	187.5	176.9	126.8	186	182.9		
% Moisture	21.8	20.7	22.1	22.5	23.2	22.9		
Dry Density	70.67	67.1	68.8	67.8	68.2	68.8		
Maximum Dry Density	70.2							
Optimum Moisture	28.3							
% Compaction	97.7	95.6	98	96.6	97.2	98		
Meets Criteria (Y\N)								

1 Point Proctor Data

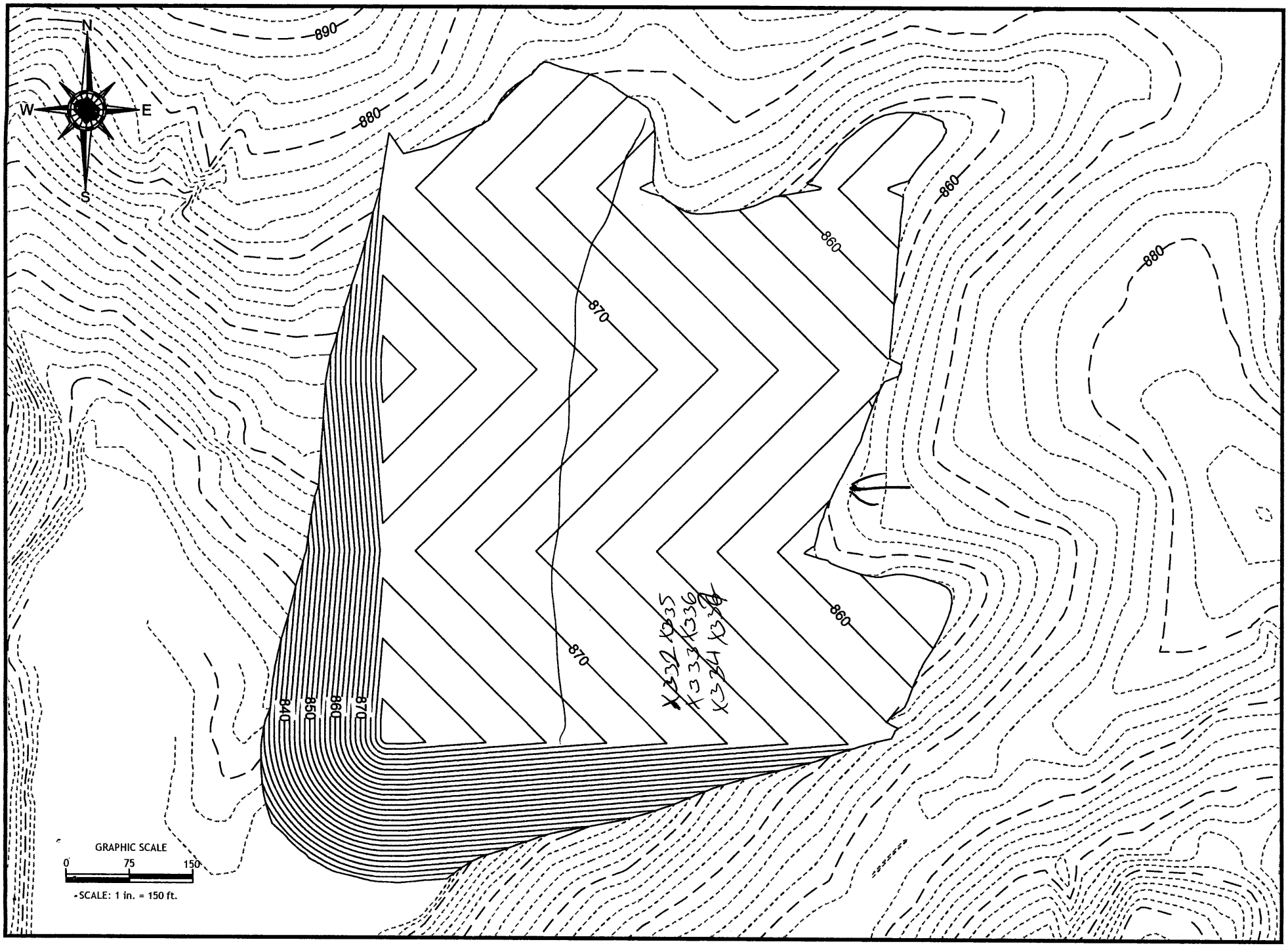
Wt. Wet Soil & Mold	4.23	
Wt. Mold	1.30	
Wt. Wet soil	2.93	
Volume Mold	0.0332	
Wet Density	88.3	
Wt. Wet soil & Pan	400.9	
Wt. Dry soil & Pan	362.1	
Wt. Pan	186.2	
Moisture Lost	38.8	
Wt. Dry soil	175.9	
% Moisture	22.1	
Dry Density	72.3	

Additional Project Data

70.2 28.3 BAS-11

ELIS REYES
Printed Name

Signature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SCALE: 1 in. = 150 ft.

4-22-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 4-26-10
Inspection of: Fill Fly Ash Mix Land Fill	**Technician:** Elis Rojas	

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Shield on site to observed Fill Fly ash at MARSHALL Steam Station.

Shield performed 6 Drive Tubes and one point.

All test meets criteria w/ exception of #341 @ 94.4% compaction

(Jme)

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 4-26-11
Inspection of: Fill Fly Ash New Land Fill		**Technician:** Elis Rojas	

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Drive Tube\Nuclear Density Data

Test No.	338	339	340	341	342	343		
Grade or Elevation	854.1							
Location								
Wt. Wet Soil & Mold	4.09	4.09	4.20	4.21	4.11	4.17		
Wt. Mold	1.31	1.31	1.34	1.33	1.31	1.31		
Wt. Wet soil	2.78	2.78	2.86	2.88	2.8	2.86		
Volume Mold	0.0332							
Wet Density	83.7	83.7	86.1	86.7	84.3	86.1		
Wt. Wet soil & Pan	460.7	455.9	397.2	501.4	457.9	458.5		
Wt. Dry soil & Pan	415.3	413.3	354.4	466.4	412.3	413.6		
Wt. Pan	235.6	237	186.4	352.6	235.8	237		
Moisture Lost	45.4	42.6	44.8	35	45.6	44.9		
Wt. Dry soil	179.5	176.3	168	113.8	176.5	176.6		
% Moisture	25.3	24.2	26.7	30.8	25.8	25.4		
Dry Density	66.8	67.4	70.68	66.3	67	68.7		
Maximum Dry Density	70.2							
Optimum Moisture	28.3							
% Compaction	95.2	96	99.7	94.4	95.4	97.9		
Meets Criteria (Y\N)			96.8					

1 Point Proctor Data

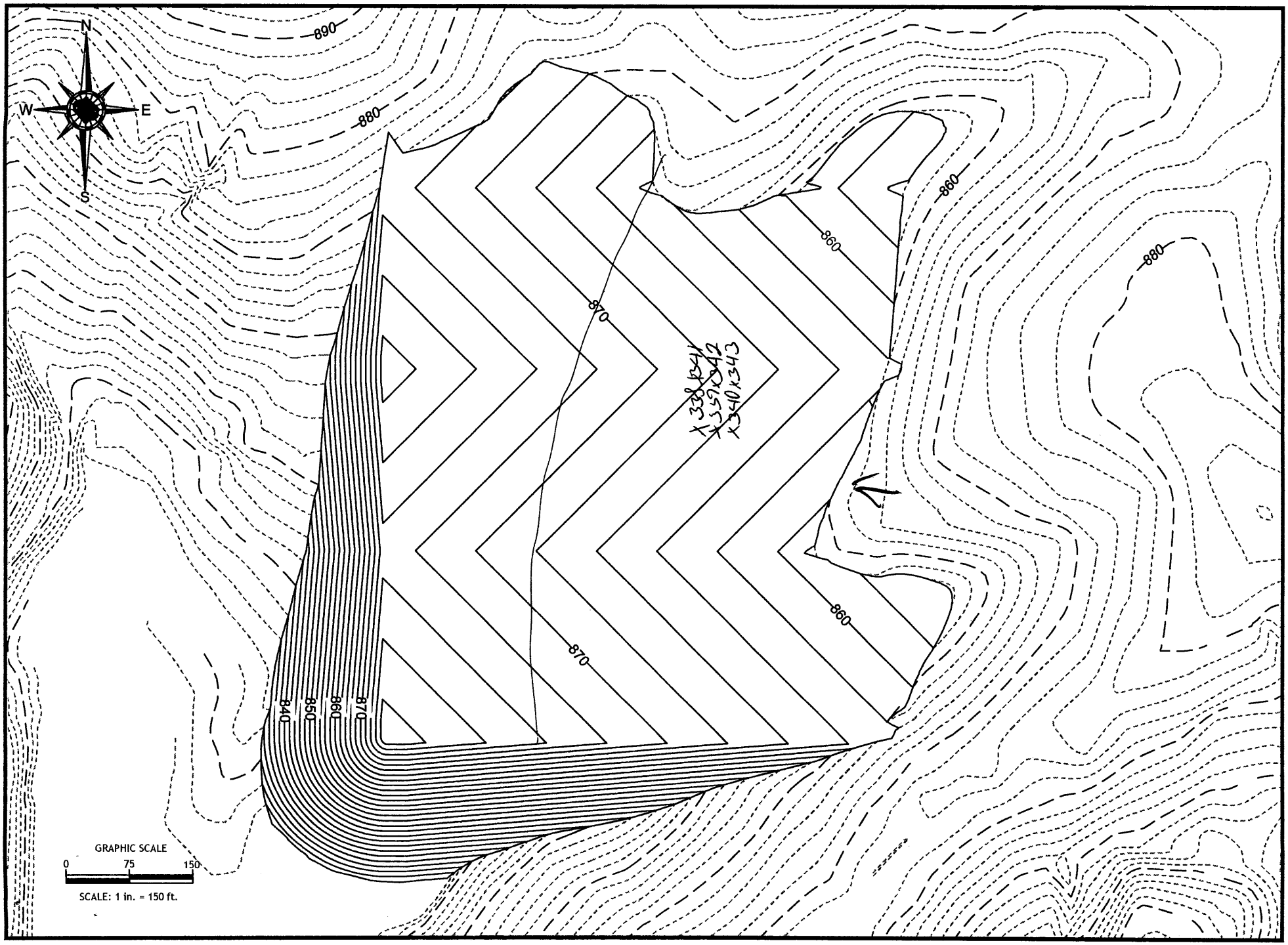
Wt. Wet Soil & Mold	12.31	
Wt. Mold	9.30	
Wt. Wet soil	3.04	
Volume Mold	0.0331	
Wet Density	91.8	
Wt. Wet soil & Pan	408.8	
Wt. Dry soil & Pan	360.3	
Wt. Pan	186.4	
Moisture Lost	42.5	
Wt. Dry soil	179.9	
% Moisture	23.6	
Dry Density	74.3	

Additional Project Data

70.2 at 28.3 B45-11

Elis Rojas
Printed Name

Signature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SCALE: 1 in. = 150 ft.

4-28-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 4-27-10
Inspection of: Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed Fill Fly Ash at MARSHALL Power Steam Station.

Shield performed 4 drive tubes. It was rainin on site.

Shield informed Janette Prosser. She recommended to bring drive tubes to the lab.

Shield performed just 4 drive tubes because the other tubes were broken in another job

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 4-27-10
Inspection of: Fill Fly Ash New Pond Fill	**Technician:** Elis Rojas	

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LAB

Drive Tube\Nuclear Density Data

					CHEPW	DDI	WI	INKA
Test No.	344	345	346	347	344	345	346	347
Grade or Elevation								
Location								
Wt. Wet Soil & Mold	4.08	4.11	4.11	4.04	4.08	4.11	4.11	4.04
Wt. Mold					1.31	1.31	1.33	1.34
Wt. Wet soil					2.77	2.8	2.78	2.7
Volume Mold					0.0332			
Wet Density					83.4	84.3	83.7	81.3
Wt. Wet soil & Pan					1562.3	1704.2	1697.4	1662.9
Wt. Dry soil & Pan					1346.2	1454.6	1464.6	1440.9
Wt. Pan	236	237.2	236.6	254.1	440.5	440.9	440.2	441.4
Moisture Lost					216.1	249.6	232.8	222
Wt. Dry soil					905.7	1013.7	1024.4	997.5
% Moisture					23.9	24.6	22.7	22.2
Dry Density					67.3	67.7	68.2	66.5
Maximum Dry Density					67			
Optimum Moisture					24			
% Compaction					100.4	101	101.8	99.3
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	14.30	
Wt. Mold	9.20	
Wt. Wet soil	5	
Volume Mold	0.0332	
Wet Density	70.6	
Wt. Wet soil & Pan	1763.5	
Wt. Dry soil & Pan	1484.6	
Wt. Pan	439.9	
Moisture Lost	278.9	
Wt. Dry soil	1044.7	
% Moisture	26.7	
Dry Density	71.5	

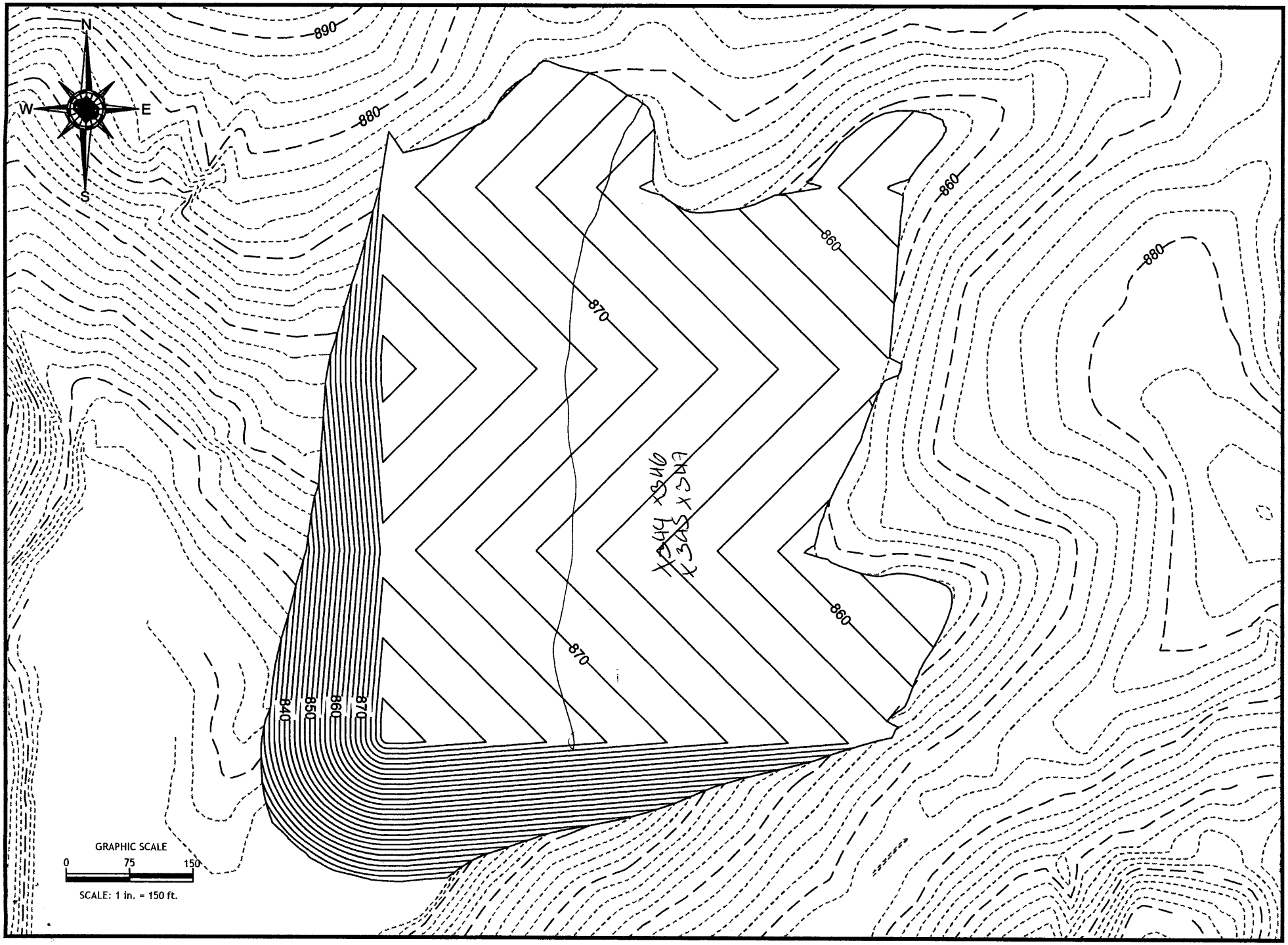
WI

Additional Project Data

7.0 24.0 BAS-7

Elis Rojas
Printed Name

Signature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GRAPHIC SCALE
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SCALE: 1 in. = 150 ft.

4-27-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 4-28-10
Inspection of: Fill Fly Ash New Landfill	**Technician:** Elis Rojas	

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Shield on site to observed Fill Fly Ash at Marshall Steam Power Station.

All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAY SHALL		**Shield No.:**	**Client No.:**
Client Name: DUKE POWER		**Task No.:**	**Date:** 4-28-10
Inspection of: Fill Fly Ash New Land Fill		**Technician:** Elis Rojas	

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Drive Tube\Nuclear Density Data

Test No.	~~350~~	~~351~~	~~352~~	~~353~~	~~354~~	~~355~~		
Grade or Elevation	348	349	350	351	352	353		
Location								
Wt. Wet Soil & Mold	4.23	4.25	4.24	4.18	4.24	4.19		
Wt. Mold	1.31	1.32	1.33	1.34	1.32	1.31		
Wt. Wet soil	2.92	2.93	2.91	2.84	2.92	2.88		
Volume Mold	0.0332							
Wet Density	88	88.3	87.7	85.5	88	86.7		
Wt. Wet soil & Pan	462.3	462.5	404.4	506.6	460.9	461.3		
Wt. Dry soil & Pan	416.5	417.8	360.8	473.9	416	417.2		
Wt. Pan	237	239.4	189.6	355	237	239.4		
Moisture Lost	45.8	44.7	43.6	32.7	44.9	44.1		
Wt. Dry soil	179.5	178.4	171.2	118.9	179	177.8		
% Moisture	25.5	25.1	25.5	27.5	25.1	24.8		
Dry Density	70.1	70.6	69.9	67.1	70.3	69.5		
Maximum Dry Density	70.2							
Optimum Moisture	28.3							
% Compaction	99.9	100.6	99.6	95.6	100.1	99		
Meets Criteria (Y\N)								

1 Point Proctor Data

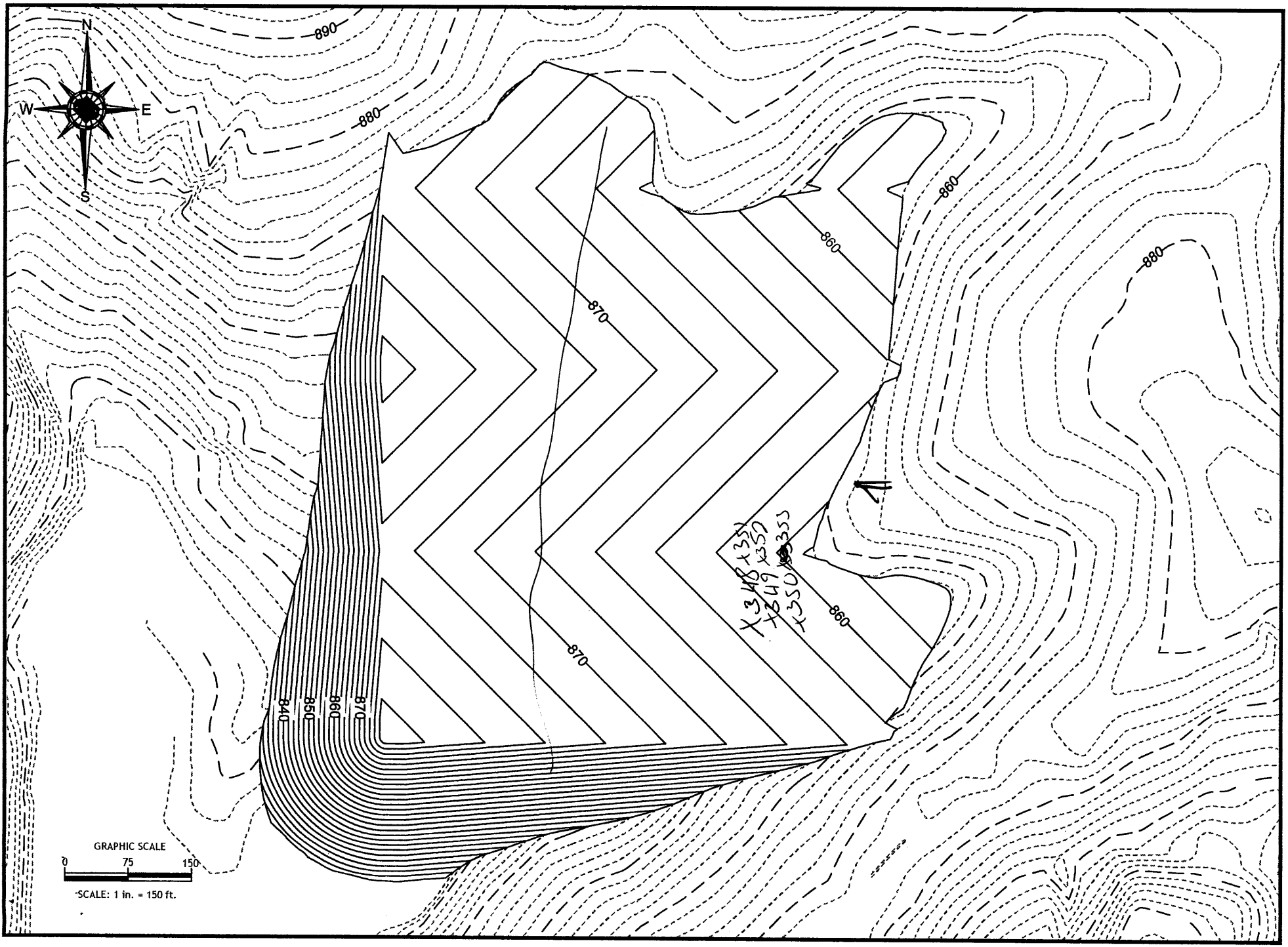
Wt. Wet Soil & Mold	12.27	
Wt. Mold	9.30	
Wt. Wet soil	2.97	
Volume Mold	0.0331	
Wet Density	89.7	
Wt. Wet soil & Pan	402.2	
Wt. Dry soil & Pan	350.1	
Wt. Pan	189.6	
Moisture Lost	44.1	
Wt. Dry soil	160.5	
% Moisture	26.2	
Dry Density	71.2	

Additional Project Data

70.2 at 28.3%. BAS-11

Elis Rojas
Printed Name

Signature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SCALE: 1 in. = 150 ft.

4-28-16

LABORATORY CONFORMANCE TEST RESULTS

BAS-35

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: **10-056**
SOURCE MATERIAL: **BAS-35 0.0 feet**
SAMPLE DESCRIPTION: Grey FLY ASH (visual)

USCS: ML AASHTO:

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 75.3
OPTIMUM MOISTURE CONTENT, (%): 29.9
NATURAL MOISTURE CONTENT, (%): 23.6

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

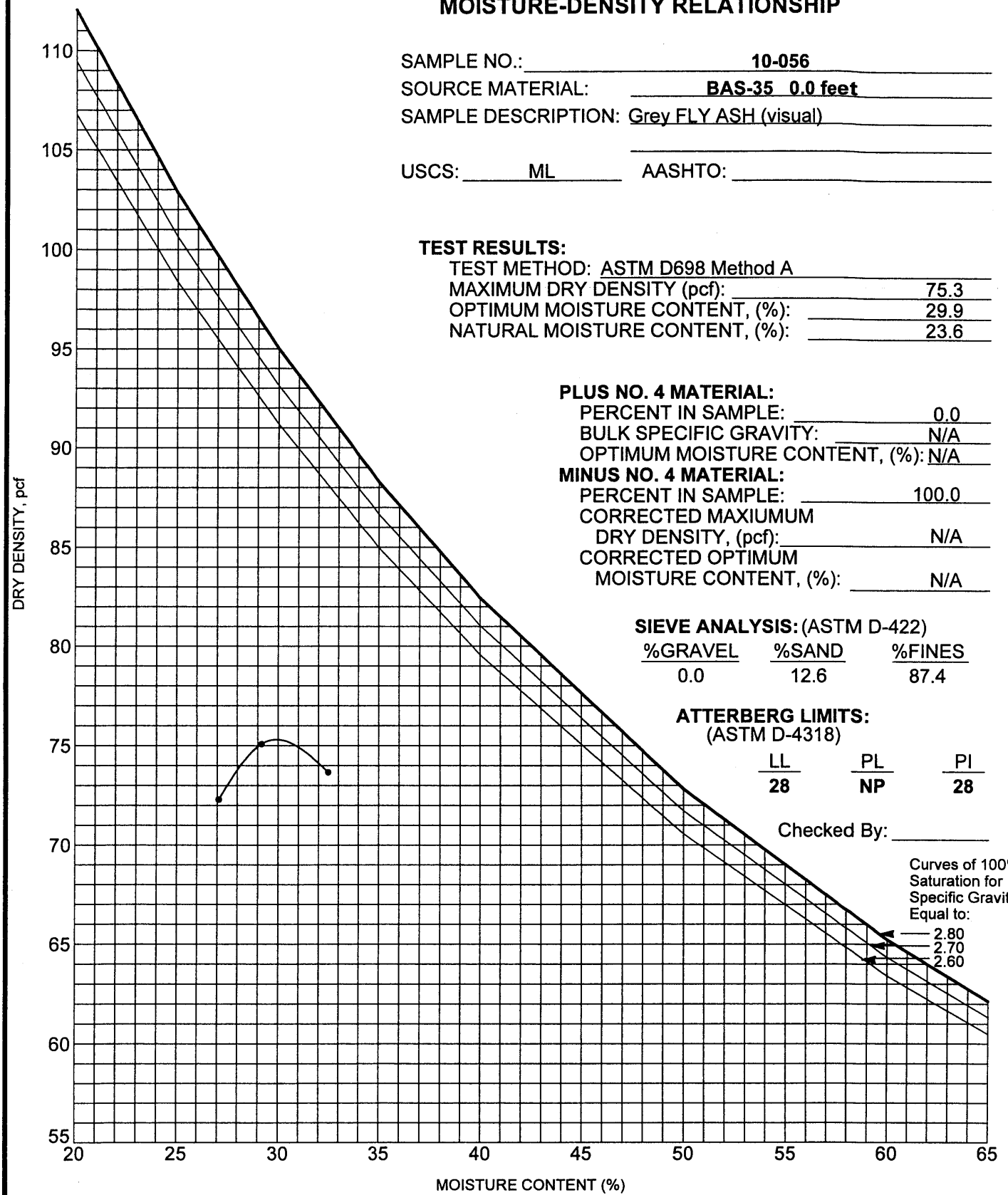
SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	12.6	87.4

ATTERBERG LIMITS:
(ASTM D-4318)

LL	PL	PI
28	**NP**	**28**

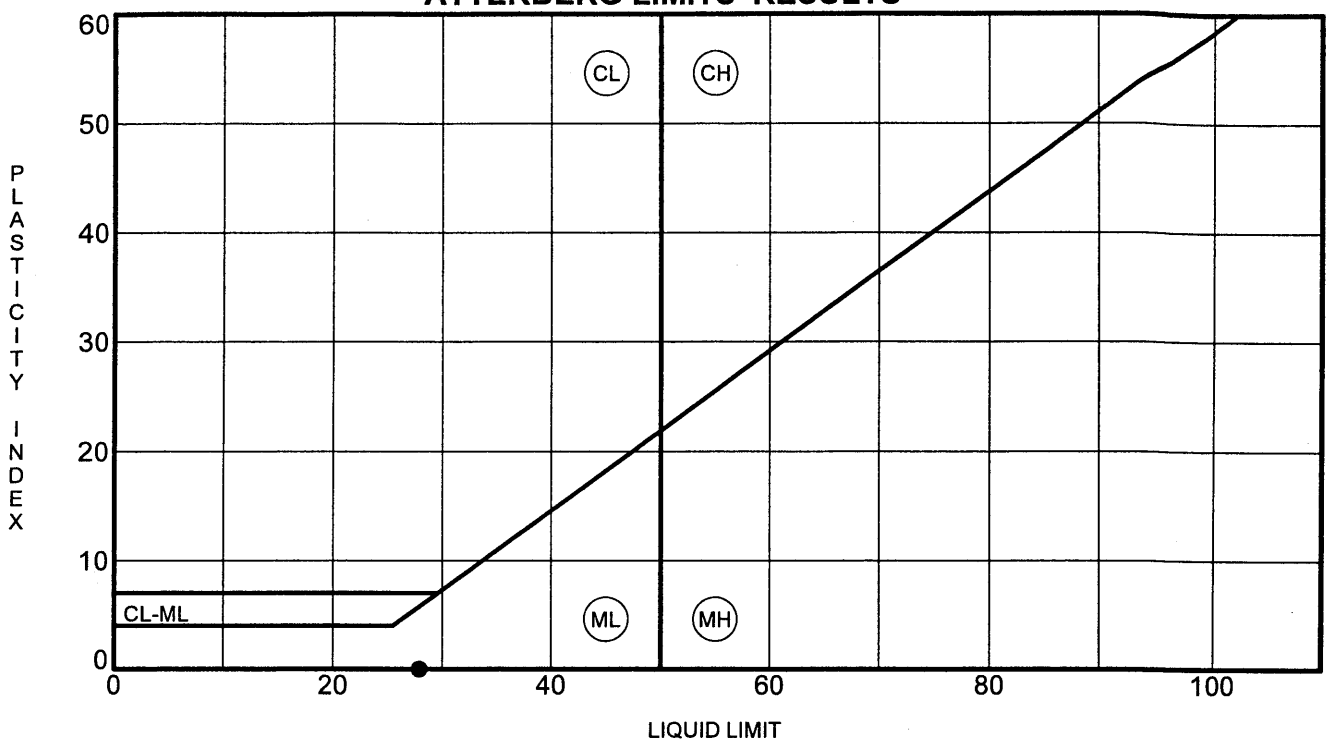
Checked By:



SHIELD ENGINEERING, INC.
4301 Taggart Creek Road
Charlotte, NC 28208
Telephone: 704-394-6913
Toll Free: 800-395-5220
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**BAS-35**	**0.0**	**28**	**NP**	**NP**	**87**	**SILT(ML)**

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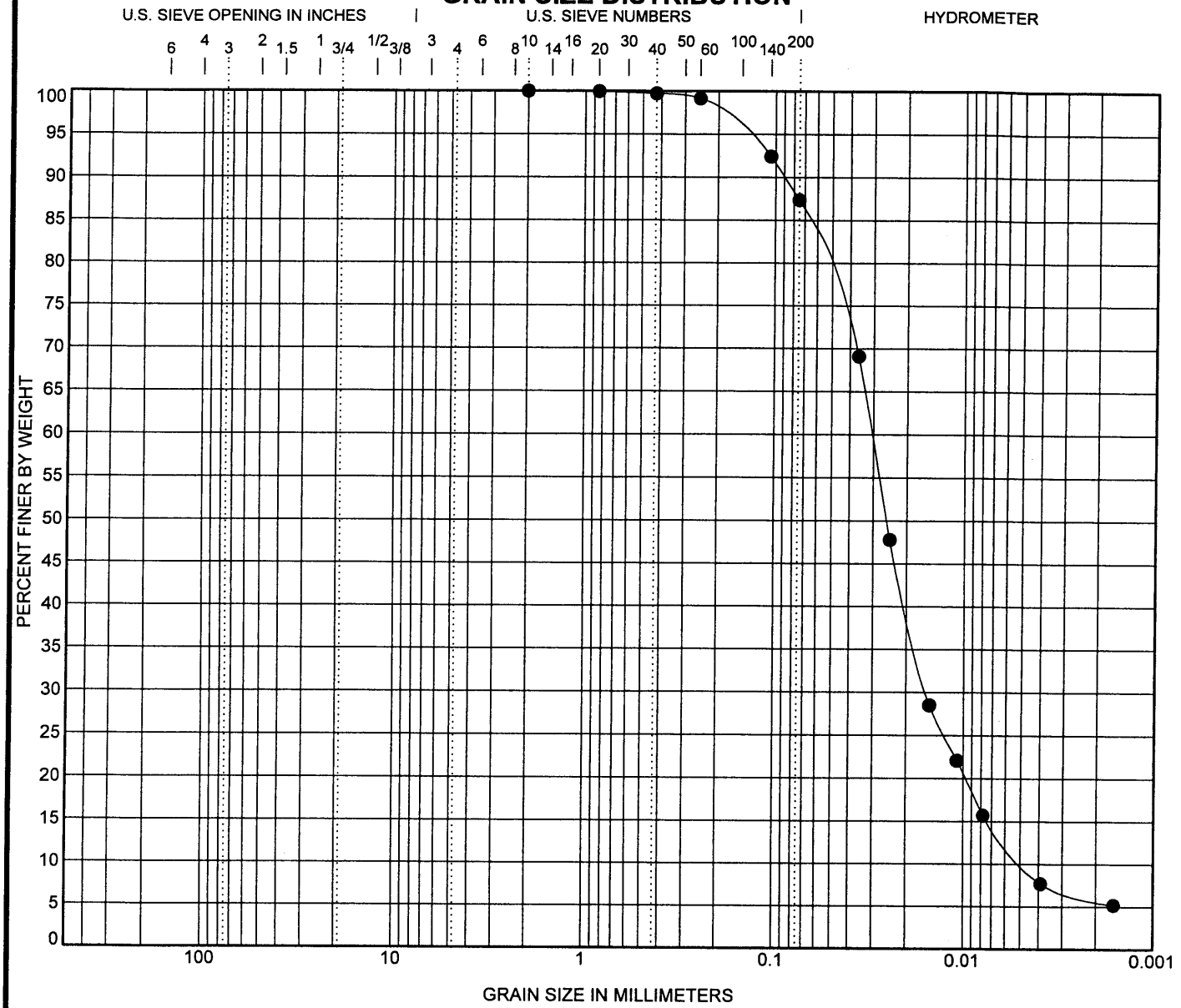
4301 Taggart Creek Road
Charlotte, NC 28208
Telephone: 704-394-6913
Toll Free: 800-395-5220
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● BAS-35	0.0	SILT(ML)	28	NP	NP	1.67	6.42

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BAS-35	0.0	2	0.031	0.016	0.005	0.0	12.6	76.8	10.6

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Charlotte, NC 28208
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Toll Free: 800-395-5220
Fax: 704-394-6968

Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

SHIELD
ENGINEERING, INC.

June 8, 2010

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 10 - Month of May 2010
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of May. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Janette Prosser/cas
Janette M. Prosser, P.E.
Senior Engineer

Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\1002083-03 Marshall Ash Landfill 2010-05.doc

4301 Taggart Creek Road
Charlotte, NC 28208

www.shieldengineering.com

Telephone 704.394.6913
Fax 704.394.6968

SHIELD ENGINEERING, INC.
4301 Taggart Creek Road, Charlotte, North Carolina 28208
Phone 704-394-6913 Fax 704-394-6968

Monthly Summary Report - No. 10

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	June 4, 2010	**Page:**	1 of 2
Report By:	Janette M. Prosser, P.E.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of March.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

1. Shield's technician was on-site on May 5, 6, 7, 10, 12, 13, 18, 19, 21, 25 and 27, 2010 to perform field density tests of the ash landfill material. The in-place density tests labeled DT-354 to DT-419 were performed during this period. Based on a review of the field test results, a few of the test results completed during this period were slightly below the required 95 percent compaction requirement, however, these isolated test results (94.0 to 94.8 percent) are not anticipated to affect the structural integrity of the overall fill. See Table 1 for preliminary results and locations.

Laboratory Conformance Test:

1. A conformance laboratory sample (BAS-36) was collected during this time period. See attached Moisture-Density Relationship test and additional required conformance test results.

Summary:

The compaction results of these samples were in accordance with instructions provided by Duke Energy representatives. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
FLY ASH														
DT-1	08/18/09	See location plan	6	838.0	53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6	838.0	58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6	838.0	57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6	838.0	57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6	838.0	61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6	838.0	64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6	839.0	61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6	839.0	57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6	839.0	54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6	839.0	74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6	839.0	67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6	839.0	60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6	841.5	85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6	841.5	86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6	841.5	88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6	841.5	82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6	841.5	86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6	841.5	90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6	842.0	95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6	842.0	91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6	842.0	90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6	842.0	96.1	45.8	65.9	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6	842.0	91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6	842.0	87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6	842.5	91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6	842.5	86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6	842.5	84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6	842.5	85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6	842.5	84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6	842.5	85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6	842.5	83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6	842.5	84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6	842.5	88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6	842.5	87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6	842.5	87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6	842.5	91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6	843.0	86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6	843.0	85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6	843.0	82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6	843.0	80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6	843.0	88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6	843.0	84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6	843.5	82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6	843.5	82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6	843.5	79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6	843.5	84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6	843.5	93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6	843.5	96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

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SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-45R	09/15/09	See location plan	6	843.5	94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6	843.5	94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6	843.5	91.9	31.6	69.8	66.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6	843.5	94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6	844.5	94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6	844.5	93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6	844.5	94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6	844.5	93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6	844.5	92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6	844.5	93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6	844.5	88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6	844.5	95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6	844.5	93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6	844.5	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6	844.5	91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6	844.5	91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6	845.0	88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6	845.0	87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6	845.0	89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6	845.0	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6	845.0	93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6	845.0	93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6	845.0	91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6	845.0	93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.9
DT-70	10/02/09	See location plan	6	845.0	91.9	30.6	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6	845.0	93.7	36.0	68.9	71.6	33.7	BAS-19	96.2	X		2.3
DT-72	10/02/09	See location plan	6	845.0	93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6	845.0	94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6	845.0	89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6	845.0	88.9	30.1	68.3	70.0	32.5	BAS-8	97.6	X		-2.4
DT-76	10/07/09	See location plan	6	845.0	92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6	845.0	95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6	845.0	94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6	845.0	90.1	26.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6	845.5	91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6	845.5	87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6	845.5	93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6	845.5	88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6	845.5	90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6	845.5	86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6	845.5	93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6	845.5	93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6	845.5	90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6	845.5	91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6	845.5	93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6	845.5	91.2	29.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6	845.5	93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6	845.5	88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6	845.5	92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6	845.5	92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

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MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-96	10/23/09	See location plan	6	845.5	96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6	845.5	98.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4
DT-98	11/03/09	See location plan	6	847.0	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-99	11/03/09	See location plan	6	847.0	91.3	28.9	70.8	71.5	33.1	BAS-26	99.1	X		-4.2
DT-100	11/03/09	See location plan	6	847.0	94.9	32.6	71.6	71.5	33.1	BAS-26	100+	X		-0.5
DT-101	11/03/09	See location plan	6	847.0	97.3	35.5	71.8	71.5	33.1	BAS-26	100+	X		2.4
DT-102	11/03/09	See location plan	6	847.0	97.9	35.3	72.4	71.5	33.1	BAS-26	100+	X		2.2
DT-103	11/03/09	See location plan	6	847.0	96.1	31.9	72.9	71.5	33.1	BAS-26	100+	X		-1.2
DT-104	11/06/09	See location plan	6	847.5	92.8	31.1	70.8	74.0	32.2	BAS-25	95.7	X		-1.1
DT-105	11/06/09	See location plan	6	847.5	89.8	31.5	68.3	74.0	32.2	BAS-25	92.3		X	-0.7
DT-105R	11/06/09	See location plan	6	847.5	92.8	31.8	70.4	74.0	32.2	BAS-25	95.1	X		-0.4
DT-106	11/06/09	See location plan	6	847.5	94.3	28.2	73.6	74.0	32.2	BAS-25	99.4	X		-4.0
DT-107	11/06/09	See location plan	6	847.5	95.2	30.8	72.8	74.0	32.2	BAS-25	98.4	X		-1.4
DT-108	11/06/09	See location plan	6	847.5	97.6	30.9	74.6	74.0	32.2	BAS-25	100+	X		-1.3
DT-109	11/06/09	See location plan	6	847.5	94.6	30.6	72.4	74.0	32.2	BAS-25	97.9	X		-1.6
DT-110	11/17/09	See location plan	6	845.5	88.0	29.9	67.7	70.2	28.3	BAS-11	96.5	X		1.6
DT-111	11/17/09	See location plan	6	845.5	89.8	28.7	69.8	70.2	28.3	BAS-11	99.4	X		0.4
DT-112	11/17/09	See location plan	6	845.5	91.3	26.1	72.4	72.0	26.3	BAS-14	100+	X		-0.2
DT-113	11/17/09	See location plan	6	845.5	91.9	26.9	72.4	72.0	26.3	BAS-14	100+	X		0.6
DT-114	11/17/09	See location plan	6	845.5	89.2	27.1	70.2	72.0	26.3	BAS-14	97.5	X		0.8
DT-115	11/17/09	See location plan	6	845.5	88.0	26.1	69.8	72.0	26.3	BAS-14	96.9	X		-0.2
DT-116	11/20/09	See location plan	6	845.5	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-117	11/20/09	See location plan	6	845.5	90.4	30.8	69.1	71.5	33.1	BAS-26	96.7	X		-2.3
DT-118	11/20/09	See location plan	6	845.5	90.7	32.3	68.6	71.5	33.1	BAS-26	95.9	X		-0.8
DT-119	11/20/09	See location plan	6	845.5	91.9	31.0	70.2	71.5	33.1	BAS-26	98.1	X		-2.1
DT-120	11/20/09	See location plan	6	845.5	95.8	31.2	73.0	71.5	33.1	BAS-26	100+	X		-1.9
DT-121	11/20/09	See location plan	6	845.5	89.2	30.7	68.2	71.5	33.1	BAS-26	95.5	X		-2.4
DT-122	11/25/09	See location plan	6	845.5	94.9	28.9	73.6	76.3	30.7	BAS-24	96.5	X		-1.8
DT-123	11/25/09	See location plan	6	845.5	96.4	32.2	72.9	76.3	30.7	BAS-24	95.6	X		1.5
DT-124	11/25/09	See location plan	6	845.5	95.8	31.2	73.0	76.3	30.7	BAS-24	95.7	X		0.5
DT-125	11/25/09	See location plan	6	845.5	94.1	27.9	73.6	76.3	30.7	BAS-24	96.4	X		-2.8
DT-126	11/25/09	See location plan	6	845.5	92.8	27.5	72.8	76.3	30.7	BAS-24	95.4	X		-3.2
DT-127	11/25/09	See location plan	6	845.5	97.0	30.7	74.2	76.3	30.7	BAS-24	97.3	X		0.0
DT-128	12/02/09	See location plan	6	846.5	84.3	26.5	66.6	70.2	28.3	BAS-11	94.9		X	-1.8
DT-129	12/02/09	See location plan	6	846.5	85.8	27.2	67.5	70.2	28.3	BAS-11	96.1	X		-1.1
DT-130	12/02/09	See location plan	6	846.5	90.4	26.5	71.5	70.2	28.3	BAS-11	100+	X		-1.8
DT-131	12/02/09	See location plan	6	846.5	91.0	28.1	71.0	70.2	28.3	BAS-11	100+	X		-0.2
DT-132	12/02/09	See location plan	6	846.5	89.5	30.0	68.8	70.2	28.3	BAS-11	98.1	X		1.7
DT-133	12/02/09	See location plan	6	846.5	88.6	27.2	69.7	70.2	28.3	BAS-11	99.2	X		-1.1
DT-134	12/07/09	See location plan	6	848.0	88.9	27.4	69.8	70.2	28.3	BAS-11	99.4	X		-0.9
DT-135	12/07/09	See location plan	6	848.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-136	12/07/09	See location plan	6	848.0	86.4	26.4	68.4	70.2	28.3	BAS-11	97.4	X		-1.9
DT-137	12/07/09	See location plan	6	848.0	84.9	25.1	67.9	70.2	28.3	BAS-11	96.7	X		-3.2
DT-138	12/07/09	See location plan	6	848.0	86.7	28.6	67.4	70.2	28.3	BAS-11	96.0	X		0.3
DT-139	12/07/09	See location plan	6	848.0	88.9	29.2	68.8	70.2	28.3	BAS-11	98.0	X		0.9
DT-140	12/16/09	See location plan	6	845.5	83.1	25.9	66.0	67.0	24.0	BAS-7	98.5	X		1.9
DT-141	12/16/09	See location plan	6	845.5	84.3	24.5	67.7	67.0	24.0	BAS-7	100+	X		0.5
DT-142	12/16/09	See location plan	6	845.5	80.4	24.9	64.4	67.0	24.0	BAS-7	96.1	X		0.9
DT-143	12/16/09	See location plan	6	845.5	81.3	26.1	64.5	67.0	24.0	BAS-7	96.2	X		2.1
DT-144	12/16/09	See location plan	6	845.5	84.0	25.6	66.9	67.0	24.0	BAS-7	99.8	X		1.6
DT-145	12/16/09	See location plan	6	845.5	86.7	26.0	68.8	67.0	24.0	BAS-7	100+	X		2.0

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-146	12/21/09	See location plan	6	849.0	94.3	32.6	71.1	71.6	33.7	BAS-19	99.3	X		-1.1
DT-147	12/21/09	See location plan	6	849.0	94.0	33.6	70.4	71.6	33.7	BAS-19	98.3	X		-0.1
DT-148	12/21/09	See location plan	6	849.0	97.0	34.0	72.4	71.6	33.7	BAS-19	100+	X		0.3
DT-149	12/21/09	See location plan	6	849.0	95.8	34.2	71.4	71.6	33.7	BAS-19	99.7	X		0.5
DT-150	12/21/09	See location plan	6	849.0	93.7	34.1	69.9	71.6	33.7	BAS-19	97.6	X		0.4
DT-151	12/21/09	See location plan	6	849.0	94.9	31.0	72.4	71.6	33.7	BAS-19	100+	X		-2.7
DT-152	12/23/09	See location plan	6	850.0	86.4	26.7	68.2	70.2	28.3	BAS-11	97.1	X		-1.6
DT-153	12/23/09	See location plan	6	850.0	88.3	25.6	70.3	70.2	28.3	BAS-11	100+	X		-2.7
DT-154	12/23/09	See location plan	6	850.0	85.2	26.4	67.4	70.2	28.3	BAS-11	96.0	X		-1.9
DT-155	12/23/09	See location plan	6	850.0	85.8	28.6	66.7	70.2	28.3	BAS-11	95.0	X		0.3
DT-156	12/23/09	See location plan	6	850.0	87.3	27.6	68.4	70.2	28.3	BAS-11	97.5	X		-0.7
DT-157	12/23/09	See location plan	6	850.0	86.4	29.5	66.7	70.2	28.3	BAS-11	95.0	X		1.2
DT-158	12/28/09	See location plan	6	851.5	88.0	33.7	65.8	70.0	32.5	BAS-11	94.0		X	1.2
DT-159	12/28/09	See location plan	6	851.5	91.3	34.8	67.7	70.0	32.5	BAS-11	96.8	X		2.3
DT-160	12/28/09	See location plan	6	851.5	92.8	32.0	70.3	70.0	32.5	BAS-11	100+	X		-0.5
DT-161	12/28/09	See location plan	6	851.5	91.0	32.8	68.5	70.0	32.5	BAS-11	97.9	X		0.3
DT-162	12/28/09	See location plan	6	851.5	90.1	31.7	68.4	70.0	32.5	BAS-11	97.7	X		-0.8
DT-163	12/28/09	See location plan	6	851.5	91.6	33.2	68.8	70.0	32.5	BAS-11	98.2	X		0.7
DT-164	12/29/09	See location plan	6	852.5	97.6	32.3	73.8	76.3	30.7	BAS-24	96.7	X		1.6
DT-165	12/29/09	See location plan	6	852.5	95.8	26.0	76.0	76.3	30.7	BAS-24	99.6	X		-4.7
DT-166	12/29/09	See location plan	6	852.5	96.1	27.3	75.5	76.3	30.7	BAS-24	98.9	X		-3.4
DT-167	12/29/09	See location plan	6	852.5	97.9	27.3	76.9	76.3	30.7	BAS-24	100+	X		-3.4
DT-168	12/29/09	See location plan	6	852.5	98.8	25.8	78.5	76.3	30.7	BAS-24	100+	X		-4.9
DT-168R	12/29/09	See location plan	6	852.5	96.1	27.0	75.7	76.3	30.7	BAS-24	99.2	X		-3.7
DT-169	12/29/09	See location plan	6	852.5	96.4	26.9	76.0	76.3	30.7	BAS-24	99.6	X		-3.8
DT-170	12/30/09	See location plan	6	853.0	88.3	24.1	71.2	72.0	26.3	BAS-14	98.8	X		-2.2
DT-171	12/30/09	See location plan	6	853.0	86.7	21.8	71.2	72.0	26.3	BAS-14	98.9	X		-4.5
DT-172	12/30/09	See location plan	6	853.0	86.1	24.2	69.3	72.0	26.3	BAS-14	96.3	X		-2.1
DT-173	12/30/09	See location plan	6	853.0	87.3	22.5	71.3	72.0	26.3	BAS-14	99.0	X		-3.8
DT-174	12/30/09	See location plan	6	853.0	86.7	21.9	71.1	72.0	26.3	BAS-14	98.8	X		-4.4
DT-175	12/30/09	See location plan	6	853.0	86.4	23.0	70.2	72.0	26.3	BAS-14	97.6	X		-3.3
DT-176	01/06/10	See location plan	6	855.0	87.0	29.1	67.4	67.9	28.5	BAS-12	99.2	X		0.6
DT-177	01/06/10	See location plan	6	855.0	86.1	32.6	64.9	67.9	28.5	BAS-12	95.6	X		4.1
DT-178	01/06/10	See location plan	6	855.0	86.1	25.1	68.8	67.9	28.5	BAS-12	100+	X		-3.4
DT-179	01/06/10	See location plan	6	855.0	85.8	29.3	66.4	67.9	28.5	BAS-12	97.7	X		0.8
DT-180	01/06/10	See location plan	6	855.0	87.3	27.5	68.5	67.9	28.5	BAS-12	100+	X		-1.0
DT-181	01/06/10	See location plan	6	855.0	86.7	26.7	68.4	67.9	28.5	BAS-12	100+	X		-1.8
DT-182	01/07/10	See location plan	6	856.0	89.5	30.7	68.5	67.9	28.5	BAS-12	100+	X		2.2
DT-183	01/07/10	See location plan	6	856.0	85.8	30.1	65.9	67.9	28.5	BAS-12	97.1	X		1.6
DT-184	01/07/10	See location plan	6	856.0	86.1	27.8	67.4	67.9	28.5	BAS-12	99.2	X		-0.7
DT-185	01/07/10	See location plan	6	856.0	86.7	29.6	66.9	67.9	28.5	BAS-12	98.5	X		1.1
DT-186	01/07/10	See location plan	6	856.0	82.5	26.1	65.4	67.9	28.5	BAS-12	96.4	X		-2.4
DT-187	01/07/10	See location plan	6	856.0	83.1	22.9	67.6	67.9	28.5	BAS-12	99.6	X		-5.6
DT-188	01/08/10	See location plan	6	858.5	95.2	34.7	70.7	72.2	33.9	BAS-31	97.9	X		0.8
DT-189	01/08/10	See location plan	6	858.5	95.8	31.6	72.8	72.2	33.9	BAS-31	100+	X		-2.3
DT-190	01/08/10	See location plan	6	858.5	94.6	35.1	70.0	72.2	33.9	BAS-31	97.0	X		1.2
DT-191	01/08/10	See location plan	6	858.5	95.2	33.3	71.4	72.2	33.9	BAS-31	98.9	X		-0.6
DT-192	01/08/10	See location plan	6	858.5	94.3	32.7	71.1	72.2	33.9	BAS-31	98.4	X		-1.2
DT-193	01/08/10	See location plan	6	858.5	94.6	36.8	69.2	72.2	33.9	BAS-31	95.8	X		2.9
DT-194	01/13/10	See location plan	6	860.0	85.5	29.2	66.2	70.2	28.3	BAS-11	94.3		X	0.9
DT-195	01/13/10	See location plan	6	860.0	85.2	25.2	68.1	70.2	28.3	BAS-11	96.9	X		-3.1

DT - Indicates Drive Tube Density Test
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DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

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SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-196	01/13/10	See location plan	6	860.0	85.2	27.0	67.1	70.2	28.3	BAS-11	95.6	X		-1.3
DT-197	01/13/10	See location plan	6	860.0	86.7	27.3	68.1	70.2	28.3	BAS-11	97.0	X		-1.0
DT-198	01/13/10	See location plan	6	860.0	86.7	25.1	69.3	70.2	28.3	BAS-11	98.7	X		-3.2
DT-199	01/13/10	See location plan	6	860.0	86.1	27.5	67.5	70.2	28.3	BAS-11	96.2	X		-0.8
DT-200	01/15/10	See location plan	6	868.5	86.1	24.5	69.2	70.2	28.3	BAS-11	98.5	X		-3.8
DT-201	01/15/10	See location plan	6	868.5	87.7	25.6	69.8	70.2	28.3	BAS-11	99.5	X		-2.7
DT-202	01/15/10	See location plan	6	868.5	87.3	26.8	68.8	70.2	28.3	BAS-11	98.1	X		-1.5
DT-203	01/15/10	See location plan	6	868.5	86.4	25.0	69.1	70.2	28.3	BAS-11	98.5	X		-3.3
DT-204	01/15/10	See location plan	6	868.5	86.7	25.8	68.9	70.2	28.3	BAS-11	98.2	X		-2.5
DT-205	01/15/10	See location plan	6	868.5	87.0	24.3	70.0	70.2	28.3	BAS-11	99.7	X		-4.0
DT-206	01/19/10	See location plan	6	871.5	93.4	31.0	71.3	71.5	33.1	BAS-26	99.7	X		-2.1
DT-207	01/19/10	See location plan	6	871.5	94.0	32.2	71.1	71.5	33.1	BAS-26	99.4	X		-0.9
DT-208	01/19/10	See location plan	6	871.5	92.8	32.6	70.0	71.5	33.1	BAS-26	97.9	X		-0.5
DT-209	01/19/10	See location plan	6	871.5	93.4	32.3	70.6	71.5	33.1	BAS-26	98.7	X		-0.8
DT-210	01/19/10	See location plan	6	871.5	94.3	35.2	69.7	71.5	33.1	BAS-26	97.6	X		2.1
DT-211	01/19/10	See location plan	6	871.5	94.3	33.5	70.6	71.5	33.1	BAS-26	98.8	X		0.4
DT-212	01/29/10	See location plan	6	861.0	94.6	31.5	71.9	74.6	30.9	BAS-29	96.4	X		0.6
DT-213	01/29/10	See location plan	6	861.0	95.2	31.4	72.5	74.6	30.9	BAS-29	97.1	X		0.5
DT-214	01/29/10	See location plan	6	861.0	95.5	29.4	73.8	74.6	30.9	BAS-29	98.9	X		-1.5
DT-215	01/29/10	See location plan	6	861.0	95.2	29.6	73.5	74.6	30.9	BAS-29	98.5	X		-1.3
DT-216	01/29/10	See location plan	6	861.0	95.8	31.2	73.0	74.6	30.9	BAS-29	97.9	X		0.3
DT-217	01/29/10	See location plan	6	861.0	96.1	30.4	73.7	74.6	30.9	BAS-29	98.8	X		-0.5
DT-218	02/04/10	See location plan	6	866.5	93.7	32.6	70.7	74.0	32.2	BAS-25	95.5	X		0.4
DT-219	02/04/10	See location plan	6	866.5	97.0	30.1	74.6	74.0	32.2	BAS-25	100+	X		-2.1
DT-220	02/04/10	See location plan	6	866.5	89.2	31.5	67.8	74.0	32.2	BAS-25	91.7		X	-0.7
DT-220R	02/04/10	See location plan	6	866.5	95.2	30.3	73.1	74.0	32.2	BAS-25	98.7	X		-1.9
DT-221	02/04/10	See location plan	6	866.5	88.6	32.1	67.1	74.0	32.2	BAS-25	90.6		X	-0.1
DT-221R	02/04/10	See location plan	6	866.5	96.4	30.4	73.9	74.0	32.2	BAS-25	99.9	X		-1.8
DT-222	02/04/10	See location plan	6	866.5	94.3	32.6	71.1	74.0	32.2	BAS-25	96.1	X		0.4
DT-223	02/04/10	See location plan	6	866.5	97.6	32.7	73.5	74.0	32.2	BAS-25	99.4	X		0.5
DT-224	02/10/10	See location plan	6	866.5	92.8	27.2	73.0	74.0	32.2	BAS-25	98.6	X		-5.0
DT-225	02/10/10	See location plan	6	866.5	91.0	27.4	71.4	74.0	32.2	BAS-25	96.5	X		-4.8
DT-226	02/10/10	See location plan	6	866.5	93.4	27.8	73.1	74.0	32.2	BAS-25	98.8	X		-4.4
DT-227	02/10/10	See location plan	6	866.5	91.6	27.5	71.8	74.0	32.2	BAS-25	97.1	X		-4.7
DT-228	02/10/10	See location plan	6	866.5	93.7	27.3	73.6	74.0	32.2	BAS-25	99.5	X		-4.9
DT-229	02/10/10	See location plan	6	866.5	92.2	26.7	72.8	74.0	32.2	BAS-25	98.3	X		-5.5
DT-230	02/12/10	See location plan	6	866.5	89.5	25.5	71.3	72.0	26.3	BAS-14	99.0	X		-0.8
DT-231	02/12/10	See location plan	6	866.5	88.9	24.5	71.4	72.0	26.3	BAS-14	99.2	X		-1.8
DT-232	02/12/10	See location plan	6	866.5	88.3	24.6	70.9	72.0	26.3	BAS-14	98.4	X		-1.7
DT-233	02/12/10	See location plan	6	866.5	88.6	24.6	71.1	72.0	26.3	BAS-14	98.8	X		-1.7
DT-234	02/12/10	See location plan	6	866.5	89.8	25.6	71.5	72.0	26.3	BAS-14	99.3	X		-0.7
DT-235	02/12/10	See location plan	6	866.5	90.4	26.3	71.6	72.0	26.3	BAS-14	99.4	X		0.0
DT-236	02/19/10	See location plan	6	848.8	87.7	24.4	70.5	72.0	26.3	BAS-14	97.9	X		-1.9
DT-237	02/19/10	See location plan	6	848.8	89.8	26.3	71.1	72.0	26.3	BAS-14	98.8	X		0.0
DT-238	02/19/10	See location plan	6	848.8	88.0	22.9	71.6	72.0	26.3	BAS-14	99.4	X		-3.4
DT-239	02/19/10	See location plan	6	848.8	89.2	23.3	72.3	72.0	26.3	BAS-14	100+	X		-3.0
DT-240	02/19/10	See location plan	6	848.8	88.3	21.6	72.6	72.0	26.3	BAS-14	100+	X		-4.7
DT-241	02/19/10	See location plan	6	848.8	88.9	22.3	72.7	72.0	26.3	BAS-14	100+	X		-4.0
DT-242	02/23/10	See location plan	6	848.8	96.4	31.0	73.6	74.8	30.7	BAS-28	98.4	X		0.3
DT-243	02/23/10	See location plan	6	848.8	97.3	30.9	74.3	74.8	30.7	BAS-28	99.4	X		0.2
DT-244	02/23/10	See location plan	6	848.8	95.5	30.2	73.3	74.8	30.7	BAS-28	98.1	X		-0.5

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MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-245	02/23/10	See location plan	6	848.8	97.3	31.2	74.2	74.8	30.7	BAS-28	99.1	X		0.5
DT-246	02/23/10	See location plan	6	848.8	95.8	30.4	73.5	74.8	30.7	BAS-28	98.2	X		-0.3
DT-247	02/23/10	See location plan	6	848.8	94.9	29.5	73.3	74.8	30.7	BAS-28	98.0	X		-1.2
DT-248	03/04/10	See location plan	6	850.8	85.2	24.7	68.3	70.2	28.3	BAS-11	97.3	X		-3.6
DT-249	03/04/10	See location plan	6	850.8	86.1	26.3	68.2	70.2	28.3	BAS-11	97.1	X		-2.0
DT-250	03/04/10	See location plan	6	850.8	86.4	24.9	69.2	70.2	28.3	BAS-11	98.5	X		-3.4
DT-251	03/04/10	See location plan	6	850.8	87.3	24.1	70.3	70.2	28.3	BAS-11	100+	X		-4.2
DT-252	03/04/10	See location plan	6	850.8	86.7	25.7	69.0	70.2	28.3	BAS-11	98.3	X		-2.6
DT-253	03/04/10	See location plan	6	850.8	85.8	26.1	68.1	70.2	28.3	BAS-11	97.0	X		-2.2
DT-254	03/08/10	See location plan	6	850.2	94.3	26.2	74.7	76.1	28.1	BAS-18	98.2	X		-1.9
DT-255	03/08/10	See location plan	6	850.2	92.5	25.7	73.6	76.1	28.1	BAS-18	96.7	X		-2.4
DT-256	03/08/10	See location plan	6	850.2	93.1	24.4	74.8	76.1	28.1	BAS-18	98.3	X		-3.7
DT-257	03/08/10	See location plan	6	850.2	93.1	25.8	74.0	76.1	28.1	BAS-18	97.2	X		-2.3
DT-258	03/08/10	See location plan	6	850.2	92.5	24.4	74.4	76.1	28.1	BAS-18	97.7	X		-3.7
DT-259	03/08/10	See location plan	6	850.2	92.8	24.8	74.4	76.1	28.1	BAS-18	97.7	X		-3.3
DT-260	03/12/10	See location plan	6	852.1	93.1	27.5	73.0	74.8	30.7	BAS-28	97.6	X		-3.2
DT-261	03/12/10	See location plan	6	852.1	92.8	27.4	72.8	74.8	30.7	BAS-28	97.4	X		-3.3
DT-262	03/12/10	See location plan	6	852.1	92.2	25.1	73.7	74.8	30.7	BAS-28	98.5	X		-5.6
DT-263	03/12/10	See location plan	6	852.1	92.8	27.9	72.6	74.8	30.7	BAS-28	97.0	X		-2.8
DT-264	03/12/10	See location plan	6	852.1	91.6	25.9	72.8	74.8	30.7	BAS-28	97.3	X		-4.8
DT-265	03/12/10	See location plan	6	852.1	91.6	27.0	72.1	74.8	30.7	BAS-28	96.4	X		-3.7
DT-266	03/17/10	See location plan	6	852.1	90.7	25.2	72.4	72.0	26.3	BAS-14	100+	X		-1.1
DT-267	03/17/10	See location plan	6	852.1	87.7	28.7	68.1	72.0	26.3	BAS-14	94.6		X	2.4
DT-268	03/17/10	See location plan	6	852.1	87.0	24.0	70.2	72.0	26.3	BAS-14	97.4	X		-2.3
DT-269	03/17/10	See location plan	6	852.1	84.3	24.0	68.0	72.0	26.3	BAS-14	94.4		X	-2.3
DT-270	03/17/10	See location plan	6	852.1	86.1	23.2	69.9	72.0	26.3	BAS-14	97.1	X		-3.1
DT-271	03/17/10	See location plan	6	852.1	87.3	24.1	70.3	72.0	26.3	BAS-14	97.7	X		-2.2
DT-272	03/18/10	See location plan	6	872.0	82.5	25.3	65.8	67.0	24.0	BAS-7	98.3	X		1.3
DT-273	03/18/10	See location plan	6	872.0	83.4	24.7	66.9	67.0	24.0	BAS-7	99.8	X		0.7
DT-274	03/18/10	See location plan	6	872.0	83.4	22.7	68.0	67.0	24.0	BAS-7	100+	X		-1.3
DT-275	03/18/10	See location plan	6	872.0	83.1	27.9	65.0	67.0	24.0	BAS-7	97.0	X		3.9
DT-276	03/18/10	See location plan	6	872.0	82.2	22.4	67.2	67.0	24.0	BAS-7	100+	X		-1.6
DT-277	03/18/10	See location plan	6	872.0	83.7	22.4	68.4	67.0	24.0	BAS-7	100+	X		-1.6
DT-278	03/19/10	See location plan	6	872.0	86.1	24.9	68.9	70.2	28.3	BAS-11	98.2	X		-3.4
DT-279	03/19/10	See location plan	6	872.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-280	03/19/10	See location plan	6	872.0	86.7	23.4	70.3	70.2	28.3	BAS-11	100+	X		-4.9
DT-281	03/19/10	See location plan	6	872.0	88.3	27.2	69.4	70.2	28.3	BAS-11	98.9	X		-1.1
DT-282	03/19/10	See location plan	6	872.0	87.0	26.1	69.0	70.2	28.3	BAS-11	98.3	X		-2.2
DT-283	03/19/10	See location plan	6	872.0	88.3	29.0	68.4	70.2	28.3	BAS-11	97.5	X		0.7
DT-284	03/22/10	See location plan	6	852.1	89.8	31.4	68.3	67.9	28.5	BAS-12	100+	X		2.9
DT-285	03/22/10	See location plan	6	852.1	85.5	32.3	64.6	67.9	28.5	BAS-12	95.2	X		3.8
DT-286	03/22/10	See location plan	6	852.1	86.7	31.1	66.1	67.9	28.5	BAS-12	97.4	X		2.6
DT-287	03/22/10	See location plan	6	852.1	85.8	33.5	64.3	67.9	28.5	BAS-12	94.7		X	5.0
DT-288	03/22/10	See location plan	6	852.1	86.7	30.1	66.6	67.9	28.5	BAS-12	98.1	X		1.6
DT-289	03/22/10	See location plan	6	852.1	86.4	30.4	66.3	67.9	28.5	BAS-12	97.6	X		1.9
DT-290	03/23/10	See location plan	6	852.1	86.4	30.7	66.1	70.2	28.3	BAS-11	94.2		X	2.4
DT-291	03/23/10	See location plan	6	852.1	86.7	31.2	66.1	70.2	28.3	BAS-11	94.1		X	2.9
DT-292	03/23/10	See location plan	6	852.1	88.9	28.1	69.4	70.2	28.3	BAS-11	98.9	X		-0.2
DT-293	03/23/10	See location plan	6	852.1	88.0	32.7	66.3	70.2	28.3	BAS-11	94.5		X	4.4
DT-294	03/23/10	See location plan	6	852.1	87.7	26.9	69.1	70.2	28.3	BAS-11	98.4	X		-1.4
DT-295	03/23/10	See location plan	6	852.1	88.3	30.4	67.7	70.2	28.3	BAS-11	96.5	X		2.1

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

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SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-296	03/25/10	See location plan	6	852.1	79.2	23.5	64.1	67.0	24.0	BAS-7	95.7	X		-0.5
DT-297	03/25/10	See location plan	6	852.1	84.0	22.6	68.5	67.0	24.0	BAS-7	100+	X		-1.4
DT-298	03/25/10	See location plan	6	852.1	78.9	23.2	64.0	67.0	24.0	BAS-7	95.6	X		-0.8
DT-299	03/25/10	See location plan	6	852.1	83.1	28.0	64.9	67.0	24.0	BAS-7	96.9	X		4.0
DT-300	03/25/10	See location plan	6	852.1	82.5	21.4	68.0	67.0	24.0	BAS-7	100+	X		-2.6
DT-301	03/25/10	See location plan	6	852.1	82.2	23.6	66.5	67.0	24.0	BAS-7	99.3	X		-0.4
DT-302	04/09/10	See location plan	6	852.1	97.9	30.6	75.0	77.9	29.8	BAS-27	96.2	X		0.8
DT-303	04/09/10	See location plan	6	852.1	97.0	32.0	73.5	77.9	29.8	BAS-27	94.3		X	2.2
DT-304	04/09/10	See location plan	6	852.1	99.1	29.8	76.3	77.9	29.8	BAS-27	98.0	X		0.0
DT-305	04/09/10	See location plan	6	852.1	99.7	33.6	74.6	77.9	29.8	BAS-27	95.8	X		3.8
DT-306	04/09/10	See location plan	6	852.1	100.0	31.4	76.1	77.9	29.8	BAS-27	97.7	X		1.6
DT-307	04/09/10	See location plan	6	852.1	100.3	30.0	77.2	77.9	29.8	BAS-27	99.0	X		0.2
DT-308	04/12/10	See location plan	6	852.1	92.8	24.4	74.6	75.3	30.4	BAS-17	99.1	X		-6.0
DT-309	04/12/10	See location plan	6	852.1	93.4	26.5	73.8	75.3	30.4	BAS-17	98.1	X		-3.9
DT-310	04/12/10	See location plan	6	852.1	92.5	25.5	73.7	75.3	30.4	BAS-17	97.9	X		-4.9
DT-311	04/12/10	See location plan	6	852.1	91.3	28.2	71.2	75.3	30.4	BAS-17	94.6		X	-2.2
DT-312	04/12/10	See location plan	6	852.1	94.0	27.1	74.0	75.3	30.4	BAS-17	98.2	X		-3.3
DT-313	04/12/10	See location plan	6	852.1	95.5	26.5	75.5	75.3	30.4	BAS-17	100+	X		-3.9
DT-314	04/13/10	See location plan	6	852.1	80.7	22.3	66.0	67.0	24.0	BAS-7	98.5	X		-1.7
DT-315	04/13/10	See location plan	6	852.1	79.5	22.3	65.0	67.0	24.0	BAS-7	97.0	X		-1.7
DT-316	04/13/10	See location plan	6	852.1	78.3	19.8	65.4	67.0	24.0	BAS-7	97.6	X		-4.2
DT-317	04/13/10	See location plan	6	852.1	81.0	23.7	65.5	67.0	24.0	BAS-7	97.7	X		-0.3
DT-318	04/13/10	See location plan	6	852.1	78.6	22.3	64.3	67.0	24.0	BAS-7	95.9	X		-1.7
DT-319	04/13/10	See location plan	6	852.1	79.2	22.0	64.9	67.0	24.0	BAS-7	96.9	X		-2.0
DT-320	04/16/10	See location plan	6	852.1	80.4	22.1	65.8	67.0	24.0	BAS-7	98.3	X		-1.9
DT-321	04/16/10	See location plan	6	852.1	83.7	24.4	67.3	67.0	24.0	BAS-7	100+	X		0.4
DT-322	04/16/10	See location plan	6	852.1	82.8	23.0	67.3	67.0	24.0	BAS-7	100+	X		-1.0
DT-323	04/16/10	See location plan	6	852.1	81.9	26.0	65.0	67.0	24.0	BAS-7	97.0	X		2.0
DT-324	04/16/10	See location plan	6	852.1	81.9	24.1	66.0	67.0	24.0	BAS-7	98.5	X		0.1
DT-325	04/16/10	See location plan	6	852.1	81.6	23.4	66.1	67.0	24.0	BAS-7	98.7	X		-0.6
DT-326	04/19/10	See location plan	6	854.1	91.6	26.3	72.5	76.1	28.1	BAS-18	95.3	X		-1.8
DT-327	04/19/10	See location plan	6	854.1	93.1	26.7	73.5	76.1	28.1	BAS-18	96.6	X		-1.4
DT-328	04/19/10	See location plan	6	854.1	91.6	24.1	73.8	76.1	28.1	BAS-18	97.0	X		-4.0
DT-329	04/19/10	See location plan	6	854.1	92.8	27.5	72.8	76.1	28.1	BAS-18	95.6	X		-0.6
DT-330	04/19/10	See location plan	6	854.1	94.6	24.6	75.9	76.1	28.1	BAS-18	99.8	X		-3.5
DT-331	04/19/10	See location plan	6	854.1	94.0	23.9	75.9	76.1	28.1	BAS-18	99.7	X		-4.2
DT-332	04/22/10	See location plan	6	854.1	81.6	21.8	67.0	70.2	28.3	BAS-11	95.4	X		-6.5
DT-333	04/22/10	See location plan	6	854.1	81.0	20.7	67.1	70.2	28.3	BAS-11	95.6	X		-7.6
DT-334	04/22/10	See location plan	6	854.1	84.0	22.1	68.8	70.2	28.3	BAS-11	98.0	X		-6.2
DT-335	04/22/10	See location plan	6	854.1	83.1	22.5	67.8	70.2	28.3	BAS-11	96.6	X		-5.8
DT-336	04/22/10	See location plan	6	854.1	84.0	23.2	68.2	70.2	28.3	BAS-11	97.1	X		-5.1
DT-337	04/22/10	See location plan	6	854.1	84.6	22.9	68.8	70.2	28.3	BAS-11	98.1	X		-5.4
DT-338	04/26/10	See location plan	6	854.1	83.7	25.3	66.8	70.2	28.3	BAS-11	95.2	X		-3.0
DT-339	04/26/10	See location plan	6	854.1	83.7	24.2	67.4	70.2	28.3	BAS-11	96.0	X		-4.1
DT-340	04/26/10	See location plan	6	854.1	86.1	26.7	68.0	70.2	28.3	BAS-11	96.8	X		-1.6
DT-341	04/26/10	See location plan	6	854.1	86.7	30.8	66.3	70.2	28.3	BAS-11	94.4		X	2.5
DT-342	04/26/10	See location plan	6	854.1	84.3	25.8	67.0	70.2	28.3	BAS-11	95.5	X		-2.5
DT-343	04/26/10	See location plan	6	854.1	86.1	25.4	68.7	70.2	28.3	BAS-11	97.8	X		-2.9
DT-344	04/27/10	See location plan	6	854.1	83.4	23.9	67.3	67.0	24.0	BAS-7	100+	X		-0.1
DT-345	04/27/10	See location plan	6	854.1	84.3	24.6	67.7	67.0	24.0	BAS-7	100+	X		0.6
DT-346	04/27/10	See location plan	6	854.1	83.7	22.7	68.2	67.0	24.0	BAS-7	100+	X		-1.3

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

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SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-347	04/27/10	See location plan	6	854.1	81.3	22.2	66.5	67.0	24.0	BAS-7	99.3	X		-1.8
DT-348	04/28/10	See location plan	6	854.1	88.0	25.5	70.1	70.2	28.3	BAS-11	99.9	X		-2.8
DT-349	04/28/10	See location plan	6	854.1	88.3	25.1	70.6	70.2	28.3	BAS-11	100+	X		-3.2
DT-350	04/28/10	See location plan	6	854.1	87.7	25.5	69.9	70.2	28.3	BAS-11	99.5	X		-2.8
DT-351	04/28/10	See location plan	6	854.1	85.5	27.5	67.1	70.2	28.3	BAS-11	95.5	X		-0.8
DT-352	04/28/10	See location plan	6	854.1	88.0	25.1	70.3	70.2	28.3	BAS-11	100+	X		-3.2
DT-353	04/28/10	See location plan	6	854.1	86.7	24.8	69.5	70.2	28.3	BAS-11	99.0	X		-3.5
DT-354	05/05/10	See location plan	6	854.1	80.4	24.5	64.6	67.0	24.0	BAS-7	96.4	X		0.5
DT-355	05/05/10	See location plan	6	854.1	78.6	19.3	65.9	67.0	24.0	BAS-7	98.3	X		-4.7
DT-356	05/05/10	See location plan	6	854.1	77.1	18.2	65.2	67.0	24.0	BAS-7	97.4	X		-5.8
DT-357	05/05/10	See location plan	6	854.1	80.7	23.3	65.5	67.0	24.0	BAS-7	97.7	X		-0.7
DT-358	05/05/10	See location plan	6	854.1	80.1	17.9	67.9	67.0	24.0	BAS-7	100+	X		-6.1
DT-359	05/05/10	See location plan	6	854.1	78.6	17.1	67.1	67.0	24.0	BAS-7	100+	X		-6.9
DT-360	05/06/10	See location plan	6	856.0	82.5	19.6	69.0	70.2	28.3	BAS-11	98.3	X		-8.7
DT-361	05/06/10	See location plan	6	856.0	81.0	20.4	67.3	70.2	28.3	BAS-11	95.8	X		-7.9
DT-362	05/06/10	See location plan	6	856.0	84.3	20.8	69.8	70.2	28.3	BAS-11	99.4	X		-7.5
DT-363	05/06/10	See location plan	6	856.0	84.9	23.0	69.0	70.2	28.3	BAS-11	98.3	X		-5.3
DT-364	05/06/10	See location plan	6	856.0	82.8	21.4	68.2	70.2	28.3	BAS-11	97.2	X		-6.9
DT-365	05/06/10	See location plan	6	856.0	81.6	20.7	67.6	70.2	28.3	BAS-11	96.3	X		-7.6
DT-366	05/07/10	See location plan	6	856.0	98.2	28.5	76.4	76.3	30.7	BAS-24	100+	X		-2.2
DT-367	05/07/10	See location plan	6	856.0	92.5	27.9	72.3	76.3	30.7	BAS-24	94.8		X	-2.8
DT-368	05/07/10	See location plan	6	856.0	95.2	28.6	74.0	76.3	30.7	BAS-24	97.0	X		-2.1
DT-369	05/07/10	See location plan	6	856.0	93.4	30.9	71.4	76.3	30.7	BAS-24	93.5		X	0.2
DT-369R	05/07/10	See location plan	6	856.0	94.6	27.5	74.2	76.3	30.7	BAS-24	97.2	X		-3.2
DT-370	05/07/10	See location plan	6	856.0	92.2	26.3	73.0	76.3	30.7	BAS-24	95.7	X		-4.4
DT-371	05/07/10	See location plan	6	856.0	90.7	27.9	70.9	76.3	30.7	BAS-24	92.9		X	-2.8
DT-371R	05/07/10	See location plan	6	856.0	94.0	28.9	72.9	76.3	30.7	BAS-24	95.6	X		-1.8
DT-372	5/10/2010	See location plan	6	856.0	85.2	29.2	65.9	67.9	28.5	BAS-12	97.1	X		0.7
DT-373	5/10/2010	See location plan	6	856.0	84.3	28.0	65.9	67.9	28.5	BAS-12	97.0	X		-0.5
DT-374	5/10/2010	See location plan	6	856.0	86.1	27.8	67.4	67.9	28.5	BAS-12	99.2	X		-0.7
DT-375	5/10/2010	See location plan	6	856.0	86.4	32.5	65.2	67.9	28.5	BAS-12	96.0	X		4
DT-376	5/10/2010	See location plan	6	856.0	87.7	30.1	67.4	67.9	28.5	BAS-12	99.3	X		1.6
DT-377	5/10/2010	See location plan	6	856.0	89.5	27.0	70.5	67.9	28.5	BAS-12	100+	X		-1.5
DT-377R	5/10/2010	See location plan	6	856.0	87.3	26.2	69.2	67.9	28.5	BAS-12	100+	X		-2.3
DT-378	5/12/2010	See location plan	6	856.0	75.9	20.5	63.0	67.0	24.0	BAS-7	94.0		X	-3.5
DT-379	5/12/2010	See location plan	6	856.0	79.8	21.3	65.8	67.0	24.0	BAS-7	98.2	X		-2.7
DT-380	5/12/2010	See location plan	6	856.0	76.2	21.3	62.8	67.0	24.0	BAS-7	93.8		X	-2.7
DT-380R	5/12/2010	See location plan	6	856.0	77.1	20.7	63.9	67.0	24.0	BAS-7	95.3	X		-3.3
DT-381	5/12/2010	See location plan	6	856.0	78.0	21.4	64.3	67.0	24.0	BAS-7	95.9	X		-2.6
DT-382	5/12/2010	See location plan	6	856.0	76.8	19.4	64.3	67.0	24.0	BAS-7	96.0	X		-4.6
DT-383	5/12/2010	See location plan	6	856.0	78.0	19.8	65.1	67.0	24.0	BAS-7	97.2	X		-4.2
DT-384	5/13/2010	See location plan	6	856.0	83.7	28.0	65.4	67.0	24.0	BAS-7	97.6	X		4.0
DT-385	5/13/2010	See location plan	6	856.0	83.1	26.1	65.9	67.0	24.0	BAS-7	98.4	X		2.1
DT-386	5/13/2010	See location plan	6	856.0	83.4	24.9	66.8	67.0	24.0	BAS-7	99.7	X		0.9
DT-387	5/13/2010	See location plan	6	856.0	83.7	29.1	64.8	67.0	24.0	BAS-7	96.8	X		5.1
DT-388	5/13/2010	See location plan	6	856.0	84.0	24.3	67.6	67.0	24.0	BAS-7	100+	X		0.3
DT-389	5/13/2010	See location plan	6	856.0	82.8	24.7	66.4	67.0	24.0	BAS-7	99.1	X		0.7
DT-390	5/18/2010	See location plan	6	856.0	91.6	34.0	68.4	67.9	28.5	BAS-12	100+	X		5.5
DT-391	5/18/2010	See location plan	6	856.0	90.0	36.5	65.9	67.9	28.5	BAS-12	97.1	X		8
DT-392	5/18/2010	See location plan	6	856.0	89.5	34.4	66.6	67.9	28.5	BAS-12	98.1	X		5.9
DT-393	5/18/2010	See location plan	6	856.0	91.6	36.4	67.2	67.9	28.5	BAS-12	98.9	X		7.9

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

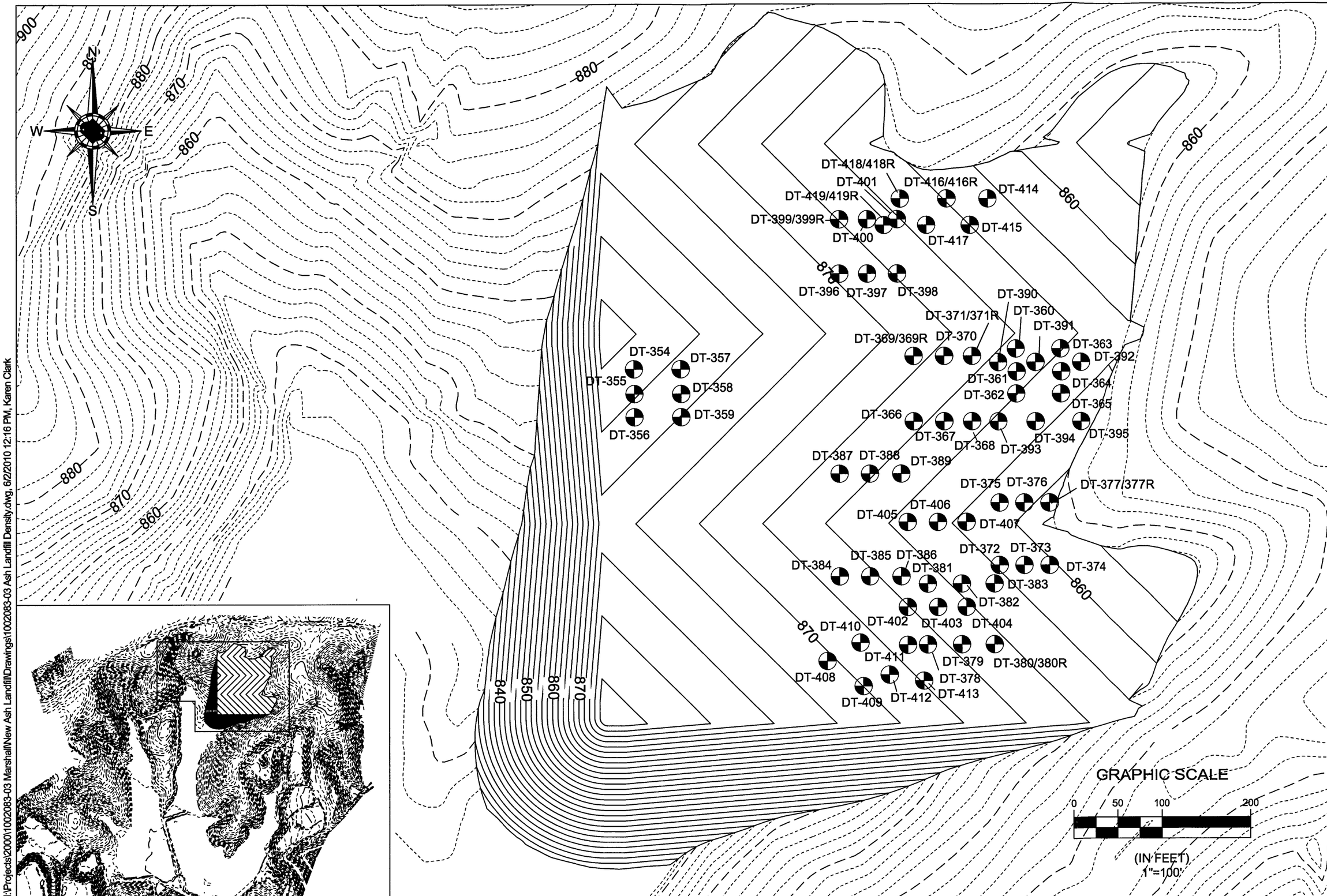
TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-394	5/18/2010	See location plan	6	856.0	89.5	33.1	67.2	67.9	28.5	BAS-12	99.0	X		4.6
DT-395	5/18/2010	See location plan	6	856.0	91.6	35.7	67.5	67.9	28.5	BAS-12	99.4	X		7.2
DT-396	5/19/2010	See location plan	6	856.0	85.5	31.9	64.8	66.6	30.2	BAS-21	97.3	X		1.7
DT-397	5/19/2010	See location plan	6	856.0	84.6	34.4	62.9	66.6	30.2	BAS-21	94.5		X	4.2
DT-398	5/19/2010	See location plan	6	856.0	88.3	30.8	67.5	66.6	30.2	BAS-21	100+	X		0.6
DT-399	5/19/2010	See location plan	6	856.0	83.4	34.4	62.1	66.6	30.2	BAS-21	93.2		X	4.2
DT-399R	5/19/2010	See location plan	6	856.0	86.1	29.0	66.7	66.6	30.2	BAS-21	100+	X		-1.2
DT-400	5/19/2010	See location plan	6	856.0	85.5	29.9	65.8	66.6	30.2	BAS-21	98.8	X		-0.3
DT-401	5/19/2010	See location plan	6	856.0	86.1	28.7	66.9	66.6	30.2	BAS-21	100+	X		-1.5
DT-402	5/21/2010	See location plan	6	856.0	89.5	31.5	68.1	67.9	28.5	BAS-12	100+	X		3
DT-403	5/21/2010	See location plan	6	856.0	90.1	31.2	68.7	67.9	28.5	BAS-12	100+	X		2.7
DT-404	5/21/2010	See location plan	6	856.0	90.7	32.8	68.3	67.9	28.5	BAS-12	100+	X		4.3
DT-405	5/21/2010	See location plan	6	856.0	88.3	35.1	65.4	67.9	28.5	BAS-12	96.3	X		6.6
DT-406	5/21/2010	See location plan	6	856.0	91.3	32.6	68.9	67.9	28.5	BAS-12	100+	X		4.1
DT-407	5/21/2010	See location plan	6	856.0	89.2	33.4	66.9	67.9	28.5	BAS-12	98.5	X		4.9
DT-408	5/25/2010	See location plan	6	858.0	84.1	29.5	64.9	67.9	28.5	BAS-12	95.6	X		1
DT-409	5/25/2010	See location plan	6	858.0	78.7	26.8	62.1	61.5	26.0	BAS-1	100+	X		0.8
DT-410	5/25/2010	See location plan	6	858.0	79.3	25.8	63.0	61.5	26.0	BAS-1	100+	X		-0.2
DT-411	5/25/2010	See location plan	6	858.0	83.5	24.8	66.9	67.9	28.5	BAS-12	98.5	X		-3.7
DT-412	5/25/2010	See location plan	6	858.0	81.1	25.3	64.7	67.9	28.5	BAS-12	95.3	X		-3.2
DT-413	5/25/2010	See location plan	6	858.0	83.5	23.1	67.8	67.9	28.5	BAS-12	99.9	X		-5.4
DT-414	5/27/2010	See location plan	6	859.0	81.7	20.6	67.7	67.0	24.0	BAS-7	100+	X		-3.4
DT-415	5/27/2010	See location plan	6	859.0	81.1	21.3	66.9	67.0	24.0	BAS-7	99.8	X		-2.7
DT-416	5/27/2010	See location plan	6	859.0	74.5	19.8	62.2	67.0	24.0	BAS-7	92.8		X	-4.2
DT-416R	5/27/2010	See location plan	6	859.0	78.1	19.8	65.2	67.0	24.0	BAS-7	97.3	X		-4.2
DT-417	5/27/2010	See location plan	6	859.0	80.5	25.1	64.3	67.0	24.0	BAS-7	96.0	X		1.1
DT-418	5/27/2010	See location plan	6	859.0	76.9	38.7	55.4	67.0	24.0	BAS-7	82.8		X	14.7
DT-418R	5/27/2010	See location plan	6	859.0	81.1	26.1	64.3	67.0	24.0	BAS-7	96.0	X		2.1
DT-419	5/27/2010	See location plan	6	859.0	78.7	9.9	71.6	67.0	24.0	BAS-7	--		X	-14.1
DT-419R	5/27/2010	See location plan	6	859.0	79.3	26.2	62.8	61.5	26.0	BAS-1	100+	X		0.2

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope



H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Drawings\1002083-03 Ash Landfill Density.dwg, 6/2/2010 12:16 PM, Karen Clark

SHIELD
ENGINEERING, INC.
4301 TAGGART CREEK ROAD
CHARLOTTE, NC 28208
704-394-6913
704-394-6930 fax
www.shieldengineering.com

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PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

DRAWING NAME: 1002083-03 Ash Landfill Density.dwg
DRAWN BY: KJC
FILE NUMBER: 1002083-03
CHECKED BY: KAA
SCALE: 1"=100'
DATE: 06/02/10

SHEET TITLE:
DENSITY TEST
LOCATION PLAN
MAY 2010

SHEET:
1

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 5-5-16
Inspection of: New Land Fill Fly Ash	**Technician:** Elis Rojas	

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Shield on site to observed Fill Fly Ash at New Land Fill Marshall Steam Station.

Shield performed 6 drive tubes 1 one point.

All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 5-6-10
Inspection of: Fill Fly Ash		**Technician:** Elis Rojas	

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Drive Tube\Nuclear Density Data

Test No.	354	355	356	357	358	359	
Grade or Elevation	854.1						
Location							
Wt. Wet Soil & Mold	3.99	3.94	3.90	4.02	4.00	3.95	
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34	
Wt. Wet soil	2.67	2.61	2.56	2.68	2.66	2.61	
Volume Mold	0.0332						
Wet Density	80.4	78.6	77.1	80.7	80.1	78.6	
Wt. Wet soil & Pan	462.2	463.9	396.9	500.2	457.6	460.2	
Wt. Dry soil & Pan	421.5	427.3	365	472.6	423.8	427.5	
Wt. Pan	235.3	237	189.7	354.2	235.3	237	
Moisture Lost	40.7	36.6	31.9	27.6	33.8	32.7	
Wt. Dry soil	186.2	190.3	175.3	118.4	188.5	190.5	
% Moisture	21.9	19.3	18.2	23.3	17.9	17.1	
Dry Density	66	65.9	65.2	65.5	67.9	67.1	
Maximum Dry Density	67						
Optimum Moisture	24						
% Compaction	98.5	98.4	97.3	97.8	101.3	100.1	
Meets Criteria (Y\N)							

1 Point Proctor Data

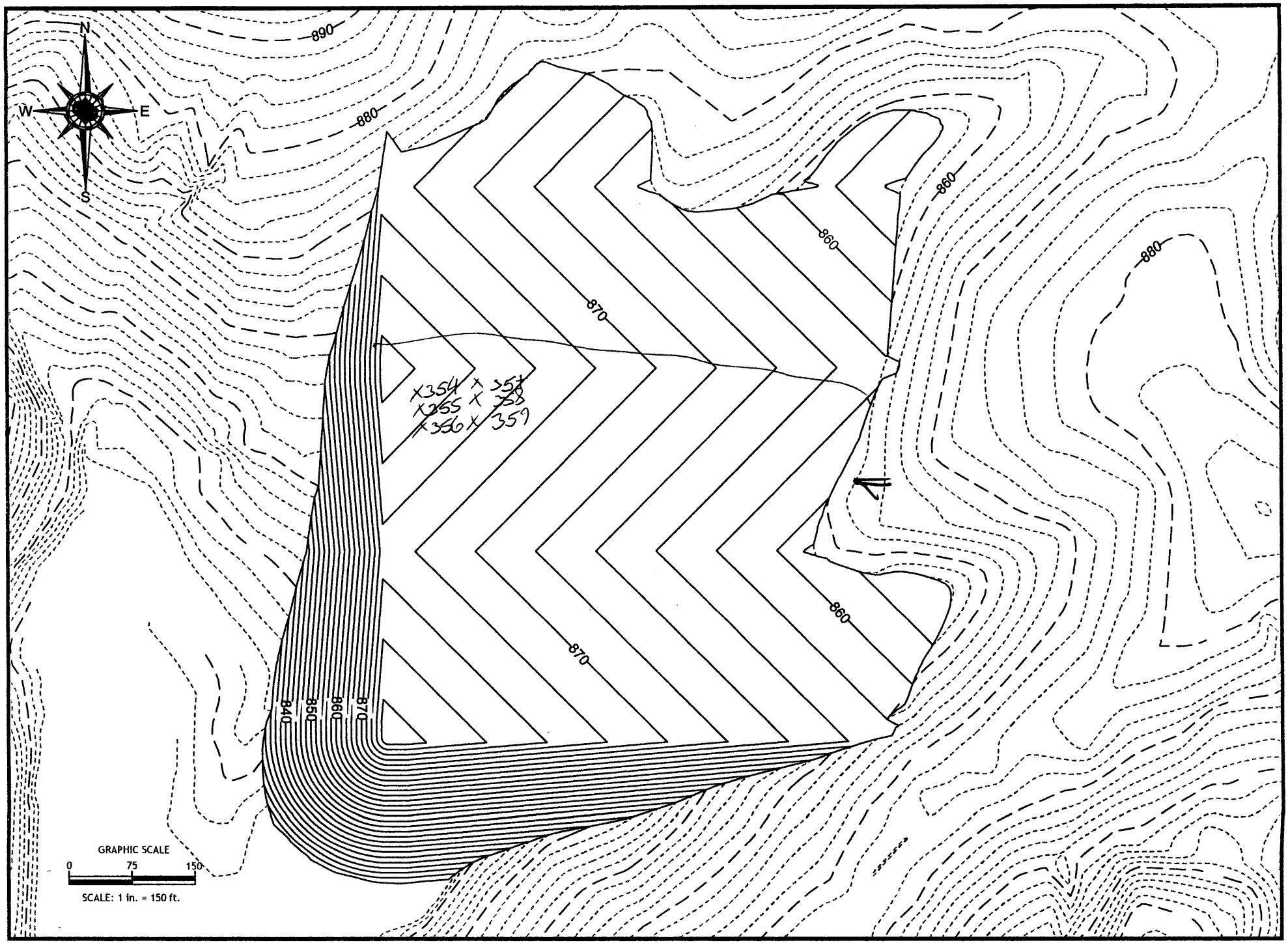
Wt. Wet Soil & Mold	11.95
Wt. Mold	9.30
Wt. Wet soil	2.65
Volume Mold	0.0331
Wet Density	80.1
Wt. Wet soil & Pan	400.5
Wt. Dry soil & Pan	362.6
Wt. Pan	189.7
Moisture Lost	37.9
Wt. Dry soil	172.9
% Moisture	21.9
Dry Density	65.7

Additional Project Data

67 at 24 BAS 7

Elis Rojas
Printed Name

Signature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GRAPHIC SCALE
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75
150
SCALE: 1 in. = 150 ft.

5-5-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 5-6-10
Inspection of: Fill Fly Ash New Landfill	**Technician:** Elis Rojas	

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Shield on site to observed new land fill fly ash at Marshall Steam Station.

Shield performed 6 Drive Tubes 1 one point.

All test meets criteria

Shield informed Janette Prosser that % moisture was 8% under optimum Moisture.

Shield observed water truck spray water 3 Times in Hour 30 minutes.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Mary Hall		Shield No.:	Client No.:
Client Name: Duke Power		Task No.:	Date: 5-6-10
Inspection of: Ellis Pejas		Technician: E.R.	

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Drive Tube\Nuclear Density Data

Test No.	360	361	362	363	364	365
Grade or Elevation	856	~~357~~	~~358~~			
Location						
Wt. Wet Soil & Mold	4.06	4.02	4.14	4.16	4.07	4.05
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34
Wt. Wet soil	2.74	2.69	2.8	2.82	2.73	2.71
Volume Mold	0.0332					
Wet Density	82.5	81	84.3	84.9	82.8	81.6
Wt. Wet soil & Pan	460.2	462.7	400.7	508.5	441.8	457.8
Wt. Dry soil & Pan	423.5	424.5	364.3	481.7	405.4	419.9
Wt. Pan	235.3	237	189.7	365	235.3	237
Moisture Lost	36.9	38.2	36.4	26.8	36.4	37.9
Wt. Dry soil	188	187.5	174.6	116.7	170.1	182.9
% Moisture	19.6	20.4	20.8	23	21.4	20.7
Dry Density	69.0 ~~70.2~~	69.3	69.8	69	68.2	67.6
Maximum Dry Density	70.2					
Optimum Moisture	28.3					
% Compaction	98.3	~~98.7~~ 95.8	97.4	98.3	97.2	96.3
Meets Criteria (Y\N)						

1 Point Proctor Data

Wt. Wet Soil & Mold	12.16	
Wt. Mold	9.30	
Wt. Wet soil	2.86	
Volume Mold	0.0331	
Wet Density	86.4	
Wt. Wet soil & Pan	399.1	
Wt. Dry soil & Pan	361.9	
Wt. Pan	~~X~~ 189.7	
Moisture Lost	37.2	
Wt. Dry soil	172.2	
% Moisture	21.6	
Dry Density	71.1	

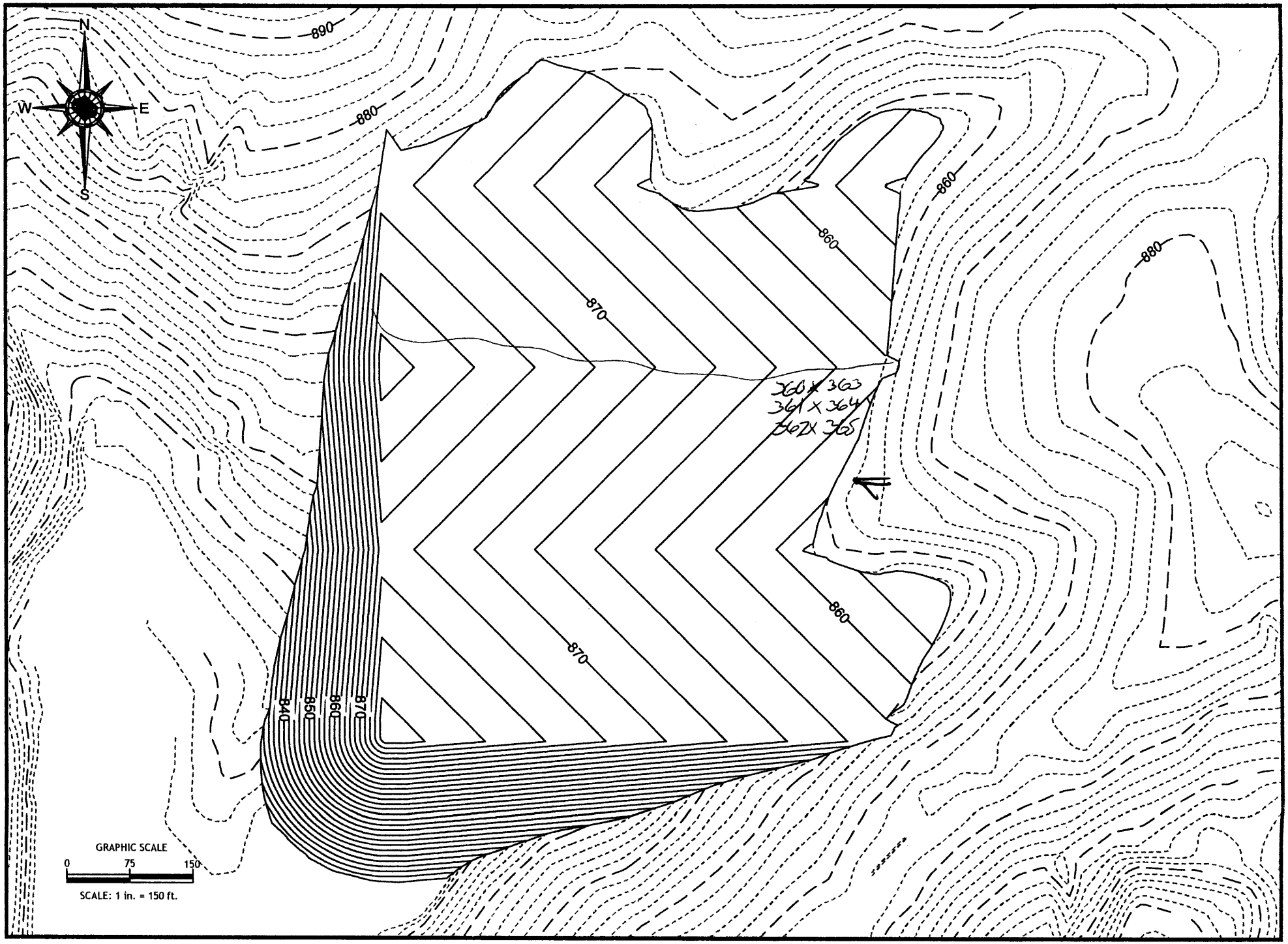
Additional Project Data

70.2 at 28.3 BAS-11

JMP

Ellis Pejas
Printed Name

Signature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GRAPHIC SCALE
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SCALE: 1 in. = 150 ft.

5-6-16

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 5-7-10
Inspection of: FILL FLY ASH NEW LANDFILL	**Technician:** ELIS PEGAS	

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Shield on site to observed Fill Fly Ash at MARSHALL Steam Station.

Shield performed 6 drive tubes 1one point.
Test #369 and 371 Failed. Shield re-tested. Numbers compaction meets criteria for second time.
except # 367 @ 94.8% compaction.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS PEGAS
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAYSHALL		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 5-7-10
Inspection of: Fill Fly Ash		**Technician:** Elis Rojas	

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Re-Test

Drive Tube\Nuclear Density Data

Test No.	366	367	368	369	370	371	369	371
Grade or Elevation	856							
Location								
Wt. Wet Soil & Mold	4.58	4.40	4.50	4.44	4.40	4.35	4.48	4.46
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34	1.34	1.34
Wt. Wet soil	3.26	3.07	3.16	3.1	3.06	3.01	3.14	3.12
Volume Mold	0.0332							
Wet Density	98.2	92.5	95.2	93.4	92.2	90.7	94.6	94
Wt. Wet soil & Pan	458.8	463.9	400.5	505.5	460.6	460.9	461.5	462.3
Wt. Dry soil & Pan	408.6	413.9	352.8	469.5	413.1	411.6	412.1	411.3
Wt. Pan	232.2	234.6	186.1	352.9	232.2	234.6	232.2	234.6
Moisture Lost	50.2	50	47.7	36	47.5	49.3	49.4	51
Wt. Dry soil	176.4	179.3	166.2	116.6	180.9	177	179.9	176.7
% Moisture	28.5	27.9	28.6	30.9	26.3	27.9	27.5	28.9
Dry Density	76.4	72.3	74.0	71.4	73	70.9	74.2	72.9
Maximum Dry Density	76.3							
Optimum Moisture	30.7							
% Compaction	100.1	94.8	97	93.6	95.7	92.9	97.2	95.6
Meets Criteria (Y\N)				N		N		

1 Point Proctor Data

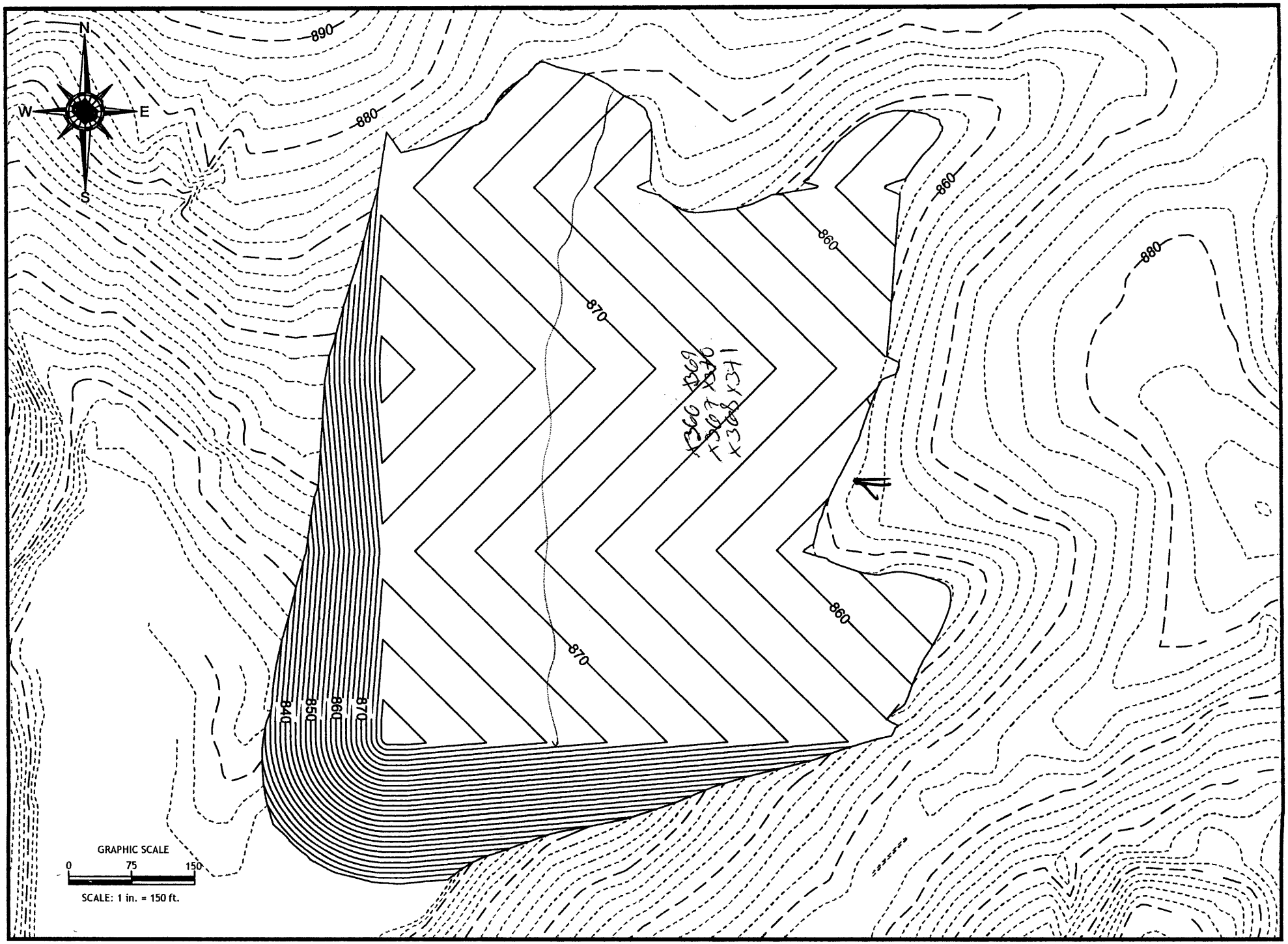
Wt. Wet Soil & Mold	12.58	
Wt. Mold	7.30	
Wt. Wet soil	3.28	
Volume Mold	0.0332	
Wet Density	98.8	
Wt. Wet soil & Pan	401.1	
Wt. Dry soil & Pan	351.4	
Wt. Pan	186.1	
Moisture Lost	49.7	
Wt. Dry soil	165.3	
% Moisture	30.1	
Dry Density	75.9	

Additional Project Data

76.3 at 30.7 BAS-24

Elis Rojas
Printed Name

Signature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GRAPHIC SCALE
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SCALE: 1 in. = 150 ft.

5-7-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 5-10-11
Inspection of: FILL FLY ASH NEW LANDFILL	**Technician:** ELIS PEJA	

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Shield onsite to observe fill fly ash at new landfill.

Shield performed 6 drive tubes.

N/A.

(Due to high #'s)

One point could not be performed. Shield did not have a solid base. Shield collect ash to performed one point on lab.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS PEJA
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 5-10-16
Inspection of: Fly Ash new Landfill		**Technician:** Elis Rojas	

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Re-test

Drive Tube\Nuclear Density Data							
Test No.	372	373	374	375	376	377	377
Grade or Elevation	856						
Location							
Wt. Wet Soil & Mold	4.15	4.13	4.20	4.21	4.25	4.31	4.24
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34	1.34
Wt. Wet soil	2.83	2.8	2.86	2.87	~~86.4~~	2.97	2.9
Volume Mold	0.0332						
Wet Density	85.2	84.3	86.1	86.4	~~86.4~~ 87.7	89.5	87.3
Wt. Wet soil & Pan	462.8	460.7	406.5	510.5	461.8	460.2	460.9
Wt. Dry soil & Pan	410.4	411.1	358.6	471.8	408.4	412.1	413.2
Wt. Pan	231.1	234	186	352.6	231.1	234	231.1
Moisture Lost	52.4	49.6	47.9	38.7	53.4	48.1	47.7
Wt. Dry soil	179.3	177.1	172.6	119.2	177.3	178.1	182.1
% Moisture	29.2	28	27.8	32.5	30.1	27	26.2
Dry Density	65.9	66.9	67.4	65.2	66.4	70.5	69.2
Maximum Dry Density	~~70.2~~	67.9			67.4		
Optimum Moisture	~~28.3~~	28.5					
% Compaction	97.5	97.5	97.3	96	97.8	103.8	101.9
Meets Criteria (Y\N)							

1 Point Proctor Data	
Wt. Wet Soil & Mold	12.34
Wt. Mold	9.30
Wt. Wet soil	3.04
Volume Mold	0.0331
Wet Density	97.8
Wt. Wet soil & Pan	1466.5
Wt. Dry soil & Pan	1189.2
Wt. Pan	188.9
Moisture Lost	277.3
Wt. Dry soil	1000.3
% Moisture	27.8
Dry Density	71.8

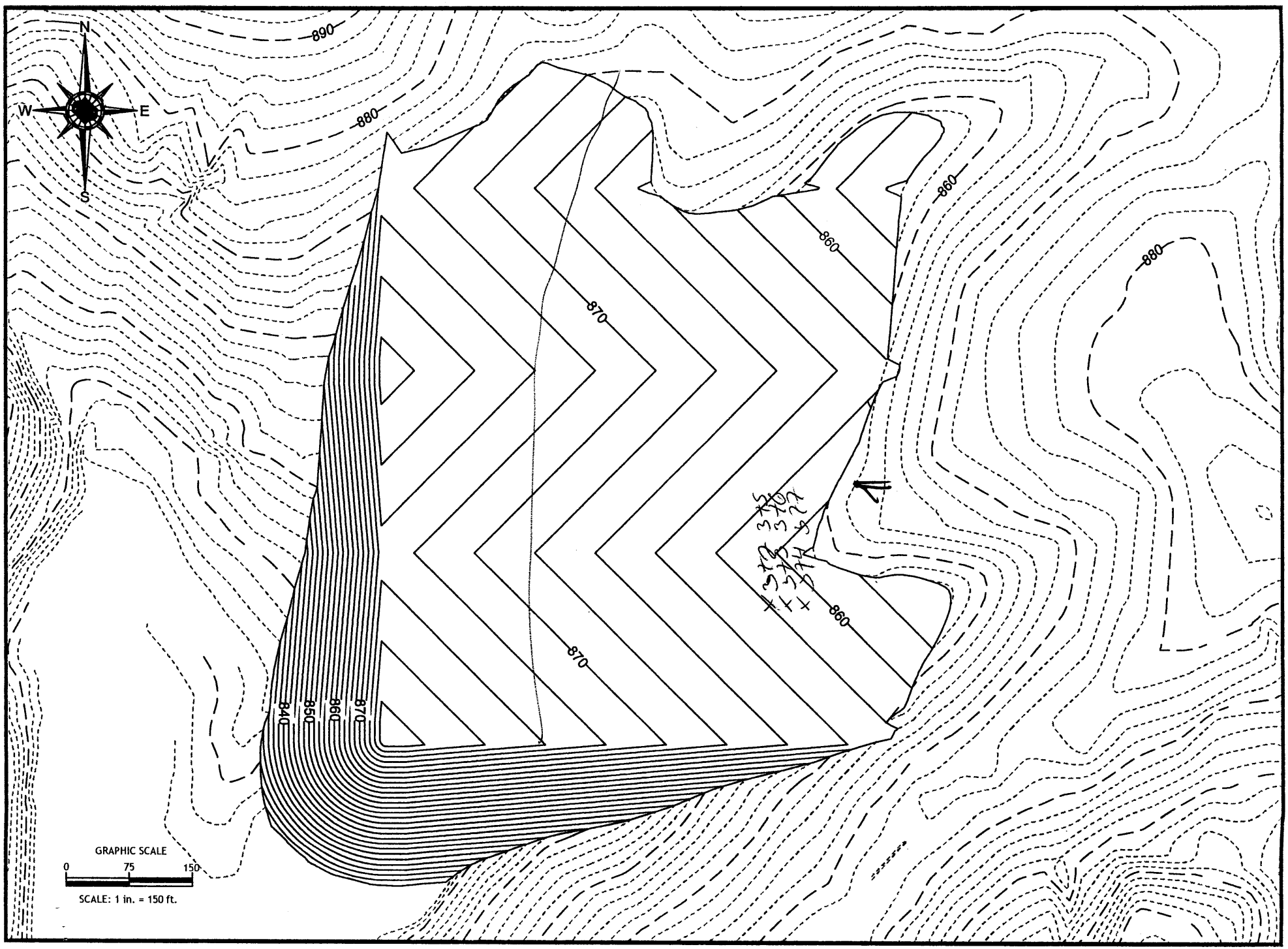
Additional Project Data

~~70.2 at 28.3 BAS-11~~
67.9 at 28.5 BAS-12

Elis Rojas
Printed Name

Signature

OVEN#1 CHECKED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SCALE: 1 in. = 150 ft.

5-10-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 5-12-10
Inspection of: New Pond Fill	**Technician:** Elis Rojas	

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Shield on site to observed Fill at MARSHALL Steam Power Station.

Shield performed 6 drive Tubes on Fly Ash Fill.

Test # 380 Failed. All test meets criteria.

except DT 378 @ 94%

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS ROJAS
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 5-12-11
Inspection of: Fill Fly Ash New Pond Fill		**Technician:** Elis Rojas	

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Drive Tube\Nuclear Density Data

Test No.	378	379	380	381	382	383	Re-Test 380
Grade or Elevation	856	~~857~~	~~858~~	~~859~~	~~860~~		
Location							
Wt. Wet Soil & Mold	3.84	3.98	3.87	3.93	3.89	3.93	3.90
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34	1.34
Wt. Wet soil	2.52	2.65	2.53	2.59	2.55	2.59	2.56
Volume Mold	0.0332						
Wet Density	75.9	79.8	76.2	78	76.8	78	77.1
Wt. Wet soil & Pan	463.2	467.2	405.6	507.2	458.9	462.3	460.1
Wt. Dry soil & Pan	423.7	426.2	367.1	479.9	421.9	424.5	420.9
Wt. Pan	231.1	234	186	352.6	231.1	234	231.1
Moisture Lost	39.5	41	38.5	27.3	36	37.8	39.2
Wt. Dry soil	192.6	192.2	181.1	127.3	190.8	190.5	189.8
% Moisture	20.5 ✓	21.3 ✓	21.3 ✓	21.4 ✓	19.4 ✓	19.8 ✓	20.7 ✓
Dry Density	63 ✓	65.8 ✓	62.8 ✓	64.3 ✓	64.3	66.1 ✓	63.9 ✓
Maximum Dry Density	67						
Optimum Moisture	24.0						
% Compaction	94	98.2	93.7	96	96	97.2	95.3
Meets Criteria (Y\N)	N ✗	Y	N	Y	Y	Y	Y

1 Point Proctor Data

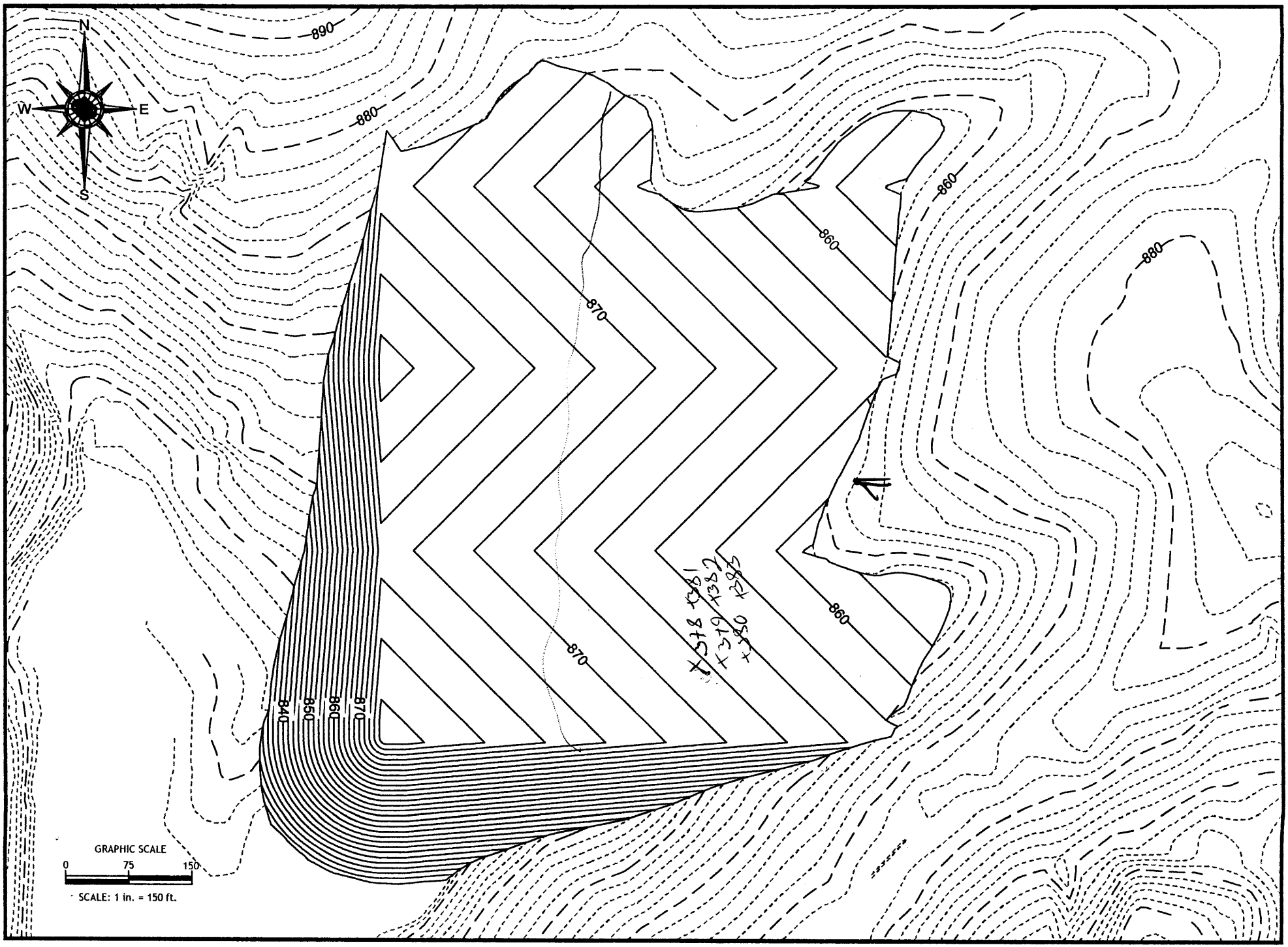
Wt. Wet Soil & Mold	11.92
Wt. Mold	9.50
Wt. Wet soil	2.62
Volume Mold	0.0331
Wet Density	79.2
Wt. Wet soil & Pan	403.1
Wt. Dry soil & Pan	367
Wt. Pan	186
Moisture Lost	36.1
Wt. Dry soil	181
% Moisture	19.9 ✓
Dry Density	66.1 ✓

Additional Project Data

6t at 24.0 BAS 7

Elis Rojas
Printed Name

Signature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SCALE: 1 in. = 150 ft.

5-12-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 5-13-10
Inspection of: Fill New Pond Fill	**Technician:** Eli's Pegas	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield on site to observe Fill Fly Ash at New Pond Fill Marshall Steam Station.
Shield performed 6 Drive Tubes 1 one point.
All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Eli's Pegas
Printed Name

Signature

f:\doc\forms\daily report.doc

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name:		**Task No.:**	**Date:** 5-13-10
Inspection of: Fill Fly Ash New Landfill		**Technician:** Elis Pepas	

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Drive Tube\Nuclear Density Data

Test No.	384	385	386	387	388	389		
Grade or Elevation	856							
Location								
Wt. Wet Soil & Mold	4.10	4.09	4.11	4.12	4.13	4.09		
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34		
Wt. Wet soil	2.78	2.76	2.77	2.78	2.79	2.75		
Volume Mold	0.032							
Wet Density	83.7	83.1	83.4	83.7	84	82.8		
Wt. Wet soil & Pan	461.9	460.5	409.7	505.4	465.9	466		
Wt. Dry soil & Pan	411.5	413.9	359.6	471.1	420.1	420.3		
Wt. Pan	231.6	235.3	186.3	353.3	231.6	235.3		
Moisture Lost	50.4	46.6	43.1	34.3	45.8	45.7		
Wt. Dry soil	179.9	178.6	173.3	117.8	188.5	185		
% Moisture	28	26.1	24.9	29.1	24.3	24.7		
Dry Density	65.4	65.9	66.8	64.8	67.6	66.4		
Maximum Dry Density	67							
Optimum Moisture	24							
% Compaction	97.6	98.4	97.7	96.7	100.9	99.1		
Meets Criteria (Y\N)								

1 Point Proctor Data

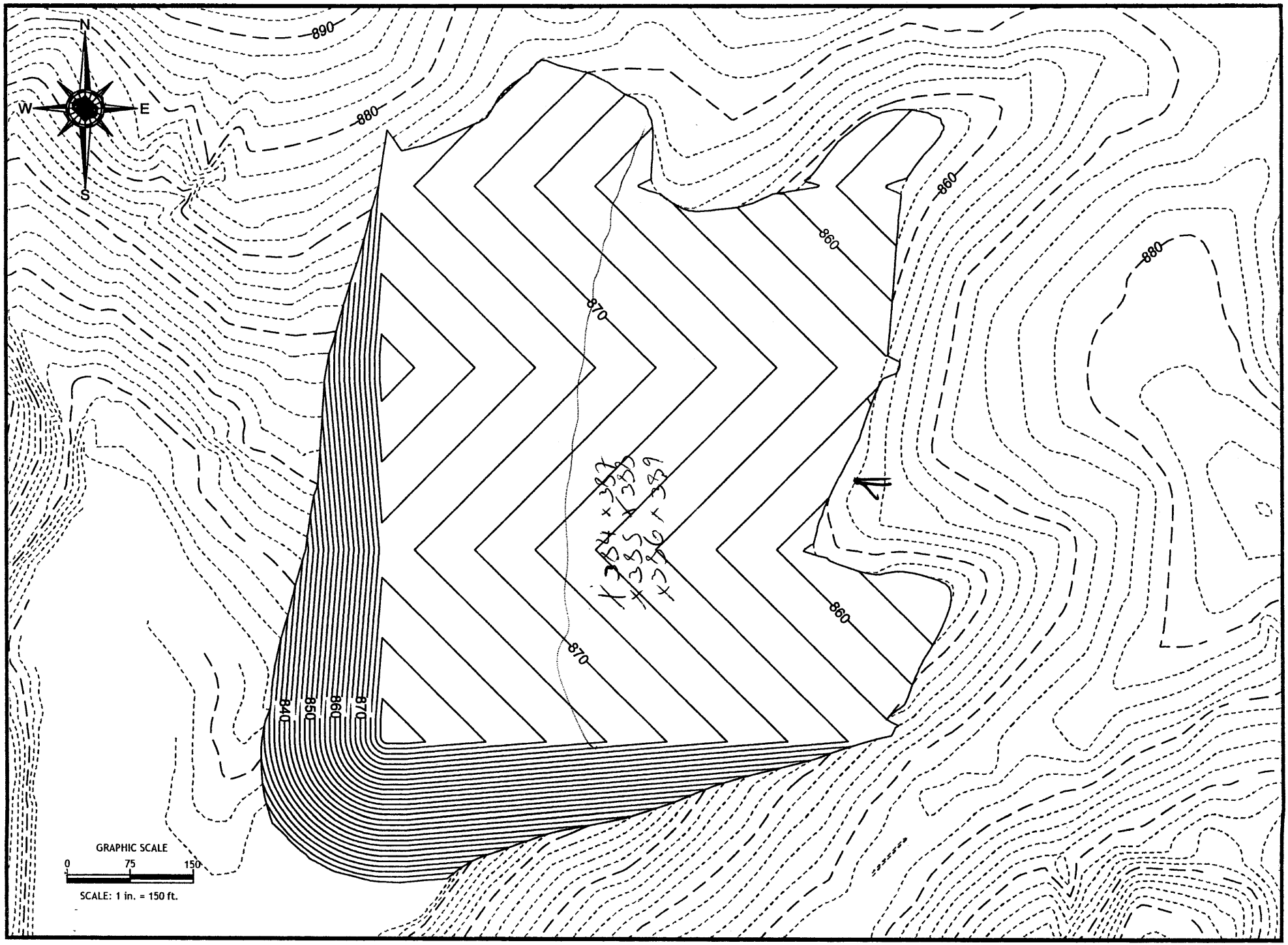
Wt. Wet Soil & Mold	12.35
Wt. Mold	9.30
Wt. Wet soil	3.05
Volume Mold	0.0331
Wet Density	92.1
Wt. Wet soil & Pan	401.9
Wt. Dry soil & Pan	362.9
Wt. Pan	186.3
Moisture Lost	39
Wt. Dry soil	166.6
% Moisture	23.4
Dry Density	71.2

Additional Project Data

67 of 24 BAS-7

Elis Pepas
Printed Name

Signature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SCALE: 1 in. = 150 ft.

5-13-16

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Marshall	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 5-18-10
Inspection of: Fill Fly Ash Lewisville Fill	**Technician:** Elis Rojas	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield on site to observed fill Fly Ash at Lewisville Fill Marshall Steam Station.
Shield monitored 6 drived Tubes. 1 one point.

Teri A.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name:		**Task No.:**	**Date:** 5-18-10
Inspection of: Fly Ash New Landfill		**Technician:** Eric Rogers	

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Drive Tube\Nuclear Density Data

Test No.	390	391	392	393	394	395
Grade or Elevation	856					
Location						
Wt. Wet Soil & Mold	4.36	4.32	4.31	4.38	4.51	4.38
Wt. Mold	1.32	1.33	1.34	1.34	1.54	1.34
Wt. Wet soil	3.04	2.97	2.97	3.04	2.97	3.04
Volume Mold	0.0332					
Wet Density	91.6	90	89.5	91.6	89.5 ~~2.97~~	91.6
Wt. Wet soil & Pan	463.8	459.4	402.5	505.4	461.5	460.7
Wt. Dry soil & Pan	404.7	399.3	347.1	464.2	404.1	401.3
Wt. Pan	230.9	234.7	186.1	351.1	230.9	234.7
Moisture Lost	59.1	60.1	55.4	41.2	57.4	59.4
Wt. Dry soil	173.8	164.6	161	113.1	173.2	166.6
% Moisture	34	36.5	34.4	36.4	33.1	35.7
Dry Density	68.4	65.7	66.6	67.2	67.2	67.5
Maximum Dry Density	67.9					
Optimum Moisture	28.5					
% Compaction	100.7	97.1	98.1	99	99	99.4
Meets Criteria (Y\N)						

1 Point Proctor Data

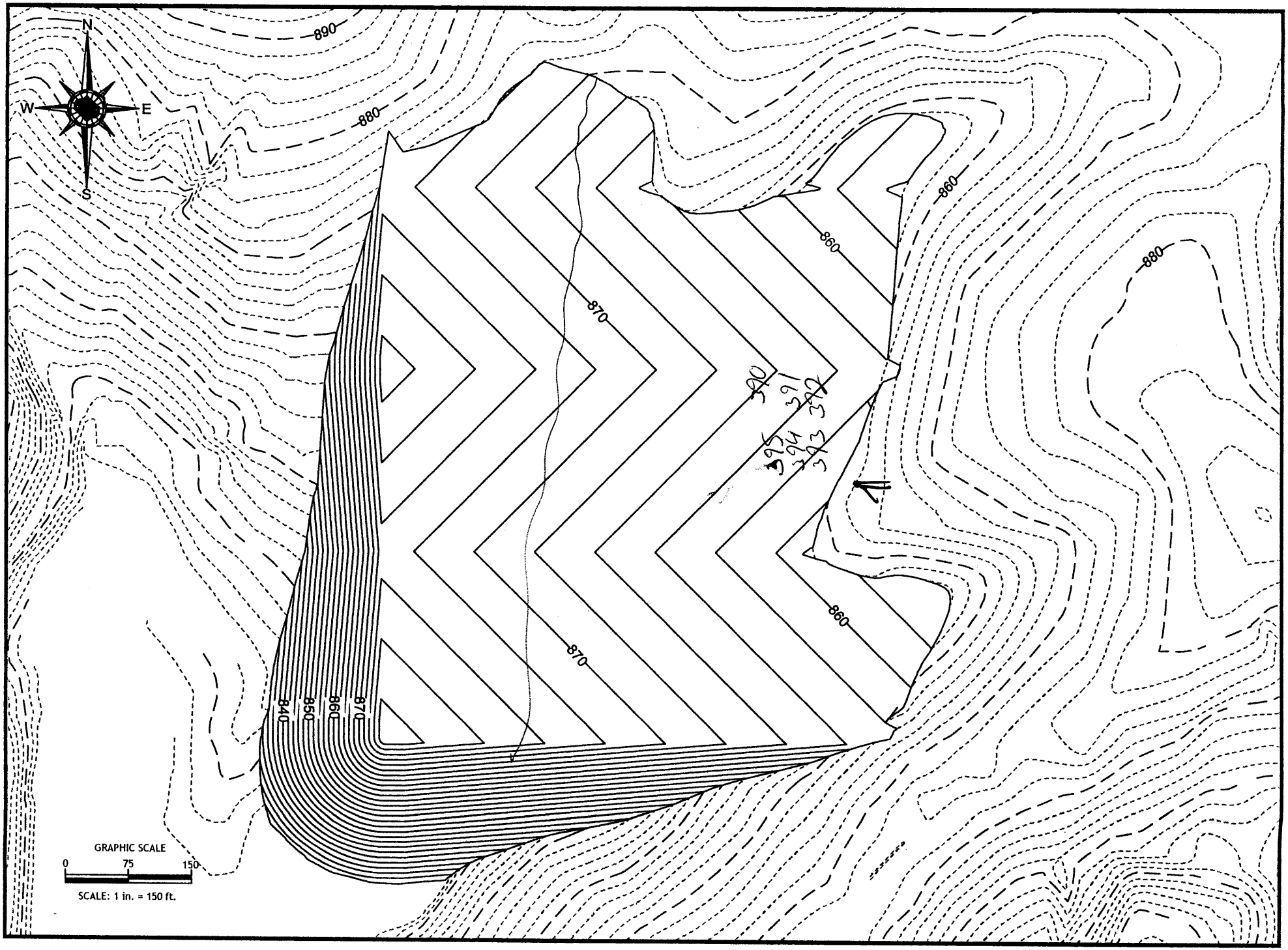
Wt. Wet Soil & Mold	12.48
Wt. Mold	9.30
Wt. Wet soil	3.18
Volume Mold	0.0331
Wet Density	96.1
Wt. Wet soil & Pan	402.3
Wt. Dry soil & Pan	344.2
Wt. Pan	186.1
Moisture Lost	58.1
Wt. Dry soil	158.1
% Moisture	36.7
Dry Density	70.3

Additional Project Data

67.9 at 28.5 BAS-12

Eric Rogers
Printed Name

Signature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SCALE: 1 in. = 150 ft.

6-18-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 5-19-10
Inspection of: FILL FLY ASH NEW LANDFILL	**Technician:** ELIS ROJAS	

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Shield on site to observed fill fly ash at new lined fill MARSHALL Steam Station.
Shield performed 6 drive Tubes one onpoint.
Test # 399 Failed
All numbers meet criteria.
except DT 397 @ 94.5%

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS ROJAS
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MA[redacted]LL		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 5-19-10
Inspection of: Fill Newly Laid Fill		**Technician:** Elis Rojas	

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Drive Tube\Nuclear Density Data

							Re-Test
Test No.	396	397	398	399	400	401	399
Grade or Elevation	856						
Location							
Wt. Wet Soil & Mold	4.16	4.14	4.27	4.11	4.18	4.20	4.20
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34	1.34
Wt. Wet soil	2.84	2.81	2.93	2.77	2.84	2.86	2.86
Volume Mold	0.0332						
Wet Density	85.5	84.6	88.3	83.4	85.5	86.1	86.1
Wt. Wet soil & Pan	464.3	461.1	401.3	504.5	462.3	460.5	463.4
Wt. Dry soil & Pan	407.9	403.2	349.9	465.2	409.1	410.2	411.1
Wt. Pan	230.9	234.7	186.1	351.1	230.9	234.7	230.9
Moisture Lost	56.4	57.9	50.4	39.3	53.2	50.3	52.3
Wt. Dry soil	177	168.5	163.8	114.1	178.2	175.5	180.2
% Moisture	31.9	34.4	30.8	34.4	29.9	28.7	29
Dry Density	64.8	62.9	67.5	62.1	65.8	66.9	66.7
Maximum Dry Density	66.6						
Optimum Moisture	30.2						
% Compaction	97.3	94.4	101.4	93.2	98.8	100.5	100.2
Meets Criteria (Y\N)							

1 Point Proctor Data

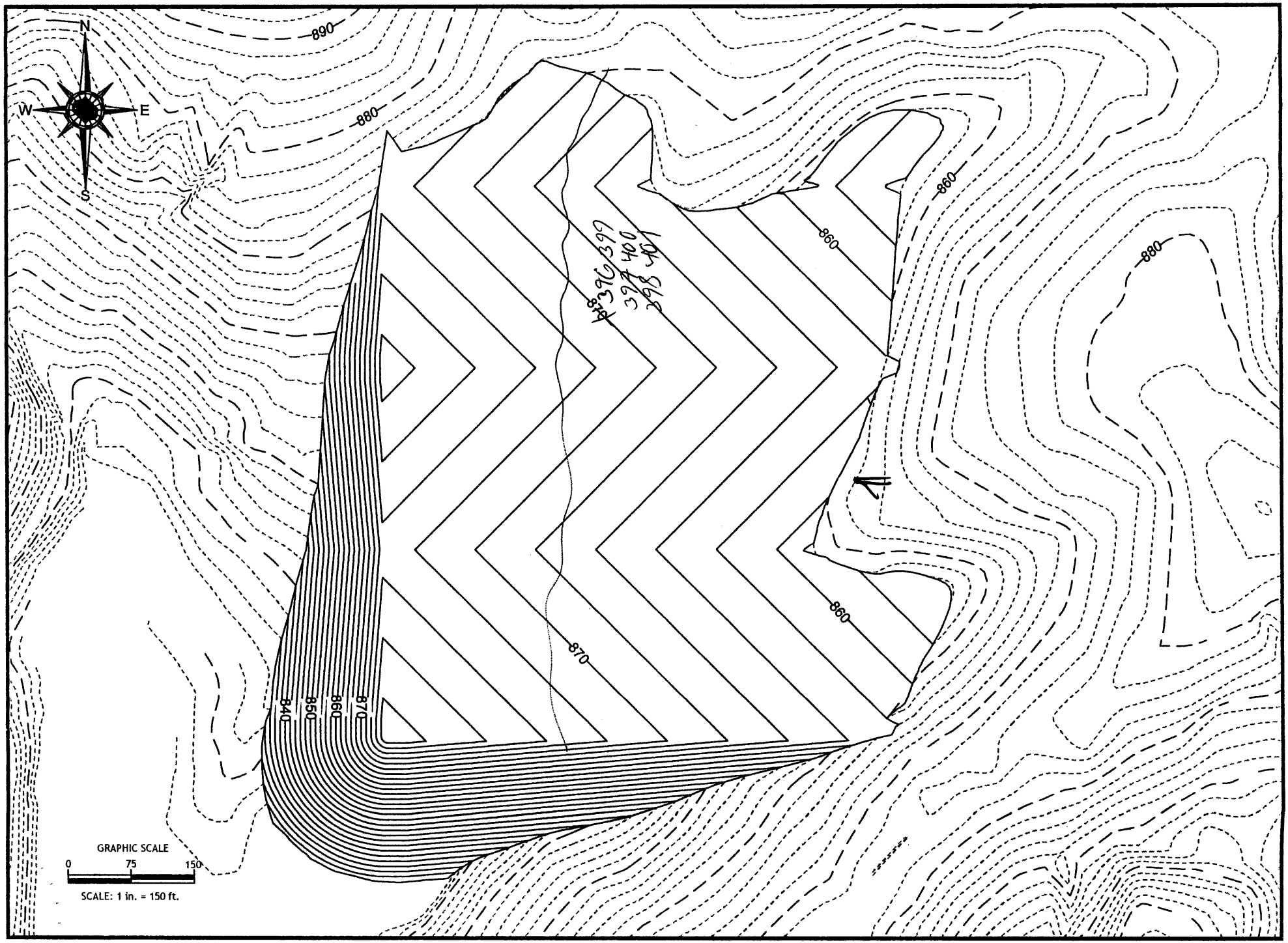
Wt. Wet Soil & Mold	12.41	
Wt. Mold	9.30	
Wt. Wet soil	3.11	
Volume Mold	0.0331	
Wet Density	94	
Wt. Wet soil & Pan	400	
Wt. Dry soil & Pan	346.2	
Wt. Pan	186.1 ~~12.41~~	
Moisture Lost	53.8	
Wt. Dry soil	160.1	
% Moisture	33.6	
Dry Density	70.4	

Additional Project Data

66.6 at 30.2 BAS-21

Elis Rojas
Printed Name

Signature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SCALE: 1 in. = 150 ft.

5-19-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 5-21-10
Inspection of: Fill Fly Ash New Landfill	**Technician:** Eli's Pogos	

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Shield on site to observed fill fly ash at new landfill Marshall Steam Station.

Shield performed 6 drive tubes and 1 one point.

All Test meets criteria.

New fly ash grading was not working.

Proctor was delivery the lab

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Eli's Pogos
Printed Name

Signature

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Mar Shall		**Shield No.:**	**Client No.:**
Client Name: Duke Power		**Task No.:**	**Date:** 5-21-10
Inspection of: Fill Fly Ash New/Sand/Fill		**Technician:** Elvis Rojas	

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Drive Tube\Nuclear Density Data

Test No.	402	403	404	405	406	407
Grade or Elevation	256					
Location						
Wt. Wet Soil & Mold	4.29	4.32	4.35	4.27	4.37	4.30
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34
Wt. Wet soil	2.97	2.99	3.01	2.93	3.03	2.96
Volume Mold	0.0332					
Wet Density	89.5	90.1	90.7	88.3	91.3	89.2
Wt. Wet soil & Pan	432.0	429.9	381.3	411	454.6	455.1
Wt. Dry soil & Pan	384.1	383.6	332.5	459.9	399.9	400.1
Wt. Pan	232.1	235.3	186.6	351.2	232.1	235.3
Moisture Lost	47.9	46.3	47.8	38.1	54.7	55
Wt. Dry soil	152	148.3	145.9	108.7	167.8	164.8
% Moisture	31.5 ✓	31.2 ✓	32.8 ✓	35.1 ✓	32.6 ✓	33.4 ✓
Dry Density	68.1 ✓	68.7 ✓	68.3 ✓	65.4 ✓	68.9 ✓	66.9 ✓
Maximum Dry Density	67.9					
Optimum Moisture	28.5					
% Compaction	100.3	101.2	100.6	96.3	101.4	98.5
Meets Criteria (Y\N)						

1 Point Proctor Data

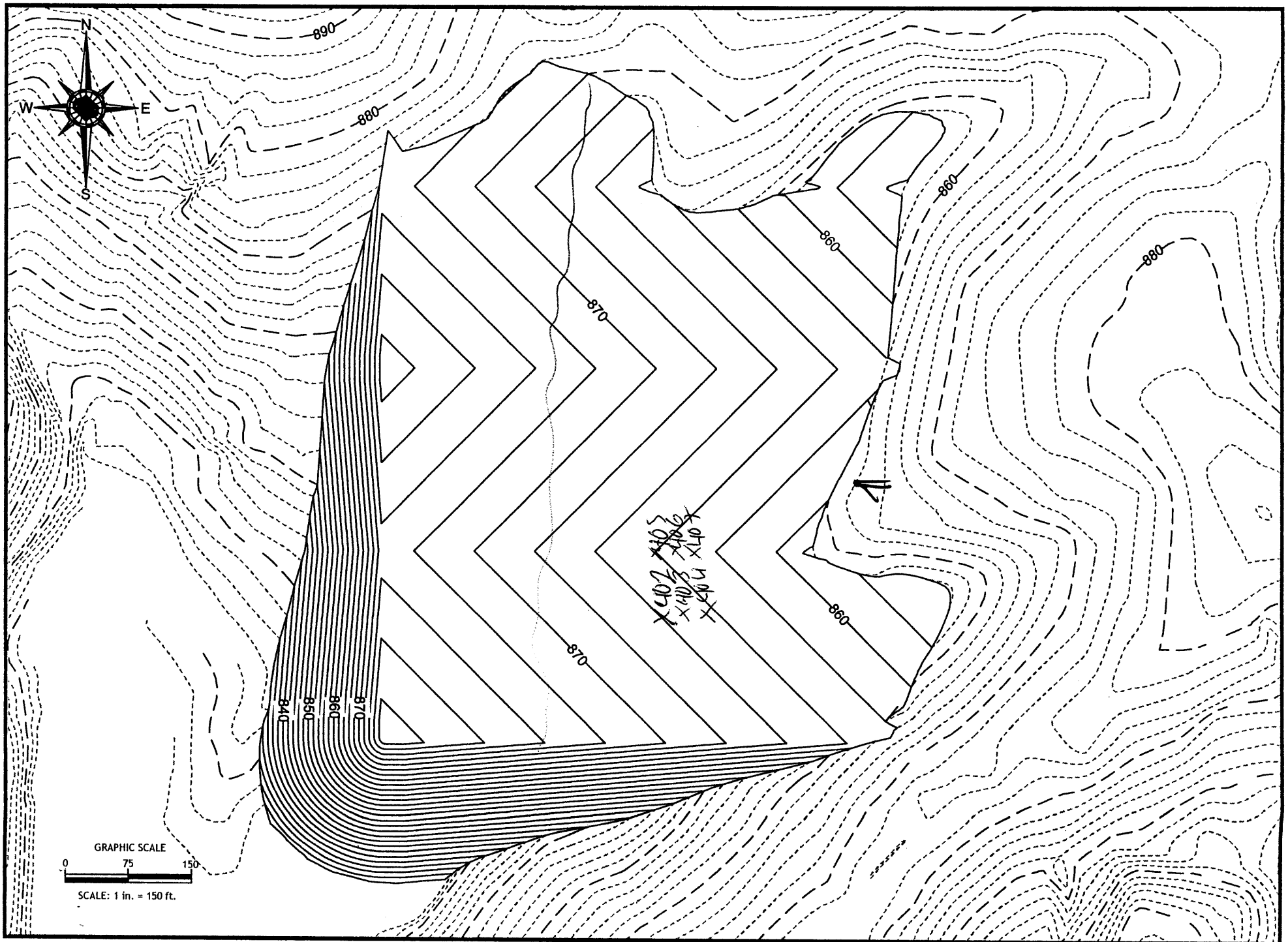
Wt. Wet Soil & Mold	12.32	
Wt. Mold	9.30	
Wt. Wet soil	3.02	
Volume Mold	0.0331	
Wet Density	91.2	
Wt. Wet soil & Pan	366.2	
Wt. Dry soil & Pan	321.6	
Wt. Pan	~~186.6~~	186.6
Moisture Lost	44.6	
Wt. Dry soil	135	
% Moisture	30.1 ✓	
Dry Density	70.1 ✓	

Additional Project Data

67.9 at 28.5 LAS-12

Elvis Rojas
Printed Name

Signature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SCALE: 1 in. = 150 ft.

5-21-10

Shield Engineering, Inc.
4301 Taggart Creek Rd, Charlotte NC 28208
Telephone 704-394-6913 Fax 704-394-6968

DAILY REPORT

Project Name: MARSHALL STEAM STATION **Client's Name: DUKE ENERGY** **Observation of: Ash Landfill Density**	**Contractor:** **SHIELD Job No. 1002083-01** **Rev: 0 Date: 5-25-10 Tue**

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form unless the signature of the certifying engineer is attached below. Interpretations based on this data are the responsibility of others.

Onsite: 10:00am **Off Site: 2:55 pm**

Weather: Mostly Overcast, Mild, Light Breeze, 70^0-73^0
Personnel on site: Richard A. Meerholz, Technician

Called Carlton Allred, Duke Energy, before departing to site. Notified him that Elis Rojas is on vacation this week and that I would be on site this week starting today. He said two units just came back on line today after being down for a few days. No ash was placed the last few days.

Upon arrival on the pad no ash was being placed. A small stockpile of ash was located on the northwest area of the pad. A large crew and earthmoving equipment was working to the north of the current pad.

Test site was established and elevation obtained from a civil marker on the southeast edge of the pad in the trees, elev. 857.60.

Six drive tubes and a 1-point field proctor was processed. By observation the pad was compacted using the trackdozer and trucks. No evidence of a drum roller.

CONTACT INFORMATION:

Duke Energy: Carlton Allred @ cell # 704.622.0907

Testing Conducted: Drive tubes and a 1-point field proctor.
Equipment Used: Drive tubes and hammer, proctor mold, propane stove and accessories.
Attachments: Data sheet and mapm
Reviewed by: Janette Prosser
Position: Senior Project Engineer
Company: Shield Engineering, Inc.
Report by: Richard A. Meerholz

SHIELD ENGINEERING, INC.
Shield Engineering, Inc.
4301 Taggart Creek Rd, Charlotte NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project name: Marshall Steam Station	Shield No: 1002083-03	Client No:
Client Name: Duke Energy	Task No: 0002	Date: 5-25-10 Tue
Inspection of: Ash Landfill Density	Technician: Richard A. Meerholz	

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THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

Drive Tube\Nuclear Density Data								
Test No.	DT-408	DT-409	DT-410	DT-411	DT-412	DT-413		
Grade or Elevation (ft)	858	858	858	858	858	858		
Location	southwest section	southwest section	southwest section	southwest section	southwest section	southwest section		
Wt. Wet Soil & Mold	4.14	3.90	3.90	4.12	4.02	4.12		
Wt. Mold	1.34	1.28	1.26	1.34	1.32	1.34		
Wt. Wet Soil	2.80	2.62	2.64	2.78	2.70	2.78		
Volume of Mold	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333		
Wet Density	84.1	78.7	79.3	83.5	81.1	83.5		
Wt. Wet Soil & Pan	454.5	394.0	408.4	429.6	408.5	422.6		
Wt. Dry Soil & Pan	410.5	365.0	377.4	396.1	378.2	392.6		
Wt. Pan	261.0	256.9	257.2	261.0	258.4	262.9		
Moisture Lost	44.0	29.0	31.0	33.5	30.3	30.0		
Wt. Dry Soil	149.4	108.1	120.2	135.1	119.8	129.7		
% Moisture	29.5	26.8	25.8	24.8	25.3	23.1		
Dry Density	65.0	62.0	63.0	66.9	64.7	67.8		
Maximum Dry Density	67.9	61.5	61.5	67.9	67.9	67.9		
Optimum Moisture	28.5	26.0	26.0	28.5	28.5	28.5		
% Compaction	95.7	100.9	102.5	98.5	95.3	99.9		
Meets Criteria (Y\N)	Y	Y	Y	Y	Y	Y		

1-Point Proctor Data		
Wt. Wet Soil & Mold	12.12	
Wt. Mold	9.28	
Wt. Wet Soil	2.84	
Volume of Mold	0.0332	
Wet Density	85.5	
Wt. Wet Soil & Pan	437.8	
Wt. Dry Soil & Pan	398.0	
Wt. Pan	261.1	
Moisture Lost	39.8	
Wt. Dry Soil	136.9	
% Moisture	29.1	
Dry Density	66.3	

Additional Project Data

Proctor 1, at test DT-408

BAS-7 67.9 pcf @ 28.5 %mc

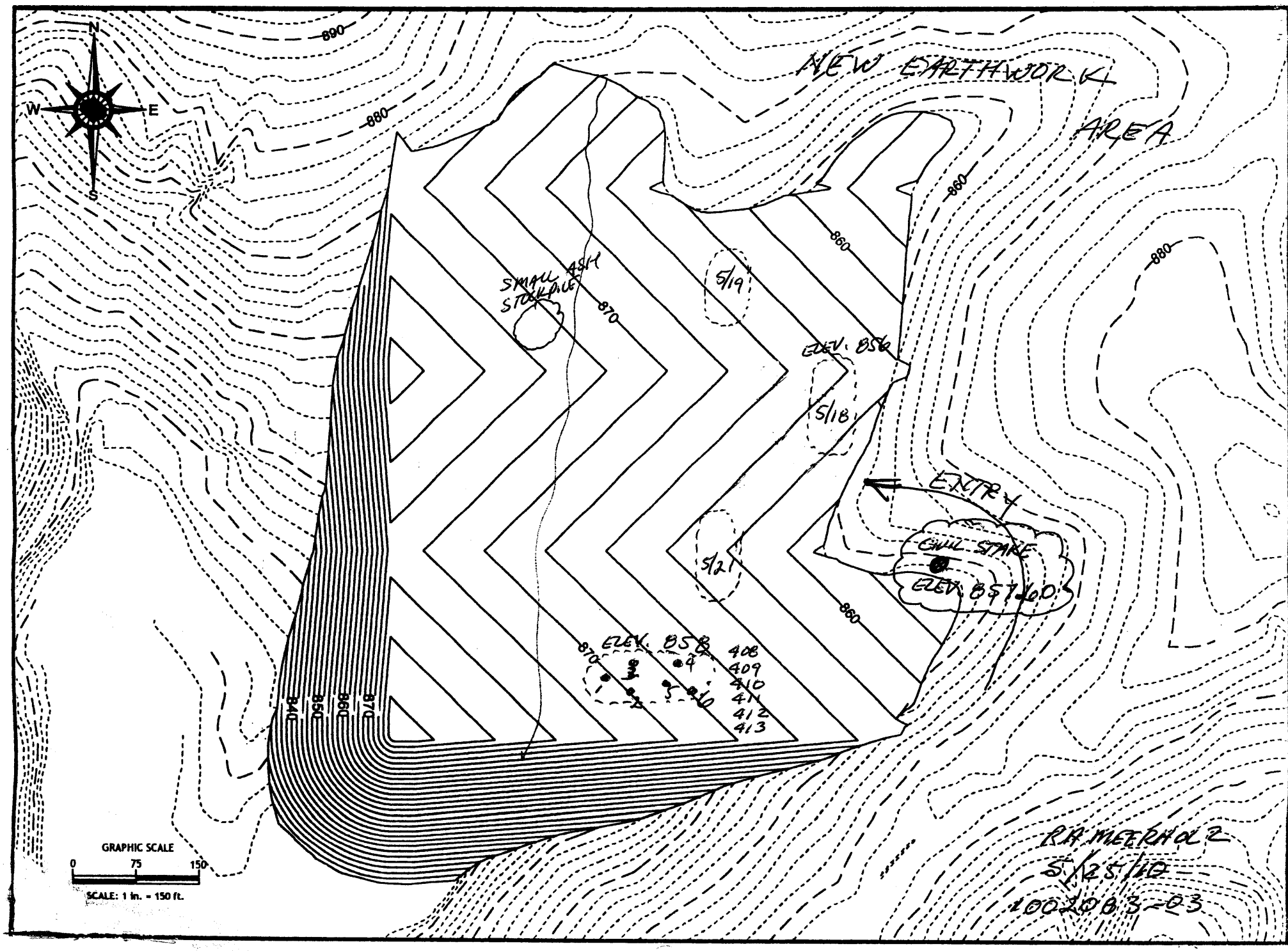
BAS-1 61.5 pcf @ 26 %mc

Printed Name	Signature
Richard A. Meerholz	Richard A. Meerholz

JMP

proctor 1

DT_1PT Data Sheet Generic.xls 11/28/09 Rev 0, ram


NEW EARTHWORK AREA
N
W
E
S
890
880
870
860
840
850
860
870
SMALL ASH STOCKPILE
5/19
ELEV. 856
5/18
5/21
ENTRY
GULL STAKE
ELEV. 857.00
ELEV. 858
408
409
410
411
412
413
GRAPHIC SCALE
0
75
150
SCALE: 1 in. = 150 ft.
RA MEERHOLZ
5/25/10
100203-03

Shield Engineering, Inc.
4301 Taggart Creek Rd, Charlotte NC 28208
Telephone 704-394-6913 Fax 704-394-6968

DAILY REPORT

Project Name: MARSHALL STEAM STATION
Client's Name: DUKE ENERGY
Observation of: Ash Landfill Density

Contractor:
SHIELD Job No. 1002083-01
Rev: 0 Date: 5-27-10 Thu

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Onsite: 11:15am **Off Site: 4:30 pm**

Weather: Mostly Sunny, Light Breeze, 79^0-88^0
Personnel on site: Richard A. Meerholz, Technician

Shield arrived on the pad at about 11:25. Trackdozer was placing ash along an east-west line on the south side of the pad. Established a test area and obtained 6 drive tubes and a bucket sample for a 1-point.

A new cell was observed on the north and east of the current pad. Earthwork in progress.

Moved to the northeast corner to setup equipment. Water truck on pad watering the area behind the placement line (see sketch).

Six drive tubes and a 1-point field proctor was processed. By observation the pad was compacted using the trackdozer and the water truck. No evidence of a drum roller. Drive tubes were obtained before the water truck arrived. Three of the drive tubes failed for various reasons. Three retests were done from the same locations as the failed tests. Retests were good.

Hosed off truck at the gypsum scale house on the way out.

CONTACT INFORMATION:

Duke Energy: Carlton Allred @ cell # 704.622.0907

Testing Conducted: Drive tubes and a 1-point field proctor.
Equipment Used: Drive tubes and hammer, proctor mold, propane stove and accessories.
Attachments: Data sheet and mapm
Reviewed by: Janette Prosser
Position: Senior Project Engineer
Company: Shield Engineering, Inc.
Report by: Richard A. Meerholz

SHIELD ENGINEERING, INC.
Shield Engineering, Inc.
4301 Taggart Creek Rd, Charlotte NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project name: Marshall Steam Station	**Shield No: 1002083-03**	**Client No:**
Client Name: Duke Energy	**Task No: 0002**	**Date: 5-27-10 Thu**
Inspection of: Ash Landfill Density	**Technician: Richard A. Meerholz**	

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Drive Tube\Nuclear Density Data									
		Retests of DT-416, 418 & 419 on sheet 2							
	Test No.	DT-414	DT-415	DT-416	DT-417	DT-418	DT-419		
	Grade or Elevation (ft)	859	859	859	859	859	859		
	Location	North Middle Section	North Middle Section	North Middle Section	North Middle Section	North Middle Section	North Middle Section		
	Wt. Wet Soil & Mold	4.06	4.04	3.82	3.94	3.84	3.94		
	Wt. Mold	1.34	1.34	1.34	1.26	1.28	1.32		
	Wt. Wet Soil	2.72	2.70	2.48	2.68	2.56	2.62		
	Volume of Mold	0.0333	0.0333	0.0333	0.0333	0.0333	0.0333		
	Wet Density	81.7	81.1	74.5	80.5	76.9	78.7		
	Wt. Wet Soil & Pan	410.8	408.1	417.6	415.2	419.7	405.1		
	Wt. Dry Soil & Pan	385.2	381.5	391.1	384.1	376.0	391.9		
	Wt. Pan	261.0	256.9	257.2	260.1	263.2	258.4		
	Moisture Lost	25.6	26.6	26.5	31.1	43.7	13.2		
	Wt. Dry Soil	124.2	124.6	133.9	124.0	112.8	133.5		
	% Moisture	20.6	21.3	19.8	25.1	38.7	9.9		
	Dry Density	67.7	66.8	62.2	64.3	55.4	71.6		
	Maximum Dry Density	67.0	67.0	67.0	67.0				
	Optimum Moisture	24.0	24.0	24.0	24.0				
	% Compaction	101.1	99.7	92.8	96.0				
	Meets Criteria (Y\N)	Y	Y	N	Y	N	N		

Due to low moisture

1-Point Proctor Data		
	Wt. Wet Soil & Mold	11.96
	Wt. Mold	9.28
	Wt. Wet Soil	2.68
	Volume of Mold	0.0332
	Wet Density	80.7
	Wt. Wet Soil & Pan	436.3
	Wt. Dry Soil & Pan	405.9
	Wt. Pan	261.1
	Moisture Lost	30.4
	Wt. Dry Soil	144.8
	% Moisture	21.0
	Dry Density	66.7

proctor 1

Additional Project Data

Proctor 1, at test *DT-414*

BAS-7 67.0 pcf @ 24.0 %mc

BAS-1 61.5 pcf @ 26 %mc

Richard A. Meerholz	*Richard A. Meerholz*
Printed Name	**Signature**

JMP

SHIELD ENGINEERING, INC.
Shield Engineering, Inc.
4301 Taggart Creek Rd, Charlotte NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project name: Marshall Steam Station	**Shield No: 1002083-03**	**Client No:**
Client Name: Duke Energy	**Task No: 0002**	**Date: 5-27-10 Thu**
Inspection of: Ash Landfill Density	**Technician: Richard A. Meerholz**	

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Drive Tube\Nuclear Density Data									
Test No.	DT-418R	DT-416R	DT-419R						
Grade or Elevation (ft)	859	859	859						
Location	North Middle Section	North Middle Section	North Middle Section						
Wt. Wet Soil & Mold	3.98	3.94	3.90						
Wt. Mold	1.28	1.34	1.26						
Wt. Wet Soil	2.70	2.60	2.64						
Volume of Mold	0.0333	0.0333	0.0333						
Wet Density	81.1	78.1	79.3						
Wt. Wet Soil & Pan	442.2	405.0	430.7						
Wt. Dry Soil & Pan	404.7	381.1	394.7						
Wt. Pan	261.0	260.2	257.2						
Moisture Lost	37.5	23.9	36.0						
Wt. Dry Soil	143.7 ~~149.4~~	120.9	137.5						
% Moisture	26.1 ~~25.1~~	19.8	26.2						
Dry Density	64.3 ~~64.8~~	65.2	62.8						
Maximum Dry Density	67.0	67.0	61.5						
Optimum Moisture	24.0	24.0	26.0						
% Compaction	96.0 ~~96.7~~	97.3	102.2						
Meets Criteria (Y\N)	Y	Y	Y						

1-Point Proctor Data		
Wt. Wet Soil & Mold		
Wt. Mold		
Wt. Wet Soil		
Volume of Mold		
Wet Density		
Wt. Wet Soil & Pan		
Wt. Dry Soil & Pan		
Wt. Pan		
Moisture Lost		
Wt. Dry Soil		
% Moisture		
Dry Density		

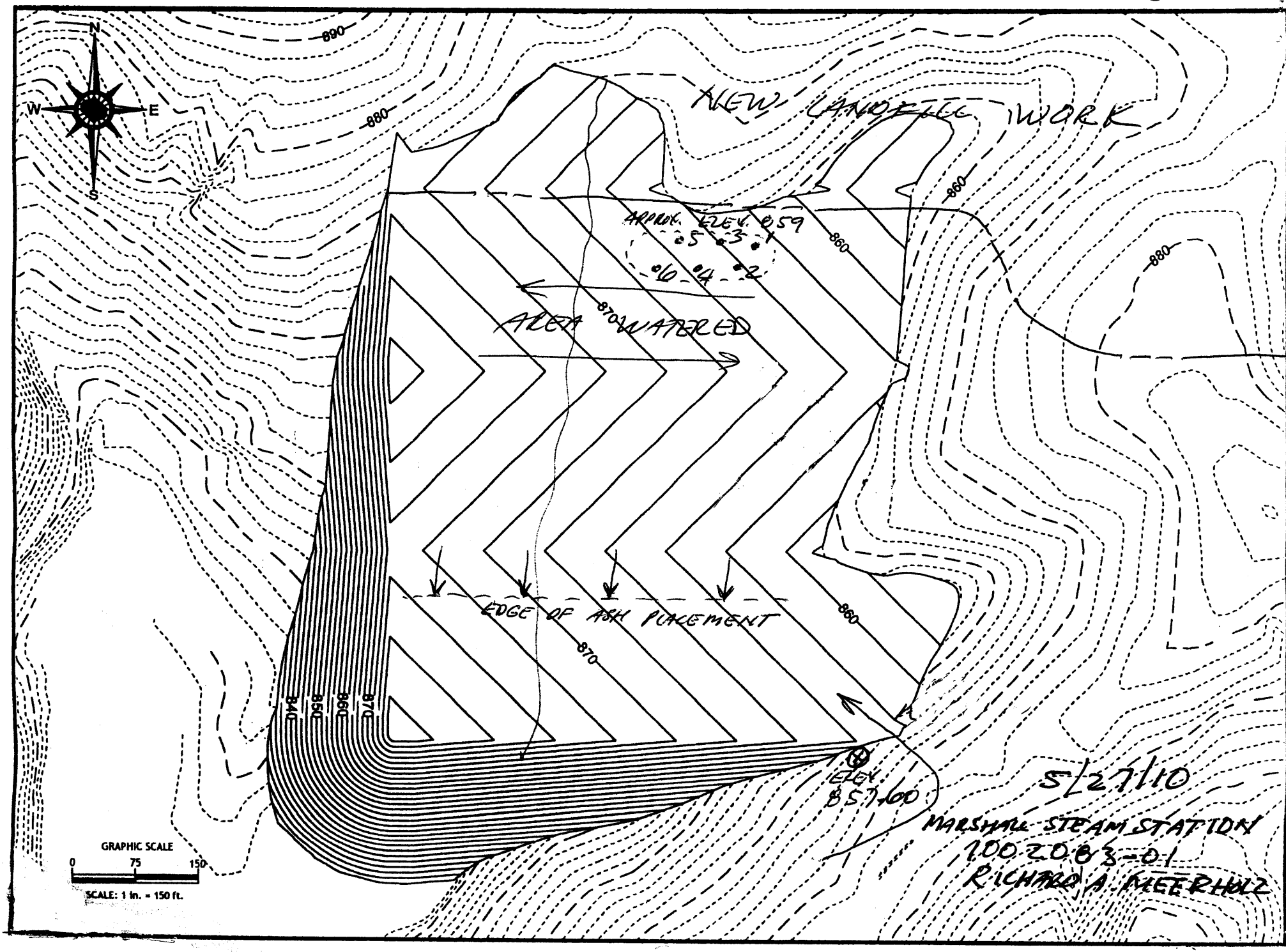
Additional Project Data

Proctor 1, at test DT-414

BAS-7 67.0 pcf @ 24.0 %mc

BAS-1 61.5 pcf @ 26 %mc

Richard A. Meerholz	*Richard A. Meerholz*
Printed Name	**Signature**


N
W
E
S
890
880
860
870
840
850
860
870
NEW LANDFILL WORK
APPROX. ELEV. 859
5 3 1
6 4 2
AREA WATERED
EDGE OF ASH PLACEMENT
ELEV. 857.60
GRAPHIC SCALE
0 75 150
SCALE: 1 in. = 150 ft.
5/27/10
MARSHALL STEAM STATION
100203-01
RICHARD A. KEERHOLZ

LABORATORY CONFORMANCE TEST RESULTS

BAS-36

MOISTURE-DENSITY RELATIONSHIP

SAMPLE NO.: **10-083**
SOURCE MATERIAL: **BAS-36 0.0 feet**
SAMPLE DESCRIPTION: Grey Fly Ash (visual)

USCS: ML AASHTO:

TEST RESULTS:
TEST METHOD: ASTM D698 Method A
MAXIMUM DRY DENSITY (pcf): 75.0
OPTIMUM MOISTURE CONTENT, (%): 31.8
NATURAL MOISTURE CONTENT, (%): 28.6

PLUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 0.0
BULK SPECIFIC GRAVITY: N/A
OPTIMUM MOISTURE CONTENT, (%): N/A

MINUS NO. 4 MATERIAL:
PERCENT IN SAMPLE: 100.0
CORRECTED MAXIUMUM DRY DENSITY, (pcf): N/A
CORRECTED OPTIMUM MOISTURE CONTENT, (%): N/A

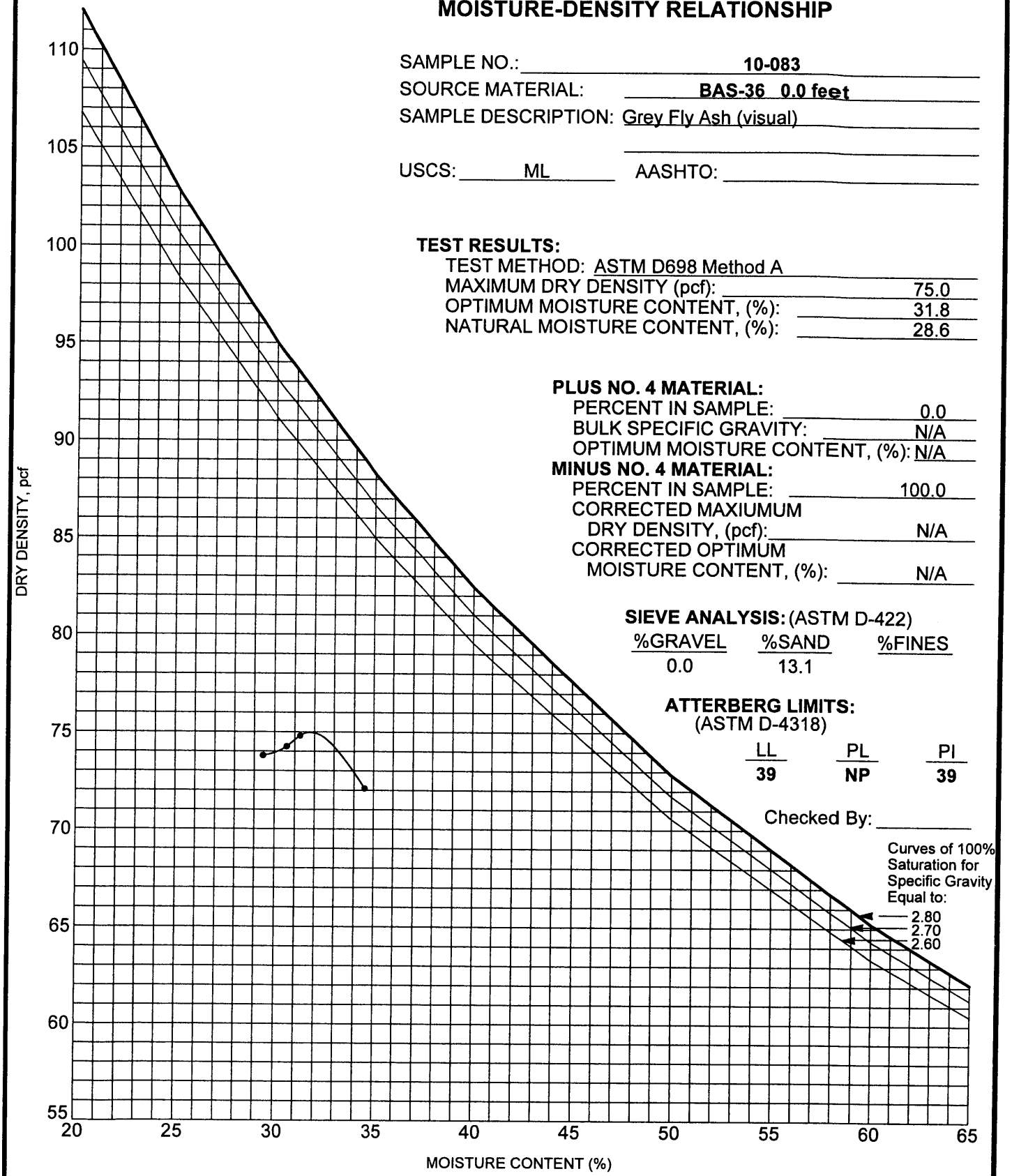
SIEVE ANALYSIS: (ASTM D-422)

%GRAVEL	%SAND	%FINES
0.0	13.1	

ATTERBERG LIMITS:
(ASTM D-4318)

LL	PL	PI
39	**NP**	**39**

Checked By:



SHIELD ENGINEERING, INC.
4301 Taggart Creek Road
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Toll Free: 800-395-5220
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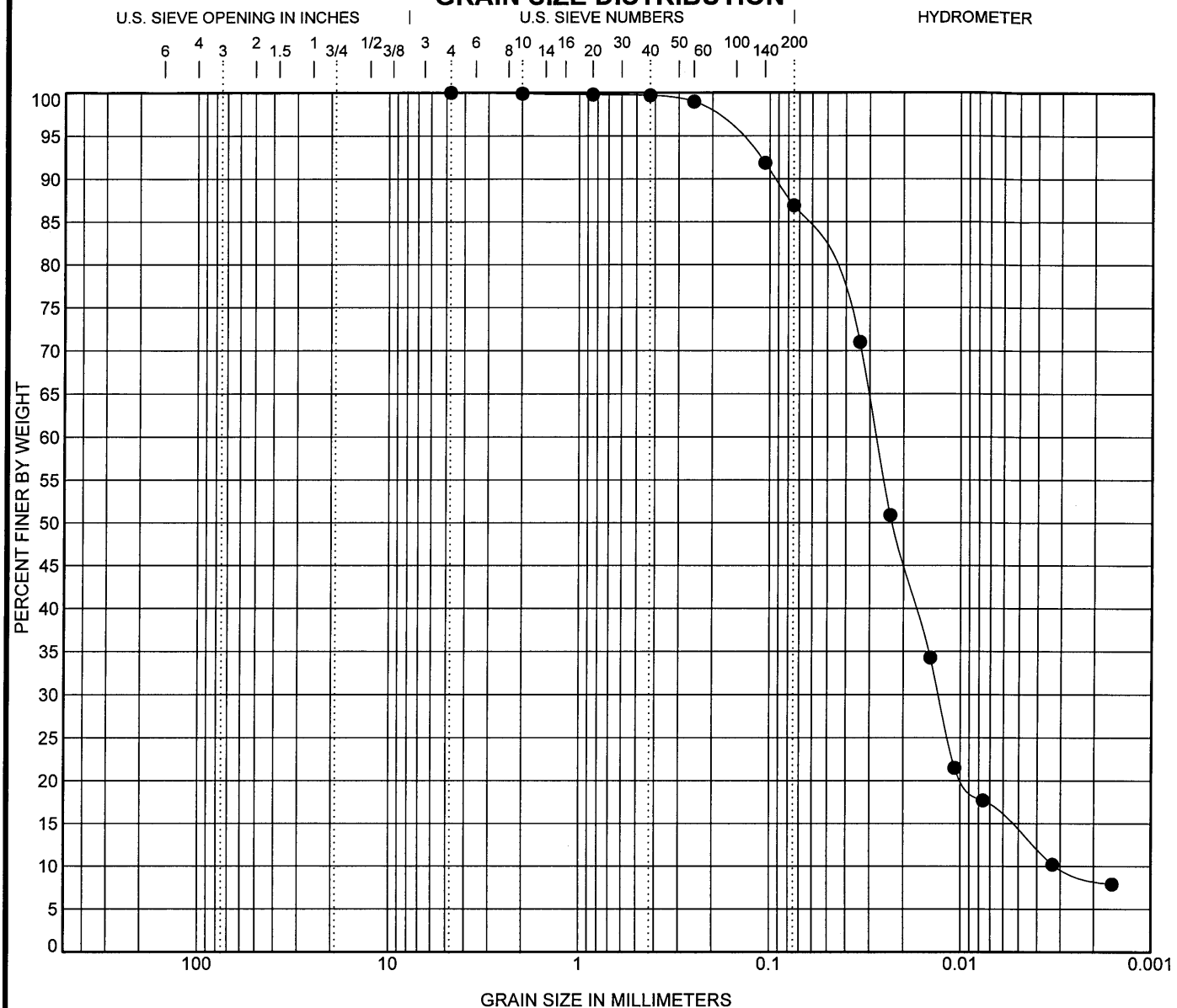
Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	**BAS-36**	**0.0**	**SILT(ML)**	**39**	**NP**	**NP**	**1.98**	**8.92**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BAS-36**	**0.0**	**4.75**	**0.028**	**0.013**	**0.003**	**0.0**	**13.1**	**73.0**	**13.9**

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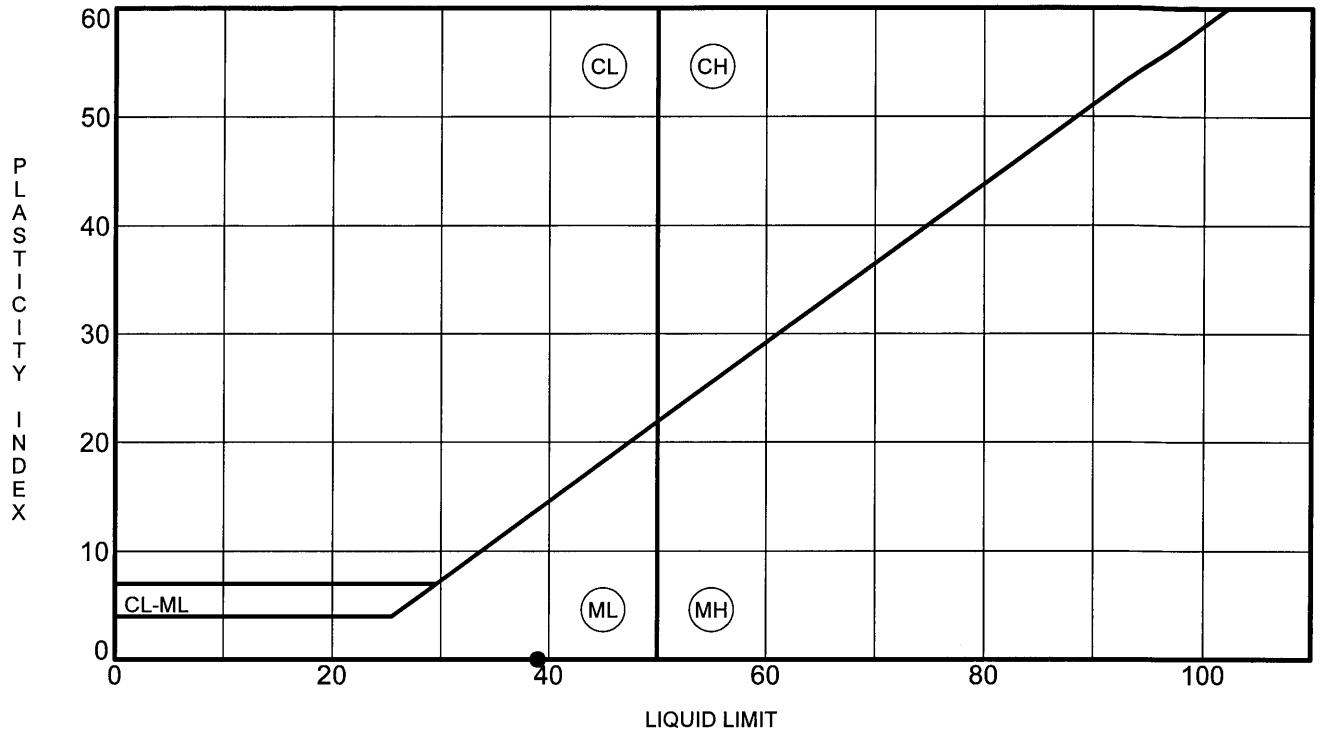
Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**BAS-36**	**0.0**	**39**	**NP**	**NP**	**87**	**SILT(ML)**

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Marshall Steam Station
(DUKE)
Catawba, North Carolina
Shield Project No.: 1002083-03

SHIELD ENGINEERING, INC.

July 6, 2010

Mr. Carlton Allred
Duke Energy – Marshall Steam
8320 East NC Highway 150
Terrell, North Carolina 28682

RE: Summary Report No. 11 - Month of June 2010
Marshall Steam Station – Industrial Landfill #1
Catawba County, North Carolina
Project Number 1002083-03

Dear Mr. Allred:

As requested, Shield Engineering Inc. has completed the Summary Report for the Marshall Steam Station - Industrial Landfill #1 project for the month of June. As part of this report we have included a summary of Shield's field test results for the ash structural fill material placed within the fill limits made during this period.

We appreciate the opportunity to be of service to Duke Energy. If there are any questions regarding the attached information, please contact one of the undersigned.

Sincerely,
SHIELD ENGINEERING, INC.

Janette M Prosser
Janette M. Prosser, P.E.
Senior Engineer

Keith A. Anthony
Keith A. Anthony, P.E.
Chief Engineer

Attachment

cc: Tim Smart

H:\Projects\2000\1002083-03 Marshall\New Ash Landfill\Documents\1002083-03 Marshall Ash Landfill 2010-06.doc

4301 Taggart Creek Road
Charlotte, NC 28208

www.shieldengineering.com

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SHIELD ENGINEERING, INC.
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Phone 704-394-6913 Fax 704-394-6968

Monthly Summary Report - No. 11

Project Name:	Marshall - Industrial Landfill #1	**Project No.:**	1002083-03
Report Date:	July 6, 2010	**Page:**	1 of 2
Report By:	Janette M. Prosser, P.E.		
Reviewed By:	Keith A. Anthony, P.E.		

This summary provides a response to field and laboratory activities completed, and submission of field and laboratory test results for the month of June.

SUMMARY OF PROJECT ACTIVITIES

Services included field test results for the ash structural fill material placed within the Industrial Landfill #1. Services may also include the collection and testing of laboratory samples for the ash structural fill materials in accordance with the Project Guidelines provided by Duke Energy.

TECHNICAL OBSERVATIONS, COMMENTS AND RECOMMENDATIONS:

Ash Structural Fill Material:

Shield's technician was on-site on June 2, 3, 4, 7, 8, 9, 16, 17, 18, 23 and 29, 2010 to perform field density tests of the ash landfill material. It should be noted that on June 7 and June 16, 2010, the site was not accessible, due to recent rains. Therefore, density testing was not performed on these days. The in-place density tests labeled DT-420 to DT-473 were performed during this period. Based on a review of the field test results, a few of the test results completed during this period were slightly below the required 95 percent compaction requirement, however, these isolated test results (94.4 to 94.7 percent) are not anticipated to affect the structural integrity of the overall fill. See Table 1 for preliminary results and locations.

Laboratory Conformance Test:

1. Laboratory Conformance Testing was not performed during this time period.

Summary:

The compaction results of these samples were in accordance with instructions provided by Duke Energy representatives. Shield will submit a final copy of the field and laboratory data in a Quality Control Report at the conclusion of the project.

SUMMARY OF IN-PLACE DENSITY TEST RESULTS

EXISTING SUBGRADE AND ASH STRUCTURAL FILL

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
FLY ASH														
DT-1	08/18/09	See location plan	6	838.0	53.5	27.3	42.0	61.8	32.3	BAS-22	68.0		X	-5.0
DT-2	08/18/09	See location plan	6	838.0	58.9	22.7	48.0	61.8	32.3	BAS-22	77.7		X	-9.6
DT-3	08/18/09	See location plan	6	838.0	57.1	19.8	47.7	61.8	32.3	BAS-22	77.1		X	-12.5
DT-4	08/18/09	See location plan	6	838.0	57.1	19.5	47.8	61.8	32.3	BAS-22	77.3		X	-12.8
DT-5	08/18/09	See location plan	6	838.0	61.3	26.2	48.6	61.8	32.3	BAS-22	78.6		X	-6.1
DT-6	08/18/09	See location plan	6	838.0	64.3	26.8	50.7	61.8	32.3	BAS-22	82.1		X	-5.5
DT-7	08/21/09	See location plan	6	839.0	61.8	30.2	47.5	61.8	32.3	BAS-22	76.8		X	-2.1
DT-8	08/21/09	See location plan	6	839.0	57.7	31.2	44.0	61.8	32.3	BAS-22	71.2		X	-1.1
DT-9	08/21/09	See location plan	6	839.0	54.7	32.9	41.2	61.8	32.3	BAS-22	66.6		X	0.6
DT-10	08/21/09	See location plan	6	839.0	74.5	26.9	58.7	61.8	32.3	BAS-22	95.0	X		-5.4
DT-11	08/21/09	See location plan	6	839.0	67.3	27.5	52.8	61.8	32.3	BAS-22	85.4		X	-4.8
DT-12	08/21/09	See location plan	6	839.0	60.1	26.3	47.6	61.8	32.3	BAS-22	77.0		X	-6.0
DT-13	08/25/09	See location plan	6	841.5	85.9	15.9	74.1	70.0	32.5	BAS-8	100+	X		-16.6
DT-14	08/25/09	See location plan	6	841.5	86.5	18.9	72.8	70.0	32.5	BAS-8	100+	X		-13.6
DT-15	08/25/09	See location plan	6	841.5	88.9	34.5	66.1	67.9	29.5	BAS-12	97.3	X		5.0
DT-16	08/25/09	See location plan	6	841.5	82.9	28.5	64.5	67.9	29.5	BAS-12	95.0	X		-1.0
DT-17	08/25/09	See location plan	6	841.5	86.5	32.3	65.4	67.9	29.5	BAS-12	96.3	X		2.8
DT-18	08/25/09	See location plan	6	841.5	90.1	31.4	68.6	70.0	32.5	BAS-8	98.0	X		-1.1
DT-19	09/01/09	See location plan	6	842.0	95.4	33.1	71.7	66.6	30.2	BAS-21	100+	X		2.9
DT-20	09/01/09	See location plan	6	842.0	91.9	38.8	66.2	66.6	30.2	BAS-21	99.4	X		8.6
DT-21	09/01/09	See location plan	6	842.0	90.1	28.9	69.9	66.6	30.2	BAS-21	100+	X		-1.3
DT-22	09/01/09	See location plan	6	842.0	96.1	45.8	65.9	66.6	30.2	BAS-21	99.0	X		15.6
DT-23	09/01/09	See location plan	6	842.0	91.6	51.3	60.5	66.6	30.2	BAS-21	90.9		X	21.1
DT-24	09/01/09	See location plan	6	842.0	87.7	42.7	61.5	66.6	30.2	BAS-21	92.3		X	12.5
DT-25	09/09/09	See location plan	6	842.5	91.9	42.1	64.7	70.0	32.5	BAS-24	92.4		X	9.6
DT-26	09/09/09	See location plan	6	842.5	86.5	33.8	64.6	70.0	32.5	BAS-24	92.4		X	1.3
DT-27	09/09/09	See location plan	6	842.5	84.7	27.2	66.6	70.0	32.5	BAS-24	95.1	X		-5.3
DT-28	09/09/09	See location plan	6	842.5	85.9	29.7	66.2	70.0	32.5	BAS-24	94.6		X	-2.8
DT-29	09/09/09	See location plan	6	842.5	84.7	25.4	67.5	70.0	32.5	BAS-24	96.5	X		-7.1
DT-30	09/09/09	See location plan	6	842.5	85.9	24.3	69.1	70.0	32.5	BAS-24	98.7	X		-8.2
DT-31	09/11/09	See location plan	6	842.5	83.5	28.3	65.1	67.7	28.5	BAS-12	96.1	X		-0.2
DT-32	09/11/09	See location plan	6	842.5	84.7	28.1	66.1	67.7	28.5	BAS-12	97.7	X		-0.4
DT-33	09/11/09	See location plan	6	842.5	88.9	30.5	68.1	67.7	28.5	BAS-12	100+	X		2.0
DT-34	09/11/09	See location plan	6	842.5	87.7	32.2	66.3	67.7	28.5	BAS-12	98.0	X		3.7
DT-35	09/11/09	See location plan	6	842.5	87.1	28.5	67.8	67.7	28.5	BAS-12	100+	X		0.0
DT-36	09/11/09	See location plan	6	842.5	91.9	29.5	71.0	67.7	28.5	BAS-12	100+	X		1.0
DT-37	09/14/09	See location plan	6	843.0	86.5	29.1	67.0	66.6	30.2	BAS-21	100+	X		-1.1
DT-38	09/14/09	See location plan	6	843.0	85.9	30.4	65.9	66.6	30.2	BAS-21	98.9	X		0.2
DT-39	09/14/09	See location plan	6	843.0	82.9	28.0	64.8	66.6	30.2	BAS-21	97.2	X		-2.2
DT-40	09/14/09	See location plan	6	843.0	80.5	25.6	64.1	66.6	30.2	BAS-21	96.2	X		-4.6
DT-41	09/14/09	See location plan	6	843.0	88.9	22.9	72.3	66.6	30.2	BAS-21	100+	X		-7.3
DT-42	09/14/09	See location plan	6	843.0	84.1	25.2	67.2	66.6	30.2	BAS-21	100+	X		-5.0
DT-43	09/15/09	See location plan	6	843.5	82.0	25.2	65.5	76.3	30.7	BAS-24	85.8		X	-5.5
DT-43R	09/15/09	See location plan	6	843.5	82.0	26.6	64.8	76.3	30.7	BAS-24	84.9		X	-4.1
DT-43R2	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-44	09/15/09	See location plan	6	843.5	79.2	26.5	62.6	76.3	30.7	BAS-24	82.1		X	-4.2
DT-44R	09/15/09	See location plan	6	843.5	84.0	27.8	65.7	76.3	30.7	BAS-24	86.1		X	-2.9
DT-44R2	09/15/09	See location plan	6	843.5	93.7	28.9	72.7	76.3	30.7	BAS-24	95.3	X		-1.8
DT-45	09/15/09	See location plan	6	843.5	96.1	33.1	72.2	76.3	30.7	BAS-24	94.6		X	2.4

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-45R	09/15/09	See location plan	6	843.5	94.0	29.0	72.9	76.3	30.7	BAS-24	95.5	X		-1.7
DT-46	09/15/09	See location plan	6	843.5	94.6	30.5	72.5	76.3	30.7	BAS-24	95.0	X		-0.2
DT-47	09/15/09	See location plan	6	843.5	91.9	31.6	69.8	66.6	30.0	BAS-21	100+	X		1.6
DT-48	09/15/09	See location plan	6	843.5	94.3	29.8	72.7	76.3	30.7	BAS-24	95.2	X		-0.9
DT-49	09/15/09	See location plan	6	843.5	93.1	27.8	72.8	76.3	30.7	BAS-24	95.5	X		-2.9
DT-50	09/22/09	See location plan	6	844.5	94.6	35.7	69.7	71.6	33.7	BAS-19	97.4	X		2.0
DT-51	09/22/09	See location plan	6	844.5	93.7	36.6	68.6	71.6	33.7	BAS-19	95.8	X		2.9
DT-52	09/22/09	See location plan	6	844.5	94.0	35.4	69.4	71.6	33.7	BAS-19	97.0	X		1.7
DT-53	09/22/09	See location plan	6	844.5	93.1	33.2	69.9	71.6	33.7	BAS-19	97.6	X		-0.5
DT-54	09/22/09	See location plan	6	844.5	92.2	33.2	69.2	71.6	33.7	BAS-19	96.7	X		-0.5
DT-55	09/22/09	See location plan	6	844.5	93.4	32.4	70.5	71.6	33.7	BAS-19	98.5	X		-1.3
DT-56	09/24/09	See location plan	6	844.5	88.5	29.3	68.4	71.6	33.7	BAS-19	95.6	X		-4.4
DT-57	09/24/09	See location plan	6	844.5	95.8	33.5	71.8	71.6	33.7	BAS-19	100+	X		-0.2
DT-58	09/24/09	See location plan	6	844.5	93.4	30.9	71.4	71.6	33.7	BAS-19	99.7	X		-2.8
DT-59	09/24/09	See location plan	6	844.5	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-60	09/24/09	See location plan	6	844.5	91.0	32.1	68.9	71.6	33.7	BAS-19	96.2	X		-1.6
DT-61	09/24/09	See location plan	6	844.5	91.6	30.7	70.1	71.6	33.7	BAS-19	97.9	X		-3.0
DT-62	09/30/09	See location plan	6	845.0	88.5	30.4	67.9	71.6	33.7	BAS-19	94.8		X	-3.3
DT-63	09/30/09	See location plan	6	845.0	87.0	29.4	67.2	71.6	33.7	BAS-19	93.9		X	-4.3
DT-64	09/30/09	See location plan	6	845.0	89.2	30.1	68.6	71.6	33.7	BAS-19	95.8	X		-3.6
DT-65	09/30/09	See location plan	6	845.0	92.5	31.8	70.2	71.6	33.7	BAS-19	98.0	X		-1.9
DT-66	09/30/09	See location plan	6	845.0	93.1	32.2	70.4	71.6	33.7	BAS-19	98.4	X		-1.5
DT-67	09/30/09	See location plan	6	845.0	93.7	29.6	72.3	71.6	33.7	BAS-19	100+	X		-4.1
DT-68	10/02/09	See location plan	6	845.0	91.9	29.6	70.9	71.6	33.7	BAS-19	99.0	X		-4.1
DT-69	10/02/09	See location plan	6	845.0	93.1	30.8	71.2	71.6	33.7	BAS-19	99.4	X		-2.9
DT-70	10/02/09	See location plan	6	845.0	91.9	30.6	70.4	71.6	33.7	BAS-19	98.3	X		-3.1
DT-71	10/02/09	See location plan	6	845.0	93.7	36.0	68.9	71.6	33.7	BAS-19	96.2	X		2.3
DT-72	10/02/09	See location plan	6	845.0	93.7	36.7	68.5	71.6	33.7	BAS-19	95.7	X		3.0
DT-73	10/02/09	See location plan	6	845.0	94.6	33.6	70.8	71.6	33.7	BAS-19	98.9	X		-0.1
DT-74	10/07/09	See location plan	6	845.0	89.5	28.4	69.7	72.0	26.3	BAS-14	96.8	X		2.1
DT-75	10/07/09	See location plan	6	845.0	88.9	30.1	68.3	70.0	32.5	BAS-8	97.6	X		-2.4
DT-76	10/07/09	See location plan	6	845.0	92.5	30.1	71.1	74.0	32.5	BAS-25	96.1	X		-2.4
DT-77	10/07/09	See location plan	6	845.0	95.5	31.1	72.8	74.0	32.5	BAS-25	98.4	X		-1.4
DT-78	10/07/09	See location plan	6	845.0	94.3	29.0	73.1	74.0	32.5	BAS-25	98.8	X		-3.5
DT-79	10/07/09	See location plan	6	845.0	90.1	26.8	71.1	72.0	26.3	BAS-14	98.7	X		0.5
DT-80	10/13/09	See location plan	6	845.5	91.9	30.5	70.4	74.0	32.2	BAS-25	95.2	X		-1.7
DT-81	10/13/09	See location plan	6	845.5	87.1	27.9	68.1	70.2	28.3	BAS-11	97.0	X		-0.4
DT-82	10/13/09	See location plan	6	845.5	93.1	32.3	70.4	74.0	32.2	BAS-25	95.1	X		0.1
DT-83	10/13/09	See location plan	6	845.5	88.9	29.4	68.7	70.2	28.3	BAS-11	97.9	X		1.1
DT-84	10/13/09	See location plan	6	845.5	90.1	30.5	69.0	70.2	28.3	BAS-11	98.4	X		2.2
DT-85	10/13/09	See location plan	6	845.5	86.5	28.6	67.3	70.2	28.3	BAS-11	95.8	X		0.3
DT-86	10/22/09	See location plan	6	845.5	93.9	28.1	73.3	74.0	32.2	BAS-25	99.1	X		-4.1
DT-87	10/22/09	See location plan	6	845.5	93.2	29.0	72.2	74.0	32.2	BAS-25	97.6	X		-3.2
DT-88	10/22/09	See location plan	6	845.5	90.5	27.1	71.2	74.0	32.2	BAS-25	96.2	X		-5.1
DT-89	10/22/09	See location plan	6	845.5	91.1	28.9	70.7	74.0	32.2	BAS-25	95.5	X		-3.3
DT-90	10/22/09	See location plan	6	845.5	93.9	30.6	71.9	74.0	32.2	BAS-25	97.2	X		-1.6
DT-91	10/22/09	See location plan	6	845.5	91.2	29.4	70.5	74.0	32.2	BAS-25	95.2	X		-2.8
DT-92	10/23/09	See location plan	6	845.5	93.4	27.3	73.4	74.0	32.2	BAS-25	99.1	X		-4.9
DT-93	10/23/09	See location plan	6	845.5	88.9	27.2	69.9	74.0	32.2	BAS-25	94.4		X	-5.0
DT-94	10/23/09	See location plan	6	845.5	92.2	27.2	72.5	74.0	32.2	BAS-25	98.0	X		-5.0
DT-95	10/23/09	See location plan	6	845.5	92.8	30.2	71.3	74.0	32.2	BAS-25	96.3	X		-2.0

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
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DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-96	10/23/09	See location plan	6	845.5	96.4	31.3	73.4	74.0	32.2	BAS-25	99.2	X		-0.9
DT-97	10/23/09	See location plan	6	845.5	98.2	31.8	74.5	74.0	32.2	BAS-25	100+	X		-0.4
DT-98	11/03/09	See location plan	6	847.0	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-99	11/03/09	See location plan	6	847.0	91.3	28.9	70.8	71.5	33.1	BAS-26	99.1	X		-4.2
DT-100	11/03/09	See location plan	6	847.0	94.9	32.6	71.6	71.5	33.1	BAS-26	100+	X		-0.5
DT-101	11/03/09	See location plan	6	847.0	97.3	35.5	71.8	71.5	33.1	BAS-26	100+	X		2.4
DT-102	11/03/09	See location plan	6	847.0	97.9	35.3	72.4	71.5	33.1	BAS-26	100+	X		2.2
DT-103	11/03/09	See location plan	6	847.0	96.1	31.9	72.9	71.5	33.1	BAS-26	100+	X		-1.2
DT-104	11/06/09	See location plan	6	847.5	92.8	31.1	70.8	74.0	32.2	BAS-25	95.7	X		-1.1
DT-105	11/06/09	See location plan	6	847.5	89.8	31.5	68.3	74.0	32.2	BAS-25	92.3		X	-0.7
DT-105R	11/06/09	See location plan	6	847.5	92.8	31.8	70.4	74.0	32.2	BAS-25	95.1	X		-0.4
DT-106	11/06/09	See location plan	6	847.5	94.3	28.2	73.6	74.0	32.2	BAS-25	99.4	X		-4.0
DT-107	11/06/09	See location plan	6	847.5	95.2	30.8	72.8	74.0	32.2	BAS-25	98.4	X		-1.4
DT-108	11/06/09	See location plan	6	847.5	97.6	30.9	74.6	74.0	32.2	BAS-25	100+	X		-1.3
DT-109	11/06/09	See location plan	6	847.5	94.6	30.6	72.4	74.0	32.2	BAS-25	97.9	X		-1.6
DT-110	11/17/09	See location plan	6	845.5	88.0	29.9	67.7	70.2	28.3	BAS-11	96.5	X		1.6
DT-111	11/17/09	See location plan	6	845.5	89.8	28.7	69.8	70.2	28.3	BAS-11	99.4	X		0.4
DT-112	11/17/09	See location plan	6	845.5	91.3	26.1	72.4	72.0	26.3	BAS-14	100+	X		-0.2
DT-113	11/17/09	See location plan	6	845.5	91.9	26.9	72.4	72.0	26.3	BAS-14	100+	X		0.6
DT-114	11/17/09	See location plan	6	845.5	89.2	27.1	70.2	72.0	26.3	BAS-14	97.5	X		0.8
DT-115	11/17/09	See location plan	6	845.5	88.0	26.1	69.8	72.0	26.3	BAS-14	96.9	X		-0.2
DT-116	11/20/09	See location plan	6	845.5	90.7	31.4	69.0	71.5	33.1	BAS-26	96.5	X		-1.7
DT-117	11/20/09	See location plan	6	845.5	90.4	30.8	69.1	71.5	33.1	BAS-26	96.7	X		-2.3
DT-118	11/20/09	See location plan	6	845.5	90.7	32.3	68.6	71.5	33.1	BAS-26	95.9	X		-0.8
DT-119	11/20/09	See location plan	6	845.5	91.9	31.0	70.2	71.5	33.1	BAS-26	98.1	X		-2.1
DT-120	11/20/09	See location plan	6	845.5	95.8	31.2	73.0	71.5	33.1	BAS-26	100+	X		-1.9
DT-121	11/20/09	See location plan	6	845.5	89.2	30.7	68.2	71.5	33.1	BAS-26	95.5	X		-2.4
DT-122	11/25/09	See location plan	6	845.5	94.9	28.9	73.6	76.3	30.7	BAS-24	96.5	X		-1.8
DT-123	11/25/09	See location plan	6	845.5	96.4	32.2	72.9	76.3	30.7	BAS-24	95.6	X		1.5
DT-124	11/25/09	See location plan	6	845.5	95.8	31.2	73.0	76.3	30.7	BAS-24	95.7	X		0.5
DT-125	11/25/09	See location plan	6	845.5	94.1	27.9	73.6	76.3	30.7	BAS-24	96.4	X		-2.8
DT-126	11/25/09	See location plan	6	845.5	92.8	27.5	72.8	76.3	30.7	BAS-24	95.4	X		-3.2
DT-127	11/25/09	See location plan	6	845.5	97.0	30.7	74.2	76.3	30.7	BAS-24	97.3	X		0.0
DT-128	12/02/09	See location plan	6	846.5	84.3	26.5	66.6	70.2	28.3	BAS-11	94.9		X	-1.8
DT-129	12/02/09	See location plan	6	846.5	85.8	27.2	67.5	70.2	28.3	BAS-11	96.1	X		-1.1
DT-130	12/02/09	See location plan	6	846.5	90.4	26.5	71.5	70.2	28.3	BAS-11	100+	X		-1.8
DT-131	12/02/09	See location plan	6	846.5	91.0	28.1	71.0	70.2	28.3	BAS-11	100+	X		-0.2
DT-132	12/02/09	See location plan	6	846.5	89.5	30.0	68.8	70.2	28.3	BAS-11	98.1	X		1.7
DT-133	12/02/09	See location plan	6	846.5	88.6	27.2	69.7	70.2	28.3	BAS-11	99.2	X		-1.1
DT-134	12/07/09	See location plan	6	848.0	88.9	27.4	69.8	70.2	28.3	BAS-11	99.4	X		-0.9
DT-135	12/07/09	See location plan	6	848.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-136	12/07/09	See location plan	6	848.0	86.4	26.4	68.4	70.2	28.3	BAS-11	97.4	X		-1.9
DT-137	12/07/09	See location plan	6	848.0	84.9	25.1	67.9	70.2	28.3	BAS-11	96.7	X		-3.2
DT-138	12/07/09	See location plan	6	848.0	86.7	28.6	67.4	70.2	28.3	BAS-11	96.0	X		0.3
DT-139	12/07/09	See location plan	6	848.0	88.9	29.2	68.8	70.2	28.3	BAS-11	98.0	X		0.9
DT-140	12/16/09	See location plan	6	845.5	83.1	25.9	66.0	67.0	24.0	BAS-7	98.5	X		1.9
DT-141	12/16/09	See location plan	6	845.5	84.3	24.5	67.7	67.0	24.0	BAS-7	100+	X		0.5
DT-142	12/16/09	See location plan	6	845.5	80.4	24.9	64.4	67.0	24.0	BAS-7	96.1	X		0.9
DT-143	12/16/09	See location plan	6	845.5	81.3	26.1	64.5	67.0	24.0	BAS-7	96.2	X		2.1
DT-144	12/16/09	See location plan	6	845.5	84.0	25.6	66.9	67.0	24.0	BAS-7	99.8	X		1.6
DT-145	12/16/09	See location plan	6	845.5	86.7	26.0	68.8	67.0	24.0	BAS-7	100+	X		2.0

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
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DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA
FOR ASH LANDFILL MATERIAL
MARSHALL STEAM STATION - ASH LANDFILL
TABLE 1
PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-146	12/21/09	See location plan	6	849.0	94.3	32.6	71.1	71.6	33.7	BAS-19	99.3	X		-1.1
DT-147	12/21/09	See location plan	6	849.0	94.0	33.6	70.4	71.6	33.7	BAS-19	98.3	X		-0.1
DT-148	12/21/09	See location plan	6	849.0	97.0	34.0	72.4	71.6	33.7	BAS-19	100+	X		0.3
DT-149	12/21/09	See location plan	6	849.0	95.8	34.2	71.4	71.6	33.7	BAS-19	99.7	X		0.5
DT-150	12/21/09	See location plan	6	849.0	93.7	34.1	69.9	71.6	33.7	BAS-19	97.6	X		0.4
DT-151	12/21/09	See location plan	6	849.0	94.9	31.0	72.4	71.6	33.7	BAS-19	100+	X		-2.7
DT-152	12/23/09	See location plan	6	850.0	86.4	26.7	68.2	70.2	28.3	BAS-11	97.1	X		-1.6
DT-153	12/23/09	See location plan	6	850.0	88.3	25.6	70.3	70.2	28.3	BAS-11	100+	X		-2.7
DT-154	12/23/09	See location plan	6	850.0	85.2	26.4	67.4	70.2	28.3	BAS-11	96.0	X		-1.9
DT-155	12/23/09	See location plan	6	850.0	85.8	28.6	66.7	70.2	28.3	BAS-11	95.0	X		0.3
DT-156	12/23/09	See location plan	6	850.0	87.3	27.6	68.4	70.2	28.3	BAS-11	97.5	X		-0.7
DT-157	12/23/09	See location plan	6	850.0	86.4	29.5	66.7	70.2	28.3	BAS-11	95.0	X		1.2
DT-158	12/28/09	See location plan	6	851.5	88.0	33.7	65.8	70.0	32.5	BAS-11	94.0		X	1.2
DT-159	12/28/09	See location plan	6	851.5	91.3	34.8	67.7	70.0	32.5	BAS-11	96.8	X		2.3
DT-160	12/28/09	See location plan	6	851.5	92.8	32.0	70.3	70.0	32.5	BAS-11	100+	X		-0.5
DT-161	12/28/09	See location plan	6	851.5	91.0	32.8	68.5	70.0	32.5	BAS-11	97.9	X		0.3
DT-162	12/28/09	See location plan	6	851.5	90.1	31.7	68.4	70.0	32.5	BAS-11	97.7	X		-0.8
DT-163	12/28/09	See location plan	6	851.5	91.6	33.2	68.8	70.0	32.5	BAS-11	98.2	X		0.7
DT-164	12/29/09	See location plan	6	852.5	97.6	32.3	73.8	76.3	30.7	BAS-24	96.7	X		1.6
DT-165	12/29/09	See location plan	6	852.5	95.8	26.0	76.0	76.3	30.7	BAS-24	99.6	X		-4.7
DT-166	12/29/09	See location plan	6	852.5	96.1	27.3	75.5	76.3	30.7	BAS-24	98.9	X		-3.4
DT-167	12/29/09	See location plan	6	852.5	97.9	27.3	76.9	76.3	30.7	BAS-24	100+	X		-3.4
DT-168	12/29/09	See location plan	6	852.5	98.8	25.8	78.5	76.3	30.7	BAS-24	100+	X		-4.9
DT-168R	12/29/09	See location plan	6	852.5	96.1	27.0	75.7	76.3	30.7	BAS-24	99.2	X		-3.7
DT-169	12/29/09	See location plan	6	852.5	96.4	26.9	76.0	76.3	30.7	BAS-24	99.6	X		-3.8
DT-170	12/30/09	See location plan	6	853.0	88.3	24.1	71.2	72.0	26.3	BAS-14	98.8	X		-2.2
DT-171	12/30/09	See location plan	6	853.0	86.7	21.8	71.2	72.0	26.3	BAS-14	98.9	X		-4.5
DT-172	12/30/09	See location plan	6	853.0	86.1	24.2	69.3	72.0	26.3	BAS-14	96.3	X		-2.1
DT-173	12/30/09	See location plan	6	853.0	87.3	22.5	71.3	72.0	26.3	BAS-14	99.0	X		-3.8
DT-174	12/30/09	See location plan	6	853.0	86.7	21.9	71.1	72.0	26.3	BAS-14	98.8	X		-4.4
DT-175	12/30/09	See location plan	6	853.0	86.4	23.0	70.2	72.0	26.3	BAS-14	97.6	X		-3.3
DT-176	01/06/10	See location plan	6	855.0	87.0	29.1	67.4	67.9	28.5	BAS-12	99.2	X		0.6
DT-177	01/06/10	See location plan	6	855.0	86.1	32.6	64.9	67.9	28.5	BAS-12	95.6	X		4.1
DT-178	01/06/10	See location plan	6	855.0	86.1	25.1	68.8	67.9	28.5	BAS-12	100+	X		-3.4
DT-179	01/06/10	See location plan	6	855.0	85.8	29.3	66.4	67.9	28.5	BAS-12	97.7	X		0.8
DT-180	01/06/10	See location plan	6	855.0	87.3	27.5	68.5	67.9	28.5	BAS-12	100+	X		-1.0
DT-181	01/06/10	See location plan	6	855.0	86.7	26.7	68.4	67.9	28.5	BAS-12	100+	X		-1.8
DT-182	01/07/10	See location plan	6	856.0	89.5	30.7	68.5	67.9	28.5	BAS-12	100+	X		2.2
DT-183	01/07/10	See location plan	6	856.0	85.8	30.1	65.9	67.9	28.5	BAS-12	97.1	X		1.6
DT-184	01/07/10	See location plan	6	856.0	86.1	27.8	67.4	67.9	28.5	BAS-12	99.2	X		-0.7
DT-185	01/07/10	See location plan	6	856.0	86.7	29.6	66.9	67.9	28.5	BAS-12	98.5	X		1.1
DT-186	01/07/10	See location plan	6	856.0	82.5	26.1	65.4	67.9	28.5	BAS-12	96.4	X		-2.4
DT-187	01/07/10	See location plan	6	856.0	83.1	22.9	67.6	67.9	28.5	BAS-12	99.6	X		-5.6
DT-188	01/08/10	See location plan	6	858.5	95.2	34.7	70.7	72.2	33.9	BAS-31	97.9	X		0.8
DT-189	01/08/10	See location plan	6	858.5	95.8	31.6	72.8	72.2	33.9	BAS-31	100+	X		-2.3
DT-190	01/08/10	See location plan	6	858.5	94.6	35.1	70.0	72.2	33.9	BAS-31	97.0	X		1.2
DT-191	01/08/10	See location plan	6	858.5	95.2	33.3	71.4	72.2	33.9	BAS-31	98.9	X		-0.6
DT-192	01/08/10	See location plan	6	858.5	94.3	32.7	71.1	72.2	33.9	BAS-31	98.4	X		-1.2
DT-193	01/08/10	See location plan	6	858.5	94.6	36.8	69.2	72.2	33.9	BAS-31	95.8	X		2.9
DT-194	01/13/10	See location plan	6	860.0	85.5	29.2	66.2	70.2	28.3	BAS-11	94.3		X	0.9
DT-195	01/13/10	See location plan	6	860.0	85.2	25.2	68.1	70.2	28.3	BAS-11	96.9	X		-3.1

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SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-196	01/13/10	See location plan	6	860.0	85.2	27.0	67.1	70.2	28.3	BAS-11	95.6	X		-1.3
DT-197	01/13/10	See location plan	6	860.0	86.7	27.3	68.1	70.2	28.3	BAS-11	97.0	X		-1.0
DT-198	01/13/10	See location plan	6	860.0	86.7	25.1	69.3	70.2	28.3	BAS-11	98.7	X		-3.2
DT-199	01/13/10	See location plan	6	860.0	86.1	27.5	67.5	70.2	28.3	BAS-11	96.2	X		-0.8
DT-200	01/15/10	See location plan	6	868.5	86.1	24.5	69.2	70.2	28.3	BAS-11	98.5	X		-3.8
DT-201	01/15/10	See location plan	6	868.5	87.7	25.6	69.8	70.2	28.3	BAS-11	99.5	X		-2.7
DT-202	01/15/10	See location plan	6	868.5	87.3	26.8	68.8	70.2	28.3	BAS-11	98.1	X		-1.5
DT-203	01/15/10	See location plan	6	868.5	86.4	25.0	69.1	70.2	28.3	BAS-11	98.5	X		-3.3
DT-204	01/15/10	See location plan	6	868.5	86.7	25.8	68.9	70.2	28.3	BAS-11	98.2	X		-2.5
DT-205	01/15/10	See location plan	6	868.5	87.0	24.3	70.0	70.2	28.3	BAS-11	99.7	X		-4.0
DT-206	01/19/10	See location plan	6	871.5	93.4	31.0	71.3	71.5	33.1	BAS-26	99.7	X		-2.1
DT-207	01/19/10	See location plan	6	871.5	94.0	32.2	71.1	71.5	33.1	BAS-26	99.4	X		-0.9
DT-208	01/19/10	See location plan	6	871.5	92.8	32.6	70.0	71.5	33.1	BAS-26	97.9	X		-0.5
DT-209	01/19/10	See location plan	6	871.5	93.4	32.3	70.6	71.5	33.1	BAS-26	98.7	X		-0.8
DT-210	01/19/10	See location plan	6	871.5	94.3	35.2	69.7	71.5	33.1	BAS-26	97.6	X		2.1
DT-211	01/19/10	See location plan	6	871.5	94.3	33.5	70.6	71.5	33.1	BAS-26	98.8	X		0.4
DT-212	01/29/10	See location plan	6	861.0	94.6	31.5	71.9	74.6	30.9	BAS-29	96.4	X		0.6
DT-213	01/29/10	See location plan	6	861.0	95.2	31.4	72.5	74.6	30.9	BAS-29	97.1	X		0.5
DT-214	01/29/10	See location plan	6	861.0	95.5	29.4	73.8	74.6	30.9	BAS-29	98.9	X		-1.5
DT-215	01/29/10	See location plan	6	861.0	95.2	29.6	73.5	74.6	30.9	BAS-29	98.5	X		-1.3
DT-216	01/29/10	See location plan	6	861.0	95.8	31.2	73.0	74.6	30.9	BAS-29	97.9	X		0.3
DT-217	01/29/10	See location plan	6	861.0	96.1	30.4	73.7	74.6	30.9	BAS-29	98.8	X		-0.5
DT-218	02/04/10	See location plan	6	866.5	93.7	32.6	70.7	74.0	32.2	BAS-25	95.5	X		0.4
DT-219	02/04/10	See location plan	6	866.5	97.0	30.1	74.6	74.0	32.2	BAS-25	100+	X		-2.1
DT-220	02/04/10	See location plan	6	866.5	89.2	31.5	67.8	74.0	32.2	BAS-25	91.7		X	-0.7
DT-220R	02/04/10	See location plan	6	866.5	95.2	30.3	73.1	74.0	32.2	BAS-25	98.7	X		-1.9
DT-221	02/04/10	See location plan	6	866.5	88.6	32.1	67.1	74.0	32.2	BAS-25	90.6		X	-0.1
DT-221R	02/04/10	See location plan	6	866.5	96.4	30.4	73.9	74.0	32.2	BAS-25	99.9	X		-1.8
DT-222	02/04/10	See location plan	6	866.5	94.3	32.6	71.1	74.0	32.2	BAS-25	96.1	X		0.4
DT-223	02/04/10	See location plan	6	866.5	97.6	32.7	73.5	74.0	32.2	BAS-25	99.4	X		0.5
DT-224	02/10/10	See location plan	6	866.5	92.8	27.2	73.0	74.0	32.2	BAS-25	98.6	X		-5.0
DT-225	02/10/10	See location plan	6	866.5	91.0	27.4	71.4	74.0	32.2	BAS-25	96.5	X		-4.8
DT-226	02/10/10	See location plan	6	866.5	93.4	27.8	73.1	74.0	32.2	BAS-25	98.8	X		-4.4
DT-227	02/10/10	See location plan	6	866.5	91.6	27.5	71.8	74.0	32.2	BAS-25	97.1	X		-4.7
DT-228	02/10/10	See location plan	6	866.5	93.7	27.3	73.6	74.0	32.2	BAS-25	99.5	X		-4.9
DT-229	02/10/10	See location plan	6	866.5	92.2	26.7	72.8	74.0	32.2	BAS-25	98.3	X		-5.5
DT-230	02/12/10	See location plan	6	866.5	89.5	25.5	71.3	72.0	26.3	BAS-14	99.0	X		-0.8
DT-231	02/12/10	See location plan	6	866.5	88.9	24.5	71.4	72.0	26.3	BAS-14	99.2	X		-1.8
DT-232	02/12/10	See location plan	6	866.5	88.3	24.6	70.9	72.0	26.3	BAS-14	98.4	X		-1.7
DT-233	02/12/10	See location plan	6	866.5	88.6	24.6	71.1	72.0	26.3	BAS-14	98.8	X		-1.7
DT-234	02/12/10	See location plan	6	866.5	89.8	25.6	71.5	72.0	26.3	BAS-14	99.3	X		-0.7
DT-235	02/12/10	See location plan	6	866.5	90.4	26.3	71.6	72.0	26.3	BAS-14	99.4	X		0.0
DT-236	02/19/10	See location plan	6	848.8	87.7	24.4	70.5	72.0	26.3	BAS-14	97.9	X		-1.9
DT-237	02/19/10	See location plan	6	848.8	89.8	26.3	71.1	72.0	26.3	BAS-14	98.8	X		0.0
DT-238	02/19/10	See location plan	6	848.8	88.0	22.9	71.6	72.0	26.3	BAS-14	99.4	X		-3.4
DT-239	02/19/10	See location plan	6	848.8	89.2	23.3	72.3	72.0	26.3	BAS-14	100+	X		-3.0
DT-240	02/19/10	See location plan	6	848.8	88.3	21.6	72.6	72.0	26.3	BAS-14	100+	X		-4.7
DT-241	02/19/10	See location plan	6	848.8	88.9	22.3	72.7	72.0	26.3	BAS-14	100+	X		-4.0
DT-242	02/23/10	See location plan	6	848.8	96.4	31.0	73.6	74.8	30.7	BAS-28	98.4	X		0.3
DT-243	02/23/10	See location plan	6	848.8	97.3	30.9	74.3	74.8	30.7	BAS-28	99.4	X		0.2
DT-244	02/23/10	See location plan	6	848.8	95.5	30.2	73.3	74.8	30.7	BAS-28	98.1	X		-0.5

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SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-245	02/23/10	See location plan	6	848.8	97.3	31.2	74.2	74.8	30.7	BAS-28	99.1	X		0.5
DT-246	02/23/10	See location plan	6	848.8	95.8	30.4	73.5	74.8	30.7	BAS-28	98.2	X		-0.3
DT-247	02/23/10	See location plan	6	848.8	94.9	29.5	73.3	74.8	30.7	BAS-28	98.0	X		-1.2
DT-248	03/04/10	See location plan	6	850.8	85.2	24.7	68.3	70.2	28.3	BAS-11	97.3	X		-3.6
DT-249	03/04/10	See location plan	6	850.8	86.1	26.3	68.2	70.2	28.3	BAS-11	97.1	X		-2.0
DT-250	03/04/10	See location plan	6	850.8	86.4	24.9	69.2	70.2	28.3	BAS-11	98.5	X		-3.4
DT-251	03/04/10	See location plan	6	850.8	87.3	24.1	70.3	70.2	28.3	BAS-11	100+	X		-4.2
DT-252	03/04/10	See location plan	6	850.8	86.7	25.7	69.0	70.2	28.3	BAS-11	98.3	X		-2.6
DT-253	03/04/10	See location plan	6	850.8	85.8	26.1	68.1	70.2	28.3	BAS-11	97.0	X		-2.2
DT-254	03/08/10	See location plan	6	850.2	94.3	26.2	74.7	76.1	28.1	BAS-18	98.2	X		-1.9
DT-255	03/08/10	See location plan	6	850.2	92.5	25.7	73.6	76.1	28.1	BAS-18	96.7	X		-2.4
DT-256	03/08/10	See location plan	6	850.2	93.1	24.4	74.8	76.1	28.1	BAS-18	98.3	X		-3.7
DT-257	03/08/10	See location plan	6	850.2	93.1	25.8	74.0	76.1	28.1	BAS-18	97.2	X		-2.3
DT-258	03/08/10	See location plan	6	850.2	92.5	24.4	74.4	76.1	28.1	BAS-18	97.7	X		-3.7
DT-259	03/08/10	See location plan	6	850.2	92.8	24.8	74.4	76.1	28.1	BAS-18	97.7	X		-3.3
DT-260	03/12/10	See location plan	6	852.1	93.1	27.5	73.0	74.8	30.7	BAS-28	97.6	X		-3.2
DT-261	03/12/10	See location plan	6	852.1	92.8	27.4	72.8	74.8	30.7	BAS-28	97.4	X		-3.3
DT-262	03/12/10	See location plan	6	852.1	92.2	25.1	73.7	74.8	30.7	BAS-28	98.5	X		-5.6
DT-263	03/12/10	See location plan	6	852.1	92.8	27.9	72.6	74.8	30.7	BAS-28	97.0	X		-2.8
DT-264	03/12/10	See location plan	6	852.1	91.6	25.9	72.8	74.8	30.7	BAS-28	97.3	X		-4.8
DT-265	03/12/10	See location plan	6	852.1	91.6	27.0	72.1	74.8	30.7	BAS-28	96.4	X		-3.7
DT-266	03/17/10	See location plan	6	852.1	90.7	25.2	72.4	72.0	26.3	BAS-14	100+	X		-1.1
DT-267	03/17/10	See location plan	6	852.1	87.7	28.7	68.1	72.0	26.3	BAS-14	94.6		X	2.4
DT-268	03/17/10	See location plan	6	852.1	87.0	24.0	70.2	72.0	26.3	BAS-14	97.4	X		-2.3
DT-269	03/17/10	See location plan	6	852.1	84.3	24.0	68.0	72.0	26.3	BAS-14	94.4		X	-2.3
DT-270	03/17/10	See location plan	6	852.1	86.1	23.2	69.9	72.0	26.3	BAS-14	97.1	X		-3.1
DT-271	03/17/10	See location plan	6	852.1	87.3	24.1	70.3	72.0	26.3	BAS-14	97.7	X		-2.2
DT-272	03/18/10	See location plan	6	872.0	82.5	25.3	65.8	67.0	24.0	BAS-7	98.3	X		1.3
DT-273	03/18/10	See location plan	6	872.0	83.4	24.7	66.9	67.0	24.0	BAS-7	99.8	X		0.7
DT-274	03/18/10	See location plan	6	872.0	83.4	22.7	68.0	67.0	24.0	BAS-7	100+	X		-1.3
DT-275	03/18/10	See location plan	6	872.0	83.1	27.9	65.0	67.0	24.0	BAS-7	97.0	X		3.9
DT-276	03/18/10	See location plan	6	872.0	82.2	22.4	67.2	67.0	24.0	BAS-7	100+	X		-1.6
DT-277	03/18/10	See location plan	6	872.0	83.7	22.4	68.4	67.0	24.0	BAS-7	100+	X		-1.6
DT-278	03/19/10	See location plan	6	872.0	86.1	24.9	68.9	70.2	28.3	BAS-11	98.2	X		-3.4
DT-279	03/19/10	See location plan	6	872.0	88.0	26.7	69.5	70.2	28.3	BAS-11	98.9	X		-1.6
DT-280	03/19/10	See location plan	6	872.0	86.7	23.4	70.3	70.2	28.3	BAS-11	100+	X		-4.9
DT-281	03/19/10	See location plan	6	872.0	88.3	27.2	69.4	70.2	28.3	BAS-11	98.9	X		-1.1
DT-282	03/19/10	See location plan	6	872.0	87.0	26.1	69.0	70.2	28.3	BAS-11	98.3	X		-2.2
DT-283	03/19/10	See location plan	6	872.0	88.3	29.0	68.4	70.2	28.3	BAS-11	97.5	X		0.7
DT-284	03/22/10	See location plan	6	852.1	89.8	31.4	68.3	67.9	28.5	BAS-12	100+	X		2.9
DT-285	03/22/10	See location plan	6	852.1	85.5	32.3	64.6	67.9	28.5	BAS-12	95.2	X		3.8
DT-286	03/22/10	See location plan	6	852.1	86.7	31.1	66.1	67.9	28.5	BAS-12	97.4	X		2.6
DT-287	03/22/10	See location plan	6	852.1	85.8	33.5	64.3	67.9	28.5	BAS-12	94.7		X	5.0
DT-288	03/22/10	See location plan	6	852.1	86.7	30.1	66.6	67.9	28.5	BAS-12	98.1	X		1.6
DT-289	03/22/10	See location plan	6	852.1	86.4	30.4	66.3	67.9	28.5	BAS-12	97.6	X		1.9
DT-290	03/23/10	See location plan	6	852.1	86.4	30.7	66.1	70.2	28.3	BAS-11	94.2		X	2.4
DT-291	03/23/10	See location plan	6	852.1	86.7	31.2	66.1	70.2	28.3	BAS-11	94.1		X	2.9
DT-292	03/23/10	See location plan	6	852.1	88.9	28.1	69.4	70.2	28.3	BAS-11	98.9	X		-0.2
DT-293	03/23/10	See location plan	6	852.1	88.0	32.7	66.3	70.2	28.3	BAS-11	94.5		X	4.4
DT-294	03/23/10	See location plan	6	852.1	87.7	26.9	69.1	70.2	28.3	BAS-11	98.4	X		-1.4
DT-295	03/23/10	See location plan	6	852.1	88.3	30.4	67.7	70.2	28.3	BAS-11	96.5	X		2.1

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-296	03/25/10	See location plan	6	852.1	79.2	23.5	64.1	67.0	24.0	BAS-7	95.7	X		-0.5
DT-297	03/25/10	See location plan	6	852.1	84.0	22.6	68.5	67.0	24.0	BAS-7	100+	X		-1.4
DT-298	03/25/10	See location plan	6	852.1	78.9	23.2	64.0	67.0	24.0	BAS-7	95.6	X		-0.8
DT-299	03/25/10	See location plan	6	852.1	83.1	28.0	64.9	67.0	24.0	BAS-7	96.9	X		4.0
DT-300	03/25/10	See location plan	6	852.1	82.5	21.4	68.0	67.0	24.0	BAS-7	100+	X		-2.6
DT-301	03/25/10	See location plan	6	852.1	82.2	23.6	66.5	67.0	24.0	BAS-7	99.3	X		-0.4
DT-302	04/09/10	See location plan	6	852.1	97.9	30.6	75.0	77.9	29.8	BAS-27	96.2	X		0.8
DT-303	04/09/10	See location plan	6	852.1	97.0	32.0	73.5	77.9	29.8	BAS-27	94.3		X	2.2
DT-304	04/09/10	See location plan	6	852.1	99.1	29.8	76.3	77.9	29.8	BAS-27	98.0	X		0.0
DT-305	04/09/10	See location plan	6	852.1	99.7	33.6	74.6	77.9	29.8	BAS-27	95.8	X		3.8
DT-306	04/09/10	See location plan	6	852.1	100.0	31.4	76.1	77.9	29.8	BAS-27	97.7	X		1.6
DT-307	04/09/10	See location plan	6	852.1	100.3	30.0	77.2	77.9	29.8	BAS-27	99.0	X		0.2
DT-308	04/12/10	See location plan	6	852.1	92.8	24.4	74.6	75.3	30.4	BAS-17	99.1	X		-6.0
DT-309	04/12/10	See location plan	6	852.1	93.4	26.5	73.8	75.3	30.4	BAS-17	98.1	X		-3.9
DT-310	04/12/10	See location plan	6	852.1	92.5	25.5	73.7	75.3	30.4	BAS-17	97.9	X		-4.9
DT-311	04/12/10	See location plan	6	852.1	91.3	28.2	71.2	75.3	30.4	BAS-17	94.6		X	-2.2
DT-312	04/12/10	See location plan	6	852.1	94.0	27.1	74.0	75.3	30.4	BAS-17	98.2	X		-3.3
DT-313	04/12/10	See location plan	6	852.1	95.5	26.5	75.5	75.3	30.4	BAS-17	100+	X		-3.9
DT-314	04/13/10	See location plan	6	852.1	80.7	22.3	66.0	67.0	24.0	BAS-7	98.5	X		-1.7
DT-315	04/13/10	See location plan	6	852.1	79.5	22.3	65.0	67.0	24.0	BAS-7	97.0	X		-1.7
DT-316	04/13/10	See location plan	6	852.1	78.3	19.8	65.4	67.0	24.0	BAS-7	97.6	X		-4.2
DT-317	04/13/10	See location plan	6	852.1	81.0	23.7	65.5	67.0	24.0	BAS-7	97.7	X		-0.3
DT-318	04/13/10	See location plan	6	852.1	78.6	22.3	64.3	67.0	24.0	BAS-7	95.9	X		-1.7
DT-319	04/13/10	See location plan	6	852.1	79.2	22.0	64.9	67.0	24.0	BAS-7	96.9	X		-2.0
DT-320	04/16/10	See location plan	6	852.1	80.4	22.1	65.8	67.0	24.0	BAS-7	98.3	X		-1.9
DT-321	04/16/10	See location plan	6	852.1	83.7	24.4	67.3	67.0	24.0	BAS-7	100+	X		0.4
DT-322	04/16/10	See location plan	6	852.1	82.8	23.0	67.3	67.0	24.0	BAS-7	100+	X		-1.0
DT-323	04/16/10	See location plan	6	852.1	81.9	26.0	65.0	67.0	24.0	BAS-7	97.0	X		2.0
DT-324	04/16/10	See location plan	6	852.1	81.9	24.1	66.0	67.0	24.0	BAS-7	98.5	X		0.1
DT-325	04/16/10	See location plan	6	852.1	81.6	23.4	66.1	67.0	24.0	BAS-7	98.7	X		-0.6
DT-326	04/19/10	See location plan	6	854.1	91.6	26.3	72.5	76.1	28.1	BAS-18	95.3	X		-1.8
DT-327	04/19/10	See location plan	6	854.1	93.1	26.7	73.5	76.1	28.1	BAS-18	96.6	X		-1.4
DT-328	04/19/10	See location plan	6	854.1	91.6	24.1	73.8	76.1	28.1	BAS-18	97.0	X		-4.0
DT-329	04/19/10	See location plan	6	854.1	92.8	27.5	72.8	76.1	28.1	BAS-18	95.6	X		-0.6
DT-330	04/19/10	See location plan	6	854.1	94.6	24.6	75.9	76.1	28.1	BAS-18	99.8	X		-3.5
DT-331	04/19/10	See location plan	6	854.1	94.0	23.9	75.9	76.1	28.1	BAS-18	99.7	X		-4.2
DT-332	04/22/10	See location plan	6	854.1	81.6	21.8	67.0	70.2	28.3	BAS-11	95.4	X		-6.5
DT-333	04/22/10	See location plan	6	854.1	81.0	20.7	67.1	70.2	28.3	BAS-11	95.6	X		-7.6
DT-334	04/22/10	See location plan	6	854.1	84.0	22.1	68.8	70.2	28.3	BAS-11	98.0	X		-6.2
DT-335	04/22/10	See location plan	6	854.1	83.1	22.5	67.8	70.2	28.3	BAS-11	96.6	X		-5.8
DT-336	04/22/10	See location plan	6	854.1	84.0	23.2	68.2	70.2	28.3	BAS-11	97.1	X		-5.1
DT-337	04/22/10	See location plan	6	854.1	84.6	22.9	68.8	70.2	28.3	BAS-11	98.1	X		-5.4
DT-338	04/26/10	See location plan	6	854.1	83.7	25.3	66.8	70.2	28.3	BAS-11	95.2	X		-3.0
DT-339	04/26/10	See location plan	6	854.1	83.7	24.2	67.4	70.2	28.3	BAS-11	96.0	X		-4.1
DT-340	04/26/10	See location plan	6	854.1	86.1	26.7	68.0	70.2	28.3	BAS-11	96.8	X		-1.6
DT-341	04/26/10	See location plan	6	854.1	86.7	30.8	66.3	70.2	28.3	BAS-11	94.4		X	2.5
DT-342	04/26/10	See location plan	6	854.1	84.3	25.8	67.0	70.2	28.3	BAS-11	95.5	X		-2.5
DT-343	04/26/10	See location plan	6	854.1	86.1	25.4	68.7	70.2	28.3	BAS-11	97.8	X		-2.9
DT-344	04/27/10	See location plan	6	854.1	83.4	23.9	67.3	67.0	24.0	BAS-7	100+	X		-0.1
DT-345	04/27/10	See location plan	6	854.1	84.3	24.6	67.7	67.0	24.0	BAS-7	100+	X		0.6
DT-346	04/27/10	See location plan	6	854.1	83.7	22.7	68.2	67.0	24.0	BAS-7	100+	X		-1.3

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Shield Engineering, Inc.

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SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-347	04/27/10	See location plan	6	854.1	81.3	22.2	66.5	67.0	24.0	BAS-7	99.3	X		-1.8
DT-348	04/28/10	See location plan	6	854.1	88.0	25.5	70.1	70.2	28.3	BAS-11	99.9	X		-2.8
DT-349	04/28/10	See location plan	6	854.1	88.3	25.1	70.6	70.2	28.3	BAS-11	100+	X		-3.2
DT-350	04/28/10	See location plan	6	854.1	87.7	25.5	69.9	70.2	28.3	BAS-11	99.5	X		-2.8
DT-351	04/28/10	See location plan	6	854.1	85.5	27.5	67.1	70.2	28.3	BAS-11	95.5	X		-0.8
DT-352	04/28/10	See location plan	6	854.1	88.0	25.1	70.3	70.2	28.3	BAS-11	100+	X		-3.2
DT-353	04/28/10	See location plan	6	854.1	86.7	24.8	69.5	70.2	28.3	BAS-11	99.0	X		-3.5
DT-354	05/05/10	See location plan	6	854.1	80.4	24.5	64.6	67.0	24.0	BAS-7	96.4	X		0.5
DT-355	05/05/10	See location plan	6	854.1	78.6	19.3	65.9	67.0	24.0	BAS-7	98.3	X		-4.7
DT-356	05/05/10	See location plan	6	854.1	77.1	18.2	65.2	67.0	24.0	BAS-7	97.4	X		-5.8
DT-357	05/05/10	See location plan	6	854.1	80.7	23.3	65.5	67.0	24.0	BAS-7	97.7	X		-0.7
DT-358	05/05/10	See location plan	6	854.1	80.1	17.9	67.9	67.0	24.0	BAS-7	100+	X		-6.1
DT-359	05/05/10	See location plan	6	854.1	78.6	17.1	67.1	67.0	24.0	BAS-7	100+	X		-6.9
DT-360	05/06/10	See location plan	6	856.0	82.5	19.6	69.0	70.2	28.3	BAS-11	98.3	X		-8.7
DT-361	05/06/10	See location plan	6	856.0	81.0	20.4	67.3	70.2	28.3	BAS-11	95.8	X		-7.9
DT-362	05/06/10	See location plan	6	856.0	84.3	20.8	69.8	70.2	28.3	BAS-11	99.4	X		-7.5
DT-363	05/06/10	See location plan	6	856.0	84.9	23.0	69.0	70.2	28.3	BAS-11	98.3	X		-5.3
DT-364	05/06/10	See location plan	6	856.0	82.8	21.4	68.2	70.2	28.3	BAS-11	97.2	X		-6.9
DT-365	05/06/10	See location plan	6	856.0	81.6	20.7	67.6	70.2	28.3	BAS-11	96.3	X		-7.6
DT-366	05/07/10	See location plan	6	856.0	98.2	28.5	76.4	76.3	30.7	BAS-24	100+	X		-2.2
DT-367	05/07/10	See location plan	6	856.0	92.5	27.9	72.3	76.3	30.7	BAS-24	94.8		X	-2.8
DT-368	05/07/10	See location plan	6	856.0	95.2	28.6	74.0	76.3	30.7	BAS-24	97.0	X		-2.1
DT-369	05/07/10	See location plan	6	856.0	93.4	30.9	71.4	76.3	30.7	BAS-24	93.5		X	0.2
DT-369R	05/07/10	See location plan	6	856.0	94.6	27.5	74.2	76.3	30.7	BAS-24	97.2	X		-3.2
DT-370	05/07/10	See location plan	6	856.0	92.2	26.3	73.0	76.3	30.7	BAS-24	95.7	X		-4.4
DT-371	05/07/10	See location plan	6	856.0	90.7	27.9	70.9	76.3	30.7	BAS-24	92.9		X	-2.8
DT-371R	05/07/10	See location plan	6	856.0	94.0	28.9	72.9	76.3	30.7	BAS-24	95.6	X		-1.8
DT-372	5/10/2010	See location plan	6	856.0	85.2	29.2	65.9	67.9	28.5	BAS-12	97.1	X		0.7
DT-373	5/10/2010	See location plan	6	856.0	84.3	28.0	65.9	67.9	28.5	BAS-12	97.0	X		-0.5
DT-374	5/10/2010	See location plan	6	856.0	86.1	27.8	67.4	67.9	28.5	BAS-12	99.2	X		-0.7
DT-375	5/10/2010	See location plan	6	856.0	86.4	32.5	65.2	67.9	28.5	BAS-12	96.0	X		4
DT-376	5/10/2010	See location plan	6	856.0	87.7	30.1	67.4	67.9	28.5	BAS-12	99.3	X		1.6
DT-377	5/10/2010	See location plan	6	856.0	89.5	27.0	70.5	67.9	28.5	BAS-12	100+	X		-1.5
DT-377R	5/10/2010	See location plan	6	856.0	87.3	26.2	69.2	67.9	28.5	BAS-12	100+	X		-2.3
DT-378	5/12/2010	See location plan	6	856.0	75.9	20.5	63.0	67.0	24.0	BAS-7	94.0		X	-3.5
DT-379	5/12/2010	See location plan	6	856.0	79.8	21.3	65.8	67.0	24.0	BAS-7	98.2	X		-2.7
DT-380	5/12/2010	See location plan	6	856.0	76.2	21.3	62.8	67.0	24.0	BAS-7	93.8		X	-2.7
DT-380R	5/12/2010	See location plan	6	856.0	77.1	20.7	63.9	67.0	24.0	BAS-7	95.3	X		-3.3
DT-381	5/12/2010	See location plan	6	856.0	78.0	21.4	64.3	67.0	24.0	BAS-7	95.9	X		-2.6
DT-382	5/12/2010	See location plan	6	856.0	76.8	19.4	64.3	67.0	24.0	BAS-7	96.0	X		-4.6
DT-383	5/12/2010	See location plan	6	856.0	78.0	19.8	65.1	67.0	24.0	BAS-7	97.2	X		-4.2
DT-384	5/13/2010	See location plan	6	856.0	83.7	28.0	65.4	67.0	24.0	BAS-7	97.6	X		4.0
DT-385	5/13/2010	See location plan	6	856.0	83.1	26.1	65.9	67.0	24.0	BAS-7	98.4	X		2.1
DT-386	5/13/2010	See location plan	6	856.0	83.4	24.9	66.8	67.0	24.0	BAS-7	99.7	X		0.9
DT-387	5/13/2010	See location plan	6	856.0	83.7	29.1	64.8	67.0	24.0	BAS-7	96.8	X		5.1
DT-388	5/13/2010	See location plan	6	856.0	84.0	24.3	67.6	67.0	24.0	BAS-7	100+	X		0.3
DT-389	5/13/2010	See location plan	6	856.0	82.8	24.7	66.4	67.0	24.0	BAS-7	99.1	X		0.7
DT-390	5/18/2010	See location plan	6	856.0	91.6	34.0	68.4	67.9	28.5	BAS-12	100+	X		5.5
DT-391	5/18/2010	See location plan	6	856.0	90.0	36.5	65.9	67.9	28.5	BAS-12	97.1	X		8
DT-392	5/18/2010	See location plan	6	856.0	89.5	34.4	66.6	67.9	28.5	BAS-12	98.1	X		5.9
DT-393	5/18/2010	See location plan	6	856.0	91.6	36.4	67.2	67.9	28.5	BAS-12	98.9	X		7.9

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MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-394	5/18/2010	See location plan	6	856.0	89.5	33.1	67.2	67.9	28.5	BAS-12	99.0	X		4.6
DT-395	5/18/2010	See location plan	6	856.0	91.6	35.7	67.5	67.9	28.5	BAS-12	99.4	X		7.2
DT-396	5/19/2010	See location plan	6	856.0	85.5	31.9	64.8	66.6	30.2	BAS-21	97.3	X		1.7
DT-397	5/19/2010	See location plan	6	856.0	84.6	34.4	62.9	66.6	30.2	BAS-21	94.5		X	4.2
DT-398	5/19/2010	See location plan	6	856.0	88.3	30.8	67.5	66.6	30.2	BAS-21	100+	X		0.6
DT-399	5/19/2010	See location plan	6	856.0	83.4	34.4	62.1	66.6	30.2	BAS-21	93.2		X	4.2
DT-399R	5/19/2010	See location plan	6	856.0	86.1	29.0	66.7	66.6	30.2	BAS-21	100+	X		-1.2
DT-400	5/19/2010	See location plan	6	856.0	85.5	29.9	65.8	66.6	30.2	BAS-21	98.8	X		-0.3
DT-401	5/19/2010	See location plan	6	856.0	86.1	28.7	66.9	66.6	30.2	BAS-21	100+	X		-1.5
DT-402	5/21/2010	See location plan	6	856.0	89.5	31.5	68.1	67.9	28.5	BAS-12	100+	X		3
DT-403	5/21/2010	See location plan	6	856.0	90.1	31.2	68.7	67.9	28.5	BAS-12	100+	X		2.7
DT-404	5/21/2010	See location plan	6	856.0	90.7	32.8	68.3	67.9	28.5	BAS-12	100+	X		4.3
DT-405	5/21/2010	See location plan	6	856.0	88.3	35.1	65.4	67.9	28.5	BAS-12	96.3	X		6.6
DT-406	5/21/2010	See location plan	6	856.0	91.3	32.6	68.9	67.9	28.5	BAS-12	100+	X		4.1
DT-407	5/21/2010	See location plan	6	856.0	89.2	33.4	66.9	67.9	28.5	BAS-12	98.5	X		4.9
DT-408	5/25/2010	See location plan	6	858.0	84.1	29.5	64.9	67.9	28.5	BAS-12	95.6	X		1
DT-409	5/25/2010	See location plan	6	858.0	78.7	26.8	62.1	61.5	26.0	BAS-1	100+	X		0.8
DT-410	5/25/2010	See location plan	6	858.0	79.3	25.8	63.0	61.5	26.0	BAS-1	100+	X		-0.2
DT-411	5/25/2010	See location plan	6	858.0	83.5	24.8	66.9	67.9	28.5	BAS-12	98.5	X		-3.7
DT-412	5/25/2010	See location plan	6	858.0	81.1	25.3	64.7	67.9	28.5	BAS-12	95.3	X		-3.2
DT-413	5/25/2010	See location plan	6	858.0	83.5	23.1	67.8	67.9	28.5	BAS-12	99.9	X		-5.4
DT-414	5/27/2010	See location plan	6	859.0	81.7	20.6	67.7	67.0	24.0	BAS-7	100+	X		-3.4
DT-415	5/27/2010	See location plan	6	859.0	81.1	21.3	66.9	67.0	24.0	BAS-7	99.8	X		-2.7
DT-416	5/27/2010	See location plan	6	859.0	74.5	19.8	62.2	67.0	24.0	BAS-7	92.8		X	-4.2
DT-416R	5/27/2010	See location plan	6	859.0	78.1	19.8	65.2	67.0	24.0	BAS-7	97.3	X		-4.2
DT-417	5/27/2010	See location plan	6	859.0	80.5	25.1	64.3	67.0	24.0	BAS-7	96.0	X		1.1
DT-418	5/27/2010	See location plan	6	859.0	76.9	38.7	55.4	67.0	24.0	BAS-7	82.8		X	14.7
DT-418R	5/27/2010	See location plan	6	859.0	81.1	26.1	64.3	67.0	24.0	BAS-7	96.0	X		2.1
DT-419	5/27/2010	See location plan	6	859.0	78.7	9.9	71.6	67.0	24.0	BAS-7	--		X	-14.1
DT-419R	5/27/2010	See location plan	6	859.0	79.3	26.2	62.8	61.5	26.0	BAS-1	100+	X		0.2
DT-420	6/2/2010	See location plan	6	859.0	86.1	32.7	64.9	67.9	28.5	BAS-12	95.6	X		4.2
DT-421	6/2/2010	See location plan	6	859.0	87.3	31.6	66.3	67.9	28.5	BAS-12	97.7	X		3.1
DT-422	6/2/2010	See location plan	6	859.0	85.5	30.8	65.4	67.9	28.5	BAS-12	96.3	X		2.3
DT-423	6/2/2010	See location plan	6	859.0	86.1	31.5	65.5	67.9	28.5	BAS-12	96.4	X		3.0
DT-424	6/2/2010	See location plan	6	859.0	86.4	29.0	67.0	67.9	28.5	BAS-12	98.6	X		0.5
DT-425	6/2/2010	See location plan	6	859.0	87.3	31.5	66.4	67.9	28.5	BAS-12	97.8	X		3.0
DT-426	6/3/2010	See location plan	6	859.0	84.9	27.1	66.8	67.9	28.5	BAS-12	98.4	X		-1.4
DT-427	6/3/2010	See location plan	6	859.0	85.2	28.6	66.3	67.9	28.5	BAS-12	97.6	X		0.1
DT-428	6/3/2010	See location plan	6	859.0	84.6	25.9	67.2	67.9	28.5	BAS-12	99.0	X		-2.6
DT-429	6/3/2010	See location plan	6	859.0	84.0	27.6	65.8	67.9	28.5	BAS-12	97.0	X		-0.9
DT-430	6/3/2010	See location plan	6	859.0	85.5	28.5	66.5	67.9	28.5	BAS-12	98.0	X		0.0
DT-431	6/3/2010	See location plan	6	859.0	84.9	31.1	64.8	67.9	28.5	BAS-12	95.4	X		2.6
DT-432	6/4/2010	See location plan	6	859.0	85.5	29.9	65.8	67.9	28.5	BAS-12	96.9	X		1.4
DT-433	6/4/2010	See location plan	6	859.0	84.6	30.4	64.9	67.9	28.5	BAS-12	95.5	X		1.9
DT-434	6/4/2010	See location plan	6	859.0	85.2	28.4	66.4	67.9	28.5	BAS-12	97.7	X		-0.1
DT-435	6/4/2010	See location plan	6	859.0	83.1	29.6	64.1	67.9	28.5	BAS-12	94.4		X	1.1
DT-436	6/4/2010	See location plan	6	859.0	86.1	28.7	66.9	67.9	28.5	BAS-12	98.5	X		0.2
DT-437	6/4/2010	See location plan	6	859.0	83.1	29.2	64.3	67.9	28.5	BAS-12	94.7		X	0.7
DT-438	6/8/2010	See location plan	6	859.0	81.9	28.3	63.8	67.0	24.0	BAS-7	95.3	X		4.3
DT-439	6/8/2010	See location plan	6	859.0	81.9	27.8	64.1	67.0	24.0	BAS-7	95.6	X		3.8
DT-440	6/8/2010	See location plan	6	859.0	81.9	19.9	68.3	67.0	24.0	BAS-7	100+	X		-4.1

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

Shield Engineering, Inc.

4301 Taggart Creek Road, Charlotte, NC 28208 (704) 394-6913

SUMMARY OF IN-PLACE DENSITY TEST DATA FOR ASH LANDFILL MATERIAL

MARSHALL STEAM STATION - ASH LANDFILL

TABLE 1

PROJECT # 1002083-03

TEST NO.	DATE	LOCATION	TEST DEPTH (inches)	APPROXIMATE GRADE ELEVATION	WET DENSITY (pcf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	PROCTOR NUMBER	PERCENT COMPACTION (%)	MEETS ACCEPTANCE COMPACTION CRITERIA		MOISTURE BIAS (%)
												YES	NO	
DT-441	6/8/2010	See location plan	6	859.0	82.8	29.7	63.8	67.0	24.0	BAS-7	95.3	X		5.7
DT-442	6/8/2010	See location plan	6	859.0	82.5	29.2	63.9	67.0	24.0	BAS-7	95.3	X		5.2
DT-443	6/8/2010	See location plan	6	859.0	83.1	28.8	64.5	67.0	24.0	BAS-7	96.3	X		4.8
DT-444	06/09/10	See location plan	6	859.0	83.7	28.2	65.3	66.6	30.2	BAS-21	98.0	X		-2.0
DT-445	06/09/10	See location plan	6	859.0	85.2	27.8	66.7	66.6	30.2	BAS-21	100+	X		-2.4
DT-446	06/09/10	See location plan	6	859.0	83.7	26.7	66.1	66.6	30.2	BAS-21	99.2	X		-3.5
DT-447	06/09/10	See location plan	6	859.0	84.0	28.5	65.4	66.6	30.2	BAS-21	98.2	X		-1.7
DT-448	06/09/10	See location plan	6	859.0	84.0	26.8	66.2	66.6	30.2	BAS-21	99.5	X		-3.4
DT-449	06/09/10	See location plan	6	859.0	84.9	28.7	66.0	66.6	30.2	BAS-21	99.1	X		-1.5
DT-450	06/17/10	See location plan	6	862.0	86.4	31.3	65.8	67.9	28.5	BAS-12	96.9	X		2.8
DT-451	06/17/10	See location plan	6	862.0	88.6	31.1	67.6	67.9	28.5	BAS-12	99.5	X		2.6
DT-452	06/17/10	See location plan	6	862.0	86.7	30.2	66.6	67.9	28.5	BAS-12	98.1	X		1.7
DT-453	06/17/10	See location plan	6	862.0	88.3	33.2	66.3	67.9	28.5	BAS-12	97.6	X		4.7
DT-454	06/17/10	See location plan	6	862.0	86.7	31.3	66.0	67.9	28.5	BAS-12	97.2	X		2.8
DT-455	06/17/10	See location plan	6	862.0	88.6	31.2	67.5	67.9	28.5	BAS-12	99.5	X		2.7
DT-456	06/18/10	See location plan	6	862.0	82.2	23.7	66.5	67.9	28.5	BAS-12	97.9	X		-4.8
DT-457	06/18/10	See location plan	6	862.0	85.5	23.8	69.1	67.9	28.5	BAS-12	100+	X		-4.7
DT-458	06/18/10	See location plan	6	862.0	82.5	22.6	67.3	67.9	28.5	BAS-12	99.1	X		-5.9
DT-459	06/18/10	See location plan	6	862.0	81.3	23.5	65.8	67.9	28.5	BAS-12	97.0	X		-5.0
DT-460	06/18/10	See location plan	6	862.0	81.0	19.8	67.6	67.9	28.5	BAS-12	99.6	X		-8.7
DT-461	06/18/10	See location plan	6	862.0	80.7	21.8	66.3	67.9	28.5	BAS-12	97.6	X		-6.7
DT-462	06/23/10	See location plan	6	862.0	81.3	26.1	64.5	67.0	24.0	BAS-7	96.2	X		2.1
DT-463	06/23/10	See location plan	6	862.0	82.5	27.4	64.8	67.0	24.0	BAS-7	96.7	X		3.4
DT-464	06/23/10	See location plan	6	862.0	82.2	24.3	66.1	67.0	24.0	BAS-7	98.7	X		0.3
DT-465	06/23/10	See location plan	6	862.0	80.7	25.8	64.1	67.0	24.0	BAS-7	95.7	X		1.8
DT-466	06/23/10	See location plan	6	862.0	83.1	26.7	65.6	67.0	24.0	BAS-7	97.9	X		2.7
DT-467	06/23/10	See location plan	6	862.0	84.0	28.1	65.6	67.0	24.0	BAS-7	97.9	X		4.1
DT-468	06/29/10	See location plan	6	862.0	79.8	22.3	65.2	67.9	28.5	BAS-12	96.1	X		-6.2
DT-469	06/29/10	See location plan	6	862.0	80.4	22.5	65.6	67.9	28.5	BAS-12	96.7	X		-6.0
DT-470	06/29/10	See location plan	6	862.0	86.1	24.3	69.3	67.9	28.5	BAS-12	100+	X		-4.2
DT-471	06/29/10	See location plan	6	862.0	81.3	25.0	65.0	67.9	28.5	BAS-12	95.8	X		-3.5
DT-472	06/29/10	See location plan	6	862.0	81.9	23.0	66.6	67.9	28.5	BAS-12	98.1	X		-5.5
DT-473	06/29/10	See location plan	6	862.0	81.9	22.5	66.9	67.9	28.5	BAS-12	98.5	X		-6.0

NOTE: Moisture Bias is the difference between the field moisture content and the optimum moisture content
The Duke Energy specification indicates +/- 5% of optimum moisture content

DT - Indicates Drive Tube Density Test
DT-#-R - Indicates Retest
DT-#-SB - Indicates Soil Buffer Test
DT-#-SG- Indicates Subgrade Test
DT-#-CS- Indicates Cover Soils Test
DT-#-SL- Indicates Test on Slope

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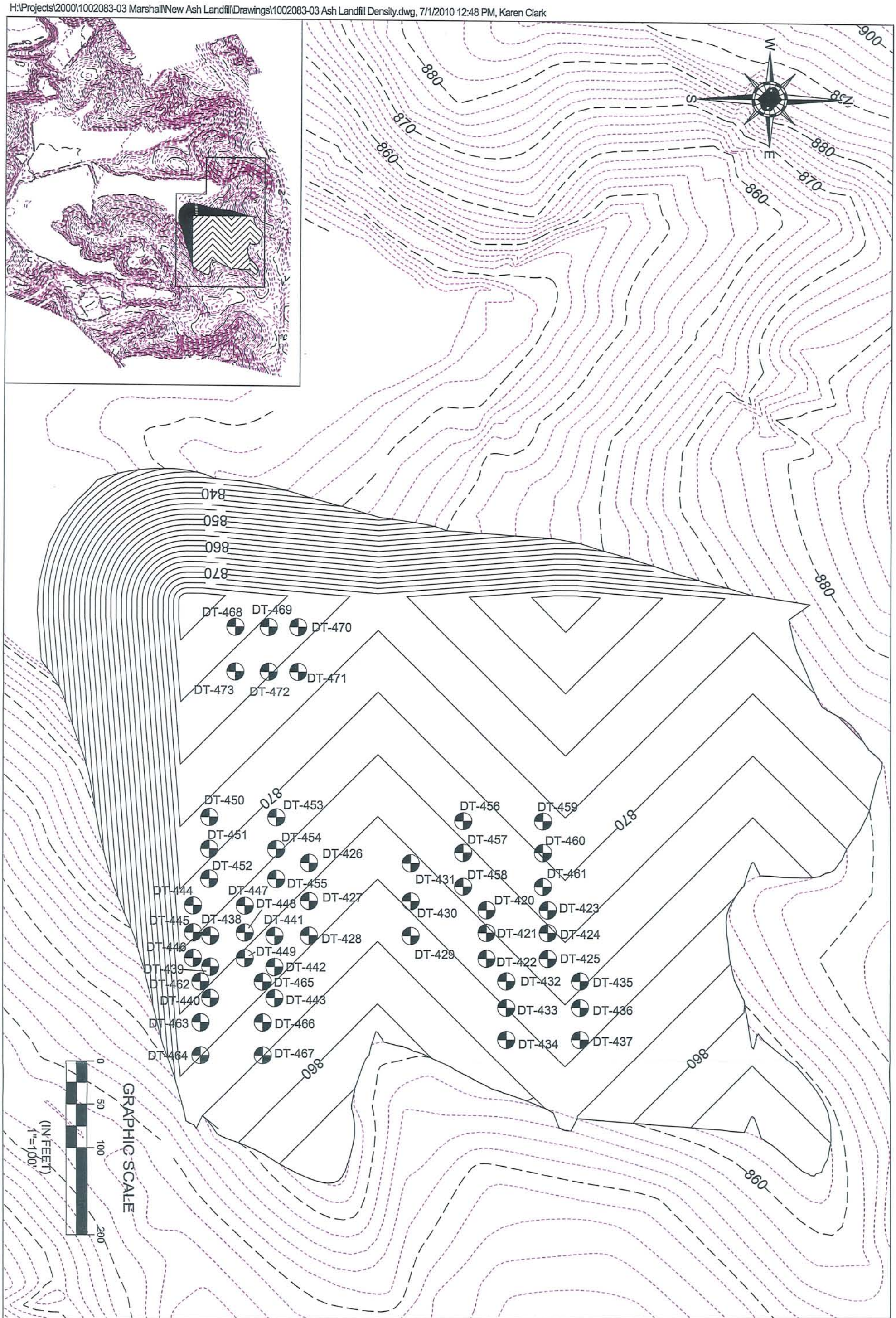

SHEET: 1	DENSITY TEST LOCATION PLAN JUNE 2010	SHEET TITLE:	DRAWING NAME:1002083-03 Ash Landfill Density.dwg
			DRAWN BY: KJC
			FILE NUMBER: 1002083-03
			CHECKED BY: KAA
			SCALE: 1"=100'
			DATE: 07/01/10

PROJECT NAME:
MARSHALL STEAM STATION
8320 EAST NC HIGHWAY 150
TERRELL, PRJ CNTY, NC

CLIENT NAME:
DUKE ENERGY CAROLINAS, INC.
8320 EAST NC HIGHWAY 150
TERRELL, NORTH CAROLINA 28682

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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: Mar SHALL Steam Station	**Shield No.:**	**Client No.:**
Client Name: DUKE ENERGY	**Task No.:**	**Date:** 6-2-10
Inspection of: Fill Fly Ash Low Land/Fill	**Technician:** Elis Rejal	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield con site to observed fill at Mar SHALL Steam Station

Shield performed 6 Drive Tubes 1 one point.

All Test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rejal
Printed Name

Signature

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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL STEAM STATION		**Shield No.:**	**Client No.:**
Client Name: DUKE ENERGY		**Task No.:**	**Date:** 6-2-1
Inspection of: FILL PLAN / NEW LANDFILL		**Technician:** ELIS PEÑA	

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Drive Tube\Nuclear Density Data

Test No.	420	421	422	423	424	425		
Grade or Elevation	857							
Location								
Wt. Wet Soil & Mold	4.18	4.23	4.18	4.20	4.21	4.24		
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34		
Wt. Wet soil	2.86	2.9	2.84	2.86	2.87	2.9		
Volume Mold	0.0332							
Wet Density	86.1	87.3	85.5	86.1	86.4	87.3		
Wt. Wet soil & Pan	460.3	460.7	401.1	511.3	461.3	460.5		
Wt. Dry soil & Pan	404.5	407	350.6	472.9	410.2	406.9		
Wt. Pan	234.1	236.8	186.5	354.1	234.1	236.8		
Moisture Lost	55.8	53.7	50.5	37.4	51.1	53.6		
Wt. Dry soil	170.5	170.2	164.1	118.8	176.1	170.1		
% Moisture	32.7	31.6	30.8	31.5	29	31.5		
Dry Density	64.9	66.3	65.4	65.5	67	66.4		
Maximum Dry Density	67.9							
Optimum Moisture	28.5							
% Compaction	95.6	97.6	96.3	96.5	98.7	97.8		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.22
Wt. Mold	9.30
Wt. Wet soil	2.92
Volume Mold	0.0332
Wet Density	88.2
Wt. Wet soil & Pan	460.7
Wt. Dry soil & Pan	350.6
Wt. Pan	186.5
Moisture Lost	50.1
Wt. Dry soil	164.1
% Moisture	30.5
Dry Density	67.6

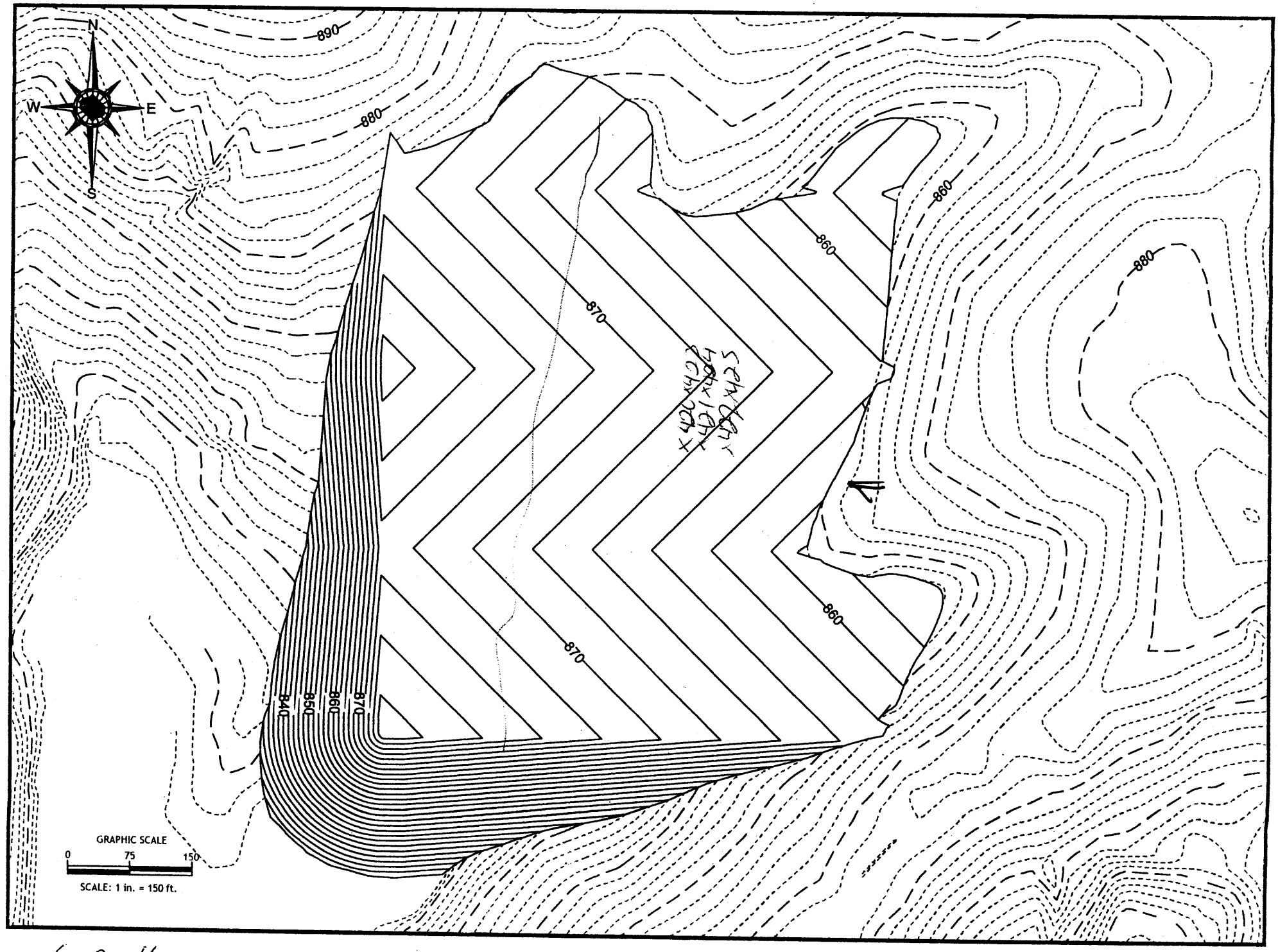
Additional Project Data

67.9 @ 28.5 BAS-12

JMP

ELIS PEÑA
Printed Name

Signature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GRAPHIC SCALE
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75
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SCALE: 1 in. = 150 ft.

6-2-11

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE ENERGY	**Task No.:**	**Date:** 6-3-10
Inspection of: FILL FLY ASH MOUNTAIN FILL	**Technician:** ELIS REAL	

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Shield on site to observe and performed FILL at MARSHALL STEAM STATION.

Shield performed 6 DRIVE TUBES 1 one point.

All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS REAL
Printed Name

Signature

f:\doc\forms\daily report.doc

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: DUKE ENERGY		**Task No.:**	**Date:** 6-3-11
Inspection of: FILL FLY ASH NEW LANDFILL		**Technician:** ELIS PAYNE	

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Drive Tube\Nuclear Density Data

Test No.	426	427	428	429	430	431		
Grade or Elevation	859							
Location								
Wt. Wet Soil & Mold	4.16	4.17	4.15	4.13	4.18	4.16		
Wt. Mold	1.34	1.34	1.34	1.34	1.34	1.34		
Wt. Wet soil	2.82	2.83	2.81	2.79	2.84	2.82		
Volume Mold	0.033							
Wet Density	84.9	85.2	84.6	84	85.5	84.9		
Wt. Wet soil & Pan	460.4	461.3	460.9	461.4	460.3	460.8		
Wt. Dry soil & Pan	413.1	411.4	414.3	412	410.1	407.7		
Wt. Pan	234.1	236.8	234.1	236.8	234.1	236.8		
Moisture Lost	48.6	49.9	46.6	48.4	50.2	53.1		
Wt. Dry soil	178	174.6	180.2	175.2	176	170.9		
% Moisture	27.1	28.6	25.9	27.6	28.5	31.1		
Dry Density	66.8	66.3	67.2	65.8	66.5	64.8		
Maximum Dry Density	67.9							
Optimum Moisture	28.5							
% Compaction	98.4	97.6	99	96.9	97.9	95.4		
Meets Criteria (Y\N)								

1 Point Proctor Data

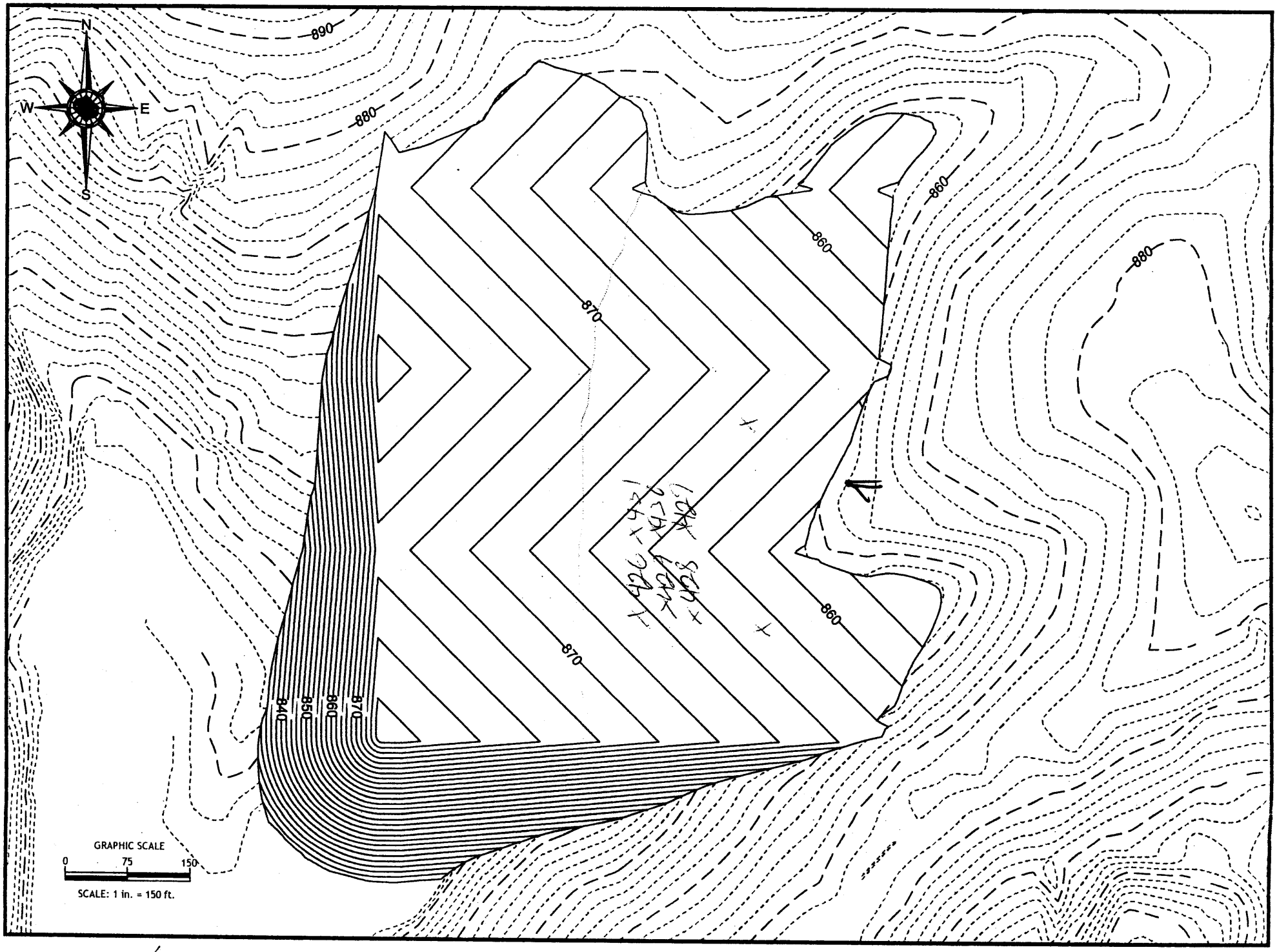
Wt. Wet Soil & Mold	6.17	
Wt. Mold	4.30	
Wt. Wet soil	2.87	
Volume Mold	0.033	
Wet Density	86.7	
Wt. Wet soil & Pan	442.3	
Wt. Dry soil & Pan	397.3	
Wt. Pan	234.1	
Moisture Lost	45	
Wt. Dry soil	163.2	
% Moisture	27.6	
Dry Density	67.9	

Additional Project Data

67.9 at 285 BAS-12

ELIS PAYNE
Printed Name

Signature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SCALE: 1 in. = 150 ft.

6-3-16

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 6-4-16
Inspection of: FILL FLY ASH NEW LAND/FILL	**Technician:** ELIS REYES	

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Shield on site to observed Fill Fly Ash at Marshall Steam Station.

Shield performed 6 drived Tubes 1 one point.

All test meets criteria.

EXCEPT #435 @ 94.4 %

#437 @ 94.7 %

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS REYES
Printed Name

Signature

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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: DUKE ENERGY		**Task No.:**	**Date:** 6-4-16
Inspection of: FILL FLY ASH NEW LANDFILL		**Technician:** ELIS REYES	

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Drive Tube\Nuclear Density Data

Test No.	432	433	434	435	436	437	
Grade or Elevation	559						
Location							
Wt. Wet Soil & Mold	4.16	4.14	4.17	4.10	4.20	4.10	
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34	
Wt. Wet soil	2.84	2.81	2.83	2.76	2.86	2.76	
Volume Mold	0.032						
Wet Density	85.5	84.6	85.2	83.1	86.1	83.1	
Wt. Wet soil & Pan	460.7	460.9	460.6	510.8	447.4	440.9	
Wt. Dry soil & Pan	406.2	406.3	352.4	473	377.5	391	
Wt. Pan	223.7	228.2	182.4	36.1	223.7	228.2	
Moisture Lost	54.5	54.9	48.2	37.8	49.9	49.9	
Wt. Dry soil	182.5	178.1	170	127.9	173.8	170.8	
% Moisture	29.9	30.4	28.4	29.6	28.7	29.2	
Dry Density	65.8	64.9	66.4	64.1	66.9	64.3	
Maximum Dry Density	67.9						
Optimum Moisture	28.5						
% Compaction	96.9	95.6	97.8	94.4	98.5	94.7	
Meets Criteria (Y\N)							

1 Point Proctor Data

Wt. Wet Soil & Mold	4.17	
Wt. Mold	1.32	
Wt. Wet soil	2.87	
Volume Mold	0.031	
Wet Density	86.4	86.7
Wt. Wet soil & Pan	415.7	
Wt. Dry soil & Pan	363.9	
Wt. Pan	182.4	
Moisture Lost	51.8	
Wt. Dry soil	181.5	
% Moisture	28.5	
Dry Density	67.2	67.3

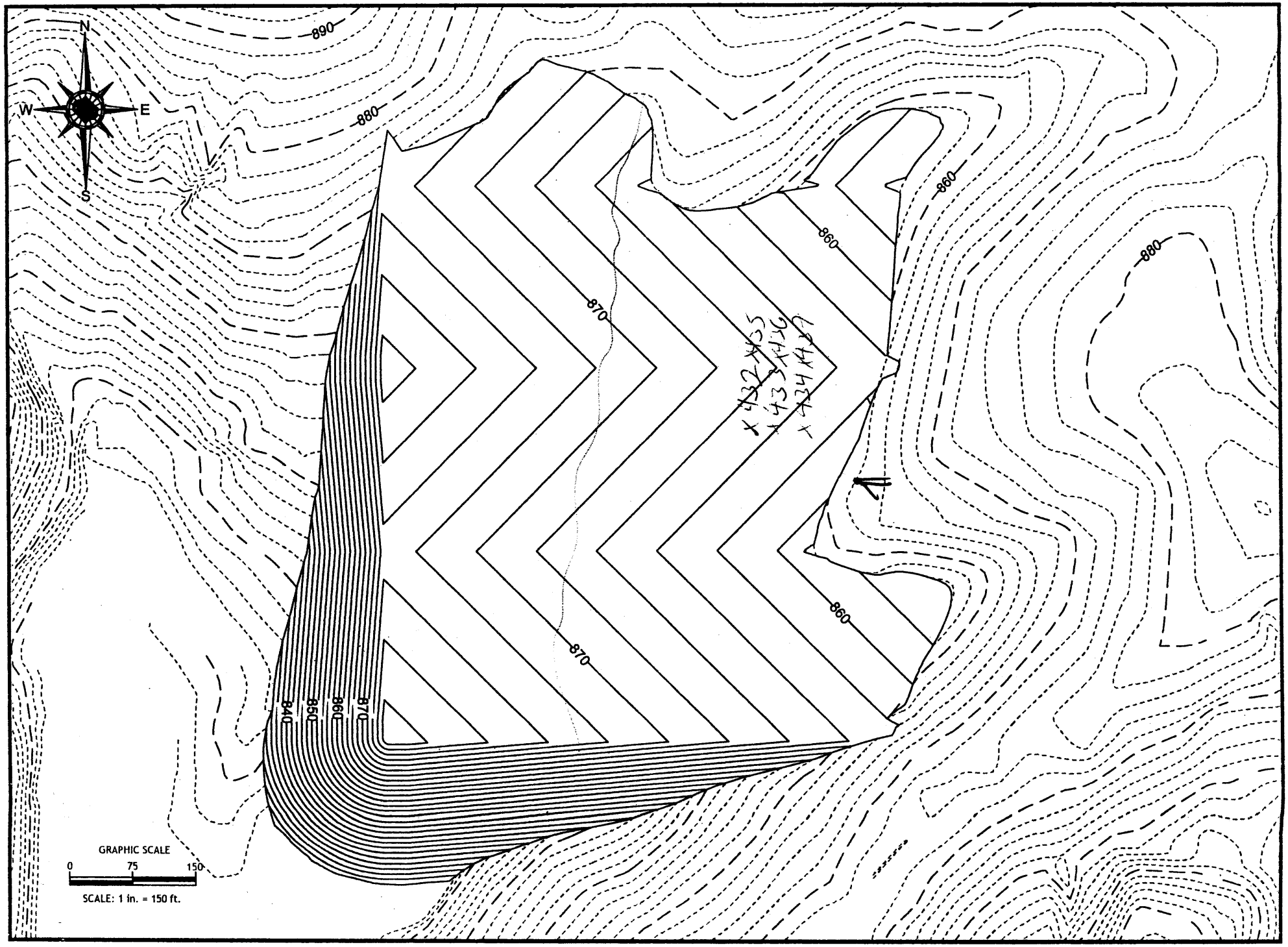
Additional Project Data

67.9 at 28.5 BAS-12

ME

ELIS REYES
Printed Name

Signature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SCALE: 1 in. = 150 ft.

6-4-11

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 07-10
Inspection of: FILL FLY ASH NEW LANDFILL	**Technician:** ELIS REYES	

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Shield arrived around 9:30 AM. After passed CILOS ~~road~~ road was blocked with mud and water. Shield observed that Truck (~~OFF HIGHWAY~~) Articulated could pass mud and water. Mud and water was almost to Top of Big Tires.

Shield call Carl Ton All read to informed that ~~AX~~ road was blocked. He recommended to come back next day.

Shield informed Jeanette Prosser. She recommended to write report.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS REYES
Printed Name

Signature

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 6-8-10
Inspection of: FILL FLYASH NEW LANDFILL	**Technician:** ELIS PEJAS	

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Shield on site to observe fill at MARSHALL DUKE POWER STEAM STATION.

Shield performed 6 drive tubes and 1 one point.

All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS PEJAS
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MAYSHALL		**Shield No.:**	**Client No.:**
Client Name: DUKE POWER		**Task No.:**	**Date:** 6-3-10
Inspection of: FILLING ASH NEW POND FILL		**Technician:** ELIS PEPAS	

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Drive Tube\Nuclear Density Data

Test No.	438	439	440	441	442	443		
Grade or Elevation	859							
Location								
Wt. Wet Soil & Mold	4.04	4.05	4.06	4.07	4.08	4.10		
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34		
Wt. Wet soil	2.72	2.72	2.72	2.75	2.74	2.76		
Volume Mold	0.0332							
Wet Density	81.9	81.9	81.9	82.8	82.5	83.1		
Wt. Wet soil & Pan	450.5	450.6	400.4	504.6	450	450.7		
Wt. Dry soil & Pan	401.1	402.2	364.3	468.5	399.5	401		
Wt. Pan	226.3	228.4	183	346.9	226.3	228.4		
Moisture Lost	49.4	48.4	36.1	36.1	50.5	49.7		
Wt. Dry soil	174.8	173.8	181.3	121.6	173.2	172.6		
% Moisture	28.3	27.8	19.9	29.7	29.2	28.8		
Dry Density	63.8	64.1	68.3	63.8	63.9	64.5		
Maximum Dry Density	67							
Optimum Moisture	24							
% Compaction	95.2	95.7	101.9	95.2	95.4	96.3		
Meets Criteria (Y\N)								

1 Point Proctor Data

Wt. Wet Soil & Mold	12.18
Wt. Mold	9.30
Wt. Wet soil	2.88
Volume Mold	0.0331
Wet Density	87
Wt. Wet soil & Pan	388.3
Wt. Dry soil & Pan	342.5
Wt. Pan	183
Moisture Lost	45.8
Wt. Dry soil	159.5
% Moisture	28.7
Dry Density	67.6

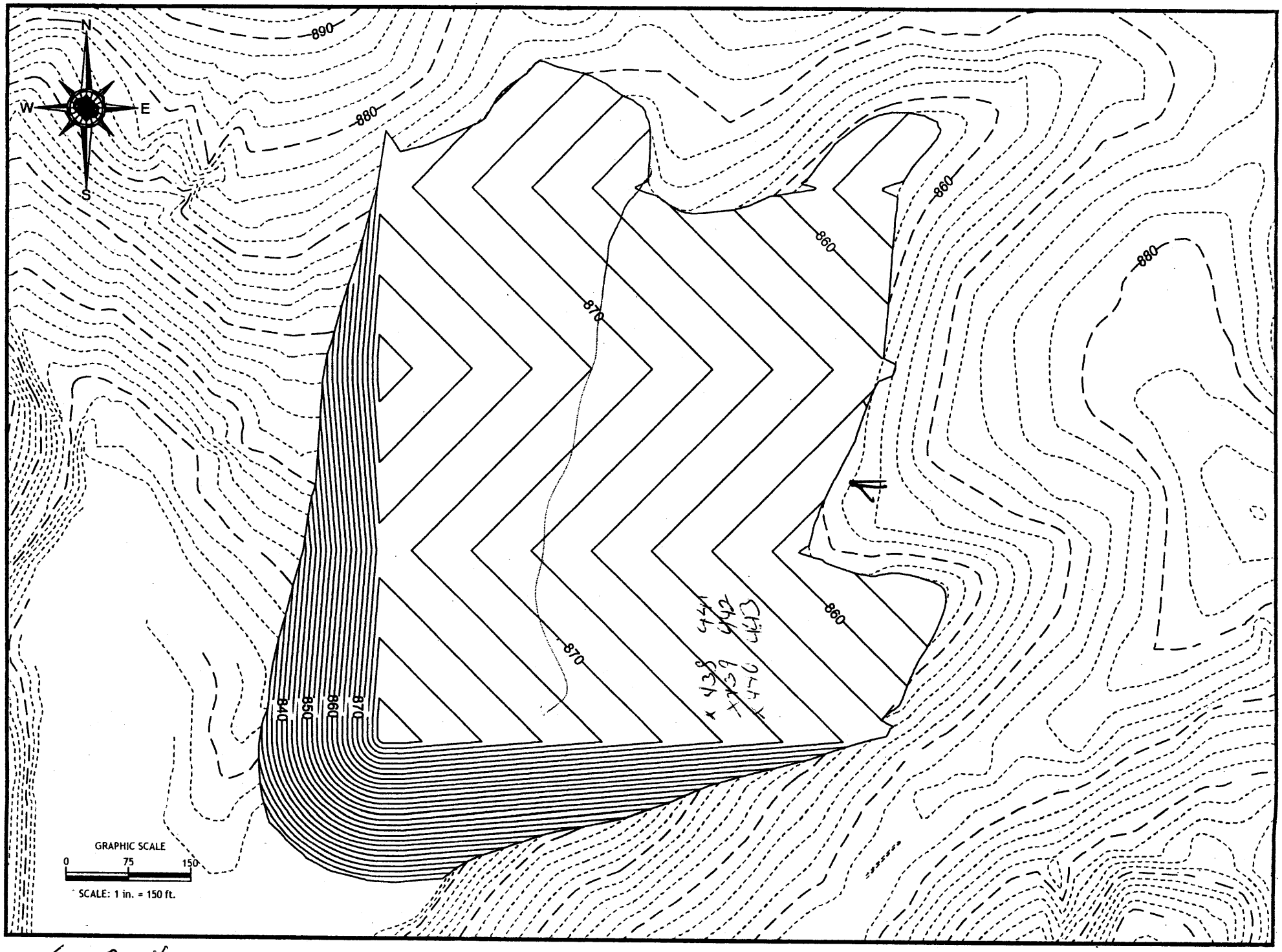
Additional Project Data

~~67.9 28.5 BAS-12~~

67 at 24 BD-7

ELIS PEPAS
Printed Name

Signature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SCALE: 1 in. = 150 ft.

6-8-11

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 09-10
Inspection of: FILL FLYASH NEW PAVE/FILL	**Technician:** ELIS RUIZ	

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Shield on site to performed 6 drive Tubes and one point at MARSHALL Steam Station.
All drived Tubes test meets criteria.
One point test was collected to be performed on lab.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS RUIZ
Printed Name

Signature

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: DUKE POWER		**Task No.:**	**Date:** 6-9-10
Inspection of: FILL FLY ASH NEW LAND FILL		**Technician:** ELIS PGS	

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Drive Tube\Nuclear Density Data

Test No.	444	445	446	447	448	449	
Grade or Elevation	859						
Location							
Wt. Wet Soil & Mold	4.10	4.16	4.12	4.13	4.13	4.16	
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34	
Wt. Wet soil	2.78	2.83	2.78	2.79	2.79	2.82	
Volume Mold	0.0332						
Wet Density	83.7	85.2	83.7	84	84	84.9	
Wt. Wet soil & Pan	460.2	460.4	397.2	500	465.5	465.5	
Wt. Dry soil & Pan	408.7	409.9	352.1	466	414.9	412.6	
Wt. Pan	226.3	228.4	183	346.9	226.3	228.4	
Moisture Lost	51.5	50.5	45.1	34	50.6	52.9	
Wt. Dry soil	182.4	181.5	169.1	119.1	188.6	184.2	
% Moisture	28.2	27.8	26.7	28.5	26.8	28.7	
Dry Density	65.3	66.6	66.1	65.4	66.2	66	
Maximum Dry Density	66.6						
Optimum Moisture	30.2						
% Compaction	98	100	99.2	98.2	99.4	99.1	
Meets Criteria (Y\N)							

1 Point Proctor Data

Wt. Wet Soil & Mold	12.26	
Wt. Mold	7.30	
Wt. Wet soil	2.93	
Volume Mold	PM-4	
Wet Density	88.25	
Wt. Wet soil & Pan	1497.5	1497.5
Wt. Dry soil & Pan	1229.5	
Wt. Pan	187.2	
Moisture Lost	269	
Wt. Dry soil	1041.3	
% Moisture	25.8	
Dry Density	70.2	

Additional Project Data

~~BAS-7~~

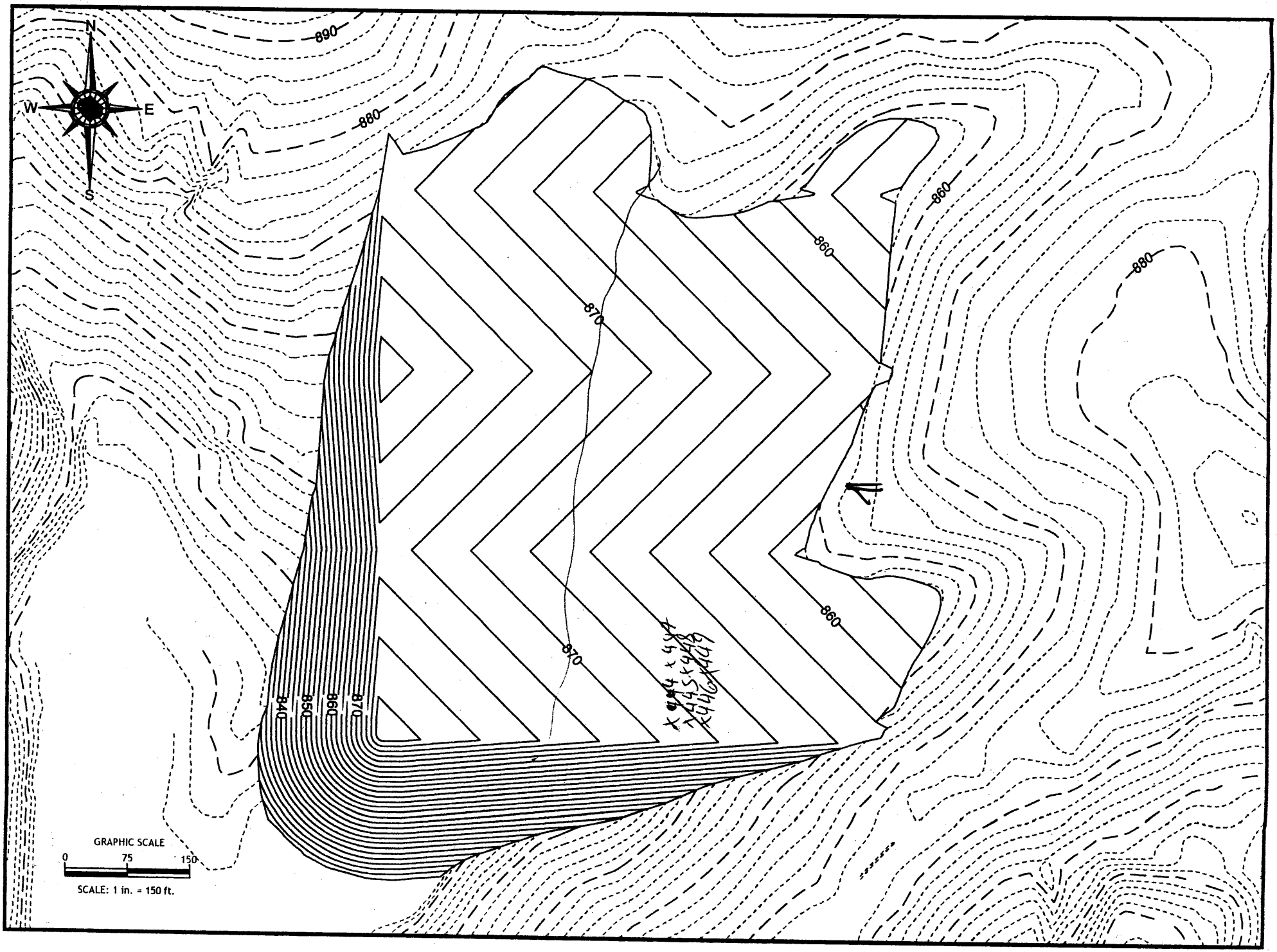
66.6 30.2 / BAS-21

JMP

ELIS PGS
Printed Name

Signature

TUBE LAB OVEN #1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SCALE: 1 in. = 150 ft.

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 6-16-10
Inspection of: FILL FLY ASH	**Technician:** ELIS PEÑAS	

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Shield on site to observed Fill Fly Ash at MARSHALL STEAM STATION.

After silos road to level fill was block by Mud. Shield informed CARLTON All rel. He recommended to come back another day.

Jeanette Prosser was informed.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS PEÑAS
Printed Name

Signature

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 6-17-10
Inspection of: FILL FLY ASH NEW PAVE/FILL	**Technician:** ELIS ROJAS	

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Shield on site to observe fill at MARSHALL Steam Power Station.
Shield performed 6 drive tubes and 1 one point on fly ash.
All test meets criteria.

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

ELIS ROJAS
Printed Name

Signature

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Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	Shield No.:	Client No.:
Client Name: DUKE POWER	Task No.:	Date: 6-17-10
Inspection of: FILLING ASH UNWIND FILL	Technician: ELIS ROJAS	

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Drive Tube\Nuclear Density Data

Test No.	450	451	452	453	454	455
Grade or Elevation	862					
Location						
Wt. Wet Soil & Mold	4.19	4.27	4.22	4.27	4.22	4.28
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34
Wt. Wet soil	2.87	2.94	2.88	2.93	2.88	2.94
Volume Mold	0.0331					
Wet Density	86.4	88.6	86.7	88.3	86.7	88.6
Wt. Wet soil & Pan	460.2	462.2	399	499.3	461.2	458.5
Wt. Dry soil & Pan	404.7	404.7	347	468.7	404.9	401.7
Wt. Pan	225.1	219.9	174.6	336.5	225.1	219.9
Moisture Lost	56	57.5	52	40.6	56.3	56.8
Wt. Dry soil	179.1	184.8	172.4	122.2	179.8	181.8
% Moisture	31.3	31.1	30.2	33.2	31.3	31.2
Dry Density	65.8	67.6	66.6	66.3	66	67.5
Maximum Dry Density	67.9					
Optimum Moisture	28.5					
% Compaction	96.9	99.6	98.1	97.6	97.2	99.4
Meets Criteria (Y\N)						

1 Point Proctor Data

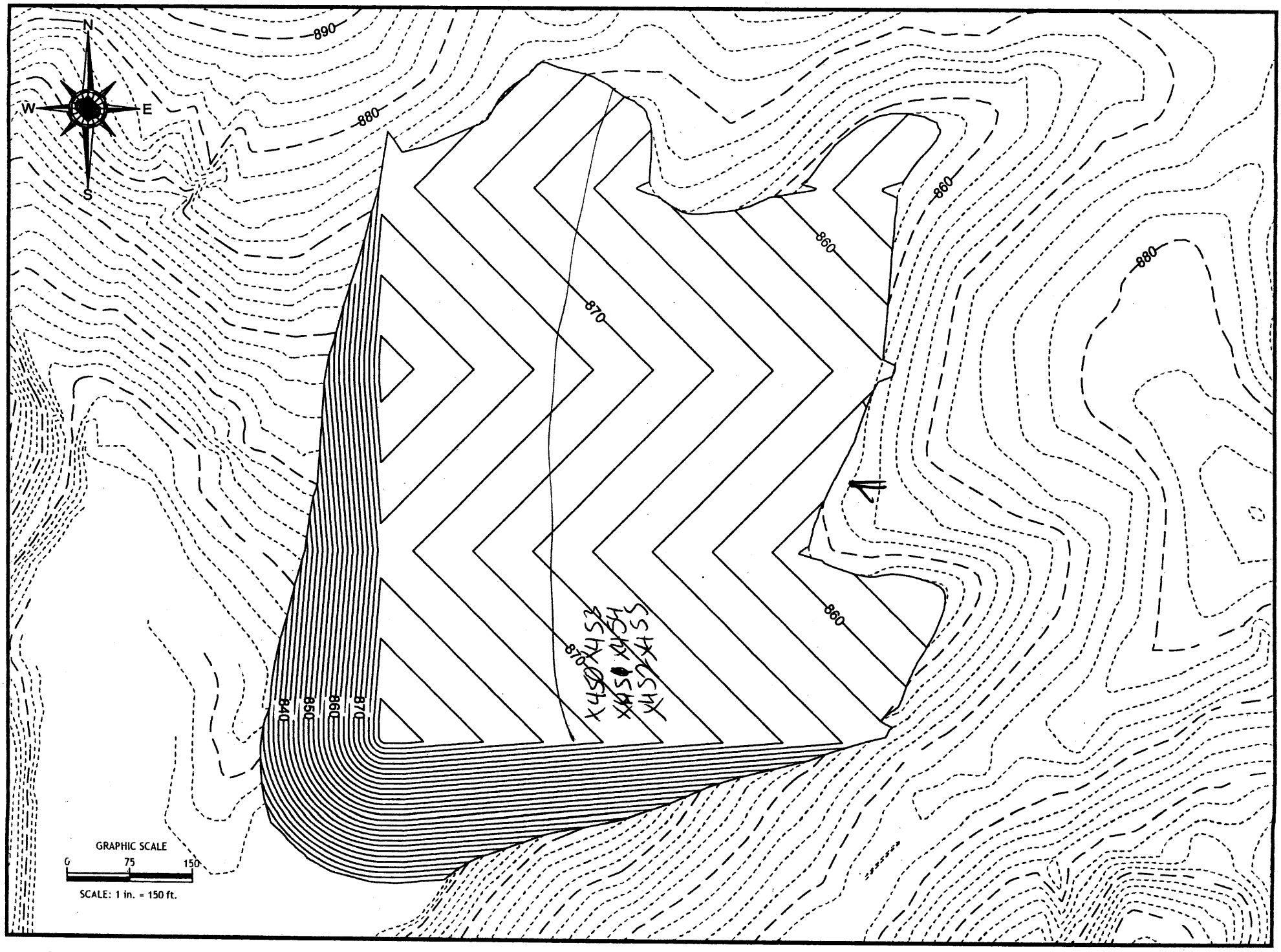
Wt. Wet Soil & Mold	9.34
Wt. Mold	9.30
Wt. Wet soil	3.04
Volume Mold	0.0331
Wet Density	91.8
Wt. Wet soil & Pan	396
Wt. Dry soil & Pan	345
Wt. Pan	174.6
Moisture Lost	51
Wt. Dry soil	170.4
% Moisture	29.9
Dry Density	70.7

Additional Project Data

67.9 28.5 BAS-12

ELIS ROJAS
Printed Name

Signature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SCALE: 1 in. = 150 ft.

6-17-10

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: DUKE POWER	**Task No.:**	**Date:** 6-18-10
Inspection of: Fill Fly Ash New pond Fill	**Technician:** Elis Rojas	

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Shield on site to observed Fill Fly Ash at MARSHALL Steam Power Station.
Shield performed 6 drive Tubes and 1 one point
All test meets criteria.

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Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: DUKE POWER		**Task No.:**	**Date:** 6-18-10
Inspection of: FILL FLY ASH NEW YARD FILL		**Technician:** ELIS PAGAS	

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Drive Tube\Nuclear Density Data

Test No.	456	457	458	459	460	461	
Grade or Elevation	862						
Location							
Wt. Wet Soil & Mold	4.05	4.17	4.08	4.04	4.03	4.07	
Wt. Mold	1.32	1.33	1.34	1.34	1.34	1.34	
Wt. Wet soil	2.73	2.84	2.74	2.7	2.69	2.68	
Volume Mold	0.0332						
Wet Density	82.2	85.5	82.5	81.3	81	80.7	
Wt. Wet soil & Pan	465.8	464.9	400.4	411.6	461.8	462.9	
Wt. Dry soil & Pan	418.2	416.8	359.1	382	421.3	418.5	
Wt. Pan	217.1	214.4	171.3	256.3	217.1	214.4	
Moisture Lost	47.6	48.1	42.3	29.6	40.5	44.4	
Wt. Dry soil	201.1	202.4	186.8	125.7	204.2	204.1	
% Moisture	23.7	23.8	22.6	23.5	19.8	21.8	
Dry Density	66.5	69.1	67.3	65.8	67.6	66.2	
Maximum Dry Density	67.9						
Optimum Moisture	28.5						
% Compaction	97.9	101.8	99.1	96.9	99.6	97.6	
Meets Criteria (Y\N)							

1 Point Proctor Data

Wt. Wet Soil & Mold	4.17	
Wt. Mold	1.30	
Wt. Wet soil	2.87	
Volume Mold	0.0332	
Wet Density	86.4	86.7
Wt. Wet soil & Pan	403.9	
Wt. Dry soil & Pan	359.8	
Wt. Pan	171.3	
Moisture Lost	44.1	
Wt. Dry soil	188.5	
% Moisture	23.4	
Dry Density	70	70.3

Additional Project Data

67.9 28.5 BAS-12

JMP

ELIS PAGAS
Printed Name

Signature

SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL	**Shield No.:**	**Client No.:**
Client Name: Duke Power	**Task No.:**	**Date:** 6-23-16
Inspection of: Fill New Land Fill Flyash	**Technician:** Elis Rojas	

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form. Interpretations bases on this data are the responsibility of others.

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Shield on site to performed (DT) Drived Tubes at MARSHALL Steam Station.

Shield performed 6 Drive Tubes and 1 one point

All test meets criteria

White Copy: Shield Representative
Yellow Copy: Contractor, Client or Owner
Pink Copy: Inspector or Superintendent

Elis Rojas
Printed Name

Signature

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SHIELD ENGINEERING, INC.

Shield Engineering, Inc.
4301 Taggart Creek Road, Charlotte, NC 28208
Telephone 704-394-6913 Fax 704-394-6968

Project Name: MARSHALL		**Shield No.:**	**Client No.:**
Client Name: DUKE POWER		**Task No.:**	**Date:** 6-23-10
Inspection of: Fly Ash Landfill		**Technician:** Elis Pozzi	

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Drive Tube\Nuclear Density Data

Test No.	462	463	464	465	466	467	
Grade or Elevation	862						
Location							
Wt. Wet Soil & Mold	4.02	4.07	4.05	4.01	4.08	4.12	
Wt. Mold	1.35	1.33	1.32	1.33	1.32	1.33	
Wt. Wet soil	2.7	2.74	2.73	2.68	2.76	2.79	
Volume Mold	0.0332						
Wet Density	81.3	82.5	82.2	80.7	83.1	84	
Wt. Wet soil & Pan	468.3	461.9	457.9	460.3	460.1	462	
Wt. Dry soil & Pan	408.7	408.8	411.6	410	409.2	407.7	
Wt. Pan	218.8	215.2	218.8	215.2	218.8	215.2	
Moisture Lost	49.6	53.1	46.3	50.3	50.4	54.3	
Wt. Dry soil	189.9	193.6	192.3	194.8	190.4	192.7	
% Moisture	26.1	27.4	24.3	25.8	26.7	28.1	
Dry Density	64.5	64.8	66.1	64.1	65.6	65.6	
Maximum Dry Density	67						
Optimum Moisture	24.0						
% Compaction	96.3	96.7	98.7	95.7	97.9	97.9	
Meets Criteria (Y\N)							

1 Point Proctor Data

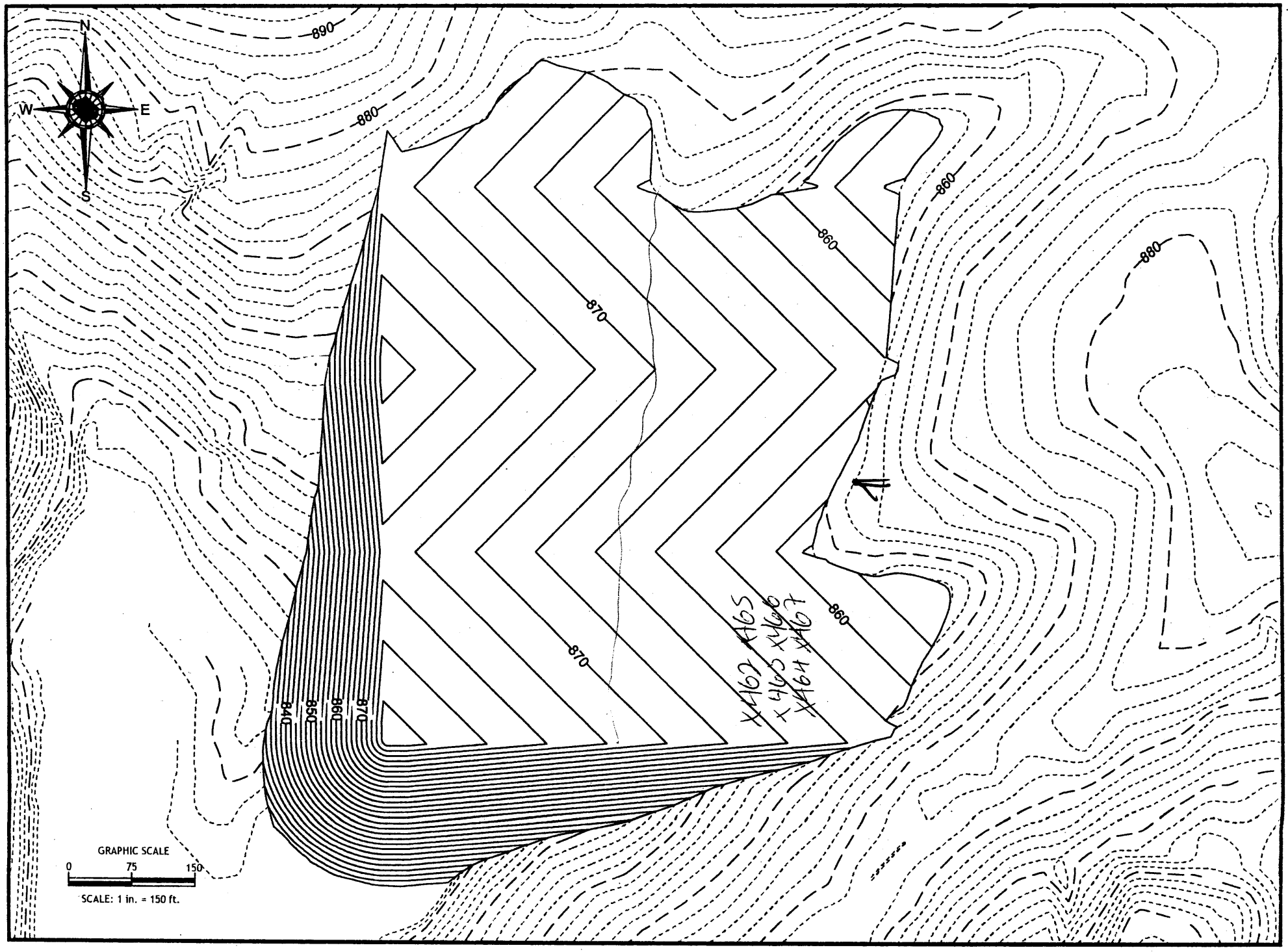
Wt. Wet Soil & Mold	12.08	
Wt. Mold	9.31	
Wt. Wet soil	2.78	
Volume Mold	0.0331	
Wet Density	84	
Wt. Wet soil & Pan	397.3	
Wt. Dry soil & Pan	348.9	
Wt. Pan	170.7	
Moisture Lost		
Wt. Dry soil		
% Moisture	24.7	
Dry Density	67.3	

Additional Project Data

67 at 24.0 BAS-7

Elis Pozzi
Printed Name

Signature


N
W
E
S
890
880
860
870
840
850
860
870
X162 X165
X165 X166
X164 X167
GRAPHIC SCALE
0
75
150
SCALE: 1 in. = 150 ft.

6-23-11

Shield Engineering, Inc.
4301 Taggart Creek Rd, Charlotte NC 28208
Telephone 704-394-6913 Fax 704-394-6968

DAILY REPORT

Project Name: MARSHALL STEAM STATION **Client's Name: DUKE ENERGY** **Observation of: Ash Landfill Density**	**Contractor:** **SHIELD Job No. 1002083-01** **Rev: 0 Date: 6-29-10 Tue**

This report and the attached data sheet(s) constitute a summary of observations and tests performed by Shield's engineering technicians. The statements made herein do not constitute a certificate. Approval of data for final report can only be made by Shield's engineers and cannot be conveyed on this form unless the signature of the certifying engineer is attached below. Interpretations based on this data are the responsibility of others.

Onsite: 8:15am **Off Site: 10:00 am**

Weather: Mostly Sunny, warm
Personnel on site: Richard A. Meerholz, Technician

Shield arrived on the pad at about 8:30. Trackdozer was placing ash along an east-west line on the south side of the pad. The operator said that today would be the last day on this current pad because it is scheduled to be covered with soil cover. He said the water truck operator has an area on the southwest corner ready for testing.

Obtained 6 drive tubes and a bucket sample for a 1-point in the southwest corner.

Liner was observed being placed in the new cell to the north of the current active cell.

Soil cover was observed being placed on a section of the ash landfill north of the current active cell. See attached sketch.

Water truck was watering the middle section of the active cell.

Due to limited time available on site the 6 drive tubes and bucket sample was taken to the Shield Laboratory for processing.

Left a message with Carlton in regards to information about what was happening with the ash testing.

CONTACT INFORMATION:

Duke Energy: Carlton Allred @ cell # 704.622.0907

Testing Conducted: Tests were conducted in the Laboratory, not in the field.
Equipment Used: Drive tubes, hammer and shovel.
Attachments: map/sketch of test locations and notes.
Reviewed by: Janette Prosser
Position: Senior Project Engineer
Company: Shield Engineering, Inc.
Report by: Richard A. Meerholz

SHIELD ENGINEERING, INC.

MOISTURE-DENSITY RELATIONSHIP

From 6/29/10 site visit by Richard M.

Project Name: Marshall	Project No: 1002083-03
Technician Name: JRS	Date: 6/30/10

	468	469	470	471	472	473	
Test No.	~~1~~	~~2~~	~~3~~	~~4~~	~~5~~	~~6~~	
Grade or Elevation	476						
Location							
Wt. Wet Soil & Mold	3.930	4.010	4.180	4.040	3.980	4.060	
Wt. Mold	1.280	1.340	1.320	1.340	1.260	1.340	
Wt. Wet Soil	2.650	2.670	2.860	2.700	2.720	2.720	
Volume Mold	0.0332	0.0332	0.0332	0.0332	0.0332	0.0332	
Wet Density	**79.82**	**80.42**	**86.14**	**81.33**	**81.93**	**81.93**	
Wt. Wet Soil & Pan	969.40	962.50	994.60	995.70	890.10	957.90	
Wt. Dry Soil & Pan	873.40	866.80	886.30	884.70	806.20	862.70	
Wt. Pan	442.6	441.4	440.5	441	441.5	438.8	
Moisture Lost	96.00	95.70	108.30	111.00	83.90	95.20	
Wt. Dry Soil	430.80	425.40	445.80	443.70	364.70	423.90	
% Moisture	**22.28%**	**22.50%**	**24.29%**	**25.02%**	**23.01%**	**22.46%**	
Dry Density	**65.27**	**65.65**	**69.31**	**65.05**	**66.61**	**66.90**	
Maximum Dry Density	67.9						
Optimum Moisture	24.5						
% Compaction							
Meets Criteria (Y/N)	Y						

SAS 2

see next sheet.

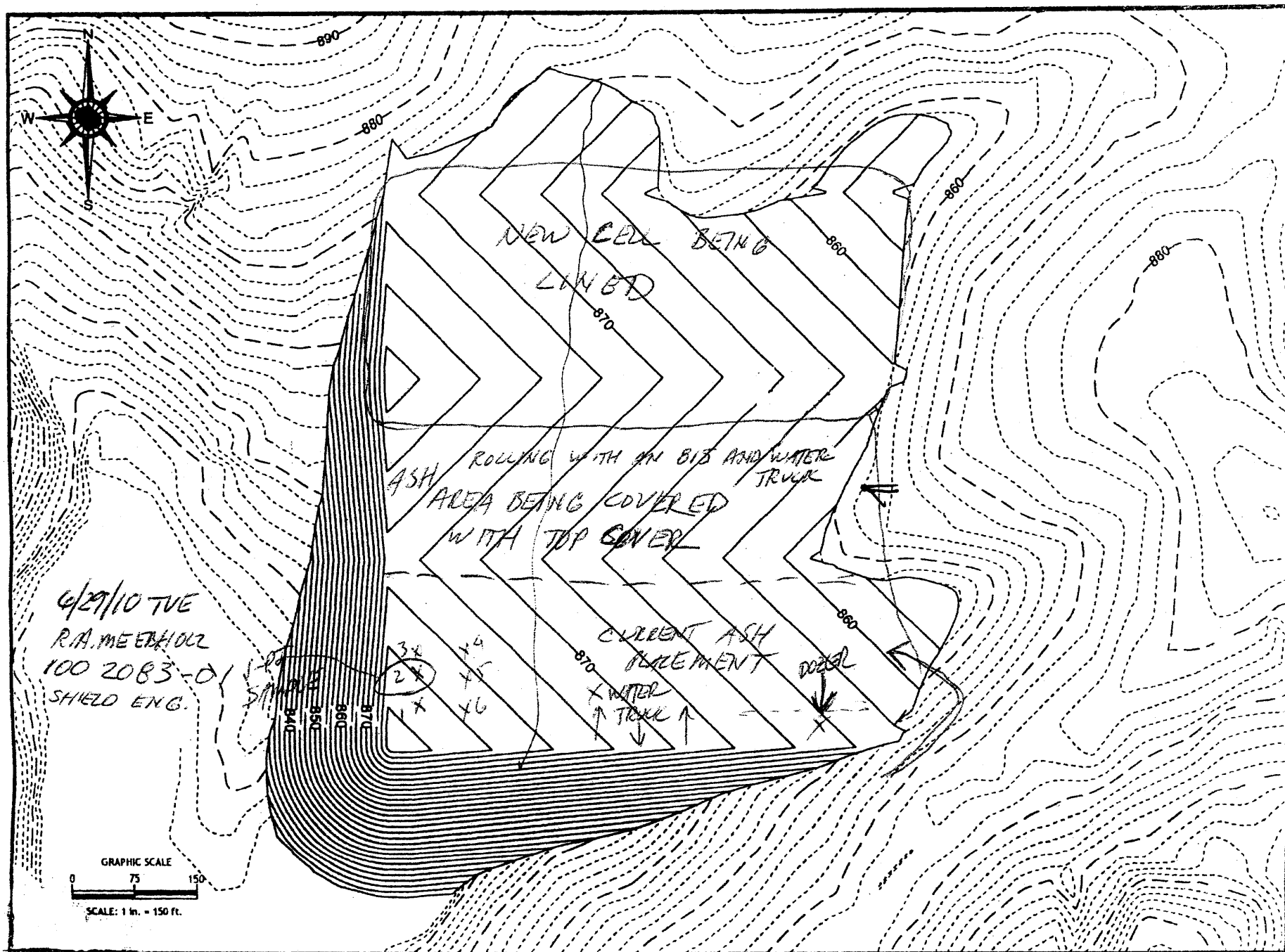
SHIELD ENGINEERING, INC.

MOISTURE-DENSITY RELATIONSHIP

Project Name: Marshall	Project No: 1002083-03
Technician Name: JRS	Date: 6/30/10

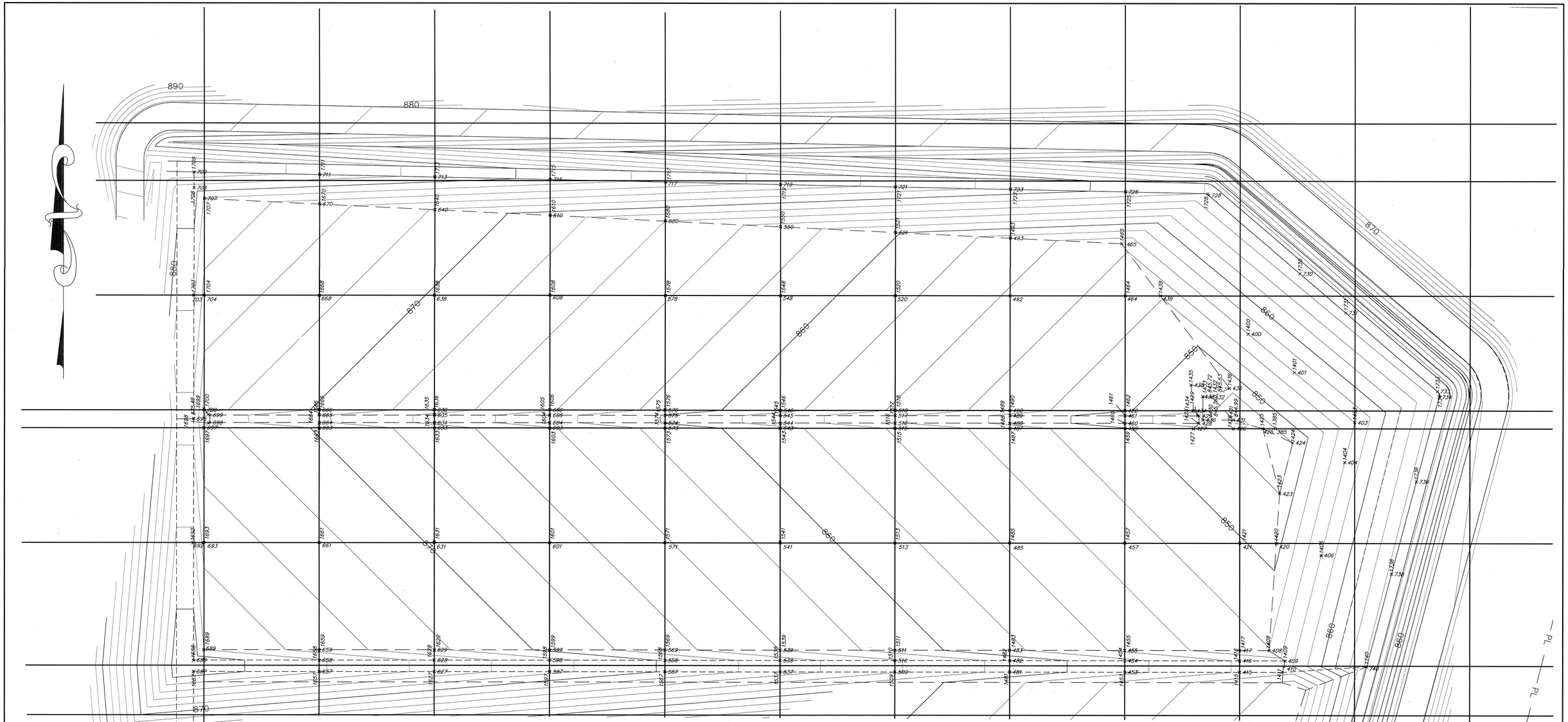
Test No.	**1-pt**						
Grade or Elevation							
Location							
Wt. Wet Soil & Mold	12.100						
Wt. Mold	9.320						
Wt. Wet Soil	2.780						
Volume Mold	0.0332						
Wet Density	**83.73**						
Wt. Wet Soil & Pan	573.00						
Wt. Dry Soil & Pan	548.10						
Wt. Pan	441.5						
Moisture Lost	24.90						
Wt. Dry Soil	106.60						
% Moisture	**23.36%**						
Dry Density	**67.88**						
Maximum Dry Density							
Optimum Moisture							
% Compaction							
Meets Criteria (Y/N)							

BAS-12
67.9@28.5



TEST #'s 468-473

Cell 1 Final Subgrade As-Built Drawing



Proposed Sub Grade		Verified Sub Grade		Proposed-Verified
Pt #	EL	Pt #	EL	Difference
385	848.00	1385	847.98	0.02
400	856.00	1400	855.91	0.09
401	856.00	1401	855.97	0.03
403	856.00	1403	855.96	0.04
404	856.00	1404	855.9	0.10
406	856.00	1406	855.92	0.08
408	852.07	1408	852.07	0.00
409	854.68	1409	854.68	0.00
410	854.71	1411	854.7	0.01
415	855.79	1415	855.74	0.05
416	855.79	1416	855.76	0.03
417	852.79	1417	852.78	0.01
420	849.28	1420	849.27	0.01
421	850.18	1421	850.17	0.01
423	847.98	1423	847.97	0.01
424	848.00	1424	847.98	0.02
425	846.82	1425	846.80	0.02
426	847.54	1426	847.47	0.07
427	848.50	1427	848.49	0.01
428	846.87	1428	846.85	0.02
429	846.87	1429	846.83	0.04
430	845.77	1430	845.76	0.01
431	845.04	1431	844.99	0.05
432	845.56	1432	845.53	0.03
433	845.77	1433	845.72	0.05
434	848.50	1434	848.44	0.06
435	849.20	1435	849.19	0.01
436	848.18	1436	848.18	0.00
439	852.12	1439	852.12	0.00

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified
Pt #	EL	Pt #	EL	Difference
453	858.59	1453	858.58	0.01
454	858.59	1454	858.58	0.01
455	855.59	1455	855.59	0.00
457	852.98	1457	852.97	0.01
459	850.18	1459	850.16	0.02
460	848.68	1460	848.63	0.05
461	848.68	1461	848.65	0.03
462	850.18	1462	850.11	0.07
464	853.11	1464	853.1	0.01
465	854.34	1465	854.33	0.01
481	861.39	1481	861.39	0.00
482	861.39	1482	861.33	0.06
483	858.39	1483	858.38	0.01
485	855.78	1485	855.74	0.04
487	852.98	1487	852.98	0.00
488	851.48	1488	851.42	0.06
489	851.48	1489	851.46	0.02
490	852.98	1490	852.97	0.01
493	857.18	1493	857.18	0.00
509	864.19	1509	864.19	0.00
510	864.19	1510	864.17	0.02
511	861.19	1511	861.19	0.00
513	858.58	1513	858.57	0.01
515	855.78	1515	855.76	0.02
516	854.28	1516	854.2	0.08
517	854.28	1517	854.21	0.07
518	855.78	1518	855.76	0.02
520	858.58	1520	858.56	0.02

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified
Pt #	EL	Pt #	EL	Difference
521	860.12	1521	860.07	0.05
537	866.99	1537	866.92	0.07
538	866.99	1538	866.91	0.08
539	863.99	1539	863.99	0.00
541	861.38	1541	861.33	0.05
543	858.58	1543	858.56	0.02
544	857.08	1544	857	0.08
545	857.08	1545	857.03	0.05
546	858.58	1546	858.56	0.02
548	861.38	1548	861.38	0.00
550	863.05	1550	863.04	0.01
567	869.79	1567	869.76	0.03
568	869.79	1568	869.77	0.02
569	866.79	1569	866.78	0.01
571	864.18	1571	864.18	0.00
573	861.38	1573	861.38	0.00
574	859.88	1574	859.86	0.02
575	859.88	1575	859.88	0.00
576	861.38	1576	861.35	0.03
578	864.18	1578	864.17	0.01
580	865.99	1580	865.95	0.04
599	869.59	1599	869.51	0.08
601	866.98	1601	866.98	0.00
603	864.18	1603	864.11	0.07
604	862.68	1604	862.65	0.03
605	862.68	1605	862.66	0.02
606	864.18	1606	864.17	0.01

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified
Pt #	EL	Pt #	EL	Difference
608	866.98	1608	866.96	0.02
610	868.93	1610	868.88	0.05
627	875.39	1627	875.39	0.00
628	875.39	1628	875.38	0.01
629	872.39	1629	872.39	0.00
631	869.78	1631	869.72	0.06
633	866.98	1633	866.98	0.00
635	865.48	1635	865.45	0.03
636	866.98	1636	866.97	0.01
638	869.78	1638	869.78	0.00
640	871.86	1640	871.83	0.03
657	878.19	1657	878.17	0.02
658	878.19	1658	878.18	0.01
659	875.19	1659	875.17	0.02
661	872.58	1661	872.58	0.00
663	869.78	1663	869.77	0.01
664	868.28	1664	868.21	0.07
665	868.28	1665	868.2	0.08
666	869.78	1666	869.76	0.02
668	872.58	1668	872.55	0.03
670	874.80	1670	874.77	0.03
687	881.24	1687	881.21	0.03
688	881.24	1688	881.22	0.02
689	878.00	1689	877.98	0.02
692	878.38	1692	878.29	0.09
693	875.38	1693	875.36	0.02
696	875.48	1696	875.46	0.02
697	872.58	1697	872.58	0.00

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified
Pt #	EL	Pt #	EL	Difference
698	870.94	1698	870.86	0.08
699	870.94	1699	870.87	0.07
700	872.58	1700	872.53	0.05
703	878.38	1703	878.36	0.02
704	875.38	1704	875.38	0.00
707	877.73	1707	877.71	0.02
708	881.00	1708	881	0.00
709	885.60	1709	885.5	0.10
711	883.41	1711	883.39	0.02
713	881.41	1713	881.4	0.01
715	879.40	1715	879.39	0.01
717	877.40	1717	877.39	0.01
719	875.39	1719	875.36	0.03
721	873.39	1721	873.37	0.02
723	871.39	1723	871.38	0.01
725	869.38	1725	869.37	0.01
728	867.80	1728	867.75	0.05
730	867.53	1730	867.5	0.03
731	867.40	1731	867.4	0.00
733	867.13	1733	867.13	0.00
734	866.96	1734	866.94	0.02
736	866.77	1736	866.76	0.01
738	866.57	1738	866.53	0.04
740	866.37	1740	866.36	0.01

NORTH CAROLINA PROFESSIONAL SEAL L-1290 LAND SURVEYOR RONALD LAWRENCE
11-22-10

FDL & assoc

Cell 1 Subgrade Verification Survey and As-Built

Marshall Steam Station Industrial Landfill No. 1

Terrell North Carolina

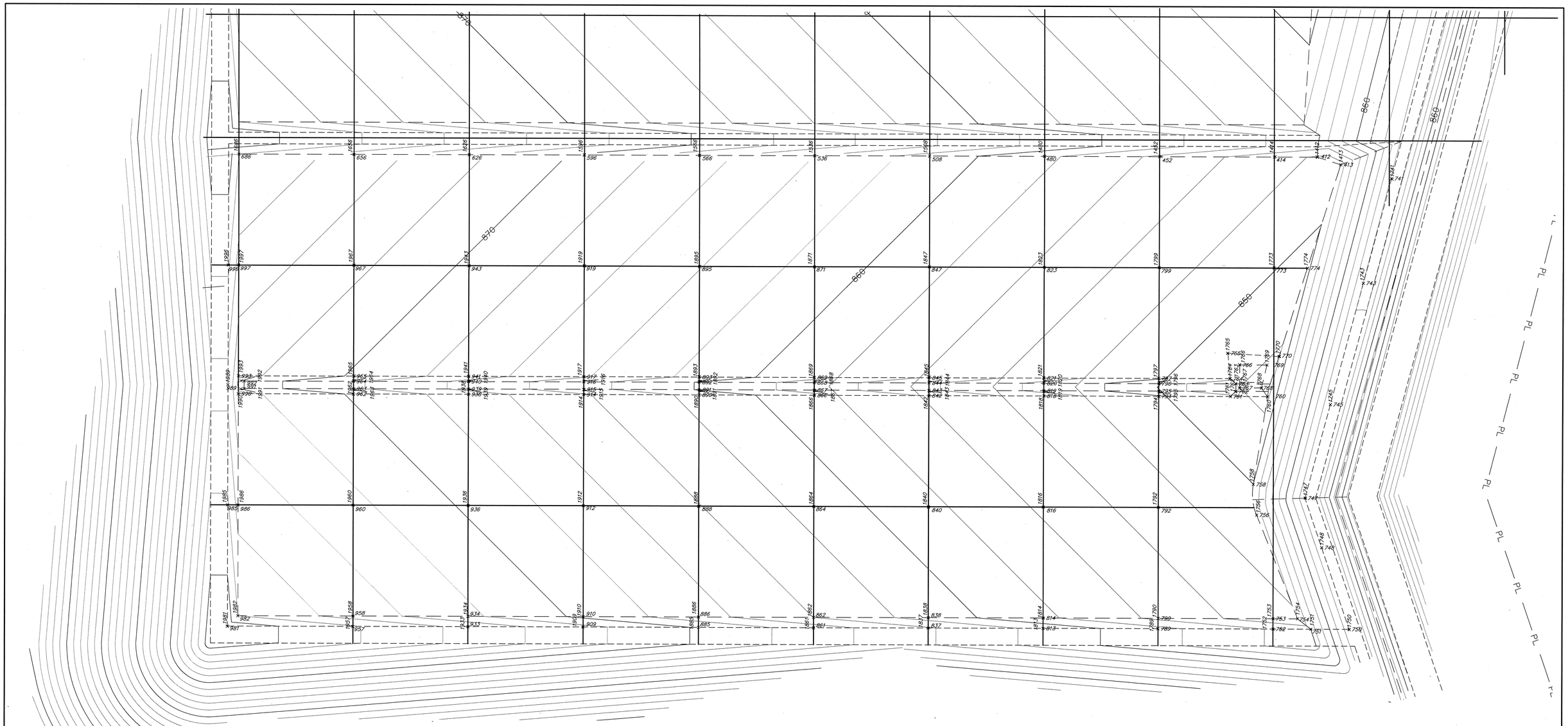
Orig. scale 1"=40' Date: 5/30/10

Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St.
Monroe, North Carolina 28111 (704) 289-1013

Drawn By: MCM
REVISIONS
6/03/10 MCM

Job No. 1345 Drawing file Cell 1 FDL 4-26-10-Submittal-Rev.dwg Drawing no.10/4.7

Cell 2 Final Subgrade As-Built Drawing



Proposed Sub Grade		Verified Sub Grade		Proposed-Verified
Pt#	EL	Pt#	EL	Difference
412	851.74	1412	851.69	-0.05
413	851.00	1413	850.98	-0.02
414	852.79	1414	852.72	-0.07
452	855.59	1452	855.53	-0.06
480	858.39	1480	858.32	-0.07
508	861.19	1508	861.14	-0.05
536	863.99	1536	863.94	-0.05
566	866.79	1566	866.71	-0.08
596	869.59	1596	869.56	-0.03
626	872.39	1626	872.34	-0.05
656	875.19	1656	875.14	-0.05
686	877.99	1686	877.95	-0.04
741	866.29	1741	866.26	-0.03
743	866.06	1743	866.00	-0.06
745	865.79	1745	865.71	-0.08
773	850.08	1773	850.08	-0.00
774	849.27	1774	849.21	-0.06
799	852.88	1799	852.87	-0.01
823	855.68	1823	855.64	-0.04
847	858.48	1847	858.45	-0.03
871	861.28	1871	861.28	-0.00
895	864.08	1895	864.06	-0.02
919	866.88	1919	866.85	-0.03
943	869.68	1943	869.66	-0.02
967	872.48	1967	872.45	-0.03
989	875.36	1989	875.36	-0.00
996	878.28	1996	878.25	-0.03
997	875.28	1997	875.2	-0.08

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified
Pt#	EL	Pt#	EL	Difference
747	865.59	1747	865.59	0.00
748	865.50	1748	865.46	-0.04
750	865.32	1750	865.30	-0.02
751	854.86	1751	854.86	0.00
752	855.79	1752	855.72	-0.07
753	852.79	1753	852.78	-0.01
754	852.19	1754	852.14	-0.05
756	850.67	1756	850.66	-0.01
758	850.01	1758	849.95	-0.06
760	847.52	1760	847.45	-0.07
761	848.43	1761	848.37	-0.06
762	846.80	1762	846.78	-0.02
763	846.80	1763	846.73	-0.07
764	848.43	1764	848.35	-0.08
765	849.12	1765	849.05	-0.07
766	845.70	1766	845.64	-0.06
767	845.70	1767	845.65	-0.05
768	845.18	1768	845.12	-0.06
769	845.05	1769	845.01	-0.04
770	847.80	1770	847.74	-0.06
789	858.59	1789	858.51	-0.08
790	855.59	1790	855.52	-0.07
792	852.88	1792	852.87	-0.01
794	850.18	1794	850.12	-0.06
795	848.68	1795	848.62	-0.06
796	848.68	1796	848.60	-0.08
797	850.18	1797	850.10	-0.08
813	861.39	1813	861.37	-0.02
814	858.39	1814	858.37	-0.02
816	855.68	1816	855.65	-0.03
818	852.98	1818	852.95	-0.03
819	851.48	1819	851.43	-0.05
820	851.48	1820	851.41	-0.07
821	852.98	1821	852.95	-0.03
837	864.19	1837	864.19	0.00
838	861.19	1838	861.18	-0.01
840	858.48	1840	858.47	-0.01
842	855.78	1842	855.75	-0.03
843	854.28	1843	854.22	-0.06
844	854.28	1844	854.20	-0.08
845	855.78	1845	855.72	-0.06
861	866.99	1861	866.98	-0.01
862	863.99	1862	863.98	-0.01
864	861.28	1864	861.26	-0.02
866	858.58	1866	858.58	0.00

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified
Pt#	EL	Pt#	EL	Difference
867	857.08	1867	857.02	-0.06
868	857.08	1868	857.03	-0.05
869	858.58	1869	858.56	-0.02
885	869.79	1885	869.73	-0.06
886	866.79	1886	866.76	-0.03
888	864.08	1888	864.08	0.00
890	861.38	1890	861.35	-0.03
891	859.88	1891	859.83	-0.05
892	859.88	1892	859.81	-0.07
893	861.38	1893	861.32	-0.06
909	872.59	1909	872.56	-0.03
910	869.59	1910	869.57	-0.02
912	866.88	1912	866.86	-0.02
914	864.18	1914	864.12	-0.06
915	862.68	1915	862.60	-0.08
916	862.68	1916	862.62	-0.06
917	864.18	1917	864.14	-0.04
933	875.39	1933	875.33	-0.06
934	872.39	1934	872.36	-0.03
936	869.68	1936	869.65	-0.03
938	866.98	1938	866.96	-0.02
939	865.48	1939	865.47	-0.01
940	865.48	1940	865.45	-0.03
941	866.98	1941	866.94	-0.04
957	878.19	1957	878.17	-0.02
958	875.19	1958	875.15	-0.04
960	872.48	1960	872.47	-0.01
962	869.78	1962	869.75	-0.03
963	868.28	1963	868.24	-0.04
964	868.28	1964	868.24	-0.04
965	869.78	1965	869.70	-0.08
981	881.24	1981	881.21	-0.03
982	877.99	1982	877.94	-0.05
985	878.28	1985	878.26	-0.02
986	875.28	1986	875.25	-0.03
990	872.58	1990	872.57	-0.01
991	870.94	1991	870.93	-0.01
992	870.94	1992	870.92	-0.02
993	872.58	1993	872.56	-0.02

Notes:

Points and grid as shown are for grading purposes only.
The certification grid is indicated by the bold grid lines.
Certification survey to include tops and toes of slopes

NORTH CAROLINA PROFESSIONAL SEAL L-3290 LAND SURVEYOR DONALD LAWRENCE
1-22-10

FDL & assoc

Cell 2 Subgrade Verification Survey and As-Built

Marshall Steam Station Industrial Landfill No. 1

Terrell North Carolina

Orig. scale 1"=40'

Date: 6/24/10

Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St.
Monroe, North Carolina 28111 (704) 289-1013

Drawn By: MCM
REVISIONS
Update 7-13-10

Job No. 1345 Drawing file Subgrade Cell 2 UPDATE.dwg Drawing no.10/47

APPENDIX I – EARTHWORKS
Section 2 – Structural Fill

Structural Fill Field Density Test Results

Structural Fill Field Density Test Results

STRUCTURAL FILL FIELD DENSITY TEST RESULTS

Test Information		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Moisture Content		Location
No.	Date	Type	Dry Density (lb/ft^3)	Moisture Content (%)	Dry Density (lb/ft^3)	Moisture Content (%)	Type	Ref. Curve	Maximum Dry Density (MDD) (lb/ft^3)	Optimum Moisture Content OMC (%)	Percent Specified (%)	Percent MDD In-Place (%)	Percent from OMC Specified (%)	Percent Above OMC In-Place (%)	
1	4/15/2010	D2937	92.0	26.5	90.8	20.6	D698	ED-2	94.5	25.0	95	**97**	+/- 3	**+1.5**	PERIMETER AND INTERCELL / INTERPHASE BERMS
2	4/15/2010	D2937	92.7	26.8			D698	ED-2	94.5	25.0	95	**98**	+/- 3	**+1.8**	
3	4/15/2010	D2937	91.8	26.1			D698	ED-2	94.5	25.0	95	**97**	+/- 3	**+1.1**	
4	4/15/2010	D2937	92.2	27.2			D698	ED-2	94.5	25.0	95	**98**	+/- 3	**+2.2**	
5	4/15/2010	D2937	95.0	27.0			D698	ED-2	94.5	25.0	95	**101**	+/- 3	**+2.0**	
6	4/16/2010	D2937	92.9	26.6	87.9	20.2	D698	ED-2	93.6	25.2	95	**99**	+/- 3	**+1.4**	
7	4/16/2010	D2937	92.2	27.6			D698	ED-2	93.6	25.2	95	**99**	+/- 3	**+2.4**	
8	4/16/2010	D2937	92.2	26.9			D698	ED-2	93.6	25.2	95	**99**	+/- 3	**+1.7**	
9	4/16/2010	D2937	94.2	27.2			D698	ED-2	93.6	25.2	95	**101**	+/- 3	**+2.0**	
10	4/16/2010	D2937	93.2	27.2			D698	ED-2	93.6	25.2	95	**100**	+/- 3	**+2.0**	
11	4/19/2010	D2937	92.9	26.6	89.1	19.9	D698	ED-2	94.3	25.1	95	**99**	+/- 3	**+1.5**	
12	4/19/2010	D2937	92.3	26.9			D698	ED-2	94.3	25.1	95	**98**	+/- 3	**+1.8**	
13	4/19/2010	D2937	91.2	26.5			D698	ED-2	94.3	25.1	95	**97**	+/- 3	**+1.4**	
14	4/19/2010	D2937	93.4	26.8			D698	ED-2	94.3	25.1	95	**99**	+/- 3	**+1.7**	
15	4/19/2010	D2937	93.4	25.7			D698	ED-2	94.3	25.1	95	**99**	+/- 3	**+0.6**	
16[1]	5/28/2010	D2937	90.4	29.1	92.3	20.9	D698	ED-2	94.8	24.9	95	**95**	+/- 3	**+4.2**	
17[1]	5/28/2010	D2937	93.2	29.3			D698	ED-2	94.8	24.9	95	**98**	+/- 3	**+4.4**	
18[1]	5/28/2010	D2937	91.7	28.6			D698	ED-2	94.8	24.9	95	**97**	+/- 3	**+3.7**	
19[1]	5/28/2010	D2937	92.5	29.0			D698	ED-2	94.8	24.9	95	**98**	+/- 3	**+4.1**	
20[1]	5/28/2010	D2937	93.5	28.9			D698	ED-2	94.8	24.9	95	**99**	+/- 3	**+4.0**	
21[1]	5/28/2010	D2937	91.5	28.5			D698	ED-2	94.8	24.9	95	**97**	+/- 3	**+3.6**	

1. These tests met compaction but not moisture content (within 3% OMC) requirements, but deemed acceptable.

APPENDIX I – EARTHWORKS
Section 3 – Compacted Soil Liner

Compacted Soil Liner Test Pad Laboratory Test Summary Table
Compacted Soil Liner Test Pad Laboratory Test Results
Compacted Soil Liner Test Sample Location Reference Map
Compacted Soil Liner Full Scale Laboratory Test Summary Table
Compacted Soil Liner Full Scale Laboratory Test Results
Cell 1 Compacted Soil Liner Field Density Test Results
Cell 2 Compacted Soil Liner Field Density Test Results
Cell 1 Compacted Soil Liner Field Density Test Locations
Cell 2 Compacted Soil Liner Field Density Test Locations
Cell 1 Compacted Soil Liner As-Built Drawing
Cell 2 Compacted Soil Liner As-Built Drawing

Compacted Soil Liner Test Pad Laboratory Test Summary Table

SUMMARY OF COMPACTED SOIL LINER TEST PAD LABORATORY TEST DATA

Sample Name	Sample Type	Soil Description	USCS Classification	% Finer No. 200 (ASTM D422)	Atterberg Limits (ASTM D4318)			Standard Proctor Data (ASTM D698)		Hydraulic Conductivity (ASTM D5084)				
										Test Conditions[1]				Permeability (cm/sec)
					LL	PL	PI	Max. Dry Density (pcf)	Opt. Moisture Content (%)	Dry Density (pcf)	% Compaction	Moisture Content (%)	% Wet of OMC	
LIFT 1	Bulk	Orange Brown Medium to Fine Sandy Clayey SILT	MH	68.6	52	32	20	98.4	23.7	93.3	94.8%	25.3	1.6	6.1×10^{-7}
LIFT 2	Bulk	Orange Brown Clayey SILT w/ Coarse to Fine Sand	MH	70.1	56	32	24	95.3	23.6	90.1	94.5%	25.5	1.9	1.0×10^{-5}
LIFT 3	Bulk	Orange Brown Coarse to Fine Sandy CLAY	CH	66.6	54	27	27	99.7	22.1	91.3	91.6%	24.6	2.5	8.7×10^{-7}
LIFT 1 POINT 1	UD	Tan Orange Brown Coarse to Fine Sandy SILT	ML	65.2	44	31	13			94.7		23.5		6.6×10^{-6}
LIFT 2 POINT 1	UD	Orange Brown CLAY w/ Coarse to Fine Sand	CH	75.3	67	33	34			91.4		26.8		6.5×10^{-6}
LIFT 3 POINT 1	UD	Orange Brown CLAY w/ Coarse to Fine Sand	CH	69.8	58	30	28			101.9		20.3		9.9×10^{-7}

UD = Undisturbed thin-walled Shelby tube sample

1. Remolded samples were tested at net confining pressures of approximately 2.5 psi and gradients ranging from approximately 5 to 3.5 (see following permeability results for exact pressure and gradient).

Compacted Soil Liner Test Pad
Laboratory Test Results

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	**1356-08-122**	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy	Address:	
Boring #:	Lift 1	Sample #:	Sample Date: 3/31/10
Location:	Test Pad Samples	Offset:	Elevation: Bulk
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		

Pan #:		Beaker #:		**Apparent Relative Density(Asumed)**		**2.700**			
Hydrometer Jar #:									
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural			
Total Sample Air Dried Wt. + tare wt. (grams):	363.58			Tare #	NN				
Weight of Total Sample Air Dried:	363.58		A	Tare Wt.	15.27				
Weight of Air Dried Hydrometer Sample (g):	49.99		B	Wet Wt. + A	25.86				
Total Sample Oven Dried:	362.56		C	Dry Wt. + A	25.83				
Hydrometer Sample Oven Dried (W):	49.85		D	Water Wt. (B-C)	0.03				
% Passing #10:	99.3%		E	Dry Wt. (C-A)	10.56				
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	0.28%				

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	1.3	Soil Mortar	99.6%
#4	1.3		99.6%
#10	2.5	100.0%	99.3%
#20	0.8	98.5%	97.8%
#40	2.6	94.8%	94.1%
#60	5.2	89.5%	88.9%
#100	9.1	81.8%	81.3%
#200	15.4	69.1%	68.6%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)$^{1/2}$)
1	23.0	38.0	4.5		33.50	66.5%	66.1%	10.8	0.01297	0.04264
2	23.0	35.0	4.5		30.50	60.6%	60.2%	11.3	0.01297	0.03083
5	23.0	32.0	4.5		27.50	54.6%	54.2%	11.8	0.01297	0.01992
15	23.0	26.5	4.0		22.50	44.7%	44.4%	12.6	0.01297	0.01189
30	23.0	24.0	4.0		20.00	39.7%	39.4%	13.0	0.01297	0.00855
60	23.0	22.5	4.0		18.50	36.7%	36.5%	13.3	0.01297	0.00610
250	24.0	19.0	4.0		15.00	29.8%	29.6%	13.8	0.01282	0.00302
1440	24.0	16.5	4.0		12.50	24.8%	24.7%	14.2	0.01282	0.00127

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

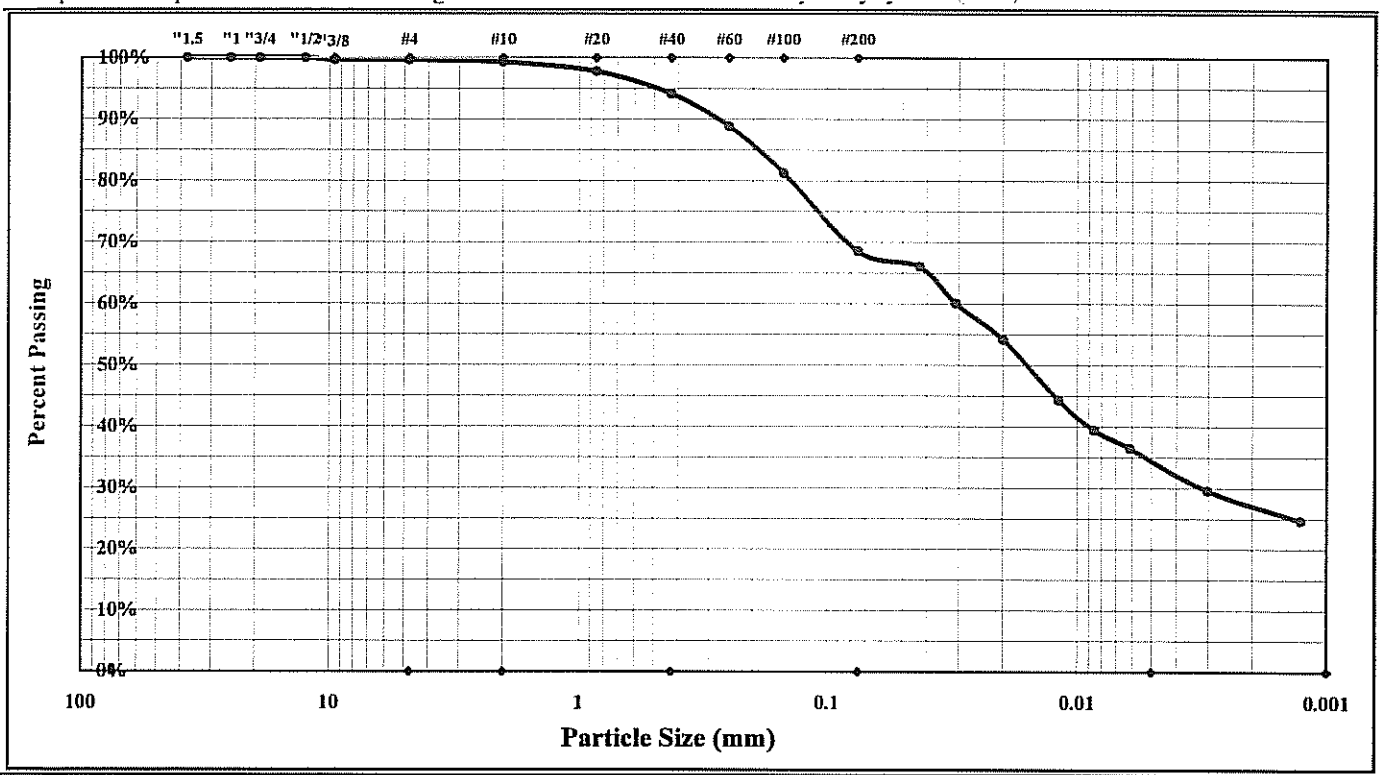
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy		
Address:			
Boring #:	Lift 1	Sample #:	Sample Date: 3/31/10
Location:	Test Pad Samples	Offset:	Elevation: Bulk
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.4%	Silt	34.6%
Silt & Clay (% Passing #200):	68.6%	Total Sand:	31.0%	Clay	34.0%
arent Relative Density(Asumed)	2.700	Moisture Content		Colloids	24.5%
Liquid Limit	52	Plastic Limit	32	Plastic Index	20
Coarse Sand:	0.3%	Medium Sand:	5.2%	Fine Sand:	25.5%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-09-122**	Report Date:	4/30/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/19-30/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

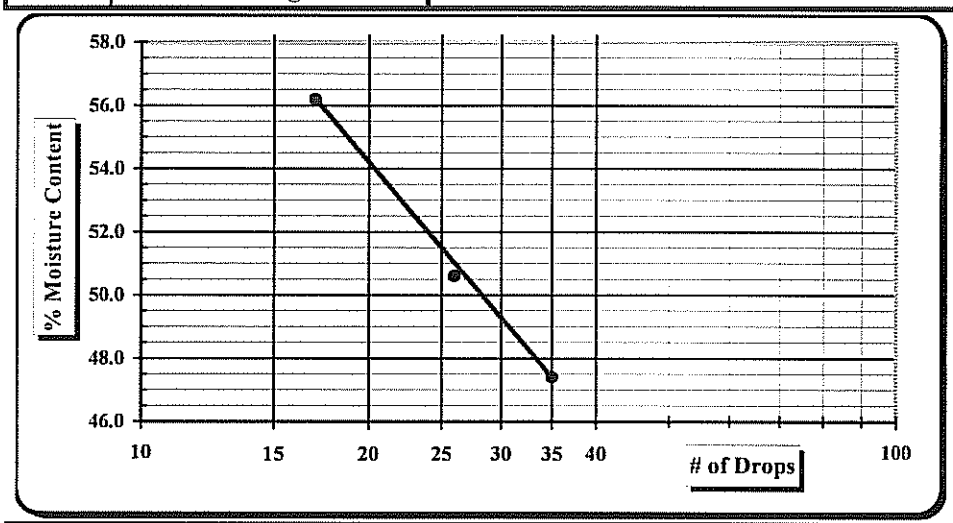
Boring #: Lift 1 Sample #: Sample Date: 3/23/10

Location: Test Pad Samples Offset: Elevation: Bulk

Sample Description: Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	16	39	XX				52	PP	
A	Tare Weight	15.71	13.94	16.05				15.70	16.16	
B	Wet Soil Weight + A	24.61	22.54	23.97				22.96	22.31	
C	Dry Soil Weight + A	21.75	19.65	21.12				21.19	20.82	
D	Water Weight (B-C)	2.86	2.89	2.85				1.77	1.49	
E	Dry Soil Weight (C-A)	6.04	5.71	5.07				5.49	4.66	
F	% Moisture (D/E)*100	47.4%	50.6%	56.2%				32.2%	32.0%	
N	# OF DROPS	35	26	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**32.1%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **52**
Plastic Limit **32**
Plastic Index 20
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	4/15/10	William Harrison	4/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

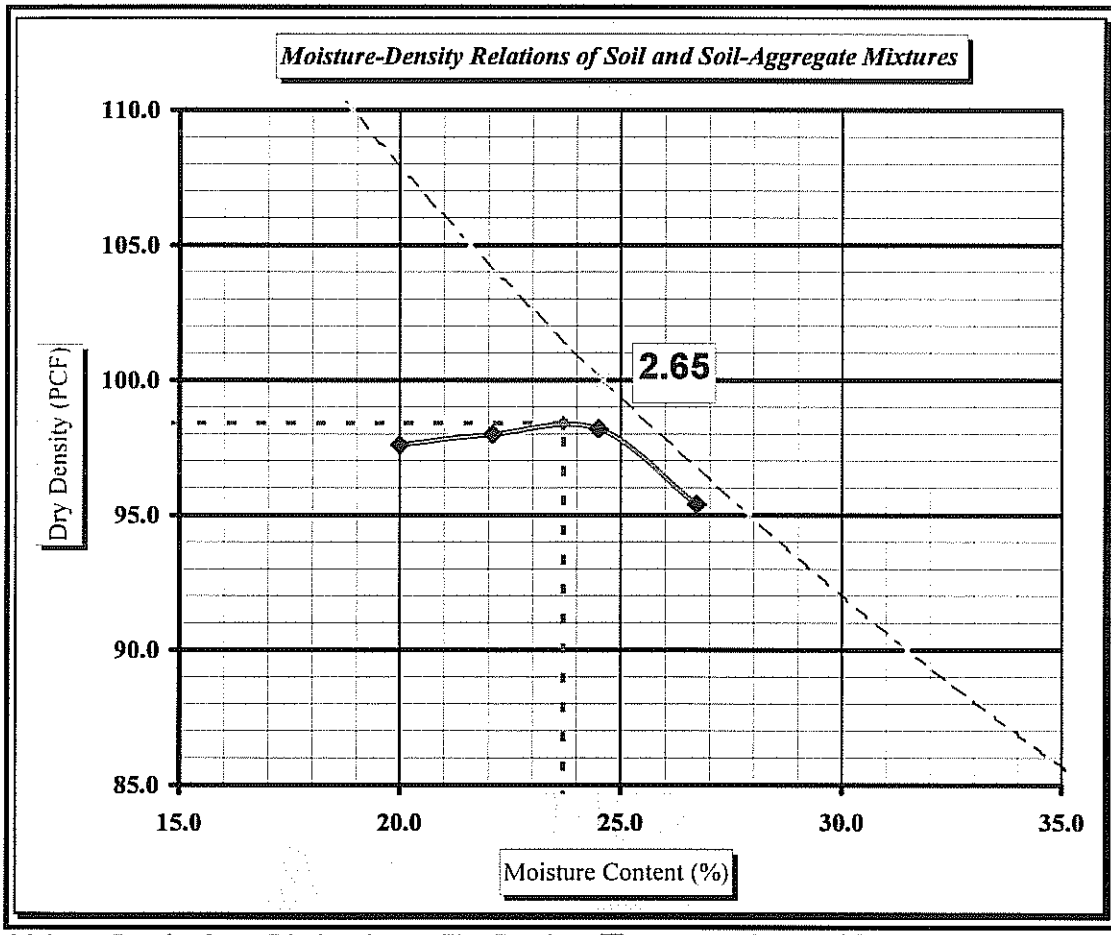
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/19/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/15/10-4/17/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Lift 1	Sample #:	Sample Date: 4/12/2010
Location:	Test Pad Samples	Offset:	Depth: Bulk
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		

Maximum Dry Density 98.4 PCF. **Optimum Moisture Content 23.7%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**52**
Plastic Limit	**32**
Plastic Index	**20**

% Passing

3/4"	100.0%
3/8"	99.6%
#4	99.6%
#10	99.3%
#40	94.1%
#60	88.9%
#200	68.6%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	5/5-6/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	5/6/10
Client Name:	Duke Energy	Sample Date:	
Client Address:	Marshall Steam Station	Panel ID:	8

Boring #: Lift 1 Sample #: Depth: Bulk Perm Cell ID:

Location: Offset: Sample Description: Orange Brown Medium to Fine Sandy Clayey Silt (MH)

Liquid Limit: 52 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 32 Plastic Index: 20 Percent Passing #200: 66.6 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.699	Wet Density (PCF):	116.9	Length (cm):	7.699	Wet Density (PCF):	116.9
Diameter (cm):	7.276	Dry Density (PCF):	93.3	Diameter (cm):	7.28	Dry Density (PCF):	93.3
Area (cm^2)	41.58	Percent Saturation:	84.7	Area (cm^2)	41.58	Percent Saturation:	84.6
Volume (cm^3)	320.13			Volume (cm^3)	320.16	B-Parameter:	0.95
Wet weight (grams)	599.4	Void Ratio:	0.807	Wet weight (grams)	599.4	Void Ratio:	0.807
Dry Weight (grams)	478.3	Porosity:	0.447	Dry Weight (grams)	478.3	Porosity:	0.447
Percent Moisture:	25.3			Percent Moisture:	25.3		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

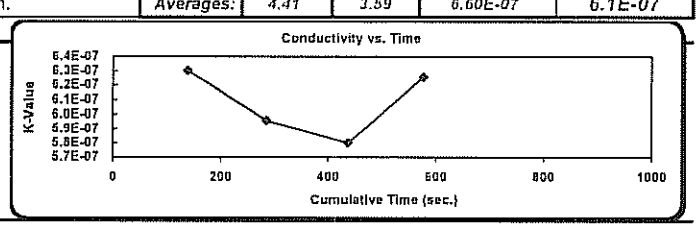
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
10:49	10:51	139	23.5	23.5	23.5	0.9204	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	6.85E-07	6.30E-07
10:57	11:00	147	23.5	23.5	23.5	0.9204	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	6.47E-07	5.96E-07
11:04	11:06	151	23.5	23.5	23.5	0.9204	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	6.30E-07	5.80E-07
11:13	11:15	140	23.5	23.5	23.5	0.9204	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	6.80E-07	6.26E-07
													Averages:		*6.60E-07*	*6.1E-07*

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy	Address:	
Boring #:	Lift 2	Sample #:	Sample Date: 3/31/10
Location:	Test Pad Samples	Offset:	Elevation: Bulk
Sample Description:	Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.700**				
Hydrometer Jar #:										
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):	388.74			Tare #	35					
Weight of Total Sample Air Dried:	388.74		A	Tare Wt.	15.65					
Weight of Air Dried Hydrometer Sample (g):	50.00		B	Wet Wt. + A	26.02					
Total Sample Oven Dried:	386.15		C	Dry Wt. + A	25.95					
Hydrometer Sample Oven Dried (W):	49.66		D	Water Wt. (B-C)	0.07					
% Passing #10:	98.7%		E	Dry Wt. (C-A)	10.30					
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	0.68%					

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	1.6		99.6%
#10	4.9	100.0%	98.7%
#20	1.2	97.5%	96.3%
#40	2.9	94.2%	93.0%
#60	5.2	89.6%	88.5%
#100	8.5	82.9%	81.9%
#200	14.4	71.0%	70.1%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	24.0	38.0	4.5		33.50	66.8%	65.9%	10.8	0.01282	0.04212
2	24.0	36.0	4.5		31.50	62.8%	62.0%	11.1	0.01282	0.03023
5	24.0	33.5	4.5		29.00	57.8%	57.1%	11.5	0.01282	0.01947
15	24.0	30.0	4.5		25.50	50.8%	50.2%	12.1	0.01282	0.01152
30	24.0	27.0	4.5		22.50	44.9%	44.3%	12.6	0.01282	0.00831
60	24.0	25.5	4.5		21.00	41.9%	41.3%	12.9	0.01282	0.00593
250	24.5	22.5	4.5		18.00	35.9%	35.4%	13.3	0.01274	0.00294
1440	23.0	20.0	4.5		15.50	30.9%	30.5%	13.8	0.01297	0.00127

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

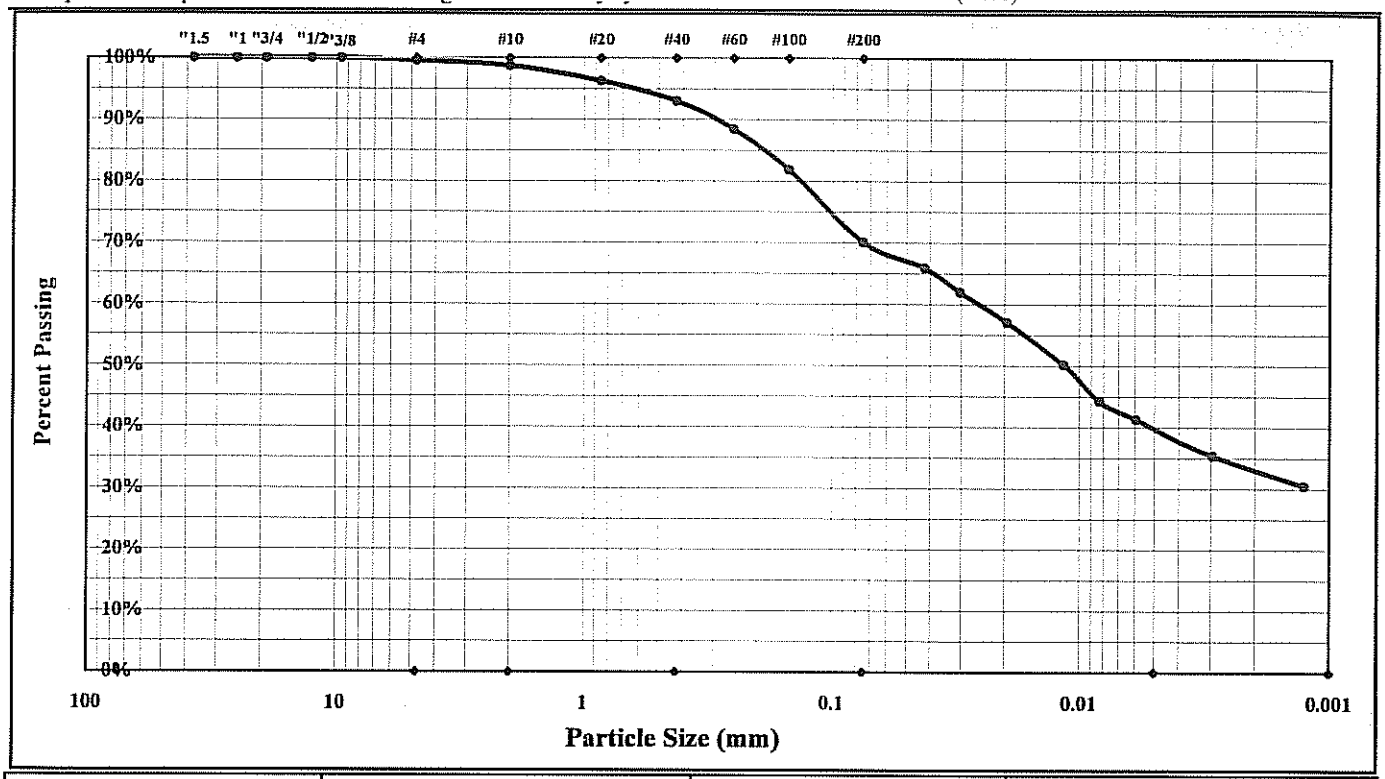
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy		
Address:			
Boring #:	Lift 2	Sample #:	Sample Date: 3/31/10
Location:	Test Pad Samples	Offset:	Elevation: Bulk
Sample Description:	Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.4%	Silt	30.1%
Silt & Clay (% Passing #200):	70.1%	Total Sand:	29.4%	Clay	40.0%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	29.0%
Liquid Limit	56	Plastic Limit	32	Plastic Index	24
Coarse Sand:	0.9%	Medium Sand:	5.7%	Fine Sand:	22.9%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/30/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/19-30/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

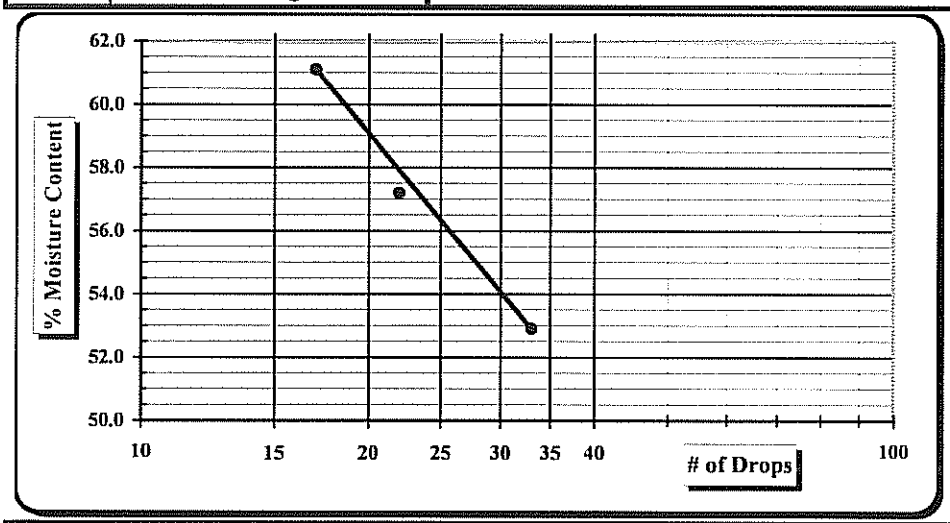
Boring #: Lift 2 Sample #: Sample Date: 3/23/10

Location: Test Pad Samples Offset: Elevation: Bulk

Sample Description: Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	10	XY	FF				35	PO	
A	Tare Weight	13.98	15.94	16.86				15.64	15.12	
B	Wet Soil Weight + A	23.66	23.80	25.30				21.79	21.51	
C	Dry Soil Weight + A	20.31	20.94	22.10				20.32	19.98	
D	Water Weight (B-C)	3.35	2.86	3.20				1.47	1.53	
E	Dry Soil Weight (C-A)	6.33	5.00	5.24				4.68	4.86	
F	% Moisture (D/E)*100	52.9%	57.2%	61.1%				31.4%	31.5%	
N	# OF DROPS	33	22	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**31.5%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **56**
Plastic Limit **32**
Plastic Index 24
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

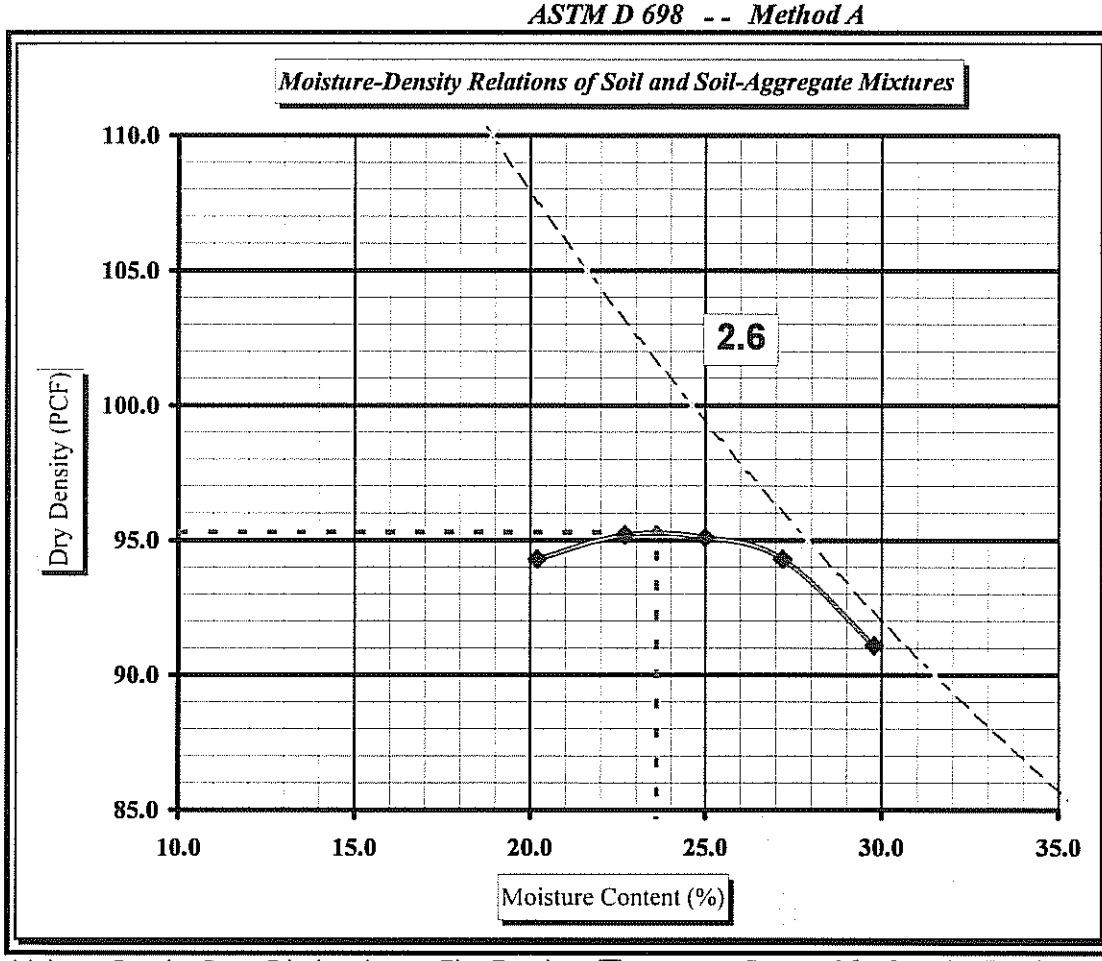
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/20/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/15/10-4/20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Lift 2	Sample #:	
Sample Date:	4/12/2010		
Location:	Test Pad Samples	Offset:	
Depth:	Bulk		
Sample Description:	Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)		

Maximum Dry Density 95.3 PCF. **Optimum Moisture Content 23.6%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**56**
Plastic Limit	**32**
Plastic Index	**24**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.6%
#10	98.7%
#40	93.0%
#60	88.5%
#200	70.1%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	5/4-6/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	5/6/10
Client Name:	Duke Energy	Sample Date:	
Client Address:	Marshall Steam Station	Panel ID:	9

Boring #: Lift 2 Sample #: Depth: Bulk Perm Cell ID:

Location: Test Pad Samples Offset: Sample Description: Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)

Liquid Limit: 56 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 32 Plastic Index: 24 Percent Passing #200: 70.1 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.699	Wet Density (PCF):	113.1	Length (cm):	7.699	Wet Density (PCF):	113.1
Diameter (cm):	7.278	Dry Density (PCF):	90.1	Diameter (cm):	7.28	Dry Density (PCF):	90.1
Area (cm^2)	41.60	Percent Saturation:	79.1	Area (cm^2)	41.60	Percent Saturation:	79.1
Volume (cm^3)	320.28			Volume (cm^3)	320.31	B-Parameter:	0.95
Wet weight (grams)	580.2	Void Ratio:	0.870	Wet weight (grams)	580.2	Void Ratio:	0.871
Dry Weight (grams)	462.3	Porosity:	0.465	Dry Weight (grams)	462.3	Porosity:	0.465
Percent Moisture:	25.5			Percent Moisture:	25.5		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

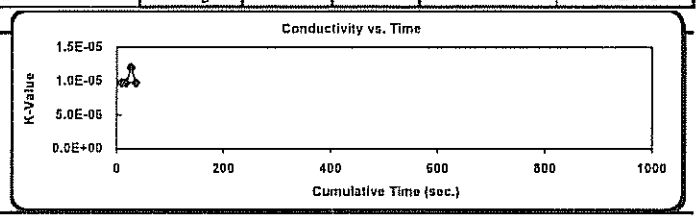
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
4:08	4:08	9	23.6	23.6	23.6	0.9183	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	1.06E-05	9.70E-06
4:09	4:09	9	23.6	23.6	23.6	0.9183	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	1.06E-05	9.70E-06
4:10	4:10	9	23.6	23.6	23.6	0.9183	4.60	1.90	4.00	1.90	33.9	26.4	4.41	3.43	1.30E-05	1.19E-05
4:12	4:12	9	23.6	23.6	23.6	0.9183	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	1.06E-05	9.70E-06
													Averages:		*1.12E-05*	*1.0E-05*

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	**1356-08-122**	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy	Address:	
Boring #:	Lift 3	Sample #:	Sample Date: 3/31/10
Location:	Test Pad Samples	Offset:	Elevation: Bulk
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		

Pan #:		Beaker #:		**Apparent Relative Density(Asumed)**		**2.700**	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	380.11			Tare #	PP		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	380.11		A	Tare Wt.	16.16		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.02		B	Wet Wt. + A	26.82		1/2"	6.3		98.3%
Total Sample Oven Dried:	378.38		C	Dry Wt. + A	26.77		3/8"	6.3	Soil Mortar	98.3%
Hydrometer Sample Oven Dried (W):	49.79		D	Water Wt. (B-C)	0.05		#4	8.0		97.9%
% Passing #10:	97.2%		E	Dry Wt. (C-A)	10.61		#10	10.7	100.0%	97.2%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	0.47%		#20	1.1	97.8%	95.0%
							#40	3.0	93.9%	91.3%
							#60	5.8	88.3%	85.9%
							#100	9.8	80.4%	78.2%
							#200	15.7	68.5%	66.6%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
			Control Cylinder	Composite Correction		P(-#10) =	P (total) =			D =
T (Min.)	(0.5 °C)	Reading			R	(R x a / W) x 100	P x % Passing #10	L	K	K x $((L/T)^{1/2}$
1	23.5	38.0	4.0		34.00	67.6%	65.7%	10.7	0.01290	0.04222
2	23.5	35.0	4.0		31.00	61.6%	59.9%	11.2	0.01290	0.03053
5	23.5	33.5	4.0		29.50	58.7%	57.0%	11.5	0.01290	0.01952
15	23.5	31.0	4.0		27.00	53.7%	52.2%	11.9	0.01290	0.01147
30	23.5	30.0	4.0		26.00	51.7%	50.2%	12.0	0.01290	0.00817
60	23.5	27.5	4.0		23.50	46.7%	45.4%	12.4	0.01290	0.00587
250	24.0	24.5	4.0		20.50	40.8%	39.6%	12.9	0.01282	0.00292
1440	24.0	21.5	4.0		17.50	34.8%	33.8%	13.4	0.01282	0.00124

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	4/16/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

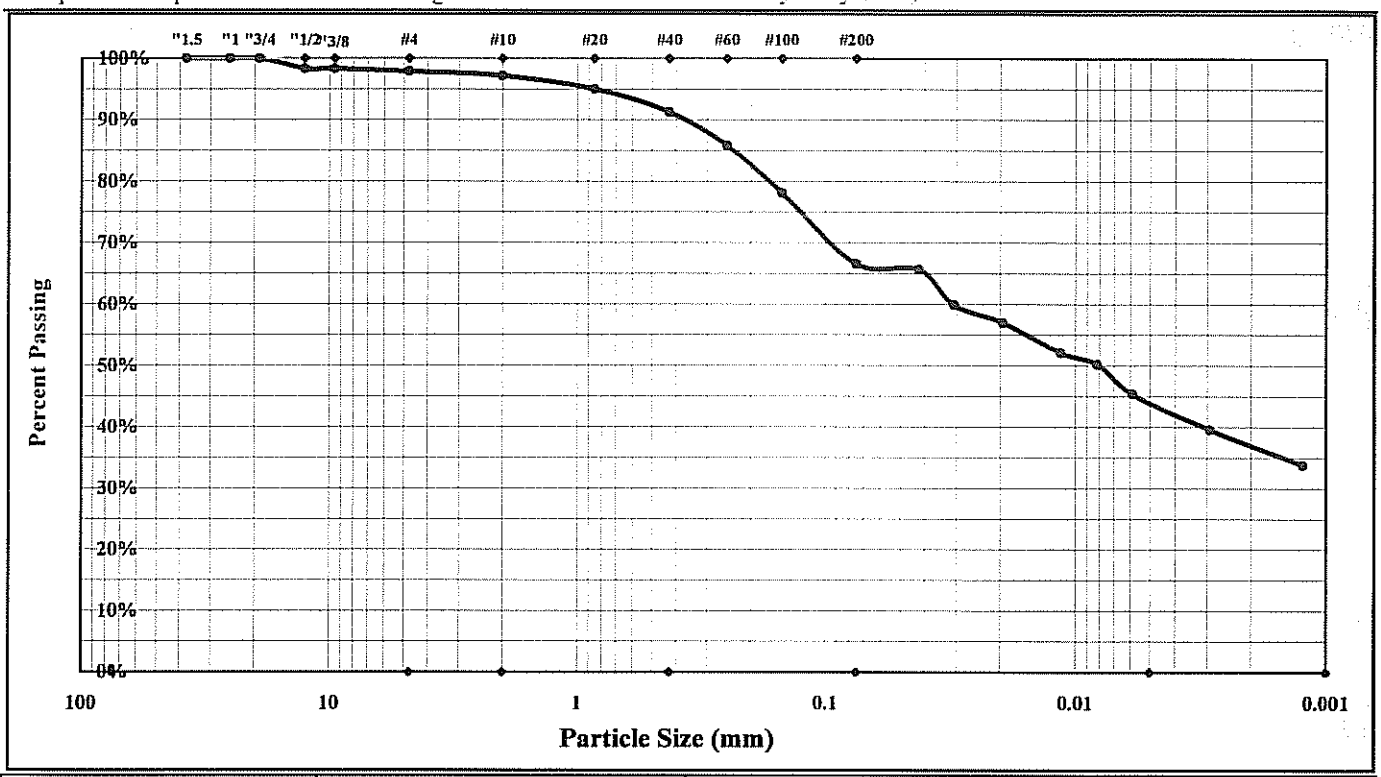
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy		
Address:			
Boring #:	Lift 3	Sample #:	Sample Date: 3/31/10
Location:	Test Pad Samples	Offset:	Elevation: Bulk
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	2.1%	Silt	22.6%
Silt & Clay (% Passing #200):	66.6%	Total Sand:	31.3%	Clay	44.0%
arent Relative Density(Asumed)	2.700	Moisture Content		Colloids	34.0%
Liquid Limit	54	Plastic Limit	27	Plastic Index	27
Coarse Sand:	0.7%	Medium Sand:	5.9%	Fine Sand:	24.6%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. — Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	Vir Mohan	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-09-122**	Report Date:	4/30/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/19-30/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

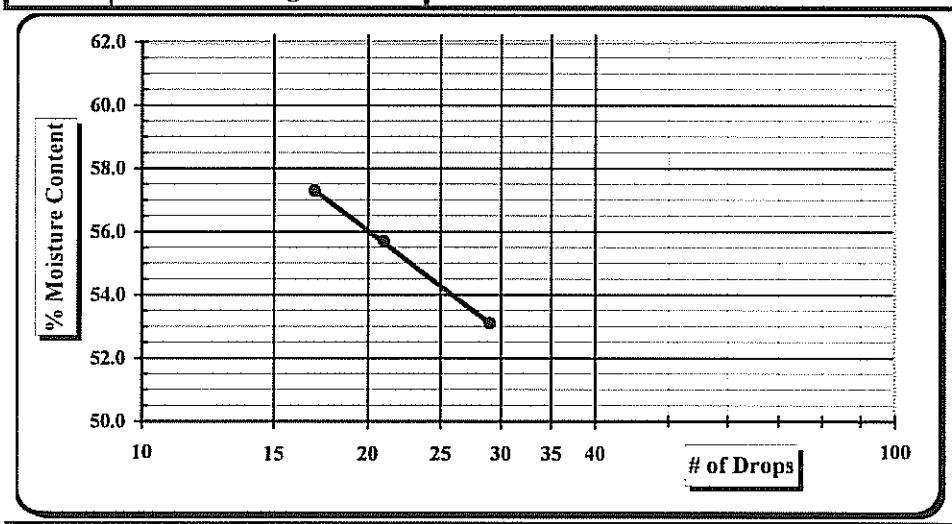
Boring #: Lift 3 Sample #: Sample Date: 3/23/10

Location: Test Pad Samples Offset: Elevation: Bulk

Sample Description: Orange Brown Coarse to Fine Sandy Clay (CH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	X	TT	1				Y	XW	
A	Tare Weight	15.52	15.92	13.86				15.39	15.23	
B	Wet Soil Weight + A	26.77	24.53	22.21				22.42	21.69	
C	Dry Soil Weight + A	22.87	21.45	19.17				20.90	20.32	
D	Water Weight (B-C)	3.90	3.08	3.04				1.52	1.37	
E	Dry Soil Weight (C-A)	7.35	5.53	5.31				5.51	5.09	
F	% Moisture (D/E)*100	53.1%	55.7%	57.3%				27.6%	26.9%	
N	# OF DROPS	29	21	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**27.3%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **54**
Plastic Limit **27**
Plastic Index 27
Group Symbol **CH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

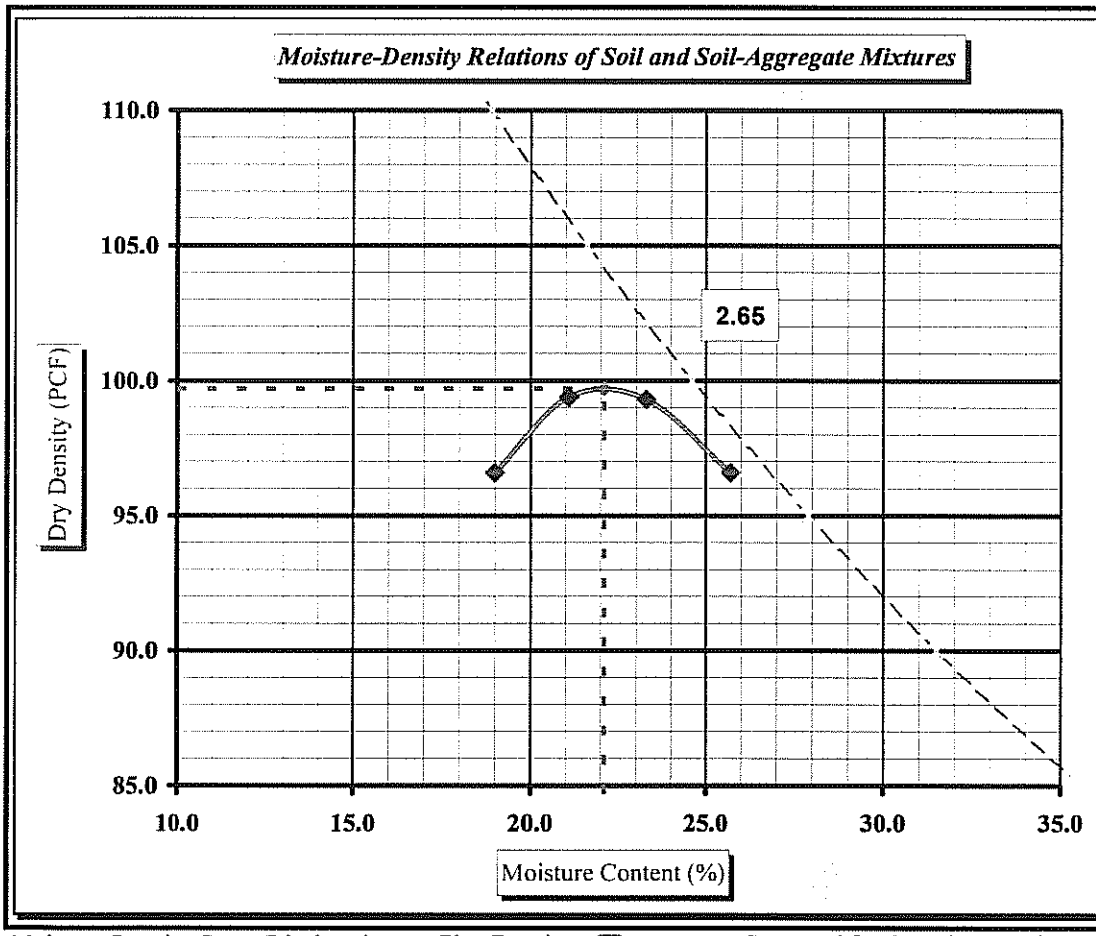
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/19/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/15/10-4/17/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Lift 3	Sample #:	
Sample Date:	4/12/2010		
Location:	Test Pad Samples	Offset:	
Depth:	Bulk		
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		

Maximum Dry Density 99.7 PCF. **Optimum Moisture Content 22.1%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**54**
Plastic Limit	**27**
Plastic Index	**27**

% Passing

3/4"	100.0%
3/8"	98.3%
#4	97.9%
#10	97.2%
#40	91.3%
#60	85.9%
#200	66.6%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	4/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	5/5-6/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	5/6/10
Client Name:	Duke Energy	Sample Date:	
Client Address:	Marshall Steam Station	Panel ID:	12
Boring #:	Lift 3	Sample #:	
Depth:	Bulk	Perm Cell ID:	
Location:	Test Pad Samples	Offset:	
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		
Liquid Limit:	54	Sp. Grav. (Assumed):	2.700
Sample Type:	Remolded	Log #:	
Plastic Limit:	27	Plastic Index:	27
Percent Passing #200:	66.6	Maximum Particle Size:	

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.646	Wet Density (PCF):	113.8	Length (cm):	7.646	Wet Density (PCF):	113.8
Diameter (cm):	7.280	Dry Density (PCF):	91.3	Diameter (cm):	7.28	Dry Density (PCF):	91.3
Area (cm^2)	41.63	Percent Saturation:	78.5	Area (cm^2)	41.63	Percent Saturation:	78.6
Volume (cm^3)	318.32			Volume (cm^3)	318.29	B-Parameter:	0.96
Wet weight (grams)	580.2	Void Ratio:	0.846	Wet weight (grams)	580.2	Void Ratio:	0.845
Dry Weight (grams)	465.7	Porosity:	0.458	Dry Weight (grams)	465.7	Porosity:	0.458
Percent Moisture:	24.6			Percent Moisture:	24.6		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

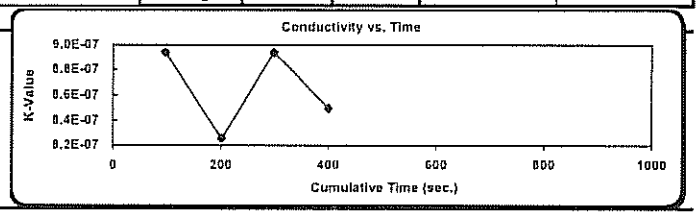
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
11:48	11:50	97	23.6	23.6	23.6	0.9183	4.60	1.90	4.10	1.90	33.9	27.7	4.44	3.62	9.73E-07	8.94E-07
11:52	11:54	105	23.6	23.6	23.6	0.9183	4.60	1.90	4.10	1.90	33.9	27.7	4.44	3.62	8.99E-07	8.26E-07
11:56	11:58	97	23.6	23.6	23.6	0.9183	4.60	1.90	4.10	1.90	33.9	27.7	4.44	3.62	9.73E-07	8.94E-07
12:00	12:02	102	23.6	23.6	23.6	0.9183	4.60	1.90	4.10	1.90	33.9	27.7	4.44	3.62	9.25E-07	8.50E-07
													Averages:		*9.43E-07*	*8.7E-07*

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	1356-08-122	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy	Address:	
Boring #:	Lift 1	Sample #: Point 1	Sample Date: 4/12/10
Location:	Test Pad Samples	Offset:	Elevation: 6" from base
Sample Description:	Tan Orange Brown Coarse to Fine Sandy Silt (ML)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.700**				
Hydrometer Jar #:										
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):		254.84		Tare #	5					
Weight of Total Sample Air Dried:		254.84	A	Tare Wt.	15.71					
Weight of Air Dried Hydrometer Sample (g):		50.00	B	Wet Wt. + A	26.62					
Total Sample Oven Dried:		253.91	C	Dry Wt. + A	26.58					
Hydrometer Sample Oven Dried (W):		49.82	D	Water Wt. (B-C)	0.04					
% Passing #10:		99.5%	E	Dry Wt. (C-A)	10.87					
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	0.37%					

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	1.2	100.0%	99.5%
#20	0.8	98.5%	98.0%
#40	2.1	95.7%	95.3%
#60	4.7	90.5%	90.1%
#100	9.1	81.8%	81.4%
#200	17.2	65.5%	65.2%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
			Control Cylinder	Composite Correction		P(-#10) =	P (total) =			D =
T (Min.)	(0.5 °C)	Reading			R	(R x a / W) x 100	P x % Passing #10	L	K	K x $((L/T)^{1/2}$
1	24.0	34.5	4.5		30.00	59.6%	59.3%	11.4	0.01282	0.04323
2	24.0	32.0	4.5		27.50	54.7%	54.4%	11.8	0.01282	0.03111
5	24.0	27.0	4.5		22.50	44.7%	44.5%	12.6	0.01282	0.02035
15	24.0	23.5	4.5		19.00	37.8%	37.6%	13.2	0.01282	0.01201
30	24.0	21.5	4.5		17.00	33.8%	33.6%	13.5	0.01282	0.00860
60	24.0	19.5	4.5		15.00	29.8%	29.7%	13.8	0.01282	0.00615
250	24.5	16.5	4.5		12.00	23.8%	23.7%	14.3	0.01274	0.00305
1440	23.0	14.5	4.5		10.00	19.9%	19.8%	14.7	0.01297	0.00131

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D422

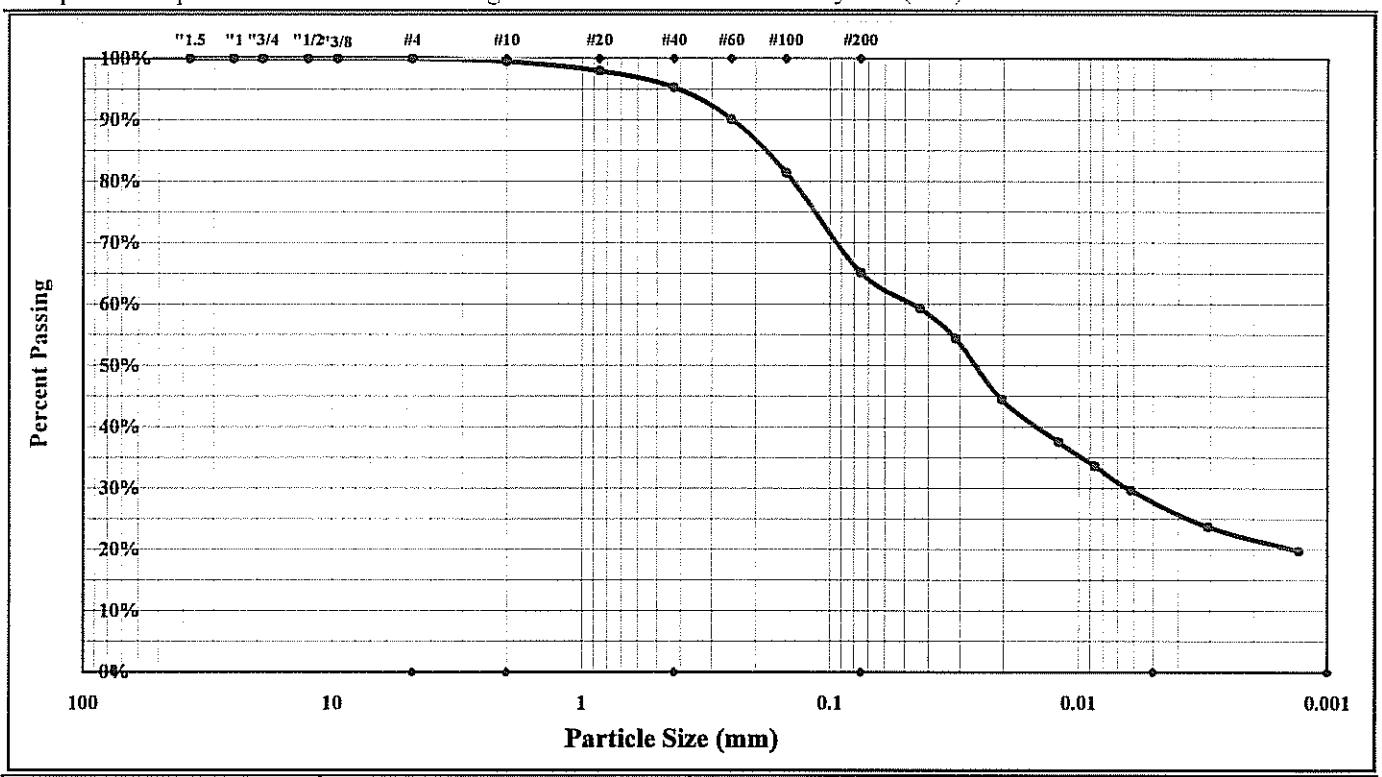
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy		
Address:			

Boring #:	Lift 1	Sample #:	Point 1	Sample Date:	4/12/10
Location:	Test Pad Samples	Offset:		Elevation:	6" from base

Sample Description: Tan Orange Brown Coarse to Fine Sandy Silt (ML)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	37.7%
Silt & Clay (% Passing #200):	65.2%	Total Sand:	34.8%	Clay	27.5%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	19.0%
Liquid Limit	44	Plastic Limit	31	Plastic Index	13
Coarse Sand:	0.5%	Medium Sand:	4.3%	Fine Sand:	30.1%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/26/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/19-26/10
Client Name:	Duke Energy		
Client Address:	Test Pad Samples		

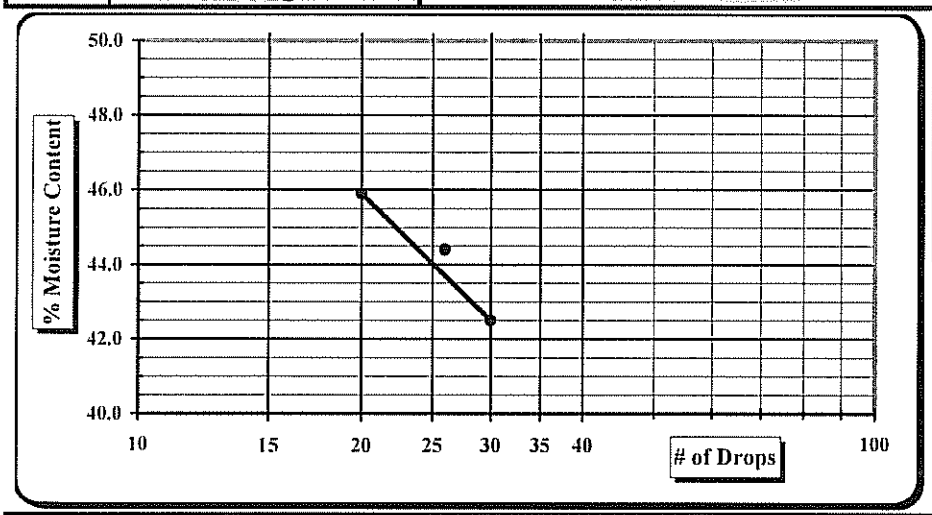
Boring #: Lift 1 Sample #: Point 1 Sample Date: 4/12/10

Location: Test Pad Samples Offset: Elevation: 6" from base

Sample Description: Tan Orange Brown Coarse to Fine Sandy Silt (ML)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	XY	KK	43				OO	57	
A	Tare Weight	15.93	16.05	13.85				16.30	13.87	
B	Wet Soil Weight + A	26.49	26.79	23.54				21.53	19.93	
C	Dry Soil Weight + A	23.34	23.49	20.49				20.31	18.49	
D	Water Weight (B-C)	3.15	3.30	3.05				1.22	1.44	
E	Dry Soil Weight (C-A)	7.41	7.44	6.64				4.01	4.62	
F	% Moisture (D/E)*100	42.5%	44.4%	45.9%				30.4%	31.2%	
N	# OF DROPS	30	26	20				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**30.8%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **44**
Plastic Limit **31**
Plastic Index 13
Group Symbol **ML**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/13-16/10
Project Name:	Marshall Steam Station - Industrial Landfill No. 1	Report Date:	4/16/10
Client Name:	Duke Energy	Sample Date:	4/12/2010
Client Address:	Marshall Steam Station	Panel ID:	7

Boring #: Lift 1 Sample #: Point 1 Depth: 6" from base Perm Cell ID:

Location: Offset: Sample Description: Tan Orange Brown Coarse to Fine Sandy Silt (ML)

Liquid Limit: 44 Sp. Grav. (Assumed): 2.700 Sample Type: Undisturbed Log #:

Plastic Limit: 31 Plastic Index: 13 Percent Passing #200: 65.2 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	6.909	Wet Density (PCF):	117.0	Length (cm):	6.909	Wet Density (PCF):	94.7
Diameter (cm):	7.252	Dry Density (PCF):	94.7	Diameter (cm):	7.25	Dry Density (PCF):	94.7
Area (cm^2)	41.30	Percent Saturation:	81.5	Area (cm^2)	41.30	Percent Saturation:	0.0
Volume (cm^3)	285.35			Volume (cm^3)	285.37	B-Parameter:	0.95
Wet weight (grams)	534.9	Void Ratio:	0.779	Wet weight (grams)	433.1	Void Ratio:	0.779
Dry Weight (grams)	433.1	Porosity:	0.438	Dry Weight (grams)	433.1	Porosity:	0.438
Percent Moisture:	23.5			Percent Moisture:			
Test Parameters:	Effective Consolidation Stress (psi):			Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):		Back Pressure (psi):		a_{out} (cm^2)	0.76712

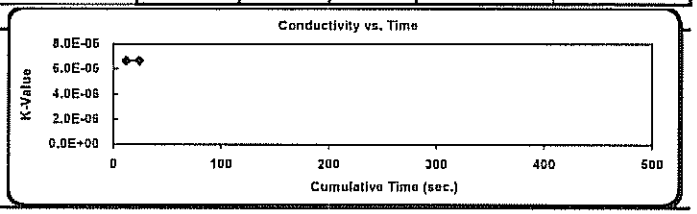
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
15:26	15:26	12	23.3	23.3	23.3	0.9247	4.60	1.90	4.10	1.91	33.9	27.5	4.91	3.99	7.16E-06	6.62E-06
15:26	15:26	12	23.3	23.3	23.3	0.9247	4.60	1.90	4.10	1.91	33.9	27.5	4.91	3.99	7.16E-06	6.62E-06
													Averages:		*7.16E-06*	*6.6E-06*

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Jennifer Olsen

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy	Address:	
Boring #:	Lift 2	Sample #: Point 1	Sample Date: 4/12/10
Location:	Test Pad Samples	Offset:	Elevation: 12" from base
Sample Description:	Orange Brown Clay w/Coarse to Fine Sand (CH)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**	**2.700**
Hydrometer Jar #:					
Pan Tare Weight (grams):			**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):	231.46		Tare #	II	
Weight of Total Sample Air Dried:	231.46	A	Tare Wt.	16.89	
Weight of Air Dried Hydrometer Sample (g):	50.00	B	Wet Wt. + A	27.18	
Total Sample Oven Dried:	230.12	C	Dry Wt. + A	27.12	
Hydrometer Sample Oven Dried (W):	49.71	D	Water Wt. (B-C)	0.06	
% Passing #10:	99.5%	E	Dry Wt. (C-A)	10.23	
Correction Factor a (Table 1):	0.99		% Moisture (100 x D/E)	0.59%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	1.1	100.0%	99.5%
#20	0.7	98.6%	98.1%
#40	2.0	96.1%	95.6%
#60	3.8	92.5%	92.0%
#100	6.7	86.6%	86.2%
#200	12.1	75.7%	75.3%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	23.0	41.0	4.5		36.50	72.7%	72.3%	10.3	0.01297	0.04166
2	23.0	39.0	4.5		34.50	68.7%	68.4%	10.6	0.01297	0.02992
5	23.0	37.0	4.5		32.50	64.7%	64.4%	11.0	0.01297	0.01921
15	23.0	33.5	4.5		29.00	57.8%	57.5%	11.5	0.01297	0.01138
30	23.5	32.0	4.0		28.00	55.8%	55.5%	11.7	0.01290	0.00805
60	23.5	31.0	4.0		27.00	53.8%	53.5%	11.9	0.01290	0.00574
250	24.0	27.0	4.0		23.00	45.8%	45.6%	12.5	0.01282	0.00287
1440	24.0	25.0	4.0		21.00	41.8%	41.6%	12.9	0.01282	0.00121

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

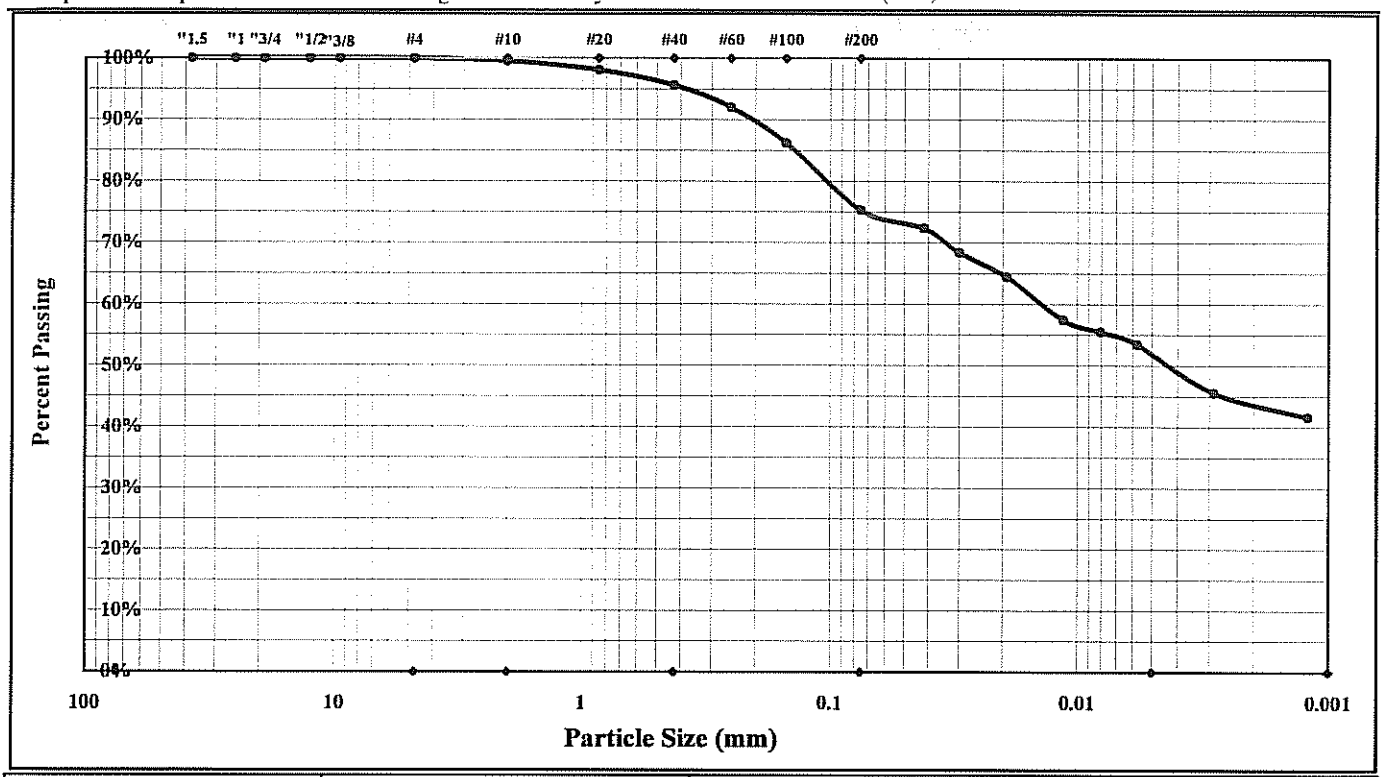
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy		
Address:			
Boring #:	Lift 2	Sample #: Point 1	Sample Date: 4/12/10
Location:	Test Pad Samples	Offset:	Elevation: 12" from base
Sample Description:	Orange Brown Clay w/Coarse to Fine Sand (CH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	22.3%
Silt & Clay (% Passing #200):	75.3%	Total Sand:	24.7%	Clay	53.0%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	42.0%
Liquid Limit	67	Plastic Limit	33	Plastic Index	34
Coarse Sand:	0.5%	Medium Sand:	3.9%	Fine Sand:	20.3%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/26/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/19-26/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

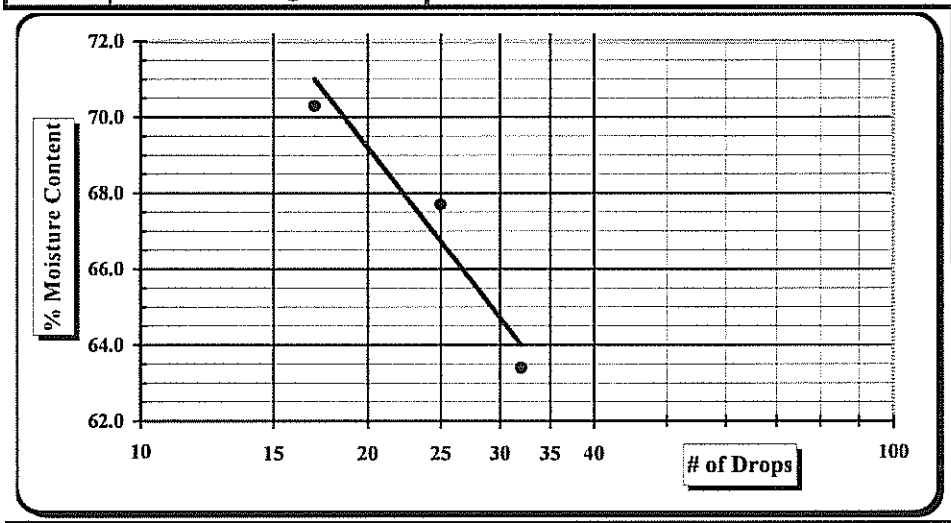
Boring #: Lift 2 Sample #: Point 1 Sample Date: 4/12/10

Location: Test Pad Samples Offset: Elevation: 12" from base

Sample Description: Orange Brown Clay w/coarse to Fine Sand (CH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	XX	QQ	NN				WN	46	
A	Tare Weight	16.04	16.86	15.28				16.55	13.76	
B	Wet Soil Weight + A	25.47	23.60	24.05				22.12	20.00	
C	Dry Soil Weight + A	21.81	20.88	20.43				20.75	18.45	
D	Water Weight (B-C)	3.66	2.72	3.62				1.37	1.55	
E	Dry Soil Weight (C-A)	5.77	4.02	5.15				4.20	4.69	
F	% Moisture (D/E)*100	63.4%	67.7%	70.3%				32.6%	33.0%	
N	# OF DROPS	32	25	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**32.8%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **67**
Plastic Limit **33**
Plastic Index 34
Group Symbol **CH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/13-16/10
Project Name:	Marshall Steam Station - Industrial Landfill No. 1	Report Date:	4/16/10
Client Name:	Duke Energy	Sample Date:	4/12/2010
Client Address:	Marshall Steam Station	Panel ID:	8

Boring #: Lift 2 Sample #: Point 1 Depth: 12" from base Perm Cell ID:

Location: Offset: Sample Description: Orange Brown Clay w/Coarse to Fine Sand (CH)

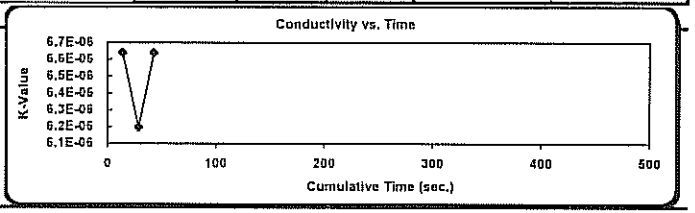
Liquid Limit: 67 Sp. Grav. (Assumed): 2.700 Sample Type: Undisturbed Log #:

Plastic Limit: 33 Plastic Index: 34 Percent Passing #200: 75.3 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	9.423	Wet Density (PCF):	115.8	Length (cm):	9.423	Wet Density (PCF):	91.4
Diameter (cm):	7.224	Dry Density (PCF):	91.4	Diameter (cm):	7.22	Dry Density (PCF):	91.4
Area (cm^2)	40.98	Percent Saturation:	85.7	Area (cm^2)	40.98	Percent Saturation:	0.0
Volume (cm^3)	386.21			Volume (cm^3)	386.16	B-Parameter:	
Wet weight (grams)	716.7	Void Ratio:	0.845	Wet weight (grams)	565.2	Void Ratio:	0.845
Dry Weight (grams)	565.2	Porosity:	0.458	Dry Weight (grams)	565.2	Porosity:	0.458
Percent Moisture:	26.8			Percent Moisture:			
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Dealred Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	92.5	Back Pressure (psi):	90.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements								K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2	Initial Gradient	Final Gradient	Uncorrected K-Value	Corrected K-Value
16:30	16:30	14	23.7	23.7	23.7	0.9162	5.60	1.88	5.00	1.89	46.8	39.1	4.96	4.15	7.24E-06	6.64E-06
16:31	16:31	15	23.7	23.7	23.7	0.9162	5.60	1.88	5.00	1.89	46.8	39.1	4.96	4.15	6.76E-06	6.19E-06
16:35	16:36	14	23.7	23.7	23.7	0.9162	5.60	1.88	5.00	1.89	46.8	39.1	4.96	4.15	7.24E-06	6.64E-06
												Averages:	4.96	4.15	7.08E-06	6.5E-06

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician: Jennifer Olsen

Technical Responsibility: Will Harrison signature Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy	Address:	
Boring #:	Lift 3	Sample #: Point 1	Sample Date: 4/12/10
Location:	Test Pad Samples	Offset:	Elevation: 18" from base
Sample Description:	Orange Brown Clay w/Coarse to Fine Sand (CH)		

Pan #:		Beaker #:		Apparent Relative Density(Assumed)		2.700	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				Moisture Content	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	257.82			Tare #	11		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	257.82		A	Tare Wt.	13.87		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	49.99		B	Wet Wt. + A	24.44		1/2"	0.0		100.0%
Total Sample Oven Dried:	257.10		C	Dry Wt. + A	24.41		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):	49.85		D	Water Wt. (B-C)	0.03		#4	2.5		99.0%
% Passing #10:	98.2%		E	Dry Wt. (C-A)	10.54		#10	4.7	100.0%	98.2%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	0.28%		#20	1.2	97.6%	95.8%
							#40	3.0	93.9%	92.2%
							#60	5.3	89.3%	87.7%
							#100	9.0	82.0%	80.5%
							#200	14.4	71.2%	69.8%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	23.0	40.0	4.5		35.50	70.5%	69.2%	10.5	0.01297	0.04199
2	23.0	37.0	4.5		32.50	64.5%	63.4%	11.0	0.01297	0.03038
5	23.0	34.5	4.5		30.00	59.6%	58.5%	11.4	0.01297	0.01957
15	23.0	32.0	4.5		27.50	54.6%	53.6%	11.8	0.01297	0.01150
30	23.5	31.0	4.0		27.00	53.6%	52.6%	11.9	0.01290	0.00811
60	23.5	27.0	4.0		23.00	45.7%	44.8%	12.5	0.01290	0.00589
250	24.0	24.5	4.0		20.50	40.7%	40.0%	12.9	0.01282	0.00292
1440	24.0	22.0	4.0		18.00	35.7%	35.1%	13.3	0.01282	0.00123

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	Will Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

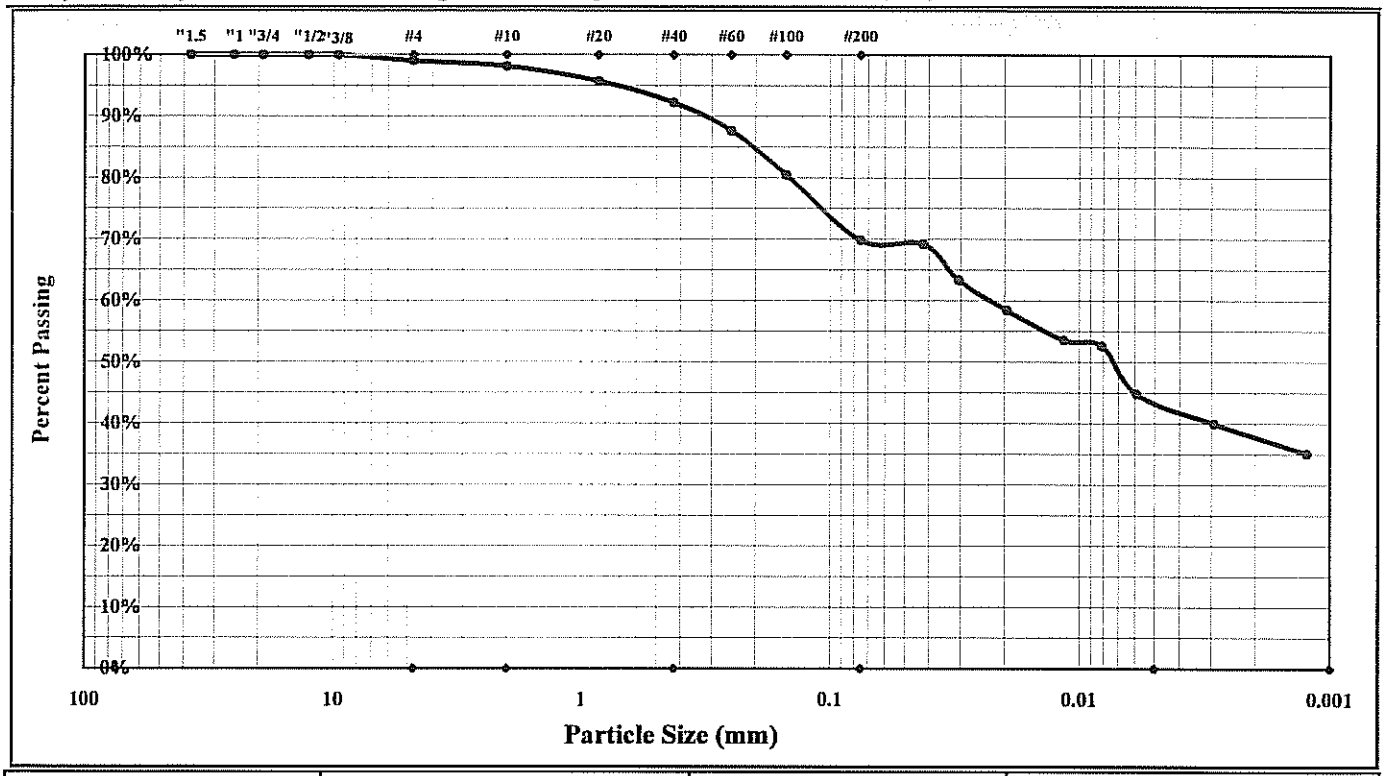
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/23/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/19-23/10
Client Name:	Duke Energy		
Address:			
Boring #:	Lift 3	Sample #: Point 1	Sample Date: 4/12/10
Location:	Test Pad Samples	Offset:	Elevation: 18" from base
Sample Description:	Orange Brown Clay w/Coarse to Fine Sand (CH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	1.0%	Silt	26.3%
Silt & Clay (% Passing #200):	69.8%	Total Sand:	29.2%	Clay	43.5%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	34.5%
Liquid Limit	58	Plastic Limit	30	Plastic Index	28
Coarse Sand:	0.9%	Medium Sand:	5.9%	Fine Sand:	22.4%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/26/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/19-26/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

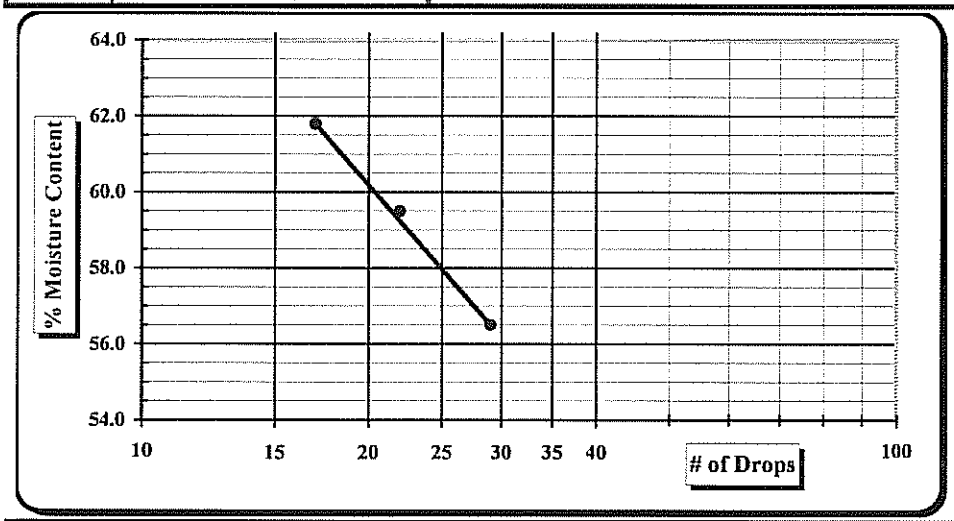
Boring #: Lift 3 Sample #: Point 1 Sample Date: 4/12/10

Location: Test Pad Samples Offset: Elevation: 18" from base

Sample Description: Orange Brown Clay w/Coarse to Fine Sand (CH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	40	60	55				5	LL	
A	Tare Weight	15.81	13.87	14.34				15.72	16.94	
B	Wet Soil Weight + A	23.23	21.00	22.14				21.73	22.05	
C	Dry Soil Weight + A	20.55	18.34	19.16				20.34	20.88	
D	Water Weight (B-C)	2.68	2.66	2.98				1.39	1.17	
E	Dry Soil Weight (C-A)	4.74	4.47	4.82				4.62	3.94	
F	% Moisture (D/E)*100	56.5%	59.5%	61.8%				30.1%	29.7%	
N	# OF DROPS	29	22	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**29.9%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **58**
Plastic Limit **30**
Plastic Index 28
Group Symbol **CH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Laboratory Record Version 4.1

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/13-16/10
Project Name:	Marshall Steam Station - Industrial Landfill No. 1	Report Date:	4/16/10
Client Name:	Duke Energy	Sample Date:	4/12/2010
Client Address:	Marshall Steam Station	Panel ID:	9

Boring #: Lift 3 Sample #: Point 1 Depth: 18" from base Perm Cell ID:

Location: Offset: Sample Description: Orange Brown Clay w/Coarse to Fine Sand (CH)

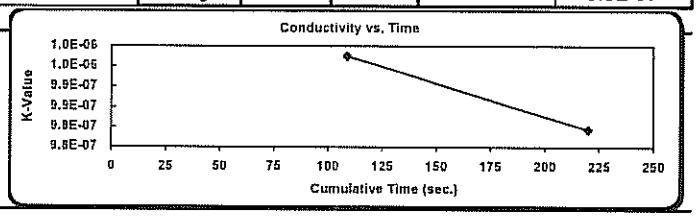
Liquid Limit: 58 Sp. Grav. (Assumed): 2.700 Sample Type: Undisturbed Log #:

Plastic Limit: 30 Plastic Index: 28 Percent Passing #200: 69.8 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	11.488	Wet Density (PCF):	122.6	Length (cm):	11.488	Wet Density (PCF):	101.9
Diameter (cm):	7.244	Dry Density (PCF):	101.9	Diameter (cm):	7.24	Dry Density (PCF):	101.9
Area (cm^2)	41.22	Percent Saturation:	83.8	Area (cm^2)	41.21	Percent Saturation:	0.0
Volume (cm^3)	473.50			Volume (cm^3)	473.44	B-Parameter:	
Wet weight (grams)	929.9	Void Ratio:	0.654	Wet weight (grams)	773.0	Void Ratio:	0.654
Dry Weight (grams)	773.0	Porosity:	0.395	Dry Weight (grams)	773.0	Porosity:	0.395
Percent Moisture:	20.3			Percent Moisture:			
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements								K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2	Initial Gradient	Final Gradient	Uncorrected K-Value	Corrected K-Value
14:47	14:48	109	22.9	22.9	22.9	0.9333	6.40	1.84	5.70	1.87	57.3	48.2	4.99	4.19	1.07E-06	9.97E-07
14:54	14:56	111	22.9	22.9	22.9	0.9333	6.40	1.84	5.70	1.87	57.3	48.2	4.99	4.19	1.05E-06	9.79E-07
													Averages:		*1.06E-06*	*9.9E-07*

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

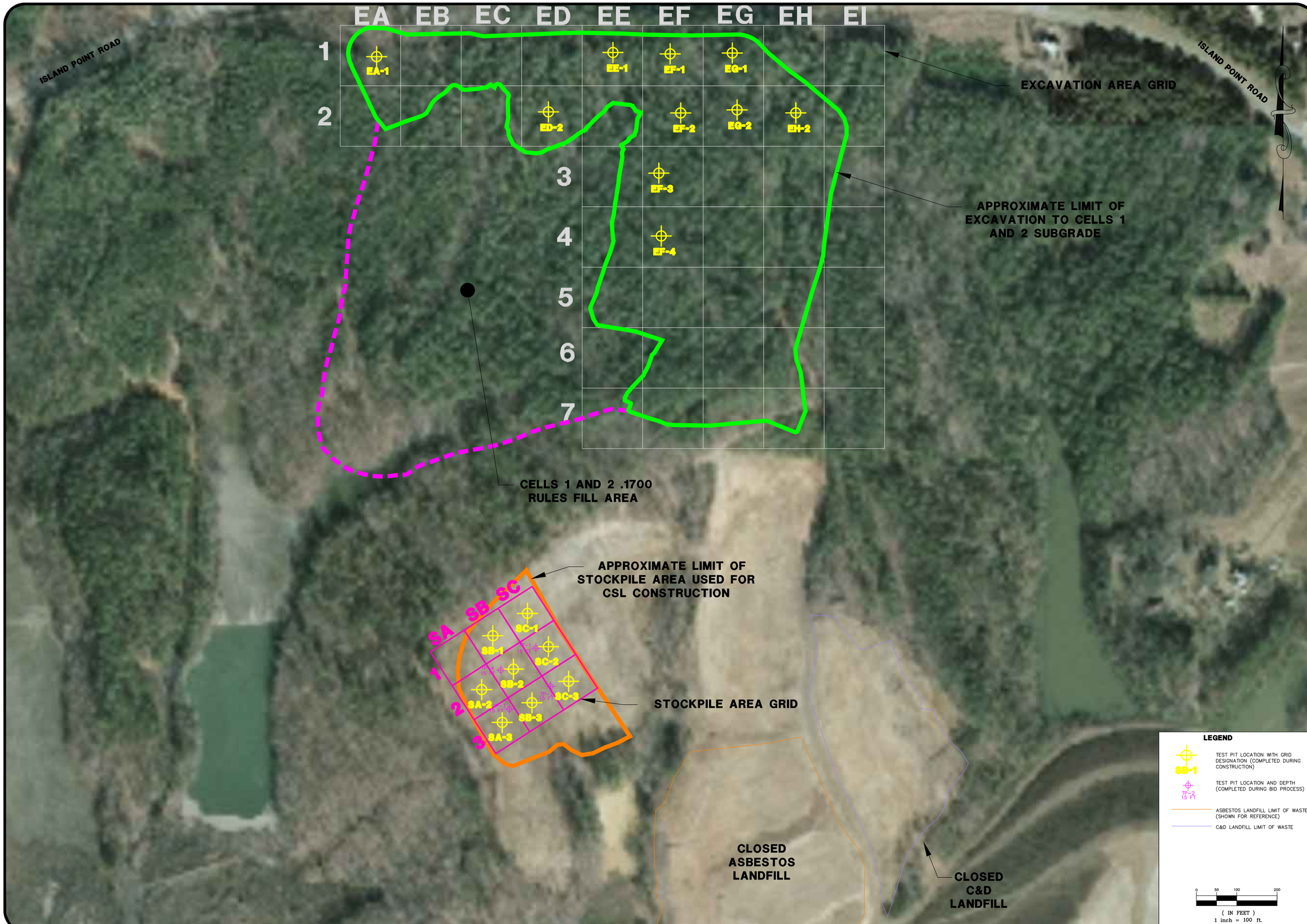
Technician: Jennifer Olsen

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Compacted Soil Liner Test Sample Location Reference Map



Duke Energy ©

S&ME
9751 SOUTHERN PINE BLVD.
CHARLOTTE, N.C. 28273
(704)523-4726
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY

COMPACTED SOIL LINER LAB TESTS
SAMPLE LOCATION REFERENCE MAP

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: WMH
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-08-122	
SCALE: AS SHOWN	DATE: 12/15/10
DRAWING: 1	OF: 1

DRAWING PATH:

Compacted Soil Liner Full Scale Laboratory Test Summary Table

SUMMARY OF COMPACTED SOIL LINER LABORATORY TEST DATA

Sample No.[1]	Sample Type	Soil Description	USCS Classification	% Finer No. 200 (ASTM D422)	Atterberg Limits (ASTM D4318)			Standard Proctor Data (ASTM D698)		Hydraulic Conductivity (ASTM D5084)				
										Test Conditions[2]				Permeability (cm/sec)
					LL	PL	PI	Max. Dry Density (pcf)	Opt. Moisture Content (%)	Dry Density (pcf)	% Compaction	Moisture Content (%)	% Wet of OMC	
EA-1	Bulk	Orange Brown Coarse to Fine Sandy Silty CLAY	MH	61.9	59	34	25	95.4	22.8	90.9	95.3%	24.3	1.5	1.3×10^{-6}
ED-2	Bulk	Orange Brown Medium to Fine Sandy Clayey SILT	MH	67.5	58	32	26	97.2	23.3	92.2	94.9%	24.8	1.5	5.6×10^{-7}
EE-1	Bulk	Orange Brown Medium to Fine Sandy Clayey SILT	MH	68.5	54	33	21	98.0	22.9	93.4	95.3%	25.5	2.6	1.2×10^{-6}
EF-1	Bulk	Orange Brown Coarse to Fine Sandy Clayey SILT	MH	68.6	59	31	28	96.1	24.1	91.6	95.3%	26.5	2.4	6.3×10^{-7}
EF-2	Bulk	Orange Brown Coarse to Fine Sandy CLAY	CH	66.3	61	29	32	97.7	24.3	93.9	96.1%	26.3	2.0	2.1×10^{-7}
EF-3	Bulk	Orange Brown Clayey SILT w/ Medium to Fine Sand	MH	77.6	67	39	28	91.7	27.3	87.4	95.3%	29.8	2.5	7.0×10^{-7}
EF-4	Bulk	Orange Brown Clayey SILT w/ Coarse to Fine Sand	MH	70.5	67	35	32	90.7	27.4	87.3	96.3%	28.9	1.5	1.0×10^{-6}
EG-1	Bulk	Orange Brown Coarse to Fine Sandy Clayey SILT	MH	64.4	54	30	24	99.5	22.6	94.3	94.8%	25.1	2.5	3.9×10^{-7}
EG-2	Bulk	Orange Brown Clayey SILT w/ Medium to Fine Sand	MH	77.9	62.0	34	28	96.6	24.7	91.9	95.1%	27.0	2.3	2.2×10^{-7}
EH-2	Bulk	Orange Brown Micaceous Clayey SILT w/ Medium to Fine Sand	MH	78.0	79	42	37	83.2	33.1	78.5	94.4%	34.6	1.5	1.0×10^{-6}
TP-1	Bulk	Orange Brown Coarse to Fine Sandy SILT	ML	52.2	45	30	15	103.4	20.4	97.4	94.2%	23.2	2.8	6.65×10^{-7}
TP-2	Bulk	Orange Brown Coarse to Fine Sandy SILT with Mica	ML	62.2	47	29	18	Not Tested						
TP-3	Bulk	Orange Brown Coarse to Fine Sandy SILT with Mica	ML	59	48	32	16							
TP-4	Bulk	Orange Brown Clayey SILT w/ Coarse to Fine Sand w/ Mica	MH	54.4	50	30	20	101.1	21.3	96.5	95.5%	23.7	2.4	6.13×10^{-6}
SA-2	Bulk	Orange Brown Clayey Coarse to Fine Sandy SILT	ML	55.9	47	33	14	101.2	19.7	96.2	95.1%	22.8	3.1	6.4×10^{-6}
SA-3	Bulk	Orange Brown Coarse to Fine Sandy Clayey SILT	MH	61.2	50	30	20	102.7	20.2	98.1	95.5%	22.3	2.1	1.0×10^{-6}
SB-1	Bulk	Orange Brown Coarse to Fine Sandy CLAY	CH	58.3	58	29	29	100.0	21.9	94.5	94.5%	23.8	1.9	1.1×10^{-6}
SB-2	Bulk	Orange Brown Medium to Fine Sandy Clayey SILT	MH	63.8	63	33	30	94.0	25.1	89.9	95.6%	26.8	1.7	8.7×10^{-7}
SB-3	Bulk	Orange Brown Coarse to Fine Sandy Clayey SILT	MH	61.5	50	35	15	98.9	20.5	95.4	96.5%	21.5	1.0	1.8×10^{-6}
SC-1	Bulk	Orange Brown Coarse to Fine Sandy CLAY	CH	55.9	53	27	26	104.1	19.2	102.8	98.8%	21.0	1.8	8.5×10^{-7}
SC-2	Bulk	Orange Brown Coarse to Fine Sandy Silty CLAY	CL	58.4	49	27	22	103.4	19.0	98.1	94.9%	21.1	2.1	1.6×10^{-6}
SC-3	Bulk	Orange Brown Medium to Fine Sandy SILT	ML	60.8	48	34	14	99.3	20.9	93.8	94.5%	22.1	1.2	3.0×10^{-6}

1. All samples were bulk samples; 20 total laboratory test result suites for in-place compacted soil liner (CSL) during construction - approximately 48,000 CY of CSL material placed in Cells 1 and 2.
2. Samples were tested at net confining pressures of approximately 2.5 psi and gradients ranging from approximately 5 to 3.5 (see following permeability results for exact pressure and gradient).

Compacted Soil Liner Full Scale Laboratory Test Results

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: EA-1	Sample Date: 3/31/10
Location:	Excavation Area TP	Offset:	Elevation: 3-3.5'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.700**	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	306.75			Tare #	35		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	306.75		A	Tare Wt.	15.64		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.00		B	Wet Wt. + A	26.08		1/2"	0.0		100.0%
Total Sample Oven Dried:	303.56		C	Dry Wt. + A	25.97		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):	49.47		D	Water Wt. (B-C)	0.11		#4	1.5		99.5%
% Passing #10:	98.8%		E	Dry Wt. (C-A)	10.33		#10	3.6	100.0%	98.8%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	1.06%		#20	0.7	98.6%	97.4%
							#40	1.7	96.5%	95.4%
							#60	4.2	91.5%	90.4%
							#100	9.5	80.7%	79.8%
							#200	18.5	62.7%	61.9%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 7/1/2009 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	22.5	34.0	4.5		29.50	59.0%	58.3%	11.5	0.01305	0.04417
2	22.5	31.0	4.5		26.50	53.0%	52.4%	11.9	0.01305	0.03189
5	22.5	28.5	4.5		24.00	48.0%	47.5%	12.4	0.01305	0.02052
15	22.5	26.0	4.5		21.50	43.0%	42.5%	12.8	0.01305	0.01204
30	22.5	24.0	4.5		19.50	39.0%	38.6%	13.1	0.01305	0.00862
60	22.5	23.0	4.5		18.50	37.0%	36.6%	13.3	0.01305	0.00613
250	22.5	21.0	4.5		16.50	33.0%	32.6%	13.6	0.01305	0.00304
1440	22.5	20.0	4.5		15.50	31.0%	30.6%	13.8	0.01305	0.00128

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

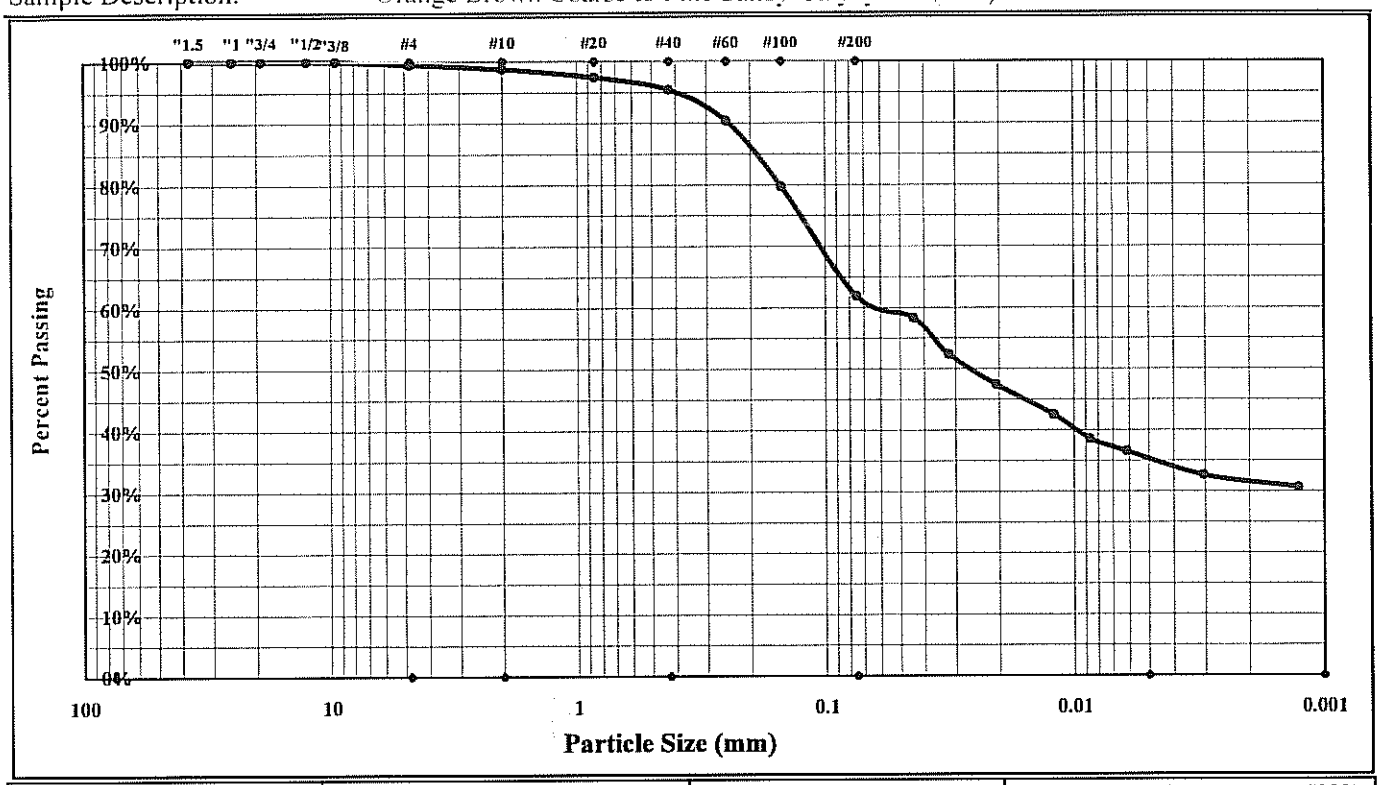
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: EA-1	Sample Date:	3/31/10
Location:	Excavation Area TP Offset:	Elevation:	3-3.5'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.5%	Silt	26.4%
Silt & Clay (% Passing #200):	61.9%	Total Sand:	37.6%	Clay	35.5%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	30.5%
Liquid Limit	59	Plastic Limit	34	Plastic Index	25
Coarse Sand:	0.7%	Medium Sand:	3.4%	Fine Sand:	33.5%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07
Another code

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

ASTM D 4318 ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/21/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/8-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

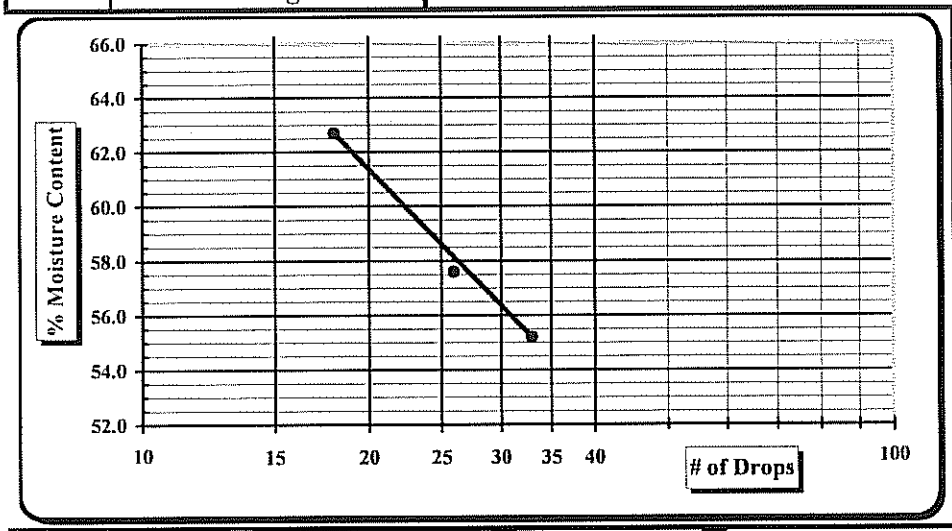
Boring #: Sample #: EA-1 Sample Date: 3/31/10

Location: Excavation Area TP Offset: Elevation: 3-3.5'

Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	44	12	FF				XY	QQ	
A	Tare Weight	15.67	14.20	16.88				15.92	16.87	
B	Wet Soil Weight + A	24.78	24.43	24.77				22.50	23.16	
C	Dry Soil Weight + A	21.54	20.69	21.73				20.83	21.58	
D	Water Weight (B-C)	3.24	3.74	3.04				1.67	1.58	
E	Dry Soil Weight (C-A)	5.87	6.49	4.85				4.91	4.71	
F	% Moisture (D/E)*100	55.2%	57.6%	62.7%				34.0%	33.5%	
N	# OF DROPS	33	26	18				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**33.8%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **59**
Plastic Limit **34**
Plastic Index 25
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

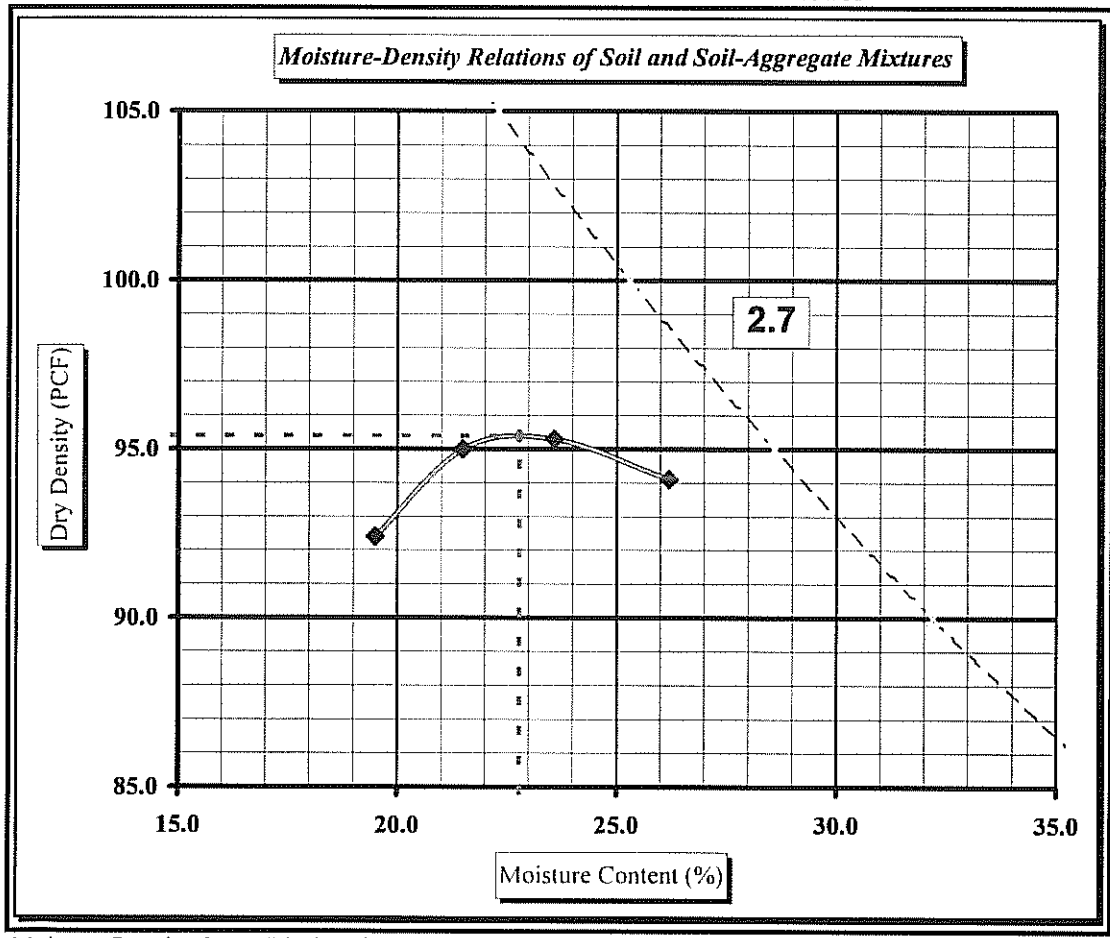
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/17/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/15/10-4/17/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #:		Sample #:	EA-1	Sample Date:	3/31/2010
Location:	Excavation Area TP	Offset:		Depth:	3-3.5'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)				

Maximum Dry Density 95.4 PCF. **Optimum Moisture Content 22.8%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**59**
Plastic Limit	**34**
Plastic Index	**25**

% Passing

3/4"	
3/8"	100.0%
#4	99.5%
#10	98.8%
#40	95.4%
#60	90.4%
#200	61.9%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/22-27/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	4/27/10
Client Name:	Duke Energy	Sample Date:	
Client Address:		Panel ID:	7
Boring #:	Sample #: EA-1 Depth: 3-3.5'	Perm Cell ID:	
Location:	Excavation Area TP Offset: Sample Description: Orange Brown Coarse to Fine Sandy Silty Clay (MH)		
Liquid Limit:	59 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded	Log #:	
Plastic Limit:	34 Plastic Index: 25 Percent Passing #200: 61.9	Maximum Particle Size:	

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.645	Wet Density (PCF):	113.0	Length (cm):	7.645	Wet Density (PCF):	113.0
Diameter (cm):	7.280	Dry Density (PCF):	90.9	Diameter (cm):	7.28	Dry Density (PCF):	90.9
Area (cm^2)	41.62	Percent Saturation:	76.8	Area (cm^2)	41.62	Percent Saturation:	76.8
Volume (cm^3)	318.21			Volume (cm^3)	318.16	B-Parameter:	97.00
Wet weight (grams)	576.0	Void Ratio:	0.854	Wet weight (grams)	576.0	Void Ratio:	0.854
Dry Weight (grams)	463.4	Porosity:	0.461	Dry Weight (grams)	463.4	Porosity:	0.461
Percent Moisture:	24.3			Percent Moisture:	24.3		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

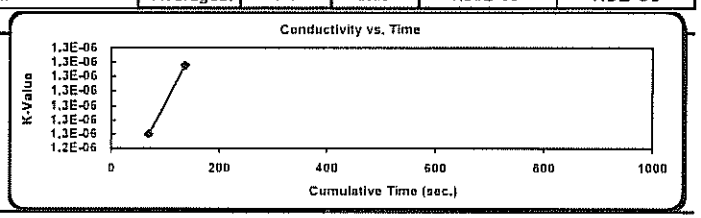
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
1:44	1:45	70	23.2	23.2	23.2	0.9268	4.60	1.90	4.10	1.90	33.9	27.7	4.44	3.62	1.35E-06	1.25E-06
2:36	2:37	67	23.3	23.3	23.3	0.9247	4.60	1.89	4.10	1.89	34.1	27.6	4.46	3.63	1.40E-06	1.30E-06
													Averages:		*1.38E-06*	*1.3E-06*

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	1356-08-122	Report Date:	4/5/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	3/31-4/5/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: ED-2	Sample Date: 3/23/10
Location:	Marshall Steam Station	Offset:	Elevation: 1-3'
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.700**	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	360.27			Tare #	TT		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	360.27	A		Tare Wt.	15.94		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.00	B		Wet Wt. + A	29.95		1/2"	0.0		100.0%
Total Sample Oven Dried:	354.37	C		Dry Wt. + A	29.72		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):	49.18	D		Water Wt. (B-C)	0.23		#4	0.0		100.0%
% Passing #10:	99.8%	E		Dry Wt. (C-A)	13.78		#10	0.6	100.0%	99.8%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	1.67%		#20	0.6	98.7%	98.6%
							#40	1.9	96.2%	96.0%
							#60	4.5	90.8%	90.6%
							#100	9.1	81.6%	81.5%
							#200	15.9	67.6%	67.5%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 7/1/2009 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	23.0	36.5	5.0		31.50	63.4%	63.3%	11.1	0.01297	0.04328
2	23.0	35.5	5.0		30.50	61.4%	61.3%	11.3	0.01297	0.03083
5	23.0	31.5	5.0		26.50	53.3%	53.3%	11.9	0.01297	0.02006
15	23.0	29.5	5.0		24.50	49.3%	49.2%	12.3	0.01297	0.01174
30	23.0	26.0	5.0		21.00	42.3%	42.2%	12.9	0.01297	0.00849
60	23.0	24.0	5.0		19.00	38.2%	38.2%	13.2	0.01297	0.00608
250	23.5	21.0	5.0		16.00	32.2%	32.2%	13.7	0.01290	0.00302
1440	23.0	19.0	5.0		14.00	28.2%	28.1%	14.0	0.01297	0.00128

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	4/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

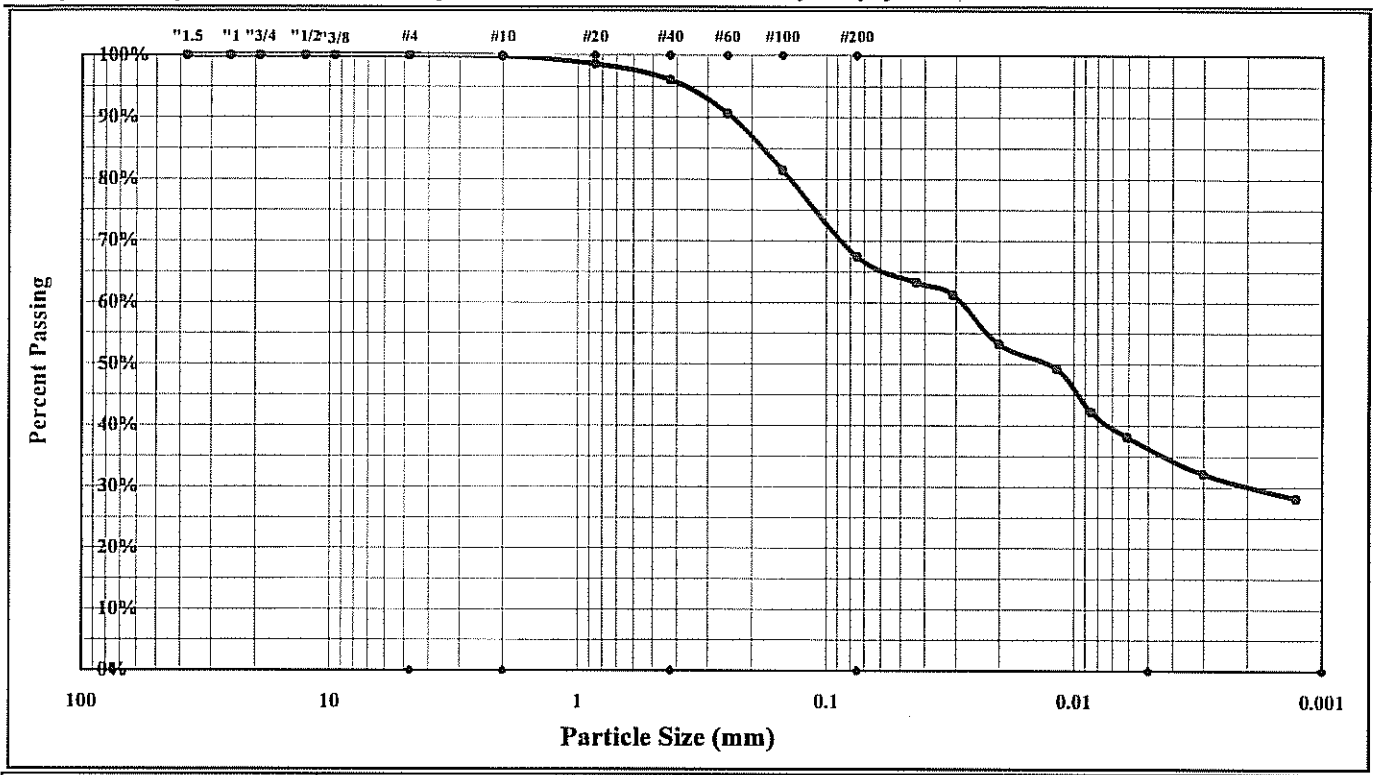
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/5/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	3/31-4/5/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: ED-2	Sample Date:	3/23/10
Location:	Marshall Steam Offset:	Elevation:	1-3'
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	31.5%
Silt & Clay (% Passing #200):	67.5%	Total Sand:	32.5%	Clay	36.0%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	28.0%
Liquid Limit	58	Plastic Limit	32	Plastic Index	26
Coarse Sand:	0.2%	Medium Sand:	3.8%	Fine Sand:	28.5%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-09-122**	Report Date:	4/17/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/1-17/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

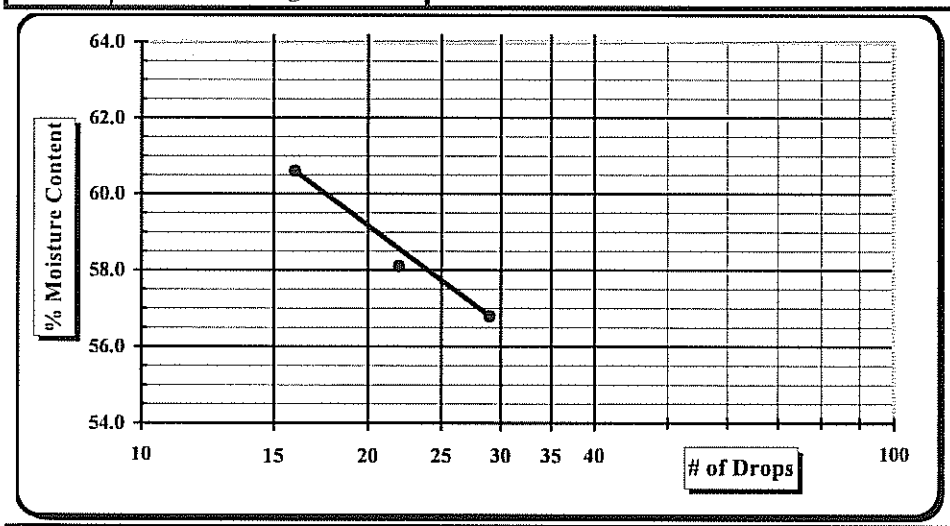
Boring #: Sample #: ED-2 Sample Date: 3/23/10

Location: Excavation Area TP Offset: Elevation: 1-3'

Sample Description: Orange Brown Medium to Fine Sandy Clayey Silt (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	LL	II	PP				39	27	
A	Tare Weight	16.93	16.88	16.16				13.98	13.91	
B	Wet Soil Weight + A	24.41	25.59	25.06				21.29	20.56	
C	Dry Soil Weight + A	21.70	22.39	21.70				19.53	18.93	
D	Water Weight (B-C)	2.71	3.20	3.36				1.76	1.63	
E	Dry Soil Weight (C-A)	4.77	5.51	5.54				5.55	5.02	
F	% Moisture (D/E)*100	56.8%	58.1%	60.6%				31.7%	32.5%	
N	# OF DROPS	29	22	16				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**32.1%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **58**
Plastic Limit **32**
Plastic Index 26
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	4/15/10	William Harrison	4/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

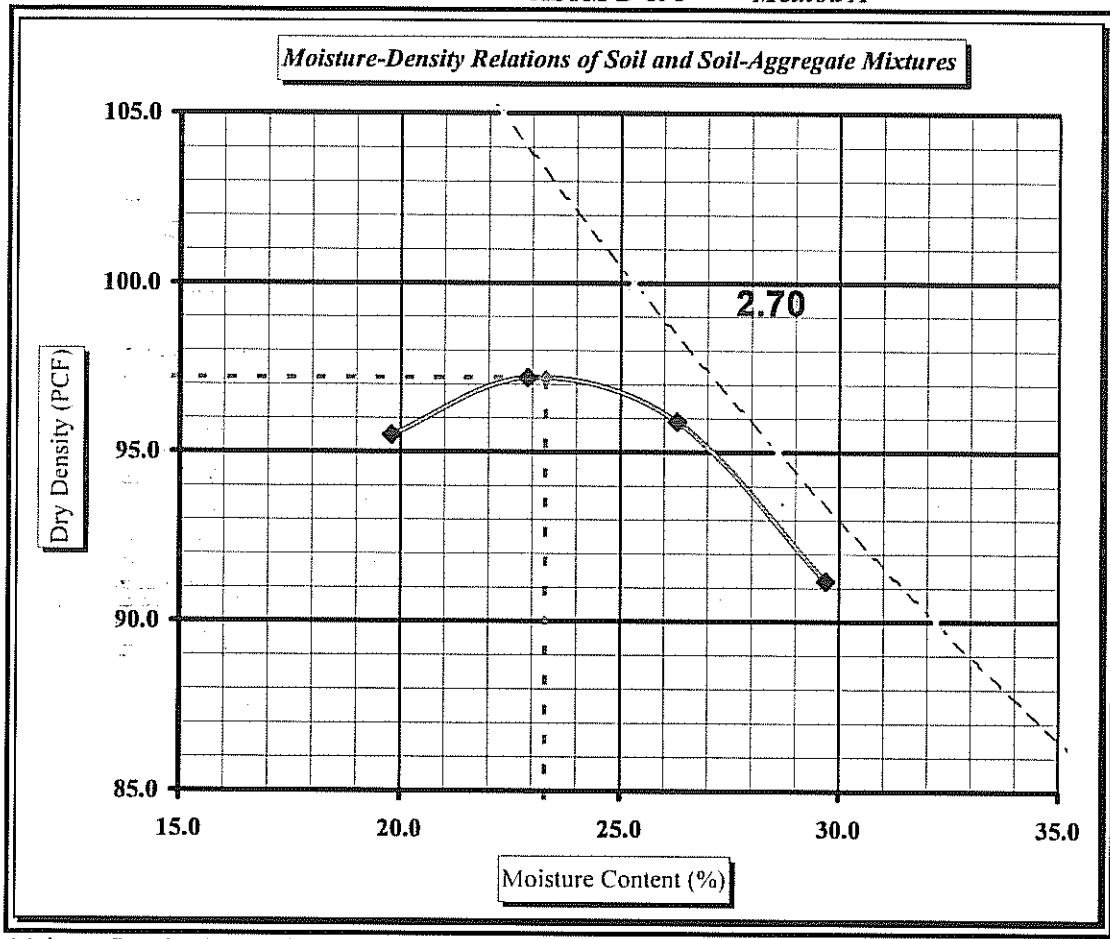
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/1/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	3/26-4/1/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: ED-2	Sample Date:	3/23/2010
Location:	Excavation Area Test Pits Offset:	Depth:	1-3'
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		

Maximum Dry Density 97.2 PCF. **Optimum Moisture Content 23.3%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**58**
Plastic Limit	**32**
Plastic Index	**26**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.8%
#40	96.0%
#60	90.6%
#200	67.5%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Laboratory Record Version 4.1

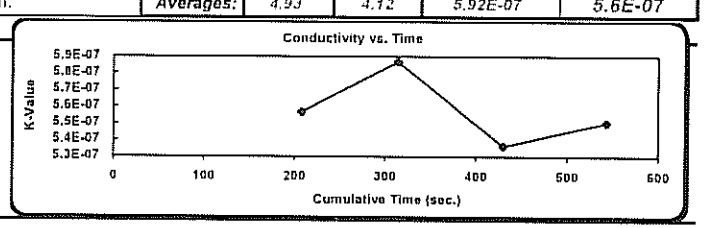
Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/1-9/10
Project Name:	Marshall Steam Station Industrial Landfill No. 1	Report Date:	4/10/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:	Marshall Steam Station I	Panel ID:	8
Boring #:	Sample #: ED-2 Depth: 1-3'	Perm Cell ID:	
Location:	Excavation Area Test Pits Sample Description: Orange Brown Medium to Fine Sandy Clayey Silt (MH)		
Liquid Limit:	58 Sp. Grav. (Assumed): 2.750 Sample Type: Remolded	Log #:	
Plastic Limit:	32 Plastic Index: 26 Percent Passing #200: 67.5	Maximum Particle Size:	#10

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.699	Wet Density (PCF):	115.0	Length (cm):	7.699	Wet Density (PCF):	92.2
Diameter (cm):	7.270	Dry Density (PCF):	92.2	Diameter (cm):	7.27	Dry Density (PCF):	92.2
Area (cm^2)	41.51	Percent Saturation:	79.1	Area (cm^2)	41.52	Percent Saturation:	0.0
Volume (cm^3)	319.61			Volume (cm^3)	319.64	B-Parameter:	0.97
Wet weight (grams)	589.1	Void Ratio:	0.862	Wet weight (grams)	472.0	Void Ratio:	0.862
Dry Weight (grams)	472.0	Porosity:	0.463	Dry Weight (grams)	472.0	Porosity:	0.463
Percent Moisture:	24.8			Percent Moisture:			
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	82.5	Back Pressure (psi):	80.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
10:20	10:24	208	22.5	22.5	22.5	0.9421	4.90	1.88	4.20	1.90	38.0	28.9	4.93	3.76	5.91E-07	5.57E-07
10:25	10:27	106	22.5	22.5	22.5	0.9421	4.90	1.88	4.50	1.90	38.0	32.7	4.93	4.25	6.23E-07	5.87E-07
10:28	10:30	116	22.5	22.5	22.5	0.9421	4.90	1.88	4.50	1.90	38.0	32.7	4.93	4.25	5.69E-07	5.36E-07
10:30	10:32	113	22.5	22.5	22.5	0.9421	4.90	1.88	4.50	1.90	38.0	32.7	4.93	4.25	5.84E-07	5.51E-07
												Averages:	4.93	4.12	5.92E-07	5.6E-07

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician: Jennifer Olsen

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: EE-1	Sample Date: 3/31/10
Location:	Excavation Area TP	Offset:	Elevation: 1-6'
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		

Pan #:		Beaker #:		Apparent Relative Density(Assumed)		2.700	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				Moisture Content	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	353.92			Tare #	0		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	353.92	A		Tare Wt.	16.41		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.00	B		Wet Wt. + A	27.70		1/2"	0.0		100.0%
Total Sample Oven Dried:	350.79	C		Dry Wt. + A	27.60		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):	49.56	D		Water Wt. (B-C)	0.10		#4	0.9		99.7%
% Passing #10:	99.7%	E		Dry Wt. (C-A)	11.19		#10	1.1	100.0%	99.7%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	0.89%		#20	0.3	99.4%	99.1%
							#40	3.3	93.3%	93.0%
							#60	7.3	85.3%	85.0%
							#100	11.5	76.8%	76.6%
							#200	15.5	68.8%	68.5%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)$^{1/2}$
1	22.5	38.0	4.5		33.50	66.9%	66.7%	10.8	0.01305	0.04288
2	22.5	36.0	4.5		31.50	62.9%	62.7%	11.1	0.01305	0.03078
5	22.5	33.0	4.5		28.50	56.9%	56.8%	11.6	0.01305	0.01989
15	22.5	28.5	4.5		24.00	47.9%	47.8%	12.4	0.01305	0.01184
30	22.5	25.0	4.5		20.50	41.0%	40.8%	12.9	0.01305	0.00857
60	22.5	23.0	4.5		18.50	37.0%	36.8%	13.3	0.01305	0.00613
250	22.5	18.0	4.5		13.50	27.0%	26.9%	14.1	0.01305	0.00310
1440	22.5	16.0	4.5		11.50	23.0%	22.9%	14.4	0.01305	0.00131

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

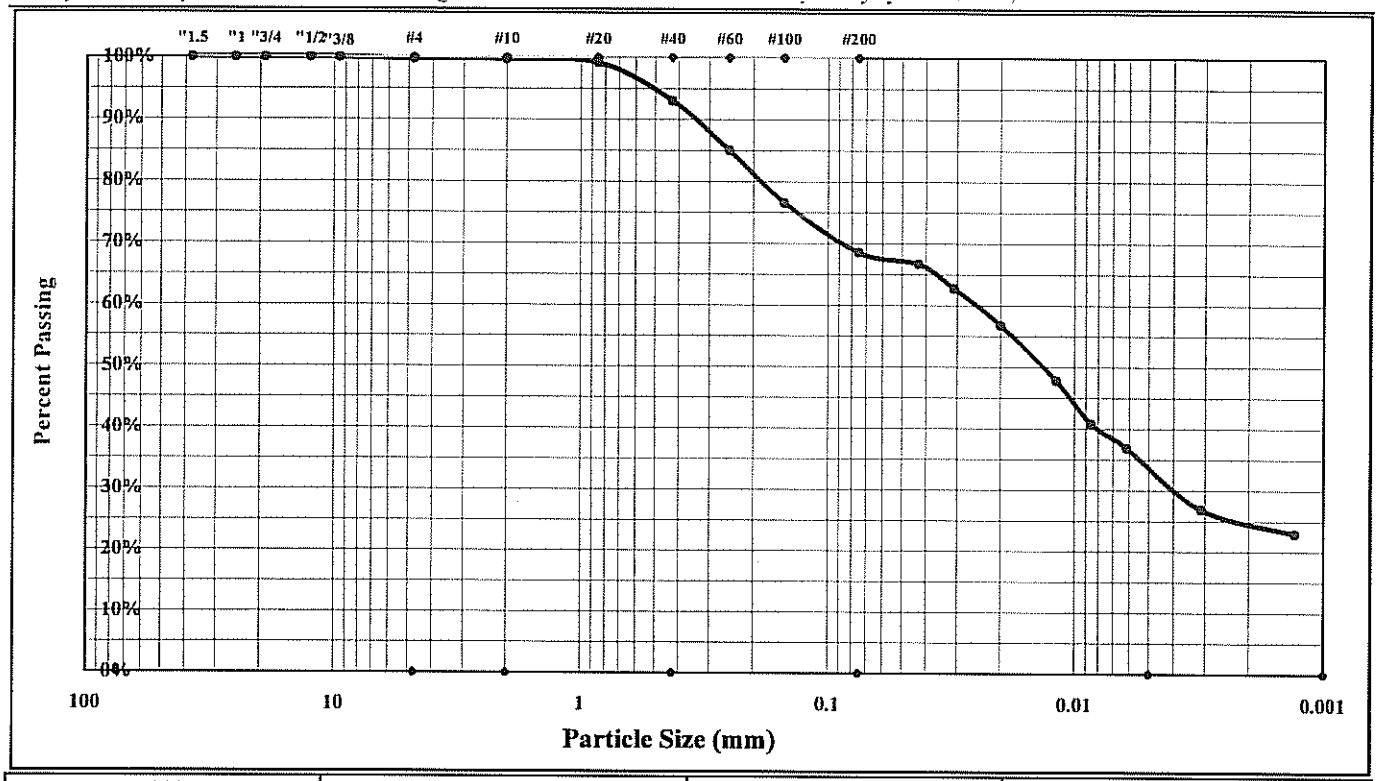
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: EE-1	Sample Date:	3/31/10
Location:	Excavation Area TP Offset:	Elevation:	1-6'
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.3%	Silt	34.5%
Silt & Clay (% Passing #200):	68.5%	Total Sand:	31.2%	Clay	34.0%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	23.5%
Liquid Limit	54	Plastic Limit	33	Plastic Index	21
Coarse Sand:	0.1%	Medium Sand:	6.6%	Fine Sand:	24.5%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

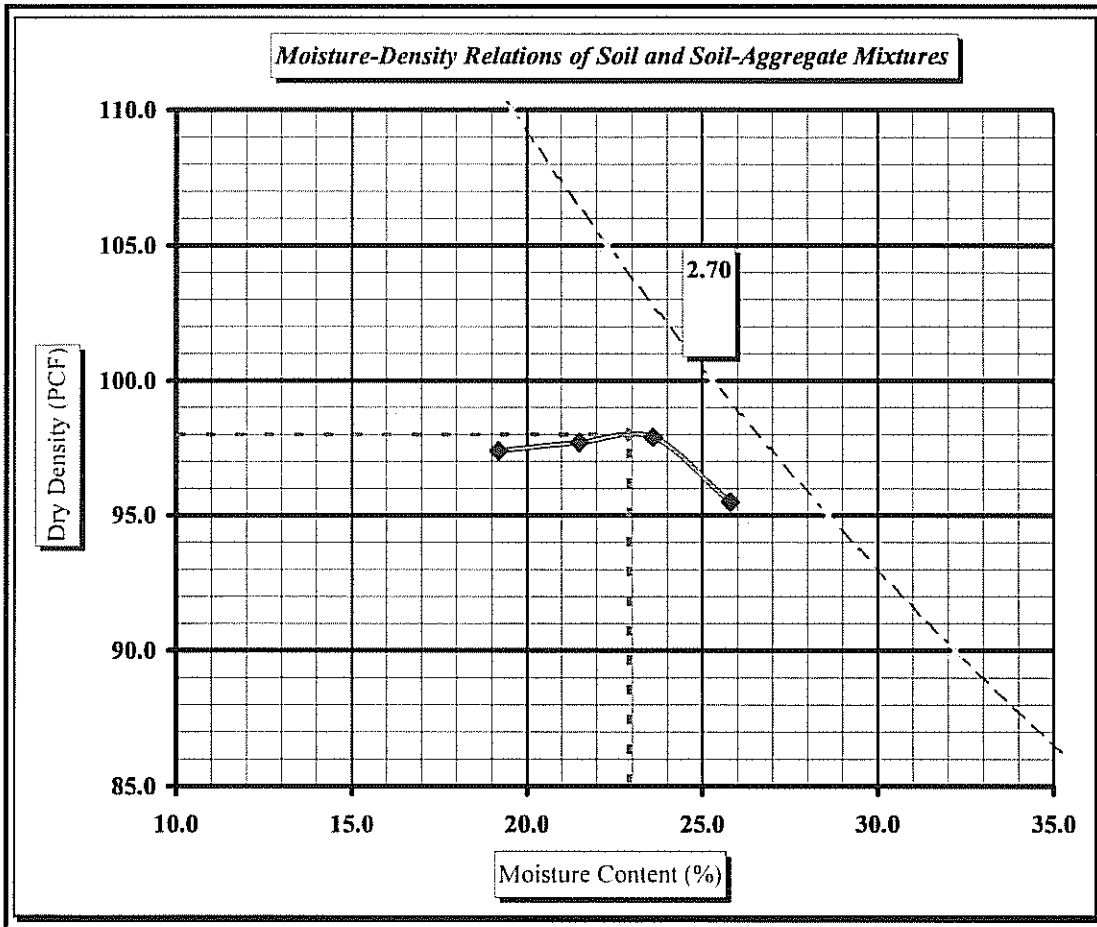
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/21/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/15/10-4/21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #:		Sample #:	EE-1	Sample Date:	3/31/2010
Location:	Excavation Area TP	Offset:		Depth:	1"-6'
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)				

Maximum Dry Density 98.0 PCF. **Optimum Moisture Content 22.9%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**54**
Plastic Limit	**33**
Plastic Index	**21**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.7%
#10	99.7%
#40	93.0%
#60	85.0%
#200	68.5%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/21/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/8-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

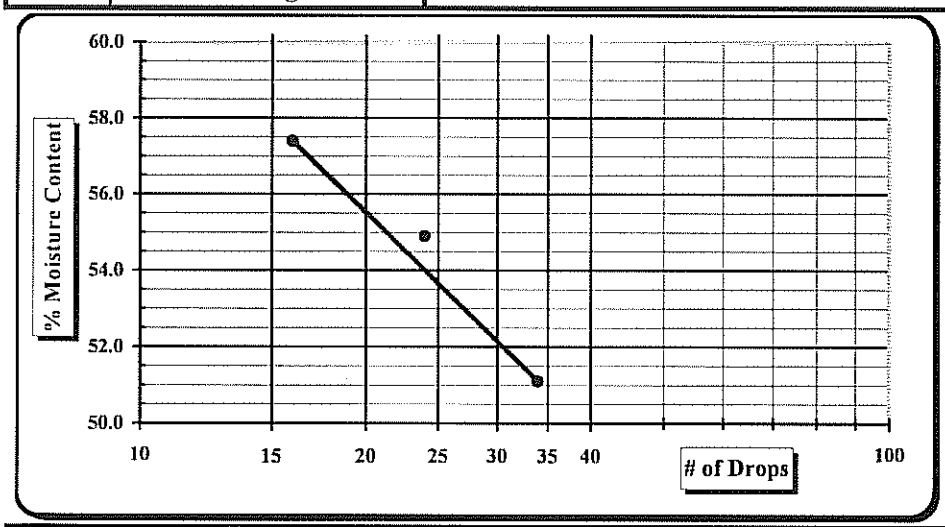
Boring #: Sample #: EE-1 Sample Date: 3/31/10

Location: Excavation Area TP Offset: Elevation: 1-6'

Sample Description: Orange Brown Medium to Fine Sandy Clayey Silt (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	39	XX	41				59	W	
A	Tare Weight	13.99	16.04	15.77				15.82	16.02	
B	Wet Soil Weight + A	23.39	24.45	24.00				22.63	23.24	
C	Dry Soil Weight + A	20.21	21.47	21.00				20.92	21.47	
D	Water Weight (B-C)	3.18	2.98	3.00				1.71	1.77	
E	Dry Soil Weight (C-A)	6.22	5.43	5.23				5.10	5.45	
F	% Moisture (D/E)*100	51.1%	54.9%	57.4%				33.5%	32.5%	
N	# OF DROPS	34	24	16				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**33.0%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **54**
Plastic Limit **33**
Plastic Index 21
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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S&ME

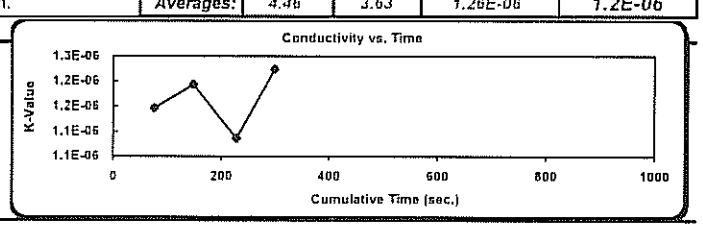
Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/30-5/3/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	5/3/10
Client Name:	Duke Energy	Sample Date:	
Client Address:	Marshall Steam Station	Panel ID:	8
Boring #:	Sample #: EE-1 Depth: 1-6'	Perm Cell ID:	
Location:	Excavation Area TP Offset: Sample Description: Orange Brown Medium to Fine Sandy Clayey Silt (MH)		
Liquid Limit:	54 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded	Log #:	
Plastic Limit:	33 Plastic Index: 21 Percent Passing #200: 68.5	Maximum Particle Size:	

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.620	Wet Density (PCF):	117.2	Length (cm):	7.620	Wet Density (PCF):	117.2
Diameter (cm):	7.275	Dry Density (PCF):	93.4	Diameter (cm):	7.28	Dry Density (PCF):	93.4
Area (cm^2)	41.57	Percent Saturation:	85.5	Area (cm^2)	41.57	Percent Saturation:	85.5
Volume (cm^3)	316.78			Volume (cm^3)	316.78	B-Parameter:	0.95
Wet weight (grams)	594.6	Void Ratio:	0.805	Wet weight (grams)	594.6	Void Ratio:	0.805
Dry Weight (grams)	473.8	Porosity:	0.446	Dry Weight (grams)	473.8	Porosity:	0.446
Percent Moisture:	25.5			Percent Moisture:	25.5		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
1:27	1:29	76	23.3	23.3	23.3	0.9247	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	1.24E-06	1.15E-06
1:32	1:33	73	23.3	23.3	23.3	0.9247	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	1.29E-06	1.19E-06
1:36	1:38	80	23.4	23.4	23.4	0.9225	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	1.18E-06	1.09E-06
1:41	1:42	71	23.4	23.4	23.4	0.9225	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	1.33E-06	1.22E-06
													Averages:		*1.26E-06*	*1.2E-06*

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: EF-1	Sample Date: 3/31/10
Location:	Excavation Area TP	Offset:	Elevation: 1-6'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.700**	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	295.78			Tare #	FF		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	295.78	A		Tare Wt.	16.17		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.00	B		Wet Wt. + A	28.00		1/2"	0.0		100.0%
Total Sample Oven Dried:	293.31	C		Dry Wt. + A	27.90		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):	49.58	D		Water Wt. (B-C)	0.10		#4	0.5		99.8%
% Passing #10:	98.8%	E		Dry Wt. (C-A)	11.73		#10	3.6	100.0%	98.8%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	0.85%		#20	1.2	97.5%	96.3%
							#40	3.5	92.9%	91.7%
							#60	6.2	87.6%	86.5%
							#100	10.2	79.5%	78.5%
							#200	15.2	69.4%	68.6%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
			Control Cylinder	Composite Correction		P(-#10) =	P (total) =			D =
T (Min.)	(0.5 °C)	Reading			R	(R x a / W) x 100	P x % Passing #10	L	K	K x ((L/T)^1/2
1	22.5	39.0	4.5		34.50	68.9%	68.0%	10.6	0.01305	0.04256
2	22.5	37.5	4.5		33.00	65.9%	65.1%	10.9	0.01305	0.03044
5	22.5	34.0	4.5		29.50	58.9%	58.2%	11.5	0.01305	0.01975
15	22.5	31.0	4.5		26.50	52.9%	52.3%	11.9	0.01305	0.01165
30	22.5	28.5	4.5		24.00	47.9%	47.3%	12.4	0.01305	0.00838
60	22.5	28.0	4.5		23.50	46.9%	46.4%	12.4	0.01305	0.00594
250	22.5	23.5	4.5		19.00	37.9%	37.5%	13.2	0.01305	0.00300
1440	22.5	20.0	4.5		15.50	31.0%	30.6%	13.8	0.01305	0.00128

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

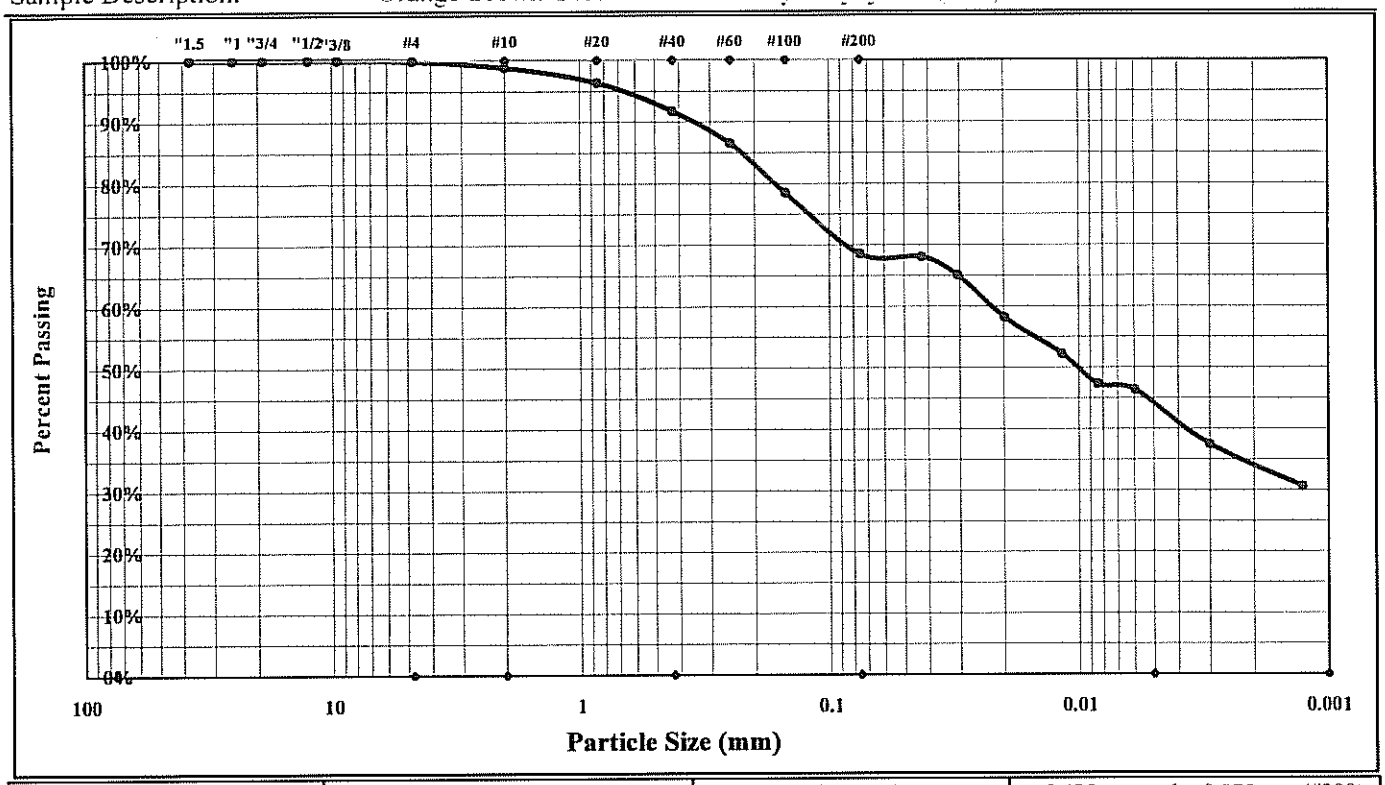
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: EF-1	Sample Date:	3/31/10
Location:	Excavation Area TP Offset:	Elevation:	1-6'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.2%	Silt	24.6%
Silt & Clay (% Passing #200):	68.6%	Total Sand:	31.3%	Clay	44.0%
ent Relative Density(Assumed)	2.700	Moisture Content		Colloids	29.0%
Liquid Limit	59	Plastic Limit	31	Plastic Index	28
Coarse Sand:	1.1%	Medium Sand:	7.0%	Fine Sand:	23.2%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/21/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/8-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

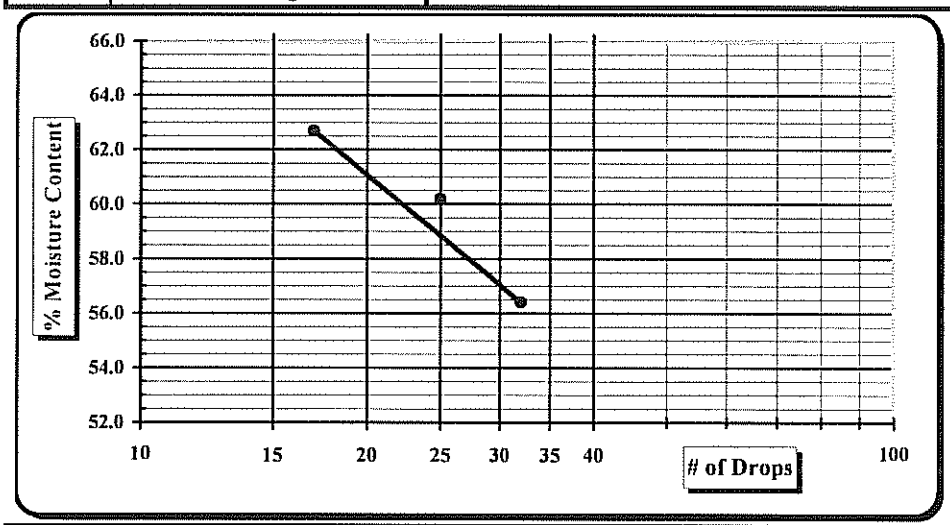
Boring #: Sample #: EF-1 Sample Date: 3/31/10

Location: Excavation Area TP Offset: Elevation: 1-6'

Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	KK	46	57				38	9	
A	Tare Weight	16.06	13.76	13.88				15.81	13.93	
B	Wet Soil Weight + A	24.68	21.85	21.98				22.39	20.89	
C	Dry Soil Weight + A	21.57	18.81	18.86				20.85	19.27	
D	Water Weight (B-C)	3.11	3.04	3.12				1.54	1.62	
E	Dry Soil Weight (C-A)	5.51	5.05	4.98				5.04	5.34	
F	% Moisture (D/E)*100	56.4%	60.2%	62.7%				30.6%	30.3%	
N	# OF DROPS	32	25	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**30.5%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **59**
Plastic Limit **31**
Plastic Index 28
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

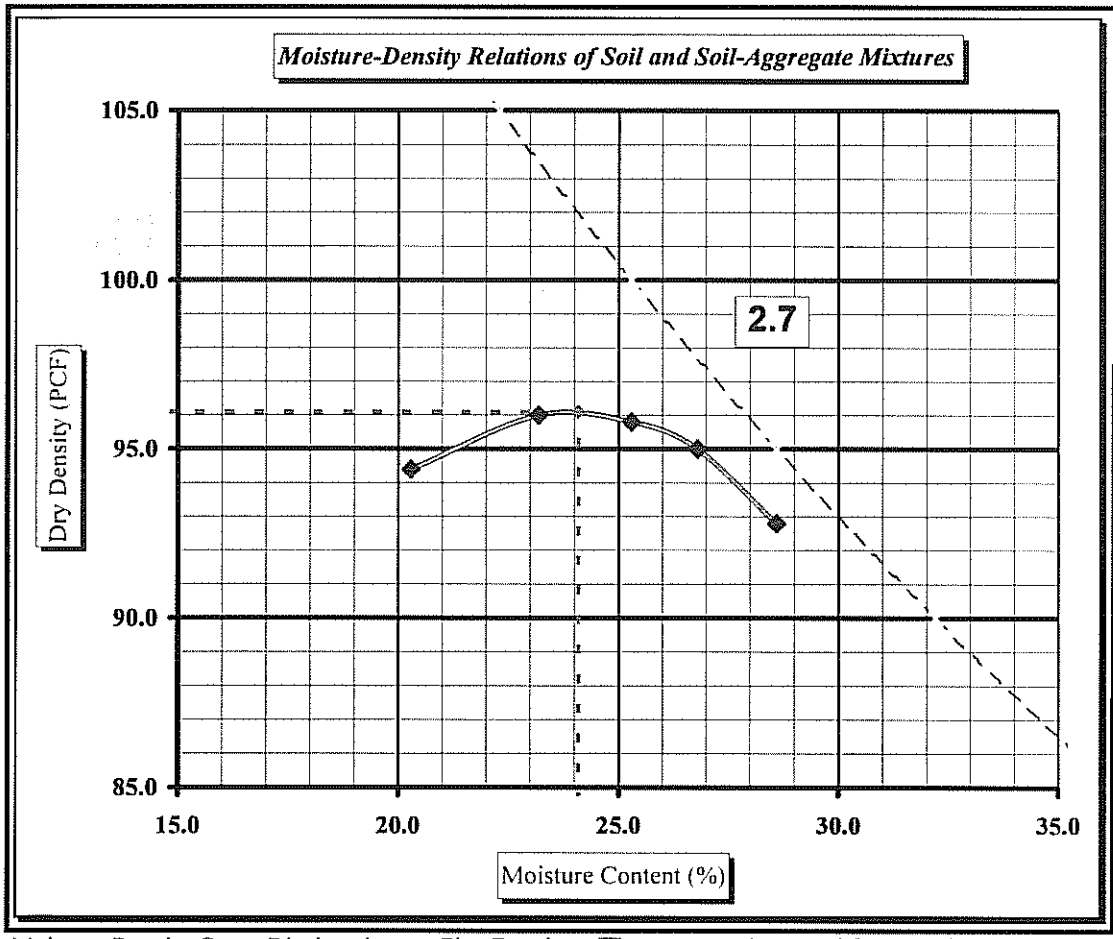
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/15/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/13/10-4/15/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: EF-1	Sample Date:	3/31/2001
Location:	Excavation Area TP Offset:	Depth:	1-6'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		

Maximum Dry Density 96.1 PCF. **Optimum Moisture Content 24.1%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**59**
Plastic Limit	**31**
Plastic Index	**28**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.8%
#10	98.8%
#40	91.7%
#60	86.5%
#200	68.6%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

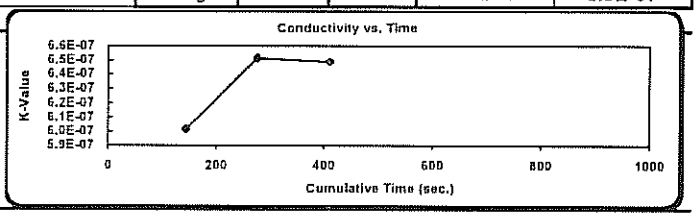
Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/23-27/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	4/27/10
Client Name:	Duke Energy	Sample Date:	
Client Address:		Panel ID:	9
Boring #:	Sample #: EF-1 Depth: 1-6'	Perm Cell ID:	
Location:	Excavation Area TP Offset: Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		
Liquid Limit:	59 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded	Log #:	
Plastic Limit:	31 Plastic Index: 28 Percent Passing #200: 68.6	Maximum Particle Size:	

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.620	Wet Density (PCF):	115.8	Length (cm):	7.620	Wet Density (PCF):	115.8
Diameter (cm):	7.279	Dry Density (PCF):	91.6	Diameter (cm):	7.28	Dry Density (PCF):	91.6
Area (cm^2)	41.61	Percent Saturation:	85.1	Area (cm^2)	41.61	Percent Saturation:	85.1
Volume (cm^3)	317.08			Volume (cm^3)	317.08	B-Parameter:	96.00
Wet weight (grams)	588.4	Void Ratio:	0.841	Wet weight (grams)	588.4	Void Ratio:	0.841
Dry Weight (grams)	465.1	Porosity:	0.457	Dry Weight (grams)	465.1	Porosity:	0.457
Percent Moisture:	26.5			Percent Moisture:	26.5		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
3:16	3:18	144	23.5	23.5	23.5	0.9204	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	6.54E-07	6.02E-07
3:21	3:23	133	23.5	23.5	23.5	0.9204	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	7.08E-07	6.51E-07
3:27	3:29	133	23.5	23.5	23.5	0.9204	4.60	1.89	4.10	1.90	34.1	27.7	4.47	3.63	7.05E-07	6.49E-07
												Averages:	4.46	3.63	6.89E-07	6.3E-07

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	1356-08-122	Report Date:	4/5/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	3/31-4/5/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: EF-2	Sample Date: 3/23/10
Location:	Marshall Steam Station	Offset:	Elevation: 1-3'
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.700**					
Hydrometer Jar #:											
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural					
Total Sample Air Dried Wt. + tare wt. (grams):		405.04		Tare #	1						
Weight of Total Sample Air Dried:		405.04	A	Tare Wt.	13.87						
Weight of Air Dried Hydrometer Sample (g):		50.05	B	Wet Wt. + A	25.20						
Total Sample Oven Dried:		396.86	C	Dry Wt. + A	24.97						
Hydrometer Sample Oven Dried (W):		49.03	D	Water Wt. (B-C)	0.23						
% Passing #10:		99.5%	E	Dry Wt. (C-A)	11.10						
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	2.07%						

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	1.9	100.0%	99.5%
#20	1.4	97.2%	96.7%
#40	4.2	91.4%	90.9%
#60	7.7	84.4%	84.0%
#100	11.3	77.0%	76.6%
#200	16.4	66.6%	66.3%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 7/1/2009 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)$^{1/2}$
1	23.0	36.5	5.0		31.50	63.6%	63.3%	11.1	0.01297	0.04328
2	23.0	34.5	5.0		29.50	59.6%	59.3%	11.5	0.01297	0.03105
5	23.0	33.0	5.0		28.00	56.5%	56.3%	11.7	0.01297	0.01985
15	23.0	31.0	5.0		26.00	52.5%	52.2%	12.0	0.01297	0.01162
30	23.0	30.0	5.0		25.00	50.5%	50.2%	12.2	0.01297	0.00827
60	23.0	29.0	5.0		24.00	48.5%	48.2%	12.4	0.01297	0.00589
250	23.5	25.5	5.0		20.50	41.4%	41.2%	12.9	0.01290	0.00293
1440	23.0	24.0	5.0		19.00	38.4%	38.2%	13.2	0.01297	0.00124

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

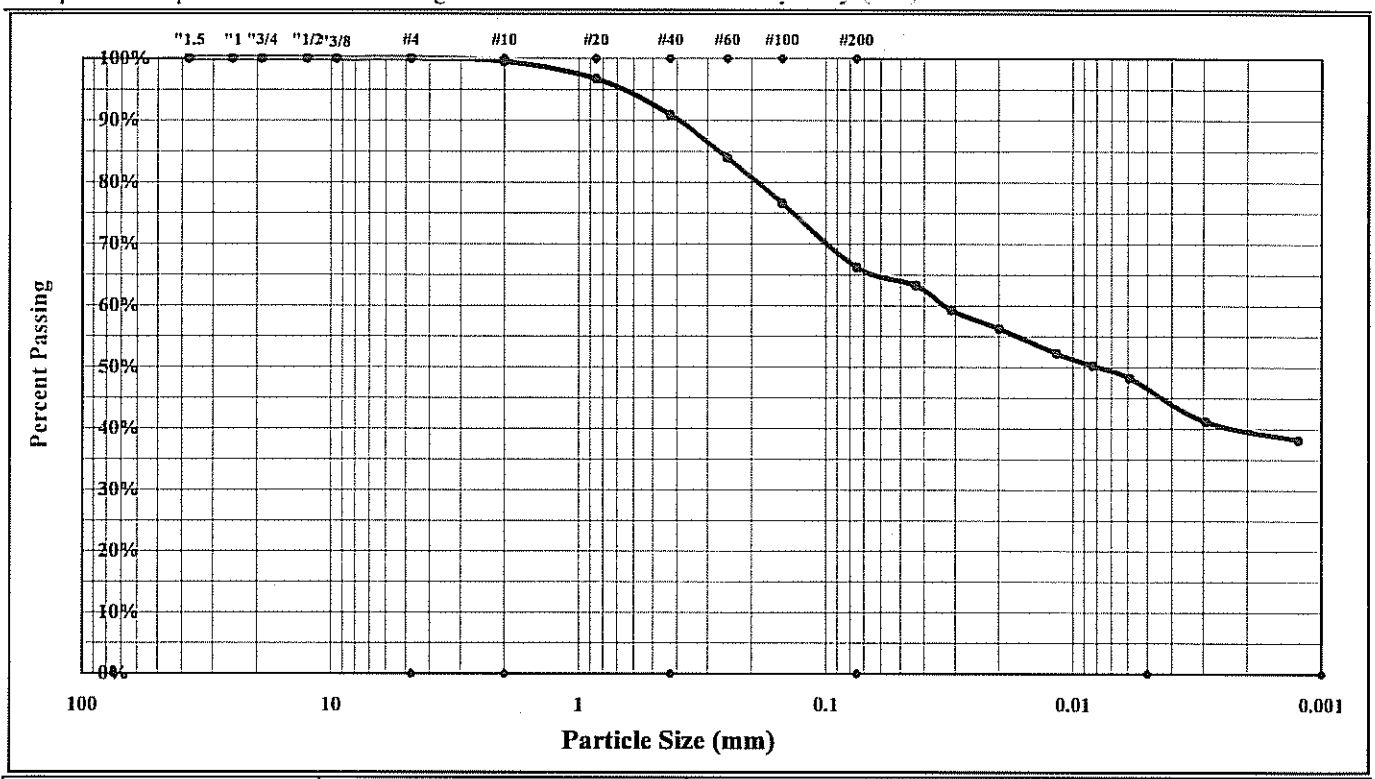
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/5/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	3/31-4/5/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: EF-2	Sample Date:	3/23/10
Location:	Marshall Steam Offset:	Elevation:	1-3'
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	19.3%
Silt & Clay (% Passing #200):	66.3%	Total Sand:	33.7%	Clay	47.0%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	38.0%
Liquid Limit	61	Plastic Limit	29	Plastic Index	32
Coarse Sand:	0.5%	Medium Sand:	8.6%	Fine Sand:	24.7%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-09-122**	Report Date:	4/17/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/1-17/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

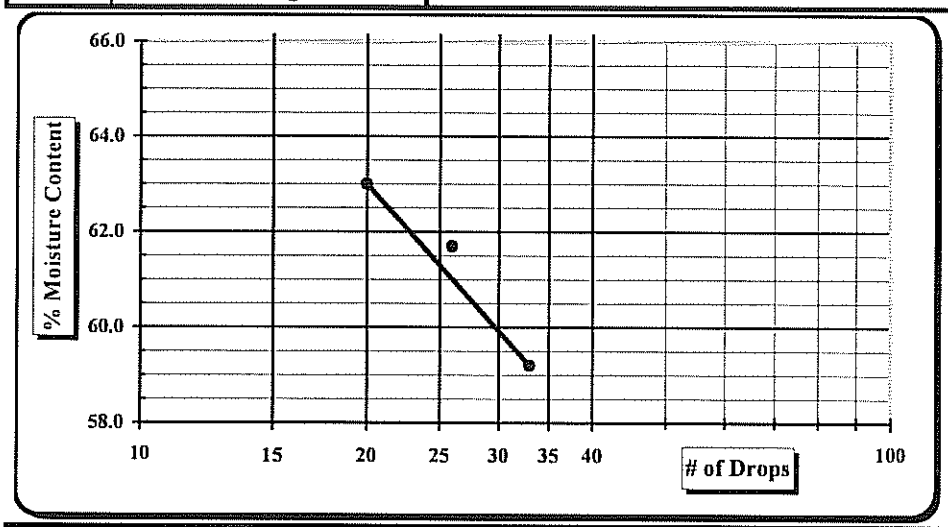
Boring #: Sample #: EF-2 Sample Date: 3/23/10

Location: Excavation Area TP Offset: Elevation: 1-3'

Sample Description: Orange Brown Coarse to Fine Sandy Clay (CH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	CC	59	BA				16	XX	
A	Tare Weight	16.77	15.83	15.36				15.72	16.05	
B	Wet Soil Weight + A	25.62	24.14	23.56				21.89	22.69	
C	Dry Soil Weight + A	22.33	20.97	20.39				20.49	21.18	
D	Water Weight (B-C)	3.29	3.17	3.17				1.40	1.51	
E	Dry Soil Weight (C-A)	5.56	5.14	5.03				4.77	5.13	
F	% Moisture (D/E)*100	59.2%	61.7%	63.0%				29.4%	29.4%	
N	# OF DROPS	33	26	20				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**29.4%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	**61**
Plastic Limit	**29**
Plastic Index	32
Group Symbol	**CH**
Multipoint Method	☑
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

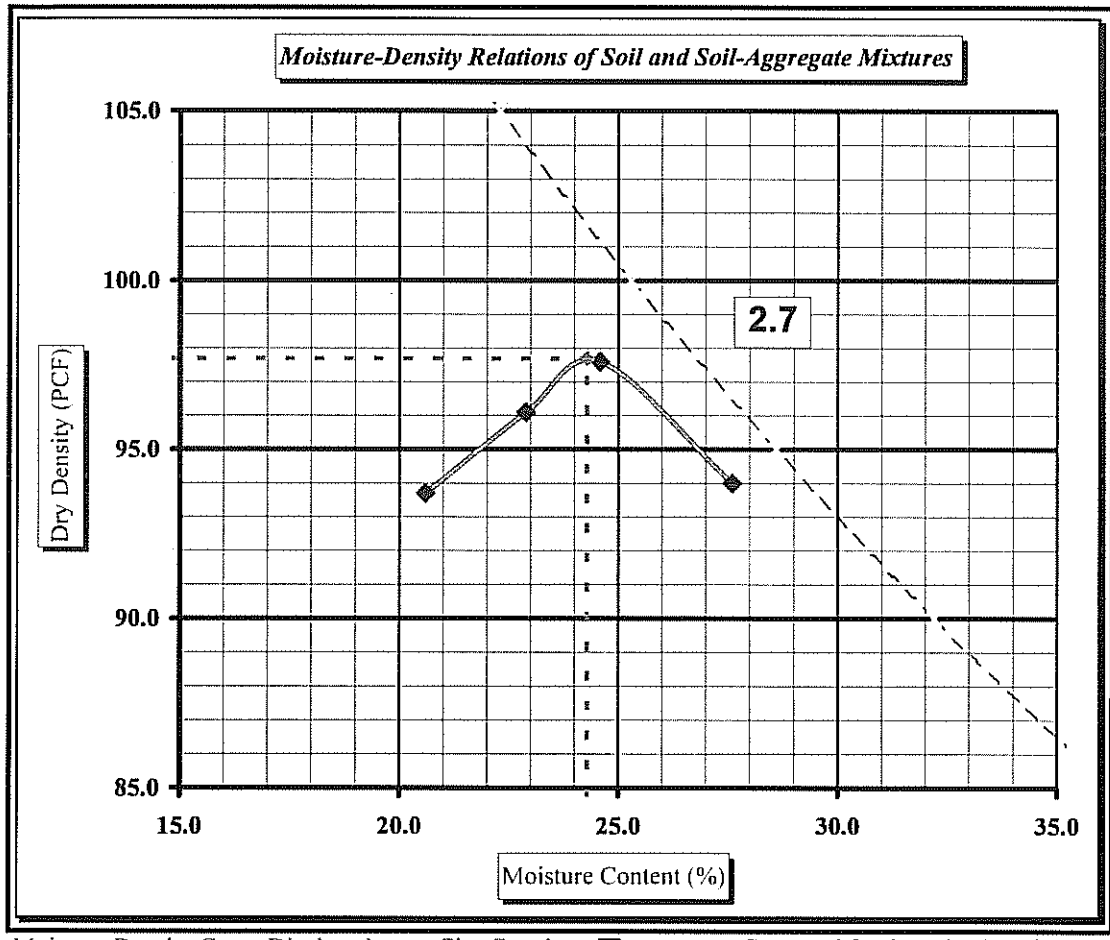
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/13/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/9/10-4/13/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: EF-2	Sample Date:	3/23/2010
Location:	Excavation Area TP Offset:	Depth:	1-3'
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		

Maximum Dry Density 97.7 PCF. **Optimum Moisture Content 24.3%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**61**
Plastic Limit	**29**
Plastic Index	**32**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.5%
#40	90.9%
#60	84.0%
#200	66.3%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	4/14/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Laboratory Record Version 4.1

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/21/10
Project Name:	Marshall Steam Station	Report Date:	4/21/10
Client Name:	Duke Energy	Sample Date:	
Client Address:		Panel ID:	10
Boring #:	Sample #: EF-2 Depth: 1-3'	Perm Cell ID:	
Location:	Marshall Steam Offset:	Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)
Liquid Limit:	61 Sp. Grav. (Assumed): 2.700	Sample Type:	Remolded Log #:
Plastic Limit:	29 Plastic Index: 32	Percent Passing #200:	66.3 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.541	Wet Density (PCF):	118.6	Length (cm):	7.541	Wet Density (PCF):	118.6
Diameter (cm):	7.282	Dry Density (PCF):	93.9	Diameter (cm):	7.28	Dry Density (PCF):	93.9
Area (cm^2)	41.65	Percent Saturation:	89.4	Area (cm^2)	41.65	Percent Saturation:	89.4
Volume (cm^3)	314.09			Volume (cm^3)	314.06	B-Parameter:	0.95
Wet weight (grams)	596.8	Void Ratio:	0.795	Wet weight (grams)	596.8	Void Ratio:	0.794
Dry Weight (grams)	472.6	Porosity:	0.443	Dry Weight (grams)	472.6	Porosity:	0.443
Percent Moisture:	26.3			Percent Moisture:	26.3		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Dealred Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

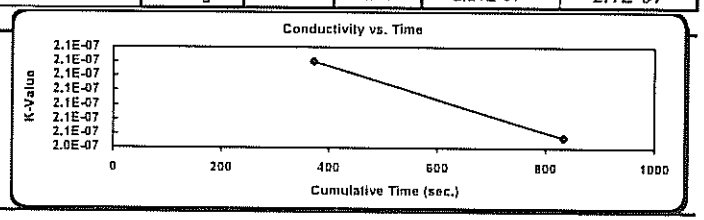
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
10:57	11:03	372	22.8	22.8	22.8	0.9355	4.90	1.89	4.40	1.90	37.8	31.4	5.02	4.17	2.22E-07	2.07E-07
11:08	11:16	461	22.8	22.9	22.9	0.9344	4.90	1.89	4.30	1.91	37.8	30.0	5.02	3.98	2.19E-07	2.05E-07
													Averages:		*2.21E-07*	*2.1E-07*

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	**1356-08-122**	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: EF-3	Sample Date: 3/31/10
Location:	Excavation Area TP	Offset:	Elevation: 1-5.5'
Sample Description:	Orange Brown Clayey Silt w/Medium to Fine Sand (MH) w/Mica		

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.700**				
Hydrometer Jar #:										
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):	365.60			Tare #	VV					
Weight of Total Sample Air Dried:	365.60		A	Tare Wt.	16.04					
Weight of Air Dried Hydrometer Sample (g):	50.00		B	Wet Wt. + A	27.45					
Total Sample Oven Dried:	361.13		C	Dry Wt. + A	27.31					
Hydrometer Sample Oven Dried (W):	49.39		D	Water Wt. (B-C)	0.14					
% Passing #10:	99.7%		E	Dry Wt. (C-A)	11.27					
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	1.24%					

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.9		99.8%
#10	1.2	100.0%	99.7%
#20	0.7	98.7%	98.4%
#40	2.0	96.0%	95.7%
#60	4.0	91.8%	91.5%
#100	9.0	81.7%	81.4%
#200	10.9	77.9%	77.6%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	22.5	41.0	4.5		36.50	73.2%	72.9%	10.3	0.01305	0.04190
2	22.5	37.5	4.5		33.00	66.2%	65.9%	10.9	0.01305	0.03044
5	22.5	34.5	4.5		30.00	60.1%	59.9%	11.4	0.01305	0.01968
15	22.5	31.0	4.5		26.50	53.1%	52.9%	11.9	0.01305	0.01165
30	22.5	29.0	4.5		24.50	49.1%	49.0%	12.3	0.01305	0.00835
60	22.5	28.0	4.5		23.50	47.1%	47.0%	12.4	0.01305	0.00594
250	22.5	24.5	4.5		20.00	40.1%	40.0%	13.0	0.01305	0.00298
1440	22.5	22.5	4.5		18.00	36.1%	36.0%	13.3	0.01305	0.00126

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

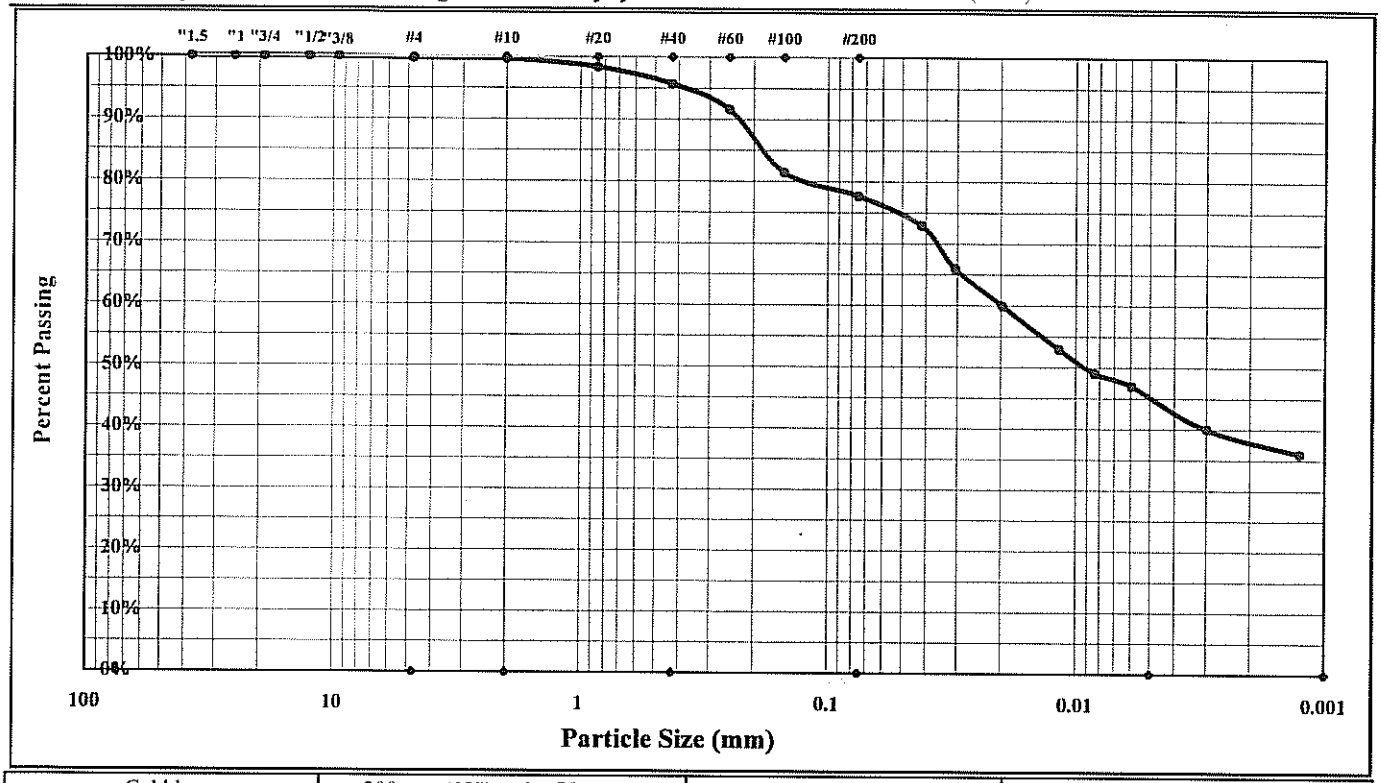
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: EF-3	Sample Date:	3/31/10
Location:	Excavation Area TP Offset:	Elevation:	1-5.5'
Sample Description:	Orange Brown Clayey Silt w/Medium to Fine Sand (MH) w/Mica		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.2%	Silt	32.1%
Silt & Clay (% Passing #200):	77.6%	Total Sand:	22.1%	Clay	45.5%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	35.0%
Liquid Limit	67	Plastic Limit	39	Plastic Index	28
Coarse Sand:	0.1%	Medium Sand:	4.0%	Fine Sand:	18.0%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/21/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/8-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

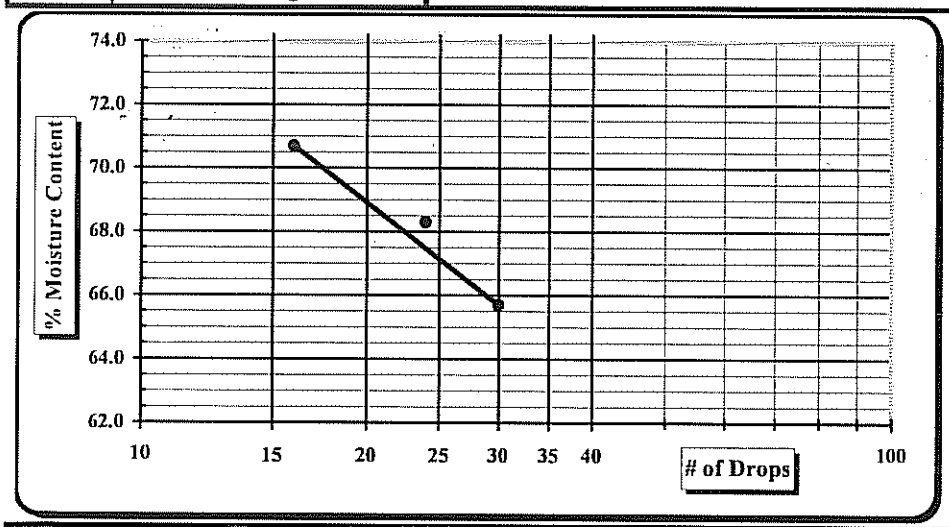
Boring #: Sample #: EF-3 Sample Date: 3/31/10

Location: Excavation Area TP Offset: Elevation: 1-1.5'

Sample Description: Orange Brown Clayey Silt w/Medium to Fine Sand (MH) w/Mica

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	BA	16	40				12	27	
A	Tare Weight	15.38	15.73	15.84				13.93	13.89	
B	Wet Soil Weight + A	23.40	24.21	22.89				20.46	20.49	
C	Dry Soil Weight + A	20.22	20.77	19.97				18.65	18.63	
D	Water Weight (B-C)	3.18	3.44	2.92				1.81	1.86	
E	Dry Soil Weight (C-A)	4.84	5.04	4.13				4.72	4.74	
F	% Moisture (D/E)*100	65.7%	68.3%	70.7%				38.3%	39.2%	
N	# OF DROPS	30	24	16				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**38.8%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **67**
Plastic Limit **39**
Plastic Index 28
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

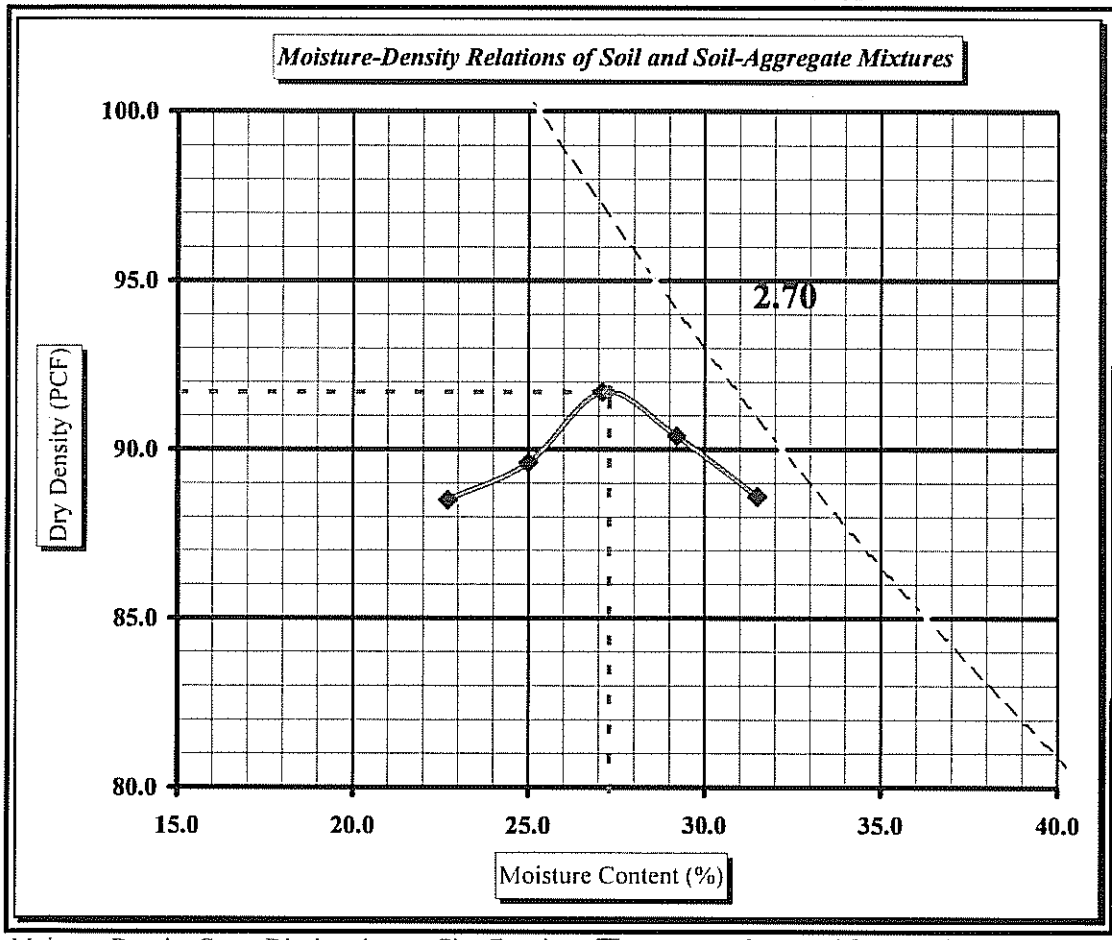
S&ME Project #:	**1356-08-122**	Report Date:	4/21/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/15/10-4/21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #:		Sample #:	EF-3	Sample Date:	3/31/2010
Location:	Excavation Area TP	Offset:		Depth:	1"-5.5'

Sample Description: Orange Brown Clayey Silt w/Medium to Fine Sand (MH) w/Mica

Maximum Dry Density 91.7 PCF. **Optimum Moisture Content 27.3%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**67**
Plastic Limit	**39**
Plastic Index	**28**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.8%
#10	99.7%
#40	95.7%
#60	91.5%
#200	77.6%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Laboratory Record Version 4.1

S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	5/3-4/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	5/4/10
Client Name:	Duke Energy	Sample Date:	3/31/2001
Client Address:		Panel ID:	11

Boring #: Sample #: EF-3 Depth: 1-5.5' Perm Cell ID:

Location: Excavation Test Pits Offset: Sample Description: Orange Brown Clayey Silt w/Medium to Fine Sand (MH)

Liquid Limit: 67 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 39 Plastic Index: 28 Percent Passing #200: 77.6 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.620	Wet Density (PCF):	113.4	Length (cm):	7.620	Wet Density (PCF):	87.4
Diameter (cm):	7.270	Dry Density (PCF):	87.4	Diameter (cm):	7.27	Dry Density (PCF):	87.4
Area (cm^2)	41.51	Percent Saturation:	86.6	Area (cm^2)	41.51	Percent Saturation:	0.0
Volume (cm^3)	316.34			Volume (cm^3)	316.34	B-Parameter:	0.97
Wet weight (grams)	574.7	Void Ratio:	0.929	Wet weight (grams)	442.7	Void Ratio:	0.929
Dry Weight (grams)	442.7	Porosity:	0.482	Dry Weight (grams)	442.7	Porosity:	0.482
Percent Moisture:	29.8			Percent Moisture:			
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

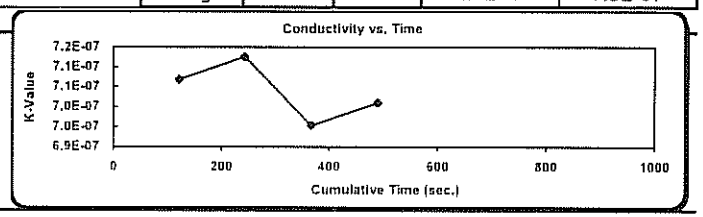
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
3:51	3:53	122	23.8	23.8	23.8	0.9140	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	7.73E-07	7.07E-07
3:57	3:59	121	23.8	23.8	23.8	0.9140	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	7.80E-07	7.13E-07
4:04	4:06	124	23.8	23.8	23.8	0.9140	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	7.61E-07	6.95E-07
4:10	4:12	123	23.8	23.8	23.8	0.9140	4.60	1.90	4.10	1.90	33.9	27.7	4.46	3.63	7.67E-07	7.01E-07
												Averages:	4.46	3.63	7.70E-07	7.0E-07

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: EF-4	Sample Date: 3/31/10
Location:	Excavation Area TP	Offset:	Elevation: 1-1.5'
Sample Description:	Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.700**				
Hydrometer Jar #:										
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):	359.89			Tare #	XW					
Weight of Total Sample Air Dried:	359.89		A	Tare Wt.	15.24					
Weight of Air Dried Hydrometer Sample (g):	50.00		B	Wet Wt. + A	26.42					
Total Sample Oven Dried:	355.58		C	Dry Wt. + A	26.28					
Hydrometer Sample Oven Dried (W):	49.37		D	Water Wt. (B-C)	0.14					
% Passing #10:	95.5%		E	Dry Wt. (C-A)	11.04					
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	1.27%					

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	7.2		98.0%
1/2"	7.2		98.0%
3/8"	7.2	Soil Mortar	98.0%
#4	8.8		97.5%
#10	16.0	100.0%	95.5%
#20	1.6	96.7%	92.4%
#40	4.2	91.6%	87.4%
#60	7.1	85.6%	81.8%
#100	10.9	77.8%	74.4%
#200	12.9	73.8%	70.5%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 7/1/2009 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)$^{1/2}$
1	22.5	40.0	4.5		35.50	71.2%	68.0%	10.5	0.01305	0.04223
2	22.5	36.5	4.5		32.00	64.2%	61.3%	11.0	0.01305	0.03067
5	22.5	34.0	4.5		29.50	59.2%	56.5%	11.5	0.01305	0.01975
15	22.5	31.5	4.5		27.00	54.1%	51.7%	11.9	0.01305	0.01161
30	22.5	30.0	4.5		25.50	51.1%	48.8%	12.1	0.01305	0.00829
60	22.5	28.5	4.5		24.00	48.1%	46.0%	12.4	0.01305	0.00592
250	22.5	26.5	4.5		22.00	44.1%	42.1%	12.7	0.01305	0.00294
1440	22.5	25.0	4.5		20.50	41.1%	39.3%	12.9	0.01305	0.00124

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

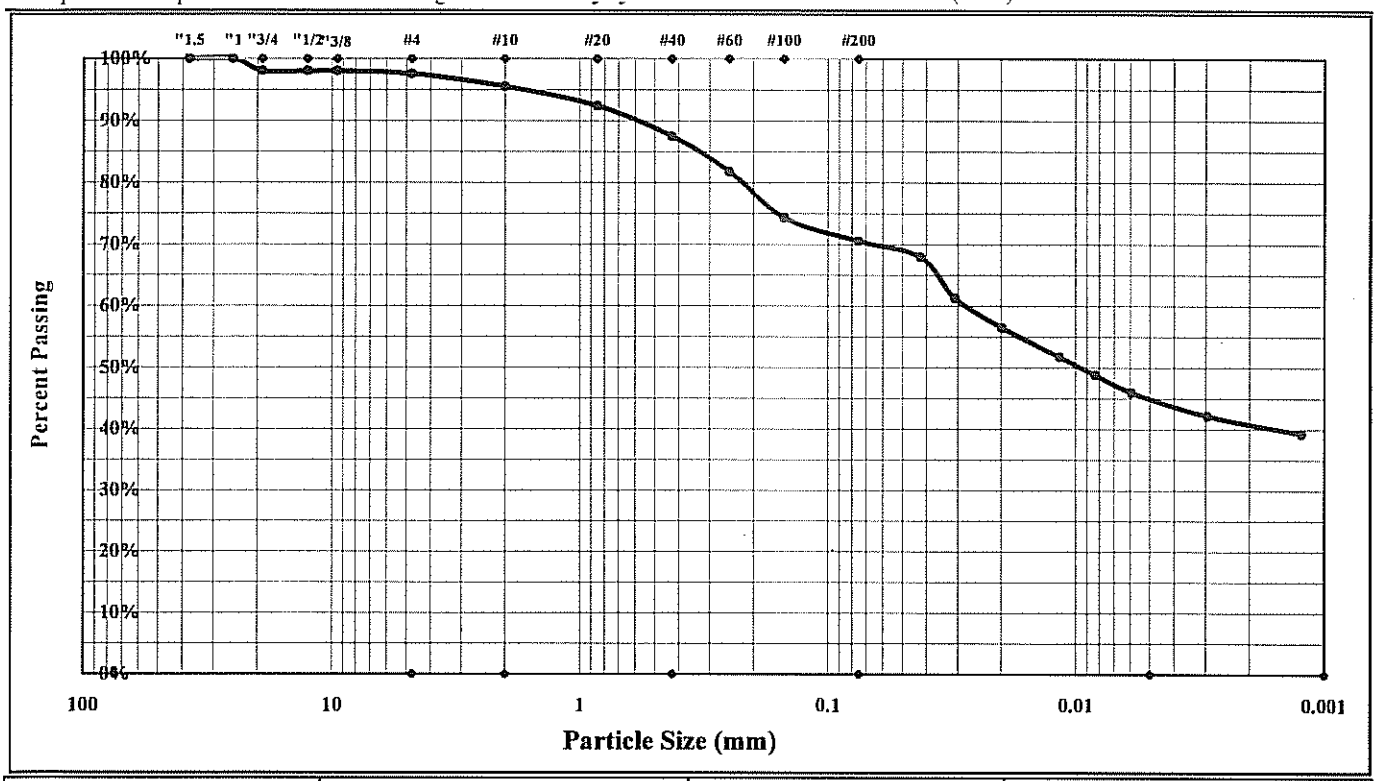
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: EF-4	Sample Date:	3/31/10
Location:	Excavation Area TP Offset:	Elevation:	1-1.5'
Sample Description:	Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	2.5%	Silt	25.5%
Silt & Clay (% Passing #200):	70.5%	Total Sand:	27.0%	Clay	45.0%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	39.5%
Liquid Limit	67	Plastic Limit	35	Plastic Index	32
Coarse Sand:	2.0%	Medium Sand:	8.1%	Fine Sand:	16.9%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/21/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/8-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

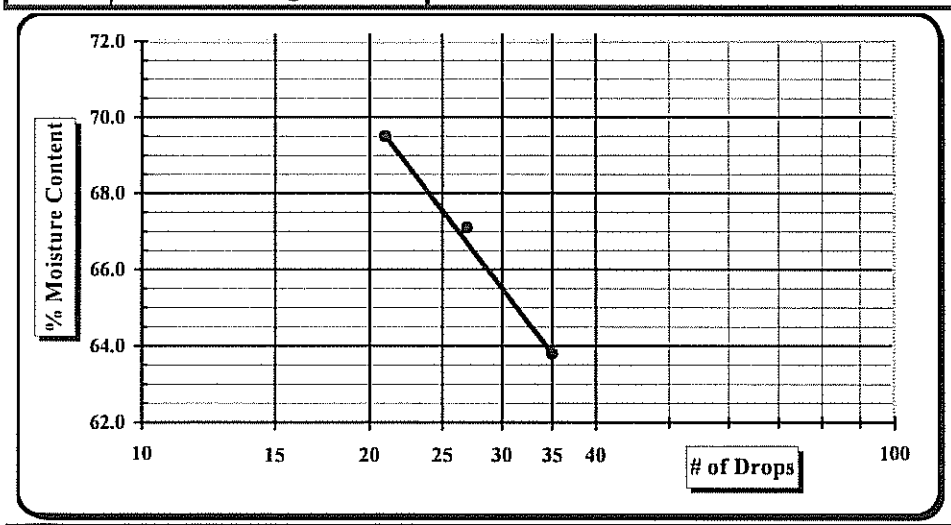
Boring #: Sample #: EF-4 Sample Date: 3/31/10

Location: Excavation Area TP Offset: Elevation: 1-1.5'

Sample Description: Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	EE	III	50				43	LL	
A	Tare Weight	16.89	15.20	15.78				13.85	16.93	
B	Wet Soil Weight + A	24.23	24.89	24.78				20.63	23.83	
C	Dry Soil Weight + A	21.37	21.00	21.09				18.87	22.03	
D	Water Weight (B-C)	2.86	3.89	3.69				1.76	1.80	
E	Dry Soil Weight (C-A)	4.48	5.80	5.31				5.02	5.10	
F	% Moisture (D/E)*100	63.8%	67.1%	69.5%				35.1%	35.3%	
N	# OF DROPS	35	27	21				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**35.2%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **67**
Plastic Limit **35**
Plastic Index 32
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

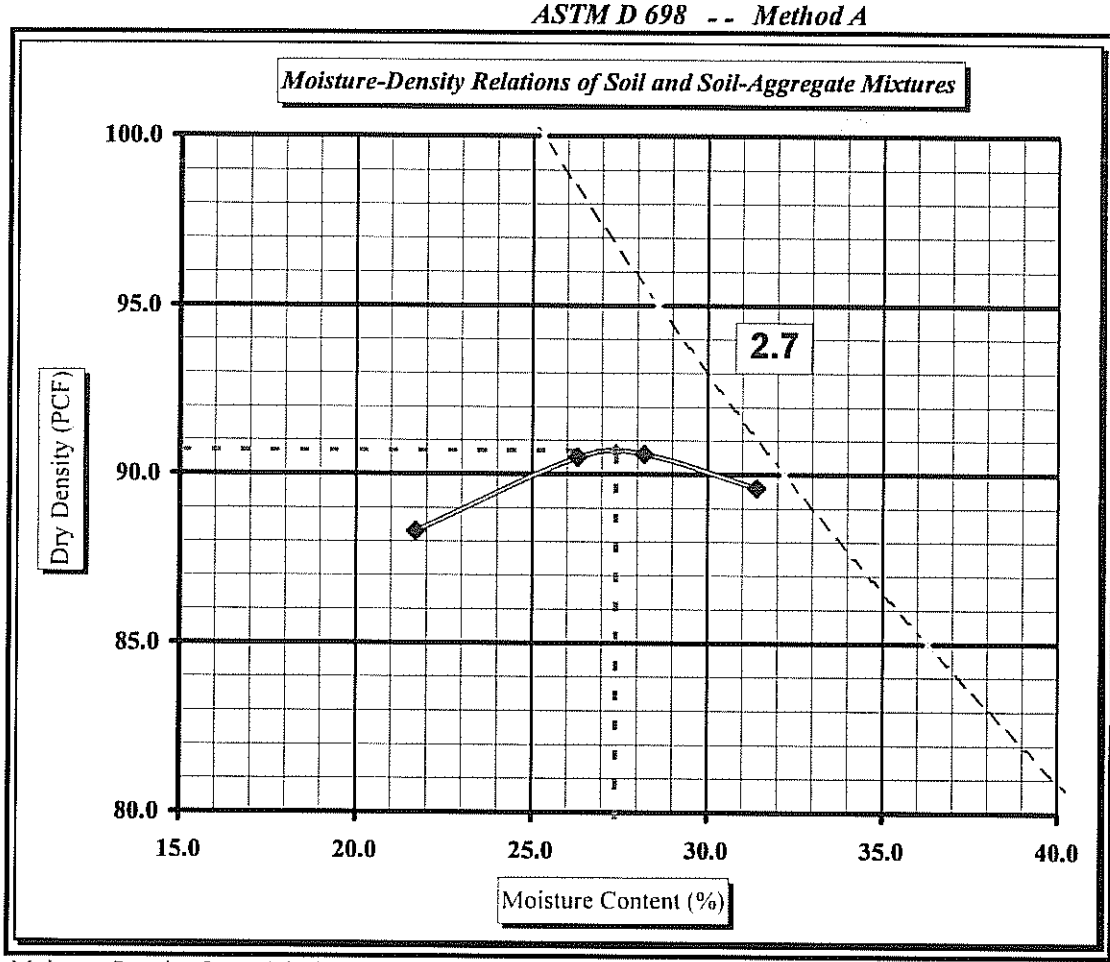
S&ME Project #:	**1356-08-122**	Report Date:	4/22/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/14/10-4/22/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #:		Sample #:	EF-4	Sample Date:	3/31/2010
Location:	Excavation Area TP	Offset:		Depth:	1-1.5'

Sample Description: Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)

Maximum Dry Density 90.7 PCF. **Optimum Moisture Content 27.4%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**67**
Plastic Limit	**35**
Plastic Index	**32**

% Passing

3/4"	98.0%
3/8"	98.0%
#4	97.5%
#10	95.5%
#40	87.4%
#60	81.8%
#200	70.5%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Laboratory Record Version 4.1

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	5/4-5/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	5/5/10
Client Name:	Duke Energy	Sample Date:	
Client Address:	Marshall Steam Station	Panel ID:	7
Boring #:	Sample #: EF-4 Depth: 1-1.5'	Perm Cell ID:	
Location:	Excavation Area TP Offset: Sample Description: Orange Brown Clayey Silt w/Coarse to Fine Sand (MH)		
Liquid Limit:	67 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded	Log #:	
Plastic Limit:	35 Plastic Index: 32 Percent Passing #200: 70.5	Maximum Particle Size:	

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.541	Wet Density (PCF):	112.5	Length (cm):	7.541	Wet Density (PCF):	112.6
Diameter (cm):	7.269	Dry Density (PCF):	87.3	Diameter (cm):	7.27	Dry Density (PCF):	87.3
Area (cm^2)	41.50	Percent Saturation:	83.9	Area (cm^2)	41.50	Percent Saturation:	83.9
Volume (cm^3)	313.00			Volume (cm^3)	312.96	B-Parameter:	0.96
Wet weight (grams)	564.4	Void Ratio:	0.930	Wet weight (grams)	564.4	Void Ratio:	0.930
Dry Weight (grams)	437.8	Porosity:	0.482	Dry Weight (grams)	437.8	Porosity:	0.482
Percent Moisture:	28.9			Percent Moisture:	28.9		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	82.5	Back Presssure (psi):	80.0	a_{out} (cm^2)	0.76712

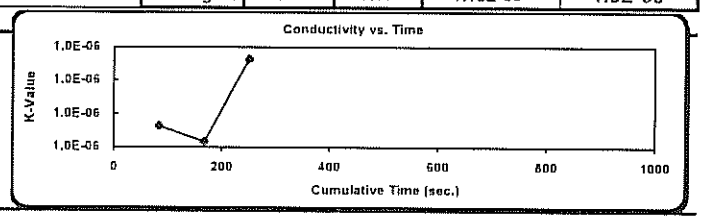
Time (24-hr)			Temperature (°C)				Measurements								K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2	Initial Gradient	Final Gradient	Uncorrected K-Value	Corrected K-Value
2:45	2:47	64	23.5	23.5	23.5	0.9204	4.60	1.90	4.10	1.90	33.9	27.7	4.50	3.67	1.11E-06	1.02E-06
2:50	2:51	64	23.6	23.6	23.6	0.9183	4.60	1.90	4.10	1.90	33.9	27.7	4.50	3.67	1.11E-06	1.02E-06
2:56	2:57	63	23.6	23.6	23.6	0.9183	4.60	1.90	4.10	1.90	33.9	27.7	4.50	3.67	1.13E-06	1.03E-06
												Averages:	4.50	3.67	1.12E-06	1.0E-06

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: EG-1	Sample Date: 3/31/10
Location:	Excavation Area TP	Offset:	Elevation: 1-6'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		

Pan #:		Beaker #:		Apparent Relative Density(Assumed)		2.700				
Hydrometer Jar #:										
Pan Tare Weight (grams):				Moisture Content	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):	275.22			Tare #	XY					
Weight of Total Sample Air Dried:	275.22		A	Tare Wt.	15.94					
Weight of Air Dried Hydrometer Sample (g):	50.00		B	Wet Wt. + A	26.76					
Total Sample Oven Dried:	271.94		C	Dry Wt. + A	26.63					
Hydrometer Sample Oven Dried (W):	49.40		D	Water Wt. (B-C)	0.13					
% Passing #10:	99.3%		E	Dry Wt. (C-A)	10.69					
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	1.22%					

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.6		99.8%
#10	1.9	100.0%	99.3%
#20	1.0	98.1%	97.4%
#40	3.1	93.8%	93.1%
#60	5.9	88.1%	87.4%
#100	10.9	78.0%	77.4%
#200	17.4	64.8%	64.4%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	22.5	36.5	4.5		32.00	64.1%	63.7%	11.0	0.01305	0.04337
2	22.5	34.0	4.5		29.50	59.1%	58.7%	11.5	0.01305	0.03123
5	22.5	31.0	4.5		26.50	53.1%	52.7%	11.9	0.01305	0.02017
15	22.5	28.0	4.5		23.50	47.1%	46.8%	12.4	0.01305	0.01188
30	22.5	26.0	4.5		21.50	43.1%	42.8%	12.8	0.01305	0.00851
60	22.5	25.0	4.5		20.50	41.1%	40.8%	12.9	0.01305	0.00606
250	22.5	22.0	4.5		17.50	35.1%	34.8%	13.4	0.01305	0.00302
1440	22.5	20.0	4.5		15.50	31.1%	30.8%	13.8	0.01305	0.00128

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

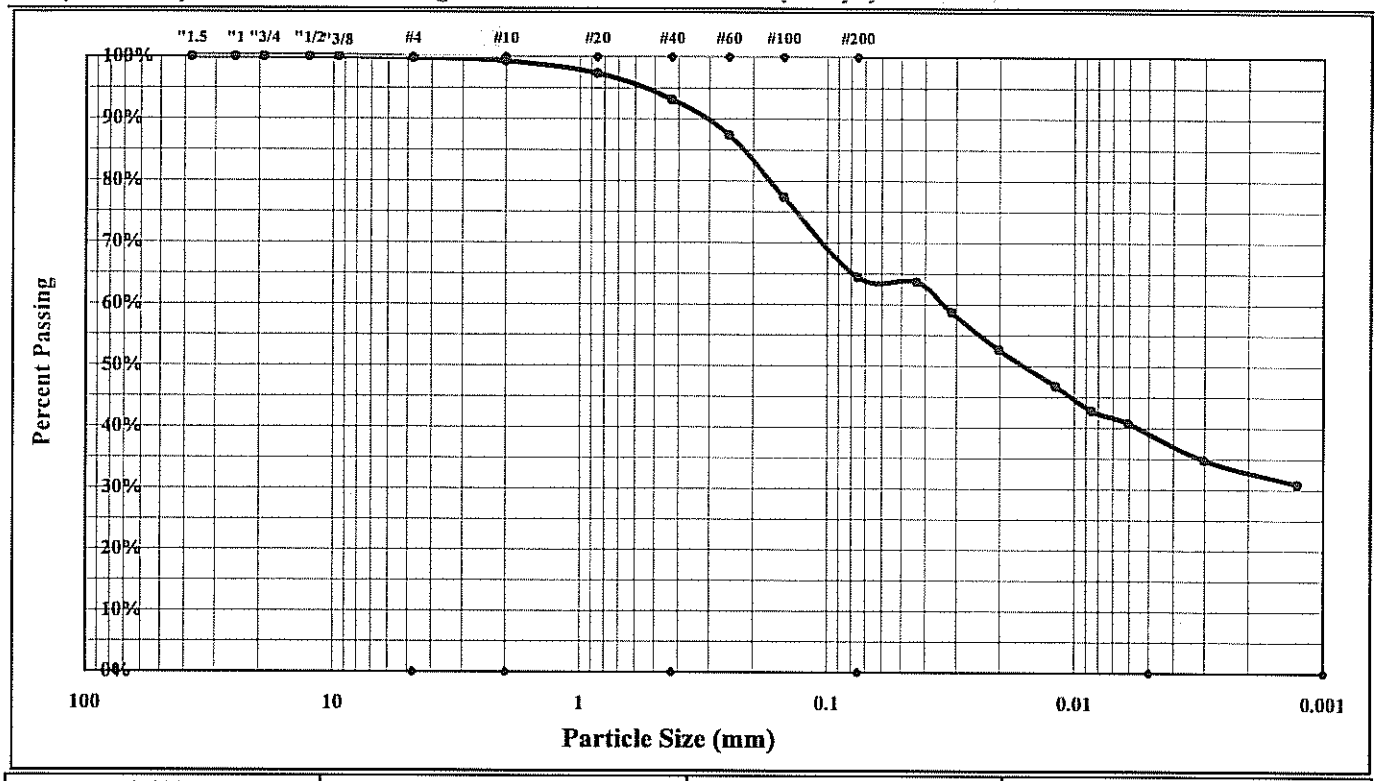
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/12/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	4/8-12/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: EG-1	Sample Date:	3/31/10
Location:	Excavation Area TP Offset:	Elevation:	1-6'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.2%	Silt	24.9%
Silt & Clay (% Passing #200):	64.4%	Total Sand:	35.4%	Clay	39.5%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	30.0%
Liquid Limit	54	Plastic Limit	30	Plastic Index	24
Coarse Sand:	0.5%	Medium Sand:	6.2%	Fine Sand:	28.7%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	1/13/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122**	Report Date:	4/21/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/8-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

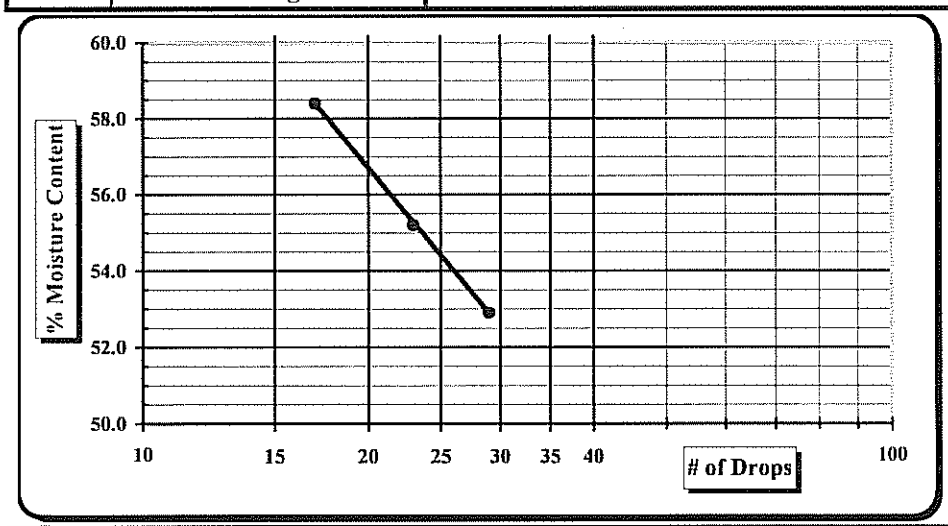
Boring #: Sample #: EG-1 Sample Date: 3/31/10

Location: Excavation Area TP Offset: Elevation: 1-6'

Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	42	XW	OO				CC	48	
A	Tare Weight	13.99	15.23	16.30				16.77	14.00	
B	Wet Soil Weight + A	22.92	21.95	25.44				23.02	22.27	
C	Dry Soil Weight + A	19.83	19.56	22.07				21.58	20.35	
D	Water Weight (B-C)	3.09	2.39	3.37				1.44	1.92	
E	Dry Soil Weight (C-A)	5.84	4.33	5.77				4.81	6.35	
F	% Moisture (D/E)*100	52.9%	55.2%	58.4%				29.9%	30.2%	
N	# OF DROPS	29	23	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**30.1%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **54**
Plastic Limit **30**
Plastic Index 24
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

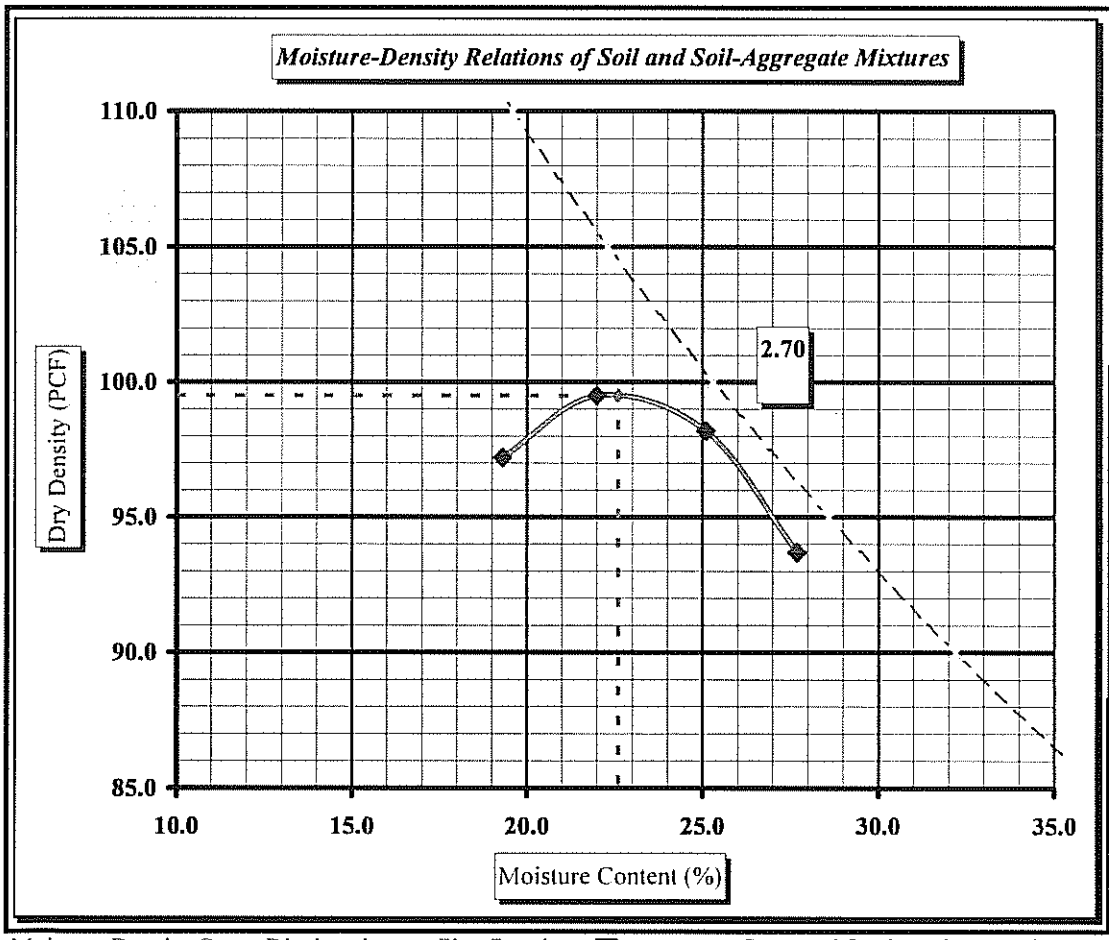
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/15/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/13/10-4/15/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #:		Sample #:	EG-1	Sample Date:	3/31/2010
Location:	Excavation Area TP	Offset:		Depth:	1-6'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)				

Maximum Dry Density 99.5 PCF. **Optimum Moisture Content 22.6%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**54**
Plastic Limit	**30**
Plastic Index	**24**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.8%
#10	99.3%
#40	93.1%
#60	87.4%
#200	64.4%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

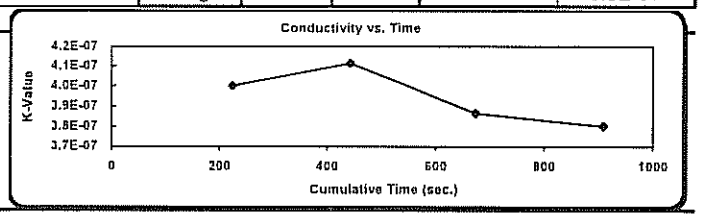
Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/23-5/3/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	5/3/10
Client Name:	Duke Energy	Sample Date:	
Client Address:	Marshall Steam Station	Panel ID:	12
Boring #:	Sample #: EG-1 Depth: 1-6'	Perm Cell ID:	
Location:	Excavation Area TP Offset: Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		
Liquid Limit:	54 Sp. Grav. (Assumed): 2.650 Sample Type: Remolded	Log #:	
Plastic Limit:	30 Plastic Index: 24 Percent Passing #200: 64.4	Maximum Particle Size:	

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.699	Wet Density (PCF):	117.9	Length (cm):	7.699	Wet Density (PCF):	117.9
Diameter (cm):	7.274	Dry Density (PCF):	94.3	Diameter (cm):	7.27	Dry Density (PCF):	94.3
Area (cm^2)	41.55	Percent Saturation:	88.2	Area (cm^2)	41.56	Percent Saturation:	88.1
Volume (cm^3)	319.91			Volume (cm^3)	319.94	B-Parameter:	0.95
Wet weight (grams)	604.5	Void Ratio:	0.755	Wet weight (grams)	604.5	Void Ratio:	0.755
Dry Weight (grams)	483.2	Porosity:	0.430	Dry Weight (grams)	483.2	Porosity:	0.430
Percent Moisture:	25.1			Percent Moisture:	25.1		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
11:56	12:00	224	23.0	23.0	23.0	0.9312	5.10	1.89	4.50	1.89	40.4	32.8	5.24	4.26	4.30E-07	4.00E-07
12:07	12:11	218	23.1	23.1	23.1	0.9290	5.10	1.90	4.50	1.90	40.2	32.7	5.23	4.25	4.43E-07	4.11E-07
12:15	12:18	232	23.1	23.1	23.1	0.9290	5.10	1.90	4.50	1.90	40.2	32.7	5.23	4.25	4.16E-07	3.87E-07
12:38	12:42	235	23.1	23.1	23.1	0.9290	5.10	1.89	4.50	1.89	40.4	32.8	5.24	4.26	4.09E-07	3.80E-07
												Averages:	5.23	4.25	4.25E-07	3.9E-07

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122	Report Date:	4/5/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	3/31-4/5/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: EG-2	Sample Date: 3/23/10
Location:	Marshall Steam Station	Offset:	Elevation: 1-3'
Sample Description:	Orange Brown Clayey Silt w/Medium to Fine Sand (MH)		

Pan #:		Beaker #:		Apparent Relative Density(Assumed)		2.700	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				Moisture Content	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	358.32			Tare #	XX		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	358.32	A		Tare Wt.	16.04		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.03	B		Wet Wt. + A	27.46		1/2"	0.0		100.0%
Total Sample Oven Dried:	352.67	C		Dry Wt. + A	27.28		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):	49.24	D		Water Wt. (B-C)	0.18		#4	0.0		100.0%
% Passing #10:	100.0%	E		Dry Wt. (C-A)	11.24		#10	0.0	100.0%	100.0%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	1.60%		#20	0.4	99.3%	99.3%
							#40	0.9	98.2%	98.2%
							#60	1.9	96.2%	96.2%
							#100	4.2	91.6%	91.6%
							#200	10.9	77.9%	77.9%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 7/1/2009 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x $((L/T)^{1/2}$
1	23.0	39.5	5.0		34.50	69.4%	69.4%	10.6	0.01297	0.04232
2	23.0	38.0	5.0		33.00	66.3%	66.3%	10.9	0.01297	0.03027
5	23.0	35.0	5.0		30.00	60.3%	60.3%	11.4	0.01297	0.01957
15	23.0	32.5	5.0		27.50	55.3%	55.3%	11.8	0.01297	0.01150
30	23.0	30.0	5.0		25.00	50.3%	50.3%	12.2	0.01297	0.00827
60	23.0	27.5	5.0		22.50	45.2%	45.2%	12.6	0.01297	0.00595
250	23.5	24.0	5.0		19.00	38.2%	38.2%	13.2	0.01290	0.00296
1440	23.0	21.5	5.0		16.50	33.2%	33.2%	13.6	0.01297	0.00126

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

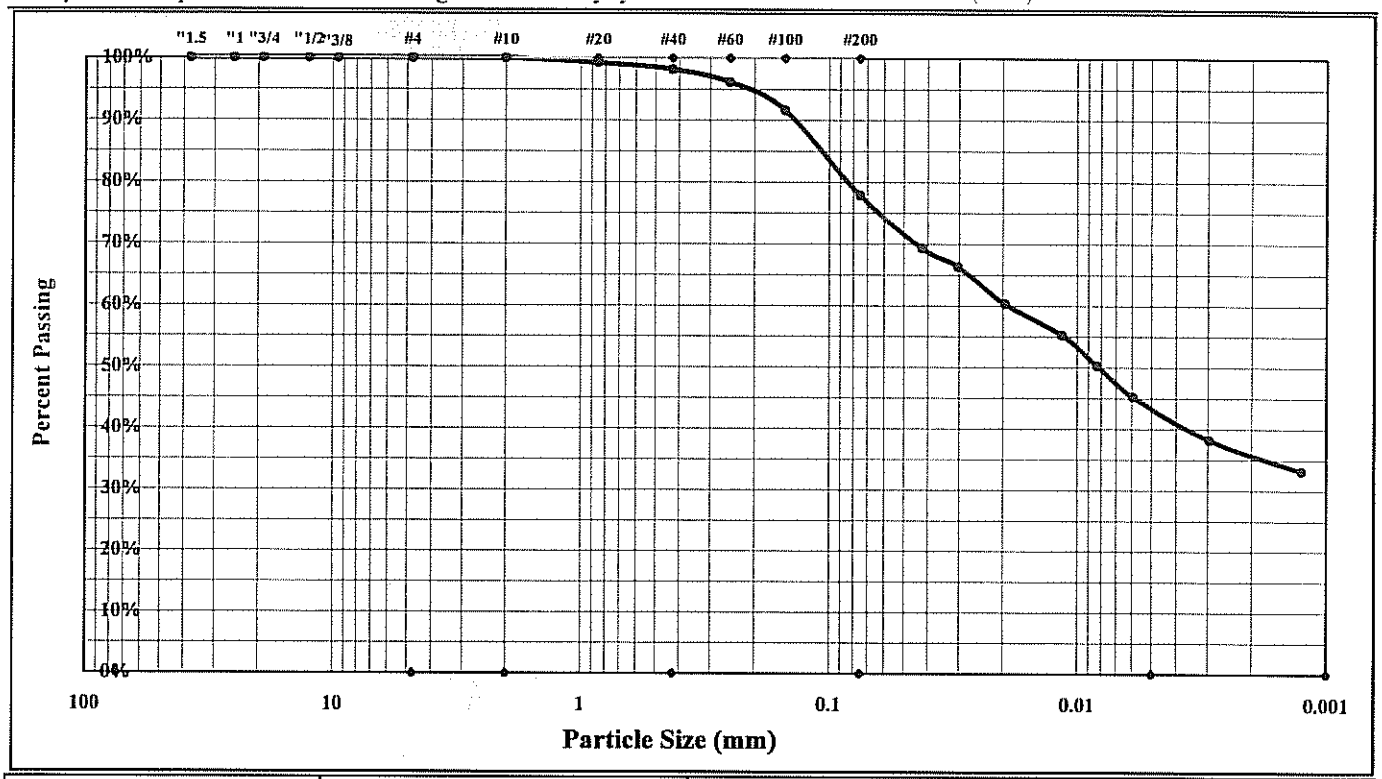
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/5/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	3/31-4/5/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: EG-2	Sample Date:	3/23/10
Location:	Marshall Steam Offset:	Elevation:	1-3'
Sample Description:	Orange Brown Clayey Silt w/Medium to Fine Sand (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	33.9%
Silt & Clay (% Passing #200):	77.9%	Total Sand:	22.1%	Clay	44.0%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	33.0%
Liquid Limit	62	Plastic Limit	34	Plastic Index	28
Coarse Sand:	0.0%	Medium Sand:	1.8%	Fine Sand:	20.3%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-09-122**	Report Date:	4/17/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/1-17/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

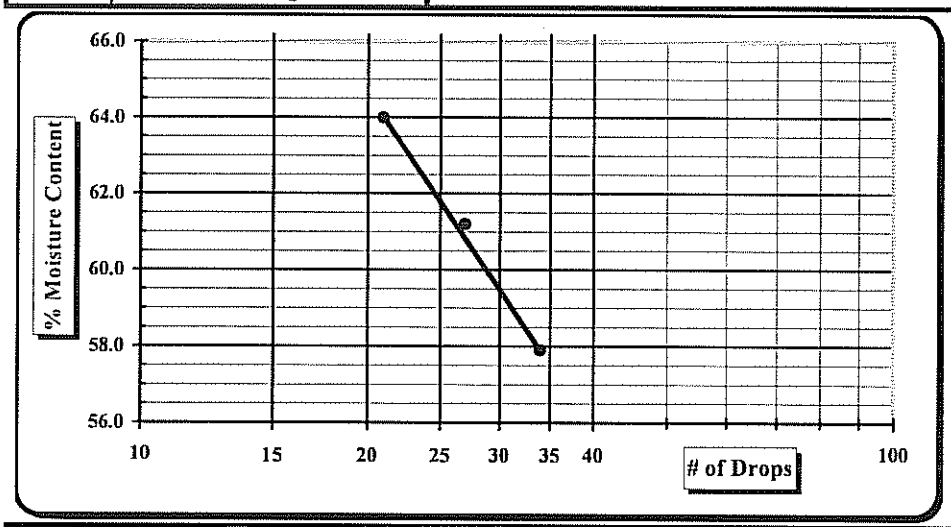
Boring #: Sample #: EG-2 Sample Date: 3/23/10

Location: Excavation Area TP Offset: Elevation: 1-3'

Sample Description: Orange Brown Clayey Silt w/Medium to Fine Sand (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	NN	5	VV				III	43	
A	Tare Weight	15.28	15.76	16.02				15.20	13.85	
B	Wet Soil Weight + A	23.79	25.32	25.35				22.76	20.03	
C	Dry Soil Weight + A	20.67	21.69	21.71				20.83	18.45	
D	Water Weight (B-C)	3.12	3.63	3.64				1.93	1.58	
E	Dry Soil Weight (C-A)	5.39	5.93	5.69				5.63	4.60	
F	% Moisture (D/E)*100	57.9%	61.2%	64.0%				34.3%	34.3%	
N	# OF DROPS	34	27	21				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**34.3%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **62**
Plastic Limit **34**
Plastic Index 28
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

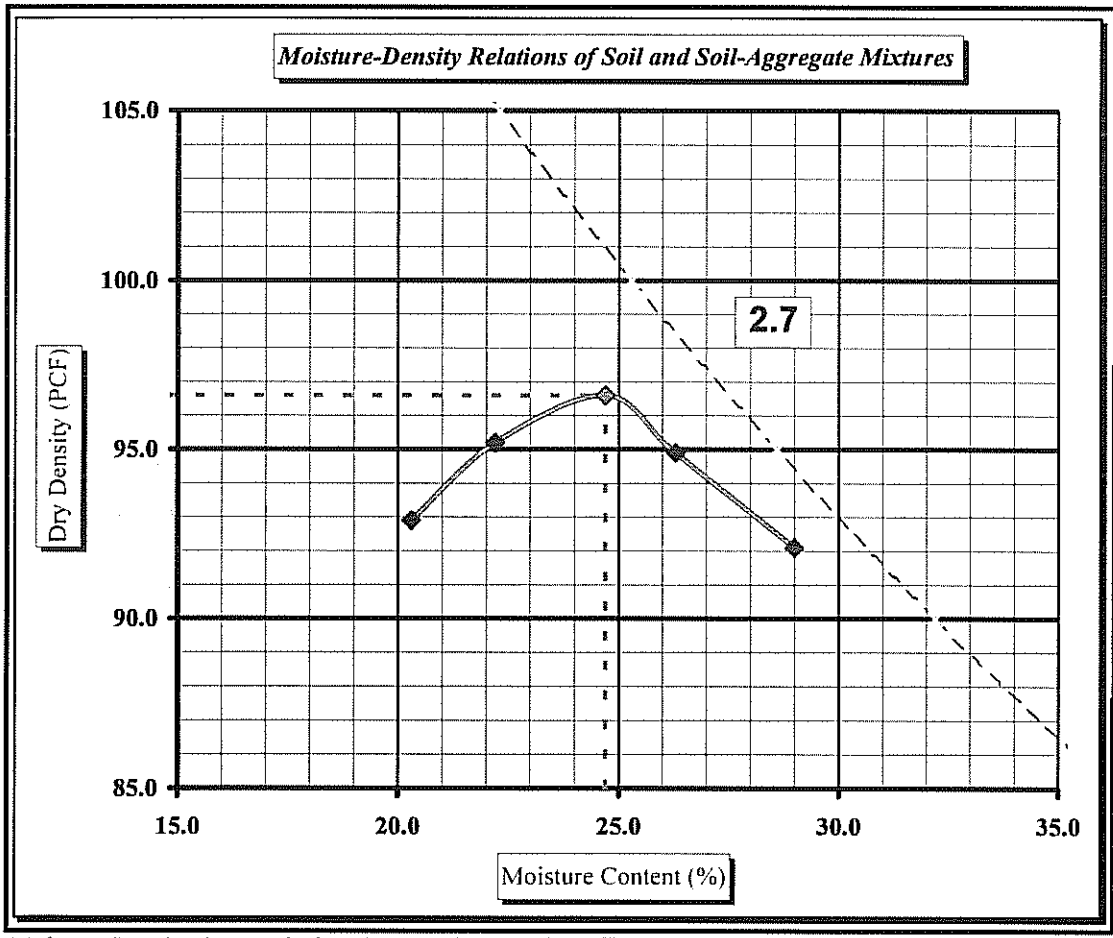
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/13/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	4/9/10-4/13/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: EG-2	Sample Date:	3/23/2010
Location:	Excavation Area TP Offset:	Depth:	1-3'
Sample Description:	Orange Brown Clayey Silt w/Medium to Fine Sand (MH)		

Maximum Dry Density 96.6 PCF. **Optimum Moisture Content 24.7%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**62**
Plastic Limit	**34**
Plastic Index	**28**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	100.0%
#40	98.2%
#60	96.2%
#200	77.9%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Laboratory Record Version 4.1

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122	Test Date(s):	4/17-
Project Name:	Marshall Steam Station Industrial Landfill #1	Report Date:	4/26/10
Client Name:	Duke Energy	Sample Date:	3/31/2010
Client Address:		Panel ID:	11

Boring #: Sample #: EG-2 Depth: 1-3' Perm Cell ID:

Location: Excavation Area TP Offset: Sample Description: Orange Brown Clayey Silt w/Medium to Fine Sand (MH)

Liquid Limit: 62 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 34 Plastic Index: 28 Percent Passing #200: 77.9 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.620	Wet Density (PCF):	116.7	Length (cm):	7.620	Wet Density (PCF):	116.7
Diameter (cm):	7.274	Dry Density (PCF):	91.9	Diameter (cm):	7.27	Dry Density (PCF):	91.9
Area (cm^2)	41.55	Percent Saturation:	87.4	Area (cm^2)	41.55	Percent Saturation:	87.4
Volume (cm^3)	316.63			Volume (cm^3)	316.63	B-Parameter:	96.00
Wet weight (grams)	592.0	Void Ratio:	0.834	Wet weight (grams)	592.0	Void Ratio:	0.834
Dry Weight (grams)	466.2	Porosity:	0.455	Dry Weight (grams)	466.2	Porosity:	0.455
Percent Moisture:	27.0			Percent Moisture:	27.0		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

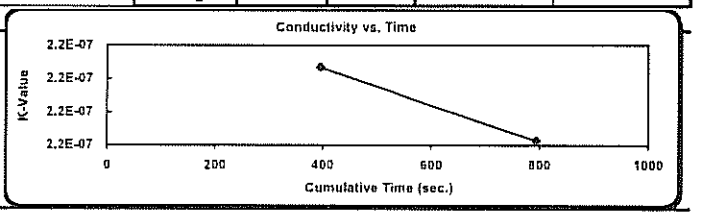
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
2:35	2:41	396	23.5	23.5	23.5	0.9204	4.60	1.89	4.10	1.90	34.1	27.7	4.47	3.63	2.37E-07	2.18E-07
2:45	2:52	398	23.5	23.5	23.5	0.9204	4.60	1.89	4.10	1.90	34.1	27.7	4.47	3.63	2.36E-07	2.17E-07
												Averages:	4.47	3.63	2.36E-07	2.2E-07

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	1356-08-122	Report Date:	4/5/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	3/31-4/5/10
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: EH-2	Sample Date: 3/23/10
Location:	Marshall Steam Station	Offset:	Elevation: 1-3'
Sample Description:	Orange Brown Micaceous Clayey Silt w/Medium to Fine Sand (MH)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.700**				
Hydrometer Jar #:										
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):	240.39			Tare #	38					
Weight of Total Sample Air Dried:	240.39		A	Tare Wt.	15.81					
Weight of Air Dried Hydrometer Sample (g):	50.06		B	Wet Wt. + A	26.24					
Total Sample Oven Dried:	235.35		C	Dry Wt. + A	26.02					
Hydrometer Sample Oven Dried (W):	49.00		D	Water Wt. (B-C)	0.22					
% Passing #10:	99.4%		E	Dry Wt. (C-A)	10.21					
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	2.15%					

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	1.4	100.0%	99.4%
#20	0.1	99.7%	99.1%
#40	1.2	97.6%	97.0%
#60	3.3	93.3%	92.8%
#100	6.2	87.4%	86.9%
#200	10.6	78.4%	78.0%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3222 *Cal. Date:* 7/1/2009 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	23.0	43.5	5.0		38.50	77.8%	77.3%	10.0	0.01297	0.04099
2	23.0	43.0	5.0		38.00	76.8%	76.3%	10.1	0.01297	0.02910
5	23.0	38.5	5.0		33.50	67.7%	67.3%	10.8	0.01297	0.01907
15	23.0	38.0	5.0		33.00	66.7%	66.3%	10.9	0.01297	0.01105
30	23.0	35.0	5.0		30.00	60.6%	60.3%	11.4	0.01297	0.00799
60	23.0	33.5	5.0		28.50	57.6%	57.2%	11.6	0.01297	0.00571
250	23.5	32.0	5.0		27.00	54.5%	54.2%	11.9	0.01290	0.00281
1440	23.0	30.0	5.0		25.00	50.5%	50.2%	12.2	0.01297	0.00119

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

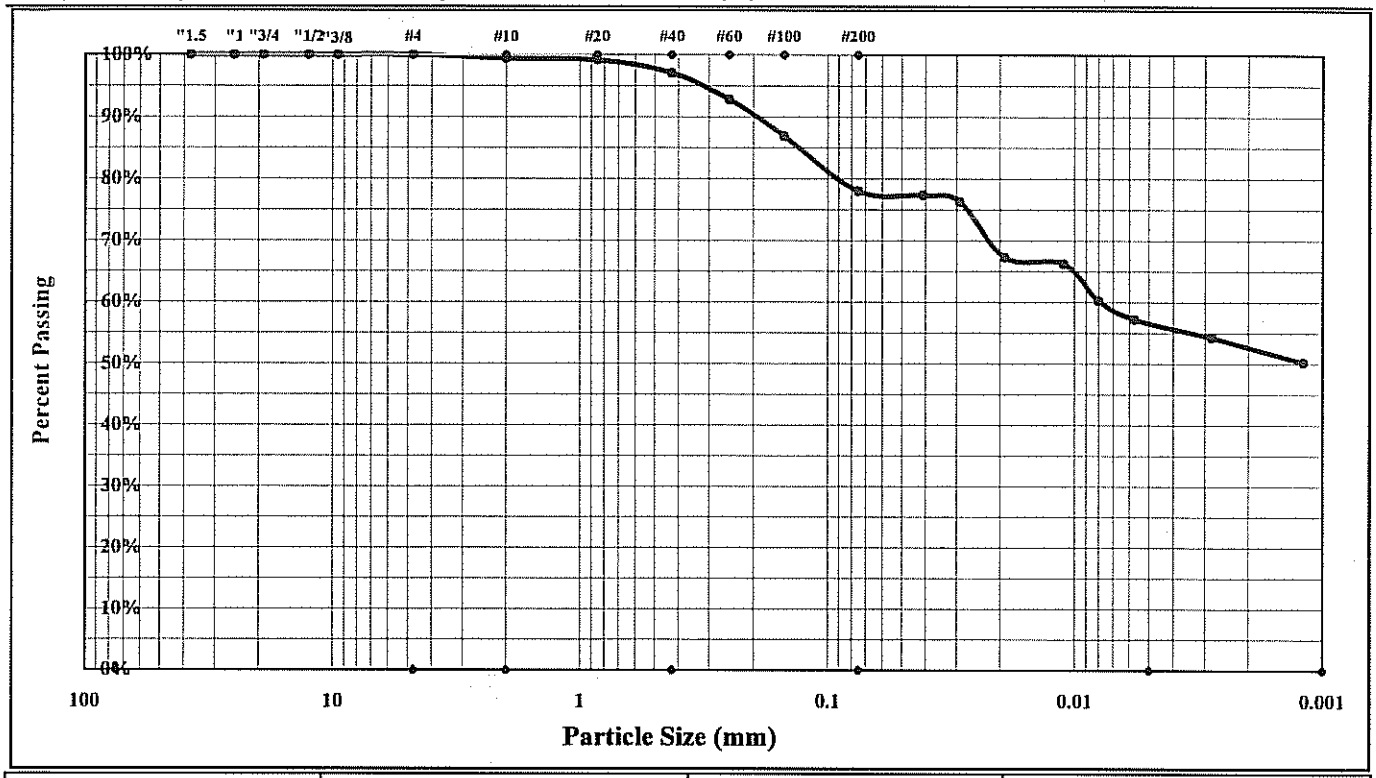
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	4/5/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	3/31-4/5/10
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: EH-2	Sample Date:	3/23/10
Location:	Marshall Steam Offset:	Elevation:	1-3'
Sample Description:	Orange Brown Micaceous Clayey Silt w/Medium to Fine Sand (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	21.5%
Silt & Clay (% Passing #200):	78.0%	Total Sand:	22.0%	Clay	56.5%
rent Relative Density(Assumed)	2.700	Moisture Content		Colloids	49.0%
Liquid Limit	79	Plastic Limit	42	Plastic Index	37
Coarse Sand:	0.6%	Medium Sand:	2.4%	Fine Sand:	19.0%

Description of Sand and Gravel Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-09-122**	Report Date:	4/17/10
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s)	4/1-17/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

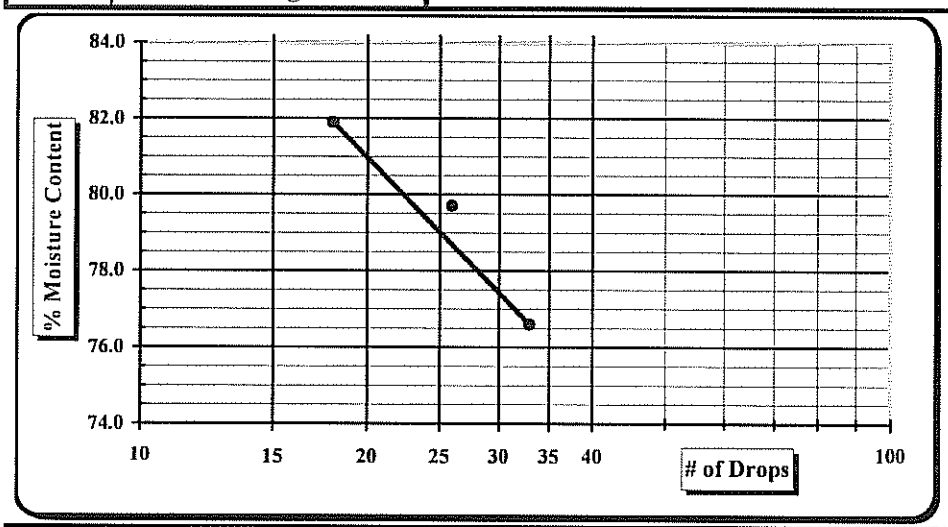
Boring #: Sample #: EH-2 Sample Date: 3/23/10

Location: Excavation Area TP Offset: Elevation: 1-3'

Sample Description: Orange Brown Micaceous Clayey Silt w/Medium to Fine Sand (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3222	7/1/2009	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	EE	50	40				32	48	
A	Tare Weight	16.88	15.78	15.82				13.95	13.99	
B	Wet Soil Weight + A	25.27	22.77	24.46				20.18	20.76	
C	Dry Soil Weight + A	21.63	19.67	20.57				18.32	18.78	
D	Water Weight (B-C)	3.64	3.10	3.89				1.86	1.98	
E	Dry Soil Weight (C-A)	4.75	3.89	4.75				4.37	4.79	
F	% Moisture (D/E)*100	76.6%	79.7%	81.9%				42.6%	41.3%	
N	# OF DROPS	33	26	18				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**42.0%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **79**
Plastic Limit **42**
Plastic Index 37
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	4/15/10	William Harrison	4/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

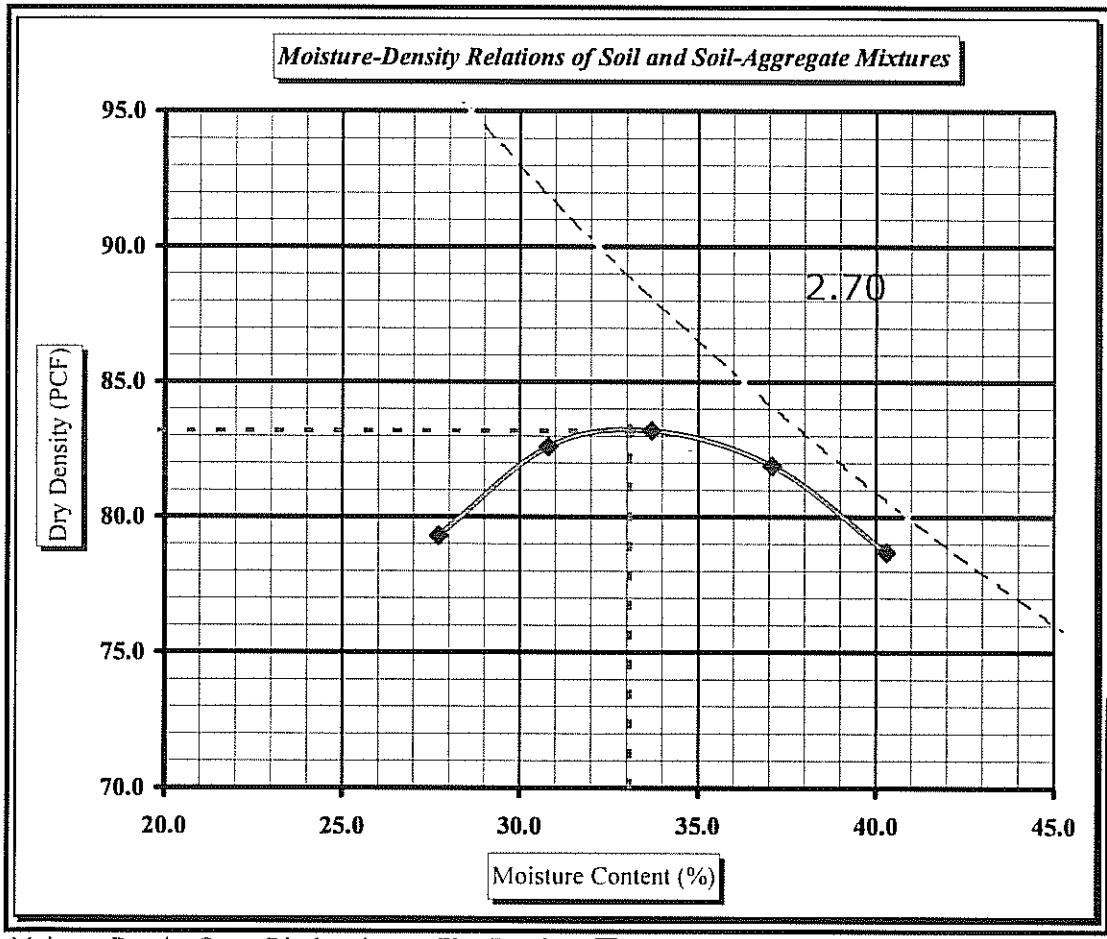
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122**	Report Date:	4/3/2010
Project Name:	Marshall Steam Station Industrial Landfill #1	Test Date(s):	3/31-4/3/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #:		Sample #:	EH-2	Sample Date:	4/1/2010
Location:	Excavation Area Test Pits	Offset:		Depth:	1-3'
Sample Description:	Orange Brown Micaceous Clayey Silt w/Medium to Fine Sand (MH)				

Maximum Dry Density 83.2 PCF. **Optimum Moisture Content 33.1%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**79**
Plastic Limit	**42**
Plastic Index	**37**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.4%
#40	97.0%
#60	92.8%
#200	78.0%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-06-825	Test Date(s):	4/12-13/10
Project Name:	Marshall Steam Station Industrial Landfill No. 1	Report Date:	4/13/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:	Marshall Steam Station	Panel ID:	10

Boring #: Sample #: EH-2 Depth: 1-3' Perm Cell ID:

Location: Excavation Area Test Pits Sample Description: Orange Brown Micaceous Clayey Silt w/Medium to Fine Sand (MH)

Liquid Limit: 79 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 42 Plastic Index: 37 Percent Passing #200: 78 Maximum Particle Size: #10

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.620	Wet Density (PCF):	105.7	Length (cm):	7.620	Wet Density (PCF):	78.5
Diameter (cm):	7.272	Dry Density (PCF):	78.5	Diameter (cm):	7.27	Dry Density (PCF):	78.5
Area (cm^2)	41.53	Percent Saturation:	81.5	Area (cm^2)	41.53	Percent Saturation:	0.0
Volume (cm^3)	316.49			Volume (cm^3)	316.49	B-Parameter:	0.96
Wet weight (grams)	536.0	Void Ratio:	1.146	Wet weight (grams)	398.2	Void Ratio:	1.146
Dry Weight (grams)	398.2	Porosity:	0.534	Dry Weight (grams)	398.2	Porosity:	0.534
Percent Moisture:	34.6			Percent Moisture:			
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	92.5	Back Pressure (psi):	90.0	a_{out} (cm^2)	0.76712

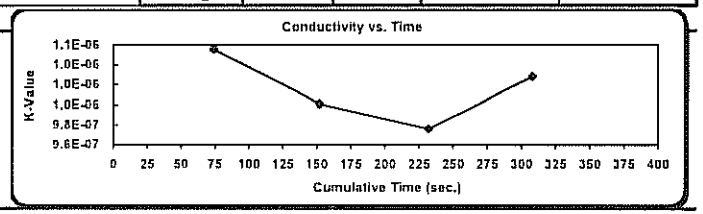
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
12:41	12:42	74	22.7	22.7	22.7	0.9377	4.90	1.88	4.40	1.90	38.0	31.4	4.98	4.13	1.13E-06	1.06E-06
12:43	12:44	78	22.7	22.7	22.7	0.9377	4.90	1.88	4.40	1.90	38.0	31.4	4.98	4.13	1.07E-06	1.00E-06
12:49	12:50	80	22.7	22.7	22.7	0.9377	4.90	1.88	4.40	1.90	38.0	31.4	4.98	4.13	1.04E-06	9.76E-07
12:54	12:55	76	22.7	22.7	22.7	0.9377	4.90	1.88	4.40	1.90	38.0	31.4	4.98	4.13	1.10E-06	1.03E-06
													Averages:	*4.98*	*4.13*	*1.08E-06*	*1.0E-06*

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Jennifer Olsen

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No: TR-D422-WH-1
Revision No. 0
Revision Date: 07/14/08

Sieve Analysis of Soils

ASTM D 422

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		
Boring #: TP-1	Sample:	Sample Date:	12/4/09
Location: Stockpile Area	Offset:	Elevation:	Composite
Sample Description:	Orange Brown Coarse to Fine Sandy Silt (ML) w/Mica		

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐
Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Particle Size Analysis / Without Hydrometer Analysis				*Material Excluded:*	
Tare No.	**537**	Tare Wt.	**105.9**	Mass of Sample after Wash + Tare Wt.	**239.8**
Total Sample Wet Wt. + Tare Wt.			**444.1**	Mass of Sample after Wash	**133.9**
Total Sample Dry Wt. + Tare Wt.			**379.9**	Mass passing #200	**140.1**
Total Sample Dry Weight			**274.0**	% Passing #200 **(D1140)**	**51.1%**

Sieve Size		**Retained Weight**	**% Retained Between Sieves**	**% Retained**	**% Passing**	**SPECS**
Standard	*mm.*	***Cumulative***	*Individual*	***Cumulative Total Sample***		
2.0"	50.00	0.0	0.0%	0.0%	**100.0%**	
1.5"	37.50	0.0	0.0%	0.0%	**100.0%**	
1.0"	25.00	0.0	0.0%	0.0%	**100.0%**	
3/4"	19.00	0.0	0.0%	0.0%	**100.0%**	
1/2"	12.50	3.3	1.2%	1.2%	**98.8%**	
3/8"	9.50	5.1	0.6%	1.8%	**98.2%**	
#4	4.75	8.8	1.4%	3.2%	**96.8%**	
#10	2.000	18.2	3.4%	6.7%	**93.3%**	
#20	0.850	29.1	4.0%	10.6%	**89.4%**	
#40	0.425	43.3	5.2%	15.8%	**84.2%**	
#60	0.250	65.3	8.0%	23.8%	**76.2%**	
#100	0.150	96.2	11.3%	35.1%	**64.9%**	
#200	0.075	130.9	12.7%	47.8%	**52.2%**	
Pan	<0.075	133.7		**% Passing #200 (C136) =**		**52.2%**

D2487	Maximum Particle Size		Medium Sand	< 2.00 mm and > 0.425 mm (#40)	9.1%
Gravel	< 75 mm and > 4.75 mm (#4)	3.2%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	32.0%
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	3.4%	% Silt & Clay	< 0.075 mm	52.2%

Notes / Deviations / References:

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No: TR-D422-WH-1Ga
Revision No. 0
Revision Date: 07/14/08

Sieve Analysis of Soils

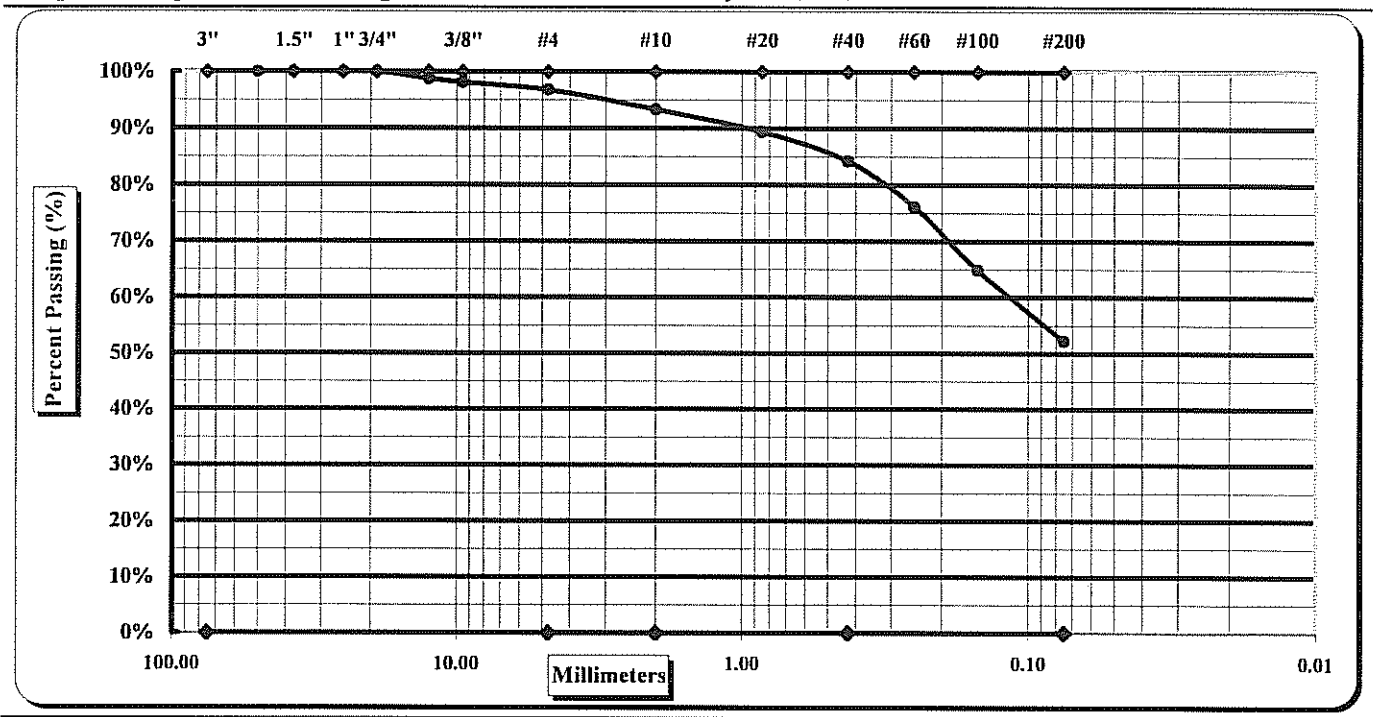
ASTM D 422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		
Boring #: TP-1	Sample:	Sample Date:	12/4/09
Location: Stockpile Area	Offset:	Elevation:	Composite

Sample Description: Orange Brown Coarse to Fine Sandy Silt (ML) w/Mica



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size		Coarse Sand	3.4%	Fine Sand	32.0%
Gravel	3.2%	Medium Sand	9.1%	Silt & Clay	52.2%
Liquid Limit	45	Plastic Limit	30	Plastic Index	15
Specific Gravity				Moisture Content	23.4%
Coarse Sand	3.4%	Medium Sand	9.1%	Fine Sand	32.0%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐
Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Notes / Deviations / References:

William Harrison		Staff Professional	11/16/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90 *Client code* *Client Test #* *state #*

Revision No. 0

Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		

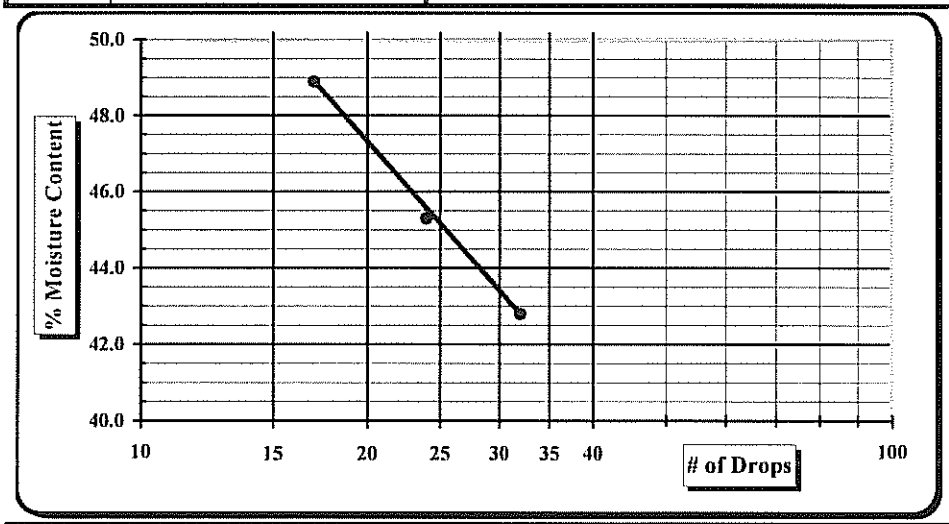
Boring #: TP-1 Sample #: Sample Date: 12/4/09

Location: Stockpile Area Offset: Elevation: Composite

Sample Description: Oragne Brown Coarse to Fine Sandy Silt (ML) w/Mica

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	53	5	45				PP	WN	
A	Tare Weight	15.82	15.70	13.94				16.17	16.57	
B	Wet Soil Weight + A	26.59	25.26	23.69				22.68	22.82	
C	Dry Soil Weight + A	23.36	22.28	20.49				21.19	21.39	
D	Water Weight (B-C)	3.23	2.98	3.20				1.49	1.43	
E	Dry Soil Weight (C-A)	7.54	6.58	6.55				5.02	4.82	
F	% Moisture (D/E)*100	42.8%	45.3%	48.9%				29.7%	29.7%	
N	# OF DROPS	32	24	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**29.7%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit **45**

Plastic Limit **30**

Plastic Index 15

Group Symbol **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

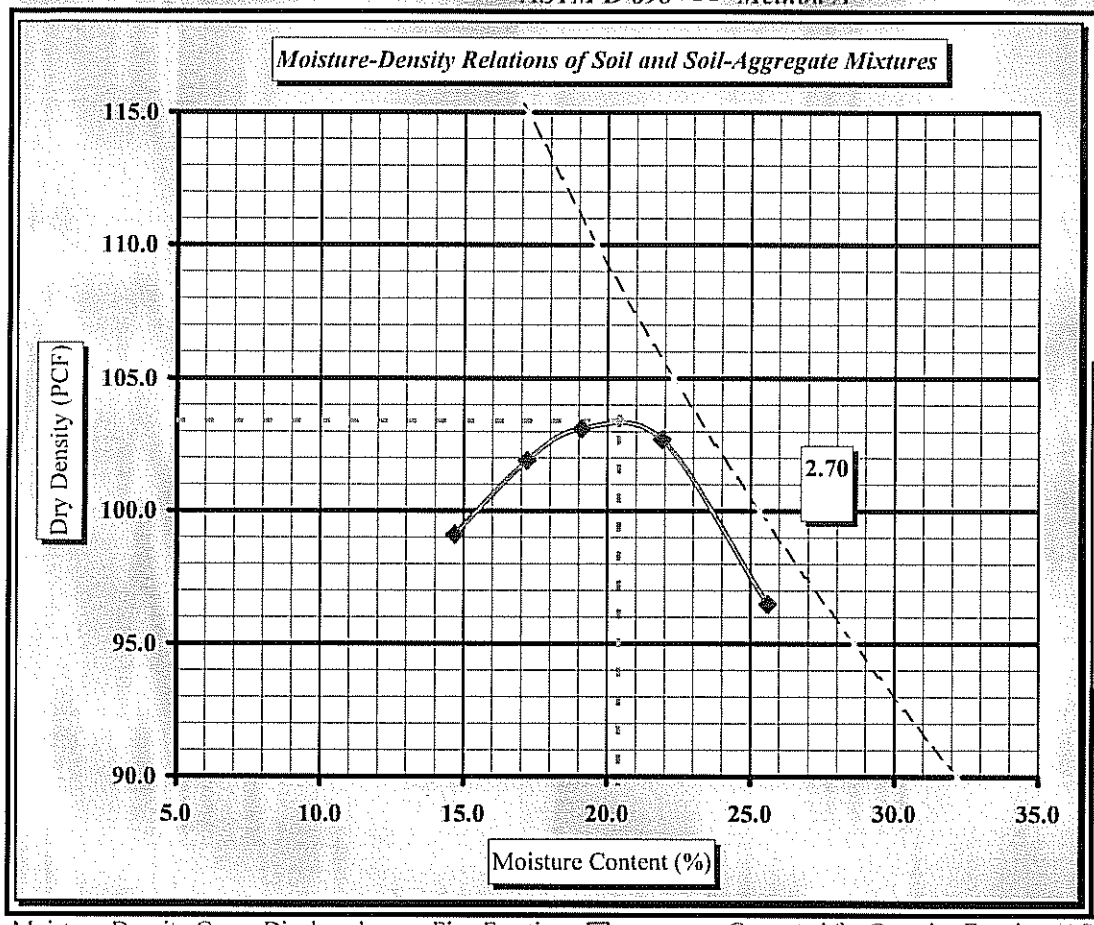
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-09-122 Phase**	Report Date:	12/17/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/11-17/09
Client Name:	Dean Synder		
Client Address:			
Boring #:	Sample #: TP-1	Sample Date:	
Location:	Stockpile Area Offset:	Depth:	
Sample Description:	Orange Brown Coarse to Fine Sandy Silt (ML) w/Mica		

Maximum Dry Density 103.4 PCF. **Optimum Moisture Content 20.4%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content
Specific Gravity of Soil
Liquid Limit
Plastic Limit
Plastic Index

% Passing

3/4"
3/8"
#4
#10
#40
#60
#200

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number:	1356-08-122 Phase 9	Project Name:	Marshall Steam Station - Industrial Landfill No.1
Sample Name:	TP-1	Client Name:	Dean Snyder
Sample Description:	Orange Brown Coarse to Fine Sandy Silt (ML)w/Mica	Client Address:	
Type of Sample:	Remolded	Date:	1/5-8/10

Sample Data		Molding Moisture Content		Target Molding Conditon		Additonal Data	
Diam. (cm)	7.282	Tare No.	Paul	γ_{wet} (pcf)	120.2	Panel No	6
Leng. (cm)	7.658	WWS+ Tare (gm)	383.39	γ_{dry} (pcf)	98.2	Cell P (psi)	85.0
Area (cm^2)	41.65	WDS+Tare (gm)	326.61	w (%)	22.4	Influent P (psi)	80.5
Vol. (cm^3)	318.94	WT of Water (gm)	56.78	Actual Molding Condition		Effluent P (psi)	80.0
WWS (gm)	612.97	WT of TARE (gm)	81.71	γ_{wet} (pcf)	120.0		
		WT Dry Soil (gm)	244.9	γ_{dry} (pcf)	97.4		
		w (%)	23.2	w (%)	23.2		

K = (Q x L) / (t x H x A) H = (Influent Pressure - Effluent Pressure) + Average Influent-Effluent Burrettes Height Difference (cm) 1 psi = 70.377 cm water

Run	Temp. (°C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	H (cm)	Gradient, i	Temp Corr.	K(cm/sec)
1		8	26		8.3	4.0	5.9					
	20	12	59	16380	8.3	5.9	4.0	1.90	38.0	5.0	1.0000	5.61E-07
2					8.3	4.0	5.9					
	21			13800	8.4	5.9	4.0	1.90	38.0	5.0	0.9760	6.50E-07
3					8.4	4.0	5.9					
	21			14280	8.4	6.0	3.9	2.00	37.9	4.9	0.9760	6.63E-07
4					8.4	4.0	5.9					
	21			12600	8.5	5.8	4.1	1.80	38.1	5.0	0.9760	6.73E-07
5					8.6	4.0	5.9					
	21			13320	8.6	5.9	4.0	1.90	38.0	5.0	0.9760	6.74E-07
											Ave. K (cm/sec)	6.65E-07
											(Runs 2 thru 5)	
											Ave. K (m/sec)	6.65E-09

References: ASTM D5084 Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Technician Name: Karen Warner

NICET 117900
Certification #

Technical Responsibility: Will Harrison

Signature

Staff Professional
Position

Form No: TR-D422-WH-1
Revision No. 0
Revision Date: 07/14/08

Sieve Analysis of Soils

ASTM D 422

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		
Boring #: TP-2	Sample:	Sample Date:	12/4/09
Location: Stockpile Area	Offset:	Elevation:	Composite
Sample Description:	Orange Brown Coarse to Fine Sandy Silt (ML) w/Mica		

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐
Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Particle Size Analysis / Without Hydrometer Analysis				*Material Excluded:*	
Tare No.	**Rahim**	Tare Wt.	**87.0**	Mass of Sample after Wash + Tare Wt.	**204.2**
Total Sample Wet Wt. + Tare Wt.			**470.4**	Mass of Sample after Wash	**117.2**
Total Sample Dry Wt. + Tare Wt.			**390.3**	Mass passing #200	**186.2**
Total Sample Dry Weight			303.4	% Passing #200 **(D1140)**	**61.4%**

Sieve Size		**Retained Weight**	**% Retained Between Sieves**	**% Retained**	**% Passing**	**SPECS**
				Cumulative		
Standard	*mm.*	***Cumulative***	*Individual*	***Total Sample***		
2.0"	50.00	0.0	0.0%	0.0%	**100.0%**	
1.5"	37.50	0.0	0.0%	0.0%	**100.0%**	
1.0"	25.00	0.0	0.0%	0.0%	**100.0%**	
3/4"	19.00	0.0	0.0%	0.0%	**100.0%**	
1/2"	12.50	0.0	0.0%	0.0%	**100.0%**	
3/8"	9.50	1.5	0.5%	0.5%	**99.5%**	
#4	4.75	7.2	1.9%	2.4%	**97.6%**	
#10	2.000	16.6	3.1%	5.5%	**94.5%**	
#20	0.850	25.4	2.9%	8.4%	**91.6%**	
#40	0.425	36.5	3.7%	12.0%	**88.0%**	
#60	0.250	56.1	6.4%	18.5%	**81.5%**	
#100	0.150	80.3	8.0%	26.5%	**73.5%**	
#200	0.075	114.7	11.3%	37.8%	**62.2%**	
Pan	<0.075	117.1		**% Passing #200 (C136) =**		**62.2%**

D2487	Maximum Particle Size		Medium Sand	< 2.00 mm and > 0.425 mm (#40)	6.6%
Gravel	< 75 mm and > 4.75 mm (#4)	2.4%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	25.8%
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	3.1%	% Silt & Clay	< 0.075 mm	62.2%

Notes / Deviations / References:

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No: TR-D422-WH-1Ga
Revision No. 0
Revision Date: 07/14/08

Sieve Analysis of Soils

ASTM D 422

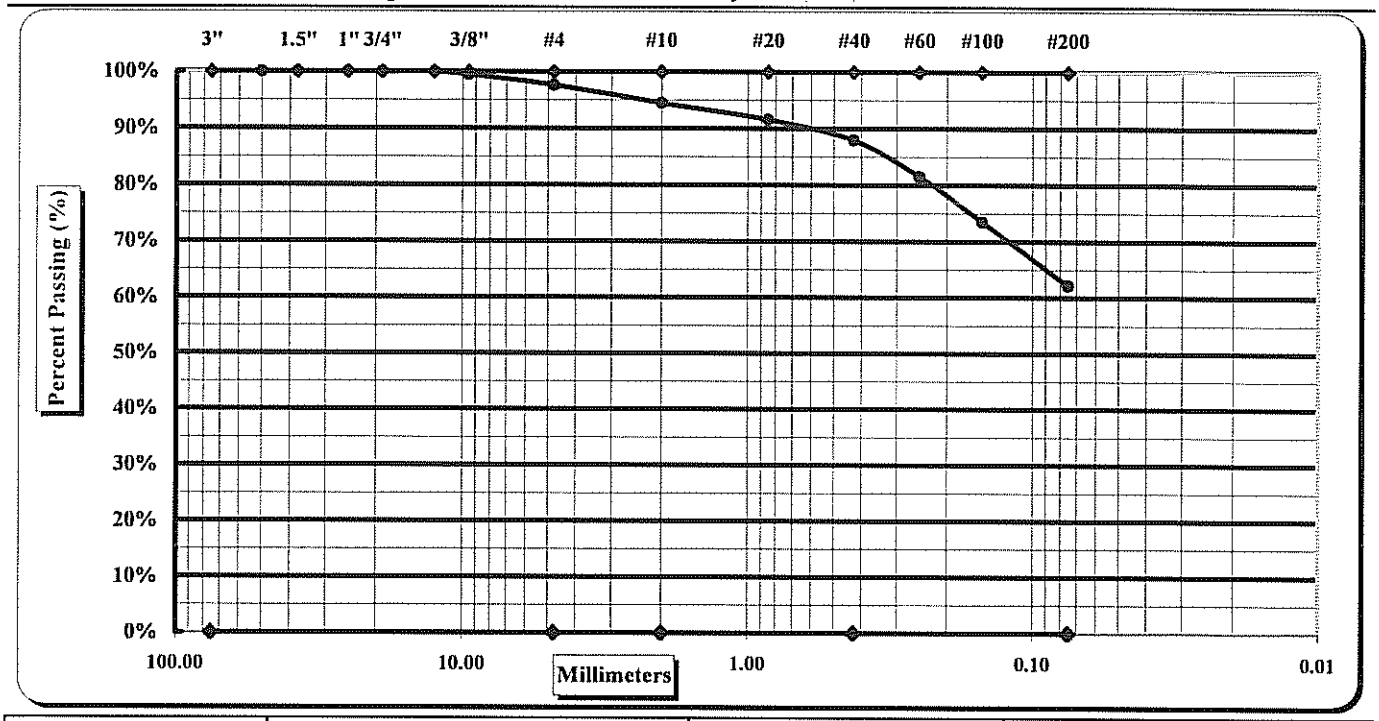
S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		
Boring #: TP-2	Sample:	Sample Date:	12/4/09
Location: Stockpile Area	Offset:	Elevation:	Composite

Sample Description: Orange Brown Coarse to Fine Sandy Silt (ML) w/Mica



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size		Coarse Sand	3.1%	Fine Sand	25.8%
Gravel	2.4%	Medium Sand	6.6%	Silt & Clay	62.2%
Liquid Limit	47	Plastic Limit	29	Plastic Index	18
Specific Gravity				Moisture Content	26.4%
Coarse Sand	3.1%	Medium Sand	6.6%	Fine Sand	25.8%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐
Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Notes / Deviations / References:

William Harrison	[signature]	Staff Professional	11/16/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90 *Client code* *Client Test #* *state #*

Revision No. 0

Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		

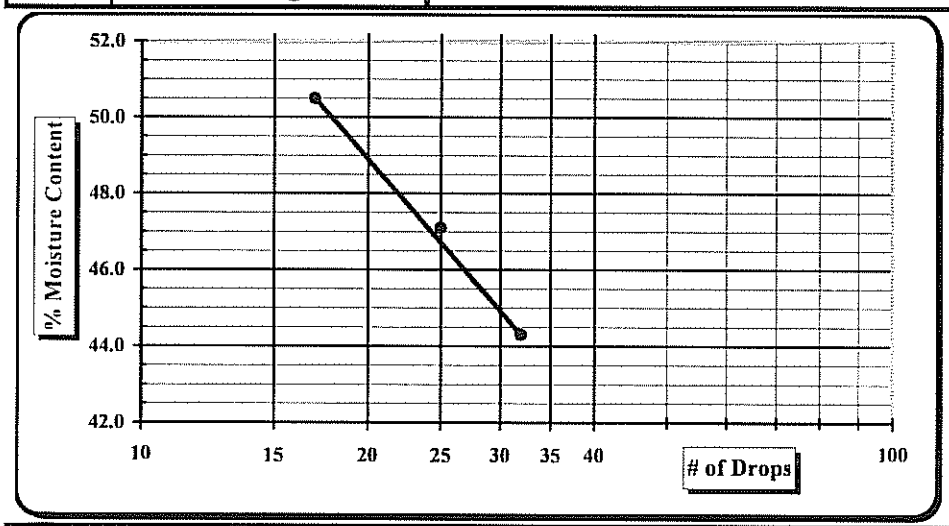
Boring #: TP-2 Sample #: Sample Date: 12/4/09

Location: Stockpile Area Offset: Elevation: Composite

Sample Description: Orange Brown Coarse to Fine Sandy Silt (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	OO	60	41				58	25	
A	Tare Weight	16.33	13.86	15.78				13.97	14.35	
B	Wet Soil Weight + A	25.91	23.23	23.53				20.17	20.62	
C	Dry Soil Weight + A	22.97	20.23	20.93				18.79	19.21	
D	Water Weight (B-C)	2.94	3.00	2.60				1.38	1.41	
E	Dry Soil Weight (C-A)	6.64	6.37	5.15				4.82	4.86	
F	% Moisture (D/E)*100	44.3%	47.1%	50.5%				28.6%	29.0%	
N	# OF DROPS	32	25	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**28.8%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit **47**

Plastic Limit **29**

Plastic Index 18

Group Symbol **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No: TR-D422-WH-1
Revision No. 0
Revision Date: 07/14/08

Sieve Analysis of Soils

ASTM D 422

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		
Boring #: TP-3	Sample:	Sample Date:	12/4/09
Location: Stockpile Area	Offset:	Elevation:	Composite

Sample Description: Orange Brown Coarse to Fine Sandy Silt (ML) w/Mica

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐
Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Particle Size Analysis / Without Hydrometer Analysis				*Material Excluded:*	
Tare No.	**MDJ**	Tare Wt.	**85.5**	Mass of Sample after Wash + Tare Wt.	**214.5**
Total Sample Wet Wt. + Tare Wt.			**470.3**	Mass of Sample after Wash	**129.0**
Total Sample Dry Wt. + Tare Wt.			**392.1**	Mass passing #200	**177.6**
Total Sample Dry Weight			306.6	% Passing #200 **(D1140)**	**57.9%**

Sieve Size		**Retained Weight**	**% Retained Between Sieves**	**% Retained**	**% Passing**	**SPECS**
Standard	*mm.*	***Cumulative***	*Individual*	***Cumulative Total Sample***		
2.0"	50.00	0.0	0.0%	0.0%	**100.0%**	
1.5"	37.50	0.0	0.0%	0.0%	**100.0%**	
1.0"	25.00	0.0	0.0%	0.0%	**100.0%**	
3/4"	19.00	0.0	0.0%	0.0%	**100.0%**	
1/2"	12.50	0.0	0.0%	0.0%	**100.0%**	
3/8"	9.50	0.0	0.0%	0.0%	**100.0%**	
#4	4.75	6.6	2.2%	2.2%	**97.8%**	
#10	2.000	12.4	1.9%	4.0%	**96.0%**	
#20	0.850	21.3	2.9%	7.0%	**93.0%**	
#40	0.425	35.2	4.5%	11.5%	**88.5%**	
#60	0.250	58.1	7.5%	18.9%	**81.1%**	
#100	0.150	87.6	9.6%	28.6%	**71.4%**	
#200	0.075	125.8	12.5%	41.0%	**59.0%**	
Pan	<0.075	128.9		**% Passing #200 (C136) =**		**59.0%**

D2487	Maximum Particle Size		Medium Sand	< 2.00 mm and > 0.425 mm (#40)	7.5%
Gravel	< 75 mm and > 4.75 mm (#4)	2.2%	Fine Sand	<0.425 mm and > 0.075 mm (#200)	29.5%
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	1.9%	% Silt & Clay	< 0.075 mm	59.0%

Notes / Deviations / References:

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No: TR-D422-WH-1Ga
Revision No. 0
Revision Date: 07/14/08

Sieve Analysis of Soils

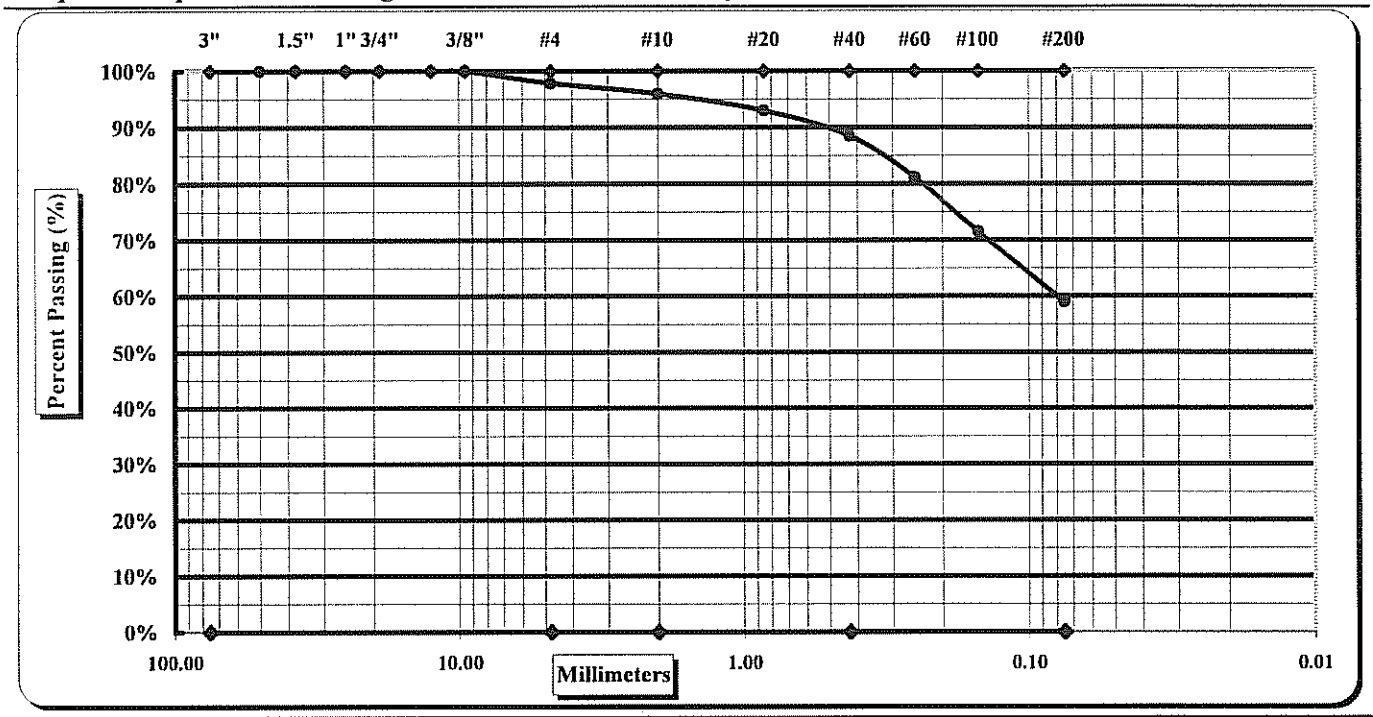
ASTM D 422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		
Boring #: TP-3	Sample:	Sample Date:	12/4/09
Location: Stockpile Area	Offset:	Elevation:	Composite

Sample Description: Orange Brown Coarse to Fine Sandy Silt (ML) w/Mica



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size		Coarse Sand	1.9%	Fine Sand	29.5%
Gravel	2.2%	Medium Sand	7.5%	Silt & Clay	59.0%
Liquid Limit	48	Plastic Limit	32	Plastic Index	16
Specific Gravity				Moisture Content	25.5%
Coarse Sand	1.9%	Medium Sand	7.5%	Fine Sand	29.5%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐
Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Notes / Deviations / References:

William Harrison	[signature]	Staff Professional	12/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90 | *Client code* | *Client Test #* | *state #*

Revision No. 0

Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code | *ASTM D 4318* ☒ | *AASHTO T 89* ☐ | *AASHTO T 90* ☐ | ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		

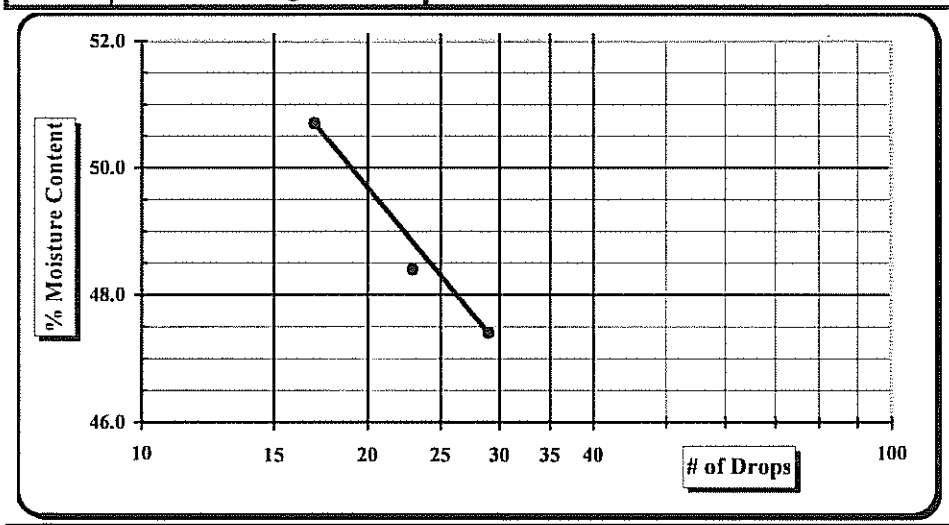
Boring #: TP-3 | Sample #: | Sample Date: 12/4/09

Location: Stockpile Area | Offset: | Elevation: Composite

Sample Description: Orange Brown Coarse to Fine Sandy Silt (ML) w/Mica

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	48	KK	QQ				33	X	
A	Tare Weight	13.99	16.02	16.86				15.90	15.53	
B	Wet Soil Weight + A	23.44	26.47	26.97				21.95	22.45	
C	Dry Soil Weight + A	20.40	23.06	23.57				20.50	20.78	
D	Water Weight (B-C)	3.04	3.41	3.40				1.45	1.67	
E	Dry Soil Weight (C-A)	6.41	7.04	6.71				4.60	5.25	
F	% Moisture (D/E)*100	47.4%	48.4%	50.7%				31.5%	31.8%	
N	# OF DROPS	29	23	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**31.7%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit **48**

Plastic Limit **32**

Plastic Index 16

Group Symbol **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ | Dry Preparation ☑ | Air Dried ☑ | *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No: TR-D422-WH-1
Revision No. 0
Revision Date: 07/14/08

Sieve Analysis of Soils

ASTM D 422

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		
Boring #: TP-4	Sample:	Sample Date:	12/4/09
Location: Stockpile Area	Offset:	Elevation:	Composite

Sample Description: Orange Brown Clayey Silt w/Coarse to Fine Sand (MH) and Mica

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐
Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Particle Size Analysis / Without Hydrometer Analysis				*Material Excluded:*	
Tare No.	C	Tare Wt.	**84.3**	Mass of Sample after Wash + Tare Wt.	**209.7**
Total Sample Wet Wt. + Tare Wt.			**429.0**	Mass of Sample after Wash	**125.4**
Total Sample Dry Wt. + Tare Wt.			**357.9**	Mass passing #200	**148.2**
Total Sample Dry Weight			**273.6**	% Passing #200 **(D1140)**	**54.2%**

Sieve Size		**Retained Weight**	**% Retained Between Sieves**	**% Retained**	**% Passing**	**SPECS**
Standard	*mm.*	***Cumulative***	*Individual*	***Cumulative Total Sample***		
2.0"	50.00	0.0	0.0%	0.0%	**100.0%**	
1.5"	37.50	0.0	0.0%	0.0%	**100.0%**	
1.0"	25.00	0.0	0.0%	0.0%	**100.0%**	
3/4"	19.00	0.0	0.0%	0.0%	**100.0%**	
1/2"	12.50	12.5	4.6%	4.6%	**95.4%**	
3/8"	9.50	12.5	0.0%	4.6%	**95.4%**	
#4	4.75	15.1	1.0%	5.5%	**94.5%**	
#10	2.000	21.2	2.2%	7.7%	**92.3%**	
#20	0.850	29.9	3.2%	10.9%	**89.1%**	
#40	0.425	42.7	4.7%	15.6%	**84.4%**	
#60	0.250	62.1	7.1%	22.7%	**77.3%**	
#100	0.150	88.9	9.8%	32.5%	**67.5%**	
#200	0.075	124.9	13.1%	45.6%	**54.4%**	
Pan	<0.075	125.2		**% Passing #200 (C136) =**		**54.4%**

D2487	Maximum Particle Size		Medium Sand	< 2.00 mm and > 0.425 mm (#40)	7.9%
Gravel	< 75 mm and > 4.75 mm (#4)	5.5%	Fine Sand	< 0.425 mm and > 0.075 mm (#200)	30.0%
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	2.2%	% Silt & Clay	< 0.075 mm	54.4%

Notes / Deviations / References:

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No: TR-D422-WH-1Ga
Revision No. 0
Revision Date: 07/14/08

Sieve Analysis of Soils

ASTM D 422

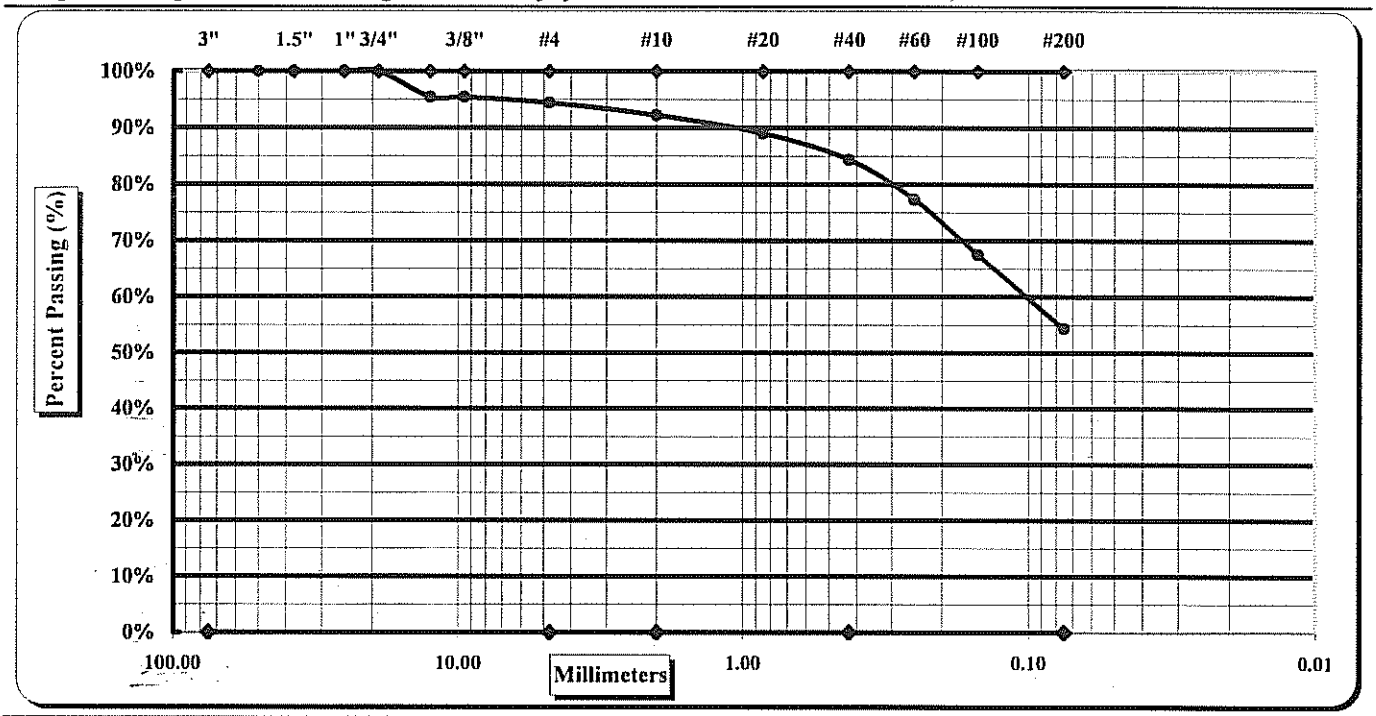
S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		
Boring #: TP-4	Sample:	Sample Date:	12/4/09
Location: Stockpile Area	Offset:	Elevation:	Composite

Sample Description: Orange Brown Clayey Silt w/Coarse to Fine Sand (MH) and Mica



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size		Coarse Sand	2.2%	Fine Sand	30.0%
Gravel	5.5%	Medium Sand	7.9%	Silt & Clay	54.4%
Liquid Limit	50	Plastic Limit	30	Plastic Index	20
Specific Gravity				Moisture Content	26.0%
Coarse Sand	2.2%	Medium Sand	7.9%	Fine Sand	30.0%

Description of Sand & Gravel Particles: Rounded ☐ Angular ☐
Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Notes / Deviations / References:

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90 *Client code* *Client Test #* *state #*

Revision No. 0

Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 06**	Report Date:	12/9/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	12/7-9/09
Client Name:	Dean Snyder		
Project Address:	Terrell, NC		

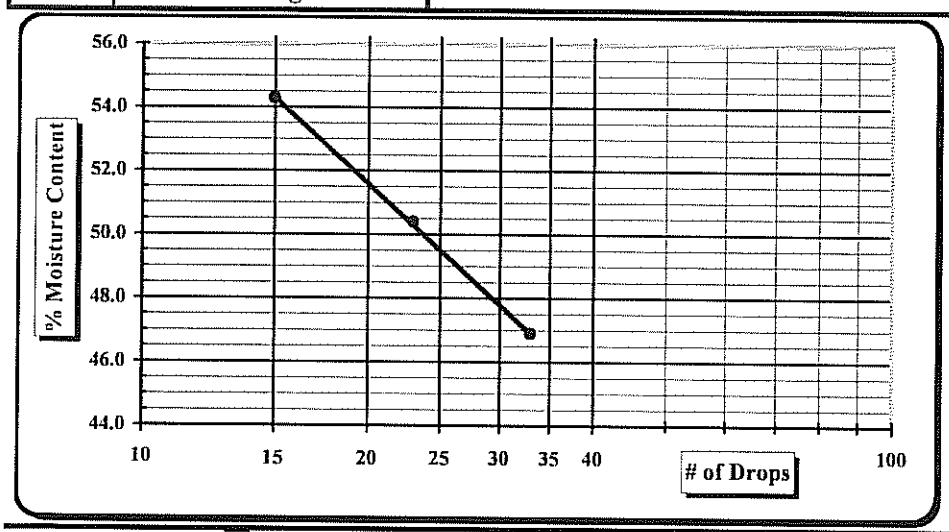
Boring #: TP-4 Sample #: Sample Date: 12/4/09

Location: Stockpile Area Offset: Elevation: Composite

Sample Description: Orange Brown Clayey Silt w/Coarse to Fine Sand (MH) and Mica

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	51	VV	10				FGD	III	
A	Tare Weight	15.78	16.03	14.00				15.97	15.20	
B	Wet Soil Weight + A	24.71	26.17	23.77				22.19	22.83	
C	Dry Soil Weight + A	21.86	22.77	20.33				20.76	21.04	
D	Water Weight (B-C)	2.85	3.40	3.44				1.43	1.79	
E	Dry Soil Weight (C-A)	6.08	6.74	6.33				4.79	5.84	
F	% Moisture (D/E)*100	46.9%	50.4%	54.3%				29.9%	30.7%	
N	# OF DROPS	33	23	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**30.3%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐

Liquid Limit **50**

Plastic Limit **30**

Plastic Index 20

Group Symbol **MH**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner — *Technician Name* — 11/15/10 *Date*

William Harrison — *Technical Responsibility* — 11/15/10 *Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

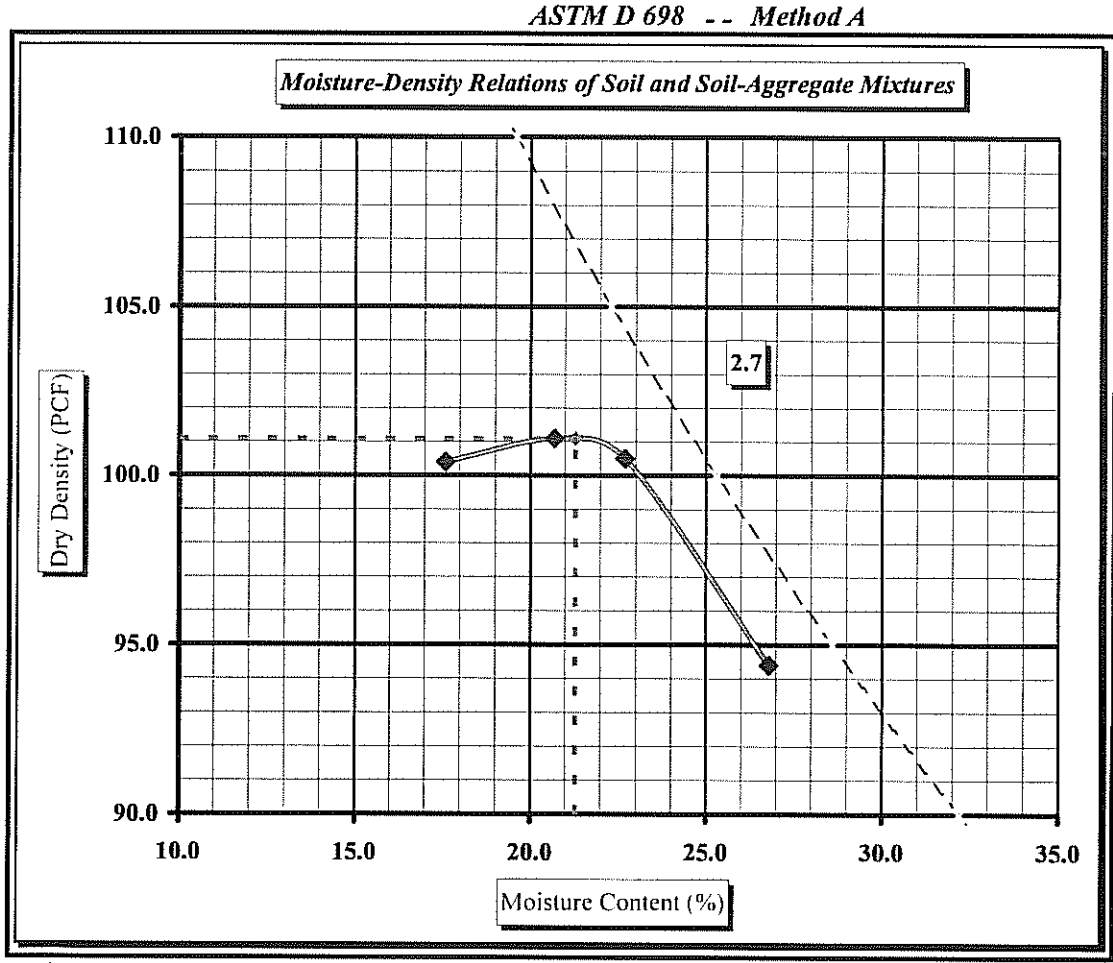
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-09-122 Phase**	Report Date:	12/17/09
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	12/11-17/09
Client Name:	Dean Synder		
Client Address:			

Boring #:		Sample #:	TP-4	Sample Date:	
Location:	Stockpile Area	Offset:		Depth:	
Sample Description:	Orange Brown Clayey Silt w/Coarse to Fine Sand (MH) w/Mica				

Maximum Dry Density 101.1 PCF. **Optimum Moisture Content 21.3%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content
Specific Gravity of Soil
Liquid Limit
Plastic Limit
Plastic Index

% Passing

3/4"
3/8"
#4
#10
#40
#60
#200

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number:	1356-08-122 Phase 9	Project Name:	Marshall Steam Station - Industrial Landfill No.1
Sample Name:	TP-4	Client Name:	Dean Snyder
Sample Description:	Orange Brown Clayey Silt w/Coarse to Fine Sand (MH) w/Mica	Client Address:	
Type of Sample:	Remolded	Date:	1/5/2010

Sample Data		Molding Moisture Content		Target Molding Conditon		Additonal Data	
Diam. (cm)	7.252	Tare No.	G-5	γ_{wet} (pcf)	118.4	Panel No	10
Leng. (cm)	7.645	WWS+ Tare (gm)	380.88	γ_{dry} (pcf)	96	Cell P (psi)	85.0
Area (cm^2)	41.31	WDS+Tare (gm)	323.55	w (%)	23.3	Influent P (psi)	80.5
Vol. (cm^3)	315.78	WT of Water (gm)	57.33	Actual Molding Condition		Effluent P (psi)	80.0
WWS (gm)	603.32	WT of TARE (gm)	82.03	γ_{wet} (pcf)	119.3		
		WT Dry Soil (gm)	241.52	γ_{dry} (pcf)	96.5		
		w (%)	23.7	w (%)	23.7		

K = (Q x L) / (t x H x A) H = (Influent Pressure - Effluent Pressure) + Average Influent-Effluent Burrettes Height Difference (cm) 1 psi = 70.377 cm water

Run	Temp. (°C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	H (cm)	Gradient, i	Temp Corr.	K(cm/sec)
1		13	29		6.1	5.0	6.9					
	21	14	0	1860	6.1	6.9	5.0	1.90	38.0	5.0	0.9760	4.86E-06
2					6.1	5.0	6.9					
	21			1560	6.1	6.9	5.0	1.90	38.0	5.0	0.9760	5.79E-06
3					6.1	5.0	6.9					
	21			1560	6.1	6.9	5.0	1.90	38.0	5.0	0.9760	5.79E-06
4					6.1	5.0	6.9					
	21			1380	6.1	6.9	5.0	1.90	38.0	5.0	0.9760	6.54E-06
5					6.1	5.0	6.9					
	21			1440	6.2	6.9	5.0	1.90	38.0	5.0	0.9760	6.27E-06
6					6.2	5.0	6.9					
	21			1440	6.2	6.9	5.0	1.90	38.0	5.0	0.9760	6.27E-06
											Ave. K (cm/sec)	6.13E-06
											(Runs 2 thru 6)	
											Ave. K (m/sec)	6.13E-08

References: ASTM D5084 Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

Technician Name: Karen Warner

NICET 117900
Certification #

Technical Responsibility: Will Harrison

Signature

Staff Professional
Position

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy	Address:	Marshall Steam Station
Boring #:		Sample #:	
Sample Date:	3/23/10	Location:	Stockpile Area Test Pits
Offset:	SA-2	Elevation:	0-8'
Sample Description:	Orange Brown Clayey Coarse to Fine Sandy Silt (ML)		

Pan #:		Beaker #:		Apparent Relative Density (Assumed)	2.700
Hydrometer Jar #:					
Pan Tare Weight (grams):			Moisture Content	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):	486.19		Tare #	46	
Weight of Total Sample Air Dried:	486.19	A	Tare Wt.	13.76	
Weight of Air Dried Hydrometer Sample (g):	50.00	B	Wet Wt. + A	28.53	
Total Sample Oven Dried:	475.64	C	Dry Wt. + A	28.19	
Hydrometer Sample Oven Dried (W):	48.85	D	Water Wt. (B-C)	0.34	
% Passing #10:	94.1%	E	Dry Wt. (C-A)	14.43	
Correction Factor a (Table 1):	0.99		% Moisture (100 x D/E)	2.36%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	14.1		97.0%
1/2"	18.7		96.1%
3/8"	18.7	Soil Mortar	96.1%
#4	21.4		95.5%
#10	27.9	100.0%	94.1%
#20	1.5	96.9%	91.2%
#40	3.6	92.7%	87.3%
#60	6.6	86.4%	81.4%
#100	11.8	75.8%	71.3%
#200	19.9	59.3%	55.9%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 20455 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	22.0	31.0	4.0		27.00	54.7%	51.5%	11.9	0.01312	0.04521
2	22.0	28.0	4.0		24.00	48.6%	45.8%	12.4	0.01312	0.03262
5	22.0	26.0	4.0		22.00	44.6%	42.0%	12.7	0.01312	0.02090
15	22.0	22.0	4.0		18.00	36.5%	34.3%	13.3	0.01312	0.01238
30	22.0	20.0	4.0		16.00	32.4%	30.5%	13.7	0.01312	0.00886
60	22.0	18.5	4.0		14.50	29.4%	27.7%	13.9	0.01312	0.00632
250	22.0	15.0	4.0		11.00	22.3%	21.0%	14.5	0.01312	0.00316
1440	23.0	12.5	4.0		8.50	17.2%	16.2%	14.9	0.01297	0.00132

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

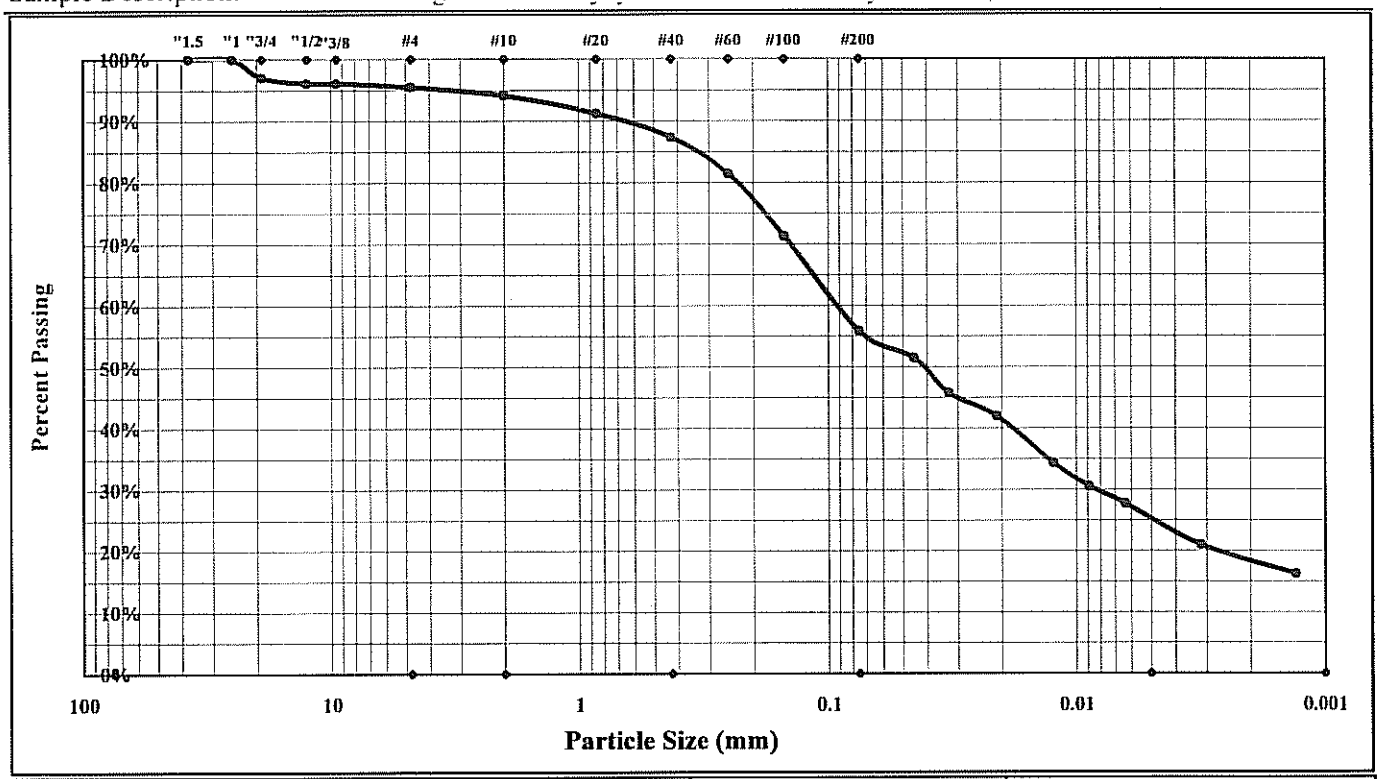
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy		
Address:	Marshall Steam Station		
Boring #:	Sample #:	Sample Date:	3/23/10
Location:	Stockpile Area Test Offset: SA-2	Elevation:	0-8'
Sample Description:	Orange Brown Clayey Coarse to Fine Sandy Silt (ML)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	4.5%	Silt	30.9%
Silt & Clay (% Passing #200):	55.9%	Total Sand:	39.6%	Clay	25.0%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	15.5%
Liquid Limit	47	Plastic Limit	33	Plastic Index	14
Coarse Sand:	1.4%	Medium Sand:	6.8%	Fine Sand:	31.4%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/20/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	5/12-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

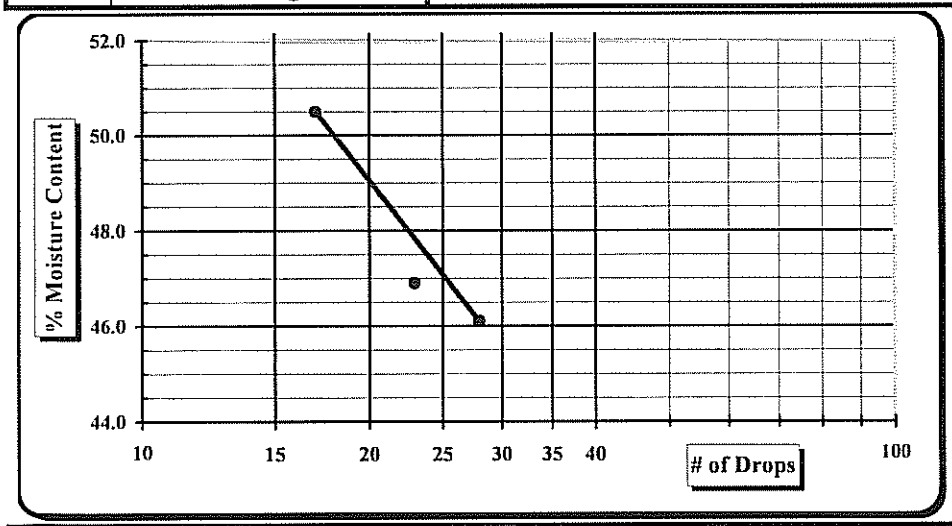
Boring #: Sample #: SA-2 Sample Date: 3/23/10

Location: Stockpile Area Test Pits Offset: Elevation: 0-8'

Sample Description: Orange Brown Clayey Coarse to Fine Sandy Silt (ML)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	57	6	55				OO	25	
A	Tare Weight	13.87	14.01	14.31				16.32	14.32	
B	Wet Soil Weight + A	24.67	23.59	23.10				23.56	20.58	
C	Dry Soil Weight + A	21.26	20.53	20.15				21.75	19.01	
D	Water Weight (B-C)	3.41	3.06	2.95				1.81	1.57	
E	Dry Soil Weight (C-A)	7.39	6.52	5.84				5.43	4.69	
F	% Moisture (D/E)*100	46.1%	46.9%	50.5%				33.3%	33.5%	
N	# OF DROPS	28	23	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**33.4%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **47**
Plastic Limit **33**
Plastic Index 14
Group Symbol **ML**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

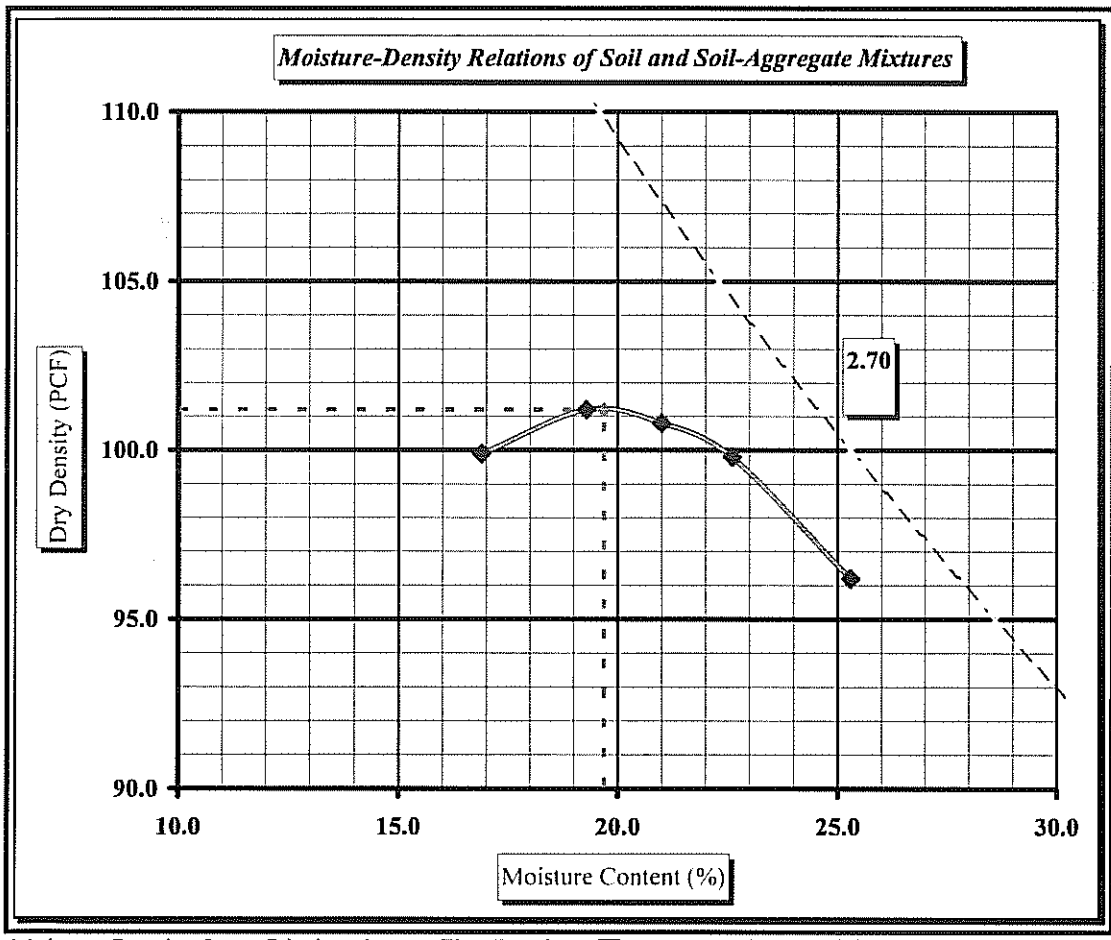
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122 Phase**	Report Date:	5/21/10
Project Name:	Marshall Steam Station	Test Date(s):	5/12-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #:		Sample #:	SA-2	Sample Date:	3/23/2010
Location:	Stockpile Area Test Pits	Offset:		Depth:	0-8'
Sample Description:	Orange Brown Clayey Coarse to Fine Sandy Silt (ML)				

Maximum Dry Density 101.2 PCF. **Optimum Moisture Content 19.7%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**47**
Plastic Limit	**33**
Plastic Index	**14**

% Passing

3/4"	97.0%
3/8"	96.1%
#4	95.5%
#10	94.1%
#40	87.3%
#60	81.4%
#200	55.9%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	1/11/5/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

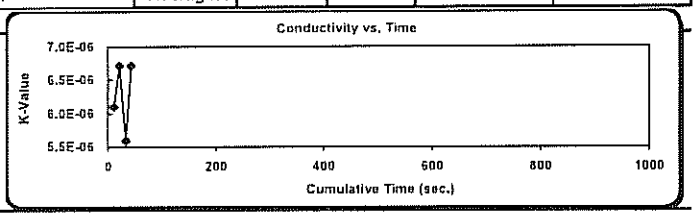
Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122-09	Test Date(s):	5/22-26/10
Project Name:	Marshall Steam Station Industrial Landfill No.1	Report Date:	5/26/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:		Panel ID:	8
Boring #:	Sample #: SA-2	Depth: 0-8'	Perm Cell ID:
Location:	Stockpile Area Test Pits	Offset:	Sample Description: Orange Brown Clayey Coarse to Fine Sandy Silt (ML)
Liquid Limit:	47	Sp. Grav. (Assumed): 2.700	Sample Type: Remolded / Log #:
Plastic Limit:	33	Plastic Index: 14	Percent Passing #200: 55.9 / Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.620	Wet Density (PCF):	116.2	Length (cm):	7.620	Wet Density (PCF):	116.2
Diameter (cm):	7.280	Dry Density (PCF):	96.2	Diameter (cm):	7.28	Dry Density (PCF):	96.2
Area (cm^2)	41.62	Percent Saturation:	82.0	Area (cm^2)	41.62	Percent Saturation:	82.0
Volume (cm^3)	317.15			Volume (cm^3)	317.15	B-Parameter:	0.96
Wet weight (grams)	600.5	Void Ratio:	0.751	Wet weight (grams)	600.5	Void Ratio:	0.751
Dry Weight (grams)	489.0	Porosity:	0.429	Dry Weight (grams)	489.0	Porosity:	0.429
Percent Moisture:	22.8			Percent Moisture:	22.8		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	82.5	Back Pressure (psi):	80.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
2:08	2:08	11	23.7	23.7	23.7	0.9162	4.60	1.89	4.20	1.89	34.1	29.0	4.47	3.81	6.66E-06	6.10E-06
2:09	2:10	10	23.7	23.7	23.7	0.9162	4.60	1.89	4.20	1.89	34.1	29.0	4.47	3.81	7.33E-06	6.72E-06
2:11	2:11	12	23.7	23.7	23.7	0.9162	4.60	1.89	4.20	1.90	34.1	28.9	4.47	3.80	6.11E-06	5.60E-06
2:11	2:12	10	23.7	23.7	23.7	0.9162	4.60	1.89	4.20	1.90	34.1	28.9	4.47	3.80	7.33E-06	6.72E-06
2:17	2:17	10	23.7	23.7	23.7	0.9162	4.60	1.89	4.20	1.90	34.1	28.9	4.47	3.80	7.33E-06	6.72E-06
												Averages:	4.47	3.80	6.95E-06	6.4E-06

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy	Address:	Marshall Steam Station
Boring #:		Sample #: SA-3	Sample Date: 3/23/10
Location:	Stockpile Area Test Pits	Offset:	Elevation: 0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.700**	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	420.84			Tare #	55		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	420.84	A		Tare Wt.	14.37		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.02	B		Wet Wt. + A	24.48		1/2"	0.0		100.0%
Total Sample Oven Dried:	412.79	C		Dry Wt. + A	24.28		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):	49.03	D		Water Wt. (B-C)	0.20		#4	4.9		98.8%
% Passing #10:	96.6%	E		Dry Wt. (C-A)	9.91		#10	13.9	100.0%	96.6%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	2.02%		#20	1.8	96.4%	93.2%
							#40	3.7	92.6%	89.4%
							#60	6.6	86.5%	83.6%
							#100	12.0	75.6%	73.0%
							#200	18.0	63.4%	61.2%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 20455 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
			Control Cylinder	Composite Correction		P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10			D = K x ((L/T)$^{1/2}$
T (Min.)	(0.5 °C)	Reading			R			L	K	
1	22.0	33.0	4.0		29.00	58.6%	56.6%	11.5	0.01312	0.04458
2	22.0	31.5	4.0		27.50	55.5%	53.7%	11.8	0.01312	0.03185
5	22.0	28.0	4.0		24.00	48.5%	46.8%	12.4	0.01312	0.02063
15	22.0	25.0	4.0		21.00	42.4%	41.0%	12.9	0.01312	0.01215
30	22.0	23.0	4.0		19.00	38.4%	37.1%	13.2	0.01312	0.00870
60	22.0	21.5	4.0		17.50	35.3%	34.1%	13.4	0.01312	0.00621
250	22.0	19.0	4.0		15.00	30.3%	29.3%	13.8	0.01312	0.00309
1440	23.0	15.0	4.0		11.00	22.2%	21.5%	14.5	0.01297	0.00130

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

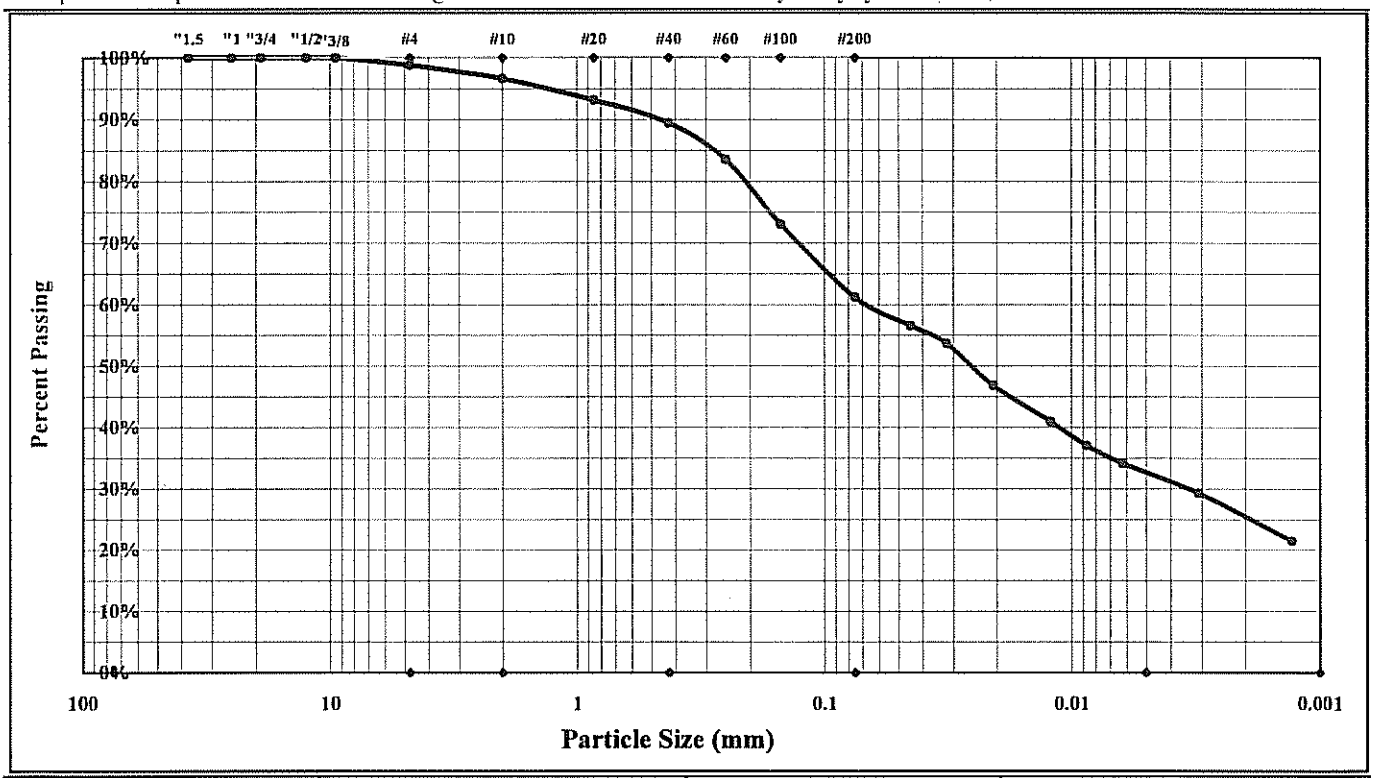
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy		
Address:	Marshall Steam Station		
Boring #:	Sample #: SA-3	Sample Date:	3/23/10
Location:	Stockpile Area Test Offset:	Elevation:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	1.2%	Silt	28.2%
Silt & Clay (% Passing #200):	61.2%	Total Sand:	37.6%	Clay	33.0%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	20.0%
Liquid Limit	50	Plastic Limit	30	Plastic Index	20
Coarse Sand:	2.2%	Medium Sand:	7.2%	Fine Sand:	28.2%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/20/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	5/12-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

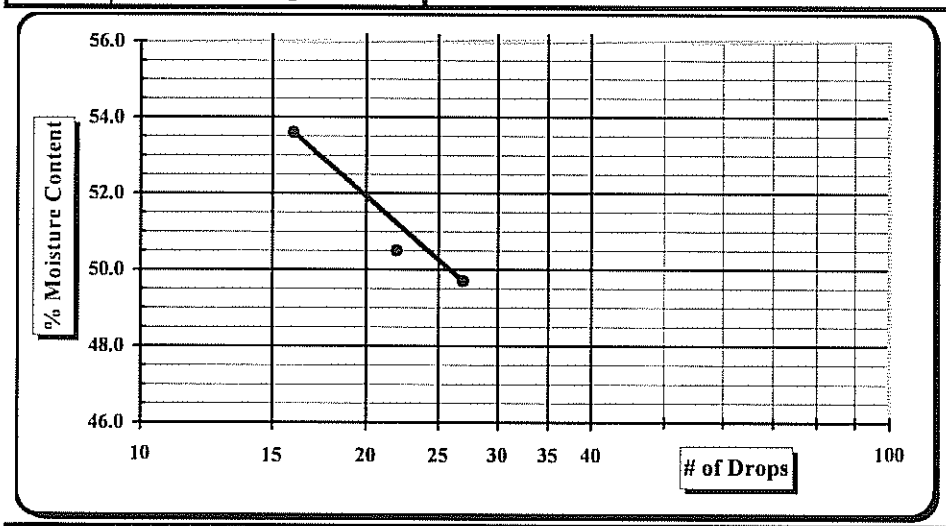
Boring #: Sample #: SA-3 Sample Date: 3/23/10

Location: Stockpile Area Test Pits Offset: Elevation: 0-8'

Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	42	FGD	II				5	KK	
A	Tare Weight	13.97	15.98	16.91				15.70	16.06	
B	Wet Soil Weight + A	22.70	24.24	25.85				21.85	22.05	
C	Dry Soil Weight + A	19.80	21.47	22.73				20.44	20.68	
D	Water Weight (B-C)	2.90	2.77	3.12				1.41	1.37	
E	Dry Soil Weight (C-A)	5.83	5.49	5.82				4.74	4.62	
F	% Moisture (D/E)*100	49.7%	50.5%	53.6%				29.7%	29.7%	
N	# OF DROPS	27	22	16				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**29.7%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **50**
Plastic Limit **30**
Plastic Index 20
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

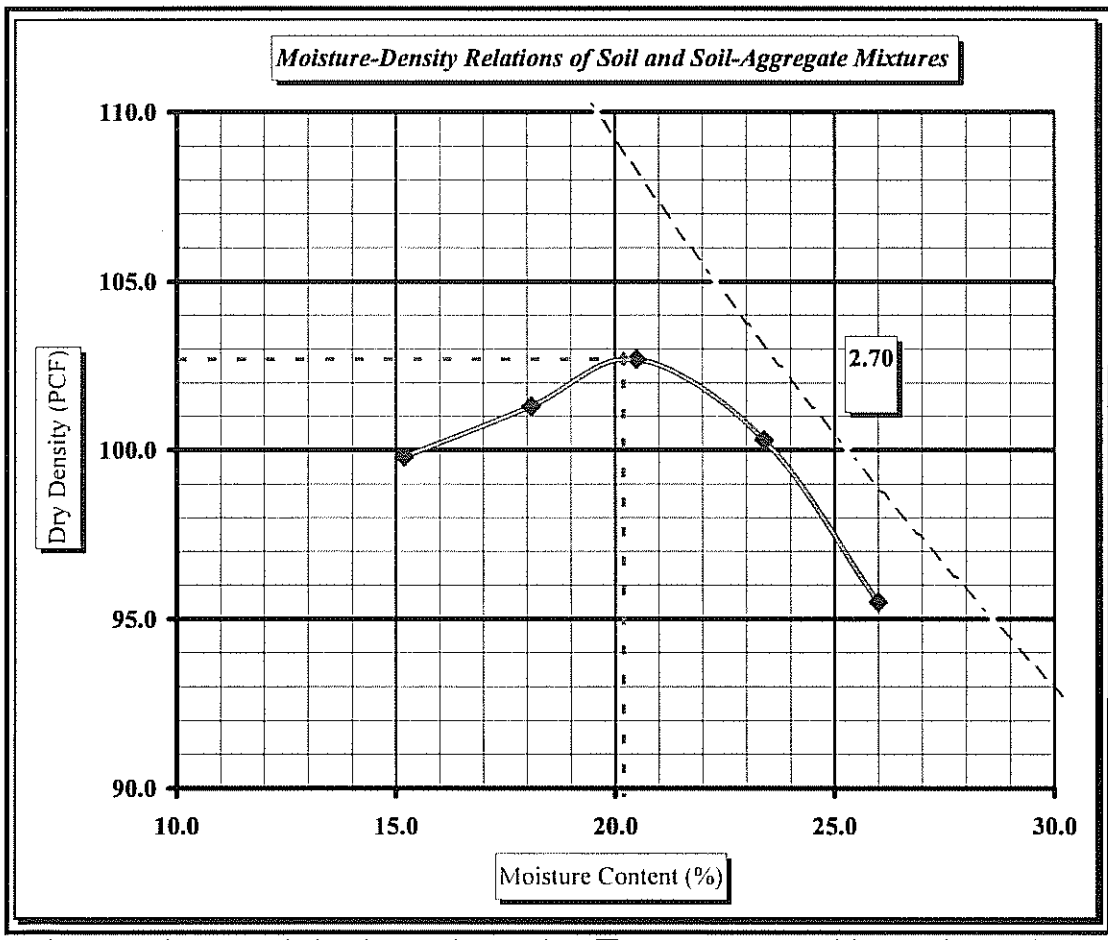
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122 Phase**	Report Date:	5/19/10
Project Name:	Marshall Steam Station	Test Date(s):	5/12-19/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: SA-3	Sample Date:	3/23/2010
Location:	Stockpile Area Test Pits Offset:	Depth:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		

Maximum Dry Density 102.7 PCF. **Optimum Moisture Content 20.2%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**50**
Plastic Limit	**30**
Plastic Index	**20**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	98.8%
#10	96.6%
#40	89.4%
#60	83.6%
#200	61.2%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122-09	Test Date(s):	5/22-28/10
Project Name:	Marshall Steam Station Industrial Landfill No.1	Report Date:	5/28/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:		Panel ID:	11

Boring #: Sample #: SA-3 Depth: 0-8' Perm Cell ID:

Location: Stockpile Area Test Pits Offset: Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)

Liquid Limit: 50 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 30 Plastic Index: 20 Percent Passing #200: 61.2 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.699	Wet Density (PCF):	120.0	Length (cm):	7.699	Wet Density (PCF):	120.0
Diameter (cm):	7.269	Dry Density (PCF):	96.1	Diameter (cm):	7.27	Dry Density (PCF):	96.1
Area (cm^2)	41.50	Percent Saturation:	84.0	Area (cm^2)	41.51	Percent Saturation:	83.9
Volume (cm^3)	319.53			Volume (cm^3)	319.57	B-Parameter:	0.94
Wet weight (grams)	614.5	Void Ratio:	0.717	Wet weight (grams)	614.5	Void Ratio:	0.717
Dry Weight (grams)	502.5	Porosity:	0.418	Dry Weight (grams)	502.5	Porosity:	0.418
Percent Moisture:	22.3			Percent Moisture:	22.3		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Dealred Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	82.5	Back Pressure (psi):	80.0	a_{out} (cm^2)	0.76712

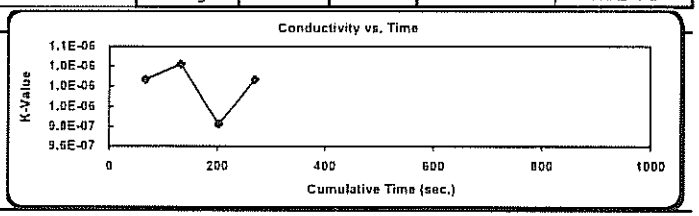
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
2:04	2:05	67	23.4	23.4	23.4	0.9225	4.60	1.90	4.20	1.90	33.9	28.9	4.41	3.76	1.11E-06	1.03E-06
2:06	2:07	66	23.4	23.4	23.4	0.9225	4.60	1.90	4.20	1.90	33.9	28.9	4.41	3.76	1.13E-06	1.04E-06
2:10	2:11	70	23.4	23.4	23.4	0.9225	4.60	1.90	4.20	1.90	33.9	28.9	4.41	3.76	1.07E-06	9.83E-07
2:14	2:15	67	23.4	23.4	23.4	0.9225	4.60	1.90	4.20	1.90	33.9	28.9	4.41	3.76	1.11E-06	1.03E-06
												Averages:	4.41	3.76	1.11E-06	1.0E-06

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy	Address:	Marshall Steam Station
Boring #:		Sample #:	SB-1
Sample Date:	3/23/10		
Location:	Stockpile Area Test Pits	Offset:	
Elevation:	0-8'		
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.700**	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	428.40			Tare #	16		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	428.40	A		Tare Wt.	15.71		3/4"	31.3		92.5%
Weight of Air Dried Hydrometer Sample (g):	50.01	B		Wet Wt. + A	26.25		1/2"	31.3		92.5%
Total Sample Oven Dried:	418.97	C		Dry Wt. + A	25.99		3/8"	31.3	Soil Mortar	92.5%
Hydrometer Sample Oven Dried (W):	48.78	D		Water Wt. (B-C)	0.26		#4	38.1		90.9%
% Passing #10:	89.0%	E		Dry Wt. (C-A)	10.28		#10	46.3	100.0%	89.0%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	2.53%		#20	1.8	96.4%	85.8%
							#40	3.8	92.3%	82.1%
							#60	6.6	86.4%	76.9%
							#100	10.7	78.0%	69.4%
							#200	16.8	65.5%	58.3%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 20455 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **26.25** **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	22.0	35.0	4.0		31.00	62.9%	56.0%	11.2	0.01312	0.04394
2	22.0	33.0	4.0		29.00	58.9%	52.4%	11.5	0.01312	0.03152
5	22.0	30.0	4.0		26.00	52.8%	46.9%	12.0	0.01312	0.02036
15	22.0	27.5	4.0		23.50	47.7%	42.4%	12.4	0.01312	0.01195
30	22.0	26.0	4.0		22.00	44.7%	39.7%	12.7	0.01312	0.00853
60	22.0	24.0	4.0		20.00	40.6%	36.1%	13.0	0.01312	0.00611
250	22.0	22.0	4.0		18.00	36.5%	32.5%	13.3	0.01312	0.00303
1440	23.0	20.0	4.0		16.00	32.5%	28.9%	13.7	0.01297	0.00126

References / Comments / Deviations 16

15.71

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

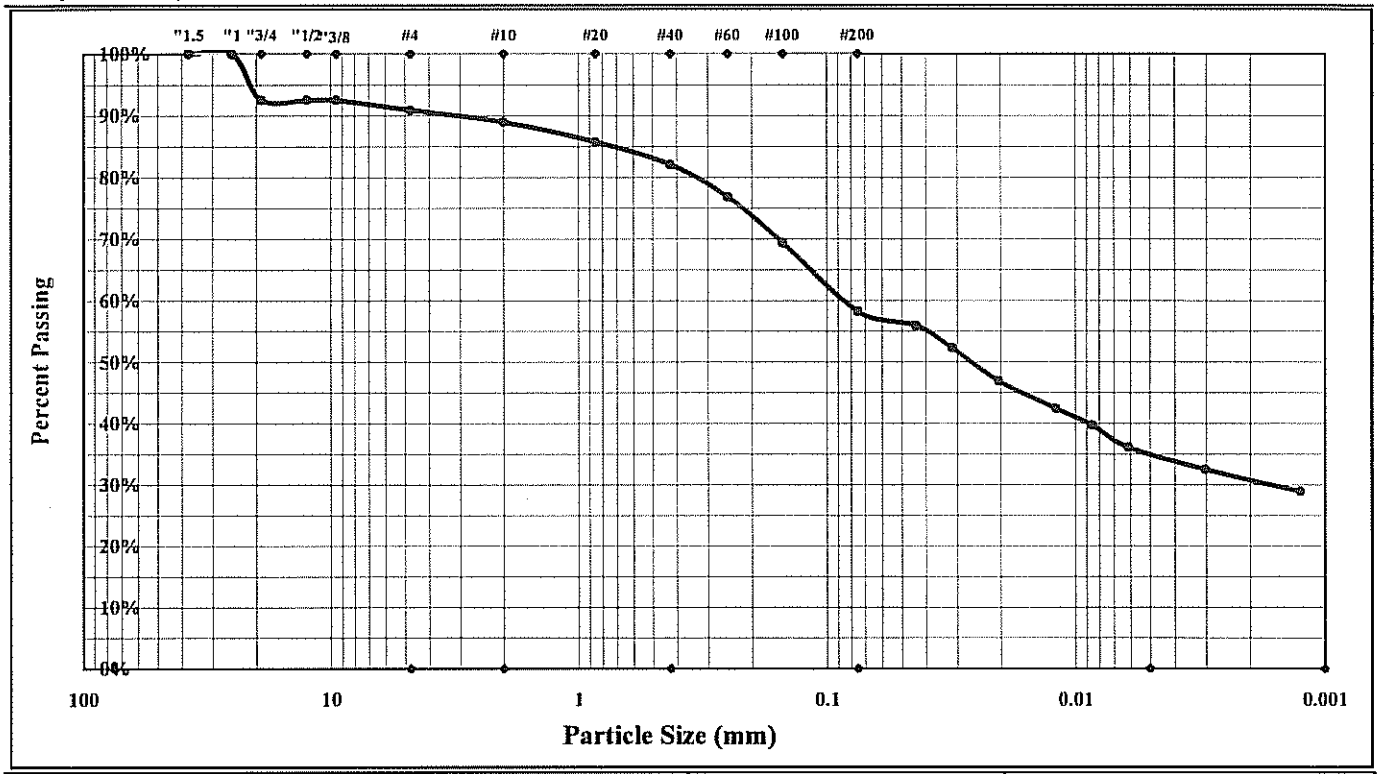
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy		
Address:	Marshall Steam Station		
Boring #:	Sample #: SB-1	Sample Date:	3/23/10
Location:	Stockpile Area Test Offset:	Elevation:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	9.1%	Silt	23.3%
Silt & Clay (% Passing #200):	58.3%	Total Sand:	32.6%	Clay	35.0%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	29.0%
Liquid Limit	58	Plastic Limit	29	Plastic Index	29
Coarse Sand:	2.0%	Medium Sand:	6.9%	Fine Sand:	23.8%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

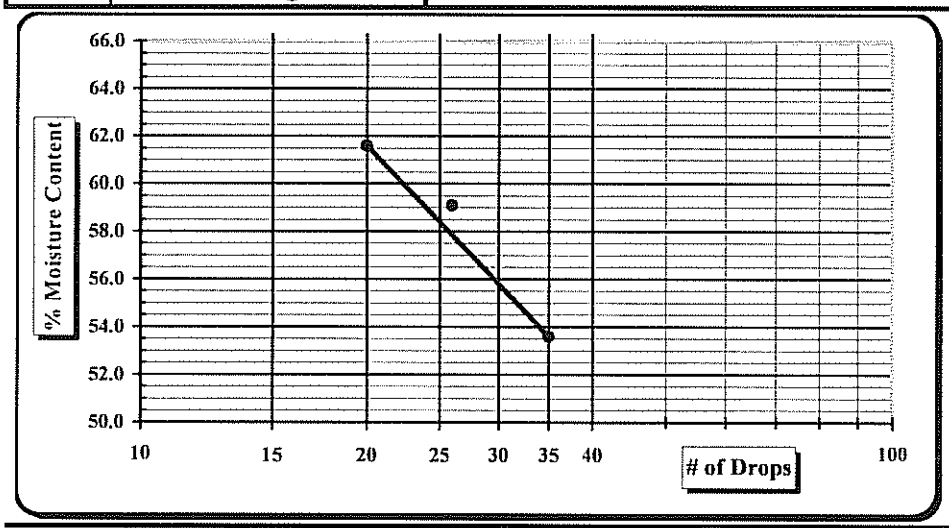
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/21/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	5/12-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #: Sample #: SB-1 Sample Date: 3/23/10
Location: Stockpile Area Test Pits Offset: Elevation: 0-8'
Sample Description: Orange Brown Coarse to Fine Sandy Clay (CH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	51	OO	QQ				KK	WN	
A	Tare Weight	15.74	16.30	16.86				16.06	16.60	
B	Wet Soil Weight + A	25.17	25.21	25.65				23.15	22.70	
C	Dry Soil Weight + A	21.88	21.90	22.30				21.55	21.36	
D	Water Weight (B-C)	3.29	3.31	3.35				1.60	1.34	
E	Dry Soil Weight (C-A)	6.14	5.60	5.44				5.49	4.76	
F	% Moisture (D/E)*100	53.6%	59.1%	61.6%				29.1%	28.2%	
N	# OF DROPS	35	26	20				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**28.7%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **58**
Plastic Limit **29**
Plastic Index 29
Group Symbol **CH**
Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

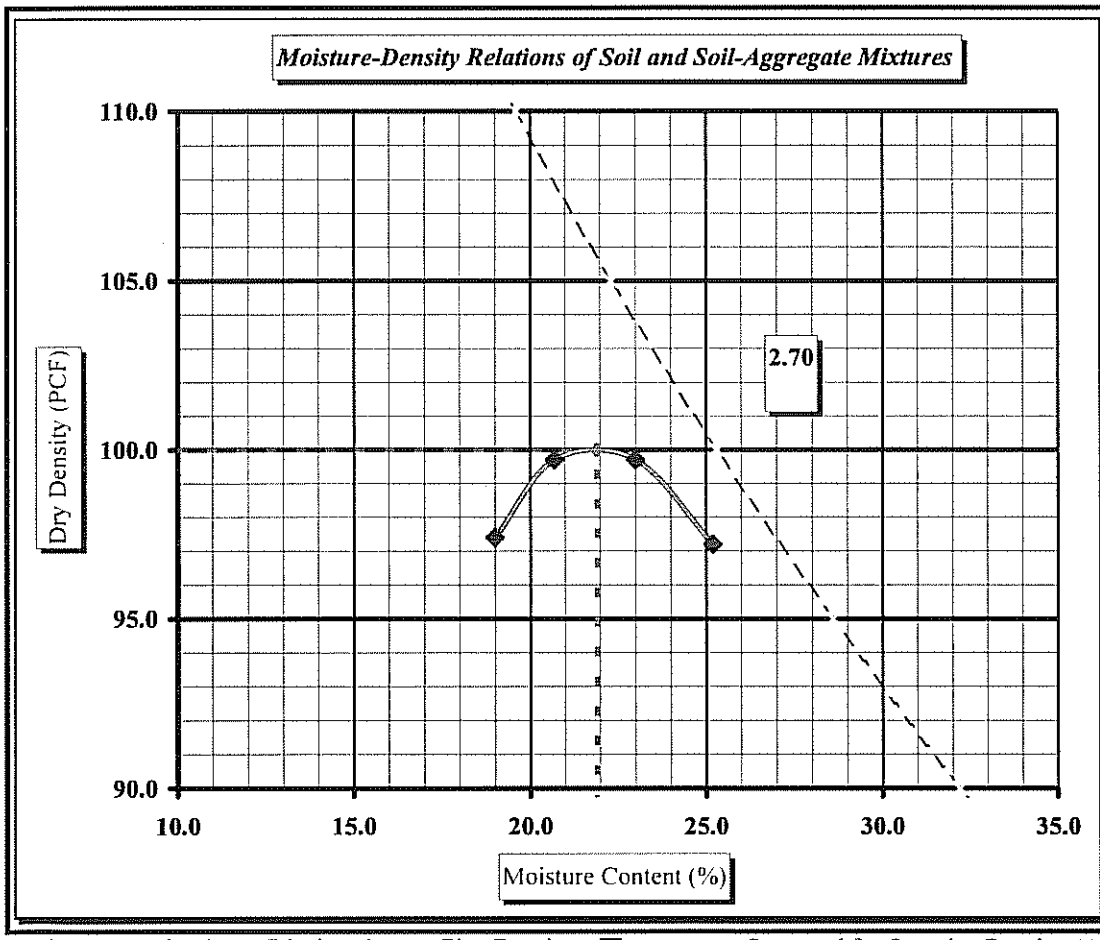
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122 Phase**	Report Date:	5/21/10
Project Name:	Marshall Steam Station	Test Date(s):	5/12-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: SB-1	Sample Date:	3/23/2010
Location:	Stockpile Area Test Pits Offset:	Depth:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		

Maximum Dry Density 100.0 PCF. **Optimum Moisture Content 21.9%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**58**
Plastic Limit	**29**
Plastic Index	**29**

% Passing

3/4"	92.5%
3/8"	92.5%
#4	90.9%
#10	89.0%
#40	82.1%
#60	76.9%
#200	58.3%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	6/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Laboratory Record Version 4.1

S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122-09	Test Date(s):	5/22-25/10
Project Name:	Marshall Steam Station Industrial Landfill No.1	Report Date:	5/25/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:		Panel ID:	10

Boring #: Sample #: SB-1 Depth: 0-8' Perm Cell ID:

Location: Stockpile Area Test Pits Offset: Sample Description: Orange Brown Coarse to Fine Sandy Silty Clay (MH)

Liquid Limit: 58 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 29 Plastic Index: 29 Percent Passing #200: 58.3 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.698	Wet Density (PCF):	117.0	Length (cm):	7.698	Wet Density (PCF):	117.0
Diameter (cm):	7.278	Dry Density (PCF):	94.5	Diameter (cm):	7.28	Dry Density (PCF):	94.5
Area (cm^2)	41.60	Percent Saturation:	82.1	Area (cm^2)	41.60	Percent Saturation:	82.1
Volume (cm^3)	320.24			Volume (cm^3)	320.26	B-Parameter:	0.95
Wet weight (grams)	600.4	Void Ratio:	0.783	Wet weight (grams)	600.4	Void Ratio:	0.783
Dry Weight (grams)	485.0	Porosity:	0.439	Dry Weight (grams)	485.0	Porosity:	0.439
Percent Moisture:	23.8			Percent Moisture:	23.8		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	82.5	Back Pressure (psi):	80.0	a_{out} (cm^2)	0.76712

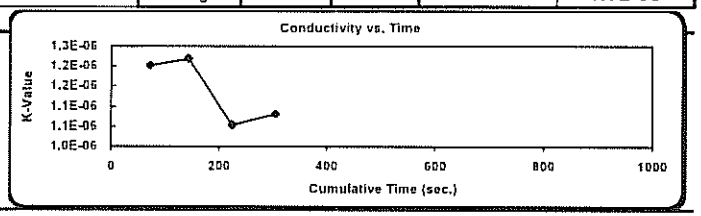
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
5:50	5:51	72	24.0	24.0	24.0	0.9098	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	1.32E-06	1.20E-06
5:54	5:55	71	24.0	24.0	24.0	0.9098	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	1.34E-06	1.22E-06
5:59	6:00	82	24.0	24.1	24.1	0.9088	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	1.16E-06	1.05E-06
6:09	6:11	80	24.0	24.0	24.0	0.9098	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	1.19E-06	1.08E-06
6:14	6:15	62	24.0	24.0	24.0	0.9098	4.60	1.90	4.10	1.90	33.9	27.7	4.41	3.59	1.16E-06	1.06E-06
												Averages:	4.41	3.59	1.23E-06	1.1E-06

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	**1356-08-122 Phase 09**	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy	Address:	Marshall Steam Station
Boring #:		Sample #:	SB-2
Sample Date:	3/23/10		
Location:	Stockpile Area Test Pits	Offset:	
Elevation:	0-8'		
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.700**	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	349.55			Tare #	57		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	349.55	A		Tare Wt.	13.87		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.40	B		Wet Wt. + A	25.48		1/2"	16.1		95.3%
Total Sample Oven Dried:	341.86	C		Dry Wt. + A	25.21		3/8"	16.1	Soil Mortar	95.3%
Hydrometer Sample Oven Dried (W):	49.23	D		Water Wt. (B-C)	0.27		#4	16.7		95.1%
% Passing #10:	94.5%	E		Dry Wt. (C-A)	11.34		#10	18.8	100.0%	94.5%
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	2.38%		#20	1.6	96.7%	91.4%
							#40	3.9	92.1%	87.0%
							#60	6.9	86.0%	81.3%
							#100	11.0	77.7%	73.4%
							#200	16.0	67.5%	63.8%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 20455 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time	Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
			Control Cylinder	Composite Correction		P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10			D = K x ((L/T)$^{1/2}$
T (Min.)	(0.5 °C)	Reading			R			L	K	
1	22.0	36.0	4.0		32.00	64.4%	60.8%	11.0	0.01312	0.04362
2	22.0	34.0	4.0		30.00	60.3%	57.0%	11.4	0.01312	0.03130
5	22.0	32.0	4.0		28.00	56.3%	53.2%	11.7	0.01312	0.02008
15	22.0	29.5	4.0		25.50	51.3%	48.5%	12.1	0.01312	0.01179
30	22.0	27.0	4.0		23.00	46.3%	43.7%	12.5	0.01312	0.00848
60	22.0	26.0	4.0		22.00	44.2%	41.8%	12.7	0.01312	0.00603
250	22.0	23.0	4.0		19.00	38.2%	36.1%	13.2	0.01312	0.00301
1440	23.0	20.5	4.0		16.50	33.2%	31.4%	13.6	0.01297	0.00126

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

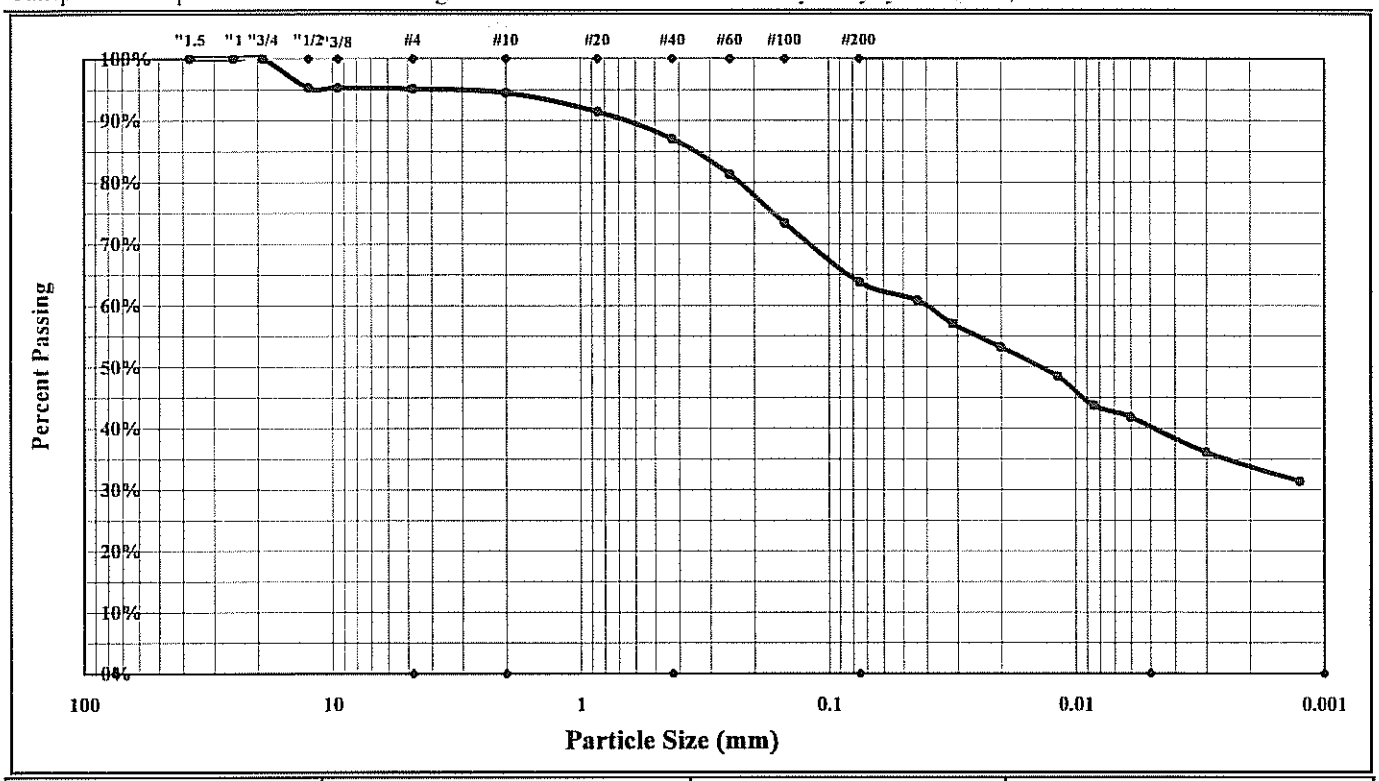
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy		
Address:	Marshall Steam Station		
Boring #:	Sample #: SB-2	Sample Date:	3/23/10
Location:	Stockpile Area Test Offset:	Elevation:	0-8'
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	4.9%	Silt	23.8%
Silt & Clay (% Passing #200):	63.8%	Total Sand:	31.3%	Clay	40.0%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	36.0%
Liquid Limit	63	Plastic Limit	33	Plastic Index	30
Coarse Sand:	0.6%	Medium Sand:	7.5%	Fine Sand:	23.2%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — **Dispersion Period:** 1 min. **Dispersing Agent:** Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/21/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	5/12-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

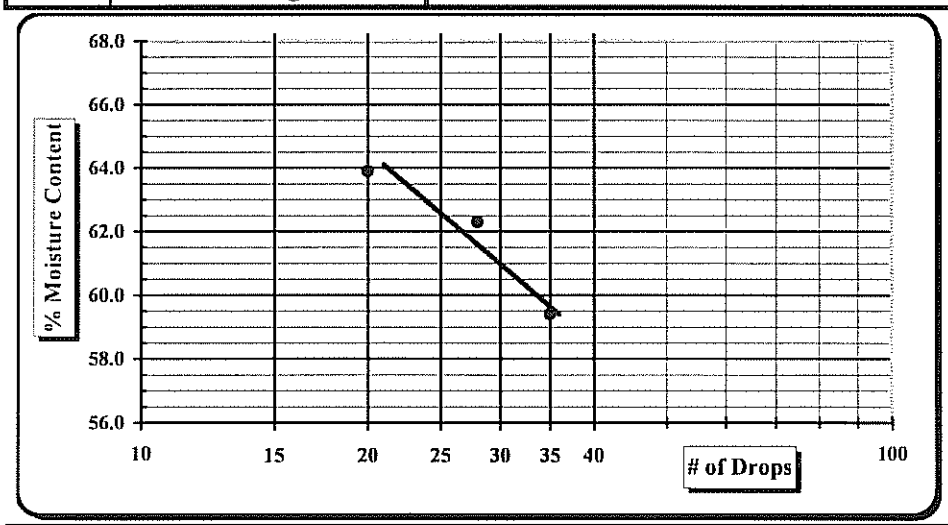
Boring #: Sample #: SB-2 Sample Date: 3/23/10

Location: Stockpile Area Test Pits Offset: Elevation: 0-8'

Sample Description: Orange Brown Medium to Fine Sandy Clayey Silt (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	36	XW	52				6	Z	
A	Tare Weight	15.67	15.29	15.73				14.84	16.90	
B	Wet Soil Weight + A	24.26	22.77	22.63				20.37	22.26	
C	Dry Soil Weight + A	21.06	19.90	19.94				18.78	20.93	
D	Water Weight (B-C)	3.20	2.87	2.69				1.59	1.33	
E	Dry Soil Weight (C-A)	5.39	4.61	4.21				4.74	4.03	
F	% Moisture (D/E)*100	59.4%	62.3%	63.9%				33.5%	33.0%	
N	# OF DROPS	35	28	20				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**33.3%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **63**
Plastic Limit **33**
Plastic Index 30
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

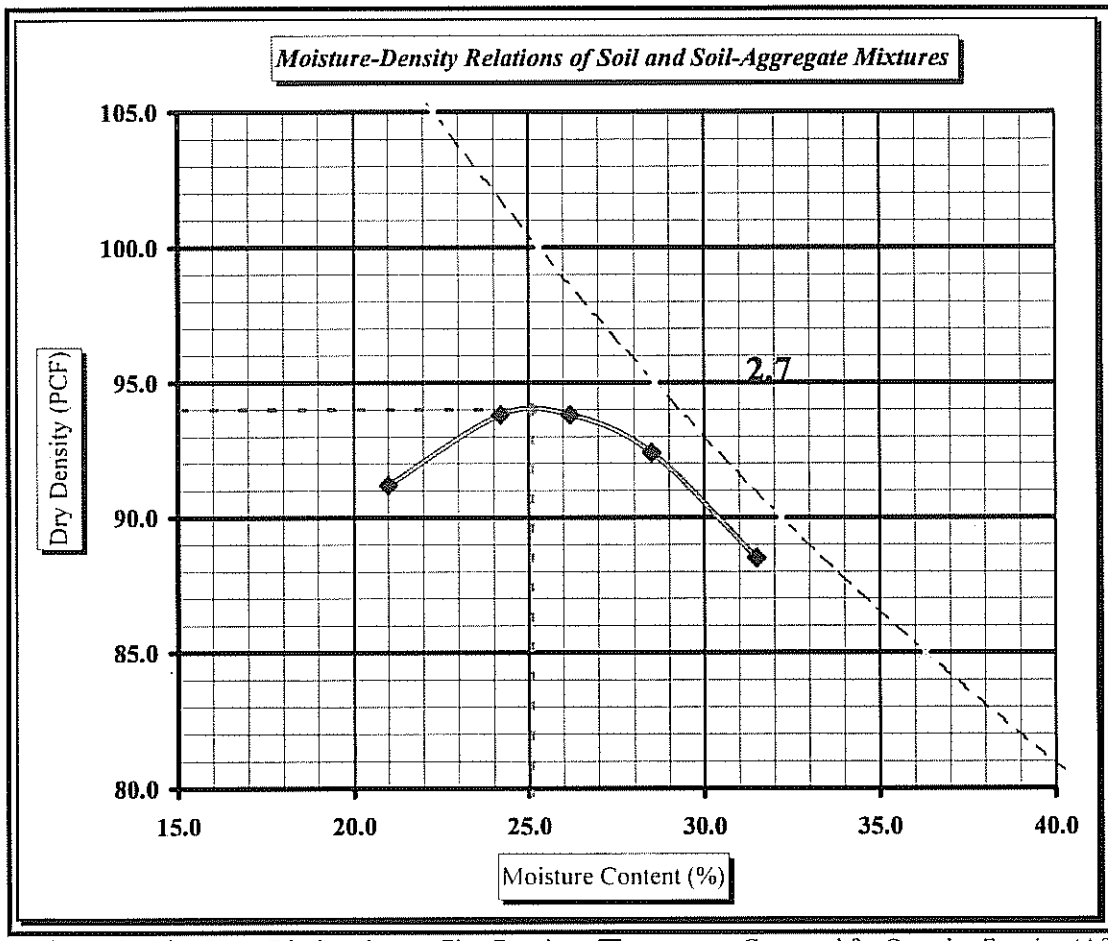
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122 Phase**	Report Date:	5/21/10
Project Name:	Marshall Steam Station	Test Date(s):	5/12-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: SB-2	Sample Date:	3/23/2010
Location:	Stockpile Area Test Pits Offset:	Depth:	0-8'
Sample Description:	Orange Brown Medium to Fine Sandy Clayey Silt (MH)		

Maximum Dry Density 94.0 PCF. **Optimum Moisture Content 25.1%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**63**
Plastic Limit	**33**
Plastic Index	**30**

% Passing

3/4"	100.0%
3/8"	95.3%
#4	95.1%
#10	94.5%
#40	87.0%
#60	81.3%
#200	63.8%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/14/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122 Phase 09	Test Date(s):	5/22-24/10
Project Name:	Marshall Steam Station Industrial Landfill No.1	Report Date:	5/24/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:		Panel ID:	11
Boring #:	Sample #: SB-2 Depth: 0-8'	Perm Cell ID:	
Location:	Stockpile Area Test Pits Offset: Sample Description: Orange Brown Medium to Fine Sandy Clayey Silt (MH)		
Liquid Limit:	63 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded	Log #:	
Plastic Limit:	33 Plastic Index: 30 Percent Passing #200: 63.8	Maximum Particle Size:	

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.620	Wet Density (PCF):	113.9	Length (cm):	7.620	Wet Density (PCF):	113.9
Diameter (cm):	7.280	Dry Density (PCF):	89.9	Diameter (cm):	7.28	Dry Density (PCF):	89.9
Area (cm^2)	41.62	Percent Saturation:	82.6	Area (cm^2)	41.62	Percent Saturation:	82.6
Volume (cm^3)	317.15			Volume (cm^3)	317.15	B-Parameter:	0.97
Wet weight (grams)	578.9	Void Ratio:	0.876	Wet weight (grams)	578.9	Void Ratio:	0.876
Dry Weight (grams)	456.5	Porosity:	0.467	Dry Weight (grams)	456.5	Porosity:	0.467
Percent Moisture:	26.8			Percent Moisture:	26.8		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	72.5	Back Pressure (psi):	70.0	a_{out} (cm^2)	0.76712

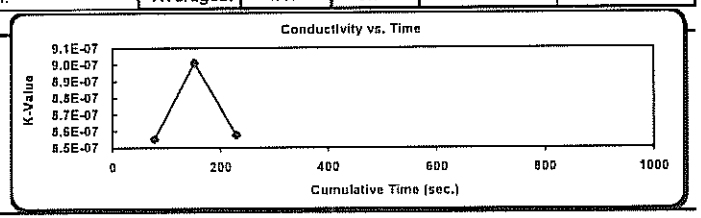
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
2:08	2:09	78	24.0	24.0	24.0	0.9098	4.60	1.89	4.20	1.90	34.1	28.9	4.47	3.80	9.40E-07	8.55E-07
2:12	2:13	74	24.0	24.0	24.0	0.9098	4.60	1.89	4.20	1.90	34.1	28.9	4.47	3.80	9.91E-07	9.01E-07
2:16	2:18	78	24.0	24.1	24.1	0.9088	4.60	1.90	4.20	1.90	33.9	28.9	4.46	3.80	9.44E-07	8.57E-07
												Averages:	4.47	3.80	9.58E-07	8.7E-07

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy	Address:	Marshall Steam Station
Boring #:		Sample #:	SB-3
Sample Date:	3/23/10		
Location:	Stockpile Area Test Pits	Offset:	
Elevation:	0-8'		
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		

Pan #:		Beaker #:		Apparent Relative Density (Assumed)		2.700		Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:								3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				Moisture Content	Hygroscopic	Natural		1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	293.19			Tare #	51			1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	293.19	A	Tare Wt.	15.77				3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.03	B	Wet Wt. + A	25.83				1/2"	0.0		100.0%
Total Sample Oven Dried:	286.62	C	Dry Wt. + A	25.60				3/8"	1.0	Soil Mortar	99.6%
Hydrometer Sample Oven Dried (W):	48.89	D	Water Wt. (B-C)	0.23				#4	2.4		99.2%
% Passing #10:	97.9%	E	Dry Wt. (C-A)	9.83				#10	6.0	100.0%	97.9%
Correction Factor a (Table 1):	0.99		% Moisture (100 x D/E)	2.34%				#20	1.9	96.2%	94.1%
								#40	3.8	92.2%	90.2%
								#60	6.7	86.4%	84.6%
								#100	11.9	75.7%	74.1%
								#200	18.2	62.8%	61.5%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 20455 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)$^{1/2}$
1	22.0	34.0	4.0		30.00	60.8%	59.5%	11.4	0.01312	0.04426
2	22.0	31.0	4.0		27.00	54.7%	53.5%	11.9	0.01312	0.03197
5	22.0	27.5	4.0		23.50	47.6%	46.6%	12.4	0.01312	0.02070
15	22.0	22.5	4.0		18.50	37.5%	36.7%	13.3	0.01312	0.01234
30	22.0	21.0	4.0		17.00	34.4%	33.7%	13.5	0.01312	0.00881
60	22.0	18.0	4.0		14.00	28.4%	27.8%	14.0	0.01312	0.00634
250	22.0	16.0	4.0		12.00	24.3%	23.8%	14.3	0.01312	0.00314
1440	23.0	12.0	4.0		8.00	16.2%	15.9%	15.0	0.01297	0.00132

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

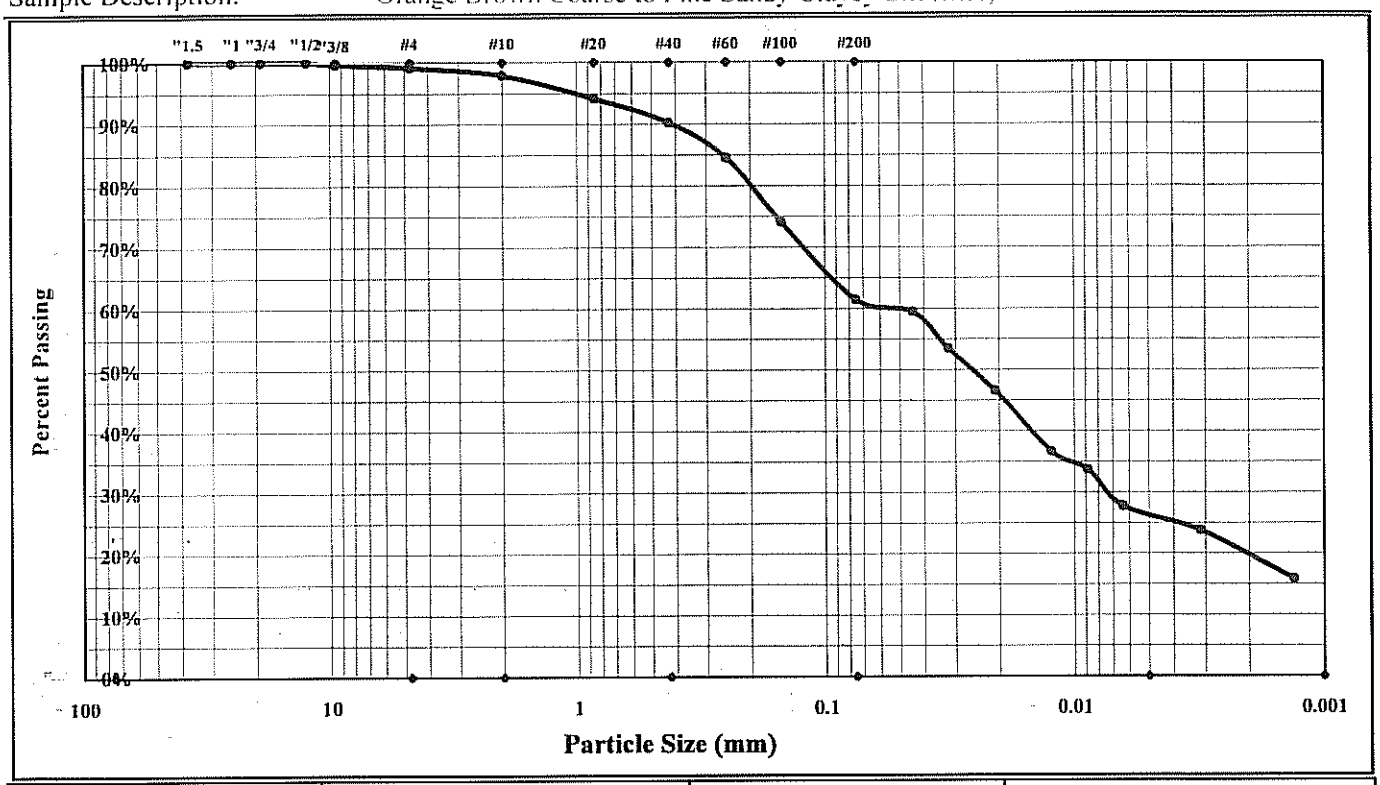
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy		
Address:	Marshall Steam Station		
Boring #:	Sample #: SB-3	Sample Date:	3/23/10
Location:	Stockpile Area Test Offset:	Elevation:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.8%	Silt	35.5%
Silt & Clay (% Passing #200):	61.5%	Total Sand:	37.6%	Clay	26.0%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	14.0%
Liquid Limit	50	Plastic Limit	35	Plastic Index	15
Coarse Sand:	1.3%	Medium Sand:	7.7%	Fine Sand:	28.7%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/20/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	5/12-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

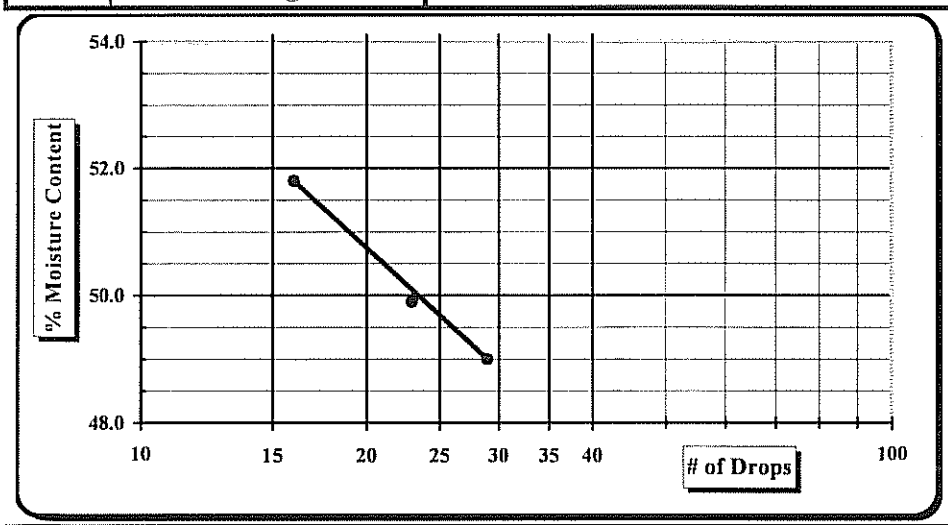
Boring #: Sample #: SB-3 Sample Date: 3/23/10

Location: Stockpile Area Test Pits Offset: Elevation: 0-8'

Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	WN	Z	36				52	QQ	
A	Tare Weight	16.57	16.87	15.67				15.73	16.88	
B	Wet Soil Weight + A	25.17	27.00	24.34				21.97	23.44	
C	Dry Soil Weight + A	22.34	23.63	21.38				20.36	21.73	
D	Water Weight (B-C)	2.83	3.37	2.96				1.61	1.71	
E	Dry Soil Weight (C-A)	5.77	6.76	5.71				4.63	4.85	
F	% Moisture (D/E)*100	49.0%	49.9%	51.8%				34.8%	35.3%	
N	# OF DROPS	29	23	16				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**35.1%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **50**
Plastic Limit **35**
Plastic Index 15
Group Symbol **MH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

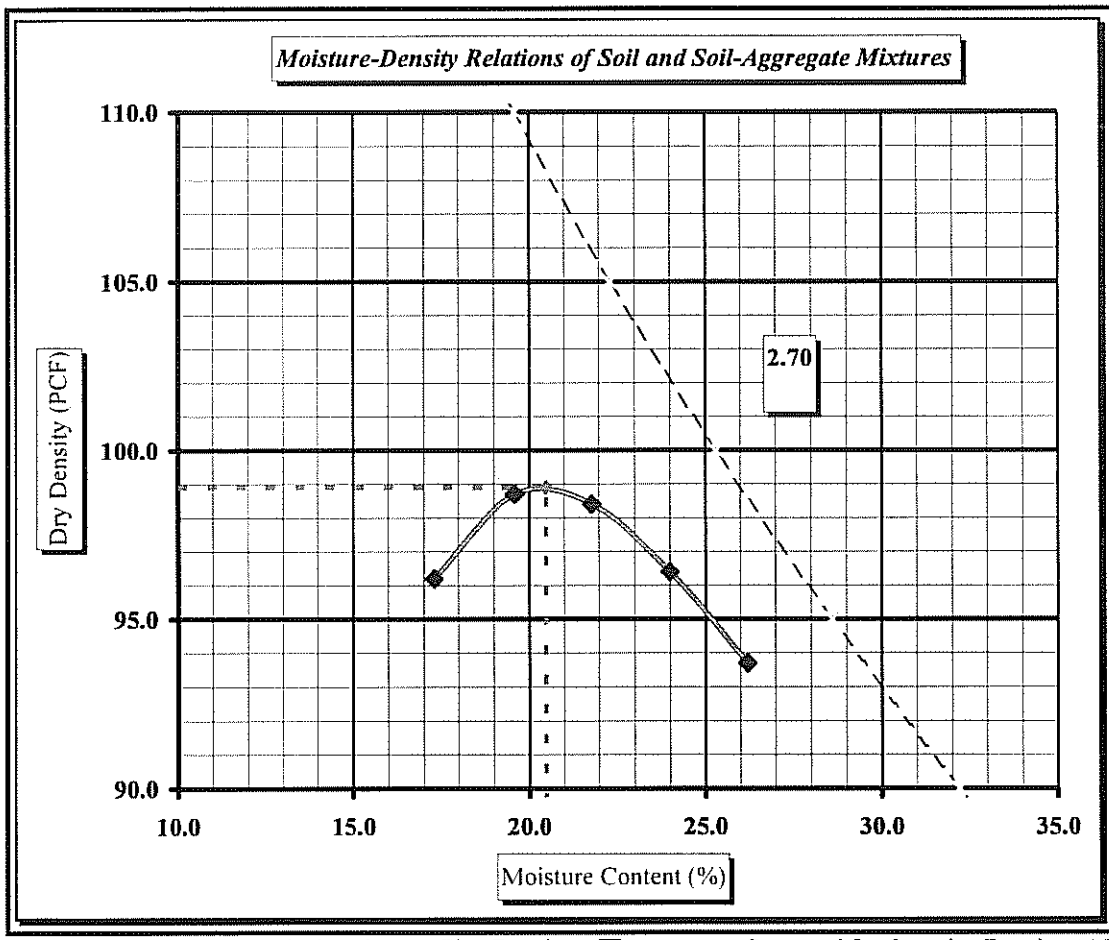
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122 Phase**	Report Date:	5/21/10
Project Name:	Marshall Steam Station	Test Date(s):	5/18-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: SB-3	Sample Date:	3/23/2010
Location:	Stockpile Area Test Pits Offset:	Depth:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		

Maximum Dry Density 98.9 PCF. **Optimum Moisture Content 20.5%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**50**
Plastic Limit	**35**
Plastic Index	**15**

% Passing

3/4"	100.0%
3/8"	99.6%
#4	99.2%
#10	97.9%
#40	90.2%
#60	84.6%
#200	61.5%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122-09	Test Date(s):	5/22-28/10
Project Name:	Marshall Steam Station Industrial Landfill No.1	Report Date:	5/28/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:		Panel ID:	7

Boring #: Sample #: SB-3 Depth: 0-8' Perm Cell ID:

Location: Stockpile Area Test Pits Offset: Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)

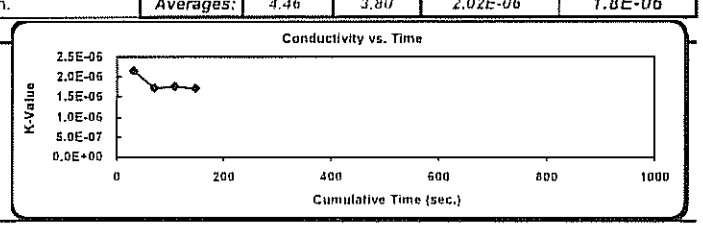
Liquid Limit: 50 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 35 Plastic Index: 15 Percent Passing #200: 61.5 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.620	Wet Density (PCF):	115.9	Length (cm):	7.620	Wet Density (PCF):	115.9
Diameter (cm):	7.275	Dry Density (PCF):	95.4	Diameter (cm):	7.27	Dry Density (PCF):	95.4
Area (cm^2)	41.56	Percent Saturation:	75.7	Area (cm^2)	41.56	Percent Saturation:	75.7
Volume (cm^3)	316.71			Volume (cm^3)	316.71	B-Parameter:	0.94
Wet weight (grams)	588.0	Void Ratio:	0.767	Wet weight (grams)	588.0	Void Ratio:	0.767
Dry Weight (grams)	484.0	Porosity:	0.434	Dry Weight (grams)	484.0	Porosity:	0.434
Percent Moisture:	21.5			Percent Moisture:	21.5		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Dealred Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	82.5	Back Pressure (psi):	80.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
11:01	11:01	31	24.1	24.1	24.1	0.9077	4.60	1.90	4.20	1.90	33.9	28.9	4.46	3.80	2.38E-06	2.16E-06
11:04	11:04	39	24.1	24.1	24.1	0.9077	4.60	1.90	4.20	1.90	33.9	28.9	4.46	3.80	1.89E-06	1.72E-06
11:06	11:06	38	24.1	24.1	24.1	0.9077	4.60	1.90	4.20	1.90	33.9	28.9	4.46	3.80	1.94E-06	1.76E-06
12:40	12:40	39	24.3	24.3	24.3	0.9036	4.60	1.90	4.20	1.90	33.9	28.9	4.46	3.80	1.89E-06	1.71E-06
												Averages:	4.46	3.80	2.02E-06	1.8E-06

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy	Address:	Marshall Steam Station
Boring #:		Sample #:	SC-1
Sample Date:	3/23/10		
Location:	Stockpile Area Test Pits	Offset:	
Elevation:	0-8'		
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		

Pan #:		Beaker #:		Apparent Relative Density (Assumed)		2.700	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):							1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	562.12						1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	562.12						3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.06						1/2"	0.0		100.0%
Total Sample Oven Dried:	550.41						3/8"	1.5	Soil Mortar	99.7%
Hydrometer Sample Oven Dried (W):	48.99						#4	5.9		98.9%
% Passing #10:	97.2%						#10	15.2	100.0%	97.2%
Correction Factor a (Table 1):	0.99						#20	1.9	96.1%	93.4%
							#40	4.7	90.5%	88.0%
							#60	8.9	81.8%	79.5%
							#100	15.1	69.2%	67.3%
							#200	20.8	57.5%	55.9%

Moisture Content			Hygroscopic	Natural
		Tare #	5	
	A	Tare Wt.	15.71	
	B	Wet Wt. + A	29.25	
	C	Dry Wt. + A	28.96	
	D	Water Wt. (B-C)	0.29	
	E	Dry Wt. (C-A)	13.25	
		% Moisture (100 x D/E)	2.19%	

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 20455 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	22.0	31.0	4.0		27.00	54.6%	53.1%	11.9	0.01312	0.04521
2	22.0	30.0	4.0		26.00	52.5%	51.1%	12.0	0.01312	0.03219
5	22.0	27.5	4.0		23.50	47.5%	46.2%	12.4	0.01312	0.02070
15	22.0	25.0	4.0		21.00	42.4%	41.3%	12.9	0.01312	0.01215
30	22.0	24.0	4.0		20.00	40.4%	39.3%	13.0	0.01312	0.00864
60	22.0	22.5	4.0		18.50	37.4%	36.4%	13.3	0.01312	0.00617
250	22.0	20.5	4.0		16.50	33.3%	32.4%	13.6	0.01312	0.00306
1440	23.0	[illegible]	4.0		14.00	28.3%	27.5%	14.0	0.01297	0.00128

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/11
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

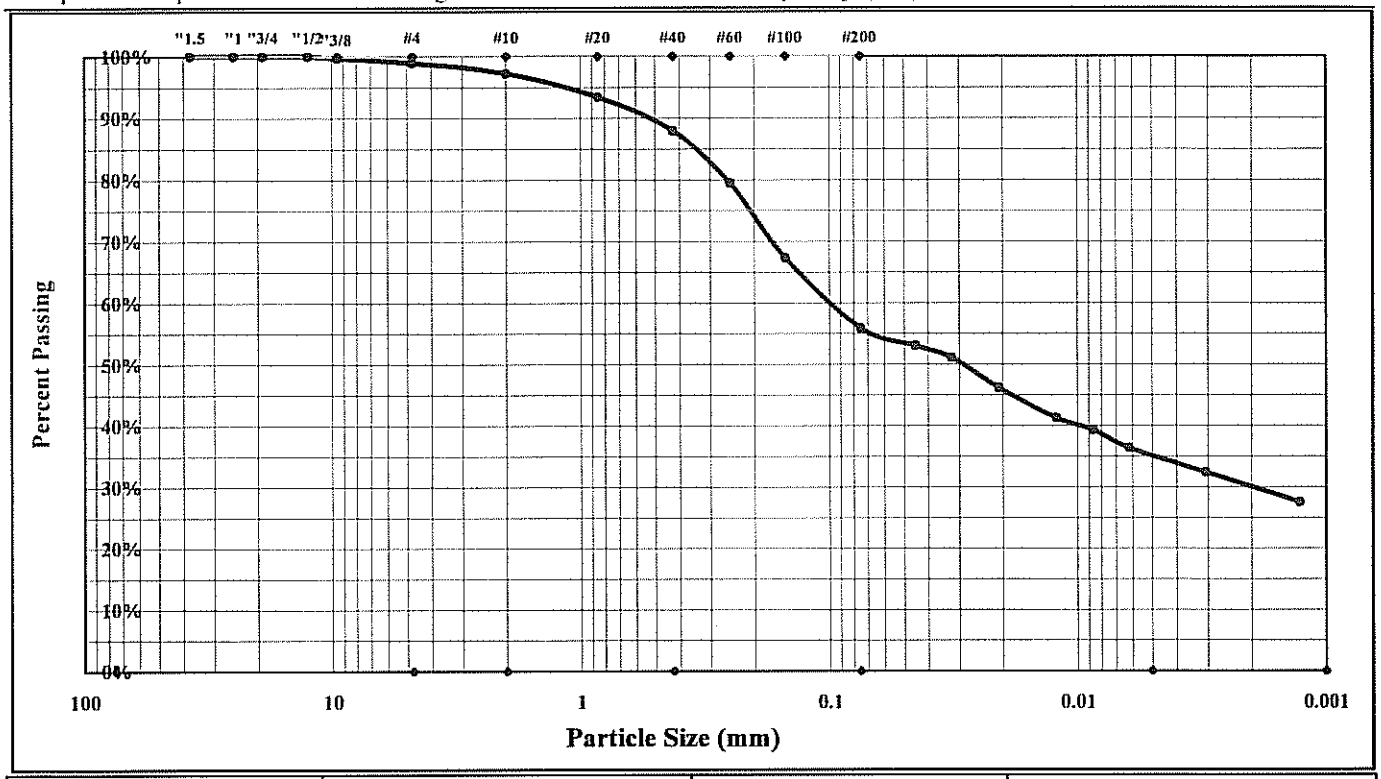
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy		
Address:	Marshall Steam Station		
Boring #:	Sample #: SC-1	Sample Date:	3/23/10
Location:	Stockpile Area Test Offset:	Elevation:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	1.1%	Silt	20.9%
Silt & Clay (% Passing #200):	55.9%	Total Sand:	43.0%	Clay	35.0%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	26.5%
Liquid Limit	53	Plastic Limit	27	Plastic Index	26
Coarse Sand:	1.7%	Medium Sand:	9.2%	Fine Sand:	32.0%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/21/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	5/12-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

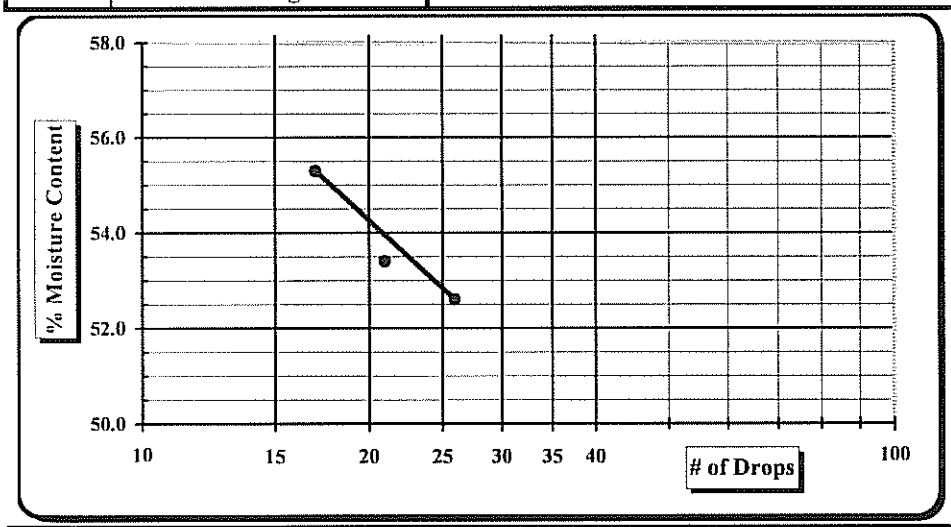
Boring #: Sample #: SC-1 Sample Date: 3/23/10

Location: Stockpile Area Test Pits Offset: Elevation: 0-8'

Sample Description: Orange Brown Coarse to Fine Sandy Clay (CH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	Y	46	10				LL	JORDI	
A	Tare Weight	15.41	13.73	13.99				16.95	15.94	
B	Wet Soil Weight + A	22.81	21.08	22.67				23.28	22.47	
C	Dry Soil Weight + A	20.26	18.52	19.58				21.94	21.08	
D	Water Weight (B-C)	2.55	2.56	3.09				1.34	1.39	
E	Dry Soil Weight (C-A)	4.85	4.79	5.59				4.99	5.14	
F	% Moisture (D/E)*100	52.6%	53.4%	55.3%				26.9%	27.0%	
N	# OF DROPS	26	21	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**27.0%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **53**
Plastic Limit **27**
Plastic Index 26
Group Symbol **CH**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

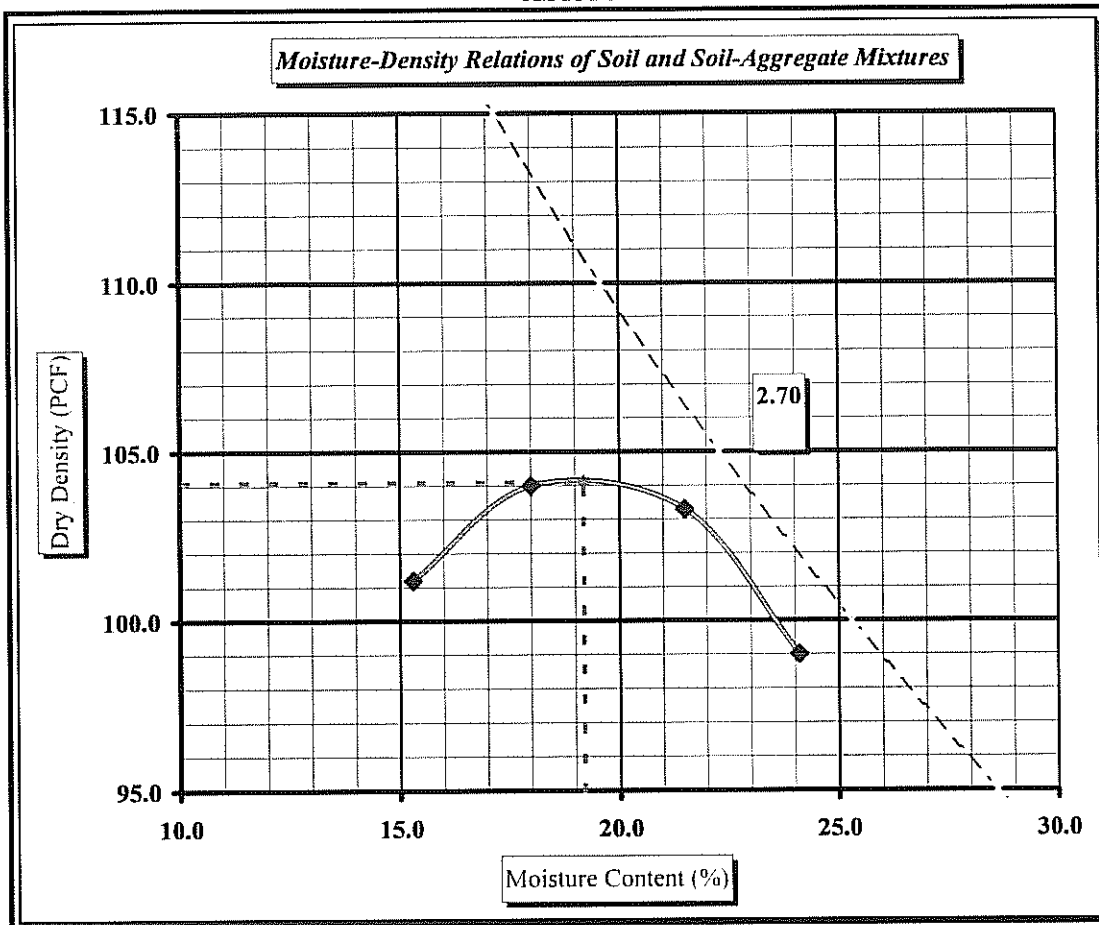
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122 Phase**	Report Date:	5/19/10
Project Name:	Marshall Steam Station	Test Date(s):	5/12-19/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: SC-1	Sample Date:	3/23/2010
Location:	Stockpile Area Test Pits Offset:	Depth:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Clay (CH)		

Maximum Dry Density 104.1 PCF. **Optimum Moisture Content 19.2%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**53**
Plastic Limit	**27**
Plastic Index	**26**

% Passing

3/4"	100.0%
3/8"	99.7%
#4	98.9%
#10	97.2%
#40	88.0%
#60	79.5%
#200	55.9%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison	Signature	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122-09	Test Date(s):	5/22-25/10
Project Name:	Marshall Steam Station Industrial Landfill No.1	Report Date:	5/25/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:		Panel ID:	11

Boring #: Sample #: SC-1 Depth: 0-8' Perm Cell ID:

Location: Stockpile Area Test Pits Offset: Sample Description: Orange Brown Coarse to Fine Sandy Clay (CH)

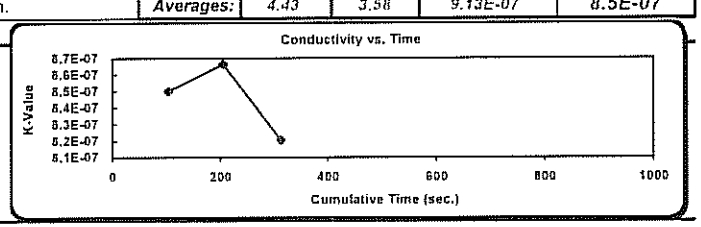
Liquid Limit: 53 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 27 Plastic Index: 26 Percent Passing #200: 55.9 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.381	Wet Density (PCF):	124.3	Length (cm):	7.381	Wet Density (PCF):	124.3
Diameter (cm):	7.269	Dry Density (PCF):	102.8	Diameter (cm):	7.27	Dry Density (PCF):	102.8
Area (cm^2)	41.49	Percent Saturation:	88.6	Area (cm^2)	41.49	Percent Saturation:	88.6
Volume (cm^3)	306.28			Volume (cm^3)	306.25	B-Parameter:	0.91
Wet weight (grams)	610.1	Void Ratio:	0.640	Wet weight (grams)	610.1	Void Ratio:	0.640
Dry Weight (grams)	504.2	Porosity:	0.390	Dry Weight (grams)	504.2	Porosity:	0.390
Percent Moisture:	21.0			Percent Moisture:	21.0		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	82.5	Back Pressure (psi):	80.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
1:18	1:19	104	23.2	23.2	23.2	0.9268	4.50	1.90	4.00	1.90	32.7	26.4	4.43	3.58	9.17E-07	8.50E-07
1:25	1:27	102	23.2	23.2	23.2	0.9268	4.50	1.90	4.00	1.90	32.7	26.4	4.43	3.58	9.35E-07	8.67E-07
1:31	1:33	107	23.3	23.3	23.3	0.9247	4.50	1.89	4.00	1.89	32.8	26.5	4.45	3.59	8.87E-07	8.21E-07
												Averages:	4.43	3.58	9.13E-07	8.5E-07

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	**1356-08-122 Phase 09**	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy	Address:	Marshall Steam Station
Boring #:		Sample #:	SC-2
Sample Date:	3/23/10		
Location:	Stockpile Area Test Pits	Offset:	
Elevation:	0-8'		
Sample Description:	Orange Brown Coarse to Fine Sandy Silty Clay (CL)		

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.700**				
Hydrometer Jar #:										
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):	405.45			Tare #	25					
Weight of Total Sample Air Dried:	405.45		A	Tare Wt.	14.39					
Weight of Air Dried Hydrometer Sample (g):	50.04		B	Wet Wt. + A	24.99					
Total Sample Oven Dried:	397.72		C	Dry Wt. + A	24.78					
Hydrometer Sample Oven Dried (W):	49.05		D	Water Wt. (B-C)	0.21					
% Passing #10:	96.2%		E	Dry Wt. (C-A)	10.39					
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	2.02%					

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	3.5		99.1%
3/8"	3.5	Soil Mortar	99.1%
#4	9.9		97.5%
#10	15.1	100.0%	96.2%
#20	1.5	97.0%	93.3%
#40	3.5	92.8%	89.3%
#60	6.9	86.0%	82.7%
#100	13.0	73.6%	70.8%
#200	19.3	60.7%	58.4%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 20455 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	22.0	33.0	4.0		29.00	58.5%	56.3%	11.5	0.01312	0.04458
2	22.0	31.5	4.0		27.50	55.5%	53.4%	11.8	0.01312	0.03185
5	22.0	29.5	4.0		25.50	51.5%	49.5%	12.1	0.01312	0.02042
15	22.0	26.0	4.0		22.00	44.4%	42.7%	12.7	0.01312	0.01207
30	22.0	24.5	4.0		20.50	41.4%	39.8%	12.9	0.01312	0.00862
60	22.0	23.5	4.0		19.50	39.4%	37.9%	13.1	0.01312	0.00613
250	22.0	20.5	4.0		16.50	33.3%	32.0%	13.6	0.01312	0.00306
1440	23.0	17.5	4.0		13.50	27.2%	26.2%	14.1	0.01297	0.00128

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

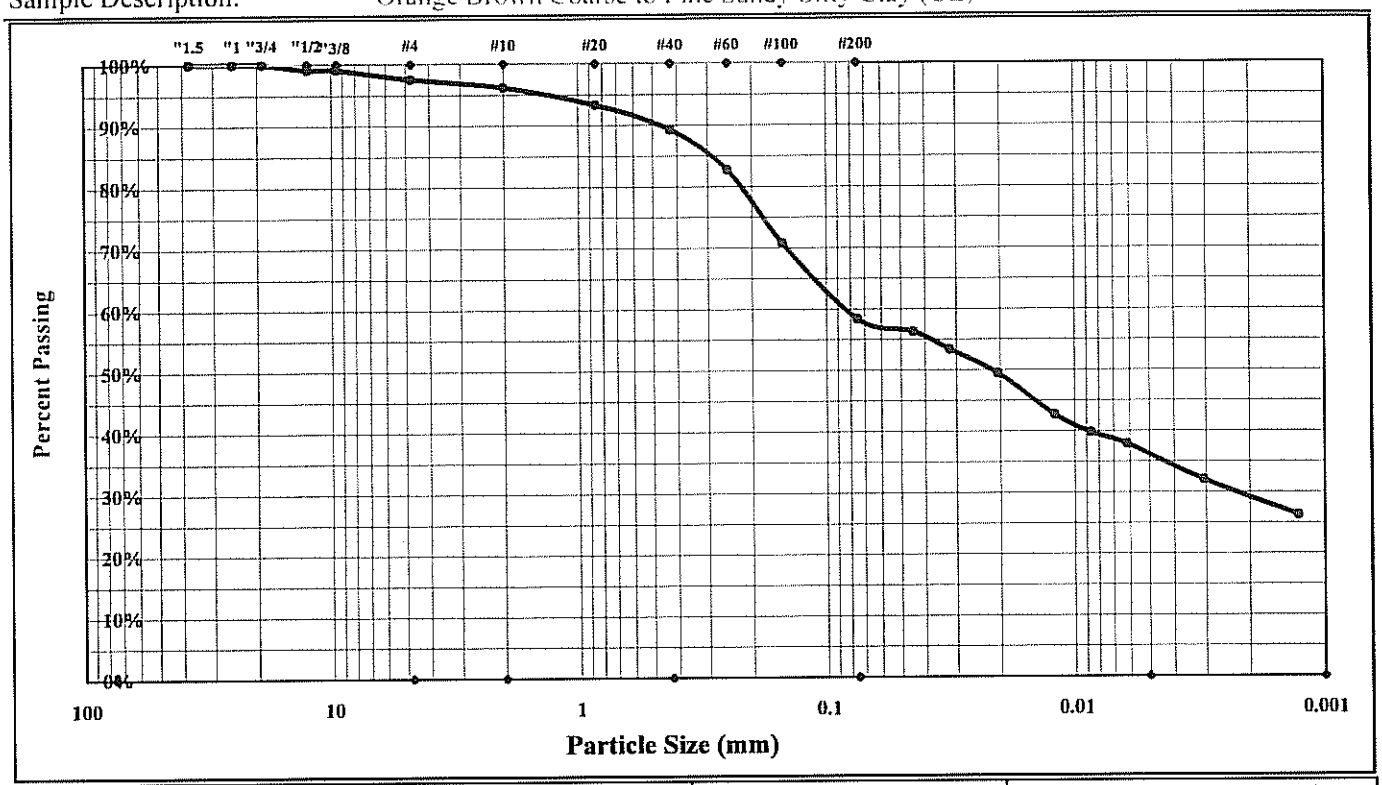
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy		
Address:	Marshall Steam Station		
Boring #:	Sample #: SC-2	Sample Date:	3/23/10
Location:	Stockpile Area Test Offset:	Elevation:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Silty Clay (CL)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	2.5%	Silt	22.4%
Silt & Clay (% Passing #200):	58.4%	Total Sand:	39.1%	Clay	36.0%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	25.0%
Liquid Limit	49	Plastic Limit	27	Plastic Index	22
Coarse Sand:	1.3%	Medium Sand:	6.9%	Fine Sand:	30.9%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/21/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	5/12-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

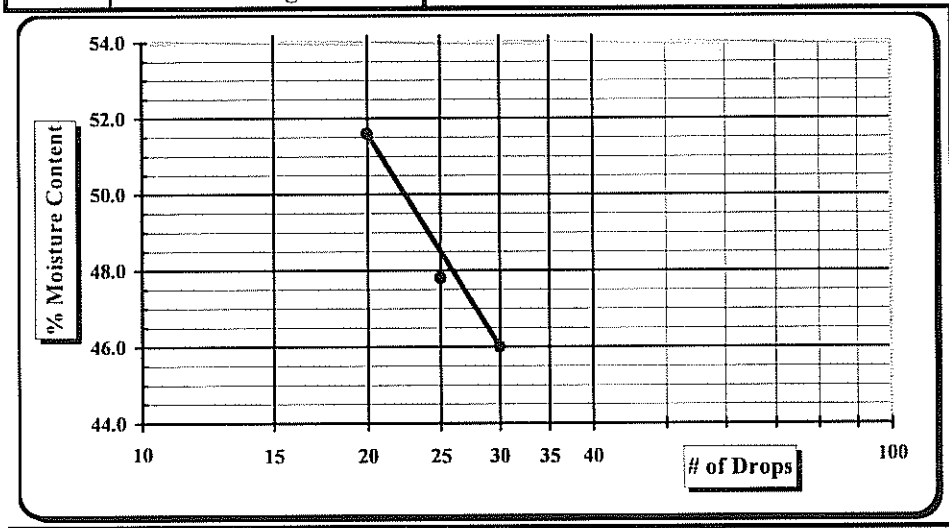
Boring #: Sample #: SC-2 Sample Date: 3/23/10

Location: Stockpile Area Test Pits Offset: Elevation: 0-8'

Sample Description: Orange Brown Coarse to Fine Sandy Silty Clay (CL)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	57	1	NN				60	*	
A	Tare Weight	13.85	13.86	15.28				13.86	15.51	
B	Wet Soil Weight + A	23.91	22.30	22.57				19.89	22.48	
C	Dry Soil Weight + A	20.74	19.57	20.09				18.63	21.02	
D	Water Weight (B-C)	3.17	2.73	2.48				1.26	1.46	
E	Dry Soil Weight (C-A)	6.89	5.71	4.81				4.77	5.51	
F	% Moisture (D/E)*100	46.0%	47.8%	51.6%				26.4%	26.5%	
N	# OF DROPS	30	25	20				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**26.5%**		



One Point Liquid Limit			
N	**Factor**	**N**	**Factor**
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **49**
Plastic Limit **27**
Plastic Index 22
Group Symbol **CL**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

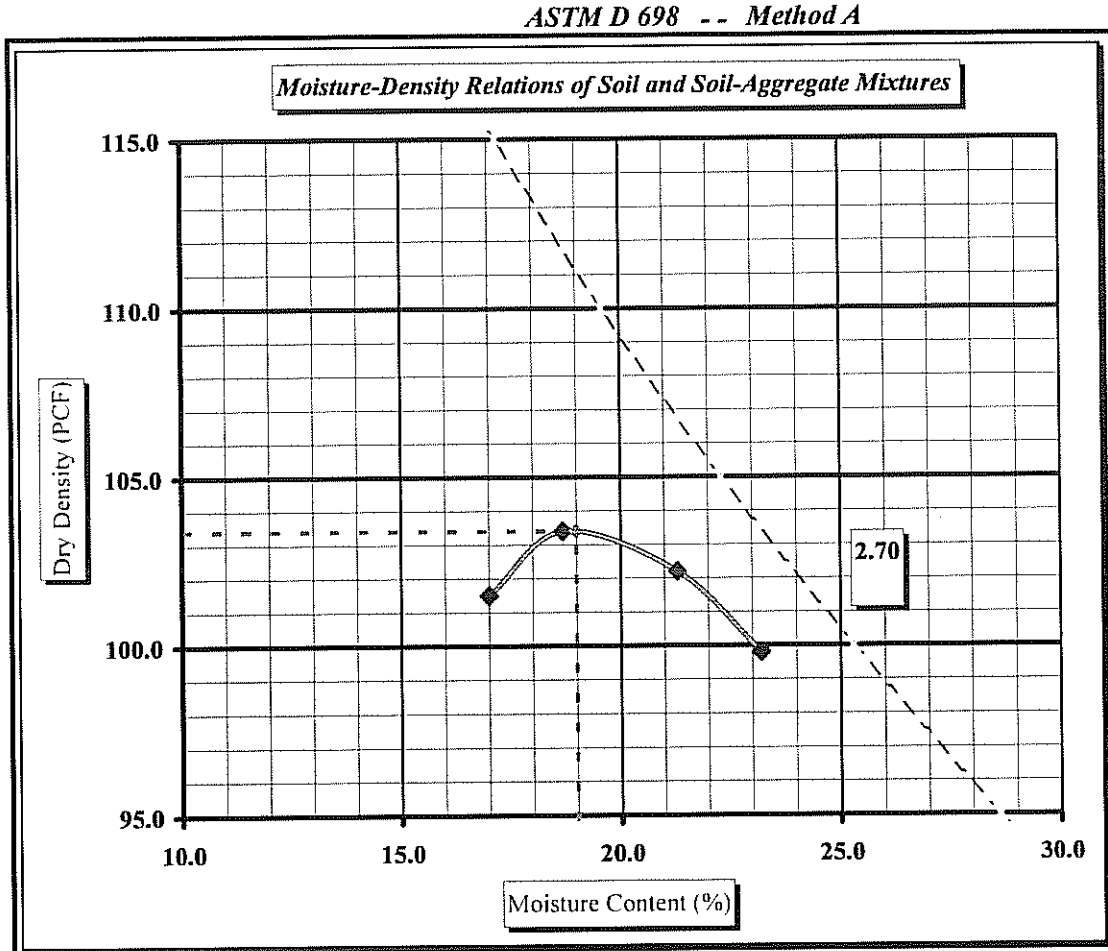
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122 Phase**	Report Date:	5/21/10
Project Name:	Marshall Steam Station	Test Date(s):	5/12-21/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: SC-2	Sample Date:	3/23/2010
Location:	Stockpile Area Test Pits Offset:	Depth:	0-8'
Sample Description:	Orange Brown Coarse to Fine Sandy Silty Clay (CL)		

Maximum Dry Density 103.4 PCF. **Optimum Moisture Content 19.0%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**49**
Plastic Limit	**27**
Plastic Index	**22**

% Passing

3/4"	100.0%
3/8"	99.1%
#4	97.5%
#10	96.2%
#40	89.3%
#60	82.7%
#200	58.4%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	6/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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S&ME

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122-09	Test Date(s):	5/22-27/10
Project Name:	Marshall Steam Station Industrial Landfill No.1	Report Date:	5/27/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:		Panel ID:	12

Boring #: Sample #: SC-2 Depth: 0-8' Perm Cell ID:

Location: Stockpile Area Test Pits Offset: Sample Description: Orange Brown Coarse to Fine Sandy Silty Clay (CL)

Liquid Limit: 49 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 27 Plastic Index: 22 Percent Passing #200: 58.4 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.699	Wet Density (PCF):	118.8	Length (cm):	7.699	Wet Density (PCF):	118.8
Diameter (cm):	7.274	Dry Density (PCF):	98.1	Diameter (cm):	7.27	Dry Density (PCF):	98.1
Area (cm^2)	41.55	Percent Saturation:	79.3	Area (cm^2)	41.56	Percent Saturation:	79.3
Volume (cm^3)	319.91			Volume (cm^3)	319.94	B-Parameter:	0.95
Wet weight (grams)	608.8	Void Ratio:	0.718	Wet weight (grams)	608.8	Void Ratio:	0.718
Dry Weight (grams)	502.7	Porosity:	0.418	Dry Weight (grams)	502.7	Porosity:	0.418
Percent Moisture:	21.1			Percent Moisture:	21.1		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	82.5	Back Pressure (psi):	80.0	a_{out} (cm^2)	0.76712

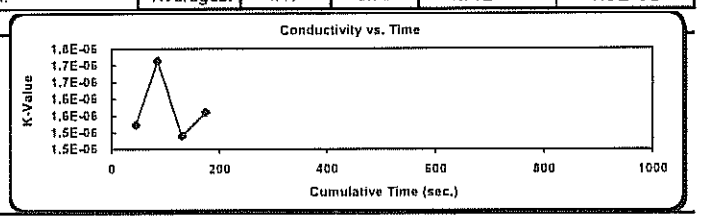
Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
10:08	10:09	45	23.5	23.5	23.5	0.9204	4.60	1.90	4.20	1.90	33.9	28.9	4.41	3.76	1.65E-06	1.52E-06
10:10	10:11	40	23.5	23.5	23.5	0.9204	4.60	1.90	4.20	1.89	33.9	29.0	4.41	3.77	1.86E-06	1.71E-06
10:17	10:17	46	23.5	23.5	23.5	0.9204	4.60	1.90	4.20	1.90	33.9	28.9	4.41	3.76	1.62E-06	1.49E-06
11:13	11:13	44	23.4	23.4	23.4	0.9225	4.60	1.90	4.20	1.90	33.9	28.9	4.41	3.76	1.69E-06	1.56E-06
												Averages:	4.41	3.76	1.71E-06	1.6E-06

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.

References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass



Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME

Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy	Address:	Marshall Steam Station
Boring #:		Sample #: SC-3	Sample Date: 3/23/10
Location:	Stockpile Area Test Pits	Offset:	Elevation: 0-8'
Sample Description:	Orange Brown Medium to Fine Sandy Silt (ML)		

Pan #:		Beaker #:		Apparent Relative Density (Assumed)		2.700				
Hydrometer Jar #:										
Pan Tare Weight (grams):				Moisture Content	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):	342.69			Tare #	6					
Weight of Total Sample Air Dried:	342.69		A	Tare Wt.	14.05					
Weight of Air Dried Hydrometer Sample (g):	50.00		B	Wet Wt. + A	24.52					
Total Sample Oven Dried:	330.22		C	Dry Wt. + A	24.11					
Hydrometer Sample Oven Dried (W):	48.04		D	Water Wt. (B-C)	0.41					
% Passing #10:	92.7%		E	Dry Wt. (C-A)	10.06					
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	4.08%					

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	6.3		98.1%
3/8"	18.5	Soil Mortar	94.4%
#4	23.9		92.8%
#10	24.2	100.0%	92.7%
#20	1.2	97.6%	90.4%
#40	2.7	94.5%	87.6%
#60	5.2	89.2%	82.7%
#100	10.4	78.3%	72.6%
#200	16.5	65.6%	60.8%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 20455 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	22.0	33.5	4.0		29.50	60.8%	56.3%	11.5	0.01312	0.04442
2	22.0	30.5	4.0		26.50	54.6%	50.6%	11.9	0.01312	0.03208
5	22.0	26.0	4.0		22.00	45.3%	42.0%	12.7	0.01312	0.02090
15	22.0	22.5	4.0		18.50	38.1%	35.3%	13.3	0.01312	0.01234
30	22.0	20.0	4.0		16.00	33.0%	30.6%	13.7	0.01312	0.00886
60	22.0	18.5	4.0		14.50	29.9%	27.7%	13.9	0.01312	0.00632
250	22.0	15.5	4.0		11.50	23.7%	22.0%	14.4	0.01312	0.00315
1440	23.0	12.5	4.0		8.50	17.5%	16.2%	14.9	0.01297	0.00132

References / Comments / Deviations

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/10
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

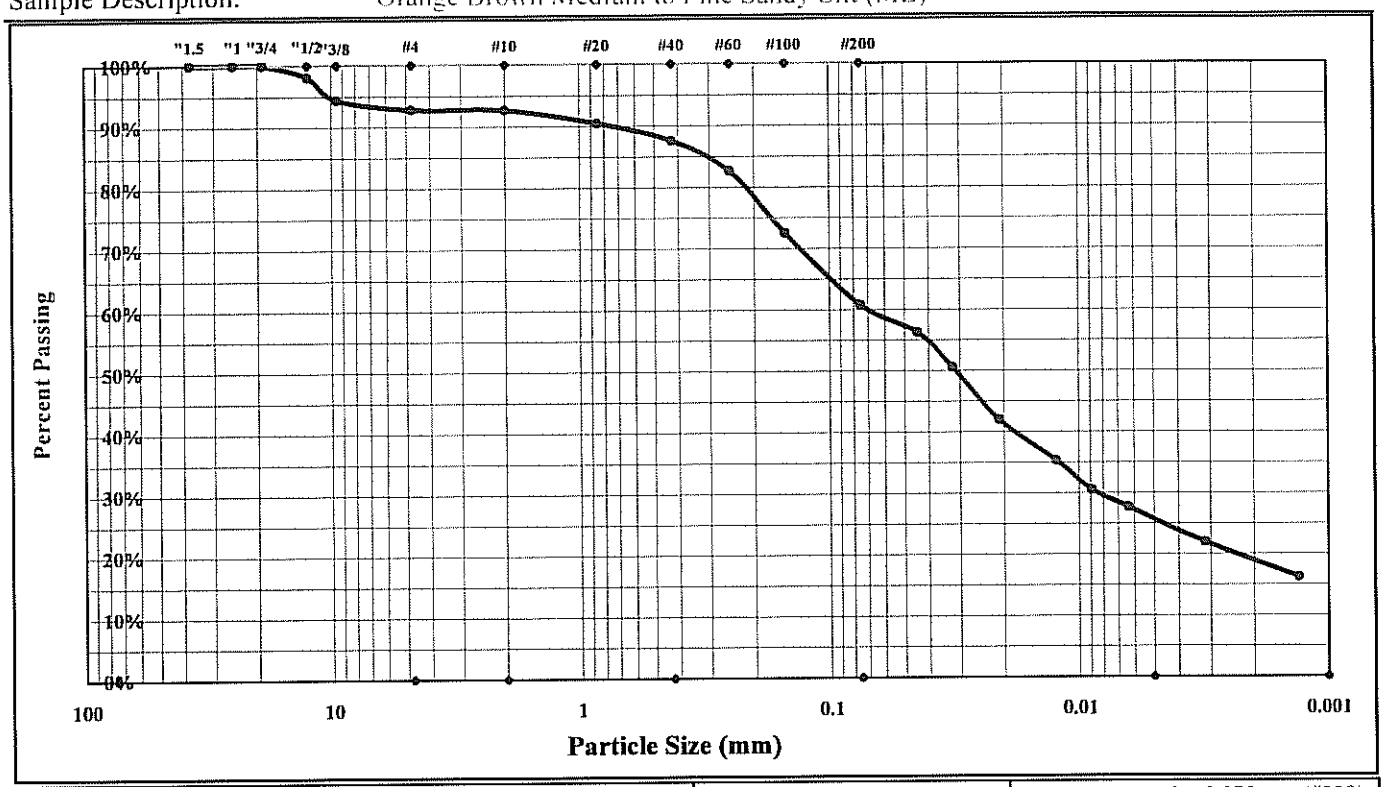
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	5/18/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	5/12-18/10
Client Name:	Duke Energy		
Address:	Marshall Steam Station		
Boring #:	Sample #: SC-3	Sample Date:	3/23/10
Location:	Stockpile Area Test Offset:	Elevation:	0-8'
Sample Description:	Orange Brown Medium to Fine Sandy Silt (ML)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	7.2%	Silt	35.3%
Silt & Clay (% Passing #200):	60.8%	Total Sand:	32.0%	Clay	25.5%
ent Relative Density (Assumed)	2.700	Moisture Content		Colloids	15.0%
Liquid Limit	48	Plastic Limit	34	Plastic Index	14
Coarse Sand:	0.1%	Medium Sand:	5.1%	Fine Sand:	26.8%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	5/21/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	5/12-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

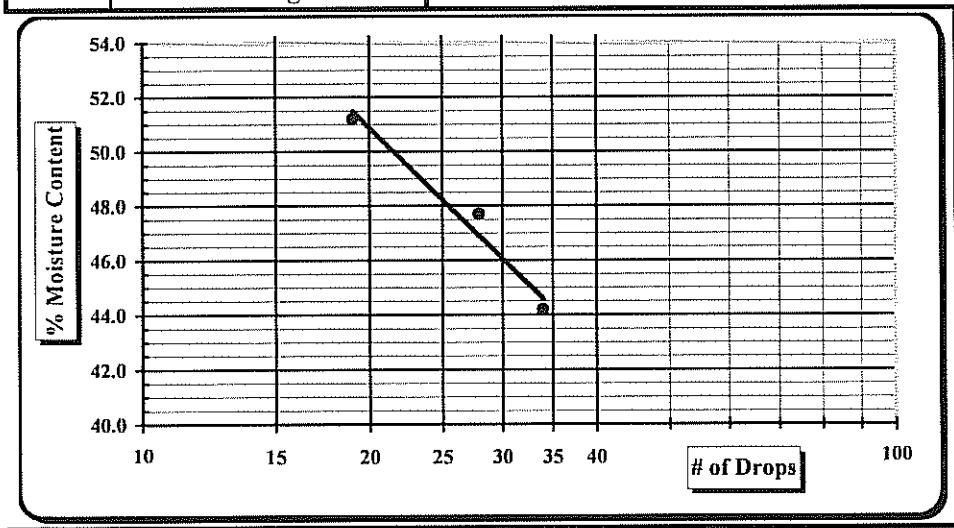
Boring #: Sample #: SC-3 Sample Date: 3/23/10

Location: Stockpile Area Test Pits Offset: Elevation: 0-8'

Sample Description: Orange Brown Medium to Fine Sandy Silt (ML)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	16	5	43				41	35	
A	Tare Weight	15.72	15.70	13.88				15.77	15.63	
B	Wet Soil Weight + A	25.90	25.61	22.86				21.93	21.96	
C	Dry Soil Weight + A	22.78	22.41	19.82				20.37	20.34	
D	Water Weight (B-C)	3.12	3.20	3.04				1.56	1.62	
E	Dry Soil Weight (C-A)	7.06	6.71	5.94				4.60	4.71	
F	% Moisture (D/E)*100	44.2%	47.7%	51.2%				33.9%	34.4%	
N	# OF DROPS	34	28	19				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**34.2%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☐
Liquid Limit **48**
Plastic Limit **34**
Plastic Index 14
Group Symbol **ML**

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/10	William Harrison	11/15/10
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

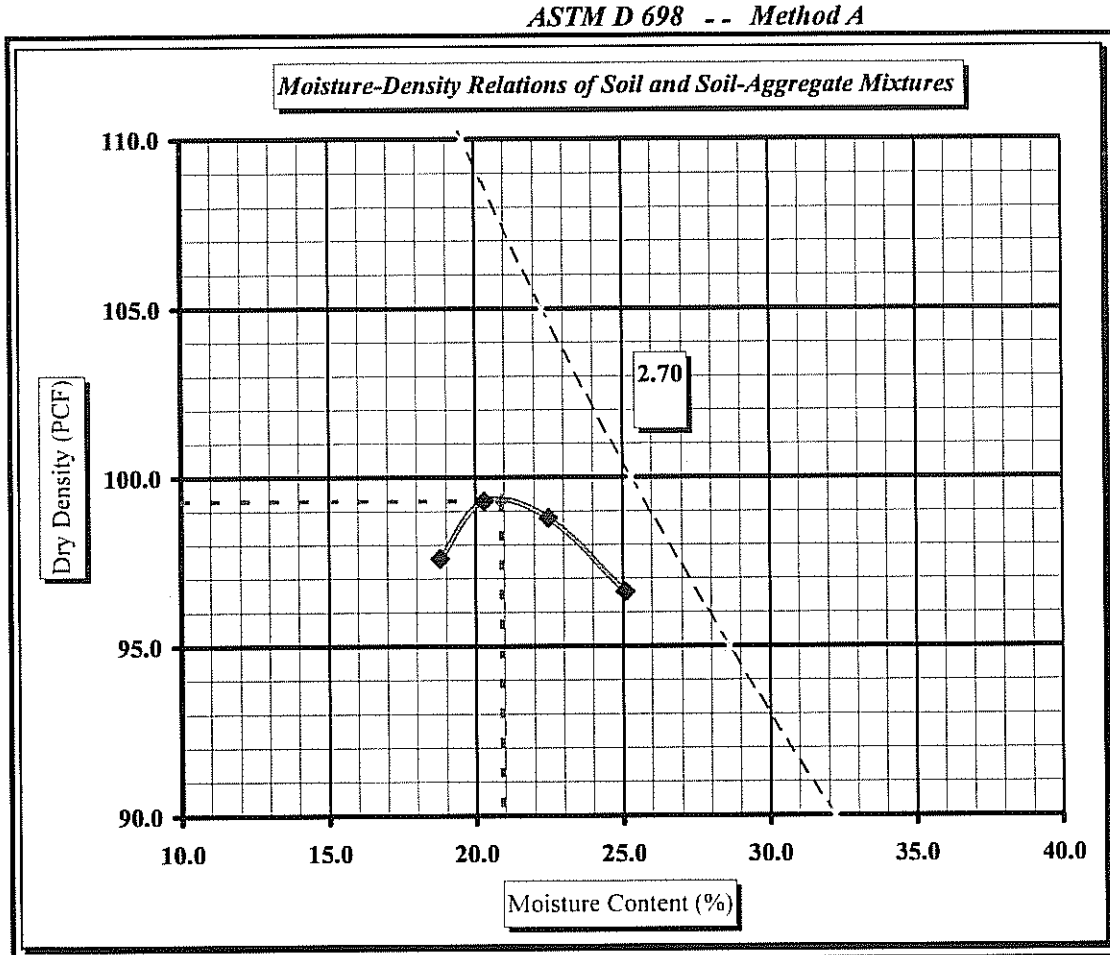
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-08-122 Phase**	Report Date:	5/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	5/12-25/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		
Boring #:	Sample #: SC-3	Sample Date:	3/23/2010
Location:	Stockpile Area Test Pits Offset:	Depth:	0-8'
Sample Description:	Orange Brown Medium to Fine Sandy Silt (ML)		

Maximum Dry Density 99.3 PCF. **Optimum Moisture Content 20.9%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**ND**
Specific Gravity of Soil	**ND**
Liquid Limit	**48**
Plastic Limit	**34**
Plastic Index	**14**

% Passing

3/4"	100.0%
3/8"	94.4%
#4	92.8%
#10	92.7%
#40	87.6%
#60	82.7%
#200	60.8%

Oversize Fraction

Bulk Gravity
% Moisture
% Oversize
MDD
Opt. MC

Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations:

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

William Harrison		Staff Professional	11/15/10
Technical Responsibility	*Signature*	*Position*	*Date*

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Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter (Method "F")

Project #:	1356-08-122-09	Test Date(s):	5/22-28/10
Project Name:	Marshall Steam Station Industrial Landfill No.1	Report Date:	5/28/10
Client Name:	Duke Energy	Sample Date:	3/23/2010
Client Address:		Panel ID:	9

Boring #: Sample #: SC-3 Depth: 0-8' Perm Cell ID:

Location: Stockpile Area Test Pits Offset: Sample Description: Orange Brown Medium to Fine Sandy Sill (ML)

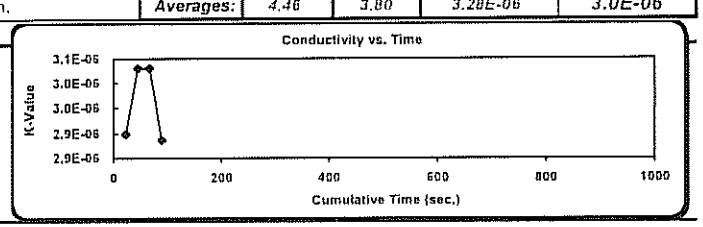
Liquid Limit: 48 Sp. Grav. (Assumed): 2.700 Sample Type: Remolded Log #:

Plastic Limit: 34 Plastic Index: 14 Percent Passing #200: 60.8 Maximum Particle Size:

Initial Sample Conditions				Final Sample Conditions			
Length (cm):	7.620	Wet Density (PCF):	114.5	Length (cm):	7.620	Wet Density (PCF):	114.5
Diameter (cm):	7.270	Dry Density (PCF):	93.8	Diameter (cm):	7.27	Dry Density (PCF):	93.8
Area (cm^2)	41.51	Percent Saturation:	74.9	Area (cm^2)	41.51	Percent Saturation:	74.9
Volume (cm^3)	316.34			Volume (cm^3)	316.34	B-Parameter:	0.94
Wet weight (grams)	580.5	Void Ratio:	0.797	Wet weight (grams)	580.5	Void Ratio:	0.797
Dry Weight (grams)	475.4	Porosity:	0.443	Dry Weight (grams)	475.4	Porosity:	0.443
Percent Moisture:	22.1			Percent Moisture:	22.1		
Test Parameters:	Effective Consolidation Stress (psi):		2.5	Permeant Liquid Used:	Deaired Water	a_{in} (cm^2)	0.031416
Hg Equilibrium Level	1.990	Cell Pressure (psi):	82.5	Back Pressure (psi):	80.0	a_{out} (cm^2)	0.76712

Time (24-hr)			Temperature (°C)				Measurements						Initial Gradient	Final Gradient	K-Value (cm/sec)	
Start	End	Time (sec)	Initial	Final	Ave.	Factor	Rp1	Ra1	Rp2	Ra2	h1	h2			Uncorrected K-Value	Corrected K-Value
3:26	3:27	23	24.3	24.3	24.3	0.9036	4.60	1.90	4.20	1.90	33.9	28.9	4.46	3.80	3.21E-06	2.90E-06
3:29	3:29	22	24.3	24.3	24.3	0.9036	4.60	1.90	4.20	1.90	33.9	28.9	4.46	3.80	3.35E-06	3.03E-06
3:30	3:30	22	24.3	24.3	24.3	0.9036	4.60	1.90	4.20	1.90	33.9	28.9	4.46	3.80	3.35E-06	3.03E-06
3:35	3:35	23	24.3	24.3	24.3	0.9036	4.60	1.89	4.20	1.89	34.1	29.0	4.47	3.81	3.20E-06	2.89E-06
												Averages:	4.46	3.80	3.28E-06	3.0E-06

Notes: Permometer P700000 byTrautwein Soil Testing was used for permeation.



References:

ASTM D 5084: Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician: Karen Warner

Technical Responsibility: Will Harrison

signature

Position: Staff Professional

Cell 1 Compacted Soil Liner Field Density Test Results

CELL 1 COMPACTED SOIL LINER FIELD DENSITY TEST RESULTS

Test Information		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Moisture Content		Location		
No.	Date	Type	Dry Density (lb/ft^3)	Moisture Content (%)	Dry Density (lb/ft^3)	Moisture Content (%)	Type	Ref. Curve	Maximum Dry Density (MDD) (lb/ft^3)	Optimum Moisture Content (%)	Percent Specified (%)	Percent In-Place (%)	Percent Above Optimum Specified (%)	Percent Above Optimum In-Place (%)	Cell Number	Lift Number	Grid ID
1	4/27/2010	D2937	93.2	28.3	92.5	20.7	D698	ED-2	95.1	25.1	95	**98**	0-5	**+3.2**	1	1	J7
2	4/27/2010	D2937	92.1	28.4			D698	ED-2	95.1	25.1	95	**97**	0-5	**+3.3**	1	1	M7
3	4/27/2010	D2937	93.4	28.0			D698	ED-2	95.1	25.1	95	**98**	0-5	**+2.9**	1	1	O7
4	4/27/2010	D2937	93.0	27.4			D698	ED-2	95.1	25.1	95	**98**	0-5	**+2.3**	1	1	L6
5	4/27/2010	D2937	92.0	27.8			D698	ED-2	95.1	25.1	95	**97**	0-5	**+2.7**	1	1	N6
6	4/28/2010	D2937	94.1	26.3	90.3	21.3	D698	ED-2	94.1	25.1	95	**100**	0-5	**+1.2**	1	1	J5
7	4/28/2010	D2937	90.9	29.7			D698	ED-2	94.1	25.1	95	**97**	0-5	**+4.6**	1	1	M5
8	4/28/2010	D2937	91.9	28.0			D698	ED-2	94.1	25.1	95	**98**	0-5	**+2.9**	1	1	O5
9	4/28/2010	D2937	95.3	25.8			D698	ED-2	94.1	25.1	95	**101**	0-5	**+0.7**	1	1	L4
10	4/28/2010	D2937	91.7	29.5			D698	ED-2	94.1	25.1	95	**97**	0-5	**+4.4**	1	1	M4
11	4/29/2010	D2937	91.8	28.4	89.6	20.9	D698	ED-2	94.1	25.1	95	**98**	0-5	**+3.3**	1	2	N7
12	4/29/2010	D2937	95.9	26.2			D698	ED-2	94.1	25.1	95	**102**	0-5	**+1.1**	1	2	L7
13	4/29/2010	D2937	96.2	27.5			D698	ED-2	94.1	25.1	95	**102**	0-5	**+2.4**	1	2	M7
14	4/29/2010	D2937	94.7	27.2			D698	ED-2	94.1	25.1	95	**101**	0-5	**+2.1**	1	2	J6
15	4/29/2010	D2937	92.8	27.4			D698	ED-2	94.1	25.1	95	**99**	0-5	**+2.3**	1	2	M6
16	4/29/2010	D2937	93.0	27.8			D698	ED-2	94.1	25.1	95	**99**	0-5	**+2.7**	1	2	O6
17	4/30/2010	D2937	92.5	27.8	91.3	21.0	D698	ED-2	94.4	25.0	95	**98**	0-5	**+2.8**	1	2	N5
18	4/30/2010	D2937	93.2	26.5			D698	ED-2	94.4	25.0	95	**99**	0-5	**+1.5**	1	2	L5
19	4/30/2010	D2937	93.9	27.4			D698	ED-2	94.4	25.0	95	**99**	0-5	**+2.4**	1	2	M5
20	4/30/2010	D2937	95.4	26.6			D698	ED-2	94.4	25.0	95	**101**	0-5	**+1.6**	1	2	J4
21	4/30/2010	D2937	91.9	27.3			D698	ED-2	94.4	25.0	95	**97**	0-5	**+2.3**	1	2	M4
22	5/21/2010	D2937	91.6	27.4	89.7	20.8	D698	ED-2	94.3	25.1	95	**97**	0-5	**+2.3**	1	1	Q7
23	5/21/2010	D2937	94.1	27.7			D698	ED-2	94.3	25.1	95	**100**	0-5	**+2.6**	1	1	S7
24	5/21/2010	D2937	91.5	28.2			D698	ED-2	94.3	25.1	95	**97**	0-5	**+3.1**	1	1	P6
25	5/21/2010	D2937	92.8	27.3			D698	ED-2	94.3	25.1	95	**98**	0-5	**+2.2**	1	1	R6
26	5/21/2010	D2937	93.1	28.5			D698	ED-2	94.3	25.1	95	**99**	0-5	**+3.4**	1	1	T6
27	5/21/2010	D2937	92.8	27.7			D698	ED-2	94.3	25.1	95	**98**	0-5	**+2.6**	1	1	S5
28	5/21/2010	D2937	92.1	28.0			D698	ED-2	94.3	25.1	95	**98**	0-5	**+2.9**	1	1	Q5
29	6/2/2010	D2937	97.7	25.8	100.7	21.0	D698	TP-4	100.8	21.6	95	**97**	0-5	**+4.2**	1	1	J3
30	6/2/2010	D2937	99.9	26.1			D698	TP-4	100.8	21.6	95	**99**	0-5	**+4.5**	1	1	M3
31	6/2/2010	D2937	101.2	25.4			D698	TP-4	100.8	21.6	95	**100**	0-5	**+3.8**	1	1	O3
32	6/2/2010	D2937	98.2	25.8			D698	TP-4	100.8	21.6	95	**97**	0-5	**+4.2**	1	1	Q3
33	6/2/2010	D2937	97.6	26.2			D698	TP-4	100.8	21.6	95	**97**	0-5	**+4.6**	1	1	N4
34	6/2/2010	D2937	100.6	25.8			D698	TP-4	100.8	21.6	95	**100**	0-5	**+4.2**	1	1	P4
35	6/2/2010	D2937	98.9	26.1			D698	TP-4	100.8	21.6	95	**98**	0-5	**+4.5**	1	1	R4
36	6/4/2010	D2937	97.6	25.9	99.1	20.8	D698	TP-4	99.6	21.9	95	**98**	0-5	**+4.0**	1	2	P7
37	6/4/2010	D2937	97.0	26.1			D698	TP-4	99.6	21.9	95	**97**	0-5	**+4.2**	1	2	R7
38	6/4/2010	D2937	95.9	25.4			D698	TP-4	99.6	21.9	95	**96**	0-5	**+3.5**	1	2	Q6
39	6/4/2010	D2937	99.8	25.7			D698	TP-4	99.6	21.9	95	**100**	0-5	**+3.8**	1	2	S6
40	6/4/2010	D2937	98.5	25.8			D698	TP-4	99.6	21.9	95	**99**	0-5	**+3.9**	1	2	P5
41	6/4/2010	D2937	96.4	25.6			D698	TP-4	99.6	21.9	95	**97**	0-5	**+3.7**	1	2	R5
42	6/4/2010	D2937	96.0	26.4			D698	TP-4	99.6	21.9	95	**96**	0-5	**+4.5**	1	2	T5
43	6/4/2010	D2937	99.7	25.8			D698	TP-4	99.6	21.9	95	**100**	0-5	**+3.9**	1	2	S4
44	6/4/2010	D2937	97.2	26.2			D698	TP-4	99.6	21.9	95	**98**	0-5	**+4.3**	1	2	R3
45	6/5/2010	D2937	100.6	25.1			D698	TP-4	99.6	21.9	95	**101**	0-5	**+3.2**	1	2	Q4
46	6/5/2010	D2937	101.7	25.7	102.1	20.8	D698	TP-4	102.2	21.0	95	**100**	0-5	**+4.7**	1	2	P3
47	6/5/2010	D2937	98.3	26.2			D698	TP-4	102.2	21.0	95	**96**	0-5	**+5.2**	1	2	O4

CELL 1 COMPACTED SOIL LINER FIELD DENSITY TEST RESULTS

Test Information		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Moisture Content		Location		
No.	Date	Type	Dry Density (lb/ft^3)	Moisture Content (%)	Dry Density (lb/ft^3)	Moisture Content (%)	Type	Ref. Curve	Maximum Dry Density (MDD) (lb/ft^3)	Optimum Moisture Content (%)	Percent Specified (%)	Percent In-Place (%)	Percent Above Optimum Specified (%)	Percent Above Optimum In-Place (%)	Cell Number	Lift Number	Grid ID
48	6/5/2010	D2937	101.5	25.3			D698	TP-4	102.2	21.0	95	**99**	0-5	**+4.3**	1	2	N3
49	6/5/2010	D2937	100.8	25.5			D698	TP-4	102.2	21.0	95	**99**	0-5	**+4.5**	1	2	L3
50	6/7/2010	D2937	96.2	27.8	97.6	21.5	D698	ED-2	98.1	23.0	95	**98**	0-5	**+4.8**	1	3	L4
51	6/7/2010	D2937	98.0	27.3			D698	ED-2	98.1	23.0	95	**100**	0-5	**+4.3**	1	3	J3
52	6/7/2010	D2937	97.3	27.6			D698	ED-2	98.1	23.0	95	**99**	0-5	**+4.6**	1	3	J5
53	6/7/2010	D2937	94.4	27.7			D698	ED-2	98.1	23.0	95	**96**	0-5	**+4.7**	1	3	N4
54	6/7/2010	D2937	97.2	27.0			D698	ED-2	98.1	23.0	95	**99**	0-5	**+4.0**	1	3	M3
55	6/7/2010	D2937	96.7	27.4			D698	ED-2	98.1	23.0	95	**99**	0-5	**+4.4**	1	3	M5
56	6/8/2010	D2937	96.6	27.5	98.1	21.1	D698	ED-2	98.3	23.2	95	**98**	0-5	**+4.3**	1	3	P4
57	6/8/2010	D2937	95.5	27.8			D698	ED-2	98.3	23.2	95	**97**	0-5	**+4.6**	1	3	O3
58	6/8/2010	D2937	94.4	27.4			D698	ED-2	98.3	23.2	95	**96**	0-5	**+4.2**	1	3	O5
59	6/8/2010	D2937	96.7	27.7			D698	ED-2	98.3	23.2	95	**98**	0-5	**+4.5**	1	3	R4
60	6/8/2010	D2937	94.2	27.0			D698	ED-2	98.3	23.2	95	**96**	0-5	**+3.8**	1	3	Q3
61	6/8/2010	D2937	96.8	27.3			D698	ED-2	98.3	23.2	95	**98**	0-5	**+4.1**	1	3	Q5
62	6/8/2010	D2937	95.3	27.4			D698	ED-2	98.3	23.2	95	**97**	0-5	**+4.2**	1	3	T4
63	6/8/2010	D2937	96.2	27.7			D698	ED-2	98.3	23.2	95	**98**	0-5	**+4.5**	1	3	S5
64	6/9/2010	D2937	93.8	27.3	96.7	21.3	D698	ED-2	97.6	23.1	95	**96**	0-5	**+4.2**	1	3	L6
65	6/9/2010	D2937	97.0	27.7			D698	ED-2	97.6	23.1	95	**99**	0-5	**+4.6**	1	3	J7
66	6/9/2010	D2937	98.1	27.5			D698	ED-2	97.6	23.1	95	**101**	0-5	**+4.4**	1	3	N6
67	6/9/2010	D2937	95.0	27.1			D698	ED-2	97.6	23.1	95	**97**	0-5	**+4.0**	1	3	M7
68	6/9/2010	D2937	94.7	27.0			D698	ED-2	97.6	23.1	95	**97**	0-5	**+3.9**	1	3	P6
69	6/9/2010	D2937	96.9	27.4			D698	ED-2	97.6	23.1	95	**99**	0-5	**+4.3**	1	3	O7
70	6/10/2010	D2937	95.1	27.4	95.4	21.4	D698	ED-2	96.6	24.8	95	**98**	0-5	**+2.6**	1	3	R6
71	6/10/2010	D2937	95.8	26.7			D698	ED-2	96.6	24.8	95	**99**	0-5	**+1.9**	1	3	Q7
72	6/10/2010	D2937	96.6	27.2			D698	ED-2	96.6	24.8	95	**100**	0-5	**+2.4**	1	3	T6
73	6/10/2010	D2937	95.7	27.5			D698	ED-2	96.6	24.8	95	**99**	0-5	**+2.7**	1	3	S7
74	6/10/2010	D2937	96.2	27.4			D698	ED-2	96.6	24.8	95	**100**	0-5	**+2.6**	1	3	U5

Cell 2 Compacted Soil Liner Field Density Test Results

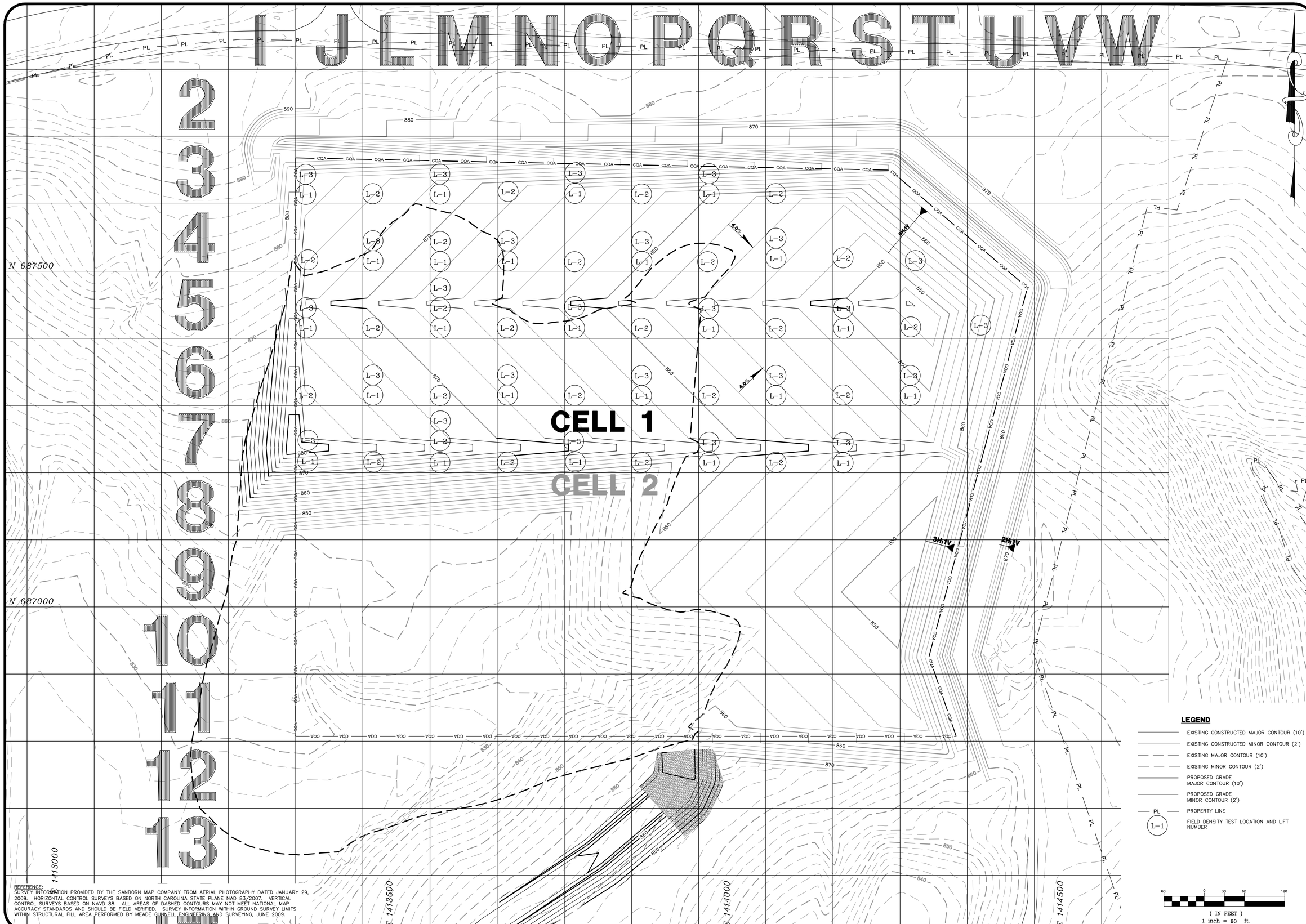
CELL 2 COMPACTED SOIL LINER FIELD DENSITY TEST RESULTS

Test Information		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Moisture Content		Location		
No.	Date	Type	Dry Density (lb/ft^3)	Moisture Content (%)	Dry Density (lb/ft^3)	Moisture Content (%)	Type	Ref. Curve	Maximum Dry Density (MDD) (lb/ft^3)	Optimum Moisture Content (%)	Percent Specified (%)	Percent In-Place (%)	Percent Above Optimum Specified (%)	Percent Above Optimum In-Place (%)	Cell Number	Lift Number	Grid ID
1	6/28/2010	D2937	97.9	26.5	95.8	21.5	D698	ED-2	96.8	23.6	95	**101**	0-5	**+2.9**	2	1	J8
2	6/28/2010	D2937	94.3	26.8			D698	ED-2	96.8	23.6	95	**97**	0-5	**+3.2**	2	1	L9
3	6/28/2010	D2937	95.8	26.1			D698	ED-2	96.8	23.6	95	**99**	0-5	**+2.5**	2	1	M8
4	6/28/2010	D2937	95.0	27.2			D698	ED-2	96.8	23.6	95	**98**	0-5	**+3.6**	2	1	N7
5	6/28/2010	D2937	95.6	27.0			D698	ED-2	96.8	23.6	95	**99**	0-5	**+3.4**	2	1	N9
6	6/28/2010	D2937	96.6	26.6			D698	ED-2	96.8	23.6	95	**100**	0-5	**+3.0**	2	1	O8
7	6/29/2010	D2937	92.9	27.6	95.5	22.3	D698	ED-2	96.3	24.8	95	**96**	0-5	**+2.8**	2	1	P9
8	6/29/2010	D2937	94.5	26.9			D698	ED-2	96.3	24.8	95	**98**	0-5	**+2.1**	2	1	P7
9	6/29/2010	D2937	94.0	27.2			D698	ED-2	96.3	24.8	95	**98**	0-5	**+2.4**	2	1	Q8
10	6/29/2010	D2937	95.0	27.2			D698	ED-2	96.3	24.8	95	**99**	0-5	**+2.4**	2	1	R9
11	6/29/2010	D2937	94.9	26.6			D698	ED-2	96.3	24.8	95	**99**	0-5	**+1.8**	2	1	R7
12	6/29/2010	D2937	95.7	26.9			D698	ED-2	96.3	24.8	95	**99**	0-5	**+2.1**	2	1	S8
13	6/29/2010	D2937	94.8	26.5			D698	ED-2	96.3	24.8	95	**98**	0-5	**+1.7**	2	1	T7
14	6/29/2010	D2937	95.5	26.8			D698	ED-2	96.3	24.8	95	**99**	0-5	**+2.0**	2	1	T9
15	6/30/2010	D2937	97.5	25.7	97.8	19.0	D698	TP-4	100.4	21.7	95	**97**	0-5	**+4.0**	2	2	J9
16	6/30/2010	D2937	97.3	24.8			D698	TP-4	100.4	21.7	95	**97**	0-5	**+3.1**	2	2	J7
17	6/30/2010	D2937	97.5	25.8			D698	TP-4	100.4	21.7	95	**97**	0-5	**+4.1**	2	2	L8
18	6/30/2010	D2937	95.9	25.3			D698	TP-4	100.4	21.7	95	**96**	0-5	**+3.6**	2	2	M9
19	6/30/2010	D2937	97.5	26.1			D698	TP-4	100.4	21.7	95	**97**	0-5	**+4.4**	2	2	M7
20	6/30/2010	D2937	95.7	26.6			D698	TP-4	100.4	21.7	95	**95**	0-5	**+4.9**	2	2	O9
21	6/30/2010	D2937	96.7	25.5			D698	TP-4	100.4	21.7	95	**96**	0-5	**+3.8**	2	2	N8
22	6/30/2010	D2937	96.7	26.2			D698	TP-4	100.4	21.7	95	**96**	0-5	**+4.5**	2	2	O7
23	6/30/2010	D2937	96.4	25.3			D698	TP-4	100.4	21.7	95	**96**	0-5	**+3.6**	2	2	P8
24	6/30/2010	D2937	97.9	25.8			D698	TP-4	100.4	21.7	95	**98**	0-5	**+4.1**	2	2	Q9
25	6/30/2010	D2937	98.1	25.3			D698	TP-4	100.4	21.7	95	**98**	0-5	**+3.6**	2	2	Q7
26	6/30/2010	D2937	99.8	24.8			D698	TP-4	100.4	21.7	95	**99**	0-5	**+3.1**	2	2	R8
27	6/30/2010	D2937	99.4	21.8			D698	TP-4	100.4	21.7	95	**99**	0-5	**+0.1**	2	2	S7
28	6/30/2010	D2937	96.5	24.2			D698	TP-4	100.4	21.7	95	**96**	0-5	**+2.5**	2	2	S9
29	6/30/2010	D2937	99.3	23.8			D698	TP-4	100.4	21.7	95	**99**	0-5	**+2.1**	2	2	T8
30	7/1/2010	D2937	97.5	25.9	94.1	18.9	D698	ED-2	99.0	23.6	95	**98**	0-5	**+2.3**	2	3	J8
31	7/1/2010	D2937	97.7	24.6	95.2	20.1	D698	ED-2	97.0	23.3	95	**101**	0-5	**+1.3**	2	3	L7
32	7/1/2010	D2937	98.1	26.7			D698	ED-2	97.0	23.3	95	**101**	0-5	**+3.4**	2	3	L9
33	7/1/2010	D2937	97.9	25.4			D698	ED-2	97.0	23.3	95	**101**	0-5	**+2.1**	2	3	M8
34	7/1/2010	D2937	93.4	27.3	90.0	22.6	D698	TP-10	93.5	25.3	95	**100**	0-5	**+2.0**	2	3	N7
35	7/1/2010	D2937	93.6	28.0			D698	TP-10	93.5	25.3	95	**100**	0-5	**+2.7**	2	3	N9
36	7/1/2010	D2937	93.1	25.7			D698	TP-10	93.5	25.3	95	**100**	0-5	**+0.4**	2	3	O8
37	7/1/2010	D2937	94.0	27.6			D698	TP-10	93.5	25.3	95	**101**	0-5	**+2.3**	2	3	P7
38	7/1/2010	D2937	93.7	29.2			D698	TP-10	93.5	25.3	95	**100**	0-5	**+3.9**	2	3	P9
39	7/6/2010	D2937	97.4	24.1	96.0	20.6	D698	ED-2	97.2	23.3	95	**100**	0-5	**+0.8**	2	3	Q8
40	7/6/2010	D2937	97.3	23.9			D698	ED-2	97.2	23.3	95	**100**	0-5	**+0.6**	2	3	R7
41	7/6/2010	D2937	97.8	25.2			D698	ED-2	97.2	23.3	95	**101**	0-5	**+1.9**	2	3	R9
42	7/6/2010	D2937	97.3	23.9			D698	ED-2	97.2	23.3	95	**100**	0-5	**+0.6**	2	3	S8
43	7/6/2010	D2937	92.7	27.1	90.5	23.6	D698	TP-10	95.0	24.2	95	**98**	0-5	**+2.9**	2	3	T7
44	7/6/2010	D2937	92.0	26.0			D698	TP-10	95.0	24.2	95	**97**	0-5	**+1.8**	2	3	T9
45	7/12/2010	D2937	94.2	26.6	96.2	22.3	D698	TP-10	95.0	24.2	95	**99**	0-5	**+2.4**	2	1	J10
46	7/12/2010	D2937	92.2	26.3			D698	TP-10	95.0	24.2	95	**97**	0-5	**+2.1**	2	1	L11
47	7/12/2010	D2937	92.5	27.0			D698	TP-10	95.0	24.2	95	**97**	0-5	**+2.8**	2	1	M10

CELL 2 COMPACTED SOIL LINER FIELD DENSITY TEST RESULTS

Test Information		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Moisture Content		Location		
No.	Date	Type	Dry Density (lb/ft^3)	Moisture Content (%)	Dry Density (lb/ft^3)	Moisture Content (%)	Type	Ref. Curve	Maximum Dry Density (MDD) (lb/ft^3)	Optimum Moisture Content (%)	Percent Specified (%)	Percent In-Place (%)	Percent Above Optimum Specified (%)	Percent Above Optimum In-Place (%)	Cell Number	Lift Number	Grid ID
48	7/12/2010	D2937	93.7	25.9			D698	TP-10	95.0	24.2	95	**99**	0-5	**+1.7**	2	1	N11
49	7/12/2010	D2937	94.4	26.7			D698	TP-10	95.0	24.2	95	**99**	0-5	**+2.5**	2	1	O10
50	7/12/2010	D2937	92.3	26.8			D698	TP-10	95.0	24.2	95	**97**	0-5	**+2.6**	2	1	P11
51	7/13/2010	D2937	96.2	26.5	94.2	22.7	D698	TP-10	94.3	25.2	95	**102**	0-5	**+1.3**	2	1	R11
52	7/13/2010	D2937	92.8	26.7			D698	TP-10	94.3	25.2	95	**98**	0-5	**+1.5**	2	1	T11
53	7/14/2010	D2937	93.5	27.0	95.0	22.1	D698	ED-2	96.4	23.8	95	**97**	0-5	**+3.2**	2	2	J11
54	7/14/2010	D2937	92.9	27.2			D698	ED-2	96.4	23.8	95	**96**	0-5	**+3.4**	2	2	L10
55	7/14/2010	D2937	95.3	26.8			D698	ED-2	96.4	23.8	95	**99**	0-5	**+3.0**	2	2	M11
56	7/14/2010	D2937	91.7	26.9			D698	ED-2	96.4	23.8	95	**95**	0-5	**+3.1**	2	2	N10
57	7/14/2010	D2937	94.0	27.3			D698	ED-2	96.4	23.8	95	**98**	0-5	**+3.5**	2	2	O11
58	7/14/2010	D2937	92.9	26.6			D698	ED-2	96.4	23.8	95	**96**	0-5	**+2.8**	2	2	P10
59	7/15/2010	D2937	88.1	31.6	84.3	23.5	D698	TP-3	90.6	27.5	95	**97**	0-5	**+4.1**	2	2	Q11
60	7/15/2010	D2937	87.0	29.4			D698	TP-3	90.6	27.5	95	**96**	0-5	**+1.9**	2	2	R10
61	7/15/2010	D2937	87.7	29.9			D698	TP-3	90.6	27.5	95	**97**	0-5	**+2.4**	2	2	S11
62	7/15/2010	D2937	92.1	27.1	93.7	22.3	D698	TP-10	94.8	24.9	95	**97**	0-5	**+2.2**	2	1	Q10
63	7/15/2010	D2937	94.6	27.4			D698	TP-10	94.8	24.9	95	**100**	0-5	**+2.5**	2	1	S10
64	7/16/2010	D2937	94.0	27.4	98.2	21.3	D698	ED-2	98.7	22.6	95	**95**	0-5	**+4.8**	2	3	J10
65	7/16/2010	D2937	95.3	27.0			D698	ED-2	98.7	22.6	95	**97**	0-5	**+4.4**	2	3	L11
66	7/16/2010	D2937	95.5	26.4			D698	ED-2	98.7	22.6	95	**97**	0-5	**+3.8**	2	3	M10
67	7/16/2010	D2937	94.8	26.7			D698	ED-2	98.7	22.6	95	**96**	0-5	**+4.1**	2	3	N11
68	7/16/2010	D2937	93.3	26.8	95.6	22.4	D698	ED-2	96.3	23.9	95	**97**	0-5	**+2.9**	2	3	O10
69	7/16/2010	D2937	93.5	27.2			D698	ED-2	96.3	23.9	95	**97**	0-5	**+3.3**	2	3	P11
70	7/16/2010	D2937	93.1	27.1			D698	ED-2	96.3	23.9	95	**97**	0-5	**+3.2**	2	3	Q10
71	7/16/2010	D2937	93.3	27.5			D698	ED-2	96.3	23.9	95	**97**	0-5	**+3.6**	2	3	R11
72	7/16/2010	D2937	93.8	26.4			D698	ED-2	96.3	23.9	95	**97**	0-5	**+2.5**	2	3	S10
73	7/16/2010	D2937	94.0	26.6			D698	ED-2	96.3	23.9	95	**98**	0-5	**+2.7**	2	3	T11
74	7/21/2010	D2937	94.3	25.6	95.1	22.5	D698	TP-10	95.9	24.1	95	**98**	0-5	**+1.5**	2	3	P10

Cell 1 Compacted Soil Liner Field Density Test Locations



REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

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9751 SOUTHERN PINE BLVD.
CHARLOTTE, N.C. 28273
(704)523-4726
S&ME
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NO.	DATE	DESCRIPTION	BY

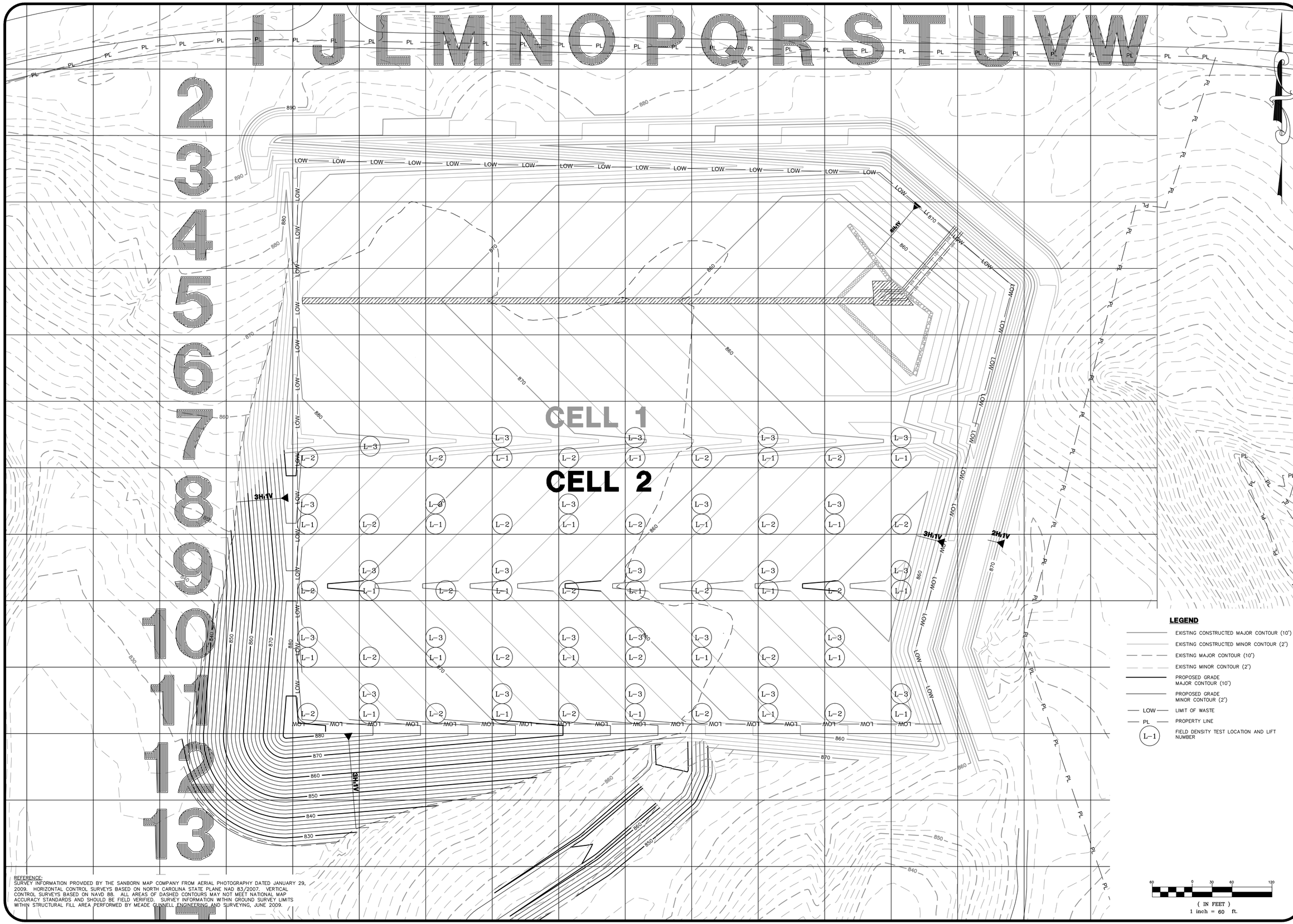
CELL 1 CSL FIELD DENSITY TEST LOCATIONS
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176	
DRAWN BY: CLD	CHECKED BY: WMH
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 12/15/10
DRAWING: 1	OF: 1

DRAWING PATH: Q:\350\DUKE ENERGY\02-322 Marshall & STEAM\Marshall Landfill 1\Field Build Verification\Energy CELL 1 FINAL SURFACE.dwg Q:\350\DUKE ENERGY\02-322 MARSHALL & STEAM\INDUSTRIAL LANDFILL 1\FAS-BUILT INFO\FIELD DENSITY CELL 1 FINAL SURFACE.DWG

Cell 2 Compacted Soil Liner Field Density Test Locations



REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE CUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

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NO.	DATE	DESCRIPTION	BY

CELL 2 CSL FIELD DENSITY TEST LOCATIONS
CELL 1 AND 2 CONSTRUCTION

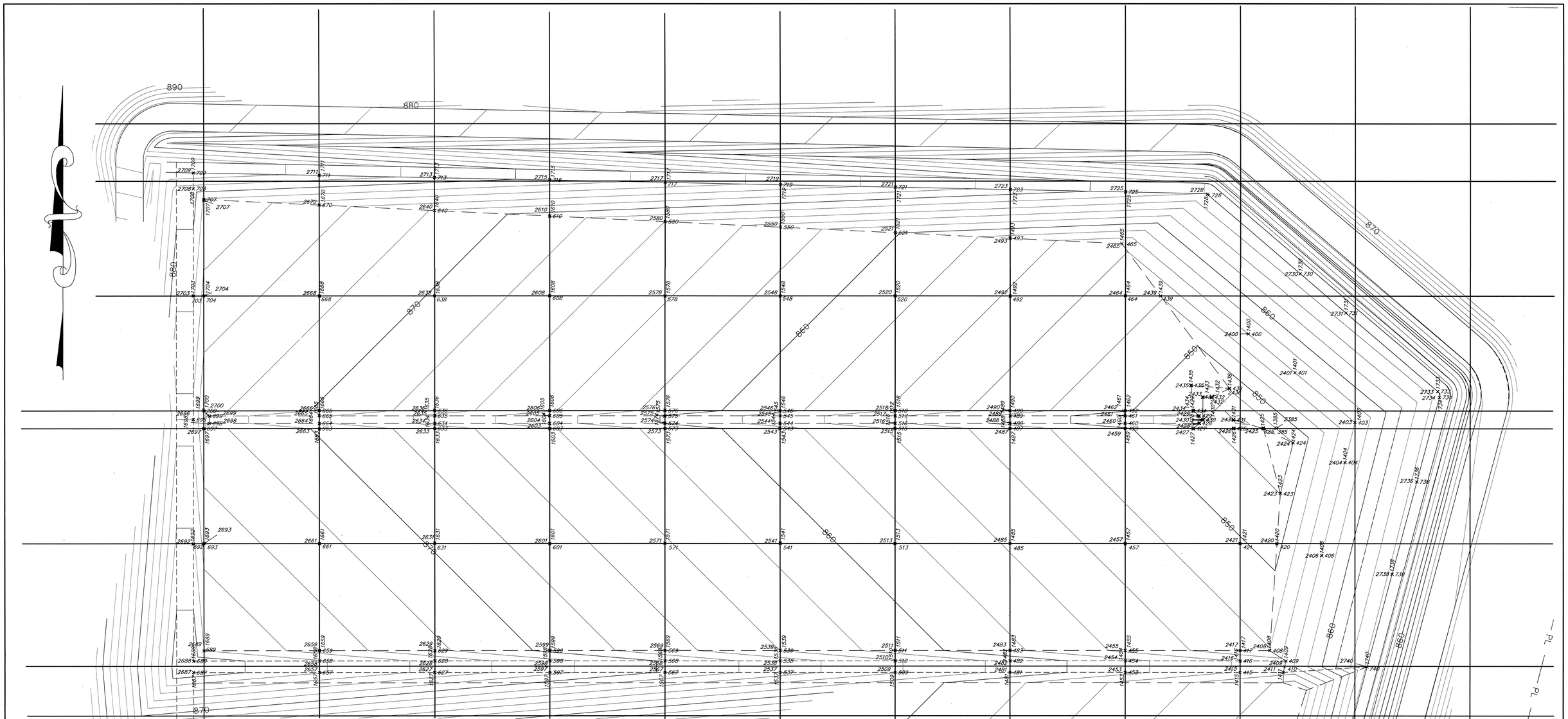
DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: WMH
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 12/15/10
DRAWING: 1	OF: 1

DRAWING PATH: Q:\DEPOSIT ENERGY\09-322 Marshall Ash Basin\Geotechnical Engineering\Cell 2 Final Subgrade\Dwg Q:\DEPOSIT ENERGY\09-322 MARSHALL ASH BASIN\INDUSTRIAL LANDFILL\STABILITY\PROPOSED DENSITY CELL 2 FINAL SUBGRADE.DWG

Cell 1 Compacted Soil Liner As-Built Drawing



Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	VerifiedTop of Clay		Sub Grade- TOC
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference
385	848.00	1385	847.98	0.02	2385	849.55	1.57
400	856.00	1400	855.91	0.09	2400	857.53	1.62
401	856.00	1401	855.97	0.03	2401	857.52	1.55
403	856.00	1403	855.96	0.04	2403	857.53	1.57
404	856.00	1404	855.9	0.10	2404	857.55	1.65
406	856.00	1406	855.92	0.08	2406	857.54	1.62
408	852.07	1408	852.07	0.00	2408	853.60	1.53
409	854.68	1409	854.68	0.00	2409	856.26	1.58
410	854.71	1411	854.7	0.01	2411	856.24	1.54
415	855.79	1415	855.74	0.05	2415	857.30	1.56
416	855.79	1416	855.76	0.03	2416	857.32	1.56
417	852.79	1417	852.78	0.01	2417	854.36	1.58
420	849.28	1420	849.27	0.01	2420	850.83	1.56
421	850.18	1421	850.17	0.01	2421	851.71	1.54
423	847.98	1423	847.97	0.01	2423	849.56	1.59
424	848.00	1424	847.98	0.02	2424	849.57	1.59
425	846.82	1425	846.48	0.34	2425	848.36	1.88
426	847.54	1426	847.47	0.07	2426	849.10	1.63
427	848.50	1427	848.49	0.01	2427	850.00	1.51
428	846.87	1428	846.85	0.02	2428	848.40	1.55
429	846.87	1429	846.83	0.04	2429	848.40	1.57
430	845.77	1430	845.76	0.01	2430	847.31	1.55
431	845.04	1431	844.99	0.05	2431	846.59	1.60
432	845.56	1432	845.53	0.03	2432	847.10	1.57
433	845.77	1433	845.72	0.05	2433	847.27	1.55
434	848.50	1434	848.44	0.06	2434	850.05	1.61
435	849.20	1435	849.19	0.01	2435	850.76	1.57
436	848.18	1436	848.18	0.00	2436	849.74	1.56
439	852.12	1439	852.12	0.00	2439	853.68	1.56
453	858.59	1453	858.58	0.01	2453	860.16	1.58
454	858.59	1454	858.58	0.01	2454	860.10	1.52
455	855.59	1455	855.59	0.00	2455	857.11	1.52
457	852.98	1457	852.97	0.01	2457	854.55	1.58
459	850.18	1459	850.16	0.02	2459	851.72	1.56
460	848.68	1460	848.63	0.05	2460	850.20	1.57
461	848.68	1461	848.65	0.03	2461	850.18	1.53
462	850.18	1462	850.11	0.07	2462	851.69	1.58
464	853.11	1464	853.1	0.01	2464	854.66	1.56
465	854.34	1465	854.33	0.01	2465	855.92	1.59
481	861.39	1481	861.39	0.00	2481	862.89	1.50
482	861.39	1482	861.33	0.06	2482	862.89	1.56
483	858.39	1483	858.38	0.01	2483	859.97	1.59
485	855.78	1485	855.74	0.04	2485	857.30	1.56
487	852.98	1487	852.98	0.00	2487	854.55	1.57
488	851.48	1488	851.42	0.06	2488	853.06	1.64
489	851.48	1489	851.46	0.02	2489	853.06	1.60
490	852.98	1490	852.97	0.01	2490	854.52	1.55

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	VerifiedTop of Clay		Sub Grade- TOC
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference
492	855.78	1492	855.78	0.00	2492	857.31	1.53
493	857.18	1493	857.18	0.00	2493	858.75	1.57
509	864.19	1509	864.19	0.00	2509	865.76	1.57
510	864.19	1510	864.17	0.02	2510	865.77	1.60
511	861.19	1511	861.19	0.00	2511	862.76	1.57
513	858.58	1513	858.57	0.01	2513	860.12	1.55
515	855.78	1515	855.76	0.02	2515	857.31	1.55
516	854.28	1516	854.2	0.08	2516	855.84	1.64
517	854.28	1517	854.21	0.07	2517	855.86	1.65
518	855.78	1518	855.76	0.02	2518	857.35	1.59
520	858.58	1520	858.56	0.02	2520	860.14	1.58
521	860.12	1521	860.07	0.05	2521	861.63	1.56
537	866.99	1537	866.92	0.07	2537	868.50	1.58
538	866.99	1538	866.91	0.08	2538	868.53	1.62
539	863.99	1539	863.99	0.00	2539	865.54	1.55
541	861.38	1541	861.33	0.05	2541	862.96	1.63
543	858.58	1543	858.56	0.02	2543	860.08	1.52
544	857.08	1544	857	0.08	2544	858.60	1.60
545	857.08	1545	857.03	0.05	2545	858.59	1.56
546	858.58	1546	858.56	0.02	2546	860.13	1.57
548	861.38	1548	861.38	0.00	2548	862.96	1.58
550	863.05	1550	863.04	0.01	2550	864.60	1.56
567	869.79	1567	869.76	0.03	2567	871.29	1.53
568	869.79	1568	869.77	0.02	2568	871.35	1.58
569	866.79	1569	866.78	0.01	2569	868.35	1.57
571	864.18	1571	864.18	0.00	2571	865.75	1.57
573	861.38	1573	861.38	0.00	2573	862.91	1.53
574	859.88	1574	859.86	0.02	2574	861.46	1.60
575	859.88	1575	859.88	0.00	2575	861.46	1.58
576	861.38	1576	861.35	0.03	2576	862.95	1.60
578	864.18	1578	864.17	0.01	2578	865.72	1.55
580	865.89	1580	865.85	0.04	2580	867.56	1.61
597	872.59	1597	872.56	0.03	2597	874.14	1.58
598	872.59	1598	872.58	0.01	2598	874.12	1.54
599	869.59	1599	869.51	0.08	2599	871.17	1.66
601	866.98	1601	866.98	0.00	2601	868.49	1.51
603	864.18	1603	864.11	0.07	2603	865.68	1.57
604	862.68	1604	862.65	0.03	2604	864.18	1.53
605	862.68	1605	862.66	0.02	2605	864.20	1.54
606	864.18	1606	864.17	0.01	2606	865.72	1.55
608	866.98	1608	866.96	0.02	2608	868.54	1.58
610	868.93	1610	868.88	0.05	2610	870.49	1.61
627	875.39	1627	875.39	0.00	2627	876.90	1.51
628	875.39	1628	875.38	0.01	2628	876.96	1.58
629	872.39	1629	872.39	0.00	2629	873.95	1.56
631	869.78	1631	869.72	0.06	2631	871.32	1.60
633	866.98	1633	866.98	0.00	2633	868.52	1.54

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	VerifiedTop of Clay		Sub Grade- TOC
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference
634	865.48	1634	865.47	0.01	2634	866.98	1.51
635	865.48	1635	865.45	0.03	2635	867.05	1.60
636	866.98	1636	866.97	0.01	2636	868.53	1.56
638	869.78	1638	869.78	0.00	2638	871.30	1.52
640	871.86	1640	871.83	0.03	2640	873.43	1.60
657	878.19	1657	878.17	0.02	2657	879.76	1.59
658	878.19	1658	878.18	0.01	2658	879.75	1.57
659	875.19	1659	875.17	0.02	2659	876.76	1.59
661	872.58	1661	872.58	0.00	2661	874.09	1.51
663	869.78	1663	869.77	0.01	2663	871.33	1.56
664	868.28	1664	868.21	0.07	2664	869.78	1.57
665	868.28	1665	868.2	0.08	2665	869.78	1.58
666	868.78	1666	868.76	0.02	2666	870.33	1.57
668	872.58	1668	872.55	0.03	2668	874.10	1.55
670	874.80	1670	874.77	0.03	2670	876.37	1.60
687	881.24	1687	881.21	0.03	2687	882.78	1.57
688	881.24	1688	881.22	0.02	2688	882.77	1.55
689	878.00	1689	877.98	0.02	2689	879.58	1.60
692	878.38	1692	878.29	0.09	2692	879.89	1.60
693	875.38	1693	875.36	0.02	2693	876.95	1.59
696	875.48	1696	875.46	0.02	2696	877.00	1.54
697	872.58	1697	872.58	0.00	2697	874.14	1.56
698	870.94	1698	870.86	0.08	2698	872.44	1.58
699	870.94	1699	870.87	0.07	2699	872.48	1.61
700	872.58	1700	872.53	0.05	2700	874.11	1.58
703	878.38	1703	878.36	0.02	2703	879.95	1.59
704	875.38	1704	875.38	0.00	2704	876.96	1.58
707	877.73	1707	877.71	0.02	2707	879.28	1.57
708	881.00	1708	881	0.00	2708	882.54	1.54
709	885.60	1709	885.5	0.10	2709	887.18	1.68
711	883.41	1711	883.39	0.02	2711	884.98	1.59
713	881.41	1713	881.4	0.01	2713	882.97	1.57
715	879.40	1715	879.39	0.01	2715	880.90	1.51
717	877.40	1717	877.39	0.01	2717	878.92	1.53
719	875.39	1719	875.36	0.03	2719	876.93	1.57
721	873.39	1721	873.37	0.02	2721	874.92	1.55
723	871.39	1723	871.38	0.01	2723	872.92	1.54
725	869.38	1725	869.37	0.01	2725	870.93	1.56
728	867.80	1728	867.75	0.05	2728	869.34	1.59
730	867.53	1730	867.5	0.03	2730	869.11	1.61
731	867.40	1731	867.4	0.00	2731	868.94	1.54
733	867.13	1733	867.13	0.00	2733	868.69	1.56
734	866.96	1734	866.94	0.02	2734	868.54	1.60
736	866.77	1736	866.76	0.01	2736	868.33	1.57
738	866.57	1738	866.53	0.04	2738	868.11	1.58
740	866.37	1740	866.36	0.01	2740	867.94	1.58

NORTH CAROLINA PROFESSIONAL SEAL L-2480 LAND SURVEYOR DONALD LAWRENCE

11-22-10

FDL & assoc

Cell 1 CSL Thickness Verification Survey and As-Built

Marshall Steam Station Industrial Landfill No. 1

Terrell North Carolina

Orig. scale 1"=40'

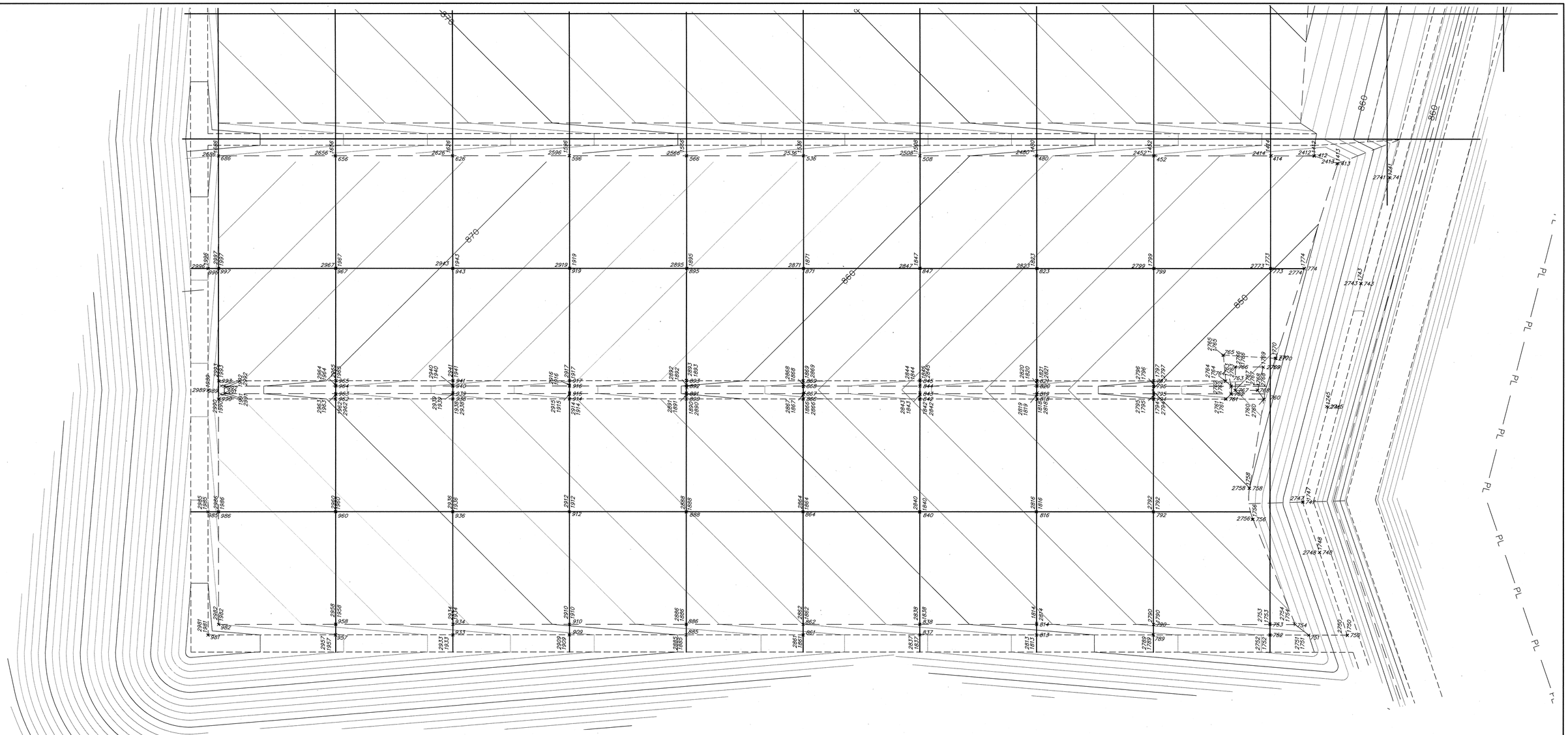
Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St.
Monroe, North Carolina 28111 (704) 289-1013

Date: 6/11/10

REVISIONS
Clay Update 6/15/10
Clay Update 6/21/10

Job No. 1345 | Drawing file Subgrade – TOC Verify_rev6-15-10.dwg | Drawing no.10/47

Cell 2 Compacted Soil Liner As-Built Drawing



Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	Verified Top of Clay		Prop. SG - Veri. Clay
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference
412	851.74	1412	851.69	−0.05	2412	853.25	1.51
413	851.00	1413	850.98	−0.02	2413	852.55	1.55
414	852.79	1414	852.72	−0.07	2414	854.35	1.56
452	855.59	1452	855.53	−0.06	2452	857.17	1.58
480	858.39	1480	858.32	−0.07	2480	859.96	1.57
508	861.19	1508	861.14	−0.05	2508	862.76	1.57
536	863.99	1536	863.94	−0.05	2536	865.56	1.57
566	866.79	1566	866.71	−0.08	2566	868.36	1.57
596	869.59	1596	869.56	−0.03	2596	871.14	1.55
626	872.39	1626	872.34	−0.05	2626	873.97	1.58
656	875.19	1656	875.14	−0.05	2656	876.77	1.58
686	877.99	1686	877.95	−0.04	2686	879.55	1.56
741	866.29	1741	866.26	−0.03	2741	867.87	1.58
743	866.06	1743	866.00	−0.06	2743	867.61	1.55
745	865.79	1745	865.71	−0.08	2745	867.37	1.58
747	865.59	1747	865.59	0.00	2747	867.12	1.53
748	865.50	1748	865.46	−0.04	2748	867.06	1.56
750	865.32	1750	865.30	−0.02	2750	866.86	1.54
751	854.86	1751	854.86	0.00	2751	856.42	1.56
752	855.79	1752	855.72	−0.07	2752	857.36	1.57
753	852.79	1753	852.78	−0.01	2753	854.29	1.50
754	853.19	1754	853.14	−0.05	2754	853.74	1.55
756	850.67	1756	850.66	−0.01	2756	852.19	1.52
758	850.01	1758	849.95	−0.06	2758	851.52	1.51
760	847.52	1760	847.45	−0.07	2760	849.07	1.55
761	846.43	1761	846.37	−0.06	2761	850.00	1.57
762	846.80	1762	846.78	−0.02	2762	848.38	1.58
763	846.80	1763	846.73	−0.07	2763	848.36	1.56
764	848.43	1764	848.35	−0.08	2764	849.98	1.55
765	849.12	1765	849.05	−0.07	2765	850.68	1.56
766	845.70	1766	845.64	−0.06	2766	847.24	1.54
767	845.70	1767	845.65	−0.05	2767	847.27	1.57
768	845.18	1768	845.12	−0.06	2768	846.76	1.58
769	845.05	1769	845.01	−0.04	2769	846.62	1.57
770	847.80	1770	847.74	−0.06	2770	849.38	1.58
773	850.08	1773	850.08	0.00	2773	851.66	1.58
774	849.27	1774	849.21	−0.06	2774	850.85	1.58
789	858.59	1789	858.51	−0.08	2789	860.14	1.55
790	855.59	1790	855.52	−0.07	2790	857.09	1.50
792	852.88	1792	852.87	−0.01	2792	854.46	1.58
794	850.18	1794	850.12	−0.06	2794	851.75	1.57
795	848.68	1795	848.62	−0.06	2795	850.26	1.58
796	848.68	1796	848.60	−0.08	2796	850.21	1.53
797	850.18	1797	850.10	−0.08	2797	851.76	1.58
799	852.88	1799	852.87	−0.01	2799	854.43	1.55

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	Verified Top of Clay		Prop. SG - Veri. Clay
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference
813	861.39	1813	861.37	−0.02	2813	862.95	1.56
814	858.39	1814	858.37	−0.02	2814	859.97	1.58
816	855.68	1816	855.65	−0.03	2816	857.26	1.58
818	852.98	1818	852.95	−0.03	2818	854.56	1.58
819	851.49	1819	851.43	−0.05	2819	853.03	1.55
820	851.48	1820	851.41	−0.07	2820	853.04	1.56
821	852.98	1821	852.95	−0.03	2821	854.56	1.58
823	855.68	1823	855.64	−0.04	2823	857.21	1.53
837	864.19	1837	864.19	0.00	2837	865.73	1.54
838	861.19	1838	861.18	−0.01	2838	862.77	1.58
840	858.48	1840	858.47	−0.01	2840	860.04	1.56
842	855.78	1842	855.75	−0.03	2842	857.36	1.58
843	854.28	1843	854.22	−0.06	2843	855.85	1.57
844	854.28	1844	854.20	−0.08	2844	855.86	1.58
845	855.78	1845	855.72	−0.06	2845	857.36	1.58
847	858.48	1847	858.45	−0.03	2847	860.03	1.55
861	866.99	1861	866.98	−0.01	2861	868.57	1.58
862	863.99	1862	863.98	−0.01	2862	865.57	1.58
864	861.29	1864	861.26	−0.02	2864	862.83	1.55
866	858.58	1866	858.58	0.00	2866	860.15	1.57
867	857.08	1867	857.02	−0.06	2867	858.60	1.52
868	857.08	1868	857.03	−0.05	2868	858.65	1.57
869	858.58	1869	858.56	−0.02	2869	860.14	1.56
871	861.28	1871	861.28	0.00	2871	862.84	1.56
885	869.79	1885	869.73	−0.06	2885	871.37	1.58
886	866.79	1886	866.76	−0.03	2886	868.34	1.55
888	864.08	1888	864.08	0.00	2888	865.66	1.58
890	861.38	1890	861.35	−0.03	2890	862.90	1.52
891	859.88	1891	859.83	−0.05	2891	861.43	1.55
892	859.88	1892	859.81	−0.07	2892	861.38	1.50
893	861.38	1893	861.32	−0.06	2893	862.94	1.56
895	864.08	1895	864.06	−0.02	2895	865.66	1.58
909	872.59	1909	872.56	−0.03	2909	874.17	1.58
910	869.59	1910	869.57	−0.02	2910	871.14	1.55
912	866.88	1912	866.86	−0.02	2912	868.45	1.57
914	864.18	1914	864.12	−0.06	2914	865.75	1.57
915	862.68	1915	862.60	−0.08	2915	864.21	1.53
916	862.68	1916	862.62	−0.06	2916	864.21	1.53
917	864.18	1917	864.14	−0.04	2917	865.75	1.57
919	866.88	1919	866.85	−0.03	2919	868.42	1.54
933	875.39	1933	875.33	−0.06	2933	876.92	1.53
934	872.39	1934	872.36	−0.03	2934	873.97	1.58
936	869.68	1936	869.65	−0.03	2936	871.25	1.57
938	866.98	1938	866.96	−0.02	2938	868.53	1.55
939	865.48	1939	865.47	−0.01	2939	867.02	1.54
940	865.48	1940	865.45	−0.03	2940	867.05	1.57

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	Verified Top of Clay		Prop. SG - Veri. Clay
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference
941	866.98	1941	866.94	−0.04	2941	868.55	1.57
943	869.68	1943	869.66	−0.02	2943	871.25	1.57
957	878.19	1957	878.17	−0.02	2957	879.72	1.53
958	875.19	1958	875.15	−0.04	2958	876.77	1.58
960	872.48	1960	872.47	−0.01	2960	874.04	1.56
962	869.78	1962	869.75	−0.03	2962	871.36	1.58
963	868.28	1963	868.24	−0.04	2963	869.86	1.58
964	868.28	1964	868.24	−0.04	2964	869.84	1.56
965	869.78	1965	869.70	−0.08	2965	871.30	1.52
967	872.48	1967	872.45	−0.03	2967	874.06	1.58
981	881.24	1981	881.21	−0.03	2981	882.77	1.53
982	877.99	1982	877.94	−0.05	2982	879.56	1.57
985	878.28	1985	878.26	−0.02	2985	879.85	1.57
986	875.28	1986	875.25	−0.03	2986	876.85	1.57
989	875.36	1989	875.36	0.00	2989	876.94	1.58
990	872.58	1990	872.57	−0.01	2990	874.15	1.57
991	870.94	1991	870.93	−0.01	2991	872.45	1.51
992	870.94	1992	870.92	−0.02	2992	872.51	1.57
993	872.58	1993	872.56	−0.02	2993	874.16	1.58
996	878.28	1996	878.25	−0.03	2996	879.83	1.55
997	875.28	1997	875.2	−0.08	2997	876.85	1.57

Notes:

Points and grid as shown are for grading purposes only.
The certification grid is indicated by the bold grid lines.
Certification survey to include tops and toes of slopes

NORTH CAROLINA PROFESSIONAL SEAL L-2230 LAND SURVEYOR GERALD LAWRENCE
11-2-10

FDL & assoc

Cell 2 CSL Thickness Verification Survey and As-Built
Marshall Steam Station Industrial Landfill No. 1
Terrell North Carolina
Orig. scale 1"=40'
Date: 7/20/10
Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St.
Monroe, North Carolina 28111 (704) 289-1013

Drawn By: MCM
REVISIONS
Update 7/21/10

Job No. 1345 | Drawing file Cell 2 Top of Clay.dwg | Drawing no. 10/73

APPENDIX I – EARTHWORKS
Section 4 – Protective Cover

Protective Cover Laboratory Test Summary Table
Protective Cover Laboratory Test Results
Cell 1 Protective Cover As-Built Drawing
Cell 2 Protective Cover As-Built Drawing

Protective Cover Laboratory Test Summary Table

SUMMARY OF PROTECTIVE COVER LABORATORY TEST DATA

Sample No.[1]	Soil Description	USCS Classification	Gravel (% > No. 4) (ASTM D422)	Sand (% < No. 4 & % > No. 200) (ASTM D422)	Silt & Clay (% < No. 200) (ASTM D422)	Atterberg Limits (ASTM D4318)	
						LL	PI
PC-1	Pink Brown Silty Coarse to Fine SAND	SM	0.3%	57.9%	41.8%	34	4
PC-2	Pink Brown Silty Coarse to Fine SAND	SM	0.3%	59.5%	40.2%	39	3
PC-3	Tan Brown Silty Coarse to Fine SAND	SM	0.2%	76.7%	23.1%	NP[2]	NP[2]
PC-4	Reddish Brown Micaceous Medium to Fine Sandy SILT	ML	0.0%	49.0%	51.0%	46	9
PC-5	Reddish Brown Micaceous Silty Fine to Medium SAND	SM	0.0%	55.0%	45.0%	48	10
PC-6	Reddish Brown Micaceous Coarse to Fine Sandy SILT	ML	0.6%	49.7%	49.8%	45	7
PC-7	Reddish Brown Micaceous Silty Medium to Fine SAND	SM	0.0%	56.8%	43.2%	44	10

1. All samples were bulk samples
2. Non-Plastic

Protective Cover Laboratory Test Results

Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122	Report Date:	7/16/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	7/11-16/10
Client Name:	Duke Energy	Address:	
Boring #:	PC	Sample #: 1	Sample Date: 6/28/10
Location:	PC Stockpile	Offset:	Elevation: East
Sample Description:	Pink Brown Silty Coarse to Fine Sand (SM)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**	**2.650**
Hydrometer Jar #:					
Pan Tare Weight (grams):			**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):	421.01		Tare #	39	
Weight of Total Sample Air Dried:	421.01	A	Tare Wt.	13.97	
Weight of Air Dried Hydrometer Sample (g):	50.04	B	Wet Wt. + A	25.62	
Total Sample Oven Dried:	413.56	C	Dry Wt. + A	25.41	
Hydrometer Sample Oven Dried (W):	49.14	D	Water Wt. (B-C)	0.21	
% Passing #10:	98.2%	E	Dry Wt. (C-A)	11.44	
Correction Factor a (Table 1):	1.00		% Moisture (100 x D/E)	1.84%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	1.3		99.7%
#10	7.5	100.0%	98.2%
#20	2.3	95.3%	93.5%
#40	6.3	87.3%	85.7%
#60	11.5	76.6%	75.2%
#100	19.0	61.4%	60.3%
#200	28.2	42.5%	41.8%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3996 *Cal. Date:* 2/3/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	21.0	23.0	4.5		18.50	37.6%	37.0%	13.3	0.01348	0.04909
2	21.0	18.5	4.5		14.00	28.5%	28.0%	14.0	0.01348	0.03566
5	21.0	15.5	4.5		11.00	22.4%	22.0%	14.5	0.01348	0.02295
15	21.0	13.0	4.5		8.50	17.3%	17.0%	14.9	0.01348	0.01344
30	21.0	11.0	4.5		6.50	13.2%	13.0%	15.2	0.01348	0.00960
60	21.0	10.0	4.5		5.50	11.2%	11.0%	15.4	0.01348	0.00683
250	21.5	9.0	4.5		4.50	9.2%	9.0%	15.6	0.01340	0.00334
1440	21.0	7.0	4.5		2.50	5.1%	5.0%	15.9	0.01348	0.00142

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	Will Harrison	Staff Professional	11/15/2010
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

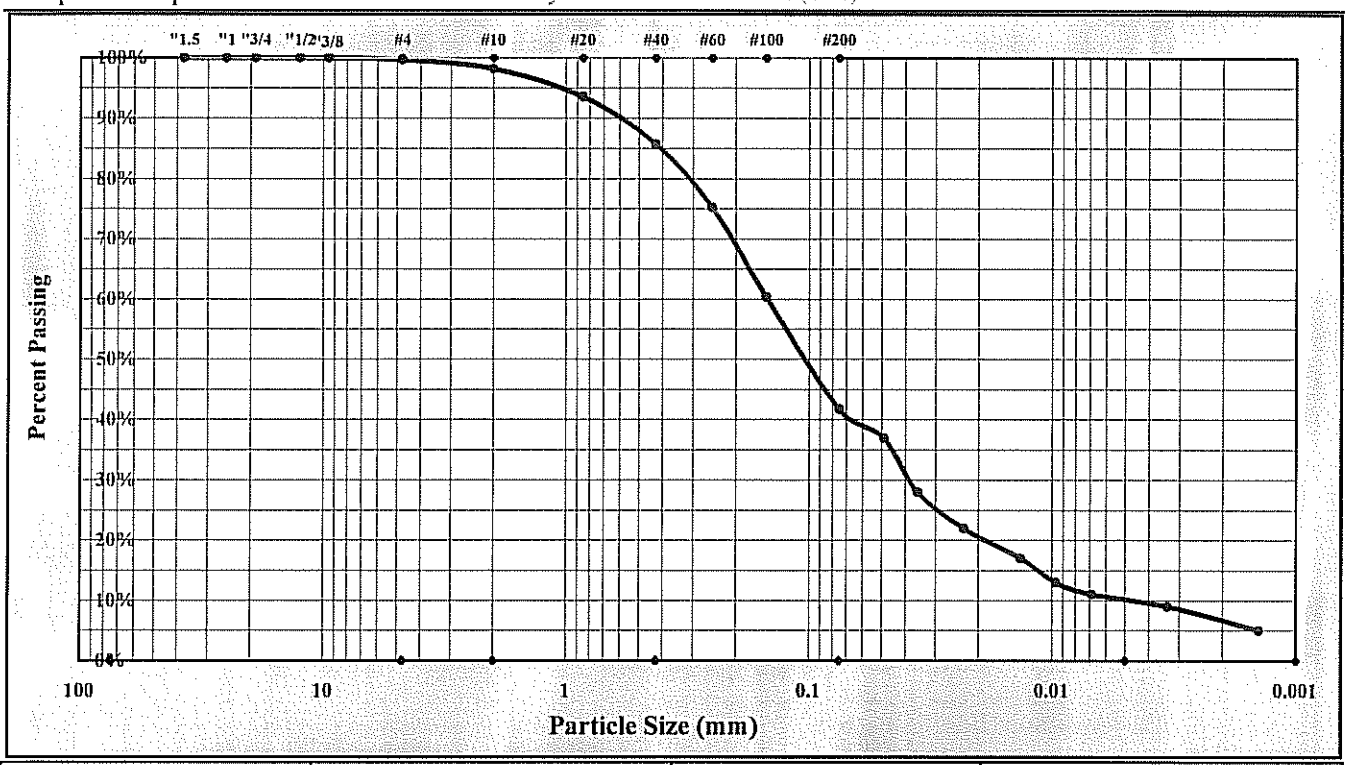
S&ME

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122	Report Date:	7/16/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	7/11-16/10
Client Name:	Duke Energy		
Address:			
Boring #:	PC	Sample #: 1	Sample Date: 6/28/10
Location:	PC Stockpile	Offset:	Elevation: East
Sample Description:	Pink Brown Silty Coarse to Fine Sand (SM)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.3%	Silt	31.8%
Silt & Clay (% Passing #200):	41.8%	Total Sand:	57.9%	Clay	10.0%
rent Relative Density(Assumed)	2.650	Moisture Content		Colloids	4.0%
Liquid Limit	34	Plastic Limit	30	Plastic Index	4
Coarse Sand:	1.5%	Medium Sand:	12.5%	Fine Sand:	43.9%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. — Dispersing Agent: Sodium Hexametaphosphate: 40 g./Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

Will Harrison		Staff Professional	11/16/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

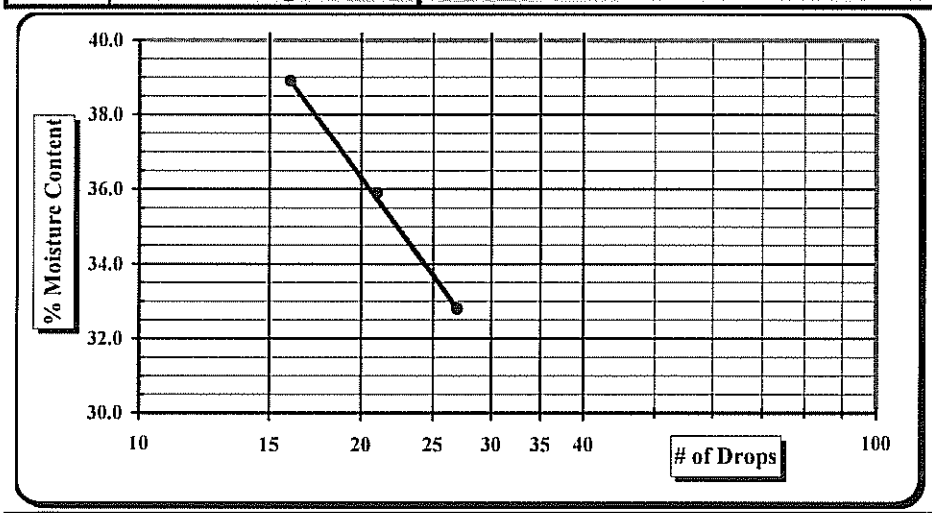
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	7/20/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s)	7/17-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #:	PC	Sample #: 1	Sample Date: 6/28/10
Location:	PC Stockpile	Offset:	Elevation: East
Sample Description:	Pink Brown Silty Coarse to Fine Sand (SM)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3966	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	P-25	P-10	37				KK	60	
A	Tare Weight	15.76	15.90	15.93				16.07	13.86	
B	Wet Soil Weight + A	28.06	28.77	27.28				22.68	20.16	
C	Dry Soil Weight + A	25.02	25.37	24.10				21.17	18.71	
D	Water Weight (B-C)	3.04	3.40	3.18				1.51	1.45	
E	Dry Soil Weight (C-A)	9.26	9.47	8.17				5.10	4.85	
F	% Moisture (D/E)*100	32.8%	35.9%	38.9%				29.6%	29.9%	
N	# OF DROPS	27	21	16				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**29.8%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	34
Plastic Limit	30
Plastic Index	4
Group Symbol	SM
Multipoint Method	☑
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

*Protective Cover and CSL Stockpile

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/16/2010	Will Harrison	11/16/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	7/17/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	7/11-17/10
Client Name:	Duke Energy	Address:	
Boring #:	PC	Sample #: 2	Sample Date: 6/28/10
Location:	PC Stockpile	Offset:	Elevation: West
Sample Description:	Pink Brown Silty Coarse to Fine Sand (SM) w/ Mica		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.650**	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):		377.53		Tare #	25		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:		377.53	A	Tare Wt.	14.34		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):		50.06	B	Wet Wt. + A	24.75		1/2"	0.0		100.0%
Total Sample Oven Dried:		373.23	C	Dry Wt. + A	24.63		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):		49.48	D	Water Wt. (B-C)	0.12		#4	1.2		99.7%
% Passing #10:		98.7%	E	Dry Wt. (C-A)	10.29		#10	4.8	100.0%	98.7%
Correction Factor a (Table 1):		1.00		% Moisture (100 x D/E)	1.17%		#20	1.2	97.7%	96.4%
							#40	4.7	90.5%	89.4%
							#60	10.2	79.4%	78.4%
							#100	18.0	63.6%	62.8%
							#200	29.3	40.7%	40.2%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. *Cal. Date:* Hydrometer: *ID No.* *Cal. Date:*

Control Cylinder ☒ **Composite Correction** ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
2	21.0	19.0	4.5		14.50	29.3%	28.9%	13.9	0.01348	0.03556
5	21.0	15.0	4.5		10.50	21.2%	20.9%	14.6	0.01348	0.02301
15	21.0	12.0	4.5		7.50	15.2%	15.0%	15.1	0.01348	0.01351
30	21.0	11.0	4.5		6.50	13.1%	13.0%	15.2	0.01348	0.00960
60	21.0	10.5	4.5		6.00	12.1%	12.0%	15.3	0.01348	0.00681
250	21.5	8.5	4.5		4.00	8.1%	8.0%	15.6	0.01340	0.00335
1440	21.0	7.5	4.5		3.00	6.1%	6.0%	15.8	0.01348	0.00141
					#VALUE!	#VALUE!	6.0%	#VALUE!	#N/A	#N/A

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	Will Harrison	Staff Professional	11/15/2010
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

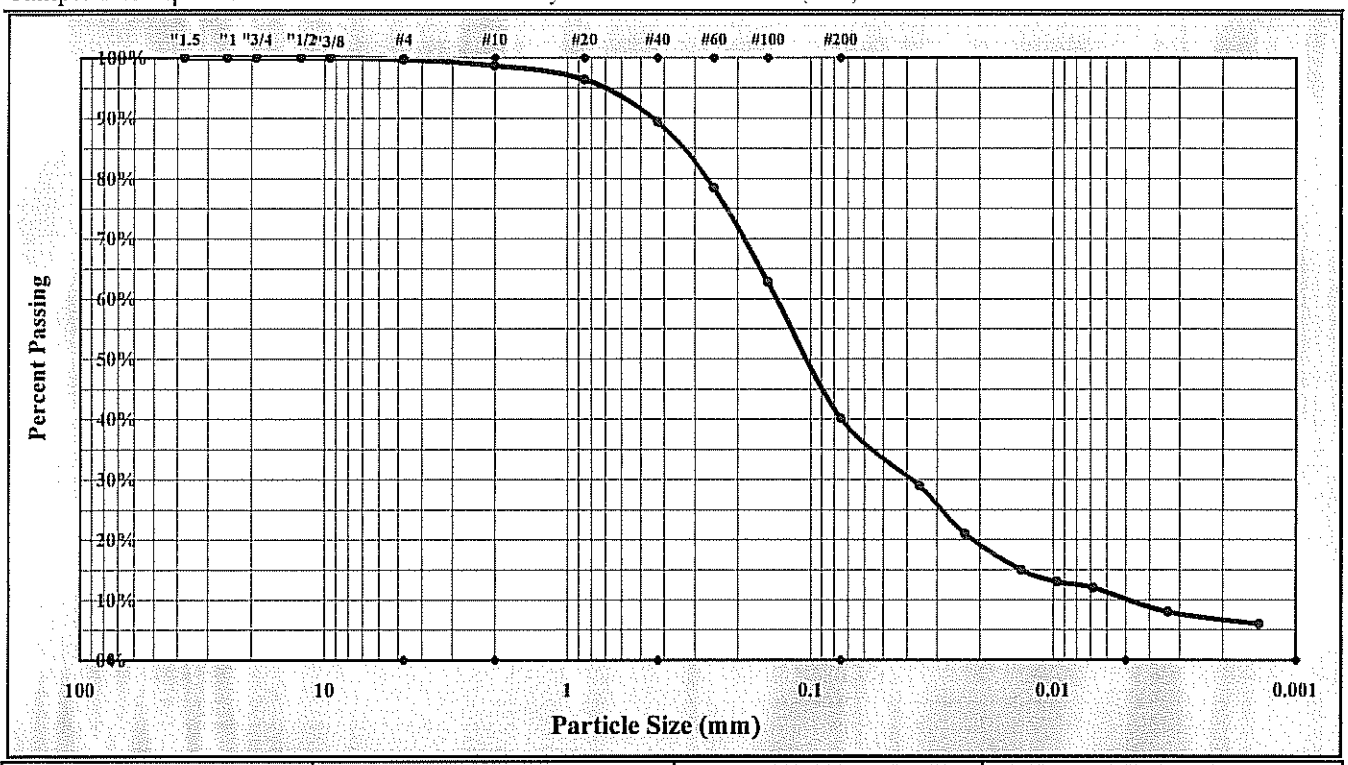
S&ME

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	7/17/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s):	7/11-17/10
Client Name:	Duke Energy		
Address:			
Boring #:	PC	Sample #: 2	Sample Date: 6/28/10
Location:	PC Stockpile	Offset:	Elevation: West
Sample Description:	Pink Brown Silty Coarse to Fine Sand (SM) w/ Mica		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.3%	Silt	30.2%
Silt & Clay (% Passing #200):	40.2%	Total Sand:	59.5%	Clay	10.0%
rent Relative Density(Assumed)	2.650	Moisture Content		Colloids	6.0%
Liquid Limit	39	Plastic Limit	36	Plastic Index	3
Coarse Sand:	1.0%	Medium Sand:	9.4%	Fine Sand:	49.2%

Description of Sand and Gravel Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion **Dispersion Period:** 1 min. **Dispersing Agent:** Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

Will Harrison		Staff Professional	11/15/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

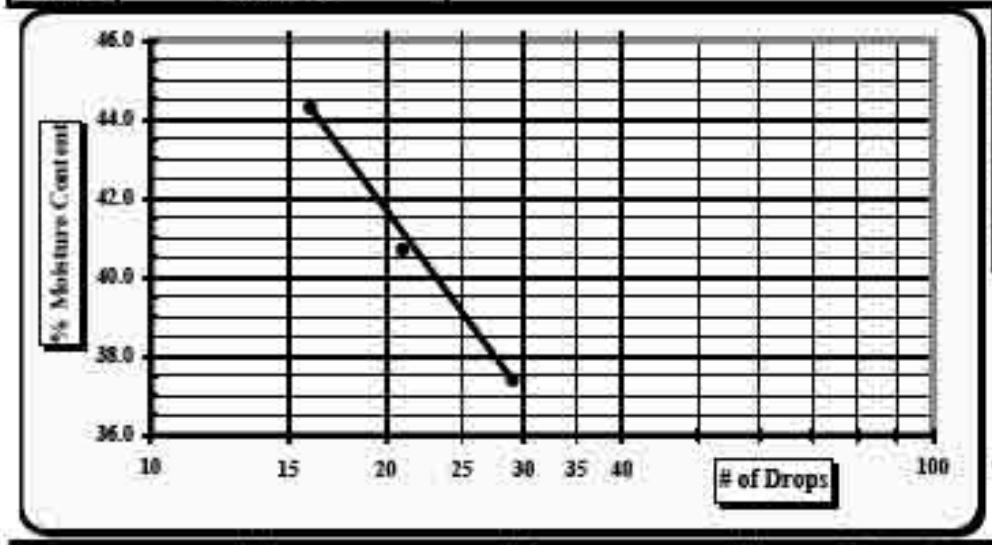
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	7/20/10
Project Name:	Marshall Steam Station-Industrial Landfill No.1	Test Date(s)	7/17-20/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

Boring #: PC Sample #: 2 Sample Date: 6/28/10
Location: PC Stockpile Offset: Elevation: West
Sample Description: Pink Brown Silty Coarse to Fine Sand (SM) w/Mica

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3966	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	PO	CC	51				OO	40	
A	Tare Weight	15.19	16.77	15.75				16.88	15.79	
B	Wet Soil Weight + A	25.43	27.87	26.08				23.85	21.91	
C	Dry Soil Weight + A	22.64	24.66	22.91				21.99	20.28	
D	Water Weight (B-C)	2.79	3.21	3.17				1.86	1.63	
E	Dry Soil Weight (C-A)	7.45	7.89	7.16				5.11	4.49	
F	% Moisture (D/E)*100	37.4%	40.7%	44.3%				36.4%	36.3%	
N	# OF DROPS	29	21	16				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							36.4%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	39
Plastic Limit	36
Plastic Index	3
Group Symbol	SM
Multipoint Method	☑
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:
*Protective Cover and CSL Stockpile

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner — *Technician Name* — 11/15/2010 — *Date*
Will Harrison — *Technical Responsibility* — 11/15/2010 — *Date*

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Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	8/3/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	7/15-8/2/10
Client Name:	Duke Energy	Address:	Marshall Steam Station
Boring #:	PC	Sample #: 3	Sample Date: 7/14/10
Location:	PC Stockpile	Offset:	Elevation: Bulk
Sample Description:	Tan Brown Silty Coarse to Fine Sand (SM)		

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.650**		Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:								3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural		1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	325.84			Tare #	Phi			1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	325.84		A	Tare Wt.	14.62			3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.00		B	Wet Wt. + A	26.25			1/2"	0.0		100.0%
Total Sample Oven Dried:	323.37		C	Dry Wt. + A	26.16			3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):	49.61		D	Water Wt. (B-C)	0.09			#4	0.7		99.8%
% Passing #10:	98.0%		E	Dry Wt. (C-A)	11.54			#10	6.5	100.0%	98.0%
Correction Factor a (Table 1):	1.00			% Moisture (100 x D/E)	0.78%			#20	3.1	93.8%	91.9%
								#40	9.8	80.2%	78.6%
								#60	19.3	61.0%	59.8%
								#100	31.3	37.0%	36.2%
								#200	37.9	23.5%	23.1%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: *ID No.* 20455 *Cal. Date:* 1/20/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type:** **151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	22.0	15.0	5.0		10.00	20.2%	19.7%	14.7	0.01332	0.05099
2	22.0	12.0	5.0		7.00	14.1%	13.8%	15.1	0.01332	0.03666
5	22.0	10.5	5.0		5.50	11.1%	10.9%	15.4	0.01332	0.02337
15	22.0	9.5	5.0		4.50	9.1%	8.9%	15.6	0.01332	0.01357
30	22.0	9.0	5.0		4.00	8.1%	7.9%	15.6	0.01332	0.00962
60	22.0	8.0	5.0		3.00	6.0%	5.9%	15.8	0.01332	0.00684
250	22.0	7.5	5.0		2.50	5.0%	4.9%	15.9	0.01332	0.00336
1440	22.0	6.5	5.0		1.50	3.0%	3.0%	16.0	0.01332	0.00141

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	William Harrison	Staff Professional	11/15/2010
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

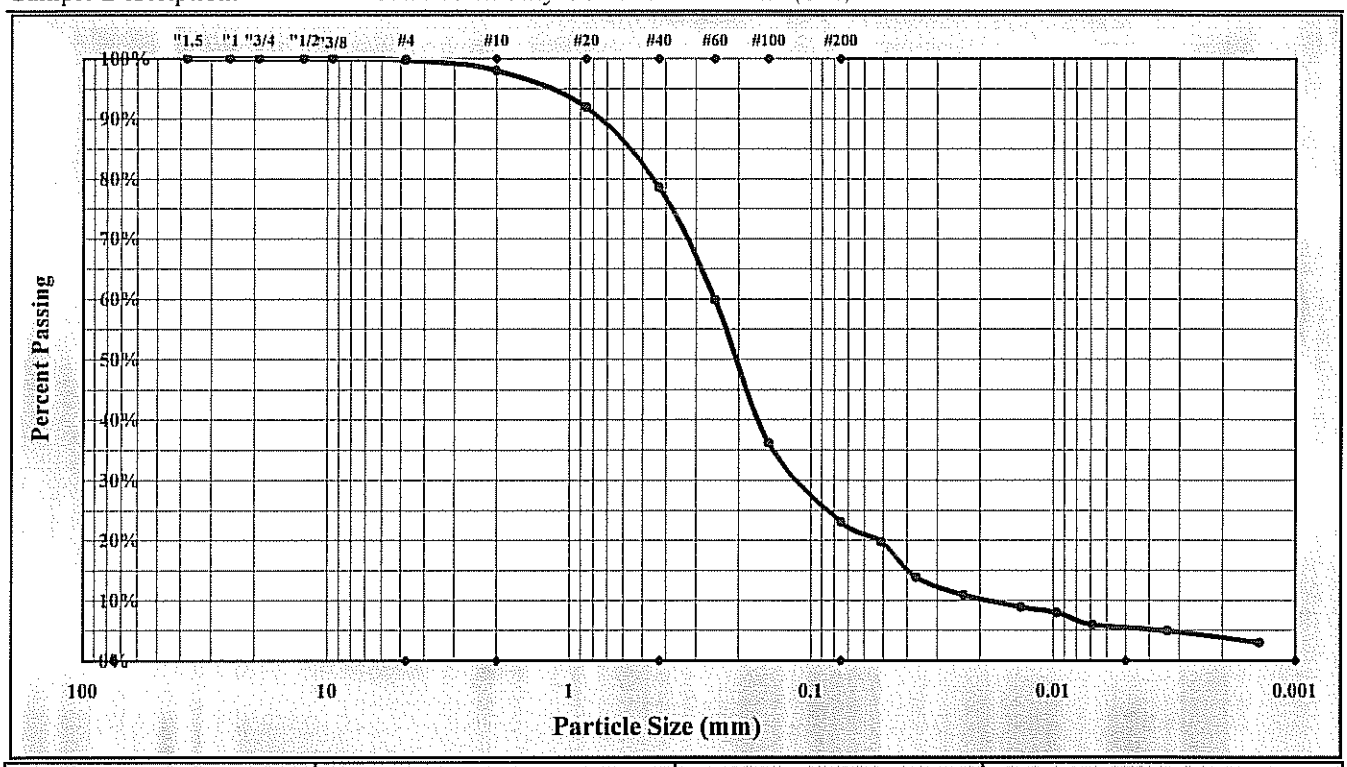
S&ME

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	8/3/10
Project Name:	Marshall Stream Station - Industrial Landfill No.1	Test Date(s):	7/15-8/2/10
Client Name:	Duke Energy		
Address:	Marshall Steam Station		
Boring #:	PC	Sample #: 3	Sample Date: 7/14/10
Location:	PC Stockpile	Offset:	Elevation: Bulk
Sample Description:	Tan Brown Silty Coarse to Fine Sand (SM)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.2%	Silt	17.6%
Silt & Clay (% Passing #200):	23.1%	Total Sand:	76.7%	Clay	5.5%
ent Relative Density (Assumed)	2.650	Moisture Content		Colloids	3.0%
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	1.8%	Medium Sand:	19.4%	Fine Sand:	55.5%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion **Dispersion Period:** 1 min. **Dispersing Agent:** Sodium Hexametaphosphate: 40 g/Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

William Harrison	[signature]	Staff Professional	11/15/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	8/3/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	7/15-8/3/10
Client Name:	Duke Energy		
Client Address:	Marshall Steam Station		

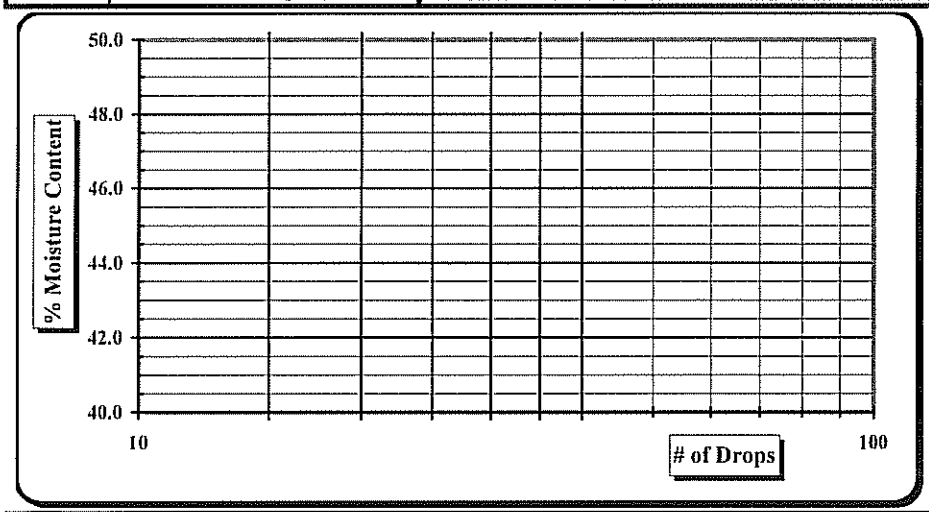
Boring #: PC Sample #: 3 Sample Date: 7/14/10

Location: PC Stockpile Offset: Elevation: Bulk

Sample Description: Tan Brown Silty Coarse to Fine Sand (SM)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:									
A	Tare Weight									
B	Wet Soil Weight + A									
C	Dry Soil Weight + A									
D	Water Weight (B-C)									
E	Dry Soil Weight (C-A)									
F	% Moisture (D/E)*100									
N	# OF DROPS							*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*									



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic ☒
Liquid Limit
Plastic Limit
Plastic Index
Group Symbol SM

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/2010	William Harrison	11/15/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	8/12-25/10
Client Name:	Duke Energy	Address:	
Boring #:	PC	Sample #: 4	Sample Date:
Location:	PC Stockpile	Offset:	Elevation: Bulk
Sample Description:	Reddish Brown Micaceous Medium to Fine Sandy Silt (ML)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.650**			
Hydrometer Jar #:									
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural			
Total Sample Air Dried Wt. + tare wt. (grams):		318.53		Tare #	11				
Weight of Total Sample Air Dried:		318.53	A	Tare Wt.	13.90				
Weight of Air Dried Hydrometer Sample (g):		50.00	B	Wet Wt. + A	24.09				
Total Sample Oven Dried:		316.66	C	Dry Wt. + A	24.03				
Hydrometer Sample Oven Dried (W):		49.71	D	Water Wt. (B-C)	0.06				
% Passing #10:		99.6%	E	Dry Wt. (C-A)	10.13				
Correction Factor a (Table 1):		1.00		% Moisture (100 x D/E)	0.59%				

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	1.4	100.0%	99.6%
#20	1.8	96.3%	95.9%
#40	4.6	90.8%	90.4%
#60	8.5	82.9%	82.6%
#100	15.8	68.2%	67.8%
#200	24.2	51.3%	51.0%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3996 *Cal. Date:* 2/3/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	23.5	28.0	4.0		24.00	48.3%	48.1%	12.4	0.01309	0.04602
2	23.5	24.0	4.0		20.00	40.2%	40.1%	13.0	0.01309	0.03339
5	23.5	20.0	4.0		16.00	32.2%	32.0%	13.7	0.01309	0.02164
15	23.5	16.0	4.0		12.00	24.1%	24.0%	14.3	0.01309	0.01279
30	23.5	15.0	4.0		11.00	22.1%	22.0%	14.5	0.01309	0.00910
60	23.5	11.0	4.0		7.00	14.1%	14.0%	15.1	0.01309	0.00658
250	23.5	9.0	4.0		5.00	10.1%	10.0%	15.5	0.01309	0.00326
1440	23.0	7.5	4.0		3.50	7.0%	7.0%	15.7	0.01317	0.00138

References / Comments / Deviations

Karen Warner	NICET 117900	Will Harrison	Staff Professional	11/15/2010
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

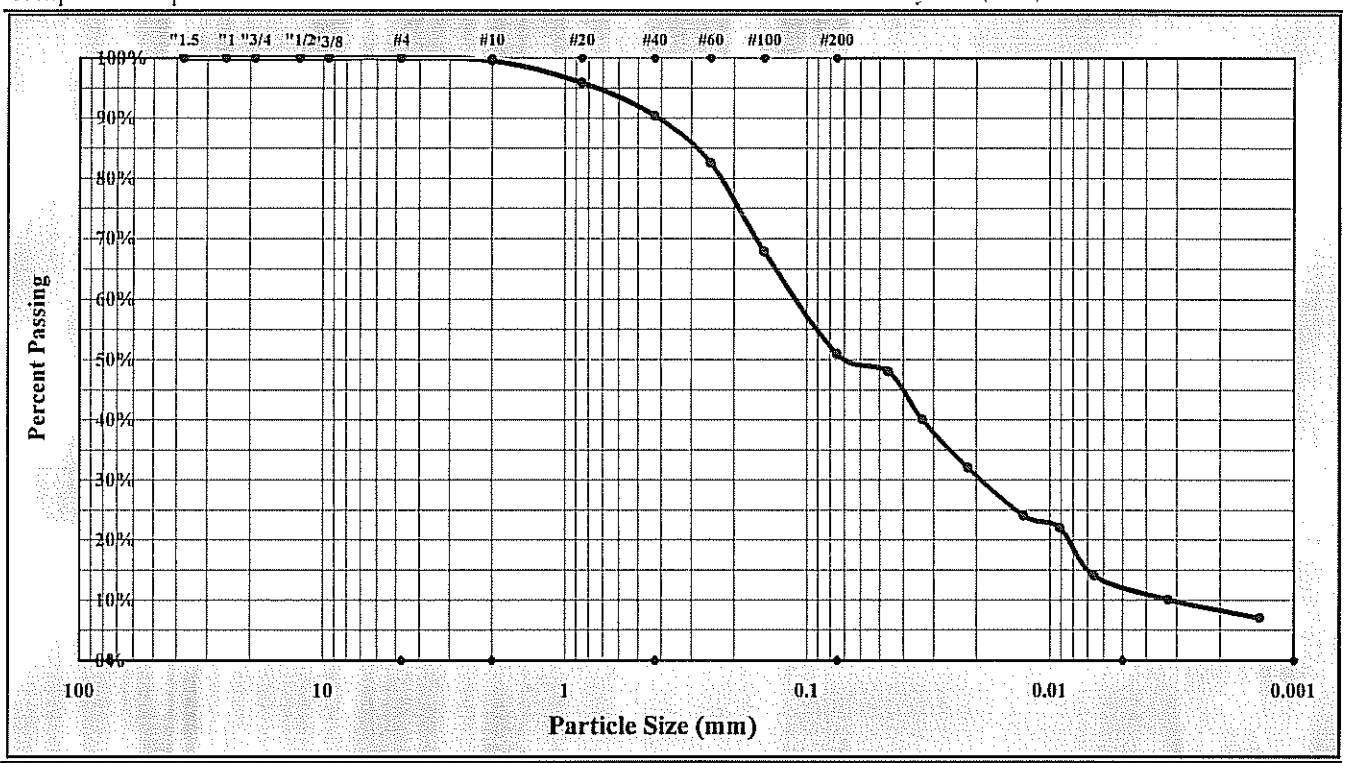
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	8/12-25/10
Client Name:	Duke Energy		
Address:			
Boring #:	PC	Sample #: 4	Sample Date:
Location:	PC Stockpile	Offset:	Elevation: Bulk
Sample Description:	Reddish Brown Micaceous Medium to Fine Sandy Silt (ML)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	39.5%
Silt & Clay (% Passing #200):	51.0%	Total Sand:	49.0%	Clay	11.5%
rent Relative Density(Assumed)	2.650	Moisture Content		Colloids	7.5%
Liquid Limit	46	Plastic Limit	37	Plastic Index	9
Coarse Sand:	0.4%	Medium Sand:	9.2%	Fine Sand:	39.4%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

Will Harrison	[signature]	Staff Professional	11/15/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	8/12-25/10
Client Name:	Duke Energy		
Client Address:			

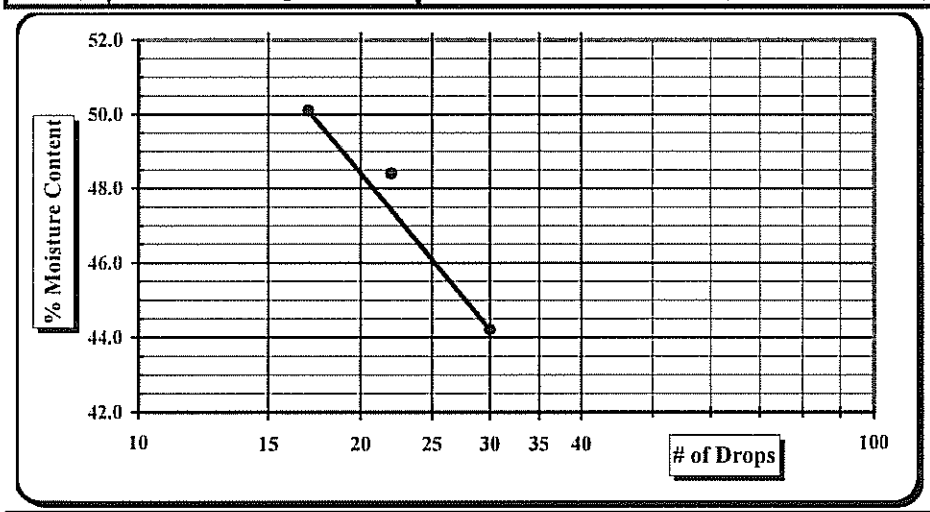
Boring #: PC Sample #: 4 Sample Date:

Location: PC Stockpile Offset: Elevation: Bulk

Sample Description: Reddish Brown Micaceous Medium to Fine Sandy Silt (ML)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	9	PP	NN				P1	P16	
A	Tare Weight	13.92	16.17	15.34				12.56	12.59	
B	Wet Soil Weight + A	24.04	26.11	24.54				20.52	18.86	
C	Dry Soil Weight + A	20.94	22.87	21.47				18.37	17.14	
D	Water Weight (B-C)	3.10	3.24	3.07				2.15	1.72	
E	Dry Soil Weight (C-A)	7.02	6.70	6.13				5.81	4.55	
F	% Moisture (D/E)*100	44.2%	48.4%	50.1%				37.0%	37.8%	
N	# OF DROPS	30	22	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**37.4%**		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	46
Plastic Limit	37
Plastic Index	9
Group Symbol	ML

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/2010	Will Harrison	11/15/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122 Phase 09	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	8/12-25/10
Client Name:	Duke Energy	Address:	
Boring #:	PC	Sample #: 5	Sample Date:
Location:	PC Stockpile	Offset:	Elevation: Bulk
Sample Description:	Reddish Brown Micaceous Silty Coarse to Fine Sand (SM)		

Pan #:		Beaker #:		Apparent Relative Density(Assumed)		2.650	Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:							3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):				Moisture Content	Hygroscopic	Natural	1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):	393.86			Tare #	47		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:	393.86	A		Tare Wt.	15.69		3/4"	0.0		100.0%
Weight of Air Dried Hydrometer Sample (g):	50.07	B		Wet Wt. + A	27.43		1/2"	0.0		100.0%
Total Sample Oven Dried:	388.54	C		Dry Wt. + A	27.27		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):	49.39	D		Water Wt. (B-C)	0.16		#4	0.0		100.0%
% Passing #10:	99.0%	E		Dry Wt. (C-A)	11.58		#10	3.7	100.0%	99.0%
Correction Factor a (Table 1):	1.00			% Moisture (100 x D/E)	1.38%		#20	2.2	95.5%	94.6%
							#40	5.5	88.9%	88.1%
							#60	10.2	79.4%	78.6%
							#100	16.5	66.6%	66.0%
							#200	26.9	45.5%	45.0%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3996 *Cal. Date:* 2/3/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	23.5	25.0	4.0		21.00	42.5%	42.1%	12.9	0.01309	0.04693
2	23.5	21.0	4.0		17.00	34.4%	34.1%	13.5	0.01309	0.03402
5	23.5	19.0	4.0		15.00	30.4%	30.1%	13.8	0.01309	0.02177
15	23.5	14.0	4.0		10.00	20.2%	20.1%	14.7	0.01309	0.01294
30	23.5	12.0	4.0		8.00	16.2%	16.0%	15.0	0.01309	0.00925
60	23.5	10.5	4.0		6.50	13.2%	13.0%	15.2	0.01309	0.00659
250	23.5	8.0	4.0		4.00	8.1%	8.0%	15.6	0.01309	0.00327
1440	23.0	6.5	4.0		2.50	5.1%	5.0%	15.9	0.01317	0.00138

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	Will Harrison	Staff Professional	1/11/2011
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

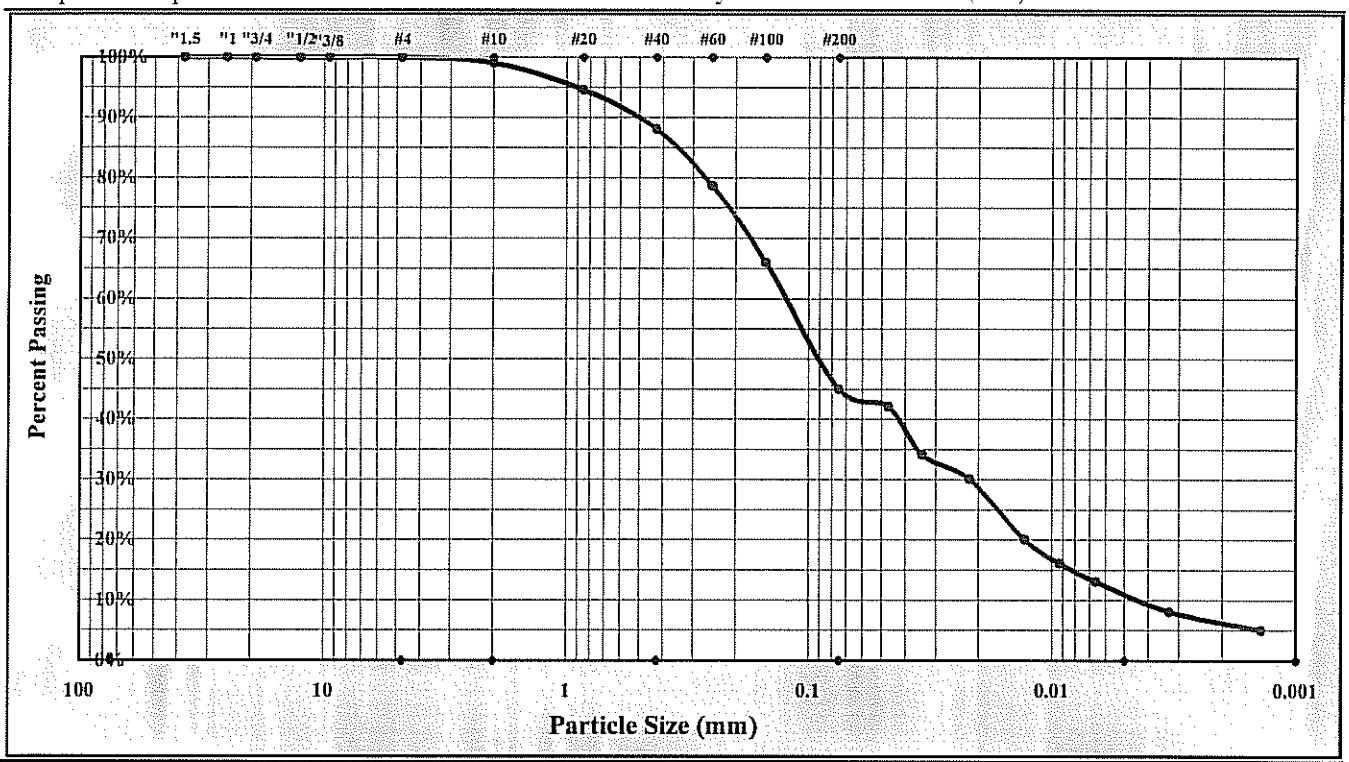
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	8/12-25/10
Client Name:	Duke Energy		
Address:			
Boring #:	PC	Sample #: 5	Sample Date:
Location:	PC Stockpile	Offset:	Elevation: Bulk
Sample Description:	Reddish Brown Micaceous Silty Coarse to Fine Sand (SM)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	34.0%
Silt & Clay (% Passing #200):	45.0%	Total Sand:	55.0%	Clay	11.0%
rent Relative Density(Assumed)	2.650	Moisture Content		Colloids	4.5%
Liquid Limit	48	Plastic Limit	38	Plastic Index	10
Coarse Sand:	1.0%	Medium Sand:	11.0%	Fine Sand:	43.0%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — **Dispersion Period:** 1 min. **Dispersing Agent:** Sodium Hexametaphosphate: 40 g / Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

Will Harrison	[signature]	Staff Professional	11/15/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

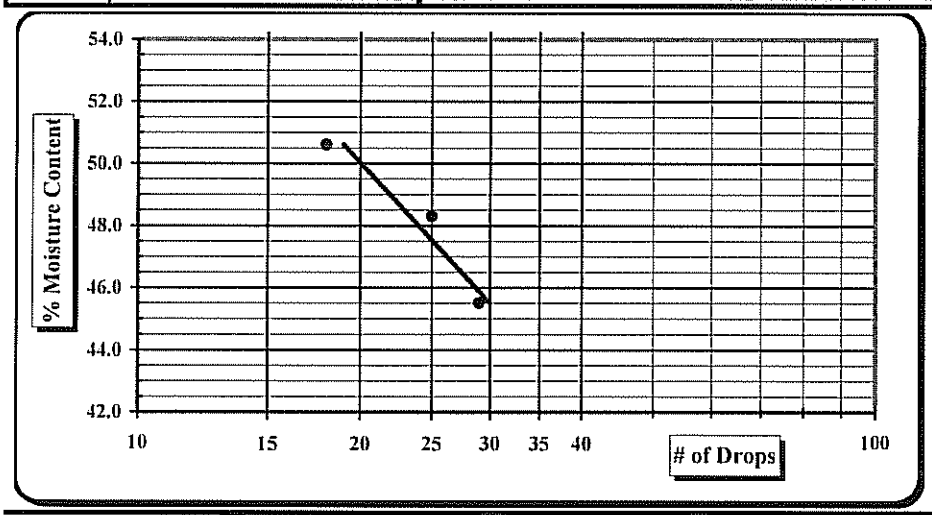
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	8/12-25/10
Client Name:	Duke Energy		
Client Address:			

Boring #:	PC	Sample #: 5		Sample Date:	
Location:	PC Stockpile	Offset:		Elevation: Bulk	
Sample Description:	Reddish Brown Micaceous Silty Coarse to Fine Sand (SM)				

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	58	13	FF				60	P3	
A	Tare Weight	13.98	14.01	16.88				13.87	12.60	
B	Wet Soil Weight + A	23.74	24.18	25.69				21.86	18.65	
C	Dry Soil Weight + A	20.69	20.87	22.73				19.68	16.99	
D	Water Weight (B-C)	3.05	3.31	2.96				2.18	1.66	
E	Dry Soil Weight (C-A)	6.71	6.86	5.85				5.81	4.39	
F	% Moisture (D/E)*100	45.5%	48.3%	50.6%				37.5%	37.8%	
N	# OF DROPS	29	25	18				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							37.7%		



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	48
Plastic Limit	38
Plastic Index	10
Group Symbol	SM
Multipoint Method	☑
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/2010	Will Harrison	11/15/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	8/12-25/10
Client Name:	Duke Energy	Address:	
Boring #:	PC	Sample #: 6	Sample Date:
Location:	PC Stockpile	Offset:	Elevation: Bulk
Sample Description:	Reddish Brown Micaceous Coarse to Fine Sandy Silt (ML)		

Pan #:		Beaker #:		**Apparent Relative Density(Assumed)**		**2.650**			
Hydrometer Jar #:									
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural			
Total Sample Air Dried Wt. + tare wt. (grams):		433.22		Tare #	TX				
Weight of Total Sample Air Dried:		433.22	A	Tare Wt.	15.77				
Weight of Air Dried Hydrometer Sample (g):		50.05	B	Wet Wt. + A	26.94				
Total Sample Oven Dried:		429.78	C	Dry Wt. + A	26.85				
Hydrometer Sample Oven Dried (W):		49.65	D	Water Wt. (B-C)	0.09				
% Passing #10:		98.4%	E	Dry Wt. (C-A)	11.08				
Correction Factor a (Table 1):		1.00		% Moisture (100 x D/E)	0.81%				

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	2.4		99.4%
#10	6.8	100.0%	98.4%
#20	1.4	97.1%	95.6%
#40	4.3	91.3%	89.9%
#60	8.1	83.6%	82.3%
#100	14.5	70.7%	69.6%
#200	24.5	50.6%	49.8%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3996 *Cal. Date:* 2/3/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	23.5	27.0	4.0		23.00	46.3%	45.6%	12.5	0.01309	0.04632
2	23.5	24.0	4.0		20.00	40.3%	39.7%	13.0	0.01309	0.03339
5	23.5	19.5	4.0		15.50	31.2%	30.7%	13.8	0.01309	0.02171
15	23.5	15.0	4.0		11.00	22.2%	21.8%	14.5	0.01309	0.01287
30	23.5	13.0	4.0		9.00	18.1%	17.8%	14.8	0.01309	0.00920
60	23.5	11.0	4.0		7.00	14.1%	13.9%	15.1	0.01309	0.00658
250	23.5	8.5	4.0		4.50	9.1%	8.9%	15.6	0.01309	0.00327
1440	23.0	7.0	4.0		3.00	6.0%	5.9%	15.8	0.01317	0.00138

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	Will Harrison	Staff Professional	11/15/2010
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

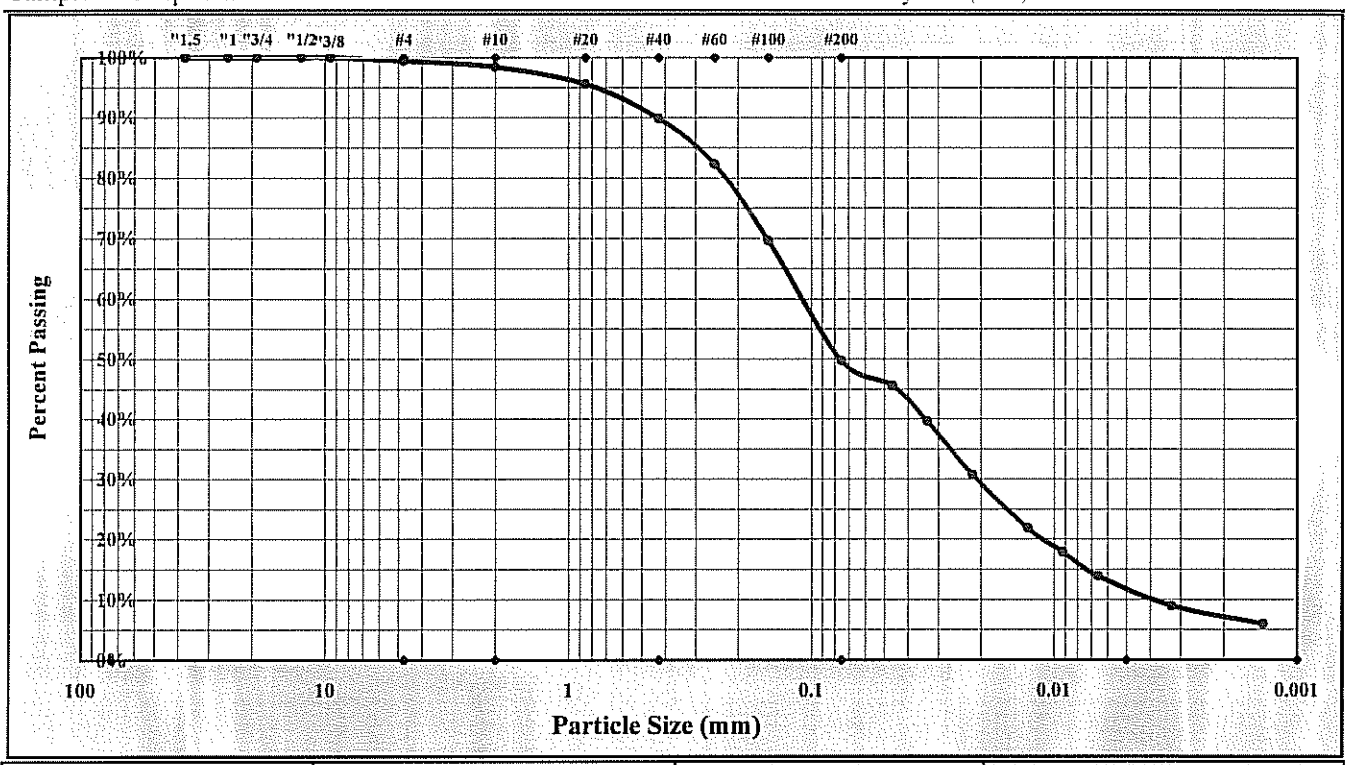
S&ME

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	8/12-25/10
Client Name:	Duke Energy		
Address:			
Boring #:	PC	Sample #: 6	Sample Date:
Location:	PC Stockpile	Offset:	Elevation: Bulk
Sample Description:	Reddish Brown Micaceous Coarse to Fine Sandy Silt (ML)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.6%	Silt	37.3%
Silt & Clay (% Passing #200):	49.8%	Total Sand:	49.7%	Clay	12.5%
rent Relative Density(Assumed)	2.650	Moisture Content		Colloids	6.0%
Liquid Limit	45	Plastic Limit	38	Plastic Index	7
Coarse Sand:	1.0%	Medium Sand:	8.5%	Fine Sand:	40.1%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — **Dispersion Period:** 1 min. **Dispersing Agent:** Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

Will Harrison		Staff Professional	11/15/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

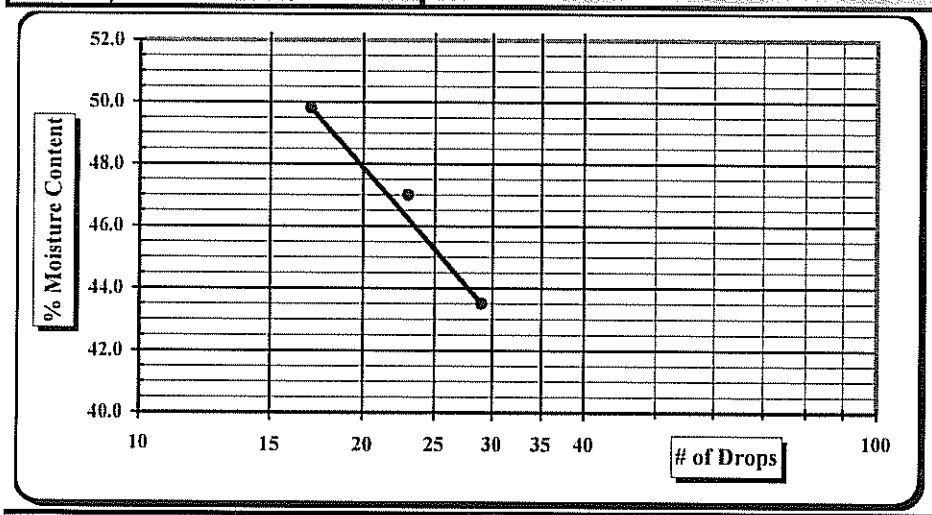
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	8/12-25/10
Client Name:	Duke Energy		
Client Address:			

Boring #: PC	Sample #: 6	Sample Date:	
Location: PC Stockpile	Offset:	Elevation: Bulk	
Sample Description:	Reddish Brown Micaceous Coarse to Fine Sandy Silt (ML)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	X	EE	CC				36	35	
A	Tare Weight	15.52	16.85	16.79				15.69	15.64	
B	Wet Soil Weight + A	24.52	29.02	27.86				23.46	23.16	
C	Dry Soil Weight + A	21.79	25.13	24.18				21.32	21.12	
D	Water Weight (B-C)	2.73	3.89	3.68				2.14	2.04	
E	Dry Soil Weight (C-A)	6.27	8.28	7.39				5.63	5.48	
F	% Moisture (D/E)*100	43.5%	47.0%	49.8%				38.0%	37.2%	
N	# OF DROPS	29	23	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							37.6%		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	45
Plastic Limit	38
Plastic Index	7
Group Symbol	ML

Multipoint Method ☑
One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	1/11/2010	Will Harrison	1/11/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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Form No. TR-D422-2
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

ASTM D 422

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	1356-08-122 Phase 09	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s):	8/12-25/10
Client Name:	Duke Energy	Address:	
Boring #:	PC	Sample #: 7	Sample Date:
Location:	Stockpile for Protective Cover	Offset:	Elevation: Bulk
Sample Description:	Reddish Brown Micaceous Silty Medium to Fine Sand (SM)		

Pan #:		Beaker #:		Apparent Relative Density(Assumed)	2.650
Hydrometer Jar #:					
Pan Tare Weight (grams):			Moisture Content	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):	402.54		Tare #	7	
Weight of Total Sample Air Dried:	402.54	A	Tare Wt.	15.71	
Weight of Air Dried Hydrometer Sample (g):	50.04	B	Wet Wt. + A	27.01	
Total Sample Oven Dried:	399.70	C	Dry Wt. + A	26.93	
Hydrometer Sample Oven Dried (W):	49.69	D	Water Wt. (B-C)	0.08	
% Passing #10:	99.6%	E	Dry Wt. (C-A)	11.22	
Correction Factor a (Table 1):	1.00		% Moisture (100 x D/E)	0.71%	

Sieve	Retained Wt.	Percent Passing	
3.0"	0.0	Pan # (washed)	100.0%
1.5"	0.0		100.0%
1.0"	0.0		100.0%
3/4"	0.0		100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	1.7	100.0%	99.6%
#20	2.8	94.5%	94.1%
#40	7.9	84.2%	83.8%
#60	13.9	72.1%	71.8%
#100	21.2	57.3%	57.0%
#200	28.1	43.4%	43.2%

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Stirring Apparatus: A ☐ B ☐ Dispersion Time: 1 min. Sodium Hexametaphosphate: 40 g./ Liter

Balance: ID No. 3996 *Cal. Date:* 2/3/2010 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/26/2010

Control Cylinder ☒ Composite Correction ☐ **Type: 151H** ☐ **152H** ☒

Time T (Min.)	Temp. (0.5 °C)	Hydrometer Reading	Corrections: Control Cylinder	Corrections: Composite Correction	Hydrometer R	Percent Passing: P(-#10) = (R x a / W) x 100	Percent Passing: P (total) = P x % Passing #10	Effective Depth L	Table 3 K	Diameter D = K x ((L/T)^1/2
1	23.5	25.0	4.0		21.00	42.3%	42.1%	12.9	0.01309	0.04693
2	23.5	21.0	4.0		17.00	34.2%	34.1%	13.5	0.01309	0.03402
5	23.5	17.0	4.0		13.00	26.2%	26.1%	14.2	0.01309	0.02203
15	23.5	13.0	4.0		9.00	18.1%	18.0%	14.8	0.01309	0.01301
30	23.5	11.0	4.0		7.00	14.1%	14.0%	15.1	0.01309	0.00930
60	23.5	10.0	4.0		6.00	12.1%	12.0%	15.3	0.01309	0.00661
250	23.5	8.0	4.0		4.00	8.1%	8.0%	15.6	0.01309	0.00327
1440	23.0	6.0	4.0		2.00	4.0%	4.0%	16.0	0.01317	0.00139

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	NICET 117900	Will Harrison	Staff Professional	1/15/2010
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

Particle Size Analysis of Soils

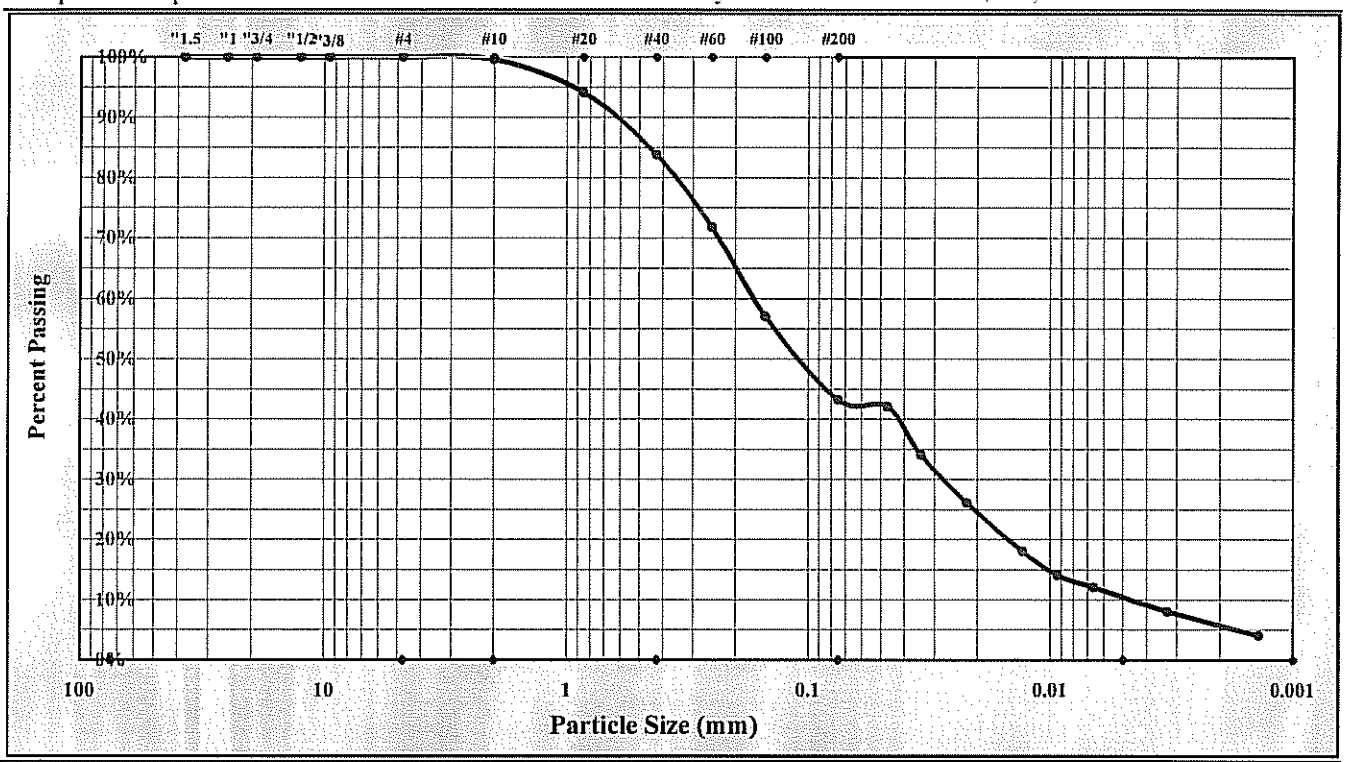
S&ME

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-08-122 Phase 09	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.I	Test Date(s):	8/12-25/10
Client Name:	Duke Energy		
Address:			
Boring #:	PC	Sample #: 7	Sample Date:
Location:	Stockpile for	Offset:	Elevation: Bulk
Sample Description:	Reddish Brown Micaceous Silty Medium to Fine Sand (SM)		



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and >2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size:	#4	Gravel:	0.0%	Silt	32.2%
Silt & Clay (% Passing #200):	43.2%	Total Sand:	56.8%	Clay	11.0%
rent Relative Density(Assumed)	2.650	Moisture Content		Colloids	4.0%
Liquid Limit	44	Plastic Limit	34	Plastic Index	10
Coarse Sand:	0.4%	Medium Sand:	15.8%	Fine Sand:	40.6%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Apparatus B: Air Jet Dispersion — **Dispersion Period:** 1 min. **Dispersing Agent:** Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: ASTM D 4318, D 854, D 2487

Will Harrison		Staff Professional	1/15/2010
Technical Responsibility	*Signature*	*Position*	*Date*

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Form No. TR-D4318-T89-90
Revision No. 0
Revision Date: 11/20/07

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ *Quality Assurance*

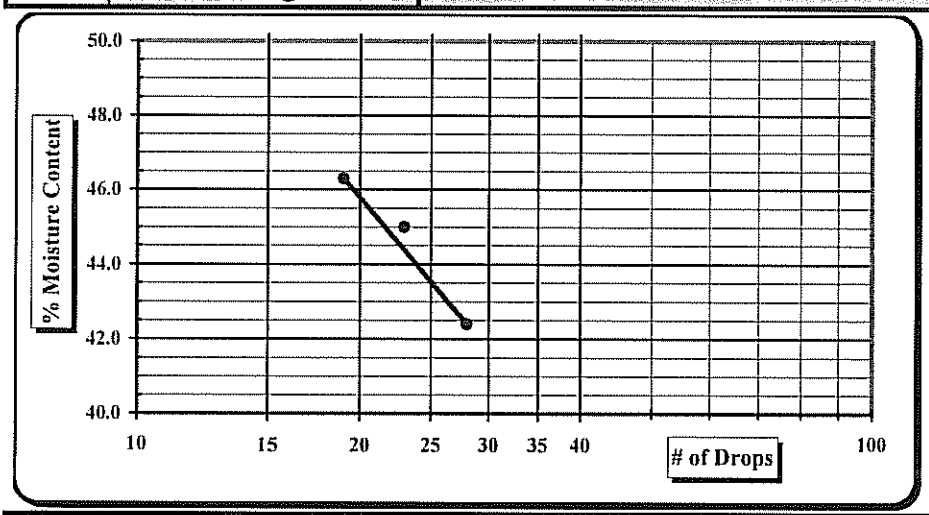
S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-08-122 Phase 09**	Report Date:	8/25/10
Project Name:	Marshall Steam Station - Industrial Landfill No.1	Test Date(s)	8/12-25/10
Client Name:	Duke Energy		
Client Address:			

Boring #:	PC	Sample #: 7		Sample Date:	
Location:	PC Stockpile	Offset:		Elevation: Bulk	
Sample Description:	Reddish Brown Micaceous Silty Medium to Fine Sand (SM)				

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/3/2010	Grooving tool	21587	2/28/2010
LL Apparatus	3611	10/20/2009	Grooving tool		
Oven	10844	9/4/2009	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	27	Y	20				48	30	
A	Tare Weight	13.91	15.44	13.90				13.99	15.90	
B	Wet Soil Weight + A	24.83	25.43	24.65				21.15	22.45	
C	Dry Soil Weight + A	21.58	22.33	21.25				19.30	20.79	
D	Water Weight (B-C)	3.25	3.10	3.40				1.85	1.66	
E	Dry Soil Weight (C-A)	7.67	6.89	7.35				5.31	4.89	
F	% Moisture (D/E)*100	42.4%	45.0%	46.3%				34.8%	33.9%	
N	# OF DROPS	28	23	19				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							34.4%		



One Point Liquid Limit

N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic	☐
Liquid Limit	44
Plastic Limit	34
Plastic Index	10
Group Symbol	SM
Multipoint Method	☑
One-point Method	☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner	11/15/2010	Will Harrison	11/15/2010
Technician Name	*Date*	*Technical Responsibility*	*Date*

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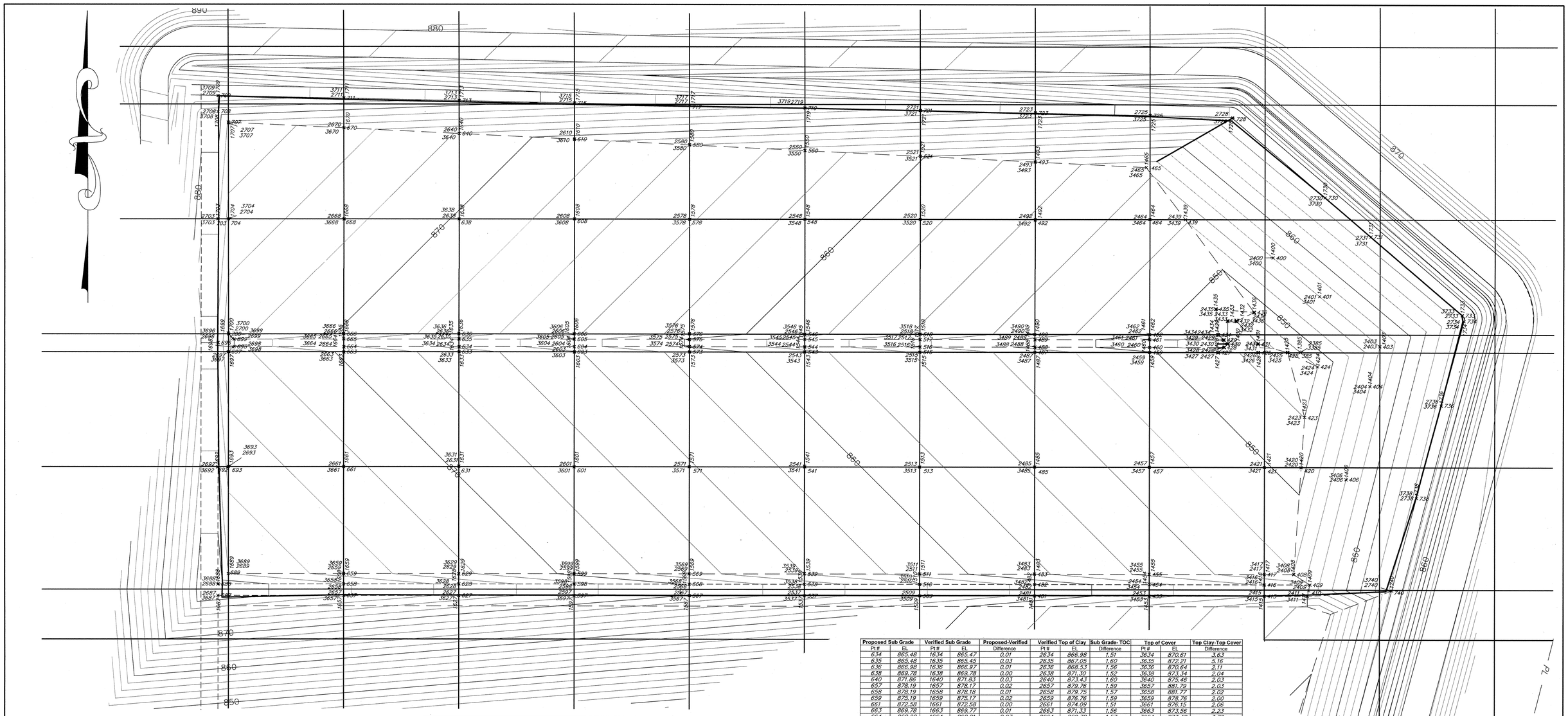
Cell 1 Protective Cover As-Built Drawing



Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	Verified Top of Clay		Sub Grade- TOC	Top of Cover		Top Clay-Top Cover
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference	Pt #	EL	Difference
385	848.00	1385	847.98	0.02	2385	849.55	1.57	3385	852.80	3.25
400	856.00	1400	855.91	0.09	2400	857.53	1.62	3400	858.83	2.30
401	856.00	1401	855.97	0.03	2401	857.52	1.55	3401	859.68	2.16
403	856.00	1403	855.96	0.04	2403	857.53	1.57	3403	862.25	4.72
404	856.00	1404	855.9	0.10	2404	857.55	1.65	3404	859.59	2.04
406	856.00	1406	855.92	0.08	2406	857.54	1.62	3406	859.69	2.15
408	852.07	1408	852.07	0.00	2408	853.60	1.53	3408	857.36	3.76
409	854.68	1409	854.68	0.00	2409	856.26	1.58	3409	858.92	2.66
410	854.71	1411	854.7	0.01	2411	856.24	1.54	3411	858.62	2.38
415	855.79	1415	855.74	0.05	2415	857.30	1.56	3415	859.33	2.03
416	855.79	1416	855.76	0.03	2416	857.32	1.56	3416	859.34	2.02
417	852.79	1417	852.78	0.01	2417	854.36	1.58	3417	856.73	2.37
420	849.28	1420	849.27	0.01	2420	850.83	1.56	3420	854.38	3.55
421	850.18	1421	850.17	0.01	2421	851.71	1.54	3421	854.38	2.67
423	847.98	1423	847.97	0.01	2423	849.56	1.59	3423	853.27	3.71
424	848.00	1424	847.98	0.02	2424	849.57	1.59	3424	852.74	3.17
425	846.82	1425	846.48	0.34	2425	848.36	1.88	3425	852.01	3.65
426	847.54	1426	847.47	0.07	2426	849.10	1.63	3426	851.93	2.83
427	848.50	1427	848.49	0.01	2427	850.00	1.51	3427	852.29	2.29
428	846.87	1428	846.85	0.02	2428	848.40	1.55	3428	852.29	3.89
429	846.87	1429	846.83	0.04	2429	848.40	1.57	3429	853.49	5.09
430	845.77	1430	845.76	0.01	2430	847.31	1.55	3430	853.29	5.98
431	845.04	1431	844.99	0.05	2431	846.59	1.60	3431	852.57	5.98
432	845.56	1432	845.53	0.03	2432	847.10	1.57	3432	853.15	6.05
433	845.77	1433	845.72	0.05	2433	847.27	1.55	3433	853.20	5.93
434	848.50	1434	848.44	0.06	2434	850.05	1.61	3434	853.02	2.97
435	849.20	1435	849.19	0.01	2435	850.76	1.57	3435	853.24	2.48
436	848.18	1436	848.18	0.00	2436	849.74	1.56	3436	853.14	3.40
439	852.12	1439	852.12	0.00	2439	853.68	1.56	3439	856.05	2.37
453	858.59	1453	858.58	0.01	2453	860.16	1.58	3453	862.17	2.01
454	858.59	1454	858.58	0.01	2454	860.10	1.52	3454	862.10	2.00
455	855.59	1455	855.59	0.00	2455	857.11	1.52	3455	859.14	2.03
457	852.98	1457	852.97	0.01	2457	854.55	1.58	3457	856.79	2.24
459	850.18	1459	850.16	0.02	2459	851.72	1.56	3459	854.49	2.77
460	848.68	1460	848.63	0.05	2460	850.20	1.57	3460	854.49	4.29
461	848.68	1461	848.65	0.03	2461	850.18	1.53	3461	854.90	4.72
462	850.18	1462	850.11	0.07	2462	851.69	1.58	3462	854.31	2.62
464	853.11	1464	853.1	0.01	2464	854.66	1.56	3464	856.67	2.01
465	854.34	1465	854.33	0.01	2465	855.92	1.59	3465	858.17	2.25
481	861.39	1481	861.39	0.00	2481	862.89	1.50	3481	864.92	2.03
482	861.39	1482	861.33	0.06	2482	862.89	1.56	3482	864.90	2.01
483	858.39	1483	858.38	0.01	2483	859.97	1.59	3483	861.97	2.00
485	855.78	1485	855.74	0.04	2485	857.30	1.56	3485	859.51	2.21
487	852.98	1487	852.98	0.00	2487	854.55	1.57	3487	856.65	2.10
488	851.48	1488	851.42	0.06	2488	853.06	1.64	3488	856.76	3.70
489	851.48	1489	851.46	0.02	2489	853.06	1.60	3489	858.30	5.24
490	852.88	1490	852.97	0.01	2490	854.52	1.55	3490	856.69	2.17

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	Verified Top of Clay		Sub Grade- TOC	Top of Cover		Top Clay-Top Cover
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference	Pt #	EL	Difference
492	855.78	1492	855.78	0.00	2492	857.31	1.53	3492	859.33	2.02
493	857.18	1493	857.18	0.00	2493	858.75	1.57	3493	860.79	2.04
509	864.19	1509	864.19	0.00	2509	865.76	1.57	3509	867.77	2.01
510	864.19	1510	864.17	0.02	2510	865.77	1.60	3510	867.80	2.03
511	861.19	1511	861.19	0.00	2511	862.76	1.57	3511	864.94	2.18
513	858.58	1513	858.57	0.01	2513	860.12	1.55	3513	862.12	2.00
515	855.78	1515	855.76	0.02	2515	857.31	1.55	3515	859.33	2.02
516	854.28	1516	854.2	0.08	2516	855.94	1.64	3516	859.54	3.70
517	854.28	1517	854.21	0.07	2517	855.86	1.65	3517	861.05	5.19
518	855.78	1518	855.76	0.02	2518	857.35	1.59	3518	859.47	2.12
520	858.58	1520	858.56	0.02	2520	860.14	1.58	3520	862.19	2.05
521	860.12	1521	860.07	0.05	2521	861.63	1.56	3521	863.69	2.06
537	866.99	1537	866.92	0.07	2537	868.50	1.58	3537	870.50	2.00
538	866.99	1538	866.91	0.08	2538	868.53	1.62	3538	870.56	2.03
539	863.99	1539	863.99	0.00	2539	865.54	1.55	3539	867.56	2.02
541	861.38	1541	861.33	0.05	2541	862.96	1.63	3541	864.96	2.00
543	858.58	1543	858.56	0.02	2543	860.08	1.52	3543	862.43	2.35
544	857.08	1544	857.00	0.08	2544	858.60	1.60	3544	862.41	3.81
545	857.08	1545	857.03	0.05	2545	858.59	1.56	3545	863.70	5.11
546	858.58	1546	858.56	0.02	2546	860.13	1.57	3546	862.23	2.10
548	861.38	1548	861.38	0.00	2548	862.96	1.58	3548	864.99	2.03
550	863.05	1550	863.04	0.01	2550	864.60	1.56	3550	866.61	2.01
567	869.79	1567	869.76	0.03	2567	871.29	1.53	3567	873.30	2.01
568	869.79	1568	869.77	0.02	2568	871.35	1.58	3568	873.41	2.06
569	866.79	1569	866.78	0.01	2569	868.35	1.57	3569	870.35	2.00
571	864.18	1571	864.18	0.00	2571	865.75	1.57	3571	867.76	2.01
573	861.38	1573	861.38	0.00	2573	862.91	1.53	3573	865.02	2.11
574	859.88	1574	859.86	0.02	2574	861.46	1.60	3574	864.96	3.50
575	859.88	1575	859.88	0.00	2575	861.46	1.58	3575	866.46	5.00
576	861.38	1576	861.35	0.03	2576	862.95	1.60	3576	865.19	2.24
578	864.18	1578	864.17	0.01	2578	865.72	1.55	3578	867.74	2.02
580	865.99	1580	865.95	0.04	2580	867.56	1.61	3580	869.65	2.09
597	872.59	1597	872.56	0.03	2597	874.14	1.58	3597	876.16	2.02
598	872.59	1598	872.58	0.01	2598	874.12	1.54	3598	876.14	2.02
599	869.59	1599	869.51	0.08	2599	871.17	1.66	3599	873.31	2.14
601	866.98	1601	866.98	0.00	2601	868.49	1.51	3601	870.67	2.18
603	864.18	1603	864.11	0.07	2603	865.68	1.57	3603	867.90	2.22
604	862.68	1604	862.65	0.03	2604	864.18	1.53	3604	867.92	3.74
605	862.68	1605	862.66	0.02	2605	864.20	1.54	3605	869.53	5.33
606	864.18	1606	864.17	0.01	2606	865.72	1.55	3606	867.91	2.19
608	866.98	1608	866.96	0.02	2608	868.54	1.58	3608	870.54	2.00
610	868.93	1610	868.88	0.05	2610	870.49	1.61	3610	872.61	2.12
627	875.39	1627	875.39	0.00	2627	876.90	1.51	3627	878.97	2.07
628	875.39	1628	875.38	0.01	2628	876.96	1.58	3628	878.96	2.00
629	872.39	1629	872.39	0.00	2629	873.95	1.56	3629	875.96	2.01
631	869.78	1631	869.72	0.06	2631	871.32	1.60	3631	873.35	2.03
633	866.98	1633	866.98	0.00	2633	868.52	1.54	3633	870.70	2.18

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	Verified Top of Clay		Sub Grade- TOC	Top of Cover		Top Clay-Top Cover
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference	Pt #	EL	Difference
634	865.48	1634	865.47	0.01	2634	866.98	1.51	3634	870.61	3.63
635	865.48	1635	865.45	0.03	2635	867.05	1.60	3635	872.21	5.16
636	866.98	1636	866.97	0.01	2636	868.53	1.56	3636	870.64	2.11
638	869.78	1638	869.78	0.00	2638	871.30	1.52	3638	873.34	2.04
640	871.86	1640	871.83	0.03	2640	873.43	1.60	3640	875.46	2.03
657	878.19	1657	878.17	0.02	2657	879.76	1.59	3657	881.79	2.03
658	878.19	1658	878.18	0.01	2658	879.75	1.57	3658	881.77	2.02
659	875.19	1659	875.17	0.02	2659	876.76	1.59	3659	878.76	2.00
661	872.58	1661	872.58	0.00	2661	874.09	1.51	3661	876.15	2.06
663	869.78	1663	869.77	0.01	2663	871.33	1.56	3663	873.56	2.23
664	868.28	1664	868.21	0.07	2664	869.78	1.57	3664	873.48	3.70
665	868.28	1665	868.20	0.08	2665	869.78	1.58	3665	875.15	5.37
666	869.78	1666	869.76	0.02	2666	871.33	1.57	3666	873.33	2.00
668	872.58	1668	872.55	0.03	2668	874.10	1.55	3668	876.14	2.04
670	874.80	1670	874.77	0.03	2670	876.37	1.60	3670	878.38	2.01
687	881.24	1687	881.21	0.03	2687	882.78	1.57	3687	884.79	2.01
688	881.24	1688	881.22	0.02	2688	882.77	1.55	3688	884.80	2.03
689	878.00	1689	877.98	0.02	2689	879.58	1.60	3689	881.66	2.08
692	878.38	1692	878.29	0.09	2692	879.89	1.60	3692	881.92	2.03
693	875.38	1693	875.36	0.02	2693	876.95	1.59	3693	879.14	2.19
696	875.48	1696	875.46	0.02	2696	877.00	1.54	3696	879.02	2.02
697	872.58	1697	872.58	0.00	2697	874.14	1.56	3697	876.21	2.07
698	870.94	1698	870.86	0.08	2698	872.44	1.58	3698	876.52	4.08
699	870.94	1699	870.87	0.07	2699	872.48	1.61	3699	877.67	5.39
700	872.58	1700	872.53	0.05	2700	874.11	1.58	3700	876.27	2.16
703	878.38	1703	878.36	0.02	2703	879.95	1.59	3703	881.95	2.00
704	875.38	1704	875.38	0.00	2704	876.96	1.58	3704	878.97	2.01
707	877.73	1707	877.71	0.02	2707	879.28	1.57	3707	881.37	2.09
708	881.00	1708	881.00	0.00	2708	882.54	1.54	3708	884.62	2.08
709	885.60	1709	885.50	0.10	2709	887.18	1.68	3709	889.20	2.02
711	883.41	1711	883.39	0.02	2711	884.98	1.59	3711	887.00	2.02
713	881.41	1713	881.40	0.01	2713	882.97	1.57	3713	884.98	2.01
715	879.40	1715	879.39	0.01	2715	880.90	1.51	3715	882.97	2.07
717	877.40	1717	877.39	0.01	2717	878.92	1.53	3717	880.94	2.02
719	875.39	1719	875.36	0.03	2719	876.93	1.57	3719	878.95	2.02
721	873.39	1721	873.37	0.02	2721	874.92	1.55	3721	876.92	2.00
723	871.39	1723	871.38	0.01	2723	872.92	1.54	3723	874.95	2.03
725	869.38	1725	869.37	0.01	2725	870.93	1.56	3725	872.93	2.00
728	867.80	1728	867.75	0.05	2728	869.34	1.59	3728	871.47	2.13
730	867.53	1730	867.50	0.03	2730	869.11	1.61	3730	871.14	2.03
731	867.40	1731	867.40	0.00	2731	868.94	1.54	3731	870.99	2.05
733	867.13	1733	867.13	0.00	2733	868.69	1.56	3733	870.74	2.05
734	866.96	1734	866.94	0.02	2734	868.54	1.60	3734	870.56	2.02
736	866.77	1736	866.76	0.01	2736	868.33	1.57	3736	870.34	2.01
738	866.57	1738	866.53	0.04	2738	868.11	1.58	3738	870.11	2.00
740	866.37	1740	866.36	0.01	2740	867.94	1.58	3740	870.12	2.18

11-22-10

NORTH CAROLINA PROFESSIONAL SEAL L-1290 LAND SURVEYOR DONALD LAWRENCE

FDL & assoc

Cell 1 Protective Cover Thickness Verification Survey and As-Built

Marshall Steam Station Industrial Landfill No. 1

Terrell North Carolina

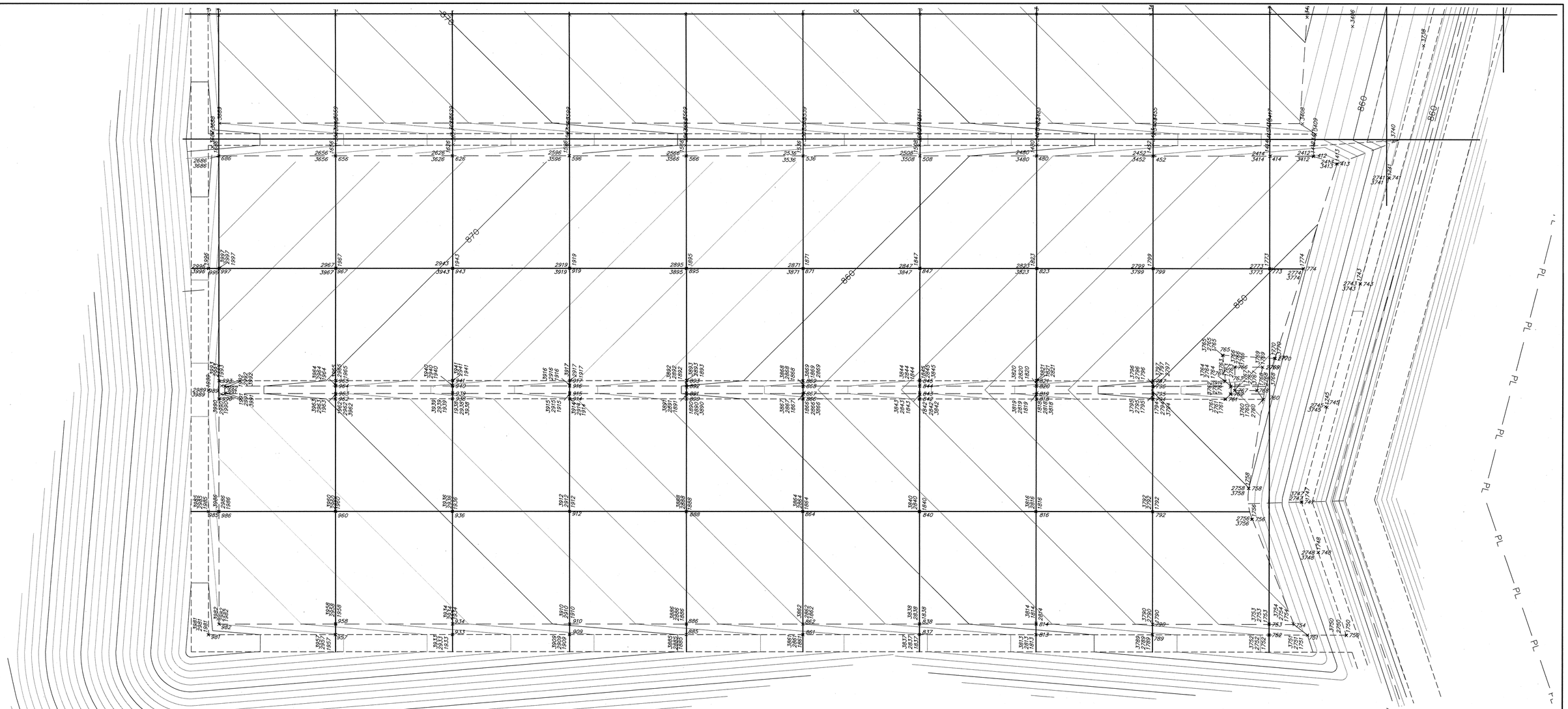
Orig. scale 1"=40' Date: 9/10/10

Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St.
Monroe, North Carolina 28111 (704) 289-1013

Drawn By: MCM
REVISIONS

Job No. 1345 Drawing file Cell 1 Top of Cover.dwg Drawing no.10/91

Cell 2 Protective Cover As-Built Drawing



Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	Verified Top of Clay		Prop. SG - Veri. Clay	Top of Cover		Top Clay-Top Cover
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference	Pt #	EL	Difference
412	851.74	1412	851.69	−0.05	2412	853.25	1.51	3412	855.26	2.01
413	851.00	1413	850.98	−0.02	2413	852.55	1.55	3413	855.15	2.60
414	852.79	1414	852.72	−0.07	2414	854.35	1.56	3414	856.42	2.07
452	855.59	1452	855.53	−0.06	2452	857.11	1.58	3452	859.32	2.15
480	858.39	1480	858.32	−0.07	2480	859.96	1.57	3480	861.96	2.00
508	861.19	1508	861.14	−0.05	2508	862.76	1.57	3508	864.82	2.06
536	863.99	1536	863.94	−0.05	2536	865.56	1.57	3536	867.68	2.12
566	866.79	1566	866.71	−0.08	2566	868.36	1.57	3566	870.37	2.01
596	869.59	1596	869.56	−0.03	2596	871.14	1.55	3596	873.14	2.00
626	872.39	1626	872.34	−0.05	2626	873.97	1.58	3626	876.00	2.03
656	875.19	1656	875.14	−0.05	2656	876.77	1.58	3656	878.78	2.01
686	877.99	1686	877.95	−0.04	2686	879.55	1.56	3686	881.90	2.35
741	866.29	1741	866.26	−0.03	2741	867.87	1.58	3741	869.95	2.08
743	866.06	1743	866	−0.06	2743	867.61	1.55	3743	869.61	2.00
745	865.79	1745	865.71	−0.08	2745	867.37	1.58	3745	869.45	2.08
747	865.59	1747	865.59	0.00	2747	867.12	1.53	3747	869.17	2.05
749	865.50	1748	865.46	−0.04	2748	867.06	1.56	3748	869.08	2.02
750	865.32	1750	865.30	−0.02	2750	866.86	1.54	3750	868.98	2.12
751	854.86	1751	854.86	0.00	2751	856.42	1.56	3751	858.44	2.02
752	855.79	1752	855.72	−0.07	2752	857.36	1.57	3752	859.36	2.00
753	852.79	1753	852.79	−0.01	2753	854.29	1.50	3753	856.40	2.11
754	852.19	1754	852.14	−0.05	2754	853.74	1.55	3754	856.29	2.55
756	850.67	1756	850.66	−0.01	2756	852.19	1.52	3756	855.76	3.57
758	850.01	1758	849.95	−0.06	2758	851.53	1.51	3758	855.18	3.66
760	847.52	1760	847.45	−0.07	2760	849.07	1.55	3760	852.73	3.66
761	848.43	1761	848.37	−0.06	2761	850.00	1.57	3761	852.55	2.55
762	846.80	1762	846.79	−0.02	2762	848.38	1.58	3762	852.25	3.87
763	846.80	1763	846.73	−0.07	2763	848.36	1.56	3763	853.45	5.09
764	848.43	1764	848.35	−0.08	2764	849.98	1.55	3764	852.67	2.69
765	849.12	1765	849.05	−0.07	2765	850.68	1.56	3765	853.24	2.56
766	845.70	1766	845.64	−0.06	2766	847.24	1.54	3766	853.37	6.13
767	845.70	1767	845.65	−0.05	2767	847.27	1.57	3767	853.04	5.77
768	845.18	1768	845.12	−0.06	2768	846.76	1.58	3768	852.20	5.44
769	845.05	1769	845.01	−0.04	2769	846.62	1.57	3769	852.96	6.34
770	847.80	1770	847.74	−0.06	2770	849.38	1.58	3770	852.97	3.59
773	850.08	1773	850.08	0.00	2773	851.66	1.58	3773	853.69	2.03
774	849.27	1774	849.21	−0.06	2774	850.85	1.58	3774	854.43	3.58
789	858.59	1789	858.51	−0.08	2789	860.14	1.55	3789	862.19	2.05
790	855.59	1790	855.52	−0.07	2790	857.09	1.50	3790	859.10	2.01
792	852.88	1792	852.87	−0.01	2792	854.46	1.58	3792	856.55	2.09
794	850.18	1794	850.12	−0.06	2794	851.75	1.57	3794	853.77	2.02
795	848.68	1795	848.62	−0.06	2795	850.26	1.58	3795	853.71	3.45
796	848.68	1796	848.60	−0.08	2796	850.21	1.53	3796	855.46	5.25
797	850.18	1797	850.10	−0.08	2797	851.76	1.58	3797	853.90	2.14
799	852.88	1799	852.87	−0.01	2799	854.43	1.55	3799	856.47	2.04

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	Verified Top of Clay		Prop. SG - Veri. Clay	Top of Cover		Top Clay-Top Cover
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference	Pt #	EL	Difference
813	861.39	1813	861.37	−0.02	2813	862.95	1.56	3813	865.03	2.08
814	858.39	1814	858.37	−0.02	2814	859.97	1.58	3814	862.05	2.08
816	855.68	1816	855.65	−0.03	2816	857.26	1.58	3816	859.26	2.00
818	852.98	1818	852.95	−0.03	2818	854.56	1.58	3818	856.78	2.22
819	851.48	1819	851.43	−0.05	2819	853.03	1.55	3819	856.88	3.85
820	851.48	1820	851.41	−0.07	2820	853.04	1.56	3820	858.18	5.14
821	852.98	1821	852.95	−0.03	2821	854.56	1.58	3821	856.84	2.28
823	855.59	1823	855.64	−0.04	2823	857.21	1.53	3823	859.40	2.19
837	864.19	1837	864.19	0.00	2837	865.73	1.54	3837	867.73	2.00
838	861.19	1838	861.18	−0.01	2838	862.77	1.58	3838	864.78	2.01
840	858.48	1840	858.47	−0.01	2840	860.04	1.56	3840	862.11	2.07
842	855.78	1842	855.75	−0.03	2842	857.36	1.58	3842	859.55	2.19
843	854.28	1843	854.22	−0.06	2843	855.85	1.57	3843	859.74	3.89
844	854.28	1844	854.20	−0.08	2844	855.86	1.58	3844	860.99	5.13
845	855.78	1845	855.72	−0.06	2845	857.36	1.58	3845	859.52	2.16
847	858.48	1847	858.45	−0.03	2847	860.03	1.55	3847	862.14	2.11
861	866.99	1861	866.98	−0.01	2861	868.57	1.58	3861	870.59	2.02
862	863.99	1862	863.98	−0.01	2862	865.57	1.58	3862	867.61	2.04
864	861.28	1864	861.26	−0.02	2864	862.83	1.55	3864	864.93	2.10
866	858.58	1866	858.58	0.00	2866	860.15	1.57	3866	862.30	2.15
867	857.08	1867	857.02	−0.06	2867	858.60	1.52	3867	862.25	3.65
868	857.08	1868	857.03	−0.05	2868	858.65	1.57	3868	863.77	5.12
869	858.58	1869	858.56	−0.02	2869	860.14	1.56	3869	862.21	2.07
871	861.28	1871	861.28	0.00	2871	862.84	1.56	3871	864.88	2.04
885	869.79	1885	869.73	−0.06	2885	871.37	1.58	3885	873.39	2.02
886	866.79	1886	866.76	−0.03	2886	868.34	1.55	3886	870.34	2.00
888	864.08	1888	864.08	0.00	2888	865.66	1.58	3888	867.69	2.03
890	861.38	1890	861.35	−0.03	2890	862.90	1.52	3890	865.09	2.19
891	859.88	1891	859.83	−0.05	2891	861.43	1.55	3891	865.33	3.90
892	859.88	1892	859.81	−0.07	2892	861.38	1.50	3892	866.47	5.09
893	861.38	1893	861.32	−0.06	2893	862.94	1.56	3893	864.94	2.00
895	864.08	1895	864.06	−0.02	2895	865.66	1.58	3895	867.70	2.04
909	872.59	1909	872.56	−0.03	2909	874.17	1.58	3909	876.20	2.03
910	869.59	1910	869.57	−0.02	2910	871.14	1.55	3910	873.15	2.01
912	866.88	1912	866.86	−0.02	2912	868.45	1.57	3912	870.50	2.05
914	864.18	1914	864.12	−0.06	2914	865.75	1.57	3914	868.20	2.45
915	862.68	1915	862.60	−0.08	2915	864.21	1.53	3915	868.24	4.03
916	862.68	1916	862.62	−0.06	2916	864.21	1.53	3916	869.34	5.13
917	864.18	1917	864.14	−0.04	2917	865.75	1.57	3917	868.84	3.09
919	866.88	1919	866.85	−0.03	2919	868.42	1.54	3919	870.50	2.08
933	875.39	1933	875.33	−0.06	2933	876.92	1.53	3933	878.94	2.02
934	872.39	1934	872.36	−0.03	2934	873.97	1.58	3934	876.00	2.03
936	869.68	1936	869.65	−0.03	2936	871.25	1.57	3936	873.28	2.03
938	866.98	1938	866.96	−0.02	2938	868.53	1.55	3938	870.61	2.08
939	865.48	1939	865.47	−0.01	2939	867.02	1.54	3939	872.16	5.14
940	865.48	1940	865.45	−0.03	2940	867.05	1.57	3940	872.13	5.08

Proposed Sub Grade		Verified Sub Grade		Proposed-Verified	Verified Top of Clay		Prop. SG - Veri. Clay	Top of Cover		Top Clay-Top Cover
Pt #	EL	Pt #	EL	Difference	Pt #	EL	Difference	Pt #	EL	Difference
941	866.98	1941	866.94	−0.04	2941	868.55	1.57	3941	870.55	2.00
943	869.68	1943	869.66	−0.02	2943	871.25	1.57	3943	873.27	2.02
957	878.19	1957	878.17	−0.02	2957	879.72	1.53	3957	881.73	2.01
958	875.19	1958	875.15	−0.04	2958	876.77	1.58	3958	878.78	2.01
960	872.48	1960	872.47	−0.01	2960	874.04	1.56	3960	876.08	2.04
962	869.78	1962	869.75	−0.03	2962	871.36	1.58	3962	873.42	2.06
963	868.28	1963	868.24	−0.04	2963	869.86	1.58	3963	873.27	3.41
964	868.28	1964	868.24	−0.04	2964	869.84	1.56	3964	875.02	5.18
965	869.78	1965	869.70	−0.08	2965	871.30	1.52	3965	873.34	2.04
967	872.48	1967	872.45	−0.03	2967	874.06	1.58	3967	876.11	2.05
981	881.24	1981	881.21	−0.03	2981	882.77	1.53	3981	884.77	2.00
982	877.90	1982	877.94	−0.05	2982	879.56	1.57	3982	882.08	2.52
985	878.28	1985	878.26	−0.02	2985	879.85	1.57	3985	881.85	2.00
986	875.28	1986	875.25	−0.03	2986	876.85	1.57	3986	878.89	2.04
989	875.36	1989	875.36	0.00	2989	876.94	1.58	3989	878.98	2.04
990	872.58	1990	872.57	−0.01	2990	874.15	1.57	3990	876.27	2.12
991	870.94	1991	870.93	−0.01	2991	872.45	1.51	3991	876.11	3.66
992	870.94	1992	870.92	−0.02	2992	872.51	1.57	3992	876.15	3.64
993	872.58	1993	872.56	−0.02	2993	874.16	1.58	3993	876.20	2.04
996	878.28	1996	878.25	−0.03	2996	879.83	1.55	3996	881.87	2.04
997	875.28	1997	875.2	−0.08	2997	876.85	1.57	3997	878.94	2.09

Notes:

Points and grid as shown are for grading purposes only.
The certification grid is indicated by the bold grid lines.
Certification survey to include tops and toes of slopes

NORTH CAROLINA PROFESSIONAL SEAL L-2230 LAND SURVEYOR DONALD LAWRENCE 11-22-10

FDL & assoc

Cell 2 Protective Cover Thickness Verification Survey and As-Built

Marshall Steam Station Industrial Landfill No. 1

Terrell North Carolina

Orig. scale 1"=40'

Date: 9/10/10

Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St.
Monroe, North Carolina 28111 (704) 289-1013

Drawn By: MCM
REVISIONS

Job No. 1345 | Drawing file: Cell 2 Top of Cover.dwg | Drawing no. 10/92

APPENDIX II – GEOSYNTHETICS

Section 1 – Cells 1 and 2 Geosynthetic Clay Liner (GCL) Testing
Section 2 – Cells 1 and 2 HDPE Geomembrane Testing
Section 3 – Cells 1 and 2 Geocomposite Testing
Section 4 – Bills of Lading / Shipment Lists
Section 5 – Cell 1 Secondary HDPE Geomembrane CQA Forms
Section 6 – Cell 1 Primary HDPE Geomembrane CQA Forms
Section 7 – Cell 2 Secondary HDPE Geomembrane CQA Forms
Section 8 – Cell 2 Primary HDPE Geomembrane CQA Forms
Section 9 – Tensiometer Load Cell Calibrations
Section 10 – Cell 1 Leachate Collection System and Leak Detection System Piping As-Built
Section 11 – Cell 2 Leachate Collection System and Leak Detection System Piping As-Built
Section 12 – Cells 1 and 2 LCS/LDS Camera Inspection

APPENDIX II – GEOSYNTHETICS
Section 1 – Cells 1 and 2 GCL Testing

Manufacturer's Quality Control (MQC) Test Results
Conformance Test Results

GCL Manufacturer's Quality Control (MQC) Test Results

Date: 5/6/2010
Purchase Order: 13180
ORDER NUMBER: 000260170

Gregg Abney
ESI
7943 Pecue Lane
Baton Rouge, LA 70809
gabney@esiliners.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to ESI.

The enclosed data package includes results of all the MQC tests required by ASTM D5889, with the exception of index flux/hydraulic conductivity. This test, which is run according to ASTM D5887, is normally performed once per production lot (once per week), unless a higher frequency is required by the project specifications. Because of the GCL's low permeability, this test can take several weeks to complete. The index flux/hydraulic conductivity results associated with this lot of material will be provided under separate cover as soon as they are available.

Although the index flux/hydraulic conductivity test results are not yet available, CETCO accepts responsibility for our GCL should the index flux/hydraulic conductivity tests produce unacceptable results. If, upon delivery and prior to installation, individual rolls of GCL are found to be nonconforming to accepted project specifications, CETCO will replace the nonconforming material at no charge.

Questions regarding this information should be directed to Chris Athanassopoulos, Technical Support Engineer, at (847) 851-1831.

Sincerely,

Melanie King

Melanie King
Quality Assurance Coordinator
CETCO Cartersville Plant

GEOSYNTHETIC CLAY LINER
MANUFACTURING QUALITY ASSURANCE DATA PACKAGE

PROJECT NAME: Duke Energy-Marshall Steam Plant
CUSTOMER P.O.: 13180
ORDER NUMBER: 000260170
PREPARED FOR: ESI

CONTENTS:

- Product Certifications
- GCL Order packing list and MQA tracking form
- GCL manufacturing quality control test data
- Bentonite clay certification
- Raw material test results

PREPARED BY: Melanie King
Quality Assurance Coordinator
CETCO
218 Industrial Park

Cartersville, GA 30121
Telephone: (770) 387-7773
E-Mail: melanie.king@cetco.com

PRODUCT CERTIFICATIONS

PROJECT NAME: Duke Energy-Marshall Steam Plant
CUSTOMER P.O.: 13180
ORDER NUMBERS: 000260170
PREPARED FOR: ESI

The GCL manufactured for the above-referenced order number(s) is certified to meet the values listed in the tables below:

GCL PROPERTY SPECIFICATIONS FOR BENTOMAT ST

Test Method	Test Method Property	Test Frequency	Certified Value
ASTM D 5891	Bentonite Fluid Loss	1 per 50 Tons	18 ml Max
ASTM D 5993	Bentonite Mass/Area	40,000 sq ft (4000 sq m)	0.75 lb /sq ft Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 6768	GCL Grab Strength	200,000 sq ft (20,000 sq m)	30 lbs/in MARV
ASTM D 6243	GCL Hydrated Internal Shear Strength	Periodic	500 psf typ @ 200 psf normal load
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5.0E-9 cm/s Max
ASTM D 5887	GCL Index Flux	Weekly	1.0E-8 m3/m2/s Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min

SPECIALLY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT ST

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D4632*	Grab Strength*modified with 4-inch grips	1/200,000sf	90 lbs	Standard
ASTM D4632*	Peel Strength*modified with 4-inch grips	1/40,000sf	15lbs	Standard

Bentonite property tests are performed at a bentonite processing facility before shipment to CETCO's production facility. All tensile testing is in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request tensile and peel results can be reported per modified ASTM D 4632 using 4 inch grips.

NEEDLE DETECTION AND REMOVAL PROCEDURE

CETCO hereby affirms that all Bentomat® geosynthetic clay liner material manufactured for this project is continually passed under a magnet for needle removal and then screened with a metal detection device. CETCO certifies Bentomat® to be essentially free of broken needles and fragments of needles that would negatively effect the performance of the final product.

Melanie King
Quality Assurance Coordinator

CETCO

GCL PACKING LIST AND MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 000260170

	GCL							Geotextiles				Clay
	CV-BENTOMAT ST							N/W-WHITE			WOVEN	CV-CG 50
Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201018CV	1745	150	15	2948	2250	1745	201018CV	00001582	00001578	2020590115	958067A
000260170	201018CV	1746	150	15	2966	2250	1745	201018CV	00001582	00001578	2020590115	958067A
000260170	201018CV	1747	150	15	2754	2250	1745	201018CV	00001583	00001578	2020590115	958067A
000260170	201018CV	1748	150	15	2712	2250	1745	201018CV	00001583	00001578	2020590115	958067A
000260170	201018CV	1749	150	15	2708	2250	1745	201018CV	00001583	00001578	2020590115	958067A
000260170	201018CV	1750	150	15	2688	2250	1745	201018CV	00001583	00001578	2020590115	958067A
000260170	201018CV	1751	150	15	2678	2250	1745	201018CV	00001583	00001578	2020590115	958067A
000260170	201018CV	1752	150	15	2694	2250	1745	201018CV	00001583	00001578	2020590115	958067A
000260170	201018CV	1753	150	15	2698	2250	1745	201018CV	00001583	00001578	2020590115	958067A
000260170	201018CV	1754	150	15	2694	2250	1745	201018CV	00001584	00001578	2020590115	958067A
000260170	201018CV	1755	150	15	2688	2250	1745	201018CV	00001584	00001578	2020590115	958067A
000260170	201018CV	1756	150	15	2684	2250	1745	201018CV	00001584	00001578	2020590115	958067A
000260170	201018CV	1757	150	15	2687	2250	1745	201018CV	00001584	00001578	2020590115	958067A
000260170	201018CV	1758	150	15	2700	2250	1745	201018CV	00001584	00001578	2020590115	958067A
000260170	201018CV	1759	150	15	2614	2250	1745	201018CV	00001584	00001578	2020590115	958067A
000260170	201018CV	1760	150	15	2652	2250	1760	201018CV	00001584	00001578	2020590115	958067A
000260170	201018CV	1762	150	15	2654	2250	1760	201018CV	00001584	00001578	2020590583	958067A
000260170	201018CV	1763	150	15	2648	2250	1760	201018CV	00001584	00001578	2020590583	958067A
000260170	201018CV	1764	150	15	2610	2250	1760	201017CV	00001441	00001439	2020590583	958067A
000260170	201018CV	1765	150	15	2624	2250	1760	201017CV	00001441	00001439	2020590583	958067A
000260170	201018CV	1766	150	15	2620	2250	1760	201017CV	00001441	00001439	2020590583	958067A
000260170	201018CV	1767	150	15	2614	2250	1760	201017CV	00001441	00001439	2020590583	958067A
000260170	201018CV	1768	150	15	2592	2250	1760	201017CV	00001441	00001439	2020590583	958067A
000260170	201018CV	1769	150	15	2616	2250	1760	201017CV	00001441	00001439	2020590583	958067A
000260170	201018CV	1770	150	15	2622	2250	1760	201017CV	00001441	00001439	2020590583	958067B
000260170	201018CV	1771	150	15	2630	2250	1760	201017CV	00001441	00001439	2020590583	958067B
000260170	201018CV	1772	150	15	2620	2250	1760	201017CV	00001441	00001439	2020590583	958067B
000260170	201018CV	1773	150	15	2626	2250	1760	201018CV	00001592	00001586	2020590583	958067B
000260170	201018CV	1774	150	15	2634	2250	1760	201018CV	00001592	00001586	2020590583	958067B
000260170	201018CV	1775	150	15	2668	2250	1775	201018CV	00001592	00001586	2020590583	958067B
000260170	201018CV	1776	150	15	2672	2250	1775	201018CV	00001592	00001586	2020590583	958067B

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201018CV	1777	150	15	2650	2250	1775	201018CV	00001594	00001586	2020590583	958067B
000260170	201018CV	1778	150	15	2640	2250	1775	201018CV	00001594	00001586	2020590583	958067B
000260170	201018CV	1779	150	15	2634	2250	1775	201018CV	00001594	00001586	2020590583	958067B
000260170	201018CV	1780	150	15	2608	2250	1775	201018CV	00001594	00001586	2020724376	958067B
000260170	201018CV	1781	150	15	2612	2250	1775	201018CV	00001594	00001586	2020724376	958067B
000260170	201018CV	1782	150	15	2614	2250	1775	201018CV	00001594	00001586	2020724376	958067B
000260170	201018CV	1783	150	15	2616	2250	1775	201018CV	00001594	00001586	2020724376	958067B
000260170	201018CV	1784	150	15	2616	2250	1775	201018CV	00001591	00001586	2020724376	958067B
000260170	201018CV	1785	150	15	2612	2250	1775	201018CV	00001591	00001586	2020724376	958067B
000260170	201018CV	1786	150	15	2614	2250	1775	201018CV	00001591	00001586	2020724376	958067B
000260170	201018CV	1787	150	15	2618	2250	1775	201018CV	00001591	00001586	2020724376	958067B
000260170	201018CV	1788	150	15	2610	2250	1775	201018CV	00001591	00001586	2020724376	958067B
000260170	201018CV	1789	150	15	2634	2250	1775	201018CV	00001591	00001586	2020724376	958067B
000260170	201018CV	1790	150	15	2780	2250	1790	201018CV	00001591	00001586	2020724376	958067B
000260170	201018CV	1791	150	15	2744	2250	1790	201018CV	00001591	00001586	2020724376	958067B
000260170	201018CV	1792	150	15	2696	2250	1790	201018CV	00001590	00001586	2020724376	958067B
000260170	201018CV	1793	150	15	2664	2250	1790	201018CV	00001590	00001586	2020724376	958067B
000260170	201018CV	1794	150	15	2668	2250	1790	201018CV	00001590	00001586	2020724376	958067B
000260170	201018CV	1795	150	15	2672	2250	1790	201018CV	00001590	00001586	2020724376	958067B
000260170	201018CV	1796	150	15	2672	2250	1790	201018CV	00001590	00001586	2020724376	958067B
000260170	201018CV	1797	150	15	2668	2250	1790	201018CV	00001590	00001586	2020724376	958067B
000260170	201018CV	1798	150	15	2670	2250	1790	201018CV	00001590	00001586	2020724376	958067B
000260170	201018CV	1799	150	15	2666	2250	1790	201017CV	00001421	00001421	2020724376	958067B
000260170	201018CV	1800	150	15	2660	2250	1790	201017CV	00001421	00001421	2020724376	958067B
000260170	201018CV	1801	150	15	2662	2250	1790	201017CV	00001421	00001421	2020724376	958067B
000260170	201018CV	1802	150	15	2660	2250	1790	201017CV	00001421	00001421	2020724376	958067B
000260170	201018CV	1803	150	15	2668	2250	1790	201017CV	00001421	00001421	2020724376	958067B
000260170	201018CV	1804	150	15	2674	2250	1790	201017CV	00001421	00001421	2020724376	958067B
000260170	201018CV	1805	150	15	2712	2250	1805	201017CV	00001421	00001421	2020724376	958067B
000260170	201018CV	1806	150	15	2678	2250	1805	201017CV	00001421	00001421	2020724376	958067B
000260170	201018CV	1807	150	15	2656	2250	1805	201017CV	00001422	00001421	2020724376	958067B
000260170	201018CV	1808	150	15	2672	2250	1805	201017CV	00001422	00001421	2020724376	958067B
000260170	201018CV	1809	150	15	2682	2250	1805	201017CV	00001422	00001421	2020724376	958067B
000260170	201018CV	1810	150	15	2674	2250	1805	201017CV	00001422	00001421	2020724376	958067B
000260170	201018CV	1811	150	15	2696	2250	1805	201017CV	00001422	00001421	2020593023	958067B
000260170	201018CV	1812	150	15	2678	2250	1805	201017CV	00001422	00001421	2020593023	958067B
000260170	201018CV	1813	150	15	2680	2250	1805	201017CV	00001423	00001421	2020593023	958067B
000260170	201018CV	1814	150	15	2684	2250	1805	201017CV	00001423	00001421	2020593023	958067B
000260170	201018CV	1815	150	15	2688	2250	1805	201017CV	00001423	00001421	2020593023	958067B

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201018CV	1816	150	15	2684	2250	1805	201017CV	00001423	00001421	2020593023	958067B
000260170	201018CV	1817	150	15	2682	2250	1805	201017CV	00001423	00001421	2020593023	958067B
000260170	201018CV	1818	150	15	2664	2250	1805	201017CV	00001423	00001421	2020593023	958067B
000260170	201018CV	1819	150	15	2652	2250	1805	201017CV	00001423	00001421	2020593023	956943A
000260170	201018CV	1820	150	15	2680	2250	1820	201017CV	00001425	00001425	2020593023	956943A
000260170	201018CV	1821	150	15	2658	2250	1820	201017CV	00001425	00001425	2020593023	956943A
000260170	201018CV	1822	150	15	2646	2250	1820	201017CV	00001425	00001425	2020593023	956943A
000260170	201018CV	1823	150	15	2652	2250	1820	201017CV	00001425	00001425	2020593023	956943A
000260170	201018CV	1824	150	15	2642	2250	1820	201017CV	00001425	00001425	2020593023	956943A
000260170	201018CV	1825	150	15	2636	2250	1820	201017CV	00001425	00001425	2020593023	956943A
000260170	201018CV	1826	150	15	2640	2250	1820	201017CV	00001425	00001425	2020593023	956943A
000260170	201018CV	1827	150	15	2644	2250	1820	201017CV	00001428	00001425	2020593023	956943A
000260170	201018CV	1828	150	15	2656	2250	1820	201017CV	00001428	00001425	2020593023	956943A
000260170	201018CV	1829	150	15	2642	2250	1820	201017CV	00001428	00001425	2020593023	956943A
000260170	201018CV	1830	150	15	2648	2250	1820	201017CV	00001428	00001425	2020593023	956943A
000260170	201018CV	1831	150	15	2656	2250	1820	201017CV	00001428	00001425	2020593023	956943A
000260170	201018CV	1832	150	15	2670	2250	1820	201017CV	00001428	00001425	2020593023	956943A
000260170	201018CV	1833	150	15	2684	2250	1820	201018CV	00001551	00001550	2020593023	9569943A
000260170	201018CV	1834	150	15	2690	2250	1834	201018CV	00001551	00001550	2020593023	956943A
000260170	201018CV	1835	150	15	2684	2250	1834	201018CV	00001551	00001550	2020593023	956943A
000260170	201018CV	1836	150	15	2688	2250	1834	201018CV	00001551	00001550	2020593023	956943A
000260170	201018CV	1837	150	15	2674	2250	1834	201018CV	00001551	00001550	2020593023	956943A
000260170	201018CV	1838	150	15	2674	2250	1834	201018CV	00001551	00001550	2020593023	956943A
000260170	201018CV	1839	150	15	2660	2250	1834	201018CV	00001553	00001553	2020593023	956943A
000260170	201018CV	1840	150	15	2676	2250	1834	201018CV	00001553	00001553	2020590130	956943A
000260170	201018CV	1841	150	15	2676	2250	1834	201018CV	00001553	00001553	2020590130	956943A
000260170	201018CV	1842	150	15	2682	2250	1834	201018CV	00001553	00001553	2020590130	956943A
000260170	201018CV	1843	150	15	2654	2250	1834	201018CV	00001553	00001553	2020590130	956943A
000260170	201018CV	1844	150	15	2702	2250	1834	201018CV	00001553	00001553	2020590130	956943A
000260170	201018CV	1845	150	15	2684	2250	1834	201018CV	00001553	00001553	2020590130	956943A
000260170	201018CV	1846	150	15	2684	2250	1834	201018CV	00001553	00001553	2020590130	956943A
000260170	201018CV	1847	150	15	2684	2250	1834	201018CV	00001553	00001553	2020590130	956943A
000260170	201018CV	1848	150	15	2678	2250	1834	201018CV	00001560	00001553	2020590130	956943A
000260170	201018CV	1849	150	15	2683	2250	1849	201018CV	00001560	00001553	2020590130	956943A
000260170	201018CV	1850	150	15	2674	2250	1849	201018CV	00001560	00001553	2020590130	956943A
000260170	201018CV	1851	150	15	2658	2250	1849	201018CV	00001560	00001553	2020590130	956943A
000260170	201018CV	1852	150	15	2656	2250	1849	201018CV	00001560	00001553	2020590130	956943A
000260170	201018CV	1853	150	15	2666	2250	1849	201018CV	00001560	00001553	2020590130	956943A
000260170	201018CV	1854	150	15	2666	2250	1849	201018CV	00001560	00001553	2020590130	956943A

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201018CV	1855	150	15	2674	2250	1849	2020822246			2020590130	956943A
000260170	201018CV	1856	150	15	2668	2250	1849	2020822246			2020590130	956943A
000260170	201018CV	1857	150	15	2668	2250	1849	2020822246			2020590130	956943A
000260170	201018CV	1858	150	15	2668	2250	1849	2020822246			2020590130	956943A
000260170	201018CV	1859	150	15	2692	2250	1849	2020822246			2020590130	956943A
000260170	201018CV	1860	150	15	2680	2250	1849	2020822246			2020590130	956943A
000260170	201018CV	1861	150	15	2700	2250	1849	2020822246			2020590130	956943A
000260170	201018CV	1862	150	15	2686	2250	1849	2020822246			2020590130	956943A
000260170	201018CV	1863	150	15	2688	2250	1849	2020816444			2020590130	956943A
000260170	201018CV	1864	150	15	2716	2250	1864	2020816444			2020618373	956943A
000260170	201018CV	1865	150	15	2692	2250	1864	2020816444			2020618373	956943A
000260170	201018CV	1866	150	15	2682	2250	1864	2020816444			2020618373	956943A
000260170	201018CV	1867	150	15	2701	2250	1864	2020816444			2020618373	956943A
000260170	201018CV	1868	150	15	2700	2250	1864	2020816444			2020618373	956943B
000260170	201018CV	1869	150	15	2706	2250	1864	2020816444			2020618373	956943B
000260170	201018CV	1870	150	15	2708	2250	1864	2020816444			2020618373	956943B
000260170	201018CV	1871	150	15	2716	2250	1864	2020816444			2020618373	956943B
000260170	201018CV	1872	150	15	2718	2250	1864	2020816444			2020618373	956943B
000260170	201018CV	1873	150	15	2720	2250	1864	2020816444			2020618373	956943B
000260170	201018CV	1874	150	15	2732	2250	1864	2020816444			2020618373	956943B
000260170	201018CV	1875	150	15	2702	2250	1864	2020816444			2020618373	956943B
000260170	201018CV	1876	150	15	2710	2250	1864	2020822239			2020618373	956943B
000260170	201018CV	1877	150	15	2688	2250	1864	2020822239			2020618373	956943B
000260170	201018CV	1878	150	15	2702	2250	1878	2020822239			2020618373	956943B
000260170	201018CV	1879	150	15	2736	2250	1878	2020822239			2020618373	956943B
000260170	201018CV	1880	150	15	2732	2250	1878	2020822239			2020618373	956943B
000260170	201018CV	1881	150	15	2722	2250	1878	2020822239			2020618373	956943B
000260170	201018CV	1882	150	15	2730	2250	1878	2020822239			2020618373	956943B
000260170	201018CV	1883	150	15	2720	2250	1878	2020822239			2020618373	956943B
000260170	201018CV	1884	150	15	2714	2250	1878	2020822243			2020618373	956943B
000260170	201018CV	1885	150	15	2712	2250	1878	2020822243			2020618373	956943B
000260170	201018CV	1886	150	15	2694	2250	1878	2020822243			2020618373	956943B
000260170	201018CV	1887	150	15	2694	2250	1878	2020822243			2020618373	956943B
000260170	201018CV	1888	150	15	2686	2250	1878	2020822243			2020618373	956943B
000260170	201018CV	1889	150	15	2682	2250	1878	2020822243			2020618373	956943B
000260170	201018CV	1890	150	15	2686	2250	1878	2020822243			2020618373	956943B
000260170	201018CV	1891	150	15	2676	2250	1878	2020822243			2020618373	956943B
000260170	201018CV	1893	150	15	2712	2250	1893	2020822238			2020662100	956943B
000260170	201018CV	1894	150	15	2748	2250	1893	2020822238			2020662100	956943B

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201018CV	1895	150	15	2734	2250	1893	2020822238			2020662100	956943B
000260170	201018CV	1897	150	15	2694	2250	1893	2020822238			2020662100	956943B
000260170	201018CV	1898	150	15	2680	2250	1893	2020822238			2020662100	956943B
000260170	201018CV	1899	150	15	2690	2250	1893	2020822238			2020662100	956943B
000260170	201018CV	1900	150	15	2692	2250	1893	2020822241			2020662100	956943B
000260170	201018CV	1901	150	15	2686	2250	1893	2020822241			2020662100	956943B
000260170	201018CV	1902	150	15	2470	2250	1893	2020822241			2020662100	956943B
000260170	201018CV	1904	150	15	2644	2250	1893	2020822241			2020662100	956943B
000260170	201018CV	1905	150	15	2668	2250	1893	2020822241			2020662100	956943B
000260170	201018CV	1906	150	15	2658	2250	1893	2020822241			2020662100	956943B
000260170	201018CV	1907	150	15	2656	2250	1893	2020822241			2020662100	956943B
000260170	201018CV	1908	150	15	2644	2250	1908	2020822241			2020662100	956943B
000260170	201018CV	1909	150	15	2656	2250	1908	201018CV	00001552	00001550	2020662100	956943B
000260170	201018CV	1910	150	15	2664	2250	1908	201018CV	00001552	00001550	2020662100	956943B
000260170	201018CV	1911	150	15	2648	2250	1908	201018CV	00001552	00001550	2020662100	956943B
000260170	201018CV	1912	150	15	2646	2250	1908	201018CV	00001552	00001550	2020662100	956943B
000260170	201018CV	1913	150	15	2650	2250	1908	201018CV	00001552	00001550	2020662100	956943B
000260170	201018CV	1914	150	15	2644	2250	1908	201018CV	00001552	00001550	2020662100	956943B
000260170	201018CV	1915	150	15	2652	2250	1908	201018CV	00001617	00001617	2020662100	956943B
000260170	201018CV	1916	150	15	2652	2250	1908	201018CV	00001617	00001617	2020662100	956943B
000260170	201018CV	1917	150	15	2650	2250	1908	201018CV	00001617	00001617	WEA014463-9	958069A
000260170	201018CV	1918	150	15	2652	2250	1908	201018CV	00001617	00001617	WEA014463-9	958069A
000260170	201018CV	1919	150	15	2654	2250	1908	201018CV	00001617	00001617	WEA014463-9	958069A
000260170	201018CV	1920	150	15	2648	2250	1908	201018CV	00001617	00001617	WEA014463-9	958069A
000260170	201018CV	1921	150	15	2650	2250	1908	201018CV	00001555	00001553	WEA014463-9	958069A
000260170	201018CV	1922	150	15	2660	2250	1922	201018CV	00001555	00001553	WEA014463-9	958069A
000260170	201018CV	1923	150	15	2654	2250	1922	201018CV	00001555	00001553	WEA014463-9	958069A
000260170	201018CV	1924	150	15	2694	2250	1922	201018CV	00001555	00001553	WEA014463-9	958069A
000260170	201018CV	1925	150	15	2658	2250	1922	201018CV	00001555	00001553	WEA014463-9	958069A
000260170	201018CV	1926	150	15	2664	2250	1922	201018CV	00001555	00001553	WEA014463-9	958069A
000260170	201018CV	1927	150	15	2670	2250	1922	201018CV	00001555	00001553	WEA014463-9	958069A
000260170	201018CV	1928	150	15	2662	2250	1922	201018CV	00001555	00001553	WEA014463-9	958069A
000260170	201018CV	1929	150	15	2664	2250	1922	201018CV	00001555	00001553	WEA014463-9	958069A
000260170	201018CV	1930	150	15	2666	2250	1922	201018CV	00001618	00001617	WEA014463-9	958069A
000260170	201018CV	1931	150	15	2664	2250	1922	201018CV	00001618	00001617	WEA014463-9	958069A
000260170	201018CV	1932	150	15	2656	2250	1922	201018CV	00001618	00001617	WEA014463-9	958069A
000260170	201018CV	1933	150	15	2634	2250	1922	201018CV	00001618	00001617	WEA014463-9	958069A
000260170	201018CV	1934	150	15	2660	2250	1922	201018CV	00001618	00001617	WEA014463-9	958069A
000260170	201018CV	1935	150	15	2666	2250	1922	201018CV	00001618	00001617	WEA014463-9	958069A

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201018CV	1936	150	15	2666	2250	1922	201018CV	00001618	00001617	WEA014463-9	958069A
000260170	201018CV	1937	150	15	2664	2250	1937	201018CV	00001618	00001617	WEA014463-9	958069A
000260170	201018CV	1938	150	15	2662	2250	1937	201018CV	00001619	00001617	WEA014463-9	958069A
000260170	201018CV	1939	150	15	2664	2250	1937	201018CV	00001619	00001617	WEA014463-9	958069A
000260170	201018CV	1940	150	15	2668	2250	1937	201018CV	00001619	00001617	WEA014463-9	958069A
000260170	201018CV	1941	150	15	2674	2250	1937	201018CV	00001619	00001617	WEA014463-9	958069A
000260170	201018CV	1942	150	15	2662	2250	1937	201018CV	00001619	00001617	WEA013730-14	958069A
000260170	201018CV	1943	150	15	2664	2250	1937	201018CV	00001619	00001617	WEA013730-14	958069A
000260170	201018CV	1944	150	15	2638	2250	1937	201018CV	00001620	00001617	WEA013730-14	958069A
000260170	201018CV	1945	150	15	2644	2250	1937	201018CV	00001620	00001617	WEA013730-14	958069A
000260170	201018CV	1946	150	15	2654	2250	1937	201018CV	00001620	00001617	WEA013730-14	958069A
000260170	201018CV	1947	150	15	2648	2250	1937	201018CV	00001620	00001617	WEA013730-14	958069A
000260170	201018CV	1948	150	15	2652	2250	1937	201018CV	00001620	00001617	WEA013730-14	958069A
000260170	201018CV	1949	150	15	2684	2250	1937	201018CV	00001620	00001617	WEA013730-14	958069A
000260170	201018CV	1950	150	15	2668	2250	1937	201018CV	00001620	00001617	WEA013730-14	958069A
000260170	201018CV	1951	150	15	2672	2250	1937	201018CV	00001621	00001617	WEA013730-14	958069A
000260170	201018CV	1952	150	15	2702	2250	1952	201018CV	00001621	00001617	WEA013730-14	958069A
000260170	201018CV	1953	150	15	2664	2250	1952	201018CV	00001621	00001617	WEA013730-14	958069A
000260170	201018CV	1954	150	15	2668	2250	1952	201018CV	00001621	00001617	WEA013730-14	958069A
000260170	201018CV	1955	150	15	2670	2250	1952	201018CV	00001621	00001617	WEA013730-14	958069A
000260170	201018CV	1956	150	15	2646	2250	1952	201018CV	00001621	00001617	WEA013730-14	958069A
000260170	201018CV	1957	150	15	2670	2250	1952	201018CV	00001621	00001617	WEA013730-14	958069A
000260170	201018CV	1958	150	15	2660	2250	1952	201018CV	00001621	00001617	WEA013730-14	958069A
000260170	201018CV	1959	150	15	2664	2250	1952	201018CV	00001622	00001617	WEA013730-14	958069A
000260170	201018CV	1960	150	15	2650	2250	1952	201018CV	00001622	00001617	WEA013730-14	958069A
000260170	201018CV	1961	150	15	2662	2250	1952	201018CV	00001622	00001617	WEA013730-14	958069A
000260170	201018CV	1962	150	15	2660	2250	1952	201018CV	00001622	00001617	WEA013730-14	958069A
000260170	201018CV	1963	150	15	2662	2250	1952	201018CV	00001622	00001617	WEA013730-14	958069A
000260170	201018CV	1964	150	15	2668	2250	1952	201018CV	00001622	00001617	WEA013730-14	958069A
000260170	201018CV	1965	150	15	2722	2250	1952	201018CV	00001624	00001617	WEA013730-14	958069A
000260170	201018CV	1966	150	15	2724	2250	1966	201018CV	00001624	00001617	WEA013730-14	958069B
000260170	201018CV	1967	150	15	2668	2250	1966	201018CV	00001624	00001617	WEA013730-14	958069B
000260170	201018CV	1968	150	15	2664	2250	1966	201018CV	00001624	00001617	WEA013730-13	958069B
000260170	201018CV	1969	150	15	2668	2250	1966	201018CV	00001624	00001617	WEA013730-13	958069B
000260170	201018CV	1970	150	15	2664	2250	1966	201018CV	00001624	00001617	WEA013730-13	958069B
000260170	201018CV	1971	150	15	2792	2250	1966	201018CV	00001624	00001617	WEA013730-13	958069B
000260170	201018CV	1972	150	15	2898	2250	1966	201011CV	00000882	00000878	WEA013730-13	958069B

Total sq ft: **504000**

Total Number of Rolls Certified: **224**

CETCO

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 000260170 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength 6496	Grab 4632 Modified	Peel 4632 Modified
	ASTM Test Method:		D 5993	D 6768	D 6496	D4632*	D4632*
	Required Value:		0.75 lb /sq ft Min	30 lbs/in MARV	3.5 lbs/in Min	90 lbs	15lbs
CV-BENTOMAT ST	201018CV	1745	0.94	70.6	5.5	282.5	28.6
CV-BENTOMAT ST	201018CV	1760	0.81	70.6	5.3	282.5	27.7
CV-BENTOMAT ST	201018CV	1775	0.86	70.6	4.9	282.5	25.0
CV-BENTOMAT ST	201018CV	1790	0.87	70.6	7.1	282.5	39.6
CV-BENTOMAT ST	201018CV	1805	0.90	70.6	8.2	282.5	39.2
CV-BENTOMAT ST	201018CV	1820	0.86	70.6	7.4	282.5	36.2
CV-BENTOMAT ST	201018CV	1834	0.85	70.7	5.7	282.8	27.0
CV-BENTOMAT ST	201018CV	1849	0.81	70.7	5.1	282.8	24.8
CV-BENTOMAT ST	201018CV	1864	0.82	70.7	3.6	282.8	18.6
CV-BENTOMAT ST	201018CV	1878	0.82	70.7	6.6	282.8	31.2
CV-BENTOMAT ST	201018CV	1893	0.89	70.7	5.6	282.8	27.4
CV-BENTOMAT ST	201018CV	1908	0.84	70.7	4.6	282.8	22.5
CV-BENTOMAT ST	201018CV	1922	0.84	89.8	4.7	359.0	25.8
CV-BENTOMAT ST	201018CV	1937	0.83	89.8	7.7	359.0	39.4
CV-BENTOMAT ST	201018CV	1952	0.87	89.8	6.2	359.0	30.0
CV-BENTOMAT ST	201018CV	1966	0.83	89.8	5.0	359.0	27.0

modified ASTM D 4632 using 4 inch grips.

GETCO

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 000260170

has been tested by American Colloid Company and yielded the following test results.

Clay Lot #	Moist	Swell	Fluid Loss
ASTM Test Method:	D 2216	D 5890	D 5891
Required Value:	12% Max	24 ml/2g Min	18 ml Max
958069A	11.60	24.00	16.00
958069B	11.60	25.00	16.20
958067A	11.20	25.00	16.40
958067B	11.20	24.00	16.80
956943A	9.20	24.00	17.80
956943B	9.20	24.00	10.40

CETCO

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 000260170 was manufactured with geotextiles which were tested with the following results.

BASE GEOTEXTILE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2020590115	3.4	178.1
PPX 82TEX	2020590130	3.5	150.9
PPX 82TEX	2020590583	3.5	161.3
PPX 82TEX	2020593023	3.4	153.9
PPX 82TEX	2020618373	3.5	170.0
PPX 82TEX	2020662100	3.5	168.1
PPX 82TEX	2020724376	3.3	163.6
MTX 1213	WEA013730-13	3.5	185.6
MTX 1213	WEA013730-14	3.5	185.6
MTX 1213	WEA014463-9	3.5	197.5

COVER GEOTEXTILE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 650	2020816444	6.4	142.4
PPX 650	2020822238	6.9	144.9
PPX 650	2020822239	6.9	144.9
PPX 650	2020822241	7.4	156.7
PPX 650	2020822243	7.4	156.7
PPX 650	2020822246	7.5	155.6
CV-NON-WOVEN	00000878	6.8	34.5
CV-NON-WOVEN	00001421	6.8	32.7
CV-NON-WOVEN	00001425	6.8	29.5
CV-NON-WOVEN	00001439	6.4	26.7
CV-NON-WOVEN	00001550	6.7	38.3
CV-NON-WOVEN	00001553	6.8	34.0
CV-NON-WOVEN	00001578	6.5	32.4
CV-NON-WOVEN	00001586	6.9	37.0
CV-NON-WOVEN	00001617	7.5	33.9

Certifications from our suppliers are on file at our production facility.

An '*' or 'PT' indicates supplier certifications were unavailable prior to shipping so testing was performed at a CETCO lab.

CETCO 218 Industrial Park Dr Cartersville, GA 30121 **Computation Sheet: GRI Accredited ASTM D-5887, Index Flux**

Sample: ST
Lot #: 201018CV
Roll#: 1694
Project # : CETCO QC

Permeability equation : ((0.879*Thickness)/(2*Pi*r^2*Time))*ln(Change in Head)

Flux equation : ((Inflow+Outflow)/200)/Pi*r^2/Time

Initial Thickness: 0.81 cm. **Hydration :** 48 hrs **Permeant :** De-aired Water

Test Position: 1 **Initial Head :** 2 psi 140.6 cm. **Analyst :** MM **Date:** 5/5/10

Cell Size: 4 in. **Max. Effective Stress:** 5 psi 34.5 kPa **Requested by :** **Date Started:** 4/26/10

Final Thickness: 0.89 cm. *** indicates value meets Flux Ratio ASTM termination criteria**

Conversions : 1 psi = 2.307 feet of head 1 foot of head = 30.48 cm 1 psi = 70.32 cm Flux (English) = Flux * 9.2366E+10

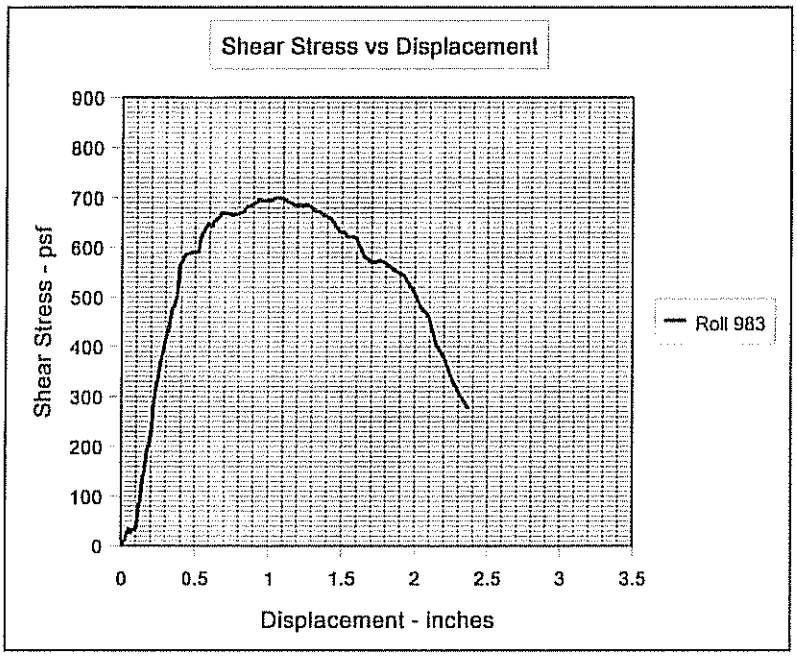
Date	Time (min)	Reading In	X	Reading Out	Y	X-Y	Head (cm)	H (cm)	Initial K (cm/sec)	Initial Flux ($m^3/m^2/sec$)		Avg Flux ($m^3/m^2/sec$)	Final K (cm/sec)	Final Flux (Gal/Acre /Day)	Inflow to Outflow Ratio
5/4/10	0	1.0	23.0	24.0	0.0	23.0	140.63	163.63							
	129	1.7	22.3	23.5	0.5	21.8	140.63	162.43	4.18E-09	9.56E-09			4.59E-9		1.40
	422	2.5	21.5	23.0	1.0	20.5	140.63	161.13	2.01E-09	4.56E-09			2.21E-9		1.60
5/5/10	1338	4.6	19.4	21.3	2.7	16.7	140.63	157.33	1.91E-09	4.26E-09	*		2.10E-9		1.24
	1692	5.5	18.5	20.5	3.5	15.0	140.63	155.63	2.25E-09	4.94E-09	*		2.47E-9		1.13
	1919	6.0	18.0	20.0	4.0	14.0	140.63	154.63	2.08E-09	4.53E-09	*	**4.58E-09**	2.28E-9	423	1.00

Final Flux 4.6E-9 $m^3/m^2/sec$ #

Final Hydraulic Conductivity 2.3E-9 cm/s

INTERNAL SHEAR TEST RESULTS
ASTM D-6243

Client:	CETCO	Date:	03/26/10
Project:		Project No.:	10LG2101.01
Material Description:	GCL - Non-woven - Light vs GCL - Woven - Dark	Perf'd By:	MLB
		Chk'd By:	JB



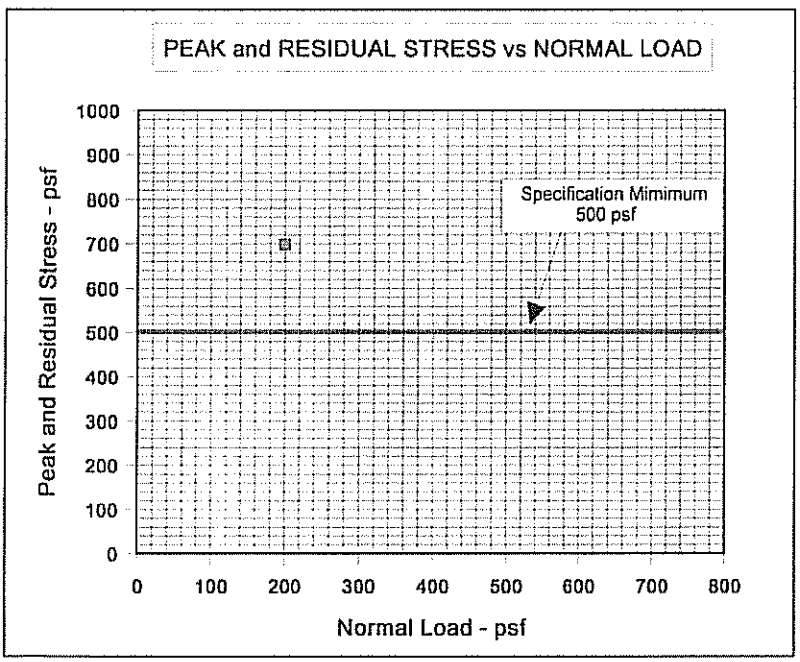
Top Box : GCL - Bentomat ST
MD : Virgin Material
Light Non-woven Side

Bottom Box : GCL - Bentomat ST
MD : Virgin Material
Dark Woven Side

Roll No. : 983 Lot No 1012CV

CURVE DATA

	Normal Load	Peak Strength	Spec Pk minimum
	psf	psf	psf
Roll 983	200	699	500



Displacement Rate: 0.04 in/min
Inundation: Yes 48 hours

Comments:
1. GCLs hydrated under a 200 psf normal load for 48 hours

JLT Laboratories, Inc.

FIGURE - GCL Internal

2010 WEEKLY QA DATA
BENTOMAT ST
Production Facility: Cartersville, GA

Week	Lot/Roll #	Permeability (cm/sec)	Flux ($m^3/m^2/sec$)	Week	Lot/Roll #	Permeability (cm/sec)	Flux ($m^3/m^2/sec$)
1	201003CV/00002	7.1×10^{-9}	3.1×10^{-9}	28			
2	None produced			29			
3	None produced			30			
4	None produced			31			
5	201005CV/00052	2.0×10^{-9}	4.2×10^{-9}	32			
6	201006CV/00182	2.9×10^{-9}	6.0×10^{-9}	33			
7	201007CV/00251	2.1×10^{-9}	5.2×10^{-9}	34			
8	201008CV/00255	1.6×10^{-9}	3.7×10^{-9}	35			
9	201009CV/00257	1.6×10^{-9}	3.7×10^{-9}	36			
10	201010CV/00488	1.7×10^{-9}	4.0×10^{-9}	37			
11	201011CV/00688	1.7×10^{-9}	3.5×10^{-9}	38			
12	201012CV/00983	2.6×10^{-9}	6.0×10^{-9}	39			
13	201013CV/01083	2.9×10^{-9}	6.1×10^{-9}	40			
14	201014CV/01154	1.7×10^{-9}	3.7×10^{-9}	41			
15	201015CV/01323	1.1×10^{-9}	2.3×10^{-9}	42			
16	None produced			43			
17	None produced			44			
18	201018CV/01694	2.3×10^{-9}	4.6×10^{-9}	45			
19	201019CV/02023	1.3×10^{-9}	2.9×10^{-9}	46			
20	201020CV/02074	1.4×10^{-9}	3.4×10^{-9}	47			
21	201021CV/02373	1.0×10^{-9}	2.1×10^{-9}	48			
22	201022CV/03283	1.4×10^{-9}	3×10^{-9}	49			
23				50			
24				51			
25				52			
26				53			
27							

All testing is performed according to ASTM D5887 using 5psi confining pressure and 2psi head pressure.

CETCO®

GSI

GAI-LAP accredited

Date: 6/14/2010
Purchase Order: 13180
ORDER NUMBER: 000260170

Gregg Abney
ESI
7943 Pecue Lane
Baton Rouge, LA 70809
gabney@esiliners.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to ESI.

The enclosed data package includes results of all the MQC tests required by ASTM D5889, with the exception of index flux/hydraulic conductivity. This test, which is run according to ASTM D5887, is normally performed once per production lot (once per week), unless a higher frequency is required by the project specifications. Because of the GCL's low permeability, this test can take several weeks to complete. The index flux/hydraulic conductivity results associated with this lot of material will be provided under separate cover as soon as they are available.

Although the index flux/hydraulic conductivity test results are not yet available, CETCO accepts responsibility for our GCL should the index flux/hydraulic conductivity tests produce unacceptable results. If, upon delivery and prior to installation, individual rolls of GCL are found to be nonconforming to accepted project specifications, CETCO will replace the nonconforming material at no charge.

Questions regarding this information should be directed to Chris Athanassopoulos, Technical Support Engineer, at (847) 851-1831.

Sincerely,

Melanie King

Melanie King
Quality Assurance Coordinator
CETCO Cartersville Plant

GEOSYNTHETIC CLAY LINER
MANUFACTURING QUALITY ASSURANCE DATA PACKAGE

PROJECT NAME: Duke Energy-Marshall Steam Plant
CUSTOMER P.O.: 13180
ORDER NUMBER: 000260170
PREPARED FOR: ESI

CONTENTS:

- Product Certifications
- GCL Order packing list and MQA tracking form
- GCL manufacturing quality control test data
- Bentonite clay certification
- Raw material test results

PREPARED BY: Melanie King
Quality Assurance Coordinator
CETCO
218 Industrial Park

Cartersville, GA 30121
Telephone: (770) 387-7773
E-Mail: melanie.king@cetco.com

CETCO

PRODUCT CERTIFICATIONS

PROJECT NAME: Duke Energy-Marshall Steam Plant
CUSTOMER P.O.: 13180
ORDER NUMBERS: 000260170
PREPARED FOR: ESI

The GCL manufactured for the above-referenced order number(s) is certified to meet the values listed in the tables below:

GCL PROPERTY SPECIFICATIONS FOR BENTOMAT ST

Test Method	Test Method Property	Test Frequency	Certified Value
ASTM D 5891	Bentonite Fluid Loss	1 per 50 Tons	18 ml Max
ASTM D 5993	Bentonite Mass/Area	40,000 sq ft (4000 sq m)	0.75 lb /sq ft Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 6768	GCL Grab Strength	200,000 sq ft (20,000 sq m)	30 lbs/in MARV
ASTM D 6243	GCL Hydrated Internal Shear Strength	Periodic	500 psf typ @ 200 psf normal load
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5.0E-9 cm/s Max
ASTM D 5887	GCL Index Flux	Weekly	1.0E-8 m3/m2/s Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min

SPECIALLY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT ST

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D4632*	Grab Strength*modified with 4-inch grips	1/200,000sf	90 lbs	Standard
ASTM D4632*	Peel Strength*modified with 4-inch grips	1/40,000sf	15lbs	Standard

Bentonite property tests are performed at a bentonite processing facility before shipment to CETCO's production facility. All tensile testing is in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request tensile and peel results can be reported per modified ASTM D 4632 using 4 inch grips.

NEEDLE DETECTION AND REMOVAL PROCEDURE

CETCO hereby affirms that all Bentomat® geosynthetic clay liner material manufactured for this project is continually passed under a magnet for needle removal and then screened with a metal detection device. CETCO certifies Bentomat® to be essentially free of broken needles and fragments of needles that would negatively effect the performance of the final product.

Melanie King
Quality Assurance Coordinator

GCL PACKING LIST AND MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 000260170

	GCL							Geotextiles				Clay
	CV-BENTOMAT ST							N/W-WHITE			WOVEN	CV-CG 50
Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201024CV	4071	150	15	2906	2250	4071	201023CV	00002223	00002219	WEA015039-12	963167B
000260170	201024CV	4072	150	15	2830	2250	4071	201023CV	00002223	00002219	WEA015039-12	963167B
000260170	201024CV	4073	150	15	2808	2250	4071	201024CV	00002321	00002320	WEA015039-12	963167B
000260170	201024CV	4074	150	15	2720	2250	4071	201024CV	00002321	00002320	WEA015039-12	963167B
000260170	201024CV	4075	150	15	2700	2250	4071	201024CV	00002321	00002320	WEA015039-12	963167B
000260170	201024CV	4076	150	15	2730	2250	4071	201024CV	00002321	00002320	WEA015039-12	963167B
000260170	201024CV	4077	150	15	2722	2250	4071	201024CV	00002321	00002320	WEA015039-12	963167B
000260170	201024CV	4078	150	15	2732	2250	4071	201024CV	00002321	00002320	WEA015039-12	963167B
000260170	201024CV	4079	150	15	2726	2250	4071	201024CV	00002321	00002320	WEA015039-12	963167B
000260170	201024CV	4080	150	15	2736	2250	4071	201024CV	00002321	00002320	WEA015039-12	963167B
000260170	201024CV	4081	150	15	2732	2250	4071	201024CV	00002322	00002320	WEA015039-12	963167B
000260170	201024CV	4082	150	15	2732	2250	4071	201024CV	00002322	00002320	WEA015039-12	963167B
000260170	201024CV	4083	150	15	2730	2250	4071	201024CV	00002322	00002320	WEA015039-12	963167B
000260170	201024CV	4084	150	15	2740	2250	4071	201024CV	00002322	00002320	WEA015039-12	963167B
000260170	201024CV	4085	150	15	2732	2250	4071	201024CV	00002322	00002320	WEA015039-12	963167B
000260170	201024CV	4086	150	15	2760	2250	4086	201024CV	00002322	00002320	WEA015039-12	963167B
000260170	201024CV	4087	150	15	2732	2250	4086	201024CV	00002323	00002320	WEA015039-12	963167B
000260170	201024CV	4088	150	15	2738	2250	4086	201024CV	00002323	00002320	WEA015039-12	963169A
000260170	201024CV	4089	150	15	2736	2250	4086	201024CV	00002323	00002320	WEA015039-12	963169A
000260170	201024CV	4090	150	15	2752	2250	4086	201024CV	00002323	00002320	WEA015039-12	963169A
000260170	201024CV	4091	150	15	2744	2250	4086	201024CV	00002323	00002320	WEA015039-12	963169A
000260170	201024CV	4092	150	15	2740	2250	4086	201024CV	00002323	00002320	WEA015039-12	963169A
000260170	201024CV	4093	150	15	2758	2250	4086	201024CV	00002323	00002320	WEA015039-12	963169A
000260170	201024CV	4094	150	15	2742	2250	4086	201024CV	00002324	00002320	WEA015039-12	963169A
000260170	201024CV	4095	150	15	2752	2250	4086	201024CV	00002324	00002320	WEA015039-12	963169A
000260170	201024CV	4096	150	15	2748	2250	4086	201024CV	00002324	00002320	WEA015073-9	963169A
000260170	201024CV	4097	150	15	2766	2250	4086	201024CV	00002324	00002320	WEA015073-9	963169A
000260170	201024CV	4098	150	15	2764	2250	4086	201024CV	00002324	00002320	WEA015073-9	963169A
000260170	201024CV	4099	150	15	2768	2250	4086	201024CV	00002324	00002320	WEA015073-9	963169A
000260170	201024CV	4100	150	15	2766	2250	4086	201024CV	00002324	00002320	WEA015073-9	963169A
000260170	201024CV	4101	150	15	2802	2250	4101	201024CV	00002325	00002320	WEA015073-9	963169A

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201024CV	4102	150	15	2766	2250	4101	201024CV	00002325	00002320	WEA015073-9	963169A
000260170	201024CV	4103	150	15	2760	2250	4101	201024CV	00002325	00002320	WEA015073-9	963169A
000260170	201024CV	4104	150	15	2766	2250	4101	201024CV	00002325	00002320	WEA015073-9	963169A
000260170	201024CV	4105	150	15	2760	2250	4101	201024CV	00002325	00002320	WEA015073-9	963169A
000260170	201024CV	4106	150	15	2752	2250	4101	201024CV	00002325	00002320	WEA015073-9	963169A
000260170	201024CV	4107	150	15	2742	2250	4101	201024CV	00002325	00002320	WEA015073-9	963169A
000260170	201024CV	4108	150	15	2738	2250	4101	201024CV	00002325	00002320	WEA015073-9	963169A
000260170	201024CV	4109	150	15	2732	2250	4101	201024CV	00002326	00002320	WEA015073-9	963169A
000260170	201024CV	4110	150	15	2730	2250	4101	201024CV	00002326	00002320	WEA015073-9	963169A
000260170	201024CV	4111	150	15	2740	2250	4101	201024CV	00002326	00002320	WEA015073-9	963169A
000260170	201024CV	4112	150	15	2736	2250	4101	201024CV	00002326	00002320	WEA015073-9	963169A
000260170	201024CV	4113	150	15	2750	2250	4101	201024CV	00002326	00002320	WEA015073-9	963169A
000260170	201024CV	4114	150	15	2744	2250	4101	201024CV	00002326	00002320	WEA015073-9	963169A
000260170	201024CV	4115	150	15	2772	2250	4115	201024CV	00002326	00002320	WEA015073-9	963169A
000260170	201024CV	4117	150	15	2760	2250	4115	201023CV	00002262	00002258	WEA015073-9	963169A
000260170	201024CV	4118	150	15	2768	2250	4115	201023CV	00002262	00002258	WEA015073-9	963169A
000260170	201024CV	4119	150	15	2748	2250	4115	201023CV	00002262	00002258	WEA015073-9	963169A
000260170	201024CV	4120	150	15	2760	2250	4115	201023CV	00002262	00002258	WEA015073-9	963169A
000260170	201024CV	4121	150	15	2736	2250	4115	201023CV	00002262	00002258	WEA015073-9	963169A
000260170	201024CV	4122	150	15	2752	2250	4115	201023CV	00002262	00002258	WEA015073-10	963169A
000260170	201024CV	4123	150	15	2754	2250	4115	201024CV	00002340	00002338	WEA015073-10	963169A
000260170	201024CV	4124	150	15	2736	2250	4115	201024CV	00002340	00002338	WEA015073-10	963169A
000260170	201024CV	4125	150	15	2738	2250	4115	201024CV	00002340	00002338	WEA015073-10	963169A
000260170	201024CV	4127	150	15	2746	2250	4115	201024CV	00002340	00002338	WEA015073-10	963169A
000260170	201024CV	4128	150	15	2776	2250	4115	201024CV	00002340	00002338	WEA015073-10	963169A
000260170	201024CV	4129	150	15	2782	2250	4115	201024CV	00002340	00002338	WEA015073-10	963169A
000260170	201024CV	4130	150	15	2786	2250	4115	201024CV	00002340	00002338	WEA015073-10	963169A
000260170	201024CV	4131	150	15	2796	2250	4131	201024CV	00002347	00002347	WEA015073-10	963169A
000260170	201024CV	4132	150	15	2746	2250	4131	201024CV	00002347	00002347	WEA015073-10	963169A
000260170	201024CV	4133	150	15	2762	2250	4131	201024CV	00002347	00002347	WEA015073-10	963169A
000260170	201024CV	4134	150	15	2752	2250	4131	201024CV	00002347	00002347	WEA015073-10	963169A
000260170	201024CV	4135	150	15	2762	2250	4131	201024CV	00002347	00002347	WEA015073-10	963169A
000260170	201024CV	4136	150	15	2756	2250	4131	201024CV	00002347	00002347	WEA015073-10	963169A
000260170	201024CV	4137	150	15	2754	2250	4131	201024CV	00002347	00002347	WEA015073-10	963169A
000260170	201024CV	4138	150	15	2730	2250	4131	201024CV	00002347	00002347	WEA015073-10	963169B
000260170	201024CV	4139	150	15	2726	2250	4131	201024CV	00002335	00002328	WEA015073-10	963169B
000260170	201024CV	4140	150	15	2736	2250	4131	201024CV	00002335	00002328	WEA015073-10	963169B
000260170	201024CV	4141	150	15	2712	2250	4131	201024CV	00002335	00002328	WEA015073-10	963169B
000260170	201024CV	4143	150	15	2720	2250	4131	201024CV	00002335	00002328	WEA015073-10	963169B

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201024CV	4144	150	15	2710	2250	4131	201024CV	00002335	00002328	WEA015073-10	963169B
000260170	201024CV	4145	150	15	2700	2250	4131	201024CV	00002335	00002328	WEA015073-10	963169B
000260170	201024CV	4146	150	15	2750	2250	4146	201024CV	00002335	00002328	WEA015073-10	963169B
000260170	201024CV	4147	150	15	2730	2250	4146	201024CV	00002334	00002328	WEA015073-10	963169B
000260170	201024CV	4148	150	15	2720	2250	4146	201024CV	00002334	00002328	WEA015073-10	963169B
000260170	201024CV	4149	150	15	2732	2250	4146	201024CV	00002334	00002328	WEA015073-8	963169B
000260170	201024CV	4150	150	15	2736	2250	4146	201024CV	00002334	00002328	WEA015073-8	963169B
000260170	201024CV	4151	150	15	2728	2250	4146	201024CV	00002334	00002328	WEA015073-8	963169B
000260170	201024CV	4152	150	15	2738	2250	4146	201024CV	00002334	00002328	WEA015073-8	963169B
000260170	201024CV	4153	150	15	2730	2250	4146	201024CV	00002334	00002328	WEA015073-8	963169B
000260170	201024CV	4154	150	15	2744	2250	4146	201024CV	00002334	00002328	WEA015073-8	963169B
000260170	201024CV	4155	150	15	2732	2250	4146	201024CV	00002333	00002328	WEA015073-8	963169B
000260170	201024CV	4156	150	15	2734	2250	4146	201024CV	00002333	00002328	WEA015073-8	963169B
000260170	201024CV	4157	150	15	2726	2250	4146	201024CV	00002333	00002328	WEA015073-8	963169B
000260170	201024CV	4158	150	15	2734	2250	4146	201024CV	00002333	00002328	WEA015073-8	963169B
000260170	201024CV	4159	150	15	2726	2250	4146	201024CV	00002333	00002328	WEA015073-8	963169B
000260170	201024CV	4160	150	15	2798	2250	4160	201024CV	00002333	00002328	WEA015073-8	963169B
000260170	201024CV	4161	150	15	2730	2250	4160	201024CV	00002351	00002347	WEA015073-8	963169B
000260170	201024CV	4162	150	15	2728	2250	4160	201024CV	00002351	00002347	WEA015073-8	963169B
000260170	201024CV	4163	150	15	2706	2250	4160	201024CV	00002351	00002347	WEA015073-8	963169B
000260170	201024CV	4164	150	15	2712	2250	4160	201024CV	00002351	00002347	WEA015073-8	963169B
000260170	201024CV	4165	150	15	2708	2250	4160	201024CV	00002351	00002347	WEA015073-8	963169B
000260170	201024CV	4166	150	15	2704	2250	4160	201024CV	00002351	00002347	WEA015073-8	963169B
000260170	201024CV	4167	150	15	2690	2250	4160	201024CV	00002351	00002347	WEA015073-8	963169B
000260170	201024CV	4168	150	15	2696	2250	4160	201024CV	00002351	00002347	WEA015073-8	963169B
000260170	201024CV	4169	150	15	2698	2250	4160	201024CV	00002352	00002347	WEA015073-8	963169B
000260170	201024CV	4170	150	15	2690	2250	4160	201024CV	00002352	00002347	WEA015073-8	963169B
000260170	201024CV	4171	150	15	2696	2250	4160	201024CV	00002352	00002347	WEA015073-8	963169B
000260170	201024CV	4172	150	15	2700	2250	4160	201024CV	00002352	00002347	WEA015073-8	963169B
000260170	201024CV	4173	150	15	2696	2250	4160	201024CV	00002352	00002347	WEA015073-8	963169B
000260170	201024CV	4174	150	15	2695	2250	4160	201024CV	00002352	00002347	WEA015073-8	963169B
000260170	201024CV	4175	150	15	2712	2250	4175	201024CV	00002352	00002347	WEA014114-6	963169B
000260170	201024CV	4177	150	15	2694	2250	4175	201024CV	00002327	00002320	WEA014114-6	963169B
000260170	201024CV	4178	150	15	2704	2250	4175	201024CV	00002327	00002320	WEA014114-6	963169B
000260170	201024CV	4179	150	15	2714	2250	4175	201024CV	00002327	00002320	WEA014114-6	963169B
000260170	201024CV	4180	150	15	2690	2250	4175	201024CV	00002327	00002320	WEA014114-6	963169B
000260170	201024CV	4182	150	15	2698	2250	4175	201024CV	00002327	00002320	WEA014114-6	963169B
000260170	201024CV	4183	150	15	2706	2250	4175	201024CV	00002353	00002347	WEA014114-6	963169B
000260170	201024CV	4184	150	15	2718	2250	4175	201024CV	00002353	00002347	WEA014114-6	963169B

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201024CV	4185	150	15	2708	2250	4175	201024CV	00002353	00002347	WEA014114-6	963169B
000260170	201024CV	4186	150	15	2720	2250	4175	201024CV	00002353	00002347	WEA014114-6	963169B
000260170	201024CV	4187	150	15	2714	2250	4175	201024CV	00002353	00002347	WEA014114-6	963169B
000260170	201024CV	4188	150	15	2716	2250	4175	201024CV	00002353	00002347	WEA014114-6	963171A
000260170	201024CV	4189	150	15	2738	2250	4175	201024CV	00002353	00002347	WEA014114-6	963171A
000260170	201024CV	4190	150	15	2724	2250	4175	201024CV	00002354	00002347	WEA014114-6	963171A
000260170	201024CV	4191	150	15	2720	2250	4191	201024CV	00002354	00002347	WEA014114-6	963171A
000260170	201024CV	4192	150	15	2710	2250	4191	201024CV	00002354	00002347	WEA014114-6	963171A
000260170	201024CV	4193	150	15	2716	2250	4191	201024CV	00002354	00002347	WEA014114-6	963171A
000260170	201024CV	4194	150	15	2724	2250	4191	201024CV	00002354	00002347	WEA014114-6	963171A
000260170	201024CV	4195	150	15	2732	2250	4191	201024CV	00002354	00002347	WEA014114-6	963171A
000260170	201024CV	4196	150	15	2726	2250	4191	201024CV	00002354	00002347	WEA014114-6	963171A
000260170	201024CV	4197	150	15	2724	2250	4191	201024CV	00002328	00002328	WEA014114-6	963171A
000260170	201024CV	4198	150	15	2732	2250	4191	201024CV	00002328	00002328	WEA014114-6	963171A
000260170	201024CV	4199	150	15	2730	2250	4191	201024CV	00002328	00002328	WEA014114-6	963171A
000260170	201024CV	4200	150	15	2710	2250	4191	201024CV	00002328	00002328	WEA014114-6	963171A
000260170	201024CV	4201	150	15	2712	2250	4191	201024CV	00002328	00002328	WEA015039-6	963171A
000260170	201024CV	4202	150	15	2738	2250	4191	201024CV	00002328	00002328	WEA015039-6	963171A
000260170	201024CV	4203	150	15	2730	2250	4191	201024CV	00002328	00002328	WEA015039-6	963171A
000260170	201024CV	4204	150	15	2734	2250	4191	201024CV	00002355	00002347	WEA015039-6	963171A
000260170	201024CV	4205	150	15	2732	2250	4205	201024CV	00002355	00002347	WEA015039-6	963171A
000260170	201024CV	4206	150	15	2730	2250	4205	201024CV	00002355	00002347	WEA015039-6	963171A
000260170	201024CV	4207	150	15	2730	2250	4205	201024CV	00002355	00002347	WEA015039-6	963171A
000260170	201024CV	4208	150	15	2732	2250	4205	201024CV	00002355	00002347	WEA015039-6	963171A
000260170	201024CV	4210	150	15	2748	2250	4205	201024CV	00002355	00002347	WEA015039-6	963171A
000260170	201024CV	4211	150	15	2766	2250	4205	201024CV	00002356	00002347	WEA015039-6	963171A
000260170	201024CV	4212	150	15	2744	2250	4205	201024CV	00002356	00002347	WEA015039-6	963171A
000260170	201024CV	4213	150	15	2749	2250	4205	201024CV	00002356	00002347	WEA015039-6	963171A
000260170	201024CV	4214	150	15	2752	2250	4205	201024CV	00002356	00002347	WEA015039-6	963171A
000260170	201024CV	4215	150	15	2762	2250	4205	201024CV	00002356	00002347	WEA015039-6	963171A
000260170	201024CV	4216	150	15	2754	2250	4205	201024CV	00002356	00002347	WEA015039-6	963171A
000260170	201024CV	4217	150	15	2754	2250	4205	201024CV	00002356	00002347	WEA015039-6	963171A
000260170	201024CV	4218	150	15	2748	2250	4205	201024CV	00002357	00002357	WEA015039-6	963171A
000260170	201024CV	4219	150	15	2742	2250	4205	201024CV	00002357	00002357	WEA015039-6	963171A
000260170	201024CV	4220	150	15	2756	2250	4220	201024CV	00002357	00002357	WEA015039-6	963171A
000260170	201024CV	4221	150	15	2748	2250	4220	201024CV	00002357	00002357	WEA015039-6	963171A
000260170	201024CV	4222	150	15	2766	2250	4220	201024CV	00002357	00002357	WEA015039-6	963171A
000260170	201024CV	4223	150	15	2760	2250	4220	201024CV	00002357	00002357	WEA015039-6	963171A
000260170	201024CV	4224	150	15	2758	2250	4220	201024CV	00002357	00002357	WEA015039-6	963171A

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201024CV	4225	150	15	2756	2250	4220	201023CV	00002219	00002219	WEA015039-6	963171A
000260170	201024CV	4226	150	15	2758	2250	4220	201023CV	00002219	00002219	WEA015039-6	963171A
000260170	201024CV	4227	150	15	2746	2250	4220	201023CV	00002219	00002219	WEA015039-6	963171A
000260170	201024CV	4228	150	15	2774	2250	4220	201023CV	00002219	00002219	WEA014113-17	963171A
000260170	201024CV	4229	150	15	2780	2250	4220	201023CV	00002219	00002219	WEA014113-17	963171A
000260170	201024CV	4230	150	15	2768	2250	4220	201023CV	00002219	00002219	WEA014113-17	963171A
000260170	201024CV	4231	150	15	2764	2250	4220	201023CV	00002219	00002219	WEA014113-17	963171A
000260170	201024CV	4232	150	15	2764	2250	4220	201024CV	00002358	00002357	WEA014113-17	963171A
000260170	201024CV	4233	150	15	2786	2250	4220	201024CV	00002358	00002357	WEA014113-17	963171A
000260170	201024CV	4234	150	15	2768	2250	4220	201024CV	00002358	00002357	WEA014113-17	963171A
000260170	201024CV	4235	150	15	2810	2250	4235	201024CV	00002358	00002357	WEA014113-17	963171A
000260170	201024CV	4236	150	15	2790	2250	4235	201024CV	00002358	00002357	WEA014113-17	963171A
000260170	201024CV	4237	150	15	2786	2250	4235	201024CV	00002358	00002357	WEA014113-17	963171B
000260170	201024CV	4238	150	15	2788	2250	4235	201024CV	00002358	00002357	WEA014113-17	963171B
000260170	201024CV	4239	150	15	2776	2250	4235	201024CV	00002359	00002357	WEA014113-17	963171B
000260170	201024CV	4240	150	15	2766	2250	4235	201024CV	00002359	00002357	WEA014113-17	963171B
000260170	201024CV	4241	150	15	2778	2250	4235	201024CV	00002359	00002357	WEA014113-17	963171B
000260170	201024CV	4242	150	15	2776	2250	4235	201024CV	00002359	00002357	WEA014113-17	963171B
000260170	201024CV	4243	150	15	2756	2250	4235	201024CV	00002359	00002357	WEA014113-17	963171B
000260170	201024CV	4244	150	15	2772	2250	4235	201024CV	00002359	00002357	WEA014113-17	963171B
000260170	201024CV	4245	150	15	2758	2250	4235	201024CV	00002359	00002357	WEA014113-17	963171B
000260170	201024CV	4246	150	15	2748	2250	4235	201024CV	00002360	00002357	WEA014113-17	963171B
000260170	201024CV	4247	150	15	2752	2250	4235	201024CV	00002360	00002357	WEA014113-17	963171B
000260170	201024CV	4248	150	15	2738	2250	4235	201024CV	00002360	00002357	WEA014113-17	963171B
000260170	201024CV	4249	150	15	2770	2250	4249	201024CV	00002360	00002357	WEA014113-17	963171B
000260170	201024CV	4250	150	15	2744	2250	4249	201024CV	00002360	00002357	WEA014113-17	963171B
000260170	201024CV	4251	150	15	2742	2250	4249	201024CV	00002360	00002357	WEA014113-17	963171B
000260170	201024CV	4252	150	15	2754	2250	4249	201024CV	00002360	00002357	WEA014113-17	963171B
000260170	201024CV	4253	150	15	2744	2250	4249	201023CV	00002266	00002258	WEA014113-17	963171B
000260170	201024CV	4254	150	15	2740	2250	4249	201023CV	00002266	00002258	WEA015039-8	963171B
000260170	201024CV	4255	150	15	2750	2250	4249	201023CV	00002266	00002258	WEA015039-8	963171B
000260170	201024CV	4256	150	15	2740	2250	4249	201023CV	00002266	00002258	WEA015039-8	963171B
000260170	201024CV	4257	150	15	2736	2250	4249	201023CV	00002266	00002258	WEA015039-8	963171B
000260170	201024CV	4258	150	15	2688	2250	4249	201023CV	00002266	00002258	WEA015039-8	963171B
000260170	201024CV	4259	150	15	2680	2250	4249	201023CV	00002266	00002258	WEA015039-8	963171B
000260170	201024CV	4260	150	15	2768	2250	4249	201024CV	00002362	00002357	WEA015039-8	963171B
000260170	201024CV	4261	150	15	2744	2250	4249	201024CV	00002362	00002357	WEA015039-8	963171B
000260170	201024CV	4262	150	15	2734	2250	4249	201024CV	00002362	00002357	WEA015039-8	963171B
000260170	201024CV	4263	150	15	2736	2250	4249	201024CV	00002362	00002357	WEA015039-8	963171B

Order	GCL Lot #	GCL Roll #	Length	Width	weight	sq ft	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
000260170	201024CV	4264	150	15	2750	2250	4264	201024CV	00002362	00002357	WEA015039-8	963171B
000260170	201024CV	4265	150	15	2740	2250	4264	201024CV	00002362	00002357	WEA015039-8	963171B
000260170	201024CV	4266	150	15	2740	2250	4264	201024CV	00002362	00002357	WEA015039-8	963171B
000260170	201024CV	4267	150	15	2744	2250	4264	201024CV	00002361	00002357	WEA015039-8	963171B
000260170	201024CV	4268	150	15	2746	2250	4264	201024CV	00002361	00002357	WEA015039-8	963171B
000260170	201024CV	4269	150	15	2744	2250	4264	201024CV	00002361	00002357	WEA015039-8	963171B
000260170	201024CV	4270	150	15	2746	2250	4264	201024CV	00002361	00002357	WEA015039-8	963171B
000260170	201024CV	4271	150	15	2734	2250	4264	201024CV	00002361	00002357	WEA015039-8	963171B
000260170	201024CV	4272	150	15	2740	2250	4264	201024CV	00002361	00002357	WEA015039-8	963171B
000260170	201024CV	4273	150	15	2730	2250	4264	201024CV	00002361	00002357	WEA015039-8	963171B
000260170	201024CV	4274	150	15	2736	2250	4264	201024CV	00002386	00002386	WEA015039-8	963171B
000260170	201024CV	4275	150	15	2744	2250	4264	201024CV	00002386	00002386	WEA015039-8	963171B
000260170	201024CV	4276	150	15	2738	2250	4264	201024CV	00002386	00002386	WEA015039-8	963171B
000260170	201024CV	4277	150	15	2698	2250	4264	201024CV	00002386	00002386	WEA015039-8	963171B
000260170	201024CV	4278	150	15	2696	2250	4264	201024CV	00002386	00002386	WEA015039-8	963171B
000260170	201024CV	4279	150	15	2740	2250	4279	201024CV	00002386	00002386	WEA015039-8	963171B
000260170	201024CV	4280	150	15	2690	2250	4279	201024CV	00002386	00002386	WEA015039-8	963171B
000260170	201024CV	4281	150	15	2696	2250	4279	201024CV	00002380	00002377	WEA015039-11	963171B
000260170	201024CV	4282	150	15	2710	2250	4279	201024CV	00002380	00002377	WEA015039-11	963171B
000260170	201024CV	4283	150	15	2698	2250	4279	201024CV	00002380	00002377	WEA015039-11	963171B
000260170	201024CV	4284	150	15	2696	2250	4279	201024CV	00002380	00002377	WEA015039-11	963171B
000260170	201024CV	4285	150	15	2702	2250	4279	201024CV	00002380	00002377	WEA015039-11	963171B
000260170	201024CV	4286	150	15	2694	2250	4279	201024CV	00002380	00002377	WEA015039-11	963174A
000260170	201024CV	4287	150	15	2692	2250	4279	201024CV	00002380	00002377	WEA015039-11	963174A
000260170	201024CV	4288	150	15	2690	2250	4279	201024CV	00002380	00002377	WEA015039-11	963174A
000260170	201024CV	4289	150	15	2688	2250	4279	201024CV	00002369	00002367	WEA015039-11	963174A
000260170	201024CV	4290	150	15	2694	2250	4279	201024CV	00002369	00002367	WEA015039-11	963174A
000260170	201024CV	4291	150	15	2700	2250	4279	201024CV	00002369	00002367	WEA015039-11	963174A
000260170	201024CV	4292	150	15	2682	2250	4279	201024CV	00002369	00002367	WEA015039-11	963174A
000260170	201024CV	4293	150	15	2692	2250	4293	201024CV	00002369	00002367	WEA015039-11	963174A
000260170	201024CV	4294	150	15	2696	2250	4293	201024CV	00002369	00002367	WEA015039-11	963174A
000260170	201024CV	4295	150	15	2688	2250	4293	201024CV	00002369	00002367	WEA015039-11	963174A
000260170	201024CV	4296	150	15	2694	2250	4293	201024CV	00002365	00002357	WEA015039-11	963174A

Total sq ft: **495000**

Total Number of Rolls Certified: **220**

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 000260170 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength 6496	Grab 4632 Modified	Grab 4632 Modified
	ASTM Test Method:		D 5993	D 6768	D 6496	D4632*	D4632*
	Required Value:		0.75 lb /sq ft Min	30 lbs/in MARV	3.5 lbs/in Min	90 lbs	90lbs
CV-BENTOMAT ST	201024CV	4071	0.80	65.9	6.5	263.5	32.1
CV-BENTOMAT ST	201024CV	4086	0.88	65.9	6.2	263.5	32.2
CV-BENTOMAT ST	201024CV	4101	0.84	65.9	6.3	263.5	31.2
CV-BENTOMAT ST	201024CV	4115	0.83	65.9	4.3	263.5	23.2
CV-BENTOMAT ST	201024CV	4131	0.82	65.9	4.5	263.5	23.2
CV-BENTOMAT ST	201024CV	4146	0.83	65.9	5.9	263.5	31.3
CV-BENTOMAT ST	201024CV	4160	0.84	37.3	8.9	149.1	47.7
CV-BENTOMAT ST	201024CV	4175	0.83	37.3	8.9	149.1	42.1
CV-BENTOMAT ST	201024CV	4191	0.82	37.3	9.1	149.1	44.8
CV-BENTOMAT ST	201024CV	4205	0.88	37.3	8.6	149.1	41.9
CV-BENTOMAT ST	201024CV	4220	0.88	37.3	7.8	149.1	36.1
CV-BENTOMAT ST	201024CV	4235	0.88	37.3	6.5	149.1	30.8
CV-BENTOMAT ST	201024CV	4249	0.88	89.2	5.8	356.8	28.8
CV-BENTOMAT ST	201024CV	4264	0.89	89.2	5.1	356.8	25.7
CV-BENTOMAT ST	201024CV	4279	0.86	89.2	4.6	356.8	21.4
CV-BENTOMAT ST	201024CV	4293	0.89	89.2	5.3	356.8	27.2

modified ASTM D 4632 using 4 inch grips.

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 000260170

has been tested by American Colloid Company and yielded the following test results.

Clay Lot #	Moist	Swell	Fluid Loss
ASTM Test Method:	D 2216	D 5890	D 5891
Required Value:	12% Max	24 ml/2g Min	18 ml Max
963171A	10.00	27.00	15.40
963171B	10.00	25.00	15.40
963169A	10.40	26.00	14.80
963169B	11.20	25.00	14.00
963167B	10.00	24.00	13.80
963174A	10.80	25.00	14.60

CETCO

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 000260170 was manufactured with geotextiles which were tested with the following results.

BASE GEOTEXTILE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
MATTEX	WEA014113-17	3.5	191.4
MATTEX	WEA014114-6	3.5	192.1
MATTEX	WEA015039-11	3.5	189.4
MATTEX	WEA015039-12	3.5	189.4
MATTEX	WEA015039-6	3.5	193.8
MATTEX	WEA015039-8	3.5	191.1
MATTEX	WEA015073-10	3.5	194.3
MATTEX	WEA015073-8	3.4	196.9
MATTEX	WEA015073-9	3.4	196.9

COVER GEOTEXTILE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
CV-NON-WOVEN	00002219	6.7	47.3
CV-NON-WOVEN	00002258	6.5	41.9
CV-NON-WOVEN	00002320	7.0	57.5
CV-NON-WOVEN	00002328	6.8	51.5
CV-NON-WOVEN	00002338	6.8	49.8
CV-NON-WOVEN	00002347	6.5	41.8
CV-NON-WOVEN	00002357	6.6	44.6
CV-NON-WOVEN	00002367	6.7	40.0
CV-NON-WOVEN	00002377	6.5	44.3
CV-NON-WOVEN	00002386	6.7	46.7

Certifications from our suppliers are on file at our production facility.

An '*' or 'PT' indicates supplier certifications were unavailable prior to shipping so testing was performed at a CETCO lab.

GCL Conformance Test Results

CONFORMANCE TEST RESULTS

geotechnics
INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-11
LAB ID NO.: L10017-11-01
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 1745

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	72.5	58.4	1.44	1.16	0.070	1.37	1.09	26	1.22
	2	59.3	47.5	1.17	0.94	0.070	1.10	0.87	27	0.98
	3	69.1	55.4	1.37	1.10	0.070	1.30	1.03	26	1.15
	4	61.2	48.7	1.21	0.97	0.070	1.14	0.90	28	1.00
	5	62.3	49.9	1.24	0.99	0.070	1.17	0.92	27	1.03
							AVERAGE:	**0.96** ✓	**27**	**1.08**

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	70.2	77.0	73.6	74.7	74.1	**73.9** ✓	2.46
PEEL STRENGTH	D 6496	MD-lbs/in	7.9	3.7	6.1	5.6	6.9	**6.1** ✓	1.55

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

CHECKED BY: BF DATE: 5-25-10

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-11
LAB ID NO.: L10017-11-02
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 1790

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	54.7	42.9	1.08	0.85	0.070	1.01	0.78	30	0.87
	2	58.8	46.6	1.17	0.92	0.070	1.10	0.85	28	0.96
	3	59.4	46.8	1.18	0.93	0.070	1.11	0.86	29	0.96
	4	61.4	48.6	1.22	0.96	0.070	1.15	0.89	29	1.00
	5	48.9	38.5	0.97	0.76	0.070	0.90	0.69	30	0.78
							AVERAGE:	0.82	29	0.91

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	25.5	27.4	30.1	30.0	32.2	29.0	2.61
PEEL STRENGTH	D 6496	MD-lbs/in	4.5	5.9	7.3	7.7	6.6	6.4	1.26

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

CHECKED BY: BF DATE: 5-25-10

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CONFORMANCE TEST RESULTS

geotechnics
INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-11
LAB ID NO.: L10017-11-03
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 1834

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	56.6	45.5	1.12	0.90	0.070	1.05	0.83	27	0.93
	2	62.5	50.0	1.24	0.99	0.070	1.17	0.92	27	1.03
	3	58.0	46.5	1.15	0.92	0.070	1.08	0.85	27	0.95
	4	62.9	50.8	1.25	1.01	0.070	1.18	0.94	26	1.05
	5	58.7	47.5	1.16	0.94	0.070	1.09	0.87	26	0.98
							AVERAGE:	**0.88**	**26**	**0.99**

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	80.1	69.1	71.1	72.8	81.7	74.9	5.59
PEEL STRENGTH	D 6496	MD-lbs/in	8.0	7.3	7.6	6.6	9.0	7.7	0.88

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

CHECKED BY: BF DATE: 5-25-10

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5/25/2010

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CONFORMANCE TEST RESULTS

geotechnics
INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-11
LAB ID NO.: L10017-11-04
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 1878

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	69.2	55.3	1.37	1.10	0.070	1.30	1.03	27	1.15
	2	63.7	50.4	1.26	1.00	0.070	1.19	0.93	28	1.04
	3	66.0	51.6	1.31	1.02	0.070	1.24	0.95	30	1.07
	4	61.1	48.8	1.21	0.97	0.070	1.14	0.90	27	1.00
	5	61.0	48.4	1.21	0.96	0.070	1.14	0.89	28	1.00
							AVERAGE:	**0.94**	**28**	**1.05**

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	92.9	97.6	85.0	97.2	96.2	**93.8**	5.21
PEEL STRENGTH	D 6496	MD-lbs/in	7.0	6.5	7.9	6.7	6.5	**6.9**	0.61

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-11
LAB ID NO.: L10017-11-05
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 1922

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	55.7	44.1	1.10	0.87	0.070	1.03	0.80	29	0.90
	2	63.5	49.9	1.26	0.99	0.070	1.19	0.92	29	1.03
	3	59.9	47.5	1.19	0.94	0.070	1.12	0.87	28	0.98
	4	60.8	48.2	1.21	0.95	0.070	1.14	0.88	28	0.99
	5	53.0	42.2	1.05	0.84	0.070	0.98	0.77	28	0.86
							AVERAGE:	0.85	29	0.95

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	99.5	100.8	100.6	102.2	95.5	99.7	2.55
PEEL STRENGTH	D 6496	MD-lbs/in	7.0	5.7	7.3	7.7	7.4	7.0	0.80

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-11
LAB ID NO.: L10017-11-06
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 1966

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	58.4	45.9	1.16	0.91	0.070	1.09	0.84	29	0.94
	2	50.9	40.9	1.01	0.81	0.070	0.94	0.74	27	0.83
	3	65.6	52.7	1.30	1.04	0.070	1.23	0.97	26	1.09
	4	59.9	48.1	1.19	0.95	0.070	1.12	0.88	27	0.99
	5	47.8	38.3	0.95	0.76	0.070	0.88	0.69	27	0.77
							AVERAGE:	0.83 ✓	27	0.92

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	95.6	86.7	98.0	96.7	100.3	95.5 ✓	5.22
PEEL STRENGTH	D 6496	MD-lbs/in	5.2	7.8	7.2	8.2	5.2	6.7 ✓	1.43

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. Info: .

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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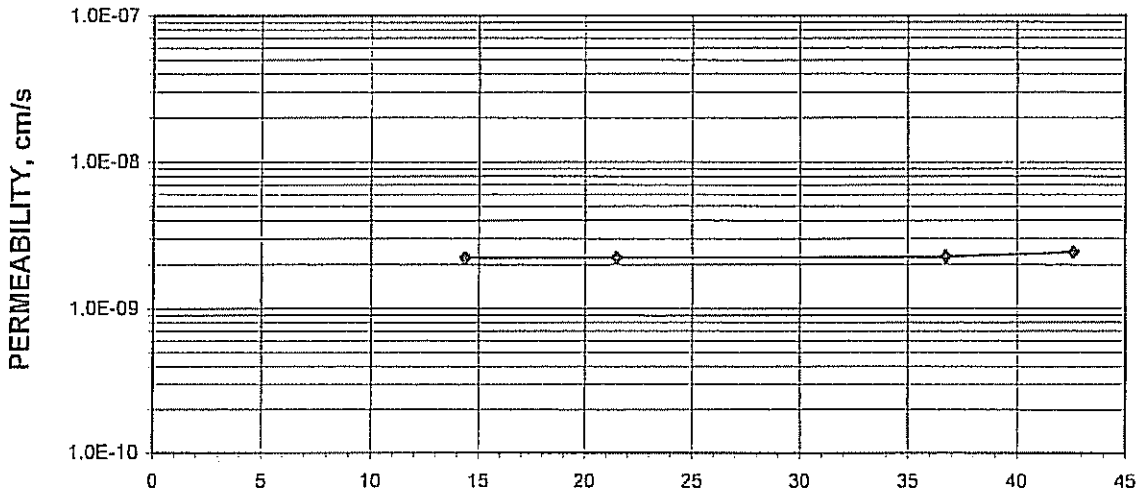
INTEGRITY IN TESTING

Lab ID No.	L10017-11-06	Material	CETCO Bentomat ST
Client	S & ME, Inc.	Roll I.D.:	1966
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-11	Sample No.	NA

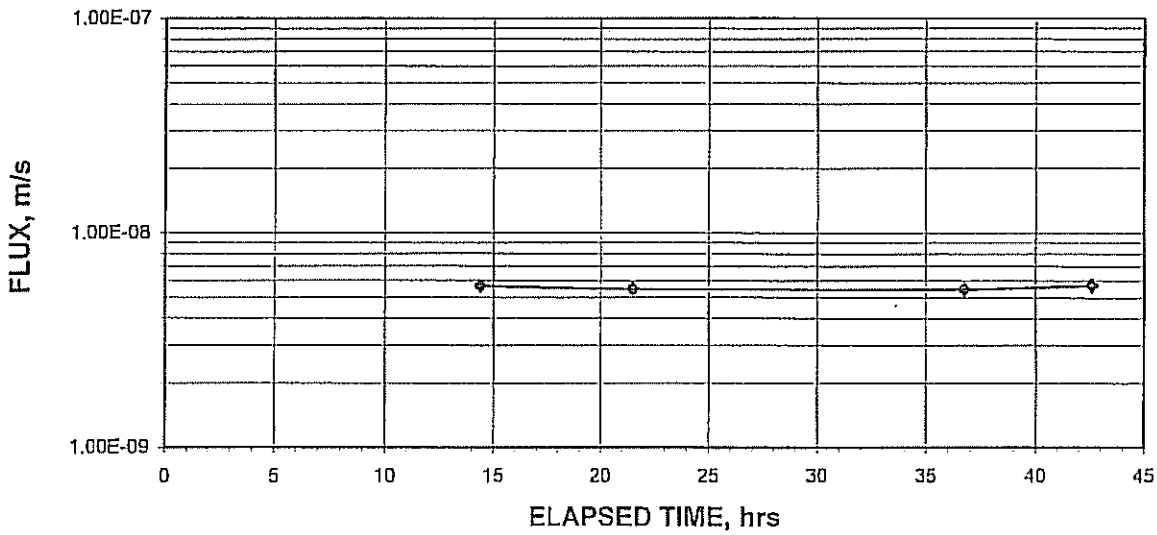
AVERAGE FLUX = 5.55E-09 m/s

AVERAGE PERMEABILITY = 2.31E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



Checked By: hb Date: 6-1-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-11-06	Tested by: JO	Date: 5/21/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 6-1-10
Project No.	L10017-11		
Material	CETCO Bentomat ST		
Roll I.D.:	1966		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	10	26
Wt. of Tare & GCL[2] (gm.)	71.73	94.77
Wt. of Tare & Dry GCL [2] (gm.)	59.66	48.84
Wt. of Tare (gm.)	10.89	10.74
Wt. of Water (gm.)	12.07	45.93
Wt. of Dry GCL (gm.) [2]	48.77	38.10
GCL Moisture Content (%)	**24.7**	**120.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	46.57	82.33 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.181	0.280
Clay Component Thickness 2 (in.) [1]	0.172	0.271
Clay Component Thickness 3 (in.) [1]	0.156	0.268
Average Clay Component Thickness (in.)	na	0.273
Average Clay Component Thickness (mm)	na	**6.934**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	5,742	10,152
Mass/Unit Area of GCL(psf) [2]	1.18	2.08
Mass/Unit Area of Dry GCL(gm./m^2) [2]	4,603	
Mass/Unit Area of Dry GCL(psf) [2]	0.94	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
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INTEGRITY IN TESTING

Lab ID No.	L10017-11-06
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-11
Material	CETCO Bentomat ST
Roll I.D.:	1966
Sample No.	NA

Pressure Heads (Constant)		**Final Sample Dimensions**	
		Sample Length (cm), L	0.693
Top Cap (psi)	75.0	Sample Diameter (cm)	10.16
Bottom Cap (psi)	77.0	Sample Area (cm^2), A	**78.50**
Cell (psi)	80.0	Inflow Burette Area (cm^2), a-in	0.871
Total Head (cm)	140.6	Outflow Burette Area (cm^2), a-out	0.863

AVERAGE FLUX = 5.55E-09 m/s
AVERAGE PERMEABILITY = 2.31E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/23/2010	0.0	0.0	0.0	NA	167.6	22.4	NA	NA
5/24/2010	14.4	2.8	1.8	NA	162.3	22.7	5.65E-09	2.23E-09
5/24/2010	21.5	4.0	2.8	1.43	159.7	22.6	5.48E-09	2.22E-09
5/25/2010	36.7	6.5	5.0	1.16	154.3	22.6	5.46E-09	2.27E-09
5/25/2010	42.6	7.5	5.9	1.13	152.1	22.5	5.71E-09	2.44E-09

Checked By: KB Date: 6-1-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
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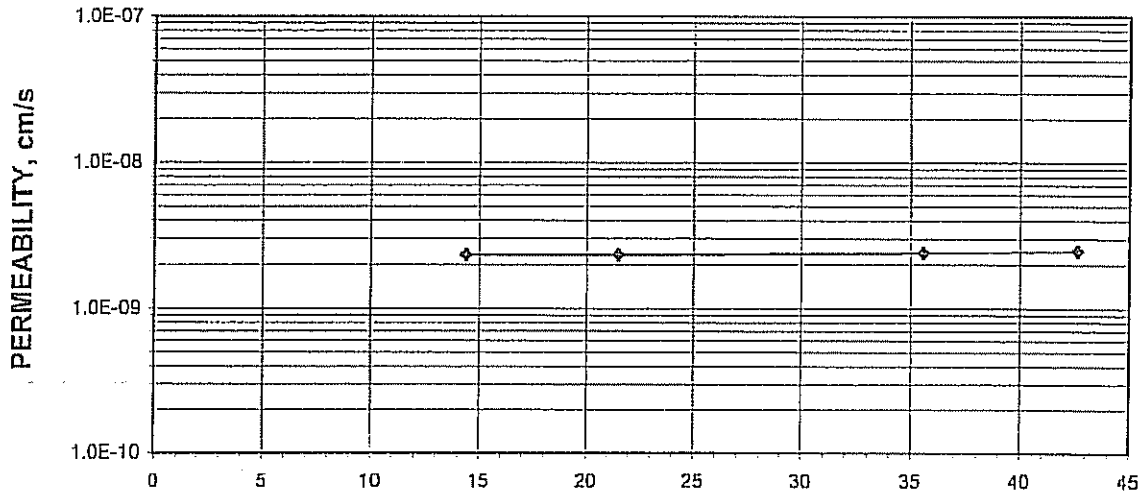
INTEGRITY IN TESTING

Lab ID No.	L10017-11-05	Material	CETCO Bentomat ST
Client	S & ME, Inc.	Roll I.D.:	1922
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-11	Sample No.	NA

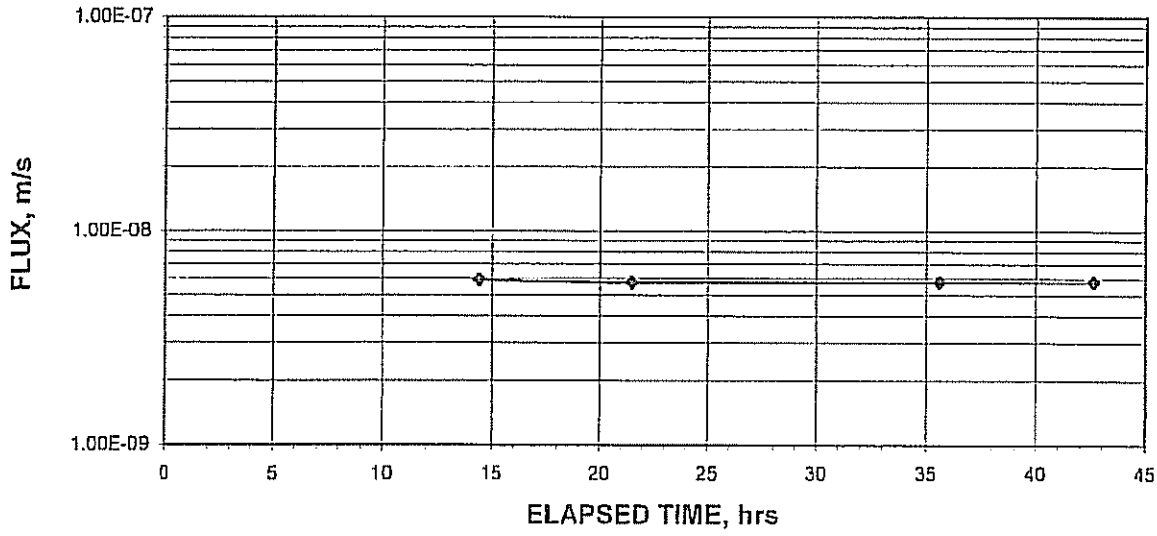
AVERAGE FLUX = 5.76E-09 m/s

AVERAGE PERMEABILITY = 2.41E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



Checked By: KB Date: 10-1-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-11-05	Tested by: JO	Date: 5/21/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 6-1-10
Project No.	L10017-11		
Material	CETCO Bentomat ST		
Roll I.D.:	1922		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	62	41
Wt. of Tare & GCL[2] (gm.)	70.00	87.94
Wt. of Tare & Dry GCL [2] (gm.)	58.01	49.10
Wt. of Tare (gm.)	10.80	10.83
Wt. of Water (gm.)	11.99	38.84
Wt. of Dry GCL (gm.) [2]	47.21	38.27
GCL Moisture Content (%)	**25.4**	**101.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	49.46	79.47 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.171	0.282
Clay Component Thickness 2 (in.) [1]	0.162	0.272
Clay Component Thickness 3 (in.) [1]	0.153	0.270
Average Clay Component Thickness (in.)	na	0.275
Average Clay Component Thickness (mm)	na	**6.977**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	6,099	9,799
Mass/Unit Area of GCL(psf) [2]	1.25	2.01
Mass/Unit Area of Dry GCL(gm./m^2) [2]	4,863	
Mass/Unit Area of Dry GCL(psf) [2]	1.00	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-11-05
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-11
Material	CETCO Bentomat ST
Roll I.D.:	1922
Sample No.	NA

Pressure Heads (Constant)		**Final Sample Dimensions**	
		Sample Length (cm), L	0.698
Top Cap (psi)	75.0	Sample Diameter (cm)	10.16
Bottom Cap (psi)	77.0	Sample Area (cm^2), A	**78.50**
Cell (psi)	80.0	Inflow Burette Area (cm^2), a-in	0.874
Total Head (cm)	140.6	Outflow Burette Area (cm^2), a-out	0.853

AVERAGE FLUX = 5.76E-09 m/s
AVERAGE PERMEABILITY = 2.41E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/23/2010	0.0	0.0	0.0	NA	167.9	22.4	NA	NA
5/24/2010	14.4	3.0	1.8	NA	162.4	22.7	5.90E-09	2.34E-09
5/24/2010	21.5	4.3	2.8	1.54	159.7	22.6	5.73E-09	2.34E-09
5/25/2010	35.6	6.8	4.9	1.23	154.4	22.6	5.77E-09	2.41E-09
5/25/2010	42.6	8.0	6.0	1.16	151.7	22.5	5.79E-09	2.49E-09

Checked By: KB Date: 6-1-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
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INTEGRITY IN TESTING

Lab ID No.	L10017-11-04	Tested by: JO	Date: 5/14/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 5-24-10
Project No.	L10017-11		
Material	CETCO Bentimat ST		
Roll I.D.:	1878		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	51	40
Wt. of Tare & GCL[2] (gm.)	76.76	103.68
Wt. of Tare & Dry GCL [2] (gm.)	63.41	49.68
Wt. of Tare (gm.)	10.87	10.85
Wt. of Water (gm.)	13.35	54.00
Wt. of Dry GCL (gm.) [2]	52.54	38.83
GCL Moisture Content (%)	**25.4**	**139.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	50.51	96.29 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.160	0.280
Clay Component Thickness 2 (in.) [1]	0.152	0.287
Clay Component Thickness 3 (in.) [1]	0.140	0.273
Average Clay Component Thickness (in.)	na	0.280
Average Clay Component Thickness (mm)	na	**7.112**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	6,228	11,873
Mass/Unit Area of GCL(psf) [2]	1.27	2.43
Mass/Unit Area of Dry GCL(gm./m^2) [2]	4,966	
Mass/Unit Area of Dry GCL(psf) [2]	1.02	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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INTEGRITY IN TESTING

Lab ID No.	L10017-11-04
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-11
Material	CETCO Bentimat ST
Roll I.D.:	1878
Sample No.	NA

Pressure Heads (Constant)

Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Head (cm)	140.6

Final Sample Dimensions

Sample Length (cm), L	0.711
Sample Diameter (cm)	10.16
Sample Area (cm^2), A	**78.50**
Inflow Burette Area (cm^2), a-in	0.856
Outflow Burette Area (cm^2), a-out	0.855

AVERAGE FLUX = 4.99E-09 m/s
AVERAGE PERMEABILITY = 2.56E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/17/2010	0.0	0.0	0.0	NA	166.6	20.3	NA	NA
5/18/2010	20.5	4.4	2.2	NA	158.9	21.9	5.69E-09	2.37E-09
5/20/2010	68.3	15.8	9.3	1.70	137.4	22.0	6.85E-09	3.13E-09
5/20/2010	74.7	16.7	10.6	1.46	134.8	20.5	6.10E-09	3.14E-09
5/21/2010	90.7	18.8	12.6	0.91	130.1	22.3	4.53E-09	2.30E-09
5/21/2010	94.0	19.2	13.0	1.04	129.1	22.5	4.33E-09	2.23E-09

Checked By: KB Date: 5-24-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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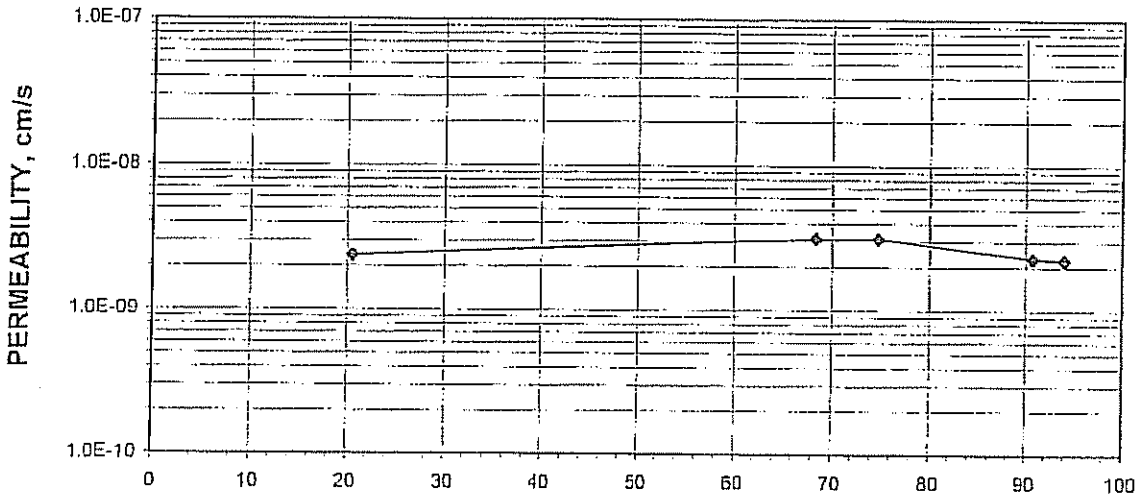
INTEGRITY IN TESTING

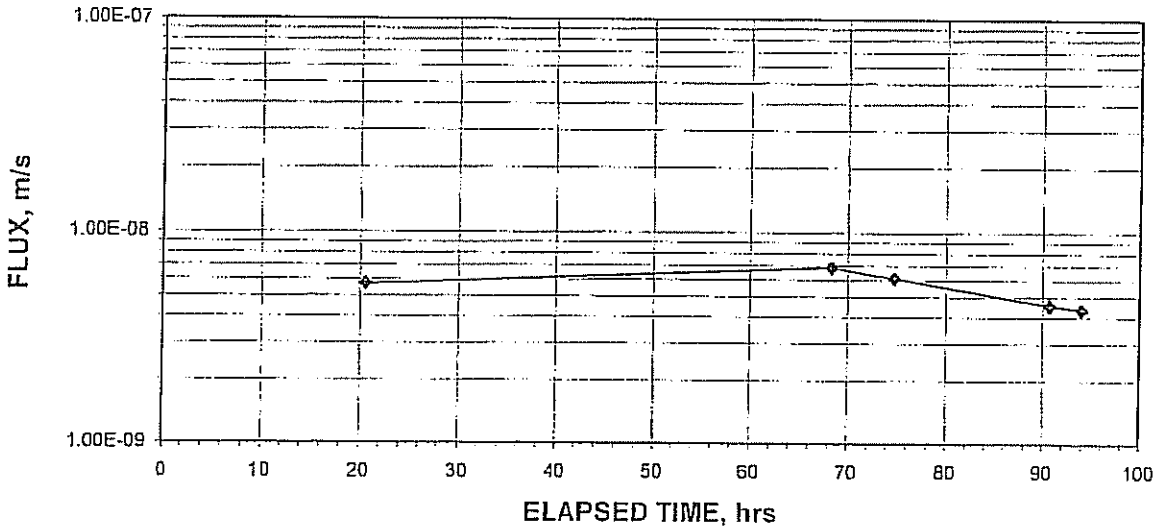
Lab ID No.	L10017-11-04	Material	CETCO Bentimat ST
Client	S & ME, Inc.	Roll I.D.:	1878
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-11	Sample No.	NA

AVERAGE FLUX = 4.99E-09 m/s
AVERAGE PERMEABILITY = 2.56E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



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INPUT BURETTE NO. AND CONDITIONS

Geotechnics

Lab ID No.	L10017-11-04	Material	Bentimat ST
Client	S & ME, Inc.	Roll I.D.:	[illegible]
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Sample No.	NA
Project No.	L10017-11		

Pressure Heads (Constant)

Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Pressure Head (cm)	140.6

INFLOW (HEADWATER) BURETTE

BURETTE No.	G **1202**
BURETTE FACTOR	**1**
INFLOW AREA (cm^2), a-in	0.856
VOLUME CORR. FACTOR	0.939
SLOPE	1.167
INTERCEPT	65.6

OUTFLOW (HEADWATER) BURETTE

BURETTE No.	G **1203**
BURETTE FACTOR	1
OUTFLOW AREA (cm^2), a-out	0.855
VOLUME CORR. FACTOR	0.943
SLOPE	1.163
INTERCEPT	65.6

DATE	TIME		INFLOW G1202	OUTFLOW G1203	FLOW (0 flow)	TEMP.
(mm/dd/yy)	(hr)	(min)	(div.)	(div.)	(1 stop)	(°C)
5/17/2010	13	24	1.8	24.2	0	20.3
5/18/2010	9	56	6.2	22.0	0	21.9
5/20/2010	9	44	17.6	14.9	0	22.0
5/20/2010	16	7	18.5	13.6	0	20.5
5/21/2010	8	7	20.6	11.6	0	22.3
5/21/2010	11	23	21.0	11.2	1	22.5

Checked By: Date:

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-11-03	Tested by: JO	Date: 5/14/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 5-24-10
Project No.	L10017-11		
Material	CETCO Bentimat ST		
Roll I.D.:	1834		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	45	51
Wt. of Tare & GCL[2] (gm.)	69.98	103.62
Wt. of Tare & Dry GCL [2] (gm.)	58.92	51.71
Wt. of Tare (gm.)	10.91	10.83
Wt. of Water (gm.)	11.06	51.91
Wt. of Dry GCL (gm.) [2]	48.01	40.88
GCL Moisture Content (%)	**23.0**	**127.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	52.80	97.41 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.158	0.282
Clay Component Thickness 2 (in.) [1]	0.152	0.269
Clay Component Thickness 3 (in.) [1]	0.142	0.274
Average Clay Component Thickness (in.)	na	0.275
Average Clay Component Thickness (mm)	na	**6.985**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	6,510	12,011
Mass/Unit Area of GCL(psf) [2]	1.33	2.46
Mass/Unit Area of Dry GCL(gm./m^2) [2]	5,291	
Mass/Unit Area of Dry GCL(psf) [2]	1.08	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-11-03
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-11
Material	CETCO Bentimat ST
Roll I.D.:	1834
Sample No.	NA

Pressure Heads (Constant)		**Final Sample Dimensions**	
		Sample Length (cm), L	0.699
Top Cap (psi)	75.0	Sample Diameter (cm)	10.16
Bottom Cap (psi)	77.0	Sample Area (cm^2), A	**78.50**
Cell (psi)	80.0	Inflow Burette Area (cm^2), a-in	0.874
Total Head (cm)	140.6	Outflow Burette Area (cm^2), a-out	0.853

AVERAGE FLUX = 4.82E-09 m/s
AVERAGE PERMEABILITY = 1.97E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/17/2010	0.0	0.0	0.0	NA	168.7	20.3	NA	NA
5/17/2010	3.3	1.0	0.5	NA	167.0	20.4	8.04E-09	3.31E-09
5/18/2010	20.5	4.7	2.4	1.96	160.5	21.9	5.75E-09	2.34E-09
5/18/2010	27.5	5.6	3.4	1.59	158.3	22.4	4.86E-09	2.02E-09
5/19/2010	44.5	8.1	5.2	1.21	153.3	21.5	4.45E-09	1.93E-09
5/19/2010	44.5	8.1	5.2	1.39	167.3	21.5	NA	NA
5/19/2010	48.0	8.6	5.7	1.00	166.2	22.0	5.15E-09	2.06E-09
5/20/2010	65.0	11.1	8.0	1.07	160.6	22.0	4.98E-09	2.03E-09
5/21/2010	87.5	13.8	10.8	1.02	154.2	22.3	4.34E-09	1.83E-09

Checked By: JB Date: 5-24-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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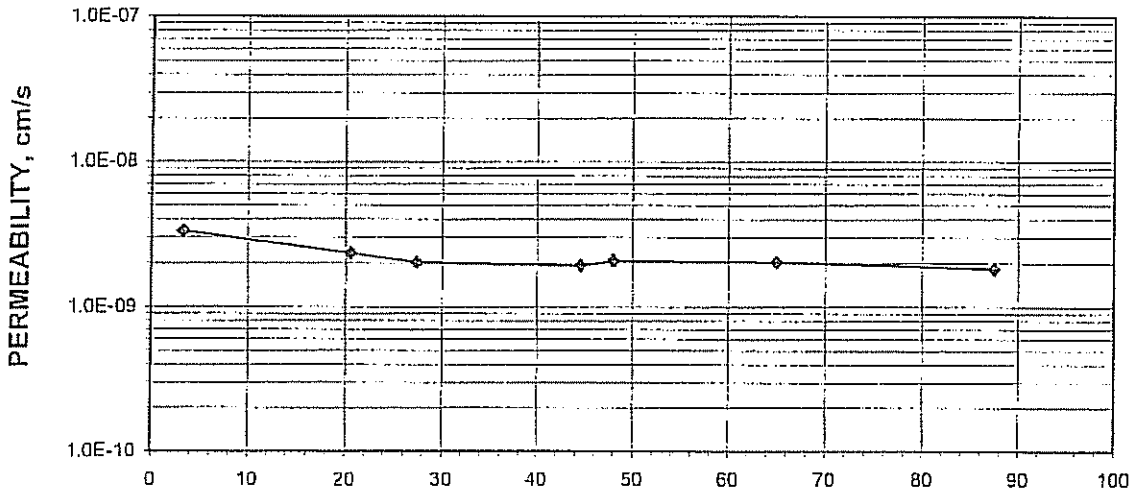
INTEGRITY IN TESTING

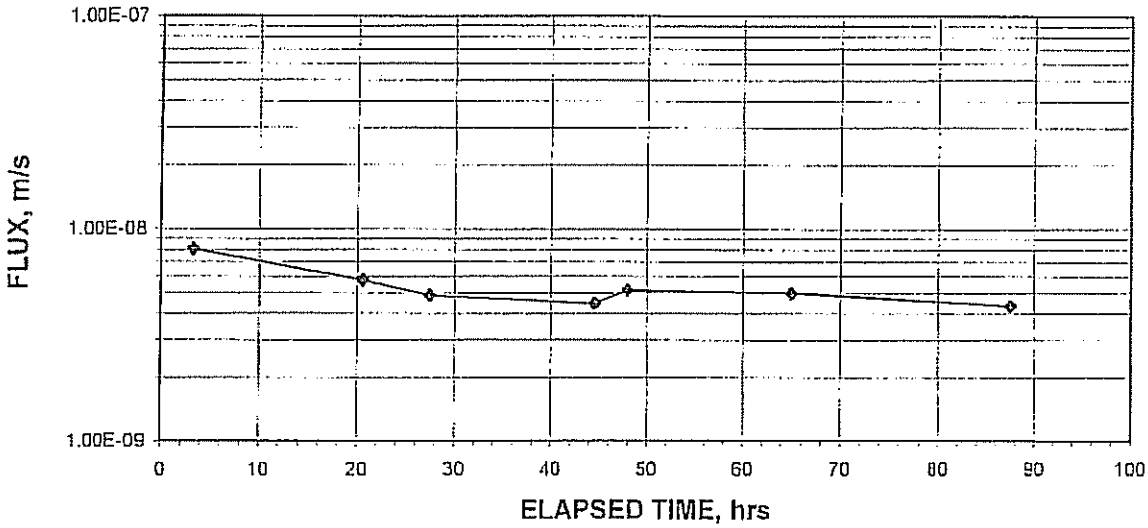
Lab ID No.	L10017-11-03	Material	CETCO Bentimat ST
Client	S & ME, Inc.	Roll I.D.:	1834
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-11	Sample No.	NA

AVERAGE FLUX = 4.82E-09 m/s
AVERAGE PERMEABILITY = 1.97E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



Checked By: KB Date: 5-24-10

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INPUT BURETTE NO. AND CONDITIONS

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Lab ID No.	L10017-11-03	Material	Geosynthetic ST
Client	S & ME, Inc.	Roll I.D.:	[illegible]
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Sample No.	NA
Project No.	L10017-11		

Pressure Heads (Constant)

Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Pressure Head (cm)	140.6

INFLOW (HEADWATER) BURETTE

BURETTE No.	G 1196
BURETTE FACTOR	1
INFLOW AREA (cm^2), a-in	0.874
VOLUME CORR. FACTOR	0.962
SLOPE	1.150
INTERCEPT	65.3

OUTFLOW (HEADWATER) BURETTE

BURETTE No.	G 1197
BURETTE FACTOR	1
OUTFLOW AREA (cm^2), a-out	0.853
VOLUME CORR. FACTOR	1.018
SLOPE	1.173
INTERCEPT	65.2

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	INFLOW G1196 (div.)	OUTFLOW G1197 (div.)	FLOW (0 flow) (1 stop)	TEMP. (°C)
5/17/2010	13	18	0.2	24.1	0	20.3
5/17/2010	16	36	1.2	23.6	0	20.4
5/18/2010	9	50	4.9	21.7	0	21.9
5/18/2010	16	45	5.8	20.7	0	22.4
5/19/2010	9	50	8.3	18.9	1	21.5
5/19/2010	13	10	0.9	23.6	0	21.5
5/19/2010	16	36	1.4	23.1	0	22.0
5/20/2010	9	40	3.9	20.8	0	22.0
5/21/2010	8	5	6.6	18.0	0	22.3

Checked By: Date:

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-11-02	Tested by: JO	Date: 5/14/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 5-24-10
Project No.	L10017-11		
Material	CETCO Bentimat ST		
Roll I.D.:	1790		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	62	45
Wt. of Tare & GCL[2] (gm.)	81.34	75.58
Wt. of Tare & Dry GCL [2] (gm.)	66.85	38.74
Wt. of Tare (gm.)	10.75	10.91
Wt. of Water (gm.)	14.49	36.84
Wt. of Dry GCL (gm.) [2]	56.10	27.83
GCL Moisture Content (%)	**25.8**	**132.4**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	38.38	70.88 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.157	0.224
Clay Component Thickness 2 (in.) [1]	0.146	0.219
Clay Component Thickness 3 (in.) [1]	0.138	0.220
Average Clay Component Thickness (in.)	na	0.221
Average Clay Component Thickness (mm)	na	**5.613**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	4,732	8,740
Mass/Unit Area of GCL(psf) [2]	0.97	1.79
Mass/Unit Area of Dry GCL(gm./m^2) [2]	3,761	
Mass/Unit Area of Dry GCL(psf) [2]	0.77	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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INTEGRITY IN TESTING

Lab ID No.	L10017-11-02
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-11
Material	CETCO Bentimat ST
Roll I.D.:	1790
Sample No.	NA

Pressure Heads (Constant)		**Final Sample Dimensions**	
		Sample Length (cm), L	0.561
Top Cap (psi)	75.0	Sample Diameter (cm)	10.16
Bottom Cap (psi)	77.0	Sample Area (cm^2), A	**78.50**
Cell (psi)	80.0	Inflow Burette Area (cm^2), a-in	0.871
Total Head (cm)	140.6	Outflow Burette Area (cm^2), a-out	0.863

AVERAGE FLUX = 6.75E-09 m/s
AVERAGE PERMEABILITY = 2.52E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/17/2010	0.0	0.0	0.0	NA	161.1	20.3	NA	NA
5/17/2010	3.3	1.6	0.8	NA	158.4	20.4	1.29E-08	4.49E-09
5/18/2010	20.5	5.6	3.7	1.51	150.4	21.9	7.08E-09	2.47E-09
5/19/2010	44.6	9.7	7.7	1.17	141.0	21.5	5.95E-09	2.22E-09
5/19/2010	44.6	9.7	7.7	1.03	160.4	22.0	NA	NA
5/20/2010	61.7	13.9	11.9	1.00	150.7	22.0	8.72E-09	3.01E-09
5/20/2010	68.1	15.2	13.1	1.02	147.8	20.5	6.91E-09	2.57E-09
5/21/2010	84.3	18.4	16.2	1.05	140.5	22.3	6.85E-09	2.53E-09
5/21/2010	87.3	19.0	16.7	1.06	139.3	22.5	6.49E-09	2.46E-09

Checked By: KB Date: 5-24-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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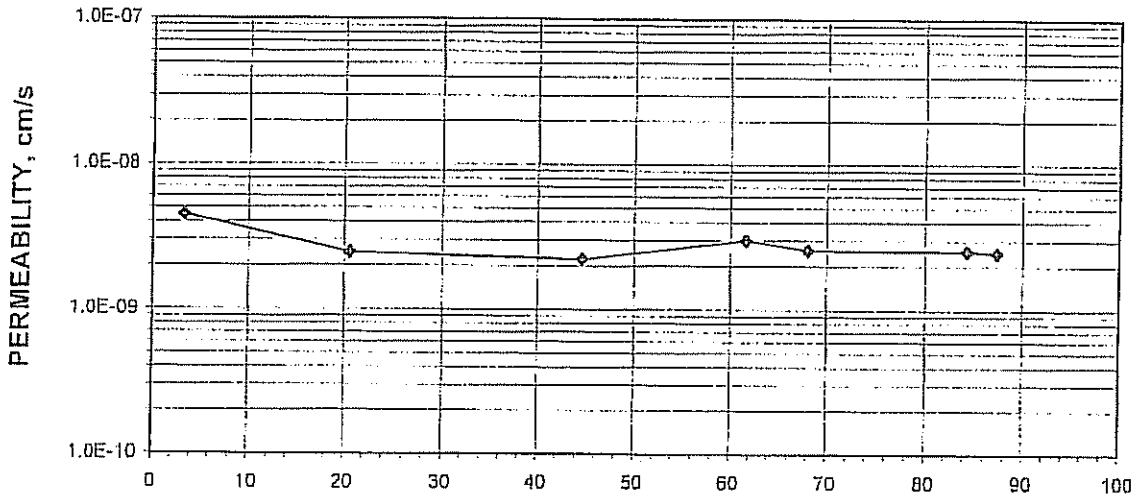
INTEGRITY IN TESTING

Lab ID No.	L10017-11-02	Material	CETCO Bentimat ST
Client	S & ME, Inc.	Roll I.D.:	1790
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-11	Sample No.	NA

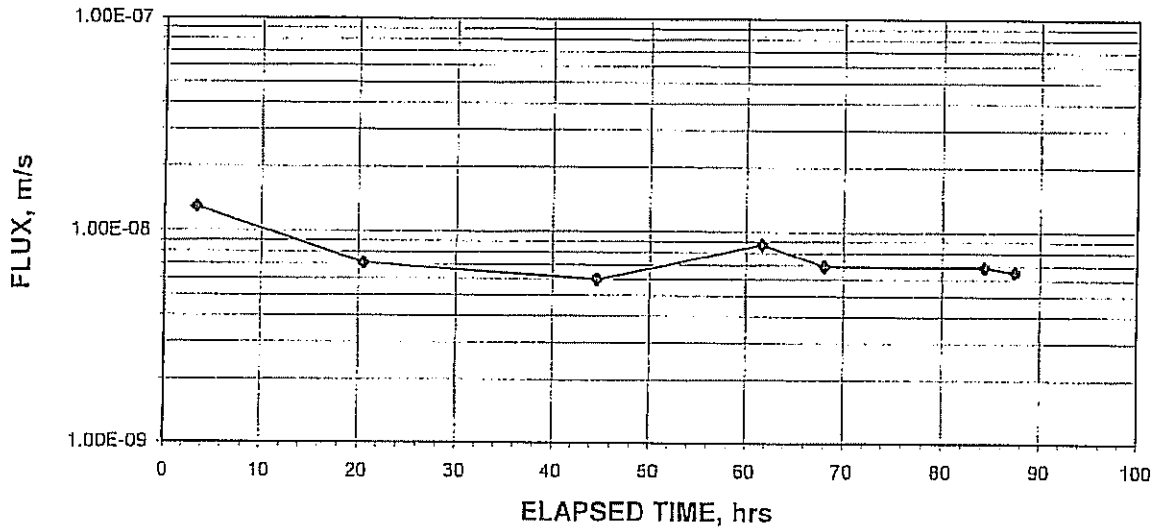
AVERAGE FLUX = 6.75E-09 m/s

AVERAGE PERMEABILITY = 2.52E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



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INPUT BURETTE NO. AND CONDITIONS

geotechnics INTEGRITY IN TESTING

Lab ID No.	L10017-11-02	Material	Bentimat ST
Client	S & ME, Inc.	Roll I.D.:	[illegible]
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Sample No.	NA
Project No.	L10017-11		

Pressure Heads (Constant)	
Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Pressure Head (cm)	140.6

INFLOW (HEADWATER) BURETTE

BURETTE No.	G 1198
BURETTE FACTOR	1
INFLOW AREA (cm^2), a-in	0.871
VOLUME CORR. FACTOR	1.067
SLOPE	1.154
INTERCEPT	65.4

OUTFLOW (HEADWATER) BURETTE

BURETTE No.	G 1199
BURETTE FACTOR	1
OUTFLOW AREA (cm^2), a-out	0.863
VOLUME CORR. FACTOR	0.955
SLOPE	1.158
INTERCEPT	65.4

DATE	TIME		INFLOW G1198	OUTFLOW G1199	FLOW (0 flow)	TEMP.
(mm/dd/yy)	(hr)	(min)	(div.)	(div.)	(1 stop)	(°C)
5/17/2010	13	20	5.9	23.6	0	20.3
5/17/2010	16	38	7.5	22.8	0	20.4
5/18/2010	9	52	11.5	19.9	0	21.9
5/19/2010	9	56	15.6	15.9	1	21.5
5/19/2010	16	38	3.3	20.4	0	22.0
5/20/2010	9	41	7.5	16.2	0	22.0
5/20/2010	16	5	8.8	15.0	0	20.5
5/21/2010	8	21	12.0	11.9	0	22.3
5/21/2010	11	21	12.6	11.4	0	22.5

Checked By: VK Date:

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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INTEGRITY IN TESTING

Lab ID No.	L10017-11-01	Tested by: JO	Date: 5/14/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: JB	Date: 5-24-10
Project No.	L10017-11		
Material	CETCO Bentimat ST		
Roll I.D.:	1745		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	24	5
Wt. of Tare & GCL[2] (gm.)	73.89	107.65
Wt. of Tare & Dry GCL [2] (gm.)	61.10	51.61
Wt. of Tare (gm.)	10.66	10.79
Wt. of Water (gm.)	12.79	56.04
Wt. of Dry GCL (gm.) [2]	50.44	40.82
GCL Moisture Content (%)	**25.4**	**137.3**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	54.92	103.96 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.170	0.288
Clay Component Thickness 2 (in.) [1]	0.164	0.272
Clay Component Thickness 3 (in.) [1]	0.158	0.281
Average Clay Component Thickness (in.)	na	0.280
Average Clay Component Thickness (mm)	na	**7.120**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	6,772	12,818
Mass/Unit Area of GCL(psf) [2]	1.39	2.62
Mass/Unit Area of Dry GCL(gm./m^2) [2]	5,402	
Mass/Unit Area of Dry GCL(psf) [2]	1.11	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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INTEGRITY IN TESTING

Lab ID No.	L10017-11-01
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-11
Material	CETCO Bentimat ST
Roll I.D.:	1745
Sample No.	NA

Pressure Heads (Constant)

Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Head (cm)	140.6

Final Sample Dimensions

Sample Length (cm), L	0.712
Sample Diameter (cm)	10.16
Sample Area (cm^2), A	**78.50**
Inflow Burette Area (cm^2), a-in	0.825
Outflow Burette Area (cm^2), a-out	0.860

AVERAGE FLUX = 4.97E-09 m/s
AVERAGE PERMEABILITY = 2.39E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN / ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
5/17/2010	0.0	0.0	0.0	NA	167.1	20.3	NA	NA
5/17/2010	3.3	0.5	0.5	NA	166.0	20.4	5.33E-09	2.22E-09
5/18/2010	20.5	4.4	2.6	1.69	159.0	21.9	6.17E-09	2.53E-09
5/18/2010	27.5	5.4	4.1	1.36	156.1	22.4	6.40E-09	2.68E-09
5/19/2010	44.6	9.1	6.7	1.15	148.7	21.5	6.50E-09	2.87E-09
5/19/2010	51.3	9.7	7.9	1.13	146.6	22.0	4.75E-09	2.14E-09
5/20/2010	68.3	12.3	10.5	0.84	140.6	22.0	5.40E-09	2.50E-09
5/20/2010	74.7	13.2	11.4	1.00	138.5	20.5	4.98E-09	2.46E-09
5/21/2010	90.7	15.3	13.4	1.03	133.7	22.3	4.53E-09	2.20E-09

Checked By: KB Date: 5-24-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

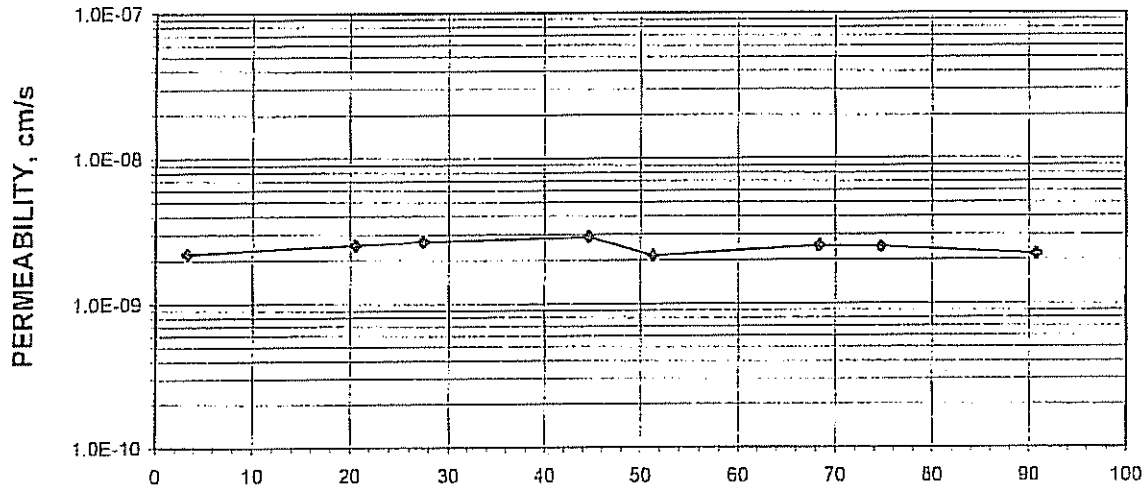
geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-11-01	Material	CETCO Bentimat ST
Client	S & ME, Inc.	Roll I.D.:	1745
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-11	Sample No.	NA

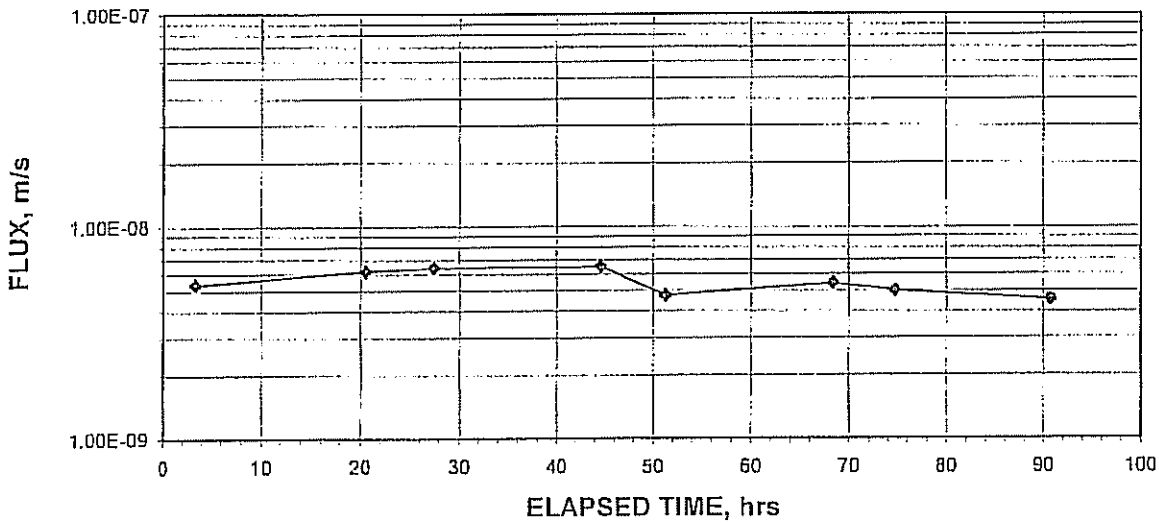
AVERAGE FLUX = 4.97E-09 ✓ m/s

AVERAGE PERMEABILITY = 2.39E-09 ✓ cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



Checked By: RB Date: 5-24-10

\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\L10017-11-01_GCLIndexFlux.xls]Temp

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INPUT BURETTE NO. AND CONDITIONS

Geotechnics

Lab ID No.	L10017-11-01	Material	CLAY
Client	S & ME, Inc.	Roll I.D.:	[illegible]
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Sample No.	NA
Project No.	L10017-11		

Pressure Heads (Constant)	
Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Pressure Head (cm)	140.6

INFLOW (HEADWATER) BURETTE

BURETTE No.	G 1200
BURETTE FACTOR	1
INFLOW AREA (cm^2), a-in	0.825
VOLUME CORR. FACTOR	1.062
SLOPE	1.167
INTERCEPT	65.4

OUTFLOW (HEADWATER) BURETTE

BURETTE No.	G 1201
BURETTE FACTOR	1
OUTFLOW AREA (cm^2), a-out	0.860
VOLUME CORR. FACTOR	0.995
SLOPE	1.163
INTERCEPT	65.5

DATE	TIME		INFLOW G1200	OUTFLOW G1201	FLOW (0 flow)	TEMP.
(mm/dd/yy)	(hr)	(min)	(div.)	(div.)	(1 stop)	(°C)
5/17/2010	13	22	1.7	24.6	0	20.3
5/17/2010	16	41	2.2	24.1	0	20.4
5/18/2010	9	54	6.1	22.0	0	21.9
5/18/2010	16	49	7.1	20.5	0	22.4
5/19/2010	9	58	10.8	17.9	0	21.5
5/19/2010	16	40	11.4	16.7	0	22.0
5/20/2010	9	42	14.0	14.1	0	22.0
5/20/2010	16	6	14.9	13.2	0	20.5
5/21/2010	8	6	17.0	11.2	1	22.3

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INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-14
LAB ID NO.: L10017-14-01
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 4071

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	55.0	45.3	1.09	0.90	0.070	1.02	0.83	23	0.93
	2	51.9	43.3	1.03	0.86	0.070	0.96	0.79	22	0.88
	3	56.3	46.7	1.12	0.93	0.070	1.05	0.86	22	0.96
	4	60.0	50.2	1.19	0.99	0.070	1.12	0.92	21	1.04
	5	59.4	49.6	1.18	0.98	0.070	1.11	0.91	21	1.02
							AVERAGE:	0.86	22	0.97

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	66.7	68.1	70.7	68.9	68.2	68.5	1.44
PEEL STRENGTH	D 6496	MD-lbs/in	6.9	7.2	7.5	7.7	7.8	7.4	0.35

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. Info: .

CHECKED BY: BF DATE: 6-22-10

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6/22/2010

CONFORMANCE TEST RESULTS

geotechnics
INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-14
LAB ID NO.: L10017-14-02
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 4115

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	64.1	54.4	1.27	1.08	0.070	1.20	1.01	19	1.13
	2	56.6	48.5	1.12	0.96	0.070	1.05	0.89	18	1.00
	3	58.2	49.6	1.15	0.98	0.070	1.08	0.91	19	1.02
	4	56.7	48.5	1.12	0.96	0.070	1.05	0.89	18	1.00
	5	67.0	57.4	1.33	1.14	0.070	1.26	1.07	18	1.19
							AVERAGE:	**0.95**	**18**	**1.07**

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	75.3	69.8	69.6	81.7	73.7	**74.0**	4.94
PEEL STRENGTH	D 6496	MD-lbs/in	5.9	7.1	6.5	5.1	3.9	**5.7**	1.24

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-14
LAB ID NO.: L10017-14-03
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 4160

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	65.4	51.2	1.30	1.01	0.070	1.23	0.94	30	1.06
	2	59.6	47.7	1.18	0.95	0.070	1.11	0.88	27	0.98
	3	57.6	46.5	1.14	0.92	0.070	1.07	0.85	26	0.95
	4	56.9	45.6	1.13	0.90	0.070	1.06	0.83	27	0.93
	5	65.8	52.0	1.31	1.03	0.070	1.24	0.96	29	1.08
							AVERAGE:	**0.89**	**28**	**1.00**

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	35.7	35.5	36.1	35.5	36.1	**35.8**	0.31
PEEL STRENGTH	D 6496	MD-lbs/in	10.2	12.2	12.9	10.6	12.7	**11.7**	1.23

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-14
LAB ID NO.: L10017-14-04
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 4205

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	56.2	44.9	1.11	0.89	0.070	1.04	0.82	27	0.92
	2	55.5	44.6	1.10	0.88	0.070	1.03	0.81	27	0.91
	3	52.9	41.7	1.05	0.83	0.070	0.98	0.76	29	0.85
	4	66.1	50.9	1.31	1.01	0.070	1.24	0.94	32	1.05
	5	60.6	49.0	1.20	0.97	0.070	1.13	0.90	25	1.01
							AVERAGE:	**0.85**	**28**	**0.95**

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	76.6	80.2	79.7	79.1	82.2	**79.5**	2.02
PEEL STRENGTH	D 6496	MD-lbs/in	8.8	9.0	9.3	9.8	9.4	**9.2**	0.38

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-14
LAB ID NO.: L10017-14-05
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 4249

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	63.3	51.1	1.26	1.01	0.070	1.19	0.94	26	1.06
	2	62.3	49.8	1.24	0.99	0.070	1.17	0.92	27	1.03
	3	57.3	45.4	1.13	0.90	0.070	1.06	0.83	28	0.93
	4	59.8	47.4	1.19	0.94	0.070	1.12	0.87	28	0.97
	5	68.1	54.4	1.35	1.08	0.070	1.28	1.01	27	1.13
							AVERAGE:	0.91	27	1.02

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	101.9	103.3	97.2	96.7	94.1	98.6	3.81
PEEL STRENGTH	D 6496	MD-lbs/in	9.6	6.9	7.6	7.3	6.1	7.5	1.28

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL No. 1
PROJECT NO.: L10017-14
LAB ID NO.: L10017-14-06
MATERIAL: CETCO BENTOMAT ST
ROLL NO: 4293

	SPECIMEN	TOTAL WT. AS REC'D grams	TOTAL WT. DRY grams	TOTAL WT. AS REC'D psf	TOTAL WT. DRY psf	WT. BACKING psf (1)	AS REC'D Bent Cont psf	DRY Bent Cont psf	MOISTURE CONTENT %	Bent Cont 12% m.c. psf
BENTONITE CONTENT ASTM D3776 & ASTM D5993	1	64.2	50.1	1.27	0.99	0.070	1.20	0.92	31	1.03
	2	58.2	45.9	1.15	0.91	0.070	1.08	0.84	29	0.94
	3	65.5	50.9	1.30	1.01	0.070	1.23	0.94	31	1.05
	4	60.1	47.8	1.19	0.95	0.070	1.12	0.88	28	0.98
	5	52.9	42.2	1.05	0.84	0.070	0.98	0.77	28	0.86
							AVERAGE:	0.87	29	0.97

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVG	STD
TENSILE STRENGTH	D 6768	MD-lbs/in	105.7	107.8	103.5	102.3	100.3	103.9	2.94
PEEL STRENGTH	D 6496	MD-lbs/in	4.6	8.3	5.9	7.3	5.6	6.3	1.44

* NOTES:1) Weight of carrier (geotextile) provided by CETCO spec. info: .

CHECKED BY: BF DATE: 6-22-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-14-01	Tested by: JO	Date: 6/21/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 6-29-10
Project No.	L10017-14		
Material	CETCO Bentomat ST		
Roll I.D.:	4071		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	6	39
Wt. of Tare & GCL[2] (gm.)	67.94	80.39
Wt. of Tare & Dry GCL [2] (gm.)	58.56	41.47
Wt. of Tare (gm.)	10.89	10.83
Wt. of Water (gm.)	9.38	38.92
Wt. of Dry GCL (gm.) [2]	47.67	30.64
GCL Moisture Content (%)	19.7	**127.0**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	39.42	74.78 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.153	0.238
Clay Component Thickness 2 (in.) [1]	0.148	0.229
Clay Component Thickness 3 (in.) [1]	0.137	0.221
Average Clay Component Thickness (in.)	na	0.229
Average Clay Component Thickness (mm)	na	**5.825**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	4,861	9,221
Mass/Unit Area of GCL(psf) [2]	1.00	1.89
Mass/Unit Area of Dry GCL(gm./m^2) [2]	4,061	
Mass/Unit Area of Dry GCL(psf) [2]	0.83	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-14-01
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-14
Material	CETCO Bentomat ST
Roll I.D.:	4071
Sample No.	NA

Pressure Heads (Constant)		Final Sample Dimensions	
		Sample Length (cm), L	0.583
Top Cap (psi)	75.0	Sample Diameter (cm)	10.16
Bottom Cap (psi)	77.0	Sample Area (cm^2), A	78.50
Cell (psi)	80.0	Inflow Burette Area (cm^2), a-in	0.874
Total Head (cm)	140.6	Outflow Burette Area (cm^2), a-out	0.853

AVERAGE FLUX = 7.13E-09 m/s
AVERAGE PERMEABILITY = 2.68E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
6/24/2010	0.0	0.0	0.0	NA	168.2	23.0	NA	NA
6/24/2010	6.6	1.5	1.5	NA	164.7	22.8	8.10E-09	2.66E-09
6/25/2010	22.4	4.9	4.6	1.07	157.1	22.7	7.26E-09	2.47E-09
6/25/2010	28.8	6.3	5.9	1.09	154.0	22.4	7.48E-09	2.65E-09
6/26/2010	50.9	10.9	10.2	1.07	143.7	22.5	7.13E-09	2.63E-09
6/28/2010	96.0	19.7	18.7	1.05	123.6	23.0	6.79E-09	2.77E-09

Checked By: KB Date: 6-29-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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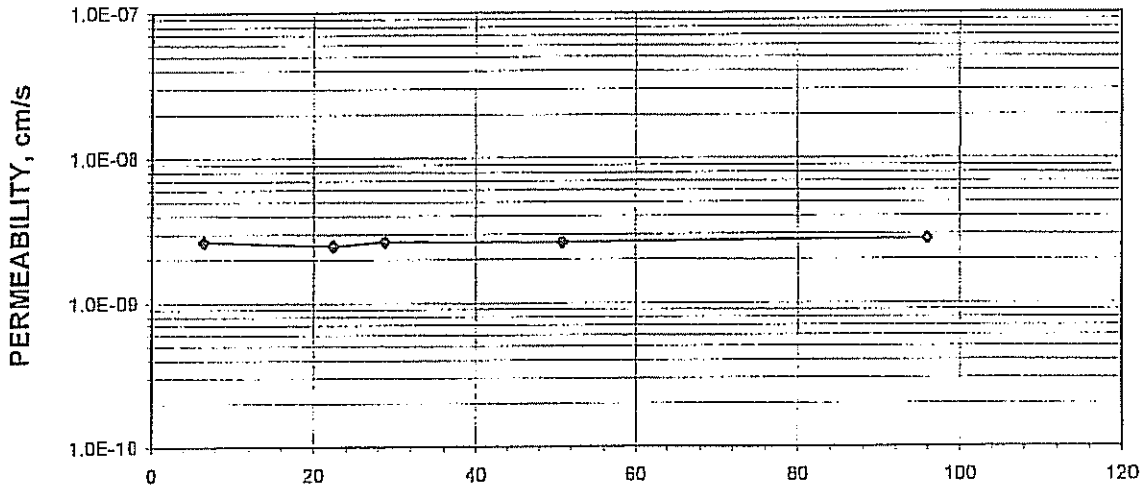
INTEGRITY IN TESTING

Lab ID No.	L10017-14-01	Material	CETCO Bentomat ST
Client	S & ME, Inc.	Roll I.D.:	4071
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-14	Sample No.	NA

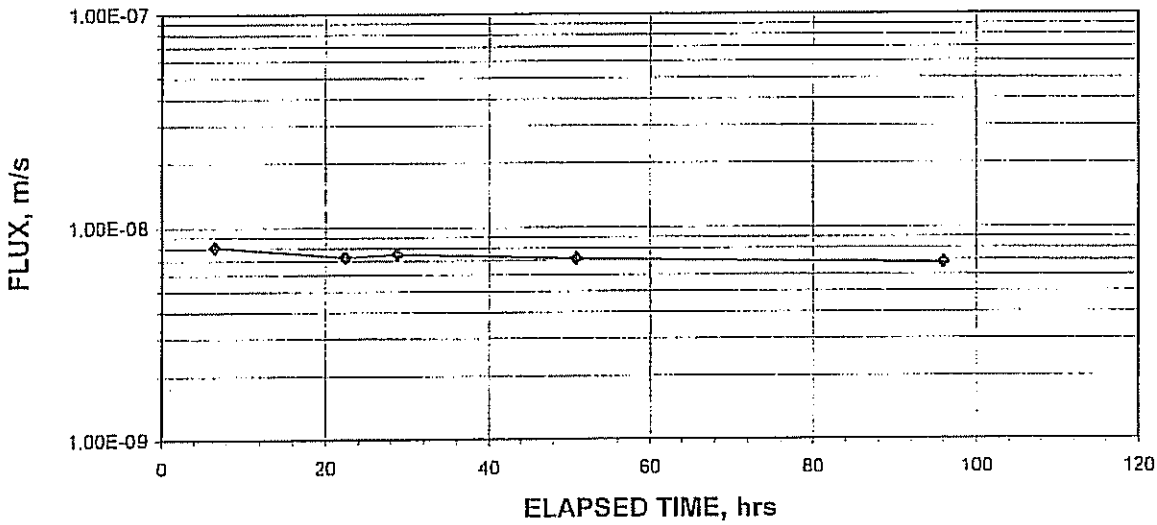
AVERAGE FLUX = 7.13E-09 m/s

AVERAGE PERMEABILITY = 2.68E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



Checked By: KB Date: 6-29-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-14-02	Tested by: JO	Date: 6/21/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 6-29-10
Project No.	L10017-14		
Material	CETCO Bentomat ST		
Roll I.D.:	4115		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	42	8
Wt. of Tare & GCL[2] (gm.)	78.50	106.23
Wt. of Tare & Dry GCL [2] (gm.)	68.35	55.06
Wt. of Tare (gm.)	10.95	10.78
Wt. of Water (gm.)	10.15	51.17
Wt. of Dry GCL (gm.) [2]	57.40	44.28
GCL Moisture Content (%)	**17.7**	**115.6**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	54.21	99.30 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.182	0.268
Clay Component Thickness 2 (in.) [1]	0.175	0.261
Clay Component Thickness 3 (in.) [1]	0.167	0.254
Average Clay Component Thickness (in.)	na	0.261
Average Clay Component Thickness (mm)	na	**6.629**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	6,684	12,244
Mass/Unit Area of GCL(psf) [2]	1.37	2.51
Mass/Unit Area of Dry GCL(gm./m^2) [2]	5,680	
Mass/Unit Area of Dry GCL(psf) [2]	1.16	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-14-02
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-14
Material	CETCO Bentomat ST
Roll I.D.:	4115
Sample No.	NA

Pressure Heads (Constant)		**Final Sample Dimensions**	
		Sample Length (cm), L	0.663
Top Cap (psi)	75.0	Sample Diameter (cm)	10.16
Bottom Cap (psi)	77.0	Sample Area (cm^2), A	**78.50**
Cell (psi)	80.0	Inflow Burette Area (cm^2), a-in	0.871
Total Head (cm)	140.6	Outflow Burette Area (cm^2), a-out	0.863

AVERAGE FLUX = 5.90E-09 m/s
AVERAGE PERMEABILITY = 2.43E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
6/24/2010	0.0	0.0	0.0	NA	167.8	23.0	NA	NA
6/24/2010	6.5	1.5	0.9	NA	165.1	22.8	6.50E-09	2.43E-09
6/25/2010	22.4	4.5	3.3	1.36	158.8	22.7	6.02E-09	2.32E-09
6/26/2010	50.9	9.6	7.9	1.16	147.6	22.5	6.03E-09	2.47E-09
6/28/2010	96.0	17.1	14.8	1.10	130.9	23.0	5.65E-09	2.51E-09

Checked By: KB Date: 6-29-10

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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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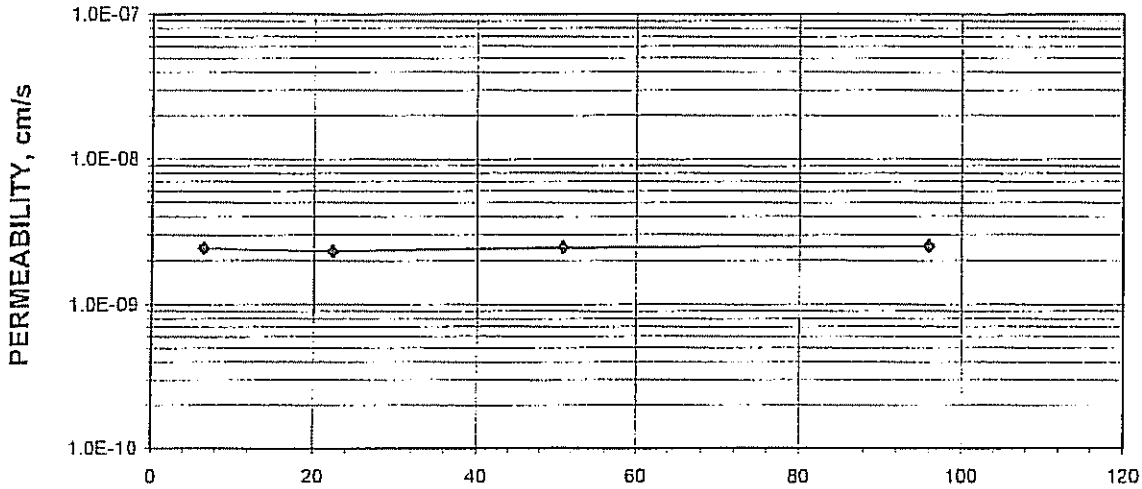
INTEGRITY IN TESTING

Lab ID No.	L10017-14-02	Material	CETCO Bentomat ST
Client	S & ME, Inc.	Roll I.D.:	4115
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-14	Sample No.	NA

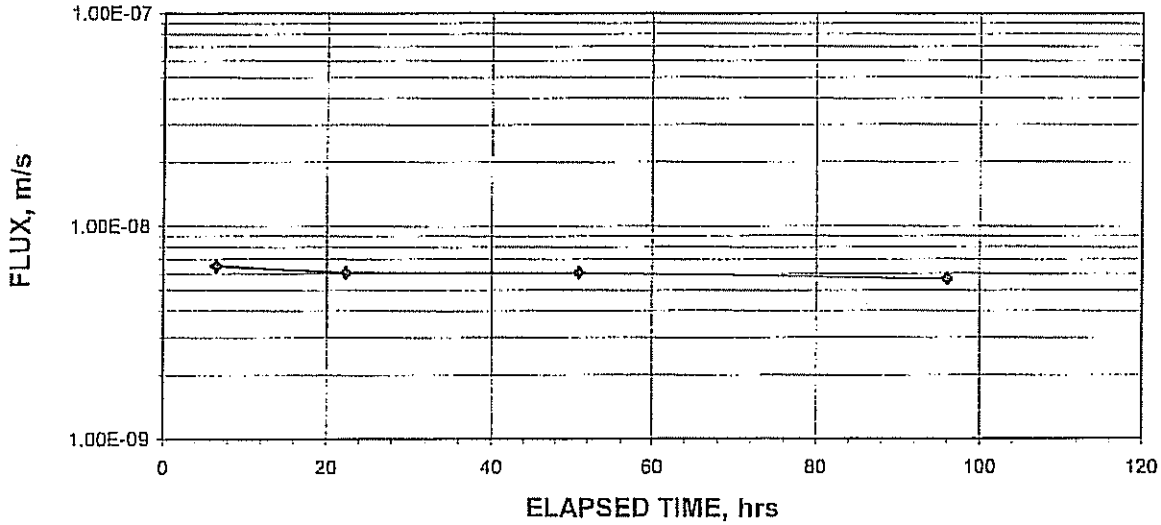
AVERAGE FLUX = 5.90E-09 m/s

AVERAGE PERMEABILITY = 2.43E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

geotechnics
INTEGRITY IN TESTING

Lab ID No.	L10017-14-03	Tested by: JO	Date: 6/21/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 6-29-10
Project No.	L10017-14		
Material	CETCO Bentomat ST		
Roll I.D.:	4160		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	3	62
Wt. of Tare & GCL[2] (gm.)	73.57	90.57
Wt. of Tare & Dry GCL [2] (gm.)	61.04	49.76
Wt. of Tare (gm.)	10.79	10.80
Wt. of Water (gm.)	12.53	40.81
Wt. of Dry GCL (gm.) [2]	50.25	38.96
GCL Moisture Content (%)	**24.9**	**104.7**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	49.86	81.71 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.156	0.268
Clay Component Thickness 2 (in.) [1]	0.148	0.265
Clay Component Thickness 3 (in.) [1]	0.141	0.257
Average Clay Component Thickness (in.)	na	0.263
Average Clay Component Thickness (mm)	na	**6.689**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	6,148	10,076
Mass/Unit Area of GCL(psf) [2]	1.26	2.06
Mass/Unit Area of Dry GCL(gm./m^2) [2]	4,921	
Mass/Unit Area of Dry GCL(psf) [2]	1.01	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

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INTEGRITY IN TESTING

Lab ID No.	L10017-14-03
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-14
Material	CETCO Bentomat ST
Roll I.D.:	4160
Sample No.	NA

Pressure Heads (Constant)

Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Head (cm)	140.6

Final Sample Dimensions

Sample Length (cm), L	0.669
Sample Diameter (cm)	10.16
Sample Area (cm^2), A	**78.50**
Inflow Burette Area (cm^2), a-in	0.825
Outflow Burette Area (cm^2), a-out	0.860

AVERAGE FLUX = 5.11E-09 m/s
AVERAGE PERMEABILITY = 2.07E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN / ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
6/24/2010	0.0	0.0	0.0	NA	167.8	23.0	NA	NA
6/24/2010	6.6	1.1	1.0	NA	165.4	22.8	5.67E-09	2.09E-09
6/25/2010	28.8	4.7	4.3	1.09	157.3	22.4	5.49E-09	2.11E-09
6/26/2010	50.8	7.9	7.4	1.06	150.0	22.5	5.06E-09	2.03E-09
6/28/2010	95.9	14.1	13.4	1.03	135.8	22.5	4.79E-09	2.07E-09

Checked By: KB Date: 6-29-10

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GCL INDEX FLUX & PERMEABILITY TEST

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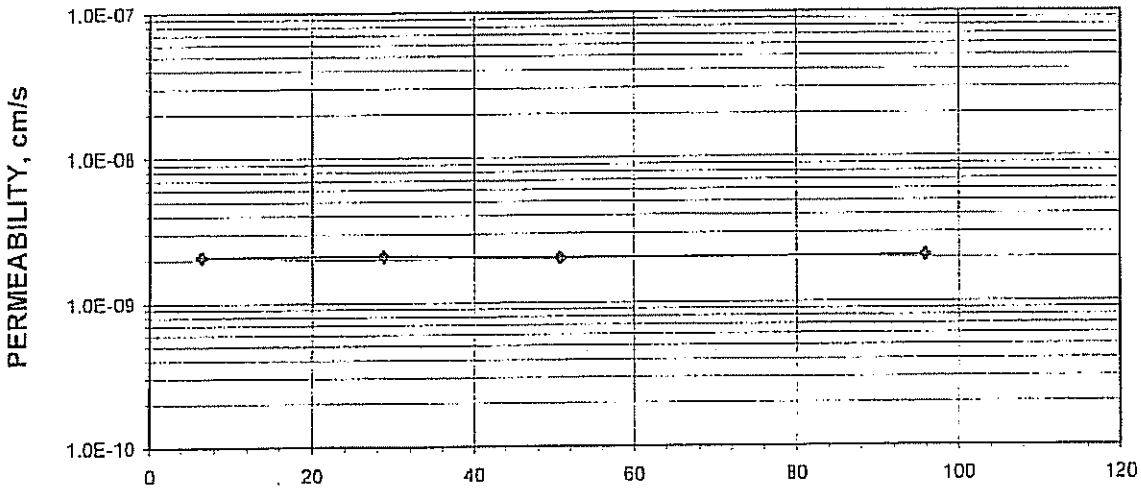
INTEGRITY IN TESTING

Lab ID No.	L10017-14-03	Material	CETCO Bentomat ST
Client	S & ME, Inc.	Roll I.D.:	4160
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-14	Sample No.	NA

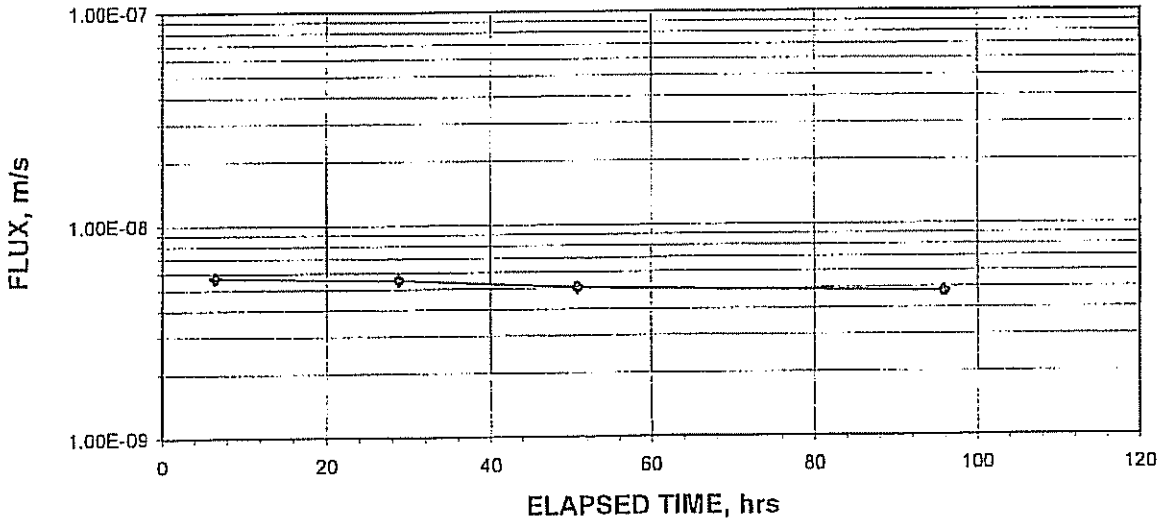
AVERAGE FLUX = 5.11E-09 m/s

AVERAGE PERMEABILITY = 2.07E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
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INTEGRITY IN TESTING

Lab ID No.	L10017-14-04	Tested by: JO	Date: 6/21/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 6-29-10
Project No.	L10017-14		
Material	CETCO Bentomat ST		
Roll I.D.:	4205		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	51	41
Wt. of Tare & GCL[2] (gm.)	83.18	92.68
Wt. of Tare & Dry GCL [2] (gm.)	68.28	48.90
Wt. of Tare (gm.)	10.89	10.79
Wt. of Water (gm.)	14.90	43.78
Wt. of Dry GCL (gm.) [2]	57.39	38.11
GCL Moisture Content (%)	**26.0**	**114.9**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	49.47	84.39 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.173	0.257
Clay Component Thickness 2 (in.) [1]	0.167	0.252
Clay Component Thickness 3 (in.) [1]	0.158	0.248
Average Clay Component Thickness (in.)	na	0.252
Average Clay Component Thickness (mm)	na	**6.409**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	6,100	10,406
Mass/Unit Area of GCL(psf) [2]	1.25	2.13
Mass/Unit Area of Dry GCL(gm./m^2) [2]	4,843	
Mass/Unit Area of Dry GCL(psf) [2]	0.99	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

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INTEGRITY IN TESTING

Lab ID No.	L10017-14-04
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-14
Material	CETCO Bentomat ST
Roll I.D.:	4205
Sample No.	NA

Pressure Heads (Constant)

Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Head (cm)	140.6

Final Sample Dimensions

Sample Length (cm), L	0.641
Sample Diameter (cm)	10.16
Sample Area (cm^2), A	**78.50**
Inflow Burette Area (cm^2), a-in	0.856
Outflow Burette Area (cm^2), a-out	0.855

AVERAGE FLUX = 4.60E-09 m/s
AVERAGE PERMEABILITY = 1.79E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
6/24/2010	0.0	0.0	0.0	NA	167.7	23.0	NA	NA
6/24/2010	6.6	1.0	0.8	NA	165.6	22.8	4.86E-09	1.74E-09
6/25/2010	28.8	4.2	3.5	1.20	158.7	22.4	4.70E-09	1.75E-09
6/26/2010	50.8	7.6	6.2	1.22	151.6	22.5	4.89E-09	1.90E-09
6/28/2010	95.9	12.9	11.6	1.07	139.2	23.0	4.20E-09	1.72E-09

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GCL INDEX FLUX & PERMEABILITY TEST

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(SOP-G52)

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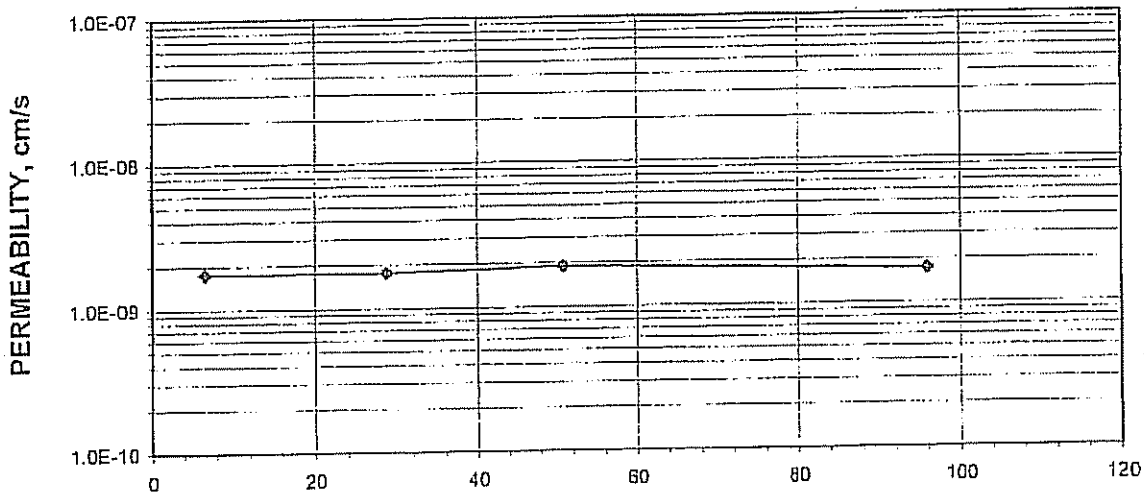
INTEGRITY IN TESTING

Lab ID No.	L10017-14-04	Material	CETCO Bentomat ST
Client	S & ME, Inc.	Roll I.D.:	4205
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-14	Sample No.	NA

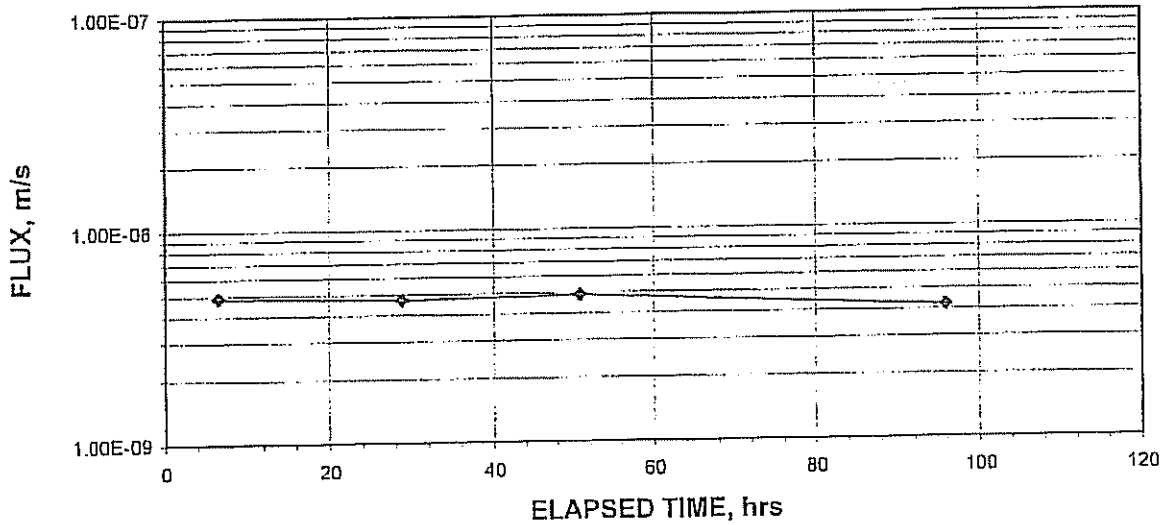
AVERAGE FLUX = 4.60E-09 m/s

AVERAGE PERMEABILITY = 1.79E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
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INTEGRITY IN TESTING

Lab ID No.	L10017-14-05	Tested by: JO	Date: 6/21/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 6-29-10
Project No.	L10017-14		
Material	CETCO Bentomat ST		
Roll I.D.:	4249		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	443	51
Wt. of Tare & GCL[2] (gm.)	76.88	96.97
Wt. of Tare & Dry GCL [2] (gm.)	64.13	48.59
Wt. of Tare (gm.)	8.26	10.87
Wt. of Water (gm.)	12.75	48.38
Wt. of Dry GCL (gm.) [2]	55.87	37.72
GCL Moisture Content (%)	**22.8**	**128.3**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	48.20	89.58 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.167	0.248
Clay Component Thickness 2 (in.) [1]	0.161	0.241
Clay Component Thickness 3 (in.) [1]	0.155	0.232
Average Clay Component Thickness (in.)	na	0.240
Average Clay Component Thickness (mm)	na	**6.104**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	5,943	11,046
Mass/Unit Area of GCL(psf) [2]	1.22	2.26
Mass/Unit Area of Dry GCL(gm./m^2) [2]	4,839	
Mass/Unit Area of Dry GCL(psf) [2]	0.99	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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GCL INDEX FLUX & PERMEABILITY TEST

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INTEGRITY IN TESTING

Lab ID No.	L10017-14-05
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-14
Material	CETCO Bentomat ST
Roll I.D.:	4249
Sample No.	NA

Pressure Heads (Constant)

Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Head (cm)	140.6

Final Sample Dimensions

Sample Length (cm), L	0.610
Sample Diameter (cm)	10.16
Sample Area (cm^2), A	**78.50**
Inflow Burette Area (cm^2), a-in	0.873
Outflow Burette Area (cm^2), a-out	0.872

AVERAGE FLUX = **4.88E-09 m/s**
AVERAGE PERMEABILITY = **1.88E-09 cm/s @ 20oC**

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
6/24/2010	0.0	0.0	0.0	NA	165.3	22.0	NA	NA
6/25/2010	16.5	3.0	1.8	NA	159.8	22.0	5.15E-09	1.84E-09
6/25/2010	26.9	4.7	3.2	1.47	156.2	21.6	5.27E-09	1.95E-09
6/26/2010	46.2	7.7	5.7	1.21	149.9	23.0	5.06E-09	1.87E-09
6/27/2010	67.0	10.7	8.5	1.13	143.3	23.5	4.93E-09	1.88E-09
6/28/2010	88.7	13.7	11.2	1.09	136.8	23.0	4.65E-09	1.88E-09

Checked By: KB Date: 6-29-10

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GCL INDEX FLUX & PERMEABILITY TEST

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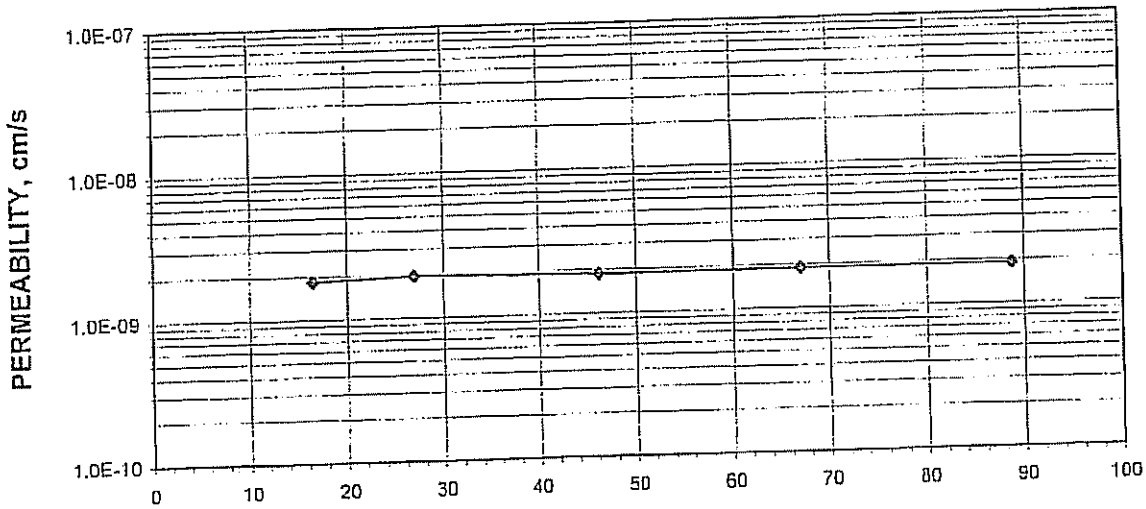
INTEGRITY IN TESTING

Lab ID No.	L10017-14-05	Material	CETCO Bentomat ST
Client	S & ME, Inc.	Roll I.D.:	4249
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-14	Sample No.	NA

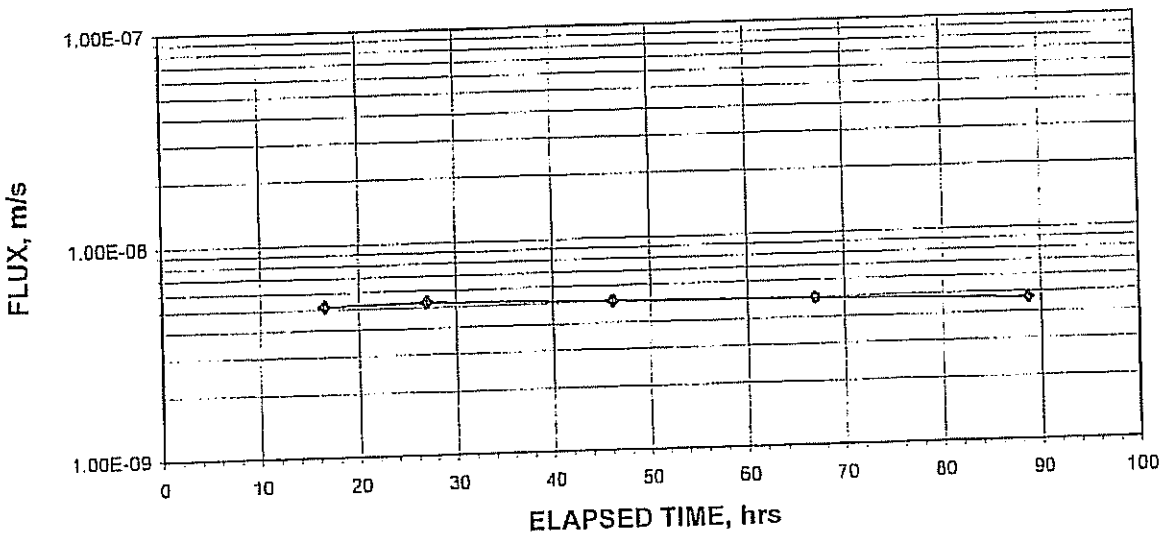
AVERAGE FLUX = 4.88E-09 m/s

AVERAGE PERMEABILITY = 1.88E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



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GCL INDEX FLUX & PERMEABILITY TEST

ASTM D 5887
(SOP-G52)

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INTEGRITY IN TESTING

Lab ID No.	L10017-14-06	Tested by: JO	Date: 6/21/2010
Client	S & ME, Inc.		
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Checked by: KB	Date: 6-29-10
Project No.	L10017-14		
Material	CETCO Bentomat ST		
Roll I.D.:	4293		
Lot No.:	NA		
Sample No.	NA		

Permeant: DEAIRED, DEIONIZED WATER

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	402	46
Wt. of Tare & GCL[2] (gm.)	68.70	111.78
Wt. of Tare & Dry GCL [2] (gm.)	57.04	54.69
Wt. of Tare (gm.)	8.25	10.88
Wt. of Water (gm.)	11.66	57.09
Wt. of Dry GCL (gm.) [2]	48.79	43.81
GCL Moisture Content (%)	**23.9**	**130.3**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of GCL (gm.) [2]	56.11	104.30 (Calculated)
Clay Component Thickness 1 (in.) [1]	0.179	0.281
Clay Component Thickness 2 (in.) [1]	0.174	0.278
Clay Component Thickness 3 (in.) [1]	0.168	0.276
Average Clay Component Thickness (in.)	na	0.278
Average Clay Component Thickness (mm)	na	**7.070**
Specimen Dia. (in)	4.000	4.000
Specimen Area (in.^{2})	12.57	12.57
Specimen Area (m^2)	0.00811	0.00811
Mass/Unit Area of GCL(gm./m^2) [2]	6,919	12,861
Mass/Unit Area of GCL(psf) [2]	1.42	2.63
Mass/Unit Area of Dry GCL(gm./m^2) [2]	5,584	
Mass/Unit Area of Dry GCL(psf) [2]	1.14	

*NOTES: 1) Direct visual measurement of exposed clay at specimen perimeter.
2) Includes weight of the textile carriers.

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INTEGRITY IN TESTING

Lab ID No.	L10017-14-06
Client	S & ME, Inc.
Client Project	Marshall Steam Station - Industrial Landfill No. 1
Project No.	L10017-14
Material	CETCO Bentomat ST
Roll I.D.:	4293
Sample No.	NA

Pressure Heads (Constant)

Top Cap (psi)	75.0
Bottom Cap (psi)	77.0
Cell (psi)	80.0
Total Head (cm)	140.6

Final Sample Dimensions

Sample Length (cm), L	0.707
Sample Diameter (cm)	10.16
Sample Area (cm^2), A	**78.50**
Inflow Burette Area (cm^2), a-in	0.877
Outflow Burette Area (cm^2), a-out	0.963

AVERAGE FLUX = 5.48E-09 m/s
AVERAGE PERMEABILITY = 2.47E-09 cm/s @ 20oC

DATE (m-d-y)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	RATIO ΔIN/ΔOUT (3 readings)	TOTAL HEAD h (cm)	TEMP. (°C)	INCREMENTAL FLUX @ 20°C (m/sec)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
6/24/2010	0.0	0.0	0.0	NA	166.5	22.0	NA	NA
6/25/2010	16.5	3.4	2.3	NA	160.2	22.0	6.11E-09	2.55E-09
6/25/2010	26.9	5.4	3.9	1.38	156.3	21.6	6.11E-09	2.64E-09
6/26/2010	46.2	8.7	6.8	1.18	149.5	23.0	5.70E-09	2.46E-09
6/27/2010	67.0	12.0	10.0	1.08	142.4	23.5	5.52E-09	2.46E-09
6/28/2010	88.7	15.3	13.1	1.05	135.4	23.0	5.23E-09	2.48E-09

Checked By: KB Date: 6-29-10

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GCL INDEX FLUX & PERMEABILITY TEST

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(SOP-G52)

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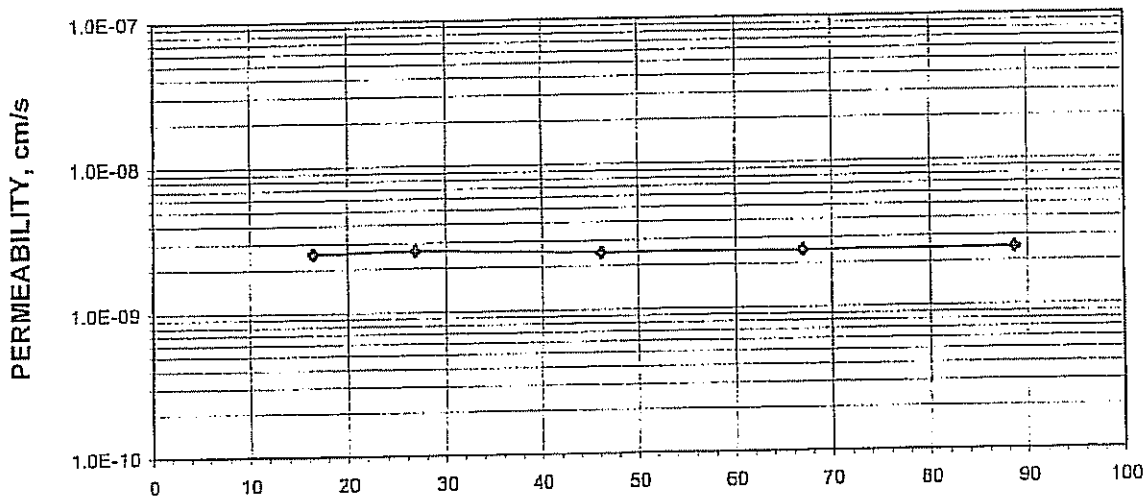
INTEGRITY IN TESTING

Lab ID No.	L10017-14-06	Material	CETCO Bentomat ST
Client	S & ME, Inc.	Roll I.D.:	4293
Client Project	Marshall Steam Station - Industrial Landfill No. 1	Lot No.:	NA
Project No.	L10017-14	Sample No.	NA

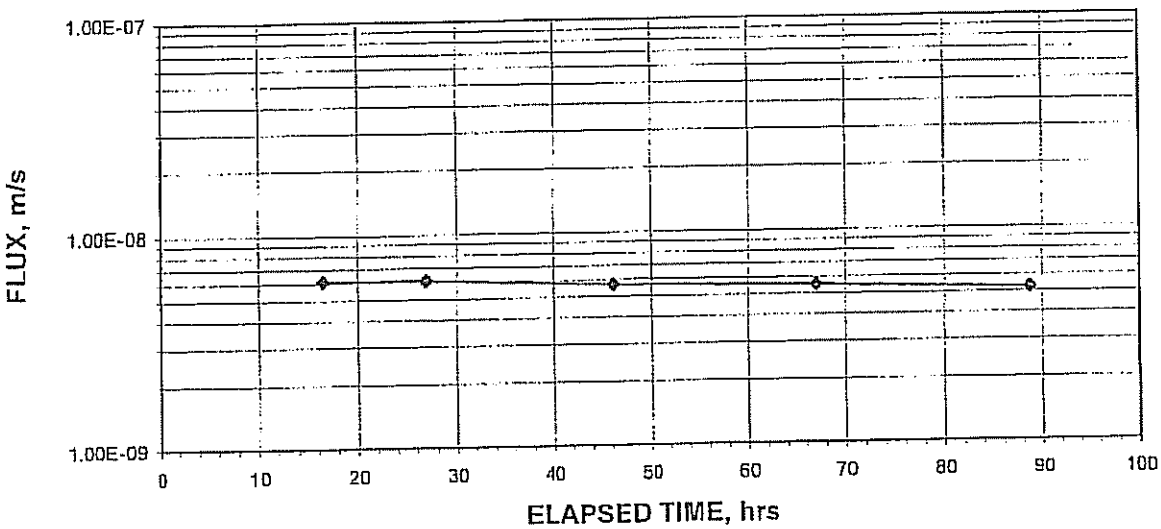
AVERAGE FLUX = 5.48E-09 m/s

AVERAGE PERMEABILITY = 2.47E-09 cm/s @ 20°C

PERMEABILITY VS. ELAPSED TIME



FLUX VS. ELAPSED TIME



Checked By: HB Date: 10-29-10

\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-14-06_GCLIndexFlux.xls]Temp

544 Braddock Avenue • East Pittsburgh, PA 15112 • 412-823-7600 • FAX 412-823-8999 • www.geotechnics.net

APPENDIX II – GEOSYNTHETICS
Section 2 – Cells 1 and 2 HDPE Geomembrane Testing

Manufacturer's Quality Control (MQC) Test Results
Conformance Test Results

HDPE Geomembrane Manufacturer's Quality Control (MQC) Test Results

Env Specialties Duke/Marshall Steam doc 13568

Terrell, NC

PO# 13173

165 rolls 60 HD micro (505) 165 left

roll #	ENGLISH DIMENSIONS wid	len	area	METRIC DIMENSIONS wid	len	area	check weld rod qty (if ordered)	wgt		lot
(K)211212 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 1	3725	10 sqs	8191288
(K)211213 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 2	3725		8191288
(K)211214 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 3	3700		8191288
(K)211315 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 4	3700	3FT to geosyntec	8191288
(K)211316 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 5	3710		8191288
(K)211317 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 6	3710		8191288
(K)211318 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 7	3690		8191288
(K)211319 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 8	3695		8191288
(K)211320 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 9	3750	10 sqs	8191288
(K)211321 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 10	3745		8191288
(K)211322 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 11	3725		8191288
(K)211323 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 12	3725		8191288
(K)211324 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 13	3725		8191288
(K)211326 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 14	3765		8191288
(K)211327 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 15	3725		8191288
(K)211328 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 16	3730		8191288
(K)211431 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 17	3730		8191288
(K)211432 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 18	3750	10 sqs	8191288
(K)211433 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 19	3755		8191288
(K)211434 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 20	3775		8191288
(K)211435 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 21	3785		8191288
(K)211436 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 22	3785		8191288
(K)211437 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 23	3785		8191288
(K)211438 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 24	3790		8191288
(K)211439 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 25	3775		8191288
(K)211440 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 26	3775	10 sqs	8191288
(K)211441 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 27	3775		8191288
(K)211442 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 28	3780		8191288
(K)211443 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 29	3795		8191288
(K)211444 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 30	3805		8191288
(K)211445 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 31	3800		8191288
(K)211446 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 32	3800		8191288
(K)211547 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 33	3775		8191288
(K)211548 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 34	3785		8191288
(K)211549 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 35	3770	10 sqs	8191288
(K)211550 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 36	3765		8191288
(K)211551 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 37	3780		8191288
(K)211552 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 38	3760		8191288
(K)211553 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 39	3720		8191288
(K)211554 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 40	3720		8191288
(K)211555 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 41	3735		8191288
(K)211556 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 42	3750		8191288
(K)211557 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 43	3745		8191288
(K)211558 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 44	3750	10 sqs	8191288
(K)211559 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 45	3745		8191288
(K)211560 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 46	3760		8191288
(K)211561 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 47	3775		8191288
(K)211562 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 48	3800		8191283
(K)211563 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 49	3810		8191283
(K)211564 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 50	3810		8191283
(K)211665 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 51	3785		8191283
(K)211666 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 52	3780	10 sqs	8191283
(K)211667 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 53	3765		8191283
(K)211668 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 54	3715		8191283
(K)211669 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 55	3725		8191283
(K)211670 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 56	3715		8191283
(K)211671 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 57	3795		8191283
(K)211672 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 58	3715		8191283
(K)211673 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 59	3755		8191283
(K)211674 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 60	3755		8191283

Env Specialties Duke/Marshall Steam doc 13568

PO# 13173

Terrell, NC

165 rolls 60 HD micro (505) 165 left

roll #	ENGLISH DIMENSIONS wid	len	area	METRIC DIMENSIONS wid	len	area	check weld rod qty (if ordered)	wgt		lot
(K)211675 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 61	3745	10 sqs	8191283
(K)211676 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 62	3755		8191283
(K)211677 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 63	3760		8191283
(K)211678 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 64	3770		8191283
(K)211679 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 65	3780		8191283
(K)211680 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 66	3790		8191283
(K)211681 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 67	3775		8191283
(K)211682 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 68	3780		8191283
(K)211683 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 69	3780	10 sqs	8191283
(K)211684 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 70	3775		8191283
(K)211785 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 71	3780		8191283
(K)211786 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 72	3765		8191283
(K)211787 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 73	3750		8191283
(K)211788 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 74	3740		8191283
(K)211789 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 75	3750		8191283
(K)211790 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 76	3735		8191283
(K)211791 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 77	3745		8191283
(K)211792 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 78	3750	10 sqs	8191283
(K)211793 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 79	3765		8191283
(K)211794 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 80	3770		8191283
(K)211795 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 81	3790		8191283
(K)211796 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 82	3795		8191283
(K)211797 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 83	3800		8191283
(K)211798 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 84	3805		8191283
(K)211799 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 85	3785		8191283
(K)211700 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 86	3800		8191283
(K)211701 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 87	3800	10 sqs	8191283
(K)211702 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 88	3790		8191283
(K)211703 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 89	3795		8191283
(K)211704 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 90	3800		8191283
(K)212101 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 91	3790		8191283
(K)212102 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 92	3795		8191283
(K)212103 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 93	3780		8191283
(K)212104 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 94	3790		8191283
(K)212105 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 95	3800	10 sqs	8191283
(K)212106 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 96	3760		8191283
(K)212107 .10	23	505	11,615.0	7	153.926	1,079	ESI Marshall Steam 165tot 97	3775		8191283

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quality control dept

quality certificate

ROLL # **211212-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.36**	mm	**54**	mil
	MAX:	**1.63**	mm	**64**	mil
Asperity ASTM D7466: **35/36** mil	AVE:	**1.47**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

					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	%			**2.20**	
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)	**153** ppi		**2,641**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**174** ppi		**3,015**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**17.02**	
Lo = 2.0" Break	Average Elongation @ Break	%			**457.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0** N			**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9** N			**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6** N			**127.15**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-16-10**

Signature

Quality Control Department

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ROLL # **211213-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **35/35** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.20**	
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		**2,641**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**177** ppi		**3,015**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.02**	
Lo = 2.0" Break	Average Elongation @ Break	%				**457.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0**	N			**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9**	N			**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6**	N			**127.15**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-16-10**

Signature.....
Quality Control Department

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ROLL # **211214-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.37**	mm	**54**	mil
	MAX:	**1.51**	mm	**59**	mil
Asperity ASTM D7466: **31/32** mil	AVE:	**1.47**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.20**	
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)		**153** ppi		**2,641**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**174** ppi		**3,015**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.02**	
Lo = 2.0" Break	Average Elongation @ Break	%				**457.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0**	N			**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9**	N			**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6**	N			**127.15**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-16-10**

Signature.....
Quality Control Department

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12/23/05

agru america
quality control dep't

quality certificate

ROLL # **211315-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **34/36** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.52**	mm	**60**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.20**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)		**158** ppi		**2,641**	psi
	Average Strength @ Break	**32** N/mm (kN/m)		**180** ppi		**3,015**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.02**	
Lo = 2.0" Break	Average Elongation @ Break	%				**457.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0**	N			**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9**	N			**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6**	N			**127.15**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-17-10**

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ROLL # **211316-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.55**	mm	**61**	mil
	AVE:	**1.48**	mm	**58**	mil

Asperity ASTM D7466: **35/36** mil
ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.20**	
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			**2,641**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**176** ppi			**3,015**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.02**	
Lo = 2.0" Break	Average Elongation @ Break	%				**457.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0** N				**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9** N				**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6** N				**127.15**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **211317-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.35**	mm	**53**	mil
	MAX:	**1.51**	mm	**59**	mil
Asperity ASTM D7466: **32/32** mil	AVE:	**1.44**	mm	**57**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

					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	%			**2.29**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**144** ppi		**2,538**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**176** ppi		**3,097**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**18.54**	
Lo = 2.0" Break	Average Elongation @ Break	%			**503.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0** N			**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9** N			**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6** N			**127.15**	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: **Environmental Specialties**
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ROLL # **211318-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **31/36** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.29**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)		**150** ppi		**2,538**	psi
	Average Strength @ Break	**32** N/mm (kN/m)		**183** ppi		**3,097**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.54**	
Lo = 2.0" Break	Average Elongation @ Break	%				**503.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0**	N			**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9**	N			**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6**	N			**127.15**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **211319-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity ASTM D7466: **36/37** mil	AVE:	**1.55**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.29**	
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			**2,538**	psi
	Average Strength @ Break	**33** N/mm (kN/m)	**189** ppi			**3,097**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.54**	
Lo = 2.0" Break	Average Elongation @ Break	%				**503.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0** N				**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9** N				**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6** N				**127.15**	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500 hrs				**CERTIFIED**	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300 hrs				**ONGOING**	

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ROLL # **211320-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **32/34** mil	AVE:	**1.53**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

						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	%				**2.29**	
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)	**153** ppi			**2,538**	psi
	Average Strength @ Break	**33** N/mm (kN/m)	**187** ppi			**3,097**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.54**	
Lo = 2.0" Break	Average Elongation @ Break	%				**503.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0** N				**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9** N				**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6** N				**127.15**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-17-10**

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ROLL # **211321-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **35/37** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

				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	%		**2.29**	
Carbon Black Dispersion ASTM D5596	Category			**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**151** ppi	**2,538**	psi
	Average Strength @ Break	**32** N/mm (kN/m)	**184** ppi	**3,097**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**18.54**	
Lo = 2.0" Break	Average Elongation @ Break	%		**503.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.0** N		**51.701**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**410.9** N		**92.383**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.6** N		**127.15**	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: **Environmental Specialties**
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Destination **Terrell, NC**

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ROLL # **211322-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH		Thickness.....	1.5 mm	60 mil
	MIN:	1.43	mm	56	mil	Length.....	153.926 m	505.0 feet
	MAX:	1.62	mm	64	mil	Width.....	7.00 m;	23.0 feet
Asperity ASTM D7466: 29/36 mil ODD # : TOP EVEN #: BOTTOM	AVE:	1.50	mm	59	mil	OIT(Standard) ASTM D3895 minutes	200	

						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		%			2.27	
Carbon Black Dispersion ASTM D5596	Category					10 In Cat 1	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	25	N/mm (kN/m)	145	ppi	2,451	psi
	Average Strength @ Break	28	N/mm (kN/m)	162	ppi	2,745	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			18.74	
Lo = 2.0" Break	Average Elongation @ Break		%			461.3	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			-0.19	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	226.8	N			50.988	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	404.1	N			90.851	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	596.8	N			134.16	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-17-10**

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ROLL # **211323-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **30/32** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.27**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**147** ppi			**2,451**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**164** ppi			**2,745**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.74**	
Lo = 2.0" Break	Average Elongation @ Break	%				**461.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**226.8** N				**50.988**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**404.1** N				**90.851**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**596.8** N				**134.16**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211324-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity ASTM D7466: **27/36** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.27**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**147** ppi			**2,451**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**164** ppi			**2,745**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.74**	
Lo = 2.0" Break	Average Elongation @ Break	%				**461.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**226.8** N				**50.988**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**404.1** N				**90.851**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**596.8** N				**134.16**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211326-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **32/34** mil	AVE:	**1.51**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.27**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**146** ppi			**2,451**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**163** ppi			**2,745**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.74**	
Lo = 2.0" Break	Average Elongation @ Break	%				**461.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**226.8** N				**50.988**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**404.1** N				**90.851**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**596.8** N				**134.16**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-17-10**

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ROLL # **211327-10** Lot #: **8191288** **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: **34/35** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.57**	mm	**62**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

				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	%		**2.26**
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)	**170** ppi	**2,753** psi
	Average Strength @ Break	**29** N/mm (kN/m)	**166** ppi	**2,690** psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**16.48**
Lo = 2.0" Break	Average Elongation @ Break	%		**428.2**
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.19**
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**226.8** N		**50.988** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**404.1** N		**90.851** lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**596.8** N		**134.16** 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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-17-10**

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ROLL # **211328-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **28/30** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.26**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**161** ppi			**2,753**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**158** ppi			**2,690**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**16.48**	
Lo = 2.0" Break	Average Elongation @ Break	%				**428.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**226.8**	N			**50.988**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**404.1**	N			**90.851**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**596.8**	N			**134.16**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-17-10**

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ROLL # **211431-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.49**	mm	**59**	mil
Asperity ASTM D7466: **33/34** mil	AVE:	**1.47**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.26**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**159** ppi			**2,753**	psi
	Average Strength @ Break	**27** N/mm (kN/m)	**156** ppi			**2,690**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**16.48**	
Lo = 2.0" Break	Average Elongation @ Break	%				**428.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**226.8** N				**50.988**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**404.1** N				**90.851**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**596.8** N				**134.16**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **211432-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.38**	mm	**54**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **33/34** mil	AVE:	**1.50**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

					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	%			**2.23**	
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		**2,609**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**179** ppi		**3,027**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**17.63**	
Lo = 2.0" Break	Average Elongation @ Break	%			**486.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1** N			**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2** N			**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0** N			**128.14**	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: **Environmental Specialties**
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ROLL # **211433-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.38**	mm	**54**	mil
	MAX:	**1.60**	mm	**63**	mil
	AVE:	**1.47**	mm	**58**	mil

Asperity ASTM D7466: **32/33** mil
ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.23**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)		**151** ppi		**2,609**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**175** ppi		**3,027**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.63**	
Lo = 2.0" Break	Average Elongation @ Break	%				**486.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1**	N			**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2**	N			**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0**	N			**128.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211434-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **36/36** mil	AVE:	**1.51**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.23**	
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			**2,609**	psi
	Average Strength @ Break	**32** N/mm (kN/m)	**180** ppi			**3,027**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.63**	
Lo = 2.0" Break	Average Elongation @ Break	%				**486.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1** N				**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2** N				**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0** N				**128.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-18-10**

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ROLL # **211435-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **34/37** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 in Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**160** ppi			**2,609**	psi
	Average Strength @ Break	**33** N/mm (kN/m)	**186** ppi			**3,027**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.63**	
Lo = 2.0" Break	Average Elongation @ Break	%				**486.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1** N				**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2** N				**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0** N				**128.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211436-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.62**	mm	**64**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.55**	mm	**61**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**159** ppi			**2,609**	psi
	Average Strength @ Break	**32** N/mm (kN/m)	**185** ppi			**3,027**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.63**	
Lo = 2.0" Break	Average Elongation @ Break	%				**486.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1**	N			**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2**	N			**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0**	N			**128.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211437-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **36/38** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.29**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**161** ppi			**2,708**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**177** ppi			**2,981**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.69**	
Lo = 2.0" Break	Average Elongation @ Break	%				**483.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1** N				**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2** N				**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0** N				**128.14**	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: **Environmental Specialties**
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ROLL # **211438-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **31/35** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

						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	%				**2.29**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)		**159** ppi		**2,708**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**175** ppi		**2,981**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.69**	
Lo = 2.0" Break	Average Elongation @ Break	%				**483.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1**	N			**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2**	N			**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0**	N			**128.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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Date: **3-18-10**

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ROLL # **211439-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **31/35** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.29**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**159** ppi			**2,708**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**175** ppi			**2,981**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.69**	
Lo = 2.0" Break	Average Elongation @ Break	%				**483.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1** N				**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2** N				**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0** N				**128.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-18-10**

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ROLL # **211440-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **34/35** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.44**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)		**158** ppi		**2,708**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**174** ppi		**2,981**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.69**	
Lo = 2.0" Break	Average Elongation @ Break	%				**483.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1**	N			**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2**	N			**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0**	N			**128.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211441-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.63**	mm	**64**	mil
Asperity ASTM D7466: **29/35** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

					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	%			**2.44**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**161** ppi		**2,708**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**177** ppi		**2,981**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**17.69**	
Lo = 2.0" Break	Average Elongation @ Break	%			**483.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1** N			**53.747**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.2** N			**92.896**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**570.0** N			**128.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211442-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.38**	mm	**54**	mil
	MAX:	**1.51**	mm	**59**	mil
Asperity ASTM D7466: **31/38** mil	AVE:	**1.45**	mm	**57**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.25**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)		**150** ppi		**2,623**	psi
	Average Strength @ Break	**29** N/mm (kN/m)		**166** ppi		**2,912**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.02**	
Lo = 2.0" Break	Average Elongation @ Break	%				**465.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3**	N			**51.993**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0**	N			**91.957**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0**	N			**131.87**	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: **Environmental Specialties**
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ROLL # **211443-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **32/38** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

					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	%			**2.25**	
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		**2,623**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**171** ppi		**2,912**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**18.02**	
Lo = 2.0" Break	Average Elongation @ Break	%			**465.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3** N			**51.993**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0** N			**91.957**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0** N			**131.87**	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: **Environmental Specialties**
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ROLL # **211444-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **31/36** mil	AVE:	**1.51**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.25**	
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)	**156** ppi			**2,623**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**173** ppi			**2,912**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.02**	
Lo = 2.0" Break	Average Elongation @ Break	%				**465.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3** N				**51.993**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0** N				**91.957**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0** N				**131.87**	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: **Environmental Specialties**
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ROLL # **211445-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **35/35** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.25**	
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		**2,623**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**171** ppi		**2,912**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.02**	
Lo = 2.0" Break	Average Elongation @ Break	%				**465.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3**	N			**51.993**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0**	N			**91.957**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0**	N			**131.87**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-18-10**

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ROLL # **211446-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **35/37** mil	AVE:	**1.46**	mm	**57**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

					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	%			**2.25**	
Carbon Black Dispersion ASTM D5596	Category				**10 in Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**151** ppi		**2,623**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**167** ppi		**2,912**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**18.02**	
Lo = 2.0" Break	Average Elongation @ Break	%			**465.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3** N			**51.993**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0** N			**91.957**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0** N			**131.87**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211547-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **35/35** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

				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	%		**2.12**
Carbon Black Dispersion ASTM D5596	Category			**10 In Cat 1**
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**151** ppi	**2,575** psi
	Average Strength @ Break	**30** N/mm (kN/m)	**169** ppi	**2,880** psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**18.03**
Lo = 2.0" Break	Average Elongation @ Break	%		**433.2**
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.19**
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3** N		**51.993** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0** N		**91.957** lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0** N		**131.87** 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: **Environmental Specialties**
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ROLL # **211548-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **33/35** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

						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	%				**2.12**	
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)		**153** ppi		**2,575**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**171** ppi		**2,880**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.03**	
Lo = 2.0" Break	Average Elongation @ Break	%				**433.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3**	N			**51.993**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0**	N			**91.957**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0**	N			**131.87**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211549-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **35/40** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

						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	%				**2.12**	
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)		**153** ppi		**2,575**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**171** ppi		**2,880**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.03**	
Lo = 2.0" Break	Average Elongation @ Break	%				**433.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3**	N			**51.993**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0**	N			**91.957**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0**	N			**131.87**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **3-19-10**

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ROLL # **211550-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **34/35** mil	AVE:	**1.47**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.12**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**149** ppi			**2,575**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**167** ppi			**2,880**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.03**	
Lo = 2.0" Break	Average Elongation @ Break	%				**433.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3** N				**51.993**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0** N				**91.957**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0** N				**131.87**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211551-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **34/34** mil	AVE:	**1.52**	mm	**60**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m:	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.12**	
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		**2,575**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**172** ppi		**2,880**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.03**	
Lo = 2.0" Break	Average Elongation @ Break	%				**433.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.3**	N			**51.993**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0**	N			**91.957**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**1.0**	N			**131.87**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211552-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **33/37** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

				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	%		**2.12**
Carbon Black Dispersion ASTM D5596	Category			**10 In Cat 1**
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**160** ppi	**2,679** psi
	Average Strength @ Break	**32** N/mm (kN/m)	**182** ppi	**3,044** psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**17.38**
Lo = 2.0" Break	Average Elongation @ Break	%		**486.4**
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.19**
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1** N		**53.981** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9** N		**90.590** lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9** N		**129.46** 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: **Environmental Specialties**
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ROLL # **211553-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.54**	mm	**61**	mil
Asperity ASTM D7466: **31/38** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.12**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**157** ppi			**2,679**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**179** ppi			**3,044**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.38**	
Lo = 2.0" Break	Average Elongation @ Break	%				**486.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1**	N			**53.981**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9**	N			**90.590**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9**	N			**129.46**	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: **Environmental Specialties**
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ROLL # **211554-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **30/36** mil	AVE:	**1.52**	mm	**60**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.12**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)		**160** ppi		**2,679**	psi
	Average Strength @ Break	**32** N/mm (kN/m)		**182** ppi		**3,044**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.38**	
Lo = 2.0" Break	Average Elongation @ Break	%				**486.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1**	N			**53.981**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9**	N			**90.590**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9**	N			**129.46**	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: **Environmental Specialties**
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ROLL # **211555-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.52**	mm	**60**	mil
Asperity ASTM D7466: **33/36** mil	AVE:	**1.47**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

					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	%			**2.20**	
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		**2,679**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**176** ppi		**3,044**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**17.38**	
Lo = 2.0" Break	Average Elongation @ Break	%			**486.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1** N			**53.981**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9** N			**90.590**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9** N			**129.46**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211556-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **33/36** mil	AVE:	**1.47**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **200**

						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	%				**2.20**	
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			**2,679**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**176** ppi			**3,044**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.38**	
Lo = 2.0" Break	Average Elongation @ Break	%				**486.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1** N				**53.981**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9** N				**90.590**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9** N				**129.46**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211557-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **32/37** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

					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	%			**2.23**	
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)	**163** ppi		**2,748**	psi
	Average Strength @ Break	**27** N/mm (kN/m)	**152** ppi		**2,562**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**18.37**	
Lo = 2.0" Break	Average Elongation @ Break	%			**372.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1** N			**53.981**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9** N			**90.590**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9** N			**129.46**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211558-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **32/35** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

						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	%				**2.23**	
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)	**163** ppi	**2,748**	psi		
	Average Strength @ Break	**27** N/mm (kN/m)	**152** ppi	**2,562**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.37**	
Lo = 2.0" Break	Average Elongation @ Break	%				**372.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1** N		**53.981**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9** N		**90.590**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9** N		**129.46**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211559-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **28/33** mil	AVE:	**1.47**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

					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	%			**2.23**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**159** ppi		**2,748**	psi
	Average Strength @ Break	**26** N/mm (kN/m)	**148** ppi		**2,562**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**18.37**	
Lo = 2.0" Break	Average Elongation @ Break	%			**372.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1** N			**53.981**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9** N			**90.590**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9** N			**129.46**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-19-10**

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ROLL # **211560-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.54**	mm	**61**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

						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	%				**2.18**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**161** ppi	**2,748**	psi		
	Average Strength @ Break	**26** N/mm (kN/m)	**150** ppi	**2,562**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.37**	
Lo = 2.0" Break	Average Elongation @ Break	%				**372.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1** N		**53.981**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9** N		**90.590**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9** N		**129.46**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211561-10** Lot #: **8191288** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **32/38** mil	AVE:	**1.50**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**200**	

					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	%			**2.18**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**162** ppi		**2,748**	psi
	Average Strength @ Break	**26** N/mm (kN/m)	**151** ppi		**2,562**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**18.37**	
Lo = 2.0" Break	Average Elongation @ Break	%			**372.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.19**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**240.1** N			**53.981**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**402.9** N			**90.590**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**575.9** N			**129.46**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **211562-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.56**	mm	**61**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**194**	

				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		**.30**
Carbon Black Content ASTM D4218	Range	%		**2.18**
Carbon Black Dispersion ASTM D5596	Category			**10 In Cat 1**
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**161** ppi	**2,694** psi
	Average Strength @ Break	**31** N/mm (kN/m)	**174** ppi	**2,915** psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**17.73**
Lo = 2.0" Break	Average Elongation @ Break	%		**470.0**
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.15**
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5** N		**57.438** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8** N		**102.23** lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3** N		**137.42** 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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **211563-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity ASTM D7466: **36/37** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

					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			**.30**	
Carbon Black Content ASTM D4218	Range	%			**2.18**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**159** ppi		**2,694**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**172** ppi		**2,915**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**17.73**	
Lo = 2.0" Break	Average Elongation @ Break	%			**470.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5** N			**57.438**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8** N			**102.23**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3** N			**137.42**	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: **Environmental Specialties**
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ROLL # **211564-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.71**	mm	**67**	mil
Asperity ASTM D7466: **34/36** mil	AVE:	**1.53**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.18**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)		**162** ppi		**2,694**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**176** ppi		**2,915**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.73**	
Lo = 2.0" Break	Average Elongation @ Break	%				**470.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5**	N			**57.438**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8**	N			**102.23**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3**	N			**137.42**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211665-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **35/36** mil	AVE:	**1.54**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
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	**29** N/mm (kN/m)		**163** ppi		**2,694**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**177** ppi		**2,915**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.73**	
Lo = 2.0" Break	Average Elongation @ Break	%				**470.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5**	N			**57.438**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8**	N			**102.23**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3**	N			**137.42**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-20-10**

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ROLL # **211666-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity ASTM D7466: **32/35** mil	AVE:	**1.51**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
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	**28** N/mm (kN/m)	**160** ppi			**2,694**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**173** ppi			**2,915**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.73**	
Lo = 2.0" Break	Average Elongation @ Break	%				**470.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5** N				**57.438**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8** N				**102.23**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3** N				**137.42**	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: **Environmental Specialties**
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ROLL # **211667-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.37**	mm	**54**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity ASTM D7466: **34/35** mil	AVE:	**1.46**	mm	**57**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

					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			**.30**	
Carbon Black Content ASTM D4218	Range	%			**2.54**	
Carbon Black Dispersion ASTM D5596	Category				**10 in Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**159** ppi		**2,769**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**172** ppi		**2,998**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**17.82**	
Lo = 2.0" Break	Average Elongation @ Break	%			**460.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5** N			**57.438**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8** N			**102.23**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3** N			**137.42**	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: **Environmental Specialties**
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ROLL # **211668-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity ASTM D7466: **34/35** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**194**	

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.54**	
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	**2,769**	psi		
	Average Strength @ Break	**31** N/mm (kN/m)	**179** ppi	**2,998**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.82**	
Lo = 2.0" Break	Average Elongation @ Break	%				**460.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5** N		**57.438**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8** N		**102.23**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3** N		**137.42**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **211669-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **33/36** mil	AVE:	**1.47**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.54**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)		**160** ppi		**2,769**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**173** ppi		**2,998**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.82**	
Lo = 2.0" Break	Average Elongation @ Break	%				**460.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5**	N			**57.438**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8**	N			**102.23**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3**	N			**137.42**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-20-10**

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ROLL # **211670-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.59**	mm	**63**	mil
	AVE:	**1.50**	mm	**59**	mil

Asperity ASTM D7466: **33/34** mil
ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.47**	
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)	**163** ppi	**2,769**	psi		
	Average Strength @ Break	**31** N/mm (kN/m)	**177** ppi	**2,998**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.82**	
Lo = 2.0" Break	Average Elongation @ Break	%				**460.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5** N		**57.438**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8** N		**102.23**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3** N		**137.42**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-20-10**

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ROLL # **211671-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.62**	mm	**64**	mil
Asperity ASTM D7466: **33/34** mil	AVE:	**1.48**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.47**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**161** ppi			**2,769**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**175** ppi			**2,998**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.82**	
Lo = 2.0" Break	Average Elongation @ Break	%				**460.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.5**	N			**57.438**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**454.8**	N			**102.23**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**611.3**	N			**137.42**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211672-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **31/35** mil	AVE:	**1.50**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**194**	

					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			**.30**
Carbon Black Content ASTM D4218	Range	%			**2.45**
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**157** ppi	**2,663**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**176** ppi	**2,972**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**17.99**	
Lo = 2.0" Break	Average Elongation @ Break	%		**467.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7** N		**51.193**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3** N		**95.157**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9** N		**140.49**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211673-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **33/36** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.45**	
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			**2,663**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**173** ppi			**2,972**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.99**	
Lo = 2.0" Break	Average Elongation @ Break	%				**467.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7** N				**51.193**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3** N				**95.157**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9** N				**140.49**	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: **Environmental Specialties**
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ROLL # **211674-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **34/36** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**194**	

					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			**.30**	
Carbon Black Content ASTM D4218	Range	%			**2.45**	
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		**2,663**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**173** ppi		**2,972**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**17.99**	
Lo = 2.0" Break	Average Elongation @ Break	%			**467.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7** N			**51.193**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3** N			**95.157**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9** N			**140.49**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211675-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.56**	mm	**61**	mil
Asperity ASTM D7466: **34/38** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.43**	
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)		**156** ppi		**2,663**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**174** ppi		**2,972**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.99**	
Lo = 2.0" Break	Average Elongation @ Break	%				**467.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7**	N			**51.193**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3**	N			**95.157**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9**	N			**140.49**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-20-10**

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ROLL # **211676-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **32/38** mil	AVE:	**1.50**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.43**	
Carbon Black Dispersion ASTM D5596	Category					**10 in Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**157** ppi	**2,663**	psi		
	Average Strength @ Break	**31** N/mm (kN/m)	**176** ppi	**2,972**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.99**	
Lo = 2.0" Break	Average Elongation @ Break	%				**467.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7** N		**51.193**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3** N		**95.157**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9** N		**140.49**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-20-10**

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ROLL # **211677-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **34/36** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.36**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**148** ppi			**2,531**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**161** ppi			**2,751**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.90**	
Lo = 2.0" Break	Average Elongation @ Break	%				**443.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7** N				**51.193**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3** N				**95.157**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9** N				**140.49**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211678-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **32/35** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**194**	

				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		**.30**
Carbon Black Content ASTM D4218	Range	%		**2.36**
Carbon Black Dispersion ASTM D5596	Category			**10 In Cat 1**
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**147** ppi	**2,531** psi
	Average Strength @ Break	**28** N/mm (kN/m)	**160** ppi	**2,751** psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		**17.90**
	Average Elongation @ Break	%		**443.6**
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.15**
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7** N		**51.193** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3** N		**95.157** lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9** N		**140.49** 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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211679-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **33/36** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.36**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**148** ppi			**2,531**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**161** ppi			**2,751**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%				**17.90**	
	Average Elongation @ Break	%				**443.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7** N				**51.193**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3** N				**95.157**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9** N				**140.49**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **3-20-10**

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ROLL # **211680-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **33/35** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.52**	mm	**60**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**194**	

				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		**.30**
Carbon Black Content ASTM D4218	Range	%		**2.39**
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)	**151** ppi	**2,531** psi
	Average Strength @ Break	**29** N/mm (kN/m)	**165** ppi	**2,751** psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**17.90**
Lo = 2.0" Break	Average Elongation @ Break	%		**443.6**
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.15**
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7** N		**51.193** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3** N		**95.157** lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9** N		**140.49** 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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-20-10**

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ROLL # **211681-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.62**	mm	**64**	mil
Asperity ASTM D7466: **33/36** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.39**	
Carbon Black Dispersion ASTM D5596	Category					**10 in Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)		**149** ppi		**2,531**	psi
	Average Strength @ Break	**28** N/mm (kN/m)		**162** ppi		**2,751**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.90**	
Lo = 2.0" Break	Average Elongation @ Break	%				**443.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.7**	N			**51.193**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.3**	N			**95.157**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**624.9**	N			**140.49**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211682-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **30/37** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT (Standard) ASTM D3895 minutes	**194**	

					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			**.30**
Carbon Black Content ASTM D4218	Range	%			**2.45**
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**143** ppi	**2,452**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**174** ppi	**2,980**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		**18.14**	
	Average Elongation @ Break	%		**509.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3** N		**51.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1** N		**97.154**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9** N		**133.74**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211683-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **32/37** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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			**.30**	
Carbon Black Content ASTM D4218	Range		%			**2.45**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**144**	ppi	**2,452**	psi
	Average Strength @ Break	**31**	N/mm (kN/m)	**175**	ppi	**2,980**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.14**	
Lo = 2.0" Break	Average Elongation @ Break		%			**509.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3**	N			**51.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1**	N			**97.154**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9**	N			**133.74**	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: **Environmental Specialties**
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ROLL # **211684-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **34/35** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.45**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**144** ppi			**2,452**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**175** ppi			**2,980**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.14**	
Lo = 2.0" Break	Average Elongation @ Break	%				**509.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3** N				**51.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1** N				**97.154**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9** N				**133.74**	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: **Environmental Specialties**
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ROLL # **211785-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity ASTM D7466: **33/37** mil	AVE:	**1.48**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc				**.946**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**143** ppi		**2,452**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**174** ppi		**2,980**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.14**	
Lo = 2.0" Break	Average Elongation @ Break	%				**509.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3**	N			**51.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1**	N			**97.154**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9**	N			**133.74**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211786-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.62**	mm	**64**	mil
Asperity ASTM D7466: **31/37** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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			**.30**	
Carbon Black Content ASTM D4218	Range		%			**2.58**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**143**	ppi	**2,452**	psi
	Average Strength @ Break	**30**	N/mm (kN/m)	**174**	ppi	**2,980**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.14**	
Lo = 2.0" Break	Average Elongation @ Break		%			**509.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3**	N			**51.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1**	N			**97.154**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9**	N			**133.74**	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: **Environmental Specialties**
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ROLL # **211787-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **31/37** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**143** ppi			**2,449**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**175** ppi			**3,004**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.22**	
Lo = 2.0" Break	Average Elongation @ Break	%				**504.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3** N				**51.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1** N				**97.154**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9** N				**133.74**	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: **Environmental Specialties**
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ROLL # **211788-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.37**	mm	**54**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.47**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**142** ppi	**2,449**	psi		
	Average Strength @ Break	**30** N/mm (kN/m)	**174** ppi	**3,004**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.22**	
Lo = 2.0" Break	Average Elongation @ Break	%				**504.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3** N		**51.093**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1** N		**97.154**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9** N		**133.74**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211789-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **32/37** mil	AVE:	**1.46**	mm	**57**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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			**.30**	
Carbon Black Content ASTM D4218	Range		%			**2.58**	
Carbon Black Dispersion ASTM D5596	Category					**10 in Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**141**	ppi	**2,449**	psi
	Average Strength @ Break	**30**	N/mm (kN/m)	**173**	ppi	**3,004**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.22**	
Lo = 2.0" Break	Average Elongation @ Break		%			**504.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3**	N			**51.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1**	N			**97.154**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9**	N			**133.74**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **211790-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.52**	mm	**60**	mil
Asperity ASTM D7466: **33/37** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.45**	mm	**57**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**24** N/mm (kN/m)	**140** ppi			**2,449**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**171** ppi			**3,004**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.22**	
Lo = 2.0" Break	Average Elongation @ Break	%				**504.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3** N				**51.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1** N				**97.154**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9** N				**133.74**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-21-10**

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ROLL # **211791-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.54**	mm	**61**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**194**	

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**143** ppi		**2,449**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**175** ppi		**3,004**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.22**	
Lo = 2.0" Break	Average Elongation @ Break	%				**504.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.3**	N			**51.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.1**	N			**97.154**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.9**	N			**133.74**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **211792-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **33/36** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
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)	**153** ppi			**2,600**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**163** ppi			**2,781**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.58**	
Lo = 2.0" Break	Average Elongation @ Break	%				**463.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8** N				**52.112**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0** N				**96.233**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5** N				**135.44**	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: **Environmental Specialties**
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ROLL # **211793-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.52**	mm	**60**	mil
Asperity ASTM D7466: **32/37** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
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)	**151** ppi			**2,600**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**162** ppi			**2,781**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.58**	
Lo = 2.0" Break	Average Elongation @ Break	%				**463.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8** N				**52.112**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0** N				**96.233**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5** N				**135.44**	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: **Environmental Specialties**
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ROLL # **211794-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.38**	mm	**54**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **32/37** mil	AVE:	**1.48**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
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)	**151** ppi			**2,600**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**162** ppi			**2,781**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.58**	
Lo = 2.0" Break	Average Elongation @ Break	%				**463.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8** N				**52.112**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0** N				**96.233**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5** N				**135.44**	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: **Environmental Specialties**
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ROLL # **211795-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
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			**2,600**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**164** ppi			**2,781**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.58**	
Lo = 2.0" Break	Average Elongation @ Break	%				**463.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8**	N			**52.112**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0**	N			**96.233**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5**	N			**135.44**	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: **Environmental Specialties**
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ROLL # **211796-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **34/36** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.58**	
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			**2,600**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**164** ppi			**2,781**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.58**	
Lo = 2.0" Break	Average Elongation @ Break	%				**463.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8** N				**52.112**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0** N				**96.233**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5** N				**135.44**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211797-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **33/37** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.49**	mm	**59**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
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	**27** N/mm (kN/m)	**153** ppi			**2,607**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**172** ppi			**2,932**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.39**	
Lo = 2.0" Break	Average Elongation @ Break	%				**471.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8** N				**52.112**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0** N				**96.233**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5** N				**135.44**	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: **Environmental Specialties**
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Destination **Terrell, NC**

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ROLL # **211798-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **32/36** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.49**	mm	**59**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
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	**27** N/mm (kN/m)	**153** ppi	**2,607**	psi		
	Average Strength @ Break	**30** N/mm (kN/m)	**172** ppi	**2,932**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.39**	
Lo = 2.0" Break	Average Elongation @ Break	%				**471.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8** N		**52.112**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0** N		**96.233**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5** N		**135.44**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211799-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **34/35** mil	AVE:	**1.48**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
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	**27** N/mm (kN/m)		**152** ppi		**2,607**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**171** ppi		**2,932**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.39**	
Lo = 2.0" Break	Average Elongation @ Break	%				**471.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8**	N			**52.112**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0**	N			**96.233**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5**	N			**135.44**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **211700-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **34/37** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
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	**27** N/mm (kN/m)	**153** ppi			**2,607**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**172** ppi			**2,932**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.39**	
Lo = 2.0" Break	Average Elongation @ Break	%				**471.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8** N				**52.112**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0** N				**96.233**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5** N				**135.44**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **211701-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.56**	mm	**61**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
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	**27** N/mm (kN/m)		**154** ppi		**2,607**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**173** ppi		**2,932**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.39**	
Lo = 2.0" Break	Average Elongation @ Break	%				**471.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.8**	N			**52.112**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.0**	N			**96.233**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**602.5**	N			**135.44**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-21-10**

Signature.....

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ROLL # **211702-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **34/35** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.49**	mm	**59**	mil

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**153.926**	m	**505.0** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

					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			**.30**	
Carbon Black Content ASTM D4218	Range	%			**2.62**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**151** ppi		**2,574**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**178** ppi		**3,030**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**17.60**	
Lo = 2.0" Break	Average Elongation @ Break	%			**478.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.5** N			**51.138**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**438.6** N			**98.606**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**582.2** N			**130.88**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-21-10**

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ROLL # **211703-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH		Thickness.....	1.5 mm	60 mil
	MIN:	1.42	mm	56	mil	Length.....	153.926 m	505.0 feet
	MAX:	1.56	mm	61	mil	Width.....	7.00 m;	23.0 feet
Asperity ASTM D7466: 33/34 mil ODD # : TOP EVEN #: BOTTOM	AVE:	1.49	mm	59	mil	OIT(Standard) ASTM D3895 minutes	194	

				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		.30
Carbon Black Content ASTM D4218	Range	%		2.62
Carbon Black Dispersion ASTM D5596	Category			10 In Cat 1
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	26 N/mm (kN/m)	151 ppi	2,574 psi
	Average Strength @ Break	31 N/mm (kN/m)	178 ppi	3,030 psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		17.60
Lo = 2.0" Break	Average Elongation @ Break	%		478.6
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		-0.15
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	227.5 N		51.138 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	438.6 N		98.606 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	582.2 N		130.88 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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-21-10**

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ROLL # **211704-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **34/36** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**194**	

				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		**.30**
Carbon Black Content ASTM D4218	Range	%		**2.62**
Carbon Black Dispersion ASTM D5596	Category			**10 In Cat 1**
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**151** ppi	**2,574** psi
	Average Strength @ Break	**31** N/mm (kN/m)	**178** ppi	**3,030** psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**17.60**
Lo = 2.0" Break	Average Elongation @ Break	%		**478.6**
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.15**
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.5** N		**51.138** lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**438.6** N		**98.606** lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**582.2** N		**130.88** 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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **212101-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.48**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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			**.30**	
Carbon Black Content ASTM D4218	Range		%			**2.68**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26**	N/mm (kN/m)	**150**	ppi	**2,574**	psi
	Average Strength @ Break	**31**	N/mm (kN/m)	**177**	ppi	**3,030**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.60**	
Lo = 2.0" Break	Average Elongation @ Break		%			**478.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.5**	N			**51.138**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**438.6**	N			**98.606**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**582.2**	N			**130.88**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-22-10**

Signature: H. Holmes
Quality Control Department

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ROLL # **212102-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **31/38** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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			**.30**	
Carbon Black Content ASTM D4218	Range		%			**2.68**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26**	N/mm (kN/m)	**151**	ppi	**2,574**	psi
	Average Strength @ Break	**31**	N/mm (kN/m)	**178**	ppi	**3,030**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.60**	
Lo = 2.0" Break	Average Elongation @ Break		%			**478.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.5**	N			**51.138**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**438.6**	N			**98.606**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**582.2**	N			**130.88**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **3-22-10**

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ROLL # **212103-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.55**	mm	**61**	mil
Asperity ASTM D7466: **31/32** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.60**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**157** ppi			**2,680**	psi
	Average Strength @ Break	**33** N/mm (kN/m)	**188** ppi			**3,206**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.28**	
Lo = 2.0" Break	Average Elongation @ Break	%				**508.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.5** N				**51.138**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**438.6** N				**98.606**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**582.2** N				**130.88**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **3-22-10**

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ROLL # **212104-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH		Thickness.....	1.5 mm	60 mil
	MIN:	1.42	mm	56	mil	Length.....	153.926 m	505.0 feet
	MAX:	1.55	mm	61	mil	Width.....	7.00 m;	23.0 feet
Asperity ASTM D7466: 33/34 mil ODD # : TOP EVEN #: BOTTOM	AVE:	1.50	mm	59	mil	OIT(Standard) ASTM D3895 minutes	194	

						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			.30	
Carbon Black Content ASTM D4218	Range		%			2.60	
Carbon Black Dispersion ASTM D5596	Category					10 In Cat 1	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	28	N/mm (kN/m)	158	ppi	2,680	psi
	Average Strength @ Break	33	N/mm (kN/m)	189	ppi	3,206	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			17.28	
Lo = 2.0" Break	Average Elongation @ Break		%			508.7	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			-0.15	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	227.5	N			51.138	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	438.6	N			98.606	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	582.2	N			130.88	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-22-10**

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ROLL # **212105-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH		Thickness.....	1.5 mm	60 mil
	MIN:	1.41	mm	56	mil	Length.....	153.926 m	505.0 feet
	MAX:	1.56	mm	61	mil	Width.....	7.00 m;	23.0 feet
Asperity ASTM D7466: 32/35 mil ODD # : TOP EVEN #: BOTTOM	AVE:	1.47	mm	58	mil	OIT(Standard) ASTM D3895 minutes	194	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			.30
Carbon Black Content ASTM D4218	Range	%			2.60
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	2,680	psi
	Average Strength @ Break	32 N/mm (kN/m)	186 ppi	3,206	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%		17.28	
	Average Elongation @ Break	%		508.7	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		-0.15	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	227.5 N		51.138	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	438.6 N		98.606	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	582.2 N		130.88	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-22-10**

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ROLL # **212106-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.56**	mm	**61**	mil
Asperity ASTM D7466: **33/33** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.60**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**157** ppi			**2,680**	psi
	Average Strength @ Break	**33** N/mm (kN/m)	**188** ppi			**3,206**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.28**	
Lo = 2.0" Break	Average Elongation @ Break	%				**508.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.5** N				**51.138**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**438.6** N				**98.606**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**582.2** N				**130.88**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **3-22-10**

Signature.....
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ROLL # **212107-10** Lot #: **8191283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.56**	mm	**61**	mil
Asperity ASTM D7466: **30/33** mil	AVE:	**1.54**	mm	**61**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **194**

						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				**.30**	
Carbon Black Content ASTM D4218	Range	%				**2.60**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)		**162** ppi		**2,680**	psi
	Average Strength @ Break	**34** N/mm (kN/m)		**194** ppi		**3,206**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.28**	
Lo = 2.0" Break	Average Elongation @ Break	%				**508.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.15**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.5**	N			**51.138**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**438.6**	N			**98.606**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**582.2**	N			**130.88**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **3-22-10**

Signature

Quality Control Department

60HDmic.FRM
REV 03
12/23/05

CoA Date: 12/18/2009

Certificate of Analysis

Shipped To: AGRU AMERICA:RAINS
MILEPOST SH317
RAINS SC 29589
USA

Recipient: PALMER
Fax:

CPC Delivery #: 87974266
PO #: 50206
Weight: 187100 LB
Ship Date: 12/18/2009
Package: BULK
Mode: Hopper Car
Car #: CHVX895050
Seal No: 269759

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 8191288

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.240	g/10mi
HLMI Flow Rate	ASTM D1238	23.00	g/10mi
Density	D1505 or D4883	0.9380	g/cm3
Pellet Count	P02.08.03	27.000	pel/g
Production Date		12/14/2009	

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

Chevron Phillips Chemical Company LP

CoA Date: 12/18/2009

Certificate of Analysis

Shipped To: AGRU AMERICA:RAINS
MILEPOST SH317
RAINS SC 29589
USA

Recipient: PALMER
Fax:

CPC Delivery #: 87974263
PO #: 50206
Weight: 186800 LB
Ship Date: 12/18/2009
Package: BULK
Mode: Hopper Car
Car #: PSPX006878
Seal No: 269947

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 8191283

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.300	g/10mi
HLMI Flow Rate	ASTM D1238	23.00	g/10mi
Density	D1505 or D4883	0.9370	g/cm3
Pellet Count	P02.08.03	26.000	pel/g
Production Date		12/13/2009	

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

Env Specialties Duke/Marshall Steam doc 13568 | PO# 13173

Terrell, NC

165 rolls 60 HD micro (505) | 105 | left

roll #	ENGLISH DIMENSIONS wid	len	area	METRIC DIMENSIONS wid	len	area	check weld rod qty (if ordered)	wgt		lot
(X)218589 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 98	3820		7100283
(X)218590 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 99	3830		7100283
(X)218591 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 100	3845		7100283
(X)218592 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 101	3840		7100283
(X)218593 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 102	3835		7100283
(X)218694 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 103	3835		7100283
(X)218695 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 104	3840	10 sqs	7100283
(X)218696 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 105	3840		7100283
(X)218697 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 106	3845		7100283
(X)218698 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 107	3845		7100283
(X)218699 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 108	3834		7100283
(X)218600 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 109	3850		7100283
(X)218601 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 110	3843		7100283
(X)218602 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 111	3835		7100283
(X)218603 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 112	3830	10 sqs	7100283
(X)218604 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 113	3840		7100283
(X)218605 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 114	3820		7100283
(X)218606 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 115	3795		7100283
(X)218607 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 116	3815		7100283
(X)218608 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 117	3805		7100283
(X)218609 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 118	3805		7100283
(X)218610 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 119	3835		7100283
(X)218611 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 120	3845		7100283
(X)218612 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 121	3840	10 sqs	7100283
(X)218713 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 122	3840		7100283
(X)218714 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 123	3835		7100283
(X)218715 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 124	3830		7100283
(X)218716 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 125	3825		7100283
(X)218717 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 126	3830		7100283
(X)218718 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 127	3835		7100283
(X)218719 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 128	3835		7100283
(X)218720 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 129	3840		7100283
(X)218721 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 130	3810	10 sqs	7100283
(X)218722 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 131	3815		7100283
(X)218723 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 132	3810		7100283
(X)218724 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 133	3815		7100283
(X)218725 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 134	3810		7100283
(X)218726 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 135	3820		7100283
(X)218727 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 136	3815		7100283
(X)218728 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 137	3820		7100283
(X)218729 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 138	3840	10 sqs	7100283
(X)218730 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 139	3830		7100283
(X)218731 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 140	3765		7100283
(X)218732 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 141	3800		7100283
(X)219101 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 142	3740		7100283
(X)219102 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 143	3730		7100283
(X)219103 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 144	3720		7100283
(X)219104 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 145	3740		7100283
(X)219105 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 146	3745		7100283
(X)219106 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 147	3750	10 sqs	7100283
(X)219107 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 148	3740		7100272
(X)219108 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 149	3745		7100272
(X)219109 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 150	3725		7100272
(X)219110 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 151	3770		7100272
(X)219111 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 152	3750		7100272
(X)219112 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 153	3745		7100272
(X)219113 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 154	3760		7100272
(X)219114 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 155	3750	10 sqs	7100272
(X)219115 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 156	3745		7100272
(X)219116 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 157	3750		7100272

Env Specialties Duke/Marshall Steam doc 13568

PO# 13173

Terrell, NC

165 rolls 60 HD micro (505) 105 left

	ENGLISH DIMENSIONS			METRIC DIMENSIONS						
roll #	wid	len	area	wid	len	area	check weld rod qty (if ordered)	wgt		lot
(X)219117 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 158	3750		7100272
(X)219118 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 159	3775		7100272
(X)219119 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 160	3770		7100272
(X)219120 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 161	3785		7100272
(X)219221 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 162			7100272
(X)219222 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 163			7100272
(X)219223 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 164		10 sqs	7100272
(X)219224 .10	23	505	11,615.0	7	153.926	1,077	ESI Duke Marshall Steam 165tot 165			7100272

agru america
quality control dept

quality certificate

ROLL # **218589-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity ASTM D7466: **31/33** mil	AVE:	**1.59**	mm	**63**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.15**	
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)	**163**	ppi	**2,603**	psi
	Average Strength @ Break	**31**	N/mm (kN/m)	**179**	ppi	**2,863**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		%			**17.81**	
	Average Elongation @ Break		%			**431.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.0**	N			**51.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2**	N			**102.57**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**568.7**	N			**127.84**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **5-7-10**

Signature.....

Quality Control Department

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quality certificate

ROLL # **218590-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **32/32** mil	AVE:	**1.50**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
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			**2,603**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**169** ppi			**2,863**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.81**	
Lo = 2.0" Break	Average Elongation @ Break	%				**431.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.0** N				**51.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2** N				**102.57**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**568.7** N				**127.84**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-7-10**

Signature.....

Quality Control Department

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12/23/05

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ROLL # **218591-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **33/34** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
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)	**156** ppi			**2,603**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**171** ppi			**2,863**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.81**	
Lo = 2.0" Break	Average Elongation @ Break	%				**431.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.0** N				**51.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2** N				**102.57**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**568.7** N				**127.84**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-7-10**

Signature

Quality Control Department

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12/23/05

agru america
quality control dept

quality certificate

ROLL # **218592-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH				
	MIN:	**1.49**	mm	**59**	mil	Thickness.....	**1.5 mm**	**60 mil**
	MAX:	**1.63**	mm	**64**	mil	Length.....	**153.926** m	**505.0** feet
Asperity ASTM D7466: **33/34** mil	AVE:	**1.54**	mm	**61**	mil	Width.....	**7.00** m;	**23.0** feet
ODD # : TOP EVEN #: BOTTOM						OIT(Standard) ASTM D3895 minutes	**188**	

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**158** ppi			**2,603**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**174** ppi			**2,863**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.81**	
Lo = 2.0" Break	Average Elongation @ Break	%				**431.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.0** N				**51.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2** N				**102.57**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**568.7** N				**127.84**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-7-10**

Signature.....

Quality Control Department

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ROLL # **218593-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.62**	mm	**64**	mil
Asperity ASTM D7466: **30/36** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**142** ppi		**2,376**	psi
	Average Strength @ Break	**29** N/mm (kN/m)		**166** ppi		**2,779**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.18**	
Lo = 2.0" Break	Average Elongation @ Break		%			**462.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.0**	N			**51.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2**	N			**102.57**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**568.7**	N			**127.84**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-7-10**

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ROLL # **218694-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **29/35** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**188**	

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**141**	ppi	**2,376**	psi
	Average Strength @ Break	**29**	N/mm (kN/m)	**165**	ppi	**2,779**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.18**	
Lo = 2.0" Break	Average Elongation @ Break		%			**462.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.0**	N			**51.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2**	N			**102.57**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**568.7**	N			**127.84**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218695-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **30/37** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.54**	mm	**61**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**188**	

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**144** ppi		**2,376**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**168** ppi		**2,779**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.18**	
Lo = 2.0" Break	Average Elongation @ Break	%				**462.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.0**	N			**51.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2**	N			**102.57**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**568.7**	N			**127.84**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218696-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity ASTM D7466: **36/36** mil	AVE:	**1.53**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**188**	

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**143** ppi			**2,376**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**167** ppi			**2,779**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.18**	
Lo = 2.0" Break	Average Elongation @ Break	%				**462.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.0** N				**51.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2** N				**102.57**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**568.7** N				**127.84**	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: **Environmental Specialties**
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ROLL # **218697-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **30/35** mil	AVE:	**1.51**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**141** ppi			**2,376**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**165** ppi			**2,779**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.18**	
Lo = 2.0" Break	Average Elongation @ Break	%				**462.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**227.0** N				**51.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2** N				**102.57**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**568.7** N				**127.84**	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: **Environmental Specialties**
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ROLL # **218698-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **34/36** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**142** ppi		**2,385**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**178** ppi		**2,986**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**19.37**	
Lo = 2.0" Break	Average Elongation @ Break	%				**484.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.5**	N			**51.815**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.4**	N			**90.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**584.3**	N			**131.36**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218699-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**143**	ppi	**2,385**	psi
	Average Strength @ Break	**31**	N/mm (kN/m)	**179**	ppi	**2,986**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**19.37**	
Lo = 2.0" Break	Average Elongation @ Break		%			**484.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.5**	N			**51.815**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.4**	N			**90.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**584.3**	N			**131.36**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-8-10**

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ROLL # **218600-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity ASTM D7466: **33/34** mil	AVE:	**1.55**	mm	**61**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**146** ppi			**2,385**	psi
	Average Strength @ Break	**32** N/mm (kN/m)	**182** ppi			**2,986**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**19.37**	
Lo = 2.0" Break	Average Elongation @ Break	%				**484.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.5** N				**51.815**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.4** N				**90.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**584.3** N				**131.36**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-8-10**

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ROLL # **218601-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity ASTM D7466: **33/35** mil	AVE:	**1.58**	mm	**62**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**148** ppi			**2,385**	psi
	Average Strength @ Break	**33** N/mm (kN/m)	**186** ppi			**2,986**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**19.37**	
Lo = 2.0" Break	Average Elongation @ Break	%				**484.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.5** N				**51.815**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.4** N				**90.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**584.3** N				**131.36**	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: **Environmental Specialties**
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ROLL # **218602-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity ASTM D7466: **34/35** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.55**	mm	**61**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**188**	

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**146** ppi		**2,385**	psi
	Average Strength @ Break	**32** N/mm (kN/m)		**182** ppi		**2,986**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**19.37**	
Lo = 2.0" Break	Average Elongation @ Break	%				**484.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.5**	N			**51.815**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.4**	N			**90.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**584.3**	N			**131.36**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **218603-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **29/38** mil	AVE:	**1.54**	mm	**61**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**188**	

					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			**.25**
Carbon Black Content ASTM D4218	Range	%			**2.15**
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**144** ppi	**2,383**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**164** ppi	**2,706**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**18.34**	
Lo = 2.0" Break	Average Elongation @ Break	%		**428.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.5** N		**51.815**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.4** N		**90.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**584.3** N		**131.36**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218604-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH		Thickness.....	1.5 mm	60 mil
	MIN:	1.43	mm	56	mil	Length.....	153.926 m	505.0 feet
	MAX:	1.67	mm	66	mil	Width.....	7.00 m;	23.0 feet
Asperity ASTM D7466: 29/32 mil ODD # : TOP EVEN #: BOTTOM	AVE:	1.58	mm	62	mil	OIT(Standard) ASTM D3895 minutes 188		

				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		.25
Carbon Black Content ASTM D4218	Range	%		2.15
Carbon Black Dispersion ASTM D5596	Category			10 In Cat 1
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	26 N/mm (kN/m)	148 ppi	2,383 psi
	Average Strength @ Break	29 N/mm (kN/m)	168 ppi	2,706 psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		18.34
Lo = 2.0" Break	Average Elongation @ Break	%		428.1
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		-0.46
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	230.5 N		51.815 lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	400.4 N		90.025 lbs
Puncture Resistance ASTM D4833 (Modified)	Load	584.3 N		131.36 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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-8-10**

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ROLL # **218605-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity ASTM D7466: **31/35** mil	AVE:	**1.57**	mm	**62**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

					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			**.25**	
Carbon Black Content ASTM D4218	Range	%			**2.15**	
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**147** ppi		**2,383**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**167** ppi		**2,706**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			**18.34**	
Lo = 2.0" Break	Average Elongation @ Break	%			**428.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.5** N			**51.815**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.4** N			**90.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**584.3** N			**131.36**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218606-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **30/38** mil	AVE:	**1.52**	mm	**60**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 in Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**143** ppi			**2,383**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**162** ppi			**2,706**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.34**	
Lo = 2.0" Break	Average Elongation @ Break	%				**428.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.5** N				**51.815**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.4** N				**90.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**584.3** N				**131.36**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **5-8-10**

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ROLL # **218607-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity ASTM D7466: **32/33** mil	AVE:	**1.57**	mm	**62**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.15**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**147** ppi			**2,383**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**167** ppi			**2,706**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.34**	
Lo = 2.0" Break	Average Elongation @ Break	%				**428.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**230.5** N				**51.815**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.4** N				**90.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**584.3** N				**131.36**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218608-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity ASTM D7466: **28/32** mil	AVE:	**1.58**	mm	**62**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**188**	

					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			**.25**
Carbon Black Content ASTM D4218	Range	%			**2.20**
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)	**156** ppi	**2,511**	psi
	Average Strength @ Break	**33** N/mm (kN/m)	**186** ppi	**2,984**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**19.25**	
Lo = 2.0" Break	Average Elongation @ Break	%		**459.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**225.0** N		**50.578**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**419.2** N		**94.251**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**618.9** N		**139.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-8-10**

Signature: G. Holmes
Quality Control Department

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ROLL # **218609-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity ASTM D7466: **31/33** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.20**	
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			**2,511**	psi
	Average Strength @ Break	**32** N/mm (kN/m)	**184** ppi			**2,984**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**19.25**	
Lo = 2.0" Break	Average Elongation @ Break	%				**459.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**225.0** N				**50.578**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**419.2** N				**94.251**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**618.9** N				**139.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218610-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH		Thickness.....	1.5 mm	60 mil
	MIN:	1.44	mm	57	mil	Length.....	153.926 m	505.0 feet
	MAX:	1.61	mm	63	mil	Width.....	7.00 m;	23.0 feet
Asperity ASTM D7466: 31/38 mil ODD # : TOP EVEN #: BOTTOM	AVE:	1.51	mm	59	mil	OIT(Standard) ASTM D3895 minutes	188	

						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			.25	
Carbon Black Content ASTM D4218	Range		%			2.20	
Carbon Black Dispersion ASTM D5596	Category					10 In Cat 1	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	26	N/mm (kN/m)	149	ppi	2,511	psi
	Average Strength @ Break	31	N/mm (kN/m)	177	ppi	2,984	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			19.25	
Lo = 2.0" Break	Average Elongation @ Break		%			459.1	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			-0.46	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	225.0	N			50.578	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	419.2	N			94.251	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	618.9	N			139.14	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-8-10**

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ROLL # **218611-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH		Thickness.....	1.5 mm	60 mil
	MIN:	1.44	mm	57	mil	Length.....	153.926 m	505.0 feet
	MAX:	1.64	mm	65	mil	Width.....	7.00 m;	23.0 feet
Asperity ASTM D7466: 34/34 mil ODD # : TOP EVEN #: BOTTOM	AVE:	1.53	mm	60	mil	OIT(Standard) ASTM D3895 minutes	188	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			.25	
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	26 N/mm (kN/m)	151 ppi		2,511	psi
	Average Strength @ Break	31 N/mm (kN/m)	180 ppi		2,984	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%			19.25	
Lo = 2.0" Break	Average Elongation @ Break	%			459.1	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%			-0.46	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	225.0 N			50.578	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	419.2 N			94.251	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	618.9 N			139.14	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-8-10**

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ROLL # **218612-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity ASTM D7466: **30/35** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
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	**26** N/mm (kN/m)	**149** ppi			**2,511**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**177** ppi			**2,984**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**19.25**	
Lo = 2.0" Break	Average Elongation @ Break	%				**459.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**225.0** N				**50.578**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**419.2** N				**94.251**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**618.9** N				**139.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **5-8-10**

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ROLL # **218713-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.62**	mm	**64**	mil
Asperity ASTM D7466: **30/39** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**188**	

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.41**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**24** N/mm (kN/m)	**138** ppi	**2,307**	psi		
	Average Strength @ Break	**30** N/mm (kN/m)	**169** ppi	**2,816**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.77**	
Lo = 2.0" Break	Average Elongation @ Break	%				**481.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**225.0** N		**50.578**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**419.2** N		**94.251**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**618.9** N		**139.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **5-8-10**

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ROLL # **218714-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **32/35** mil	AVE:	**1.54**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.41**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**24** N/mm (kN/m)	**140** ppi			**2,307**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**171** ppi			**2,816**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.77**	
Lo = 2.0" Break	Average Elongation @ Break	%				**481.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**225.0** N				**50.578**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**419.2** N				**94.251**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**618.9** N				**139.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218715-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **31/37** mil	AVE:	**1.52**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.41**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**24** N/mm (kN/m)	**138** ppi			**2,307**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**169** ppi			**2,816**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.77**	
Lo = 2.0" Break	Average Elongation @ Break	%				**481.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**225.0** N				**50.578**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**419.2** N				**94.251**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**618.9** N				**139.14**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218716-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.62**	mm	**64**	mil
Asperity ASTM D7466: **30/38** mil	AVE:	**1.50**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.27**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**24** N/mm (kN/m)	**136** ppi	**2,307**	psi		
	Average Strength @ Break	**29** N/mm (kN/m)	**166** ppi	**2,816**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.77**	
Lo = 2.0" Break	Average Elongation @ Break	%				**481.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**225.0** N		**50.578**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**419.2** N		**94.251**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**618.9** N		**139.14**	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: **Environmental Specialties**
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ROLL # **218717-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **31/35** mil	AVE:	**1.53**	mm	**60**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.43**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**142** ppi			**2,353**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**160** ppi			**2,657**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.45**	
Lo = 2.0" Break	Average Elongation @ Break	%				**456.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.5** N				**54.971**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.2** N				**98.064**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.7** N				**132.57**	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: **Environmental Specialties**
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ROLL # **218718-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity ASTM D7466: **32/35** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.43**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**144** ppi		**2,353**	psi
	Average Strength @ Break	**29** N/mm (kN/m)		**163** ppi		**2,657**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.45**	
Lo = 2.0" Break	Average Elongation @ Break	%				**456.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.5**	N			**54.971**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.2**	N			**98.064**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.7**	N			**132.57**	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: **Environmental Specialties**
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ROLL # **218719-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.50**	mm	**59**	mil
	MAX:	**1.76**	mm	**69**	mil
Asperity ASTM D7466: **30/34** mil	AVE:	**1.61**	mm	**63**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.43**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26**	N/mm (kN/m)	**149**	ppi	**2,353**	psi
	Average Strength @ Break	**29**	N/mm (kN/m)	**168**	ppi	**2,657**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.45**	
Lo = 2.0" Break	Average Elongation @ Break		%			**456.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.5**	N			**54.971**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.2**	N			**98.064**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.7**	N			**132.57**	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: **Environmental Specialties**
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ROLL # **218720-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity ASTM D7466: **31/34** mil	AVE:	**1.60**	mm	**63**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet
OIT(Standard) ASTM D3895 minutes	**188**	

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.43**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**148** ppi	**2,353**	psi		
	Average Strength @ Break	**29** N/mm (kN/m)	**167** ppi	**2,657**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.45**	
Lo = 2.0" Break	Average Elongation @ Break	%				**456.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.5** N		**54.971**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.2** N		**98.064**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**589.7** N		**132.57**	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: **Environmental Specialties**
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ROLL # **218721-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity ASTM D7466: **30/33** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.59**	mm	**63**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.43**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**147** ppi	**2,353**	psi		
	Average Strength @ Break	**29** N/mm (kN/m)	**166** ppi	**2,657**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**17.45**			
Lo = 2.0" Break	Average Elongation @ Break	%		**456.6**			
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.46**			
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.5** N		**54.971**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.2** N		**98.064**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**589.7** N		**132.57**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218722-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **32/36** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.47**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26**	N/mm (kN/m)	**149**	ppi	**2,408**	psi
	Average Strength @ Break	**31**	N/mm (kN/m)	**177**	ppi	**2,870**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**16.56**	
Lo = 2.0" Break	Average Elongation @ Break		%			**479.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.5**	N			**54.971**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.2**	N			**98.064**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.7**	N			**132.57**	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: **Environmental Specialties**
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ROLL # **218723-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH		Thickness.....	1.5 mm	60 mil
	MIN:	1.41	mm	56	mil	Length.....	153.926 m	505.0 feet
	MAX:	1.65	mm	65	mil	Width.....	7.00 m;	23.0 feet
Asperity ASTM D7466: 28/35 mil ODD # : TOP EVEN #: BOTTOM	AVE:	1.56	mm	61	mil	OIT(Standard) ASTM D3895 minutes	188	

						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			.25	
Carbon Black Content ASTM D4218	Range		%			2.47	
Carbon Black Dispersion ASTM D5596	Category					10 In Cat 1	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	26	N/mm (kN/m)	148	ppi	2,408	psi
	Average Strength @ Break	31	N/mm (kN/m)	176	ppi	2,870	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			16.56	
Lo = 2.0" Break	Average Elongation @ Break		%			479.7	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			-0.46	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	244.5	N			54.971	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	436.2	N			98.064	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	589.7	N			132.57	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **218724-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.50**	mm	**59**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity ASTM D7466: **29/33** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.47**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**151** ppi			**2,408**	psi
	Average Strength @ Break	**31** N/mm (kN/m)	**180** ppi			**2,870**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**16.56**	
Lo = 2.0" Break	Average Elongation @ Break	%				**479.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.5** N				**54.971**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.2** N				**98.064**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.7** N				**132.57**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218725-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity ASTM D7466: **30/33** mil	AVE:	**1.56**	mm	**61**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.42**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**148** ppi	**2,408**	psi		
	Average Strength @ Break	**31** N/mm (kN/m)	**176** ppi	**2,870**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**16.56**	
Lo = 2.0" Break	Average Elongation @ Break	%				**479.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.5** N		**54.971**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.2** N		**98.064**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**589.7** N		**132.57**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218726-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity ASTM D7466: **30/35** mil	AVE:	**1.56**	mm	**61**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.42**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)		**148** ppi		**2,408**	psi
	Average Strength @ Break	**31** N/mm (kN/m)		**176** ppi		**2,870**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**16.56**	
Lo = 2.0" Break	Average Elongation @ Break	%				**479.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.5**	N			**54.971**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.2**	N			**98.064**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.7**	N			**132.57**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218727-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity ASTM D7466: **31/32** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.40**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**161** ppi			**2,625**	psi
	Average Strength @ Break	**34** N/mm (kN/m)	**193** ppi			**3,146**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**14.89**	
Lo = 2.0" Break	Average Elongation @ Break	%				**483.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0** N				**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5** N				**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5** N				**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-9-10**

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ROLL # **218728-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.62**	mm	**64**	mil
Asperity ASTM D7466: **30/35** mil	AVE:	**1.56**	mm	**61**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.40**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**161** ppi			**2,625**	psi
	Average Strength @ Break	**34** N/mm (kN/m)	**193** ppi			**3,146**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**14.89**	
Lo = 2.0" Break	Average Elongation @ Break	%				**483.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0** N				**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5** N				**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5** N				**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218729-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity ASTM D7466: **33/34** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.40**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**162** ppi			**2,625**	psi
	Average Strength @ Break	**34** N/mm (kN/m)	**194** ppi			**3,146**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**14.89**	
Lo = 2.0" Break	Average Elongation @ Break	%				**483.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0** N				**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5** N				**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5** N				**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218730-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity ASTM D7466: **34/36** mil	AVE:	**1.54**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.47**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**28** N/mm (kN/m)	**159** ppi			**2,625**	psi
	Average Strength @ Break	**33** N/mm (kN/m)	**191** ppi			**3,146**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**14.89**	
Lo = 2.0" Break	Average Elongation @ Break	%				**483.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0** N				**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5** N				**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5** N				**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218731-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.63**	mm	**64**	mil
Asperity ASTM D7466: **30/37** mil	AVE:	**1.51**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.47**	
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)		**156** ppi		**2,625**	psi
	Average Strength @ Break	**33** N/mm (kN/m)		**187** ppi		**3,146**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**14.89**	
Lo = 2.0" Break	Average Elongation @ Break	%				**483.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0**	N			**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5**	N			**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5**	N			**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **218732-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.37**	mm	**54**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **34/37** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.32**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**24** N/mm (kN/m)		**137** ppi		**2,324**	psi
	Average Strength @ Break	**30** N/mm (kN/m)		**172** ppi		**2,908**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.90**	
Lo = 2.0" Break	Average Elongation @ Break		%			**485.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0**	N			**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5**	N			**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5**	N			**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-9-10**

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ROLL # **219101-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.36**	mm	**54**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **35/35** mil	AVE:	**1.47**	mm	**58**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.32**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**24**	N/mm (kN/m)	**134**	ppi	**2,324**	psi
	Average Strength @ Break	**29**	N/mm (kN/m)	**168**	ppi	**2,908**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.90**	
Lo = 2.0" Break	Average Elongation @ Break		%			**485.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0**	N			**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5**	N			**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5**	N			**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **219102-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **34/36** mil	AVE:	**1.48**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.32**	
Carbon Black Dispersion ASTM D5596	Category					**10 in Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**24**	N/mm (kN/m)	**135**	ppi	**2,324**	psi
	Average Strength @ Break	**30**	N/mm (kN/m)	**169**	ppi	**2,908**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.90**	
Lo = 2.0" Break	Average Elongation @ Break		%			**485.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0**	N			**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5**	N			**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5**	N			**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **5-10-10**

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ROLL # **219103-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **33/34** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.32**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**24** N/mm (kN/m)	**137** ppi			**2,324**	psi
	Average Strength @ Break	**30** N/mm (kN/m)	**172** ppi			**2,908**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.90**	
Lo = 2.0" Break	Average Elongation @ Break	%				**485.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0** N				**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5** N				**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5** N				**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **219104-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.38**	mm	**54**	mil
	MAX:	**1.53**	mm	**60**	mil
Asperity ASTM D7466: **32/38** mil	AVE:	**1.46**	mm	**57**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.32**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**23** N/mm (kN/m)		**134** ppi		**2,324**	psi
	Average Strength @ Break	**29** N/mm (kN/m)		**167** ppi		**2,908**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.90**	
Lo = 2.0" Break	Average Elongation @ Break		%			**485.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.0**	N			**51.944**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5**	N			**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.5**	N			**134.55**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **219105-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **31/38** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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			**.25**	
Carbon Black Content ASTM D4218	Range		%			**2.47**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**143**	ppi	**2,438**	psi
	Average Strength @ Break	**29**	N/mm (kN/m)	**163**	ppi	**2,786**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.95**	
Lo = 2.0" Break	Average Elongation @ Break		%			**445.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6**	N			**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5**	N			**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8**	N			**139.79**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **219106-10** Lot #: **7100283** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **31/37** mil	AVE:	**1.48**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **188**

						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				**.25**	
Carbon Black Content ASTM D4218	Range	%				**2.47**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**142** ppi			**2,438**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**162** ppi			**2,786**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.95**	
Lo = 2.0" Break	Average Elongation @ Break	%				**445.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.46**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6** N				**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5** N				**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8** N				**139.79**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **219107-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.38**	mm	**54**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity ASTM D7466: **35/35** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.46**	mm	**57**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

							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	%					**2.47**	
Carbon Black Dispersion ASTM D5596	Category						**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**140** ppi			**2,438**	psi
	Average Strength @ Break	**28** N/mm (kN/m)		**160** ppi			**2,786**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**17.95**	
Lo = 2.0" Break	Average Elongation @ Break	%					**445.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6**	N				**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5**	N				**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8**	N				**139.79**	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: **Environmental Specialties**
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ROLL # **219108-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.38**	mm	**54**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **33/35** mil	AVE:	**1.49**	mm	**59**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	%				**2.31**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**143** ppi			**2,438**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**163** ppi			**2,786**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.95**	
Lo = 2.0" Break	Average Elongation @ Break	%				**445.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6** N				**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5** N				**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8** N				**139.79**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **219109-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.35**	mm	**53**	mil
	MAX:	**1.62**	mm	**64**	mil
Asperity ASTM D7466: **34/37** mil	AVE:	**1.47**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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		%			**2.31**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**141**	ppi	**2,438**	psi
	Average Strength @ Break	**28**	N/mm (kN/m)	**161**	ppi	**2,786**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.95**	
Lo = 2.0" Break	Average Elongation @ Break		%			**445.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6**	N			**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5**	N			**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8**	N			**139.79**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **219110-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.37**	mm	**54**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **33/35** mil	AVE:	**1.46**	mm	**57**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	%				**2.40**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**144** ppi		**2,508**	psi
	Average Strength @ Break	**27** N/mm (kN/m)		**155** ppi		**2,695**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.07**	
Lo = 2.0" Break	Average Elongation @ Break	%				**412.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6**	N			**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5**	N			**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8**	N			**139.79**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **219111-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.35**	mm	**53**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **32/38** mil ODD # : TOP EVEN #: BOTTOM	AVE:	**1.47**	mm	**58**	mil

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	%				**2.40**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**145** ppi		**2,508**	psi
	Average Strength @ Break	**27** N/mm (kN/m)		**156** ppi		**2,695**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.07**	
Lo = 2.0" Break	Average Elongation @ Break	%				**412.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6**	N			**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5**	N			**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8**	N			**139.79**	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: **Environmental Specialties**
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Destination **Terrell, NC**

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ROLL # **219112-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.34**	mm	**53**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity ASTM D7466: **33/36** mil	AVE:	**1.46**	mm	**57**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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		%			**2.40**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**144**	ppi	**2,508**	psi
	Average Strength @ Break	**27**	N/mm (kN/m)	**155**	ppi	**2,695**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.07**	
Lo = 2.0" Break	Average Elongation @ Break		%			**412.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6**	N			**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5**	N			**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8**	N			**139.79**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
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ROLL # **219113-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.63**	mm	**64**	mil
Asperity ASTM D7466: **31/35** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

							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		%				**2.40**	
Carbon Black Dispersion ASTM D5596	Category						**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26**	N/mm (kN/m)	**148**	ppi		**2,508**	psi
	Average Strength @ Break	**28**	N/mm (kN/m)	**159**	ppi		**2,695**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.07**	
Lo = 2.0" Break	Average Elongation @ Break		%				**412.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6**	N				**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5**	N				**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8**	N				**139.79**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-10-10**

Signature.....

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ROLL # **219114-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **31/34** mil	AVE:	**1.52**	mm	**60**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

					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	%			**2.40**
Carbon Black Dispersion ASTM D5596	Category				**10 In Cat 1**
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**26** N/mm (kN/m)	**150** ppi	**2,508**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**161** ppi	**2,695**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%		**17.07**	
Lo = 2.0" Break	Average Elongation @ Break	%		**412.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%		**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**231.6** N		**52.058**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.5** N		**87.794**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**621.8** N		**139.79**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-10-10**

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ROLL # **219115-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.38**	mm	**54**	mil
	MAX:	**1.63**	mm	**64**	mil
Asperity ASTM D7466: **33/35** mil	AVE:	**1.48**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	**25** N/mm (kN/m)		**145** ppi		**2,490**	psi
	Average Strength @ Break	**28** N/mm (kN/m)		**161** ppi		**2,770**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.62**	
Lo = 2.0" Break	Average Elongation @ Break	%				**446.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2**	N			**56.464**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2**	N			**99.422**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4**	N			**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-10-10**

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ROLL # **219116-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.63**	mm	**64**	mil
Asperity ASTM D7466: **33/34** mil	AVE:	**1.50**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	**26** N/mm (kN/m)	**147** ppi			**2,490**	psi
	Average Strength @ Break	**29** N/mm (kN/m)	**164** ppi			**2,770**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.62**	
Lo = 2.0" Break	Average Elongation @ Break	%				**446.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2** N				**56.464**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2** N				**99.422**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4** N				**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-10-10**

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ROLL # **219117-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **33/35** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	**26**	N/mm (kN/m)	**146**	ppi	**2,490**	psi
	Average Strength @ Break	**28**	N/mm (kN/m)	**162**	ppi	**2,770**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.62**	
Lo = 2.0" Break	Average Elongation @ Break		%			**446.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2**	N			**56.464**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2**	N			**99.422**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4**	N			**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-10-10**

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ROLL # **219118-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.39**	mm	**55**	mil
	MAX:	**1.54**	mm	**61**	mil
Asperity ASTM D7466: **31/33** mil	AVE:	**1.45**	mm	**57**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	%				**2.26**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**142** ppi			**2,490**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**158** ppi			**2,770**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.62**	
Lo = 2.0" Break	Average Elongation @ Break	%				**446.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2** N				**56.464**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2** N				**99.422**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4** N				**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

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ROLL # **219119-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.38**	mm	**54**	mil
	MAX:	**1.61**	mm	**63**	mil
Asperity ASTM D7466: **31/36** mil	AVE:	**1.47**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	%				**2.26**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**144** ppi		**2,490**	psi
	Average Strength @ Break	**28** N/mm (kN/m)		**160** ppi		**2,770**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**17.62**	
Lo = 2.0" Break	Average Elongation @ Break	%				**446.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2**	N			**56.464**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2**	N			**99.422**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4**	N			**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-10-10**

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ROLL # **219120-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.32**	mm	**52**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **31/35** mil	AVE:	**1.47**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5** mm	**60** mil
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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		%			**2.47**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**143**	ppi	**2,467**	psi
	Average Strength @ Break	**28**	N/mm (kN/m)	**160**	ppi	**2,766**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**18.61**	
Lo = 2.0" Break	Average Elongation @ Break		%			**423.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2**	N			**56.464**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2**	N			**99.422**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4**	N			**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **5-10-10**

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ROLL # **219221-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **31/36** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	%				**2.47**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**145** ppi			**2,467**	psi
	Average Strength @ Break	**28** N/mm (kN/m)	**162** ppi			**2,766**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.61**	
Lo = 2.0" Break	Average Elongation @ Break	%				**423.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2** N				**56.464**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2** N				**99.422**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4** N				**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-11-10**

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ROLL # **219222-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity ASTM D7466: **34/34** mil	AVE:	**1.49**	mm	**59**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	%				**2.47**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)	**145** ppi	**2,467**	psi		
	Average Strength @ Break	**28** N/mm (kN/m)	**162** ppi	**2,766**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.61**	
Lo = 2.0" Break	Average Elongation @ Break	%				**423.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2** N		**56.464**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2** N		**99.422**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4** N		**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-11-10**

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ROLL # **219223-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.37**	mm	**54**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity ASTM D7466: **33/34** mil	AVE:	**1.48**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

						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	%				**2.35**	
Carbon Black Dispersion ASTM D5596	Category					**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25** N/mm (kN/m)		**144** ppi		**2,467**	psi
	Average Strength @ Break	**28** N/mm (kN/m)		**161** ppi		**2,766**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%				**18.61**	
Lo = 2.0" Break	Average Elongation @ Break	%				**423.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2**	N			**56.464**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2**	N			**99.422**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4**	N			**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date: **5-11-10**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america
quality control dep't

quality certificate

ROLL # **219224-10** Lot #: **7100272** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity ASTM D7466: **31/34** mil	AVE:	**1.48**	mm	**58**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5 mm**	**60 mil**
Length.....	**153.926** m	**505.0** feet
Width.....	**7.00** m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **191**

							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		%				**2.35**	
Carbon Black Dispersion ASTM D5596	Category						**10 In Cat 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**25**	N/mm (kN/m)	**144**	ppi		**2,467**	psi
	Average Strength @ Break	**28**	N/mm (kN/m)	**161**	ppi		**2,766**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.61**	
Lo = 2.0" Break	Average Elongation @ Break		%				**423.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.62**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.2**	N				**56.464**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.2**	N				**99.422**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**598.4**	N				**134.52**	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: **Environmental Specialties**
PO: **13173 Duke Energy**
Destination **Terrell, NC**

Date:..... **5-11-10**

Signature.....

Quality Control Department

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12/23/05

CoA Date: 03/04/2010

Certificate of Analysis

Shipped To: AGRU AMERICA INC
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

CPC Delivery #: 88015277
PO #: 005329
Weight: 196200 LB
Ship Date: 03/04/2010
Package: BULK
Mode: Hopper Car
Car #: NAHX610315

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 7100283

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.25	g/10mi
HLMI Flow Rate	ASTM D1238	21	g/10mi
Density	D1505 or D4883	0.936	g/cm3
Pellet Count	P02.08.03	27	pel/g
Production Date		03/01/2010	

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: 03/04/2010

Certificate of Analysis

Shipped To: AGRU AMERICA INC 500 GARRISON RD GEORGETOWN SC 29440 USA	CPC Delivery #: 88013175 PO #: 005329 Weight: 195400 LB Ship Date: 03/02/2010 Package: BULK
Recipient: PALMER Fax:	Mode: Hopper Car Car #: CHVX889230 Seal No: 275012

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 7100272

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.24	g/10mi
HLMI Flow Rate	ASTM D1238	21	g/10mi
Density	D1505 or D4883	0.937	g/cm3
Pellet Count	P02.08.03	27	pel/g
Production Date		02/27/2010	

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

HDPE Geomembrane Conformance Test Results

CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-01
LAB ID NO.: L10017-01-01
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211212-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	61	61	62	60	59		
			60	60	60	60	59	**60.2** ✓	0.92
DENSITY	D 1505	g/cc	0.9469	0.9469	0.9468			**0.9469** ✓	0.0001
CARBON BLACK CONTENT	D 1603	%	2.22	2.20				**2.21** ✓	0.013
TEAR RESISTANCE	D 1004	MD-lbs	57.2	56.0	55.9	56.3	54.3		
			54.9	56.0	53.2	54.5	56.1	**55.4** ✓	1.18
		CD-lbs	50.7	51.4	51.4	49.6	50.1		
			53.6	50.8	51.8	49.1	50.3	**50.9** ✓	1.27
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	147	152	147	153	149	**150** ✓	2.67
		CD-ppi	157	160	157	157	160	**158** ✓	1.64
STRENGTH AT BREAK		MD-ppi	184	180	178	185	165	**178** ✓	8.24
		CD-ppi	157	160	159	166	161	**161** ✓	3.49
ELONGATION AT YIELD		MD%	20.4	20.4	21.0	19.9	18.5	**20.0** ✓	0.94
Lo = 1.3"		CD%	15.4	15.4	16.2	14.3	14.0	**15.1** ✓	0.90
ELONGATION AT BREAK		MD%	414	396	386	439	418	**411** ✓	20.56
Lo = 2.0"		CD%	472	311	470	543	397	**439** ✓	88.05

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-01
LAB ID NO.: L10017-01-02
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211320-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	58	59	61	61	60		
			62	60	60	62	61	**60.4** ✓	1.26
DENSITY	D 1505	g/cc	0.9466	0.9466	0.9465			**0.9466** ✓	0.0001
CARBON BLACK CONTENT	D 1603	%	2.21	2.22				**2.21** ✓	0.007
TEAR RESISTANCE	D 1004	MD-lbs	56.7	56.0	55.9	55.4	53.5		
			58.4	55.7	55.9	57.4	55.6	**56.1** ✓	1.29
		CD-lbs	52.3	52.5	52.6	53.5	54.2		
			52.3	51.0	52.3	52.7	48.7	**52.2** ✓	1.49
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	147	146	152	156	147	**150** ✓	4.37
		CD-ppi	160	162	168	168	172	**166** ✓	4.94
STRENGTH AT BREAK		MD-ppi	205	172	206	217	196	**199** ✓	17.04
		CD-ppi	171	162	169	168	172	**169** ✓	3.82
ELONGATION AT YIELD		MD%	21.4	19.4	20.5	20.5	20.2	**20.4** ✓	0.72
Lo = 1.3"		CD%	14.8	13.1	13.7	14.5	12.9	**13.8** ✓	0.84
ELONGATION AT BREAK		MD%	438	445	449	447	428	**441** ✓	8.56
Lo = 2.0"		CD%	504	481	519	444	517	**493** ✓	31.30

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-01
LAB ID NO.: L10017-01-03
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211432-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	59	60	63	60	61		
			59	61	62	61	59	**60.5** ✓	1.35
DENSITY	D 1505	g/cc	0.9468	0.9468	0.9467			**0.9468** ✓	0.0001
CARBON BLACK CONTENT	D 1603	%	2.32	2.32				**2.32** ✓	0.003
TEAR RESISTANCE	D 1004	MD-lbs	55.0	56.5	55.6	56.6	57.8		
			56.5	55.3	56.4	54.9	53.4	**55.8** ✓	1.22
		CD-lbs	48.3	49.6	49.6	50.6	50.7		
			51.1	49.5	48.2	48.8	50.6	**49.7** ✓	1.04
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	144	147	150	152	150	**149** ✓	3.33
		CD-ppi	150	156	158	160	156	**156** ✓	3.58
STRENGTH AT BREAK		MD-ppi	158	199	208	206	187	**192** ✓	20.44
		CD-ppi	168	156	158	160	156	**159** ✓	4.88
ELONGATION AT YIELD		MD%	19.7	21.0	21.3	20.0	19.7	**20.3** ✓	0.76
Lo = 1.3"		CD%	15.8	13.9	14.2	13.9	13.4	**14.2** ✓	0.92
ELONGATION AT BREAK		MD%	404	430	461	453	440	**438** ✓	22.23
Lo = 2.0"		CD%	518	468	376	424	354	**428** ✓	66.89

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-01
LAB ID NO.: L10017-01-04
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211440-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	61	63	63	60	59		
			62	59	60	62	59	**60.8**	1.62
DENSITY	D 1505	g/cc	0.9470	0.9471	0.9468			**0.9470**	0.0001
CARBON BLACK CONTENT	D 1603	%	2.20	2.18				**2.19**	0.017
TEAR RESISTANCE	D 1004	MD-lbs	57.8	54.8	52.4	54.9	58.2		
			58.1	58.8	58.2	57.7	59.1	**57.0**	2.19
		CD-lbs	51.2	52.4	53.7	55.5	52.1		
			50.9	52.1	49.4	51.8	53.8	**52.3**	1.71
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	154	151	146	156	144	**150**	4.92
		CD-ppi	168	157	160	164	162	**162**	3.85
STRENGTH AT BREAK		MD-ppi	205	186	183	206	201	**196**	10.99
		CD-ppi	192	166	176	174	182	**178**	9.78
ELONGATION AT YIELD		MD%	22.7	22.9	22.9	24.1	24.9	**23.5**	0.96
Lo = 1.3"		CD%	15.0	15.3	15.0	13.6	13.9	**14.6**	0.76
ELONGATION AT BREAK		MD%	460	435	475	440	416	**445**	22.86
Lo = 2.0"		CD%	582	506	540	526	555	**542**	28.83

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-01
LAB ID NO.: L10017-01-05
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211549-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	62	63	61	61	62		
			61	60	62	58	62	**61.2**	1.40
DENSITY	D 1505	g/cc	0.9467	0.9467	0.9466			**0.9467**	0.0001
CARBON BLACK CONTENT	D 1603	%	2.28	2.29				**2.28**	0.010
TEAR RESISTANCE	D 1004	MD-lbs	56.8	56.9	52.9	55.2	57.8		
			58.7	56.7	60.6	56.6	56.9	**56.9**	2.02
		CD-lbs	52.2	53.4	55.4	53.8	54.3		
			54.8	55.8	56.6	53.2	56.1	**54.6**	1.42
TENSILE PROPERTIES	.D 6693								
STRENGTH AT YIELD		MD-ppi	156	152	143	147	146	**149**	5.31
		CD-ppi	175	164	163	164	158	**165**	6.15
STRENGTH AT BREAK		MD-ppi	214	186	197	198	162	**191**	19.34
		CD-ppi	192	178	173	164	160	**173**	12.57
ELONGATION AT YIELD		MD%	21.3	20.8	21.9	21.1	19.7	**21.0**	0.81
Lo = 1.3"		CD%	14.2	14.2	14.4	13.6	15.0	**14.3**	0.50
ELONGATION AT BREAK		MD%	447	399	414	437	416	**423**	19.22
Lo = 2.0"		CD%	578	558	540	316	463	**491**	107.08

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-03
LAB ID NO.: L10017-03-01
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211558-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	65	62	63	60	60		
			62	61	60	62	62	**61.7**	1.57
DENSITY	D 1505	g/cc	0.9473	0.9474	0.9474			**0.9474**	0.0001
CARBON BLACK CONTENT	D 1603	%	2.27	2.26				**2.26**	0.009
TEAR RESISTANCE	D 1004	MD-lbs	54.4	55.1	56.8	58.8	56.8		
			56.5	57.8	53.8	57.2	52.5	**56.0**	1.96
		CD-lbs	54.6	48.3	50.9	51.7	49.9		
			48.3	47.7	45.9	47.6	47.9	**49.3**	2.53
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	156	160	158	160	153	**157**	2.88
		CD-ppi	167	167	173	166	159	**166**	5.13
STRENGTH AT BREAK		MD-ppi	214	187	196	196	172	**193**	15.57
		CD-ppi	171	171	173	166	159	**168**	5.73
ELONGATION AT YIELD		MD%	20.9	20.1	20.6	20.1	20.1	**20.4**	0.37
Lo = 1.3"		CD%	15.1	15.1	14.8	14.8	14.8	**14.9**	0.16
ELONGATION AT BREAK		MD%	455	418	451	445	432	**440**	15.16
Lo = 2.0"		CD%	505	519	458	424	429	**467**	43.36

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-03
LAB ID NO.: L10017-03-02
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211666-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	61	61	59	61	60		
			60	63	64	62	60	61.1	1.52
DENSITY	D 1505	g/cc	0.9477	0.9476	0.9477			0.9476	0.0001
CARBON BLACK CONTENT	D 1603	%	2.51	2.53				2.52	0.014
TEAR RESISTANCE	D 1004	MD-lbs	52.8	55.7	55.4	54.4	53.5		
			57.7	57.1	56.5	55.6	59.1	55.8	1.92
		CD-lbs	47.2	54.0	52.1	51.2	48.1		
			51.1	47.6	49.2	46.7	46.8	49.4	2.55
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	147	148	164	154	150	153	7.12
		CD-ppi	166	165	173	178	161	169	6.57
STRENGTH AT BREAK		MD-ppi	188	189	209	192	206	197	9.86
		CD-ppi	172	168	190	178	170	176	8.92
ELONGATION AT YIELD		MD%	20.5	20.2	20.2	19.4	19.9	20.0	0.42
Lo = 1.3"		CD%	13.7	14.8	13.4	13.4	13.7	13.8	0.58
ELONGATION AT BREAK		MD%	377	445	433	431	490	435	40.34
Lo = 2.0"		CD%	517	517	583	489	515	524	34.95

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-03
LAB ID NO.: L10017-03-03
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211675-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	59	60	60	61	60		
			60	61	60	63	63	**60.7**	1.34
DENSITY	D 1505	g/cc	0.9471	0.9471	0.9471			**0.9471**	0.0001
CARBON BLACK CONTENT	D 1603	%	2.36	2.41				**2.38**	0.029
TEAR RESISTANCE	D 1004	MD-lbs	53.9	57.1	51.3	51.9	51.9		
			54.5	53.3	56.4	55.8	53.0	**53.9**	2.01
		CD-lbs	50.0	48.8	53.0	49.9	47.3		
			53.0	48.0	53.6	54.7	47.6	**50.6**	2.75
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	153	161	152	150	154	**154**	4.28
		CD-ppi	148	153	159	162	160	**156**	5.55
STRENGTH AT BREAK		MD-ppi	169	201	213	173	194	**190**	18.68
		CD-ppi	165	170	159	173	167	**167**	5.26
ELONGATION AT YIELD		MD%	20.8	20.5	20.8	20.2	20.2	**20.5**	0.30
Lo = 1.3"		CD%	14.7	14.4	15.5	14.7	14.4	**14.7**	0.45
ELONGATION AT BREAK		MD%	421	478	468	424	471	**452**	27.56
Lo = 2.0"		CD%	518	543	468	536	498	**513**	30.43

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-03
LAB ID NO.: L10017-03-04
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211683-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	60	59	60	62	61		
			62	62	61	65	63	**61.5**	1.72
DENSITY	D 1505	g/cc	0.9479	0.9479	0.9479			**0.9479**	0.0001
CARBON BLACK CONTENT	D 1603	%	2.76	2.75				**2.76**	0.012
TEAR RESISTANCE	D 1004	MD-lbs	56.7	54.8	54.1	57.0	46.4		
			51.1	50.7	52.4	52.0	45.2	**52.0**	3.94
		CD-lbs	53.1	55.8	55.5	52.3	47.5		
			50.4	51.2	48.9	50.5	49.8	**51.5**	2.70
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	146	140	158	143	148	**147**	7.18
		CD-ppi	160	161	154	174	156	**161**	7.96
STRENGTH AT BREAK		MD-ppi	220	170	204	165	191	**190**	23.00
		CD-ppi	160	165	157	174	156	**162**	7.67
ELONGATION AT YIELD		MD%	20.8	19.7	20.5	20.3	20.0	**20.3**	0.43
Lo = 1.3"		CD%	14.3	14.0	14.6	14.0	14.0	**14.2**	0.27
ELONGATION AT BREAK		MD%	484	438	420	453	437	**446**	24.05
Lo = 2.0"		CD%	172	511	501	481	451	**423**	142.28

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-03
LAB ID NO.: L10017-03-05
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211701-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	60	60	61	59	63		
			59	60	61	62	63	**60.8** ✓	1.48
DENSITY	D 1505	g/cc	0.9476	0.9477	0.9477			**0.9476** ✓	0.0001
CARBON BLACK CONTENT	D 1603	%	2.69	2.66				**2.68** ✓	0.023
TEAR RESISTANCE	D 1004	MD-lbs	52.6	54.3	54.8	56.3	57.3		
			54.6	50.4	54.2	51.3	48.3	**53.4** ✓	2.76
		CD-lbs	47.1	56.0	52.0	48.8	48.4		
			45.6	46.0	47.2	45.9	46.4	**48.3** ✓	3.30
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	155	143	153	146	152	**150** ✓	5.00
		CD-ppi	153	156	171	163	151	**159** ✓	8.42
STRENGTH AT BREAK		MD-ppi	218	190	186	166	176	**187** ✓	19.73
		CD-ppi	162	156	176	163	163	**164** ✓	7.59
ELONGATION AT YIELD		MD%	20.9	20.9	20.1	19.9	20.1	**20.4** ✓	0.48
Lo = 1.3"		CD%	15.2	14.3	14.6	15.2	15.2	**14.9** ✓	0.42
ELONGATION AT BREAK		MD%	460	444	425	440	457	**445** ✓	14.10
Lo = 2.0"		CD%	493	465	514	465	486	**485** ✓	20.65

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-03
LAB ID NO.: L10017-03-06
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 211792-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	59	58	60	59	60		
			60	60	59	62	61	**59.8** ✓	1.14
DENSITY	D 1505	g/cc	0.9472	0.9472	0.9474			**0.9473** ✓	0.0001
CARBON BLACK CONTENT	D 1603	%	2.45	2.44				**2.44** ✓	0.009
TEAR RESISTANCE	D 1004	MD-lbs	51.1	53.8	56.2	54.2	55.2		
			54.3	51.2	53.4	54.0	55.0	**53.8** ✓	1.63
		CD-lbs	51.8	47.8	49.2	53.5	51.7		
			47.1	45.6	47.1	50.6	46.4	**49.1** ✓	2.69
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	152	163	149	155	151	**154** ✓	5.54
		CD-ppi	157	160	157	166	160	**160** ✓	3.92
STRENGTH AT BREAK		MD-ppi	198	204	170	170	193	**187** ✓	16.30
		CD-ppi	157	160	161	166	160	**161** ✓	3.47
ELONGATION AT YIELD		MD%	20.2	19.8	18.2	18.8	19.8	**19.4** ✓	0.83
Lo = 1.3"		CD%	13.9	13.9	15.9	15.3	15.0	**14.8** ✓	0.88
ELONGATION AT BREAK		MD%	428	451	448	394	444	**433** ✓	23.54
Lo = 2.0"		CD%	213	461	494	470	415	**411** ✓	114.20

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-03
LAB ID NO.: L10017-03-07
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 212105-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	62	62	61	62	61		
			60	60	60	60	62	**61.0** ✓	0.94
DENSITY	D 1505	g/cc	0.9479	0.9478	0.9479			**0.9478** ✓	0.0001
CARBON BLACK CONTENT	D 1603	%	2.51	2.47				**2.49** ✓	0.024
TEAR RESISTANCE	D 1004	MD-lbs	54.2	56.0	50.1	55.3	51.2		
			53.1	53.2	53.5	51.7	53.0	**53.1** ✓	1.80
		CD-lbs	48.3	49.6	47.2	48.0	48.4		
			51.2	49.8	51.4	49.5	47.5	**49.1** ✓	1.46
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	160	157	156	158	156	**157** ✓	1.43
		CD-ppi	156	164	164	164	161	**162** ✓	3.27
STRENGTH AT BREAK		MD-ppi	201	192	189	179	156	**184** ✓	17.29
		CD-ppi	157	164	164	170	161	**163** ✓	4.96
ELONGATION AT YIELD		MD%	20.6	20.0	19.7	18.1	18.7	**19.4** ✓	1.01
Lo = 1.3"		CD%	15.3	13.9	14.4	16.1	14.7	**14.9** ✓	0.85
ELONGATION AT BREAK		MD%	432	439	418	463	354	**421** ✓	40.95
Lo = 2.0"		CD%	404	285	469	404	304	**373** ✓	76.88

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-10
LAB ID NO.: L10017-10-01
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 218603-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	56	57	59	60	60		
			60	61	61	61	61	**59.6**	2.05
DENSITY	D 1505	g/cc	0.9453	0.9451	0.9451			**0.9452**	0.0001
CARBON BLACK CONTENT	D 1603	%	2.22	2.40				**2.31**	0.127
TEAR RESISTANCE	D 1004	MD-lbs	56.1	55.6	61.3	57.8	61.3		
			56.3	62.0	54.1	57.3	57.9	**58.0**	2.70
		CD-lbs	55.1	55.0	54.3	58.4	54.6		
			56.7	53.3	51.1	56.4	53.4	**54.8**	2.04
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	152	153	162	165	165	**160**	6.26
		CD-ppi	160	172	163	157	156	**162**	6.68
STRENGTH AT BREAK		MD-ppi	193	165	199	194	165	**183**	16.85
		CD-ppi	185	178	181	157	156	**171**	13.76
ELONGATION AT YIELD		MD%	21.2	19.3	20.6	20.6	18.4	**20.0**	1.14
Lo = 1.3"		CD%	15.9	14.3	13.5	16.8	13.5	**14.8**	1.49
ELONGATION AT BREAK		MD%	465	428	416	418	312	**408**	57.07
Lo = 2.0"		CD%	516	496	520	304	117	**391**	177.44

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CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-10
LAB ID NO.: L10017-10-02
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 218612-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	61	60	60	60	62		
			61	61	62	60	64	**61.1**	1.11
DENSITY	D 1505	g/cc	0.9458	0.9457	0.9457			**0.9457**	0.0001
CARBON BLACK CONTENT	D 1603	%	2.54	2.56				**2.55**	0.016
TEAR RESISTANCE	D 1004	MD-lbs	54.4	54.1	57.8	56.6	55.4		
			55.1	60.8	53.6	60.8	56.6	**56.5**	2.59
		CD-lbs	49.8	49.5	53.6	53.5	53.8		
			51.3	53.7	54.2	53.7	49.3	**52.2**	2.03
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	150	157	165	168	162	**160**	6.88
		CD-ppi	162	157	172	180	161	**166**	9.19
STRENGTH AT BREAK		MD-ppi	163	166	228	178	173	**182**	26.51
		CD-ppi	192	168	178	180	171	**178**	9.31
ELONGATION AT YIELD		MD%	20.0	19.2	21.1	18.6	17.8	**19.3**	1.27
Lo = 1.3"		CD%	16.9	16.0	15.5	13.5	14.1	**15.2**	1.39
ELONGATION AT BREAK		MD%	375	426	463	432	448	**429**	33.36
Lo = 2.0"		CD%	549	485	488	429	528	**496**	46.12

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CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-10
LAB ID NO.: L10017-10-03
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 218695-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	61	60	60	60	64		
			66	61	61	68	70	63.2 ✓	3.66
DENSITY	D 1505	g/cc	0.9456	0.9453	0.9452			0.9454 ✓	0.0002
CARBON BLACK CONTENT	D 1603	%	2.23	2.18				2.21 ✓	0.029
TEAR RESISTANCE	D 1004	MD-lbs	54.8	60.8	62.8	59.4	57.1		
			57.6	54.4	60.3	55.9	55.3	57.8 ✓	2.86
		CD-lbs	51.0	55.1	57.4	53.6	50.5		
			51.9	53.9	56.1	52.4	53.3	53.5 ✓	2.20
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	147	149	160	164	153	155 ✓	7.32
		CD-ppi	158	174	171	156	150	162 ✓	10.37
STRENGTH AT BREAK		MD-ppi	170	180	220	176	176	184 ✓	20.45
		CD-ppi	192	191	171	177	157	178 ✓	14.59
ELONGATION AT YIELD		MD%	20.7	21.8	21.5	19.6	18.8	20.5 ✓	1.27
Lo = 1.3"		CD%	17.1	15.7	13.5	14.9	14.6	15.2 ✓	1.34
ELONGATION AT BREAK		MD%	415	433	436	417	478	436 ✓	25.37
Lo = 2.0"		CD%	553	530	218	516	458	455 ✓	137.05

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-10
LAB ID NO.: L10017-10-04
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 218721-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	61	61	59	60	60		
			60	69	67	69	67	**63.3** ✓	4.10
DENSITY	D 1505	g/cc	0.9460	0.9457	0.9459			**0.9459** ✓	0.0002
CARBON BLACK CONTENT	D 1603	%	2.46	2.48				**2.47** ✓	0.009
TEAR RESISTANCE	D 1004	MD-lbs	58.3	51.4	54.0	56.4	56.7		
			52.2	58.0	54.9	59.3	56.2	**55.7** ✓	2.60
		CD-lbs	54.6	51.1	52.6	51.1	49.7		
			56.9	56.4	55.2	50.9	50.0	**52.9** ✓	2.70
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	154	146	156	148	160	**153** ✓	5.55
		CD-ppi	150	152	158	159	156	**155** ✓	3.80
STRENGTH AT BREAK		MD-ppi	221	158	171	177	176	**181** ✓	23.87
		CD-ppi	150	179	174	182	199	**177** ✓	17.67
ELONGATION AT YIELD		MD%	20.5	19.1	18.3	19.6	19.4	**19.4** ✓	0.80
Lo = 1.3"		CD%	16.4	15.3	16.1	14.8	14.2	**15.4** ✓	0.91
ELONGATION AT BREAK		MD%	472	402	423	443	428	**434** ✓	26.01
Lo = 2.0"		CD%	406	541	479	499	577	**500** ✓	64.98

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-10
LAB ID NO.: L10017-10-05
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 218729-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	60	59	58	60	60		
			60	61	61	60	63	**60.2** ✓	1.45
DENSITY	D 1505	g/cc	0.9453	0.9452	0.9455			**0.9453** ✓	0.0001
CARBON BLACK CONTENT	D 1603	%	2.43	2.43				**2.43** ✓	0.002
TEAR RESISTANCE	D 1004	MD-lbs	54.2	58.7	59.6	59.5	54.7		
			53.7	59.7	57.5	53.5	60.6	**57.2** ✓	2.84
		CD-lbs	51.4	50.5	53.7	54.7	53.6		
			55.1	49.5	51.7	48.4	57.3	**52.6** ✓	2.77
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	140	145	156	162	161	**153** ✓	9.79
		CD-ppi	163	150	148	162	165	**158** ✓	7.81
STRENGTH AT BREAK		MD-ppi	178	159	212	162	161	**174** ✓	22.27
		CD-ppi	186	161	154	188	170	**172** ✓	14.94
ELONGATION AT YIELD Lo = 1.3"		MD%	21.8	19.5	21.2	18.1	18.1	**19.7** ✓	1.72
		CD%	16.8	17.1	13.2	15.7	14.0	**15.4** ✓	1.71
ELONGATION AT BREAK Lo = 2.0"		MD%	411	419	432	393	338	**399** ✓	36.71
		CD%	508	482	466	527	488	**494** ✓	23.71

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CONFORMANCE TEST RESULTS

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INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-10
LAB ID NO.: L10017-10-06
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 219106-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	60	59	60	59	64		
			64	62	61	64	60	**61.1** ✓	2.00
DENSITY	D 1505	g/cc	0.9458	0.9460	0.9458			**0.9459** ✓	0.0001
CARBON BLACK CONTENT	D 1603	%	2.37	2.42				**2.39** ✓	0.035
TEAR RESISTANCE	D 1004	MD-lbs	57.8	57.6	59.8	52.8	50.4		
			55.6	55.8	60.9	55.5	53.9	**56.0** ✓	3.17
		CD-lbs	49.6	50.6	54.3	54.2	54.0		
			52.3	48.7	53.4	53.2	52.8	**52.3** ✓	2.00
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	157	158	164	142	138	**152** ✓	11.42
		CD-ppi	160	157	153	148	161	**156** ✓	5.47
STRENGTH AT BREAK		MD-ppi	177	205	191	159	181	**182** ✓	17.18
		CD-ppi	174	157	161	163	178	**166** ✓	8.71
ELONGATION AT YIELD		MD%	18.8	21.6	15.4	19.3	20.4	**19.1** ✓	2.33
Lo = 1.3"		CD%	17.2	19.2	15.0	15.3	13.9	**16.1** ✓	2.09
ELONGATION AT BREAK		MD%	441	413	538	416	466	**455** ✓	51.21
Lo = 2.0"		CD%	469	363	487	488	536	**469** ✓	64.05

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CONFORMANCE TEST RESULTS

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CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-10
LAB ID NO.: L10017-10-07
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 219223-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	61	61	58	58	56		
			57	61	60	61	65	**59.7** ✓	2.77
DENSITY	D 1505	g/cc	0.9462	0.9460	0.9460			**0.9461** ✓	0.0001
CARBON BLACK CONTENT	D 1603	%	2.39	2.39				**2.39** ✓	0.006
TEAR RESISTANCE	D 1004	MD-lbs	56.3	57.7	59.5	51.0	51.0		
			58.6	61.5	54.5	51.0	51.7	**55.3** ✓	3.98
		CD-lbs	47.3	49.3	51.7	54.8	55.0		
			50.0	51.1	48.6	53.5	54.7	**51.6** ✓	2.80
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	142	144	155	160	162	**153** ✓	9.14
		CD-ppi	166	150	148	164	167	**159** ✓	9.17
STRENGTH AT BREAK		MD-ppi	174	145	205	189	180	**179** ✓	22.25
		CD-ppi	181	166	148	171	190	**171** ✓	15.73
ELONGATION AT YIELD		MD%	19.1	18.2	20.2	17.4	18.5	**18.7** ✓	1.05
Lo = 1.3"		CD%	16.5	16.2	14.6	14.0	15.1	**15.3** ✓	1.06
ELONGATION AT BREAK		MD%	460	370	444	455	427	**431** ✓	36.48
Lo = 2.0"		CD%	483	493	191	489	530	**437** ✓	138.85

CHECKED BY: CK DATE: 5-19-10

\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-10-07 HDPE MARSHALL.xls]Sheet1 L10017-10-07 5/19/2010

KB

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CONFORMANCE TEST RESULTS

geotechnics
INTEGRITY IN TESTING

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-12
LAB ID NO.: L10017-12-01
MATERIAL: AGRU 60 MIL HDPE MICROSPIKE
ROLL NO: 219114-10

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994	mils	60	58	58	59	61		
			59	61	62	63	63	**60.3**	1.76
DENSITY	D 1505	g/cc	0.9454	0.9454	0.9452			**0.9453**	0.0001
CARBON BLACK CONTENT	D 1603	%	2.33	2.32				**2.33**	0.003
TEAR RESISTANCE	D 1004	MD-lbs	54.6	57.7	57.3	58.0	54.5		
			52.4	51.4	52.1	51.4	58.0	**54.7**	2.82
		CD-lbs	54.5	61.7	56.4	57.6	56.1		
			55.3	60.6	55.8	53.5	54.0	**56.6**	2.72
TENSILE PROPERTIES	D 6693								
STRENGTH AT YIELD		MD-ppi	150	160	150	167	163	**158**	7.77
		CD-ppi	162	168	176	155	156	**163**	8.60
STRENGTH AT BREAK		MD-ppi	177	217	163	167	163	**177**	22.74
		CD-ppi	177	168	190	170	156	**172**	12.36
ELONGATION AT YIELD		MD%	20.0	24.2	19.2	18.4	17.8	**19.9**	2.53
Lo = 1.3"		CD%	17.1	17.1	15.1	16.2	15.9	**16.3**	0.85
ELONGATION AT BREAK		MD%	498	464	447	369	418	**439**	48.76
Lo = 2.0"		CD%	513	470	563	521	443	**502**	46.66

CHECKED BY: BF DATE: 5-24-10

\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-12-01 HDPE MARSHALL.xls]Sheet1 L10017-12-01 5/24/2010

APPENDIX II – GEOSYNTHETICS
Section 3 – Cells 1 and 2 Geocomposite Testing

330-mil, LDS and LCS Geocomposite Manufacturer's Quality Control (MQC) Test Results
330-mil, LDS and LCS Geocomposite Conformance Test Results
350-mil, LDS Geocomposite Alternate Manufacturer's Quality Control (MQC) Test Results
350-mil, LDS Geocomposite Alternate Conformance Test Results

330-mil, LDS and LCS Geocomposite Manufacturer's Quality Control (MQC) Test Results

SKAPS Industries

Engineered Synthetic Products, Inc.

May 11, 2010
Environmental Specialties International
7943 Pecue Lane, Suite A
Baton Rouge, LA 70809

Ref. : Duke Energy Marshall Steam Station, NC
Customer P.O. # 13179
Transnet 330-2-8

We certify that the Transnet 330-2-8 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	0.3	Minimum
Thickness	ASTM D 5199	mil	300	Minimum
Carbon Black	ASTM D 4218	%	2.0 - 3.0	Range
Tensile Strength	ASTM D 5035	lbs/in	75	Minimum
Melt Flow	ASTM D 1238[3]	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm^3	0.94	Minimum
Composite				
Ply Adhesion	ASTM D 7005	lb/in	1.0	MARV[6]
Transmissivity[1]	ASTM D 4716	m^2/sec	2.87×10^{-3}	MARV
Transmissivity[2]	ASTM D 4716	m^2/sec	3.45×10^{-3}	MARV
Geotextile[4 & 5]				
Fabric Weight	ASTM D 5261	oz/yd^2	8.0	MARV
Grab Strength	ASTM D 4632	lbs	200	MARV
Grab Elongation	ASTM D 4632	%	50	MARV
Puncture Resistance	ASTM D 4833	lbs	80	MARV
Permeability	ASTM D 4491	cm/sec	2.0×10^{-4}	MARV
AOS	ASTM D 4751	US Sieve	80	MARV
UV Resistance	ASTM D 4355	%/hrs	70/500	MARV

Notes:

1 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

2 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between liners after 100 hours.

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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210001	359210001 - N	3592.008	3592.016	1.22	4.02	
2	359210002	359210002 - N	3592.008	3592.016			
3	359210003	359210003 - N	3592.008	3592.016			
4	359210004	359210004 - N	3592.008	3592.016			
5	359210005	359210005 - N	3592.008	3592.016			
6	359210006	359210006 - N	3592.008	3592.016			
7	359210007	359210007 - N	3592.008	3592.016			
8	359210008	359210008 - N	3592.021	3592.005			
9	359210009	359210009 - N	3592.021	3592.005			
10	359210010	359210010 - N	3592.021	3592.005			
11	359210011	359210011 - N	3592.021	3592.005			
12	359210012	359210012 - N	3592.021	3592.005			
13	359210013	359210013 - N	3592.021	3592.005			
14	359210014	359210014 - N	3592.021	3592.005			
15	359210015	359210015 - N	3592.002	3592.022			
16	359210016	359210016 - N	3592.002	3592.022			
17	359210017	359210017 - N	3592.002	3592.022			
18	359210018	359210018 - N	3592.002	3592.022			
19	359210019	359210019 - N	3592.002	3592.022			
20	359210020	359210020 - N	3592.002	3592.022	1.90	4.45	
21	359210021	359210021 - N	3592.002	3592.022			
22	359210022	359210022 - N	3592.017	3592.009			
23	359210023	359210023 - N	3592.017	3592.009			
24	359210024	359210024 - N	3592.017	3592.009			
25	359210025	359210025 - N	3592.017	3592.009			
26	359210026	359210026 - N	3592.017	3592.009			
27	359210027	359210027 - N	3592.017	3592.009			

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210001 - N	CHVX898541	0.9543	0.442	360	2.73	126	
359210002 - N	CHVX898541	0.9543					
359210003 - N	CHVX898541	0.9543					
359210004 - N	CHVX898541	0.9543					
359210005 - N	CHVX898541	0.9543					
359210006 - N	CHVX898541	0.9543					
359210007 - N	CHVX898541	0.9543					
359210008 - N	CHVX898541	0.9543					
359210009 - N	CHVX898541	0.9543					
359210010 - N	CHVX898541	0.9543					
359210011 - N	CHVX898541	0.9543					
359210012 - N	CHVX898541	0.9543					
359210013 - N	CHVX898541	0.9543					
359210014 - N	CHVX898541	0.9543					
359210015 - N	CHVX898541	0.9543					
359210016 - N	CHVX898541	0.9543					
359210017 - N	CHVX898541	0.9543					
359210018 - N	CHVX898541	0.9543					
359210019 - N	CHVX898541	0.9543					
359210020 - N	CHVX898541	0.9551	0.477	369	2.24	137	
359210021 - N	CHVX898541	0.9551					
359210022 - N	CHVX898541	0.9551					
359210023 - N	CHVX898541	0.9551					
359210024 - N	CHVX898541	0.9551					
359210025 - N	CHVX898541	0.9551					
359210026 - N	CHVX898541	0.9551					
359210027 - N	CHVX898541	0.9551					

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210028	359210028 - N	3592.017	3592.009			
2	359210029	359210029 - N	3592.012	3592.026			
3	359210030	359210030 - N	3592.012	3592.026			
4	359210031	359210031 - N	3592.012	3592.026			
5	359210032	359210032 - N	3592.012	3592.026			
6	359210033	359210033 - N	3592.012	3592.026			
7	359210034	359210034 - N	3592.012	3592.026			
8	359210035	359210035 - N	3592.012	3592.026			
9	359210036	359210036 - N	3592.025	3592.003			
10	359210037	359210037 - N	3592.025	3592.003			
11	359210038	359210038 - N	3592.025	3592.003			
12	359210039	359210039 - N	3592.025	3592.003			
13	359210040	359210040 - N	3592.025	3592.003	1.25	4.05	
14	359210041	359210041 - N	3592.025	3592.003			
15	359210042	359210042 - N	3592.025	3592.003			
16	359210043	359210043 - N	3592.006	3592.020			
17	359210044	359210044 - N	3592.006	3592.020			
18	359210045	359210045 - N	3592.006	3592.020			
19	359210046	359210046 - N	3592.006	3592.020			
20	359210047	359210047 - N	3592.006	3592.020			
21	359210048	359210048 - N	3592.006	3592.020			
22	359210049	359210049 - N	3592.006	3592.020			
23	359210050	359210050 - N	3592.019	3592.011			
24	359210051	359210051 - N	3592.019	3592.011			
25	359210052	359210052 - N	3592.019	3592.011			
26	359210053	359210053 - N	3592.019	3592.011			
27	359210054	359210054 - N	3592.019	3592.011			

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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)
359210028 - N	CHVX898541	0.9551					
359210029 - N	CHVX898541	0.9551					
359210030 - N	CHVX898541	0.9551					
359210031 - N	CHVX898541	0.9551					
359210032 - N	CHVX898541	0.9551					
359210033 - N	CHVX898541	0.9551					
359210034 - N	CHVX898541	0.9551					
359210035 - N	CHVX898541	0.9551					
359210036 - N	CHVX898541	0.9551					
359210037 - N	CHVX898541	0.9551					
359210038 - N	CHVX898541	0.9551					
359210039 - N	CHVX898541	0.9551					
359210040 - N	CHVX898541	0.9545	0.444	362	2.70	128	
359210041 - N	CHVX898541	0.9545					
359210042 - N	CHVX898541	0.9545					
359210043 - N	CHVX898541	0.9545					
359210044 - N	CHVX898541	0.9545					
359210045 - N	CHVX898541	0.9545					
359210046 - N	CHVX898541	0.9545					
359210047 - N	CHVX898541	0.9545					
359210048 - N	CHVX898541	0.9545					
359210049 - N	CHVX898541	0.9545					
359210050 - N	CHVX898541	0.9545					
359210051 - N	CHVX898541	0.9545					
359210052 - N	CHVX898541	0.9545					
359210053 - N	CHVX898541	0.9545					
359210054 - N	CHVX898541	0.9545					

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Roll	Geocomposite Roll Number	Geonet Roll Number	Geotextile Roll Number		Ply Adhesion (lb/in)		Geocomposite Transmissivity (m^2/sec)
			Top	Bottom	Minimum	Average	
1	359210055	359210055 - N	3592.019	3592.011			
2	359210056	359210056 - N	3592.019	3592.011			
3	359210057	359210057 - N	3592.004	3592.024			
4	359210058	359210058 - N	3592.004	3592.024			
5	359210059	359210059 - N	3592.004	3592.024			
6	359210060	359210060 - N	3592.004	3592.024	1.87	4.43	
7	359210061	359210061 - N	3592.004	3592.024			
8	359210062	359210062 - N	3592.004	3592.024			
9	359210063	359210063 - N	3592.004	3592.024			
10	359210064	359210064 - N	3592.023	3592.007			
11	359210065	359210065 - N	3592.023	3592.007			
12	359210066	359210066 - N	3592.023	3592.007			
13	359210067	359210067 - N	3592.023	3592.007			
14	359210068	359210068 - N	3592.023	3592.007			
15	359210069	359210069 - N	3592.023	3592.007			
16	359210070	359210070 - N	3592.023	3592.007			
17	359210071	359210071 - N	3592.010	3592.018			
18	359210072	359210072 - N	3592.010	3592.018			
19	359210073	359210073 - N	3592.010	3592.018			
20	359210074	359210074 - N	3592.010	3592.018			
21	359210075	359210075 - N	3592.010	3592.018			
22	359210076	359210076 - N	3592.010	3592.018			
23	359210077	359210077 - N	3592.010	3592.018			
24	359210078	359210078 - N	3592.027	3592.013			
25	359210079	359210079 - N	3592.027	3592.013			
26	359210080	359210080 - N	3592.027	3592.013	1.28	4.08	
27	359210081	359210081 - N	3592.027	3592.013			

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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)
359210055 - N	CHVX898541	0.9545					
359210056 - N	CHVX898541	0.9545					
359210057 - N	CHVX898541	0.9545					
359210058 - N	CHVX898541	0.9545					
359210059 - N	CHVX898541	0.9545					
359210060 - N	CHVX898541	0.9549	0.475	367	2.26	135	
359210061 - N	CHVX898541	0.9549					
359210062 - N	CHVX898541	0.9549					
359210063 - N	CHVX898541	0.9549					
359210064 - N	CHVX898541	0.9549					
359210065 - N	CHVX898541	0.9549					
359210066 - N	CHVX898541	0.9549					
359210067 - N	CHVX898541	0.9549					
359210068 - N	CHVX898541	0.9549					
359210069 - N	CHVX898541	0.9549					
359210070 - N	CHVX898541	0.9549					
359210071 - N	CHVX898541	0.9549					
359210072 - N	CHVX898541	0.9549					
359210073 - N	CHVX898541	0.9549					
359210074 - N	CHVX898541	0.9549					
359210075 - N	CHVX898541	0.9549					
359210076 - N	CHVX898541	0.9549					
359210077 - N	CHVX898541	0.9549					
359210078 - N	CHVX898541	0.9549					
359210079 - N	CHVX898541	0.9549					
359210080 - N	CHVX898541	0.9542	0.450	364	2.67	130	
359210081 - N	CHVX898541	0.9542					

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Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210082	359210082 - N	3592.027	3592.013			
2	359210083	359210083 - N	3592.027	3592.013			
3	359210084	359210084 - N	3592.027	3592.013			
4	359210085	359210085 - N	3592.014	3592.051			
5	359210086	359210086 - N	3592.014	3592.051			
6	359210087	359210087 - N	3592.014	3592.051			
7	359210088	359210088 - N	3592.014	3592.051			
8	359210089	359210089 - N	3592.014	3592.051			
9	359210090	359210090 - N	3592.014	3592.051			
10	359210091	359210091 - N	3592.014	3592.051			
11	359210092	359210092 - N	3592.042	3592.015			
12	359210093	359210093 - N	3592.042	3592.015			
13	359210094	359210094 - N	3592.042	3592.015			
14	359210095	359210095 - N	3592.042	3592.015			
15	359210096	359210096 - N	3592.042	3592.015			
16	359210097	359210097 - N	3592.042	3592.015			
17	359210098	359210098 - N	3592.042	3592.015			
18	359210099	359210099 - N	3592.001	3592.045			
19	359210100	359210100 - N	3592.001	3592.045	1.84	4.40	
20	359210101	359210101 - N	3592.001	3592.045			
21	359210102	359210102 - N	3592.001	3592.045			
22	359210103	359210103 - N	3592.001	3592.045			
23	359210104	359210104 - N	3592.001	3592.045			
24	359210105	359210105 - N	3592.001	3592.045			
25	359210106	359210106 - N	3592.050	3592.031			
26	359210107	359210107 - N	3592.050	3592.031			
27	359210108	359210108 - N	3592.050	3592.031			

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Product : **TN330-2-8**
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We, the Geonet Manufacturer, hereby certify 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)
359210082 - N	CHVX898541	0.9542					
359210083 - N	CHVX898541	0.9542					
359210084 - N	CHVX898541	0.9542					
359210085 - N	CHVX898541	0.9542					
359210086 - N	CHVX898541	0.9542					
359210087 - N	CHVX898541	0.9542					
359210088 - N	CHVX898541	0.9542					
359210089 - N	CHVX898541	0.9542					
359210090 - N	CHVX898541	0.9542					
359210091 - N	CHVX898541	0.9542					
359210092 - N	CHVX898541	0.9542					
359210093 - N	CHVX898541	0.9542					
359210094 - N	CHVX898541	0.9542					
359210095 - N	CHVX898541	0.9542					
359210096 - N	CHVX898541	0.9542					
359210097 - N	CHVX898541	0.9542					
359210098 - N	CHVX898541	0.9542					
359210099 - N	CHVX898541	0.9542					
359210100 - N	CHVX898541	0.9547	0.471	370	2.29	133	
359210101 - N	CHVX898541	0.9547					
359210102 - N	CHVX898541	0.9547					
359210103 - N	CHVX898541	0.9547					
359210104 - N	CHVX898541	0.9547					
359210105 - N	CHVX898541	0.9547					
359210106 - N	CHVX898541	0.9547					
359210107 - N	CHVX898541	0.9547					
359210108 - N	CHVX898541	0.9547					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210109	359210109 - N	3592.050	3592.031			
2	359210110	359210110 - N	3592.050	3592.031			
3	359210111	359210111 - N	3592.050	3592.031			
4	359210112	359210112 - N	3592.050	3592.031			
5	359210113	359210113 - N	3592.034	3592.047			
6	359210114	359210114 - N	3592.034	3592.047			
7	359210115	359210115 - N	3592.034	3592.047			
8	359210116	359210116 - N	3592.034	3592.047			
9	359210117	359210117 - N	3592.034	3592.047			
10	359210118	359210118 - N	3592.034	3592.047			
11	359210119	359210119 - N	3592.034	3592.047			
12	359210120	359210120 - N	3592.048	3592.029	1.33	4.11	
13	359210121	359210121 - N	3592.048	3592.029			
14	359210122	359210122 - N	3592.048	3592.029			
15	359210123	359210123 - N	3592.048	3592.029			
16	359210124	359210124 - N	3592.048	3592.029			
17	359210125	359210125 - N	3592.048	3592.029			
18	359210126	359210126 - N	3592.048	3592.029			
19	359210127	359210127 - N	3592.038	3592.053			
20	359210128	359210128 - N	3592.038	3592.053			
21	359210129	359210129 - N	3592.038	3592.053			
22	359210130	359210130 - N	3592.038	3592.053			
23	359210131	359210131 - N	3592.038	3592.053			
24	359210132	359210132 - N	3592.038	3592.053			
25	359210133	359210133 - N	3592.038	3592.053			
26	359210134	359210134 - N	3592.052	3592.032			
27	359210135	359210135 - N	3592.052	3592.032			

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210109 - N	CHVX898541	0.9547					
359210110 - N	CHVX898541	0.9547					
359210111 - N	CHVX898541	0.9547					
359210112 - N	CHVX898541	0.9547					
359210113 - N	CHVX898541	0.9547					
359210114 - N	CHVX898541	0.9547					
359210115 - N	CHVX898541	0.9547					
359210116 - N	CHVX898541	0.9547					
359210117 - N	CHVX898541	0.9547					
359210118 - N	CHVX898541	0.9547					
359210119 - N	CHVX898541	0.9547					
359210120 - N	CHVX898541	0.9544	0.448	359	2.65	125	
359210121 - N	CHVX898541	0.9544					
359210122 - N	CHVX898541	0.9544					
359210123 - N	CHVX898541	0.9544					
359210124 - N	CHVX898541	0.9544					
359210125 - N	CHVX898541	0.9544					
359210126 - N	CHVX898541	0.9544					
359210127 - N	CHVX898541	0.9544					
359210128 - N	CHVX898541	0.9544					
359210129 - N	CHVX898541	0.9544					
359210130 - N	CHVX898541	0.9544					
359210131 - N	CHVX898541	0.9544					
359210132 - N	CHVX898541	0.9544					
359210133 - N	CHVX898541	0.9544					
359210134 - N	CHVX898541	0.9544					
359210135 - N	CHVX898541	0.9544					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210136	359210136 - N	3592.052	3592.032			
2	359210137	359210137 - N	3592.052	3592.032			
3	359210138	359210138 - N	3592.052	3592.032			
4	359210139	359210139 - N	3592.052	3592.032			
5	359210140	359210140 - N	3592.052	3592.032	1.82	4.38	
6	359210141	359210141 - N	3592.036	3592.043			
7	359210142	359210142 - N	3592.036	3592.043			
8	359210143	359210143 - N	3592.036	3592.043			
9	359210144	359210144 - N	3592.036	3592.043			
10	359210145	359210145 - N	3592.036	3592.043			
11	359210146	359210146 - N	3592.036	3592.043			
12	359210147	359210147 - N	3592.036	3592.043			
13	359210148	359210148 - N	3592.044	3592.035			
14	359210149	359210149 - N	3592.044	3592.035			
15	359210150	359210150 - N	3592.044	3592.035			
16	359210151	359210151 - N	3592.044	3592.035			
17	359210152	359210152 - N	3592.044	3592.035			
18	359210153	359210153 - N	3592.044	3592.035			
19	359210154	359210154 - N	3592.044	3592.035			
20	359210155	359210155 - N	3592.030	3592.049			
21	359210156	359210156 - N	3592.030	3592.049			
22	359210157	359210157 - N	3592.030	3592.049			
23	359210158	359210158 - N	3592.030	3592.049			
24	359210159	359210159 - N	3592.030	3592.049			
25	359210160	359210160 - N	3592.030	3592.049	1.36	4.14	
26	359210161	359210161 - N	3592.030	3592.049			
27	359210162	359210162 - N	3592.046	3592.033			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210136 - N	CHVX898541	0.9544					
359210137 - N	CHVX898541	0.9544					
359210138 - N	CHVX898541	0.9544					
359210139 - N	CHVX898541	0.9544					
359210140 - N	CHVX898541	0.9550	0.473	368	2.32	138	
359210141 - N	CHVX898541	0.9550					
359210142 - N	CHVX898541	0.9550					
359210143 - N	CHVX898541	0.9550					
359210144 - N	CHVX898541	0.9550					
359210145 - N	CHVX898541	0.9550					
359210146 - N	CHVX898541	0.9550					
359210147 - N	CHVX898541	0.9550					
359210148 - N	CHVX898541	0.9550					
359210149 - N	CHVX898541	0.9550					
359210150 - N	CHVX898541	0.9550					
359210151 - N	CHVX898541	0.9550					
359210152 - N	CHVX898541	0.9550					
359210153 - N	CHVX898541	0.9550					
359210154 - N	CHVX898541	0.9550					
359210155 - N	CHVX898541	0.9550					
359210156 - N	CHVX898541	0.9550					
359210157 - N	CHVX898541	0.9550					
359210158 - N	CHVX898541	0.9550					
359210159 - N	CHVX898541	0.9550					
359210160 - N	CHVX898541	0.9546	0.439	361	2.62	127	
359210161 - N	CHVX898541	0.9546					
359210162 - N	CHVX898541	0.9546					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210163	359210163 - N	3592.046	3592.033			
2	359210164	359210164 - N	3592.046	3592.033			
3	359210165	359210165 - N	3592.046	3592.033			
4	359210166	359210166 - N	3592.046	3592.033			
5	359210167	359210167 - N	3592.046	3592.033			
6	359210168	359210168 - N	3592.046	3592.033			
7	359210169	359210169 - N	3592.028	3592.041			
8	359210170	359210170 - N	3592.028	3592.041			
9	359210171	359210171 - N	3592.028	3592.041			
10	359210172	359210172 - N	3592.028	3592.041			
11	359210173	359210173 - N	3592.028	3592.041			
12	359210174	359210174 - N	3592.028	3592.041			
13	359210175	359210175 - N	3592.028	3592.041			
14	359210176	359210176 - N	3592.054	3592.037			
15	359210177	359210177 - N	3592.054	3592.037			
16	359210178	359210178 - N	3592.054	3592.037			
17	359210179	359210179 - N	3592.054	3592.037			
18	359210180	359210180 - N	3592.054	3592.037	1.80	4.35	
19	359210181	359210181 - N	3592.054	3592.037			
20	359210182	359210182 - N	3592.054	3592.037			
21	359210183	359210183 - N	3592.040	3592.077			
22	359210184	359210184 - N	3592.040	3592.077			
23	359210185	359210185 - N	3592.040	3592.077			
24	359210186	359210186 - N	3592.040	3592.077			
25	359210187	359210187 - N	3592.040	3592.077			
26	359210188	359210188 - N	3592.040	3592.077			
27	359210189	359210189 - N	3592.040	3592.077			

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210163 - N	CHVX898541	0.9546					
359210164 - N	CHVX898541	0.9546					
359210165 - N	CHVX898541	0.9546					
359210166 - N	CHVX898541	0.9546					
359210167 - N	CHVX898541	0.9546					
359210168 - N	CHVX898541	0.9546					
359210169 - N	CHVX898541	0.9546					
359210170 - N	CHVX898541	0.9546					
359210171 - N	CHVX898541	0.9546					
359210172 - N	CHVX898541	0.9546					
359210173 - N	CHVX898541	0.9546					
359210174 - N	CHVX898541	0.9546					
359210175 - N	CHVX898541	0.9546					
359210176 - N	CHVX898541	0.9546					
359210177 - N	CHVX898541	0.9546					
359210178 - N	CHVX898541	0.9546					
359210179 - N	CHVX898541	0.9546					
359210180 - N	NAHX610274	0.9539	0.470	366	2.37	136	
359210181 - N	NAHX610274	0.9539					
359210182 - N	NAHX610274	0.9539					
359210183 - N	NAHX610274	0.9539					
359210184 - N	NAHX610274	0.9539					
359210185 - N	NAHX610274	0.9539					
359210186 - N	NAHX610274	0.9539					
359210187 - N	NAHX610274	0.9539					
359210188 - N	NAHX610274	0.9539					
359210189 - N	NAHX610274	0.9539					

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210190	359210190 - N	3592.074	3592.039			
2	359210191	359210191 - N	3592.074	3592.039			
3	359210192	359210192 - N	3592.074	3592.039			
4	359210193	359210193 - N	3592.074	3592.039			
5	359210194	359210194 - N	3592.074	3592.039			
6	359210195	359210195 - N	3592.074	3592.039			
7	359210196	359210196 - N	3592.074	3592.039			
8	359210197	359210197 - N	3592.058	3592.081			
9	359210198	359210198 - N	3592.058	3592.081			
10	359210199	359210199 - N	3592.058	3592.081			
11	359210200	359210200 - N	3592.058	3592.081	1.39	4.17	
12	359210201	359210201 - N	3592.058	3592.081			
13	359210202	359210202 - N	3592.058	3592.081			
14	359210203	359210203 - N	3592.058	3592.081			
15	359210204	359210204 - N	3592.078	3592.063			
16	359210205	359210205 - N	3592.078	3592.063			
17	359210206	359210206 - N	3592.078	3592.063			
18	359210207	359210207 - N	3592.078	3592.063			
19	359210208	359210208 - N	3592.078	3592.063			
20	359210209	359210209 - N	3592.078	3592.063			
21	359210210	359210210 - N	3592.078	3592.063			
22	359210211	359210211 - N	3592.060	3592.075			
23	359210212	359210212 - N	3592.060	3592.075			
24	359210213	359210213 - N	3592.060	3592.075			
25	359210214	359210214 - N	3592.060	3592.075			
26	359210215	359210215 - N	3592.060	3592.075			
27	359210216	359210216 - N	3592.060	3592.075			

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210190 - N	NAHX610274	0.9539					
359210191 - N	NAHX610274	0.9539					
359210192 - N	NAHX610274	0.9539					
359210193 - N	NAHX610274	0.9539					
359210194 - N	NAHX610274	0.9539					
359210195 - N	NAHX610274	0.9539					
359210196 - N	NAHX610274	0.9539					
359210197 - N	NAHX610274	0.9539					
359210198 - N	NAHX610274	0.9539					
359210199 - N	NAHX610274	0.9539					
359210200 - N	NAHX610274	0.9548	0.443	363	2.60	129	
359210201 - N	NAHX610274	0.9548					
359210202 - N	NAHX610274	0.9548					
359210203 - N	NAHX610274	0.9548					
359210204 - N	NAHX610274	0.9548					
359210205 - N	NAHX610274	0.9548					
359210206 - N	NAHX610274	0.9548					
359210207 - N	NAHX610274	0.9548					
359210208 - N	NAHX610274	0.9548					
359210209 - N	NAHX610274	0.9548					
359210210 - N	NAHX610274	0.9548					
359210211 - N	NAHX610274	0.9548					
359210212 - N	NAHX610274	0.9548					
359210213 - N	NAHX610274	0.9548					
359210214 - N	NAHX610274	0.9548					
359210215 - N	NAHX610274	0.9548					
359210216 - N	NAHX610274	0.9548					

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210217	359210217 - N	3592.060	3592.075			
2	359210218	359210218 - N	3592.072	3592.065			
3	359210219	359210219 - N	3592.072	3592.065			
4	359210220	359210220 - N	3592.072	3592.065	1.77	4.32	
5	359210221	359210221 - N	3592.072	3592.065			
6	359210222	359210222 - N	3592.072	3592.065			
7	359210223	359210223 - N	3592.072	3592.065			
8	359210224	359210224 - N	3592.072	3592.065			
9	359210225	359210225 - N	3592.064	3592.071			
10	359210226	359210226 - N	3592.064	3592.071			
11	359210227	359210227 - N	3592.064	3592.071			
12	359210228	359210228 - N	3592.064	3592.071			
13	359210229	359210229 - N	3592.064	3592.071			
14	359210230	359210230 - N	3592.064	3592.071			
15	359210231	359210231 - N	3592.064	3592.071			
16	359210232	359210232 - N	3592.080	3592.057			
17	359210233	359210233 - N	3592.080	3592.057			
18	359210234	359210234 - N	3592.080	3592.057			
19	359210235	359210235 - N	3592.080	3592.057			
20	359210236	359210236 - N	3592.080	3592.057			
21	359210237	359210237 - N	3592.080	3592.057			
22	359210238	359210238 - N	3592.080	3592.057			
23	359210239	359210239 - N	3592.062	3592.079			
24	359210240	359210240 - N	3592.062	3592.079	1.42	4.20	
25	359210241	359210241 - N	3592.062	3592.079			
26	359210242	359210242 - N	3592.062	3592.079			
27	359210243	359210243 - N	3592.062	3592.079			

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210217 - N	NAHX610274	0.9548					
359210218 - N	NAHX610274	0.9548					
359210219 - N	NAHX610274	0.9548					
359210220 - N	NAHX610274	0.9541	0.474	369	2.40	134	
359210221 - N	NAHX610274	0.9541					
359210222 - N	NAHX610274	0.9541					
359210223 - N	NAHX610274	0.9541					
359210224 - N	NAHX610274	0.9541					
359210225 - N	NAHX610274	0.9541					
359210226 - N	NAHX610274	0.9541					
359210227 - N	NAHX610274	0.9541					
359210228 - N	NAHX610274	0.9541					
359210229 - N	NAHX610274	0.9541					
359210230 - N	NAHX610274	0.9541					
359210231 - N	NAHX610274	0.9541					
359210232 - N	NAHX610274	0.9541					
359210233 - N	NAHX610274	0.9541					
359210234 - N	NAHX610274	0.9541					
359210235 - N	NAHX610274	0.9541					
359210236 - N	NAHX610274	0.9541					
359210237 - N	NAHX610274	0.9541					
359210238 - N	NAHX610274	0.9541					
359210239 - N	NAHX610274	0.9541					
359210240 - N	NAHX610274	0.9550	0.441	365	2.57	131	
359210241 - N	NAHX610274	0.9550					
359210242 - N	NAHX610274	0.9550					
359210243 - N	NAHX610274	0.9550					

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210244	359210244 - N	3592.062	3592.079			
2	359210245	359210245 - N	3592.062	3592.079			
3	359210246	359210246 - N	3592.076	3592.059			
4	359210247	359210247 - N	3592.076	3592.059			
5	359210248	359210248 - N	3592.076	3592.059			
6	359210249	359210249 - N	3592.076	3592.059			
7	359210250	359210250 - N	3592.076	3592.059			
8	359210251	359210251 - N	3592.076	3592.059			
9	359210252	359210252 - N	3592.076	3592.059			
10	359210253	359210253 - N	3592.068	3592.073			
11	359210254	359210254 - N	3592.068	3592.073			
12	359210255	359210255 - N	3592.068	3592.073			
13	359210256	359210256 - N	3592.068	3592.073			
14	359210257	359210257 - N	3592.068	3592.073			
15	359210258	359210258 - N	3592.068	3592.073			
16	359210259	359210259 - N	3592.068	3592.073			
17	359210260	359210260 - N	3592.070	3592.067	1.74	4.30	
18	359210261	359210261 - N	3592.070	3592.067			
19	359210262	359210262 - N	3592.070	3592.067			
20	359210263	359210263 - N	3592.070	3592.067			
21	359210264	359210264 - N	3592.070	3592.067			
22	359210265	359210265 - N	3592.070	3592.067			
23	359210266	359210266 - N	3592.070	3592.067			
24	359210267	359210267 - N	3592.061	3592.069			
25	359210268	359210268 - N	3592.061	3592.069			
26	359210269	359210269 - N	3592.061	3592.069			
27	359210270	359210270 - N	3592.061	3592.069			

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210244 - N	NAHX610274	0.9550					
359210245 - N	NAHX610274	0.9550					
359210246 - N	NAHX610274	0.9550					
359210247 - N	NAHX610274	0.9550					
359210248 - N	NAHX610274	0.9550					
359210249 - N	NAHX610274	0.9550					
359210250 - N	NAHX610274	0.9550					
359210251 - N	NAHX610274	0.9550					
359210252 - N	NAHX610274	0.9550					
359210253 - N	NAHX610274	0.9550					
359210254 - N	NAHX610274	0.9550					
359210255 - N	NAHX610274	0.9550					
359210256 - N	NAHX610274	0.9550					
359210257 - N	NAHX610274	0.9550					
359210258 - N	NAHX610274	0.9550					
359210259 - N	NAHX610274	0.9550					
359210260 - N	NAHX610274	0.9544	0.478	367	2.42	137	
359210261 - N	NAHX610274	0.9544					
359210262 - N	NAHX610274	0.9544					
359210263 - N	NAHX610274	0.9544					
359210264 - N	NAHX610274	0.9544					
359210265 - N	NAHX610274	0.9544					
359210266 - N	NAHX610274	0.9544					
359210267 - N	NAHX610274	0.9544					
359210268 - N	NAHX610274	0.9544					
359210269 - N	NAHX610274	0.9544					
359210270 - N	NAHX610274	0.9544					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210271	359210271 - N	3592.061	3592.069			
2	359210272	359210272 - N	3592.061	3592.069			
3	359210273	359210273 - N	3592.061	3592.069			
4	359210274	359210274 - N	3592.106	3592.055			
5	359210275	359210275 - N	3592.106	3592.055			
6	359210276	359210276 - N	3592.106	3592.055			
7	359210277	359210277 - N	3592.106	3592.055			
8	359210278	359210278 - N	3592.106	3592.055			
9	359210279	359210279 - N	3592.106	3592.055			
10	359210280	359210280 - N	3592.106	3592.055	1.21	4.01	
11	359210281	359210281 - N	3592.056	3592.101			
12	359210282	359210282 - N	3592.056	3592.101			
13	359210283	359210283 - N	3592.056	3592.101			
14	359210284	359210284 - N	3592.056	3592.101			
15	359210285	359210285 - N	3592.056	3592.101			
16	359210286	359210286 - N	3592.056	3592.101			
17	359210287	359210287 - N	3592.056	3592.101			
18	359210288	359210288 - N	3592.102	3592.085			
19	359210289	359210289 - N	3592.102	3592.085			
20	359210290	359210290 - N	3592.102	3592.085			
21	359210291	359210291 - N	3592.102	3592.085			
22	359210292	359210292 - N	3592.102	3592.085			
23	359210293	359210293 - N	3592.102	3592.085			
24	359210294	359210294 - N	3592.102	3592.085			
25	359210295	359210295 - N	3592.066	3592.107			
26	359210296	359210296 - N	3592.066	3592.107			
27	359210297	359210297 - N	3592.066	3592.107			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210271 - N	NAHX610274	0.9544					
359210272 - N	NAHX610274	0.9544					
359210273 - N	NAHX610274	0.9544					
359210274 - N	NAHX610274	0.9544					
359210275 - N	NAHX610274	0.9544					
359210276 - N	NAHX610274	0.9544					
359210277 - N	NAHX610274	0.9544					
359210278 - N	NAHX610274	0.9544					
359210279 - N	NAHX610274	0.9544					
359210280 - N	NAHX610274	0.9547	0.445	362	2.55	126	
359210281 - N	NAHX610274	0.9547					
359210282 - N	NAHX610274	0.9547					
359210283 - N	NAHX610274	0.9547					
359210284 - N	NAHX610274	0.9547					
359210285 - N	NAHX610274	0.9547					
359210286 - N	NAHX610274	0.9547					
359210287 - N	NAHX610274	0.9547					
359210288 - N	NAHX610274	0.9547					
359210289 - N	NAHX610274	0.9547					
359210290 - N	NAHX610274	0.9547					
359210291 - N	NAHX610274	0.9547					
359210292 - N	NAHX610274	0.9547					
359210293 - N	NAHX610274	0.9547					
359210294 - N	NAHX610274	0.9547					
359210295 - N	NAHX610274	0.9547					
359210296 - N	NAHX610274	0.9547					
359210297 - N	NAHX610274	0.9547					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210298	359210298 - N	3592.066	3592.107			
2	359210299	359210299 - N	3592.066	3592.107			
3	359210300	359210300 - N	3592.066	3592.107	1.72	4.39	
4	359210301	359210301 - N	3592.066	3592.107			
5	359210302	359210302 - N	3592.108	3592.091			
6	359210303	359210303 - N	3592.108	3592.091			
7	359210304	359210304 - N	3592.108	3592.091			
8	359210305	359210305 - N	3592.108	3592.091			
9	359210306	359210306 - N	3592.108	3592.091			
10	359210307	359210307 - N	3592.108	3592.091			
11	359210308	359210308 - N	3592.108	3592.091			
12	359210309	359210309 - N	3592.088	3592.103			
13	359210310	359210310 - N	3592.088	3592.103			
14	359210311	359210311 - N	3592.088	3592.103			
15	359210312	359210312 - N	3592.088	3592.103			
16	359210313	359210313 - N	3592.088	3592.103			
17	359210314	359210314 - N	3592.088	3592.103			
18	359210315	359210315 - N	3592.088	3592.103			
19	359210316	359210316 - N	3592.100	3592.089			
20	359210317	359210317 - N	3592.100	3592.089			
21	359210318	359210318 - N	3592.100	3592.089			
22	359210319	359210319 - N	3592.100	3592.089			
23	359210320	359210320 - N	3592.100	3592.089	1.24	4.03	
24	359210321	359210321 - N	3592.100	3592.089			
25	359210322	359210322 - N	3592.100	3592.089			
26	359210323	359210323 - N	3592.092	3592.105			
27	359210324	359210324 - N	3592.092	3592.105			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210298 - N	NAHX610274	0.9547					
359210299 - N	NAHX610274	0.9547					
359210300 - N	NAHX610274	0.9542	0.476	370	2.45	133	
359210301 - N	NAHX610274	0.9542					
359210302 - N	NAHX610274	0.9542					
359210303 - N	NAHX610274	0.9542					
359210304 - N	NAHX610274	0.9542					
359210305 - N	NAHX610274	0.9542					
359210306 - N	NAHX610274	0.9542					
359210307 - N	NAHX610274	0.9542					
359210308 - N	NAHX610274	0.9542					
359210309 - N	NAHX610274	0.9542					
359210310 - N	NAHX610274	0.9542					
359210311 - N	NAHX610274	0.9542					
359210312 - N	NAHX610274	0.9542					
359210313 - N	NAHX610274	0.9542					
359210314 - N	NAHX610274	0.9542					
359210315 - N	NAHX610274	0.9542					
359210316 - N	NAHX610274	0.9542					
359210317 - N	NAHX610274	0.9542					
359210318 - N	NAHX610274	0.9542					
359210319 - N	NAHX610274	0.9542					
359210320 - N	NAHX610274	0.9549	0.449	364	2.77	128	
359210321 - N	NAHX610274	0.9549					
359210322 - N	NAHX610274	0.9549					
359210323 - N	NAHX610274	0.9549					
359210324 - N	NAHX610274	0.9549					

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Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210325	359210325 - N	3592.092	3592.105			
2	359210326	359210326 - N	3592.092	3592.105			
3	359210327	359210327 - N	3592.092	3592.105			
4	359210328	359210328 - N	3592.092	3592.105			
5	359210329	359210329 - N	3592.092	3592.105			
6	359210330	359210330 - N	3592.098	3592.095			
7	359210331	359210331 - N	3592.098	3592.095			
8	359210332	359210332 - N	3592.098	3592.095			
9	359210333	359210333 - N	3592.098	3592.095			
10	359210334	359210334 - N	3592.098	3592.095			
11	359210335	359210335 - N	3592.098	3592.095			
12	359210336	359210336 - N	3592.098	3592.095			
13	359210337	359210337 - N	3592.086	3592.099			
14	359210338	359210338 - N	3592.086	3592.099			
15	359210339	359210339 - N	3592.086	3592.099			
16	359210340	359210340 - N	3592.086	3592.099	1.91	4.36	
17	359210341	359210341 - N	3592.086	3592.099			
18	359210342	359210342 - N	3592.086	3592.099			
19	359210343	359210343 - N	3592.086	3592.099			
20	359210344	359210344 - N	3592.104	3592.083			
21	359210345	359210345 - N	3592.104	3592.083			
22	359210346	359210346 - N	3592.104	3592.083			
23	359210347	359210347 - N	3592.104	3592.083			
24	359210348	359210348 - N	3592.104	3592.083			
25	359210349	359210349 - N	3592.104	3592.083			
26	359210350	359210350 - N	3592.104	3592.083			
27	359210351	359210351 - N	3592.090	3592.097			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210325 - N	NAHX610274	0.9549					
359210326 - N	NAHX610274	0.9549					
359210327 - N	NAHX610274	0.9549					
359210328 - N	NAHX610274	0.9549					
359210329 - N	NAHX610274	0.9549					
359210330 - N	NAHX610274	0.9549					
359210331 - N	NAHX610274	0.9549					
359210332 - N	NAHX610274	0.9549					
359210333 - N	NAHX610274	0.9549					
359210334 - N	NAHX610274	0.9549					
359210335 - N	NAHX610274	0.9549					
359210336 - N	NAHX610274	0.9549					
359210337 - N	NAHX610274	0.9549					
359210338 - N	NAHX610274	0.9549					
359210339 - N	NAHX610274	0.9549					
359210340 - N	NAHX610274	0.9545	0.472	368	2.48	135	
359210341 - N	NAHX610274	0.9545					
359210342 - N	NAHX610274	0.9545					
359210343 - N	NAHX610274	0.9545					
359210344 - N	NAHX610274	0.9545					
359210345 - N	NAHX610274	0.9545					
359210346 - N	NAHX610274	0.9545					
359210347 - N	NAHX610274	0.9545					
359210348 - N	NAHX610274	0.9545					
359210349 - N	NAHX610274	0.9545					
359210350 - N	NAHX610274	0.9545					
359210351 - N	NAHX610274	0.9545					

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210352	359210352 - N	3592.090	3592.097			
2	359210353	359210353 - N	3592.090	3592.097			
3	359210354	359210354 - N	3592.090	3592.097			
4	359210355	359210355 - N	3592.090	3592.097			
5	359210356	359210356 - N	3592.090	3592.097			
6	359210357	359210357 - N	3592.090	3592.097			
7	359210358	359210358 - N	3592.096	3592.093			
8	359210359	359210359 - N	3592.096	3592.093			
9	359210360	359210360 - N	3592.096	3592.093	1.27	4.06	
10	359210361	359210361 - N	3592.096	3592.093			
11	359210362	359210362 - N	3592.096	3592.093			
12	359210363	359210363 - N	3592.096	3592.093			
13	359210364	359210364 - N	3592.096	3592.093			
14	359210365	359210365 - N	3592.082	3592.135			
15	359210366	359210366 - N	3592.082	3592.135			
16	359210367	359210367 - N	3592.082	3592.135			
17	359210368	359210368 - N	3592.082	3592.135			
18	359210369	359210369 - N	3592.082	3592.135			
19	359210370	359210370 - N	3592.082	3592.135			
20	359210371	359210371 - N	3592.082	3592.135			
21	359210372	359210372 - N	3592.094	3592.087			
22	359210373	359210373 - N	3592.094	3592.087			
23	359210374	359210374 - N	3592.094	3592.087			
24	359210375	359210375 - N	3592.094	3592.087			
25	359210376	359210376 - N	3592.094	3592.087			
26	359210377	359210377 - N	3592.094	3592.087			
27	359210378	359210378 - N	3592.094	3592.087			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210352 - N	NAHX610274	0.9545					
359210353 - N	NAHX610274	0.9545					
359210354 - N	NAHX610274	0.9545					
359210355 - N	NAHX610274	0.9545					
359210356 - N	NAHX610274	0.9545					
359210357 - N	NAHX610274	0.9545					
359210358 - N	NAHX610274	0.9545					
359210359 - N	NAHX610274	0.9545					
359210360 - N	EQUX632233	0.9558	0.451	359	2.74	130	
359210361 - N	EQUX632233	0.9558					
359210362 - N	EQUX632233	0.9558					
359210363 - N	EQUX632233	0.9558					
359210364 - N	EQUX632233	0.9558					
359210365 - N	EQUX632233	0.9558					
359210366 - N	EQUX632233	0.9558					
359210367 - N	EQUX632233	0.9558					
359210368 - N	EQUX632233	0.9558					
359210369 - N	EQUX632233	0.9558					
359210370 - N	EQUX632233	0.9558					
359210371 - N	EQUX632233	0.9558					
359210372 - N	EQUX632233	0.9558					
359210373 - N	EQUX632233	0.9558					
359210374 - N	EQUX632233	0.9558					
359210375 - N	EQUX632233	0.9558					
359210376 - N	EQUX632233	0.9558					
359210377 - N	EQUX632233	0.9558					
359210378 - N	EQUX632233	0.9558					

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210379	359210379 - N	3592.084	3592.127			
2	359210380	359210380 - N	3592.084	3592.127	1.88	4.31	
3	359210381	359210381 - N	3592.084	3592.127			
4	359210382	359210382 - N	3592.084	3592.127			
5	359210383	359210383 - N	3592.084	3592.127			
6	359210384	359210384 - N	3592.084	3592.127			
7	359210385	359210385 - N	3592.084	3592.127			
8	359210386	359210386 - N	3592.132	3592.119			
9	359210387	359210387 - N	3592.132	3592.119			
10	359210388	359210388 - N	3592.132	3592.119			
11	359210389	359210389 - N	3592.132	3592.119			
12	359210390	359210390 - N	3592.132	3592.119			
13	359210391	359210391 - N	3592.132	3592.119			
14	359210392	359210392 - N	3592.132	3592.119			
15	359210393	359210393 - N	3592.114	3592.133			
16	359210394	359210394 - N	3592.114	3592.133			
17	359210395	359210395 - N	3592.114	3592.133			
18	359210396	359210396 - N	3592.114	3592.133			
19	359210397	359210397 - N	3592.114	3592.133			
20	359210398	359210398 - N	3592.114	3592.133			
21	359210399	359210399 - N	3592.114	3592.133			
22	359210400	359210400 - N	3592.128	3592.111	1.30	4.00	
23	359210401	359210401 - N	3592.128	3592.111			
24	359210402	359210402 - N	3592.128	3592.111			
25	359210403	359210403 - N	3592.128	3592.111			
26	359210404	359210404 - N	3592.128	3592.111			
27	359210405	359210405 - N	3592.128	3592.111			

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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210379 - N	EQUX632233	0.9558					
359210380 - N	EQUX632233	0.9547	0.469	366	2.51	138	
359210381 - N	EQUX632233	0.9547					
359210382 - N	EQUX632233	0.9547					
359210383 - N	EQUX632233	0.9547					
359210384 - N	EQUX632233	0.9547					
359210385 - N	EQUX632233	0.9547					
359210386 - N	EQUX632233	0.9547					
359210387 - N	EQUX632233	0.9547					
359210388 - N	EQUX632233	0.9547					
359210389 - N	EQUX632233	0.9547					
359210390 - N	EQUX632233	0.9547					
359210391 - N	EQUX632233	0.9547					
359210392 - N	EQUX632233	0.9547					
359210393 - N	EQUX632233	0.9547					
359210394 - N	EQUX632233	0.9547					
359210395 - N	EQUX632233	0.9547					
359210396 - N	EQUX632233	0.9547					
359210397 - N	EQUX632233	0.9547					
359210398 - N	EQUX632233	0.9547					
359210399 - N	EQUX632233	0.9547					
359210400 - N	EQUX632233	0.9556	0.454	361	2.71	125	
359210401 - N	EQUX632233	0.9556					
359210402 - N	EQUX632233	0.9556					
359210403 - N	EQUX632233	0.9556					
359210404 - N	EQUX632233	0.9556					
359210405 - N	EQUX632233	0.9556					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210406	359210406 - N	3592.128	3592.111			
2	359210407	359210407 - N	3592.116	3592.125			
3	359210408	359210408 - N	3592.116	3592.125			
4	359210409	359210409 - N	3592.116	3592.125			
5	359210410	359210410 - N	3592.116	3592.125			
6	359210411	359210411 - N	3592.116	3592.125			
7	359210412	359210412 - N	3592.116	3592.125			
8	359210413	359210413 - N	3592.116	3592.125			
9	359210414	359210414 - N	3592.130	3592.117			
10	359210415	359210415 - N	3592.130	3592.117			
11	359210416	359210416 - N	3592.130	3592.117			
12	359210417	359210417 - N	3592.130	3592.117			
13	359210418	359210418 - N	3592.130	3592.117			
14	359210419	359210419 - N	3592.130	3592.117			
15	359210420	359210420 - N	3592.130	3592.117	1.85	4.44	
16	359210421	359210421 - N	3592.112	3592.131			
17	359210422	359210422 - N	3592.112	3592.131			
18	359210423	359210423 - N	3592.112	3592.131			
19	359210424	359210424 - N	3592.112	3592.131			
20	359210425	359210425 - N	3592.112	3592.131			
21	359210426	359210426 - N	3592.112	3592.131			
22	359210427	359210427 - N	3592.112	3592.131			
23	359210428	359210428 - N	3592.134	3592.115			
24	359210429	359210429 - N	3592.134	3592.115			
25	359210430	359210430 - N	3592.134	3592.115			
26	359210431	359210431 - N	3592.134	3592.115			
27	359210432	359210432 - N	3592.134	3592.115			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210406 - N	EQUX632233	0.9556					
359210407 - N	EQUX632233	0.9556					
359210408 - N	EQUX632233	0.9556					
359210409 - N	EQUX632233	0.9556					
359210410 - N	EQUX632233	0.9556					
359210411 - N	EQUX632233	0.9556					
359210412 - N	EQUX632233	0.9556					
359210413 - N	EQUX632233	0.9556					
359210414 - N	EQUX632233	0.9556					
359210415 - N	EQUX632233	0.9556					
359210416 - N	EQUX632233	0.9556					
359210417 - N	EQUX632233	0.9556					
359210418 - N	EQUX632233	0.9556					
359210419 - N	EQUX632233	0.9556					
359210420 - N	EQUX632233	0.9549	0.466	369	2.21	132	
359210421 - N	EQUX632233	0.9549					
359210422 - N	EQUX632233	0.9549					
359210423 - N	EQUX632233	0.9549					
359210424 - N	EQUX632233	0.9549					
359210425 - N	EQUX632233	0.9549					
359210426 - N	EQUX632233	0.9549					
359210427 - N	EQUX632233	0.9549					
359210428 - N	EQUX632233	0.9549					
359210429 - N	EQUX632233	0.9549					
359210430 - N	EQUX632233	0.9549					
359210431 - N	EQUX632233	0.9549					
359210432 - N	EQUX632233	0.9549					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210433	359210433 - N	3592.134	3592.115			
2	359210434	359210434 - N	3592.134	3592.115			
3	359210435	359210435 - N	3592.120	3592.129			
4	359210436	359210436 - N	3592.120	3592.129			
5	359210437	359210437 - N	3592.120	3592.129			
6	359210438	359210438 - N	3592.120	3592.129			
7	359210439	359210439 - N	3592.120	3592.129			
8	359210440	359210440 - N	3592.120	3592.129	1.34	4.15	
9	359210441	359210441 - N	3592.120	3592.129			
10	359210442	359210442 - N	3592.124	3592.113			
11	359210443	359210443 - N	3592.124	3592.113			
12	359210444	359210444 - N	3592.124	3592.113			
13	359210445	359210445 - N	3592.124	3592.113			
14	359210446	359210446 - N	3592.124	3592.113			
15	359210447	359210447 - N	3592.124	3592.113			
16	359210448	359210448 - N	3592.124	3592.113			
17	359210449	359210449 - N	3592.110	3592.123			
18	359210450	359210450 - N	3592.110	3592.123			
19	359210451	359210451 - N	3592.110	3592.123			
20	359210452	359210452 - N	3592.110	3592.123			
21	359210453	359210453 - N	3592.110	3592.123			
22	359210454	359210454 - N	3592.110	3592.123			
23	359210455	359210455 - N	3592.110	3592.123			
24	359210456	359210456 - N	3592.126	3592.109			
25	359210457	359210457 - N	3592.126	3592.109			
26	359210458	359210458 - N	3592.126	3592.109			
27	359210459	359210459 - N	3592.126	3592.109			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210433 - N	EQUX632233	0.9549					
359210434 - N	EQUX632233	0.9549					
359210435 - N	EQUX632233	0.9549					
359210436 - N	EQUX632233	0.9549					
359210437 - N	EQUX632233	0.9549					
359210438 - N	EQUX632233	0.9549					
359210439 - N	EQUX632233	0.9549					
359210440 - N	EQUX632233	0.9559	0.452	363	2.68	127	
359210441 - N	EQUX632233	0.9559					
359210442 - N	EQUX632233	0.9559					
359210443 - N	EQUX632233	0.9559					
359210444 - N	EQUX632233	0.9559					
359210445 - N	EQUX632233	0.9559					
359210446 - N	EQUX632233	0.9559					
359210447 - N	EQUX632233	0.9559					
359210448 - N	EQUX632233	0.9559					
359210449 - N	EQUX632233	0.9559					
359210450 - N	EQUX632233	0.9559					
359210451 - N	EQUX632233	0.9559					
359210452 - N	EQUX632233	0.9559					
359210453 - N	EQUX632233	0.9559					
359210454 - N	EQUX632233	0.9559					
359210455 - N	EQUX632233	0.9559					
359210456 - N	EQUX632233	0.9559					
359210457 - N	EQUX632233	0.9559					
359210458 - N	EQUX632233	0.9559					
359210459 - N	EQUX632233	0.9559					

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210460	359210460 - N	3592.126	3592.109	1.83	4.42	
2	359210461	359210461 - N	3592.126	3592.109			
3	359210462	359210462 - N	3592.126	3592.109			
4	359210463	359210463 - N	3592.118	3592.161			
5	359210464	359210464 - N	3592.118	3592.161			
6	359210465	359210465 - N	3592.118	3592.161			
7	359210466	359210466 - N	3592.118	3592.161			
8	359210467	359210467 - N	3592.118	3592.161			
9	359210468	359210468 - N	3592.118	3592.161			
10	359210469	359210469 - N	3592.118	3592.161			
11	359210470	359210470 - N	3592.158	3592.121			
12	359210471	359210471 - N	3592.158	3592.121			
13	359210472	359210472 - N	3592.158	3592.121			
14	359210473	359210473 - N	3592.158	3592.121			
15	359210474	359210474 - N	3592.158	3592.121			
16	359210475	359210475 - N	3592.158	3592.121			
17	359210476	359210476 - N	3592.158	3592.121			
18	359210477	359210477 - N	3592.122	3592.153			
19	359210478	359210478 - N	3592.122	3592.153			
20	359210479	359210479 - N	3592.122	3592.153			
21	359210480	359210480 - N	3592.122	3592.153	1.37	4.19	
22	359210481	359210481 - N	3592.122	3592.153			
23	359210482	359210482 - N	3592.122	3592.153			
24	359210483	359210483 - N	3592.122	3592.153			
25	359210484	359210484 - N	3592.154	3592.141			
26	359210485	359210485 - N	3592.154	3592.141			
27	359210486	359210486 - N	3592.154	3592.141			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210460 - N	EQUX632233	0.9551	0.468	365	2.31	134	
359210461 - N	EQUX632233	0.9551					
359210462 - N	EQUX632233	0.9551					
359210463 - N	EQUX632233	0.9551					
359210464 - N	EQUX632233	0.9551					
359210465 - N	EQUX632233	0.9551					
359210466 - N	EQUX632233	0.9551					
359210467 - N	EQUX632233	0.9551					
359210468 - N	EQUX632233	0.9551					
359210469 - N	EQUX632233	0.9551					
359210470 - N	EQUX632233	0.9551					
359210471 - N	EQUX632233	0.9551					
359210472 - N	EQUX632233	0.9551					
359210473 - N	EQUX632233	0.9551					
359210474 - N	EQUX632233	0.9551					
359210475 - N	EQUX632233	0.9551					
359210476 - N	EQUX632233	0.9551					
359210477 - N	EQUX632233	0.9551					
359210478 - N	EQUX632233	0.9551					
359210479 - N	EQUX632233	0.9551					
359210480 - N	EQUX632233	0.9557	0.455	360	2.64	131	
359210481 - N	EQUX632233	0.9557					
359210482 - N	EQUX632233	0.9557					
359210483 - N	EQUX632233	0.9557					
359210484 - N	EQUX632233	0.9557					
359210485 - N	EQUX632233	0.9557					
359210486 - N	EQUX632233	0.9557					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210487	359210487 - N	3592.154	3592.141			
2	359210488	359210488 - N	3592.154	3592.141			
3	359210489	359210489 - N	3592.154	3592.141			
4	359210490	359210490 - N	3592.154	3592.141			
5	359210491	359210491 - N	3592.144	3592.157			
6	359210492	359210492 - N	3592.144	3592.157			
7	359210493	359210493 - N	3592.144	3592.157			
8	359210494	359210494 - N	3592.144	3592.157			
9	359210495	359210495 - N	3592.144	3592.157			
10	359210496	359210496 - N	3592.144	3592.157			
11	359210497	359210497 - N	3592.144	3592.157			
12	359210498	359210498 - N	3592.156	3592.139			
13	359210499	359210499 - N	3592.156	3592.139			
14	359210500	359210500 - N	3592.156	3592.139	1.79	4.46	
15	359210501	359210501 - N	3592.156	3592.139			
16	359210502	359210502 - N	3592.156	3592.139			
17	359210503	359210503 - N	3592.156	3592.139			
18	359210504	359210504 - N	3592.156	3592.139			
19	359210505	359210505 - N	3592.140	3592.151			
20	359210506	359210506 - N	3592.140	3592.151			
21	359210507	359210507 - N	3592.140	3592.151			
22	359210508	359210508 - N	3592.140	3592.151			
23	359210509	359210509 - N	3592.140	3592.151			
24	359210510	359210510 - N	3592.140	3592.151			
25	359210511	359210511 - N	3592.140	3592.151			
26	359210512	359210512 - N	3592.162	3592.145			
27	359210513	359210513 - N	3592.162	3592.145			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210487 - N	EQUX632233	0.9557					
359210488 - N	EQUX632233	0.9557					
359210489 - N	EQUX632233	0.9557					
359210490 - N	EQUX632233	0.9557					
359210491 - N	EQUX632233	0.9557					
359210492 - N	EQUX632233	0.9557					
359210493 - N	EQUX632233	0.9557					
359210494 - N	EQUX632233	0.9557					
359210495 - N	EQUX632233	0.9557					
359210496 - N	EQUX632233	0.9557					
359210497 - N	EQUX632233	0.9557					
359210498 - N	EQUX632233	0.9557					
359210499 - N	EQUX632233	0.9557					
359210500 - N	EQUX632233	0.9548	0.464	368	2.38	136	
359210501 - N	EQUX632233	0.9548					
359210502 - N	EQUX632233	0.9548					
359210503 - N	EQUX632233	0.9548					
359210504 - N	EQUX632233	0.9548					
359210505 - N	EQUX632233	0.9548					
359210506 - N	EQUX632233	0.9548					
359210507 - N	EQUX632233	0.9548					
359210508 - N	EQUX632233	0.9548					
359210509 - N	EQUX632233	0.9548					
359210510 - N	EQUX632233	0.9548					
359210511 - N	EQUX632233	0.9548					
359210512 - N	EQUX632233	0.9548					
359210513 - N	EQUX632233	0.9548					

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210514	359210514 - N	3592.162	3592.145			
2	359210515	359210515 - N	3592.162	3592.145			
3	359210516	359210516 - N	3592.162	3592.145			
4	359210517	359210517 - N	3592.162	3592.145			
5	359210518	359210518 - N	3592.162	3592.145			
6	359210519	359210519 - N	3592.142	3592.159			
7	359210520	359210520 - N	3592.142	3592.159	1.40	4.16	
8	359210521	359210521 - N	3592.142	3592.159			
9	359210522	359210522 - N	3592.142	3592.159			
10	359210523	359210523 - N	3592.142	3592.159			
11	359210524	359210524 - N	3592.142	3592.159			
12	359210525	359210525 - N	3592.142	3592.159			
13	359210526	359210526 - N	3592.160	3592.147			
14	359210527	359210527 - N	3592.160	3592.147			
15	359210528	359210528 - N	3592.160	3592.147			
16	359210529	359210529 - N	3592.160	3592.147			
17	359210530	359210530 - N	3592.160	3592.147			
18	359210531	359210531 - N	3592.160	3592.147			
19	359210532	359210532 - N	3592.160	3592.147			
20	359210533	359210533 - N	3592.146	3592.155			
21	359210534	359210534 - N	3592.146	3592.155			
22	359210535	359210535 - N	3592.146	3592.155			
23	359210536	359210536 - N	3592.146	3592.155			
24	359210537	359210537 - N	3592.146	3592.155			
25	359210538	359210538 - N	3592.146	3592.155			
26	359210539	359210539 - N	3592.146	3592.155			
27	359210540	359210540 - N	3592.152	3592.137	1.76	4.29	

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210514 - N	EQUX632233	0.9548					
359210515 - N	EQUX632233	0.9548					
359210516 - N	EQUX632233	0.9548					
359210517 - N	EQUX632233	0.9548					
359210518 - N	EQUX632233	0.9548					
359210519 - N	EQUX632233	0.9548					
359210520 - N	GPLX1010	0.9555	0.457	362	2.58	129	
359210521 - N	GPLX1010	0.9555					
359210522 - N	GPLX1010	0.9555					
359210523 - N	GPLX1010	0.9555					
359210524 - N	GPLX1010	0.9555					
359210525 - N	GPLX1010	0.9555					
359210526 - N	GPLX1010	0.9555					
359210527 - N	GPLX1010	0.9555					
359210528 - N	GPLX1010	0.9555					
359210529 - N	GPLX1010	0.9555					
359210530 - N	GPLX1010	0.9555					
359210531 - N	GPLX1010	0.9555					
359210532 - N	GPLX1010	0.9555					
359210533 - N	GPLX1010	0.9555					
359210534 - N	GPLX1010	0.9555					
359210535 - N	GPLX1010	0.9555					
359210536 - N	GPLX1010	0.9555					
359210537 - N	GPLX1010	0.9555					
359210538 - N	GPLX1010	0.9555					
359210539 - N	GPLX1010	0.9555					
359210540 - N	GPLX1010	0.9550	0.467	366	2.41	133	

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210541	359210541 - N	3592.152	3592.137			
2	359210542	359210542 - N	3592.152	3592.137			
3	359210543	359210543 - N	3592.152	3592.137			
4	359210544	359210544 - N	3592.152	3592.137			
5	359210545	359210545 - N	3592.152	3592.137			
6	359210546	359210546 - N	3592.152	3592.137			
7	359210547	359210547 - N	3592.138	3592.149			
8	359210548	359210548 - N	3592.138	3592.149			
9	359210549	359210549 - N	3592.138	3592.149			
10	359210550	359210550 - N	3592.138	3592.149			
11	359210551	359210551 - N	3592.138	3592.149			
12	359210552	359210552 - N	3592.138	3592.149			
13	359210553	359210553 - N	3592.138	3592.149			
14	359210554	359210554 - N	3592.150	3592.143			
15	359210555	359210555 - N	3592.150	3592.143			
16	359210556	359210556 - N	3592.150	3592.143			
17	359210557	359210557 - N	3592.150	3592.143			
18	359210558	359210558 - N	3592.150	3592.143			
19	359210559	359210559 - N	3592.150	3592.143			
20	359210560	359210560 - N	3592.150	3592.143	1.43	4.18	
21	359210561	359210561 - N	3592.136	3592.187			
22	359210562	359210562 - N	3592.136	3592.187			
23	359210563	359210563 - N	3592.136	3592.187			
24	359210564	359210564 - N	3592.136	3592.187			
25	359210565	359210565 - N	3592.136	3592.187			
26	359210566	359210566 - N	3592.136	3592.187			
27	359210567	359210567 - N	3592.136	3592.187			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210541 - N	GPLX1010	0.9550					
359210542 - N	GPLX1010	0.9550					
359210543 - N	GPLX1010	0.9550					
359210544 - N	GPLX1010	0.9550					
359210545 - N	GPLX1010	0.9550					
359210546 - N	GPLX1010	0.9550					
359210547 - N	GPLX1010	0.9550					
359210548 - N	GPLX1010	0.9550					
359210549 - N	GPLX1010	0.9550					
359210550 - N	GPLX1010	0.9550					
359210551 - N	GPLX1010	0.9550					
359210552 - N	GPLX1010	0.9550					
359210553 - N	GPLX1010	0.9550					
359210554 - N	GPLX1010	0.9550					
359210555 - N	GPLX1010	0.9550					
359210556 - N	GPLX1010	0.9550					
359210557 - N	GPLX1010	0.9550					
359210558 - N	GPLX1010	0.9550					
359210559 - N	GPLX1010	0.9550					
359210560 - N	GPLX1010	0.9553	0.440	359	2.56	126	
359210561 - N	GPLX1010	0.9553					
359210562 - N	GPLX1010	0.9553					
359210563 - N	GPLX1010	0.9553					
359210564 - N	GPLX1010	0.9553					
359210565 - N	GPLX1010	0.9553					
359210566 - N	GPLX1010	0.9553					
359210567 - N	GPLX1010	0.9553					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210568	359210568 - N	3592.180	3592.172			
2	359210569	359210569 - N	3592.180	3592.172			
3	359210570	359210570 - N	3592.180	3592.172			
4	359210571	359210571 - N	3592.180	3592.172			
5	359210572	359210572 - N	3592.180	3592.172			
6	359210573	359210573 - N	3592.180	3592.172			
7	359210574	359210574 - N	3592.180	3592.172			
8	359210575	359210575 - N	3592.148	3592.189			
9	359210576	359210576 - N	3592.148	3592.189			
10	359210577	359210577 - N	3592.148	3592.189			
11	359210578	359210578 - N	3592.148	3592.189			
12	359210579	359210579 - N	3592.148	3592.189			
13	359210580	359210580 - N	3592.148	3592.189	1.73	4.26	
14	359210581	359210581 - N	3592.148	3592.189			
15	359210582	359210582 - N	3592.184	3592.166			
16	359210583	359210583 - N	3592.184	3592.166			
17	359210584	359210584 - N	3592.184	3592.166			
18	359210585	359210585 - N	3592.184	3592.166			
19	359210586	359210586 - N	3592.184	3592.166			
20	359210587	359210587 - N	3592.184	3592.166			
21	359210588	359210588 - N	3592.184	3592.166			
22	359210589	359210589 - N	3592.169	3592.181			
23	359210590	359210590 - N	3592.169	3592.181			
24	359210591	359210591 - N	3592.169	3592.181			
25	359210592	359210592 - N	3592.169	3592.181			
26	359210593	359210593 - N	3592.169	3592.181			
27	359210594	359210594 - N	3592.169	3592.181			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210568 - N	GPLX1010	0.9553					
359210569 - N	GPLX1010	0.9553					
359210570 - N	GPLX1010	0.9553					
359210571 - N	GPLX1010	0.9553					
359210572 - N	GPLX1010	0.9553					
359210573 - N	GPLX1010	0.9553					
359210574 - N	GPLX1010	0.9553					
359210575 - N	GPLX1010	0.9553					
359210576 - N	GPLX1010	0.9553					
359210577 - N	GPLX1010	0.9553					
359210578 - N	GPLX1010	0.9553					
359210579 - N	GPLX1010	0.9553					
359210580 - N	GPLX1010	0.9547	0.463	369	2.22	130	
359210581 - N	GPLX1010	0.9547					
359210582 - N	GPLX1010	0.9547					
359210583 - N	GPLX1010	0.9547					
359210584 - N	GPLX1010	0.9547					
359210585 - N	GPLX1010	0.9547					
359210586 - N	GPLX1010	0.9547					
359210587 - N	GPLX1010	0.9547					
359210588 - N	GPLX1010	0.9547					
359210589 - N	GPLX1010	0.9547					
359210590 - N	GPLX1010	0.9547					
359210591 - N	GPLX1010	0.9547					
359210592 - N	GPLX1010	0.9547					
359210593 - N	GPLX1010	0.9547					
359210594 - N	GPLX1010	0.9547					

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210595	359210595 - N	3592.169	3592.181			
2	359210596	359210596 - N	3592.186	3592.168			
3	359210597	359210597 - N	3592.186	3592.168			
4	359210598	359210598 - N	3592.186	3592.168			
5	359210599	359210599 - N	3592.186	3592.168			
6	359210600	359210600 - N	3592.186	3592.168	1.45	3.95	
7	359210601	359210601 - N	3592.186	3592.168			
8	359210602	359210602 - N	3592.186	3592.168			
9	359210603	359210603 - N	3592.175	3592.185			
10	359210604	359210604 - N	3592.175	3592.185			
11	359210605	359210605 - N	3592.175	3592.185			
12	359210606	359210606 - N	3592.175	3592.185			
13	359210607	359210607 - N	3592.175	3592.185			
14	359210608	359210608 - N	3592.175	3592.185			
15	359210609	359210609 - N	3592.175	3592.185			
16	359210610	359210610 - N	3592.182	3592.164			
17	359210611	359210611 - N	3592.182	3592.164			
18	359210612	359210612 - N	3592.182	3592.164			
19	359210613	359210613 - N	3592.182	3592.164			
20	359210614	359210614 - N	3592.182	3592.164			
21	359210615	359210615 - N	3592.182	3592.164			
22	359210616	359210616 - N	3592.182	3592.164			
23	359210617	359210617 - N	3592.171	3592.183			
24	359210618	359210618 - N	3592.171	3592.183			
25	359210619	359210619 - N	3592.171	3592.183			
26	359210620	359210620 - N	3592.171	3592.183	1.69	4.41	
27	359210621	359210621 - N	3592.171	3592.183			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210595 - N	GPLX1010	0.9547					
359210596 - N	GPLX1010	0.9547					
359210597 - N	GPLX1010	0.9547					
359210598 - N	GPLX1010	0.9547					
359210599 - N	GPLX1010	0.9547					
359210600 - N	GPLX1010	0.9556	0.446	361	2.63	128	
359210601 - N	GPLX1010	0.9556					
359210602 - N	GPLX1010	0.9556					
359210603 - N	GPLX1010	0.9556					
359210604 - N	GPLX1010	0.9556					
359210605 - N	GPLX1010	0.9556					
359210606 - N	GPLX1010	0.9556					
359210607 - N	GPLX1010	0.9556					
359210608 - N	GPLX1010	0.9556					
359210609 - N	GPLX1010	0.9556					
359210610 - N	GPLX1010	0.9556					
359210611 - N	GPLX1010	0.9556					
359210612 - N	GPLX1010	0.9556					
359210613 - N	GPLX1010	0.9556					
359210614 - N	GPLX1010	0.9556					
359210615 - N	GPLX1010	0.9556					
359210616 - N	GPLX1010	0.9556					
359210617 - N	GPLX1010	0.9556					
359210618 - N	GPLX1010	0.9556					
359210619 - N	GPLX1010	0.9556					
359210620 - N	GPLX1010	0.9552	0.465	367	2.33	134	
359210621 - N	GPLX1010	0.9552					

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Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210622	359210622 - N	3592.171	3592.183			
2	359210623	359210623 - N	3592.171	3592.183			
3	359210624	359210624 - N	3592.178	3592.174			
4	359210625	359210625 - N	3592.178	3592.174			
5	359210626	359210626 - N	3592.178	3592.174			
6	359210627	359210627 - N	3592.178	3592.174			
7	359210628	359210628 - N	3592.178	3592.174			
8	359210629	359210629 - N	3592.178	3592.174			
9	359210630	359210630 - N	3592.178	3592.174			
10	359210631	359210631 - N	3592.165	3592.177			
11	359210632	359210632 - N	3592.165	3592.177			
12	359210633	359210633 - N	3592.165	3592.177			
13	359210634	359210634 - N	3592.165	3592.177			
14	359210635	359210635 - N	3592.165	3592.177			
15	359210636	359210636 - N	3592.165	3592.177			
16	359210637	359210637 - N	3592.165	3592.177			
17	359210638	359210638 - N	3592.188	3592.170			
18	359210639	359210639 - N	3592.188	3592.170			
19	359210640	359210640 - N	3592.188	3592.170	1.48	3.91	
20	359210641	359210641 - N	3592.188	3592.170			
21	359210642	359210642 - N	3592.188	3592.170			
22	359210643	359210643 - N	3592.188	3592.170			
23	359210644	359210644 - N	3592.188	3592.170			
24	359210645	359210645 - N	3592.167	3592.179			
25	359210646	359210646 - N	3592.167	3592.179			
26	359210647	359210647 - N	3592.167	3592.179			
27	359210648	359210648 - N	3592.167	3592.179			

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210622 - N	GPLX1010	0.9552					
359210623 - N	GPLX1010	0.9552					
359210624 - N	GPLX1010	0.9552					
359210625 - N	GPLX1010	0.9552					
359210626 - N	GPLX1010	0.9552					
359210627 - N	GPLX1010	0.9552					
359210628 - N	GPLX1010	0.9552					
359210629 - N	GPLX1010	0.9552					
359210630 - N	GPLX1010	0.9552					
359210631 - N	GPLX1010	0.9552					
359210632 - N	GPLX1010	0.9552					
359210633 - N	GPLX1010	0.9552					
359210634 - N	GPLX1010	0.9552					
359210635 - N	GPLX1010	0.9552					
359210636 - N	GPLX1010	0.9552					
359210637 - N	GPLX1010	0.9552					
359210638 - N	GPLX1010	0.9552					
359210639 - N	GPLX1010	0.9552					
359210640 - N	GPLX1010	0.9558	0.458	363	2.76	125	
359210641 - N	GPLX1010	0.9558					
359210642 - N	GPLX1010	0.9558					
359210643 - N	GPLX1010	0.9558					
359210644 - N	GPLX1010	0.9558					
359210645 - N	GPLX1010	0.9558					
359210646 - N	GPLX1010	0.9558					
359210647 - N	GPLX1010	0.9558					
359210648 - N	GPLX1010	0.9558					

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210649	359210649 - N	3592.167	3592.179			
2	359210650	359210650 - N	3592.167	3592.179			
3	359210651	359210651 - N	3592.167	3592.179			
4	359210652	359210652 - N	3592.176	3592.195			
5	359210653	359210653 - N	3592.176	3592.195			
6	359210654	359210654 - N	3592.176	3592.195			
7	359210655	359210655 - N	3592.176	3592.195			
8	359210656	359210656 - N	3592.176	3592.195			
9	359210657	359210657 - N	3592.176	3592.195			
10	359210658	359210658 - N	3592.176	3592.195			
11	359210659	359210659 - N	3592.163	3592.209			
12	359210660	359210660 - N	3592.163	3592.209	1.66	4.23	
13	359210661	359210661 - N	3592.163	3592.209			
14	359210662	359210662 - N	3592.163	3592.209			
15	359210663	359210663 - N	3592.163	3592.209			
16	359210664	359210664 - N	3592.163	3592.209			
17	359210665	359210665 - N	3592.163	3592.209			
18	359210666	359210666 - N	3592.212	3592.199			
19	359210667	359210667 - N	3592.212	3592.199			
20	359210668	359210668 - N	3592.212	3592.199			
21	359210669	359210669 - N	3592.212	3592.199			
22	359210670	359210670 - N	3592.212	3592.199			
23	359210671	359210671 - N	3592.212	3592.199			
24	359210672	359210672 - N	3592.212	3592.199			
25	359210673	359210673 - N	3592.173	3592.205			
26	359210674	359210674 - N	3592.173	3592.205			
27	359210675	359210675 - N	3592.173	3592.205			

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210649 - N	GPLX1010	0.9558					
359210650 - N	GPLX1010	0.9558					
359210651 - N	GPLX1010	0.9558					
359210652 - N	GPLX1010	0.9558					
359210653 - N	GPLX1010	0.9558					
359210654 - N	GPLX1010	0.9558					
359210655 - N	GPLX1010	0.9558					
359210656 - N	GPLX1010	0.9558					
359210657 - N	GPLX1010	0.9558					
359210658 - N	GPLX1010	0.9558					
359210659 - N	GPLX1010	0.9558					
359210660 - N	GPLX1010	0.9549	0.475	370	2.23	136	
359210661 - N	GPLX1010	0.9549					
359210662 - N	GPLX1010	0.9549					
359210663 - N	GPLX1010	0.9549					
359210664 - N	GPLX1010	0.9549					
359210665 - N	GPLX1010	0.9549					
359210666 - N	GPLX1010	0.9549					
359210667 - N	GPLX1010	0.9549					
359210668 - N	GPLX1010	0.9549					
359210669 - N	GPLX1010	0.9549					
359210670 - N	GPLX1010	0.9549					
359210671 - N	GPLX1010	0.9549					
359210672 - N	GPLX1010	0.9549					
359210673 - N	GPLX1010	0.9549					
359210674 - N	GPLX1010	0.9549					
359210675 - N	GPLX1010	0.9549					

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210676	359210676 - N	3592.173	3592.205			
2	359210677	359210677 - N	3592.173	3592.205			
3	359210678	359210678 - N	3592.173	3592.205			
4	359210679	359210679 - N	3592.173	3592.205			
5	359210680	359210680 - N	3592.210	3592.197	1.51	3.88	
6	359210681	359210681 - N	3592.210	3592.197			
7	359210682	359210682 - N	3592.210	3592.197			
8	359210683	359210683 - N	3592.210	3592.197			
9	359210684	359210684 - N	3592.210	3592.197			
10	359210685	359210685 - N	3592.210	3592.197			
11	359210686	359210686 - N	3592.210	3592.197			
12	359210687	359210687 - N	3592.198	3592.213			
13	359210688	359210688 - N	3592.198	3592.213			
14	359210689	359210689 - N	3592.198	3592.213			
15	359210690	359210690 - N	3592.198	3592.213			
16	359210691	359210691 - N	3592.198	3592.213			
17	359210692	359210692 - N	3592.198	3592.213			
18	359210693	359210693 - N	3592.198	3592.213			
19	359210694	359210694 - N	3592.214	3592.201			
20	359210695	359210695 - N	3592.214	3592.201			
21	359210696	359210696 - N	3592.214	3592.201			
22	359210697	359210697 - N	3592.214	3592.201			
23	359210698	359210698 - N	3592.214	3592.201			
24	359210699	359210699 - N	3592.214	3592.201			
25	359210700	359210700 - N	3592.214	3592.201	1.92	4.34	
26	359210701	359210701 - N	3592.194	3592.215			
27	359210702	359210702 - N	3592.194	3592.215			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210676 - N	GPLX1010	0.9549					
359210677 - N	GPLX1010	0.9549					
359210678 - N	GPLX1010	0.9549					
359210679 - N	GPLX1010	0.9549					
359210680 - N	GPLX1010	0.9554	0.447	365	2.61	129	
359210681 - N	GPLX1010	0.9554					
359210682 - N	GPLX1010	0.9554					
359210683 - N	GPLX1010	0.9554					
359210684 - N	GPLX1010	0.9554					
359210685 - N	GPLX1010	0.9554					
359210686 - N	GPLX1010	0.9554					
359210687 - N	GPLX1010	0.9554					
359210688 - N	GPLX1010	0.9554					
359210689 - N	GPLX1010	0.9554					
359210690 - N	GPLX1010	0.9554					
359210691 - N	GPLX1010	0.9554					
359210692 - N	GPLX1010	0.9554					
359210693 - N	GPLX1010	0.9554					
359210694 - N	GPLX1010	0.9554					
359210695 - N	GPLX1010	0.9554					
359210696 - N	GPLX1010	0.9554					
359210697 - N	GPLX1010	0.9554					
359210698 - N	GPLX1010	0.9554					
359210699 - N	GPLX1010	0.9554					
359210700 - N	GPLX1010	0.9551	0.472	368	2.35	138	
359210701 - N	GPLX1010	0.9551					
359210702 - N	GPLX1010	0.9551					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210703	359210703 - N	3592.194	3592.215			
2	359210704	359210704 - N	3592.194	3592.215			
3	359210705	359210705 - N	3592.194	3592.215			
4	359210706	359210706 - N	3592.194	3592.215			
5	359210707	359210707 - N	3592.194	3592.215			
6	359210708	359210708 - N	3592.208	3592.191			
7	359210709	359210709 - N	3592.208	3592.191			
8	359210710	359210710 - N	3592.208	3592.191			
9	359210711	359210711 - N	3592.208	3592.191			
10	359210712	359210712 - N	3592.208	3592.191			
11	359210713	359210713 - N	3592.208	3592.191			
12	359210714	359210714 - N	3592.208	3592.191			
13	359210715	359210715 - N	3592.192	3592.207			
14	359210716	359210716 - N	3592.192	3592.207			
15	359210717	359210717 - N	3592.192	3592.207			
16	359210718	359210718 - N	3592.192	3592.207			
17	359210719	359210719 - N	3592.192	3592.207			
18	359210720	359210720 - N	3592.192	3592.207	1.54	3.96	
19	359210721	359210721 - N	3592.192	3592.207			
20	359210722	359210722 - N	3592.204	3592.193			
21	359210723	359210723 - N	3592.204	3592.193			
22	359210724	359210724 - N	3592.204	3592.193			
23	359210725	359210725 - N	3592.204	3592.193			
24	359210726	359210726 - N	3592.204	3592.193			
25	359210727	359210727 - N	3592.204	3592.193			
26	359210728	359210728 - N	3592.204	3592.193			
27	359210729	359210729 - N	3592.196	3592.211			

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210703 - N	GPLX1010	0.9551					
359210704 - N	GPLX1010	0.9551					
359210705 - N	GPLX1010	0.9551					
359210706 - N	GPLX1010	0.9551					
359210707 - N	GPLX1010	0.9551					
359210708 - N	GPLX1010	0.9551					
359210709 - N	GPLX1010	0.9551					
359210710 - N	GPLX1010	0.9551					
359210711 - N	GPLX1010	0.9551					
359210712 - N	GPLX1010	0.9551					
359210713 - N	GPLX1010	0.9551					
359210714 - N	GPLX1010	0.9551					
359210715 - N	GPLX1010	0.9551					
359210716 - N	GPLX1010	0.9551					
359210717 - N	GPLX1010	0.9551					
359210718 - N	GPLX1010	0.9551					
359210719 - N	GPLX1010	0.9551					
359210720 - N	CHVX896817	0.9568	0.456	362	2.72	131	
359210721 - N	CHVX896817	0.9568					
359210722 - N	CHVX896817	0.9568					
359210723 - N	CHVX896817	0.9568					
359210724 - N	CHVX896817	0.9568					
359210725 - N	CHVX896817	0.9568					
359210726 - N	CHVX896817	0.9568					
359210727 - N	CHVX896817	0.9568					
359210728 - N	CHVX896817	0.9568					
359210729 - N	CHVX896817	0.9568					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210730	359210730 - N	3592.196	3592.211			
2	359210731	359210731 - N	3592.196	3592.211			
3	359210732	359210732 - N	3592.196	3592.211			
4	359210733	359210733 - N	3592.196	3592.211			
5	359210734	359210734 - N	3592.196	3592.211			
6	359210735	359210735 - N	3592.196	3592.211			
7	359210736	359210736 - N	3592.206	3592.203			
8	359210737	359210737 - N	3592.206	3592.203			
9	359210738	359210738 - N	3592.206	3592.203			
10	359210739	359210739 - N	3592.206	3592.203			
11	359210740	359210740 - N	3592.206	3592.203	1.68	4.28	
12	359210741	359210741 - N	3592.206	3592.203			
13	359210742	359210742 - N	3592.206	3592.203			
14	359210743	359210743 - N	3592.200	3592.237			
15	359210744	359210744 - N	3592.200	3592.237			
16	359210745	359210745 - N	3592.200	3592.237			
17	359210746	359210746 - N	3592.200	3592.237			
18	359210747	359210747 - N	3592.200	3592.237			
19	359210748	359210748 - N	3592.200	3592.237			
20	359210749	359210749 - N	3592.200	3592.237			
21	359210750	359210750 - N	3592.216	3592.190			
22	359210751	359210751 - N	3592.216	3592.190			
23	359210752	359210752 - N	3592.216	3592.190			
24	359210753	359210753 - N	3592.216	3592.190			
25	359210754	359210754 - N	3592.216	3592.190			
26	359210755	359210755 - N	3592.216	3592.190			
27	359210756	359210756 - N	3592.216	3592.190			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210730 - N	CHVX896817	0.9568					
359210731 - N	CHVX896817	0.9568					
359210732 - N	CHVX896817	0.9568					
359210733 - N	CHVX896817	0.9568					
359210734 - N	CHVX896817	0.9568					
359210735 - N	CHVX896817	0.9568					
359210736 - N	CHVX896817	0.9568					
359210737 - N	CHVX896817	0.9568					
359210738 - N	CHVX896817	0.9568					
359210739 - N	CHVX896817	0.9568					
359210740 - N	CHVX896817	0.9561	0.477	366	2.27	135	
359210741 - N	CHVX896817	0.9561					
359210742 - N	CHVX896817	0.9561					
359210743 - N	CHVX896817	0.9561					
359210744 - N	CHVX896817	0.9561					
359210745 - N	CHVX896817	0.9561					
359210746 - N	CHVX896817	0.9561					
359210747 - N	CHVX896817	0.9561					
359210748 - N	CHVX896817	0.9561					
359210749 - N	CHVX896817	0.9561					
359210750 - N	CHVX896817	0.9561					
359210751 - N	CHVX896817	0.9561					
359210752 - N	CHVX896817	0.9561					
359210753 - N	CHVX896817	0.9561					
359210754 - N	CHVX896817	0.9561					
359210755 - N	CHVX896817	0.9561					
359210756 - N	CHVX896817	0.9561					

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210757	359210757 - N	3592.202	3592.233			
2	359210758	359210758 - N	3592.202	3592.233			
3	359210759	359210759 - N	3592.202	3592.233			
4	359210760	359210760 - N	3592.202	3592.233	1.50	3.90	
5	359210761	359210761 - N	3592.202	3592.233			
6	359210762	359210762 - N	3592.202	3592.233			
7	359210763	359210763 - N	3592.202	3592.233			
8	359210764	359210764 - N	3592.240	3592.228			
9	359210765	359210765 - N	3592.240	3592.228			
10	359210766	359210766 - N	3592.240	3592.228			
11	359210767	359210767 - N	3592.240	3592.228			
12	359210768	359210768 - N	3592.240	3592.228			
13	359210769	359210769 - N	3592.240	3592.228			
14	359210770	359210770 - N	3592.240	3592.228			
15	359210771	359210771 - N	3592.225	3592.241			
16	359210772	359210772 - N	3592.225	3592.241			
17	359210773	359210773 - N	3592.225	3592.241			
18	359210774	359210774 - N	3592.225	3592.241			
19	359210775	359210775 - N	3592.225	3592.241			
20	359210776	359210776 - N	3592.225	3592.241			
21	359210777	359210777 - N	3592.225	3592.241			
22	359210778	359210778 - N	3592.236	3592.222			
23	359210779	359210779 - N	3592.236	3592.222			
24	359210780	359210780 - N	3592.236	3592.222	1.65	4.37	
25	359210781	359210781 - N	3592.236	3592.222			
26	359210782	359210782 - N	3592.236	3592.222			
27	359210783	359210783 - N	3592.236	3592.222			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210757 - N	CHVX896817	0.9561					
359210758 - N	CHVX896817	0.9561					
359210759 - N	CHVX896817	0.9561					
359210760 - N	CHVX896817	0.9566	0.453	359	2.66	127	
359210761 - N	CHVX896817	0.9566					
359210762 - N	CHVX896817	0.9566					
359210763 - N	CHVX896817	0.9566					
359210764 - N	CHVX896817	0.9566					
359210765 - N	CHVX896817	0.9566					
359210766 - N	CHVX896817	0.9566					
359210767 - N	CHVX896817	0.9566					
359210768 - N	CHVX896817	0.9566					
359210769 - N	CHVX896817	0.9566					
359210770 - N	CHVX896817	0.9566					
359210771 - N	CHVX896817	0.9566					
359210772 - N	CHVX896817	0.9566					
359210773 - N	CHVX896817	0.9566					
359210774 - N	CHVX896817	0.9566					
359210775 - N	CHVX896817	0.9566					
359210776 - N	CHVX896817	0.9566					
359210777 - N	CHVX896817	0.9566					
359210778 - N	CHVX896817	0.9566					
359210779 - N	CHVX896817	0.9566					
359210780 - N	CHVX896817	0.9559	0.471	364	2.39	133	
359210781 - N	CHVX896817	0.9559					
359210782 - N	CHVX896817	0.9559					
359210783 - N	CHVX896817	0.9559					

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Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210784	359210784 - N	3592.236	3592.222			
2	359210785	359210785 - N	3592.227	3592.231			
3	359210786	359210786 - N	3592.227	3592.231			
4	359210787	359210787 - N	3592.227	3592.231			
5	359210788	359210788 - N	3592.227	3592.231			
6	359210789	359210789 - N	3592.227	3592.231			
7	359210790	359210790 - N	3592.227	3592.231			
8	359210791	359210791 - N	3592.227	3592.231			
9	359210792	359210792 - N	3592.242	3592.218			
10	359210793	359210793 - N	3592.242	3592.218			
11	359210794	359210794 - N	3592.242	3592.218			
12	359210795	359210795 - N	3592.242	3592.218			
13	359210796	359210796 - N	3592.242	3592.218			
14	359210797	359210797 - N	3592.242	3592.218			
15	359210798	359210798 - N	3592.242	3592.218			
16	359210799	359210799 - N	3592.221	3592.235			
17	359210800	359210800 - N	3592.221	3592.235	1.23	3.85	
18	359210801	359210801 - N	3592.221	3592.235			
19	359210802	359210802 - N	3592.221	3592.235			
20	359210803	359210803 - N	3592.221	3592.235			
21	359210804	359210804 - N	3592.221	3592.235			
22	359210805	359210805 - N	3592.221	3592.235			
23	359210806	359210806 - N	3592.238	3592.226			
24	359210807	359210807 - N	3592.238	3592.226			
25	359210808	359210808 - N	3592.238	3592.226			
26	359210809	359210809 - N	3592.238	3592.226			
27	359210810	359210810 - N	3592.238	3592.226			

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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210784 - N	CHVX896817	0.9559					
359210785 - N	CHVX896817	0.9559					
359210786 - N	CHVX896817	0.9559					
359210787 - N	CHVX896817	0.9559					
359210788 - N	CHVX896817	0.9559					
359210789 - N	CHVX896817	0.9559					
359210790 - N	CHVX896817	0.9559					
359210791 - N	CHVX896817	0.9559					
359210792 - N	CHVX896817	0.9559					
359210793 - N	CHVX896817	0.9559					
359210794 - N	CHVX896817	0.9559					
359210795 - N	CHVX896817	0.9559					
359210796 - N	CHVX896817	0.9559					
359210797 - N	CHVX896817	0.9559					
359210798 - N	CHVX896817	0.9559					
359210799 - N	CHVX896817	0.9559					
359210800 - N	CHVX896817	0.9569	0.461	361	2.75	125	
359210801 - N	CHVX896817	0.9569					
359210802 - N	CHVX896817	0.9569					
359210803 - N	CHVX896817	0.9569					
359210804 - N	CHVX896817	0.9569					
359210805 - N	CHVX896817	0.9569					
359210806 - N	CHVX896817	0.9569					
359210807 - N	CHVX896817	0.9569					
359210808 - N	CHVX896817	0.9569					
359210809 - N	CHVX896817	0.9569					
359210810 - N	CHVX896817	0.9569					

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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210811	359210811 - N	3592.238	3592.226			
2	359210812	359210812 - N	3592.238	3592.226			
3	359210813	359210813 - N	3592.229	3592.239			
4	359210814	359210814 - N	3592.229	3592.239			
5	359210815	359210815 - N	3592.229	3592.239			
6	359210816	359210816 - N	3592.229	3592.239			
7	359210817	359210817 - N	3592.229	3592.239			
8	359210818	359210818 - N	3592.229	3592.239			
9	359210819	359210819 - N	3592.229	3592.239			
10	359210820	359210820 - N	3592.234	3592.220	1.78	4.33	
11	359210821	359210821 - N	3592.234	3592.220			
12	359210822	359210822 - N	3592.234	3592.220			
13	359210823	359210823 - N	3592.234	3592.220			
14	359210824	359210824 - N	3592.234	3592.220			
15	359210825	359210825 - N	3592.234	3592.220			
16	359210826	359210826 - N	3592.234	3592.220			
17	359210827	359210827 - N	3592.219	3592.243			
18	359210828	359210828 - N	3592.219	3592.243			
19	359210829	359210829 - N	3592.219	3592.243			
20	359210830	359210830 - N	3592.219	3592.243			
21	359210831	359210831 - N	3592.219	3592.243			
22	359210832	359210832 - N	3592.219	3592.243			
23	359210833	359210833 - N	3592.219	3592.243			
24	359210834	359210834 - N	3592.232	3592.224			
25	359210835	359210835 - N	3592.232	3592.224			
26	359210836	359210836 - N	3592.232	3592.224			
27	359210837	359210837 - N	3592.232	3592.224			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210811 - N	CHVX896817	0.9569					
359210812 - N	CHVX896817	0.9569					
359210813 - N	CHVX896817	0.9569					
359210814 - N	CHVX896817	0.9569					
359210815 - N	CHVX896817	0.9569					
359210816 - N	CHVX896817	0.9569					
359210817 - N	CHVX896817	0.9569					
359210818 - N	CHVX896817	0.9569					
359210819 - N	CHVX896817	0.9569					
359210820 - N	CHVX896817	0.9562	0.468	367	2.28	136	
359210821 - N	CHVX896817	0.9562					
359210822 - N	CHVX896817	0.9562					
359210823 - N	CHVX896817	0.9562					
359210824 - N	CHVX896817	0.9562					
359210825 - N	CHVX896817	0.9562					
359210826 - N	CHVX896817	0.9562					
359210827 - N	CHVX896817	0.9562					
359210828 - N	CHVX896817	0.9562					
359210829 - N	CHVX896817	0.9562					
359210830 - N	CHVX896817	0.9562					
359210831 - N	CHVX896817	0.9562					
359210832 - N	CHVX896817	0.9562					
359210833 - N	CHVX896817	0.9562					
359210834 - N	CHVX896817	0.9562					
359210835 - N	CHVX896817	0.9562					
359210836 - N	CHVX896817	0.9562					
359210837 - N	CHVX896817	0.9562					

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210838	359210838 - N	3592.232	3592.224			
2	359210839	359210839 - N	3592.232	3592.224			
3	359210840	359210840 - N	3592.232	3592.224	1.26	3.82	
4	359210841	359210841 - N	3592.223	3592.249			
5	359210842	359210842 - N	3592.223	3592.249			
6	359210843	359210843 - N	3592.223	3592.249			
7	359210844	359210844 - N	3592.223	3592.249			
8	359210845	359210845 - N	3592.223	3592.249			
9	359210846	359210846 - N	3592.223	3592.249			
10	359210847	359210847 - N	3592.223	3592.249			
11	359210848	359210848 - N	3592.230	3592.245			
12	359210849	359210849 - N	3592.230	3592.245			
13	359210850	359210850 - N	3592.230	3592.245			
14	359210851	359210851 - N	3592.230	3592.245			
15	359210852	359210852 - N	3592.230	3592.245			
16	359210853	359210853 - N	3592.230	3592.245			
17	359210854	359210854 - N	3592.230	3592.245			
18	359210855	359210855 - N	3592.217	3592.255			
19	359210856	359210856 - N	3592.217	3592.255			
20	359210857	359210857 - N	3592.217	3592.255			
21	359210858	359210858 - N	3592.217	3592.255			
22	359210859	359210859 - N	3592.217	3592.255			
23	359210860	359210860 - N	3592.217	3592.255	1.71	4.27	
24	359210861	359210861 - N	3592.217	3592.255			
25	359210862	359210862 - N	3592.252	3592.247			
26	359210863	359210863 - N	3592.252	3592.247			
27	359210864	359210864 - N	3592.252	3592.247			

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210838 - N	CHVX896817	0.9562					
359210839 - N	CHVX896817	0.9562					
359210840 - N	CHVX896817	0.9567	0.459	363	2.59	130	
359210841 - N	CHVX896817	0.9567					
359210842 - N	CHVX896817	0.9567					
359210843 - N	CHVX896817	0.9567					
359210844 - N	CHVX896817	0.9567					
359210845 - N	CHVX896817	0.9567					
359210846 - N	CHVX896817	0.9567					
359210847 - N	CHVX896817	0.9567					
359210848 - N	CHVX896817	0.9567					
359210849 - N	CHVX896817	0.9567					
359210850 - N	CHVX896817	0.9567					
359210851 - N	CHVX896817	0.9567					
359210852 - N	CHVX896817	0.9567					
359210853 - N	CHVX896817	0.9567					
359210854 - N	CHVX896817	0.9567					
359210855 - N	CHVX896817	0.9567					
359210856 - N	CHVX896817	0.9567					
359210857 - N	CHVX896817	0.9567					
359210858 - N	CHVX896817	0.9567					
359210859 - N	CHVX896817	0.9567					
359210860 - N	CHVX896817	0.9564	0.476	370	2.34	134	
359210861 - N	CHVX896817	0.9564					
359210862 - N	CHVX896817	0.9564					
359210863 - N	CHVX896817	0.9564					
359210864 - N	CHVX896817	0.9564					

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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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geocomposite manufacturer, hereby certify the following for the material delivered 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	Bottom	Minimum	Average	
1	359210865	359210865 - N	3592.252	3592.247			
2	359210866	359210866 - N	3592.252	3592.247			
3	359210867	359210867 - N	3592.252	3592.247			
4	359210868	359210868 - N	3592.252	3592.247			
5	359210869	359210869 - N	3592.248	3592.251			
6	359210870	359210870 - N	3592.248	3592.251			
7	359210871	359210871 - N	3592.248	3592.251			
8	359210872	359210872 - N	3592.248	3592.251			
9	359210873	359210873 - N	3592.248	3592.251			
10	359210874	359210874 - N	3592.248	3592.251			
11	359210875	359210875 - N	3592.248	3592.251			
12	359210876	359210876 - N	3592.254	3592.244			
13	359210877	359210877 - N	3592.254	3592.244			
14	359210878	359210878 - N	3592.254	3592.244			
15	359210879	359210879 - N	3592.254	3592.244			
16	359210880	359210880 - N	3592.254	3592.244	1.32	3.98	
17	359210881	359210881 - N	3592.254	3592.244			
18	359210882	359210882 - N	3592.254	3592.244			
19	359210883	359210883 - N	3592.250	3592.253			
20	359210884	359210884 - N	3592.250	3592.253			
21	359210885	359210885 - N	3592.250	3592.253			
22	359210886	359210886 - N	3592.250	3592.253			
23	359210887	359210887 - N	3592.250	3592.253			
24	359210888	359210888 - N	3592.250	3592.253			
25	359210889	359210889 - N	3592.250	3592.253			
26	359210890	359210890 - N	3592.256	3592.246			
27	359210891	359210891 - N	3592.256	3592.246			

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 : **TN330-2-8**
Project : **Duke Energy Marshall Steam Station, NC**

We, the Geonet Manufacturer, hereby certify 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)
359210865 - N	CHVX896817	0.9564					
359210866 - N	CHVX896817	0.9564					
359210867 - N	CHVX896817	0.9564					
359210868 - N	CHVX896817	0.9564					
359210869 - N	CHVX896817	0.9564					
359210870 - N	CHVX896817	0.9564					
359210871 - N	CHVX896817	0.9564					
359210872 - N	CHVX896817	0.9564					
359210873 - N	CHVX896817	0.9564					
359210874 - N	CHVX896817	0.9564					
359210875 - N	CHVX896817	0.9564					
359210876 - N	CHVX896817	0.9564					
359210877 - N	CHVX896817	0.9564					
359210878 - N	CHVX896817	0.9564					
359210879 - N	CHVX896817	0.9564					
359210880 - N	CHVX896817	0.9570	0.462	360	2.69	128	
359210881 - N	CHVX896817	0.9570					
359210882 - N	CHVX896817	0.9570					
359210883 - N	CHVX896817	0.9570					
359210884 - N	CHVX896817	0.9570					
359210885 - N	CHVX896817	0.9570					
359210886 - N	CHVX896817	0.9570					
359210887 - N	CHVX896817	0.9570					
359210888 - N	CHVX896817	0.9570					
359210889 - N	CHVX896817	0.9570					
359210890 - N	CHVX896817	0.9570					
359210891 - N	CHVX896817	0.9570					

APPROVED 5 QA

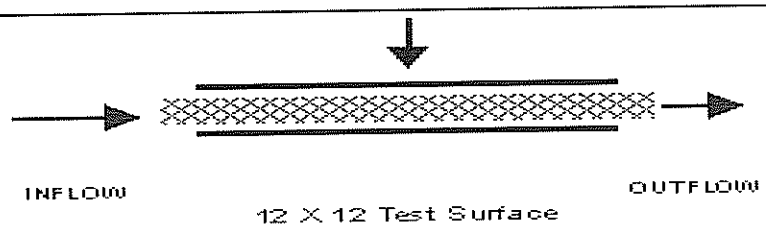
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 Fax: 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	Environmental Specialties International	**Job #**	3592
Project:	Duke Energy Marshall Steam Station, NC		
Product:	TN330-2-8		

Test Configuration:



Test Information:

Boundary Conditions:	Ottawa Sand Geocomposite Liner	**Normal Load:**	7200 psf
		Gradient:	0.03 ft
		Seating Time:	100 hours
		Flow Direction:	MD

Test Results:

Roll No.	Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec 100 hours
359210001	7200	0.03	3.02×10^{-3}
359210480			3.15×10^{-3}

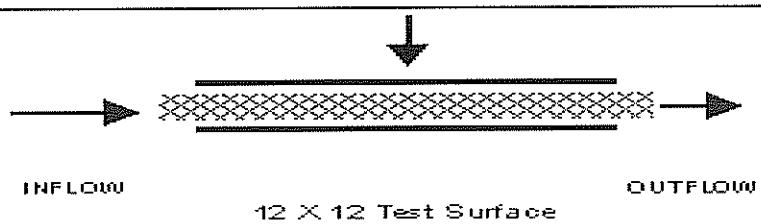
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	Environmental Specialties International	**Job #**	3592
Project:	Duke Energy Marshall Steam Station, NC		
Product:	TN330-2-8		

Test Configuration:



Test Information:

Boundary Conditions:	Liner Geocomposite Liner	**Normal Load:**	7200 psf
		Gradient:	0.03 ft
		Seating Time:	100 hours
		Flow Direction:	MD

Test Results:

Roll No.	Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec 100 hours
359210240	7200	0.03	3.81×10^{-3}
359210720			3.92×10^{-3}

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 : Environmental Specialties International
Project Name : Duke Energy Marshall Steam Station, NC
Geocomposite Manufacturer : SKAPS Industries
Geocomposite Production Plant : Commerce, GA
Geocomposite Brand Name : TN330-2-8

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*
Trademark Plastics Corporation	Chevron, TX	HDPE	CHVX898541	Density	ASTM D 1505	gm/cc	0.949	0.949
				Melt Flow Index	ASTM D 1238[a]	gm/10 min	0.09	0.10
			NAHX610274	Density	ASTM D 1505	gm/cc	0.948	0.949
				Melt Flow Index	ASTM D 1238[a]	gm/10 min	0.105	0.11
Marco Polo International			EQUX632233	Density	ASTM D 1505	gm/cc	0.950	0.950
				Melt Flow Index	ASTM D 1238[a]	gm/10 min	0.35	0.36
			GPLX1010	Density	ASTM D 1505	gm/cc	0.950	0.950
				Melt Flow Index	ASTM D 1238[a]	gm/10 min	0.30	0.32
Osterman and Company			CHVX896817	Density	ASTM D 1505	gm/cc	0.9528	0.9510
				Melt Flow Index	ASTM D 1238[a]	gm/10 min	0.231	0.240

(a) Condition 190/2.16
* Data from SKAPS Quality Control

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : TN330-2-8
Project : Duke Energy Marshall Steam Station, NC

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 %	PUNCTURE lbs.	AOS us sieve	PERM-ABL cm/sec
359210001	3592.008	8.41	232	74	244	81	132	80	0.41
	3592.016	8.60	234	72	240	85	136	80	0.41
359210040	3592.025	8.47	231	70	242	83	130	80	0.41
	3592.003	8.16	228	68	232	79	132	80	0.41
359210080	3592.027	8.47	231	70	242	83	130	80	0.41
	3592.013	8.33	230	66	236	75	136	80	0.41
359210120	3592.048	8.43	235	71	243	84	134	80	0.41
	3592.029	8.47	231	70	242	83	130	80	0.41
359210160	3592.030	8.31	229	67	234	76	138	80	0.41
	3592.049	8.43	235	71	243	84	134	80	0.41
359210200	3592.058	8.56	230	75	241	82	140	80	0.44
	3592.081	8.20	230	65	234	76	133	80	0.44
359210240	3592.062	8.12	226	68	235	77	131	80	0.44
	3592.079	8.50	232	74	245	81	137	80	0.44
359210280	3592.106	8.49	233	75	240	82	135	80	0.40
	3592.055	8.56	230	75	241	82	140	80	0.44

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 : TN330-2-8
Project : Duke Energy Marshall Steam Station, NC

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 %	PUNCTURE lbs.	AOS us sieve	PERM-ABL cm/sec
359210320	3592.100	8.14	227	69	232	76	135	80	0.40
	3592.089	8.39	235	71	242	83	133	80	0.44
359210360	3592.096	8.46	231	73	238	80	139	80	0.44
	3592.093	8.31	225	67	230	78	139	80	0.44
359210400	3592.128	8.53	234	74	243	81	130	80	0.40
	3592.111	8.17	229	66	236	75	138	80	0.40
359210440	3592.120	8.30	226	68	231	77	130	80	0.40
	3592.129	8.53	234	74	243	81	130	80	0.40
359210480	3592.122	8.30	226	68	231	77	130	80	0.40
	3592.153	8.13	227	69	237	78	140	80	0.42
359210520	3592.142	8.22	225	67	235	75	132	80	0.40
	3592.159	8.54	231	71	245	84	140	80	0.42
359210560	3592.150	8.13	227	69	237	78	140	80	0.42
	3592.143	8.22	225	67	235	75	132	80	0.40
359210600	3592.186	8.55	234	74	242	85	131	80	0.42
	3592.168	8.59	235	73	240	80	134	80	0.42

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SKAPS Industries

Engineered Synthetic Products, Inc.

Product : TN330-2-8
Project : Duke Energy Marshall Steam Station, NC

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 %	PUNCTURE lbs.	AOS us sieve	PERM-ABL cm/sec
359210640	3592.188	8.55	234	74	242	85	131	80	0.42
	3592.170	8.15	226	68	234	75	138	80	0.42
359210680	3592.210	8.21	227	66	231	78	139	80	0.44
	3592.197	8.48	231	72	238	81	137	80	0.42
359210720	3592.192	8.19	228	67	230	79	137	80	0.42
	3592.207	8.57	233	75	241	83	133	80	0.44
359210760	3592.202	8.32	225	69	233	76	133	80	0.44
	3592.233	8.23	226	65	237	77	138	80	0.44
359210800	3592.221	8.26	229	68	235	75	135	80	0.44
	3592.235	8.60	230	74	245	82	138	80	0.44
359210840	3592.232	8.23	226	65	237	77	138	80	0.44
	3592.224	8.26	229	68	235	75	135	80	0.44
359210880	3592.254	8.27	225	69	232	76	136	80	0.41
	3592.244	8.11	228	67	230	79	130	80	0.44

571 Industrial Parkway, Commerce, GA 30529 Phone: 706-336-7000 Fax: 706-336-7007 Email: skaps@skaps.com

SKAPS Industries

ASTM D 1621

Client: Environmental Specialties International
Project: Duke Energy Marshall Steam Station, NC
Product: TN330-2-8

Job # 3592

Sr. No.	Geonet Roll Number	Compressive Strength , psf
1	359210001 - N	55,320
2	359210045 - N	55,367
3	359210090 - N	54,684
4	359210135 - N	55,490
5	359210180 - N	54,819
6	359210225 - N	54,899
7	359210270 - N	54,646
8	359210315 - N	55,424
9	359210360 - N	54,690
10	359210405 - N	55,232
11	359210450 - N	54,636
12	359210495 - N	55,412
13	359210540 - N	55,178
14	359210585 - N	55,195
15	359210630 - N	55,097
16	359210675 - N	55,382
17	359210720 - N	55,075
18	359210765 - N	55,120
19	359210810 - N	55,035
20	359210855 - N	54,861

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

330-mil, LDS and LCS Geocomposite Conformance Test Results

CELL 1 GEOCOMPOSITE CONFORMANCE TESTING SUMMARY TABLE							
GEOTECHNICS PROJECT NUMBER	GEOTECHNICS ID NUMBER	MANUFACTURER ROLL NUMBER	THICKNESS (ASTM D5199) inches	DENSITY (ASTM D1505) g/cc	PLY ADHESION (ASTM D7005) MD-lb/in SIDE "A"/SIDE "B"	TRANSMISSIVITY SETUP	TRANSMISSIVITY (ASTM D4716) M^2/SEC
L10017-04	L10017-04-01	359210001	0.4231	0.9513	5.91/2.52	GM-GC-GM	4.63E-03
L10017-04	L10017-04-02	359210045	0.4065	0.949	6.15/2.54	GM-GC-GM	4.41E-03
L10017-04	L10017-04-03	359210090	0.4007	0.9484	6.48/3.24	GM-GC-GM	5.18E-03
L10017-04	L10017-04-04	359210135	0.3929	0.9518	7.25/3.44	GM-GC-GM	4.08E-03
L10017-04	L10017-04-05	359210180	0.4094	0.9518	5.11/2.17	GM-GC-GM	3.98E-03
L10017-05	L10017-05-01	359210225	0.3955	0.9515	10.41/5.22	PC-GC-GM	2.95E-03
L10017-05	L10017-05-02	359210270	0.3946	0.9508	7.56/5.19	PC-GC-GM	2.89E-03
L10017-05	L10017-05-03	359210315	0.3898	0.955	6.66/4.61	PC-GC-GM	3.91E-03
L10017-05	L10017-05-04	359210360	0.4085	0.952	6.88/4.17	PC-GC-GM	2.99E-03
L10017-05	L10017-05-05	359210405	0.3855	0.9523	9.42/4.63	PC-GC-GM	4.53E-03

geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-04
LAB ID NO.: L10017-04-01
MATERIAL: SKAPS TN 330-2-8 GEOCOMPOSITE
ROLL NO: 359210001

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4247	0.4234	0.4238	0.4286	0.4308		
			0.4134	0.4209	0.4219	0.4179	0.4257	**0.4231**	0.0050
DENSITY	D 1505	g/cc	0.9521	0.9508	0.9510			**0.9513**	0.0007
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	6.8	4.4	2.5	8.6	7.3	**5.91**	2.454
	SIDE"B"	MD-lb/in	3.4	3.0	1.5	2.5	2.2	**2.52**	0.724

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

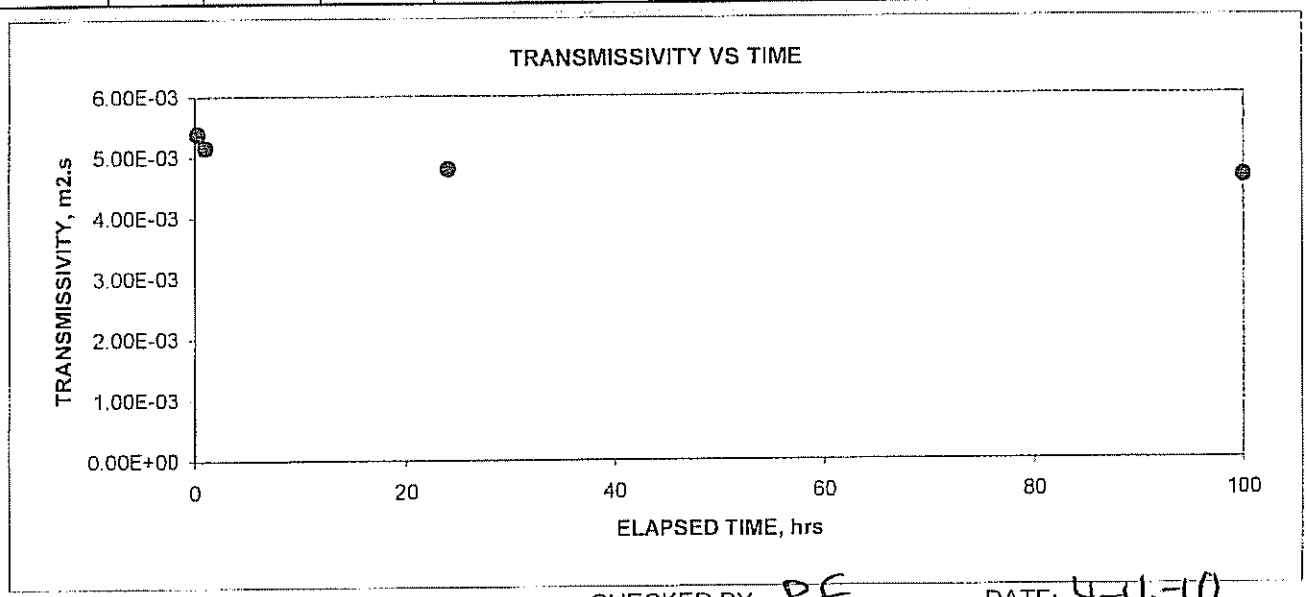
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-04
LAB I.D. NO.: L10017-04-01
ROLL NO.: 359210001
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.86	0.50	0.03	990 990 990	20 20 20	19.1	1.61E-01	0.780	5.38E-03
1	0.86	0.50	0.03	950 950 950	20 20 20	19.2	1.55E-01	0.747	5.15E-03
24	0.86	0.50	0.03	880 880 880	20 20 20	19.0	1.44E-01	0.695	4.80E-03
100	0.86	0.50	0.03	850 850 850	20 20 20	19.0	1.39E-01	0.671	4.63E-03



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geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-04
LAB ID NO.: L10017-04-02
MATERIAL: SKAPS TN 330-2-8 GEOCOMPOSITE
ROLL NO: 359210045

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3991	0.4071	0.4104	0.4206	0.4077		
			0.4085	0.3976	0.4020	0.4043	0.4072	**0.4065**	0.0065
DENSITY	D 1505	g/cc	0.9487	0.9494	0.9487			**0.9490**	0.0004
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	9.4	4.9	5.9	5.8	4.7	**6.15**	1.867
	SIDE"B"	MD-lb/in	1.9	2.3	2.9	3.0	2.6	**2.54**	0.432

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

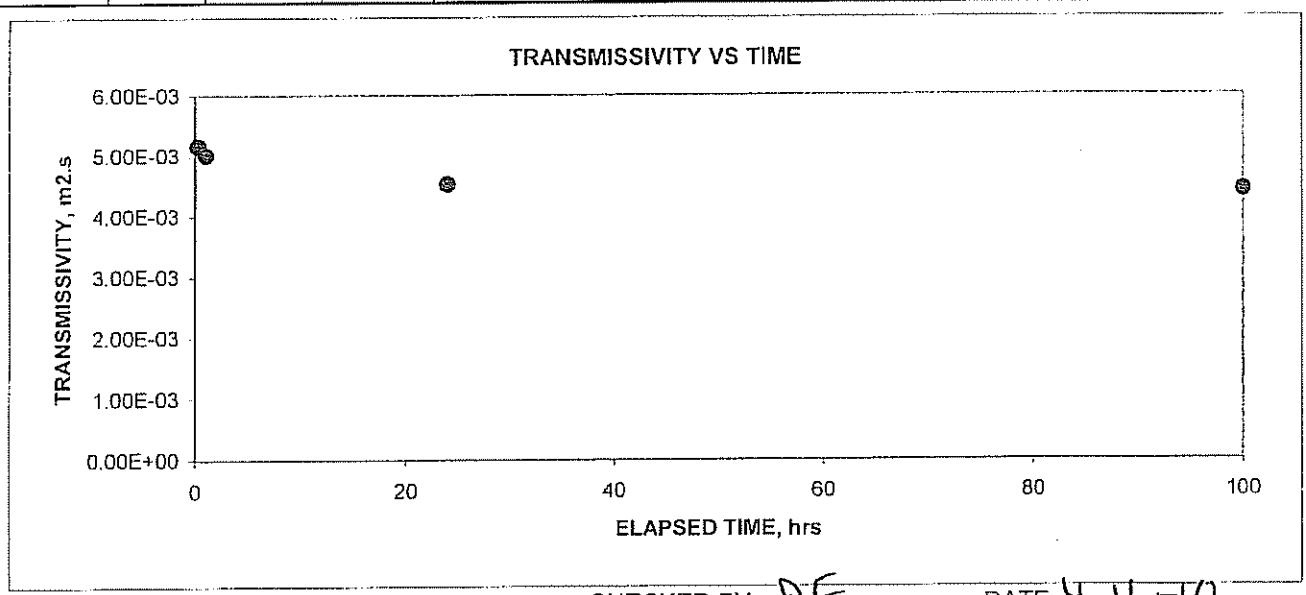
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-04
LAB I.D. NO.: L10017-04-02
ROLL NO.: 359210045
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.62	0.26	0.03	950 950 950	20 20 20	19.1	1.55E-01	0.749	5.17E-03
1	0.62	0.26	0.03	925 925 920	20 20 20	19.2	1.50E-01	0.726	5.01E-03
24	0.62	0.26	0.03	830 830 830	20 20 20	19.0	1.36E-01	0.656	4.52E-03
100	0.62	0.26	0.03	810 810 810	20 20 20	19.0	1.32E-01	0.640	4.41E-03



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geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-04
LAB ID NO.: L10017-04-03
MATERIAL: SKAPS TN 330-2-8 GEOCOMPOSITE
ROLL NO: 359210090

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3991	0.3966	0.3949	0.3787	0.3981		
			0.3970	0.4180	0.4088	0.4165	0.3989	**0.4007**	0.0114
DENSITY	D 1505	g/cc	0.9486	0.9478	0.9487			**0.9484**	0.0005
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	6.8	3.0	6.5	9.9	6.2	**6.48**	2.468
	SIDE"B"	MD-lb/in	2.8	3.2	2.4	5.0	2.9	**3.24**	1.040

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

CHECKED BY: BF DATE: 4-12-10

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

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INTEGRITY IN TESTING

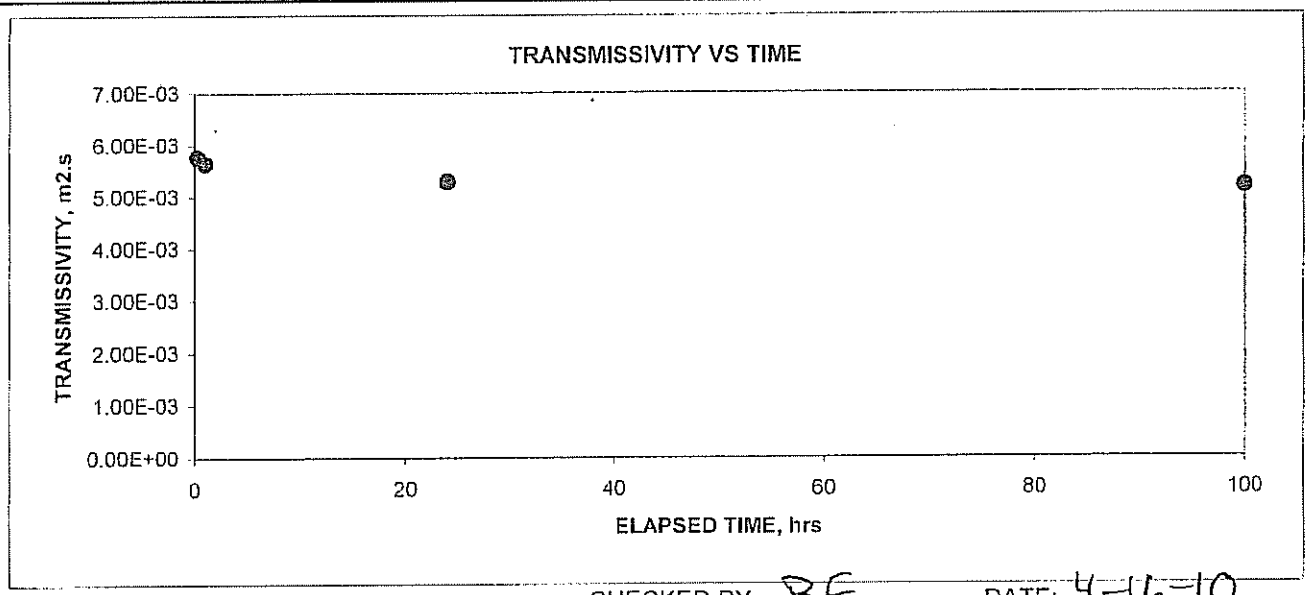
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-04
LAB I.D. NO.: L10017-04-03
ROLL NO.: 359210090
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.66	0.30	0.03	1060 1060 1060	20 20 20	19.1	1.73E-01	0.835	5.76E-03
1	0.66	0.30	0.03	1040 1040 1040	20 20 20	19.2	1.69E-01	0.818	5.64E-03
24	0.66	0.30	0.03	970 970 970	20 20 20	19.0	1.59E-01	0.766	5.29E-03
100	0.66	0.30	0.03	950 950 950	20 20 20	19.0	1.55E-01	0.750	5.18E-03



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geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-04
LAB ID NO.: L10017-04-04
MATERIAL: SKAPS TN 330-2-8 GEOCOMPOSITE
ROLL NO: 359210135

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3835	0.4009	0.3990	0.3925	0.3991		
			0.3918	0.3955	0.3980	0.3882	0.3808	**0.3929**	0.0069
DENSITY	D 1505	g/cc	0.9517	0.9515	0.9522			**0.9518**	0.0003
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	5.3	6.5	10.9	6.6	7.0	**7.25**	2.140
	SIDE"B"	MD-lb/in	2.4	4.3	2.2	3.1	5.3	**3.44**	1.303

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

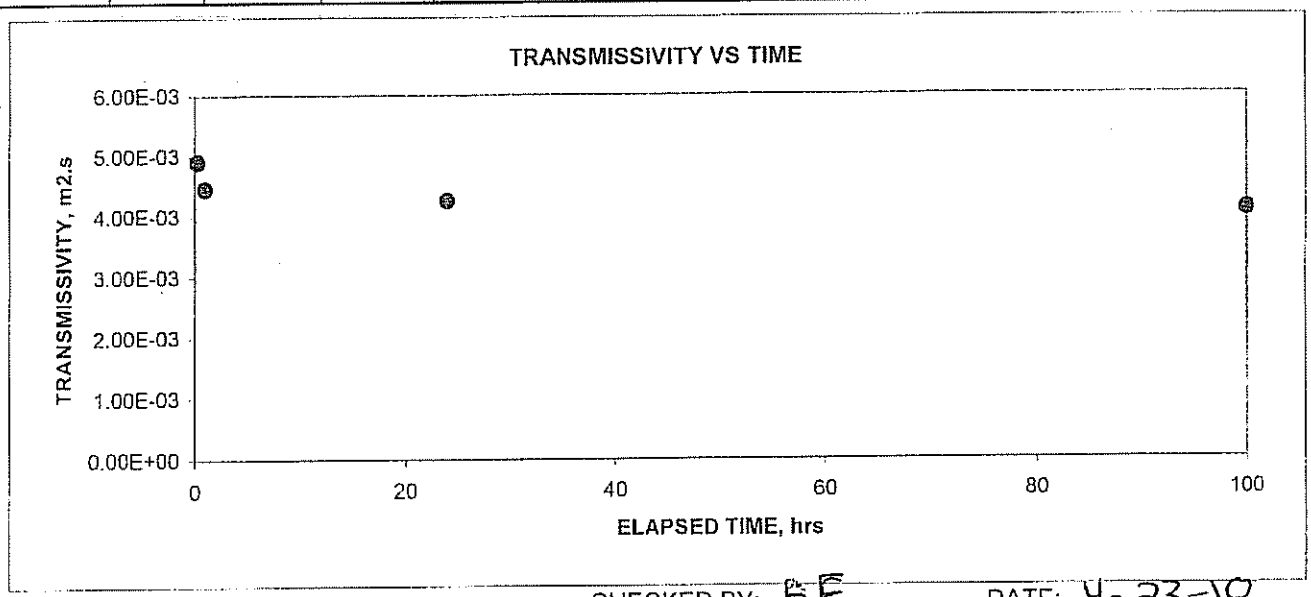
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-04
LAB I.D. NO.: L10017-04-04
ROLL NO.: 359210135
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.66	0.30	0.03	900 900 900	20 20 20	19.0	1.47E-01	0.711	4.91E-03
1	0.66	0.30	0.03	820 820 820	20 20 20	19.1	1.34E-01	0.646	4.46E-03
24	0.66	0.30	0.03	780 780 780	20 20 20	19.0	1.28E-01	0.616	4.25E-03
100	0.66	0.30	0.03	750 750 750	20 20 20	19.1	1.22E-01	0.591	4.08E-03



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geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-04
LAB ID NO.: L10017-04-05
MATERIAL: SKAPS TN 330-2-8 GEOCOMPOSITE
ROLL NO: 359210180

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4054	0.3994	0.4206	0.4130	0.3989		
			0.3976	0.4019	0.4113	0.4220	0.4243	**0.4094**	0.0102
DENSITY	D 1505	g/cc	0.9524	0.9522	0.9508			**0.9518**	0.0009
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	5.8	5.7	3.4	5.8	4.9	**5.11**	1.010
	SIDE"B"	MD-lb/in	3.0	3.0	1.8	1.6	1.5	**2.17**	0.781

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

CHECKED BY: BF DATE: 4-12-10

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

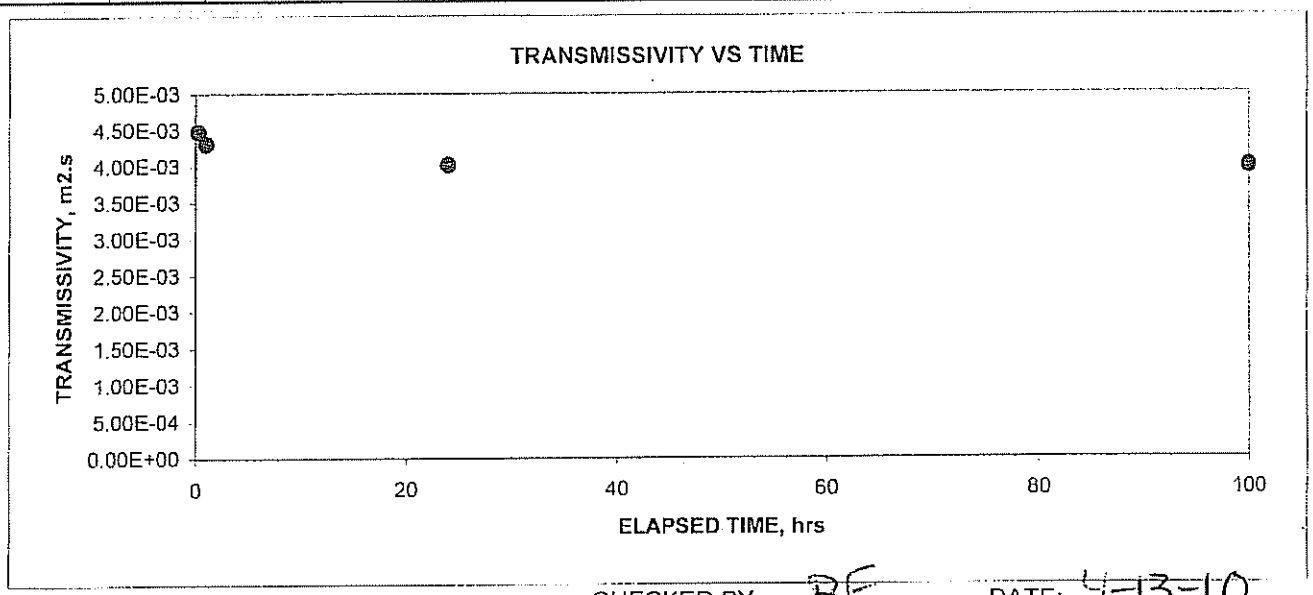
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-04
LAB I.D. NO.: L10017-04-05
ROLL NO.: 359210180
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.66	0.30	0.03	850 850 850	20 20 20	20.4	1.34E-01	0.649	4.48E-03
1	0.66	0.30	0.03	820 820 820	20 20 20	20.5	1.29E-01	0.625	4.31E-03
24	0.66	0.30	0.03	760 760 760	20 20 20	20.3	1.20E-01	0.582	4.02E-03
100	0.66	0.30	0.03	740 740 740	20 20 20	19.6	1.19E-01	0.576	3.98E-03



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geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-05
LAB ID NO.: L10017-05-01
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210225

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3972	0.3987	0.3994	0.3865	0.3887		
			0.4011	0.3913	0.3894	0.4023	0.4001	**0.3955**	0.0059
DENSITY	D 1505	g/cc	0.9501	0.9510	0.9533			**0.9515**	0.0016
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	10.5	11.8	14.5	7.1	8.1	**10.41**	2.949
	SIDE"B"	MD-lb/in	6.7	6.3	6.3	4.2	2.6	**5.22**	1.751

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

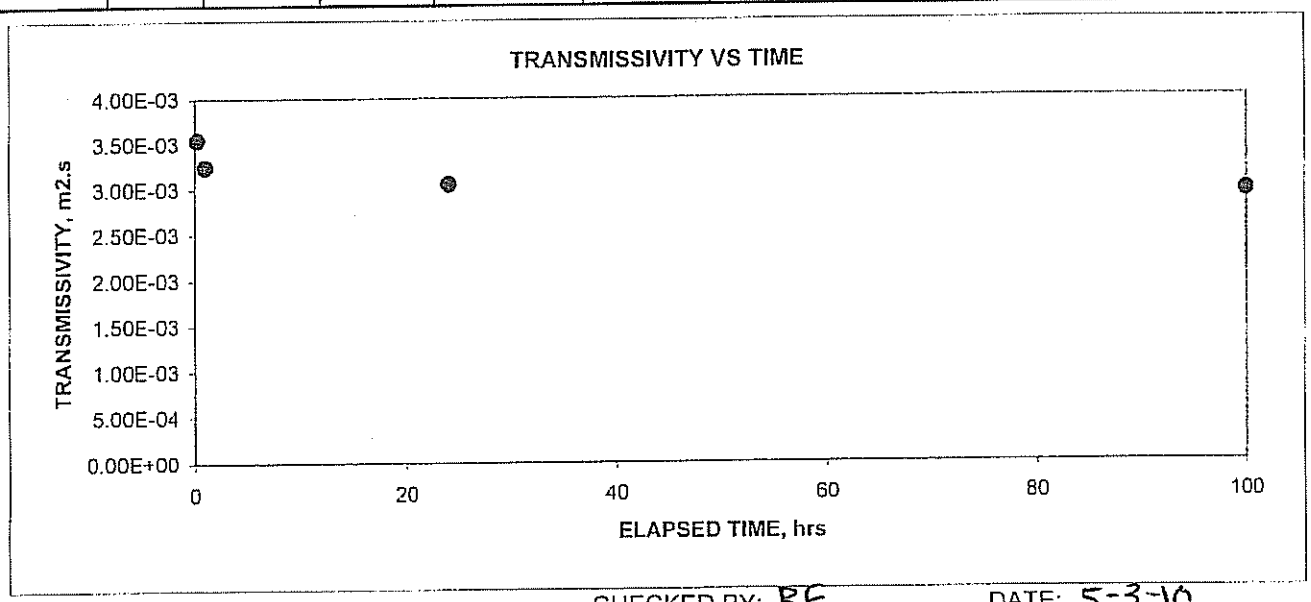
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-05
LAB I.D. NO.: L10017-05-01
ROLL NO.: 359210225
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.82	0.46	0.03	980 980 975	30 30 30	19.1	1.06E-01	0.514	3.55E-03
1	0.82	0.46	0.03	900 900 900	30 30 30	19.3	9.74E-02	0.471	3.25E-03
24	0.82	0.46	0.03	840 840 840	30 30 30	19.0	9.16E-02	0.442	3.05E-03
100	0.82	0.46	0.03	820 820 820	30 30 30	19.4	8.85E-02	0.428	2.95E-03



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geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-05
LAB ID NO.: L10017-05-02
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210270

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3998	0.4014	0.3802	0.3835	0.4012		
			0.4023	0.3999	0.3977	0.3824	0.3977	**0.3946**	0.0088
DENSITY	D 1505	g/cc	0.9512	0.9511	0.9500			**0.9508**	0.0007
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	6.2	9.2	5.1	11.0	6.3	**7.56**	2.465
	SIDE"B"	MD-lb/in	3.9	5.0	5.7	6.4	5.0	**5.19**	0.926

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

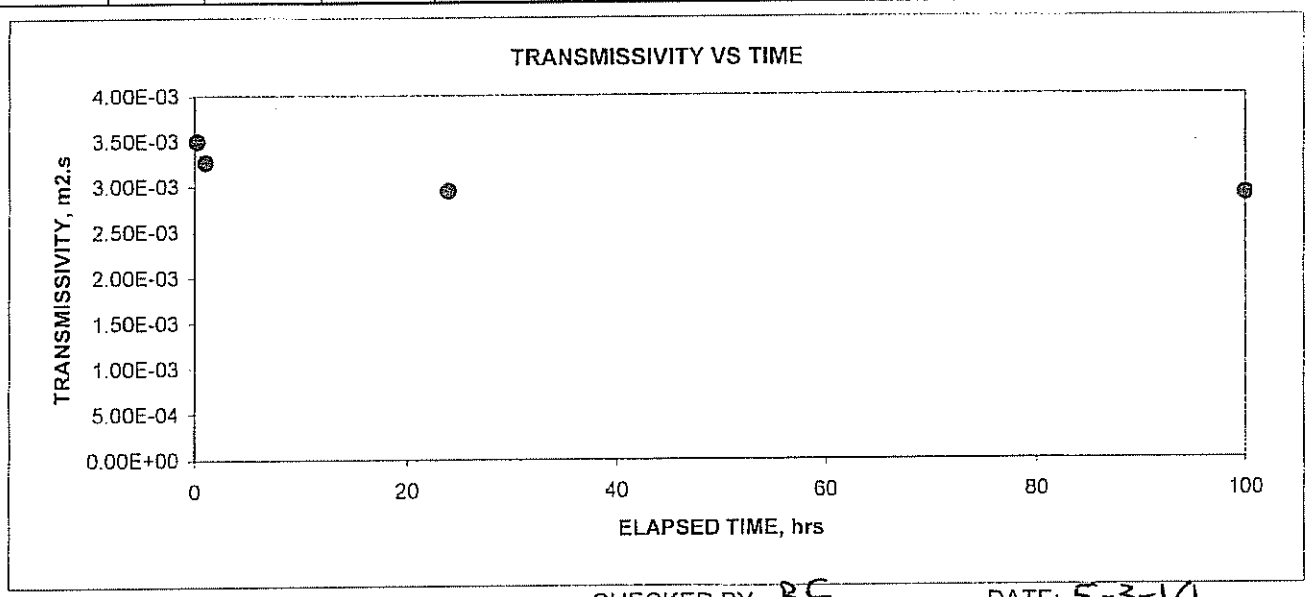
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-05
LAB I.D. NO.: L10017-05-02
ROLL NO.: 359210270
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.62	0.26	0.03	970 970 970	30 30 30	19.3	1.05E-01	0.507	3.50E-03
1	0.62	0.26	0.03	910 910 910	30 30 30	19.5	9.80E-02	0.474	3.27E-03
24	0.62	0.26	0.03	810 810 810	30 30 30	19.0	8.83E-02	0.427	2.94E-03
100	0.62	0.26	0.03	800 800 800	30 30 30	19.2	8.68E-02	0.419	2.89E-03



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geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-05
LAB ID NO.: L10017-05-03
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210315

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4101	0.4098	0.3843	0.3866	0.3909		
			0.3845	0.3809	0.3812	0.3799	0.3899	**0.3898**	0.0112
DENSITY	D 1505	g/cc	0.9549	0.9555	0.9545			**0.9550**	0.0005
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	6.3	6.8	6.8	7.2	6.2	**6.66**	0.408
	SIDE"B"	MD-lb/in	4.6	3.6	4.3	5.5	5.1	**4.61**	0.728

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

CHECKED BY: J.O DATE: 4-30-10

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

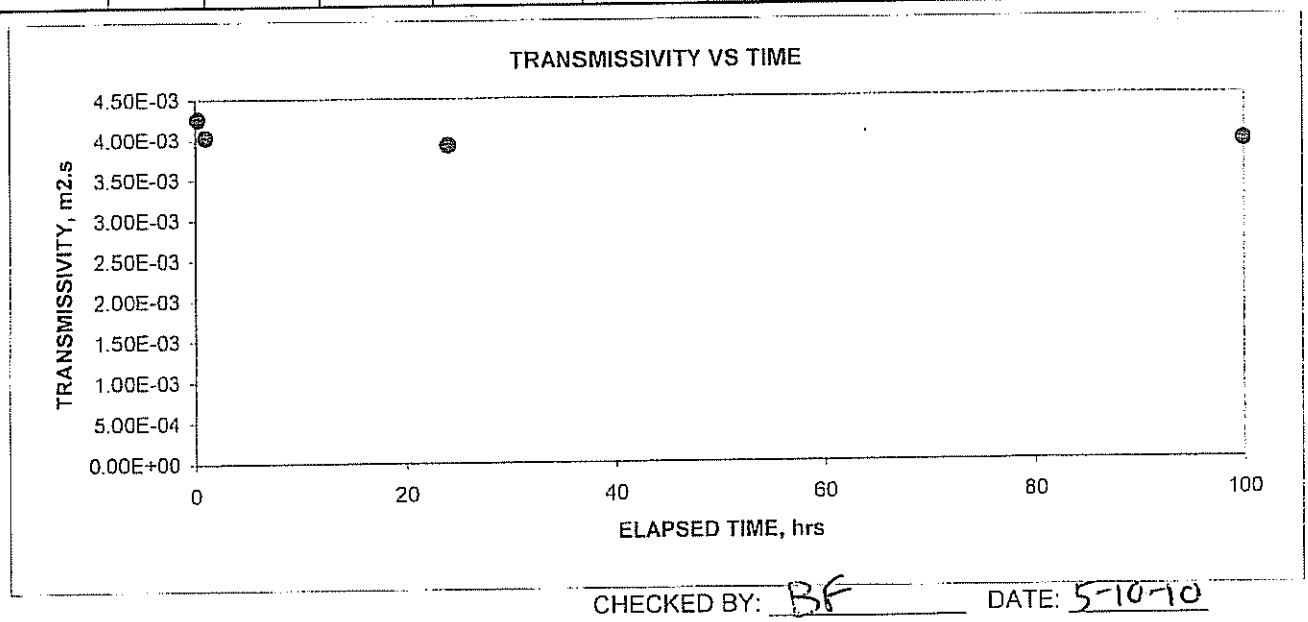
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-05
LAB I.D. NO.: L10017-05-03
ROLL NO.: 359210315
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.86	0.50	0.03	1200 1200 1200	30 30 30	20.0	1.28E-01	0.617	4.26E-03
1	0.86	0.50	0.03	1140 1140 1140	30 30 30	20.2	1.21E-01	0.583	4.03E-03
24	0.86	0.50	0.03	1120 1120 1120	30 30 30	20.6	1.17E-01	0.568	3.92E-03
100	0.86	0.50	0.03	1110 1110 1110	30 30 30	20.3	1.17E-01	0.567	3.91E-03



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geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-05
LAB ID NO.: L10017-05-04
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210360

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4144	0.4111	0.4109	0.4098	0.4035		
			0.4122	0.4197	0.4008	0.4013	0.4012	**0.4085**	0.0065
DENSITY	D 1505	g/cc	0.9527	0.9530	0.9503			**0.9520**	0.0015
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	4.8	8.6	8.0	6.9	6.1	**6.88**	1.524
	SIDE"B"	MD-lb/in	2.8	3.7	4.5	5.0	4.9	**4.17**	0.937

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

CHECKED BY: J.O DATE: 4-30-10

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

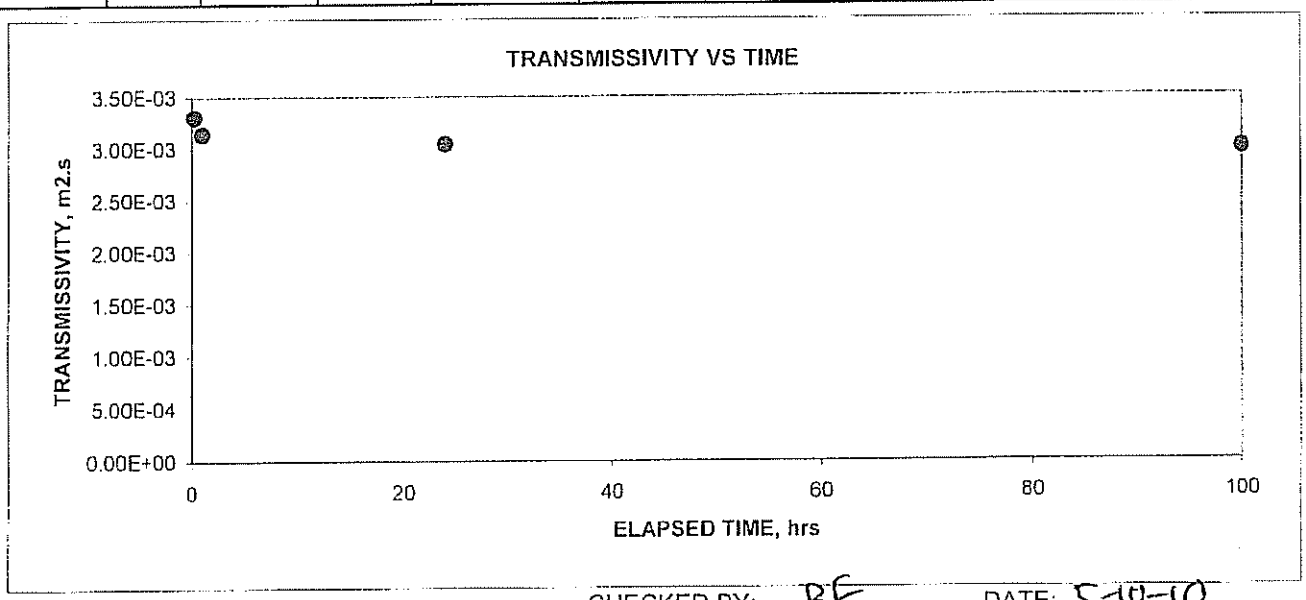
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-05
LAB I.D. NO.: L10017-05-04
ROLL NO.: 359210360
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.64	0.28	0.03	965 960 955	30 30 30	21.2	9.92E-02	0.479	3.31E-03
1	0.64	0.28	0.03	910 910 910	30 30 30	21.1	9.43E-02	0.456	3.14E-03
24	0.64	0.28	0.03	875 875 875	30 30 30	20.8	9.13E-02	0.441	3.04E-03
100	0.64	0.28	0.03	850 850 850	30 30 30	20.4	8.96E-02	0.433	2.99E-03



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geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-05
LAB ID NO.: L10017-05-05
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210405

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3901	0.3898	0.3887	0.3856	0.3876		
			0.3866	0.3924	0.3934	0.3700	0.3711	**0.3855**	0.0083
DENSITY	D 1505	g/cc	0.9527	0.9525	0.9518			**0.9523**	0.0005
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	12.7	8.4	8.9	9.7	7.4	**9.42**	2.021
	SIDE"B"	MD-lb/in	7.0	3.6	4.3	5.1	3.2	**4.63**	1.496

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

CHECKED BY: J.O DATE: 4-30-10

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

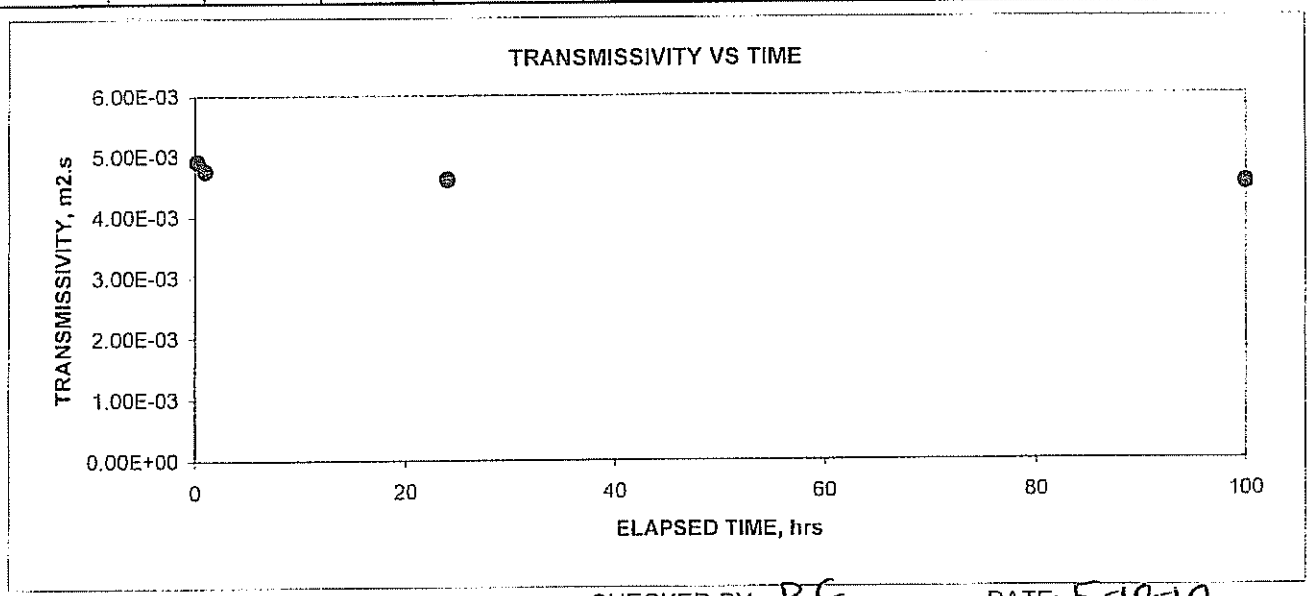
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-05
LAB I.D. NO.: L10017-05-05
ROLL NO.: 359210405
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.66	0.30	0.03	930 930 930	20 20 20	20.3	1.47E-01	0.712	4.91E-03
1	0.66	0.30	0.03	900 900 900	20 20 20	20.3	1.43E-01	0.689	4.76E-03
24	0.66	0.30	0.03	870 870 870	20 20 20	20.2	1.38E-01	0.668	4.61E-03
100	0.66	0.30	0.03	840 840 840	20 20 20	19.4	1.36E-01	0.657	4.53E-03



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CELL 2 GEOCOMPOSITE CONFORMANCE TESTING SUMMARY TABLE							
GEOTECHNICS PROJECT NUMBER	GEOTECHNICS ID NUMBER	MANUFACTURER ROLL NUMBER	THICKNESS (ASTM D5199) Inches	DENSITY (ASTM D1505) g/cc	PLY ADHESION (ASTM D7005) MD-lb/in SIDE "A"/SIDE "B"	TRANSMISSIVITY SETUP	TRANSMISSIVITY (ASTM D4716) M^2/SEC
L10017-07	L10017-07-01	359210450	0.3976	0.9492	10.06/3.85	GM-GC-GM	4.63E-03
L10017-07	L10017-07-02	359210495	0.4089	0.9527	6.63/3.08	GM-GC-GM	4.04E-03
L10017-07	L10017-07-03	359210540	0.4143	0.9528	6.20/2.78	GM-GC-GM	4.90E-03
L10017-07	L10017-07-04	359210585	0.4047	0.9527	7.42/3.04	GM-GC-GM	4.31E-03
L10017-07	L10017-07-05	359210585	0.3941	0.9518	8.08/3.31	GM-GC-GM	5.51E-03
L10017-09	L10017-09-01	359210675	0.4095	0.9538	5.62/2.75	PC-GC-GM	3.67E-03
L10017-09	L10017-09-02	359210720	0.415	0.9541	6.90/3.75	PC-GC-GM	2.87E-03
L10017-09	L10017-09-03	359210765	0.4003	0.9536	8.16/4.45	PC-GC-GM	3.22E-03
L10017-09	L10017-09-04	359210810	0.3939	0.9538	7.90/4.66	PC-GC-GM	3.63E-03
L10017-09	L10017-09-05	359210855	0.398	0.9549	8.96/3.84	PC-GC-GM	3.33E-03

geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-07
LAB ID NO.: L10017-07-01
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210450

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4013	0.4098	0.4077	0.4012	0.3901		
			0.3811	0.4098	0.4124	0.3802	0.3825	**0.3976**	0.0129
DENSITY	D 1505	g/cc	0.9498	0.9491	0.9486			**0.9492**	0.0006
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	10.8	8.8	9.5	11.2	10.1	**10.06**	0.967
	SIDE"B"	MD-lb/in	6.7	3.8	2.5	2.8	3.3	**3.85**	1.684

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

CHECKED BY: J. O DATE: 5-4-10

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

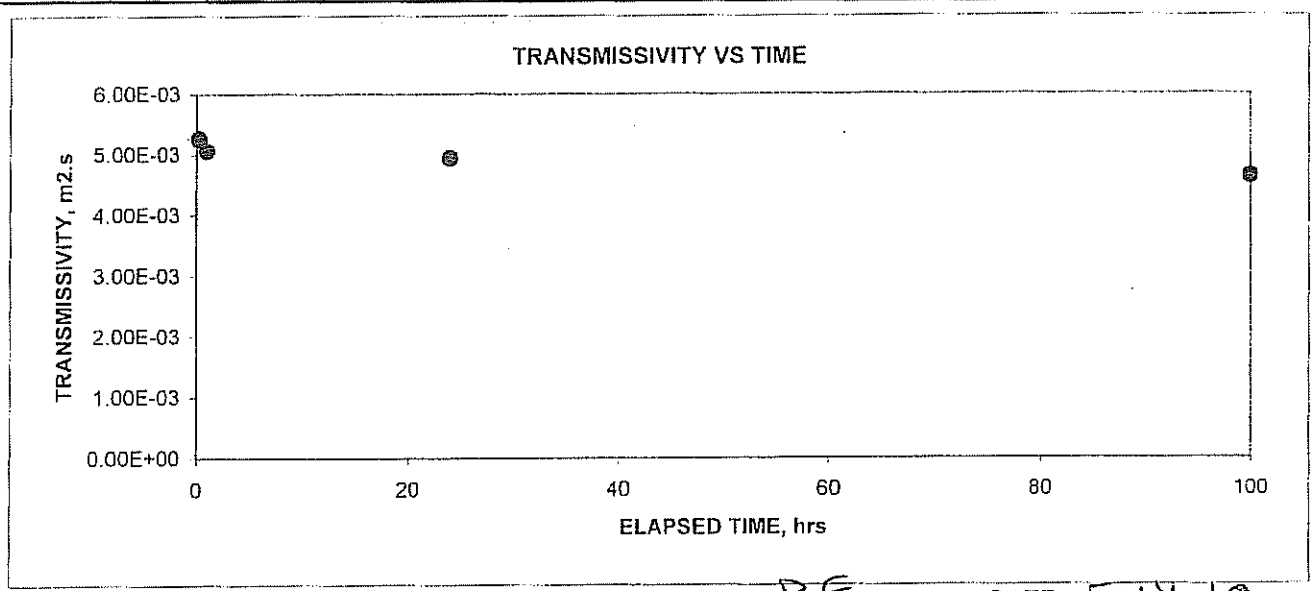
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-07
LAB I.D. NO.: L10017-07-01
ROLL NO.: 359210450
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.72	0.36	0.03	970 970 970	20 20 20	19.2	1.58E-01	0.763	5.26E-03
1	0.72	0.36	0.03	940 940 940	20 20 20	19.5	1.52E-01	0.734	5.06E-03
24	0.72	0.36	0.03	910 910 910	20 20 20	19.2	1.48E-01	0.716	4.94E-03
100	0.72	0.36	0.03	870 870 870	20 20 20	20.0	1.39E-01	0.671	4.63E-03



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INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-07
LAB ID NO.: L10017-07-02
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210495

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4109	0.4024	0.4109	0.4100	0.4066		
			0.4122	0.4108	0.4144	0.4012	0.4099	**0.4089**	0.0042
DENSITY	D 1505	g/cc	0.9522	0.9524	0.9536			**0.9527**	0.0008
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	9.0	8.3	8.2	4.8	2.9	**6.63**	2.664
	SIDE"B"	MD-lb/in	4.0	2.2	4.3	2.6	2.3	**3.08**	1.018

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

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INTEGRITY IN TESTING

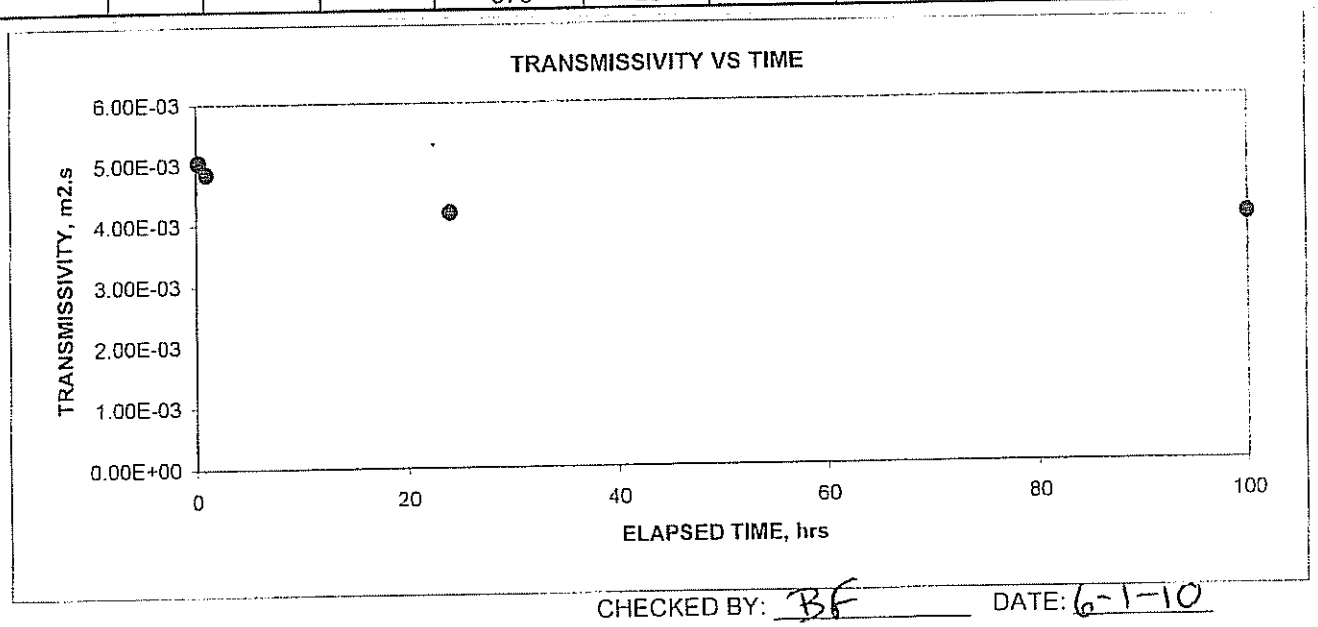
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-07
LAB I.D. NO.: L10017-07-02
ROLL NO.: 359210495
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.74	0.38	0.03	1200 1200 1200	25 25 25	20.5	1.51E-01	0.732	5.05E-03
1	0.74	0.38	0.03	1160 1160 1160	25 25 25	20.7	1.46E-01	0.704	4.86E-03
24	0.74	0.38	0.03	1010 1000 1000	25 25 25	20.8	1.26E-01	0.607	4.19E-03
100	0.74	0.38	0.03	970 970 970	25 25 25	20.9	1.21E-01	0.586	4.04E-03



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CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-07
LAB ID NO.: L10017-07-03
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210540

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4097	0.4086	0.4208	0.4186	0.4098		
			0.4056	0.4200	0.4201	0.4122	0.4178	**0.4143**	0.0057
DENSITY	D 1505	g/cc	0.9532	0.9531	0.9522			**0.9528**	0.0005
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	9.2	9.1	2.5	5.6	4.7	**6.20**	2.895
	SIDE"B"	MD-lb/in	2.2	5.2	1.9	2.5	2.2	**2.78**	1.367

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

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INTEGRITY IN TESTING

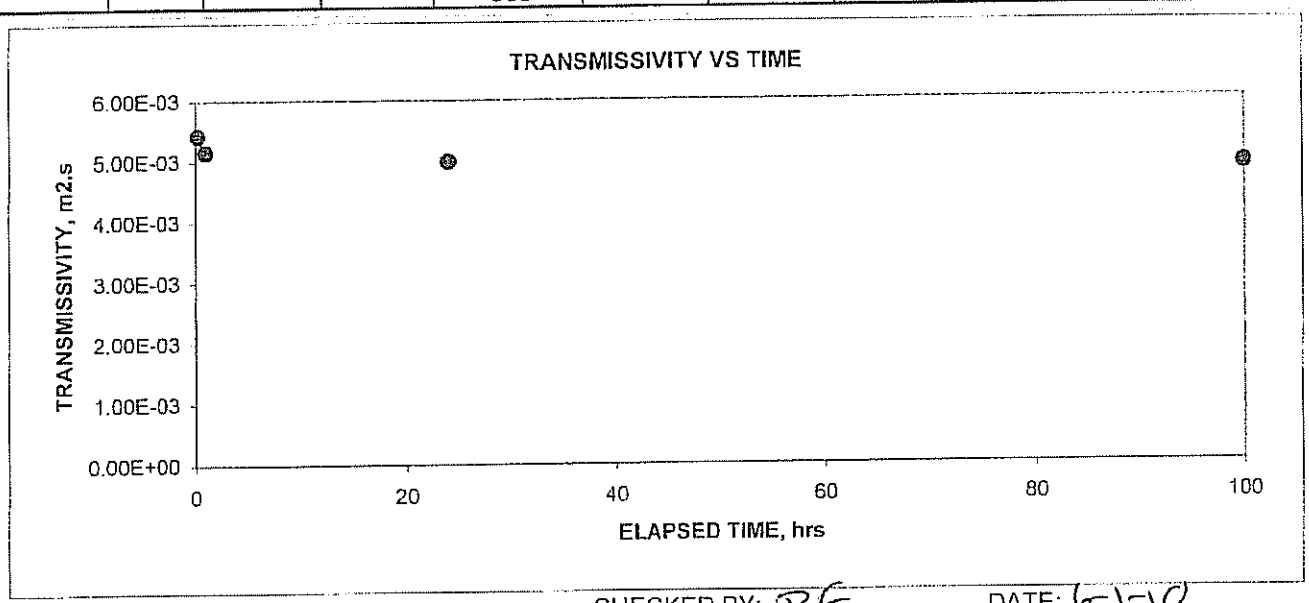
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-07
LAB I.D. NO.: L10017-07-03
ROLL NO.: 359210540
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.66	0.30	0.03	1050 1050 1050	20 20 20	21.2	1.63E-01	0.787	5.43E-03
1	0.66	0.30	0.03	1000 1000 1000	20 20 20	21.3	1.55E-01	0.747	5.16E-03
24	0.66	0.30	0.03	970 970 970	20 20 20	21.4	1.50E-01	0.723	4.99E-03
100	0.66	0.30	0.03	955 955 955	20 20 20	21.5	1.47E-01	0.710	4.90E-03



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INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-07
LAB ID NO.: L10017-07-04
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210585

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4109	0.4087	0.4086	0.4100	0.4013		
			0.4045	0.4076	0.4034	0.3999	0.3922	**0.4047**	0.0058
DENSITY	D 1505	g/cc	0.9519	0.9532	0.9531			**0.9527**	0.0007
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	11.1	5.9	10.2	5.4	4.6	**7.42**	2.993
	SIDE"B"	MD-lb/in	3.3	2.4	5.6	1.8	2.1	**3.04**	1.531

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

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INTEGRITY IN TESTING

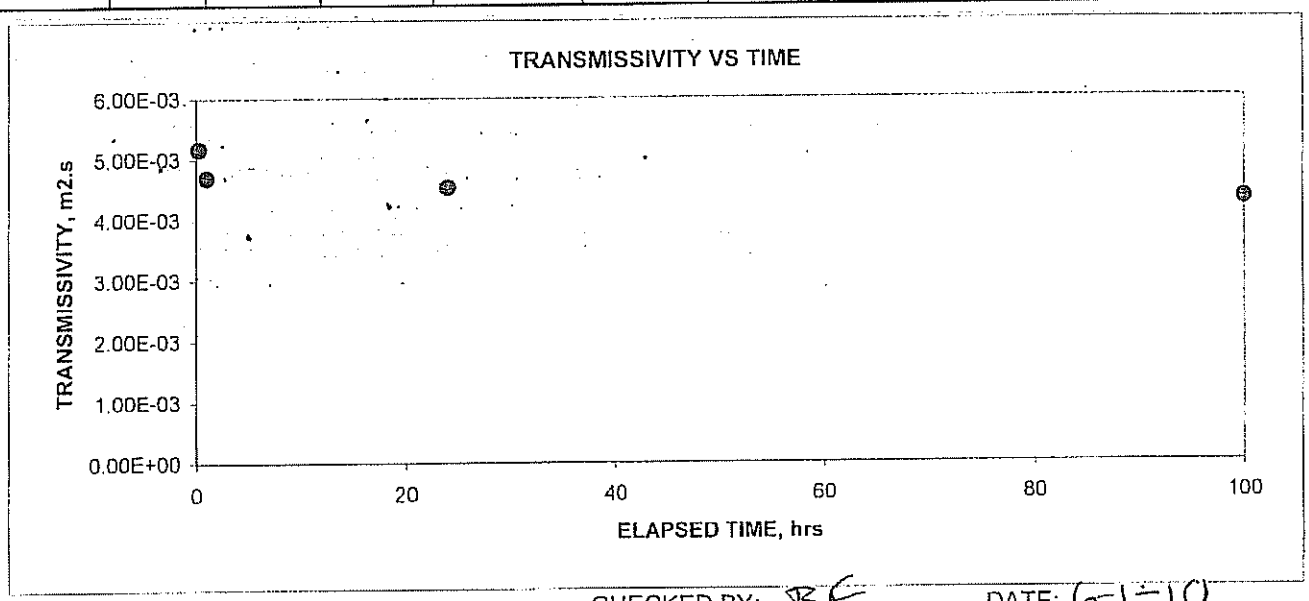
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-07
LAB I.D. NO.: L10017-07-04
ROLL NO.: 359210585
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.86	0.50	0.03	1000 1000 1000	20 20 20	21.2	1.55E-01	0.749	5.17E-03
1	0.86	0.50	0.03	910 910 910	20 20 20	21.3	1.41E-01	0.680	4.69E-03
24	0.86	0.50	0.03	880 880 880	20 20 20	21.4	1.36E-01	0.656	4.53E-03
100	0.86	0.50	0.03	840 840 840	20 20 20	21.5	1.29E-01	0.625	4.31E-03



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INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-07
LAB ID NO.: L10017-07-05
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210630

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3798	0.3799	0.3888	0.3888	0.3913		
			0.3966	0.4066	0.4076	0.3999	0.4013	**0.3941**	0.0100
DENSITY	D 1505	g/cc	0.9514	0.9515	0.9524			**0.9518**	0.0005
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	3.5	9.7	11.4	11.0	4.9	**8.08**	3.643
	SIDE"B"	MD-lb/in	1.6	4.1	2.0	5.5	3.4	**3.31**	1.592

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

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INTEGRITY IN TESTING

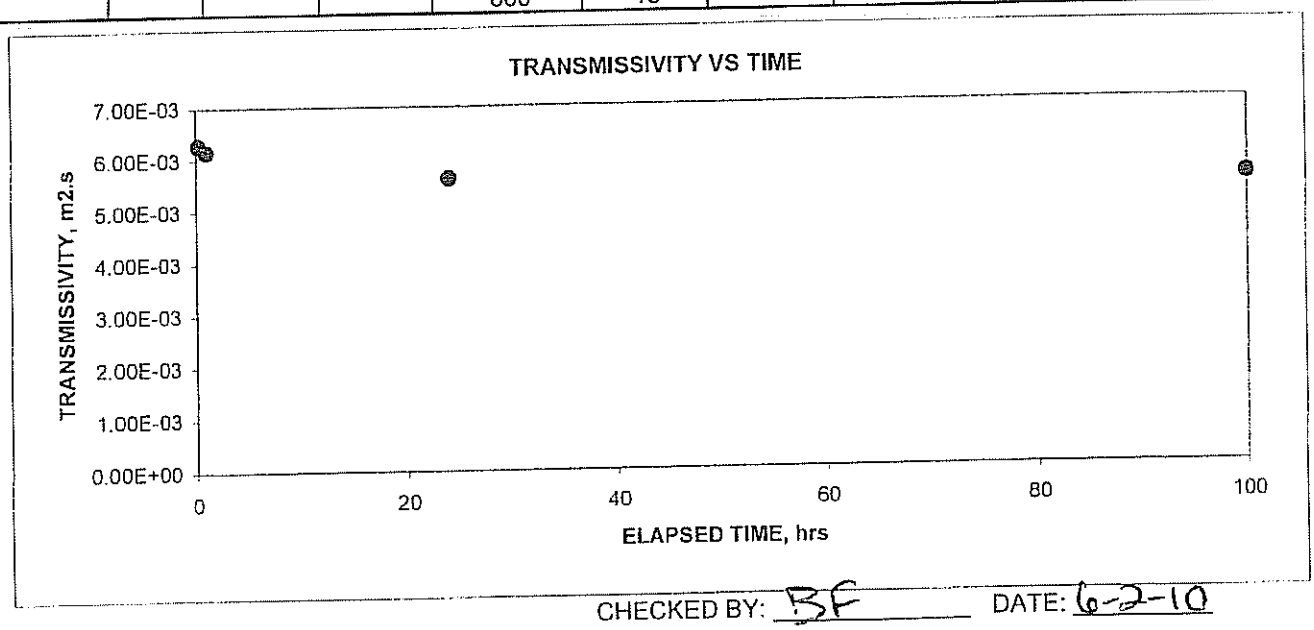
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-07
LAB I.D. NO.: L10017-07-05
ROLL NO.: 359210630
REPLICATE NO.: 1 of 1

TEST SECTION: AGRU 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.88	0.52	0.03	920 920 915	15 15 15	21.5	1.88E-01	0.910	6.28E-03
1	0.88	0.52	0.03	900 900 900	15 15 15	21.5	1.85E-01	0.892	6.16E-03
24	0.88	0.52	0.03	820 820 820	15 15 15	21.5	1.68E-01	0.813	5.61E-03
100	0.88	0.52	0.03	800 800 800	15 15 15	21.2	1.65E-01	0.799	5.51E-03



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INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-09
LAB ID NO.: L10017-09-01
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210675

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4065	0.4095	0.4114	0.4045	0.4148		
			0.4190	0.4062	0.4001	0.4113	0.4112	**0.4095**	0.0054
DENSITY	D 1505	g/cc	0.9539	0.9538	0.9538			**0.9538**	0.0001
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	5.4	7.5	5.5	5.6	4.1	**5.62**	1.212
	SIDE"B"	MD-lb/in	3.4	2.0	2.4	3.7	2.3	**2.75**	0.752

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

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INTEGRITY IN TESTING

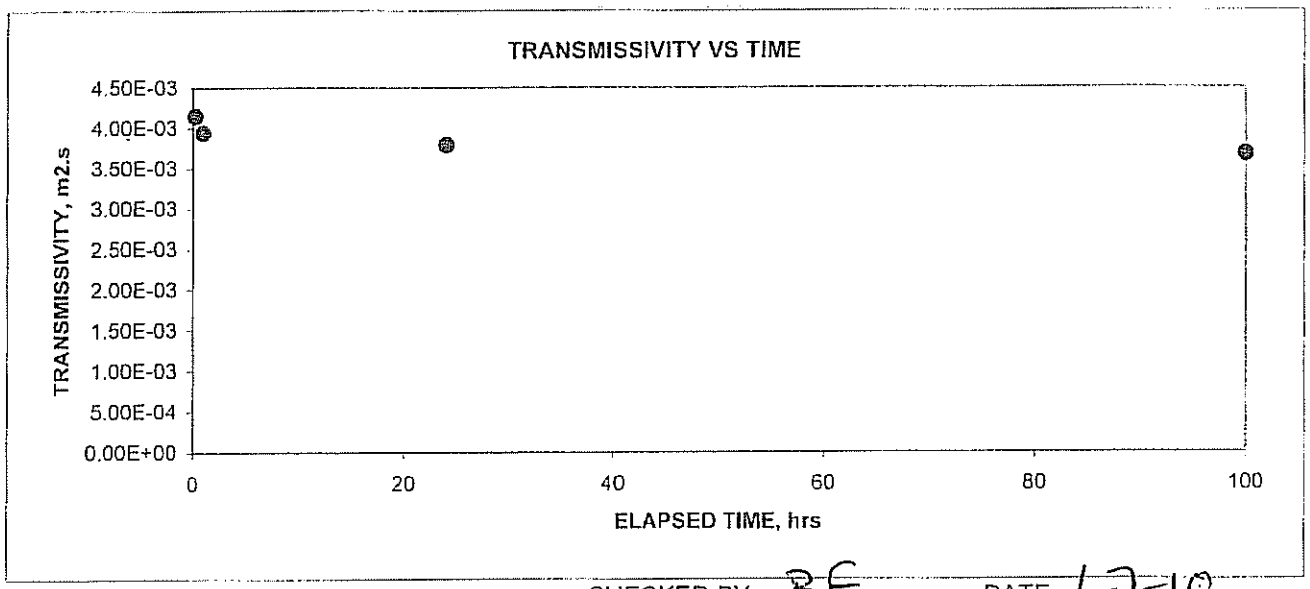
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-09
LAB I.D. NO.: L10017-09-01
ROLL NO.: 359210675
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.62	0.26	0.03	800 800 800	20 20 20	21.1	1.24E-01	0.601	4.14E-03
1	0.62	0.26	0.03	760 760 760	20 20 20	21.1	1.18E-01	0.571	3.94E-03
24	0.62	0.26	0.03	740 740 740	20 20 20	21.6	1.14E-01	0.549	3.79E-03
100	0.62	0.26	0.03	720 720 720	20 20 20	21.8	1.10E-01	0.531	3.67E-03



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INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-09
LAB ID NO.: L10017-09-02
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210720

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.4144 0.4198	0.4143 0.4225	0.4115 0.4129	0.4109 0.4088	0.4215 0.4138	**0.4150**	0.0047
DENSITY	D 1505	g/cc	0.9539	0.9541	0.9542			**0.9541**	0.0001
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	8.6	11.1	4.6	4.2	6.0	**6.90**	2.913
	SIDE"B"	MD-lb/in	3.7	3.7	5.6	3.5	2.3	**3.75**	1.182

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

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INTEGRITY IN TESTING

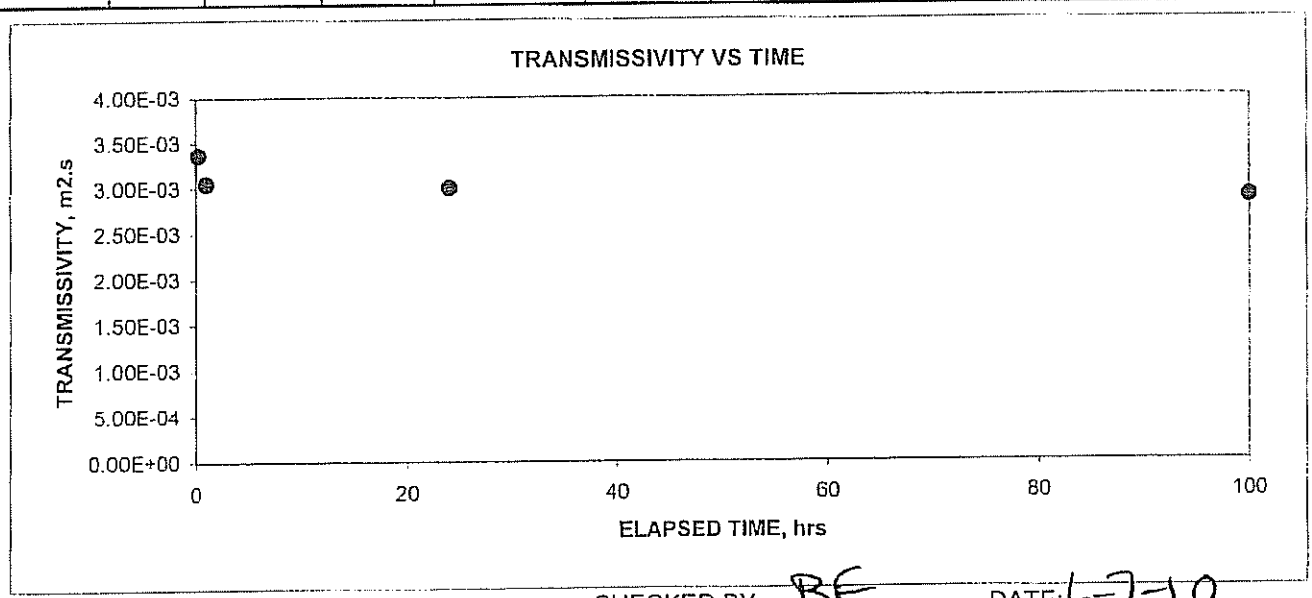
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-09
LAB I.D. NO.: L10017-09-02
ROLL NO.: 359210720
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.86	0.50	0.03	650 650 650	20 20 20	21.1	1.01E-01	0.488	3.37E-03
1	0.86	0.50	0.03	590 590 590	20 20 20	21.2	9.15E-02	0.442	3.05E-03
24	0.86	0.50	0.03	580 580 580	20 20 20	21.2	8.99E-02	0.434	3.00E-03
100	0.86	0.50	0.03	560 560 560	20 20 20	21.5	8.62E-02	0.416	2.87E-03



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INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-09
LAB ID NO.: L10017-09-03
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210765

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3921 0.4131	0.3939 0.3975	0.3997 0.4008	0.4019 0.3923	0.4124 0.3993	**0.4003**	0.0074
DENSITY	D 1505	g/cc	0.9536	0.9536	0.9535			**0.9536**	0.0001
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	12.3	7.4	8.0	5.5	7.5	**8.16**	2.503
	SIDE"B"	MD-lb/in	3.2	7.5	5.5	2.9	3.1	**4.45**	2.019

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

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TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

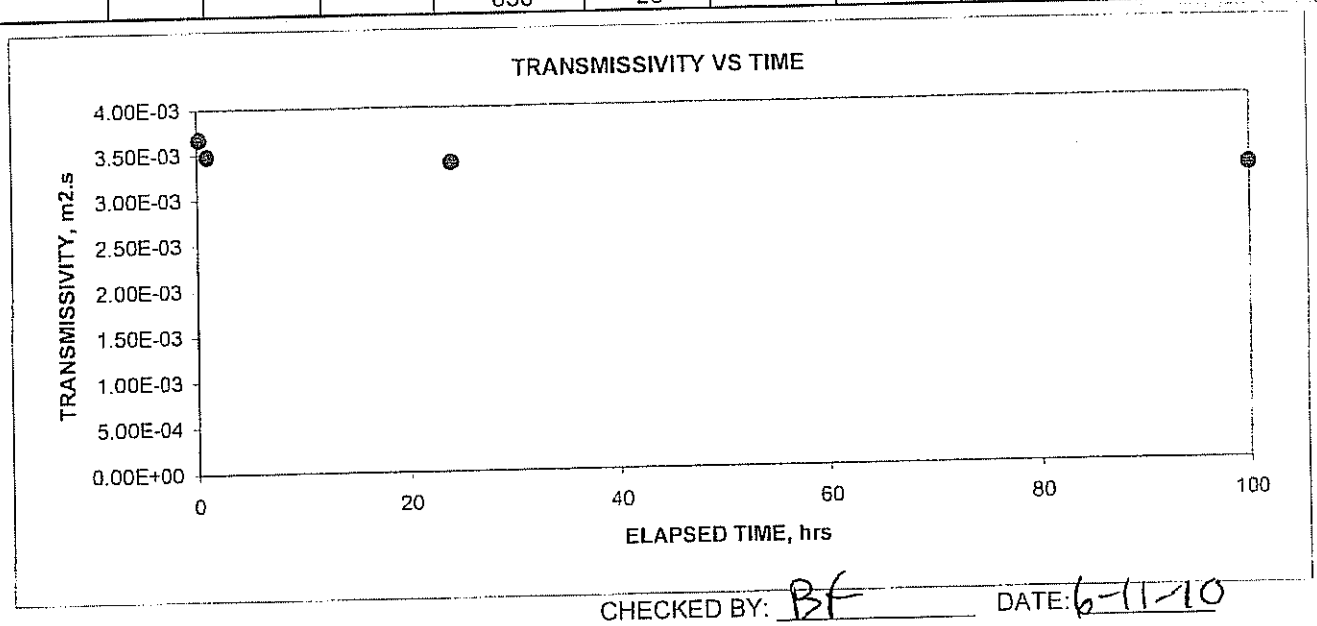
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-09
LAB I.D. NO.: L10017-09-03
ROLL NO.: 359210765
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.60	0.24	0.03	710 710 710	20 20 20	21.2	1.10E-01	0.532	3.67E-03
1	0.60	0.24	0.03	675 675 675	20 20 20	21.3	1.04E-01	0.504	3.48E-03
24	0.60	0.24	0.03	655 655 655	20 20 20	21.2	1.02E-01	0.491	3.38E-03
100	0.60	0.24	0.03	630 630 630	20 20 20	21.6	9.67E-02	0.467	3.22E-03



CHECKED BY: BF DATE: 6-11-10

C:\My Documents\EXCEL\Templates\[Trans100hr1Load1Grad.xls]Sheet1
\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-09-03 TRANS MARSHALL.xls]Rep1 L10017-09-03 6/11/2010

geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-09
LAB ID NO.: L10017-09-04
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210810

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3919 0.3971	0.3937 0.3935	0.3930 0.3904	0.3950 0.3949	0.3971 0.3926	**0.3939**	0.0022
DENSITY	D 1505	g/cc	0.9539	0.9538	0.9536			**0.9538**	0.0001
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	9.0	11.3	9.4	3.7	6.1	**7.90**	2.989
	SIDE"B"	MD-lb/in	6.0	7.5	3.9	2.0	3.9	**4.66**	2.141

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

CHECKED BY: CK DATE: 5/21/10

\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-09-04 COMP MARSHALL.xls]Sheet1 L10017-09-04 5/21/2010

TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

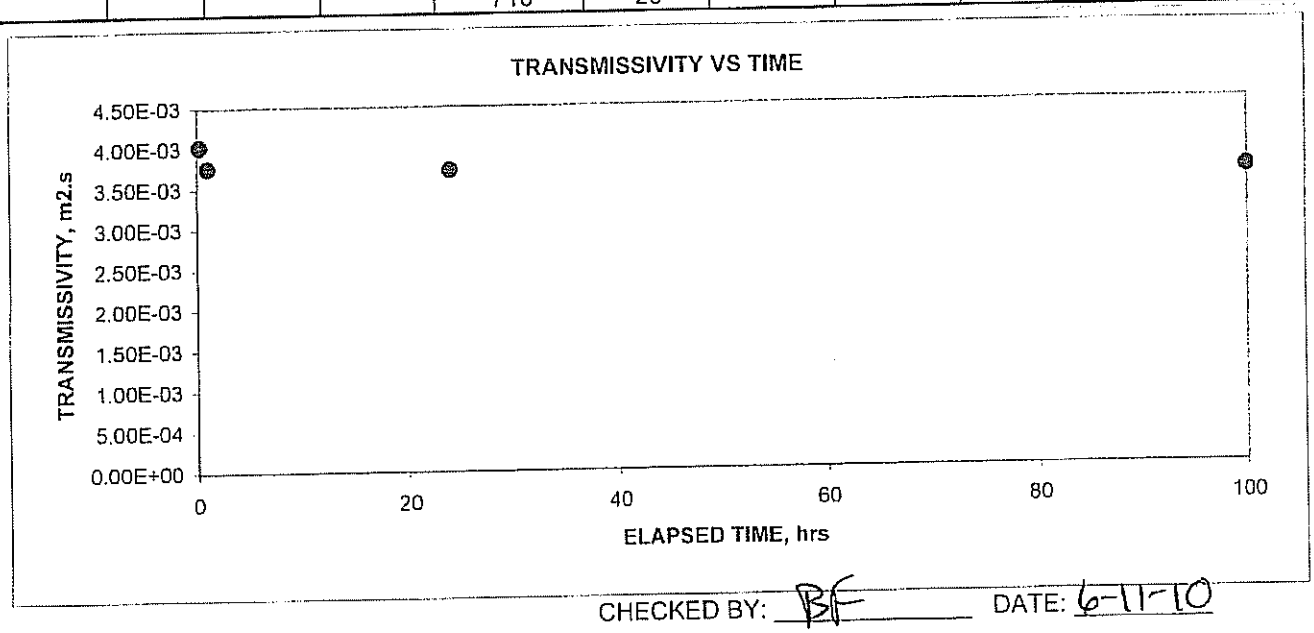
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-09
LAB I.D. NO.: L10017-09-04
ROLL NO.: 359210810
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.60	0.24	0.03	780 780 780	20 20 20	21.3	1.21E-01	0.583	4.02E-03
1	0.60	0.24	0.03	730 730 730	20 20 20	21.4	1.13E-01	0.544	3.75E-03
24	0.60	0.24	0.03	720 720 720	20 20 20	21.3	1.11E-01	0.538	3.71E-03
100	0.60	0.24	0.03	710 710 710	20 20 20	21.6	1.09E-01	0.527	3.63E-03



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\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-09-04 TRANS MARSHALL.xls]Rep1 L10017-09-04 6/11/2010

geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-09
LAB ID NO.: L10017-09-05
MATERIAL: SKAPS TN 330-2-8
ROLL NO: 359210855

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3938 0.3943	0.3837 0.3986	0.4020 0.4000	0.4038 0.4045	0.3961 0.4033	**0.3980**	0.0064
DENSITY	D 1505	g/cc	0.9549	0.9548	0.9549			**0.9549**	0.0001
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	17.3	6.1	7.6	10.4	3.4	**8.96**	5.290
	SIDE"B"	MD-lb/in	6.6	5.5	4.1	1.0	2.0	**3.84**	2.327

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

CHECKED BY: CK DATE: 5/21/10

\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-09-05 COMP MARSHALL.xls]Sheet1 L10017-09-05 5/21/2010

TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

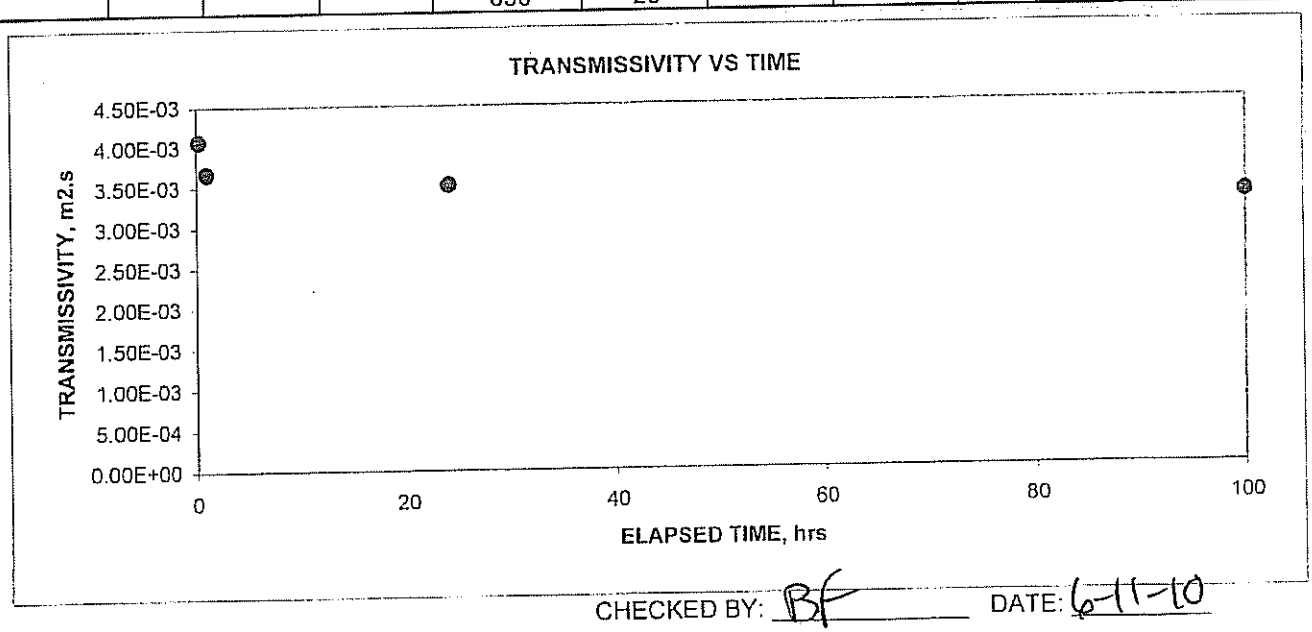
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-09
LAB I.D. NO.: L10017-09-05
ROLL NO.: 359210855
REPLICATE NO.: 1 of 1

TEST SECTION: PROTECTIVE COVER
SKAPS TN330-2-8 GEOCOMPOSITE - MD
AGRU 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.86	0.50	0.03	790 790 790	20 20 20	21.3	1.22E-01	0.590	4.07E-03
1	0.86	0.50	0.03	710 710 710	20 20 20	21.2	1.10E-01	0.532	3.67E-03
24	0.86	0.50	0.03	680 680 680	20 20 20	21.2	1.05E-01	0.509	3.51E-03
100	0.86	0.50	0.03	650 650 650	20 20 20	21.6	9.98E-02	0.482	3.33E-03



CHECKED BY: BF DATE: 6-11-10

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\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-09-05 TRANS MARSHALL.xls]Rep1 L10017-09-05 6/11/2010

350-mil, LDS Geocomposite Alternate Manufacturer's Quality Control (MQC) Test Results

SKAPS Industries

Engineered Synthetic Products, Inc.

April 16, 2010
Environmental Specialties International
7943 Pecue Lane, Suite A
Baton Rouge, LA 70809

Ref. :Duke Energy
Customer P.O. #
Transnet 350-2-8

We certify that the Transnet 350-2-8 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[5]				
Mass per Unit Area	ASTM D 5261	lbs/ft^2	0.162	Minimum
Thickness	ASTM D 5199	mil	200	Minimum
Carbon Black	ASTM D 4218	%	2 - 3	Range
Tensile Strength	ASTM D 5035	lbs/in	45	Minimum
Melt Flow	ASTM D 1238[4]	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm^3	0.94	Minimum
Composite				
Ply Adhesion	ASTM D 7005	lb/in	1.0	MARV[7]
Geotextile[5 & 6]				
Fabric Weight	ASTM D 5261	oz/yd^2	8.0	MARV
Grab Strength	ASTM D 4632	lbs	200	MARV
Tear Strength	ASTM D 4533	lbs	75	MARV
Puncture Resistance	ASTM D 4833	lbs	90	MARV
Static Puncture Strength	ASTM D 4833	lbs	500	MARV
Permittivity	ASTM D 4491	sec^{-1}	0.5	MARV
AOS	ASTM D 4751	US Sieve	80	MARV
UV Resistance	ASTM D 4355	%/hrs	70/500	MARV

Notes:

1 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.33 and a confining pressure of 500 psf between soil & liner after 24 hours.

2 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.02 and a confining pressure of 1000 psf between soil & liner after 24 hours.

3 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.02 and a confining pressure of 12000 psf between soil & liner after 100 hours.

4 Condition 190/2.16

5 Geotextile and Geonet properties are prior to lamination.

6 Geotextile data is provided by the supplier.

7 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 : TN 350-2-8
Project : Duke Energy

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	Bottom	Minimum	Average	
1	323410304	323410304 - N	3234.082	3234.104	1.77	3.53	
2	323410305	323410305 - N	3234.082	3234.104	1.77	3.53	
3	323410306	323410306 - N	3234.082	3234.104	1.77	3.53	
4	323410308	323410308 - N	3234.082	3234.104	1.77	3.53	
5	323410310	323410310 - N	3234.099	3234.091	1.77	3.53	
6	323410314	323410314 - N	3234.099	3234.091	1.77	3.53	
7	323410315	323410315 - N	3234.099	3234.091	1.77	3.53	
8	323410316	323410316 - N	3234.088	3234.102	1.77	3.53	
9	323410317	323410317 - N	3234.088	3234.102	1.77	3.53	
10	323410325	323410325 - N	3234.105	3234.093	1.23	3.06	
11	323410326	323410326 - N	3234.105	3234.093	1.23	3.06	
12	323410327	323410327 - N	3234.105	3234.093	1.23	3.06	
13	323410328	323410328 - N	3234.105	3234.093	1.23	3.06	
14	323410329	323410329 - N	3234.105	3234.093	1.23	3.06	
15	323410330	323410330 - N	3234.105	3234.093	1.23	3.06	

APPROVED 5 QA

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN 350-2-8**
Project : **Duke Energy**

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)
323410304 - N	26976-3	0.9548	0.415	343	2.29	112	
323410305 - N	26976-3	0.9548	0.415	343	2.29	112	
323410306 - N	26976-3	0.9548	0.415	343	2.29	112	
323410308 - N	26976-3	0.9548	0.415	343	2.29	112	
323410310 - N	26976-3	0.9548	0.421	347	2.66	118	
323410314 - N	26976-3	0.9548	0.421	347	2.66	118	
323410315 - N	26976-3	0.9548	0.421	347	2.66	118	
323410316 - N	26976-3	0.9548	0.421	347	2.66	118	
323410317 - N	26976-3	0.9548	0.421	347	2.66	118	
323410325 - N	26976-3	0.9552	0.417	345	2.35	114	
323410326 - N	26976-3	0.9552	0.417	345	2.35	114	
323410327 - N	26976-3	0.9552	0.417	345	2.35	114	
323410328 - N	26976-3	0.9552	0.417	345	2.35	114	
323410329 - N	26976-3	0.9552	0.417	345	2.35	114	
323410330 - N	26976-3	0.9552	0.419	350	2.60	116	

APPROVED 5 QA

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : TN 350-2-8
Project : Duke Energy

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	Bottom	Minimum	Average	
1	323410331	323410331 - N	3234.062	3234.052	1.23	3.06	
2	323410332	323410332 - N	3234.062	3234.052	1.23	3.06	
3	323410333	323410333 - N	3234.062	3234.052	1.23	3.06	
4	323410334	323410334 - N	3234.062	3234.052	1.23	3.06	
5	323410335	323410335 - N	3234.062	3234.052	1.23	3.06	
6	323410336	323410336 - N	3234.062	3234.052	1.23	3.06	
7	323410337	323410337 - N	3234.094	3234.098	1.23	3.06	
8	323410338	323410338 - N	3234.094	3234.098	1.23	3.06	
9	323410339	323410339 - N	3234.094	3234.098	1.23	3.06	
10	323410340	323410340 - N	3234.094	3234.098	1.75	3.50	
11	323410342	323410342 - N	3234.094	3234.098	1.75	3.50	
12	323410343	323410343 - N	3234.094	3234.098	1.75	3.50	
13	323410344	323410344 - N	3234.097	3234.089	1.75	3.50	
14	323410345	323410345 - N	3234.097	3234.089	1.75	3.50	
15	323410346	323410346 - N	3234.097	3234.089	1.75	3.50	
16	323410347	323410347 - N	3234.097	3234.089	1.75	3.50	
17	323410348	323410348 - N	3234.097	3234.089	1.75	3.50	
18	323410349	323410349 - N	3234.097	3234.089	1.75	3.50	
19	323410350	323410350 - N	3234.097	3234.089	1.75	3.50	
20	323410351	323410351 - N	3234.084	3234.096	1.75	3.50	
21	323410352	323410352 - N	3234.084	3234.096	1.75	3.50	
22	323410353	323410353 - N	3234.084	3234.096	1.75	3.50	
23	323410354	323410354 - N	3234.084	3234.096	1.75	3.50	
24	323410355	323410355 - N	3234.084	3234.096	1.75	3.50	
25	323410356	323410356 - N	3234.084	3234.096	1.75	3.50	
26	323410357	323410357 - N	3234.084	3234.096	1.75	3.50	

APPROVED 5 QA

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN 350-2-8**
Project : **Duke Energy**

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)
323410331 - N	26976-3	0.9552	0.417	345	2.35	114	
323410332 - N	26976-3	0.9552	0.417	345	2.35	114	
323410333 - N	26976-3	0.9552	0.417	345	2.35	114	
323410334 - N	26976-3	0.9552	0.417	345	2.35	114	
323410335 - N	26976-3	0.9552	0.417	345	2.35	114	
323410336 - N	26976-3	0.9552	0.417	345	2.35	114	
323410337 - N	26976-3	0.9552	0.417	345	2.35	114	
323410338 - N	26976-3	0.9552	0.417	345	2.35	114	
323410339 - N	26976-3	0.9552	0.417	345	2.35	114	
323410340 - N	26976-3	0.9552	0.413	341	2.39	113	
323410342 - N	26976-3	0.9552	0.413	341	2.39	113	
323410343 - N	26976-3	0.9552	0.413	341	2.39	113	
323410344 - N	26976-3	0.9552	0.413	341	2.39	113	
323410345 - N	26976-3	0.9552	0.413	341	2.39	113	
323410346 - N	26976-3	0.9552	0.413	341	2.39	113	
323410347 - N	26976-3	0.9552	0.413	341	2.39	113	
323410348 - N	26976-3	0.9552	0.413	341	2.39	113	
323410349 - N	26976-3	0.9552	0.413	341	2.39	113	
323410350 - N	26976-3	0.9552	0.422	352	2.71	119	
323410351 - N	26976-3	0.9552	0.422	352	2.71	119	
323410352 - N	26976-3	0.9552	0.422	352	2.71	119	
323410353 - N	26976-3	0.9552	0.422	352	2.71	119	
323410354 - N	26976-3	0.9552	0.422	352	2.71	119	
323410355 - N	26976-3	0.9552	0.422	352	2.71	119	
323410356 - N	26976-3	0.9552	0.422	352	2.71	119	
323410357 - N	26976-3	0.9552	0.422	352	2.71	119	

APPROVED 5 QA

SKAPS Industries

POLYETHYLENE RESIN CERTIFICATION

Customer Name : Environmental Specialties International
Project Name : Duke Energy
Geocomposite Manufacturer : SKAPS Industries
Geocomposite Production Plant : Commerce, GA
Geocomposite Brand Name : TN350-2-8

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*
New South Polymers, Inc	Formosa, TX	HDPE	26976-3	Density	ASTM D 1505	gm/cc	0.950	0.950
				Melt Flow Index	ASTM D 1238[(a)]	gm/10 min	0.17	0.17

(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 : TN350-2-8
Project : Duke Energy

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.	XMD TENSILE lbs.	MD TRAP lbs.	XMD TRAP lbs.	PUNCTURE lbs.	STATIC PUNCTURE STRENGTH lbs.	AOS us sieve	PERM-ITY sec^{-1}
323410304	3234.082	8.37	235	241	100	104	132	504	80	1.33
	3234.104	8.28	232	239	96	107	140	508	80	1.39
323410310	3234.099	8.14	228	237	105	120	138	502	80	1.33
	3234.091	8.18	230	233	105	120	138	502	80	1.33
323410316	3234.088	8.12	226	230	100	104	132	504	80	1.33
	3234.102	8.28	232	239	96	107	140	508	80	1.39
323410325	3234.105	8.16	234	245	96	107	140	508	80	1.39
	3234.093	8.18	230	233	105	120	138	502	80	1.33
323410331	3234.062	8.24	231	236	98	102	135	506	80	1.33
	3234.052	8.22	234	240	100	111	137	510	80	1.33
323410337	3234.094	8.18	230	233	105	120	138	502	80	1.33
	3234.098	8.14	228	237	105	120	138	502	80	1.33
323410344	3234.097	8.14	228	237	105	120	138	502	80	1.33
	3234.089	8.12	226	230	100	104	132	504	80	1.33
323410351	3234.084	8.37	235	241	100	104	132	504	80	1.33
	3234.096	8.14	228	237	105	120	138	502	80	1.33

571 Industrial Parkway, Commerce, GA 30529 Phone: 706-336-7000 Fax: 706-336-7007 Email: skaps@skaps.com

350-mil, LDS Geocomposite Alternate Conformance Test Results

geotechnics
INTEGRITY IN TESTING

CONFORMANCE TEST RESULTS

CLIENT: S&ME, INC.
CLIENT PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
PROJECT NO.: L10017-08
LAB ID NO.: L10017-08-01
MATERIAL: SKAPS TN 350-2-8
ROLL NO: 323410309

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
Geonet*									
THICKNESS	D 5199	inches	0.3501	0.3491	0.3499	0.3586	0.3522		
			0.3497	0.3474	0.3566	0.3508	0.3497	**0.3514**	0.0035
DENSITY	D 1505	g/cc	0.9528	0.9506	0.9503			**0.9512**	0.0014
Geocomposite									
PLY ADHESION	D 7005								
	SIDE "A"	MD-lb/in	3.0	2.4	3.6	3.3	2.9	**3.03**	0.469
	SIDE"B"	MD-lb/in	3.6	2.9	2.7	3.1	2.9	**3.02**	0.321

* GEONET TAKEN FROM GEOCOMPOSITE LOOSE ENDS

CHECKED BY: J.O DATE: 5-14-10

\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-08-01 COMP MARSHALL.xls]Sheet1 L10017-08-01 5/14/2010

TRANSMISSIVITY TEST RESULTS

ASTM D 4716-00

geotechnics
INTEGRITY IN TESTING

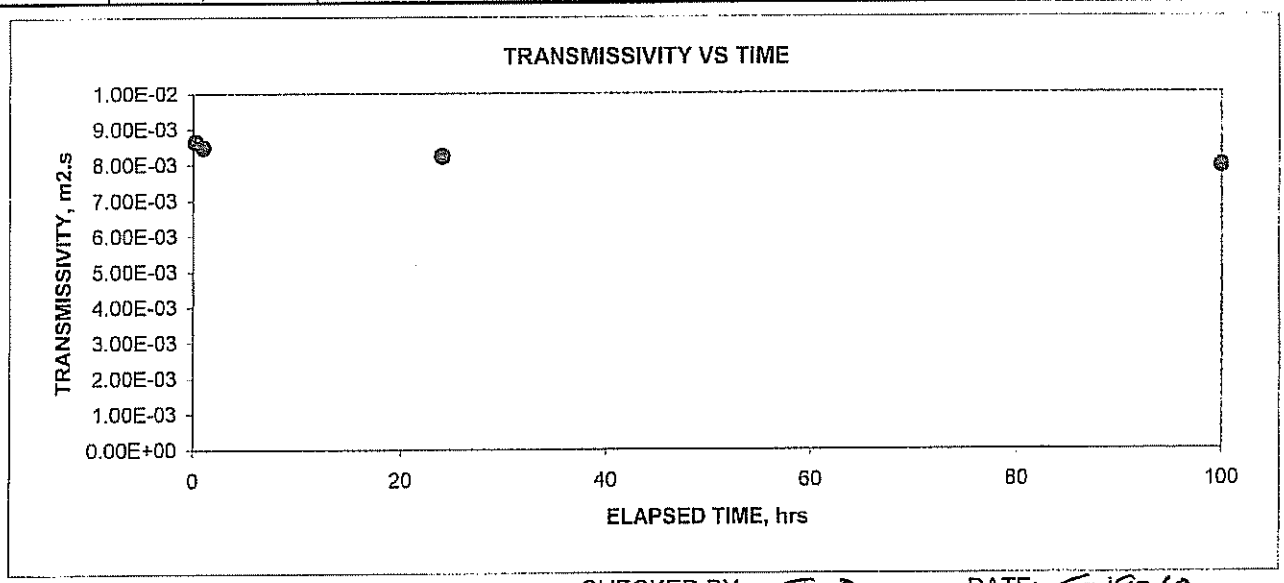
CLIENT: S&ME, INC.
PROJECT: MARSHALL STEAM STATION
INDUSTRIAL LANDFILL NO. 1
MATERIAL: SKAPS TN330-2-8 GEOCOMPOSITE

PROJECT NO.: L10017-08
LAB I.D. NO.: L10017-08-01
ROLL NO.: 323410309
REPLICATE NO.: 1 of 1

TEST SECTION: LINER 60 MIL MICROSPIKE (BOTTOM SIDE)
SKAPS TN330-2-8 GEOCOMPOSITE - MD
LINER 60 MIL MICROSPIKE (TOP SIDE)

7,200 psf NORMAL COMPRESSIVE STRESS

ELAPSED TIME (hrs)	MANOMETERS RES. (in)	MANOMETERS WEIR (in)	HYDR. GRAD.	COLLECTION DATA VOLUME (ml)	COLLECTION DATA TIME (sec.)	WATER TEMP °C	AVERAGE FLOW RATE (l/s-m)	AVERAGE FLOW RATE (gpm/ft)	CALCULATED TRANSMISSIVITY (m2/sec)
0.25	0.66	0.30	0.03	1230 1230 1230	15 15 15	20.4	2.59E-01	1.253	8.64E-03
1	0.66	0.30	0.03	1210 1210 1210	15 15 15	20.5	2.54E-01	1.230	8.48E-03
24	0.66	0.30	0.03	1160 1160 1160	15 15 15	20.0	2.47E-01	1.193	8.23E-03
100	0.66	0.30	0.03	1120 1120 1120	15 15 15	20.1	2.38E-01	1.149	7.93E-03



CHECKED BY: J.O DATE: 5-19-10

C:\My Documents\EXCEL\Templates\[Trans100hr1Load1Grad.xls]Sheet1
\\GEOSERVER\Data Drive\Synthetics\2010 SYNTHETICS\017 - S&ME, INC - MARSHALL STEAM\[L10017-08-01 TRANS MARSHALL.xls]Rep1 L10017-08-01 5/19/2010

APPENDIX II – GEOSYNTHETICS
Section 4 – Bills of Lading / Shipment Lists

PLASTIC FUSION FABRICATORS, INC.
THERMOPLASTIC CONSULTING FABRICATION INSTALLATION
3455 STANWOOD BLVD.
HUNTSVILLE, AL 35811
256/852/0378 BUS
256/852/0388 FAX

PACKING LIST

Date	PFF Order #	Your Order #	Sales Contact	Shipment #
4/29/2010	F10066	MSS11-003	LEIF MARTIN	8962

Sold To: EARNHARDT GRADING INC.
15220 STUMPTOWN RD.
HUNTERSVILLE NC 28078
704-875-6727

Ship To: DUKE ENERGY/MARSHALL STEAM STA.
ATTN: EARNHARDT/LF CELL 1 & 2
8320 EAST NC 150
TERRELL NC 28628
WILSON 704-361-7882

Qty Ordered	Back-Ordered	Qty Shipped	Description
6		6	EA. FABRICATED 18" SDR17 HDPE PERFORATED COLLECTION SUMPS.
			(SUMPS ARE 10' LONG)
			***ATTN: 3 EA. HAVE 7.7 DEGREE BENDS & 3 EA. HAVE 19.5 DEGREE
			BENDS.
6		6	EA. FABRICATED 18" HDPE FLANGE RINGS AND BLINDS @ 1" THICK
			AND WITH STAINLESS STEEL HARDWARE.
6		6	EA. FABRICATED 3" SDR11 HDPE SCREENED VENT PIPES @ 3' LONG.
			***ATTN: CALL WILSON WITH ETA AND UPON ARRIVAL AT PLANT TO
			GET ESCORTED TO UNLOADING SITE.

Total Shipping Units 1
Total Weight
Packed By Mike PITT

Shipped Via TRUCKING WITH CHARACTER
TRACKING #

60345900

PolyPipe® Trailer #11

Customer Service: 1-800-433-5632

Delivery Ticket#: 80032506
Date: 04/20/2010
Page 1 of 1

Sold To: PLASTIC FUSION FABRICATORS INC
Phone #: 256-852-0378
Deliver To: EARNHARDT GRADING INC
8320 EAST NC 150
TERRELL NC 28682
Payer: PLASTIC FUSION FABRICATORS INC
3455 STANWOOD BLVD
HUNTSVILLE AL 35811

Plant:
Polypipe Erwin
PO Box 199
37650 ERWIN
PH: 423-743-9116
#9700 Job No. 3040666

Order#:1000015123
Job#:P12751
Customer#:3040666
PO#:P12751
Type:3RD

Zone:
Total Load Wt: 17,246.600 LB

Bill freight to Payer Account
PLASTIC FUSION FABRICATORS INC
3455 STANWOOD BLVD
HUNTSVILLE AL 35811

Carrier# & Name:
Cont/Pro #:kustom

Over

Ordered By/Phone#:
LEIF 256-746-1257
256-746-1224 FAX
Shipping Instructions:
F.O.B. ERWIN, TENNESSEE --- SHIP VIA BEST WAY / THIRD PARTY

DELIVER THURSDAY 04-22-10

Jerry Deel

TAG: P.O.# MS511-003

24 HOUR PRECALL REQUIRED FOR DIRECTIONS AND DELIVERY INSTRUCTIONS - WILSON 704-361-7882
SOMEONE WILL MEET DRIVER AT GATE AND DIRECT TO PROPER DELIVERY LOCATION

Contact

*****THANK YOU FOR YOUR ORDER, WE APPRECIATE YOUR BUSINESS*****

BARRY BRITAIN FAX 940-665-8108 / barry.britain@polypipeinc.com / PHONE 888-433-5931

Load Quantity	UOM	Order Quantity	Product Code	Product Description	Units	UOM
700.000	FT	700.000	1306482	HD,BLK,IPS,18,17,50,W/I POLYPIPE PW HDPE WATER PIPE, AWWA C-906,	700.000	FT

Subject to Section 7 of conditions of applicable bill of lading. If this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement. The carrier shall not make delivery of the shipment without payment of freight and all other lawful charges.		Customer, by signing below, acknowledges receipt of the goods identified above.
Shipper Polypipe Inc	Freight Consignor	Customer EARNHARDT GRADING
Per 4-20-10 Date	Per Jerry Deel Date	Per Wilson Warlick Date 4-22-10

CUSTOMER DELIVERY

Flying "W" Plastics, Inc.
P.O. Box 759
487 Vanhorn Rd.
Glenville, WV 26351 USA

Phone: 304-462-5779
Fax: 304-462-7657
Fed ID: 55-071-3785

Packing Slip No. 31791

Invoice To: **Plastic Fusion Fabricators**
3455 Stanwood Blvd
Huntsville, AL 35811
Phone: 256-852-0378
Fax: 256-852-0378

Ship To: **EARNHARDT GRADING**
DUKE ENERGY/MARSHALL STEAM STA
8320 EAST NORTH CAROLINA 150
TERRELL, NC 28628
704-601-4290

Reference No.: MSSII-003

Ship Date	*Ship Via*	*Order Date*	*Cust ID*
4/21/2010	FWP Company Trucks	**03/22/2010**	338

Order Qty	*Ship/BO Qty*	*Part ID/Description*	*U/M*	*Your Order*	*Our Order*
450.00	**0.00** 450.00	**SP10I1700050** *Rev* 10" IPS SDR 17 100 PSI SPEC II 50' PE3408 AWWA PIPE	**FT** *FOB* *Terms* Net 30 Days *Salesperson* 1	**P12752**	**31791**
3,600.00	**700.00** 2,900.00	**SP10I1700050PF** *Rev* 10" IPS SDR 17 100 PSI SPEC II 50' PE3408 AWWA PIPE PERFORATED	**FT** *FOB* *Terms* Net 30 Days *Salesperson* 1	**P12752**	**31791**

SIGNATURE
PRINT

Flying "W" Plastics, Inc.
P.O. Box 759
487 Vanhorn Rd.
Glenville, WV 26351 USA

Phone: 304-462-5779
Fax: 304-462-7657
Fed ID: 55-071-3785

Packing Slip No. 31791-2

Invoice To: **Plastic Fusion Fabricators**
3455 Stanwood Blvd
Huntsville, AL 35811
Phone: 256-852-0378
Fax: 256-852-0378

Ship To: **EARNHARDT GRADING**
DUKE ENERGY/MARSHALL STEAM STA
8320 EAST NORTH CAROLINA 150
TERRELL, NC 28628
704-601-4290

Reference No.: MSSII-003

Ship Date	*Ship Via*	*Order Date*	*Cust ID*
4/22/2010	FWP Company Trucks	**03/22/2010**	338

Order Qty	*Ship/BO Qty*	*Part ID/Description*	*U/M*	*Your Order*	*Our Order*
450.00	**450.00** 0.00	**SP10I1700050** *Rev* 10" IPS SDR 17 100 PSI SPEC II 50' PE3408 AWWA PIPE	**FT** *FOB* *Terms* Net 30 Days *Salesperson* 1	**P12752**	**31791**
3,600.00	**2,900.00** 0.00	**SP10I1700050PF** *Rev* 10" IPS SDR 17 100 PSI SPEC II 50' PE3408 AWWA PIPE PERFORATED	**FT** *FOB* *Terms* Net 30 Days *Salesperson* 1	**P12752**	**31791**

STRAIGHT BILL OF LADING
ORIGINAL - NOT NEGOTIABLE

BOL# 10-01-1001-002

Environmental Specialties International, Inc
7943 Pecue Lane Suite A
Baton Rouge, LA 70809

DATE 6/1/2010

CH Robinson / Meteor Express
(NAME OF CARRIER) (SCAC)

TO:		FROM:	
CONSIGNEE	Duke Energy Marshall Steam Plant LF #1	SHIPPER	Environmental Specialties International, Inc.
STREET	8320 NC Highway 150 E	STREET	7943 Pecue Lane, Suite A
DESTINATION	Terrell, NC	ORIGIN	Baton Rouge, La 70809
ZIP CODE	28682	Attention:	Fred Clark 225-317-4087
Contact:	Attn: W. Warlick 704-361-7882 Seal #	TAG # / TRL #	TR 5M 7P 49118

NO. SPECIFIC UNITS	HM	KIND OF PACKAGING, DESCRIPTION OF ARTICLES	Quantity	WEIGHT (SUBJECT TO CORRECTION)
20 rolls		Composite (15'x 3' x 1200 lbs)	20 rolls	24,000 lbs
		SHIPMENT OF		
		ALTERNATE GEOCOMPOSITE		
		Roll # 323410305, 323410306		
		323410357, 323410307		
		323410310, 323410311		
		323410312, 323410313		
		323410314, 323410315		
		323410316, 323410317		
		323410318, 323410319		
		323410325, 323410326		
		323410327, 323410328		
		323410329, 323410330		
Total			Total	Total
20 rolls			20 rolls	24,000 lbs

REMIT C.O.D. TO
ADDRESS - ESI @ 7943 Pecue Lane, Suite A, Baton Rouge, LA

COD AMT:

C.O.D. PREPAID $
FEE: COLLECT $

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Carrier: CH Robinson

Shipper: ESI
Baton Rouge, LA

Per:

Driver:

Driver's #:

Date: 6/1/2010

* Mark with "X" to designate Hazardous Material as defined in Title 49 of the Code of Federal Regulations

STRAIGHT BILL OF LADING
ORIGINAL - NOT NEGOTIABLE

BOL# 10-01-1001-001

Environmental Specialties International, Inc
7943 Pecue Lane Suite A
Baton Rouge, LA 70809

DATE 6/1/2010

CH Robinson
(NAME OF CARRIER) (SCAC)

TO:		FROM:	
CONSIGNEE	Duke Energy Marshall Steam Plant LF #1	SHIPPER	Environmental Specialties International, Inc.
STREET	8320 NC Highway 150 E	STREET	7943 Pecue Lane, Suite A
DESTINATION	Terrell, NC	ORIGIN	Baton Rouge, La 70809
ZIP CODE	28682	Attention:	Fred Clark 225-317-4087

TAG #

Contact: Attn: W. Warlick 704-361-7882 Seal # TPL #

NO. SHIPPING UNITS	TIM	KIND OF PACKAGING, DESCRIPTION OF ARTICLES,	Quantity	WEIGHT (SUBJECT TO CORRECTION)
20 rolls		Composite (15'x 3' x 1200 lbs)	20 rolls	24,000 lbs.
		SHIPMENT OF		
		ALTERNATE GEOCOMPOSITE		
		Roll # 323410335, 323410337		
		323410338, 323410339		
		323410340, 323410341		
		323410342, 323410343		
		323410344, 323410304		
		323410321, 323410322		
		323410323, 323410324		
		323410331, 323410332		
		323410333, 323410334		
		323410336, 323410320		
Total			Total	Total
20 rolls			20 rolls	24,000 lbs.

REMIT C.O.D. TO: COD AMT: C.O.D. PREPAID $
ADDRESS - ESI @ 7943 Pecue Lane, Suite A, Baton Rouge, LA FEE: COLLECT $

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment

Carrier: CH Robinson

Shipper: *ESI*
Baton Rouge, LA

Driver:

Per:

Driver's #:

Date: 6/1/2010

Mark with "X" to designate Hazardous Material as defined in Title 49 of the Code of Federal Regulations

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14890

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/25/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210300	2240	16	359210369	2240
2	359210301	2240	17	359210371	2240
3	359210302	2240	18	359210374	2240
4	359210303	2240	19	359210375	2240
5	359210315	2240	20	359210376	2240
6	359210316	2240	21	359210377	2240
7	359210322	2240	22	359210379	2240
8	359210323	2240	23	359210380	1680
9	359210326	2240	24	359210382	2240
10	359210330	2240	25	359210383	2240
11	359210331	2240	26	359210384	2240
12	359210332	2240	27	359210385	2240
13	359210366	2240			
14	359210367	2240			
15	359210368	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,920
Total Weight: 35,361

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Loadpro
Date : 5/25/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14891

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/25/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210076	1400	16	359210321	2240
2	359210077	2240	17	359210324	2100
3	359210078	2240	18	359210325	2240
4	359210304	2240	19	359210327	2240
5	359210305	2240	20	359210328	2240
6	359210306	2240	21	359210329	2240
7	359210307	2240	22	359210333	2240
8	359210308	2240	23	359210364	2240
9	359210309	2240	24	359210365	2240
10	359210311	2240	25	359210372	2240
11	359210312	2240	26	359210373	2240
12	359210313	2240	27	359210381	2240
13	359210318	2240			
14	359210319	2240			
15	359210320	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,500
Total Weight: 35,300

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : KEMTU
Driver's Name : JEFF THOMPSON
Driver's Sign :
Driver's Cell Phone # : 418-222-8435
Trucking Co. : KEMTU (CANADA)
Trucking Co. Phone # : Same
Broker : Cheetah
Date : 5/25/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14899

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/26/2010

Cust. P.O. # 13179

Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.
1	359210001	2240
2	359210002	2520
3	359210003	2240
4	359210004	2240
5	359210005	2240
6	359210006	2240
7	359210023	2240
8	359210025	2240
9	359210026	2240
10	359210027	2240
11	359210028	2240
12	359210030	2240
13	359210037	2240
14	359210038	2240
15	359210039	1960
16	359210040	2240
17	359210041	2240
18	359210047	2240
19	359210048	2240
20	359210049	2240
21	359210050	2240
22	359210052	2240
23	359210055	2240
24	359210057	2240
25	359210058	2240
26	359210059	2240
27	359210060	2240

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,480
Total Weight: 36,881

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : _____

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # : _____
Seal # : _____

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : _____
Driver's Name : _____
Driver's Sign : _____
Driver's Cell Phone # : _____
Trucking Co. : _____
Trucking Co. Phone # : _____
Broker : Mercer
Date : 5/26/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER _____

SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14904

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/26/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210007	2240	16	359210042	2240
2	359210008	1890	17	359210043	2240
3	359210009	2520	18	359210044	2240
4	359210010	2240	19	359210045	2240
5	359210011	2240	20	359210046	2240
6	359210019	2240	21	359210051	2240
7	359210020	2240	22	359210053	2240
8	359210021	2170	23	359210054	2240
9	359210022	2170	24	359210056	2240
10	359210024	2240	25	359210061	2240
11	359210029	2240	26	359210062	2240
12	359210031	2240	27	359210063	2240
13	359210032	2240			
14	359210033	2240			
15	359210034	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,270
Total Weight: 36,777

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

2 BAGS OF TIES
RETURN

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Anderson
Date : 5/26/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14910

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/26/2010

Cust. P.O. # : 13179

Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210012	2240	16	359210192	2240
2	359210013	2240	17	359210193	2240
3	359210014	2240	18	359210194	2240
4	359210015	2240	19	359210195	2240
5	359210016	2240	20	359210196	2240
6	359210017	2240	21	359210197	2240
7	359210018	2240	22	359210198	2240
8	359210035	2240	23	359210199	1400
9	359210036	2240	24	359210419	2240
10	359210185	2240	25	359210422	2240
11	359210187	2240	26	359210423	2240
12	359210188	2240	27	359210426	2240
13	359210189	2240			
14	359210190	2240			
15	359210191	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,640
Total Weight: 36,699

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :

Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Lonestar
Date : 5/26/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER 5/26/10
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries, subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14911

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/27/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210159	2240	16	359210174	2240
2	359210160	2240	17	359210175	2240
3	359210161	2240	18	359210176	2240
4	359210162	2240	19	359210177	2240
5	359210163	2240	20	359210178	2240
6	359210164	2240	21	359210179	2240
7	359210165	2240	22	359210180	2240
8	359210166	2240	23	359210181	2240
9	359210167	2240	24	359210182	2240
10	359210168	2240	25	359210183	2240
11	359210169	2240	26	359210184	2240
12	359210170	2240	27	359210186	2240
13	359210171	2240			
14	359210172	2240			
15	359210173	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet : 60,480
Total Weight : 36,935

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday
2) Driver must call 706-336-7000 when unloaded
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice. failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Cheetah
Date : 5/27/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

#1623

Bill of Lading # : 14914

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/27/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210334	2240	16	359210351	2240
2	359210337	2240	17	359210352	1400
3	359210338	2240	18	359210353	2240
4	359210339	2240	19	359210354	2240
5	359210340	2240	20	359210355	2240
6	359210341	2240	21	359210356	2240
7	359210342	2240	22	359210357	2240
8	359210343	2240	23	359210358	2240
9	359210344	2240	24	359210360	2240
10	359210345	2240	25	359210361	2240
11	359210346	2240	26	359210362	2240
12	359210347	2240	27	359210363	2240
13	359210348	2240			
14	359210349	2240			
15	359210350	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,640
Total Weight: 35,566

Bags of ties : 2 (IN TRL# SIDE BOX)

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : DAVID HAUEN
Driver's Name :
Driver's Sign :
Driver's Cell Phone # : 803-378-2430
Trucking Co. : SENN
Trucking Co. Phone # : 800-447-0792
Broker : Loadpro
Date : 5/27/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14926

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/27/2010

Cust. P.C. # : 13179

Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210105	2240	16	359210121	1890
2	359210106	2240	17	359210122	2240
3	359210108	2240	18	359210123	2240
4	359210109	2240	19	359210124	2240
5	359210110	2240	20	359210125	2240
6	359210111	2240	21	359210126	2240
7	359210112	2240	22	359210127	2240
8	359210113	2240	23	359210128	2240
9	359210114	2240	24	359210129	2240
10	359210115	2240	25	359210131	2240
11	359210116	2240	26	359210132	2240
12	359210117	2240	27	359210133	2240
13	359210118	2240			
14	359210119	2240			
15	359210120	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,130
Total Weight: 36,558

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Lonestar
Date : 5/27/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER

SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14927

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/28/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210130	2240	16	359210148	2240
2	359210134	2240	17	359210149	2240
3	359210135	2240	18	359210150	2240
4	359210136	2240	19	359210151	2240
5	359210137	2240	20	359210152	2240
6	359210138	2240	21	359210153	2240
7	359210139	2240	22	359210154	2240
8	359210140	2240	23	359210155	2240
9	359210141	2240	24	359210156	2240
10	359210142	2240	25	359210157	2240
11	359210143	2240	26	359210158	2240
12	359210144	2240	27	359210200	2240
13	359210145	2240			
14	359210146	2240			
15	359210147	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,480
Total Weight: 36,755

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign . [signature]

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name : [illegible]
Driver's Sign : [signature]
Driver's Cell Phone # : 704 902-[illegible]
Trucking Co. : Landy W. Overcash
Trucking Co. Phone # : 704-[illegible]-6706
Broker : Mercer
Date : 5/28/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER [signature] 5-28-10
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either. (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14928

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/27/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210079	2240	16	359210094	2240
2	359210080	2240	17	359210095	2240
3	359210081	2240	18	359210096	2240
4	359210082	2100	19	359210097	2240
5	359210083	2240	20	359210098	2240
6	359210084	2240	21	359210099	2240
7	359210085	2240	22	359210100	2240
8	359210086	2240	23	359210101	2240
9	359210087	2240	24	359210102	2240
10	359210088	2240	25	359210103	2240
11	359210089	2240	26	359210104	2240
12	359210090	2240	27	359210107	2240
13	359210091	2240			
14	359210092	2240			
15	359210093	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,340
Total Weight: 36,884

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : _____

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # : _____
Seal # : _____

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : _____
Driver's Name : _____
Driver's Sign : _____
Driver's Cell Phone # : _____
Trucking Co. : _____
Trucking Co. Phone # : _____
Broker : Lonestar
Date : 5/27/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER _____
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14933

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/28/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210275	2240	16	359210290	2240
2	359210276	2240	17	359210291	2240
3	359210277	2240	18	359210292	2240
4	359210278	2240	19	359210293	2240
5	359210279	2240	20	359210294	2240
6	359210280	2240	21	359210295	2240
7	359210281	2240	22	359210296	2240
8	359210282	2240	23	359210297	2240
9	359210283	2240	24	359210298	2240
10	359210284	2240	25	359210299	2240
11	359210285	2240	26	359210335	2240
12	359210286	2240	27	359210336	2240
13	359210287	2240			
14	359210288	2380			
15	359210289	2380			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,760
Total Weight: 35,819

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Lonestar
Date : 5/28/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14935

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/28/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210258	2240	16	359210274	2240
2	359210259	2240	17	359210414	2240
3	359210260	2240	18	359210415	2240
4	359210262	2240	19	359210416	2240
5	359210263	2240	20	359210417	2240
6	359210264	2240	21	359210418	2240
7	359210265	2240	22	359210420	2240
8	359210266	2240	23	359210421	2240
9	359210267	2240	24	359210424	2240
10	359210268	2240	25	359210425	2240
11	359210269	2240	26	359210427	2240
12	359210270	2240	27	359210428	2240
13	359210271	2240			
14	359210272	2240			
15	359210273	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,480
Total Weight: 35,156

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : 704-269-7032
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Lonestar
Date : 5/28/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER 5-28-10
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14937

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 5/28/2010
Cust. P O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210230	2240	16	359210247	2240
2	359210233	2240	17	359210248	2240
3	359210234	2240	18	359210249	2240
4	359210235	2240	19	359210250	2240
5	359210236	2240	20	359210251	2240
6	359210237	2240	21	359210252	2240
7	359210238	2240	22	359210253	2240
8	359210239	2240	23	359210254	2240
9	359210240	2240	24	359210255	2240
10	359210241	2240	25	359210256	2240
11	359210242	2240	26	359210257	2170
12	359210243	2240	27	359210261	2240
13	359210244	2240			
14	359210245	2240			
15	359210246	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,410
Total Weight: 35,324

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : _____

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # : _____
Seal # : _____

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : _____
Driver's Name : _____
Driver's Sign : _____
Driver's Cell Phone # : _____
Trucking Co. : _____
Trucking Co. Phone # : _____
Broker : Loadpro
Date : 5/28/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER _____

SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14938

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/1/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210387	2240	16	359210402	2240
2	359210388	2240	17	359210403	2240
3	359210389	2240	18	359210404	2240
4	359210390	2380	19	359210405	2240
5	359210391	2240	20	359210406	2240
6	359210392	2240	21	359210407	2240
7	359210393	2240	22	359210408	2240
8	359210394	2240	23	359210409	2240
9	359210395	2240	24	359210410	2240
10	359210396	2240	25	359210411	2240
11	359210397	2240	26	359210412	2240
12	359210398	2240	27	359210413	2240
13	359210399	2240			
14	359210400	2240			
15	359210401	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,620
Total Weight: 34,230

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : [illegible]

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : [illegible]
Driver's Name : [illegible]
Driver's Sign : [illegible]
Driver's Cell Phone # : 803-209-1876
Trucking Co. : Long Star Eds
Trucking Co. Phone # :
Broker : Lonestar
Date : 6/1/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14940

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/1/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210570	2240	16	359210589	2240
2	359210571	2240	17	359210590	2240
3	359210572	2240	18	359210591	2800
4	359210573	2240	19	359210592	2240
5	359210574	2240	20	359210593	2240
6	359210575	2240	21	359210594	2240
7	359210578	2240	22	359210595	2240
8	359210579	2240	23	359210596	2240
9	359210580	2240	24	359210606	1820
10	359210581	2240	25	359210627	2240
11	359210582A	1400	26	359210629	2240
12	359210584	1820	27	359210630	2240
13	359210585	2100			
14	359210587	2240			
15	359210588	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,220
Total Weight: 38,281

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : _____

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # : _____
Seal # : _____

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : _____
Driver's Name : _____
Driver's Sign : _____
Driver's Cell Phone # : _____
Trucking Co. : _____
Trucking Co. Phone # : _____
Broker : Anderson Tr.
Date : 6/1/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER _____
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14941

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/1/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210204	2240	16	359210220	2240
2	359210205	2240	17	359210221	2240
3	359210206	2240	18	359210222	2240
4	359210207	2240	19	359210223	2240
5	359210208	2240	20	359210224	2240
6	359210209	2240	21	359210225	2240
7	359210210	2240	22	359210226	2240
8	359210211	2240	23	359210227	2240
9	359210212	2240	24	359210228	2240
10	359210213	2100	25	359210229	2240
11	359210214	2240	26	359210231	2240
12	359210215	2240	27	359210232	2240
13	359210217	2240			
14	359210218	2240			
15	359210219	2030			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,130
Total Weight: 33,981

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Cheetah
Date : 6/1/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) If the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # 14942

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip: Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date: 6/1/2010
Cust. P.O. #: 13179
Job #: 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210064	2240	16	359210216	2240
2	359210065	2240	17	359210442	2240
3	359210066	2240	18	359210452	2240
4	359210067	2240	19	359210576	2240
5	359210068	2240	20	359210577	2240
6	359210069	2240	21	359210583A	1400
7	359210070	2240	22	359210586	2240
8	359210071	2240	23	359210603	2240
9	359210072	2240	24	359210604	1400
10	359210073	2240	25	359210605	2240
11	359210074	2240	26	359210613	2240
12	359210075	2240	27	359210628	2240
13	359210201	2100			
14	359210202	2240			
15	359210203	2240			

SHIPMENT SUMMARY

Product Code: TN 330-2-8

Total Rolls: 27
Total Sq. Feet: 58,660
Total Weight: 36,507

Bags of ties: 2

Driver sign below if you have received above mentioned items:

Driver's Sign: CHARLES

ATTN RECEIVER: If ties are not collected from driver, *SKAPS* will not assume responsibility

Container #:
Seal #:

Driver Requirements:

1) For Monday delivery driver must call on Friday
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by:
Driver's Name: CHARLES
Driver's Sign: CHALE
Driver's Cell Phone #: 1-864-992-7160
Trucking Co.: CROMER
Trucking Co. Phone #: 1-864-445-4640
Broker: Lonestar
Date: 6/1/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS 571 INDUSTRIAL PKWY
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries Subject to the above terms and conditions as to which party is the Shipper. Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14946

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/2/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210465	2240	16	359210496	2100
2	359210466	2100	17	359210497	2240
3	359210467	2240	18	359210498	2170
4	359210468	2240	19	359210499	2240
5	359210476	2240	20	359210500	2240
6	359210478	2240	21	359210501	2240
7	359210480	2240	22	359210503	2240
8	359210481	2240	23	359210508	2240
9	359210485	2240	24	359210509	2240
10	359210486	2240	25	359210510	2240
11	359210487	2240	26	359210511	2240
12	359210491	2240	27	359210512	2240
13	359210493	2240			
14	359210494	2240			
15	359210495	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,130
Total Weight: 39,432

Bags of ties : 2

Driver sign below if you have received above mentioned Items :

Driver's Sign : _____

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # : _____
Seal # : _____

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : _____
Driver's Name : _____
Driver's Sign : _____
Driver's Cell Phone # : _____
Trucking Co. : _____
Trucking Co. Phone # : _____
Broker : Cheetah
Date : 6/2/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER _____
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

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STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14947

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/2/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210455	2240	16	359210482	2240
2	359210457	2030	17	359210483	2240
3	359210461	2240	18	359210484	2240
4	359210462	2240	19	359210488	2240
5	359210463	2240	20	359210489	2240
6	359210464	2240	21	359210490	2240
7	359210469	2240	22	359210492	2240
8	359210470	2240	23	359210502	2240
9	359210471	2240	24	359210504	2240
10	359210472	2240	25	359210505	2240
11	359210473	2240	26	359210506	2240
12	359210474	1400	27	359210507	2240
13	359210475	1750			
14	359210477	2240			
15	359210479	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 58,940
Total Weight: 39,292

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : _____

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # : _____
Seal # : _____

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : _____
Driver's Name : _____
Driver's Sign : _____
Driver's Cell Phone # : _____
Trucking Co. : _____
Trucking Co. Phone # : _____
Broker : Cheetah
Date : 6/2/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER _____
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper. Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14949

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/2/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210527	2240	16	359210556	2240
2	359210533	2240	17	359210557	2240
3	359210542	2240	18	359210558	2240
4	359210543	2240	19	359210559	2240
5	359210544	2240	20	359210562	2240
6	359210545	2240	21	359210563	2450
7	359210546	2240	22	359210564	2240
8	359210547	2240	23	359210565	2240
9	359210548	2240	24	359210566	2240
10	359210549	2240	25	359210567	2240
11	359210550	2240	26	359210568	2240
12	359210551	2240	27	359210569	1680
13	359210553	2240			
14	359210554	2240			
15	359210555	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,130
Total Weight: 39,500

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. : Gem
Trucking Co. Phone # :
Broker : Lonestar
Date : 6/2/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

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SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14954

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/2/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210513	2240	16	359210532	2240
2	359210514	2240	17	359210534	2240
3	359210515	2240	18	359210535	2310
4	359210519	2240	19	359210536	2310
5	359210520	2240	20	359210537	2240
6	359210521	2240	21	359210538	2240
7	359210522	2240	22	359210539	2240
8	359210523	2240	23	359210540	2240
9	359210524	2240	24	359210541	1820
10	359210525	2240	25	359210552	2240
11	359210526	2240	26	359210560	2240
12	359210528	2240	27	359210561	1540
13	359210529	2240			
14	359210530	2240			
15	359210531	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,500
Total Weight: 39,468

Bags of ties : 2

Driver sign below if you have received above-mentioned items :

Driver's Sign

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by
Driver's Name
Driver's Sign
Driver's Cell Phone #
Trucking Co.
Trucking Co. Phone #
Broker : Lonestar
Date : 6/2/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14961

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/3/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210429	2240	16	359210460	2240
2	359210430	2240	17	359210516	2240
3	359210432	1960	18	359210517	2240
4	359210433	2240	19	359210518	2240
5	359210435	2240	20	359210609	2240
6	359210444	2240	21	359210610	2240
7	359210446	2240	22	359210611	2240
8	359210447	2240	23	359210612	2240
9	359210448	2240	24	359210622	2240
10	359210451	2240	25	359210623	2240
11	359210453	2240	26	359210624	2030
12	359210454	2240	27	359210626	2240
13	359210456	2240			
14	359210458	2240			
15	359210459	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,990
Total Weight: 39,119

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : [illegible]

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : Ronnie
Driver's Name : [illegible]
Driver's Sign : 910-734-1204
Driver's Cell Phone # : OBL
Trucking Co. : 910-734-1204
Trucking Co. Phone # :
Broker : Anderson Tr.
Date : 6/3/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14966

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/3/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210314A	1400	16	359210601	2240
2	359210386	2240	17	359210602	2240
3	359210431	1960	18	359210607	2240
4	359210434	2240	19	359210608	2240
5	359210439	2240	20	359210614	2240
6	359210440	2030	21	359210615	2240
7	359210441	2240	22	359210616	2240
8	359210443	2240	23	359210617	2240
9	359210445	2240	24	359210618	2240
10	359210449	2240	25	359210619	2240
11	359210450	2240	26	359210620	2240
12	359210597	2240	27	359210621	2240
13	359210598	2240			
14	359210599	2240			
15	359210600	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,150
Total Weight: 38,394

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Anderson Tr.
Date : 6/3/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14969

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/3/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210631	2240	16	359210646	2240
2	359210632	2240	17	359210647	2240
3	359210633	2240	18	359210648	1960
4	359210634	2240	19	359210649	2450
5	359210635	2240	20	359210650	2100
6	359210636	2240	21	359210651	2240
7	359210637	2240	22	359210652	2240
8	359210638	2240	23	359210653	2240
9	359210639	2240	24	359210654	2240
10	359210640	2240	25	359210655	2240
11	359210641	2240	26	359210656	1820
12	359210642	2240	27	359210657	2240
13	359210643	2240			
14	359210644	2240			
15	359210645	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,850
Total Weight: 38,914

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : Toby T. Campbell

ATTN RECEIVER : If ties are not collected from driver, SKAPS will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign : Toby T. Campbell
Driver's Cell Phone # : Toby T. Campbell
Trucking Co. : Total Logistics
Trucking Co. Phone # : [illegible]
Broker : Cheetah 12 6706
Date : 6/3/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 14970

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/3/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210310	2240	16	359210664	2240
2	359210317	2240	17	359210665	2240
3	359210359	2240	18	359210666	2240
4	359210370	2240	19	359210667	2240
5	359210378	2240	20	359210668	2240
6	359210436	2240	21	359210669	2240
7	359210437	2240	22	359210670	2240
8	359210438	2240	23	359210671	2240
9	359210625	2240	24	359210672	1400
10	359210658	2240	25	359210673	2240
11	359210659	2240	26	359210674	2240
12	359210660	2240	27	359210675	2240
13	359210661	2240			
14	359210662	2240			
15	359210663	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,640
Total Weight: 36,840

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : Frazier G. Clark

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : F. GREAT AMERICAN LINES
Driver's Name : ~~FRAZIER G. CLARK~~
Driver's Sign : Frazier G. Clark
Driver's Cell Phone # : 919-452-3185
Trucking Co. : ~~GREAT AMERICAN LINES~~
Trucking Co. Phone # : ~~360-755-1955~~
Broker : Landstar
Date : 6/3/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 15019

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/9/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210676	2265	16	359210697	2240
2	359210677	2265	17	359210698	2240
3	359210682	2240	18	359210701	2240
4	359210683	2240	19	359210705	2240
5	359210684	2240	20	359210715	2240
6	359210685	2240	21	359210717	2240
7	359210686	2240	22	359210718	2240
8	359210687	2240	23	359210719	2240
9	359210688	2240	24	359210811	1820
10	359210690	2240	25	359210812	1540
11	359210691	2240	26	359210813	2240
12	359210692	2240	27	359210814	2240
13	359210694	2240			
14	359210695	2240			
15	359210696	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 59,410
Total Weight: 38,852

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Dennis Pickell

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Landstar
Date : 6/9/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 15021

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/10/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210707	2240	16	359210733	2240
2	359210708	2240	17	359210734	2240
3	359210709	2240	18	359210735	2240
4	359210710	2240	19	359210736	2240
5	359210713	2240	20	359210737	2240
6	359210720	2240	21	359210738	2240
7	359210721	2240	22	359210770	2240
8	359210722	2240	23	359210772	2240
9	359210723	2240	24	359210775	2240
10	359210724	2240	25	359210776	2240
11	359210727	2240	26	359210777	2240
12	359210728	2240	27	359210778	2240
13	359210729	2240			
14	359210731	2240			
15	359210732	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,480
Total Weight: 39,551

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Cheetah
Date : 6/10/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 15026

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/10/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210711	2240	16	359210762	2240
2	359210712	2240	17	359210763	2240
3	359210714	2240	18	359210765	2240
4	359210725	2240	19	359210766	2240
5	359210726	2240	20	359210767	2240
6	359210730	2240	21	359210768	2240
7	359210739	2240	22	359210769	2240
8	359210740	2240	23	359210771	2240
9	359210746	2240	24	359210773	2240
10	359210748	2240	25	359210774	2240
11	359210751	2240	26	359210779	2240
12	359210754	2240	27	359210780	2240
13	359210757	2240			
14	359210758	2240			
15	359210761	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,480
Total Weight: 39,608

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name :
Driver's Sign :
Driver's Cell Phone # :
Trucking Co. :
Trucking Co. Phone # :
Broker : Lonestar
Date : 6/10/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 15031

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/11/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210678	2240	16	359210798	2240
2	359210679	2240	17	359210799	2240
3	359210680	2240	18	359210800	2240
4	359210781	2240	19	359210801	2240
5	359210782	2240	20	359210805	2240
6	359210783	2240	21	359210806	2240
7	359210784	2240	22	359210807	2240
8	359210786	2380	23	359210808	2240
9	359210787	2240	24	359210815	2240
10	359210788	2240	25	359210821	2240
11	359210789	2240	26	359210822	2240
12	359210793	2660	27	359210826	2240
13	359210794	2240			
14	359210795	2240			
15	359210797	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 61,040
Total Weight: 37,776

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : Robert Simmons

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by :
Driver's Name : EDGE
Driver's Sign : Robert Simmons
Driver's Cell Phone # : Robert Simmons
Trucking Co : 803-371-6166
Trucking Co. Phone # : EDGE
Broker : Lonestar
Date : 6/11/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 15033

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/10/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210742	2240	16	359210802	2240
2	359210743	2240	17	359210803	2240
3	359210744	2240	18	359210804	2240
4	359210745	2240	19	359210809	2240
5	359210747	2240	20	359210810	2240
6	359210749	2240	21	359210816	2240
7	359210750	2240	22	359210817	2240
8	359210752	2240	23	359210818	2240
9	359210753	2240	24	359210819	2240
10	359210755	2240	25	359210820	2240
11	359210756	2240	26	359210827	2240
12	359210759	2240	27	359210829	2240
13	359210760	2240			
14	359210764	2240			
15	359210785	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 27
Total Sq. Feet: 60,480
Total Weight: 38,528

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign :

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # :
Seal # :

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by
Driver's Name
Driver's Sign :
Driver's Cell Phone # : " " "
Trucking Co. :
Trucking Co. Phone # :
Broker : Cheetah
Date : 6/10/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

STRAIGHT BILL OF LADING ORIGINAL-NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
Ph: 706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Bill of Lading # : 15069

Job Name: ESI - Duke Energy Marshall Steam Station
Address: 8320 NC Highway 150 E
City, State, Zip : Terrell, NC 28682
Contact: Wilson Warlick
Phone: 704-361-7882

Ship Date : 6/15/2010
Cust. P.O. # : 13179
Job # : 3592

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY

Product Code: TN 330-2-8

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	359210681	2240	16	359210823	2240
2	359210689	2240	17	359210824	2240
3	359210693A	1400	18	359210825	2240
4	359210693B	700	19	359210828	2240
5	359210699B	700	20	359210830	2240
6	359210700	2240	21	359210831	2240
7	359210702	2240	22	359210832	2240
8	359210703	1960	23	359210833	2240
9	359210704	2240			
10	359210706	2240			
11	359210716	2240			
12	359210790	2240			
13	359210791	2240			
14	359210792	2240			
15	359210796	2240			

SHIPMENT SUMMARY

Product Code : TN 330-2-8

Total Rolls : 23
Total Sq. Feet: 47,320
Total Weight: 29,488

Bags of ties : 2

Driver sign below if you have received above mentioned items :

Driver's Sign : _____

ATTN RECEIVER : If ties are not collected from driver, *SKAPS* will not assume responsibility

Container # : _____
Seal # : _____

Driver Requirements:

1) For Monday delivery driver must call on Friday.
2) Driver must call 706-336-7000 when unloaded.
3) Driver must call and advise of any delay in transit.
4) A copy of this bill-of-lading must accompany freight invoice, failure to do this will result in delayed payments.

Deliver by : _____
Driver's Name : _____
Driver's Sign : _____
Driver's Cell Phone # : _____
Trucking Co. : _____
Trucking Co. Phone # : _____
Broker : Cheetah
Date : 6/15/2010

CARRIER MUST COLLECT THE FREIGHT FROM THE BROKER ONLY

SIGN HERE FOR SHIPPER _____
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from SKAPS Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is SKAPS Industries as indicated by the designation of the "Shipper" to be SKAPS Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not SKAPS Industries then SKAPS Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, SKAPS Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occuring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by SKAPS Industries. Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

CETCO

Shippers No : 026017010 Previous Page

Straight Bill of Lading - Original Loader: RPANK Time In: 5/17/10-13:42:14 Time Out: 5/17/10-16:59:05

Carrier: ROSEDALE
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/18/2010
Ship Date : 05/17/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 89382 Trailer #: 682745/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45430.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 45430

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, except as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier**:

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per Jeff Flora

Placards Required? Yes / No **Supplied?** Yes / No

638668/F003646

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017010
ORDER DATE: 3/12/2010
SHIP DATE:. 5/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201018CV	00001748	150.0	15.0	2250.0	2712.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001763	150.0	15.0	2250.0	2648.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001767	150.0	15.0	2250.0	2614.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001771	150.0	15.0	2250.0	2630.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001797	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001852	150.0	15.0	2250.0	2656.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001857	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001872	150.0	15.0	2250.0	2718.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001878	150.0	15.0	2250.0	2702.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001889	150.0	15.0	2250.0	2682.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001899	150.0	15.0	2250.0	2690.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001906	150.0	15.0	2250.0	2658.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001942	150.0	15.0	2250.0	2662.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001945	150.0	15.0	2250.0	2644.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001946	150.0	15.0	2250.0	2654.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001952	150.0	15.0	2250.0	2702.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001965	150.0	15.0	2250.0	2722.0
							========	
							38250.0	
							========	
								========
ORDER TOTALS.....								45430.0

TOTAL ITEMS..... 17

CETCO®

Shippers No : 026017009 Previous Page

Straight Bill of Lading - Original Loader: RPANK Time In: 5/17/10 13:31:47 Time Out: 5/17/10-14:44:51

Carrier: ROSEDALE
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/18/2010
Ship Date : 05/17/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 473915 Trailer #: 720739/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45277.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 45277

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017009
ORDER DATE: 3/12/2010
SHIP DATE:. 5/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201018CV	00001764	150.0	15.0	2250.0	2610.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001769	150.0	15.0	2250.0	2616.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001772	150.0	15.0	2250.0	2620.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001849	150.0	15.0	2250.0	2683.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001873	150.0	15.0	2250.0	2720.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001895	150.0	15.0	2250.0	2734.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001919	150.0	15.0	2250.0	2654.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001929	150.0	15.0	2250.0	2664.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001934	150.0	15.0	2250.0	2660.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001936	150.0	15.0	2250.0	2666.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001943	150.0	15.0	2250.0	2664.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001948	150.0	15.0	2250.0	2652.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001949	150.0	15.0	2250.0	2684.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001950	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001951	150.0	15.0	2250.0	2672.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001956	150.0	15.0	2250.0	2646.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001968	150.0	15.0	2250.0	2664.0
							========	
							38250.0	
							========	

ORDER TOTALS..... 45277.0

TOTAL ITEMS..... 17

Shippers No : 026017011 Previous Page

Straight Bill of Lading - Original Loader: WWYAT Time In: 5/17/10-14:44:49 Time Out: 5/17/10-17:35:19

Carrier: ROSEDALE
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/18/2010
Ship Date : 05/17/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 86299 Trailer #: 720782/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45822.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 45822

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per Chris Stanley **Placards Required?** Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017011
ORDER DATE: 3/12/2010
SHIP DATE:. 5/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201018CV	00001746	150.0	15.0	2250.0	2966.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001760	150.0	15.0	2250.0	2652.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001762	150.0	15.0	2250.0	2654.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001765	150.0	15.0	2250.0	2624.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001773	150.0	15.0	2250.0	2626.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001777	150.0	15.0	2250.0	2650.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001785	150.0	15.0	2250.0	2612.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001790	150.0	15.0	2250.0	2780.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001793	150.0	15.0	2250.0	2664.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001795	150.0	15.0	2250.0	2672.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001822	150.0	15.0	2250.0	2646.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001870	150.0	15.0	2250.0	2708.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001875	150.0	15.0	2250.0	2702.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001901	150.0	15.0	2250.0	2686.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001911	150.0	15.0	2250.0	2648.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001933	150.0	15.0	2250.0	2634.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001972	150.0	15.0	2250.0	2898.0
							========	
							38250.0	
							========	

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ORDER TOTALS..... 45822.0

TOTAL ITEMS..... 17

Shippers No : 026017013 Previous Page

Straight Bill of Lading - Original Loader: WWTAT Time In: 5/18/10-11:17:12 Time Out: 5/18/10-11:57:54

Carrier: volume
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/18/2010
Ship Date : 05/17/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 5058 Trailer #: 5043/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45438.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 45438

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier**:

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

D Sang 770-387-7700

Per **Placards Required?** Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017013
ORDER DATE: 3/12/2010
SHIP DATE:. 5/18/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201018CV	00001804	150.0	15.0	2250.0	2674.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001806	150.0	15.0	2250.0	2678.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001807	150.0	15.0	2250.0	2656.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001808	150.0	15.0	2250.0	2672.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001809	150.0	15.0	2250.0	2682.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001810	150.0	15.0	2250.0	2674.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001811	150.0	15.0	2250.0	2696.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001826	150.0	15.0	2250.0	2640.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001830	150.0	15.0	2250.0	2648.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001836	150.0	15.0	2250.0	2688.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001839	150.0	15.0	2250.0	2660.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001840	150.0	15.0	2250.0	2676.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001848	150.0	15.0	2250.0	2678.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001853	150.0	15.0	2250.0	2666.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001874	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001905	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001913	150.0	15.0	2250.0	2650.0
							========	
							38250.0	
							========	

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ORDER TOTALS..... 45438.0

TOTAL ITEMS..... 17

Shippers No : 026017012 | Previous Page

Straight Bill of Lading - Original Loader: RPANK Time In: 5/17/10-12:45:27 Time Out: 5/17/10-14:28:06

Carrier: ROSEDALE GROUP
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/18/2010
Ship Date : 05/17/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 5468 Trailer #: 720726/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45264.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 45264

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per John Dines

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017012
ORDER DATE: 3/12/2010
SHIP DATE:. 5/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201018CV	00001749	150.0	15.0	2250.0	2708.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001766	150.0	15.0	2250.0	2620.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001768	150.0	15.0	2250.0	2592.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001770	150.0	15.0	2250.0	2622.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001861	150.0	15.0	2250.0	2700.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001883	150.0	15.0	2250.0	2720.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001915	150.0	15.0	2250.0	2652.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001924	150.0	15.0	2250.0	2694.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001944	150.0	15.0	2250.0	2638.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001953	150.0	15.0	2250.0	2664.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001954	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001957	150.0	15.0	2250.0	2670.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001958	150.0	15.0	2250.0	2660.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001959	150.0	15.0	2250.0	2664.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001961	150.0	15.0	2250.0	2662.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001963	150.0	15.0	2250.0	2662.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001964	150.0	15.0	2250.0	2668.0
							========	
							38250.0	
							========	

ORDER TOTALS..... 45264.0

TOTAL ITEMS..... 17

Shippers No : 026017007 Previous Page

Straight Bill of Lading - Original Loader: WWYAT Time In: 5/14/10-10:22:27 Time Out: 5/14/10-11:53:42

Carrier: rosedale trans
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/17/2010
Ship Date : 05/14/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 87317 Trailer #: 717665/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45236.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 45236

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017007
ORDER DATE: 3/12/2010
SHIP DATE:. 5/14/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201018CV	00001886	150.0	15.0	2250.0	2694.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001891	150.0	15.0	2250.0	2676.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001897	150.0	15.0	2250.0	2694.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001902	150.0	15.0	2250.0	2470.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001912	150.0	15.0	2250.0	2646.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001918	150.0	15.0	2250.0	2652.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001920	150.0	15.0	2250.0	2648.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001922	150.0	15.0	2250.0	2660.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001927	150.0	15.0	2250.0	2670.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001928	150.0	15.0	2250.0	2662.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001932	150.0	15.0	2250.0	2656.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001935	150.0	15.0	2250.0	2666.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001937	150.0	15.0	2250.0	2664.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001947	150.0	15.0	2250.0	2648.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001955	150.0	15.0	2250.0	2670.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001967	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001971	150.0	15.0	2250.0	2792.0
								38250.0	

ORDER TOTALS..... 45236.0

TOTAL ITEMS..... 17

Shippers No : 026017002 Previous Page

Straight Bill of Lading - Original Loader: DRAKE Time In: 5/14/10-08:42:08 Time Out: 5/14/10-09:06:50

Carrier: schilli/wabash
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/17/2010
Ship Date : 05/14/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 4636 Trailer #: 48308/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45226.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 45226

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per A Wilkins

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017002
ORDER DATE: 3/12/2010
SHIP DATE:. 5/14/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201018CV	00001887	150.0	15.0	2250.0	2694.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001890	150.0	15.0	2250.0	2686.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001904	150.0	15.0	2250.0	2644.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001907	150.0	15.0	2250.0	2656.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001908	150.0	15.0	2250.0	2644.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001909	150.0	15.0	2250.0	2656.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001910	150.0	15.0	2250.0	2664.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001914	150.0	15.0	2250.0	2644.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001917	150.0	15.0	2250.0	2650.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001923	150.0	15.0	2250.0	2654.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001925	150.0	15.0	2250.0	2658.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001926	150.0	15.0	2250.0	2664.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001931	150.0	15.0	2250.0	2664.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001941	150.0	15.0	2250.0	2674.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001960	150.0	15.0	2250.0	2650.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001962	150.0	15.0	2250.0	2660.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001970	150.0	15.0	2250.0	2664.0
							========	
							38250.0	

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ORDER TOTALS..... 45226.0

TOTAL ITEMS..... 17

CETCO

Shippers No : 026017003 Previous Page

Straight Bill of Lading - Original Loader: RFANK Time In: 5/17/10-17:42:37 Time Out: 5/17/10-19:21:55

Carrier: boyd
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/17/2010
Ship Date : 05/14/2010 **Via:** NATI
FOB ORIGIN

Sold To : 1823 **Ship To :** 128
Consigned PO: 13180
Truck #: 7234 Trailer #: 50076/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45384.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 45384

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Wilhe Brown

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017003
ORDER DATE: 3/12/2010
SHIP DATE:. 5/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201018CV	00001752	150.0	15.0	2250.0	2694.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001755	150.0	15.0	2250.0	2688.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001756	150.0	15.0	2250.0	2684.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001775	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001779	150.0	15.0	2250.0	2634.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001780	150.0	15.0	2250.0	2608.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001783	150.0	15.0	2250.0	2616.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001789	150.0	15.0	2250.0	2634.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001791	150.0	15.0	2250.0	2744.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001794	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001796	150.0	15.0	2250.0	2672.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001800	150.0	15.0	2250.0	2660.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001817	150.0	15.0	2250.0	2682.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001821	150.0	15.0	2250.0	2658.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001841	150.0	15.0	2250.0	2676.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001842	150.0	15.0	2250.0	2682.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001871	150.0	15.0	2250.0	2716.0
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							38250.0	

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ORDER TOTALS..... 45384.0

TOTAL ITEMS..... 17

Shippers No : 026017008 Previous Page

Straight Bill of Lading - Original Loader: WWYAT Time In: 5/14/10 13:25:45 Time Out: 5/14/10-14:33:14

Carrier: rosedale
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/17/2010
Ship Date : 05/14/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 86282 Trailer #: 948101/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	Hm	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45860.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 45860

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Dale Wilson

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017008
ORDER DATE: 3/12/2010
SHIP DATE:. 5/14/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201018CV	00001753	150.0	15.0	2250.0	2698.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001854	150.0	15.0	2250.0	2666.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001855	150.0	15.0	2250.0	2674.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001856	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001858	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001859	150.0	15.0	2250.0	2692.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001860	150.0	15.0	2250.0	2680.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001862	150.0	15.0	2250.0	2686.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001864	150.0	15.0	2250.0	2716.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001876	150.0	15.0	2250.0	2710.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001877	150.0	15.0	2250.0	2688.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001879	150.0	15.0	2250.0	2736.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001884	150.0	15.0	2250.0	2714.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001885	150.0	15.0	2250.0	2712.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001894	150.0	15.0	2250.0	2748.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001898	150.0	15.0	2250.0	2680.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001966	150.0	15.0	2250.0	2724.0
							========	
							38250.0	
							========	
								========
ORDER TOTALS.....								45860.0

TOTAL ITEMS..... 17

Shippers No : 026017006 Previous Page

Straight Bill of Lading - Original Loader: DPARR Time In: 5/14/10-13:41:05 Time Out: 5/14/10-14:56:35

Carrier: ROSEDALE
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/17/2010
Ship Date : 05/14/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 6403 Trailer #: 720774/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45513.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 45513

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per **Placards Required?** Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017006
ORDER DATE: 3/12/2010
SHIP DATE:. 5/14/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201018CV	00001750	150.0	15.0	2250.0	2688.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001751	150.0	15.0	2250.0	2678.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001778	150.0	15.0	2250.0	2640.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001782	150.0	15.0	2250.0	2614.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001787	150.0	15.0	2250.0	2618.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001827	150.0	15.0	2250.0	2644.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001828	150.0	15.0	2250.0	2656.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001837	150.0	15.0	2250.0	2674.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001838	150.0	15.0	2250.0	2674.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001844	150.0	15.0	2250.0	2702.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001847	150.0	15.0	2250.0	2684.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001865	150.0	15.0	2250.0	2692.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001866	150.0	15.0	2250.0	2682.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001867	150.0	15.0	2250.0	2701.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001880	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001881	150.0	15.0	2250.0	2722.0
CV-BENTOMAT ST		SFT	SF	201018CV	00001893	150.0	15.0	2250.0	2712.0
							========	
							38250.0	
							========	

========
45513.0

ORDER TOTALS.....

TOTAL ITEMS..... 17

Shippers No : 026017005 Previous Page

Straight Bill of Lading - Original Loader: RPARK Time In: 5/17/10-15:21:09 Time Out: 5/17/10-18:10:14

Carrier: boyd
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/17/2010
Ship Date : 05/14/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 7090 Trailer #: 50520/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45293.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 45293

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Calloway Ben

Per **Placards Required?** Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017005
ORDER DATE: 3/12/2010
SHIP DATE:. 5/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201018CV	00001754	150.0	15.0	2250.0	2694.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001757	150.0	15.0	2250.0	2687.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001759	150.0	15.0	2250.0	2614.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001781	150.0	15.0	2250.0	2612.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001784	150.0	15.0	2250.0	2616.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001786	150.0	15.0	2250.0	2614.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001792	150.0	15.0	2250.0	2696.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001798	150.0	15.0	2250.0	2670.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001799	150.0	15.0	2250.0	2666.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001801	150.0	15.0	2250.0	2662.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001802	150.0	15.0	2250.0	2660.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001803	150.0	15.0	2250.0	2668.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001805	150.0	15.0	2250.0	2712.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001813	150.0	15.0	2250.0	2680.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001816	150.0	15.0	2250.0	2684.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001832	150.0	15.0	2250.0	2670.0
CV-BENTOMAT ST		SFT	SF 201018CV	00001863	150.0	15.0	2250.0	2688.0
							========	
							38250.0	
							========	

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ORDER TOTALS..... 45293.0

TOTAL ITEMS..... 17

Shippers No : 026017004 Previous Page

Straight Bill of Lading - Original Loader: DPARR Time In: 5/14/10-09:44:10 Time Out: 5/14/10-10:20:28

Carrier: boyd bros
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/17/2010
Ship Date : 05/14/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 7243 Trailer #: 50466/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	45626.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 45626

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per R. E. B.

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017004
ORDER DATE: 3/12/2010
SHIP DATE:. 5/14/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST	SFT SF	201018CV	00001747	150.0	15.0	2250.0	2754.0
CV-BENTOMAT ST	SFT SF	201018CV	00001758	150.0	15.0	2250.0	2700.0
CV-BENTOMAT ST	SFT SF	201018CV	00001834	150.0	15.0	2250.0	2690.0
CV-BENTOMAT ST	SFT SF	201018CV	00001843	150.0	15.0	2250.0	2654.0
CV-BENTOMAT ST	SFT SF	201018CV	00001845	150.0	15.0	2250.0	2684.0
CV-BENTOMAT ST	SFT SF	201018CV	00001850	150.0	15.0	2250.0	2674.0
CV-BENTOMAT ST	SFT SF	201018CV	00001851	150.0	15.0	2250.0	2658.0
CV-BENTOMAT ST	SFT SF	201018CV	00001868	150.0	15.0	2250.0	2700.0
CV-BENTOMAT ST	SFT SF	201018CV	00001869	150.0	15.0	2250.0	2706.0
CV-BENTOMAT ST	SFT SF	201018CV	00001882	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST	SFT SF	201018CV	00001888	150.0	15.0	2250.0	2686.0
CV-BENTOMAT ST	SFT SF	201018CV	00001900	150.0	15.0	2250.0	2692.0
CV-BENTOMAT ST	SFT SF	201018CV	00001916	150.0	15.0	2250.0	2652.0
CV-BENTOMAT ST	SFT SF	201018CV	00001921	150.0	15.0	2250.0	2650.0
CV-BENTOMAT ST	SFT SF	201018CV	00001930	150.0	15.0	2250.0	2666.0
CV-BENTOMAT ST	SFT SF	201018CV	00001938	150.0	15.0	2250.0	2662.0
CV-BENTOMAT ST	SFT SF	201018CV	00001969	150.0	15.0	2250.0	2668.0
						========	
						38250.0	

========

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45626.0

ORDER TOTALS.....

TOTAL ITEMS..... 17

Shippers No : 026017001 Previous Page

Straight Bill of Lading - Original Loader: WWTAI Time In: 5/14/10-15:06:45 Time Out: 5/14/10-17:01:59

Carrier: edge
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 05/17/2010
Ship Date : 05/14/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 21 Trailer #: 102/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day *****cannot start delivery until Monday 5/17

Quantity	HM	Product Size / Description	Weight
27000.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 12 rolls palletized	32146.0000
42.0000 EACH		COMMODITY GRANULAR-50 (10902/024) CLAY-BENTONITE-GROUND CLASS 50 ITEM 48170 / 3295232 3295232 12 rolls palletized	2100.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 34246

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

If the charges are to be prepaid, write or stamp here, "Prepaid."

Prepaid

Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

CETCO

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

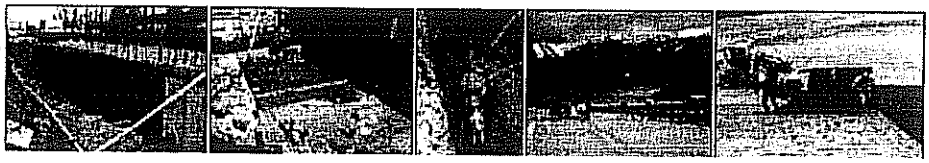
This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Luis Lerona

Per

Placards Required? Yes / No **Supplied?** Yes / No

CETCO®



Shippers No : 026017024 | **Previous Page**

Straight Bill of Lading - Original Loader: DPARR Time In: 6/21/10-12:01:21 Time Out: **6/21/10-14:33:41**

Carrier: jA RAY
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/17/2010
Ship Date : 06/16/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 6772 Trailer #: 70/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
38250.0000 SF	38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	46398.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 46398

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017024
ORDER DATE: 3/12/2010
SHIP DATE:. 6/21/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201024CV	00004212	150.0	15.0	2250.0	2744.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004237	150.0	15.0	2250.0	2786.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004243	150.0	15.0	2250.0	2756.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004253	150.0	15.0	2250.0	2744.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004258	150.0	15.0	2250.0	2688.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004261	150.0	15.0	2250.0	2744.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004262	150.0	15.0	2250.0	2734.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004263	150.0	15.0	2250.0	2736.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004265	150.0	15.0	2250.0	2740.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004270	150.0	15.0	2250.0	2746.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004271	150.0	15.0	2250.0	2734.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004274	150.0	15.0	2250.0	2736.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004277	150.0	15.0	2250.0	2698.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004279	150.0	15.0	2250.0	2740.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004280	150.0	15.0	2250.0	2690.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004295	150.0	15.0	2250.0	2688.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004296	150.0	15.0	2250.0	2694.0
							========	
							38250.0	
							========	

ORDER TOTALS..... 46398.0

TOTAL ITEMS..... 17

CETCO

Shippers No : 026017025 | Previous Page

Straight Bill of Lading - Original Loader: WWYAT Time In: 6/21/10-13:43:54 Time Out: **6/21/10-16:11:05**

Carrier: DAKOTA VALLEY TRUCKING
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/17/2010
Ship Date : 06/16/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 82 Trailer #: 19/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
36000.0000 SF	36000.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	43901.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 43901

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

CETCO

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017025
ORDER DATE: 3/12/2010
SHIP DATE:. 6/21/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201024CV	00004129	150.0	15.0	2250.0	2782.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004130	150.0	15.0	2250.0	2786.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004144	150.0	15.0	2250.0	2710.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004156	150.0	15.0	2250.0	2734.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004170	150.0	15.0	2250.0	2690.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004204	150.0	15.0	2250.0	2734.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004213	150.0	15.0	2250.0	2749.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004215	150.0	15.0	2250.0	2762.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004216	150.0	15.0	2250.0	2754.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004217	150.0	15.0	2250.0	2754.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004220	150.0	15.0	2250.0	2756.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004234	150.0	15.0	2250.0	2768.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004238	150.0	15.0	2250.0	2788.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004266	150.0	15.0	2250.0	2740.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004278	150.0	15.0	2250.0	2696.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004283	150.0	15.0	2250.0	2698.0
							========	
							36000.0	

========

ORDER TOTALS..... ========
43901.0

TOTAL ITEMS..... 16

Shippers No : 026017023 | Previous Page

Straight Bill of Lading - Original Loader: RPANK Time In: 6/18/10-09:23:46 Time Out: **6/18/10-11:04:22**

Carrier: HARGETT & SONS
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/17/2010
Ship Date : 06/16/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 4 Trailer #: 4A/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
38250.0000 SF	38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	46558.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 46558

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017023
ORDER DATE: 3/12/2010
SHIP DATE:. 6/18/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201024CV	00004090	150.0	15.0	2250.0	2752.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004095	150.0	15.0	2250.0	2752.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004132	150.0	15.0	2250.0	2746.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004135	150.0	15.0	2250.0	2762.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004153	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004158	150.0	15.0	2250.0	2734.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004161	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004190	150.0	15.0	2250.0	2724.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004210	150.0	15.0	2250.0	2748.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004218	150.0	15.0	2250.0	2748.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004221	150.0	15.0	2250.0	2748.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004222	150.0	15.0	2250.0	2766.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004254	150.0	15.0	2250.0	2740.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004264	150.0	15.0	2250.0	2750.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004272	150.0	15.0	2250.0	2740.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004286	150.0	15.0	2250.0	2694.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004290	150.0	15.0	2250.0	2694.0
								========	
								38250.0	

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ORDER TOTALS..... ========
46558.0

TOTAL ITEMS..... 17

Shippers No : 026017022 | **Previous Page**

Straight Bill of Lading - Original Loader: RPANK Time In: 6/18/10-09:34:28 Time Out: **6/18/10-12:04:00**

Carrier: LANDSTAR
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/17/2010
Ship Date : 06/16/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 2278 Trailer #: 237/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
38250.0000 SF	38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	46472.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 46472

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017022
ORDER DATE: 3/12/2010
SHIP DATE:. 6/18/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201024CV	00004081	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004133	150.0	15.0	2250.0	2762.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004145	150.0	15.0	2250.0	2700.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004154	150.0	15.0	2250.0	2744.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004182	150.0	15.0	2250.0	2698.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004199	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004200	150.0	15.0	2250.0	2710.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004201	150.0	15.0	2250.0	2712.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004206	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004207	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004228	150.0	15.0	2250.0	2774.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004231	150.0	15.0	2250.0	2764.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004245	150.0	15.0	2250.0	2758.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004246	150.0	15.0	2250.0	2748.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004247	150.0	15.0	2250.0	2752.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004248	150.0	15.0	2250.0	2738.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004288	150.0	15.0	2250.0	2690.0
								========	
								38250.0	
								========	
									========
ORDER TOTALS.....									46472.0

TOTAL ITEMS..... 17

CETCO

Shippers No : 026017017 | **Previous Page**

Straight Bill of Lading - Original Loader: DPARR Time In: 6/17/10-09:41:17 Time Out: **6/17/10-11:08:25**

Carrier: MERCER
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/16/2010
Ship Date : 06/15/2010 **Via:** NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 10578 Trailer #: 10578A/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
38250.0000 SF	38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	46476.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 46476

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

CETCO

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017017
ORDER DATE: 3/12/2010
SHIP DATE:. 6/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201024CV	00004076	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004085	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004093	150.0	15.0	2250.0	2758.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004094	150.0	15.0	2250.0	2742.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004096	150.0	15.0	2250.0	2748.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004141	150.0	15.0	2250.0	2712.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004162	150.0	15.0	2250.0	2728.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004165	150.0	15.0	2250.0	2708.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004168	150.0	15.0	2250.0	2696.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004188	150.0	15.0	2250.0	2716.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004189	150.0	15.0	2250.0	2738.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004195	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004205	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004214	150.0	15.0	2250.0	2752.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004227	150.0	15.0	2250.0	2746.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004260	150.0	15.0	2250.0	2768.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004276	150.0	15.0	2250.0	2738.0
							========	
							38250.0	
							========	

========
ORDER TOTALS..... 46476.0

TOTAL ITEMS..... 17

Shippers No : 026017019 | Previous Page

Straight Bill of Lading - Original Loader: DPARR Time In: 6/17/10-08:11:46 Time Out: **6/17/10-09:36:18**

Carrier: R.C.KELLY
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/16/2010
Ship Date : 06/15/2010 **Via:** NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 007 Trailer #: 003/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
40500.0000 SF	40500.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	49165.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 49165

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

CETCO

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the property described above in apparent good order, expact as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per **Placards Required?** Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017019
ORDER DATE: 3/12/2010
SHIP DATE:. 6/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201024CV	00004146	150.0	15.0	2250.0	2750.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004147	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004152	150.0	15.0	2250.0	2738.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004157	150.0	15.0	2250.0	2726.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004159	150.0	15.0	2250.0	2726.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004166	150.0	15.0	2250.0	2704.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004171	150.0	15.0	2250.0	2696.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004172	150.0	15.0	2250.0	2700.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004173	150.0	15.0	2250.0	2696.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004174	150.0	15.0	2250.0	2695.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004192	150.0	15.0	2250.0	2710.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004193	150.0	15.0	2250.0	2716.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004198	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004239	150.0	15.0	2250.0	2776.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004241	150.0	15.0	2250.0	2778.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004242	150.0	15.0	2250.0	2776.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004244	150.0	15.0	2250.0	2772.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004250	150.0	15.0	2250.0	2744.0
								========	
								40500.0	
								========	

ORDER TOTALS..... ========
49165.0

TOTAL ITEMS..... 18

CETCO

Shippers No : 026017021 Previous Page

Straight Bill of Lading - Original Loader: WWYAT Time In: 6/17/10-13:25:06 Time Out: **6/17/10-15:37:01**

Carrier: palmetto
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/17/2010
Ship Date : 06/16/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 2284 Trailer #: 230/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
38250.0000 SF	38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	46160.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 46160

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

CETCO

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Frank A

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017021
ORDER DATE: 3/12/2010
SHIP DATE:. 6/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201024CV	00004143	150.0	15.0	2250.0	2720.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004155	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004163	150.0	15.0	2250.0	2706.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004164	150.0	15.0	2250.0	2712.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004219	150.0	15.0	2250.0	2742.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004225	150.0	15.0	2250.0	2756.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004232	150.0	15.0	2250.0	2764.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004249	150.0	15.0	2250.0	2770.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004281	150.0	15.0	2250.0	2696.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004282	150.0	15.0	2250.0	2710.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004285	150.0	15.0	2250.0	2702.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004287	150.0	15.0	2250.0	2692.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004289	150.0	15.0	2250.0	2688.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004291	150.0	15.0	2250.0	2700.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004292	150.0	15.0	2250.0	2682.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004293	150.0	15.0	2250.0	2692.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004294	150.0	15.0	2250.0	2696.0
							========	
							38250.0	
							========	

ORDER TOTALS..... ========
46160.0

TOTAL ITEMS..... 17

CETCO®

Shippers No : 026017020 | Previous Page

Straight Bill of Lading - Original Loader: RPANK Time In: 6/17/10-15:37:37 Time Out: **6/17/10-17:04:10**

Carrier: sst
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/16/2010
Ship Date : 06/15/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 711 Trailer #: 711A/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
38250.0000 SF	38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	46812.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 46812

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

CETCO Mike Mullen

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per R. Dulen

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017020
ORDER DATE: 3/12/2010
SHIP DATE:. 6/17/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF	201024CV	00004071	150.0	15.0	2250.0	2906.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004077	150.0	15.0	2250.0	2722.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004084	150.0	15.0	2250.0	2740.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004089	150.0	15.0	2250.0	2736.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004091	150.0	15.0	2250.0	2744.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004092	150.0	15.0	2250.0	2740.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004115	150.0	15.0	2250.0	2772.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004160	150.0	15.0	2250.0	2798.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004169	150.0	15.0	2250.0	2698.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004180	150.0	15.0	2250.0	2690.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004197	150.0	15.0	2250.0	2724.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004203	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004211	150.0	15.0	2250.0	2766.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004229	150.0	15.0	2250.0	2780.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004230	150.0	15.0	2250.0	2768.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004252	150.0	15.0	2250.0	2754.0
CV-BENTOMAT ST		SFT	SF	201024CV	00004269	150.0	15.0	2250.0	2744.0
							========	
							38250.0	

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ORDER TOTALS..... 46812.0

TOTAL ITEMS..... 17

Shippers No : 026017015 Previous Page

Straight Bill of Lading - Original Loader: RPANK Time In: 6/16/10-14:09:22 Time Out: 6/16/10-16:03:55

Carrier: mercer
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/16/2010
Ship Date : 06/15/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 11620 Trailer #: 11620A/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
40500.0000 SF	40500.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 18 rolls	49136.0000

Gross: 0.0000 Tare: 0.0000 **Total**: 49136

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

CETCO

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017015
ORDER DATE: 3/12/2010
SHIP DATE:. 6/16/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201024CV	00004112	150.0	15.0	2250.0	2736.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004134	150.0	15.0	2250.0	2752.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004136	150.0	15.0	2250.0	2756.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004137	150.0	15.0	2250.0	2754.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004138	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004139	150.0	15.0	2250.0	2726.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004140	150.0	15.0	2250.0	2736.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004175	150.0	15.0	2250.0	2712.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004177	150.0	15.0	2250.0	2694.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004178	150.0	15.0	2250.0	2704.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004179	150.0	15.0	2250.0	2714.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004183	150.0	15.0	2250.0	2706.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004184	150.0	15.0	2250.0	2718.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004185	150.0	15.0	2250.0	2708.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004186	150.0	15.0	2250.0	2720.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004187	150.0	15.0	2250.0	2714.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004236	150.0	15.0	2250.0	2790.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004240	150.0	15.0	2250.0	2766.0
							========	
							40500.0	
							========	

ORDER TOTALS..... 49136.0

TOTAL ITEMS..... 18

CETCO®

Shippers No : 026017018 | Previous Page

Straight Bill of Lading - Original Loader: DPARR Time In: 6/16/10-12:37:46 Time Out: 6/16/10-13:49:26

Carrier: bailey trucking
Consigned To :
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
TERRELL NC 28682
Phone:

CETCO 2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192
Deliver Date : 06/16/2010
Ship Date : 06/15/2010 **Via**: NATI
FOB ORIGIN

Sold To : 1823 **Ship To** : 128
Consigned PO: 13180
Truck #: 912 Trailer #: 9632/

Shipping Plant: CETCO CARTERSVILLE 218 INDUSTRIAL PARK ROAD
CARTERSVILLE GA 30121
Product Lots: Seal #: --enter here-- Container/Pro #:

Global Comments: ALL SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS. LOADS MAY NOT BE UNTARPED FOR ANY REASON PRIOR TO DELIVERY TO THE CUSTOMER UNTARPING THE LOAD MAY RESULT IN REJECTION OF THE MATERIAL AND LIABILITY TO THE CARRIER
Customer Comments:
Order Comments: CALL WILSON WARLICK 704.361.7882 24hrs. prior to delivery MON-FRI 7AM-5PM 8 max per day

Order Qty	Shipped Qty	HM	Product Size / Description	Weight
38250.0000 SF	38250.0000 SF		BENTOMAT ST CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTURE OF CLOTHING: CLASS 65 / ITEM 49265 SUB 10 17 rolls	46680.0000

Gross: 0.0000 Tare: 0.0000 **Total:** 46680

Subject to section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges

CETCO

If the charges are to be prepaid, write or stamp here, "Prepaid."
Prepaid
Shipper liable for the linehaul charges only. COD charges to be paid by: Consignee

Phone:
Fax:
Attn:

Mark with an 'X' to designate hazardous materials as defined in title 49 of the code of Federal Regulations. Received Subject to the classifications and lawfully filed tariffs in effect on the date of issued of this billing of lading, the properly described above in apparent good order, expect as noted (contents and conditions of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of the said property over all or any portion of the said route to destination , and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Stright Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification of tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns. **Carrier:**

This is to certify that the above named materials are properly classified, described, packaged, and labeled and are in proper condition for transportation according to the applicable regulations of the department of Transportation.

Per Wilson Bell

Placards Required? Yes / No **Supplied?** Yes / No

P A C K I N G L I S T

CETCO
2870 FORBS AVENUE
HOFFMAN ESTATES IL 60192

ORDER NO:.. 026017018
ORDER DATE: 3/12/2010
SHIP DATE:. 6/16/2010

SOLD TO: 1823
ENVIRONMENTAL SPECIALTIES
INTERNATIONAL, INC.
7943 PECUE LANE

BATON ROUGE LA 70809

SHIP FROM:. CETCO CARTERSVILLE
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. AMERICO LOGISTICS

SHIP TO: 128
DUKE ENERGY
MARSHALL STEAM PLANT
8320 NC HIGHWAY 150E
ATTN: WILSON WARLICK
TERRELL NC 28682

PO: 13180

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
CV-BENTOMAT ST		SFT	SF 201024CV	00004078	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004082	150.0	15.0	2250.0	2732.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004083	150.0	15.0	2250.0	2730.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004086	150.0	15.0	2250.0	2760.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004100	150.0	15.0	2250.0	2766.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004106	150.0	15.0	2250.0	2752.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004107	150.0	15.0	2250.0	2742.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004118	150.0	15.0	2250.0	2768.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004119	150.0	15.0	2250.0	2748.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004120	150.0	15.0	2250.0	2760.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004121	150.0	15.0	2250.0	2736.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004122	150.0	15.0	2250.0	2752.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004123	150.0	15.0	2250.0	2754.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004124	150.0	15.0	2250.0	2736.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004125	150.0	15.0	2250.0	2738.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004127	150.0	15.0	2250.0	2746.0
CV-BENTOMAT ST		SFT	SF 201024CV	00004151	150.0	15.0	2250.0	2728.0
							========	
							38250.0	

========

ORDER TOTALS..... ========
46680.0

TOTAL ITEMS..... 17

'RAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

ME OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		4/16/2010	025318

ERVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading,
property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier bei
erstood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver
ther carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any
f property, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the da
ate, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
hipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditio
hereby agreed to by the shipper and accepted for himself and his assigns.

IOM:
-IIPPER
ORIGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE: DUKE ENERGY
MARSHALL STEAM PLANT
STREET: 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION: WILSON WARLICK 704-361-7882
ZIP

IVERING CARRIER: TDT
ROUTE:
VEHICLE NUMBER:

NO. PACKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONLY)
139,380		HD DBL MICRO 60MIL 23FT	~~45,996~~ 45,600 LBS			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	211548-10	11,615
L-HD-MSDS-60-23	211550-10	11,615
L-HD-MSDS-60-23	211551-10	11,615
L-HD-MSDS-60-23	211558-10	11,615
L-HD-MSDS-60-23	211666-10	11,615
L-HD-MSDS-60-23	211675-10	11,615
L-HD-MSDS-60-23	211683-10	11,615
L-HD-MSDS-60-23	211701-10	11,615
L-HD-MSDS-60-23	212104-10	11,615
L-HD-MSDS-60-23	212105-10	11,615
L-HD-MSDS-60-23	212106-10	11,615
L-HD-MSDS-60-23	212107-10	11,615

Total Weight: 45,600 LBS ~~45,996 LB~~
Total Units: 12 ROLLS
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

VIT C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
☑ Prepaid
☐ Collect $

he shipment moves between two ports by a carrier by
er, the law requires that the bill of lading shall state
ther it is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect. ☐ Check box if charges are Colle

s is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportatio

Shipper, Per

Agent, Per

Page 1 of 1

nanent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.

en transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response
ommunication Standard (HM-126C). Provide emergency response phone number in case of incident or accident.

1

agru america, inc.

SHIPPING RELEASE FORM

Date : 4-16-10

BOL# :

Document # :

Customer :

Destination : Terrell, NC

	Roll #	EXTERNAL VISUAL OK		STRAPS OK		CORE OK		WELD ROD OK		COMMENTS (TO ALL NO REMARKS)
1	211548-10	Y	N	Y	N	Y	N	Y	N	
2	211550-10	Y	N	Y	N	Y	N	Y	N	
3	211551-10	Y	N	Y	N	Y	N	Y	N	No Weld Rod
4	211558-10	Y	N	Y	N	Y	N	Y	N	
5	211666-10	Y	N	Y	N	Y	N	Y	N	
6	211675-10	Y	N	Y	N	Y	N	Y	N	
7	211701-10	Y	N	Y	N	Y	N	Y	N	
8	211683-10	Y	N	Y	N	Y	N	Y	N	
9	212104-10	Y	N	Y	N	Y	N	Y	N	
10	212105-10	Y	N	Y	N	Y	N	Y	N	
11	212106-10	Y	N	Y	N	Y	N	Y	N	
12	212107-10	Y	N	Y	N	Y	N	Y	N	
13		Y	N	Y	N	Y	N	Y	N	
14		Y	N	Y	N	Y	N	Y	N	
15		Y	N	Y	N	Y	N	Y	N	
16		Y	N	Y	N	Y	N	Y	N	
17		Y	N	Y	N	Y	N	Y	N	
18		Y	N	Y	N	Y	N	Y	N	
19		Y	N	Y	N	Y	N	Y	N	
20		Y	N	Y	N	Y	N	Y	N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if necessary) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

Digital photo taken of shipment ?
yes no

SHIPREL.FRM
REV.01

Inspector :

Loader : RM

RAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

ME OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		4/16/2010	025313

EIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading,
roperty described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier beir
ratoon throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver
her carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any
property, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the da
of, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
ipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditio
hereby agreed to by the shipper and accepted for himself and his assigns.

OM:
HIPPER
ORIGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE DUKE ENERGY
MARSHALL STEAM PLANT
STREET 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION WILSON WARLICK 704-361-7882 ZIP

IVERING RRIER T.D.T. ROUTE VEHICLE NUMBER

NO. PACKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONLY
139,380		HD DBL MICRO 60MIL 23FT	~~45,996~~ 45450 lbs.			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	211435-10	11,615
L-HD-MSDS-60-23	211436-10	11,615
L-HD-MSDS-60-23	211437-10	11,615
L-HD-MSDS-60-23	211438-10	11,615
L-HD-MSDS-60-23	211439-10	11,615
L-HD-MSDS-60-23	211440-10	11,615
L-HD-MSDS-60-23	211441-10	11,615
L-HD-MSDS-60-23	211442-10	11,615
L-HD-MSDS-60-23	211443-10	11,615
L-HD-MSDS-60-23	211444-10	11,615
L-HD-MSDS-60-23	211445-10	11,615
L-HD-MSDS-60-23	211446-10	11,615

Total Weight: ~~45,996 LB~~ 45450 lbs
Total Units: 12 Rolls @ 45450 lbs
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

IT C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
☒ Prepaid
☐ Collect $

e shipment moves between two ports by a carrier by
, the law requires that the bill of lading shall state
her it is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect. ☐ Check box if charges are Collec

pper's imprint in lieu of stamp; not a part of bill of lading
oved by the Interstate Commerce Commission.

is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportatio

Shipper, Per Agent, Per

Page 1 of 1

anent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.

n transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response
munication Standard (HM 126C). Provide emergency response phone number in case of incident or accident.

1

agru america, inc.

SHIPPING RELEASE FORM

Date : 4-15-10

BOL # :

Document # : 13568

Customer : Duke/Marshall

Destination Tunell N.C.

	Roll #	External Visual OK?	Straps OK?	Core OK?	Weld Rod OK?	Comments (1 to ALL NO REMARK)
1	211435-10	✓ N	✓ N	✓ N	Y N	
2	211436-10	✓ N	✓ N	✓ N	Y N	
3	211437-10	✓ N	✓ N	✓ N	Y N	
4	211438-10	✓ N	✓ N	✓ N	Y N	
5	211439-10	✓ N	✓ N	✓ N	Y N	
6	211440-10	✓ N	✓ N	✓ N	Y N	
7	211441-10	✓ N	✓ N	✓ N	Y N	
8	211442-10	✓ N	✓ N	✓ N	Y N	
9	211443-10	✓ N	✓ N	✓ N	Y N	
10	211444-10	✓ N	✓ N	✓ N	Y N	
11	211445-10	✓ N	✓ N	✓ N	Y N	
12	211446-10	✓ N	✓ N	✓ N	Y N	
13		Y N	Y N	Y N	Y N	
14		Y N	Y N	Y N	Y N	
15		Y N	Y N	Y N	Y N	
16		Y N	Y N	Y N	Y N	
17		Y N	Y N	Y N	Y N	
18		Y N	Y N	Y N	Y N	
19		Y N	Y N	Y N	Y N	
20		Y N	Y N	Y N	Y N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if necessary) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

SHIPREL FRM
REV 01

Inspector -

Digital photo taken of shipment ?

Yes no

Loader - L. Mayfield

IIS MEMORANDUM is an acknowledgment that a Bill of Lading has been issued and is not the Original Bill of Lading, nor a copy or duplicate, covering the property named herein, and is intended solely for filing or record.

ME OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		4/16/2010	025312

CEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading,
property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier be
lerstood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to delive
ther carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or am
l property, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the d
ed, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
pper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditi
hereby agreed to by the shipper and accepted for himself and his assigns.

ROM:
HIPPER
ORIGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE DUKE ENERGY
MARSHALL STEAM PLANT
STREET 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION WILSON WARLICK 704-361-7882
ZIP

LIVERING RRIER ATL | ROUTE | VEHICLE NUMBER

NO. PACKAGES	* HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONL'
139,380		HD DBL MICRO 60MIL 23FT	~~45,996~~ 45 525 lbs.			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	211700-10	1,615
L-HD-MSDS-60-23	211702-10	1,615
L-HD-MSDS-60-23	211703-10	1,615
L-HD-MSDS-60-23	211704-10	1,615
L-HD-MSDS-60-23	211795-10	1,615
L-HD-MSDS-60-23	211796-10	1,615
L-HD-MSDS-60-23	211797-10	1,615
L-HD-MSDS-60-23	211798-10	1,615
L-HD-MSDS-60-23	211799-10	1,615
L-HD-MSDS-60-23	212101-10	1,615
L-HD-MSDS-60-23	212102-10	1,615
L-HD-MSDS-60-23	212103-10	1,615

Total Weight: ~~45,996 LB~~ 45 525 lbs.
Total Units: 12 Rolls
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

VIT C.O.D. TO: AGRU/AMERICA, INC. 500 GARRISON ROAD GEORGETOWN, SOUTH CAROLINA 29440 (843) 546-0600

C.O.D. Amt $

C.O.D. FEE ☒ Prepaid ☐ Collect $

he shipment moves between two ports by a carrier by
er, the law requires that the bill of lading shall state
ther it is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect. ☐ Check box if charges are Colle

hipper's imprint in lieu of stamp; not a part of bill of lading
roved by the Interstate Commerce Commission.

I hereby certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportatio

Shipper, Per Agent, Per

Page 1 of 1

ermanent post office address of shipper

* MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.

en transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response
mmunication Standard (HM-126C). Provide emergency response phone number in case of incident or accident.

3

agru america, inc.

SHIPPING RELEASE FORM

Date : 4-16-10

BOL # :

Document # :

Customer :

Destination :

	ROLL #	EXTERNAL VISUAL OK?	STRAPS OK?	CORE OK?	WELD ROD OK?	COMMENTS (TO ALL NO REMARKS)
1	211795-10	Y N	Y N	Y N	Y N	
2	211796-10	Y N	Y N	Y N	Y N	No Weld Rod
3	211797-10	Y N	Y N	Y N	Y N	
4	211798-10	Y N	Y N	Y N	Y N	
5	211799-10	Y N	Y N	Y N	Y N	
6	211700-10	Y N	Y N	Y N	Y N	
7	211702-10	Y N	Y N	Y N	Y N	
8	211703-10	Y N	Y N	Y N	Y N	
9	211704-10	Y N	Y N	Y N	Y N	
10	212101-10	Y N	Y N	Y N	Y N	
11	212102-10	Y N	Y N	Y N	Y N	
12	212103-10	Y N	Y N	Y N	Y N	
13		Y N	Y N	Y N	Y N	
14		Y N	Y N	Y N	Y N	
15		Y N	Y N	Y N	Y N	
16		Y N	Y N	Y N	Y N	
17		Y N	Y N	Y N	Y N	
18		Y N	Y N	Y N	Y N	
19		Y N	Y N	Y N	Y N	
20		Y N	Y N	Y N	Y N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if necessary*) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

Digital photo taken of shipment ?

yes no

SHIPREL.FRM
REV.01

Inspector :

Loader : R.H

TRAIG. .LL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

B/L NO. 025309

ME OF CARRIER: TRUCK | CARRIER'S NO. | DATE: 4/16/2010

CEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier bei derstood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver other carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any d property, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the da eof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. pper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditio hereby agreed to by the shipper and accepted for himself and his assigns.

ROM: HIPPER ORIGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE: DUKE ENERGY
MARSHALL STEAM PLANT
STREET: 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION: WILSON WARLICK 704-361-7882 ZIP

LIVERING RRIER: RTL | ROUTE | VEHICLE NUMBER

NO. PACKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONLY)
139,380		HD DBL MICRO 60MIL 23FT	~~45,996~~			
132		WELD ROD MFG BLACK HDPE 5MM	45105 132			
		Item Key / Roll Number / Quantity	45237 lbs.			
		L-HD-MSDS-60-23 211682-10 11,615				
		L-HD-MSDS-60-23 211684-10 11,615				
		L-HD-MSDS-60-23 211785-10 11,615				
		L-HD-MSDS-60-23 211786-10 11,615				
		L-HD-MSDS-60-23 211787-10 11,615				
		L-HD-MSDS-60-23 211788-10 11,615				
		L-HD-MSDS-60-23 211789-10 11,615				
		L-HD-MSDS-60-23 211790-10 11,615				
		L-HD-MSDS-60-23 211791-10 11,615				
		L-HD-MSDS-60-23 211792-10 11,615				
		L-HD-MSDS-60-23 211793-10 11,615				
		L-HD-MSDS-60-23 211794-10 11,615				
		45237 lbs.				
		Total Weight: ~~46,128 LB~~				
		Total Units: 12 Rolls & 6 Spools				
		Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10				
		Location: GTOWN P.O. No.: 13173				
		12 Rolls @ 45105 lbs.				
		6 Spools @ 132 lbs. } 45237 lbs.				

MIT C.O.D. TO:

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE: ☑ Prepaid ☐ Collect $

the shipment moves between two ports by a carrier by ler, the law requires that the bill of lading shall state ether it is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property. The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding $ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges. (Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect. ☐ Check box if charges are Colle

hipper's imprint in lieu of stamp; not a part of bill of lading roved by the Interstate Commerce Commission.

a is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportati

Shipper, Per: VES Agent, Per: Jimmy Bly

Page 1 of 1

manent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.

en transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response Communication Standard (HM-126C). Provide emergency response phone number in case of incident or accident.

1

agru america, inc.

SHIPPING RELEASE FORM

Date : 4-15-10

BOL # :

Document # : 13568

Customer : Duke/Rockell

Destination : Terrell N.C

	ROLL #	EXTERNAL VISUAL OK?	STRAPS OK?	CORE OK?	WELD ROD OK?	COMMENTS (ALL NO REMARK)
1	211682-10	Y N	Y N	Y N	Y N	6 weld rods
2	211684-10	Y N	Y N	Y N	Y N	LOT # 7100252
3	211785-10	Y N	Y N	Y N	Y N	
4	211786-10	Y N	Y N	Y N	Y N	6X22 =
5	211787-10	Y N	Y N	Y N	Y N	132 lbs
6	211788-10	Y N	Y N	Y N	Y N	
7	211789-10	Y N	Y N	Y N	Y N	
8	211790-10	Y N	Y N	Y N	Y N	
9	211791-10	Y N	Y N	Y N	Y N	
10	211792-10	Y N	Y N	Y N	Y N	
11	211793-10	Y N	Y N	Y N	Y N	
12	211794-10	Y N	Y N	Y N	Y N	
13		Y N	Y N	Y N	Y N	
14		Y N	Y N	Y N	Y N	
15		Y N	Y N	Y N	Y N	
16		Y N	Y N	Y N	Y N	
17		Y N	Y N	Y N	Y N	
18		Y N	Y N	Y N	Y N	
19		Y N	Y N	Y N	Y N	
20		Y N	Y N	Y N	Y N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if necessary*) : *Secure Load; Lot # on BOL; Check type*

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

SHIPREL FRM
REV 01

Digital photo taken of shipment ?
yes no

Inspector -

Loader : J. M

TRAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

ME OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK	616	4/16/2010	025308

EIVED, subject to the classifications and tariffs in effect on the date of issue of this Bill of Lading.
property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier bei
lerstood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver
ther carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any
l property, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the da
not, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
pper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditio
hereby agreed to by the shipper and accepted for himself and his assigns.

ROM:
HIPPER
ORIGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE DUKE ENERGY
MARSHALL STEAM PLANT
STREET 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION WILSON WARLICK 704-361-7882 ZIP

LIVERING RRIER TDT | ROUTE | VEHICLE NUMBER

NO. PACKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONLY)
139,380		HD DBL MICRO 60MIL 23FT	45,996			
198		WELD ROD MFG BLACK HDPE 5MM	198			
			45,825			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	211669-10	11,615
L-HD-MSDS-60-23	211670-10	11,615
L-HD-MSDS-60-23	211671-10	11,615
L-HD-MSDS-60-23	211672-10	11,615
L-HD-MSDS-60-23	211673-10	11,615
L-HD-MSDS-60-23	211674-10	11,615
L-HD-MSDS-60-23	211676-10	11,615
L-HD-MSDS-60-23	211677-10	11,615
L-HD-MSDS-60-23	211678-10	11,615
L-HD-MSDS-60-23	211679-10	11,615
L-HD-MSDS-60-23	211680-10	11,615
L-HD-MSDS-60-23	211681-10	11,615

Total Weight: ~~46,194~~ 45,825 LB
Total Units: 12 Rolls / 9 Pallets
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

MIT C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
☒ Prepaid
☐ Collect $

he shipment moves between two ports by a carrier by
er, the law requires that the bill of lading shall state
therein is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect. ☐ Check box if charges are Colle

ipper's imprint in lieu of stamp; not a part of bill of lading
roved by the Interstate Commerce Commission.

s is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportatio

Shipper, Per

Agent, Per

nanent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.
n transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response
munication Standard (HM-126C). Provide emergency response phone number in case of incident or accident.

agru america, inc.

SHIPPING RELEASE FORM

Date : 4-15-10

BOL # :

Document # : 13568

Customer : Duke/Marshall

Destination : Leeds, NC

	ROLL #	EXTERNAL VISUAL OK?	STRAPS OK?	CORE OK?	WELD ROD OK?	COMMENTS (TO ALL NO REMARK)
1	211669-10	Y N	Y N	Y N	Y N	
2	211670-10	Y N	Y N	Y N	Y N	9 Weld rods
3	211671-10	Y N	Y N	Y N	Y N	Lot # 8A1302
4	211672-10	Y N	Y N	Y N	Y N	
5	211673-10	Y N	Y N	Y N	Y N	
6	211674-10	Y N	Y N	Y N	Y N	
7	211676-10	Y N	Y N	Y N	Y N	
8	211677-10	Y N	Y N	Y N	Y N	
9	211678-10	Y N	Y N	Y N	Y N	
10	211679-10	Y N	Y N	Y N	Y N	
11	211680-10	Y N	Y N	Y N	Y N	
12	211681-10	Y N	Y N	Y N	Y N	
13		Y N	Y N	Y N	Y N	
14		Y N	Y N	Y N	Y N	
15		Y N	Y N	Y N	Y N	
16		Y N	Y N	Y N	Y N	
17		Y N	Y N	Y N	Y N	
18		Y N	Y N	Y N	Y N	
19		Y N	Y N	Y N	Y N	
20		Y N	Y N	Y N	Y N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if neccessary) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

SHIPREL FRM
REV 01

Digital photo taken of shipment ?
yes no

Inspector :

Loader : L Marshall

'RAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

.ME OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		4/16/2010	025304

:EIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading.
property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier bel
erstood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver
ther carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any
l property, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the da
set, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
pper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditio
hereby agreed to by the shipper and accepted for himself and his assigns.

IOM:
HIPPER
ORIGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE: DUKE ENERGY
MARSHALL STEAM PLANT
STREET: 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION: WILSON WARLICK 704-361-7882 ZIP

LIVERING RRIER: JTL
ROUTE
VEHICLE NUMBER

NO. PACKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONLY)
139,380		HD DBL MICRO 60MIL 23FT	45,195 ~~45,996~~			
330		WELD ROD MFG BLACK HDPE 5MM	330			
			45525 lbs.			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	211555-10	11,615
L-HD-MSDS-60-23	211556-10	11,615
L-HD-MSDS-60-23	211557-10	11,615
L-HD-MSDS-60-23	211559-10	11,615
L-HD-MSDS-60-23	211560-10	11,615
L-HD-MSDS-60-23	211561-10	11,615
L-HD-MSDS-60-23	211562-10	11,615
L-HD-MSDS-60-23	211563-10	11,615
L-HD-MSDS-60-23	211564-10	11,615
L-HD-MSDS-60-23	211665-10	11,615
L-HD-MSDS-60-23	211667-10	11,615
L-HD-MSDS-60-23	211668-10	11,615

Total Weight: 45,525 lbs. ~~46,326 LB~~
Total Units: 12 Rolls
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

12 Rolls @ 45195 lbs.
15 spools @ 330 lbs.
} 45,525 lbs

IT C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
☒ Prepaid
☐ Collect $

ie shipment moves between two ports by a carrier by
r, the law requires that the bill of lading shall state
her it is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

pper's imprint in lieu of stamp; not a part of bill of lading
ved by the Interstate Commerce Commission.

Freight charges are PREPAID unless marked collect.
☐ Check box if charges are Colle

is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportatio

Shipper, Per YES
Agent, Per

Page 1 of 1

ianent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.
n transporting hazardous materials include the technical or chemical name (or n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response
munication Standard (HM 126C). Provide emergency response phone number in case of incident or accident.

1

agru America, Inc.

SHIPPING RELEASE FORM

Date: 4-15-10

BOL #:

Document #: 13568

Customer: Duke Marshall

Destination: Terrell, NC

	Roll #	External Visual OK?	Straps OK?	Core OK?	Weld Rod OK?	Comments (Y to all no remark)
1	211555-10	Y N	Y N	Y N	Y N	
2	211556-10	Y N	Y N	Y N	Y N	# 15 weld rods
3	211557-10	Y N	Y N	Y N	Y N	Lot# 8/11/2C
4	211558-10	Y N	Y N	Y N	Y N	15 X 22 = 330 lbs
5	211560-10	Y N	Y N	Y N	Y N	
6	211561-10	Y N	Y N	Y N	Y N	
7	211562-10	Y N	Y N	Y N	Y N	
8	211563-10	Y N	Y N	Y N	Y N	
9	211564-10	Y N	Y N	Y N	Y N	
10	211665-10	Y N	Y N	Y N	Y N	
11	211667-10	Y N	Y N	Y N	Y N	
12	211668-10	Y N	Y N	Y N	Y N	
13		Y N	Y N	Y N	Y N	
14		Y N	Y N	Y N	Y N	
15		Y N	Y N	Y N	Y N	
16		Y N	Y N	Y N	Y N	
17		Y N	Y N	Y N	Y N	
18		Y N	Y N	Y N	Y N	
19		Y N	Y N	Y N	Y N	
20		Y N	Y N	Y N	Y N	

12 Rolls @ 45145

15 spools of weld Rods @ 330 lbs

Total - 45,525 lbs.

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if neccessary) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

SHIPPED FROM
REV 01

Inspector :

Digital photo taken of shipment ?
yes no

Loader : J. Mayfield

'RAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

ME OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		4/19/2010	025326

'EIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading.
property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier bei
erstood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver
ther carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any
l property, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the da
aof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
oper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditio
hereby agreed to by the shipper and accepted for himself and his assigns.

ROM:
HIPPER
ORIGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE: DUKE ENERGY
MARSHALL STEAM PLANT
STREET: 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION: WILSON WARLICK 704-361-7882 ZIP

LIVERING ARRIER: Stone Construction
ROUTE:
VEHICLE NUMBER:

NO. PACKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONLY)
139,380		HD DBL MICRO 60MIL 23FT	~~45,996~~ 44920 lbs.			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	211320-10	11,615
L-HD-MSDS-60-23	211324-10	11,615
L-HD-MSDS-60-23	211326-10	11,615
L-HD-MSDS-60-23	211327-10	11,615
L-HD-MSDS-60-23	211328-10	11,615
L-HD-MSDS-60-23	211431-10	11,615
L-HD-MSDS-60-23	211432-10	11,615
L-HD-MSDS-60-23	211433-10	11,615
L-HD-MSDS-60-23	211434-10	11,615
L-HD-MSDS-60-23	211547-10	11,615
L-HD-MSDS-60-23	211553-10	11,615
L-HD-MSDS-60-23	211554-10	11,615

Total Weight: ~~45,996 LB~~ 44920 lbs.
Total Units: 12 Rolls
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

MIT C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
☐ Prepaid
☐ Collect $

he shipment moves between two ports by a carrier by
it, the law requires that the bill of lading shall state
ther it is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect.
☐ Check box if charges are Colle

hipper's Imprint in lieu of stamp; not a part of bill of lading
roved by the Interstate Commerce Commission.

: is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportatio

Shipper, Per

Agent, Per

nanent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.

n transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response
mmunication Standard (HM 126C). Provide emergency response phone number in case of incident or accident

agru america, inc

SHIPPING RELEASE FORM

Date: 4/19/10

BOL #:

Document #: 13568

Customer:

Destination: INC

	ROLL #	EXTERNAL VISUAL OK?	STRAPS OK?	CORE OK?	WELD ROD OK?	COMMENTS (TO ALL NO REMARKS)
1	211320-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
2	211324-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
3	211326-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
4	211327-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
5	211328-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
6	211431-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
7	211432-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
8	211433-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
9	211434-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
10	211517-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
11	211553-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
12	211554-10	~~Y~~ N	~~Y~~ N	~~Y~~ N	Y N	
13		Y N	Y N	Y N	Y N	
14		Y N	Y N	Y N	Y N	
15		Y N	Y N	Y N	Y N	
16		Y N	Y N	Y N	Y N	
17		Y N	Y N	Y N	Y N	
18		Y N	Y N	Y N	Y N	
19		Y N	Y N	Y N	Y N	
20		Y N	Y N	Y N	Y N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if necessary*) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

SHIPREL.FRM
REV 01

Digital photo taken of shipment ?
yes no

Inspector: [illegible]

Loader: [illegible]

RAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

ME OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		4/19/2010	025325

EIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading.
roperty described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier bei
erstood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver
her carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any
property, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the da
of, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
per hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditio
ereby agreed to by the shipper and accepted for himself and his assigns.

OM:
IIPPER
RIGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE: DUKE ENERGY
MARSHALL STEAM PLANT
STREET: 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION: WILSON WARLICK 704-361-7882
ZIP

IVERING IRIER: Stone Construction
ROUTE
VEHICLE NUMBER

NO. PACKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONLY
139,380		HD DBL MICRO 60MIL 23FT	~~45,996~~ 45,180 LBS			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	211212-10	11,615
L-HD-MSDS-60-23	211213-10	11,615
L-HD-MSDS-60-23	211214-10	11,615
L-HD-MSDS-60-23	211315-10	11,615
L-HD-MSDS-60-23	211316-10	11,615
L-HD-MSDS-60-23	211317-10	11,615
L-HD-MSDS-60-23	211318-10	11,615
L-HD-MSDS-60-23	211319-10	11,615
L-HD-MSDS-60-23	211321-10	11,615
L-HD-MSDS-60-23	211322-10	11,615
L-HD-MSDS-60-23	211323-10	11,615
L-HD-MSDS-60-23	211549-10	11,615

Total Weight: ~~45,996 LB~~ 45,180 LBS
Total Units: 12 Rolls
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

IIT C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
☐ Prepaid
☐ Collect $

a shipment moves between two ports by a carrier by
, the law requires that the bill of lading shall state
er it is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect.
☐ Check box if charges are Collec

pper's imprint in lieu of stamp; not a part of bill of lading
ved by the Interstate Commerce Commission.

is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportatio

Shipper, Per
Agent, Per

Page 1 of 1

anent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.
transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response
unication Standard (HM 126C). Provide emergency response phone number in case of incident or accident.

IGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

B/L NO. 025916

OF CARRIER TRUCK | CARRIER'S NO. | DATE 6/18/2010

), subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading,
rty described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier bei
d throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver
arrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any
erty, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the da
this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditio
y agreed to by the shipper and accepted for himself and his assigns.

I: AGRU/AMERICA, INC.
PER 500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
GIN) (843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE DUKE ENERGY
MARSHALL STEAM PLANT
STREET 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION WILSON WARLICK 704-361-7882 ZIP

RING ER Stone Construction | ROUTE | VEHICLE NUMBER

NO. KAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONLY)
7,765		HD DBL MICRO 60MIL 23FT	42,163			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	218590-10	11,615
L-HD-MSDS-60-23	218591-10	11,615
L-HD-MSDS-60-23	218592-10	11,615
L-HD-MSDS-60-23	218593-10	11,615
L-HD-MSDS-60-23	218694-10	11,615
L-HD-MSDS-60-23	218722-10	11,615
L-HD-MSDS-60-23	218723-10	11,615
L-HD-MSDS-60-23	219103-10	11,615
L-HD-MSDS-60-23	219104-10	11,615
L-HD-MSDS-60-23	219105-10	11,615
L-HD-MSDS-60-23	219107-10	11,615

Total Weight: 42,163 LB
Total Units: 13 Rolls
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

T C.O.D. TO: AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
☒ Prepaid
☐ Collect $

shipment moves between two ports by a carrier by the law requires that the bill of lading shall state r it is "carrier's or shipper's weight".

ier's imprint in lieu of stamp; not a part of bill of lading ed by the Interstate Commerce Commission.

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect. ☐ Check box if charges are Coll

to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportat

Shipper, Per KD Agent, Per

ment post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.
transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response

agru america, inc

SHIPPING RELEASE FOR

Date: 6/18/10

BOL #:

Document #: 13568

Customer:

Destination: INC

	ROLL #	EXTERNAL VISUAL OK?		STRAPS OK?		CORE OK?		WELD ROD OK?		COMMENTS (TO ALL NO REMARK)
1	218590-10	Y	N	Y	N	Y	N	Y	N	
2	218591-10	Y	N	Y	N	Y	N	Y	N	
3	218592-10	Y	N	Y	N	Y	N	Y	N	
4	218593-10	Y	N	Y	N	Y	N	Y	N	
5	218694-10	Y	N	Y	N	Y	N	Y	N	
6	218722-10	Y	N	Y	N	Y	N	Y	N	
7	218723-10	Y	N	Y	N	Y	N	Y	N	
8	219103-10	Y	N	Y	N	Y	N	Y	N	
9	219104-10	Y	N	Y	N	Y	N	Y	N	
10	219105-10	Y	N	Y	N	Y	N	Y	N	
11	219107-10	Y	N	Y	N	Y	N	Y	N	
12		Y	N	Y	N	Y	N	Y	N	
13		Y	N	Y	N	Y	N	Y	N	
14		Y	N	Y	N	Y	N	Y	N	
15		Y	N	Y	N	Y	N	Y	N	
16		Y	N	Y	N	Y	N	Y	N	
17		Y	N	Y	N	Y	N	Y	N	
18		Y	N	Y	N	Y	N	Y	N	
19		Y	N	Y	N	Y	N	Y	N	
20		Y	N	Y	N	Y	N	Y	N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if necessary) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

Digital photo taken of shipment ?

yes no

SHIPREL FRM
REV 01

Inspector: KF

Loader: KF

AIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

E OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		6/18/2010	025918

'ED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, perty described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier b ood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliv carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or ar perty, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the f this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. r hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and condit eby agreed to by the shipper and accepted for himself and his assigns.

M:
PPER
IGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

agru america

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE DUKE ENERGY
MARSHALL STEAM PLANT
STREET 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION WILSON WARLICK 704-361-7882 ZIP

ERING IER Stone Construction | ROUTE | VEHICLE NUMBER

NO. CKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONL
27,765		HD DBL MICRO 60MIL 23FT	42,163			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	211552-10	11,615
L-HD-MSDS-60-23	218603-10	11,615
L-HD-MSDS-60-23	218612-10	11,615
L-HD-MSDS-60-23	218695-10	11,615
L-HD-MSDS-60-23	218729-10	11,615
L-HD-MSDS-60-23	219106-10	11,615
L-HD-MSDS-60-23	219108-10	11,615
L-HD-MSDS-60-23	219109-10	11,615
L-HD-MSDS-60-23	219110-10	11,615
L-HD-MSDS-60-23	219114-10	11,615
L-HD-MSDS-60-23	219223-10	11,615

Total Weight: 42,163 LB
Total Units: 11 Rolls
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

T C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
[X] Prepaid
[ ] Collect $

shipment moves between two ports by a carrier by the law requires that the bill of lading shall state r it is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect.
[ ] Check box if charges are Colle

oer's imprint in lieu of stamp; not a part of bill of lading ed by the Interstate Commerce Commission.

to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportati

Shipper, Per Agent, Per

ment post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.

transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response unication Standard (HM-126F). Provide emergency response phone number in case of incident or accident.

1

agru america, inc

SHIPPING RELEASE FORI

Date: 6/18/10

BOL #:

Document #: 13568

Customer:

Destination: INC

	ROLL #	EXTERNAL VISUAL OK?		STRAPS OK?		CORE OK?		WELD ROD OK?		COMMENTS (TO ALL NO REMARK)
1	211552-10	Y	N	Y	N	Y	N	Y	N	
2	218695-10	Y	N	Y	N	Y	N	Y	N	
3	218603-10	Y	N	Y	N	Y	N	Y	N	
4	218612-10	Y	N	Y	N	Y	N	Y	N	
5	218727-10	Y	N	Y	N	Y	N	Y	N	
6	219106-10	Y	N	Y	N	Y	N	Y	N	
7	219108-10	Y	N	Y	N	Y	N	Y	N	
8	219109-10	Y	N	Y	N	Y	N	Y	N	
9	219110-10	Y	N	Y	N	Y	N	Y	N	
10	219114-10	Y	N	Y	N	Y	N	Y	N	
11	219223-10	Y	N	Y	N	Y	N	Y	N	
12		Y	N	Y	N	Y	N	Y	N	
13		Y	N	Y	N	Y	N	Y	N	
14		Y	N	Y	N	Y	N	Y	N	
15		Y	N	Y	N	Y	N	Y	N	
16		Y	N	Y	N	Y	N	Y	N	
17		Y	N	Y	N	Y	N	Y	N	
18		Y	N	Y	N	Y	N	Y	N	
19		Y	N	Y	N	Y	N	Y	N	
20		Y	N	Y	N	Y	N	Y	N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if neccessary*) : *Secure Load; Lot # on BOL; Check type*

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

SHIPREL FRM
REV 01

Digital photo taken of shipment ?
yes no

Inspector: KF

Loader: KF

AIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		6/18/2010	025917

ED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading.
perty described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier b
ood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliv
carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or ar
operty, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the
if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and condit
by agreed to by the shipper and accepted for himself and his assigns.

VI:
PER
GIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

agru america

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE DUKE ENERGY
MARSHALL STEAM PLANT
STREET 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION WILSON WARLICK 704-361-7882
ZIP

ERING ER Stone Construction
ROUTE
VEHICLE NUMBER

NO. CKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONL
27,765		HD DBL MICRO 60MIL 23FT	42,163			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	218589-10	11,615
L-HD-MSDS-60-23	218601-10	11,615
L-HD-MSDS-60-23	218607-10	11,615
L-HD-MSDS-60-23	218696-10	11,615
L-HD-MSDS-60-23	218697-10	11,615
L-HD-MSDS-60-23	218698-10	11,615
L-HD-MSDS-60-23	218699-10	11,615
L-HD-MSDS-60-23	218721-10	11,615
L-HD-MSDS-60-23	219102-10	11,615
L-HD-MSDS-60-23	219222-10	11,615
L-HD-MSDS-60-23	219224-10	11,615

Total Weight: 42,163 LB
Total Units: 11 Rolls
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
[X] Prepaid
[ ] Collect $

hipment moves between two ports by a carrier by
se law requires that the bill of lading shall state
t is "carrier's or shipper's weight".

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

r's imprint in lieu of stamp; not a part of bill of lading
l by the Interstate Commerce Commission.

Freight charges are PREPAID unless marked collect.
[ ] Check box if charges are Collo

o certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportatio

Shipper, Per
Agent, Per

ent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.

ansporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response

agru america, inc

SHIPPING RELEASE FOR

Date : 06-18-10

BOL # :

Document # : 13568

Customer :

Destination : Jewell NC

	ROLL #	EXTERNAL VISUAL OK?		STRAPS OK?		CORE OK?		WELD ROD OK?		COMMENTS (TO ALL NO REMARK)
1	218589-10	Y	N	Y	N	Y	N	Y	N	
2	218696-10	Y	N	Y	N	Y	N	Y	N	
3	218697-10	Y	N	Y	N	Y	N	Y	N	
4	218698-10	Y	N	Y	N	Y	N	Y	N	
5	218699-10	Y	N	Y	N	Y	N	Y	N	
6	218601-10	Y	N	Y	N	Y	N	Y	N	
7	218607-10	Y	N	Y	N	Y	N	Y	N	
8	218721-10	Y	N	Y	N	Y	N	Y	N	
9	219102-10	Y	N	Y	N	Y	N	Y	N	
10	219222-10	Y	N	Y	N	Y	N	Y	N	
11	219224-10	Y	N	Y	N	Y	N	Y	N	
12		Y	N	Y	N	Y	N	Y	N	
13		Y	N	Y	N	Y	N	Y	N	
14		Y	N	Y	N	Y	N	Y	N	
15		Y	N	Y	N	Y	N	Y	N	
16		Y	N	Y	N	Y	N	Y	N	
17		Y	N	Y	N	Y	N	Y	N	
18		Y	N	Y	N	Y	N	Y	N	
19		Y	N	Y	N	Y	N	Y	N	
20		Y	N	Y	N	Y	N	Y	N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if neccessary) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

SHIPREL FRM
REV 01

Digital photo taken of shipment ?

yes no

Inspector : J.T.D

Loader : J.T.D

RAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

ME OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		6/17/2010	025900

IVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading,
roperty described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier bei
rstood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to delivor
ier carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any
roperty, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the d
f, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
ier hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditi
ereby agreed to by the shipper and accepted for himself and his assigns.

DM:
IPPER
RIGIN)

agru america

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE: DUKE ENERGY
MARSHALL STEAM PLANT
STREET: 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION: WILSON WARLICK 704-361-7882
ZIP

IVERING RIER: Stone Construction
ROUTE
VEHICLE NUMBER

NO. ACKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONL'
139,380		HD DBL MICRO 60MIL 23FT	~~45,996~~			
242		WELD ROD MFG BLACK HDPE 5MM	242			
			46080 LBS			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	218602-10	11,615
L-HD-MSDS-60-23	218604-10	11,615
L-HD-MSDS-60-23	218605-10	11,615
L-HD-MSDS-60-23	218606-10	11,615
L-HD-MSDS-60-23	218608-10	11,615
L-HD-MSDS-60-23	218609-10	11,615
L-HD-MSDS-60-23	218610-10	11,615
L-HD-MSDS-60-23	218611-10	11,615
L-HD-MSDS-60-23	218714-10	11,615
L-HD-MSDS-60-23	218731-10	11,615
L-HD-MSDS-60-23	219111-10	11,615
L-HD-MSDS-60-23	219116-10	11,615

Total Weight: ~~46,238 LB~~ 46080 LBS
Total Units: 12 Rolls
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

IT C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
☑ Prepaid
☐ Collect $

e shipment moves between two ports by a carrier by r, the law requires that the bill of lading shall state ner it is "carrier's or shipper's weight".

pper's imprint in lieu of stamp; not a part of bill of lading oved by the Interstate Commerce Commission.

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect.
☐ Check box if charges are Colle

is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportatir

Shipper, Per
Agent, Per

Page 1 of 1

ıanent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.
n transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response

agru america, inc

SHIPPING RELEASE FORI

Date : 06-16-10

BOL # :

Document # : 13568

Customer :

Destination : Iredell NC

	ROLL #	EXTERNAL VISUAL OK?		STRAPS OK?		CORE OK?		WELD ROD OK?		COMMENTS (TO ALL NO REMARK	
1	218602-10	Y	N	Y	N	Y	N	Y	N		
2	218604-10	Y	N	Y	N	Y	N	Y	N		
3	218605-10	Y	N	Y	N	Y	N	Y	N		
4	218606-10	Y	N	Y	N	Y	N	Y	N		
5	218608-10	Y	N	Y	N	Y	N	Y	N		
6	218609-10	Y	N	Y	N	Y	N	Y	N		
7	218610-10	Y	N	Y	N	Y	N	Y	N		
8	218611-10	Y	N	Y	N	Y	N	Y	N	5mm HD	
9	218714-10	Y	N	Y	N	Y	N	Y	N		
10	218731-10	Y	N	Y	N	Y	N	Y	N	8290800 (8 spools	
11	219111-10	Y	N	Y	N	Y	N	Y	N	791450 (3)	
12	219116-10	Y	N	Y	N	Y	N	Y	N	11 spools	
13		Y	N	Y	N	Y	N	Y	N		
14		Y	N	Y	N	Y	N	Y	N		
15		Y	N	Y	N	Y	N	Y	N		
16		Y	N	Y	N	Y	N	Y	N		
17		Y	N	Y	N	Y	N	Y	N		
18		Y	N	Y	N	Y	N	Y	N		
19		Y	N	Y	N	Y	N	Y	N		
20		Y	N	Y	N	Y	N	Y	N		

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if neccessary) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

Digital photo taken of shipment ?

yes no

SHIPREL FRM
REV 01

Inspector : J.T.D

Loader : J.T.D

; MEMORANDUM is an acknowledgment that a Bill of Lading has been issued and is not the Original Bill of Lading, nor a copy or duplicate, covering the property named herein, and is intended solely for filing or record.

E OF CARRIER	CARRIER'S NO.	DATE	B/L NO.
TRUCK		6/17/2010	025904

'ED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading,
perty described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier bei
tood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver
r carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any
operty, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the da
if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
r hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditio
eby agreed to by the shipper and accepted for himself and his assigns.

M:
PPER
IGIN)

agru america

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE: DUKE ENERGY
MARSHALL STEAM PLANT
STREET: 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION: WILSON WARLICK 704-361-7882
ZIP

VERING IER: Stare
ROUTE
VEHICLE NUMBER

NO. CKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONLY)
139,380		HD DBL MICRO 60MIL 23FT	~~45,996~~			
245		WELD ROD MFG BLACK HDPE 5MM	245			
			45,960 LBS			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	216600-10	11,615
L-HD-MSDS-60-23	218713-10	11,615
L-HD-MSDS-60-23	218718-10	11,615
L-HD-MSDS-60-23	218719-10	11,615
L-HD-MSDS-60-23	218720-10	11,615
L-HD-MSDS-60-23	218724-10	11,615
L-HD-MSDS-60-23	218725-10	11,615
L-HD-MSDS-60-23	218726-10	11,615
L-HD-MSDS-60-23	218727-10	11,615
L-HD-MSDS-60-23	218728-10	11,615
L-HD-MSDS-60-23	218730-10	11,615
L-HD-MSDS-60-23	218732-10	11,615

Total Weight: ~~46,241 LB~~ 46,202 LBS
Total Units: 12 ROLLS
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

IT C.O.D. TO:
agru america
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE
☑ Prepaid
☐ Collect $

o shipment moves between two ports by a carrier by , the law requires that the bill of lading shall state ier it is "carrier's or shipper's weight".

oper's imprint in lieu of stamp; not a part of bill of lading ved by the Interstate Commerce Commission.

NOTE: Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.
(Signature of Consignor)

TOTAL CHARGES $

Freight charges are PREPAID unless marked collect. ☐ Check box if charges are Colle

is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportati

Shipper, Per

Agent, Per Kenneth Dixon

anent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.

n transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response

agru america, inc

SHIPPING RELEASE FORM

Date : 6-16-10

BOL # :

Document # : 13568

Customer :

Destination : NC

	ROLL #	EXTERNAL VISUAL OK?		STRAPS OK?		CORE OK?		WELD ROD OK?		COMMENTS (TO ALL NO REMARKS)
1	218600-10	Y	N	Y	N	Y	N	Y	N	
2	218718-10	Y	N	Y	N	Y	N	Y	N	
3	218719-10	Y	N	Y	N	Y	N	Y	N	
4	218720-10	Y	N	Y	N	Y	N	Y	N	
5	218724-10	Y	N	Y	N	Y	N	Y	N	
6	218725-10	Y	N	Y	N	Y	N	Y	N	
7	218726-10	Y	N	Y	N	Y	N	Y	N	
8	218727-10	Y	N	Y	N	Y	N	Y	N	Smm HD
9	218728-10	Y	N	Y	N	Y	N	Y	N	7100409
10	218730-10	Y	N	Y	N	Y	N	Y	N	11 spools
11	218731-10	Y	N	Y	N	Y	N	Y	N	
12	218732-10	Y	N	Y	N	Y	N	Y	N	
13		Y	N	Y	N	Y	N	Y	N	
14		Y	N	Y	N	Y	N	Y	N	
15		Y	N	Y	N	Y	N	Y	N	
16		Y	N	Y	N	Y	N	Y	N	
17		Y	N	Y	N	Y	N	Y	N	
18		Y	N	Y	N	Y	N	Y	N	
19		Y	N	Y	N	Y	N	Y	N	
20		Y	N	Y	N	Y	N	Y	N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if neccessary) : Secure Load; Lot # on BOL; Check type

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

SHIPREL FRM
REV 01

Digital photo taken of shipment ?
yes no

Inspector : J. T. D

Loader : J. T. D

RAIGHT BILL OF LADING - SHORT FORM - ORIGINAL - NOT NEGOTIABLE

B/L NO. 025905

ME OF CARRIER: TRUCK | CARRIER'S NO. | DATE: 6/17/2010

EIVED, subject to the classifications and lawfully filed tariffs in effect on the date of Issue of this Bill of Lading,
roperty described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier b
rstood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliv
her carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or an
property, that every service to be performed hereunder, shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the
of, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
per hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditi
ereby agreed to by the shipper and accepted for himself and his assigns.

OM:
IIPPER
RIGIN)

AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

EMERGENCY RESPONSE PHONE NO.

TO:
CONSIGNEE: DUKE ENERGY
MARSHALL STEAM PLANT
STREET: 8320 NC HIGHWAY E
TERRELL, NC 28682
DESTINATION: WILSON WARLICK 704-361-7882
ZIP

IVERING IRIER: Stone Construction | ROUTE | VEHICLE NUMBER

NO. PACKAGES	+ HM	KIND OF PACKAGE, DESCRIPTION OF ARTICLES SPECIAL MARKS AND EXCEPTIONS	*WEIGHT (SUBJECT TO CORR.)	CLASS OR RATE	✓	CHARGES (FOR CARRIER USE ONL
139,380		HD DBL MICRO 60MIL 23FT	~~45,996~~			
239		WELD ROD MFG BLACK HDPE 5MM	239			
			45,960 LBS			

Item Key	Roll Number	Quantity
L-HD-MSDS-60-23	218715-10	11,615
L-HD-MSDS-60-23	218716-10	11,615
L-HD-MSDS-60-23	218717-10	11,615
L-HD-MSDS-60-23	219101-10	11,615
L-HD-MSDS-60-23	219112-10	11,615
L-HD-MSDS-60-23	219113-10	11,615
L-HD-MSDS-60-23	219115-10	11,615
L-HD-MSDS-60-23	219117-10	11,615
L-HD-MSDS-60-23	219118-10	11,615
L-HD-MSDS-60-23	219119-10	11,615
L-HD-MSDS-60-23	219120-10	11,615
L-HD-MSDS-60-23	219221-10	11,615

46,199 LBS
Total Weight: ~~46,235 LB~~
Total Units: 12 Rolls
Order No.: 13568 Order Date: 03/09/10 Request Date: 03/09/10
Location: GTOWN P.O. No.: 13173

IT C.O.D. TO:
AGRU/AMERICA, INC.
500 GARRISON ROAD
GEORGETOWN, SOUTH CAROLINA 29440
(843) 546-0600

C.O.D. Amt $

C.O.D. FEE: ✓ Prepaid / Collect $

e shipment moves between two ports by a carrier by r, the law requires that the bill of lading shall state ner it is "carrier's or shipper's weight".

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The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding
$ per

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TOTAL CHARGES $

Freight charges are PREPAID unless marked collect. ☐ Check box if charges are Colle

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Shipper, Per: Agent, Per:

Page 1 of 1

anent post office address of shipper

+ MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIAL AS DEFINED IN TITLE 49 OF FEDERAL REGULATIONS.

n transporting hazardous materials include the technical or chemical name for n.o.s. (not otherwise specified) or generic description of material with appropriate UN or NA number as defined in US DOT Emergency Response munication Standard (NM 126C). Provide emergency response phone number in case of incident or accident.

1

agru america, inc

SHIPPING RELEASE FORM

Date : 06-16-10

BOL # :

Document # : 13568

Customer :

Destination : NC

	ROLL #	EXTERNAL VISUAL OK?		STRAPS OK?		CORE OK?		WELD ROD OK?		COMMENTS (TO ALL NO REMARK)
1	218715-10	Y	N	Y	N	Y	N	Y	N	
2	218717-10	Y	N	Y	N	Y	N	Y	N	
3	219716-10	Y	N	Y	N	Y	N	Y	N	
4	219101-10	Y	N	Y	N	Y	N	Y	N	
5	219112-10	Y	N	Y	N	Y	N	Y	N	
6	219113-10	Y	N	Y	N	Y	N	Y	N	
7	219115-10	Y	N	Y	N	Y	N	Y	N	
8	219117-10	Y	N	Y	N	Y	N	Y	N	5mm HD
9	219118-10	Y	N	Y	N	Y	N	Y	N	7100409
10	219119-10	Y	N	Y	N	Y	N	Y	N	11 Spools
11	219120-10	Y	N	Y	N	Y	N	Y	N	
12	219221-10	Y	N	Y	N	Y	N	Y	N	
13		Y	N	Y	N	Y	N	Y	N	
14		Y	N	Y	N	Y	N	Y	N	
15		Y	N	Y	N	Y	N	Y	N	
16		Y	N	Y	N	Y	N	Y	N	
17		Y	N	Y	N	Y	N	Y	N	
18		Y	N	Y	N	Y	N	Y	N	
19		Y	N	Y	N	Y	N	Y	N	
20		Y	N	Y	N	Y	N	Y	N	

External Visual Check : Clean Roll; Damage (Holes, Tears); Telescoping; Liner Defects (Voids, Bug Marks, etc.); Legible markings on roll

Strap Check : 6 foot spacing; Check for wear, cuts

Core Check : Check for cracks, defects

Weld Rod Check (*if neccessary*) : *Secure Load; Lot # on BOL; Check type*

Comments : Note comments for ANY & ALL "No" entries on form

CHECK OFF ON ALL FIELDS - INSPECTOR VERIFIES ALL COMMENTS

SHIPREL FRM
REV 01

Digital photo taken of shipment ?

yes no

Inspector : J.T.D

Loader : J.T.D

APPENDIX II – GEOSYNTHETICS
Section 5 – Cell 1 Secondary HDPE Geomembrane CQA Forms

Subgrade Certification Forms
Geomembrane Deployment Report
Geomembrane Trial Seam Log
Geomembrane Seam Log
Destructive Laboratory Test Results
Geomembrane Defect Log
Geomembrane Repair Testing Log

Cell 1 Secondary HDPE Geomembrane Subgrade Certification Forms

CERTIFICATE OF SUBGRADE SURFACE ACCEPTANCE

INSTALLER: ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

PROJECT NAME: Duke Energy Marshall Cell 2 **PROJECT NO:** 10 - 01 - 1001

LOCATION: Terrell,NC.

AREA ACCEPTED: PANEL- 01 THRU PANEL- 28

PANEL NUMBERS: PANEL - 01 THRU PANEL- 28

GRADE ACCEPTANCE: INSPECTOR: JIMMY ADDIS

GENERAL CONTRACTOR: EARNHARDT GRADING, INC.

OWNER: Duke Energy Corp

AUTHORIZED REPRESENTATIVE: Darrell B. Wolfe

The undersigned, MOHAMMED MALIMAR ,certifies that he/she is a representative of Environmental Specialties International, Inc. authorized to execute this certificate, that he/she has visually inspected the subgrade surface described above on 14-Jun and found the surface to be acceptable for installation of the geomembrane.

This certification is based on observation of the surface of the subgrade only. No subsurface inspections or test have been performed and Environmental Specialties International, Inc. makes no representations or warranties regarding conditions which may exist below the surface of the subgrade.

AUTHORIZED REPRESENTATIVE OF ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

Signature	Title	DATE
Mohammed Malimar A.	SUPERINTENDENT	14-Jun

OWNER REPRESENTATIVE:

Signature	Title	DATE
Jimmy H. Addis	CQA	6/14/10

7943 PECUE LANE SUITE A ~ BATON ROUGE, LA. 70809 ~ PHONE 225-291-2700 ~ FAX 225-291-2789

CERTIFICATE OF SUBGRADE SURFACE ACCEPTANCE

INSTALLER: ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

PROJECT NAME: Duke Energy Marshall Cell 2 | **PROJECT NO:** 10 - 01 - 1001

LOCATION: Terrell,NC. DSW 7/2/10

AREA ACCEPTED: PANEL- 29 THRU. PANEL- 39

PANEL NUMBERS: PANEL - 29 THRU. PANEL- 39

GRADE ACCEPTANCE: INSPECTOR: JIMMY ADDIS

GENERAL CONTRACTOR: EARNHARDT GRADING, INC.

OWNER: DUKE ENERGY CORP

AUTHORIZED REPRESENTATIVE: Darrell S. Wolfe

The undersigned, MOHAMMED MALIMAR ,certifies that he/she is a representative of Environmental Specialties International, Inc. authorized to execute this certificate, that he/she has visually inspected the subgrade surface described above on 17-Jun and found the surface to be acceptable for installation of the geomembrane.

This certification is based on observation of the surface of the subgrade only. No subsurface inspections or test have been performed and Environmental Specialties International, Inc. makes no representations or warranties regarding conditions which may exist below the surface of the subgrade.

AUTHORIZED REPRESENTATIVE OF ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

Signature	Title	DATE
Mohammed Malimar A.	SUPERINTENDENT	17-Jun

OWNER REPRESENTATIVE:

Signature	Title	DATE
Jimmy H. Addis	CQA	6/17/10

7943 PECUE LANE SUITE A ~ BATON ROUGE, LA. 70809 ~ PHONE 225-291-2700 ~ FAX 225-291-2788

CERTIFICATE OF SUBGRADE SURFACE ACCEPTANCE

INSTALLER: ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

PROJECT NAME: Duke Energy Marshall Cell ~~2~~ 1 **PROJECT NO:** 10 - 01 - 1001

LOCATION: Terrell, NC. DBW 7/2/10

AREA ACCEPTED: PANEL- 40 THRU. PANEL- 71

PANEL NUMBERS: PANEL - 40 THRU. PANEL- 71

GRADE ACCEPTANCE: INSPECTOR: JIMMY ADDIS

GENERAL CONTRACTOR: EARNHARDT GRADING, INC.

OWNER: Duke Energy Corp

AUTHORIZED REPRESENTATIVE: David B. Wolfe

The undersigned, MOHAMMED MALIMAR ,certifies that he/she is a representative of Environmental Specialties International, Inc. authorized to execute this certificate, that he/she has visually inspected the subgrade surface described above on 18-Jun and found the surface to be acceptable for installation of the geomembrane.

This certification is based on observation of the surface of the subgrade only. No subsurface inspections or test have been performed and Environmental Specialties International, Inc. makes no representations or warranties regarding conditions which may exist below the surface of the subgrade.

AUTHORIZED REPRESENTATIVE OF ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

Signature	Title	DATE
Mohammed Malimar A.	SUPERINTENDENT	18-Jun

OWNER REPRESENTATIVE:

Signature	Title	DATE
Jimmy H. Addis	CQA	6/18/10

7943 PECUE LANE SUITE A ~ BATON ROUGE, LA. 70809 ~ PHONE 225-291-2700 ~ FAX 225-291-2788

CERTIFICATE OF SUBGRADE SURFACE ACCEPTANCE

INSTALLER: ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

PROJECT NAME: Duke Energy Marshall Cell 2 | **PROJECT NO:** 10 - 01 - 1001

LOCATION: Terrell,NC. DBA 7/12/10

AREA ACCEPTED: PANEL- 72 THRU. PANEL- 100

PANEL NUMBERS: PANEL - 72 THRU. PANEL- 100

GRADE ACCEPTANCE: INSPECTOR: JIMMY ADDIS

GENERAL CONTRACTOR: EARNHARDT GRADING, INC.

OWNER: DUKE ENERGY CORP

AUTHORIZED REPRESENTATIVE: Daniel B. Wolfe

The undersigned, MOHAMMED MALIMAR ,certifies that he/she is a representative of Environmental Specialties International, Inc. authorized to execute this certificate, that he/she has visually inspected the subgrade surface described above on 19-Jun and found the surface to be acceptable for installation of the geomembrane.

This certification is based on observation of the surface of the subgrade only. No subsurface inspections or test have been performed and Environmental Specialties International, Inc. makes no representations or warranties regarding conditions which may exist below the surface of the subgrade.

AUTHORIZED REPRESENTATIVE OF ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

Signature	Title	DATE
Mohammed Malimar A.	SUPERINTENDENT	19-Jun

OWNER REPRESENTATIVE:

Signature	Title	DATE
Jimmy H. Addis	CQA	6/19/10

7943 PECUE LANE SUITE A ~ BATON ROUGE, LA. 70809 ~ PHONE 225-291-2700 ~ FAX 225-291-2788

Cell 1 Secondary HDPE Geomembrane Deployment Report

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 6/14,6/17,6/18/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 1 **of** 4

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	-----	-----		
S1	211684	501	22	11,022	0	TB	6/14/10
S2	211786	500	22	11,000	0	TB	6/14/10
S3	211791	500	22	11,000	0	TB	6/14/10
S4	211790	501	22	11,022	0	TB	6/14/10
S5	211555	500	22	11,000	0	TB	6/14/10
S6	211668	502	22	11,044	0	TB	6/14/10
S7	211327	76	22	1,672	0	TB	6/14/10
S8	211327	75	22	1,650	0	TB	6/14/10
S9	211327	74	22	1,628	0	TB	6/14/10
S10	211327	75	22	1,650	0	TB	6/14/10
S11	211327	74	22	1,628	0	TB	6/14/10
S12	211327	73	22	1,606	0	TB	6/14/10
S13	211557	73	22	1,606	0	TB	6/14/10
S14	211557	72	22	1,584	0	TB	6/14/10
S15	211557	71	22	1,562	0	TB	6/14/10
S16	211557	71	22	1,562	0	TB	6/14/10
S17	211557	71	22	1,562	0	TB	6/14/10
S18	211557	70	22	1,540	0	TB	6/14/10
S19	211324	70	22	1,540	0	TB	6/14/10
S20	211324	71	22	1,562	0	TB	6/14/10
S21	111324	69	22	1,518	0	TB	6/14/10
S22	211324	70	22	1,540	0	TB	6/14/10
S23	211324	69	22	1,518	0	TB	6/14/10
S24	211324	70	22	1,540	0	TB	6/14/10
S25	211665	70	22	1,540	0	TB	6/14/10
S26	211665	67	22	1,474	0	TB	6/14/10
S27	211665	67	22	1,474	0	TB	6/14/10
S28	211665	67	22	1,474	0	TB	6/14/10
S29	211785	502	22	11,044	0	TB	6/17/10
			Sheet Total	111,562	0		
			Total to Date	111,562	0		

CQA Personnel: Travis Bowman

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 6/14,6/17,6/18/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 2 **of** 4

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	111,562	0		
S30	211432	499	22	10,978	0	TB	6/17/10
S31	211214	498	22	10,956	0	TB	6/17/10
S32	211433	502	22	11,044	0	TB	6/17/10
S33	211553	500	22	11,000	0	TB	6/17/10
S34	211431	499	22	10,978	0	TB	6/17/10
S35	211434	501	22	11,022	0	TB	6/17/10
S36	211671	496	22	10,912	0	TB	6/17/10
S37	211678	497	22	10,934	0	TB	6/17/10
S38	211213	498	22	10,956	0	TB	6/17/10
S39	211321	501	8	4,008	0	TB	6/17/10
S40	211321	331	8	2,483	0	TB	6/18/10
S41	211673	326	22	7,172	0	TB	6/18/10
S42	211319	328	22	7,216	0	TB	6/18/10
S43	211564	328	22	7,216	0	TB	6/18/10
S44	211560	327	22	7,194	0	TB	6/18/10
S45	211561	330	22	7,260	0	TB	6/18/10
S46	211558	332	22	7,304	0	TB	6/18/10
S47	211559	333	22	7,326	0	TB	6/18/10
S48	211680	334	22	7,348	0	TB	6/18/10
S49	211556	331	22	7,282	0	TB	6/18/10
S50	211677	333	22	7,326	0	TB	6/18/10
S51	211679	329	22	7,238	0	TB	6/18/10
S52	211669	328	22	7,216	0	TB	6/18/10
S53	211326	329	22	7,238	0	TB	6/18/10
S54	211547	328	22	7,216	0	TB	6/18/10
S55	211788	327	22	7,194	0	TB	6/18/10
S56	211788	173	22	3,806	0	TB	6/18/10
S57	211547	154	22	3,388	0	TB	6/18/10
S58	211564	65	22	1,430	0	TB	6/18/10
			Sheet Total	222,641	0		
			Total to Date	334,203	0		

CQA Personnel: Travis Bowman

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 6/14,6/17,6/18/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 3 **of** 4

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	334,203	0		
S59	211564	64	22	1,408	0	TB	6/18/10
S60	211326	64	22	1,408	0	TB	6/18/10
S61	211326	66	22	1,452	0	TB	6/18/10
S62	211669	64	22	1,408	0	TB	6/18/10
S63	211669	64	22	1,408	0	TB	6/18/10
S64	211679	62	22	1,364	0	TB	6/18/10
S65	211679	62	22	1,364	0	TB	6/18/10
S66	211556	63	22	1,386	0	TB	6/18/10
S67	211556	62	22	1,364	0	TB	6/18/10
S68	211680	63	22	1,386	0	TB	6/18/10
S69	211	65	22	1,430	0	TB	6/18/10
S70	211673	61	22	1,342	0	TB	6/18/10
S71	211673	61	22	1,342	0	TB	6/18/10
S72	211548	230	22	5,060	0	TB	6/18/10
S73	211548	237	22	5,214	0	TB	6/18/10
S74	211666	234	22	5,148	0	TB	6/18/10
S75	211666	239	22	5,258	0	TB	6/18/10
S76	211701	244	22	5,368	0	TB	6/18/10
S77	211701	248	22	5,456	0	TB	6/18/10
S78	211683	259	22	5,698	0	TB	6/18/10
S79	211683	227	22	4,994	0	TB	6/18/10
S80	211679	41	22	902	0	TB	6/18/10
S81	211321	144	22	3,168	0	TB	6/18/10
S82	211104	188	22	4,136	0	TB	6/18/10
S83	212104	169	22	3,718	0	TB	6/18/10
S84	211319	113	22	2,486	0	TB	6/18/10 Measured center cut on 45
S85	212104	84	22	1,848	0	TB	6/18/10 Measured center cut on 45
S86	211558	37	22	814	0	TB	6/18/10 Measured center cut on 45
S87	211558	12	10	120	0	TB	6/18/10 Measured center cut on 45
			Sheet Total	77,450	0		
			Total to Date	411,653	0		

CQA Personnel: Travis Bowman

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 6/14,6/17,6/18/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 4 **of** 4

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	411,653	0		
S88	211558	24	20	480	0	TB	6/18/10 Measured center cut on 45
S89	211558	69	22	1,518	0	TB	6/18/10 Measured center cut on 45
S90	211677	110	22	2,420	0	TB	6/18/10 Measured center cut on 45
S91	211550	198	22	4,356	0	TB	6/18/10 Measured center cut on 45
S92	211550	213	22	4,686	0	TB	6/18/10 Measured center cut on 45
S93	211674	230	22	5,060	0	TB	6/18/10 Measured center cut on 45
S94	211674	188	22	4,136	0	TB	6/18/10 Measured center cut on 45
S95	211328	179	22	3,938	0	TB	6/18/10 Measured center cut on 45
S96	211328	140	22	3,080	0	TB	6/18/10 Measured center cut on 45
S97	211328	129	22	2,838	0	TB	6/18/10 Measured center cut on 45
S98	211560	69	22	1,518	0	TB	6/18/10 Measured center cut on 45
S99	211560	51	22	1,122	0	TB	6/18/10 Measured center cut on 45
S100	211674	24	22	528	0	TB	6/18/10 Measured center cut on 45
			Sheet Total	35,680	0		
			Total to Date	447,333	0		

CQA Personnel: Travis Bowman

Cell 1 Secondary HDPE Geomembrane Trial Seam Log

GEOMEMBRANE TRIAL SEAM LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 1 **of** 2

					Machine Settings		Peel Test Results						Shear Test Results							
Sample No.	Approx. Time	Tech. Init.	Mach. No.	Ambient Temp.	Preheat or Speed	Temp. Setting	1		2		3		1	2	3	Pass/ Fail	Weld Type	Material	CQA Init.	Date
S1	1230	WT	3211	90	30	750	119	98	125	115	114	116	130	132	138	P	F	SS	JA	06/14/2010
S2	1228	DC	3210	90	30	750	125	120	119	120	121	119	133	141	137	P	F	SS	JA	06/14/2010
S3	1427	LN	1220	92	7	860	110	101	113	141	120	123	140	143	144	P	F	SS	JA	06/14/2010
S4	1430	BV	1219	92	7	860	116	111	100	98	103	107	149	141	139	P	F	SS	KB	06/16/2010
S5	1555	DC	3210	94	13	750	106	111	114	109	100	107	135	138	136	P	F	ST	KB	06/16/2010
S6	740	JT	5171	70	475	550	130	0	122	0	123	0	137	142	133	P	Ex	TT	KB	06/16/2010
S7	738	MM	829	70	500	550	137	0	137	0	120	0	134	143	140	P	Ex	TT	KB	06/16/2010
S8	745	MV	5155	72	500	550	130	0	131	0	146	0	140	139	140	P	Ex	ST	KB	06/16/2010
S9	1230	WT	3211	90	30	860	110	109	116	111	106	116	140	137	133	P	F	SS	JA	06/17/2010
S10	1222	DC	3210	90	30	860	106	111	109	107	123	127	141	144	147	P	F	SS	JA	06/17/2010
S11	1505	JT	5171	94	450	550	130	0	123	0	127	0	147	149	137	P	Ex	TT	JA	06/18/2010
S12	1240	SL	1221	90	7	860	110	117	121	115	112	121	138	129	133	P	F	SS	JA	06/18/2010
S13	1250	WT	3211	90	30	860	102	119	102	114	127	107	136	137	146	P	F	SS	JA	06/18/2010
S14	1250	DC	3210	90	30	860	113	120	126	119	112	118	134	137	139	P	F	SS	JA	06/18/2010
S15	1247	BV	1219	90	7	860	110	106	114	118	114	122	136	134	130	P	F	SS	JA	06/18/2010

Weld Type: (**Ex**)trusion, (**F**)usion
Material: (**SS**) Smooth/Smooth - (**ST**) Smooth/Texture - (**TT**) Texture /Texture

CQA Personnel: James Addis / Kyle Baucom

GEOMEMBRANE TRIAL SEAM LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 2 **of** 2

					Machine Settings		Peel Test Results						Shear Test Results							
Sample No.	Approx. Time	Tech. Init.	Mach. No.	Ambient Temp.	Preheat or Speed	Temp. Setting	1		2		3		1	2	3	Pass/ Fail	Weld Type	Material	CQA Init.	Date
S16	1430	BV	1219	91	5	860	97	120	100	109	118	112	129	136	132	P	F	TT	JA	06/18/2010
S17	1630	WT	3211	92	13	860	101	106	107	111	114	118	131	127	137	P	F	ST	JA	06/18/2010
S18	720	JT	5171	78	450	550	123	0	120	0	126	0	151	154	149	P	Ex	TT	KB	06/19/2010
S19	1020	DC	3210	82	30	860	115	117	110	107	112	115	150	153	154	P	F	SS	KB	06/19/2010
S20	1022	WT	3211	82	30	860	110	119	117	113	121	109	140	144	149	P	F	SS	KB	06/19/2010
S21	1030	BV	1219	82	7	860	115	111	106	114	119	112	144	152	147	P	F	SS	KB	06/19/2010
S22	1235	BV	1219	90	5	860	118	114	121	110	112	110	136	141	137	P	F	TT	KB	06/19/2010
S23	1236	DC	3210	90	30	860	114	110	106	109	112	118	141	146	137	P	F	SS	KB	06/19/2010
S24	1240	WT	3211	90	30	860	110	112	116	114	122	118	146	151	148	P	F	SS	KB	06/19/2010
S25	1245	JT	5171	90	450	550	111	0	126	0	114	0	151	146	154	P	Ex	TT	KB	06/19/2010
S26	1450	WT	3211	92	17	860	114	120	121	116	118	121	138	147	151	P	F	ST	KB	06/19/2010
S27	1456	DC	3210	92	17	860	110	112	106	122	110	125	140	141	138	P	F	ST	KB	06/19/2010
S28	725	MV	5155	79	450	550	135	0	141	0	127	0	155	157	167	P	Ex	TT	KB	06/21/2010
S29	730	JT	5171	79	450	550	130	0	145	0	151	0	166	171	161	P	Ex	TT	KB	06/21/2010

Weld Type: (**Ex**)trusion, (**F**)usion
Material: (**SS**) Smooth/Smooth - (**ST**) Smooth/Texture - (**TT**) Texture /Texture

CQA Personnel: James Addis / Kyle Baucom

Cell 1 Secondary HDPE Geomembrane Seam Log

GEOMEMBRANE SEAM LOG

Date: 06/14/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 1 of 16

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S1 / S2	EEOS / WAT	1240	DC	3210	500	1	A	1320 / 1325	30 / 29	RC	JA	P	06-14-2010	
S2 / S3	EEOS / WAT	1250	WT	3211	500	2	A	1258 / 1303	30 / 30	RC	JA	P	06-14-2010	Z2 1:25/1:30 30/30
S3 / S4	EEOS / WAT	1308	DC	3210	500	3	A	1338 / 1343	30 / 30	RC	JA	P	06-14-2010	
S4 / S5	EEOS / WAT	1325	WT	3211	499	4	A	1350 / 1355	30 / 29	RC	JA	P	06-14-2010	
S5 / S6	EEOS / WAT	1336	DC	3210	497	5	A	1404 / 1409	30 / 29	RC	JA	P	06-14-2010	
S7 / S8	NAT / SEOS	1358	WT	3211	75		A	1410 / 1415	30 / 30	RC	JA	P	06-14-2010	Z2 2:41/2:46 30/29
S8 / S9	NAT / SEOS	1410	DC	3210	74		A	1426 / 1431	30 / 20	RC	JA	P	06-14-2010	
S9 / S10	NAT / SEOS	1413	DC	3210	74		A	1419 / 1424	30 / 20	RC	JA	P	06-14-2010	
S10 / S11	NAT / SEOS	1427	DC	3210	74		A	1434 / 1439	30 / 30	RC	JA	P	06-14-2010	
S11 / S12	NAT / SEOS	1432	DC	3210	73		A	1440 / 1445	30 / 30	RC	JA	P	06-14-2010	
S12 / S13	NAT / SEOS	1439	DC	3210	73		A	1448 / 1453	30 / 29	RC	JA	P	06-14-2010	
S13 / S14	NAT / SEOS	1428	BV	1219	72	6	A	1445 / 1450	30 / 30	RC	JA	P	06-14-2010	
S14 / S15	NAT / SEOS	1450	DC	3210	72		A	1458 / 1303	30 / 29	RC	JA	P	06-14-2010	
S15 / S16	NAT / SEOS	1444	LN	1220	71		A	1500 / 1505	30 / 30	RC	JA	P	06-14-2010	
S16 / S17	NAT / SEOS	1458	BV	1219	70		A	1502 / 1507	30 / 30	RC	JA	P	06-14-2010	
					Sheet Total	3,224								
					Total to Date	3,224								

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 6/14/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 2 of 16

Project Total Carry Over 3,224

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S17 / S18	NAT / SEOS	1458	DC	3210	70		A	1506 / 1511	30 / 29	RC	JA	P	06-14-2010	
S18 / S19	NAT / SEOS	1500	LN	1220	69		A	1512 / 1517	30 / 29	RC	JA	P	06-14-2010	
S19 / S20	NAT / SEOS	1506	BV	1219	70		A	1516 / 1521	30 / 30	RC	JA	P	06-14-2010	
S20 / S21	NAT / SEOS	1512	DC	3210	69	7	A	1519 / 1524	30 / 30	RC	JA	P	06-14-2010	
S21 / S22	NAT / SEOS	1514	LN	1220	69		A	1525 / 1530	30 / 30	RC	JA	P	06-14-2010	
S22 / S23	NAT / SEOS	1518	BV	1219	67		A	1528 / 1533	30 / 29	RC	JA	P	06-14-2010	
S23 / S24	NAT / SEOS	1523	DC	3210	68		A	1531 / 1536	30 / 30	RC	JA	P	06-14-2010	
S24 / S25	NAT / SEOS	1531	LN	1220	68		A	1544 / 1549	30 / 29	RC	JA	P	06-14-2010	
S25 / S26	NAT / SEOS	1534	BV	1219	67		A	1545 / 1550	30 / 29	RC	JA	P	06-14-2010	
S26 / S27	NAT / SEOS	1537	DC	3210	67		A	1547 / 1552	30 / 30	RC	JA	P	06-14-2010	
S27 / S28	NAT / SEOS	1550	BV	1219	66		A	1558 / 1603	30 / 29	RC	JA	P	06-14-2010	
S6 / S28	EEOS / S27	1601	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S27	S27 / S26	1603	DC	3210	22	8	A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S26	S26 / S25	1605	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S25	S25 / S24	1607	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	

Sheet Total 838
Total to Date 4,062

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 6/14/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 3 of 16

Project Total Carry Over 4,062

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S6 / S24	S24 / S23	1609	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S23	S23 / S22	1611	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S22	S22 / S21	1613	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S21	S21 / S20	1615	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S20	S20 / S19	1617	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S19	S19 / S18	1619	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S18	S18 / S17	1621	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S17	S17 / S16	1623	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S16	S16 / S15	1625	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S15	S15 / S14	1627	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S14	S14 / S13	1629	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S13	S13 / S12	1631	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S12	S12 / S11	1633	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S11	S11 / S10	1635	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S10	S10 / S9	1637	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	

Sheet Total 330
Total to Date 4,392

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 6/14/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 4 of 16

Project Total Carry Over 4,392

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S6 / S9	S9 / S8	1639	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S8	S8 / S7	1641	DC	3210	22		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	
S6 / S7	S7 / WEOS	1643	DC	3210	21		A	1645 / 1650	30 / 29	RC	JA	P	06-14-2010	

Sheet Total 65
Total to Date 4,457

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 6/17/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 5 of 16

Project Total Carry Over 4,457

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S1 / S29	EEOS / WAT	1258	WT	3211	495	9	A	1300 / 1305	30 / 30	RC	JA	P	06-17-2010	
S29 / S30	WAT / EEOS	1234	DC	3210	493	10	A	1310 / 1315	30 / 30	RC	JA	P	06-17-2010	
S30 / S31	WAT / EEOS	1305	WT	3211	493	11	A	1324 / 1329	30 / 30	RC	JA	P	06-17-2010	
S31 / S32	WAT / EEOS	1306	DC	3210	492	12	A	1327 / 1332	30 / 29	RC	JA	P	06-17-2010	
S32 / S33	WAT / EEOS	1335	WT	3211	492	13	A	1350 / 1355	30 / 29	RC	JA	P	06-17-2010	
S33 / S34	WAT / EEOS	1330	DC	3210	494	14	A	1356 / 1402	30 / 30	RC	KB	P	06-17-2010	
S34 / S35	WAT / EEOS	1358	WT	3211	494	15	A	1418 / 1423	30 / 30	RC	JA	P	06-17-2010	
S35 / S36	WAT / EEOS	1358	DC	3210	495	16	A	1424 / 1429	30 / 30	RC	JA	P	06-17-2010	
S36 / S37	WAT / EEOS	1427	WT	3211	493	17	A	1456 / 1501	30 / 30	RC	JA	P	06-17-2010	
S37 / S38	WAT / EEOS	1432	DC	3210	494	18	A	1505 / 1510	30 / 30	RC	JA	P	06-17-2010	Z2 3:10/3:15 30/30
S38 / S39	WAT / EEOS	1504	DC	3210	493	19	A	1530 / 1535	30 / 30	RC	JA	P	06-17-2010	

Sheet Total 5,428
Total to Date 9,885

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 06-18-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 6 of 16

Project Total Carry Over 9,885

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S40 / S41	WEOS / EEOS	1322	SL	1221	323	20	A	1350 / 1355	30 / 30	RC	JA	P	06-18-2010	Z2 14:00/14:05 30/30
S41 / S42	WEOS / EEOS	1310	DC	3210	324	21	A	1330 / 1335	30 / 30	RC	JA	P	06-18-2010	
S42 / S43	WEOS / EEOS	1320	WT	3211	324		A	1335 / 1340	30 / 29	RC	JA	P	06-18-2010	
S43 / S44	WEOS / EEOS	1330	DC	3210	324	22	A	1347 / 1352	30 / 29	RC	JA	P	06-18-2010	
S44 / S45	WEOS / EEOS	1339	WT	3211	326	23	A	1358 / 1403	30 / 29	RC	JA	P	06-18-2010	
S45 / S46	WEOS / EEOS	1347	DC	3210	327		A	1414 / 1419	30 / 30	RC	JA	P	06-18-2010	
S46 / S47	WEOS / EEOS	1359	WT	3211	327	24	A	1410 / 1415	30 / 29	RC	JA	P	06-18-2010	
S47 / S48	WEOS / EEOS	1404	DC	3210	327		A	1422 / 1427	30 / 30	RC	JA	P	06-18-2010	
S48 / S49	WEOS / EEOS	1408	SL	1221	327	25	A	1437 / 1442	30 / 29	RC	JA	P	06-18-2010	
S49 / S50	WEOS / EEOS	1419	WT	3211	327	26	A	1435 / 1440	30 / 30	RC	JA	P	06-18-2010	
S50 / S51	EEOS / WEOS	1426	DC	3210	324		A	1445 / 1450	30 / 30	RC	JA	P	06-18-2010	
S51 / S52	EEOS / WEOS	1437	WT	3211	324	27	A	1451 / 1456	30 / 29	RC	JA	P	06-18-2010	
S52 / S53	EEOS / WEOS	1445	SL	1221	325	28	A	1525 / 1530	30 / 30	RC	JA	P	06-18-2010	
S53 / S54	EEOS / WEOS	1452	DC	3210	323		A	1531 / 1536	30 / 30	RC	JA	P	06-18-2010	
S54 / S55	EEOS / WEOS	1458	WT	3211	323	29	A	1535 / 1540	30 / 30	RC	JA	P	06-18-2010	

Sheet Total 4,875
Total to Date 14,760

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 06-18-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 7 of 16

Project Total Carry Over 14,763

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
S56 / S57	NEOS / SEOS	1519	WT	3211	22		A	1543 / 1548	30 / 29	RC	JA	P	06-18-2010	
S55 / S57	EEOS / S56	1518	DC	3210	153		A	1542 / 1547	30 / 30	RC	JA	P	06-18-2010	
S55 / S56	S56 / WEOS	1524	DC	3210	172	30	A	1545 / 1550	30 / 30	RC	JA	P	06-18-2010	
S28 / S58	NAT / SEOS	1518	SL	1221	63		A	1609 / 1614	30 / 30	RC	JA	P	06-18-2010	
S58 / S59	NAT / SEOS	1531	WT	3211	63		A	1614 / 1619	30 / 30	RC	JA	P	06-18-2010	
S59 / S60	NAT / SEOS	1535	SL	1221	61		A	1616 / 1621	30 / 30	RC	JA	P	06-18-2010	
S60 / S61	NAT / SEOS	1537	DC	3210	61		A	1619 / 1624	30 / 30	RC	JA	P	06-18-2010	
S61 / S62	NAT / SEOS	1541	WT	3211	61		A	1621 / 1626	30 / 30	RC	JA	P	06-18-2010	
S62 / S63	NAT / SEOS	1535	DC	3210	61		A	1623 / 1628	30 / 30	RC	JA	P	06-18-2010	
S63 / S64	NAT / SEOS	1605	WT	3211	61	31	A	1628 / 1633	30 / 30	RC	JA	P	06-18-2010	
S64 / S65	NAT / SEOS	1606	DC	3210	60		A	1630 / 1635	30 / 30	RC	JA	P	06-18-2010	
S65 / S66	NAT / SEOS	1614	WT	3211	60		A	1634 / 1639	30 / 30	RC	JA	P	06-18-2010	
S66 / S67	NAT / SEOS	1614	DC	3210	60		A	1637 / 1642	30 / 30	RC	JA	P	06-18-2010	
S67 / S68	NAT / SEOS	1621	WT	3211	60		A	1650 / 1655	30 / 30	RC	JA	P	06-18-2010	
S68 / S69	NAT / SEOS	1623	DC	3210	61		A	1648 / 1653	30 / 30	RC	JA	P	06-18-2010	

Sheet Total 1,079
Total to Date 15,842

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 06-18-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 8 of 16

Project Total Carry Over 15,842

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S69 / S70	NAT / SEOS	1629	WT	3211	59		A	1642 / 1647	30 / 29	RC	JA	P	06-18-2010	
S70 / S71	NAT / SEOS	1630	DC	3210	59		A	1640 / 1545	30 / 30	RC	JA	P	06-18-2010	
S29 / S50	NEOS / S49	1446	BV	1219	22		A	1452 / 1457	30 / 30	RC	JA	P	06-18-2010	
S29 / S49	S49 / S30	1449	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-97
S30 / S49	S30 / S48	1449	BV	1219	20	32	A	1454 / 1459	30 / 29	RC	JA	P	06-18-2010	
S30 / S48	S48 / S31	1452	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-74
S31 / S48	S31 / S47	1452	BV	1219	20		A	1456 / 1501	30 / 30	RC	JA	P	06-18-2010	
S31 / S47	S47 / S32	1454	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-98
S32 / S47	S32 / S46	1454	BV	1219	20		A	1505 / 1510	30 / 29	RC	JA	P	06-18-2010	
S32 / S46	S46 / S33	1457	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-100
S33 / S46	S33 / S45	1457	BV	1219	20		A	1510 / 1515	30 / 30	RC	JA	P	06-18-2010	
S33 / S45	S45 / S34	1459	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-101
S34 / S45	S34 / S44	1459	BV	1219	20		A	1504 / 1509	30 / 29	RC	JA	P	06-18-2010	
S34 / S44	S44 / S35	1502	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-102
S35 / S44	S35 / S43	1502	BV	1219	20		A	1511 / 1516	30 / 30	RC	JA	P	06-18-2010	

Sheet Total 272
Total to Date 16,114

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 06-18-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 9 of 16

Project Total Carry Over 16,114

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
S35 / S43	S43 / S36	1505	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-103
S36 / S43	S36 / S42	1505	BV	1219	20		A	1513 / 1518	30 / 30	RC	JA	P	06-18-2010	
S36 / S42	S42 / S37	1507	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-107
S37 / S42	S37 / S41	1507	BV	1219	20		A	1515 / 1520	30 / 30	RC	JA	P	06-18-2010	
S37 / S41	S41 / S38	1510	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-108
S38 / S41	S38 / S40	1510	BV	1219	20		A	1522 / 1527	30 / 30	RC	JA	P	06-18-2010	
S38 / S40	S40 / S29	1513	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-109
S39 / S40	S39 / SEOS	1513	BV	1219	6		A	1525 / 1530	30 / 30	RC	JA	P	06-18-2010	
S57 / S70	EEOS / S69	1640	WT	3211	21		A	1652 / 1657	30 / 30	RC	JA	P	06-18-2010	
S57 / S69	S69 / S68	1641	WT	3211	22		A	1652 / 1657	30 / 30	RC	JA	P	06-18-2010	
S57 / S68	S68 / S67	1642	WT	3211	22		A	1652 / 1657	30 / 30	RC	JA	P	06-18-2010	
S57 / S67	S67 / S66	1643	WT	3211	22		A	1652 / 1657	30 / 30	RC	JA	P	06-18-2010	
S57 / S66	S66 / S65	1644	WT	3211	22		A	1652 / 1657	30 / 30	RC	JA	P	06-18-2010	
S57 / S65	S65 / S56	1645	WT	3211	10		A	1652 / 1657	30 / 30	RC	JA	P	06-18-2010	

Sheet Total 193
Total to Date 16,307

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 06-18-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 10 of 16

Project Total Carry Over 16,307

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
S6 / S56	NEOS / S55	1541	BV	1219	20		A	1606 / 1611	30 / 30	RC	JA	P	06-18-2010	
S6 / S55	S55 / S5	1544	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-91
S5 / S55	S5 / S54	1544	BV	1219	20		A	1605 / 1610	30 / 30	RC	JA	P	06-18-2010	
S5 / S54	S54 / S4	1547	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-92
S4 / S54	S4 / S53	1547	BV	1219	20		A	1556 / 1601	30 / 30	RC	JA	P	06-18-2010	
S4 / S53	S53 / S3	1550	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-93
S3 / S53	S3 / S52	0	BV	1219	20		A	1555 / 1600	30 / 29	RC	JA	P	06-18-2010	
S3 / S52	S52 / S2	1553	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-94
S2 / S52	S2 / S51	1553	BV	1219	20		A	1558 / 1603	30 / 30	RC	JA	P	06-18-2010	
S2 / S51	S51 / S1	1556	BV	1219	2		V	0 / 0	0 / 0	RC	JA	P	06-18-2010	SR-95
S1 / S51	S1 / SEOS	1556	BV	1219	20		A	1539 / 1604	30 / 30	RC	JA	P	06-18-2010	

Sheet Total 130
Total to Date 16,437

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 06-18-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 11 of 16

Project Total Carry Over 16,437

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
S56 / S65	S56 / S64	1646	WT	3211	12		A	1700 / 1705	30 / 29	RC	JA	P	06-18-2010	
S56 / S64	S64 / S63	1647	WT	3211	22		A	1700 / 1705	30 / 29	RC	JA	P	06-18-2010	
S56 / S63	S63 / S62	1648	WT	3211	22	33	A	1700 / 1705	30 / 29	RC	JA	P	06-18-2010	
S56 / S62	S62 / S61	1649	WT	3211	22		A	1700 / 1705	30 / 29	RC	JA	P	06-18-2010	
S56 / S61	S61 / S60	1650	WT	3211	22		A	1700 / 1705	30 / 29	RC	JA	P	06-18-2010	
S56 / S60	S60 / S59	1651	WT	3211	22		A	1700 / 1705	30 / 29	RC	JA	P	06-18-2010	
S56 / S59	S59 / S58	1652	WT	3211	22		A	1700 / 1705	30 / 29	RC	JA	P	06-18-2010	
S56 / S58	S58 / WEOS	1653	WT	3211	22		A	1700 / 1705	30 / 29	RC	JA	P	06-18-2010	

Sheet Total 166
Total to Date 16,603

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 06-19-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 12 of 16

Project Total Carry Over 16,603

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S81 / S72	WEOS / EEOS	1117	BV	1219	141		A	1100 / 1105	30 / 30	RC	WH	P	06-19-2010	
S72 / S73	WEOS / EAT	1056	DC	3210	229		A	1110 / 1115	30 / 30	RC	WH	P	06-19-2010	
S73 / S74	WEOS / EAT	1107	WT	3211	229	34	A	1114 / 1119	30 / 29	RC	WH	P	06-19-2010	SR-110
S74 / S75	WEOS / EAT	1111	DC	3210	235		A	1130 / 1135	30 / 29	RC	WH	P	06-19-2010	
S75 / S76	WEOS / EAT	1122	WT	3211	240	35	A	1133 / 1138	30 / 30	RC	WH	P	06-19-2010	SR-111
S76 / S77	WEOS / EAT	1126	DC	3210	244		A	1140 / 1145	30 / 30	RC	WH	P	06-19-2010	
S77 / S78	WEOS / EAT	1137	WT	3211	244	36	A	1233 / 1238	30 / 29	RC	WH	P	06-19-2010	SR-112
S79 / S80	NEOS / SEOS	1141	BV	1219	22		A	1240 / 1245	30 / 30	RC	WH	P	06-19-2010	
S78 / S80	WEOS / S79	1140	DC	3210	33		A	1235 / 1240	30 / 30	RC	WH	P	06-19-2010	
S78 / S79	S79 / EAT	1148	DC	3210	224		A	1250 / 1255	30 / 30	RC	WH	P	06-19-2010	
S83 / S84	WEOS / EAT	1257	DC	3210	146	37	A	1308 / 1313	30 / 30	RC	WH	P	06-19-2010	SR-113
S85 / S86	WEOS / EAT	1308	DC	3210	58		A	1314 / 1319	30 / 30	RC	WH	P	06-19-2010	
S82 / S83	WEOS / EAT	1245	WT	3211	164		A	1300 / 1305	30 / 30	RC	WH	P	06-19-2010	
S86 / S87	WEOS / EAT	1300	WT	3211	14		A	1320 / 1325	30 / 30	RC	WH	P	06-19-2010	
S79 / S90	WEOS / EAT	1316	DC	3210	135		A	1332 / 1337	30 / 30	RC	WH	P	06-19-2010	

Sheet Total 2,358
Total to Date 18,961

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 06-19-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 13 of 16

Project Total Carry Over 18,961

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S84 / S85	WEOS / EAT	1305	WT	3211	102	38	A	1325 / 1330	30 / 29	RC	WH	P	06-19-2010	
S88 / S89	WEOS / EAT	1327	DC	3210	43		A	1330 / 1335	30 / 30	RC	WH	P	06-19-2010	
S82 / S91	WEOS / EAT	1340	WT	3211	182		A	1430 / 1435	30 / 30	RC	WH	P	06-19-2010	
S91 / S92	WEOS / EAT	1341	DC	3210	200		A	1434 / 1439	30 / 30	RC	WH	P	06-19-2010	
S92 / S93	EAT / WEOS	1400	WT	3211	218	39	A	1436 / 1441	30 / 29	RC	WH	P	06-19-2010	
S89 / S90	WEOS / EAT	1315	WT	3211	82		A	1328 / 1333	30 / 30	RC	WH	P	06-19-2010	
S93 / S94	EAT / WEOS	1353	DC	3210	207		A	1446 / 1451	30 / 29	RC	WH	P	06-19-2010	
S94 / S95	EAT / WEOS	1407	DC	3210	180	40	A	1450 / 1455	30 / 30	RC	WH	P	06-19-2010	
S95 / S96	EAT / WEOS	1420	WT	3211	155		A	1452 / 1457	30 / 30	RC	WH	P	06-19-2010	
S96 / S97	EAT / WEOS	1420	DC	3210	129		A	1535 / 1540	30 / 30	RC	WH	P	06-19-2010	
S71 / S98	SEOS / NAT	1440	DC	3210	57	41	A	1519 / 1524	30 / 30	RC	WH	P	06-19-2010	
S57 / S98	NEOS / SEOS	1454	DC	3210	22		A	1524 / 1529	30 / 30	RC	WH	P	06-19-2010	
S98 / S99	SEOS / NAT	1431	WT	3211	57		A	1501 / 1506	30 / 29	RC	WH	P	06-19-2010	
S99 / S100	SEOS / NAT	1438	WT	3211	30		A	1452 / 1457	30 / 29	RC	WH	P	06-19-2010	
S97 / S100	NAT / S99	1458	DC	3210	32		A	1505 / 1510	30 / 30	RC	WH	P	06-19-2010	

Sheet Total 1,696
Total to Date 20,657

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 06-19-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 14 of 16

Project Total Carry Over 20,657

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S97 / S99	S99 / S98	1500	DC	3210	33		A	1515 / 1520	30 / 30	RC	WH	P	06-19-2010	
S97 / S98	S98 / SEOS	1502	DC	3210	32		A	1513 / 1518	30 / 30	RC	WH	P	06-19-2010	
S80 / S93	WEOS / S92	1454	WT	3211	11		A	1550 / 1555	30 / 30	RC	WH	P	06-19-2010	
S80 / S92	S92 / S79	1455	WT	3211	24		A	1550 / 1555	30 / 30	RC	WH	P	06-19-2010	
S79 / S92	S79 / S91	1456	WT	3211	3		A	1550 / 1555	30 / 30	RC	WH	P	06-19-2010	
S79 / S91	S91 / S82	1457	WT	3211	29		A	1550 / 1555	30 / 30	RC	WH	P	06-19-2010	
S79 / S82	S82 / S83	1458	WT	3211	29		A	1550 / 1555	30 / 30	RC	WH	P	06-19-2010	
S79 / S83	S83 / EEOS	1500	WT	3211	29		A	1550 / 1555	30 / 30	R	WH	P	06-19-2010	
S84 / S90	WEOS / S85	1402	BV	1219	48		A	1412 / 1417	30 / 30	RC	WH	P	06-19-2010	
S85 / S90	S85 / S89	1409	BV	1219	5		A	1413 / 1418	30 / 30	RC	WH	P	06-19-2010	
S85 / S89	S89 / S86	1410	BV	1219	44		A	1418 / 1423	30 / 30	RC	WH	P	06-19-2010	
S86 / S89	S86 / S88	1415	BV	1219	13		A	1419 / 1424	30 / 30	RC	WH	P	06-19-2010	
S86 / S88	S88 / S87	1416	BV	1219	36	42	A	1425 / 1430	30 / 29	RC	WH	P	06-19-2010	
S87 / S88	S87 / NEAT	1422	BV	1219	15		A	1428 / 1433	30 / 30	RC	WH	P	06-19-2010	

Sheet Total 351
Total to Date 21,008

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 06-19-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 15 of 16

Project Total Carry Over 21,008

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
S48 / S80	NEOS / SR130	1320	BV	1219	22		A	1331 / 1336	30 / 30	RC	WH	P	06-19-2010	
S47 / S78	SR130 / SR114	1324	BV	1219	22		A	1336 / 1341	30 / 29	RC	WH	P	06-19-2010	
S46 / S77	SR114 / SR115	1328	BV	1219	22		A	1335 / 1340	30 / 29	RC	WH	P	06-19-2010	
S45 / S76	SR115 / SR116	1332	BV	1219	22		A	1338 / 1343	30 / 30	RC	WH	P	06-19-2010	
S44 / S75	SR116 / SR131	1336	BV	1219	22		A	1350 / 1355	30 / 30	RC	WH	P	06-19-2010	
S43 / S74	SR131 / SR132	1340	BV	1219	22		A	1352 / 1357	30 / 29	RC	WH	P	06-19-2010	
S42 / S73	SR132 / SR133	1344	BV	1219	22		A	1355 / 1400	30 / 30	RC	WH		06-19-2010	
S41 / S72	SR133 / SR134	1348	BV	1219	22		A	1405 / 1410	30 / 29	RC	WH	P	06-19-2010	
S40 / S81	SR134 / SEOS	1352	BV	1219	7		A	1400 / 1405	30 / 29	RC	WH	P	06-19-2010	
S55 / S97	NEOS / S54	1447	BV	1219	22		A	1530 / 1535	30 / 28	RC	WH	P	06-19-2010	
S54 / S97	S54 / S96	1450	BV	1219	9		A	1533 / 1538	30 / 30	RC	WH	P	06-19-2010	
S54 / S96	S96 / S53	1451	BV	1219	12		A	1536 / 1541	30 / 29	RC	WH	P	06-19-2010	
S53 / S96	S53 / S95	1452	BV	1219	20	43	A	1538 / 1543	30 / 30	RC	WH	P	06-19-2010	
S53 / S95	S95 / S52	1455	BV	1219	2		V	0 / 0	0 / 0	RC	WH	P	06-19-2010	SR-141
S52 / S95	S52 / S51	1455	BV	1219	22		A	1542 / 1547	30 / 30	RC	WH	P	06-19-2010	

Sheet Total 270
Total to Date 21,278

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 06-19-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 16 of 16

Project Total Carry Over 21,278

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S51 / S95	S51 / S94	1457	BV	1219	9		A	1544 / 1549	30 / 30	RC	WH	P	06-19-2010	
S51 / S94	S94 / S50	1458	BV	1219	13		A	1545 / 1550	30 / 30	RC	WH	P	06-19-2010	
S50 / S94	S50 / SR118	1500	BV	1219	22		A	1547 / 1552	30 / 30	RC	WH	P	06-19-2010	
S49 / S93	SR118 / SEOS	1503	BV	1219	22		A	1520 / 1525	30 / 28	RC	WH	P	06-19-2010	

Sheet Total 66
Total to Date 21,344

CQA Personnel: William Harrison

Cell 1 Secondary HDPE Geomembrane Destructive Laboratory Test Results

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S1
Tested by: William Harrison
Date Tested: 06/15/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	192.0	Elongation
S2	194.0	Elongation
S3	193.0	Elongation
S4	188.0	Elongation
S5	175.0	Elongation
Average	188.4	*FTB - Film Tear Bond
Standard Deviation	7.0	
Maximum	194.0	
Minimum	175.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	121.0	FTB
P1B	118.0	FTB
P2A	126.0	FTB
P2B	94.0	FTB
P3A	118.0	FTB
P3B	115.0	FTB
P4A	113.0	FTB
P4B	120.0	FTB
P5A	114.0	FTB
P5B	114.0	FTB
Average	115.3	*FTB - Film Tear Bond
Standard Deviation	8.0	
Maximum	126.0	
Minimum	94.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S2
Tested by: William Harrison
Date Tested: 06/15/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	194.0	Elongation
S2	197.0	Elongation
S3	199.0	Elongation
S4	194.0	Elongation
S5	197.0	Elongation
Average	196.2	*FTB - Film Tear Bond
Standard Deviation	1.9	
Maximum	199.0	
Minimum	194.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	113.0	FTB
P1B	124.0	FTB
P2A	106.0	FTB
P2B	114.0	FTB
P3A	125.0	FTB
P3B	107.0	FTB
P4A	112.0	FTB
P4B	117.0	FTB
P5A	104.0	FTB
P5B	94.0	FTB
Average	111.6	*FTB - Film Tear Bond
Standard Deviation	8.9	
Maximum	125.0	
Minimum	94.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S3
Tested by: James Addis
Date Tested: 06/16/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	208.0	Elongation
S2	205.0	Elongation
S3	201.0	Elongation
S4	202.0	Elongation
S5	205.0	Elongation
Average	204.2	*FTB - Film Tear Bond
Standard Deviation	2.5	
Maximum	208.0	
Minimum	201.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	118.0	FTB
P1B	114.0	FTB
P2A	119.0	FTB
P2B	117.0	FTB
P3A	112.0	FTB
P3B	123.0	FTB
P4A	123.0	FTB
P4B	116.0	FTB
P5A	117.0	FTB
P5B	113.0	FTB
Average	117.2	*FTB - Film Tear Bond
Standard Deviation	3.6	
Maximum	123.0	
Minimum	112.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S4
Tested by: James Addis
Date Tested: 06/16/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	203.0	Elongation
S2	210.0	Elongation
S3	213.0	Elongation
S4	208.0	Elongation
S5	209.0	Elongation
Average	208.6	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	213.0	
Minimum	203.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	129.0	FTB
P2A	138.0	FTB
P2B	123.0	FTB
P3A	138.0	FTB
P3B	126.0	FTB
P4A	121.0	FTB
P4B	103.0	FTB
P5A	122.0	FTB
P5B	118.0	FTB
Average	124.1	*FTB - Film Tear Bond
Standard Deviation	9.6	
Maximum	138.0	
Minimum	103.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S5
Tested by: James Addis
Date Tested: 06/16/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	208.0	Elongation
S2	212.0	Elongation
S3	205.0	Elongation
S4	209.0	Elongation
S5	210.0	Elongation
Average	208.8	*FTB - Film Tear Bond
Standard Deviation	2.3	
Maximum	212.0	
Minimum	205.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	119.0	FTB
P1B	109.0	FTB
P2A	111.0	FTB
P2B	104.0	FTB
P3A	125.0	FTB
P3B	125.0	FTB
P4A	121.0	FTB
P4B	121.0	FTB
P5A	118.0	FTB
P5B	108.0	FTB
Average	116.1	*FTB - Film Tear Bond
Standard Deviation	7.1	
Maximum	125.0	
Minimum	104.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S6
Tested by: James Addis
Date Tested: 06/16/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	211.0	Elongation
S2	211.0	Elongation
S3	215.0	Elongation
S4	215.0	Elongation
S5	215.0	Elongation
Average	213.4	*FTB - Film Tear Bond
Standard Deviation	2.0	
Maximum	215.0	
Minimum	211.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	119.0	FTB
P1B	115.0	FTB
P2A	109.0	FTB
P2B	114.0	FTB
P3A	124.0	FTB
P3B	113.0	FTB
P4A	116.0	FTB
P4B	107.0	FTB
P5A	118.0	FTB
P5B	119.0	FTB
Average	115.4	*FTB - Film Tear Bond
Standard Deviation	4.8	
Maximum	124.0	
Minimum	107.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S7
Tested by: James Addis
Date Tested: 06/16/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	205.0	Elongation
S2	210.0	Elongation
S3	206.0	Elongation
S4	206.0	Elongation
S5	206.0	Elongation
Average	206.6	*FTB - Film Tear Bond
Standard Deviation	1.7	
Maximum	210.0	
Minimum	205.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	142.0	FTB
P1B	132.0	FTB
P2A	119.0	FTB
P2B	109.0	FTB
P3A	123.0	FTB
P3B	128.0	FTB
P4A	100.0	FTB
P4B	116.0	FTB
P5A	91.0	FTB
P5B	118.0	FTB
Average	117.8	*FTB - Film Tear Bond
Standard Deviation	14.3	
Maximum	142.0	
Minimum	91.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S8
Tested by: James Addis
Date Tested: 06/16/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	170.0	Elongation
S2	178.0	Elongation
S3	181.0	Elongation
S4	183.0	Elongation
S5	178.0	Elongation
Average	178.0	*FTB - Film Tear Bond
Standard Deviation	4.4	
Maximum	183.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	127.0	FTB
P1B	116.0	FTB
P2A	127.0	FTB
P2B	96.0	FTB
P3A	126.0	FTB
P3B	131.0	FTB
P4A	115.0	FTB
P4B	109.0	FTB
P5A	117.0	FTB
P5B	121.0	FTB
Average	118.5	*FTB - Film Tear Bond
Standard Deviation	9.9	
Maximum	131.0	
Minimum	96.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S9
Tested by: William Harrison
Date Tested: 06/17/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	206.0	Elongation
S2	207.0	Elongation
S3	199.0	Elongation
S4	200.0	Elongation
S5	200.0	Elongation
Average	202.4	*FTB - Film Tear Bond
Standard Deviation	3.4	
Maximum	207.0	
Minimum	199.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	123.0	FTB
P2A	129.0	FTB
P2B	114.0	FTB
P3A	112.0	FTB
P3B	144.0	FTB
P4A	100.0	FTB
P4B	118.0	FTB
P5A	116.0	FTB
P5B	137.0	FTB
Average	121.6	*FTB - Film Tear Bond
Standard Deviation	12.1	
Maximum	144.0	
Minimum	100.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S10
Tested by: William Harrison
Date Tested: 06/17/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	198.0	Elongation
S2	199.0	Elongation
S3	183.0	Elongation
S4	196.0	Elongation
S5	197.0	Elongation
Average	194.6	*FTB - Film Tear Bond
Standard Deviation	5.9	
Maximum	199.0	
Minimum	183.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	126.0	FTB
P1B	110.0	FTB
P2A	101.0	FTB
P2B	112.0	FTB
P3A	127.0	FTB
P3B	108.0	FTB
P4A	115.0	FTB
P4B	112.0	FTB
P5A	138.0	FTB
P5B	118.0	FTB
Average	116.7	*FTB - Film Tear Bond
Standard Deviation	10.3	
Maximum	138.0	
Minimum	101.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S11
Tested by: William Harrison
Date Tested: 06/17/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	170.0	Elongation
S2	196.0	Elongation
S3	196.0	Elongation
S4	188.0	Elongation
S5	197.0	Elongation
Average	189.4	*FTB - Film Tear Bond
Standard Deviation	10.2	
Maximum	197.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	97.0	FTB
P1B	97.0	FTB
P2A	105.0	FTB
P2B	97.0	FTB
P3A	125.0	FTB
P3B	131.0	FTB
P4A	126.0	FTB
P4B	129.0	FTB
P5A	101.0	FTB
P5B	93.0	FTB
Average	110.1	*FTB - Film Tear Bond
Standard Deviation	14.8	
Maximum	131.0	
Minimum	93.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S12
Tested by: James Addis
Date Tested: 06/18/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	211.0	Elongation
S2	211.0	Elongation
S3	208.0	Elongation
S4	210.0	Elongation
S5	203.0	Elongation
Average	208.6	*FTB - Film Tear Bond
Standard Deviation	3.0	
Maximum	211.0	
Minimum	203.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	113.0	FTB
P2A	113.0	FTB
P2B	131.0	FTB
P3A	116.0	FTB
P3B	127.0	FTB
P4A	125.0	FTB
P4B	127.0	FTB
P5A	118.0	FTB
P5B	111.0	FTB
Average	120.4	*FTB - Film Tear Bond
Standard Deviation	6.7	
Maximum	131.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S13
Tested by: James Addis
Date Tested: 06/18/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	214.0	Elongation
S2	209.0	Elongation
S3	210.0	Elongation
S4	207.0	Elongation
S5	200.0	Elongation
Average	208.0	*FTB - Film Tear Bond
Standard Deviation	4.6	
Maximum	214.0	
Minimum	200.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	116.0	FTB
P1B	127.0	FTB
P2A	120.0	FTB
P2B	130.0	FTB
P3A	116.0	FTB
P3B	116.0	FTB
P4A	116.0	FTB
P4B	138.0	FTB
P5A	115.0	FTB
P5B	116.0	FTB
Average	121.0	*FTB - Film Tear Bond
Standard Deviation	7.5	
Maximum	138.0	
Minimum	115.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S14
Tested by: James Addis
Date Tested: 06/18/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	213.0	Elongation
S2	214.0	Elongation
S3	209.0	Elongation
S4	205.0	Elongation
S5	211.0	Elongation
Average	210.4	*FTB - Film Tear Bond
Standard Deviation	3.2	
Maximum	214.0	
Minimum	205.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	113.0	FTB
P1B	124.0	FTB
P2A	107.0	FTB
P2B	84.0	FTB
P3A	112.0	FTB
P3B	131.0	FTB
P4A	114.0	FTB
P4B	130.0	FTB
P5A	120.0	FTB
P5B	116.0	FTB
Average	115.1	*FTB - Film Tear Bond
Standard Deviation	12.8	
Maximum	131.0	
Minimum	84.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S15
Tested by: James Addis
Date Tested: 06/18/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	219.0	Elongation
S2	218.0	Elongation
S3	215.0	Elongation
S4	210.0	Elongation
S5	212.0	Elongation
Average	214.8	*FTB - Film Tear Bond
Standard Deviation	3.4	
Maximum	219.0	
Minimum	210.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	126.0	FTB
P1B	114.0	FTB
P2A	120.0	FTB
P2B	126.0	FTB
P3A	119.0	FTB
P3B	116.0	FTB
P4A	116.0	FTB
P4B	117.0	FTB
P5A	124.0	FTB
P5B	118.0	FTB
Average	119.6	*FTB - Film Tear Bond
Standard Deviation	4.1	
Maximum	126.0	
Minimum	114.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S16
Tested by: James Addis
Date Tested: 06/18/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	215.0	Elongation
S2	216.0	Elongation
S3	213.0	Elongation
S4	211.0	Elongation
S5	208.0	Elongation
Average	212.6	*FTB - Film Tear Bond
Standard Deviation	2.9	
Maximum	216.0	
Minimum	208.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	129.0	FTB
P1B	124.0	FTB
P2A	122.0	FTB
P2B	111.0	FTB
P3A	130.0	FTB
P3B	125.0	FTB
P4A	116.0	FTB
P4B	116.0	FTB
P5A	126.0	FTB
P5B	125.0	FTB
Average	122.4	*FTB - Film Tear Bond
Standard Deviation	5.9	
Maximum	130.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S17
Tested by: James Addis
Date Tested: 06/18/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	206.0	Elongation
S2	212.0	Elongation
S3	217.0	Elongation
S4	211.0	Elongation
S5	215.0	Elongation
Average	212.2	*FTB - Film Tear Bond
Standard Deviation	3.8	
Maximum	217.0	
Minimum	206.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	121.0	FTB
P1B	130.0	FTB
P2A	126.0	FTB
P2B	123.0	FTB
P3A	121.0	FTB
P3B	130.0	FTB
P4A	122.0	FTB
P4B	125.0	FTB
P5A	124.0	FTB
P5B	121.0	FTB
Average	124.3	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	130.0	
Minimum	121.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S18
Tested by: James Addis
Date Tested: 06/18/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	202.0	Elongation
S2	203.0	Elongation
S3	199.0	Elongation
S4	204.0	Elongation
S5	205.0	Elongation
Average	202.6	*FTB - Film Tear Bond
Standard Deviation	2.1	
Maximum	205.0	
Minimum	199.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	130.0	FTB
P1B	127.0	FTB
P2A	125.0	FTB
P2B	123.0	FTB
P3A	104.0	FTB
P3B	123.0	FTB
P4A	118.0	FTB
P4B	120.0	FTB
P5A	107.0	FTB
P5B	128.0	FTB
Average	120.5	*FTB - Film Tear Bond
Standard Deviation	8.3	
Maximum	130.0	
Minimum	104.0	
Pass/Fail [1,2,3]	FAIL	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S19
Tested by: James Addis
Date Tested: 06/18/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	214.0	Elongation
S2	215.0	Elongation
S3	217.0	Elongation
S4	203.0	Elongation
S5	202.0	Elongation
Average	210.2	*FTB - Film Tear Bond
Standard Deviation	6.4	
Maximum	217.0	
Minimum	202.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	126.0	FTB
P1B	115.0	FTB
P2A	123.0	FTB
P2B	105.0	FTB
P3A	110.0	FTB
P3B	133.0	FTB
P4A	117.0	FTB
P4B	118.0	FTB
P5A	127.0	FTB
P5B	125.0	FTB
Average	119.9	*FTB - Film Tear Bond
Standard Deviation	8.1	
Maximum	133.0	
Minimum	105.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S20
Tested by: William Harrison
Date Tested: 06/20/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	207.0	Elongation
S2	210.0	Elongation
S3	205.0	Elongation
S4	212.0	Elongation
S5	208.0	Elongation
Average	208.4	*FTB - Film Tear Bond
Standard Deviation	2.4	
Maximum	212.0	
Minimum	205.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	115.0	FTB
P1B	162.0	FTB
P2A	120.0	FTB
P2B	133.0	FTB
P3A	118.0	FTB
P3B	160.0	FTB
P4A	122.0	FTB
P4B	138.0	FTB
P5A	115.0	FTB
P5B	159.0	FTB
Average	134.2	*FTB - Film Tear Bond
Standard Deviation	18.5	
Maximum	162.0	
Minimum	115.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S21
Tested by: William Harrison
Date Tested: 06/20/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	206.0	Elongation
S2	204.0	Elongation
S3	201.0	Elongation
S4	210.0	Elongation
S5	206.0	Elongation
Average	205.4	*FTB - Film Tear Bond
Standard Deviation	2.9	
Maximum	210.0	
Minimum	201.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	116.0	FTB
P1B	120.0	FTB
P2A	122.0	FTB
P2B	113.0	FTB
P3A	114.0	FTB
P3B	109.0	FTB
P4A	87.0	FTB
P4B	116.0	FTB
P5A	92.0	FTB
P5B	123.0	FTB
Average	111.2	*FTB - Film Tear Bond
Standard Deviation	11.6	
Maximum	123.0	
Minimum	87.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S22
Tested by: William Harrison
Date Tested: 06/20/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	211.0	Elongation
S2	202.0	Elongation
S3	213.0	Elongation
S4	200.0	Elongation
S5	205.0	Elongation
Average	206.2	*FTB - Film Tear Bond
Standard Deviation	5.0	
Maximum	213.0	
Minimum	200.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	124.0	FTB
P1B	113.0	FTB
P2A	90.0	FTB
P2B	116.0	FTB
P3A	122.0	FTB
P3B	121.0	FTB
P4A	123.0	FTB
P4B	120.0	FTB
P5A	113.0	FTB
P5B	107.0	FTB
Average	114.9	*FTB - Film Tear Bond
Standard Deviation	9.8	
Maximum	124.0	
Minimum	90.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S23
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	180.0	Elongation
S2	217.0	Elongation
S3	208.0	Elongation
S4	213.0	Elongation
S5	202.0	Elongation
Average	204.0	*FTB - Film Tear Bond
Standard Deviation	13.0	
Maximum	217.0	
Minimum	180.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	110.0	FTB
P1B	92.0	FTB
P2A	113.0	FTB
P2B	93.0	FTB
P3A	118.0	FTB
P3B	104.0	FTB
P4A	107.0	FTB
P4B	107.0	FTB
P5A	81.0	FTB
P5B	121.0	FTB
Average	104.6	*FTB - Film Tear Bond
Standard Deviation	11.9	
Maximum	121.0	
Minimum	81.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S24
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	211.0	Elongation
S2	186.0	Elongation
S3	215.0	Elongation
S4	201.0	Elongation
S5	180.0	Elongation
Average	198.6	*FTB - Film Tear Bond
Standard Deviation	13.7	
Maximum	215.0	
Minimum	180.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	102.0	FTB
P1B	103.0	FTB
P2A	102.0	FTB
P2B	108.0	FTB
P3A	123.0	FTB
P3B	126.0	FTB
P4A	129.0	FTB
P4B	126.0	FTB
P5A	117.0	FTB
P5B	101.0	FTB
Average	113.7	*FTB - Film Tear Bond
Standard Deviation	11.0	
Maximum	129.0	
Minimum	101.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S25
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	204.0	Elongation
S2	210.0	Elongation
S3	204.0	Elongation
S4	198.0	Elongation
S5	206.0	Elongation
Average	204.4	*FTB - Film Tear Bond
Standard Deviation	3.9	
Maximum	210.0	
Minimum	198.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	102.0	FTB
P1B	112.0	FTB
P2A	109.0	FTB
P2B	83.0	FTB
P3A	97.0	FTB
P3B	97.0	FTB
P4A	138.0	FTB
P4B	114.0	FTB
P5A	113.0	FTB
P5B	112.0	FTB
Average	107.7	*FTB - Film Tear Bond
Standard Deviation	13.8	
Maximum	138.0	
Minimum	83.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S26
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	214.0	Elongation
S2	211.0	Elongation
S3	209.0	Elongation
S4	211.0	Elongation
S5	186.0	Elongation
Average	206.2	*FTB - Film Tear Bond
Standard Deviation	10.2	
Maximum	214.0	
Minimum	186.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	103.0	FTB
P1B	121.0	FTB
P2A	109.0	FTB
P2B	95.0	FTB
P3A	119.0	FTB
P3B	121.0	FTB
P4A	121.0	FTB
P4B	112.0	FTB
P5A	102.0	FTB
P5B	133.0	FTB
Average	113.6	*FTB - Film Tear Bond
Standard Deviation	10.9	
Maximum	133.0	
Minimum	95.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S27
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	209.0	Elongation
S2	206.0	Elongation
S3	173.0	Elongation
S4	196.0	Elongation
S5	199.0	Elongation
Average	196.6	*FTB - Film Tear Bond
Standard Deviation	12.7	
Maximum	209.0	
Minimum	173.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	115.0	FTB
P1B	166.0	FTB
P2A	109.0	FTB
P2B	108.0	FTB
P3A	119.0	FTB
P3B	124.0	FTB
P4A	115.0	FTB
P4B	109.0	FTB
P5A	111.0	FTB
P5B	124.0	FTB
Average	120.0	*FTB - Film Tear Bond
Standard Deviation	16.3	
Maximum	166.0	
Minimum	108.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S28
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	213.0	Elongation
S2	212.0	Elongation
S3	205.0	Elongation
S4	197.0	Elongation
S5	182.0	Elongation
Average	201.8	*FTB - Film Tear Bond
Standard Deviation	11.4	
Maximum	213.0	
Minimum	182.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	130.0	FTB
P1B	116.0	FTB
P2A	126.0	FTB
P2B	143.0	FTB
P3A	124.0	FTB
P3B	117.0	FTB
P4A	139.0	FTB
P4B	145.0	FTB
P5A	128.0	FTB
P5B	134.0	FTB
Average	130.2	*FTB - Film Tear Bond
Standard Deviation	9.5	
Maximum	145.0	
Minimum	116.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S29
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	206.0	Elongation
S2	207.0	Elongation
S3	191.0	Elongation
S4	202.0	Elongation
S5	209.0	Elongation
Average	203.0	*FTB - Film Tear Bond
Standard Deviation	6.4	
Maximum	209.0	
Minimum	191.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	114.0	FTB
P1B	120.0	FTB
P2A	108.0	FTB
P2B	107.0	FTB
P3A	104.0	FTB
P3B	116.0	FTB
P4A	113.0	FTB
P4B	123.0	FTB
P5A	102.0	FTB
P5B	91.0	FTB
Average	109.8	*FTB - Film Tear Bond
Standard Deviation	9.0	
Maximum	123.0	
Minimum	91.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S30
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	206.0	Elongation
S2	203.0	Elongation
S3	206.0	Elongation
S4	204.0	Elongation
S5	206.0	Elongation
Average	205.0	*FTB - Film Tear Bond
Standard Deviation	1.3	
Maximum	206.0	
Minimum	203.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	112.0	FTB
P1B	123.0	FTB
P2A	126.0	FTB
P2B	103.0	FTB
P3A	113.0	FTB
P3B	131.0	FTB
P4A	109.0	FTB
P4B	111.0	FTB
P5A	108.0	FTB
P5B	107.0	FTB
Average	114.3	*FTB - Film Tear Bond
Standard Deviation	8.7	
Maximum	131.0	
Minimum	103.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S31
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	200.0	Elongation
S2	202.0	Elongation
S3	203.0	Elongation
S4	208.0	Elongation
S5	184.0	Elongation
Average	199.4	*FTB - Film Tear Bond
Standard Deviation	8.1	
Maximum	208.0	
Minimum	184.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	112.0	FTB
P1B	139.0	FTB
P2A	106.0	FTB
P2B	89.0	FTB
P3A	124.0	FTB
P3B	116.0	FTB
P4A	99.0	FTB
P4B	118.0	FTB
P5A	112.0	FTB
P5B	105.0	FTB
Average	112.0	*FTB - Film Tear Bond
Standard Deviation	13.1	
Maximum	139.0	
Minimum	89.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S32
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	184.0	Elongation
S2	162.0	Elongation
S3	177.0	Elongation
S4	181.0	Elongation
S5	182.0	Elongation
Average	177.2	*FTB - Film Tear Bond
Standard Deviation	7.9	
Maximum	184.0	
Minimum	162.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	145.0	FTB
P2A	101.0	FTB
P2B	146.0	FTB
P3A	106.0	FTB
P3B	170.0	FTB
P4A	131.0	FTB
P4B	145.0	FTB
P5A	121.0	FTB
P5B	154.0	FTB
Average	134.2	*FTB - Film Tear Bond
Standard Deviation	20.6	
Maximum	170.0	
Minimum	101.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S33
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	177.0	Elongation
S2	169.0	Elongation
S3	176.0	Elongation
S4	176.0	Elongation
S5	174.0	Elongation
Average	174.4	*FTB - Film Tear Bond
Standard Deviation	2.9	
Maximum	177.0	
Minimum	169.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	100.0	FTB
P1B	157.0	FTB
P2A	102.0	FTB
P2B	135.0	FTB
P3A	97.0	FTB
P3B	161.0	FTB
P4A	121.0	FTB
P4B	105.0	FTB
P5A	138.0	FTB
P5B	112.0	FTB
Average	122.8	*FTB - Film Tear Bond
Standard Deviation	22.5	
Maximum	161.0	
Minimum	97.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S34
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	207.0	Elongation
S2	184.0	Elongation
S3	174.0	Elongation
S4	207.0	Elongation
S5	208.0	Elongation
Average	196.0	*FTB - Film Tear Bond
Standard Deviation	14.2	
Maximum	208.0	
Minimum	174.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	105.0	FTB
P2A	79.0	FTB
P2B	88.0	FTB
P3A	104.0	FTB
P3B	108.0	FTB
P4A	93.0	FTB
P4B	85.0	FTB
P5A	91.0	FTB
P5B	104.0	FTB
Average	98.0	*FTB - Film Tear Bond
Standard Deviation	12.4	
Maximum	123.0	
Minimum	79.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S35
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	203.0	Elongation
S2	198.0	Elongation
S3	205.0	Elongation
S4	199.0	Elongation
S5	194.0	Elongation
Average	199.8	*FTB - Film Tear Bond
Standard Deviation	3.9	
Maximum	205.0	
Minimum	194.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	114.0	FTB
P1B	124.0	FTB
P2A	104.0	FTB
P2B	114.0	FTB
P3A	111.0	FTB
P3B	127.0	FTB
P4A	118.0	FTB
P4B	109.0	FTB
P5A	110.0	FTB
P5B	114.0	FTB
Average	114.5	*FTB - Film Tear Bond
Standard Deviation	6.6	
Maximum	127.0	
Minimum	104.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S36
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	205.0	Elongation
S2	199.0	Elongation
S3	205.0	Elongation
S4	198.0	Elongation
S5	206.0	Elongation
Average	202.6	*FTB - Film Tear Bond
Standard Deviation	3.4	
Maximum	206.0	
Minimum	198.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	105.0	FTB
P1B	120.0	FTB
P2A	108.0	FTB
P2B	111.0	FTB
P3A	108.0	FTB
P3B	114.0	FTB
P4A	108.0	FTB
P4B	118.0	FTB
P5A	125.0	FTB
P5B	131.0	FTB
Average	114.8	*FTB - Film Tear Bond
Standard Deviation	8.1	
Maximum	131.0	
Minimum	105.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S37
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	206.0	Elongation
S2	199.0	Elongation
S3	204.0	Elongation
S4	198.0	Elongation
S5	195.0	Elongation
Average	200.4	*FTB - Film Tear Bond
Standard Deviation	4.0	
Maximum	206.0	
Minimum	195.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	96.0	FTB
P1B	100.0	FTB
P2A	106.0	FTB
P2B	96.0	FTB
P3A	113.0	FTB
P3B	122.0	FTB
P4A	107.0	FTB
P4B	98.0	FTB
P5A	102.0	FTB
P5B	88.0	FTB
Average	102.8	*FTB - Film Tear Bond
Standard Deviation	9.2	
Maximum	122.0	
Minimum	88.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S38
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	189.0	Elongation
S2	183.0	Elongation
S3	170.0	Elongation
S4	204.0	Elongation
S5	196.0	Elongation
Average	188.4	*FTB - Film Tear Bond
Standard Deviation	11.6	
Maximum	204.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	96.0	FTB
P1B	122.0	FTB
P2A	97.0	FTB
P2B	108.0	FTB
P3A	104.0	FTB
P3B	119.0	FTB
P4A	107.0	FTB
P4B	118.0	FTB
P5A	93.0	FTB
P5B	107.0	FTB
Average	107.1	*FTB - Film Tear Bond
Standard Deviation	9.6	
Maximum	122.0	
Minimum	93.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S39
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	201.0	Elongation
S2	204.0	Elongation
S3	208.0	Elongation
S4	204.0	Elongation
S5	202.0	Elongation
Average	203.8	*FTB - Film Tear Bond
Standard Deviation	2.4	
Maximum	208.0	
Minimum	201.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	102.0	FTB
P1B	127.0	FTB
P2A	96.0	FTB
P2B	94.0	FTB
P3A	86.0	FTB
P3B	98.0	FTB
P4A	92.0	FTB
P4B	114.0	FTB
P5A	116.0	FTB
P5B	105.0	FTB
Average	103.0	*FTB - Film Tear Bond
Standard Deviation	12.0	
Maximum	127.0	
Minimum	86.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S40
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	197.0	Elongation
S2	198.0	Elongation
S3	183.0	Elongation
S4	194.0	Elongation
S5	195.0	Elongation
Average	193.4	*FTB - Film Tear Bond
Standard Deviation	5.4	
Maximum	198.0	
Minimum	183.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	100.0	FTB
P1B	104.0	FTB
P2A	105.0	FTB
P2B	109.0	FTB
P3A	99.0	FTB
P3B	105.0	FTB
P4A	84.0	FTB
P4B	98.0	FTB
P5A	98.0	FTB
P5B	104.0	FTB
Average	100.6	*FTB - Film Tear Bond
Standard Deviation	6.5	
Maximum	109.0	
Minimum	84.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S41
Tested by: William Harrison
Date Tested: 06/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	196.0	Elongation
S2	189.0	Elongation
S3	182.0	Elongation
S4	201.0	Elongation
S5	181.0	Elongation
Average	189.8	*FTB - Film Tear Bond
Standard Deviation	7.8	
Maximum	201.0	
Minimum	181.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	111.0	FTB
P1B	132.0	FTB
P2A	112.0	FTB
P2B	122.0	FTB
P3A	123.0	FTB
P3B	121.0	FTB
P4A	96.0	FTB
P4B	97.0	FTB
P5A	108.0	FTB
P5B	84.0	FTB
Average	110.6	*FTB - Film Tear Bond
Standard Deviation	14.0	
Maximum	132.0	
Minimum	84.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S42
Tested by: William Harrison
Date Tested: 06/22/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	183.0	Elongation
S2	185.0	Elongation
S3	189.0	Elongation
S4	186.0	Elongation
S5	184.0	Elongation
Average	185.4	*FTB - Film Tear Bond
Standard Deviation	2.1	
Maximum	189.0	
Minimum	183.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	136.0	FTB
P1B	119.0	FTB
P2A	153.0	FTB
P2B	135.0	FTB
P3A	153.0	FTB
P3B	120.0	FTB
P4A	132.0	FTB
P4B	113.0	FTB
P5A	112.0	FTB
P5B	121.0	FTB
Average	129.4	*FTB - Film Tear Bond
Standard Deviation	14.3	
Maximum	153.0	
Minimum	112.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S43
Tested by: William Harrison
Date Tested: 06/22/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	186.0	Elongation
S2	181.0	Elongation
S3	185.0	Elongation
S4	179.0	Elongation
S5	187.0	Elongation
Average	183.6	*FTB - Film Tear Bond
Standard Deviation	3.1	
Maximum	187.0	
Minimum	179.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	142.0	FTB
P1B	136.0	FTB
P2A	109.0	FTB
P2B	134.0	FTB
P3A	150.0	FTB
P3B	138.0	FTB
P4A	134.0	FTB
P4B	138.0	FTB
P5A	146.0	FTB
P5B	139.0	FTB
Average	136.6	*FTB - Film Tear Bond
Standard Deviation	10.4	
Maximum	150.0	
Minimum	109.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Extrusion
Sample: S44
Tested by: William Harrison
Date Tested: 06/22/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	142.0	Elongation
S2	143.0	Elongation
S3	139.0	Elongation
S4	143.0	Elongation
S5	146.0	Elongation
Average	142.6	*FTB - Film Tear Bond
Standard Deviation	2.2	
Maximum	146.0	
Minimum	139.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	166.0	FTB
P1B	0.0	
P2A	135.0	FTB
P2B	0.0	
P3A	155.0	FTB
P3B	0.0	
P4A	161.0	FTB
P4B	0.0	
P5A	139.0	FTB
P5B	0.0	
Average	75.6	*FTB - Film Tear Bond
Standard Deviation	76.1	
Maximum	166.0	
Minimum	0.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

Cell 1 Secondary HDPE Geomembrane Defect Log

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
1	S1/S2	450FT W OF EEOS	LDT	06-14-2010	LDT-1	06-16-2010	JA
2	S2/S3	400FT W OF EEOS	LDT	06-14-2010	LDT-2	06-16-2010	JA
3	S3/S4	350FT W OF EEOS	LDT	06-14-2010	LDT-3	06-16-2010	JA
4	S4/S5	300FT W OF EEOS	LDT	06-14-2010	LDT-4	06-16-2010	JA
5	S5/S6	20 FT E OF WAT	LDT	06-14-2010	LDT-5	06-16-2010	JA
6	S13/S14	11FT N OF SEOS	LDT	06-15-2010	LDT-6	06-16-2010	JA
7	S20/21	2 FT N OF SEOS	LDT	06-15-2010	LDT-7	06-16-2010	JA
8	S6/27	4FT W OF EEOS	LDT	06-15-2010	LDT-8	06-16-2010	JA
9	S2/3	26 FT W OF EEOS	O	06-16-2010	Burnout	06-16-2010	JA
10	S5/6	1FT. E OF WAT	O	06-16-2010	Burnout	06-16-2010	JA
11	S6/7	1FT E OF WAT	O	06-16-2010	Burnout	06-16-2010	JA
12	S7/8	22FT N OF SEOS	O	06-16-2010		06-16-2010	JA
13	S7/8	SEOS	T	06-16-2010		06-16-2010	JA
14	S8/9	SEOS	T	06-23-2010		06-16-2010	JA
15	S9/10	SEOS	T	06-16-2010		06-15-2010	JA
16	S9/10	6FT S OF WAT	O	06-16-2010		06-15-2010	JA
17	S9/10	WAT TO 6FT S OF	O	06-16-2010		06-16-2010	JA
18	S10/11	SEOS	T	06-16-2010		06-16-2010	JA
19	S11/12	SEOS	T	06-16-2010		06-16-2010	JA
20	S12/13	SEOS	T	06-16-2010		06-16-2010	JA
21	S13/14	SEOS	T	06-16-2010		06-16-2010	JA
22	S13	5 FT N 10 FT W OF SEOS 13/14	O	06-16-2010		06-16-2010	JA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
23	S13	12 FT N AND 10 FT W FR SEOS 13/14	O	06-16-2010		06-16-2010	JA
24	S13	21 FT N 10FT W OF SEOS13/14	O	06-16-2010		06-16-2010	JA
25	S13/14	3 FT FROM NAT TO 5 FT FROM NAT	O	06-23-2010		06-16-2010	JA
26	S14/15	SEOS	T	06-16-2010		06-16-2010	JA
27	S15/16	SEOS	T	06-16-2010		06-16-2010	JA
28	S16/17	SEOS	T	06-16-2010		06-16-2010	JA
29	S17/18	SEOS	T	06-16-2010		06-16-2010	JA
30	S17/18	4 FT FROM NAT TO 5.5 FT FROM NAT	O	06-16-2010		06-16-2010	JA
31	S18/19	SEOS	T	06-16-2010		06-16-2010	JA
32	S19/20	SEOS	T	06-16-2010		06-16-2010	JA
33	S20/21	SEOS	T	06-16-2010		06-16-2010	JA
34	S21/22	SEOS	T	06-16-2010		06-16-2010	JA
35	S22/23	SEOS	T	06-16-2010		06-16-2010	JA
36	S23/24	NAT	O	06-16-2010		06-16-2010	JA
37	S26/27	NAT	O	06-16-2010		06-16-2010	JA
38	S23/24	SEOS	T	06-16-2010		06-16-2010	JA
39	S24/25	SEOS	T	06-16-2010		06-16-2010	JA
40	S25/26	SEOS	T	06-16-2010		06-16-2010	JA
41	S26/27	SEOS	T	06-16-2010		06-16-2010	JA
42	S27/28	SEOS	T	06-16-2010		06-16-2010	JA
43	S1/29	43 FT W OF EEOS	LDT	06-17-2010	LDT-9	06-17-2010	JA
44	S29/30	48 FT E OF WAT	LDT	06-17-2010	LDT-10	06-17-2010	JA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
45	S30/31	55 FT E OF WAT	LDT	06-17-2010	LDT-11	06-17-2010	JA
46	S31/32	62 FT E OF WAT	LDT	06-17-2010	LDT-12	06-17-2010	JA
47	S32/33	70 FT E OF WAT	LDT	06-17-2010	LDT-13	06-17-2010	KB
48	S33/34	78 FT E OF WAT	LDT	06-17-2010	LDT-14	06-17-2010	KB
49	S34/35	84 FT E OF WAT	LDT	06-17-2010	LDT-15	06-17-2010	JA
50	S35/36	90 FT E OF WAT	LDT	06-17-2010	LDT-16	06-17-2010	JA
51	S36/37	95 FT E OF WAT	LDT	06-17-2010	LDT-17	06-17-2010	JA
52	S37/38	22 FT E OF WAT	LDT	06-17-2010	LDT-18	06-17-2010	JA
53	S38/39	108FT E OF WAT	LDT	06-17-2010	LDT-19	06-17-2010	JA
54	S29	9 FT E 5 FT S OF S1/29 W END	O	06-17-2010	Cut due to wrinkle	06-17-2010	JA
55	S29	EX WELD FROM SR 54 INTO WAT	O	06-17-2010	Wrinkle cut	06-17-2010	JA
56	S31/32	1 FT E OF WAT	O	06-17-2010		06-17-2010	JA
57	S37/38	134FT E OF WAT	O	06-17-2010	Burnout	06-17-2010	JA
58	S38/39	143FT E OF WAT	O	06-17-2010		06-17-2010	JA
59	S40/41	115 FT E OF WEOS	LDT	06-18-2010	LDT-20	06-19-2010	KB
60	S40/41	168 FT E OF WEOS	O	06-18-2010	Burnout	06-19-2010	JA
61	S41/42	32 FT W OF EEOS	LDT	06-18-2010	LDT-21	06-19-2010	JA
62	S43/44	144 FT E OF WEOS	LDT	06-18-2010	LDT-22	06-19-2010	JA
63	S44/45	6FT W OF EEOS	LDT	06-18-2010	LDT-23	06-19-2010	JA
64	46/47	167FT E OF WEOS	LDT	06-18-2010	LDT-24	06-19-2010	JA
65	S48/49	13FT E OF WEOS	LDT	06-18-2010	LDT-25	06-18-2010	JA
66	S49/50	186 FT E OF WEOS	LDT	06-18-2010	LDT-26	06-18-2010	JA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis / Kyle Baucom

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
67	51/52	35 FT W OF EEOS	LDT	06-18-2010	LDT-27	06-19-2010	JA
68	S52/53	208 FT W OF EEOS	LDT	06-18-2010	LDT-28	06-19-2010	JA
69	S54/55	60FT W OF EEOS	LDT	06-18-2010	LDT-29	06-19-2010	JA
70	S55/56	62FT W OF EEOS	LDT	06-18-2010	LDT-30	06-19-2010	JA
71	S28/58	AT THE NAT	O	06-18-2010		06-19-2010	KB
72	S58/59	50FT S OF NEOS	O	06-18-2010		06-19-2010	JA
73	S63/S64	20 FT S OF NAT	LDT	06-18-2010	LDT-31	06-19-2010	JA
74	S30/S49	40 FT S OF NEOS	LDT	06-18-2010	LDT-32	06-19-2010	JA
75	S56/S63	173 FT W OF EEOS	LDT	06-18-2010	LDT-33	06-19-2010	JA
76	S68/S69	SEOS	T	06-18-2010		06-19-2010	JA
77	S67/S68	SEOS	T	06-18-2010		06-19-2010	JA
78	S66/S67	SEOS	T	06-18-2010		06-19-2010	JA
79	S65/S66	SEOS	T	06-18-2010		06-19-2010	JA
80	S64/S65	SEOS	T	06-18-2010		06-19-2010	JA
81	S63/S64	SEOS	T	06-19-2010		06-19-2010	JA
82	S62/S63	SEOS	T	06-19-2010		06-19-2010	JA
83	S61/S62	SEOS	T	06-19-2010		06-19-2010	JA
84	S60/S61	SEOS	T	06-19-2010		06-19-2010	JA
85	S59/S60	SEOS	T	06-19-2010		06-19-2010	JA
86	S58/S59	SEOS	T	06-19-2010		06-19-2010	JA
87	S61/S62	AT NAT	O	06-19-2010		06-19-2010	JA
88	S56/S57	SEOS	O	06-19-2010		06-19-2010	JA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis / Kyle Baucom

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
89	S56/S57	NEOS	O	06-19-2010		06-19-2010	JA
90	S56/S58/S6/S28	SEOS 28/58	O	06-19-2010		06-19-2010	JA
91	S5/S6/S55/S56	EEOS 5/6	O	06-19-2010		06-19-2010	JA
92	S4/S5/S54/S55	EEOS 4/5	O	06-19-2010		06-19-2010	JA
93	S3/S4/S53/S54	EEOS 3/4	O	06-19-2010		06-19-2010	JA
94	S2/S3/S52/S53	EEOS 2/3	O	06-19-2010		06-19-2010	JA
95	S1/S2/S51/S52	EEOS 1/2	O	06-19-2010		06-19-2010	JA
96	S29/S1/S50/S51	EEOS 29/1	O	06-19-2010		06-19-2010	JA
97	S29/S30/S50/S49	EEOS 29/30	O	06-19-2010		06-19-2010	JA
98	S31/S32/S47/S48	EEOS 31/32	O	06-19-2010		06-19-2010	JA
99	S47	15 FT S 0F S48 1 FT E OF S32	O	06-19-2010		06-19-2010	JA
100	S32/S33/S46/S47	EEOS 32/33	O	06-19-2010		06-19-2010	JA
101	S45/S46/S33/S34	EEOS 33/34	O	06-19-2010		06-19-2010	JA
102	S34/S35/S44/S45	EEOS 34/35	O	06-19-2010		06-19-2010	JA
103	S35/S36/S43/S44	EEOS 35/36	O	06-19-2010		06-19-2010	JA
104	S43	8 FT S OF 44 5FT E OF 36	O	06-19-2010		06-19-2010	JA
105	S43	8FT S OF 44 8FT E OF 36	O	06-19-2010		06-19-2010	JA
106	S43	8FT S OF 44 15FT E OF 36	O	06-19-2010		06-19-2010	JA
107	S36/S37/S42/S43	EEOS 36/37	O	06-19-2010		06-19-2010	JA
108	S37/S38/S41/S42	EEOS 37/38	O	06-19-2010		06-19-2010	JA
109	S38/S39/S40/S41	EEOS 38/39	O	06-19-2010		06-19-2010	JA
110	S73/S74	27FT E OF WEOS	LDT	06-19-2010	LDT-34	06-21-2010	JA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
111	S75/S76	63FT E OF WEOS	LDT	06-19-2010	LDT-35	06-21-2010	JA
112	S77/S78	79FT E OF WEOS	LDT	06-21-2010	LDT-36	06-21-2010	JA
113	S83/S84	56FT E OF WEOS	LDT	06-19-2010	LDT-37	06-21-2010	JA
114	S46/S47/S77/S78	EEOS 46/47	O	06-19-2010		06-19-2010	JA
115	S45/S46/S76/S77	EEOS 45/46	O	06-19-2010		06-19-2010	JA
116	S44/S45/S75/S76	EEOS 44/45	O	06-19-2010		06-19-2010	JA
117	S48/S49/S80/S93	EEOS 48/49	O	06-19-2010		06-19-2010	JA
118	S49/S50/S93/S94	EEOS 49/50	O	06-19-2010		06-19-2010	JA
119	S92/S93	144FT FROM NEAT	O	06-19-2010		06-21-2010	JA
120	S83/S84/S79/S90	EEOS 83,84,90	O	06-19-2010		06-21-2010	JA
121	S55/S57/S97/S98	EEOS 55/57	O	06-19-2010		06-19-2010	JA
122	S57/S71/S98	EEOS 57/71	O	06-19-2010		06-21-2010	JA
123	S57/S70/S71	SEOS 70/71	O	06-19-2010		06-21-2010	JA
124	S96/S53/S54	EEOS 53/54	O	06-19-2010		06-21-2010	JA
125	S92/S93	12FT W 0F EAT	LDT	06-20-2010	LDT-39	06-21-2010	JA
126	S84/S85	39 FT E OF WEOS	LDT	06-20-2010	LDT-38	06-21-2010	JA
127	S94/S95	5FT W OF EAT	LDT	06-20-2010	LDT-40	06-21-2010	JA
128	S71/S98	41 FT S OF NAT	LDT	06-20-2010	LDT-41	06-21-2010	JA
129	S86/S88	13 FT SW OF NEAT	LDT	06-20-2010	LDT-42	06-21-2010	JA
130	S78/S80	WEOS	O	06-20-2010	Covers EEOS 47/48	06-21-2010	JA
131	S74/S75	WEOS	O	06-20-2010	Covers EEOS 43/44 also	06-21-2010	JA
132	S73/S74	WEOS	O	06-20-2010	Covers EEOS 42/43 also	06-21-2010	JA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 7 of 8

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
133	S72/S73	WEOS	O	06-20-2010	Covers EEOS 41/42 also	06-21-2010	JA
134	S72/S81	WEOS	O	06-20-2010	Covers EEOS 40/41 also	06-21-2010	JA
135	S53/S96	10 FT S OF NEOS	LDT	06-20-2010	LDT-43	06-21-2010	JA
136	S79/S92	ALL OF SEAM	O	06-21-2010	Cap entire seam, did not air test.	06-21-2010	JA
137	SR-117/S93	CUT OFF E SIDE OF EXISTING PATCH	LDT	06-21-2010	Extrusion destruct taken. LDT-44	06-21-2010	JA
138	S50/S51	EEOS	O	06-21-2010		06-21-2010	JA
139	S94/S95	WEOS	O	06-21-2010		06-21-2010	JA
140	S51/S52	EEOS	O	06-21-2010		06-21-2010	JA
141	S52/S53	EEOS & WEOS 95/96	O	06-21-2010		06-21-2010	JA
142	S96/S97	WEOS	O	06-21-2010		06-21-2010	JA
143	S54/S55	EEOS	O	06-21-2010		06-21-2010	JA
144	S69/S70	SEOS	T	06-21-2010		06-19-2010	JA
145	S98/S99	SEOS	O	06-21-2010		06-21-2010	JA
146	S99/S100	SEOS	O	06-21-2010		06-21-2010	JA
147	S97/S100	NAT	O	06-21-2010	Extends into anchor trench.	06-21-2010	JA
148	S96/S97	EAT	O	06-21-2010	Extends into anchor trench.	06-21-2010	JA
149	S91	AT EAT	O	06-21-2010	Short, added liner into anchor trench.	06-21-2010	JA
150	S77	EAT	O	06-21-2010	Short, added liner into anchor trench.	06-21-2010	JA
151	S86/S87	WEOS	O	06-21-2010		06-21-2010	JA
152	S86/S88/S89	TIE-IN WEOS	O	06-21-2010		06-21-2010	JA
153	S85/S86/S89	TIE-IN WEOS	O	06-21-2010		06-21-2010	JA
154	S89/S90	TIE-IN WEOS	O	06-21-2010		06-21-2010	JA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
155	S84/S85	TIE-IN WEOS	O	06-21-2010		06-21-2010	JA
156	S82/S83	WEOS	O	06-21-2010		06-21-2010	JA
157	S82/S83	35FT E OF WEOS	O	06-21-2010		06-21-2010	JA
158	S82/S91	WEOS	O	06-21-2010		06-21-2010	JA
159	S79/S80	SEOS	O	06-21-2010		06-21-2010	JA
160	S92/S93	WEOS	O	06-21-2010		06-21-2010	JA
161	S92/S93	81FT E OF WEOS	O	06-21-2010		06-21-2010	JA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

Cell 1 Secondary HDPE Geomembrane Repair Testing Log

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 1 of 8

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
1	P	6 FT X 2 FT	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
2	P	6 FT X 2 FT	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
3	P	6 FT X 2 FT	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
4	P	6 FT X 2 FT	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
5	P	6 FT X 2 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
6	P	6 FT X 2 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
7	P	6 FT X 1.5 FT	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
8	P	5 FT X 2 FT	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
9	P	8 FT X 3 FT	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
10	P	3 FT X 1.5 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
11	P	1 FT X 3 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
12	P	2 FT X 2 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
13	P	1.5 FT X 4 IN	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
14	P	1.5 FT X 4 IN	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
15	P	1.5 FT X 4 IN	MM	JA	06-15-2010	VB	HG	JA	P	06-16-2010	
16	P	3 FT X 2 FT	MM	JA	06-15-2010	VB	HG	JA	P	06-16-2010	
17	G&W	6 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
18	G&W	1.5 FT X 4 IN	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
19	G&W	1.5 FT X 4 IN	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
20	G&W	1.5 FT X 5 IN	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
21	G&W	1.5 FT X 5 IN	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
22	P	2 FT X 3 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 2 of 8

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
23	P	2 FT X 2 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
24	P	2 FT X 2 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
25	P	1.5 FT X 1.5 FT	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
26	G&W	1.5 FT X 4 IN	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
27	G&W	1.5 FT X8 IN	MM	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
28	G&W	1 FT X 7 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
29	G&W	1.5 FT X 7 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
30	P	1.5 FT X 1 FT	MV	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
31	G&W	1.5 FT X 6 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
32	G&W	1.5 FT X 6 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
33	G&W	1.5 FT X 9 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
34	G&W	1 FT X 6 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
35	G&W	1.5 FT X 6 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
36	P	3 FT X 1.5 FT	MV	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
37	P	3 FT X 2 FT	MV	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
38	G&W	2 FT X6 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
39	G&W	2 FT X8 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
40	G&W	1 FT X6 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
41	G&W	1 FT X8 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
42	G&W	1 FT X6 IN	JT	JA	06-16-2010	VB	HG	JA	P	06-16-2010	
43	P	5 FT X 2 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
44	P	6 FT X 2 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 3 of 8

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
45	P	5 FT X 2 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
46	P	6 FT X 2 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
47	P	6 FT X 2 FT	JT	KB	06-17-2010	VB	HG	KB	P	06-17-2010	
48	P	6 FT X 2 FT	JT	KB	06-17-2010	VB	HG	KB	P	06-17-2010	
49	P	5 FT X 2 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
50	P	5 FT X 2 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
51	P	5 FT X 2 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
52	P	5 FT X 2 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
53	P	5 FT X 2 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
54	P	1.5 FT X 1.5 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
55	G&W	14 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
56	P	1.5 FT X 1 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
57	P	1.5 FT X 1.5 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
58	P	1.5 FT X 1.5 FT	JT	JA	06-17-2010	VB	HG	JA	P	06-17-2010	
59	P	6 FT X 2 FT	JT	KB	06-19-2010	VB	HG	KB	P	06-21-2010	
60	P	3 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
61	P	5.5 FT X 2FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
62	P	5 FT X 2.5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
63	P	5 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
64	P	6 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
65	P	5 FT X 2 FT	JT	JA	06-18-2010	VB	HG	JA	P	06-21-2010	
66	P	5 FT X 2 FT	JT	JA	06-18-2010	VB	HG	JA	P	06-21-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis / Kyle Baucom

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 4 of 8

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
67	P	6 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
68	P	6 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
69	P	6 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
70	P	6 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
71	P	5 FT X 1.5 FT	JT	KB	06-19-2010	VB	HG	KB	P	06-21-2010	
72	P	5 FT X 1.5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
73	P	6 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
74	P	10 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
75	P	5 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
76	G&W	1 FT X 8 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
77	G&W	1.5 FT X 8 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
78	G&W	1.5 FT X 8 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
79	G&W	1.5 FT X 8 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
80	G&W	1.5 FT X 6 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
81	G&W	1.5 FT X 6 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
82	G&W	1 FT X 8 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
83	G&W	1 FT X 6 IN	JT	JA	06-19-2010	SP	HG	JA	P	06-21-2010	
84	G&W	1 FT X 8 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
85	G&W	1 FT X 6 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
86	G&W	1 FT X 6 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
87	P	6 FT X 1.5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
88	P	2 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 5 of 8

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
89	P	2 FT X 4 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
90	P	3 FT X 4 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
91	P	2 FT X 4 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
92	P	2 FT X 5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
93	P	2 FT X 4 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
94	P	2 FT X 4.5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-19-2010	
95	P	2 FT X 5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-19-2010	
96	P	5 FT X 5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
97	P	2 FT X 5.5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
98	P	5 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
99	P	1.5 FT X 1 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
100	P	6 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
101	P	5 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
102	P	5 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
103	P	5 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
104	P	1 FT X 1 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
105	P	1 FT X 1 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
106	P	1 FT X 1 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
107	P	4 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
108	P	4.5 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
109	P	3 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
110	P	5 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 6 of 8

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
111	P	5 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
112	P	5 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
113	P	5 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
114	P	1.5 FT X 2.5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
115	P	3 FT X 3 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
116	P	1.5 FT X 2.5 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
117	P	8 FT X 4 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
118	P	4 FT X 2 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
119	P	9 FT X 3.5 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
120	P	7 FT X 4 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
121	P	5 FT X 4 FT	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
122	P	4 FT X 3 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
123	P	3 FT X 3 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
124	P	2 FT X 1.5 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
125	P	5 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
126	P	5 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
127	P	5 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
128	P	5 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
129	P	5 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
130	P	2.5 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
131	P	3 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
132	P	2 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 7 of 8

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
133	P	4 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
134	P	3 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
135	P	5 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
136	P	7 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
137	P	4.5 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
138	P	2 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
139	P	2 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
140	P	2 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
141	P	3.5 FT X 1.5 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
142	P	2 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
143	P	2 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
144	G&W	1 FT X 6 IN	JT	JA	06-19-2010	VB	HG	JA	P	06-21-2010	
145	P	2 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
146	P	2.5 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
147	P	3 FT X 4 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
148	P	2 FT X 4 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
149	P	6 FT X 22 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
150	P	7 FT X 22 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
151	P	4 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
152	P	3 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
153	P	3 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
154	P	3 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis / Kyle Baucom

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Secondary GM
Project Location: Terrell, North Carolina
Page: 8 of 8

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
155	P	3 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
156	P	2 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
157	P	2 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
158	P	2 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
159	P	3 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
160	P	3 FT X 2 FT	JT	JA	06-21-2010	VB	HG	JA	P	06-21-2010	
161	P	4 FT X 2 FT	MV	JA	06-21-2010	VB	HG	JA	P	06-21-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

APPENDIX II – GEOSYNTHETICS
Section 6 – Cell 1 Primary HDPE Geomembrane CQA Forms

Geomembrane Deployment Report
Geomembrane Trial Seam Log
Geomembrane Seam Log
Destructive Laboratory Test Results
Geomembrane Defect Log
Geomembrane Repair Testing Log

Cell 1 Primary HDPE Geomembrane Deployment Report

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 6/25,6/26,6/28/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 1 **of** 4

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	-----	-----		
P01	218589	496	22	10,912	0	TB	
P02	218607	496	22	10,912	0	TB	
P03	218699	496	22	10,912	0	TB	
P04	218698	496	22	10,912	0	TB	
P05	218697	496	22	10,912	0	TB	
P06	218601	496	22	10,912	0	TB	
P07	218721	497	22	10,934	0	TB	
P08	211435	328	22	7,216	0	TB	
P09	211440	329	22	7,238	0	TB	
P10	219110	331	22	7,282	0	TB	
P11	218729	331	22	7,282	0	TB	
P12	219102	331	22	7,282	0	TB	
P13	218696	331	22	7,282	0	TB	
P14	218696	134	22	2,948	0	TB	
P15	219110	24	22	528	0	TB	Measured center cut on 45
P16	218729	51	22	1,122	0	TB	Measured center cut on 45
P17	218729	71	22	1,562	0	TB	Measured center cut on 45
P18	219110	66	22	1,452	0	TB	
P19	219102	65	22	1,430	0	TB	
P20	219102	66	22	1,452	0	TB	
P21	211435	67	22	1,474	0	TB	
P22	211435	67	22	1,474	0	TB	
P23	211440	68	22	1,496	0	TB	
P24	211440	70	22	1,540	0	TB	
P25	219224	68	22	1,496	0	TB	
P26	219224	68	22	1,496	0	TB	
P27	219224	68	22	1,496	0	TB	
P28	219224	70	22	1,540	0	TB	
P29	219224	69	22	1,518	0	TB	
			Sheet Total	144,012	0		
			Total to Date	144,012	0		

CQA Personnel: Travis Bowman, Kyle Baucom

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 6/25,6/26,6/28/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 2 **of** 4

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	144,012	0		
P30	219224	70	22	1,540	0	TB	
P31	219224	71	22	1,562	0	TB	
P32	219612	72	22	1,584	0	TB	
P33	218612	55	22	1,210	0	TB	
P34	219612	54	22	1,188	0	TB	
P35	218612	54	22	1,188	0	TB	
P36	218612	52	22	1,144	0	TB	
P37	218612	51	22	1,122	0	TB	
P38	218612	50	22	1,100	0	TB	
P39	218612	53	22	1,166	0	TB	
P40	219223	55	22	1,210	0	TB	
P41	219223	54	22	1,188	0	TB	
P42	219223	53	22	1,166	0	TB	
P43	219223	54	22	1,188	0	TB	
P44	219223	54	22	1,188	0	TB	
P45	219223	54	22	1,188	0	TB	
P46	219223	56	22	1,232	0	TB	
P47	219223	58	22	1,276	0	TB	
P48	211529	54	22	1,188	0	TB	
P49	211529	58	22	1,276	0	TB	
P50	211561	58	22	1,276	0	TB	
P51	211561	57	22	1,254	0	TB	
P52	211797	57	22	1,254	0	TB	
P53	211797	57	22	1,254	0	TB	
P54	211797	58	22	1,276	0	TB	
P55	219114	240	22	5,280	0	KB	
P56	219114	241	22	5,302	0	KB	Deployed N to S starting @ W end of southern half of cell
P57	218722	238	22	5,236	0	KB	
P58	218722	237	22	5,214	0	KB	
			Sheet Total	52,250	0		
			Total to Date	196,262	0		

CQA Personnel: Travis Bowman, Kyle Baucom

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 6/25,6/26,6/28/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 3 **of** 4

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	196,262	0		
P59	218603	497	22	10,934	0	KB	Start E to W full roll deployment
P60	218591	499	22	10,978	0	KB	
P61	218694	498	22	10,956	0	KB	
P62	219106	498	22	10,956	0	KB	
P63	218592	498	22	10,956	0	KB	
P64	219105	500	22	11,000	0	KB	
P65	219103	500	22	11,000	0	KB	
P66	218590	500	22	11,000	0	KB	
P67	219104	500	22	11,000	0	KB	
P68	218609	500	22	11,000	0	KB	
P69	211321	500	3	1,500	0	KB	
P70	211797	230	22	5,060	0	KB	
P71	218602	180	22	3,960	0	KB	
P71A	218602	323	22	7,106	0	KB	
P72	219111	181	22	3,982	0	KB	
P72A	219111	319	22	7,018	0	KB	
P73	218610	310	22	6,820	0	KB	
P73A	218610	187	22	4,114	0	KB	
P74	218604	312	22	6,864	0	KB	
P74A	218604	186	22	4,092	0	KB	
P75	218605	317	22	6,974	0	KB	
P75A	218605	173	22	3,806	0	KB	
P76	218606	315	22	6,930	0	KB	
P76A	218606	172	22	3,784	0	KB	
P77	218611	314	22	6,908	0	KB	
P77A	218611	171	22	3,762	0	KB	
P78	218724	314	22	6,908	0	KB	
P78A	218724	154	22	3,388	0	KB	
P79	218726	310	22	6,820	0	KB	
			Sheet Total	209,576	0		
			Total to Date	405,838	0		

CQA Personnel: Kyle Baucom

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 6/25,6/26,6/28/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 4 **of** 4

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	405,838	0		
P79A	218726	148	22	3,256	0	KB	
P80	211321	312	4	1,248	0	KB	
P81	211321	48	4	192	0	KB	
P82	219222	153	22	3,366	0	KB	Measured center cut on 45
P83	219222	176	22	3,872	0	KB	Measured center cut on 45
P84	219110	43	22	946	0	KB	Measured center cut on 45
P85	219222	145	22	3,190	0	KB	
P86	218600	159	22	3,498	0	KB	Measuree center cut on 45
P87	218600	152	22	3,344	0	KB	Measured center cut on 45
P88	218720	130	22	2,860	0	KB	Measured center cut on 45
P89	218720	111	22	2,442	0	KB	Measured center cut on 45
P90	218720	78	22	1,716	0	KB	Measured center cut on 45
P91	218720	73	22	1,606	0	KB	Measured cwnter cut on 45
P92	218600	56	22	1,232	0	KB	Measured center cut on 45
P93	218600	33	22	726	0	KB	Measured center cut on 45
P94	218600	12	11	132	0	KB	Measured center cut on 45
P95	218718	287	22	6,314	0	JA	
			Sheet Total	39,940	0		
			Total to Date	445,778	0		

CQA Personnel: James Addis/Kyle Baucom

Cell 1 Primary HDPE Geomembrane Trial Seam Log

GEOMEMBRANE TRIAL SEAM LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 1 **of** 3

					Machine Settings		Peel Test Results						Shear Test Results							
Sample No.	Approx. Time	Tech. Init.	Mach. No.	Ambient Temp.	Preheat or Speed	Temp. Setting	1		2		3		1	2	3	Pass/ Fail	Weld Type	Material	CQA Init.	Date
P1	732	DC	3210	78	30	860	121	119	130	134	126	101	171	178	174	P	F	SS	JA	06/25/2010
P2	724	WT	3211	78	30	860	121	134	117	124	114	110	126	125	181	P	F	SS	JA	06/25/2010
P3	730	JT	5171	78	500	550	126	0	118	0	124	0	176	182	181	P	Ex	TT	KB	06/25/2010
P4	1010	BV	1221	85	5	860	132	133	122	134	129	131	166	168	174	P	F	TT	KB	06/25/2010
P5	1120	BV	1221	85	5	860	111	116	120	117	124	126	172	181	170	P	F	ST	KB	06/25/2010
P6	1025	LN	1220	85	7	860	118	121	115	116	126	110	145	162	171	P	F	SS	KB	06/25/2010
P7	1250	BV	1221	92	5	860	120	123	122	119	117	109	144	145	148	P	F	ST	KB	06/25/2010
P8	1249	LN	1220	92	7	860	100	97	101	103	109	107	150	149	143	P	F	SS	KB	06/25/2010
P9	1250	DC	3210	92	30	860	110	105	115	110	119	121	141	147	143	P	F	SS	KB	06/25/2010
P10	1251	LN	1220	92	9	860	114	111	121	118	114	116	146	137	140	P	F	ST	KB	06/25/2010
P11	728	BV	1219	78	7	860	124	117	122	125	118	115	158	140	153	P	F	SS	JA	06/26/2010
P12	730	DC	3210	78	7	860	124	121	118	126	131	141	166	174	166	P	F	SS	JA	06/26/2010
P13	725	LN	1220	78	7	860	121	134	126	117	107	114	155	147	161	P	F	SS	JA	06/26/2010
P14	740	JT	5171	78	500	550	131	0	140	0	145	0	160	162	167	P	Ex	TT	JA	06/26/2010
P15	1100	LN	1220	87	5	860	113	112	116	121	114	118	162	154	161	P	F	ST	JA	06/26/2010

Weld Type: (**Ex**)trusion, (**F**)usion
Material: (**SS**) Smooth/Smooth - (**ST**) Smooth/Texture - (**TT**) Texture /Texture

CQA Personnel: James Addis, Kyle Baucom

GEOMEMBRANE TRIAL SEAM LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 2 **of** 3

					Machine Settings		Peel Test Results						Shear Test Results							
Sample No.	Approx. Time	Tech. Init.	Mach. No.	Ambient Temp.	Preheat or Speed	Temp. Setting	1		2		3		1	2	3	Pass/ Fail	Weld Type	Material	CQA Init.	Date
P16	1300	DC	3210	94	30	860	118	120	114	119	121	116	134	142	155	P	F	SS	JA	06/26/2010
P17	1305	DC	3210	94	17	860	110	114	120	116	122	116	141	146	152	P	F	TT	JA	06/26/2010
P18	1310	BV	1219	94	5	860	106	108	114	121	118	120	152	146	150	P	F	SS	JA	06/26/2010
P19	1305	LN	1220	94	5	860	120	115	118	105	104	110	150	142	150	P	F	ST	JA	06/26/2010
P20	1300	JT	5171	94	500	550	115	0	120	0	118	0	136	139	141	P	Ex	TT	JA	06/26/2010
P21	745	DC	249	75	500	550	133	0	137	0	130	0	157	151	155	P	Ex	TT	JA	06/28/2010
P22	710	JT	5171	75	500	550	131	0	128	0	124	0	148	155	142	P	Ex	TT	JA	06/28/2010
P23	720	MV	5155	75	500	550	119	0	128	0	116	0	151	142	150	P	Ex	TT	JA	06/28/2010
P24	1031	WT	3211	80	30	860	111	119	109	100	115	116	146	149	141	P	F	SS	JA	06/28/2010
P25	1035	DC	3210	80	30	860	110	100	99	101	103	101	141	149	153	P	F	SS	JA	06/28/2010
P26	1315	WT	3211	90	30	860	116	120	115	110	109	106	151	140	143	P	F	SS	JA	06/28/2010
P27	1310	DC	3210	90	30	860	122	115	118	130	114	116	140	137	136	P	F	SS	JA	06/28/2010
P28	1315	DC	3210	90	17	860	118	109	105	113	114	100	149	138	130	P	F	TT	JA	06/28/2010
P29	1312	WT	3211	90	17	860	110	102	106	117	114	118	137	138	136	P	F	TT	JA	06/28/2010
P30	1318	WT	3211	90	17	860	116	114	118	110	116	131	139	141	146	P	F	ST	JA	06/28/2010

Weld Type: (**Ex**)trusion, (**F**)usion
Material: (**SS**) Smooth/Smooth - (**ST**) Smooth/Texture - (**TT**) Texture /Texture

CQA Personnel: James Addis

GEOMEMBRANE TRIAL SEAM LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 3 **of** 3

					Machine Settings		Peel Test Results						Shear Test Results							
Sample No.	Approx. Time	Tech. Init.	Mach. No.	Ambient Temp.	Preheat or Speed	Temp. Setting	1		2		3		1	2	3	Pass/ Fail	Weld Type	Material	CQA Init.	Date
P31	1300	JT	5171	90	500	550	122	0	110	0	114	0	146	152	148	P	Ex	TT	JA	06/28/2010
P32	730	JT	5171	78	450	550	121	0	116	0	110	0	148	156	162	P	Ex	TT	JA	06/29/2010
P33	735	MV	5155	78	450	550	132	0	128	0	119	0	152	155	160	P	Ex	TT	WH	06/29/2010

Weld Type: (**Ex**)trusion, (**F**)usion
Material: (**SS**) Smooth/Smooth - (**ST**) Smooth/Texture - (**TT**) Texture /Texture

CQA Personnel: James Addis, William Harrison

Cell 1 Primary HDPE Geomembrane Seam Log

GEOMEMBRANE SEAM LOG

Date: 06/25/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 1 of 14

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
P1 / P2	EEOS / WAT	739	DC	3210	492	1	A	803 / 808	30 / 30	RC	WH	P	06-25-2010	
P2 / P3	EEOS / WAT	746	WT	3211	493	2	A	815 / 820	30 / 29	RC	WH	P	06-25-2010	
P3 / P4	EEOS / WAT	806	DC	3210	493	3	A	832 / 837	30 / 30	RC	WH	P	06-25-2010	
P4 / P5	EEOS / WAT	816	WT	3211	497	4	A	845 / 850	30 / 29	RC	WH	P	06-25-2010	
P5 / P6	EEOS / WAT	830	DC	3210	497	5	A	900 / 905	30 / 30	RC	WH	P	06-25-2010	
P6 / P7	EEOS / WAT	849	WT	3211	497	6	A	914 / 919	30 / 30	RC	WH	P	06-25-2010	
P8 / P9	EEOS / WEOS	913	DC	3210	324		A	935 / 940	30 / 30	RC	WH	P	06-25-2010	
P9 / P10	EEOS / WEOS	926	WT	3211	323	7	A	945 / 950	30 / 30	RC	WH	P	06-25-2010	
P10 / P11	EEOS / WEOS	935	DC	3210	323		A	1000 / 1005	30 / 29	RC	WH	P	06-25-2010	
P11 / P12	EEOS / WEOS	946	WT	3211	323	8	A	1005 / 1010	30 / 30	RC	WH	P	06-25-2010	
P12 / P13	EEOS / WEOS	955	DC	3210	324	9	A	1013 / 1018	30 / 29	RC	WH	P	06-25-2010	
P16 / P17	NAT / SEOS	1010	WT	3211	63		A	1033 / 1038	30 / 30	RC	WH	P	06-25-2010	
P15 / P16	NAT / SEOS	1016	WT	3211	34		A	1030 / 1035	30 / 30	RC	WH	P	06-25-2010	
P17 / P18	NAT / SEOS	1018	DC	3210	64		A	1026 / 1031	30 / 29	RC	WH	P	06-25-2010	
P18 / P19	NAT / SEOS	1025	WT	3211	62		A	1041 / 1046	30 / 30	RC	WH	P	06-25-2010	Z2 1038/1043 30/29 Z3 1040/1045 30/30
				Sheet Total	4,809									
				Total to Date	4,809									

CQA Personnel: Will Harrison

GEOMEMBRANE SEAM LOG

Date: 06/25/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 2 of 14

Project Total Carry Over 4,809

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P19 / P20	NAT / SEOS	1033	DC	3210	64		A	1044 / 1049	30 / 29	RC	WH	P	06-25-2010	
P21 / P22	NAT / SEOS	1048	DC	3210	64	10	A	1053 / 1058	30 / 30	RC	WH	P	06-25-2010	
P6 / P13	NEOS / SEOS	1052	BV	1221	22		A	1354 / 1359	30 / 29	RC	KB	P	06-25-2010	
P20 / P21	NAT / SEOS	1055	DC	3210	63		A	1047 / 1052	30 / 30	RC	WH	P	06-25-2010	
P5 / P12	NEOS / SEOS	1100	BV	1221	22		A	1133 / 1138	30 / 29	RC	KB	P	06-25-2010	
P4 / P11	NEOS / SEOS	1103	BV	1221	22		A	1132 / 1137	30 / 30	RC	KB	P	06-25-2010	Z2 1126/1131 30/30
P22 / P23	NAT / SEOS	1104	DC	3210	65		A	1110 / 1115	30 / 30	RC	WH	P	06-25-2010	
P23 / P24	NAT / SEOS	1108	DC	3210	63		A	1108 / 1113	30 / 29	RC	WH	P	06-25-2010	
P3 / P10	NEOS / SEOS	1108	BV	1221	22		A	1124 / 1129	30 / 30	RC	KB	P	06-25-2010	
P24 / P25	NAT / SEOS	1110	DC	3210	65		A	1115 / 1120	30 / 29	RC	WH	P	06-25-2010	
P2 / P9	NEOS / SEOS	1112	BV	1221	22		A	1130 / 1135	30 / 30	RC	KB	P	06-25-2010	
P1 / P8	NEOS / SEOS	1116	BV	1221	22		A	1124 / 1129	30 / 30	RC	KB	P	06-25-2010	Z2 1123/1128 30/30
P25 / P26	NAT / SEOS	1118	LN	1220	66		A	1230 / 1235	30 / 30	RC	WH	P	06-25-2010	
P26 / P27	NAT / SEOS	1120	DC	3210	64		A	1233 / 1238	30 / 30	RC	WH	P	06-25-2010	
P27 / P28	NAT / SEOS	1125	DC	3210	67	11	A	1250 / 1255	30 / 30	RC	WH	P	06-25-2010	

Sheet Total 713
Total to Date 5,522

CQA Personnel: Kyle Baucom, Will Harrison

GEOMEMBRANE SEAM LOG

Date: 06/25/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 3 of 14

Project Total Carry Over 5,522

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P28 / P29	NAT / SEOS	1129	DC	3210	68		A	1300 / 1305	30 / 30	RC	WH	P	06-25-2010	
P14 / P15	NEAT / SWEOS	1129	BV	1221	36		A	1240 / 1245	30 / 30	RC	KB	P	06-25-2010	
P29 / P30	NAT / SEOS	1133	LN	1220	69		A	1304 / 1309	30 / 29	RC	WH	P	06-25-2010	
P30 / P31	NAT / SEOS	1133	DC	3210	69		A	1310 / 1315	30 / 30	RC	WH	P	06-25-2010	
P14 / P16	NEEOS / SWEOS	1135	BV	1221	37		A	1240 / 1245	30 / 30	RC	KB	P	06-25-2010	
P14 / P17	NEEOS / SWEOS	1140	BV	1221	35		A	1240 / 1245	30 / 30	RC	KB	P	06-25-2010	
P31 / P32	NAT / SEOS	1143	DC	3210	72		A	1312 / 1317	30 / 29	RC	WH	P	06-25-2010	Z2 1315/1320 30/30
P32 / P33	NAT / SEOS	1251	LN	1220	56	12	A	1404 / 1409	30 / 30	RC	WH	P	06-25-2010	
P33 / P34	NAT / SEOS	1255	DC	3210	54		A	1410 / 1415	30 / 30	RC	WH	P	06-25-2010	Z2 1415/1419 30/30
P34 / P35	NAT / SEOS	1259	DC	3210	53		A	1426 / 1431	30 / 30	RC	WH	P	06-25-2010	
P35 / P36	NAT / SEOS	1302	LN	1220	51		A	1433 / 1438	30 / 29	RC	WH	P	06-25-2010	
P13 / P18	EEOS / WEOS	1303	BV	1221	22		A	1324 / 1329	30 / 30	RC	KB	P	06-25-2010	Z2 1317/1323 30/30
P36 / P37	NAT / SEOS	1304	DC	3210	50		A	1436 / 1441	30 / 30	RC	WH	P	06-25-2010	
P37 / P38	NAT / SEOS	1307	DC	3210	51		A	1437 / 1441	30 / 30	RC	WH	P	06-25-2010	
P13 / P19	EEOS / WEOS	1308	BV	1221	22		A	1317 / 1323	30 / 30	RC	KB	P	06-25-2010	

Sheet Total 745
Total to Date 6,267

CQA Personnel: Will Harrison, Kyle Baucom

GEOMEMBRANE SEAM LOG

Date: 06/25/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 4 of 14

Project Total Carry Over 6,267

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P38 / P39	NAT / SEOS	1310	LN	1220	52		A	1443 / 1448	30 / 30	RC	WH	P	06-25-2010	
P13 / P20	EEOS / WEOS	1311	BV	1221	22		A	1317 / 1323	30 / 30	RC	KB	P	06-25-2010	
P13 / P21	EEOS / WEOS	1314	BV	1221	22		A	1317 / 1323	30 / 30	RC	KB	P	06-25-2010	Z2 1330/1335 30/30
P13 / P22	EEOS / WEOS	1317	BV	1221	22		A	1330 / 1335	30 / 30	RC	KB	P	06-25-2010	
P39 / P40	NAT / SEOS	1320	LN	1220	52		A	1448 / 1453	30 / 29	RC	WH	P	06-25-2010	
P13 / P23	EEOS / WEOS	1321	BV	1221	22		A	1332 / 1337	30 / 30	RC	KB	P	06-25-2010	
P13 / P24	EEOS / WEOS	1324	BV	1221	22		A	1334 / 1339	30 / 29	RC	KB	P	06-25-2010	Z2 1334/1339 30/29
P40 / P41	NAT / SEOS	1325	DC	3210	51	13	A	1453 / 1458	30 / 30	RC	WH	P	06-25-2010	
P13 / P25	EEOS / WEOS	1327	BV	1221	22	16	A	1334 / 1339	30 / 29	RC	KB	P	06-25-2010	
P41 / P42	NAT / SEOS	1330	LN	1220	53		A	1456 / 1501	30 / 30	RC	WH	P	06-25-2010	
P42 / P43	NAT / SEOS	1330	DC	3210	53		A	1500 / 1505	30 / 30	RC	WH	P	06-25-2010	
P13 / P26	EEOS / WEOS	1330	BV	1221	22		A	1421 / 1426	30 / 29	RC	KB	P	06-25-2010	
P13 / P27	EEOS / WEOS	1333	BV	1221	22		A	1421 / 1426	30 / 30	RC	KB	P	06-25-2010	
P13 / P28	EEOS / WEOS	1336	BV	1221	22		A	1421 / 1426	30 / 29	RC	KB	P	06-25-2010	Z2 1345/1350 30/29
P13 / P29	EEOS / WEOS	1340	BV	1221	22		A	1345 / 1350	30 / 29	RC	KB	P	06-25-2010	Z2 1346/1351 30/30

Sheet Total 481
Total to Date 6,748

CQA Personnel: Will Harrison, Kyle Baucom

GEOMEMBRANE SEAM LOG

Date: 6/17/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 5 of 14

Project Total Carry Over 6,748

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P43 / P44	NAT / SEOS	1343	LN	1220	52		A	1505 / 1510	30 / 30	RC	WH	P	06-25-2010	
P13 / P30	EEOS / WEOS	1343	BV	1221	22		A	1350 / 1355	30 / 29	RC	KB	P	06-25-2010	
P13 / P31	EEOS / WEOS	1346	BV	1221	22		A	1350 / 1355	30 / 29	RC	KB	P	06-25-2010	Z2 1352/1357 30/30
P44 / P45	NAT / SEOS	1348	DC	3210	51		A	1508 / 1513	30 / 30	RC	WH	P	06-25-2010	
P13 /	EEOS / WEOS	1349	BV	1221	12		A	1352 / 1357	30 / 30	RC	KB	P	06-25-2010	
P45 / P46	NAT / SEOS	1351	LN	1220	53		A	1518 / 1523	30 / 30	RC	WH	P	06-25-2010	
P7 / P32	SEOS / NWEOS	1352	BV	1221	30		A	1400 / 1405	30 / 30	RC	KB	P	06-25-2010	Z2 1432/1437 30/30 L-SHAPED TIE-IN
P46 / P47	NAT / SEOS	1355	DC	3210	53	14	A	1520 / 1525	30 / 30	RC	WH	P	06-25-2010	
P7 / P33	EEOS / WEOS	1357	BV	1221	22		A	1432 / 1437	30 / 30	RC	KB	P	06-25-2010	
P7 / P34	EEOS / WEOS	1400	BV	1221	22		A	1432 / 1437	30 / 30	RC	WH	P	06-25-2010	
P7 / P35	EEOS / WEOS	1403	BV	1221	22		A	1432 / 1437	30 / 30	RC	KB	P	06-25-2010	Z2 1435/1440 30/30 Z3 1450/1455 30/30
P47 / P48	NAT / SEOS	1405	LN	1220	56		A	1523 / 1528	30 / 30	RC	WH	P	06-25-2010	
P48 / P49	NAT / SEOS	1405	DC	3210	55		A	1530 / 1535	30 / 30	RC	WH	P	06-25-2010	
P7 / P36	EEOS / WEOS	1406	BV	1221	22		A	1450 / 1455	30 / 30	RC	KB	P	06-25-2010	
P7 / P37	EEOS / WEOS	1409	BV	1221	22		A	1450 / 1455	30 / 30	RC	KB	P	06-25-2010	

Sheet Total 516
Total to Date 7,264

CQA Personnel: Will Harrison, Kyle Baucom

GEOMEMBRANE SEAM LOG

Date: 06-25-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 6 of 14

Project Total Carry Over 7,264

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P7 / P38	EEOS / WEOS	1412	BV	1221	22		A	1450 / 1455	30 / 30	RC	KB	P	06-25-2010	
P49 / P50	NAT / SEOS	1413	DC	3210	55		A	1532 / 1537	30 / 30	RC	WH	P	06-25-2010	
P7 / P39	EEOS / WEOS	1415	BV	1221	22		A	1450 / 1455	30 / 30	RC	KB	P	06-25-2010	
P7 / P40	EEOS / WEOS	1415	BV	1221	22		A	1525 / 1530	30 / 29	RC	KB	P	06-25-2010	
P50 / P51	NAT / SEOS	1416	LN	1220	55		A	1540 / 1545	30 / 30	RC	WH	P	06-25-2010	
P7 / P41	EEOS / WEOS	1421	BV	1221	22		A	1525 / 1530	30 / 29	RC	KB	P	06-25-2010	
P7 / P42	EEOS / WEOS	1424	BV	1221	22		A	1525 / 1530	30 / 29	RC	KB	P	06-25-2010	
P7 / P43	EEOS / WEOS	1427	BV	1221	22	15	A	1525 / 1530	30 / 29	RC	KB	P	06-25-2010	
P52 / P53	NAT / SEOS	1428	LN	1220	54		A	1552 / 1557	30 / 29	RC	WH	P	06-25-2010	Z2 1550/1555 30/30
P7 / P44	EEOS / WEOS	1430	BV	1221	22		A	1525 / 1530	30 / 29	RC	KB	P	06-25-2010	
P7 / P45	EEOS / WEOS	1433	BV	1221	22		A	1525 / 1530	30 / 29	RC	KB	P	06-25-2010	
P51 / P52	NAT / SEOS	1434	DC	3210	54		A	1542 / 1547	30 / 30	RC	WH	P	06-25-2010	
P53 / P54	NAT / SEOS	1436	LN	1220	57		A	1555 / 1600	30 / 29	RC	WH	P	06-25-2010	
P7 / P46	EEOS / WEOS	1436	BV	1221	22		A	1525 / 1530	30 / 29	RC	KB	P	06-25-2010	
P7 / P47	EEOS / WEOS	1439	BV	1221	22		A	1525 / 1530	30 / 29	RC	KB	P	06-25-2010	Z2 1535/1540 30/29

Sheet Total 495
Total to Date 7,759

CQA Personnel: Will Harrison, Kyle Baucom

GEOMEMBRANE SEAM LOG

Date: 06-25-2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 7 of 14

Project Total Carry Over 7,759

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P7 / P48	EEOS / WEOS	1442	BV	1221	22		A	1535 / 1540	30 / 29	RC	KB	P	06-25-2010	
P7 / P49	EEOS / WEOS	1445	BV	1221	22		A	1535 / 1540	30 / 29	RC	KB	P	06-25-2010	
P7 / P50	EEOS / WEOS	1448	BV	1221	22		A	1535 / 1540	30 / 29	RC	KB	P	06-25-2010	Z2 1603/1608 30/30
P7 / P51	EEOS / WEOS	1451	BV	1221	22		A	1603 / 1608	30 / 30	RC	KB	P	06-25-2010	
P7 / P52	EEOS / WEOS	1454	BV	1221	22		A	1603 / 1608	30 / 30	RC	KB	P	06-25-2010	
P7 / P54	EEOS / WAT	1500	BV	1221	22		A	1605 / 1610	30 / 29	RC	KB	P	06-25-2010	Z2 1610/1615 30/30
P7 / P53	EEOS / WEOS	1557	BV	1221	11		A	1403 / 1408	30 / 30	RC	KB	P	06-25-2010	

Sheet Total 143
Total to Date 7,902

CQA Personnel: Kyle Baucom

GEOMEMBRANE SEAM LOG

Date: 6/26/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 8 of 14

Project Total Carry Over 7,902

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P55 / P56	NEOS / SEOS	754	LN	1220	231		A	1155 / 1200	30 / 30	RC	KB	P	06-26-2010	Z2 1200/1205 30/30 Z3 1210/1215 30/30
P56 / P57	NEOS / SEOS	800	DC	3210	231	17	A	1215 / 1220	30 / 30	RC	KB	P	06-26-2010	
P57 / P58	NEOS / SEOS	810	DC	3210	230		A	1120 / 1125	30 / 30	RC	KB	P	06-26-2010	
P59 / P60	WEOS / EEOS	825	LN	1220	489	19	A	1020 / 1025	30 / 30	RC	KB	P	06-26-2010	Z2 1010/1015 30/29
P8 / P59	EEOS / WEOS	826	BV	1219	87		A	1000 / 1005	30 / 30	RC	KB	P	06-26-2010	
P60 / P61	EEOS / WEOS	835	DC	3210	489	20	A	1030 / 1035	30 / 30	RC	KB	P	06-26-2010	
P1 / P59	EEOS / WEOS	836	BV	1219	404	18	A	1025 / 1030	30 / 30	RC	KB	P	06-26-2010	
P61 / P62	WEOS / EEOS	902	DC	3210	489	21	A	1040 / 1045	30 / 29	RC	KB	P	06-26-2010	Z2 1042/1047 30/30
P62 / P63	WEOS / EEOS	912	BV	1219	490	22	A	1045 / 1050	30 / 30	RC	KB	P	06-26-2010	
P63 / P64	WEOS / EEOS	919	LN	1220	491	23	A	1050 / 1055	30 / 30	RC	KB	P	06-26-2010	
P64 / P65	WEOS / EEOS	927	DC	3210	491	24	A	1120 / 1125	30 / 30	RC	KB	P	06-26-2010	
P65 / P66	WEOS / EEOS	954	DC	3210	492	25	A	1145 / 1150	30 / 30	RC	KB	P	06-26-2010	
P66 / P67	WEOS / EEOS	958	BV	1219	491	26	A	1142 / 1147	30 / 30	RC	KB	P	06-26-2010	
P67 / P68	WEOS / EEOS	1011	LN	1220	491	27	A	1145 / 1150	30 / 30	RC	KB	P	06-26-2010	
P8 / P70	WEOS / T E OF	1054	DC	3210	491		A	1310 / 1315	30 / 30	RC	JA	P	06-26-2010	

Sheet Total 6,087
Total to Date 13,989

CQA Personnel: Kyle Baucom, James Addis

GEOMEMBRANE SEAM LOG

Date: 6/26/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 9 of 14

Project Total Carry Over 13,989

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P68 / P69	WEOS / EEOS	1108	LN	1220	495	28	A	1300 / 1305	30 / 30	RC	KB	P	06-26-2010	
P70 / P71	WEOS / EEOS	1112	DC	3210	179		A	1307 / 1312	30 / 29	RC	KB	P	06-26-2010	
P71 / P72	WEOS / EEOS	1118	BV	1219	179	29	A	1313 / 1318	30 / 30	RC	KB	P	06-26-2010	
P72 / P73	WEOS / EEOS	1126	DC	3210	183		A	1320 / 1325	30 / 30	RC	KB	P	06-26-2010	
P73 / P74	WEOS / EEOS	1134	BV	1219	309	30	A	1326 / 1331	30 / 30	RC	KB	P	06-26-2010	
P74 / P75	WEOS / EEOS	1142	DC	3210	312		A	1342 / 1347	30 / 30	RC	KB	P	06-26-2010	
P75 / P76	WEOS / EEOS	1159	DC	3210	313	31	A	1328 / 1333	30 / 29	RC	JA	P	06-26-2010	
P76 / P77	WEOS / EEOS	1200	BV	1219	312	32	A	1342 / 1347	30 / 30	RC	JA	P	06-26-2010	
P77 / P78	EEOS / WEOS	1318	DC	3210	313			1345 / 1350	30 / 29	RC	KB	P	06-26-2010	
P78 / P79	WEOS / EEOS	1335	DC	3210	309	33	A	1350 / 1355	30 / 29	RC	KB	P	06-26-2010	Z2 1353/1358 30/30

Sheet Total 2,904
Total to Date 16,893

CQA Personnel: Kyle Baucom, James Addis

GEOMEMBRANE SEAM LOG

Date: 6/28/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 10 of 14

Project Total Carry Over 16,893

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P1 / P58	EEOS / WEOS	1335	LN	1220	22		A	745 / 750	30 / 30	RC	JA	P	06-28-2010	
P1 / P57	EEOS / WEOS	1339	LN	1220	22		A	745 / 750	30 / 30	RC	JA	P	06-28-2010	
P1 / P56	EEOS / WEOS	1342	LN	1220	22		A	745 / 750	30 / 30	RC	JA	P	06-28-2010	
P1 / P55	EEOS / WEOS	1345	LN	1220	22		A	745 / 50	30 / 30	RC	JA	P	06-28-2010	
P79 / P80	WEOS / EEOS	1348	BV	1219	309	34		717 / 722	30 / 29	RC	KB	P	06-28-2010	
P58 / P59	NEOS / SEOS	1353	LN	1220	22		A	741 / 746	30 / 30	RC	JA	P	06-28-2010	
P58 / P60	NEOS / SEOS	1357	LN	1220	22		A	741 / 746	30 / 30	RC	JA	P	06-28-2010	
P59 / P70	NEOS / SEOS	1400	DC	3210	22		A	1405 / 1410	30 / 30	RC	KB	P	06-26-2010	
P58 / P61	NEOS / SEOS	1400	LN	1220	22		A	741 / 746	30 / 30	RC	JA	P	06-28-2010	
P60 / P71	NEOS / SEOS	1403	DC	3210	22		A	1408 / 1413	30 / 30	RC	JA	P	06-26-2010	
P58 / P62	NEOS / SEOS	1403	LN	1220	22		A	741 / 746	30 / 30	RC	JA	P	06-28-2010	
P61 / P72	NEOS / SEOS	1405	DC	3210	22		A	1410 / 1415	30 / 29	RC	JA	P	06-26-2010	
P58 / P63	NEOS / SEOS	1406	LN	1220	22		A	741 / 746	30 / 30	RC	JA	P	06-28-2010	
P58 / P64	NEOS / SEOS	1409	LN	1220	22		A	741 / 746	30 / 30	RC	JA	P	06-28-2010	
P62 / P73	NEOS / SEOS	1410	DC	3210	22			700 / 705	30 / 29	RC	KB	P	06-28-2010	

Sheet Total 617
Total to Date 17,510

CQA Personnel: Kyle Baucom, James Addis

GEOMEMBRANE SEAM LOG

Date: 6/28/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 11 of 14

Project Total Carry Over 17,510

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P63 / P74	NEOS / SEOS	1412	DC	3210	22		A	702 / 707	30 / 30	RC	KB	P	06-28-2010	
P58 / P65	NEOS / SEOS	1412	LN	1220	22	36	A	741 / 746	30 / 30	RC	JA	P	06-28-2010	Z2 735/740 30/30 Z3 725/730 30/30
P64 / P75	NEOS / SEOS	1414	DC	3210	12		A	704 / 709	30 / 30	RC	KB	P	06-28-2010	
P58 / P66	NEOS / SEOS	1415	LN	1220	22		A	725 / 730	30 / 30	RC	JA	P	06-28-2010	
P65 / P76	NEOS / SEOS	1416	DC	3210	22		A	710 / 715	30 / 29	RC	KB	P	06-28-2010	
P58 / P67	NEOS / SEOS	1418	LN	1220	22		A	725 / 730	30 / 30	RC	JA	P	06-28-2010	
P66 / P77	NEOS / SEOS	1418	DC	3210	22		A	711 / 716	30 / 30	RC	KB	P	06-28-2010	
P67 / P78	NEOS / SEOS	1420	DC	3210	22		A	714 / 719	30 / 30	RC	KB	P	06-28-2010	
P58 / P68	NEOS / SEOS	1421	LN	1220	22		A	725 / 730	30 / 30	RC	JA	P	06-28-2010	
P68 / P79	NEOS / SEOS	1422	DC	3210	22	35	A	715 / 720	30 / 30	RC	KB	P	06-28-2010	
P58 / P69	NEOS / SEOS	1424	LN	1220	4		A	705 / 710	30 / 30	RC	JA	P	06-28-2010	
P69 / P8O	NEOS / SEOS	1424	DC	3210	4		A	717 / 722	30 / 30	RC	KB	P	06-28-2010	
P73A / P74A	WEOS / EEOS	1043	WT	3211	185		A	1102 / 1107	30 / 30	RC	KB	P	06-28-2010	
P74A / P75A	WEOS / EEOS	1050	DC	3210	171	38	A	1106 / 1111	30 / 30	RC	KB	P	06-28-2010	
P75A / P76A	WEOS / EEOS	1055	WT	3211	170		A	1116 / 1121	30 / 30	RC	KB	P	06-28-2010	

Sheet Total 744
Total to Date 18,254

CQA Personnel: Kyle Baucom, James Addis

GEOMEMBRANE SEAM LOG

Date: 6/28/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 12 of 14

Project Total Carry Over 18,254

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P76A / P77A	WEOS / EEOS	1100	DC	3210	160		A	1118 / 1123	30 / 30	RC	KB	P	06-28-2010	
P77A / P78A	WEOS / EEOS	1109	WT	3211	154		A	1124 / 1129	30 / 29	RC	KB	P	06-28-2010	
P78A / P79A	WEOS / EEOS	1112	DC	3210	148		A	1125 / 1130	30 / 30	RC	KB	P	06-28-2010	
P72A / P73	WEOS / EEOS	1129	WT	3211	126		A	1140 / 1145	30 / 30	RC	WH	P	06-28-2010	
P72A / P73A	WEOS / EEOS	1139	WT	3211	187		A	1154 / 1159	30 / 30	RC	WH	P	06-28-2010	
P82 / P83	NEAT / SWEOS	1325	DC	3210	166	39	A	1418 / 1423	30 / 30	RC	JA	P	06-28-2010	
P83 / P84	WEOS / EEOS	1334	WT	3211	49		A	1428 / 1433	30 / 29	RC	KB	P	06-28-2010	
P83 / P85	NEAT / SWEOS	1334	WT	3211	143		A	1353 / 1358	30 / 30	RC	JA	P	06-28-2010	
P92 / P93	SWEOS / NEEPS	1337	DC	3210	39		A	1542 / 1548	30 / 29	RC	JA	P	06-28-2010	
P84 / P85	NWEOS / SEEOS	1340	DC	3210	22		A	1350 / 1355	30 / 30	RC	JA	P	06-28-2010	
P85 / P86	NEEOS / SWEOS	1359	DC	3210	143	40	A	1440 / 1445	30 / 30	RC	JA	P	06-28-2010	
P13 / P17	NEOS / SEOS	1400	WT	3211	22	43	A	1405 / 1410	30 / 30	RC	WH	P	06-28-2010	
P12 / P14	NEOS / SEOS	1400	WT	3211	16		A	1408 / 1413	30 / 30	RC	WH	P	06-28-2010	
P11 / P14	NEOS / SEOS	1400	WT	3211	16		A	1409 / 1414	30 / 30	RC	WH	P	06-28-2010	
P11 / P82	NEOS / SEOS	1400	WT	3211	6		A	1412 / 1417	30 / 30	RC	WH	P	06-28-2010	

Sheet Total 1,397
Total to Date 19,651

CQA Personnel: K Baucom, J Addis, W Harrison

GEOMEMBRANE SEAM LOG

Date: 6/28/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 13 of 14

Project Total Carry Over 19,651

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P10 / P82	NEOS / SEOS	1400	WT	3211	22		A	1415 / 1420	30 / 30	RC	WH	P	06-28-2010	
P84 / P86	SWEOS / NEEOS	1406	DC	3210	33		A	1430 / 1435	30 / 29	RC	JA	P	06-28-2010	
P9 / P82	NEOS / SEOS	1407	WT	3211	6		A	1416 / 1421	30 / 30	RC	WH	P	06-28-2010	
P9 / P83	NEOS / SEOS	1408	WT	3211	16		A	1420 / 1425	30 / 30	RC	WH	P	06-28-2010	
P8 / P83	NEOS / SEOS	1409	WT	3211	22		A	1424 / 1429	30 / 30	RC	WH	P	06-28-2010	
P86 / P87	NEEOS / SWEOS	1430	DC	3210	155		A	1445 / 1450	30 / 29	RC	JA	P	06-28-2010	
P87 / P88	NEEOS / SWEOS	1442	DC	3210	137	41	A	1500 / 1505	30 / 30	RC	JA	P	06-28-2010	
P88 / P89	NEEOS / SWEOS	1454	DC	3210	115		A	1505 / 1510	30 / 30	RC	JA	P	06-28-2010	
P89 / P90	NEEOS / SWEOS	1516	DC	3210	98		A	1520 / 1525	30 / 29	RC	JA	P	06-28-2010	
P90 / P91	SWEOS / NEEOS	1520	DC	3210	81		A	1527 / 1532	30 / 30	RC	JA	P	06-28-2010	
P91 / P92	SWEOS / NEEOS	1533	DC	3210	64		A	1537 / 1542	30 / 29	RC	JA	P	06-28-2010	
P93 / P94	SWEOS / NEEOS	1541	DC	3210	24		A	1546 / 1551	20 / 29	RC	JA	P	06-28-2010	
P71A / P72A	WEOS / EEOS	1547	DC	3210	317		A	1555 / 1600	30 / 30	RC	WH	P	06-28-2010	Z2 1600/1605 30/29 Z3 1605/1610 30/30
P71A / P70	WEOS / EEOS	1606	DC	3210	44		A	1618 / 1623	30 / 29	RC	WH	P	06-28-2010	
P95 / P70	NEOS / SEOS	1615	DC	3210	17		A	1623 / 1628	30 / 29	RC	WH	P	06-28-2010	

Sheet Total 1,151
Total to Date 20,802

CQA Personnel: Will Harrison, James Addis

GEOMEMBRANE SEAM LOG

Date: 6/28/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 14 of 14

Project Total Carry Over 20,802

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
P95 / P71A	WEOS / EEOS	1620	DC	3210	284		A	1633 / 1638	30 / 29	RC	WH	P	06-28-2010	
P95 / P94	EEOS / WEOS	1625	WT	3211	9		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P93	EEOS / WEOS	1626	WT	3211	29		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P92	EEOS / WEOS	1628	WT	3211	29		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P91	EEOS / WEOS	1630	WT	3211	30		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P90	EEOS / WEOS	1633	WT	3211	30	42	A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P89	EEOS / WEOS	1635	WT	3211	30		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P88	EEOS / WEOS	1637	WT	3211	30		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P87	EEOS / WEOS	1639	WT	3211	30		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P86	EEOS / WEOS	1644	WT	3211	29		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P84	EEOS / WEOS	1647	WT	3211	29		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P84	EEOS / WEOS	1647	WT	3211	29		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	
P95 / P84	EEOS / WEOS	1647	WT	3211	29		A	1650 / 1655	30 / 29	RC	WH	P	06-28-2010	

Sheet Total 617
Total to Date 21,419

CQA Personnel: William Harrison

Cell 1 Primary HDPE Geomembrane Destructive Laboratory Test Results

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P1
Tested by: James Addis
Date Tested: 06/28/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	179.0	Elongation
S2	172.0	Elongation
S3	174.0	Elongation
S4	170.0	Elongation
S5	180.0	Elongation
Average	175.0	*FTB - Film Tear Bond
Standard Deviation	3.9	
Maximum	180.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	132.0	FTB
P2A	136.0	FTB
P2B	126.0	FTB
P3A	124.0	FTB
P3B	127.0	FTB
P4A	141.0	FTB
P4B	128.0	FTB
P5A	144.0	FTB
P5B	129.0	FTB
Average	131.0	*FTB - Film Tear Bond
Standard Deviation	6.8	
Maximum	144.0	
Minimum	123.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P2
Tested by: James Addis
Date Tested: 06/28/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	173.0	Elongation
S2	165.0	Elongation
S3	167.0	Elongation
S4	166.0	Elongation
S5	175.0	Elongation
Average	169.2	*FTB - Film Tear Bond
Standard Deviation	4.0	
Maximum	175.0	
Minimum	165.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	116.0	FTB
P1B	123.0	FTB
P2A	113.0	FTB
P2B	122.0	FTB
P3A	131.0	FTB
P3B	129.0	FTB
P4A	122.0	FTB
P4B	112.0	FTB
P5A	113.0	FTB
P5B	125.0	FTB
Average	120.6	*FTB - Film Tear Bond
Standard Deviation	6.5	
Maximum	131.0	
Minimum	112.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P3
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	174.0	Elongation
S2	172.0	Elongation
S3	170.0	Elongation
S4	168.0	Elongation
S5	163.0	Elongation
Average	169.4	*FTB - Film Tear Bond
Standard Deviation	3.8	
Maximum	174.0	
Minimum	163.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	111.0	FTB
P1B	121.0	FTB
P2A	116.0	FTB
P2B	119.0	FTB
P3A	148.0	FTB
P3B	128.0	FTB
P4A	130.0	FTB
P4B	122.0	FTB
P5A	132.0	FTB
P5B	127.0	FTB
Average	125.4	*FTB - Film Tear Bond
Standard Deviation	9.8	
Maximum	148.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P4
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	173.0	Elongation
S2	175.0	Elongation
S3	176.0	Elongation
S4	170.0	Elongation
S5	175.0	Elongation
Average	173.8	*FTB - Film Tear Bond
Standard Deviation	2.1	
Maximum	176.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	117.0	FTB
P1B	115.0	FTB
P2A	115.0	FTB
P2B	113.0	FTB
P3A	118.0	FTB
P3B	114.0	FTB
P4A	112.0	FTB
P4B	121.0	FTB
P5A	118.0	FTB
P5B	117.0	FTB
Average	116.0	*FTB - Film Tear Bond
Standard Deviation	2.6	
Maximum	121.0	
Minimum	112.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P5
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	178.0	Elongation
S2	180.0	Elongation
S3	176.0	Elongation
S4	176.0	Elongation
S5	170.0	Elongation
Average	176.0	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	180.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	120.0	FTB
P1B	121.0	FTB
P2A	120.0	FTB
P2B	120.0	FTB
P3A	115.0	FTB
P3B	128.0	FTB
P4A	137.0	FTB
P4B	126.0	FTB
P5A	124.0	FTB
P5B	128.0	FTB
Average	123.9	*FTB - Film Tear Bond
Standard Deviation	5.9	
Maximum	137.0	
Minimum	115.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P6
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	175.0	Elongation
S2	173.0	Elongation
S3	178.0	Elongation
S4	173.0	Elongation
S5	175.0	Elongation
Average	174.8	*FTB - Film Tear Bond
Standard Deviation	1.8	
Maximum	178.0	
Minimum	173.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	134.0	FTB
P1B	119.0	FTB
P2A	132.0	FTB
P2B	117.0	FTB
P3A	126.0	FTB
P3B	118.0	FTB
P4A	113.0	FTB
P4B	109.0	FTB
P5A	116.0	FTB
P5B	121.0	FTB
Average	120.5	*FTB - Film Tear Bond
Standard Deviation	7.6	
Maximum	134.0	
Minimum	109.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P7
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	168.0	Elongation
S2	161.0	Elongation
S3	170.0	Elongation
S4	166.0	Elongation
S5	169.0	Elongation
Average	166.8	*FTB - Film Tear Bond
Standard Deviation	3.2	
Maximum	170.0	
Minimum	161.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	139.0	FTB
P1B	132.0	FTB
P2A	139.0	FTB
P2B	133.0	FTB
P3A	131.0	FTB
P3B	124.0	FTB
P4A	136.0	FTB
P4B	129.0	FTB
P5A	125.0	FTB
P5B	123.0	FTB
Average	131.1	*FTB - Film Tear Bond
Standard Deviation	5.6	
Maximum	139.0	
Minimum	123.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P8
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	168.0	Elongation
S2	169.0	Elongation
S3	167.0	Elongation
S4	167.0	Elongation
S5	166.0	Elongation
Average	167.4	*FTB - Film Tear Bond
Standard Deviation	1.0	
Maximum	169.0	
Minimum	166.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	129.0	FTB
P1B	124.0	FTB
P2A	114.0	FTB
P2B	120.0	FTB
P3A	117.0	FTB
P3B	118.0	FTB
P4A	128.0	FTB
P4B	120.0	FTB
P5A	119.0	FTB
P5B	122.0	FTB
Average	121.1	*FTB - Film Tear Bond
Standard Deviation	4.5	
Maximum	129.0	
Minimum	114.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P9
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	167.0	Elongation
S2	165.0	Elongation
S3	166.0	Elongation
S4	163.0	Elongation
S5	164.0	Elongation
Average	165.0	*FTB - Film Tear Bond
Standard Deviation	1.4	
Maximum	167.0	
Minimum	163.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	106.0	FTB
P1B	108.0	FTB
P2A	109.0	FTB
P2B	111.0	FTB
P3A	118.0	FTB
P3B	118.0	FTB
P4A	127.0	FTB
P4B	112.0	FTB
P5A	121.0	FTB
P5B	108.0	FTB
Average	113.8	*FTB - Film Tear Bond
Standard Deviation	6.5	
Maximum	127.0	
Minimum	106.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P10
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	189.0	Elongation
S2	189.0	Elongation
S3	182.0	Elongation
S4	181.0	Elongation
S5	182.0	Elongation
Average	184.6	*FTB - Film Tear Bond
Standard Deviation	3.6	
Maximum	189.0	
Minimum	181.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	144.0	FTB
P1B	130.0	FTB
P2A	155.0	FTB
P2B	125.0	FTB
P3A	126.0	FTB
P3B	128.0	FTB
P4A	130.0	FTB
P4B	145.0	FTB
P5A	124.0	FTB
P5B	144.0	FTB
Average	135.1	*FTB - Film Tear Bond
Standard Deviation	10.3	
Maximum	155.0	
Minimum	124.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P11
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	165.0	Elongation
S2	162.0	Elongation
S3	170.0	Elongation
S4	169.0	Elongation
S5	180.0	Elongation
Average	169.2	*FTB - Film Tear Bond
Standard Deviation	6.1	
Maximum	180.0	
Minimum	162.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	117.0	FTB
P1B	121.0	FTB
P2A	116.0	FTB
P2B	121.0	FTB
P3A	109.0	FTB
P3B	115.0	FTB
P4A	116.0	FTB
P4B	120.0	FTB
P5A	132.0	FTB
P5B	121.0	FTB
Average	118.8	*FTB - Film Tear Bond
Standard Deviation	5.7	
Maximum	132.0	
Minimum	109.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P12
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	175.0	Elongation
S2	170.0	Elongation
S3	164.0	Elongation
S4	171.0	Elongation
S5	168.0	Elongation
Average	169.6	*FTB - Film Tear Bond
Standard Deviation	3.6	
Maximum	175.0	
Minimum	164.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	127.0	FTB
P1B	137.0	FTB
P2A	129.0	FTB
P2B	139.0	FTB
P3A	135.0	FTB
P3B	130.0	FTB
P4A	131.0	FTB
P4B	126.0	FTB
P5A	128.0	FTB
P5B	120.0	FTB
Average	130.2	*FTB - Film Tear Bond
Standard Deviation	5.3	
Maximum	139.0	
Minimum	120.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P13
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	172.0	Elongation
S2	170.0	Elongation
S3	176.0	Elongation
S4	169.0	Elongation
S5	173.0	Elongation
Average	172.0	*FTB - Film Tear Bond
Standard Deviation	2.4	
Maximum	176.0	
Minimum	169.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	121.0	FTB
P1B	111.0	FTB
P2A	117.0	FTB
P2B	133.0	FTB
P3A	121.0	FTB
P3B	123.0	FTB
P4A	118.0	FTB
P4B	140.0	FTB
P5A	128.0	FTB
P5B	141.0	FTB
Average	125.3	*FTB - Film Tear Bond
Standard Deviation	9.5	
Maximum	141.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P14
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	175.0	Elongation
S2	170.0	Elongation
S3	175.0	Elongation
S4	172.0	Elongation
S5	177.0	Elongation
Average	173.8	*FTB - Film Tear Bond
Standard Deviation	2.5	
Maximum	177.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	118.0	FTB
P1B	123.0	FTB
P2A	114.0	FTB
P2B	123.0	FTB
P3A	119.0	FTB
P3B	118.0	FTB
P4A	117.0	FTB
P4B	120.0	FTB
P5A	120.0	FTB
P5B	121.0	FTB
Average	119.3	*FTB - Film Tear Bond
Standard Deviation	2.6	
Maximum	123.0	
Minimum	114.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P15
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	164.0	Elongation
S2	162.0	Elongation
S3	168.0	Elongation
S4	167.0	Elongation
S5	170.0	Elongation
Average	166.2	*FTB - Film Tear Bond
Standard Deviation	2.9	
Maximum	170.0	
Minimum	162.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	131.0	FTB
P1B	150.0	FTB
P2A	124.0	FTB
P2B	133.0	FTB
P3A	146.0	FTB
P3B	121.0	FTB
P4A	128.0	FTB
P4B	123.0	FTB
P5A	133.0	FTB
P5B	147.0	FTB
Average	133.6	*FTB - Film Tear Bond
Standard Deviation	10.0	
Maximum	150.0	
Minimum	121.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P16
Tested by: James Addis
Date Tested: 06/29/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	176.0	Elongation
S2	172.0	Elongation
S3	176.0	Elongation
S4	175.0	Elongation
S5	179.0	Elongation
Average	175.6	*FTB - Film Tear Bond
Standard Deviation	2.2	
Maximum	179.0	
Minimum	172.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	149.0	FTB
P1B	160.0	FTB
P2A	149.0	FTB
P2B	153.0	FTB
P3A	144.0	FTB
P3B	172.0	FTB
P4A	159.0	FTB
P4B	155.0	FTB
P5A	166.0	FTB
P5B	152.0	FTB
Average	155.9	*FTB - Film Tear Bond
Standard Deviation	8.1	
Maximum	172.0	
Minimum	144.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P17
Tested by: William Harrison
Date Tested: 07/01/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	195.0	Elongation
S2	204.0	Elongation
S3	203.0	Elongation
S4	203.0	Elongation
S5	202.0	Elongation
Average	201.4	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	204.0	
Minimum	195.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	124.0	FTB
P1B	121.0	FTB
P2A	118.0	FTB
P2B	107.0	FTB
P3A	113.0	FTB
P3B	120.0	FTB
P4A	142.0	FTB
P4B	76.0	FTB
P5A	149.0	FTB
P5B	99.0	FTB
Average	116.9	*FTB - Film Tear Bond
Standard Deviation	19.6	
Maximum	149.0	
Minimum	76.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P18
Tested by: William Harrison
Date Tested: 07/01/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	214.0	Elongation
S2	209.0	Elongation
S3	208.0	Elongation
S4	209.0	Elongation
S5	211.0	Elongation
Average	210.2	*FTB - Film Tear Bond
Standard Deviation	2.1	
Maximum	214.0	
Minimum	208.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	117.0	FTB
P1B	116.0	FTB
P2A	117.0	FTB
P2B	123.0	FTB
P3A	125.0	FTB
P3B	104.0	FTB
P4A	116.0	FTB
P4B	140.0	FTB
P5A	104.0	FTB
P5B	122.0	FTB
Average	118.4	*FTB - Film Tear Bond
Standard Deviation	9.9	
Maximum	140.0	
Minimum	104.0	
Pass/Fail [1,2,3]	FAIL	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P19
Tested by: William Harrison
Date Tested: 07/01/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	211.0	Elongation
S2	207.0	Elongation
S3	209.0	Elongation
S4	213.0	Elongation
S5	210.0	Elongation
Average	210.0	*FTB - Film Tear Bond
Standard Deviation	2.0	
Maximum	213.0	
Minimum	207.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	106.0	FTB
P1B	157.0	FTB
P2A	94.0	FTB
P2B	111.0	FTB
P3A	113.0	FTB
P3B	82.0	FTB
P4A	117.0	FTB
P4B	96.0	FTB
P5A	119.0	FTB
P5B	124.0	FTB
Average	111.9	*FTB - Film Tear Bond
Standard Deviation	19.4	
Maximum	157.0	
Minimum	82.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P20
Tested by: William Harrison
Date Tested: 07/01/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	199.0	Elongation
S2	206.0	Elongation
S3	205.0	Elongation
S4	207.0	Elongation
S5	208.0	Elongation
Average	205.0	*FTB - Film Tear Bond
Standard Deviation	3.2	
Maximum	208.0	
Minimum	199.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	117.0	FTB
P1B	123.0	FTB
P2A	103.0	FTB
P2B	98.0	FTB
P3A	104.0	FTB
P3B	105.0	FTB
P4A	121.0	FTB
P4B	100.0	FTB
P5A	102.0	FTB
P5B	107.0	FTB
Average	108.0	*FTB - Film Tear Bond
Standard Deviation	8.5	
Maximum	123.0	
Minimum	98.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P21
Tested by: William Harrison
Date Tested: 07/01/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	209.0	Elongation
S2	203.0	Elongation
S3	200.0	Elongation
S4	202.0	Elongation
S5	207.0	Elongation
Average	204.2	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	209.0	
Minimum	200.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	96.0	FTB
P1B	116.0	FTB
P2A	103.0	FTB
P2B	106.0	FTB
P3A	115.0	FTB
P3B	109.0	FTB
P4A	105.0	FTB
P4B	100.0	FTB
P5A	108.0	FTB
P5B	111.0	FTB
Average	106.9	*FTB - Film Tear Bond
Standard Deviation	6.0	
Maximum	116.0	
Minimum	96.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P22
Tested by: William Harrison
Date Tested: 07/01/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	210.0	Elongation
S2	205.0	Elongation
S3	207.0	Elongation
S4	206.0	Elongation
S5	203.0	Elongation
Average	206.2	*FTB - Film Tear Bond
Standard Deviation	2.3	
Maximum	210.0	
Minimum	203.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	109.0	FTB
P1B	120.0	FTB
P2A	77.0	FTB
P2B	99.0	FTB
P3A	94.0	FTB
P3B	109.0	FTB
P4A	104.0	FTB
P4B	107.0	FTB
P5A	120.0	FTB
P5B	107.0	FTB
Average	104.6	*FTB - Film Tear Bond
Standard Deviation	12.0	
Maximum	120.0	
Minimum	77.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P23
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	209.0	Elongation
S2	204.0	Elongation
S3	202.0	Elongation
S4	207.0	Elongation
S5	203.0	Elongation
Average	205.0	*FTB - Film Tear Bond
Standard Deviation	2.6	
Maximum	209.0	
Minimum	202.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	104.0	FTB
P1B	93.0	FTB
P2A	95.0	FTB
P2B	107.0	FTB
P3A	100.0	FTB
P3B	83.0	FTB
P4A	109.0	FTB
P4B	100.0	FTB
P5A	102.0	FTB
P5B	103.0	FTB
Average	99.6	*FTB - Film Tear Bond
Standard Deviation	7.2	
Maximum	109.0	
Minimum	83.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P24
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	200.0	Elongation
S2	200.0	Elongation
S3	200.0	Elongation
S4	199.0	Elongation
S5	201.0	Elongation
Average	200.0	*FTB - Film Tear Bond
Standard Deviation	0.6	
Maximum	201.0	
Minimum	199.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	130.0	FTB
P1B	117.0	FTB
P2A	107.0	FTB
P2B	121.0	FTB
P3A	116.0	FTB
P3B	105.0	FTB
P4A	130.0	FTB
P4B	113.0	FTB
P5A	133.0	FTB
P5B	112.0	FTB
Average	118.4	*FTB - Film Tear Bond
Standard Deviation	9.4	
Maximum	133.0	
Minimum	105.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P25
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	202.0	Elongation
S2	203.0	Elongation
S3	208.0	Elongation
S4	201.0	Elongation
S5	205.0	Elongation
Average	203.8	*FTB - Film Tear Bond
Standard Deviation	2.5	
Maximum	208.0	
Minimum	201.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	105.0	FTB
P1B	109.0	FTB
P2A	133.0	FTB
P2B	123.0	FTB
P3A	113.0	FTB
P3B	97.0	FTB
P4A	126.0	FTB
P4B	108.0	FTB
P5A	114.0	FTB
P5B	111.0	FTB
Average	113.9	*FTB - Film Tear Bond
Standard Deviation	10.1	
Maximum	133.0	
Minimum	97.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P26
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	171.0	Elongation
S2	171.0	Elongation
S3	172.0	Elongation
S4	160.0	Elongation
S5	173.0	Elongation
Average	169.4	*FTB - Film Tear Bond
Standard Deviation	4.8	
Maximum	173.0	
Minimum	160.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	105.0	FTB
P1B	105.0	FTB
P2A	103.0	FTB
P2B	101.0	FTB
P3A	116.0	FTB
P3B	104.0	FTB
P4A	103.0	FTB
P4B	104.0	FTB
P5A	109.0	FTB
P5B	122.0	FTB
Average	107.2	*FTB - Film Tear Bond
Standard Deviation	6.4	
Maximum	122.0	
Minimum	101.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P27
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	173.0	Elongation
S2	172.0	Elongation
S3	170.0	Elongation
S4	171.0	Elongation
S5	171.0	Elongation
Average	171.4	*FTB - Film Tear Bond
Standard Deviation	1.0	
Maximum	173.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	113.0	FTB
P2A	122.0	FTB
P2B	114.0	FTB
P3A	119.0	FTB
P3B	112.0	FTB
P4A	122.0	FTB
P4B	111.0	FTB
P5A	115.0	FTB
P5B	124.0	FTB
Average	117.5	*FTB - Film Tear Bond
Standard Deviation	4.8	
Maximum	124.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P28
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	167.0	Elongation
S2	165.0	Elongation
S3	168.0	Elongation
S4	167.0	Elongation
S5	166.0	Elongation
Average	166.6	*FTB - Film Tear Bond
Standard Deviation	1.0	
Maximum	168.0	
Minimum	165.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	125.0	FTB
P1B	127.0	FTB
P2A	128.0	FTB
P2B	138.0	FTB
P3A	124.0	FTB
P3B	122.0	FTB
P4A	125.0	FTB
P4B	119.0	FTB
P5A	123.0	FTB
P5B	117.0	FTB
Average	124.8	*FTB - Film Tear Bond
Standard Deviation	5.4	
Maximum	138.0	
Minimum	117.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P29
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	182.0	Elongation
S2	178.0	Elongation
S3	179.0	Elongation
S4	180.0	Elongation
S5	183.0	Elongation
Average	180.4	*FTB - Film Tear Bond
Standard Deviation	1.9	
Maximum	183.0	
Minimum	178.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	121.0	FTB
P1B	120.0	FTB
P2A	124.0	FTB
P2B	117.0	FTB
P3A	133.0	FTB
P3B	113.0	FTB
P4A	100.0	FTB
P4B	141.0	FTB
P5A	1116.0	FTB
P5B	107.0	FTB
Average	219.2	*FTB - Film Tear Bond
Standard Deviation	299.1	
Maximum	1116.0	
Minimum	100.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P30
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	176.0	Elongation
S2	176.0	Elongation
S3	177.0	Elongation
S4	179.0	Elongation
S5	176.0	Elongation
Average	176.8	*FTB - Film Tear Bond
Standard Deviation	1.2	
Maximum	179.0	
Minimum	176.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	131.0	FTB
P1B	131.0	FTB
P2A	121.0	FTB
P2B	115.0	FTB
P3A	117.0	FTB
P3B	135.0	FTB
P4A	115.0	FTB
P4B	111.0	FTB
P5A	113.0	FTB
P5B	118.0	FTB
Average	120.7	*FTB - Film Tear Bond
Standard Deviation	8.1	
Maximum	135.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P31
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	175.0	Elongation
S2	177.0	Elongation
S3	177.0	Elongation
S4	176.0	Elongation
S5	176.0	Elongation
Average	176.2	*FTB - Film Tear Bond
Standard Deviation	0.7	
Maximum	177.0	
Minimum	175.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	117.0	FTB
P1B	146.0	FTB
P2A	106.0	FTB
P2B	100.0	FTB
P3A	122.0	FTB
P3B	113.0	FTB
P4A	110.0	FTB
P4B	131.0	FTB
P5A	115.0	FTB
P5B	109.0	FTB
Average	116.9	*FTB - Film Tear Bond
Standard Deviation	12.7	
Maximum	146.0	
Minimum	100.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P32
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	180.0	Elongation
S2	176.0	Elongation
S3	176.0	Elongation
S4	175.0	Elongation
S5	177.0	Elongation
Average	176.8	*FTB - Film Tear Bond
Standard Deviation	1.7	
Maximum	180.0	
Minimum	175.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	114.0	FTB
P1B	111.0	FTB
P2A	110.0	FTB
P2B	117.0	FTB
P3A	126.0	FTB
P3B	119.0	FTB
P4A	120.0	FTB
P4B	113.0	FTB
P5A	118.0	FTB
P5B	114.0	FTB
Average	116.2	*FTB - Film Tear Bond
Standard Deviation	4.6	
Maximum	126.0	
Minimum	110.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P33
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	172.0	Elongation
S2	174.0	Elongation
S3	174.0	Elongation
S4	172.0	Elongation
S5	171.0	Elongation
Average	172.6	*FTB - Film Tear Bond
Standard Deviation	1.2	
Maximum	174.0	
Minimum	171.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	128.0	FTB
P1B	116.0	FTB
P2A	118.0	FTB
P2B	114.0	FTB
P3A	125.0	FTB
P3B	116.0	FTB
P4A	111.0	FTB
P4B	117.0	FTB
P5A	121.0	FTB
P5B	115.0	FTB
Average	118.1	*FTB - Film Tear Bond
Standard Deviation	4.9	
Maximum	128.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P34
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	175.0	Elongation
S2	177.0	Elongation
S3	178.0	Elongation
S4	176.0	Elongation
S5	174.0	Elongation
Average	176.0	*FTB - Film Tear Bond
Standard Deviation	1.4	
Maximum	178.0	
Minimum	174.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	129.0	FTB
P1B	117.0	FTB
P2A	119.0	FTB
P2B	115.0	FTB
P3A	127.0	FTB
P3B	109.0	FTB
P4A	117.0	FTB
P4B	111.0	FTB
P5A	122.0	FTB
P5B	115.0	FTB
Average	118.1	*FTB - Film Tear Bond
Standard Deviation	6.1	
Maximum	129.0	
Minimum	109.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P35
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	192.0	Elongation
S2	194.0	Elongation
S3	195.0	Elongation
S4	194.0	Elongation
S5	193.0	Elongation
Average	193.6	*FTB - Film Tear Bond
Standard Deviation	1.0	
Maximum	195.0	
Minimum	192.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	149.0	FTB
P1B	140.0	FTB
P2A	129.0	FTB
P2B	130.0	FTB
P3A	135.0	FTB
P3B	121.0	FTB
P4A	125.0	FTB
P4B	120.0	FTB
P5A	128.0	FTB
P5B	119.0	FTB
Average	129.6	*FTB - Film Tear Bond
Standard Deviation	9.0	
Maximum	149.0	
Minimum	119.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P36
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	188.0	Elongation
S2	190.0	Elongation
S3	192.0	Elongation
S4	191.0	Elongation
S5	187.0	Elongation
Average	189.6	*FTB - Film Tear Bond
Standard Deviation	1.9	
Maximum	192.0	
Minimum	187.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	130.0	FTB
P1B	138.0	FTB
P2A	123.0	FTB
P2B	134.0	FTB
P3A	118.0	FTB
P3B	128.0	FTB
P4A	124.0	FTB
P4B	133.0	FTB
P5A	126.0	FTB
P5B	131.0	FTB
Average	128.5	*FTB - Film Tear Bond
Standard Deviation	5.6	
Maximum	138.0	
Minimum	118.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Extrusion
Sample: P37
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	190.0	Elongation
S2	188.0	Elongation
S3	191.0	Elongation
S4	191.0	Elongation
S5	189.0	Elongation
Average	189.8	*FTB - Film Tear Bond
Standard Deviation	1.2	
Maximum	191.0	
Minimum	188.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	145.0	FTB
P1B	0.0	
P2A	131.0	FTB
P2B	0.0	
P3A	126.0	FTB
P3B	0.0	
P4A	136.0	FTB
P4B	0.0	
P5A	129.0	FTB
P5B	0.0	
Average	66.7	*FTB - Film Tear Bond
Standard Deviation	66.9	
Maximum	145.0	
Minimum	0.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P38
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	209.0	Elongation
S2	211.0	Elongation
S3	206.0	Elongation
S4	204.0	Elongation
S5	210.0	Elongation
Average	208.0	*FTB - Film Tear Bond
Standard Deviation	2.6	
Maximum	211.0	
Minimum	204.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	115.0	FTB
P1B	110.0	FTB
P2A	108.0	FTB
P2B	126.0	FTB
P3A	132.0	FTB
P3B	129.0	FTB
P4A	122.0	FTB
P4B	121.0	FTB
P5A	145.0	FTB
P5B	104.0	FTB
Average	121.2	*FTB - Film Tear Bond
Standard Deviation	11.8	
Maximum	145.0	
Minimum	104.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P39
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	205.0	Elongation
S2	200.0	Elongation
S3	207.0	Elongation
S4	203.0	Elongation
S5	209.0	Elongation
Average	204.8	*FTB - Film Tear Bond
Standard Deviation	3.1	
Maximum	209.0	
Minimum	200.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	104.0	FTB
P1B	91.0	FTB
P2A	108.0	FTB
P2B	98.0	FTB
P3A	112.0	FTB
P3B	106.0	FTB
P4A	113.0	FTB
P4B	102.0	FTB
P5A	110.0	FTB
P5B	100.0	FTB
Average	104.4	*FTB - Film Tear Bond
Standard Deviation	6.5	
Maximum	113.0	
Minimum	91.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P40
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	210.0	Elongation
S2	203.0	Elongation
S3	199.0	Elongation
S4	204.0	Elongation
S5	200.0	Elongation
Average	203.2	*FTB - Film Tear Bond
Standard Deviation	3.9	
Maximum	210.0	
Minimum	199.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	131.0	FTB
P1B	109.0	FTB
P2A	101.0	FTB
P2B	106.0	FTB
P3A	111.0	FTB
P3B	105.0	FTB
P4A	110.0	FTB
P4B	91.0	FTB
P5A	131.0	FTB
P5B	103.0	FTB
Average	109.8	*FTB - Film Tear Bond
Standard Deviation	11.9	
Maximum	131.0	
Minimum	91.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P41
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	195.0	Elongation
S2	198.0	Elongation
S3	200.0	Elongation
S4	195.0	Elongation
S5	194.0	Elongation
Average	196.4	*FTB - Film Tear Bond
Standard Deviation	2.2	
Maximum	200.0	
Minimum	194.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	119.0	FTB
P1B	114.0	FTB
P2A	114.0	FTB
P2B	106.0	FTB
P3A	112.0	FTB
P3B	106.0	FTB
P4A	114.0	FTB
P4B	115.0	FTB
P5A	110.0	FTB
P5B	103.0	FTB
Average	111.3	*FTB - Film Tear Bond
Standard Deviation	4.7	
Maximum	119.0	
Minimum	103.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P42
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	196.0	Elongation
S2	194.0	Elongation
S3	196.0	Elongation
S4	192.0	Elongation
S5	194.0	Elongation
Average	194.4	*FTB - Film Tear Bond
Standard Deviation	1.5	
Maximum	196.0	
Minimum	192.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	141.0	FTB
P1B	115.0	FTB
P2A	138.0	FTB
P2B	130.0	FTB
P3A	142.0	FTB
P3B	145.0	FTB
P4A	146.0	FTB
P4B	134.0	FTB
P5A	137.0	FTB
P5B	128.0	FTB
Average	135.6	*FTB - Film Tear Bond
Standard Deviation	8.9	
Maximum	146.0	
Minimum	115.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 1, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P43
Tested by: William Harrison
Date Tested: 07/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	195.0	Elongation
S2	183.0	Elongation
S3	190.0	Elongation
S4	196.0	Elongation
S5	197.0	Elongation
Average	192.2	*FTB - Film Tear Bond
Standard Deviation	5.2	
Maximum	197.0	
Minimum	183.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	104.0	FTB
P1B	117.0	FTB
P2A	100.0	FTB
P2B	102.0	FTB
P3A	105.0	FTB
P3B	114.0	FTB
P4A	107.0	FTB
P4B	105.0	FTB
P5A	103.0	FTB
P5B	95.0	FTB
Average	105.2	*FTB - Film Tear Bond
Standard Deviation	6.1	
Maximum	117.0	
Minimum	95.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

Cell 1 Primary HDPE Geomembrane Defect Log

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 1 of 9

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
1	P1/P2	100F WOEEOS	LDT	06-25-2010	LDT-1	06-28-2010	JA
2	P2/P3	200F WOEEOS	LDT	06-25-2010	LDT-2	06-28-2010	JA
3	P3/P4	300F WOEEOS	LDT	06-25-2010	LDT-3	06-28-2010	JA
4	P4/P5	400F WOEEOS	LDT	06-25-2010	LDT-4	06-28-2010	JA
5	P5/P6	100F WOEEOS	LDT	06-25-2010	LDT-5	06-28-2010	JA
6	P6/P7	200F WPEEOS	LDT	06-25-2010	LDT-6	06-28-2010	JA
7	P9/P10	176WOEEOS	LDT	06-25-2010	LDT-7	06-28-2010	JA
8	P11/P12	31F WOEEOS	LDT	06-25-2010	LDT-8	06-28-2010	JA
9	P12/P13	208F WOEEOS	LDT	06-25-2010	LDT-9	06-28-2010	JA
10	18/19	28FT S OF NAT	O	06-25-2010	Burnout	06-28-2010	WH
11	18/19	37 FT S OF NAT	O	06-26-2010	Gap	06-28-2010	KB
12	21/22	34 FT S OF NAT	LDT	06-26-2010	LDT-10	06-28-2010	KB
13	46/47	40 FT N OF SEPS	LDT	06-26-2010	LDT-14	06-28-2010	KB
14	7/43	11 FT W OF EEOS	LDT	06-26-2010	LDT-15	06-28-2010	KB
15	40/41	21 FT N OF SEOS	LDT	06-26-2010	LDT-13	06-28-2010	KB
16	32/33	35 FT N OF SEOS	LDT	06-26-2010	LDT-12	06-28-2010	KB
17	27/28	10 FT N OF SEOS	LDT	06-26-2010	LDT-11	06-28-2010	KB
18	25/13	11 FT W OF EEOS	LDT	06-26-2010	LDT-16	06-28-2010	KB
19	14/15/16	15/16 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
20	14/16/17	16/17 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
21	17/18	SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
22	13/18	18 FT W OF EEOS	O	06-26-2010	Burnout	06-28-2010	KB

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 2 of 9

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
23	13/18/19	18/19 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
24	19/20/13	19/20 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
25	20/21/13	20/21 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
26	21/13	3 FT W OF EEOS	O	06-26-2010	Burnout	06-28-2010	KB
27	21/22/13	21/22 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
28	22/13	21 FT W OF EEOS 22/13	O	06-26-2010	Burnout	06-28-2010	KB
29	22/23/13	22/23 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
30	23/24/13	23/24 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
31	24/13	15 FT W OF EEOS	O	06-26-2010	Burnout	06-28-2010	KB
32	24/25/13	24/25 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
33	25/26/13	25/26 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
34	26/27/13	26/27 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
35	27/28/13	27/28 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
36	28/13	6 FT W OF EEOS	O	06-26-2010	Burnout	06-28-2010	KB
37	28/29/13	29/20 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
38	29/13	11 FT W OC EEOS	O	06-26-2010	Burnout	06-28-2010	KB
39	29/30/13	29/30 SEOS	O	06-26-2010	Burnout	06-28-2010	KB
40	30/31/13	30/31 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
41	31/13	4 FT W OF EEOS	O	06-26-2010	Burnout	06-28-2010	KB
42	31/32/13	31/32 SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	KB
43	31/32	24 FT N OF SEOS	O	06-26-2010	Burnout	06-28-2010	KB
44	P6/P7/P13/P32	WEO P32/13 E-W SEAM	O	06-26-2010	4 Panel Intersection Patch	06-28-2010	WH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
45	P32/P7	EEO E-W SEAM P32/P7	O	06-26-2010	Corner Cut Fix at E-W and N-S Corner Seam Intersection	06-28-2010	WH
46	P32/P33/P7	SEO P32/33 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
47	P33/P34/P7	SEO 33/34 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
48	P33/P34	26F NOSEOS	O	06-26-2010	Burnout	06-28-2010	WH
49	P34/P35/P7	SEO 34/35 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
50	P7/P35	12F WOEEOS	O	06-26-2010	Burnout	06-28-2010	WH
51	P35/P36/P7	SEOS	T	06-26-2010	Tie-In Corner	06-28-2010	WH
52	P36/P37/P7	SEO 36/37 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
53	P37/P38/P7	SEO P37/P38 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
54	P37/P38	12F NOSEOS	O	06-26-2010	Burnout	06-28-2010	WH
55	P38/P39/P7	SEO 38/39 SEAM	T	06-26-2010	Tie-In	06-28-2010	WH
56	P39/P40/P7	SEO 39/40 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
57	P40/P41/P7	SEO 40/41 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
58	P41/P42/P7	SEO 41/42 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
59	P42/P43/P7	SEO 42/43 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
60	P43/P44/P7	SEO 43/44 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
61	P44/P45/P7	SEO 44/45 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
62	P45/P46/P7	SEO 45/46 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
63	P46/P47/P7	SEO 46/47 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
64	P47/P7	3F WOEEOS	O	06-26-2010	Burnout	06-28-2010	WH
65	P47/P48/P7	SEO 47/48 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
66	P48/P49/P7	SEO 48/49 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis / Kyle Baucom

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 4 of 9

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
67	P49/P50/P7	SEO 49/50 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
68	P50/P7	3F WOEEOS	O	06-26-2010	Burnout	06-28-2010	WH
69	P50/P51/P7	SEO 50/51 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
70	P51/P52/P7	SEO 51/52 SEAM	T	06-26-2010	Tie-In Corner	06-28-2010	WH
71	P52/P53/P7	SEO 52/53 SEAM	T	06-26-2010	Tie-In	06-28-2010	WH
72	P52/P53	38F NOSEOS	O	06-26-2010	Burnout	06-28-2010	WH
73	P53/P54/P7	SEO 53/54 SEAM	O	06-26-2010	Burnout and Tie-In Corner	06-28-2010	WH
74	P54/P7	8F WOEEOS	O	06-26-2010	Burnout	06-28-2010	WH
75	P5/P6/P12/P13	EEO 5/6 SEAM	O	06-26-2010	4 Panel Intersection Patch	06-28-2010	WH
76	P4/P5/P11/P12	EEO 4/5 SEAM	O	06-26-2010	4 Panel Intersection Patch	06-28-2010	WH
77	P4/P11	9F WONEOS	O	06-26-2010	Burnout	06-28-2010	WH
78	P3/P4/P10/P11	EEO 3/4 SEAM	O	06-26-2010	4 Panel Intersection Patch	06-28-2010	WH
79	P2/P3/P9/P10	EEO 2/3 SEAM	O	06-26-2010	4 Panel Intersection Patch	06-28-2010	WH
80	P1/P2/P8/P9	EEO 1/2 SEAM	O	06-26-2010	4 Panel Intersection Patch	06-28-2010	WH
81	P1/P8	4F SONEOS	O	06-26-2010	Burnout	06-28-2010	WH
82	P56/P57	170F SONEOS	LDT	06-26-2010	LDT-17	06-28-2010	WH
83	P1/P59	100F EOWEOS	LDT	06-26-2010	LDT-18	06-28-2010	WH
84	P59/P60	200F EOWEOS	LDT	06-26-2010	LDT-19	06-28-2010	WH
85	P60/P61	300F EOWEOS	LDT	06-26-2010	LDT-20	06-28-2010	WH
86	P61/62	400F EOWEOS	LDT	06-26-2010	LDT-21	06-28-2010	WH
87	P62/P63	100F EOWEOS	LDT	06-26-2010	LDT-22	06-28-2010	WH
88	P63/P64	200F EOWEOS	LDT	06-26-2010	LDT-23	06-28-2010	WH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William Harrison

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
89	P64/P65	300F EOWEOS	LDT	06-26-2010	LDT-24	06-28-2010	WH
90	P65/P66	400F EOWEOS	LDT	06-26-2010	LDT-25	06-28-2010	WH
91	P66/P67	100F EOWEOS	LDT	06-26-2010	LDT-26	06-28-2010	WH
92	P67/P68	200F EOWEOS	LDT	06-26-2010	LDT-27	06-28-2010	WH
93	P68/P69	300F EOWEOS	LDT	06-26-2010	LDT-28	06-28-2010	WH
94	P71/P72	46F EOWEOS	LDT	06-28-2010	LDT-29	06-28-2010	WH
95	P73/P74	184F EOWEOS	LDT	06-28-2010	LDT-30	06-28-2010	WH
96	P75/P76	65F EOWEOS	LDT	06-28-2010	LDT-31	06-28-2010	WH
97	P76/P77	252F EOWEOS	LDT	06-28-2010	LDT-32	06-28-2010	WH
98	P78/P79	105F EOWEOS	LDT	06-28-2010	LDT-33	06-28-2010	WH
99	P79/P80	230F EOWEOS	LDT	06-28-2010	LDT-34	06-28-2010	WH
100	P68/P79	11F SONEOS	LDT	06-28-2010	LDT-35	06-28-2010	WH
101	P65/P58	11F SONEOS	LDT	06-28-2010	LDT-36	06-28-2010	WH
102	P55/P56/P1	NEO P55/P56 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
103	P56/P57/P1	NEO P56/P57 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
104	P57/P58/P1	NEO P57/P58 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
105	P58/P59/P1	NEO P58/P59 Seam	B	06-28-2010	Patch at Tie-In Corner	06-28-2010	WH
106	P55/P56	87F SONEOS	O	06-28-2010	Patch Burnout	06-28-2010	WH
107	P55/P56	111F SONEOS	O	06-28-2010	Burnout	06-28-2010	WH
108	P68/P69/P58	SEO 58/68 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
109	P67/P68/P58	SEO 58/67 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
110	P66/P67/P58	SEO 58/66 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William Harrison

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
111	P65/P66/P58	SEO 65/58 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
112	P65/P58	3F SONEOS	O	06-28-2010	Burnout	06-28-2010	WH
113	P65/P64/P58	SEO 64/58 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
114	P63/P64/P58	SEO 63/58 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
115	P62/P63/P58	SEO 62/58 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
116	P62/P61/P58	SEO 61/58 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
117	P60/P61/P58	SEO 60/58 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
118	P59/P60/P58	SEO 59/58 Seam	T	06-28-2010	Tie-In Corner	06-28-2010	WH
119	P1/P8/P59	EEO 1/59 Seam	O	06-28-2010	Patch at Tie-In Corner	06-28-2010	WH
120	P8/P59/P70	EEO 8/59 Seam	O	06-28-2010	Patch at Tie-In Corner	06-28-2010	WH
121	P59/P70	1F WO Seam in Panel @ 3F NOSEOS	O	06-28-2010	Patch at Pull Holes	06-28-2010	WH
122	P59/P70/P60/P71	NEO 60/71 Seam	O	06-28-2010	Patch at 4 Panel Corner and Burnout	06-28-2010	WH
123	P60/P71/P61/P72	NEO 61/72 Seam	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
124	P61/P72	4F EO 4F NOSEO 61/72 Seam	O	06-28-2010	Hole Patch	06-28-2010	WH
125	P61/P72/P62/P73	NEO 62/73 Seam	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
126	P62/P73/P63/P74	NEO 63/74 Seam	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
127	P63/P74/P64/P75	NEO 64/75 Seam	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
128	P64/P75/P65/P76	NEO 65/76 Seam	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
129	P65/P76/P66/P77	NEO 66/77 Seam	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
130	P66/P77/P67/P78	NEO 67/78 Seam	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
131	P67/P78/P68/P79	NEO 68/79 Seam	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
132	P68/P79/P69/P80	NEO 69/80 Seam	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William Harrison

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 7 of 9

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
133	P59/P60	63F EOWEOS	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
134	P78/P79	90F WOEEOS	O	06-28-2010	Patch at 4 Panel Corner	06-28-2010	WH
135	P76/PR-97	North Side of PR-97 Patch	LDT	06-28-2010	LDT - 37	06-28-2010	WH
136	P61/P62	398F EOWEOS	O	06-28-2010	Burnout	06-28-2010	WH
137	P72/P73/P72A	180F EOWEOS	O	06-29-2010	BURNOUT	06-29-2010	TB
138	P71/P72/P71A/P72A	178F EOWEOS	O	06-29-2010	BURNOUT	06-29-2010	TB
139	P70/P71/P71A	175F EOWEOS	O	06-29-2010	BURNOUT	06-29-2010	TB
140	P8/P70	180F EOWEOS	O	06-29-2010	BURNOUT	06-29-2010	TB
141	P8/P70/P95	NEOS P70/P95	O	06-29-2010	PATCH	06-29-2010	TB
142	P70/P95/71A	SEOS P70/P95	O	06-29-2010	PATCH	06-29-2010	TB
143	P8/P83/P84/P95	SEOS P8/P83	O	06-29-2010	PATCH	06-29-2010	TB
144	P72A/P73/P73A	172F WOEEOS	O	06-29-2010	PATCH	06-29-2010	TB
145	P71A/P72A	139F WOEEOS	O	06-29-2010	PATCH	06-29-2010	TB
146	P71A/P72A	154F WOEEOS	O	06-29-2010	PATCH	06-29-2010	TB
147	P73/P74/P73A/P74A	306F EOWEOS	O	06-29-2010	PATCH	06-29-2010	TB
148	P74/P75/P74A/P75A	169F WOEEOS	O	06-29-2010	PATCH	06-29-2010	TB
149	P75/P76/P75A/P76A	310F EOWEOS	O	06-29-2010	PATCH	06-29-2010	TB
150	P76/P77/P76A/P77A	159F WOEEOS	O	06-29-2010	PATCH	06-29-2010	TB
151	P77/P78/P77A/P78A	307F EOWEOS	O	06-29-2010	PATCH	06-29-2010	TB
152	P78/P79/P78A/P79A	142F WOEEOS	O	06-29-2010	PATCH	06-29-2010	TB
153	P79/P80/P81/P79A	NEOS P81/P80	O	06-29-2010	PATCH	06-29-2010	TB
154	P74A/P75A	64F WOEAT	LDT	06-29-2010	LDT-38	06-29-2010	TB

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis / Kyle Baucom

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
155	P71A/P95	EEOS	O	06-29-2010	PATCH	06-29-2010	TB
156	P17/P13	9F NO P12	LDT	06-29-2010	LDT-43	06-29-2010	TB
157	P12/P13/P17/P14	EEOS P12/P13	O	06-29-2010	PATCH	06-29-2010	TB
158	P11/P12/P14	EEOS P11/P12	O	06-29-2010	PATCH	06-29-2010	TB
159	P11/P14/P82	SWEOS P14/P82	O	06-29-2010	PATCH	06-29-2010	TB
160	P10/P11/P82	EEOS P10/P11	O	06-29-2010	PATCH	06-29-2010	TB
161	P9/P10/P82	EEOS P9/P10	O	06-29-2010	PATCH	06-29-2010	TB
162	P9/P82/P83	SWEOS P14/P82	O	06-29-2010	PATCH	06-29-2010	TB
163	P8/P9/P83	EEOS P8/P9	O	06-29-2010	PATCH	06-29-2010	TB
164	P84/P86/P95	SWEOS P84/P86	O	06-29-2010	T-INTERSECTION	06-29-2010	TB
165	P86/P87/P95	SWEOS P86/P87	O	06-29-2010	T-INTERSECTION	06-29-2010	TB
166	P87/P88/P95	SWEOS P87/P88	O	06-29-2010	T-INTERSECTION	06-29-2010	TB
167	P88/P89/P95	SWEOS P88/P89	O	06-29-2010	T-INTERSECTION	06-29-2010	TB
168	P89/P90/P95	SWEOS P89/P90	O	06-29-2010	T-INTERSECTION	06-29-2010	TB
169	P90/P95	12F EOWEOS	LDT	06-29-2010	LDT-42	06-29-2010	TB
170	P90/P91/P95	SWEOS P90/P91	O	06-29-2010	T-INTERSECTION	06-29-2010	TB
171	P91/P92/P95	SWEOS P91/P92	O	06-29-2010	T-INTERSECTION	06-29-2010	TB
172	P92/P93/P95	SWEOS P92/P93	O	06-29-2010	T-INTERSECTION	06-29-2010	TB
173	P93/P94/P95	SWEOS P93/P94	O	06-29-2010	T-INTERSECTION	06-29-2010	TB
174	P87/P88	51F SWONEEOS	LDT	06-29-2010	LDT-41	06-29-2010	TB
175	P85/P86	95F SWONEEOS	LDT	06-29-2010	LDT-40	06-29-2010	TB
176	P84/P85/P86	SEEOS P84/P85	O	06-29-2010	PATCH	06-29-2010	TB

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
177	P83/P84/P85	NWEOS P84/P85	O	06-29-2010	PATCH	06-29-2010	TB
178	P82/P83	29F NEOSWEOS	LDT	06-29-2010	LDT-39	06-29-2010	TB
179	P14/P15	NAT	O	06-29-2010	PATCH	06-29-2010	TB
180	P95	SKIRT FOR BOOT	O	06-29-2010	SKIRT FOR BOOTS	06-29-2010	TB
181	P95	BOOT AT NAT	O	06-29-2010	18" PIPE BOOT	06-29-2010	TB
182	P95	BOOT AT NAT	O	06-29-2010	10" PIPE BOOT	06-29-2010	TB

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William Harrison

Cell 1 Primary HDPE Geomembrane Repair Testing Log

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
1	P	5 FT x 2 FT	JT	JA	06-28-2010	VB	HG	JA	P	06-28-2010	
2	P	4 FT x 2 FT	JT	JA	06-28-2010	VB	HG	JA	P	06-28-2010	
3	P	4.5 FT x 2 FT	JT	JA	06-28-2010	VB	HG	JA	P	06-28-2010	
4	P	4.5 FT x 2 FT	JT	JA	06-28-2010	VB	HG	JA	P	06-28-2010	
5	P	5 FT x 2 FT	JT	JA	06-28-2010	VB	HG	JA	P	06-28-2010	
6	P	5 FT x 2 FT	JT	JA	06-28-2010	VB	HG	JA	P	06-28-2010	
7	P	4 FT x 2 FT	JT	JA	06-28-2010	VB	HG	JA	P	06-28-2010	
8	P	4 FT x 1.5 FT	JT	JA	06-28-2010	VB	HG	JA	P	06-28-2010	
9	P	4 FT x 1.5 FT	JT	JA	06-28-2010	VB	HG	JA	P	06-28-2010	
10	P	3 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
11	P	4.5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
12	P	4.5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
13	P	4.5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
14	P	4 FT x 1.5 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
15	P	5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
16	P	7 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
17	P	5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
18	P	6 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
19	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
20	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
21	P	3 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
22	P	3 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: W Harrison, K Baucom, J Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
23	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
24	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
25	P	5.5 FT x 1.5 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	25 and 26 Repaired with 1 Patch
26	P	5.5 FT x 1.5 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	25 and 26 Repaired with 1 Patch
27	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
28	P	3.5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	28 and 29 Repaired with 1 Patch
29	P	3.5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	28 and 29 Repaired with 1 Patch
30	P	2.5 FT x 1.5 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
31	P	2.5 FT x 1.5 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
32	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
33	P	4 FT x 1.5 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
34	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
35	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
36	P	3 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
37	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
38	P	3.5 FT x 3 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
39	P	5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
40	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
41	P	3.5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
42	G&W	6 IN x 6 IN x 6 IN	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
43	P	4.5 FT x 2 FT	JT	KB	06-28-2010	VB	HG	KB	P	06-28-2010	
44	P	2.5 FT x 3 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: Will Harrison, Kyle Baucom

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
45	P	3.5 FT x 2.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
46	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
47	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
48	P	3 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
49	P	4 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
50	P	2 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
51	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
52	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
53	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
54	P	2.5 FT x 1 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
55	G&W	6 IN x 6 IN x 1'	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
56	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
57	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
58	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
59	G&W	6 IN x 6 IN x 1'	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
60	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
61	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
62	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
63	G&W	6 IN x 6 IN x 2'	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
64	P	3 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
65	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
66	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: Will Harrison

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
67	G&W	6 IN x 6 IN x 2'	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
68	P	3 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
69	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
70	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
71	G&W	6 IN x 6 IN x 6 IN	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
72	P	6.5 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
73	P	3.5 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
74	P	3 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
75	P	4 FT x 4 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
76	P	3 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
77	P	2.5 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
78	P	3 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
79	P	3 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
80	P	3 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
81	P	2 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
82	P	4.5 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
83	P	4 FT x 2 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
84	P	4 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
85	P	4 FT x 2 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
86	P	5 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
87	P	4.5 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
88	P	4.5 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: William Harrison

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
89	P	4 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
90	P	4 FT x 2 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
91	P	4 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
92	P	5 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
93	P	5 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
94	P	5 FT x 2 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
95	P	5 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
96	P	5.5 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
97	P	5 FT x 2 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
98	P	5 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
99	P	5 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
100	P	4.5 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
101	P	6 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
102	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
103	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
104	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
105	P	2.5 FT x 2 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
106	P	3 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
107	P	1.5 FT x 1 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
108	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
109	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
110	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: William Harrison

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
111	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
112	P	3 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
113	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
114	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
115	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
116	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
117	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
118	G&W	6 IN x 6 IN x 6 IN	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
119	P	3 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
120	P	2 FT x 4 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
121	P	2.5 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
122	P	6 FT x 2.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
123	P	2.5 FT x 2.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
124	P	3 FT x 1 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
125	P	7.5 FT x 5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
126	P	3 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
127	P	5 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
128	P	2.5 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
129	P	3.5 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
130	P	2.5 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
131	P	2 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
132	P	1.5 FT x 1.5 FT	DC	WH	06-28-2010	VB	HG	WH	P	06-28-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: William Harrison

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 7 of 9

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
133	P	2 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
134	P	3.5 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
135	P	4 FT x 1.5 FT	JT	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
136	P	3.5 FT x 1.5 FT	MV	WH	06-28-2010	VB	HG	WH	P	06-28-2010	
137	P	3 FT X 1.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
138	P	4.5 FT X 3.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
139	P	4.5 FT X 3 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
140	P	3.5 FT X 3 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
141	P	3.5 FT X 2 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
142	P	5.5 FT X 1.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
143	P	6.5 FT X 3 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
144	P	2.5 FT X 1.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
145	P	7 FT X 2 FT	MV	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
146	P	7 FT X 2 FT	MV	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
147	P	3.5 FT X 3 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
148	P	4.5 FT X 3 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
149	P	3 FT X 2.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
150	P	5 FT X 4 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
151	P	3.5 FT X 2.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
152	P	6 FT X 3.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
153	P	8 FT X 3 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
154	P	5 FT X 2 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: Will Harrison, Travis Bowman

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 8 of 9

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
155	P	12 FT X 4.5 FT	MV	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
156	P	5 FT X 2 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
157	P	7 FT X 2 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
158	P	2.5 FT X 1.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
159	P	5 FT X 4 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
160	P	3 FT X 3 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
161	P	2.5 FT X 2.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
162	P	5.5 FT X 3 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
163	P	3.5 FT X 2 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
164	G&W	1.5 FT X 6 IN	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
165	G&W	1.5 FT X 8 IN	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
166	G&W	1.5 FT X 6 IN	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
167	G&W	1.5 FT X 6 IN	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
168	G&W	1.5 FT X 1.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
169	P	6 FT X 1.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
170	G&W	1.5 FT X 1 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
171	G&W	1.5 FT X 10 IN	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
172	G&W	1.5 FT X 8 IN	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
173	G&W	1.5 FT X 6 IN	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
174	P	4.5 FT X 2.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
175	P	4 FT X 2 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
176	P	2 FT X 1.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: Travis Bowman

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 1, Primary GM
Project Location: Terrell, North Carolina
Page: 9 of 9

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
177	P	2.5 FT X 1.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
178	P	6 FT X 1.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
179	P	5 FT X 2.5 FT	JT	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
180	P	12 FT X 7 FT	MV	TB	06-29-2010	VB	HG	TB	P	06-29-2010	
181	BOOT	18" BOOT	DC	JA	7/30/2010	SP	JHA	JA	P	7/30/2010	TESTED WITH CELL 2 BOOTS
182	BOOT	10" BOOT	DC	JA	7/30/2010	SP	JHA	JA	P	7/30/2010	TESTED WITH CELL 2 BOOTS

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis, Travis Bowman

APPENDIX II – GEOSYNTHETICS
Section 7 – Cell 2 Secondary HDPE Geomembrane CQA Forms

Subgrade Certification Forms
Geomembrane Deployment Report
Geomembrane Trial Seam Log
Geomembrane Seam Log
Destructive Laboratory Test Results
Geomembrane Defect Log
Geomembrane Repair Testing Log

Cell 2 Secondary HDPE Geomembrane Subgrade Certification Forms

CERTIFICATE OF SUBGRADE SURFACE ACCEPTANCE

INSTALLER: ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

PROJECT NAME: Duke Energy Marshall Steam Plant Industrial LF # 2 **PROJECT NO:** 10 - 01 - 1001

LOCATION: Terrell,NC.

AREA ACCEPTED: PANEL- 01 THRU. PANEL- 09

PANEL NUMBERS: PANEL - 01 THRU. PANEL- 09

GRADE ACCEPTANCE: INSPECTOR: S&ME(WILLIAM B. [illegible])

GENERAL CONTRACTOR: EARNHARDT GRADING,INC.(WILSON WARLICK)

OWNER: [illegible]

AUTHORIZED REPRESENTATIVE: DARRELL WOLFE(DUKE)

The undersigned, MOHAMMED MALIMAR ,certifies that he/she is a representative of Environmental Specialties International, Inc. authorized to execute this certificate, that he/she has visually inspected the subgrade surface described above on 20-Jul and found the surface to be acceptable for installation of the geomembrane.

This certification is based on observation of the surface of the subgrade only. No subsurface inspections or test have been performed and Environmental Specialties International, Inc. makes no representations or warranties regarding conditions which may exist below the surface of the subgrade.

AUTHORIZED REPRESENTATIVE OF ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

Signature	Title	DATE
Mohammed Malimar A.	SUPERINTENDENT	20-Jul

OWNER REPRESENTATIVE:

Signature	Title	DATE
[illegible]	Owners Engineer	20-Jul-2010

7049 PECUE LANE SUITE A ~ BATON ROUGE, LA. 70809 ~ PHONE 225-291-3700 ~ FAX 225-291-3788

CERTIFICATE OF SUBGRADE SURFACE ACCEPTANCE

INSTALLER: ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

PROJECT NAME: Duke Energy Marshall Steam Plant Industrial LF # 2 **PROJECT NO:** 10 - 01 - 1001

LOCATION: Terrell,NC.

AREA ACCEPTED: PANEL- 10 THRU. PANEL- 20

PANEL NUMBERS: PANEL - 10 THRU. PANEL- 20

GRADE ACCEPTANCE: INSPECTOR: [illegible]

GENERAL CONTRACTOR: EARNHARDT GRADING,INC.(WILSON WARLICK)

OWNER: [illegible]

AUTHORIZED REPRESENTATIVE: DARRELL WOLFE(DUKE)

The undersigned, MOHAMMED MALIMAR ,certifies that he/she is a representative of Environmental Specialties International, Inc. authorized to execute this certificate, that he/she has visually inspected the subgrade surface described above on 21-Jul and found the surface to be acceptable for installation of the geomembrane.

This certification is based on observation of the surface of the subgrade only. No subsurface inspections or test have been performed and Environmental Specialties International, Inc. makes no representations or warranties regarding conditions which may exist below the surface of the subgrade.

AUTHORIZED REPRESENTATIVE OF ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

Signature	Title	DATE
Mohammed Malimar A.	SUPERINTENDENT	21-Jul

OWNER REPRESENTATIVE:

Signature	Title	DATE
[illegible]	Owners Engineer	24-Jul-2010

7943 PECUE LANE SUITE A ~ BATON ROUGE, LA. 70809 ~ PHONE 225-291-2700 ~ FAX 225-291-2715

CERTIFICATE OF SUBGRADE SURFACE ACCEPTANCE

INSTALLER: ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

PROJECT NAME: Duke Energy Marshall Steam Plant Industrial LF # 2 **PROJECT NO:** 10 - 01 - 1001

LOCATION: Terrell,NC.

AREA ACCEPTED: PANEL- 21 THRU. PANEL- 38

PANEL NUMBERS: PANEL - 21 THRU. PANEL- 38

GRADE ACCEPTANCE: INSPECTOR: NAME(WILLIAM M. HARRIS

GENERAL CONTRACTOR: EARNHARDT GRADING,INC.(WILSON WARLICK)

OWNER: Darrell G. Wolfe

AUTHORIZED REPRESENTATIVE: DARRELL WOLFE(DUKE)

The undersigned, MOHAMMED MALIMAR ,certifies that he/she is a representative of Environmental Specialties International, Inc. authorized to execute this certificate, that he/she has visually inspected the subgrade surface described above on 22-Jul and found the surface to be acceptable for installation of the geomembrane.

This certification is based on observation of the surface of the subgrade only. No subsurface inspections or test have been performed and Environmental Specialties International, Inc. makes no representations or warranties regarding conditions which may exist below the surface of the subgrade.

AUTHORIZED REPRESENTATIVE OF ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

Signature	Title	DATE
Mohammed Malimar A.	SUPERINTENDENT	22-Jul

OWNER REPRESENTATIVE:

Signature	Title	DATE
[illegible]	Owner's Engineer	22-Jul-201

7942 PECUE LANE SUITE A ~ BATON ROUGE, LA. 70809 ~ PHONE 225-291-2700 ~ FAX 225-291-5718

CERTIFICATE OF SUBGRADE SURFACE ACCEPTANCE

INSTALLER: ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

PROJECT NAME: Duke Energy Marshall Steam Plant Industrial LF # 2 **PROJECT NO:** 10 - 01 - 1001

LOCATION: Terrell,NC.

AREA ACCEPTED: PANEL- 39 THRU. PANEL- 58

PANEL NUMBERS: PANEL - 39 THRU. PANEL- 58

GRADE ACCEPTANCE: INSPECTOR: [illegible]

GENERAL CONTRACTOR: EARNHARDT GRADING,INC.(WILSON WARLICK)

OWNER: [illegible]

AUTHORIZED REPRESENTATIVE: DARRELL WOLFE(DUKE)

The undersigned, MOHAMMED MALIMAR ,certifies that he/she is a representative of Environmental Specialties International, Inc. authorized to execute this certificate, that he/she has visually inspected the subgrade surface described above on 23-Jul and found the surface to be acceptable for installation of the geomembrane.

This certification is based on observation of the surface of the subgrade only. No subsurface inspections or test have been performed and Environmental Specialties International, Inc. makes no representations or warranties regarding conditions which may exist below the surface of the subgrade.

AUTHORIZED REPRESENTATIVE OF ENVIRONMENTAL SPECIALTIES INTERNATIONAL, INC.

Signature	Title	DATE
Mohammed Malimar A.	SUPERINTENDENT	23-Jul

OWNER REPRESENTATIVE:

Signature	Title	DATE
[illegible]	Owner's Engineer	23-Jul-2010

7043 PECUE LANE SUITE A ~ BATON ROUGE, LA. 70805 ~ PHONE 225-291-3700 ~ FAX 225-291-2766

Cell 2 Secondary HDPE Geomembrane Deployment Report

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 7/20-7/23/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
Page: 1 **of** 2

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	-----	-----		
S1	211315	502	22	11,044	0	WH	7/20/10
S2	211212	499	22	10,978	0	WH	7/20/10
S3	218716	500	22	11,000	0	WH	7/20/10
S4	218727	502	22	11,044	0	WH	7/20/10
S5	211316	500	22	11,000	0	WH	7/20/10
S6	211681	500	22	11,000	0	WH	7/20/10
S7	211446	501	22	11,022	0	WH	7/20/10
S8	211444	500	22	11,000	0	WH	7/20/10
S9	219118	499	22	10,978	0	WH	7/20/10
S10	211795	501	22	11,022	0	WH	7/21/10
S11	218723	502	22	11,044	0	WH	7/21/10
S12	218608	502	22	11,044	0	WH	7/21/10
S13	219108	504	22	11,088	0	WH	7/21/10
S14	211552	501	22	11,022	0	WH	7/21/10
S15	219116	502	22	11,044	0	WH	7/21/10
S16	219107	504	22	11,088	0	WH	7/21/10
S17	218713	502	22	11,044	0	WH	7/21/10
S18	218695	503	22	11,066	0	WH	7/21/10
S19	219109	504	22	11,088	0	WH	7/21/10
S20	211667	500	8	4,000	0	WH	7/21/10
S21	211554	434	22	9,548	0	WH	7/22/10
S22	219113	436	22	9,592	0	WH	7/22/10
S23	218731	435	22	9,570	0	WH	7/22/10
S24	211675	435	22	9,570	0	WH	7/22/10
S25	219115	436	22	9,592	0	WH	7/22/10
S26	219112	433	22	9,526	0	WH	7/22/10
S27	219101	434	22	9,548	0	WH	7/22/10
S28	211439	430	22	9,460	0	WH	7/22/10
S29	219221	383	22	8,426	0	WH	7/22/10
			Sheet Total	298,448	0		
			Total to Date	298,448	0		

CQA Personnel: William M. Harrison

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 7/20-7/23/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
Page: 2 **of** 2

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	298,448	0		
S30	211670	81	22	1,782	0	WH	7/22/10
S31	211670	84	22	1,848	0	WH	7/22/10
S32	211670	90	22	1,980	0	WH	7/22/10
S33	211670	96	22	2,112	0	WH	7/22/10
S34	211670	103	22	2,266	0	WH	7/22/10
S35	211436	113	22	2,486	0	WH	7/22/10
S36	211436	118	22	2,596	0	WH	7/22/10
S37	211436	120	22	2,640	0	WH	7/22/10
S38	211436	52	22	572	0	WH	Triangular Section 7/22/10
S39	218593	375	22	8,250	0	WH	7/23/10
S40	218598	116	22	2,552	0	WH	7/23/10
S41	218718	114	22	2,508	0	WH	7/23/10
S42	218718	71	4	284	0	WH	7/23/10
S43	211675	66	22	1,452	0	WH	7/23/10
S44	219731	67	22	1,474	0	WH	7/23/10
S45	219112	63	22	1,386	0	WH	7/23/10
S46	219112	66	22	1,452	0	WH	7/23/10
S47	211554	63	22	1,386	0	WH	7/23/10
S48	219113	68	22	1,496	0	WH	7/23/10
S49	218725	504	22	11,088	0	WH	7/23/10
S50	212102	500	22	11,000	0	WH	7/23/10
S51	211702	502	22	11,044	0	WH	7/23/10
S52	211700	502	22	11,044	0	WH	7/23/10
S53	211798	483	22	10,626	0	WH	7/23/10
S54	211318	480	22	10,560	0	WH	7/23/10
S55	218732	470	22	10,340	0	WH	7/23/10
S56	211332	464	22	10,208	0	WH	7/23/10
S57	211667	476	3	1,428	0	WH	7/23/10
S58	211665	107	22	2,354	0	WH	7/23/10
			Sheet Total	130,214	0		
			Total to Date	428,662	0		

CQA Personnel: William M. Harrison

Cell 2 Secondary HDPE Geomembrane Trial Seam Log

GEOMEMBRANE TRIAL SEAM LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
Page: 1 **of** 2

					Machine Settings		Peel Test Results						Shear Test Results							
Sample No.	Approx. Time	Tech. Init.	Mach. No.	Ambient Temp.	Preheat or Speed	Temp. Setting	1		2		3		1	2	3	Pass/ Fail	Weld Type	Material	CQA Init.	Date
S1	1334	DC	3210	88	30	860	128	122	119	126	124	126	152	161	168	P	F	SS	WH	7/20/10
S2	1339	WT	3211	88	30	860	116	132	126	133	124	128	147	149	152	P	F	SS	WH	7/20/10
S3	1345	BV	1220	88	4	860	118	126	119	124	132	136	147	152	158	P	F	ST	WH	7/20/10
S4	735	JT	5171	73	500	550	110	0	112	0	115	0	149	151	156	P	Ex	TT	WH	7/21/10
S5	1240	DC	3210	84	30	860	109	117	105	122	118	114	146	152	140	P	F	SS	WH	7/21/10
S6	1239	WT	3211	84	30	860	121	118	116	121	114	107	153	148	147	P	F	SS	WH	7/21/10
S7	100	BV	1218	84	20	860	101	117	118	119	121	114	140	148	152	P	F	SS	WH	7/21/10
S8	247	WT	3211	92	17	860	121	131	141	148	138	124	161	158	147	P	F	ST	WH	7/21/10
S9	730	JT	5171	90	500	550	111	0	115	0	125	0	140	150	147	P	F	TT	WH	7/22/10
S10	1250	DC	3210	90	30	860	111	121	110	106	115	109	147	155	148	P	F	SS	WH	7/22/10
S11	115	WT	3211	90	30	860	122	117	116	118	121	114	152	156	141	P	F	SS	WH	7/22/10
S12	230	BV	1220	90	5	860	115	110	123	120	118	122	151	162	156	P	F	TT	WH	7/22/10
S13	110	BV	1220	90	5	860	118	110	112	119	121	114	141	151	152	P	F	ST	WH	7/22/10
S14	410	WT	3211	92	17	860	122	117	114	121	118	117	146	147	152	P	F	ST	WH	7/22/10
S15	720	JT	5171	78	500	550	121	0	114	0	127	0	145	150	152	P	Ex	TT	WH	7/23/10

Weld Type: (**Ex**)trusion, (**F**)usion
Material: (**SS**) Smooth/Smooth - (**ST**) Smooth/Texture - (**TT**) Texture /Texture

CQA Personnel: William Harrison

GEOMEMBRANE TRIAL SEAM LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
Page: 2 **of** 2

					Machine Settings		Peel Test Results						Shear Test Results							
Sample No.	Approx. Time	Tech. Init.	Mach. No.	Ambient Temp.	Preheat or Speed	Temp. Setting	1		2		3		1	2	3	Pass/ Fail	Weld Type	Material	CQA Init.	Date
S16	910	DC	3210	80	27	860	106	112	108	111	114	121	160	163	161	P	F	SS	WH	7/23/10
S17	1000	BV	1220	82	5	860	118	116	124	119	110	126	146	151	148	P	F	ST	WH	7/23/10
S18	1005	BV	1220	82	5	860	122	126	131	124	120	126	151	161	165	P	F	TT	WH	7/23/10
S19	1300	BV	1220	100	5	860	118	114	121	117	118	106	142	151	147	P	F	TT	WH	7/23/10
S20	1300	WT	3211	100	30	860	119	116	110	118	121	114	161	152	161	P	F	SS	WH	7/23/10
S21	1305	DC	3210	100	27	860	116	117	121	114	118	116	151	147	146	P	F	SS	WH	7/23/10
S22	1310	BV	1220	100	7	860	121	118	122	114	119	121	141	147	151	P	F	SS	WH	7/23/10
S23	1310	JT	5171	100	500	550	121	0	118	0	114	0	146	160	151	P	Ex	TT	WH	7/23/10
S24	1310	WT	3211	80	17	860	118	124	126	136	141	121	155	147	152	P	F	TT	WH	7/23/10
S25	1645	DC	3210	100	15	860	126	110	116	118	126	124	152	141	148	P	F	ST	WH	7/23/10
S26	715	MV	5155	78	500	550	121	0	119	0	120	0	148	151	147	P	Ex	TT	WH	7/24/10
S27	710	JT	5171	78	500	550	120	0	117	0	126	0	145	150	151	P	Ex	TT	WH	7/24/10
S28	725	DC	3210	78	27	860	116	111	109	104	114	101	149	154	154	P	F	SS	WH	7/24/10

Weld Type: (**Ex**)trusion, (**F**)usion
Material: (**SS**) Smooth/Smooth - (**ST**) Smooth/Texture - (**TT**) Texture /Texture

CQA Personnel: William Harrison

Cell 2 Secondary HDPE Geomembrane Seam Log

GEOMEMBRANE SEAM LOG

Date: 7/20/2010-7/23/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
Page: 1 of 7

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S1 / S2	EEOS / WEOS	1421	DC	3210	495	2	A	1500 / 1505	30 / 29	RC	WH	P	07-20-2010	
S2 / S3	EEOS / WEOS	1430	WT	3211	490	3	A	1503 / 1508	30 / 30	RC	WH	P	07-20-2010	
S1 / CELL 1	EEOS / WEOS	1431	BV	1220	8		A	1440 / 1445	30 / 30	RC	WH	P	07-20-2010	
S1 / CELL 1	EEOS / WEOS	1433	BV	1220	491	1	A	1518 / 1523	30 / 30	RC	WH	P	07-20-2010	Z2 1528/1533 30/30 Z3 7/21 710/715 30/30
S3 / S4	EEOS / WEOS	1451	DC	3210	494	4	A	1530 / 1535	30 / 30	RC	WH	P	07-20-2010	
S4 / S5	EEOS / WEOS	1500	WT	3211	495	5	A	1530 / 1535	30 / 30	RC	WH	P	07-20-2010	
S6 / S7	EEOS / WEOS	1530	WT	3211	496	7	A	1555 / 1600	30 / 30	RC	WH	P	07-20-2010	
S5 / S6	EEOS / WEOS	1532	DC	3210	494	6	A	1610 / 1615	30 / 30	RC	WH	P	07-20-2010	
S7 / S8	EEOS / WEOS	1550	DC	3210	496	8	A	1618 / 1623	30 / 29	RC	WH	P	07-20-2010	
S8 / S9	EEOS / WEOS	1557	WT	3211	496	9	A	705 / 710	30 / 29	RC	WH	P	07-21-2010	SEAM COMPLETED 7/20 AIR TEST COMPLETED 7/21
S9 / S10	WAT / EEOS	1245	WT	3211	495	10	A	1320 / 1325	30 / 29	RC	WH	P	07-21-2010	
S10 / S11	WAT / EEOS	1250	DC	3210	499	11	A	1324 / 1329	30 / 30	RC	WH	P	07-21-2010	
S11 / S12	WAT / EEOS	1314	WT	3211	501	12	A	1342 / 1347	30 / 30	RC	WH	P	07-21-2010	
S12 / S13	WAT / EEOS	1314	BV	1218	500	13	A	1405 / 1410	30 / 29	RC	WH	P	07-21-2010	
S13 / S14	WAT / EEOS	1318	DC	3210	499	14	A	1346 / 1351	30 / 29	RC	WH	P	07-21-2010	
				Sheet Total	6,949									
				Total to Date	6,949									

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 7/20/2010-7/23/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
Page: 2 of 7

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S14 / S15	WAT / EEOS	1347	WT	3211	494	15	A	1412 / 1417	30 / 30	RC	WH	P	07-21-2010	
S15 / S16	WAT / EEOS	1348	DC	3210	501	16	A	1420 / 1425	30 / 30	RC	WH	P	07-21-2010	
S16 / S17	WAT / EEOS	1410	BV	1218	499	17	A	1503 / 1508	30 / 30	RC	WH	P	07-21-2010	
S17 / S18	WAT / EEOS	1417	WT	3211	498	18	A	1455 / 1500	30 / 30	RC	WH	P	07-21-2010	
S18 / S19	WAT / EEOS	1437	DC	3210	498	19	A	1505 / 1510	30 / 30	RC	WH	P	07-21-2010	
S19 / S20	WAT / EEOS	1522	WT	3211	499	20	A	1606 / 1611	30 / 29	RC	WH	P	07-21-2010	Z2 1600/1605 30/30
S21 / S22	EEOS / WEOS	1316	DC	3210	425	22	A	1340 / 1345	30 / 30	RC	WH	P	07-22-2010	
S22 / S23	EEOS / WEOS	1327	WT	3210	420		A	1350 / 1355	30 / 30	RC	WH	P	07-22-2010	
S21 / CELL 1	EEOS / WEOS	1331	BV	1220	312	21	A	1419 / 1024	30 / 30	RC	WH	P	07-22-2010	
S23 / S24	EEOS / WEOS	1342	DC	3210	422	23	A	1406 / 1411	30 / 29	RC	WH	P	07-22-2010	
S24 / S25	EEOS / WEOS	1352	WT	3211	427	24	A	1413 / 1418	30 / 29	RC	WH	P	07-22-2010	
S25 / S26	EEOS / WEOS	1412	DC	3210	422	25	A	1430 / 1435	30 / 30	RC	WH	P	07-22-2010	
S26 / S27	EEOS / WEOS	1417	WT	3211	420	26	A	1435 / 1440	30 / 30	RC	WH	P	07-22-2010	
S27 / S28	EEOS / WEOS	1432	DC	3210	420	27	A	1455 / 1500	30 / 30	RC	WH	P	07-22-2010	Z2 1445/1450 30/30
S28 / S29	EEOS / WEOS	1439	WT	3211	376		A	1500 / 1505	30 / 30	RC	WH	P	07-22-2010	
				Sheet Total	6,633									
				Total to Date	13,582									

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 7/20/2010-7/23/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
Page: 3 of 7

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S1 / S21	NEOS / SEOS	1505	BV	1220	21		A	1511 / 1516	30 / 30	RC	WH	P	07-22-2010	
S30 / S31	EAT / WEOS	1507	DC	3210	77	28	A	1540 / 1545	30 / 30	RC	WH	P	07-22-2010	
S2 / S22	NEOS / SEOS	1509	BV	1220	22	31	A	1514 / 1519	30 / 29	RC	WH	P	07-22-2010	
S31 / S32	EAT / WEOS	1511	WT	3211	81		A	1545 / 1550	30 / 30	RC	WH	P	07-22-2010	
S3 / S23	NEOS / SEOS	1512	BV	1220	22		A	1518 / 1523	30 / 30	RC	WH	P	07-22-2010	
S32 / S33	EAT / WEOS	1514	DC	3210	86		A	1550 / 1555	30 / 29	RC	WH	P	07-22-2010	
S4 / S24	NEOS / SEOS	1516	BV	1220	22		A	1522 / 1527	30 / 30	RC	WH	P	07-22-2010	Z2 1521/1526 30/30
S33 / S34	EAT / WEOS	1519	WT	3211	91		A	1553 / 1558	30 / 29	RC	WH	P	07-22-2010	
S5 / S25	NEOS / SEOS	1519	BV	1220	22		A	1525 / 1530	30 / 29	RC	WH	P	07-22-2010	
S6 / S26	NEOS / SEOS	1522	BV	1220	22		A	1527 / 1532	30 / 29	RC	WH	P	07-22-2010	
S7 / S27	NEOS / SEOS	1525	BV	1220	22		A	1533 / 1538	30 / 30	RC	WH	P	07-22-2010	
S8 / S28	NEOS / SEOS	1529	BV	1220	22		A	1541 / 1546	30 / 30	RC	WH	P	07-22-2010	
S34 / S35	EAT / WEOS	1530	DC	3210	97		A	1600 / 1605	30 / 30	RC	WH	P	07-22-2010	
S9 / S29	NEOS / SEOS	1532	BV	1220	22		A	1543 / 1548	30 / 30	RC	WH	P	07-22-2010	
S35 / S36	EAT / WEOS	1542	WT	3211	105		A	1603 / 1608	30 / 30	RC	WH	P	07-22-2010	
				Sheet Total	734									
				Total to Date	14,316									

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 7/20/2010-7/23/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
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Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S36 / S37	EAT / WEOS	1550	DC	3210	111	29	A	1605 / 1610	30 / 29	RC	WH	P	07-22-2010	
S37 / S38	EAT / WEOS	1558	WT	3211	101		A	1615 / 1620	30 / 30	RC	WH	P	07-22-2010	
CELL 1 / S38	EAT / WEOS	1619	WT	3211	77		A	1620 / 1625	30 / 30	RC	WH	P	07-22-2010	
S21 / S37	NEOS / SEOS	1623	BV	1220	18		A	1628 / 1633	30 / 30	RC	WH	P	07-22-2010	
S21 / S36	NEOS / SEOS	1624	BV	1220	5		A	1629 / 1634	30 / 30	RC	WH	P	07-22-2010	
S22 / S36	NEOS / SEOS	1627	BV	1220	19		A	1631 / 1636	30 / 30	RC	WH	P	07-22-2010	
S22 / S35	NEOS / SEOS	1629	BV	1220	5		A	1633 / 1638	30 / 30	RC	WH	P	07-22-2010	
S23 / S35	NEOS / SEOS	1630	BV	1220	22	30	A	1635 / 1640	30 / 30	RC	WH	P	07-22-2010	
S24 / S34	NEOS / SEOS	1632	BV	1220	20		A	1637 / 1642	30 / 30	RC	WH	P	07-22-2010	
S25 / S33	NEOS / SEOS	1635	BV	1220	21		A	1641 / 1646	30 / 30	RC	WH	P	07-22-2010	
S26 / S32	NEOS / SEOS	1638	BV	1220	22		A	700 / 705	30 / 30	RC	WH	P	07-23-2010	SEAM COMPLETED 7/22 AIR TEST COMPLETED 7/23
S27 / S31	NEOS / SEOS	1641	BV	1220	22		A	707 / 712	30 / 30	RC	WH	P	07-23-2010	SEAM COMPLETED 7/22 AIR TEST COMPLETED 7/23
S28 / S30	NEOS / SEOS	1644	BV	1220	22		A	710 / 715	30 / 30	RC	WH	P	07-23-2010	SEAM COMPLETED 7/22 AIR TEST COMPLETED 7/23
S39 / S29	EEOS / WEOS	921	DC	3210	370	32	A	1502 / 1507	30 / 29	RC	WH	P	07-23-2010	
S40 / S41	EAT / WEOS	947	DC	3210	114		A	1320 / 1325	30 / 30	RC	WH	P	07-23-2010	
				Sheet Total	949									
				Total to Date	15,265									

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 7/20/2010-7/23/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
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Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S42 / S41	EEOS / WEOS	958	DC	3210	70		A	1300 / 1305	30 / 30	RC	WH	P	07-23-2010	
S42 / S28	EEOS / WEOS	1005	BV	1220	40		A	1150 / 1155	30 / 30	RC	WH	P	07-23-2010	Z2 1210/1215 30/30
S41 / S30	EAT / WEOS	1018	BV	1220	45		A	1410 / 1415	30 / 30	RC	WH	P	07-23-2010	
S42 / S30	EEOS / WEOS	1025	BV	1220	30		A	1130 / 1135	30 / 30	RC	WH	P	07-23-2010	
S39 / S40	NEOS / SEOS	1030	BV	1220	22		A	1333 / 1338	30 / 30	RC	WH	P	07-23-2010	
S29 / S41	NEOS / SEOS	1048	BV	1220	22		A	1307 / 1312	30 / 30	RC	WH	P	07-23-2010	
S47 / S46	NEOS / SEOS	1056	BV	1220	22		A	1420 / 1425	30 / 29	RC	WH	P	07-23-2010	
S48 / S47	NEOS / SEOS	1124	BV	1220	22	33	A	1355 / 1400	30 / 30	RC	WH	P	07-23-2010	
S48 / S39	WEOS / EEOS	1131	DC	3210	52		A	1344 / 1349	30 / 30	RC	WH	P	07-23-2010	
S48 / S58	NEOS / SEOS	1135	BV	1220	22		A	1145 / 1150	30 / 30	RC	WH	P	07-23-2010	
S46 / S45	NEOS / SEOS	1307	BV	1220	22		A	1431 / 1436	30 / 30	RC	WH	P	07-23-2010	
S45 / S44	NEOS / SEOS	1314	BV	1220	22		A	1433 / 1438	30 / 30	RC	WH	P	07-23-2010	
S43 / S39	WEOS / EEOS	1319	DC	3210	65		A	1455 / 1500	30 / 30	RC	WH	P	07-23-2010	
S44 / S39	WEOS / EEOS	1322	DC	3210	66		A	1440 / 1445	30 / 30	RC	WH	P	07-23-2010	
S45 / S39	WEOS / EEOS	1324	DC	3210	62		A	1435 / 1440	30 / 30	RC	WH	P	07-23-2010	
				Sheet Total	584									
				Total to Date	15,849									

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 7/20/2010-7/23/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
Page: 6 of 7

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
S44 / S43	NEOS / SEOS	1324	BV	1220	22		A	1450 / 1455	30 / 30	RC	WH	P	07-23-2010	
S46 / S39	WEOS / EEOS	1327	DC	3210	68	34	A	1422 / 1427	30 / 30	RC	WH	P	07-23-2010	Z2 1430/1455 30/29
S47 / S39	WEOS / EEOS	1330	DC	3210	62		A	1413 / 1418	30 / 30	RC	WH	P	07-23-2010	
S49 / S50	WEOS / EEOS	1430	DC	3210	490	35	A	1515 / 1520	30 / 29	RC	WH	P	07-23-2010	
S50 / S51	WEOS / EEOS	1442	WT	3211	483	36	A	1518 / 1523	30 / 30	RC	WH	P	07-23-2010	
S51 / S52	WEOS / EEOS	1500	DC	3210	476	37	A	1528 / 1533	30 / 30	RC	WH	P	07-23-2010	
S52 / S53	WEOS / EEOS	1513	WT	3211	468	38	A	1535 / 1540	30 / 30	RC	WH	P	07-23-2010	
S53 / S54	WEOS / EEOS	1535	DC	3210	465	39	A	1600 / 1605	30 / 30	RC	WH	P	07-23-2010	
S54 / S55	WEOS / EEOS	1544	WT	3211	461	40	A	1610 / 1615	30 / 30	RC	WH	P	07-23-2010	
S55 / S56	WEOS / EEOS	1610	DC	3210	465	41	A	1737 / 1742	30 / 29	RC	WH	P	07-23-2010	
S40 / S58	WEOS / EEOS	1615	WT	3211	107		A	1629 / 1634	30 / 30	RC	WH	P	07-23-2010	Z2 1735/1740 30/30
S56 / S57	WEOS / EEOS	1631	WT	3211	471	42	A	1735 / 1740	30 / 29	RC	WH	P	07-23-2010	
S10 / S39	NEOS / SEOS	1631	BV	1220	22		A	1636 / 1641	30 / 30	RC	WH	P	07-23-2010	Z2 1627/1632 30/30
S11 / S43	NEOS / SEOS	1635	BV	1220	22		A	1641 / 1646	30 / 30	RC	WH	P	07-23-2010	
S12 / S56	NEOS / SEOS	1639	BV	1220	22		A	1646 / 1651	30 / 29	RC	WH	P	07-23-2010	Z2 1647/1652 30/30
				Sheet Total	4,104									
				Total to Date	19,953									

CQA Personnel: William Harrison

GEOMEMBRANE SEAM LOG

Date: 7/20/2010-7/23/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Secondary GM
Project Location: Terrell, North Carolina
Page: 7 of 7

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
S13 / S55	NEOS / SEOS	1643	BV	1220	22		A	1648 / 1653	30 / 30	RC	WH	P	07-23-2010	
S14 / S54	NEOS / SEOS	1646	BV	1220	22		A	1653 / 1658	30 / 30	RC	WH	P	07-23-2010	
S57 / S43	WEOS / EEOS	1647	DC	3210	60		A	1714 / 1719	30 / 29	RC	WH	P	07-23-2010	
S15 / S53	NEOS / SEOS	1649	BV	1220	22		A	1655 / 1700	30 / 30	RC	WH	P	07-23-2010	
S16 / S52	NEOS / SEOS	1652	BV	1220	22		A	1659 / 1704	30 / 29	RC	WH	P	07-23-2010	
S44 / S57	WEOS / EEOS	1653	DC	3210	64		A	1718 / 1723	30 / 30	RC	WH	P	07-23-2010	
S17 / S51	NEOS / SEOS	1655	BV	1220	22		A	1703 / 1708	30 / 30	RC	WH	P	07-23-2010	
S18 / S50	NEOS / SEOS	1655	BV	1220	22		A	1706 / 1711	30 / 30	RC	WH	P	07-23-2010	
S45 / S57	WEOS / EEOS	1658	DC	3210	66	43	A	1720 / 1725	30 / 30	RC	WH	P	07-23-2010	
S19 / S49	NEOS / SEOS	1701	BV	1220	18		A	1707 / 1712	30 / 30	RC	WH	P	07-23-2010	
S46 / S57	WEOS / EEOS	1702	DC	3210	65		A	1720 / 1725	30 / 30	RC	WH	P	07-23-2010	
S47 / S57	WEOS / EEOS	1707	DC	3210	63		A	1725 / 1730	30 / 30	RC	WH	P	07-23-2010	
S57 / S58	WEOS / EEOS	1709	WT	3211	149		A	1730 / 1735	30 / 29	RC	WH	P	07-23-2010	Z2 1733/1737 30/30
S48 / S57	WEOS / EEOS	1711	DC	3210	48		A	1728 / 1733	30 / 29	RC	WH	P	07-23-2010	
				Sheet Total	665									
				Total to Date	20,618									

CQA Personnel: William Harrison

Cell 2 Secondary HDPE Geomembrane Destructive Laboratory Test Results

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S1
Tested by: William Harrison
Date Tested: 07/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	165.0	Elongation
S2	165.0	Elongation
S3	167.0	Elongation
S4	165.0	Elongation
S5	165.0	Elongation
Average	165.4	*FTB - Film Tear Bond
Standard Deviation	0.8	
Maximum	167.0	
Minimum	165.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	130.0	FTB
P1B	104.0	FTB
P2A	119.0	FTB
P2B	128.0	FTB
P3A	130.0	FTB
P3B	117.0	FTB
P4A	121.0	FTB
P4B	106.0	FTB
P5A	136.0	FTB
P5B	129.0	FTB
Average	122.0	*FTB - Film Tear Bond
Standard Deviation	10.1	
Maximum	136.0	
Minimum	104.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S2
Tested by: William Harrison
Date Tested: 07/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	165.0	Elongation
S2	140.0	Elongation
S3	136.0	Elongation
S4	126.0	Elongation
S5	145.0	Elongation
Average	142.4	*FTB - Film Tear Bond
Standard Deviation	12.9	
Maximum	165.0	
Minimum	126.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	106.0	FTB
P1B	110.0	FTB
P2A	115.0	FTB
P2B	108.0	FTB
P3A	114.0	FTB
P3B	109.0	FTB
P4A	119.0	FTB
P4B	112.0	FTB
P5A	105.0	FTB
P5B	112.0	FTB
Average	111.0	*FTB - Film Tear Bond
Standard Deviation	4.1	
Maximum	119.0	
Minimum	105.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S3
Tested by: William Harrison
Date Tested: 07/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	166.0	Elongation
S2	167.0	Elongation
S3	139.0	Elongation
S4	171.0	Elongation
S5	172.0	Elongation
Average	163.0	*FTB - Film Tear Bond
Standard Deviation	12.2	
Maximum	172.0	
Minimum	139.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	118.0	FTB
P1B	130.0	FTB
P2A	135.0	FTB
P2B	125.0	FTB
P3A	109.0	FTB
P3B	132.0	FTB
P4A	137.0	FTB
P4B	101.0	FTB
P5A	117.0	FTB
P5B	120.0	FTB
Average	122.4	*FTB - Film Tear Bond
Standard Deviation	11.0	
Maximum	137.0	
Minimum	101.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S4
Tested by: William Harrison
Date Tested: 07/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	160.0	Elongation
S2	164.0	Elongation
S3	164.0	Elongation
S4	168.0	Elongation
S5	162.0	Elongation
Average	163.6	*FTB - Film Tear Bond
Standard Deviation	2.7	
Maximum	168.0	
Minimum	160.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	105.0	FTB
P1B	115.0	FTB
P2A	112.0	FTB
P2B	116.0	FTB
P3A	116.0	FTB
P3B	118.0	FTB
P4A	124.0	FTB
P4B	119.0	FTB
P5A	118.0	FTB
P5B	118.0	FTB
Average	116.1	*FTB - Film Tear Bond
Standard Deviation	4.7	
Maximum	124.0	
Minimum	105.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S5
Tested by: William Harrison
Date Tested: 07/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	169.0	Elongation
S2	158.0	Elongation
S3	164.0	Elongation
S4	168.0	Elongation
S5	174.0	Elongation
Average	166.6	*FTB - Film Tear Bond
Standard Deviation	5.4	
Maximum	174.0	
Minimum	158.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	111.0	FTB
P1B	123.0	FTB
P2A	107.0	FTB
P2B	118.0	FTB
P3A	114.0	FTB
P3B	124.0	FTB
P4A	117.0	FTB
P4B	127.0	FTB
P5A	110.0	FTB
P5B	120.0	FTB
Average	117.1	*FTB - Film Tear Bond
Standard Deviation	6.2	
Maximum	127.0	
Minimum	107.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S6
Tested by: William Harrison
Date Tested: 07/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	165.0	Elongation
S2	179.0	Elongation
S3	174.0	Elongation
S4	182.0	Elongation
S5	181.0	Elongation
Average	176.2	*FTB - Film Tear Bond
Standard Deviation	6.2	
Maximum	182.0	
Minimum	165.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	132.0	FTB
P1B	130.0	FTB
P2A	123.0	FTB
P2B	120.0	FTB
P3A	133.0	FTB
P3B	128.0	FTB
P4A	119.0	FTB
P4B	121.0	FTB
P5A	122.0	FTB
P5B	125.0	FTB
Average	125.3	*FTB - Film Tear Bond
Standard Deviation	4.9	
Maximum	133.0	
Minimum	119.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S7
Tested by: William Harrison
Date Tested: 07/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	181.0	Elongation
S2	176.0	Elongation
S3	177.0	Elongation
S4	180.0	Elongation
S5	186.0	Elongation
Average	180.0	*FTB - Film Tear Bond
Standard Deviation	3.5	
Maximum	186.0	
Minimum	176.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	127.0	FTB
P1B	123.0	FTB
P2A	133.0	FTB
P2B	127.0	FTB
P3A	132.0	FTB
P3B	132.0	FTB
P4A	133.0	FTB
P4B	126.0	FTB
P5A	128.0	FTB
P5B	128.0	FTB
Average	128.9	*FTB - Film Tear Bond
Standard Deviation	3.2	
Maximum	133.0	
Minimum	123.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S8
Tested by: William Harrison
Date Tested: 07/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	187.0	Elongation
S2	185.0	Elongation
S3	184.0	Elongation
S4	183.0	Elongation
S5	183.0	Elongation
Average	184.4	*FTB - Film Tear Bond
Standard Deviation	1.5	
Maximum	187.0	
Minimum	183.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	128.0	FTB
P1B	134.0	FTB
P2A	128.0	FTB
P2B	142.0	FTB
P3A	129.0	FTB
P3B	132.0	FTB
P4A	123.0	FTB
P4B	138.0	FTB
P5A	133.0	FTB
P5B	130.0	FTB
Average	131.7	*FTB - Film Tear Bond
Standard Deviation	5.2	
Maximum	142.0	
Minimum	123.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S9
Tested by: William Harrison
Date Tested: 07/21/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	166.0	Elongation
S2	164.0	Elongation
S3	164.0	Elongation
S4	165.0	Elongation
S5	166.0	Elongation
Average	165.0	*FTB - Film Tear Bond
Standard Deviation	0.9	
Maximum	166.0	
Minimum	164.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	114.0	FTB
P1B	106.0	FTB
P2A	113.0	FTB
P2B	110.0	FTB
P3A	105.0	FTB
P3B	115.0	FTB
P4A	108.0	FTB
P4B	124.0	FTB
P5A	109.0	FTB
P5B	118.0	FTB
Average	112.2	*FTB - Film Tear Bond
Standard Deviation	5.5	
Maximum	124.0	
Minimum	105.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S10
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	181.0	Elongation
S2	166.0	Elongation
S3	177.0	Elongation
S4	180.0	Elongation
S5	175.0	Elongation
Average	175.8	*FTB - Film Tear Bond
Standard Deviation	5.3	
Maximum	181.0	
Minimum	166.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	117.0	FTB
P1B	114.0	FTB
P2A	127.0	FTB
P2B	123.0	FTB
P3A	125.0	FTB
P3B	115.0	FTB
P4A	107.0	FTB
P4B	108.0	FTB
P5A	120.0	FTB
P5B	118.0	FTB
Average	117.4	*FTB - Film Tear Bond
Standard Deviation	6.3	
Maximum	127.0	
Minimum	107.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S11
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	155.0	Elongation
S2	170.0	Elongation
S3	177.0	Elongation
S4	155.0	Elongation
S5	161.0	Elongation
Average	163.6	*FTB - Film Tear Bond
Standard Deviation	8.7	
Maximum	177.0	
Minimum	155.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	130.0	FTB
P2A	125.0	FTB
P2B	108.0	FTB
P3A	131.0	FTB
P3B	125.0	FTB
P4A	132.0	FTB
P4B	131.0	FTB
P5A	128.0	FTB
P5B	104.0	FTB
Average	123.7	*FTB - Film Tear Bond
Standard Deviation	9.3	
Maximum	132.0	
Minimum	104.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S12
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	176.0	Elongation
S2	173.0	Elongation
S3	174.0	Elongation
S4	161.0	Elongation
S5	168.0	Elongation
Average	170.4	*FTB - Film Tear Bond
Standard Deviation	5.4	
Maximum	176.0	
Minimum	161.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	119.0	FTB
P1B	124.0	FTB
P2A	110.0	FTB
P2B	113.0	FTB
P3A	116.0	FTB
P3B	110.0	FTB
P4A	123.0	FTB
P4B	123.0	FTB
P5A	115.0	FTB
P5B	118.0	FTB
Average	117.1	*FTB - Film Tear Bond
Standard Deviation	4.9	
Maximum	124.0	
Minimum	110.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S13
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	163.0	Elongation
S2	163.0	Elongation
S3	168.0	Elongation
S4	165.0	Elongation
S5	163.0	Elongation
Average	164.4	*FTB - Film Tear Bond
Standard Deviation	2.0	
Maximum	168.0	
Minimum	163.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	121.0	FTB
P1B	120.0	FTB
P2A	136.0	FTB
P2B	132.0	FTB
P3A	115.0	FTB
P3B	129.0	FTB
P4A	102.0	FTB
P4B	103.0	FTB
P5A	101.0	FTB
P5B	137.0	FTB
Average	119.6	*FTB - Film Tear Bond
Standard Deviation	13.3	
Maximum	137.0	
Minimum	101.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S14
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	163.0	Elongation
S2	147.0	Elongation
S3	162.0	Elongation
S4	136.0	Elongation
S5	165.0	Elongation
Average	154.6	*FTB - Film Tear Bond
Standard Deviation	11.3	
Maximum	165.0	
Minimum	136.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	122.0	FTB
P1B	126.0	FTB
P2A	126.0	FTB
P2B	121.0	FTB
P3A	122.0	FTB
P3B	132.0	FTB
P4A	134.0	FTB
P4B	131.0	FTB
P5A	127.0	FTB
P5B	136.0	FTB
Average	127.7	*FTB - Film Tear Bond
Standard Deviation	5.0	
Maximum	136.0	
Minimum	121.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S15
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	159.0	Elongation
S2	158.0	Elongation
S3	163.0	Elongation
S4	168.0	Elongation
S5	169.0	Elongation
Average	163.4	*FTB - Film Tear Bond
Standard Deviation	4.5	
Maximum	169.0	
Minimum	158.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	118.0	FTB
P1B	129.0	FTB
P2A	128.0	FTB
P2B	122.0	FTB
P3A	127.0	FTB
P3B	134.0	FTB
P4A	125.0	FTB
P4B	133.0	FTB
P5A	119.0	FTB
P5B	117.0	FTB
Average	125.2	*FTB - Film Tear Bond
Standard Deviation	5.8	
Maximum	134.0	
Minimum	117.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S16
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	164.0	Elongation
S2	159.0	Elongation
S3	165.0	Elongation
S4	162.0	Elongation
S5	164.0	Elongation
Average	162.8	*FTB - Film Tear Bond
Standard Deviation	2.1	
Maximum	165.0	
Minimum	159.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	125.0	FTB
P1B	105.0	FTB
P2A	109.0	FTB
P2B	124.0	FTB
P3A	119.0	FTB
P3B	124.0	FTB
P4A	117.0	FTB
P4B	119.0	FTB
P5A	120.0	FTB
P5B	111.0	FTB
Average	117.3	*FTB - Film Tear Bond
Standard Deviation	6.5	
Maximum	125.0	
Minimum	105.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S17
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	151.0	Elongation
S2	167.0	Elongation
S3	162.0	Elongation
S4	161.0	Elongation
S5	162.0	Elongation
Average	160.6	*FTB - Film Tear Bond
Standard Deviation	5.2	
Maximum	167.0	
Minimum	151.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	118.0	FTB
P1B	1182.0	FTB
P2A	112.0	FTB
P2B	110.0	FTB
P3A	102.0	FTB
P3B	108.0	FTB
P4A	116.0	FTB
P4B	127.0	FTB
P5A	120.0	FTB
P5B	102.0	FTB
Average	219.7	*FTB - Film Tear Bond
Standard Deviation	320.9	
Maximum	1182.0	
Minimum	102.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S18
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	167.0	Elongation
S2	169.0	Elongation
S3	167.0	Elongation
S4	168.0	Elongation
S5	166.0	Elongation
Average	167.4	*FTB - Film Tear Bond
Standard Deviation	1.0	
Maximum	169.0	
Minimum	166.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	118.0	FTB
P1B	135.0	FTB
P2A	117.0	FTB
P2B	131.0	FTB
P3A	131.0	FTB
P3B	119.0	FTB
P4A	134.0	FTB
P4B	122.0	FTB
P5A	114.0	FTB
P5B	123.0	FTB
Average	124.4	*FTB - Film Tear Bond
Standard Deviation	7.3	
Maximum	135.0	
Minimum	114.0	
Pass/Fail [1,2,3]	FAIL	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S19
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	156.0	Elongation
S2	156.0	Elongation
S3	160.0	Elongation
S4	161.0	Elongation
S5	160.0	Elongation
Average	158.6	*FTB - Film Tear Bond
Standard Deviation	2.2	
Maximum	161.0	
Minimum	156.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	111.0	FTB
P1B	121.0	FTB
P2A	108.0	FTB
P2B	116.0	FTB
P3A	129.0	FTB
P3B	118.0	FTB
P4A	135.0	FTB
P4B	118.0	FTB
P5A	120.0	FTB
P5B	133.0	FTB
Average	120.9	*FTB - Film Tear Bond
Standard Deviation	8.5	
Maximum	135.0	
Minimum	108.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S20
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	153.0	Elongation
S2	158.0	Elongation
S3	160.0	Elongation
S4	161.0	Elongation
S5	156.0	Elongation
Average	157.6	*FTB - Film Tear Bond
Standard Deviation	2.9	
Maximum	161.0	
Minimum	153.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	127.0	FTB
P1B	116.0	FTB
P2A	113.0	FTB
P2B	120.0	FTB
P3A	124.0	FTB
P3B	113.0	FTB
P4A	109.0	FTB
P4B	132.0	FTB
P5A	121.0	FTB
P5B	123.0	FTB
Average	119.8	*FTB - Film Tear Bond
Standard Deviation	6.7	
Maximum	132.0	
Minimum	109.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S21
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	181.0	Elongation
S2	181.0	Elongation
S3	173.0	Elongation
S4	179.0	Elongation
S5	179.0	Elongation
Average	178.6	*FTB - Film Tear Bond
Standard Deviation	2.9	
Maximum	181.0	
Minimum	173.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	124.0	FTB
P1B	130.0	FTB
P2A	123.0	FTB
P2B	134.0	FTB
P3A	123.0	FTB
P3B	131.0	FTB
P4A	128.0	FTB
P4B	137.0	FTB
P5A	126.0	FTB
P5B	132.0	FTB
Average	128.8	*FTB - Film Tear Bond
Standard Deviation	4.6	
Maximum	137.0	
Minimum	123.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S22
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	176.0	Elongation
S2	172.0	Elongation
S3	171.0	Elongation
S4	168.0	Elongation
S5	174.0	Elongation
Average	172.2	*FTB - Film Tear Bond
Standard Deviation	2.7	
Maximum	176.0	
Minimum	168.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	121.0	FTB
P1B	131.0	FTB
P2A	129.0	FTB
P2B	120.0	FTB
P3A	119.0	FTB
P3B	132.0	FTB
P4A	126.0	FTB
P4B	116.0	FTB
P5A	122.0	FTB
P5B	133.0	FTB
Average	124.9	*FTB - Film Tear Bond
Standard Deviation	5.8	
Maximum	133.0	
Minimum	116.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S23
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	170.0	Elongation
S2	169.0	Elongation
S3	168.0	Elongation
S4	166.0	Elongation
S5	171.0	Elongation
Average	168.8	*FTB - Film Tear Bond
Standard Deviation	1.7	
Maximum	171.0	
Minimum	166.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	113.0	FTB
P1B	131.0	FTB
P2A	125.0	FTB
P2B	125.0	FTB
P3A	119.0	FTB
P3B	126.0	FTB
P4A	116.0	FTB
P4B	132.0	FTB
P5A	110.0	FTB
P5B	129.0	FTB
Average	122.6	*FTB - Film Tear Bond
Standard Deviation	7.3	
Maximum	132.0	
Minimum	110.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S24
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	170.0	Elongation
S2	169.0	Elongation
S3	171.0	Elongation
S4	169.0	Elongation
S5	167.0	Elongation
Average	169.2	*FTB - Film Tear Bond
Standard Deviation	1.3	
Maximum	171.0	
Minimum	167.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	117.0	FTB
P1B	122.0	FTB
P2A	121.0	FTB
P2B	126.0	FTB
P3A	114.0	FTB
P3B	127.0	FTB
P4A	125.0	FTB
P4B	121.0	FTB
P5A	118.0	FTB
P5B	116.0	FTB
Average	120.7	*FTB - Film Tear Bond
Standard Deviation	4.2	
Maximum	127.0	
Minimum	114.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S25
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	168.0	Elongation
S2	170.0	Elongation
S3	169.0	Elongation
S4	167.0	Elongation
S5	166.0	Elongation
Average	168.0	*FTB - Film Tear Bond
Standard Deviation	1.4	
Maximum	170.0	
Minimum	166.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	127.0	FTB
P1B	114.0	FTB
P2A	123.0	FTB
P2B	104.0	FTB
P3A	109.0	FTB
P3B	118.0	FTB
P4A	123.0	FTB
P4B	115.0	FTB
P5A	124.0	FTB
P5B	113.0	FTB
Average	117.0	*FTB - Film Tear Bond
Standard Deviation	7.0	
Maximum	127.0	
Minimum	104.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S26
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	168.0	Elongation
S2	165.0	Elongation
S3	166.0	Elongation
S4	165.0	Elongation
S5	168.0	Elongation
Average	166.4	*FTB - Film Tear Bond
Standard Deviation	1.4	
Maximum	168.0	
Minimum	165.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	107.0	FTB
P1B	119.0	FTB
P2A	115.0	FTB
P2B	120.0	FTB
P3A	113.0	FTB
P3B	132.0	FTB
P4A	122.0	FTB
P4B	114.0	FTB
P5A	112.0	FTB
P5B	113.0	FTB
Average	116.7	*FTB - Film Tear Bond
Standard Deviation	6.6	
Maximum	132.0	
Minimum	107.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S27
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	172.0	Elongation
S2	173.0	Elongation
S3	173.0	Elongation
S4	171.0	Elongation
S5	173.0	Elongation
Average	172.4	*FTB - Film Tear Bond
Standard Deviation	0.8	
Maximum	173.0	
Minimum	171.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	159.0	FTB
P1B	115.0	FTB
P2A	141.0	FTB
P2B	123.0	FTB
P3A	111.0	FTB
P3B	137.0	FTB
P4A	147.0	FTB
P4B	103.0	FTB
P5A	133.0	FTB
P5B	111.0	FTB
Average	128.0	*FTB - Film Tear Bond
Standard Deviation	17.3	
Maximum	159.0	
Minimum	103.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S28
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	179.0	Elongation
S2	177.0	Elongation
S3	178.0	Elongation
S4	176.0	Elongation
S5	178.0	Elongation
Average	177.6	*FTB - Film Tear Bond
Standard Deviation	1.0	
Maximum	179.0	
Minimum	176.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	129.0	FTB
P1B	130.0	FTB
P2A	132.0	FTB
P2B	133.0	FTB
P3A	125.0	FTB
P3B	142.0	FTB
P4A	133.0	FTB
P4B	128.0	FTB
P5A	130.0	FTB
P5B	133.0	FTB
Average	131.5	*FTB - Film Tear Bond
Standard Deviation	4.3	
Maximum	142.0	
Minimum	125.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S29
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	182.0	Elongation
S2	179.0	Elongation
S3	180.0	Elongation
S4	178.0	Elongation
S5	180.0	Elongation
Average	179.8	*FTB - Film Tear Bond
Standard Deviation	1.3	
Maximum	182.0	
Minimum	178.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	144.0	FTB
P1B	137.0	FTB
P2A	142.0	FTB
P2B	135.0	FTB
P3A	125.0	FTB
P3B	136.0	FTB
P4A	127.0	FTB
P4B	148.0	FTB
P5A	137.0	FTB
P5B	136.0	FTB
Average	136.7	*FTB - Film Tear Bond
Standard Deviation	6.7	
Maximum	148.0	
Minimum	125.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S30
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	157.0	Elongation
S2	155.0	Elongation
S3	155.0	Elongation
S4	152.0	Elongation
S5	155.0	Elongation
Average	154.8	*FTB - Film Tear Bond
Standard Deviation	1.6	
Maximum	157.0	
Minimum	152.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	144.0	FTB
P1B	152.0	FTB
P2A	145.0	FTB
P2B	111.0	FTB
P3A	147.0	FTB
P3B	134.0	FTB
P4A	147.0	FTB
P4B	134.0	FTB
P5A	138.0	FTB
P5B	143.0	FTB
Average	139.5	*FTB - Film Tear Bond
Standard Deviation	11.0	
Maximum	152.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S31
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	146.0	Elongation
S2	146.0	Elongation
S3	150.0	Elongation
S4	148.0	Elongation
S5	149.0	Elongation
Average	147.8	*FTB - Film Tear Bond
Standard Deviation	1.6	
Maximum	150.0	
Minimum	146.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	141.0	FTB
P1B	115.0	FTB
P2A	131.0	FTB
P2B	123.0	FTB
P3A	134.0	FTB
P3B	130.0	FTB
P4A	133.0	FTB
P4B	97.0	FTB
P5A	121.0	FTB
P5B	125.0	FTB
Average	125.0	*FTB - Film Tear Bond
Standard Deviation	11.7	
Maximum	141.0	
Minimum	97.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S32
Tested by: William Harrison
Date Tested: 07/24/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	168.0	Elongation
S2	170.0	Elongation
S3	166.0	Elongation
S4	164.0	Elongation
S5	167.0	Elongation
Average	167.0	*FTB - Film Tear Bond
Standard Deviation	2.0	
Maximum	170.0	
Minimum	164.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	118.0	FTB
P1B	132.0	FTB
P2A	123.0	FTB
P2B	128.0	FTB
P3A	124.0	FTB
P3B	120.0	FTB
P4A	119.0	FTB
P4B	113.0	FTB
P5A	121.0	FTB
P5B	120.0	FTB
Average	121.8	*FTB - Film Tear Bond
Standard Deviation	5.1	
Maximum	132.0	
Minimum	113.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S33
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	160.0	Elongation
S2	156.0	Elongation
S3	161.0	Elongation
S4	159.0	Elongation
S5	160.0	Elongation
Average	159.2	*FTB - Film Tear Bond
Standard Deviation	1.7	
Maximum	161.0	
Minimum	156.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	131.0	FTB
P1B	122.0	FTB
P2A	132.0	FTB
P2B	136.0	FTB
P3A	130.0	FTB
P3B	133.0	FTB
P4A	140.0	FTB
P4B	125.0	FTB
P5A	133.0	FTB
P5B	148.0	FTB
Average	133.0	*FTB - Film Tear Bond
Standard Deviation	6.9	
Maximum	148.0	
Minimum	122.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S34
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	171.0	Elongation
S2	170.0	Elongation
S3	172.0	Elongation
S4	170.0	Elongation
S5	173.0	Elongation
Average	171.2	*FTB - Film Tear Bond
Standard Deviation	1.2	
Maximum	173.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	122.0	FTB
P1B	122.0	FTB
P2A	121.0	FTB
P2B	106.0	FTB
P3A	131.0	FTB
P3B	116.0	FTB
P4A	128.0	FTB
P4B	120.0	FTB
P5A	130.0	FTB
P5B	125.0	FTB
Average	122.1	*FTB - Film Tear Bond
Standard Deviation	7.0	
Maximum	131.0	
Minimum	106.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S35
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	180.0	Elongation
S2	180.0	Elongation
S3	180.0	Elongation
S4	179.0	Elongation
S5	177.0	Elongation
Average	179.2	*FTB - Film Tear Bond
Standard Deviation	1.2	
Maximum	180.0	
Minimum	177.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	120.0	FTB
P1B	134.0	FTB
P2A	117.0	FTB
P2B	135.0	FTB
P3A	119.0	FTB
P3B	136.0	FTB
P4A	132.0	FTB
P4B	118.0	FTB
P5A	112.0	FTB
P5B	127.0	FTB
Average	125.0	*FTB - Film Tear Bond
Standard Deviation	8.4	
Maximum	136.0	
Minimum	112.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S36
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	180.0	Elongation
S2	185.0	Elongation
S3	186.0	Elongation
S4	187.0	Elongation
S5	190.0	Elongation
Average	185.6	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	190.0	
Minimum	180.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	128.0	FTB
P1B	145.0	FTB
P2A	148.0	FTB
P2B	135.0	FTB
P3A	152.0	FTB
P3B	134.0	FTB
P4A	132.0	FTB
P4B	134.0	FTB
P5A	153.0	FTB
P5B	118.0	FTB
Average	137.9	*FTB - Film Tear Bond
Standard Deviation	10.7	
Maximum	153.0	
Minimum	118.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S37
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	179.0	Elongation
S2	178.0	Elongation
S3	185.0	Elongation
S4	175.0	Elongation
S5	178.0	Elongation
Average	179.0	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	185.0	
Minimum	175.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	125.0	FTB
P2A	130.0	FTB
P2B	122.0	FTB
P3A	132.0	FTB
P3B	128.0	FTB
P4A	126.0	FTB
P4B	123.0	FTB
P5A	146.0	FTB
P5B	145.0	FTB
Average	130.0	*FTB - Film Tear Bond
Standard Deviation	8.3	
Maximum	146.0	
Minimum	122.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S38
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	182.0	Elongation
S2	178.0	Elongation
S3	178.0	Elongation
S4	178.0	Elongation
S5	177.0	Elongation
Average	178.6	*FTB - Film Tear Bond
Standard Deviation	1.7	
Maximum	182.0	
Minimum	177.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	124.0	FTB
P1B	121.0	FTB
P2A	141.0	FTB
P2B	123.0	FTB
P3A	122.0	FTB
P3B	122.0	FTB
P4A	127.0	FTB
P4B	123.0	FTB
P5A	122.0	FTB
P5B	127.0	FTB
Average	125.2	*FTB - Film Tear Bond
Standard Deviation	5.6	
Maximum	141.0	
Minimum	121.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S39
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	185.0	Elongation
S2	183.0	Elongation
S3	183.0	Elongation
S4	185.0	Elongation
S5	185.0	Elongation
Average	184.2	*FTB - Film Tear Bond
Standard Deviation	1.0	
Maximum	185.0	
Minimum	183.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	134.0	FTB
P1B	125.0	FTB
P2A	127.0	FTB
P2B	120.0	FTB
P3A	129.0	FTB
P3B	128.0	FTB
P4A	128.0	FTB
P4B	146.0	FTB
P5A	165.0	FTB
P5B	127.0	FTB
Average	132.9	*FTB - Film Tear Bond
Standard Deviation	12.5	
Maximum	165.0	
Minimum	120.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S40
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	178.0	Elongation
S2	173.0	Elongation
S3	169.0	Elongation
S4	172.0	Elongation
S5	177.0	Elongation
Average	173.8	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	178.0	
Minimum	169.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	128.0	FTB
P1B	103.0	FTB
P2A	134.0	FTB
P2B	102.0	FTB
P3A	107.0	FTB
P3B	127.0	FTB
P4A	107.0	FTB
P4B	133.0	FTB
P5A	128.0	FTB
P5B	103.0	FTB
Average	117.2	*FTB - Film Tear Bond
Standard Deviation	13.1	
Maximum	134.0	
Minimum	102.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S41
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	180.0	Elongation
S2	183.0	Elongation
S3	180.0	Elongation
S4	174.0	Elongation
S5	183.0	Elongation
Average	180.0	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	183.0	
Minimum	174.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	119.0	FTB
P1B	127.0	FTB
P2A	122.0	FTB
P2B	114.0	FTB
P3A	117.0	FTB
P3B	136.0	FTB
P4A	114.0	FTB
P4B	116.0	FTB
P5A	109.0	FTB
P5B	133.0	FTB
Average	120.7	*FTB - Film Tear Bond
Standard Deviation	8.3	
Maximum	136.0	
Minimum	109.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S42
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	196.0	Elongation
S2	194.0	Elongation
S3	194.0	Elongation
S4	193.0	Elongation
S5	189.0	Elongation
Average	193.2	*FTB - Film Tear Bond
Standard Deviation	2.3	
Maximum	196.0	
Minimum	189.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	124.0	FTB
P1B	136.0	FTB
P2A	156.0	FTB
P2B	122.0	FTB
P3A	129.0	FTB
P3B	124.0	FTB
P4A	127.0	FTB
P4B	146.0	FTB
P5A	129.0	FTB
P5B	127.0	FTB
Average	132.0	*FTB - Film Tear Bond
Standard Deviation	10.4	
Maximum	156.0	
Minimum	122.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: S43
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	168.0	Elongation
S2	169.0	Elongation
S3	167.0	Elongation
S4	156.0	Elongation
S5	170.0	Elongation
Average	166.0	*FTB - Film Tear Bond
Standard Deviation	5.1	
Maximum	170.0	
Minimum	156.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	139.0	FTB
P2A	118.0	FTB
P2B	153.0	FTB
P3A	150.0	FTB
P3B	119.0	FTB
P4A	130.0	FTB
P4B	116.0	FTB
P5A	115.0	FTB
P5B	146.0	FTB
Average	130.9	*FTB - Film Tear Bond
Standard Deviation	14.1	
Maximum	153.0	
Minimum	115.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Secondary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Extrusion
Sample: S44
Tested by: William Harrison
Date Tested: 07/26/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	182.0	Elongation
S2	181.0	Elongation
S3	182.0	Elongation
S4	181.0	Elongation
S5	181.0	Elongation
Average	181.4	*FTB - Film Tear Bond
Standard Deviation	0.5	
Maximum	182.0	
Minimum	181.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	115.0	FTB
P1B	0.0	
P2A	142.0	FTB
P2B	0.0	
P3A	120.0	FTB
P3B	0.0	
P4A	155.0	FTB
P4B	0.0	
P5A	122.0	FTB
P5B	0.0	
Average	65.4	*FTB - Film Tear Bond
Standard Deviation	66.3	
Maximum	155.0	
Minimum	0.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

Cell 2 Secondary HDPE Geomembrane Defect Log

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
Page: 1 of 6

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
1	S1 / CELL 1	7F WOEEOS	T	7/20/2010	BURNOUT	7/21/2010	WMH
2	S1 / CELL 1	32F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
3	S1 / CELL 1	89F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
4	S1 / CELL 1	163F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
5	S1 / CELL 1	169F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
6	S1 / CELL 1	174F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
7	S1 / CELL 1	267F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
8	S1 / CELL 1	302F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
9	S1 / CELL 1	319F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
10	S1 / CELL 1	324F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
11	S1 / CELL 1	329F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
12	S1 / CELL 1	340F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
13	S1 / CELL 1	349F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
14	S1 / CELL 1	369F WOEEOS	O	7/20/2010	BURNOUT	7/21/2010	WMH
15	S1 / CELL 1	400F WOEEOS	LDT	7/20/2010	LDT-1	7/21/2010	WMH
16	S1	10F SOWAT	O	7/20/2010		7/21/2010	WMH
17	S1/S2	200F EOWAT	LDT	7/20/2010	LDT-2	7/21/2010	WMH
18	S2/S3	300F EOWAT	LDT	7/20/2010	LDT-3	7/21/2010	WMH
19	S3/S4	400F EOWAT	LDT	7/20/2010	LDT-4	7/21/2010	WMH
20	S4/S5	100F EOWAT	LDT	7/20/2010	LDT-5	7/21/2010	WMH
21	S5/S6	470F EOWAT	LDT	7/20/2010	LDT-6	7/21/2010	WMH
22	S6/S7	300 F EOWAT	LDT	7/20/2010	LDT-7	7/21/2010	WMH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William M. Harrison

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
Page: 2 of 6

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
23	S7/S8	400F EOWAT	LDT	7/20/2010	LDT-8	7/21/2010	WMH
24	S8/S9	100F EOWAT	LDT	7/20/2010	LDT-9	7/21/2010	WMH
25	S5/S6	220F WOEEOS	O	7/20/2010		7/21/2010	WMH
26	S5/S6	198F WOEEOS	O	7/20/2010		7/21/2010	WMH
27	S5/S6	69F WOEEOS	O	7/20/2010		7/21/2010	WMH
28	S5/S6	54F WOEEOS	O	7/20/2010		7/21/2010	WMH
29	S9/S10	200F EOWAT	LDT	7/20/2010	LDT-10	7/22/2010	WMH
30	S10/S11	300F EOWAT	LDT	7/20/2010	LDT-11	7/22/2010	WMH
31	S11/S12	400F EOWAT	LDT	7/20/2010	LDT-12	7/22/2010	WMH
32	S12/S13	100F EOWAT	LDT	7/20/2010	LDT-13	7/22/2010	WMH
33	S13/S14	200F EOWAT	LDT	7/20/2010	LDT-14	7/22/2010	WMH
34	S14/S15	300F EOWAT	LDT	7/20/2010	LDT-15	7/22/2010	WMH
35	S15/S16	400F EOWAT	LDT	7/20/2010	LDT-16	7/22/2010	WMH
36	S16/S17	100F EOWAT	LDT	7/20/2010	LDT-17	7/22/2010	WMH
37	S17/S18	200F EOWAT	LDT	7/20/2010	LDT-18	7/22/2010	WMH
38	S18/S19	300F EOWAT	LDT	7/20/2010	LDT-19	7/22/2010	WMH
39	S19/S20	400F EOWAT	LDT	7/20/2010	LDT-20	7/22/2010	WMH
40	S9	180F WOEEOS	O	7/20/2010		7/22/2010	WMH
41	S5/S6	WAT	O	7/20/2010	BURNOUT AT ANCHOR TRENCH	7/21/2010	WMH
42	S13/S14	6F EOWEOS	O	7/20/2010		7/22/2010	WMH
43	S13/S14	13F EOWEOS	O	7/20/2010		7/22/2010	WMH
44	S13/S14	21F EOWEOS	O	7/20/2010		7/22/2010	WMH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William M. Harrison

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
45	S16	11F EOWAT 4F SONEO S15/S16 SEAM	O	7/20/2010		7/22/2010	WMH
46	S16	11F EOWAT 8F SONEO S15/S16 SEAM	O	7/20/2010		7/22/2010	WMH
47	S18/S19	WAT	O	7/20/2010		7/22/2010	WMH
48	S19/S20	WAT	O	7/20/2010		7/22/2010	WMH
49	S19/S20	6F EOWAT	O	7/20/2010		7/22/2010	WMH
50	S1/S21/CELL 1	T AT NEO S1/S21 SEAM	O	7/20/2010		7/23/2010	WMH
51	S1/S21/S22/S2	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
52	S2/S22/S3/S23	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
53	S3/S23/S4/S24	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
54	S4/S24	12 F SONEO S4/S24 SEAM	O	7/20/2010		7/23/2010	WMH
55	S4/S24/S5/S25	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
56	S5/S25/S6/S26	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
57	S6/S26/S7/S27	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
58	S7/S27/S8/S28	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
59	S8/S28/S9/S29	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
60	S27/S28	200F EOWEOS	O	7/20/2010		7/23/2010	WMH
61	S21/CELL 1	150F EOWEOS	LDT	7/20/2010	LDT-21	7/23/2010	WMH
62	S21/S22	350F EOWEOS	LDT	7/20/2010	LDT-22	7/23/2010	WMH
63	S23/S24	15F EOWEOS	LDT	7/20/2010	LDT-23	7/23/2010	WMH
64	S24/S25	90F WOEEOS	LDT	7/20/2010	LDT-24	7/23/2010	WMH
65	S25/S26	170F EOWEOS	LDT	7/20/2010	LDT-25	7/23/2010	WMH
66	S26/S27	250F WOEEOS	LDT	7/20/2010	LDT-26	7/23/2010	WMH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William M. Harrison

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
67	S27/S28	330F EOWEOS	LDT	7/20/2010	LDT-27	7/23/2010	WMH
68	S30/S31	34F EOWEOS	LDT	7/20/2010	LDT-28	7/23/2010	WMH
69	S36/S37	10F EOWEOS	LDT	7/20/2010	LDT-29	7/23/2010	WMH
70	S23/S35	10F SONEOS	LDT	7/20/2010	LDT-30	7/23/2010	WMH
71	S2/S22	10F SONEOS	LDT	7/20/2010	LDT-31	7/23/2010	WMH
72	S21/CELL 1/S37	NEOS S21/S37	O	7/20/2010		7/23/2010	WMH
73	S21/S37/S36/S22	WEOS S36/S37	O	7/20/2010		7/23/2010	WMH
74	S36/S35/S22/S23	WEOS S35/S36	O	7/20/2010		7/23/2010	WMH
75	S23/S24/S34/S35	WEOS S34/S35	O	7/20/2010		7/23/2010	WMH
76	S24/S25/S33/S34	WEOS S33/S34	O	7/20/2010		7/23/2010	WMH
77	S25/S26/S32/S33	WEOS S32/S33	O	7/20/2010		7/23/2010	WMH
78	S26/S27/S31/S32	WEOS S31/S32	O	7/20/2010		7/23/2010	WMH
79	S27/S28/S30/S31	WEOS S30/S31	O	7/20/2010		7/23/2010	WMH
80	S42/S30/S28	SEOS S30/S28	O	7/20/2010		7/23/2010	WMH
81	S42/S30/S41	EEOS S42	O	7/20/2010		7/23/2010	WMH
82	S39/S10/S29/S9	4 PANEL CORNER	O	7/20/2010		7/24/2010	WMH
83	S40/S41/S29/S39	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
84	S41/S42/S29/S28	5 PANEL PATCH	O	7/20/2010		7/23/2010	WMH
85	S42/S28	11F EOWEOS	O	7/20/2010		7/23/2010	WMH
86	S40/S39/S48/S58	4 PANEL CORNER	O	7/20/2010		7/23/2010	WMH
87	S47/S48/S39	3 PANEL PATCH	O	7/20/2010		7/23/2010	WMH
88	S46/S47/S39	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William M. Harrison

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
89	S46/S39	45F WOEEOS	O	7/20/2010		7/24/2010	WMH
90	S45/S46/S39	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
91	S44/S45/S39	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
92	S43/S44/S39	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
93	S10/S11/S43/S39	4 PANEL CORNER	O	7/20/2010		7/24/2010	WMH
94	S10/S39	6F NOSEOS	O	7/20/2010		7/24/2010	WMH
95	S56/S57/S43/S12/S11	5 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
96	S12/S56	15F SONEOS	O	7/20/2010		7/24/2010	WMH
97	S13/S12/S55/S56	4 PANEL CORNER	O	7/20/2010		7/24/2010	WMH
98	S54/S55/S14/S13	4 PANEL CORNER	O	7/20/2010		7/24/2010	WMH
99	S15/S53/S54/S14	4 PANEL CORNER	O	7/20/2010		7/24/2010	WMH
100	S53/S15/S52/S16	4 PANEL CORNER	O	7/20/2010		7/24/2010	WMH
101	S16/S17/S52/S51	4 PANEL CORNER	O	7/20/2010		7/24/2010	WMH
102	S17/S18/S50/S51	4 PANEL CORNER	O	7/20/2010		7/24/2010	WMH
103	S49/S50/S18/S19	4 PANEL CORNER	O	7/20/2010		7/24/2010	WMH
104	S19/S20/S49	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
105	S39/S29	100F EOWEOS	LDT	7/20/2010	LDT-32	7/24/2010	WMH
106	S47/S48	11F SONEOS	LDT	7/20/2010	LDT-33	7/24/2010	WMH
107	S46/S39	30F WOEEOS	LDT	7/20/2010	LDT-34	7/24/2010	WMH
108	S49/S50	30F EOWEOS	LDT	7/20/2010	LDT-35	7/24/2010	WMH
109	S50/S51	100F EOWEOS	LDT	7/20/2010	LDT-36	7/24/2010	WMH
110	S51/S52	150F EOWEOS	LDT	7/20/2010	LDT-37	7/24/2010	WMH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William M. Harrison

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
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Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
111	S52/S53	200F EOWEOS	LDT	7/20/2010	LDT-38	7/24/2010	WMH
112	S53/S54	250F EOWEOS	LDT	7/20/2010	LDT-39	7/24/2010	WMH
113	S54/S55	300F EOWEOS	LDT	7/20/2010	LDT-40	7/24/2010	WMH
114	S55/S56	350F EOWEOS	LDT	7/20/2010	LDT-41	7/24/2010	WMH
115	S56/S57	300F EOWEOS	LDT	7/20/2010	LDT-42	7/24/2010	WMH
116	S45/S57	70F WOEEOS	LDT	7/20/2010	LDT-43	7/24/2010	WMH
117	SR-95/S56	SOUTH SIDE OF SR-95 PATCH	LDT	7/20/2010	LDT-44	7/24/2010	WMH
118	S57/S43/S44	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
119	S57/S44/S45	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
120	S57/S45/S46	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
121	S46/S47/S57	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
122	S57/S47/S48	3 PANEL PATCH	O	7/20/2010		7/24/2010	WMH
123	S57/S48/S58	3 PANEL PATCH	O	7/20/2010		7/23/2010	WMH
124	S57/S58	56F WOEEOS	O	7/20/2010		7/24/2010	WMH
125	S57/S58	47F WOEEOS	O	7/20/2010		7/24/2010	WMH
126	S21/CELL 1	106F WOEEOS	O	7/20/2010		7/23/2010	WMH
127	S38/S37/CELL 1	3 PANEL PATCH	O	7/20/2010		7/23/2010	WMH
128	S38/CELL 1	88F WOEEOS	O	7/20/2010		7/23/2010	WMH
129	S38/CELL 1	EAT	O	7/20/2010		7/23/2010	WMH

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : William M. Harrison

Cell 2 Secondary HDPE Geomembrane Repair Testing Log

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
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Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
1	P	2 FT X 2 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
2	G&W	6"	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
3	G&W	6"	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
4	G&W	6"	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
5	G&W	6"	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
6	G&W	1 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
7	P	3 FT X 2 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
8	G&W	1 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
9	G&W	1 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
10	G&W	6"	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
11	G&W	6"	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
12	G&W	2 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
13	G&W	2 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
14	G&W	6"	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
15	P	5 FT X 2 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
16	G&W	2 FT X 6"	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
17	G&W	2 FT X 6"	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
18	P	2 FT X 5 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
19	P	2 FT X 5 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
20	P	2 FT X 5 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
21	P	2 FT X 5 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
22	P	2 FT X 5 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: William M. Harrison

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
Page: 2 of 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
23	P	2 FT X 5 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
24	P	1.5 FT X 5 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
25	G&W	2.5 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
26	G&W	3 FT X 2 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
27	G&W	1 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
28	G&W	1 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
29	P	2 FT X 5 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
30	P	2 FT X 5 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
31	P	2 FT X 5 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
32	P	2 FT X 5 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
33	P	2 FT X 5 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
34	P	2 FT X 5 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
35	P	5 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
36	P	5 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
37	P	4 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
38	P	2 FT X 5 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
39	P	2 FT X 5 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
40	P	2 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
41	P	2 FT X 6 FT	JT	WMH	7/21/2010	VB	SL	WMH	P	7/22/2010	
42	P	2 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
43	P	2 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
44	P	2 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: William M. Harrison

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
Page: 3 of 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
45	P	4 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
46	P	4 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
47	P	2 FT X 10 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
48	P	3 FT X 4 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
49	P	2 FT X 2 FT	JT	WMH	7/22/2010	VB	SL	WMH	P	7/22/2010	
50	P	5 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/22/2010	
51	P	2.5 FT X 7 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
52	P	2 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
53	P	2 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
54	P	1.5 FT X 1.5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
55	P	2 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
56	P	1.5 FT X 3.5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
57	P	4 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
58	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
59	P	3 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
60	P	2 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
61	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
62	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
63	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
64	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
65	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
66	P	2 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: William M. Harrison

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
Page: 4 of 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
67	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
68	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
69	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
70	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
71	P	2 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
72	P	2 FT X 3 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
73	P	2.5 FT X 7 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
74	P	2 FT X 6 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
75	P	3 FT X 6 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
76	P	2 FT X 6 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
77	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
78	P	2 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
79	P	2 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
80	P	2 FT X 3 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
81	P	2 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
82	P	8 FT X 4 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
83	P	2 FT X 2 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
84	P	3 FT X 6 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
85	P	2 FT X 3 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
86	P	3 FT X 4 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
87	P	2 FT X 2 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
88	P	2 FT X 2 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: William M. Harrison

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
Page: 5 of 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
89	P	2 FT X 6 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
90	P	2 FT X 2 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
91	P	2 FT X 2 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
92	P	2 FT X 2 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
93	P	2 FT X 4 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
94	P	2 FT X 4 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
95	P	4 FT X 10 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
96	P	1 FT X 2.5 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
97	P	2 FT X 3 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
98	P	2.5 FT X 2.5 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
99	P	2 FT X 2.5 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
100	P	1.5 FT X 4 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
101	P	2 FT X 3 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
102	P	2 FT X 9 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
103	P	2 FT X 3 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
104	P	2 FT X 8 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
105	P	2 FT X 8 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
106	P	2 FT X 6 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
107	P	2 FT X 8 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
108	P	2 FT X 5 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
109	P	2 FT X 5 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
110	P	2 FT X 5 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: William M. Harrison

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2 Secondary
Project Location: Terrell, North Carolina
Page: 6 of 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
111	P	2 FT X 5 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
112	P	2 FT X 5 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
113	P	2 FT X 5 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
114	P	2 FT X 5 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
115	P	2 FT X 4 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
116	P	2 FT X 5 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
117	P	2 FT X 5 FT	JT	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
118	P	2 FT X 2 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
119	P	2 FT X 2 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
120	P	2 FT X 2 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
121	P	2 FT X 2 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
122	P	2 FT X 2 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
123	P	3 FT X 9 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
124	P	1.5 FT X 1.5 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
125	P	2 FT X 3 FT	MV	WMH	7/24/2010	VB	CV	WMH	P	7/24/2010	
126	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
127	G&W	6" X 6"	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
128	P	2 FT X 5 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	
129	P	3 FT X 8 FT	JT	WMH	7/23/2010	VB	CV	WMH	P	7/24/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: William M. Harrison

APPENDIX II – GEOSYNTHETICS
Section 8 – Cell 2 Primary HDPE Geomembrane CQA Forms

Geomembrane Deployment Report
Geomembrane Trial Seam Log
Geomembrane Seam Log
Destructive Laboratory Test Results
Geomembrane Defect Log
Geomembrane Repair Testing Log

Cell 2 Primary HDPE Geomembrane Deployment Report

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 7/29,7/30/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 1 **of** 2

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	-----	-----		
P1	211794	500	22	11,000	0	WMH	7/29/10
P2	211317	503	22	11,066	0	WMH	7/29/10
P3	211320	501	22	11,022	0	WMH	7/29/10
P4	211792	503	22	11,066	0	WMH	7/29/10
P5	211672	499	22	10,978	0	WMH	7/29/10
P6	218414	502	22	11,044	0	WMH	7/29/10
P7	211799	502	22	11,044	0	WMH	7/29/10
P8	218715	502	22	11,044	0	WMH	7/29/10
P9	212103	501	22	11,022	0	WMH	7/29/10
P10	211438	503	22	11,066	0	WMH	7/29/10
P11	211562	505	22	11,110	0	WMH	7/29/10
P12	211445	505	22	11,110	0	WMH	7/29/10
P13	211787	504	22	11,088	0	WMH	7/29/10
P14	211682	503	22	11,066	0	WMH	7/29/10
P15	211789	503	22	11,066	0	WMH	7/29/10
P16	211551	502	22	11,044	0	WMH	7/29/10
P17	211793	503	22	11,066	0	WMH	7/29/10
P18	211549	501	22	11,022	0	WMH	7/29/10
P19	218718	60	2.5	150	0	WMH	7/29/10
P20	218718	30	2.5	75	0	WMH	7/29/10
P21	219221	114	22	2,508	0	WMH	7/29/10
P22	219101	64	22	1,408	0	WMH	7/29/10
P23	211439	70	22	1,540	0	WMH	7/29/10
P24	211551	4	22	88	0	WMH	7/29/10
P25	211793	10	22	220	0	WMH	7/29/10
P26	215155	4	22	88	0	WMH	7/29/10
P27	211322	501	22	11,022	0	WMH	7/29/10
P28	211443	501	22	11,022	0	WMH	7/29/10
P29	218717	502	22	11,044	0	WMH	7/29/10
			Sheet Total	238,089	0		
			Total to Date	238,089	0		

CQA Personnel: William M. Harrison / Jimmy Addis

GEOMEMBRANE DEPLOYMENT REPORT

Material Description
Agru America: 60-mil HDPE Liner

Date: 7/29,7/30/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 2 **of** 2

Panel No.	Roll Number	Length (ft)	Width (ft)	Approximate Area (ft^2) Textured	Approximate Area (ft^2) Smooth	CQA Initials	Remarks
			Carry Over	238,089	0		
P30	211703	503	22	11,066	0	WMH	7/30/10
P31	212105	502	22	11,044	0	WMH	7/30/10
P32	212106	502	22	11,044	0	WMH	7/30/10
P33	218730	502	22	11,044	0	WMH	7/30/10
P34	218719	503	22	11,066	0	WMH	7/30/10
P35	211796	504	22	11,088	0	WMH	7/30/10
P36	211667	503	6	3,018	0	WMH	7/30/10
P37	211442	503	22	11,066	0	WMH	7/30/10
P38	212107	496	22	10,912	0	JHA	7/30/10
P39	219120	489	22	10,758	0	JHA	7/30/10
P40	219119	490	22	10,780	0	JHA	7/30/10
P41	219117	485	22	10,670	0	JHA	7/30/10
P42	211437	490	22	10,780	0	JHA	7/30/10
P43	211414	490	22	10,780	0	JHA	7/30/10
P44	218728	496	22	10,912	0	JHA	7/30/10
P45	211676	482	22	10,604	0	JHA	7/30/10
P46	211704	495	22	10,890	0	JHA	7/30/10
P47	212110	495	11	5,445	0	JHA	7/30/10
P48	211563	498	22	10,956	0	JHA	7/30/10
			Sheet Total	193,923	0		
			Total to Date	432,012	0		

CQA Personnel: William M. Harrison / Jimmy Addis

Cell 2 Primary HDPE Geomembrane Trial Seam Log

GEOMEMBRANE TRIAL SEAM LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 1 **of** 2

					Machine Settings		Peel Test Results						Shear Test Results							
Sample No.	Approx. Time	Tech. Init.	Mach. No.	Ambient Temp.	Preheat or Speed	Temp. Setting	1		2		3		1	2	3	Pass/ Fail	Weld Type	Material	CQA Init.	Date
P1	714	WT	3211	78	30	860	110	112	105	112	106	110	122	125	126	P	F	SS	WH	07/29/2010
P2	720	BV	1219	78	5	850	120	121	116	120	114	124	146	142	147	P	F	ST	WH	07/29/2010
P3	725	DC	3210	78	27	860	116	111	109	104	114	101	149	154	154	P	F	SS	WH	07/29/2010
P4	900	BV	1219	78	7	860	119	110	120	114	116	111	152	146	151	P	F	SS	WH	07/29/2010
P5	905	BV	1219	78	5	860	111	114	110	107	116	121	156	149	152	P	F	TT	WH	07/29/2010
P6	1333	WT	3211	92	30	860	101	119	97	117	91	116	152	148	140	P	F	SS	WH	07/29/2010
P7	1350	DC	3210	92	30	860	99	102	97	108	101	105	143	141	148	P	F	SS	WH	07/29/2010
P8	1335	BV	1219	92	5	860	115	106	118	121	111	103	146	151	148	P	F	TT	WH	07/29/2010
P9	1335	BV	1219	92	5	860	117	121	114	123	110	117	143	148	145	P	F	ST	WH	07/29/2010
P10	1338	BV	1219	92	7	860	116	122	114	110	106	108	142	146	143	P	F	SS	WH	07/29/2010
P11	730	JT	5171	75	500	550	120	0	121	0	130	0	149	143	150	P	Ex	TT	WH	07/30/2010
P12	730	DC	3210	75	30	860	109	99	99	94	110	93	163	170	165	P	F	SS	WH	07/30/2010
P13	725	WT	3211	75	30	860	111	105	112	104	132	134	166	164	165	P	F	SS	WH	07/30/2010
P14	1030	BV	1219	80	5	860	118	115	122	114	126	119	151	150	148	P	F	TT	WH	07/30/2010
P15	1035	BV	1219	80	5	860	110	112	117	116	115	117	146	151	148	P	F	SS	WH	07/30/2010

Weld Type: (**Ex**)trusion, (**F**)usion
Material: (**SS**) Smooth/Smooth - (**ST**) Smooth/Texture - (**TT**) Texture /Texture

CQA Personnel: William Harrison

GEOMEMBRANE TRIAL SEAM LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 2 **of** 2

					Machine Settings		Peel Test Results						Shear Test Results							
Sample No.	Approx. Time	Tech. Init.	Mach. No.	Ambient Temp.	Preheat or Speed	Temp. Setting	1		2		3		1	2	3	Pass/ Fail	Weld Type	Material	CQA Init.	Date
P16	1100	WT	3211	80	17	860	115	122	118	124	119	121	148	146	152	P	F	ST	WH	07/30/2010
P17	1300	JT	5171	92	500	550	120	0	130	0	121	0	146	151	147	P	Ex	TT	WH	07/30/2010
P18	1300	BV	1219	92	5	860	118	114	116	121	116	120	145	152	150	P	F	TT	WH	07/30/2010
P19	1305	MV	5171	92	500	550	117	0	120	0	118	0	146	141	156	P	Ex	TT	WH	07/30/2010
P20	1400	DC	249	92	500	550	119	0	124	0	111	0	140	137	146	P	Ex	TT	WH	07/30/2010

Weld Type: (**Ex**)trusion, (**F**)usion
Material: (**SS**) Smooth/Smooth - (**ST**) Smooth/Texture - (**TT**) Texture /Texture

CQA Personnel: William Harrison

Cell 2 Primary HDPE Geomembrane Seam Log

GEOMEMBRANE SEAM LOG

Date: 7/29/2010-7/30/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 1 of 6

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P1 / P2	EEOS / WAT	7:32	WT	3211	494	2	Air	8:10 / 8:15	30 / 30	RC	WMH	PASS	7/29/2010	
P2 / P3	EEOS / WAT	7:35	DC	3210	493	3	Air	8:16 / 8:21	30 / 30	RC	WMH	PASS	7/29/2010	
P1 / Cell 1	EEOS / WAT	7:42	BV	1219	495	1	Air	8:55 / 9:00	30 / 30	RC	WMH	PASS	7/29/2010	Z2 8:52/8:57 30/30 Z3 8:49/8:54 30/30 Z4 9:01/9:06 30/29 Z5 9:07/9:12 30/29 Z6 9:04/9:09 30/29
P4 / P5	EEOS / WAT	8:04	DC	3210	491	5	Air	9:25 / 9:30	30 / 30	RC	WMH	PASS	7/29/2010	Z2 9:20/9:25 30/30
P3 / P4	EEOS / WAT	8:05	WT	3211	491	4	Air	8:45 / 8:50	30 / 30	RC	WMH	PASS	7/29/2010	Z2 8:47/8:52 30/30
P5 / P6	EEOS / WAT	8:35	DC	3210	491	6	Air	9:10 / 9:15	30 / 29	RC	WMH	PASS	7/29/2010	
P6 / P7	EEOS / WAT	8:39	WT	3211	493	7	Air	9:14 / 9:19	30 / 30	RC	WMH	PASS	7/29/2010	
P7 / P8	EEOS / WAT	9:07	WT	3211	494	8	Air	9:35 / 9:40	30 / 30	RC	WMH	PASS	7/29/2010	
P8 / P9	EEOS / WAT	9:11	DC	3210	496	9	Air	9:41 / 9:46	30 / 29	RC	WMH	PASS	7/29/2010	
P10 / P19	EEOS / WEOS	9:52	BV	1219	62		Air	9:04 / 9:09	30 / 30	RC	WMH	PASS	7/29/2010	
P10 / P11	EAT / WEOS	9:55	WT	3211	493	11	Air	10:49 / 10:54	30 / 30	RC	WMH	PASS	7/29/2010	
P11 / P12	EAT / WEOS	9:57	DC	3210	490	12	Air	10:50 / 10:55	30 / 30	RC	WMH	PASS	7/29/2010	
P10 / P20	EEOS / WEOS	10:00	BV	1219	30		Air	9:08 / 9:13	30 / 30	RC	WMH	PASS	7/29/2010	
P20 / Cell 1	WEOS / EEOS	10:08	BV	1219	30		Air	10:14 / 10:19	30 / 30	RC	WMH	PASS	7/29/2010	
P19 / Cell 1	WEOS / EEOS	10:12	BV	1219	62	20	Air	10:25 / 10:30	30 / 30	RC	WMH	PASS	7/29/2010	
				Sheet Total	5,605									
				Total to Date	5,605									

CQA Personnel: William M. Harrison

GEOMEMBRANE SEAM LOG

Date: 7/29/2010-7/30/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 2 of 6

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P10 / Cell 1	EEOS / WEOS	10:23	BV	1219	406	10	Air	10:33 / 10:38	30 / 30	RC	WMH	PASS	7/29/2010	Z2 11:20/11:25 30/30 Z3 11:30/11:35 30/30
P13 / P14	EAT / WEOS	10:32	DC	3210	491	14	Air	11:03 / 11:08	30 / 30	RC	WMH	PASS	7/29/2010	
P12 / P13	EAT / WEOS	10:34	WT	3211	495	13	Air	11:06 / 11:11	30 / 29	RC	WMH	PASS	7/29/2010	
P15 / P16	EAT / WEOS	11:00	DC	3210	495	16	Air	12:05 / 12:10	30 / 30	RC	WMH	PASS	7/29/2010	
P14 / P15	EAT / WEOS	11:15	WT	3211	496	15	Air	12:11 / 12:16	30 / 29	RC	WMH	PASS	7/29/2010	
P1 / P21	NEOS / SEOS	11:29	BV	1219	22		Air	11:33 / 11:38	30 / 30	RC	WMH	PASS	7/29/2010	
P2 / P21	NEOS / SEOS	11:30	BV	1219	22		Air	11:36 / 11:41	30 / 30	RC	WMH	PASS	7/29/2010	
P3 / P21	NEOS / SEOS	11:34	BV	1219	22		Air	11:39 / 11:44	30 / 30	RC	WMH	PASS	7/29/2010	
P4 / P21	NEOS / SEOS	11:37	BV	1219	22		Air	11:43 / 11:48	30 / 30	RC	WMH	PASS	7/29/2010	
P5 / P21	NEOS / SEOS	11:40	BV	1219	22		Air	11:48 / 11:53	30 / 30	RC	WMH	PASS	7/29/2010	
P17 / P18	EAT / WEOS	11:45	DC	3210	479	18	Air	13:22 / 13:27	30 / 30	RC	WMH	PASS	7/29/2010	
P6 / P22	NEOS / SEOS	11:45	BV	1219	22		Air	11:52 / 11:52	30 / 30	RC	WMH	PASS	7/29/2010	
P7 / P22	NEOS / SEOS	11:49	BV	1219	22		Air	11:55 / 12:00	30 / 30	RC	WMH	PASS	7/29/2010	
P16 / P17	EAT / WEOS	11:50	WT	3211	485	17	Air	13:30 / 13:35	30 / 29	RC	WMH	PASS	7/29/2010	
P8 / P22	NEOS / SEOS	11:52	BV	1219	22		Air	11:58 / 12:03	30 / 29	RC	WMH	PASS	7/29/2010	
				Sheet Total	3,523									
				Total to Date	9,128									

CQA Personnel: William M. Harrison

GEOMEMBRANE SEAM LOG

Date: 7/29/2010-7/30/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 3 of 6

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
P26 / P9	NEOS / SEOS	11:56	BV	1219	22		Air	12:04 / 12:09	30 / 30	RC	WMH	PASS	7/29/2010	
P18 / P26	NEOS / SEOS	12:00	BV	1219	22		Air	13:15 / 13:20	30 / 29	RC	WMH	PASS	7/29/2010	
P21 / P22	WEOS / EEOS	12:07	BV	1219	22	19	Air	13:18 / 13:23	30 / 30	RC	WMH	PASS	7/29/2010	
P25 / P23	EEOS / WEOS	13:36	BV	1219	6		Air	13:38 / 13:43	30 / 30	RC	WMH	PASS	7/29/2010	
P13 / P25	NEOS / SEOS	13:38	BV	1219	23		Air	13:50 / 13:55	30 / 30	RC	WMH	PASS	7/29/2010	
P14 / P25	EEOS / SEOS	13:41	BV	1219	6		Air	13:44 / 13:49	30 / 29	RC	WMH	PASS	7/29/2010	
P10 / P24	NEOS / SEOS	13:43	BV	1219	22		Air	14:11 / 14:16	30 / 30	RC	WMH	PASS	7/29/2010	
P24 / P23	NEOS / SEOS	13:48	BV	1219	22		Air	14:05 / 14:10	30 / 30	RC	WMH	PASS	7/29/2010	
P23 / P11	NEOS / SEOS	13:51	BV	1219	22		Air	14:08 / 14:13	30 / 30	RC	WMH	PASS	7/29/2010	
P23 / P12	NEOS / SEOS	13:54	BV	1219	24		Air	13:58 / 14:03	30 / 30	RC	WMH	PASS	7/29/2010	
P23 / P13	EEOS / WEOS	13:57	BV	1219	10		Air	14:01 / 14:06	30 / 30	RC	WMH	PASS	7/29/2010	
P28 / P29	WAT / EEOS	14:02	DC	3210	498	22	Air	15:03 / 15:08	30 / 30	RC	WMH	PASS	7/29/2010	
P21 / P23	NEOS / SEOS	14:03	BV	1219	70		Air	14:14 / 14:19	30 / 30	RC	WMH	PASS	7/29/2010	
P25 / P21	NEOS / SEOS	14:11	BV	1219	22		Air	14:16 / 14:21	30 / 30	RC	WMH	PASS	7/29/2010	Z2 14:15/14:30 30/29
P14 / P21	NEOS / SEOS	14:13	BV	1219	12		Air	14:17 / 14:22	30 / 29	RC	WMH	PASS	7/29/2010	
				Sheet Total	803									
				Total to Date	9,931									

CQA Personnel: William M. Harrison

GEOMEMBRANE SEAM LOG

Date: 7/29/2010-7/30/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 4 of 6

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
P15 / P22	NEOS / SEOS	14:17	BV	1219	22		Air	14:24 / 14:29	30 / 30	RC	WMH	PASS	7/29/2010	
P27 / P28	WAT / EEOS	14:17	WT	3211	498	21	Air	15:00 / 15:05	30 / 30	RC	WMH	PASS	7/29/2010	
P16 / P22	NEOS / SEOS	14:19	BV	1219	22		Air	14:25 / 14:30	30 / 29	RC	WMH	PASS	7/29/2010	
P17 / P22	NEOS / SEOS	14:22	BV	1219	23		Air	14:28 / 14:33	30 / 30	RC	WMH	PASS	7/29/2010	
P18 / P22	EEOS / WEOS	14:25	BV	1219	15		Air	14:30 / 14:35	30 / 30	RC	WMH	PASS	7/29/2010	
P29 / P30	WAT / EEOS	14:33	DC	3210	499	23	Air	15:10 / 15:15	30 / 30	RC	WMH	PASS	7/29/2010	
P23 / Cell 1	WEOS / EEOS	14:38	BV	1219	22		Air	14:44 / 14:49	30 / 29	RC	WMH	PASS	7/29/2010	
P21 / Cell 1	EEOS / WEOS	14:40	BV	1219	22		Air	14:47 / 14:52	30 / 30	RC	WMH	PASS	7/29/2010	
P30 / P31	WAT / EEOS	14:49	WT	3211	497	24	Air	15:20 / 15:25	30 / 30	RC	WMH	PASS	7/29/2010	
P31 / P32	WAT / EEOS	15:04	DC	3210	498	25	Air	15:30 / 15:25	30 / 30	RC	WMH	PASS	7/29/2010	
P32 / P33	WAT / EEOS	15:23	WT	3211	498	26	Air	15:55 / 16:00	30 / 30	RC	WMH	PASS	7/29/2010	
P33 / P34	WAT / EEOS	15:46	DC	3210	498	27	Air	16:11 / 16:16	30 / 30	RC	WMH	PASS	7/29/2010	
P36 / P37	WAT / EEOS	15:50	BV	1219	498	29	Air	7:00 / 7:05	30 / 30	RC	WMH	PASS	7/30/2010	
P34 / P35	WAT / EEOS	16:00	WT	3211	497	44	Air	16:25 / 16:30	30 / 30	RC	WMH	PASS	7/29/2010	
P37 / P9	EEOS / WAT	16:10	DC	3210	498	30	Air	16:40 / 16:45	30 / 30	RC	WMH	PASS	7/29/2010	
				Sheet Total	4,607									
				Total to Date	14,538									

CQA Personnel: William M. Harrison

GEOMEMBRANE SEAM LOG

Date: 7/29/2010-7/30/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 5 of 6

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	AIR PRESSURE TEST Pressure Start/ Finish	AIR PRESSURE TEST Tech. Init.	AIR PRESSURE TEST QC Init.	Pass /Fail	Date	Remarks (ZONE)
P35 / P36	WAT / EEOS	16:27	WT	3211	499	28	Air	7:10 / 7:15	30 / 30	RC	WMH	PASS	7/30/2010	
P38 / P39	WEOS / EAT	8:14	DC	3210	493	31	Air	8:55 / 9:00	30 / 30	RC	JHA	PASS	7/30/2010	
P39 / P40	WEOS / EAT	8:24	WT	3211	486	32	Air	8:57 / 9:02	30 / 30	RC	JHA	PASS	7/30/2010	
P40 / P41	WEOS / EAT	8:45	DC	3210	482	33	Air	9:16 / 9:21	30 / 30	RC	JHA	PASS	7/30/2010	
P41 / P42	WEOS / EAT	8:56	WT	3211	482	34	Air	9:30 / 9:35	30 / 30	RC	JHA	PASS	7/30/2010	
P42 / P43	WEOS / EAT	9:25	DC	3210	466	35	Air	9:52 / 9:57	30 / 30	RC	JHA	PASS	7/30/2010	
P43 / P44	WEOS / EAT	9:34	WT	3211	472	36	Air	10:00 / 10:05	30 / 29	RC	JHA	PASS	7/30/2010	
P44 / P45	WEOS / EAT	9:57	DC	3210	466	37	Air	10:25 / 10:30	30 / 30	RC	JHA	PASS	7/30/2010	
P45 / P46	WEOS / EAT	10:10	WT	3211	478	38	Air	10:40 / 10:45	30 / 29	RC	JHA	PASS	7/30/2010	
P18 / P48	EAT / WEOS	10:34	BV	1219	488	41	Air	11:22 / 11:27	30 / 30	RC	JHA	PASS	7/30/2010	Z2 11:33/11:38 30/30
P47 / P48	WEOS / EAT	10:55	DC	3210	476	40	Air	11:15 / 11:20	30 / 30	RC	JHA	PASS	7/30/2010	Z2 11:20/11:25 30/30
P46 / P47	WEOS / EAT	11:04	WT	3211	479	39	Air	12:40 / 12:45	30 / 30	RC	JHA	PASS	7/30/2010	
P37 / P48	NEOS / SEOS	13:01	BV	1219	22		Air	13:04 / 13:09	30 / 30	RC	JHA	PASS	7/30/2010	Z2 13:08/13:13 30/30
P36 / P47	NEOS / SEOS	13:06	BV	1219	6		Air	13:09 / 13:14	30 / 30	RC	JHA	PASS	7/30/2010	
P35 / P46	NEOS / SEOS	13:07	BV	1219	22		Air	13:12 / 13:17	30 / 29	RC	JHA	PASS	7/30/2010	
				Sheet Total	5,817									
				Total to Date	20,355									

CQA Personnel: James Addis

GEOMEMBRANE SEAM LOG

Date: 7/29/2010-7/30/2010
S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 6 of 6

Seam Panels	Seam Start/Finish	Time	Tech. Init.	Mach. No.	Length Welded	Located Destr. Number	Test Type (Air / Vac.)	AIR PRESSURE TEST Time Start/ Finish	Pressure Start/ Finish	Tech. Init.	QC Init.	Pass /Fail	Date	Remarks (ZONE)
P34 / P45	NEOS / SEOS	13:10	BV	1219	22		Air	13:16 / 13:21	30 / 30	RC	JHA	PASS	7/30/2010	
P33 / P44	NEOS / SEOS	13:13	BV	1219	22		Air	13:20 / 13:25	30 / 30	RC	JHA	PASS	7/30/2010	
P32 / P43	NEOS / SEOS	13:16	BV	1219	22		Air	13:23 / 13:28	30 / 30	RC	JHA	PASS	7/30/2010	
P31 / P42	NEOS / SEOS	13:20	BV	1219	22	43	Air	13:28 / 13:33	30 / 30	RC	JHA	PASS	7/30/2010	
P30 / P41	NEOS / SEOS	13:24	BV	1219	22		Air	13:32 / 13:37	30 / 29	RC	JHA	PASS	7/30/2010	
P29 / P40	NEOS / SEOS	13:27	BV	1219	22		Air	13:35 / 13:40	30 / 30	RC	JHA	PASS	7/30/2010	
P28 / P39	NEOS / SEOS	13:30	BV	1219	22		Air	13:40 / 13:45	30 / 30	RC	JHA	PASS	7/30/2010	
P27 / P38	NEOS / SAT	13:34	BV	1219	18		Air	13:44 / 13:49	30 / 30	RC	JHA	PASS	7/30/2010	

Sheet Total 172
Total to Date 20,527

CQA Personnel: James Addis

Cell 2 Primary HDPE Geomembrane Destructive Laboratory Test Results

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P1
Tested by: William Harrison
Date Tested: 07/30/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	164.0	Elongation
S2	159.0	Elongation
S3	159.0	Elongation
S4	157.0	Elongation
S5	160.0	Elongation
Average	159.8	*FTB - Film Tear Bond
Standard Deviation	2.3	
Maximum	164.0	
Minimum	157.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	116.0	FTB
P1B	132.0	FTB
P2A	122.0	FTB
P2B	136.0	FTB
P3A	123.0	FTB
P3B	112.0	FTB
P4A	147.0	FTB
P4B	122.0	FTB
P5A	127.0	FTB
P5B	143.0	FTB
Average	128.0	*FTB - Film Tear Bond
Standard Deviation	10.8	
Maximum	147.0	
Minimum	112.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P2
Tested by: William Harrison
Date Tested: 07/30/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	173.0	Elongation
S2	171.0	Elongation
S3	183.0	Elongation
S4	182.0	Elongation
S5	179.0	Elongation
Average	177.6	*FTB - Film Tear Bond
Standard Deviation	4.8	
Maximum	183.0	
Minimum	171.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	130.0	FTB
P1B	128.0	FTB
P2A	136.0	FTB
P2B	110.0	FTB
P3A	142.0	FTB
P3B	130.0	FTB
P4A	122.0	FTB
P4B	124.0	FTB
P5A	138.0	FTB
P5B	112.0	FTB
Average	127.2	*FTB - Film Tear Bond
Standard Deviation	10.0	
Maximum	142.0	
Minimum	110.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P3
Tested by: William Harrison
Date Tested: 07/30/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	186.0	Elongation
S2	183.0	Elongation
S3	175.0	Elongation
S4	178.0	Elongation
S5	190.0	Elongation
Average	182.4	*FTB - Film Tear Bond
Standard Deviation	5.4	
Maximum	190.0	
Minimum	175.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	138.0	FTB
P1B	124.0	FTB
P2A	130.0	FTB
P2B	137.0	FTB
P3A	130.0	FTB
P3B	139.0	FTB
P4A	133.0	FTB
P4B	137.0	FTB
P5A	130.0	FTB
P5B	142.0	FTB
Average	134.0	*FTB - Film Tear Bond
Standard Deviation	5.2	
Maximum	142.0	
Minimum	124.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P4
Tested by: James Addis
Date Tested: 08/03/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	195.0	Elongation
S2	188.0	Elongation
S3	187.0	Elongation
S4	190.0	Elongation
S5	186.0	Elongation
Average	189.2	*FTB - Film Tear Bond
Standard Deviation	3.2	
Maximum	195.0	
Minimum	186.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	103.0	FTB
P1B	133.0	FTB
P2A	106.0	FTB
P2B	123.0	FTB
P3A	108.0	FTB
P3B	141.0	FTB
P4A	106.0	FTB
P4B	120.0	FTB
P5A	118.0	FTB
P5B	137.0	FTB
Average	119.5	*FTB - Film Tear Bond
Standard Deviation	13.2	
Maximum	141.0	
Minimum	103.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P5
Tested by: James Addis
Date Tested: 08/03/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	188.0	Elongation
S2	183.0	Elongation
S3	186.0	Elongation
S4	187.0	Elongation
S5	184.0	Elongation
Average	185.6	*FTB - Film Tear Bond
Standard Deviation	1.9	
Maximum	188.0	
Minimum	183.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	128.0	FTB
P1B	134.0	FTB
P2A	135.0	FTB
P2B	123.0	FTB
P3A	132.0	FTB
P3B	141.0	FTB
P4A	117.0	FTB
P4B	122.0	FTB
P5A	132.0	FTB
P5B	121.0	FTB
Average	128.5	*FTB - Film Tear Bond
Standard Deviation	7.2	
Maximum	141.0	
Minimum	117.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P6
Tested by: James Addis
Date Tested: 08/03/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	182.0	Elongation
S2	175.0	Elongation
S3	180.0	Elongation
S4	183.0	Elongation
S5	185.0	Elongation
Average	181.0	*FTB - Film Tear Bond
Standard Deviation	3.4	
Maximum	185.0	
Minimum	175.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	115.0	FTB
P1B	129.0	FTB
P2A	119.0	FTB
P2B	114.0	FTB
P3A	112.0	FTB
P3B	129.0	FTB
P4A	123.0	FTB
P4B	123.0	FTB
P5A	121.0	FTB
P5B	114.0	FTB
Average	119.9	*FTB - Film Tear Bond
Standard Deviation	5.9	
Maximum	129.0	
Minimum	112.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P7
Tested by: James Addis
Date Tested: 08/03/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	181.0	Elongation
S2	182.0	Elongation
S3	180.0	Elongation
S4	183.0	Elongation
S5	185.0	Elongation
Average	182.2	*FTB - Film Tear Bond
Standard Deviation	1.7	
Maximum	185.0	
Minimum	180.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	133.0	FTB
P1B	117.0	FTB
P2A	125.0	FTB
P2B	118.0	FTB
P3A	134.0	FTB
P3B	121.0	FTB
P4A	126.0	FTB
P4B	124.0	FTB
P5A	130.0	FTB
P5B	118.0	FTB
Average	124.6	*FTB - Film Tear Bond
Standard Deviation	5.9	
Maximum	134.0	
Minimum	117.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P8
Tested by: James Addis
Date Tested: 08/03/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	178.0	Elongation
S2	175.0	Elongation
S3	179.0	Elongation
S4	172.0	Elongation
S5	175.0	Elongation
Average	175.8	*FTB - Film Tear Bond
Standard Deviation	2.5	
Maximum	179.0	
Minimum	172.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	135.0	FTB
P1B	113.0	FTB
P2A	137.0	
P2B	100.0	FTB
P3A	112.0	FTB
P3B	138.0	FTB
P4A	118.0	FTB
P4B	144.0	FTB
P5A	137.0	FTB
P5B	113.0	FTB
Average	124.7	*FTB - Film Tear Bond
Standard Deviation	14.3	
Maximum	144.0	
Minimum	100.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P9
Tested by: James Addis
Date Tested: 08/03/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	181.0	Elongation
S2	178.0	Elongation
S3	180.0	Elongation
S4	177.0	Elongation
S5	183.0	Elongation
Average	179.8	*FTB - Film Tear Bond
Standard Deviation	2.1	
Maximum	183.0	
Minimum	177.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	132.0	FTB
P1B	106.0	FTB
P2A	131.0	FTB
P2B	109.0	FTB
P3A	119.0	FTB
P3B	139.0	FTB
P4A	122.0	FTB
P4B	110.0	FTB
P5A	127.0	FTB
P5B	114.0	FTB
Average	120.9	*FTB - Film Tear Bond
Standard Deviation	10.6	
Maximum	139.0	
Minimum	106.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P10
Tested by: James Addis
Date Tested: 08/03/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	180.0	Elongation
S2	171.0	Elongation
S3	180.0	Elongation
S4	178.0	Elongation
S5	175.0	Elongation
Average	176.8	*FTB - Film Tear Bond
Standard Deviation	3.4	
Maximum	180.0	
Minimum	171.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	140.0	FTB
P1B	154.0	FTB
P2A	141.0	FTB
P2B	134.0	FTB
P3A	130.0	FTB
P3B	139.0	FTB
P4A	138.0	FTB
P4B	127.0	FTB
P5A	143.0	FTB
P5B	133.0	FTB
Average	137.9	*FTB - Film Tear Bond
Standard Deviation	7.2	
Maximum	154.0	
Minimum	127.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P11
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	190.0	Elongation
S2	191.0	Elongation
S3	191.0	Elongation
S4	191.0	Elongation
S5	189.0	Elongation
Average	190.4	*FTB - Film Tear Bond
Standard Deviation	0.8	
Maximum	191.0	
Minimum	189.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	140.0	FTB
P1B	140.0	FTB
P2A	136.0	FTB
P2B	126.0	FTB
P3A	134.0	FTB
P3B	139.0	FTB
P4A	136.0	FTB
P4B	135.0	FTB
P5A	133.0	FTB
P5B	133.0	FTB
Average	135.2	*FTB - Film Tear Bond
Standard Deviation	4.0	
Maximum	140.0	
Minimum	126.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P12
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	185.0	Elongation
S2	186.0	Elongation
S3	180.0	Elongation
S4	187.0	Elongation
S5	182.0	Elongation
Average	184.0	*FTB - Film Tear Bond
Standard Deviation	2.6	
Maximum	187.0	
Minimum	180.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	135.0	FTB
P1B	132.0	FTB
P2A	131.0	FTB
P2B	126.0	FTB
P3A	131.0	FTB
P3B	130.0	FTB
P4A	132.0	FTB
P4B	136.0	FTB
P5A	130.0	FTB
P5B	136.0	FTB
Average	131.9	*FTB - Film Tear Bond
Standard Deviation	2.9	
Maximum	136.0	
Minimum	126.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P13
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	179.0	Elongation
S2	179.0	Elongation
S3	181.0	Elongation
S4	183.0	Elongation
S5	183.0	Elongation
Average	181.0	*FTB - Film Tear Bond
Standard Deviation	1.8	
Maximum	183.0	
Minimum	179.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	128.0	FTB
P1B	132.0	FTB
P2A	128.0	FTB
P2B	134.0	FTB
P3A	133.0	FTB
P3B	132.0	FTB
P4A	138.0	FTB
P4B	128.0	FTB
P5A	125.0	FTB
P5B	120.0	FTB
Average	129.8	*FTB - Film Tear Bond
Standard Deviation	4.8	
Maximum	138.0	
Minimum	120.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P14
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	185.0	Elongation
S2	183.0	Elongation
S3	182.0	Elongation
S4	179.0	Elongation
S5	185.0	Elongation
Average	182.8	*FTB - Film Tear Bond
Standard Deviation	2.2	
Maximum	185.0	
Minimum	179.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	140.0	FTB
P1B	148.0	FTB
P2A	126.0	FTB
P2B	136.0	FTB
P3A	131.0	FTB
P3B	134.0	FTB
P4A	134.0	FTB
P4B	128.0	FTB
P5A	131.0	FTB
P5B	122.0	FTB
Average	133.0	*FTB - Film Tear Bond
Standard Deviation	7.0	
Maximum	148.0	
Minimum	122.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P15
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	178.0	Elongation
S2	174.0	Elongation
S3	176.0	Elongation
S4	181.0	Elongation
S5	178.0	Elongation
Average	177.4	*FTB - Film Tear Bond
Standard Deviation	2.3	
Maximum	181.0	
Minimum	174.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	127.0	FTB
P1B	125.0	FTB
P2A	123.0	FTB
P2B	118.0	FTB
P3A	116.0	FTB
P3B	114.0	FTB
P4A	112.0	FTB
P4B	114.0	FTB
P5A	126.0	FTB
P5B	115.0	FTB
Average	119.0	*FTB - Film Tear Bond
Standard Deviation	5.4	
Maximum	127.0	
Minimum	112.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P16
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	187.0	Elongation
S2	186.0	Elongation
S3	179.0	Elongation
S4	183.0	Elongation
S5	188.0	Elongation
Average	184.6	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	188.0	
Minimum	179.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	129.0	FTB
P1B	128.0	FTB
P2A	130.0	FTB
P2B	127.0	FTB
P3A	131.0	FTB
P3B	132.0	FTB
P4A	128.0	FTB
P4B	126.0	FTB
P5A	122.0	FTB
P5B	125.0	FTB
Average	127.8	*FTB - Film Tear Bond
Standard Deviation	2.8	
Maximum	132.0	
Minimum	122.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P17
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	180.0	Elongation
S2	174.0	Elongation
S3	176.0	Elongation
S4	176.0	Elongation
S5	176.0	Elongation
Average	176.4	*FTB - Film Tear Bond
Standard Deviation	2.0	
Maximum	180.0	
Minimum	174.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	122.0	FTB
P1B	122.0	FTB
P2A	122.0	FTB
P2B	125.0	FTB
P3A	117.0	FTB
P3B	120.0	FTB
P4A	122.0	FTB
P4B	126.0	FTB
P5A	118.0	FTB
P5B	121.0	FTB
Average	121.5	*FTB - Film Tear Bond
Standard Deviation	2.6	
Maximum	126.0	
Minimum	117.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P18
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	180.0	Elongation
S2	180.0	Elongation
S3	181.0	Elongation
S4	181.0	Elongation
S5	179.0	Elongation
Average	180.2	*FTB - Film Tear Bond
Standard Deviation	0.7	
Maximum	181.0	
Minimum	179.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	119.0	FTB
P1B	121.0	FTB
P2A	129.0	FTB
P2B	122.0	FTB
P3A	130.0	FTB
P3B	158.0	FTB
P4A	128.0	FTB
P4B	123.0	FTB
P5A	159.0	FTB
P5B	110.0	FTB
Average	129.9	*FTB - Film Tear Bond
Standard Deviation	15.3	
Maximum	159.0	
Minimum	110.0	
Pass/Fail [1,2,3]	FAIL	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P19
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	168.0	Elongation
S2	164.0	Elongation
S3	173.0	Elongation
S4	170.0	Elongation
S5	167.0	Elongation
Average	168.4	*FTB - Film Tear Bond
Standard Deviation	3.0	
Maximum	173.0	
Minimum	164.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	144.0	FTB
P1B	139.0	FTB
P2A	138.0	FTB
P2B	128.0	FTB
P3A	148.0	FTB
P3B	138.0	FTB
P4A	135.0	FTB
P4B	146.0	FTB
P5A	134.0	FTB
P5B	134.0	FTB
Average	138.4	*FTB - Film Tear Bond
Standard Deviation	5.8	
Maximum	148.0	
Minimum	128.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P20
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	160.0	Elongation
S2	162.0	Elongation
S3	170.0	Elongation
S4	165.0	Elongation
S5	169.0	Elongation
Average	165.2	*FTB - Film Tear Bond
Standard Deviation	3.9	
Maximum	170.0	
Minimum	160.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	127.0	FTB
P1B	115.0	FTB
P2A	123.0	FTB
P2B	117.0	FTB
P3A	123.0	FTB
P3B	131.0	FTB
P4A	121.0	FTB
P4B	113.0	FTB
P5A	126.0	FTB
P5B	115.0	FTB
Average	121.1	*FTB - Film Tear Bond
Standard Deviation	5.7	
Maximum	131.0	
Minimum	113.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P21
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	181.0	Elongation
S2	187.0	Elongation
S3	185.0	Elongation
S4	184.0	Elongation
S5	188.0	Elongation
Average	185.0	*FTB - Film Tear Bond
Standard Deviation	2.4	
Maximum	188.0	
Minimum	181.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	119.0	FTB
P1B	131.0	FTB
P2A	118.0	FTB
P2B	132.0	FTB
P3A	113.0	FTB
P3B	132.0	FTB
P4A	123.0	FTB
P4B	131.0	FTB
P5A	128.0	FTB
P5B	129.0	FTB
Average	125.6	*FTB - Film Tear Bond
Standard Deviation	6.5	
Maximum	132.0	
Minimum	113.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P22
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	183.0	Elongation
S2	180.0	Elongation
S3	171.0	Elongation
S4	179.0	Elongation
S5	178.0	Elongation
Average	178.2	*FTB - Film Tear Bond
Standard Deviation	4.0	
Maximum	183.0	
Minimum	171.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	126.0	FTB
P1B	129.0	FTB
P2A	138.0	FTB
P2B	134.0	FTB
P3A	135.0	FTB
P3B	130.0	FTB
P4A	129.0	FTB
P4B	132.0	FTB
P5A	130.0	FTB
P5B	135.0	FTB
Average	131.8	*FTB - Film Tear Bond
Standard Deviation	3.5	
Maximum	138.0	
Minimum	126.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P23
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	173.0	Elongation
S2	169.0	Elongation
S3	172.0	Elongation
S4	171.0	Elongation
S5	172.0	Elongation
Average	171.4	*FTB - Film Tear Bond
Standard Deviation	1.4	
Maximum	173.0	
Minimum	169.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	138.0	FTB
P1B	135.0	FTB
P2A	111.0	FTB
P2B	112.0	FTB
P3A	114.0	FTB
P3B	114.0	FTB
P4A	138.0	FTB
P4B	135.0	FTB
P5A	135.0	FTB
P5B	111.0	FTB
Average	124.3	*FTB - Film Tear Bond
Standard Deviation	12.0	
Maximum	138.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P24
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	185.0	Elongation
S2	184.0	Elongation
S3	184.0	Elongation
S4	164.0	Elongation
S5	178.0	Elongation
Average	179.0	*FTB - Film Tear Bond
Standard Deviation	7.9	
Maximum	185.0	
Minimum	164.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	126.0	FTB
P1B	128.0	FTB
P2A	127.0	FTB
P2B	128.0	FTB
P3A	130.0	FTB
P3B	126.0	FTB
P4A	124.0	FTB
P4B	127.0	FTB
P5A	128.0	FTB
P5B	127.0	FTB
Average	127.1	*FTB - Film Tear Bond
Standard Deviation	1.5	
Maximum	130.0	
Minimum	124.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P25
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	183.0	Elongation
S2	173.0	Elongation
S3	183.0	Elongation
S4	180.0	Elongation
S5	182.0	Elongation
Average	180.2	*FTB - Film Tear Bond
Standard Deviation	3.8	
Maximum	183.0	
Minimum	173.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	125.0	FTB
P1B	128.0	FTB
P2A	128.0	FTB
P2B	132.0	FTB
P3A	131.0	FTB
P3B	129.0	FTB
P4A	127.0	FTB
P4B	126.0	FTB
P5A	132.0	FTB
P5B	131.0	FTB
Average	128.9	*FTB - Film Tear Bond
Standard Deviation	2.4	
Maximum	132.0	
Minimum	125.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P26
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	172.0	Elongation
S2	176.0	Elongation
S3	173.0	Elongation
S4	170.0	Elongation
S5	172.0	Elongation
Average	172.6	*FTB - Film Tear Bond
Standard Deviation	2.0	
Maximum	176.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	132.0	FTB
P1B	127.0	FTB
P2A	119.0	FTB
P2B	121.0	FTB
P3A	127.0	FTB
P3B	116.0	FTB
P4A	116.0	FTB
P4B	112.0	FTB
P5A	117.0	FTB
P5B	114.0	FTB
Average	120.1	*FTB - Film Tear Bond
Standard Deviation	6.2	
Maximum	132.0	
Minimum	112.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P27
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	175.0	Elongation
S2	172.0	Elongation
S3	173.0	Elongation
S4	172.0	Elongation
S5	170.0	Elongation
Average	172.4	*FTB - Film Tear Bond
Standard Deviation	1.6	
Maximum	175.0	
Minimum	170.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	124.0	FTB
P1B	119.0	FTB
P2A	139.0	FTB
P2B	127.0	FTB
P3A	137.0	FTB
P3B	122.0	FTB
P4A	116.0	FTB
P4B	128.0	FTB
P5A	116.0	FTB
P5B	121.0	FTB
Average	124.9	*FTB - Film Tear Bond
Standard Deviation	7.6	
Maximum	139.0	
Minimum	116.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P28
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	169.0	Elongation
S2	163.0	Elongation
S3	168.0	Elongation
S4	169.0	Elongation
S5	163.0	Elongation
Average	166.4	*FTB - Film Tear Bond
Standard Deviation	2.8	
Maximum	169.0	
Minimum	163.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	139.0	FTB
P1B	136.0	FTB
P2A	131.0	FTB
P2B	135.0	FTB
P3A	135.0	FTB
P3B	132.0	FTB
P4A	130.0	FTB
P4B	126.0	FTB
P5A	131.0	FTB
P5B	128.0	FTB
Average	132.3	*FTB - Film Tear Bond
Standard Deviation	3.7	
Maximum	139.0	
Minimum	126.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P29
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	172.0	Elongation
S2	169.0	Elongation
S3	179.0	Elongation
S4	173.0	Elongation
S5	174.0	Elongation
Average	173.4	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	179.0	
Minimum	169.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	127.0	FTB
P1B	116.0	FTB
P2A	125.0	FTB
P2B	128.0	FTB
P3A	141.0	FTB
P3B	130.0	FTB
P4A	128.0	FTB
P4B	127.0	FTB
P5A	130.0	FTB
P5B	124.0	FTB
Average	127.6	*FTB - Film Tear Bond
Standard Deviation	5.9	
Maximum	141.0	
Minimum	116.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P30
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	215.0	Elongation
S2	212.0	Elongation
S3	218.0	Elongation
S4	215.0	Elongation
S5	212.0	Elongation
Average	214.4	*FTB - Film Tear Bond
Standard Deviation	2.2	
Maximum	218.0	
Minimum	212.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	138.0	FTB
P1B	125.0	FTB
P2A	132.0	FTB
P2B	126.0	FTB
P3A	128.0	FTB
P3B	129.0	FTB
P4A	127.0	FTB
P4B	134.0	FTB
P5A	124.0	FTB
P5B	118.0	FTB
Average	128.1	*FTB - Film Tear Bond
Standard Deviation	5.3	
Maximum	138.0	
Minimum	118.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P31
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	202.0	Elongation
S2	204.0	Elongation
S3	199.0	Elongation
S4	207.0	Elongation
S5	210.0	Elongation
Average	204.4	*FTB - Film Tear Bond
Standard Deviation	3.8	
Maximum	210.0	
Minimum	199.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	127.0	FTB
P1B	115.0	FTB
P2A	107.0	FTB
P2B	116.0	FTB
P3A	105.0	FTB
P3B	106.0	FTB
P4A	108.0	FTB
P4B	116.0	FTB
P5A	101.0	FTB
P5B	108.0	FTB
Average	110.9	*FTB - Film Tear Bond
Standard Deviation	7.2	
Maximum	127.0	
Minimum	101.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P32
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	203.0	Elongation
S2	202.0	Elongation
S3	206.0	Elongation
S4	201.0	Elongation
S5	200.0	Elongation
Average	202.4	*FTB - Film Tear Bond
Standard Deviation	2.1	
Maximum	206.0	
Minimum	200.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	119.0	FTB
P1B	101.0	FTB
P2A	118.0	FTB
P2B	105.0	FTB
P3A	115.0	FTB
P3B	102.0	FTB
P4A	101.0	FTB
P4B	116.0	FTB
P5A	111.0	FTB
P5B	104.0	FTB
Average	109.2	*FTB - Film Tear Bond
Standard Deviation	7.0	
Maximum	119.0	
Minimum	101.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P33
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	203.0	Elongation
S2	206.0	Elongation
S3	209.0	Elongation
S4	204.0	Elongation
S5	205.0	Elongation
Average	205.4	*FTB - Film Tear Bond
Standard Deviation	2.1	
Maximum	209.0	
Minimum	203.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	117.0	FTB
P1B	112.0	FTB
P2A	114.0	FTB
P2B	111.0	FTB
P3A	120.0	FTB
P3B	109.0	FTB
P4A	103.0	FTB
P4B	111.0	FTB
P5A	110.0	FTB
P5B	101.0	FTB
Average	110.8	*FTB - Film Tear Bond
Standard Deviation	5.4	
Maximum	120.0	
Minimum	101.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P34
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	215.0	Elongation
S2	211.0	Elongation
S3	207.0	Elongation
S4	212.0	Elongation
S5	205.0	Elongation
Average	210.0	*FTB - Film Tear Bond
Standard Deviation	3.6	
Maximum	215.0	
Minimum	205.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	119.0	FTB
P1B	113.0	FTB
P2A	107.0	FTB
P2B	100.0	FTB
P3A	108.0	FTB
P3B	140.0	FTB
P4A	108.0	FTB
P4B	139.0	FTB
P5A	116.0	FTB
P5B	110.0	FTB
Average	116.0	*FTB - Film Tear Bond
Standard Deviation	12.7	
Maximum	140.0	
Minimum	100.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P35
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	222.0	Elongation
S2	218.0	Elongation
S3	212.0	Elongation
S4	217.0	Elongation
S5	218.0	Elongation
Average	217.4	*FTB - Film Tear Bond
Standard Deviation	3.2	
Maximum	222.0	
Minimum	212.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	125.0	FTB
P1B	134.0	FTB
P2A	95.0	FTB
P2B	119.0	FTB
P3A	129.0	FTB
P3B	118.0	FTB
P4A	140.0	FTB
P4B	120.0	FTB
P5A	119.0	FTB
P5B	115.0	FTB
Average	121.4	*FTB - Film Tear Bond
Standard Deviation	11.6	
Maximum	140.0	
Minimum	95.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P36
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	214.0	Elongation
S2	204.0	Elongation
S3	210.0	Elongation
S4	217.0	Elongation
S5	208.0	Elongation
Average	210.6	*FTB - Film Tear Bond
Standard Deviation	4.5	
Maximum	217.0	
Minimum	204.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	131.0	FTB
P1B	131.0	FTB
P2A	120.0	FTB
P2B	128.0	FTB
P3A	123.0	FTB
P3B	106.0	FTB
P4A	125.0	FTB
P4B	99.0	FTB
P5A	122.0	FTB
P5B	116.0	FTB
Average	120.1	*FTB - Film Tear Bond
Standard Deviation	10.0	
Maximum	131.0	
Minimum	99.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P37
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	204.0	Elongation
S2	208.0	Elongation
S3	203.0	Elongation
S4	210.0	Elongation
S5	206.0	Elongation
Average	206.2	*FTB - Film Tear Bond
Standard Deviation	2.6	
Maximum	210.0	
Minimum	203.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	130.0	FTB
P1B	130.0	FTB
P2A	124.0	FTB
P2B	110.0	FTB
P3A	124.0	FTB
P3B	131.0	FTB
P4A	114.0	FTB
P4B	123.0	FTB
P5A	125.0	FTB
P5B	119.0	FTB
Average	123.0	*FTB - Film Tear Bond
Standard Deviation	6.6	
Maximum	131.0	
Minimum	110.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P38
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	218.0	Elongation
S2	216.0	Elongation
S3	213.0	Elongation
S4	217.0	Elongation
S5	209.0	Elongation
Average	214.6	*FTB - Film Tear Bond
Standard Deviation	3.3	
Maximum	218.0	
Minimum	209.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	123.0	FTB
P1B	127.0	FTB
P2A	133.0	FTB
P2B	131.0	FTB
P3A	154.0	FTB
P3B	162.0	FTB
P4A	111.0	FTB
P4B	115.0	FTB
P5A	117.0	FTB
P5B	146.0	FTB
Average	131.9	*FTB - Film Tear Bond
Standard Deviation	16.3	
Maximum	162.0	
Minimum	111.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P39
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	188.0	Elongation
S2	198.0	Elongation
S3	192.0	Elongation
S4	199.0	Elongation
S5	194.0	Elongation
Average	194.2	*FTB - Film Tear Bond
Standard Deviation	4.0	
Maximum	199.0	
Minimum	188.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	100.0	FTB
P1B	118.0	FTB
P2A	115.0	FTB
P2B	109.0	FTB
P3A	144.0	FTB
P3B	122.0	FTB
P4A	123.0	FTB
P4B	119.0	FTB
P5A	118.0	FTB
P5B	102.0	FTB
Average	117.0	*FTB - Film Tear Bond
Standard Deviation	11.7	
Maximum	144.0	
Minimum	100.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P40
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	225.0	Elongation
S2	218.0	Elongation
S3	210.0	Elongation
S4	215.0	Elongation
S5	214.0	Elongation
Average	216.4	*FTB - Film Tear Bond
Standard Deviation	5.0	
Maximum	225.0	
Minimum	210.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	130.0	FTB
P1B	129.0	FTB
P2A	126.0	FTB
P2B	108.0	FTB
P3A	129.0	FTB
P3B	124.0	FTB
P4A	109.0	FTB
P4B	100.0	FTB
P5A	120.0	FTB
P5B	117.0	FTB
Average	119.2	*FTB - Film Tear Bond
Standard Deviation	9.9	
Maximum	130.0	
Minimum	100.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P41
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	218.0	Elongation
S2	212.0	Elongation
S3	211.0	Elongation
S4	215.0	Elongation
S5	206.0	Elongation
Average	212.4	*FTB - Film Tear Bond
Standard Deviation	4.0	
Maximum	218.0	
Minimum	206.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)

Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	145.0	FTB
P1B	150.0	FTB
P2A	145.0	FTB
P2B	115.0	FTB
P3A	151.0	FTB
P3B	128.0	FTB
P4A	128.0	FTB
P4B	128.0	FTB
P5A	133.0	FTB
P5B	122.0	FTB
Average	134.5	*FTB - Film Tear Bond
Standard Deviation	11.8	
Maximum	151.0	
Minimum	115.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Extrusion
Sample: P42
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	185.0	Elongation
S2	181.0	Elongation
S3	188.0	Elongation
S4	183.0	Elongation
S5	182.0	Elongation
Average	183.8	*FTB - Film Tear Bond
Standard Deviation	2.5	
Maximum	188.0	
Minimum	181.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	158.0	FTB
P1B	0.0	
P2A	166.0	FTB
P2B	0.0	
P3A	144.0	FTB
P3B	0.0	
P4A	140.0	FTB
P4B	0.0	
P5A	147.0	FTB
P5B	0.0	
Average	75.5	*FTB - Film Tear Bond
Standard Deviation	75.8	
Maximum	166.0	
Minimum	0.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P43
Tested by: James Addis
Date Tested: 07/31/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	183.0	Elongation
S2	180.0	Elongation
S3	177.0	Elongation
S4	187.0	Elongation
S5	180.0	Elongation
Average	181.4	*FTB - Film Tear Bond
Standard Deviation	3.4	
Maximum	187.0	
Minimum	177.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	143.0	FTB
P1B	145.0	FTB
P2A	167.0	FTB
P2B	157.0	FTB
P3A	149.0	FTB
P3B	159.0	FTB
P4A	133.0	FTB
P4B	149.0	FTB
P5A	144.0	FTB
P5B	152.0	FTB
Average	149.8	*FTB - Film Tear Bond
Standard Deviation	9.1	
Maximum	167.0	
Minimum	133.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

S&ME, Inc. - CHARLOTTE, NC
Laboratory Destructive Test Result Summary

Project Name: MSSILF#1: Cell 2, Primary Geomembrane
S&ME Project No.: 1356-08-122
Material Description: 60-mil Textured HDPE Liner
Weld Type: Fusion
Sample: P44
Tested by: James Addis
Date Tested: 08/02/2010 Date of Summary: 11/15/2010

SHEAR TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
S1	162.0	Elongation
S2	171.0	Elongation
S3	174.0	Elongation
S4	174.0	Elongation
S5	170.0	Elongation
Average	170.2	*FTB - Film Tear Bond
Standard Deviation	4.4	
Maximum	174.0	
Minimum	162.0	
Pass/Fail [1,2,3]	PASS	

PEEL TESTING (ASTM D-6392)		
Specimen No.	Load at Yield (lbs/in)	Failure Description
P1A	110.0	FTB
P1B	109.0	FTB
P2A	118.0	FTB
P2B	117.0	FTB
P3A	119.0	FTB
P3B	123.0	FTB
P4A	105.0	FTB
P4B	109.0	FTB
P5A	121.0	FTB
P5B	105.0	FTB
Average	113.6	*FTB - Film Tear Bond
Standard Deviation	6.4	
Maximum	123.0	
Minimum	105.0	
Pass/Fail [1,2,3]	PASS	

[1] Fusion Weld Passing Values: Shear - 120 lb/in; Peel - 91 lb/in
[2] Extrusion Weld Passing Values: Shear - 120 lb/in; Peel - 78 lb/in
[3] Values are for 4 out of 5 specimens; 5th specimen can be 80% of listed value

Cell 2 Primary HDPE Geomembrane Defect Log

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 1 of 6

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
1	P1/CELL1	50F WOEEOS	LDT	7/30/2010	LDT-1	7/30/2010	JHA
2	P1/P2	100F WOEEOS	LDT	7/30/2010	LDT-2	7/30/2010	JHA
3	P2/P3	150F WOEEOS	LDT	7/30/2010	LDT-3	7/30/2010	JHA
4	P3/P4	200F WOEEOS	LDT	7/30/2010	LDT-4	7/30/2010	JHA
5	P4/P5	250F WOEEOS	LDT	7/30/2010	LDT-5	7/30/2010	JHA
6	P5/P6	300F WOEEOS	LDT	7/30/2010	LDT-6	7/30/2010	JHA
7	P6/P7	350F WOEEOS	LDT	7/30/2010	LDT-7	7/30/2010	JHA
8	P7/P8	400 F WOEEOS	LDT	7/30/2010	LDT-8	7/30/2010	JHA
9	P8/P9	450F WOEEOS	LDT	7/30/2010	LDT-9	7/30/2010	JHA
10	P1/CELL1	403F WOEEOS	O	7/30/2010		7/30/2010	JHA
11	P1/CELL1	428F WOEEOS	O	7/30/2010		7/30/2010	JHA
12	P1/CELL1	451F WOEEOS	O	7/30/2010		7/30/2010	JHA
13	P1/CELL1	475F WOEEOS	O	7/30/2010		7/30/2010	JHA
14	P1/CELL1	483F WOEEOS	O	7/30/2010		7/30/2010	JHA
15	P4/P5	88F WOEEOS	O	7/30/2010		7/30/2010	JHA
16	P3/P4	337 F WOEEOS	O	7/30/2010		7/30/2010	JHA
17	P19/CELL1	EAT	O	7/30/2010		7/30/2010	JHA
18	P19/P20/P10/CELL1	PATCH OVER WEOS P19	O	7/30/2010		7/30/2010	JHA
19	P20/P10/CELL1	PATCH OVER WEOS P20	O	7/30/2010		7/30/2010	JHA
20	P10/CELL1	44F WOEEOS	O	7/30/2010		7/30/2010	JHA
21	P10/CELL1	361F WOEEOS	O	7/30/2010		7/30/2010	JHA
22	P10/CELL1/P24/P23	406F WOEEOS	O	7/30/2010		7/30/2010	JHA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 2 of 6

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
23	P24/P10/P11/P23	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
24	P11/P12/P23	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
25	P12/P13/P23	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
26	P13/P25/P23	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
27	P25/P14/P13	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
28	P14/P25/P21	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
29	P25/P21/P23	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
30	P14/P15/P21	3 PANEL TEE AND CAP	O	7/30/2010		7/30/2010	JHA
31	P15/P16/P22	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
32	P16/P17/P22	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
33	P17/P22/P18	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
34	P26/P22/P18/P9/P8	5 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
35	P21/P23/CELL 1	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
36	P1/P21/CELL 1	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
37	P1/P2/P21	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
38	P2/P3/P21	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
39	P3/P4/P21	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
40	P4/P5/P21	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
41	P5/P6/P21/P22	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
42	P6/P7/P22	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
43	P7/P8/P22	3 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
44	P10/CELL 1	50F WOEEOS	LDT	7/30/2010	LDT-10	7/30/2010	JHA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 3 of 6

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
45	P10/P11	200F WOEEOS	LDT	7/30/2010	LDT-11	7/30/2010	JHA
46	P11/P12	250F WOEEOS	LDT	7/30/2010	LDT-12	7/30/2010	JHA
47	P12/P13	300F WOEEOS	LDT	7/30/2010	LDT-13	7/30/2010	JHA
48	P13/P14	350F WOEEOS	LDT	7/30/2010	LDT-14	7/30/2010	JHA
49	P14/P15	400F WOEEOS	LDT	7/30/2010	LDT-15	7/30/2010	JHA
50	P15/P16	450F WOEEOS	LDT	7/30/2010	LDT-16	7/30/2010	JHA
51	P16/P17	400F WOEEOS	LDT	7/30/2010	LDT-17	7/30/2010	JHA
52	P17/P18	350F WOEEOS	LDT	7/30/2010	LDT-18	7/30/2010	JHA
53	P21/P22	11F EOWEOS	LDT	7/30/2010	LDT-19	7/30/2010	JHA
54	P19/CELL1	33F WOEEOS	LDT	7/30/2010	LDT-20	7/30/2010	JHA
55	P27/P28	50F WOEEOS	LDT	7/30/2010	LDT-21	7/30/2010	JHA
56	P28/P29	100F WOEEOS	LDT	7/30/2010	LDT-22	7/30/2010	JHA
57	P29/P30	150F WOEEOS	LDT	7/30/2010	LDT-23	7/30/2010	JHA
58	P30/P31	200F WOEEOS	LDT	7/30/2010	LDT-24	7/30/2010	JHA
59	P31/P32	250F WOEEOS	LDT	7/30/2010	LDT-25	7/30/2010	JHA
60	P32/P33	300F WOEEOS	LDT	7/30/2010	LDT-26	7/30/2010	JHA
61	P33/P34	350F WOEEOS	LDT	7/30/2010	LDT-27	7/30/2010	JHA
62	P34/P35	400F WOEEOS	LDT	7/30/2010	LDT-44	7/30/2010	JHA
63	P35/P36	450F WOEEOS	LDT	7/30/2010	LDT-28	7/30/2010	JHA
64	P36/P37	400F WOEEOS	LDT	7/30/2010	LDT-29	7/30/2010	JHA
65	P37/P9	350F WOEEOS	LDT	7/30/2010	LDT-30	7/30/2010	JHA
66	P17/P18	250F WOEEOS	O	7/30/2010	BURNOUT	7/30/2010	JHA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 4 of 6

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
67	P10/P11	EAT	O	7/30/2010		7/30/2010	JHA
68	P11/P12	EAT	O	7/30/2010		7/30/2010	JHA
69	P16/P17	EAT	O	7/30/2010		7/30/2010	JHA
70	P25/P21	10F SONEOS	O	7/30/2010		7/30/2010	JHA
71	P4	25F EOWAT	O	7/30/2010		7/30/2010	JHA
72	P4	15F EOWAT	O	7/30/2010		7/30/2010	JHA
73	P4	5F EOWAT	O	7/30/2010		7/30/2010	JHA
74	P5	10F EOWAT	O	7/30/2010		7/30/2010	JHA
75	P4	WAT	O	7/30/2010		7/30/2010	JHA
76	P33/P34	WAT	O	7/30/2010		7/30/2010	JHA
77	P33	WAT	O	7/30/2010		7/30/2010	JHA
78	P31/P30	WAT	O	7/30/2010		7/30/2010	JHA
79	P28/P29	WAT	O	7/30/2010		7/30/2010	JHA
80	P38/P39	25F WOEAT	LDT	7/30/2010	LDT-31	7/30/2010	JHA
81	P39/P40	75F WOEAT	LDT	7/30/2010	LDT-32	7/30/2010	JHA
82	P40/P41	125F WOEAT	LDT	7/30/2010	LDT-33	7/30/2010	JHA
83	P41/P42	175F WOEAT	LDT	7/30/2010	LDT-34	7/30/2010	JHA
84	P42/P43	225F WOEAT	LDT	7/30/2010	LDT-35	7/30/2010	JHA
85	P43/P44	275F WOEAT	LDT	7/30/2010	LDT-36	7/30/2010	JHA
86	P44/P45	325F WOEAT	LDT	7/30/2010	LDT-37	7/30/2010	JHA
87	P45/P46	375F WOEAT	LDT	7/30/2010	LDT-38	7/30/2010	JHA
88	P46/P47	425F WOEAT	LDT	7/30/2010	LDT-39	7/30/2010	JHA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 5 of 6

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
89	P47/P48	375F WOEAT	LDT	7/30/2010	LDT-40	7/30/2010	JHA
90	P48/P18	325F WOEAT	LDT	7/30/2010	LDT-41	7/30/2010	JHA
91	WEO PR30	LDT ON PATCH	LDT	7/30/2010	LDT-42	7/30/2010	JHA
92	P18/P48	165F WOEAT	O	7/30/2010	BURNOUT	7/30/2010	JHA
93	P31/P42	12F SONEOS	LDT	7/30/2010	LDT-43	7/30/2010	JHA
94	P38/P27	SAT	O	7/30/2010		7/30/2010	JHA
95	P27/P28/P38/P39	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
96	P28/P29/P39/P40	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
97	P29/P30/P40/P41	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
98	P30/P31/P41/P42	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
99	P42/P43/P31/P32	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
100	P32/P33/P43/P44	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
101	P33/P34/P44/P45	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
102	P34/P35/P45/P46	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
103	P35/P36/P46/P47	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
104	P36/P37/P47/P48	4 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
105	P48/P37	12F SONEOS	O	7/30/2010		7/30/2010	JHA
106	P37/P9/P48/P18/P26	5 PANEL PATCH	O	7/30/2010		7/30/2010	JHA
107	P47/P48	69F WOEAT	O	7/30/2010	PATCH AT WRINKLE	7/30/2010	JHA
108	LDS PIPES	EAT AT PIPE PENETRATION	O	7/30/2010	SKIRT AND TWO BOOTS	7/30/2010	JHA
109	P34	WAT	O	7/30/2010		7/30/2010	JHA
110	P38	12F W 10F N O SE CORNER OF PANEL	O	7/30/2010		7/30/2010	JHA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

GEOMEMBRANE DEFECT LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 6 of 6

Defect Code	Defect Seam or Panel	Location of Defect	Defect Type	Log Date	Remarks	Repair Date	CQA Initial
111	P38	EAT	O	7/30/2010		7/30/2010	JHA
112	P42	EAT	O	7/30/2010		7/30/2010	JHA
113	P44/P45	EEOS	O	7/30/2010		7/30/2010	JHA
114	P48	345F W 2F N OEEO PANEL	O	7/30/2010		7/30/2010	JHA
115	P41	4F W 11F N OEEO PANEL	O	7/30/2010		7/30/2010	JHA
116	P10	30F W 10F N OEAT	O	7/30/2010		7/30/2010	JHA
117	P10	14F W 2F S OEAT	O	7/30/2010		7/30/2010	JHA
118	P10	6F W 2FS OEAT	O	7/30/2010		7/30/2010	JHA
119	P10	1F W 1F S OEAT	O	7/30/2010		7/30/2010	JHA

Location: **NEOS** - north end of seam, **SEOS** - south end of seam, **EEOS** - east end of seam, **WEOS** - west end of seam, **INT SAME** - panel intersection, **R** - repair number

Defect Type: **LDT** - Laboratory Destructive Testing, **FDT** - Field Destructive Testing, **T** - T weld, **O** - Other

CQA Personnel : James Addis

Cell 2 Primary HDPE Geomembrane Repair Testing Log

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 1 of 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
1	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
2	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
3	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
4	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
5	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
6	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
7	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
8	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
9	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
10	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
11	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
12	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
13	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
14	P	2 FT X 3 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
15	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
16	P	2 FT X 5 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
17	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
18	P	2 FT X 3 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
19	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
20	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
21	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
22	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 2 of 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
23	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
24	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
25	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
26	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
27	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
28	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
29	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
30	P	3 FT X 17 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
31	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
32	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
33	P	2 FT X 3 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
34	P	3 FT X 11 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
35	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
36	P	3 FT X 4 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
37	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
38	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
39	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
40	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
41	P	2 FT X 4 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
42	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
43	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
44	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 3 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
45	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
46	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
47	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
48	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
49	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
50	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
51	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
52	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
53	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
54	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
55	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
56	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
57	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
58	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
59	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
60	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
61	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
62	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
63	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
64	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
65	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
66	P	2 FT X 17 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
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Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
67	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
68	P	2 FT X 3 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
69	P	2 FT X 4 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
70	P	2 FT X 3 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
71	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
72	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
73	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
74	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
75	P	2 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
76	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
77	P	2 FT X 10 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
78	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
79	P	2 FT X 3 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
80	P	2 FT X 5 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
81	P	2 FT X 6 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
82	P	2 FT X 6 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
83	P	2 FT X 6 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
84	P	2 FT X 6 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
85	P	2 FT X 6 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
86	P	2 FT X 6 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
87	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
88	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 5 of 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
89	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
90	P	2 FT X 5 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
91	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
92	P	2 FT X 6 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
93	P	2 FT X 6 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
94	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
95	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
96	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
97	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
98	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
99	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
100	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
101	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
102	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
103	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
104	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
105	P	2 FT X 5 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
106	P	3 FT X 8 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
107	P	3 FT X 3 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
108	P	10 FT X 10 FT	DC	JHA	7/30/2010	VB/SP	CV	JHA	P	7/30/2010	2 BOOTS SPARK TESTED
109	P	2 FT X 2 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/30/2010	
110	P	2 FT X 2 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

GEOMEMBRANE REPAIR TESTING LOG

S&ME Project No.: 1356-08-122
Project Name: MSSILF#1: Cell 2, Primary GM
Project Location: Terrell, North Carolina
Page: 6 of 6

Defect Code	Repair Type	Approximate Dimensions	Tech. Initials	CQA Initials	Date	Test Type	Tech. Initials	CQA Initials	Pass / Fail	Date	Remarks
111	P	2 FT X 2 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
112	P	2 FT X 2 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
113	P	3 FT X 5 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
114	P	6 FT X 10 FT	MV	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
115	P	2 FT X 2 FT	DC	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
116	P	3 FT X 2 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
117	P	1 FT X 1 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
118	P	1 FT X 1 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	
119	P	1 FT X 1 FT	JT	JHA	7/30/2010	VB	CV	JHA	P	7/31/2010	

Repair Type: **G&W** - Grind and Weld, **P**- Patch, **CAP** - Cap Strip

Testing Type: **SP** - Spark Test, **VB** - Vacuum Box Test

CQA Personnel: James Addis

APPENDIX II – GEOSYNTHETICS
Section 9 – Tensiometer Load Cell Calibrations

Demtech Services, Inc.

Placerville, California, USA

CALIBRATION CERTIFICATE

Customer Name: **S & ME Inc.**

Tensiometer Model: Pro-Tester T-0100

Device Calibrated: S-Type load cell

Range: 0 - 750 lbs. Tension

Model No: M2405-750#

Serial No: **209948**

Calibration Apparatus:

Reference load cell (S/N 204781)

A/D Module Model No: T-029

A/D Module Serial No: **4205209948**

Channel No: N/A

Dead Weight:		Reference Cell:	
W1	2	R1	2
W2	152	R2	152
W3	302	R3	302

Indicator reading with no load: 0

Offset: **6.866882** Scale: **3.872254**

Applied Force lbs.	Cell Response:	Deviation Error:
2	2	0.00
52	52	0.00
102	102	0.00
152	152	0.00
202	202	0.00
252	252	0.00
302	302	0.00

Total Deviation Error (%): 0.00%

Temperature at time of calibration: 73 degrees F

Exitation Voltage: 5 V DC

This calibration conforms to the standards set by ASTM E4 and is traceable to NIST standards

Note: A/D Module and load cell above have been systems calibrated and are considered a matched pair. In general, calibrated A/D Modules and load cells are not interchangeable.

Calibration Technician: Matt Roy

Date: 04/08/09

Demtech Services, Inc.

Placerville, California, USA

CALIBRATION CERTIFICATE

Customer Name: **S & ME Inc.**

Tensiometer Model: Pro-Tester T-0100

Device Calibrated: S-Type load cell

Range: 0 - 750 lbs. Tension

Model No: M2405-750#

Serial No: **206371**

Calibration Apparatus:

Reference load cell (S/N 204781)

A/D Module Model No: T-029

A/D Module Serial No: **4205206371**

Channel No: N/A

Dead Weight:		Reference Cell:	
W1	2	R1	2
W2	152	R2	152
W3	302	R3	302

Indicator reading with no load: 0

Offset: **6.030090** Scale: **5.010223**

Applied Force lbs.	Cell Response:	Deviation Error:
2	2	0.00
52	52	0.00
102	102	0.00
152	152	0.00
202	202	0.00
252	252	0.00
302	302	0.00

Total Deviation Error (%): 0.00%

Temperature at time of calibration: 73 degrees F

Exitation Voltage: 5 V DC

This calibration conforms to the standards set by ASTM E4 and is traceable to NIST standards

Note: A/D Module and load cell above have been systems calibrated and are considered a matched pair. In general, calibrated A/D Modules and load cells are not interchangeable.

Calibration Technician: Matt Roy

Date: 04/08/09

Demtech Services, Inc.

Placerville, California, USA

CALIBRATION CERTIFICATE

Customer Name: **S & ME Inc.**

Tensiometer Model: Pro-Tester T-0100

Device Calibrated: S-Type load cell

Range: 0 - 750 lbs. Tension

Model No: M2405-750#

Serial No: **208671**

Calibration Apparatus:

Reference load cell (S/N 204781)

A/D Module Model No: T-029

A/D Module Serial No: 2807208671

Channel No: N/A

Dead Weight:		Reference Cell:	
W1	2	R1	2
W2	152	R2	152
W3	302	R3	302

Indicator reading with no load: 0

Offset: **3.649077** Scale: **4.179689**

Applied Force lbs.	Cell Response:	Deviation Error:
2	2	0.00
52	52	0.00
102	102	0.00
152	152	0.00
202	202	0.00
252	252	0.00
302	302	0.00

Total Deviation Error (%): 0.00%

Temperature at time of calibration: 73 degrees F

Exitation Voltage: 5 V DC

This calibration conforms to the standards set by ASTM E4 and is traceable to NIST standards

Note: A/D Module and load cell above have been systems calibrated and are considered a matched pair. In general, calibrated A/D Modules and load cells are not interchangeable.

Calibration Technician: MWH

Matt Harrison

Date: 04/05/10

Demtech Services, Inc.

Placerville, California, USA

CALIBRATION CERTIFICATE

S & ME Inc.

Tensiometer Model: Pro-Tester T-0100

Device Calibrated: S-Type load cell

Range: 0 - 750 lbs. Tension

Model No: M2405-750#

Serial No: **240712**

Calibration Apparatus:

Pro-Cal unit, model TC-0100/A

A/D Module Model No: T-029

A/D Module Serial No: **4309240712**

Channel No: N/A

Dead Weight:		Reference Cell:	
W1	2	R1	2
W2	152	R2	152
W3	302	R3	302

Indicator reading with no load: 0

Offset: **3.800056** Scale: **5.048248**

Applied Force lbs.	Cell Response:	Deviation Error:
2	2	0.00
52	52	0.00
102	102	0.00
152	152	0.00
202	202	0.00
252	252	0.00
302	302	0.00

Total Deviation Error (%): 0.00%

Temperature at time of calibration: 73 degrees F

Exitation Voltage: 5 V DC

This calibration conforms to the standards set by ASTM E4 and is traceable to NIST standards

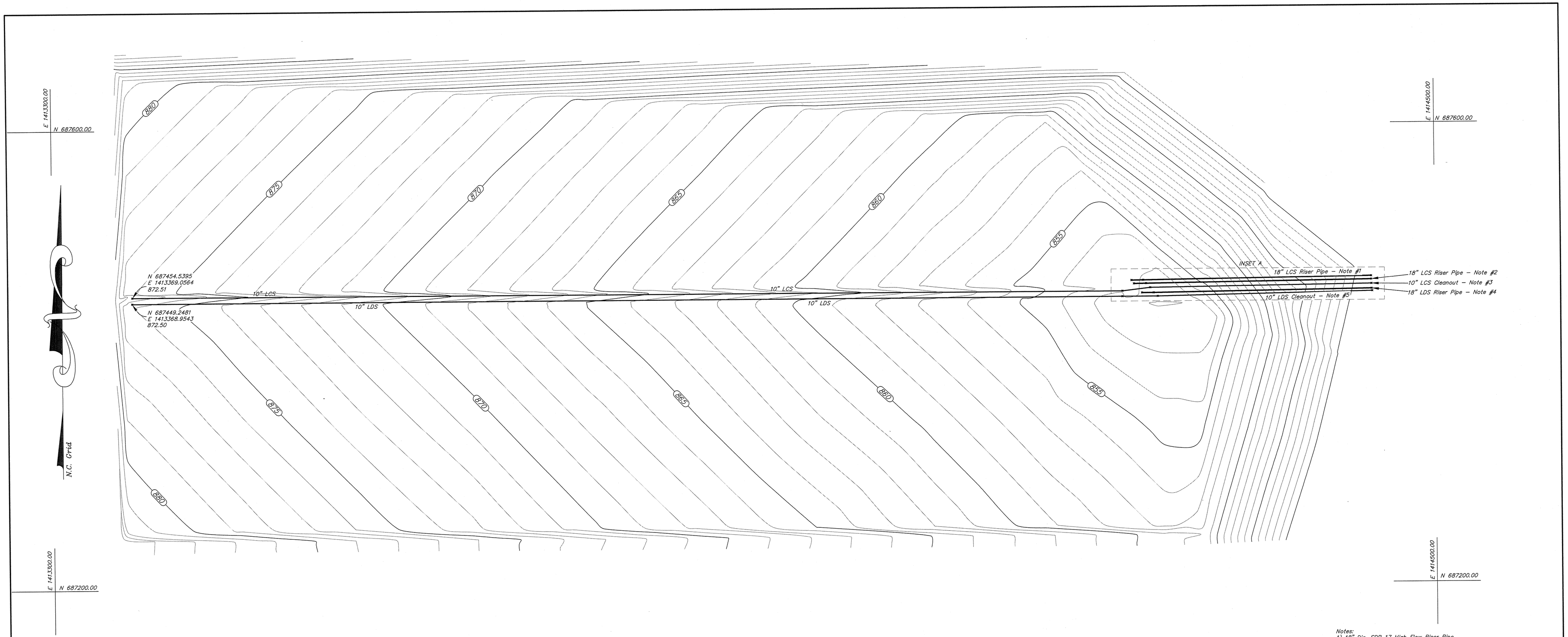
Note: A/D Module and load cell above have been systems calibrated and are considered a matched pair. In general, calibrated A/D Modules and load cells are not interchangeable.

MWH

Matt Harrison

Date: 04/05/10

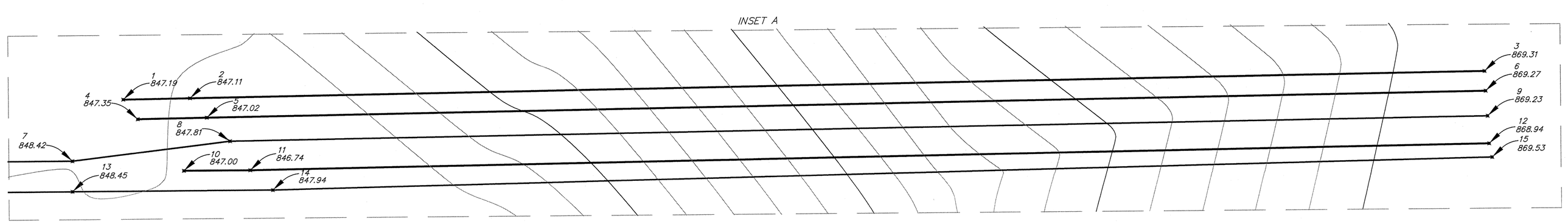
APPENDIX II – GEOSYNTHETICS
Section 10 – Cell 1 Leachate Collection System and Leak Detection System Piping As-Built



Notes:
1) 18" Dia. SDR 17 High Flow Riser Pipe
2) 18" Dia. SDR 17 Low Flow Riser Pipe
3) 10" Dia. SDR 17 LCS perforated Header Pipe Cleanout Perforated pipe stops at sump.
4) 18" Dia. SDR 17 Riser Pipe
5) 10" Dia SDR 17 LDS perforated Header pipe Cleanout. Perforated pipe stops at sump.

Pipe Locations and Elevations provided by Earnhardt Grading. All elevations at breakpoints are bottom of pipe elevations.

Pipe Descriptions taken from construction plans.



PT	N	E	EL
1	687463.7337	1414236.5378	847.19
2	687463.8574	1414245.6706	847.11
3	687466.4200	1414444.6950	869.31
4	687460.7292	1414238.7140	847.35
5	687460.8650	1414249.2011	847.02
6	687463.3990	1414444.8390	869.27
7	687454.3831	1414228.7102	848.42
8	687457.2478	1414252.7269	847.81
9	687459.5660	1414445.1130	869.23
10	687452.7826	1414245.6477	847.00
11	687452.7952	1414255.8077	846.74
12	687455.3510	1414445.3180	868.94
13	687449.7035	1414228.7022	848.45
14	687449.7197	1414259.2779	847.94
15	687453.2500	1414445.7610	869.53

NORTH CAROLINA PROFESSIONAL SEAL L-1280 LAND SURVEYOR RONALD LAWRENCE
10/12/10

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

LAWRENCE ASSOCIATES
106 W. Jefferson St.
Monroe, North Carolina 28112
P 704-289-1013 866-557-8051
F 704-283-9035
www.lawrencesurveying.com

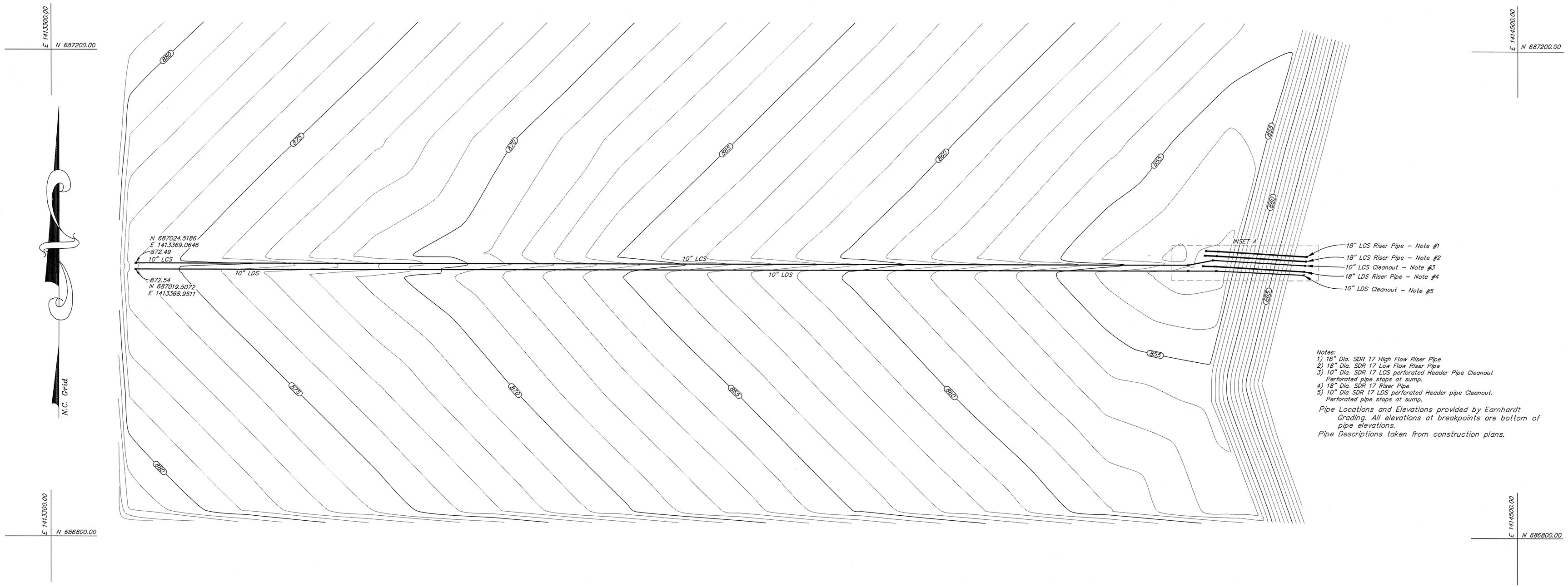
Cell 1 Piping Asbuilt
Plant Marshall
Terrell North Carolina

Orig. scale: 1" = 40' Date: October 5, 2010 Drawn By: MCM

REVISIONS
MCM 10/8/2010
MCM 10/12/2010

Job No. 1345 Drawing file Cell 1 Piping Asbuilt-Cover Cont.dwg Drawing no. 10/106

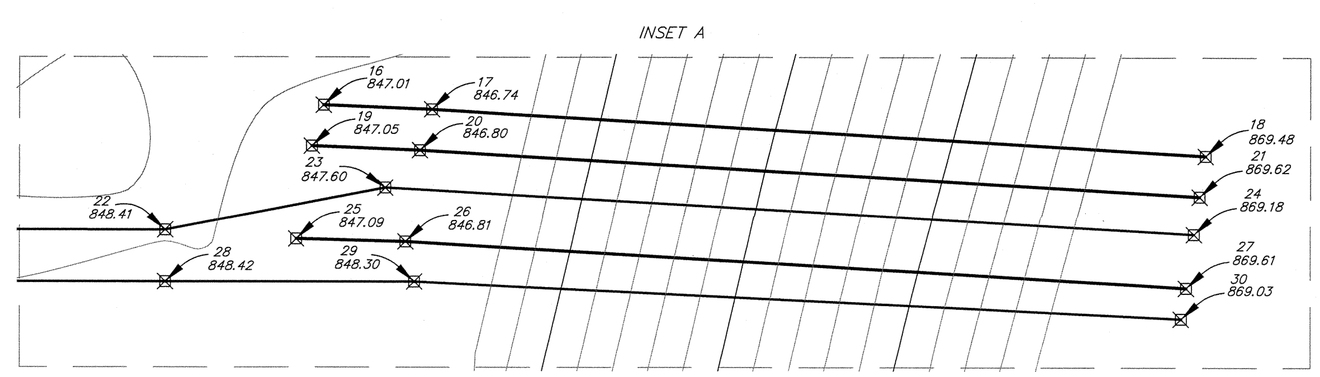
APPENDIX II – GEOSYNTHETICS
Section 11 – Cell 2 Leachate Collection System and Leak Detection System Piping As-Built



Notes:
1) 18" Dia. SDR 17 High Flow Riser Pipe
2) 18" Dia. SDR 17 Low Flow Riser Pipe
3) 10" Dia. SDR 17 LCS perforated Header Pipe Cleanout Perforated pipe stops at sump.
4) 18" Dia. SDR 17 Riser Pipe
5) 10" Dia SDR 17 LDS perforated Header pipe Cleanout. Perforated pipe stops at sump.

Pipe Locations and Elevations provided by Earnhardt Grading. All elevations at breakpoints are bottom of pipe elevations.

Pipe Descriptions taken from construction plans.



PT	N	E	EL
16	687035.8604	1414245.2456	847.01
17	687035.4477	1414255.3378	846.74
18	687031.1420	1414327.2980	869.48
19	687032.0403	1414244.1475	847.05
20	687031.6479	1414254.2098	846.80
21	687027.3450	1414326.7320	869.62
22	687024.2207	1414230.5814	848.41
23	687028.1609	1414250.9852	847.60
24	687023.8420	1414326.2050	869.18
25	687023.3971	1414242.7033	847.09
26	687023.1363	1414252.8899	846.81
27	687018.8440	1414325.4790	869.61
28	687019.4065	1414230.5718	848.42
29	687019.4038	1414233.7019	848.30
30	687015.9630	1414325.0130	869.03

NORTH CAROLINA PROFESSIONAL SEAL L-1290 LAND SURVEYOR R. DONALD LAWRENCE
10/12/10

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

LAWRENCE ASSOCIATES
106 W. Jefferson St.
Monroe, North Carolina 28112
P 704-289-1013 866-557-8051
F 704-283-9035
www.lawrencesurveying.com

Cell 2 Piping Asbuilt
Plant Marshall
Terrell North Carolina

Orig. scale: 1" = 40' Date: October 5, 2010 Drawn By: MCM

REVISIONS
MCM 10/8/2010
MCM 10/11/2010
MCM 10/12/2010

Job No. 1345 Drawing file: Cell 2 Piping Asbuilt–Cover Cont.dwg Drawing no. 10/107

APPENDIX II – GEOSYNTHETICS
Section 12 – Cells 1 and 2 LCS/LDS Camera Inspection

JETCLEAN AMERICA

HIGH PRESSURE WATER JETTING
EXPLOSION-PROOF VIDEO-INSPECTION
NO DIG POINT REPAIRS
VACUUM TRUCK SERVICES

OFFICES IN FLORIDA & CAROLINAS
TEL: 800-226-8013
FAX 813-926-4616

EARNHARDT GRADING, INC.
DUKE ENERGY - MARSHALL STEAM STATION
LEACHATE SYSTEM
HIGH-PRESSURE WATER-JETTING & EXPLOSION-PROOF VIDEO-INSPECTION

Work Conducted:

October 2010 – November 2010

By Jetclean America

800-226-8013

JETCLEAN AMERICA

HIGH-PRESSURE WATER-JETTING
EXPLOSION-PROOF PIPELINE INSPECTION
NO DIG POINT REPAIRS
VACUUM TRUCK SERVICES

OFFICES IN FLORIDA & CAROLINAS
TEL: 800-226-8013
FAX 813-926-4616

DATE : 11/29/2010
TO : Fred Brown – Earnhardt Grading, Inc.
FROM : Ralph Calistri (jetcleanamerica@yahoo.com)
SUBJECT : Duke Energy – Marshall Steam Station New Cells – 2010

Jetclean America completed the high-pressure water-jetting and explosion-proof video-inspection of the new Cell 1 & 2 leachate collection and detection piping on 11/17/2010. Included with this report are the applicable jetting logs, pipe graphic reports, and video-inspection footage in DVD format.

High-pressure Water-jetting:
As the below jetting log indicates, the new cell's leachate collection and detection piping was jetcleaned end-to-end from the available cleanout access utilizing a high-pressure water-jetting nozzle. The leachate collection system was blockage free upon completion.

LEACHATE COLLECTION & DETECTION SYSTEM JETTING LOG OCTOBER 2010 – NOVEMBER 2010

LOCATION	ACHIEVED DISTANCE (ft)	RESULT
10 LDS Cell 1	1,065'	End of Pipe Reached
10 LCS Cell 1	1,020'	End of Pipe Reached
10 LDS Cell 2	950'	End of Pipe Reached
10 LCS Cell 2	960'	End of Pipe Reached

Explosion-proof Video-inspection:
After jetcleaning was completed, the above piping was video-inspected as far as possible from the available cleanout access (see summary chart below). All areas of the pipe viewed with the inspection camera appear to be in good condition, with no defects noted (see included pipe graphic reports and DVD inspection footage for more details).

VIDEO SETUP	DESCRIPTION	VIDEO LENGTH	RESULT
1	18 LDS Cell 2	82.9'	Pipe Is Clean and Defect Free
2	18 LCS1 Cell 2	79.7'	Pipe Is Clean and Defect Free
3	18 LCS2 Cell 2	80.8'	Pipe Is Clean and Defect Free
4	18 LDS Cell 1	191.3'	Pipe Is Clean and Defect Free
5	18 LCS1 Cell 1	199.2'	Pipe Is Clean and Defect Free
6	18 LCS2 Cell 1	203.8'	Pipe Is Clean and Defect Free
7	10 LCS Cell 1	986.6'	Pipe Is Clean and Defect Free
8	10 LDS Cell 1	923.1'	Pipe Is Clean and Defect Free

9	10 LCS Cell 2	815.2'	Pipe Is Clean and Defect Free
10	10 LDS Cell 2	785.2'	Some Minor Gravel First 300', Pipe Is Defect Free
11	10 LDS Cell 2 (RedoFirst 300' After Re-jetting)	303.1'	Pipe Is Clean and Defect Free

Based on both the jetcleaning and video-inspection data, the leachate collection system appears to flow and drain properly, and looks to be ready to deliver leachate.

Please call us with questions or concerns.

Regards,

Ralph Calistri – Jetclean America

CCTV Surveys List for Earnhardt

Number of surveys in this list is 11 as of Thursday, November 18, 2010 Unit of measure: ft

Setup	Date	Street	Start MH	Finish MH	Dir	Size inch	Pre Clean	Vid Cassette	Scheduled Length	Surveyed Length
1	10/27/2010		18 LDS	18 LDSA	U	18		1		82.9
2	10/27/2010	Marshall Steam	18 LCS1 CELL 2	18 LCS1A CELL2	D	18		1		79.7
3	10/27/2010	Marshall Steam	18 LCS2 CELL2	18 LCS2A CELL2	D	18		1		80.8
4	10/27/2010	Marshall Steam	18 LDS CELL1	18 LDSA CELL1	D	18		1		191.3
5	10/27/2010	Marshall Steam	18 LCS CELL1	18 LCS1 CELL1	D	18		1		199.2
6	10/27/2010	Marshall Steam	18 LCS2 CELL1	18 LCS21 CELL1	D	18		1		203.8
7	10/27/2010	Marshall Steam	10 LCS CELL 1	10 LCS CELL1A	U	10	Y	1		986.6
8	10/27/2010	Marshall Steam	10 LDS CELL1	10 LDS CELL1A	U	10	Y	1		923.1
9	10/27/2010	Marshall Steam	10 LCS CELL 2	10 LCS CELL 2A	U	10	Y	1		815.2
10	10/27/2010	Marshall Steam	10 LDS CELL2	10 LDS CELL2A	U	10	Y	1		785.2
11	10/27/2010	Marshall Steam	10 LDS CELL2	10 LDS CELL2A	U	10	Y	1		303.1

Total Scheduled Length 0.0

Total Length Surveyed 4,650.9

Pipe Graphic Report of PLR 18 LDSA X **for** Earnhardt

Work Order		***Contract***		***Video***	1	***Setup***	1
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name ***City***

Location type LANDFILL

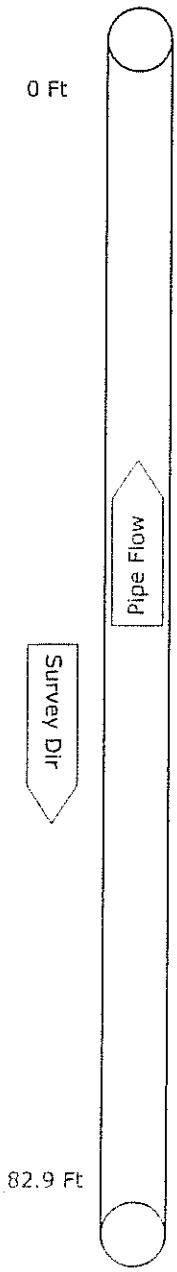
Surface

Survey purpose Pre-acceptance - normally new sewers for adoption or private line goin ***Weather*** Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	18 LDS	***Depth***	Ft
Shape	Circular	***Size*** 18	***by*** ins	***To***	18 LDSA	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Upstream		
Lining		***Year laid***	2010	***Pre-clean***		***Last cleaned***	

General note

Location note



0.0 Ft Start of Survey
Manhole/Node [18 LDS]
Water level 0

82.9 Ft Survey abandoned [END]

Pipe Graphic Report of PLR 18 LCS1 CELL 2 X **for** Earnhardt

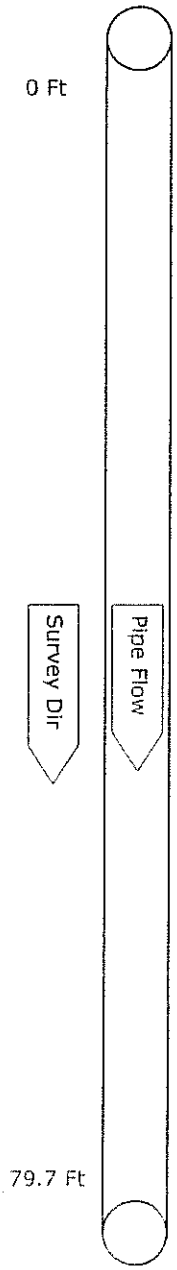
Work Order		***Contract***		***Video***	1	***Setup***	2
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	18 LCS1 CELL 2	***Depth***	Ft
Shape	Circular	***Size*** 18	***by*** ins	***To***	18 LCS1A CELL2	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Downstream		
Lining		***Year laid***	2010	***Pre-clean***		***Last cleaned***	

General note

Location note



0 Ft — 0.0 Ft — Start of Survey
Manhole/Node [18 LCS1 CELL 2]
Water level 0

79.7 Ft — 79.7 Ft — Survey abandoned [END CAP]

Pipe Graphic Report of PLR 18 LCS2 CELL2 X **for** Earnhardt

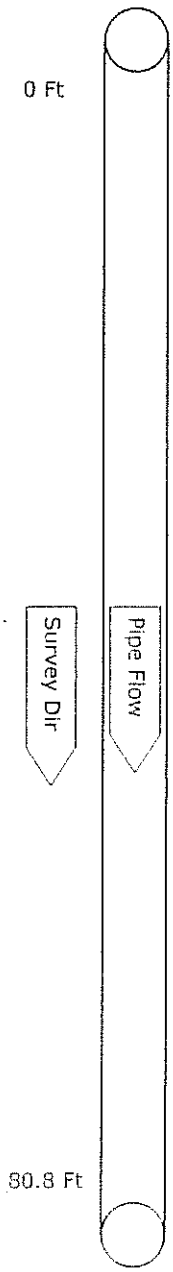
Work Order		***Contract***		***Video***	1	***Setup***	3
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	18 LCS2 CELL2	***Depth***	Ft
Shape	Circular	***Size*** 18	***by*** ins	***To***	18 LCS2A CELL2	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Downstream		
Lining		***Year laid***	2010	***Pre-clean***		***Last cleaned***	

General note

Location note



0.0 Ft Start of Survey
Manhole/Node [18 LCS2 CELL2]
Water level 0

80.8 Ft Survey abandoned [END CAP]

Pipe Graphic Report of PLR 18 LDS CELL1 X **for** Earnhardt

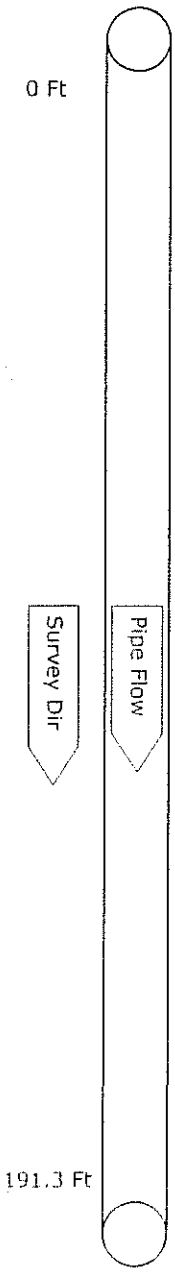
Work Order		***Contract***		***Video***	1	***Setup***	4
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	18 LDS CELL1	***Depth***	Ft
Shape	Circular	***Size*** 18	***by*** ins	***To***	18 LDSA CELL1	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Downstream		
Lining		***Year laid***	2010	***Pre-clean***		***Last cleaned***	

General note

Location note



	Start of Survey
0.0 Ft	Manhole/Node [18 LDS CELL1]
	Water level 0
191.3 Ft	Survey abandoned [END CAP]

Pipe Graphic Report of PLR 18 LCS CELL1 X **for** Earnhardt

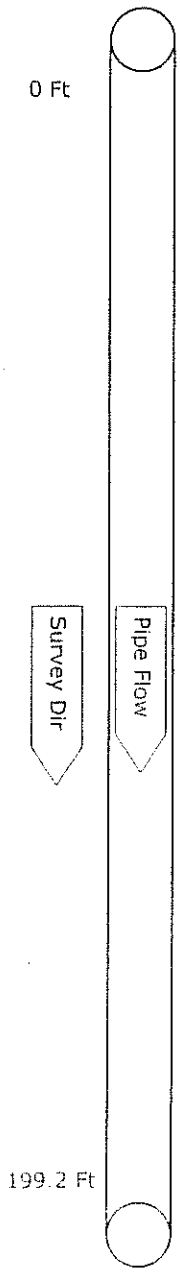
Work Order		***Contract***		***Video***	1	***Setup***	5
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	18 LCS CELL1	***Depth***	Ft
Shape	Circular	***Size*** 18	***by*** ins	***To***	18 LCS1 CELL1	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Downstream		
Lining		***Year laid***	2010	***Pre-clean***		***Last cleaned***	

General note

Location note



Start of Survey

0.0 Ft Manhole/Node [18 LCS CELL1]

Water level 0

199.2 Ft Survey abandoned [END CAP]

Pipe Graphic Report of PLR 18 LCS2 CELL1 X **for** Earnhardt

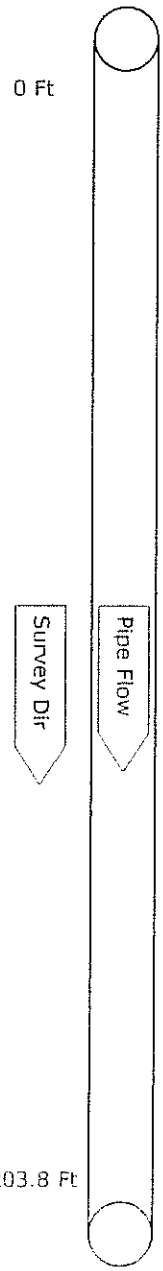
Work Order		***Contract***		***Video***	1	***Setup***	6
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	18 LCS2 CELL1	***Depth***	Ft
Shape	Circular	***Size*** 18	***by*** ins	***To***	18 LCS21 CELL1	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Downstream		
Lining		***Year laid***	2010	***Pre-clean***		***Last cleaned***	

General note

Location note



0 Ft — Start of Survey

0.0 Ft — Manhole/Node [18 LCS2 CELL1]

Water level 0

203.8 Ft — Survey abandoned [END CAP]

Pipe Graphic Report of PLR 10 LCS CELL1A S **for** Earnhardt

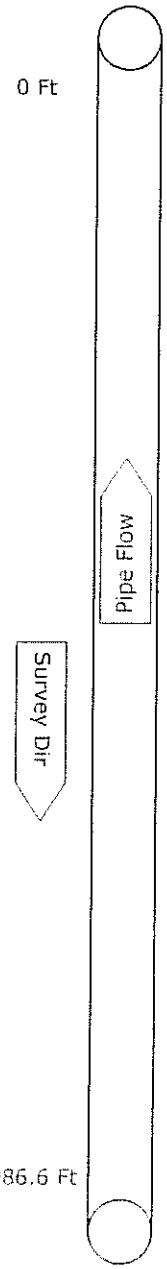
Work Order		***Contract***		***Video***	1	***Setup***	7
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	10 LCS CELL 1	***Depth***	Ft
Shape	Circular	***Size*** 10	***by*** ins	***To***	10 LCS CELL1A	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Upstream		
Lining		***Year laid***	2010	***Pre-clean***	Y	***Last cleaned***	11/18/2010

General note

Location note



0.0 Ft Manhole/Node [10 LCS CELL 1]
Water level 0

171.0 Ft Camera Submerged Begin [WATER]

241.0 Ft Camera Submerged End [WATER]

986.6 Ft Survey abandoned [CABLE RESISTANCE]

Pipe Graphic Report of PLR 10 LDS CELL1A T **for** Earnhardt

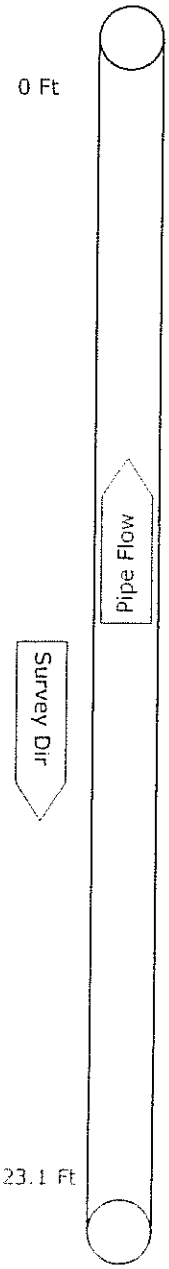
Work Order		***Contract***		***Video***	1	***Setup***	8
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	10 LDS CELL1	***Depth***	Ft
Shape	Circular	***Size*** 10	***by*** ins	***To***	10 LDS CELL1A	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Upstream		
Lining		***Year laid***	2010	***Pre-clean***	Y	***Last cleaned***	

General note

Location note



0.0 Ft Manhole/Node [10 LDS CELL1]
Water level 0

164.8 Ft Camera Submerged Begin [WATER]

221.1 Ft Camera Submerged End [WATER]

923.1 Ft Survey abandoned [CABLE RESISTANCE]

Pipe Graphic Report of PLR 10 LCS CELL 2A T **for** Earnhardt

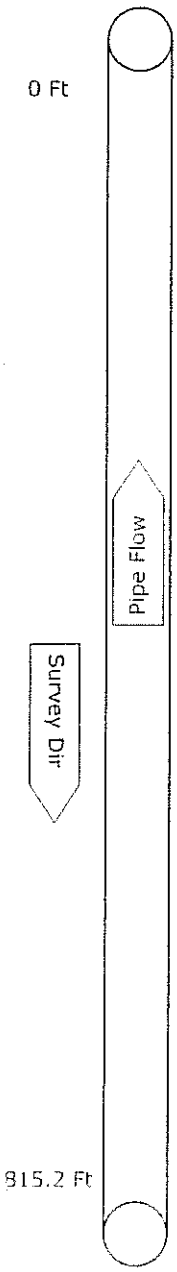
Work Order		***Contract***		***Video***	1	***Setup***	9
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	10 LCS CELL 2	***Depth***	Ft
Shape	Circular	***Size*** 10	***by*** ins	***To***	10 LCS CELL 2A	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Upstream		
Lining		***Year laid***	2010	***Pre-clean***	Y	***Last cleaned***	11/18/2010

General note

Location note



0.0 Ft Manhole/Node [10 LCS CELL 2]
Water level 0

69.8 Ft Camera Submerged Begin [WATER]

103.4 Ft Camera Submerged End [WATER]

815.2 Ft Survey abandoned [CABLE RESISTANCE]

Pipe Graphic Report of PLR 10 LDS CELL2A B **for** Earnhardt

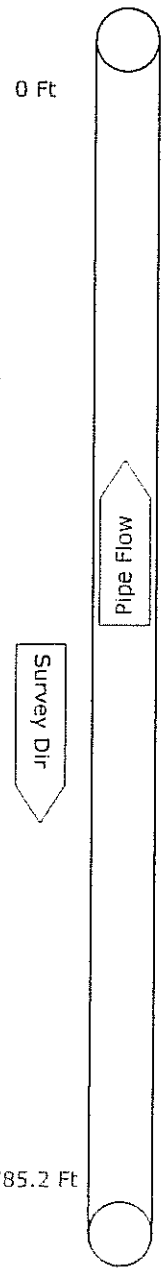
Work Order		***Contract***		***Video***	1	***Setup***	10
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	10 LDS CELL2	***Depth***	Ft
Shape	Circular	***Size*** 10	***by*** ins	***To***	10 LDS CELL2A	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Upstream		
Lining		***Year laid***	2010	***Pre-clean***	Y	***Last cleaned***	11/18/2010

General note

Location note



0.0 Ft	Manhole/Node [10 LDS CELL2] Water level 0
71.1 Ft	Camera Submerged Begin [WATER]
87.2 Ft	Camera Submerged End [WATER]
785.2 Ft	Survey abandoned [CABLE RESISTANCE]

Pipe Graphic Report of PLR 10 LDS CELL2A C **for** Earnhardt

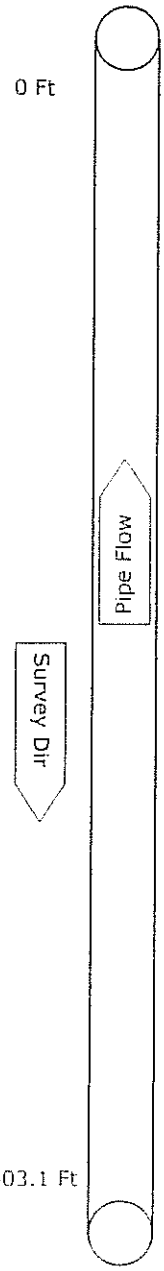
Work Order		***Contract***		***Video***	1	***Setup***	11
Facility		***Operator***	David	***Van Ref***	NC-1	***Surveyed On***	10/27/2010

Street Name	Marshall Steam	***City***	
Location type	LANDFILL		
Surface			
Survey purpose	Pre-acceptance - normally new sewers for adoption or private line goin	***Weather***	Light rainfall

Pipe Use	LEACHATE	***Schedule length***	Ft	***From***	10 LDS CELL2	***Depth***	Ft
Shape	Circular	***Size*** 10	***by*** ins	***To***	10 LDS CELL2A	***Depth***	Ft
Material	hdpe	***Joint spacing***	Ft	***Direction***	Upstream		
Lining		***Year laid***	2010	***Pre-clean***	Y	***Last cleaned***	11/18/2010

General note

Location note Revideo first 200 feet



0.0 Ft Start of Survey
Manhole/Node [10 LDS CELL2]
Water level 0

303.1 Ft Survey abandoned [RE JET]

APPENDIX III – ANCILLARY FACILITIES

Section 1 – Pump Submittal
Section 2 – Electrical/Mechanical Drawing Set
Section 3 – Fencing Plan
Section 4 – Visual Screening Plan and Zoning Compliance Certificate

APPENDIX III – ANCILLARY FACILITIES
Section 1 – Pump Submittal

GunnCo

Pump & Control, Inc.
P.O. Box 3022 Cumming, GA 30028
515 Industrial Way, Cumming, GA 30040
Phone: 770-889-7114 Fax: 770-889-2754

TRANSMITTAL

Date: 09/16/10
Project: Marshall Steam Station
GunnCo Job # 2950: Leachate Pump Systems

TO: Crowder Construction Company
1990 New Cut Road
Spartanburg, SC 29303

Attention: Mr. Jeff Leopard

Attached is one PDF set of GunnCo Sidesloper™ leachate pumping system engineering submittals for the Marshall Steam Station Project for your review.

Please return approved cover and any notes/changes.

I trust you will find the submittal in order and urge you to give me a call with any questions or if you need additional information.

Best regards,

Andre Steyn
GunnCo Pump & Control, Inc.

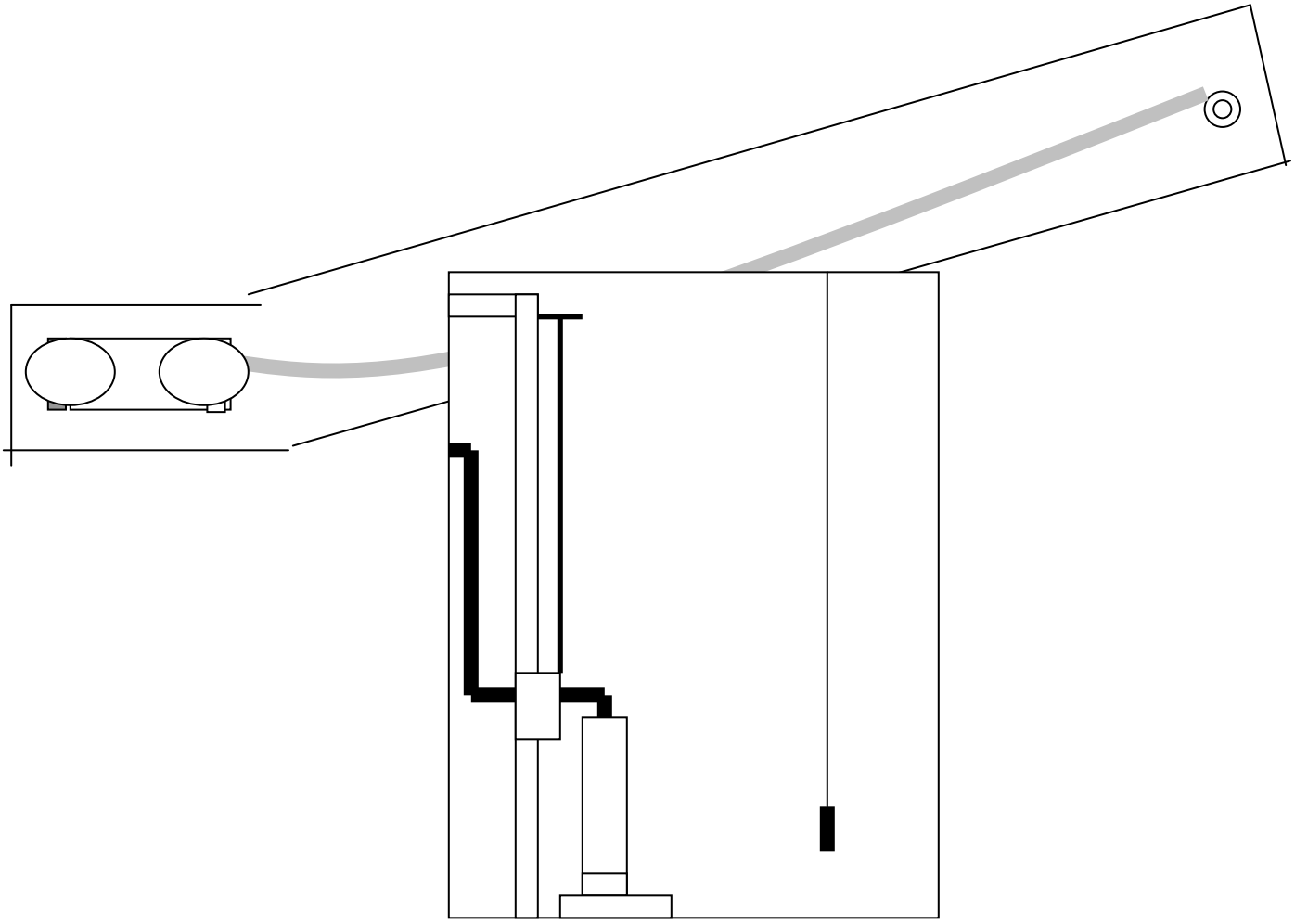
GunnCo Pump & Control, Inc.

Sidesloper™ Pump

Submittals

Marshall Steam Station
Contractor – Crowder Construction Company

GunnCo Reference # 2950 Leachate Pump



GunnCo Pump & Control Inc.

Sidesloper™ Leachate Pumping System

Project: Marshall Steam Station
Contractor: Crowder Construction Company

GunnCo Project Reference Leachate Pumps

Submittal INDEX

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8	Pump Curve – P2K 385.1
9	Materials of Construction
10	Pump Dimension Data
11	Pump Layout
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16 - 19	Motor Data – 7.5 HP 3/460V
20	Exit Fitting Installation
21	Cable Fitting Installation
22	Pull Cable
23	Hose Data
24 - 27	1.0 HP Control Panel Data
28 – 32	1.0 HP Panel Schematic & Data
33 - 34	1.0 HP Bill of Materials
35 – 38	7.5 HP Control Panel Data
39 - 44	7.5 HP Panel Schematic & Data
45 – 46	7.5 HP Bill of Materials
47	Level controller
48	Transducer
49	Warranty
50	Riser Data

GunnCo Pump & Control Inc.

Sidesloper™ Leachate Pumping System

Contact Information
For technical questions, replacement parts, or service contact GunnCo.

Mailing address: P.O. Box 2789
Cumming, GA 30028

Shipping address: 515 Industrial Way
Cumming, GA 30040

Phone: 770-889-7114
Fax # : 770-889-2754
e-mail: andre@gunnco.com
Emergency #: 404-316-3131

www.gunnco.com www.landfillpumps.com

GunnCo *Sidesloper* Leachate Pumping System

Project Equipment List

Marshall Steam Station

Submersible Leachate Pumps

Main Leachate Pump System:

One (1) GunnCo submersible "sidesloper" pump model P2K385-1 in stainless steel construction Teflon fitted with 7.5 hp, 3/460V motor, mounted in a stainless steel wheeled carrier with 100 feet power cable, stainless steel pull cable.
One (1) set 3" HDPE discharge pipe and fittings terminating with a 3" exit nipple at the top of the riser.
One (1) GunnCo submersible "sidesloper" pump model P2K40-2 in stainless steel construction Teflon fitted with 1.0 hp, 3/460V motor, mounted in a stainless steel wheeled carrier with 100 feet power cable, stainless steel pull cable.
One (1) set 2" HDPE discharge pipe and fittings terminating with a 2" exit nipple at the top of the riser.
One (1) GunnCo Duplex control panel in NEMA 4X enclosure for manual or automatic control of the leachate pumps. Panel set for 1 hp pump to start first with second pump running if the first pump does not keep up.
GunnCo O & M manuals

Groundwater Detection Pump:

One (1) GunnCo submersible "sidesloper" pump model P2K40-2 in stainless steel construction Teflon fitted with 1.0 hp, 3/460V motor, mounted in a stainless steel wheeled carrier with 100 feet power cable, stainless steel pull cable.
One (1) set 2" HDPE discharge pipe and fittings terminating with a 2" exit nipple at the top of the riser.
One (1) GunnCo Simplex control panel in NEMA 4X enclosure for manual or automatic control of the groundwater pump.
GunnCo O & M manuals

System start-up, installation supervision and training.

GunnCo *Sidesloper* Leachate Pumping System

Engineering Comments

EXCEPTIONS

1) We are not supplying, electrical work, riser pipes, discharge pipe from exit fitting in our scope. These items to be provided by general contractor.

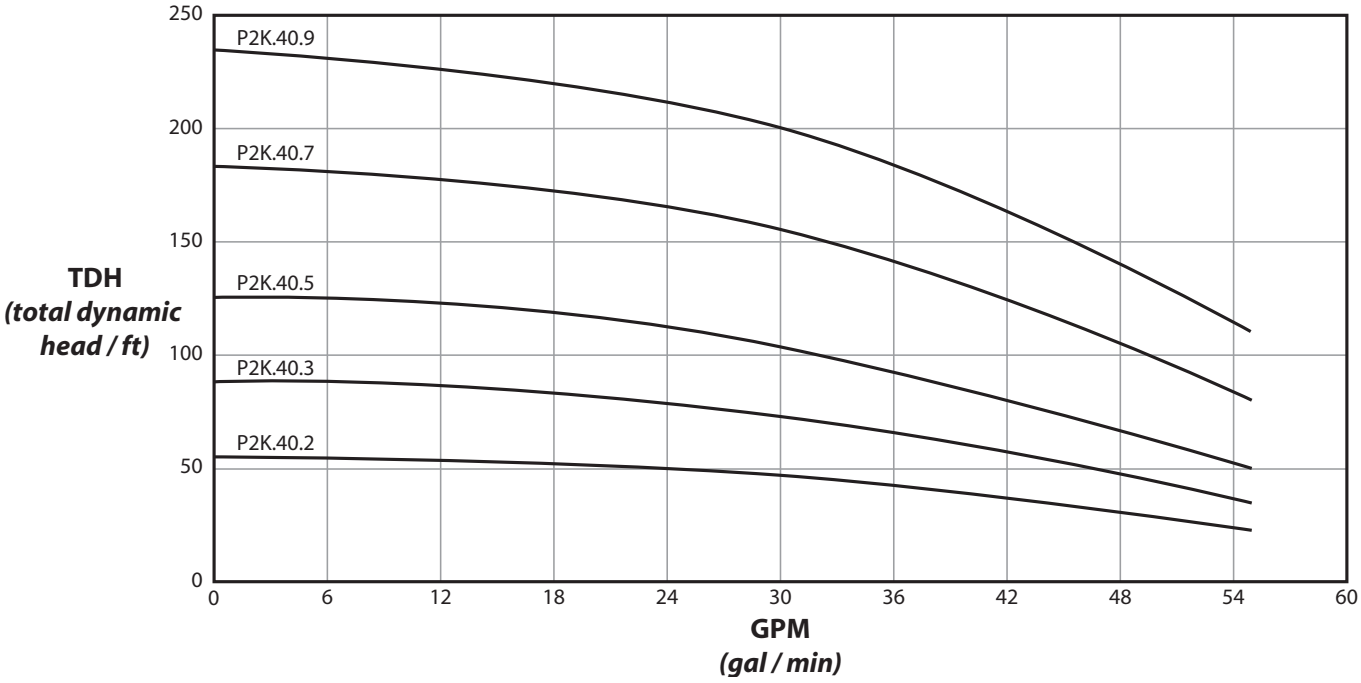
2) Control panel and breakout boxes mounting to be completed by others.

3) An "AS BUILT" dimension should be provided prior to the installation of the pumping system.

4) The riser pipe, wet well and collection system should be inspected prior to final closure/welding to ensure that no HDPE shavings, mud, rock, or debris is present in the system. Pipe shavings from construction is a frequent cause of pump problems in new cells. Pumps are designed to pump clear leachate. Failure due to debris in pump is not covered under warranty.

5) GunnCo supply terminates at exit nipple. Connection from this point to force main by general contractor

Model P2K.40 Series Performance Curves



30-55 GPM Operating Range

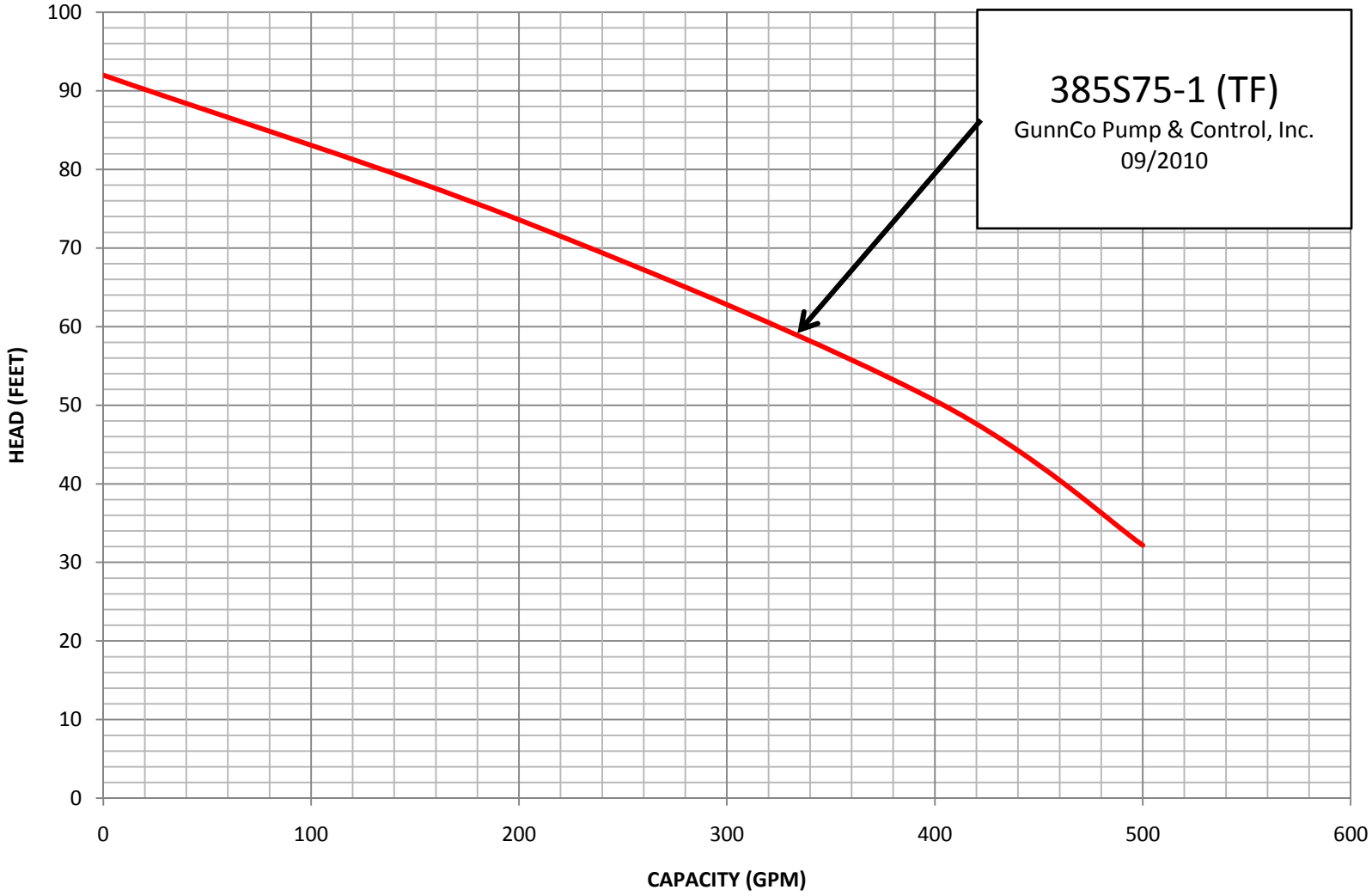
Model	Max H.P.	Max Length (Standard Carrier)	Estimated Weight	Pull Cable	Breaking Strength Rating	Discharge	Riser Recommendation
40.2	1.0	34	55	3/16″	3700#	2.0″	18″
40.3*	1.0	34	56	3/16″	3700#	2.0″	18″
40.5*	1.5	38	60	3/16″	3700#	2.0″	18″
40.7*	2.0	42	70	3/16″	3700#	2.0″	18″
40.9*	3.0	48	82	3/16″	3700#	2.0″	18″

* Preferred Model

Higher head pumps available.

GunnCo Pump and Control, Inc.

515 Industrial Way
Cumming, GA 30040
770-889-7114
www.gunnco.com



Pump Performance Test Curve

MATERIALS OF CONSTRUCTION

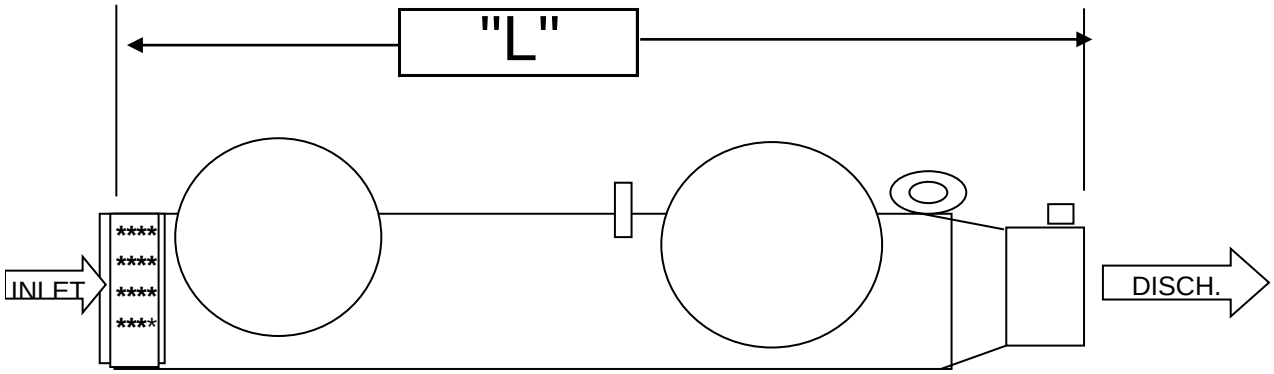
Leachate Pump

Pump Model P2K

Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Pump Shaft	431 Stainless Steel
Straps	304 Stainless Steel
Priming Inducer	304 Stainless Steel
Coupling	329/431 Stainless Steel
Check Valve Seat	Teflon/304 Stainless Steel
Top Bearing	Teflon
Impeller Seal Ring	Teflon
Intermediate Bearings	Teflon
Shaft Washer	LCP (Vectra®)
Split Cone	304 Stainless Steel
Split Cone Nut	304 Stainless Steel

GunnCo.....*Sidesloper*™ Pump

Dimensional Data and Weights P2K Models

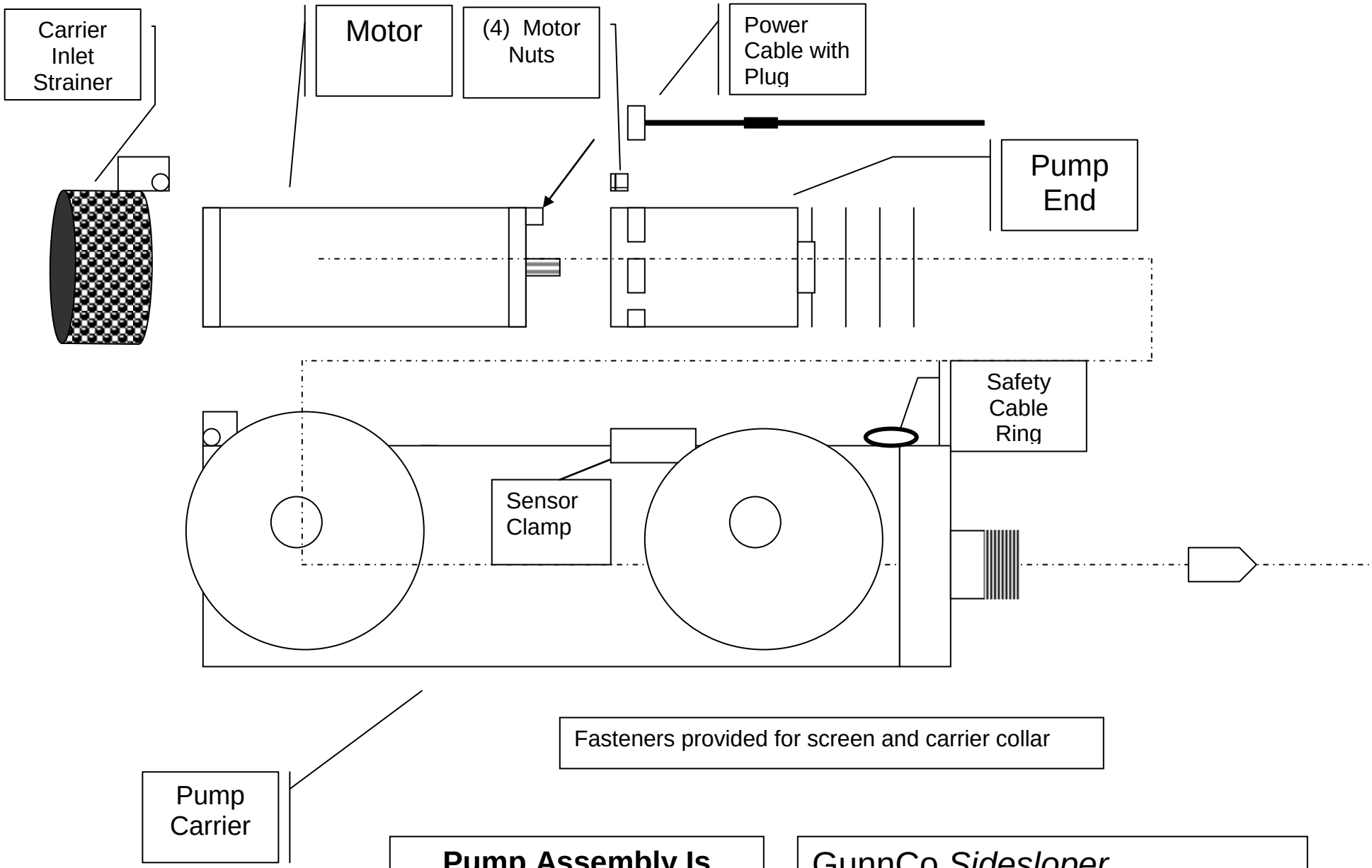


Pump Model	"L" Max.	Discharge Size	Est. Weight	Pull Cable	
P2K-10 (ALL)	24"	*1.25"	50 pounds max.	1/8"	18" RISER
P2K-25 (ALL)	24"	1.5"	50 pounds max.	1/8"	
P2K-40-1/2/3	24"	2.0"	50 pounds max.	1/8"	
P2K-40-4/5	36"	2.0"	60 pound max.	1/8"	
P2K-40-6/7	42"	2.0"	60 pound max.	1/8"	
P2K-60-1/2/3/4	36"	2.0"	60 pound max.	1/8"	
P2K-60-5	42"	2.0"	90 pound max.	3/16	
P2K-60-6 & 7	58"	2.0"	100 pound max.	3/16"	
P2K-60-8 & 9	63"	2.0"	100 pound max.	3/16	
P2K-75-1/2/3	36"	2.0"	60 pound max.	3/16	
P2K-75-4/5	42"	2.0"	90 pound max.	3/16	
P2K-85-1	36"	3.0"	75 pound max.	3/16"	24" RISER
P2K-85-2	46"	3.0"	100 pound max.	3/16"	
P2K-85-3/4	55"	3.0"	130 pound max.	3/16"	
P2K-150-1	36"	3.0"	90 pound max.	3/16"	
P2K-150-2	55"	3.0"	110 pound max.	3/16"	
P2K-150-3	60"	3.0"	140 pound max.	3/16"	
P2K-230-1	55"	3.0"	100 pound max.	3/16"	
P2K-230-2	60"	3.0"	160 pound max.	3/16"	
P2K-230-3	55"	3.0"	200 pound max.	3/16"	
P2K-385-1	60"	4.0"	160 Pounds Max.	1/4"	

* Select 1.5" Discharge Hose.

"L" Dimensions are maximum and may vary depending upon voltage and project requirements.
1/8" Pull Cable has 1760# breaking strength rating.
3/16" Pull Cable has 3700# breaking strength rating.
Optional 1/4" Pull Cable with 6400# breaking strength rating available.
Data Subject To Change

Section 2 Page 3



Pump Assembly Is Shipped Pre-Assembled

GunnCo *Sidesloper*
Model P2K Pump Assembly
Protected by U.S. Patent MBG 1.5.2K

GunnCo *Sidesloper* ™

MODEL P2K MOTOR DATA 1.0 HP, 3/460V/60

HORSE POWER	**:**	**1.0 hp**
PHASE	**:**	**3**
VOLTS	**:**	**460 volts**
FREQUENCY	**:**	**60 Hz**
SERVICE FACTOR	**:**	**1.4**
FULL LOAD AMPS	**:**	**2.0 amps**
AMPS @ SF	**:**	**2.4 amps**

Line to line Resistance	**:**	**19.9 – 23.0 Ohms**
Locked rotor amps	**:**	**13.5 amps**

Applications

These motors are built for dependable operation in 4" diameter or larger water wells.

Basic Features

- Corrosion-resistant Stainless Steel Exterior
- Stainless Steel Splined Shaft
- Hermetically-sealed Windings
- Anti-track Self-healing Resin System
- Filter Check Valve
- Water Lubrication
- Kingsbury-type Thrust Bearing
- Pressure-equalizing Diaphragm
- Built-in Lightning Arrestors (All Single-phase; 200 & 230 V Three-Phase)
- Removable Water Bloc Lead
- Franklin-manufactured Control Boxes Available for Single-Phase Motors
- UL 778 Recognized (North American Voltages)
- CSA Certified
- ANSI/NSF 61 Certified
- Industry Standard NEMA Mounting Dimensions

Special Features

- No flow inducer sleeve required in water up to 86°F (30°C) for motors through 2 Hp.
- Two-wire motors are split-phase designs with integral starting components and do not require a control box. They feature Franklin's patented 2-wire BIAC starting switch which provides Reverse Impact Torque to aid starting in adverse environments and prevents extreme fast cycling (e.g. water logged tank).
- Three-wire motors through 1 Hp use Franklin's exclusive 3-wire QD (Quick Disconnect) Control Box with the patented QD Relay. This relay provides the ultimate in operational life.
- Single-phase motors can be used with Pumptec products to protect against dry-run and other installation conditions that can damage motors and/or pumps. See Single-phase Protection Devices for details.

Constant Pressure Options

- Use Franklin's MonoDrive controller with 1 1/2 Hp three-wire single-phase motors to provide constant water pressure.
- Three-phase motors can be used with SubDrive controllers to provide constant water pressure.

Pollution Recovery Option

- Pollution Recovery motors are equipped for use in monitoring and recovery wells in which hydrocarbons and other chemicals may be present.
- Special Viton® rubber parts and other chemical resistant materials as listed in Construction Materials chart.

4-Inch Super Stainless Motor Specifications

Hz	Ph	Hp Range	kW Range	Poles	RPM	Max. Ambient Temp.	Duty Rating	Rotation
60	2-Wire	1/3 - 1.5	0.25 - 1.1	2	3450	86°F / 30°C	Continuous	CCW Facing Shaft End
50	2-Wire	1/2 - 1.5	0.37 - 1.1	2	2875	86°F / 30°C	Continuous	
60	3-Wire	1/3 - 3	0.25 - 2.2	2	3450	86°F / 30°C	Continuous*	
50	3-Wire	1/3 - 3	0.25 - 2.2	2	2875	86°F / 30°C	Continuous*	
60	3-Phase	1/2 - 3	0.37 - 2.2	2	3450	86°F / 30°C	Continuous*	Electrically Reversible
50	3-Phase	1/2 - 3	0.37 - 2.2	2	2875	86°F / 30°C	Continuous*	

4-Inch Pollution Recovery Motor Specifications

Hz	Ph	Hp Range	kW Range	Poles	RPM	Max. Ambient Temp.	Duty Rating	Rotation
60	2-Wire	1/3 - 1.5	0.25 - 1.1	2	3450	86°F / 30°C	Continuous	CCW Facing Shaft End
50	2-Wire	1/2 - 1.5	0.37 - 1.1	2	2875	86°F / 30°C	Continuous	
60	3-Wire	1/3 - 2	0.25 - 1.5	2	3450	86°F / 30°C	Continuous	
50	3-Wire	1/3 - 2	0.25 - 1.5	2	2875	86°F / 30°C	Continuous	
60	3-Phase	1/2 - 2	0.37 - 1.5	2	3450	86°F / 30°C	Continuous	Electrically Reversible
50	3-Phase	1/2 - 2	0.37 - 1.5	2	2875	86°F / 30°C	Continuous	

*3 Hp motors require 0.25 ft/sec flow past motor.

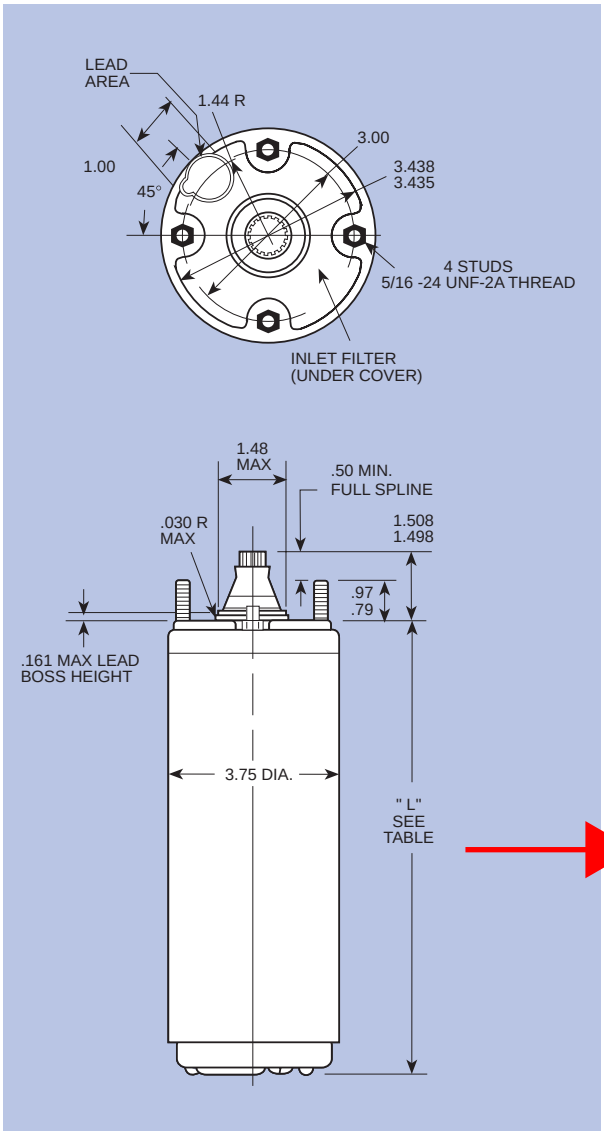
4-Inch Construction Materials

	Construction Type	
Component	Standard Water Well	Pollution Recovery
End Bells	304 SS over Iron	304 SS over Iron
Stator Shell	301 SS	301 SS
Shaft Extension	17-4 SS	17-4 SS
Fasteners	300 Series SS	316 SS
Seal Cover	Acetal	Tefzel®
Seal	Nitrile Rubber Lip	Viton®
Diaphragm	Nitrile Rubber	Viton®
Slinger	Nitrile Rubber	Viton®
Lead Wire (or Cable)	XLPE	Lead not furnished with motor
Lead Potting	Epoxy	Lead not furnished with motor
Lead Jam Nut	300 Series SS	Lead not furnished with motor

Specifications subject to change without notice. Contact Franklin Electric if current material types are required for bid specifications.

Viton® is a registered trademark of DuPont Dow Elastomers.
Tefzel® is a registered trademark of E.I. du Pont Nemours and Company.

4-Inch Dimensions and Weights



Single-phase Motors - 2-wire

HP	KW	"L" (inches)	SHIPPING WEIGHT LBS	SHIPPING WEIGHT KG	MOTOR CARTON SIZE (in inches)
1/3	0.25	8.76	16	7.3	4 x 4.375 x 16
1/2	0.37	9.51	18	8.2	4 x 4.375 x 16
3/4	0.55	10.64	21	9.5	4 x 4.375 x 19
1	0.75	11.73	24	10.9	4 x 4.375 x 19
1.5	1.1	15.10	31	14.1	4 x 4.375 x 21

Single-phase Motors - 3-wire

HP	KW	"L" (inches)	SHIPPING WEIGHT LBS	SHIPPING WEIGHT KG	MOTOR CARTON SIZE (in inches)
1/3	0.25	8.76	17	7.7	4 x 4.375 x 16
1/2	0.37	9.51	19	8.6	4 x 4.375 x 16
3/4	0.55	10.64	21	9.5	4 x 4.375 x 19
1	0.75	11.73	24	10.9	4 x 4.375 x 19
1.5	1.1	13.60	28	12.7	4 x 4.375 x 21
2	1.5	15.10	33	15.0	4 x 4.375 x 21
3	2.2	19.04	41	18.6	6 x 6 x 25

Three-phase Motors

HP	KW	"L" (inches)	SHIPPING WEIGHT LBS	SHIPPING WEIGHT KG	MOTOR CARTON SIZE (in inches)
1/2	0.37	9.51	18	8.2	4 x 4.375 x 16
3/4	0.55	10.64	21	9.5	4 x 4.375 x 16
1	0.75	11.73	24	10.9	4 x 4.375 x 19
1.5	1.1	11.73	24	10.9	4 x 4.375 x 19
2	1.5	13.60	28	12.7	4 x 4.375 x 21
3	2.2	16.04	35	15.9	6 x 6 x 22

All dimensions listed above are for models supplied with lead. Consult factory for other models.

GunnCo *Sidesloper* ™

MODEL P2K MOTOR DATA 7.5 HP, 3/460V/60

HORSE POWER	**:**	**7.5 hp**
PHASE	**:**	**3**
VOLTS	**:**	**460 volts**
FREQUENCY	**:**	**60 Hz**
SERVICE FACTOR	**:**	**1.15**
FULL LOAD AMPS	**:**	**10.9 amps**
AMPS @ SF	**:**	**12.3 amps**

Line to line Resistance	**:**	**2.4 – 2.9 Ohms**
Locked rotor amps	**:**	**65 amps**

Applications

These motors are built for dependable operation in 6” diameter or larger water wells.

Basic Features

- Full 3450 RPM, 60 Hz Design Point
- Maximum Temperature Winding Wire NEMA Class 200
- Double Flange Design
- Stainless Steel Splined Shaft
- Hermetically-sealed Stator
- Resin Encapsulated Windings
- Stainless Steel Shell
- Epoxy Coated End Frames
- Filter Check Valve
- Kingsbury-type Water-lubricated Thrust Bearing
- Pressure-equalizing Diaphragm
- 3-Lead & 6-Lead (Wye-delta) Configurations
- Pre-filled with Temperature-resistant Fill Solution
- Sand Fighting Slinger
- Removable Water Bloc™ Lead
- Copper Bar Rotor
- Carbon Ceramic Rotating Face Seal
- Franklin-manufactured Control Boxes Available for Single-Phase Motors
- Worldwide Availability

Special Options

- Sand Fighter Models with special Silicon Carbide based sealing system available for applications with sand or other abrasives.
- 316 SS Construction available. All 316 SS motors include Sand Fighter sealing system and Subtrol Heat Sensor for use with SubMonitor protective devices.
- NiResist Construction available. All NiResist motors include a Sand Fighter sealing system and Subtrol Heat Sensor for use with SubMonitor protective devices.
- SubMonitor Motor Protection — A field proven and contractor friendly premium motor protection system. It protects the motor against overload, underload, overheating, and rapid cycling. The use of SubMonitor can also extend the motor warranty (see SubMonitor literature for details).

NOTE: Motor must be manufactured with Subtrol Heat Sensor.

Standard 6-Inch Motor Specifications

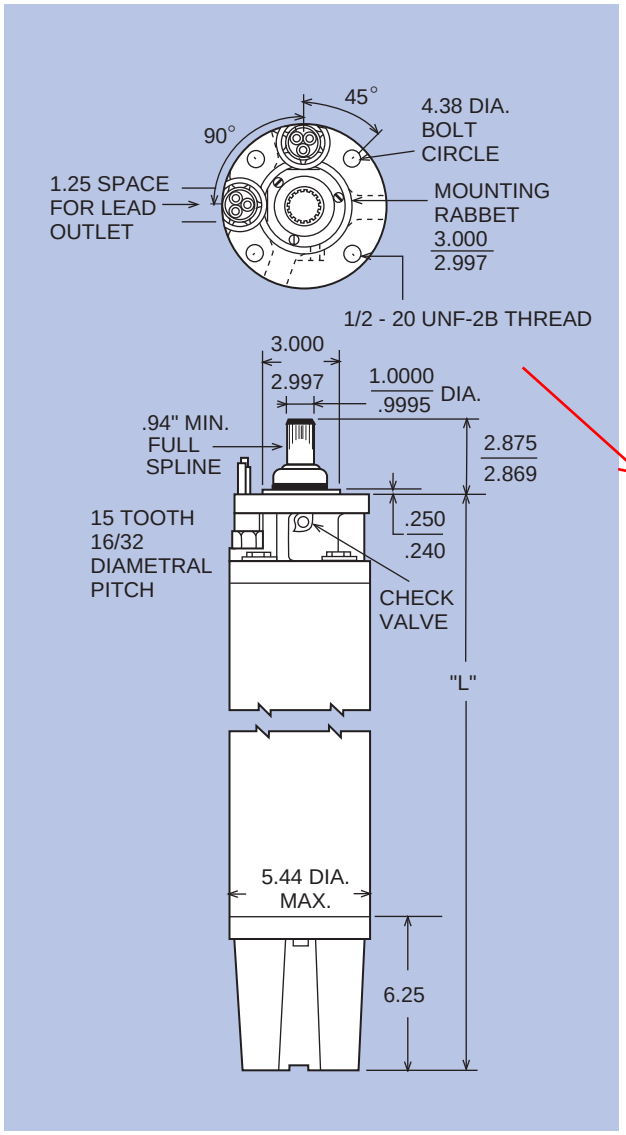
Hz	Ph	Hp Range	kW Range	Poles	RPM	Max. Ambient Temp.	Duty Rating
60	1	5 - 15	3.7 - 11	2	3450	86°F / 30°C	Continuous at 0.5 ft/sec flow past motor
60	3	5 - 60	3.7 - 45	2	3450	86°F / 30°C	Continuous at 0.5 ft/sec flow past motor
50	1	5 - 15	3.7 - 11	2	2875	86°F / 30°C	Continuous at 0.5 ft/sec flow past motor
50	3	5 - 60	3.7 - 45	2	2875	86°F / 30°C	Continuous at 0.5 ft/sec flow past motor

6-Inch Construction Materials

Component	Construction Type			
	Standard Water Well	Sand Fighter™	Ni-Resist	Corrosion Resistant (316 SS)
Castings	Gray Iron	Gray Iron	Ni-Resist Type 1B	316 SS
Stator Shell	301 SS	301 SS	316 SS	316 SS
Stator Ends	Low Carbon Steel	Low Carbon Steel	316 SS	316 SS
Shaft Extension	303 SS (5-30 Hp), 17-4 SS (40-60 Hp)	303 SS (5-30 Hp), 17-4 SS (40-60 Hp)	17-4 SS	17-4 SS
Fasteners	300 & 400 Series SS	300 & 400 Series SS	316 SS	316 SS
Seal Cover	304 SS & Sintered Bronze	304 SS & Sintered Bronze	316 SS	316 SS
Seal	Carbon Ceramic Face	Sand Fighter™ SiC/SiC Seal System	Sand Fighter™ SiC/SiC Seal System	Sand Fighter™ SiC/SiC Seal System
Diaphragm	Nitrile	Nitrile	Nitrile	Nitrile
Diaphragm Plate	304 SS	304 SS	316 SS	316 SS
Diaphragm Spring	302 SS	302 SS	17-7 SS	17-7 SS
Slinger	Nitrile	Nitrile	Type 100 Hydrin	Type 100 Hydrin
Lead Wire (or Cable)	XLPE 125°C	XLPE 125°C	XLPE 125°C	XLPE 125°C
Lead Potting	Epoxy	Epoxy	Epoxy	Epoxy
Filter	Delrin & Polyester	Delrin & Polyester	316 SS Plug	316 SS Plug
Insulation	Class F	Class F	Class F	Class F

Specifications subject to change without notice. Contact Franklin Electric if current material types are required for bid specifications.

6-Inch Dimensions and Weights



3-Lead Single-phase Motors

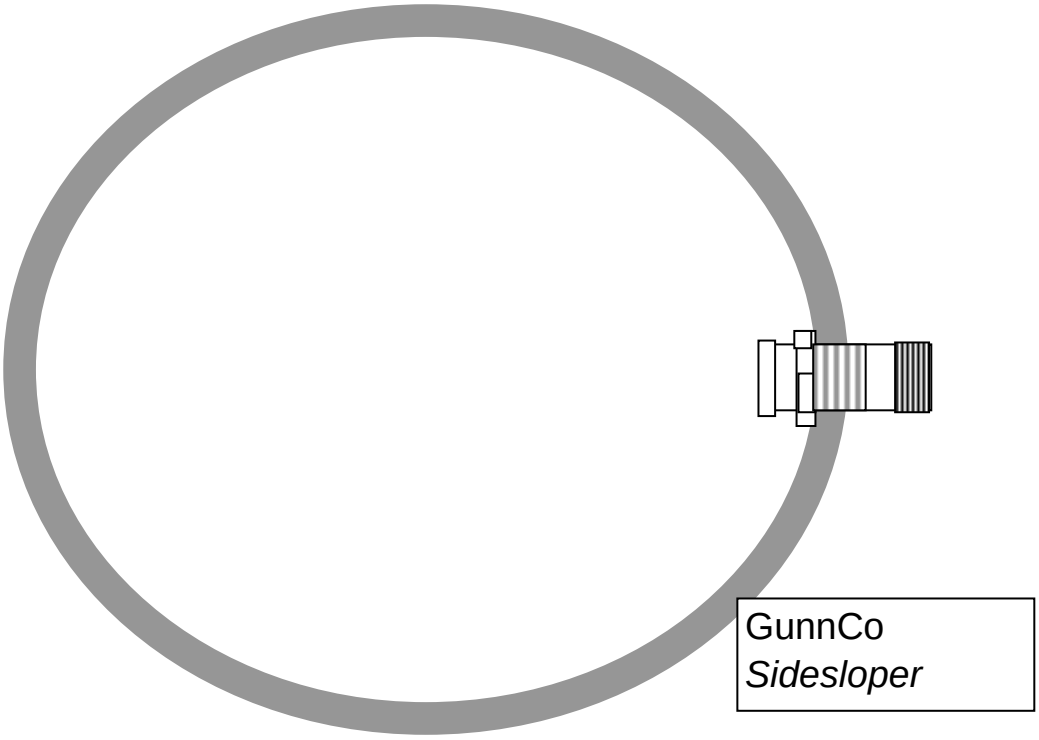
HP	KW	"L" (inches)	SHIPPING WEIGHT LBS	SHIPPING WEIGHT KG	MOTOR CARTON SIZE (in inches)
5	3.7	25.4	110	50	7.5 x 10.75 x 34.5
7.5	5.5	28.0	123	56	7.5 x 10.75 x 34.5
10	7.5	30.6	141	64	7.5 x 10.75 x 37
15	11	33.1	154	70	7.5 x 10.75 x 42.25

3-Lead Three-phase Motors

HP	KW	"L" (inches)	SHIPPING WEIGHT LBS	SHIPPING WEIGHT KG	MOTOR CARTON SIZE (in inches)
5	3.7	22.9	101	46	7.5 x 10.75 x 34.5
7.5	5.5	24.2	108	49	7.5 x 10.75 x 34.5
10	7.5	25.4	116	53	7.5 x 10.75 x 34.5
15	11	28.0	129	59	7.5 x 10.75 x 34.5
20	15	30.6	145	66	7.5 x 10.75 x 37
25	18.5	33.1	156	71	7.5 x 10.75 x 42.25
30	22	35.7	174	79	7.5 x 10.75 x 42.25
40	30	40.8	202	92	7.5 x 10.75 x 47.25
50	37	55.3	300	136	8.75 x 10.5 x 71.75
60	45	61.3	330	150	8.75 x 10.5 x 71.75

6-Lead Three-phase Motors

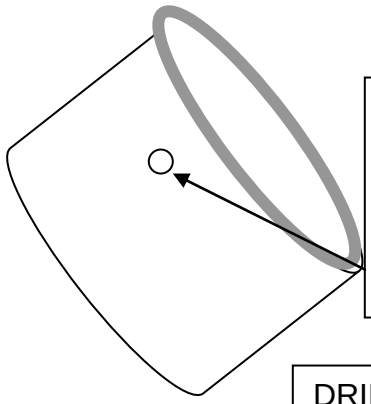
HP	KW	"L" (inches)	SHIPPING WEIGHT LBS	SHIPPING WEIGHT KG	MOTOR CARTON SIZE (in inches)
5	3.7	22.9	103	47	7.5 x 10.75 x 34.5
7.5	5.5	24.2	110	50	7.5 x 10.75 x 34.5
10	7.5	25.4	118	54	7.5 x 10.75 x 34.5
15	11	28.0	131	60	7.5 x 10.75 x 34.5
20	15	30.6	147	67	7.5 x 10.75 x 37
25	18.5	33.1	158	72	7.5 x 10.75 x 42.25
30	22	35.7	176	80	7.5 x 10.75 x 42.25
40	30	40.8	206	94	7.5 x 10.75 x 47.25
50	37	55.3	304	138	8.75 x 10.5 x 71.75
60	45	61.3	334	152	8.75 x 10.5 x 71.75



Exit Nipple Installation

1) Drill hole to correct size at desired location.
2) Thread exit nipple into drilled hole. Hold at non-threaded boss area or attach end cap to turn. Extend into riser approximately 2".
3) Attach male cam & groove fitting- use thread paste.
4) Back up nipple until sholder of cam & groove fitting is against inside of riser pipe wall.

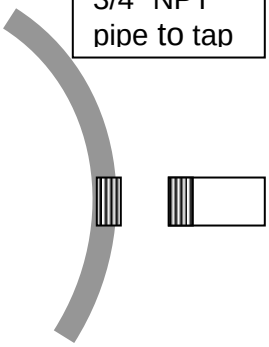
GunnCo *Sidesloper Pumps* *mbg1/2K*



Drill hole to correct size at desired location in upper part of sump.

DRILL (1) 3/4" & (1) 15/16" HOLE

2

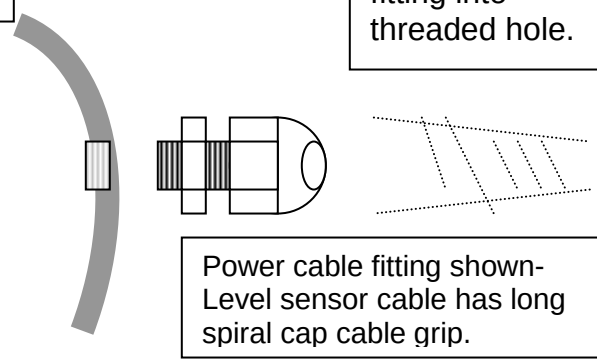


USE 1/2" & 3/4" NPT pipe to tap

Thread drilled hole to approx. 1/2" to 3/4" depth. This may be accomplished using a threaded pipe nipple-3-6" long. (thread into clean hole about 2/3 of threaded end of pipe).

3

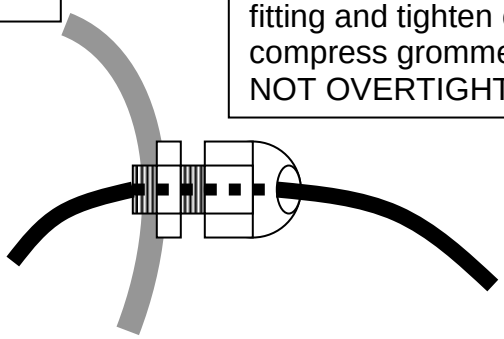
Install cable fitting into threaded hole.



Power cable fitting shown- Level sensor cable has long spiral cap cable grip.

4

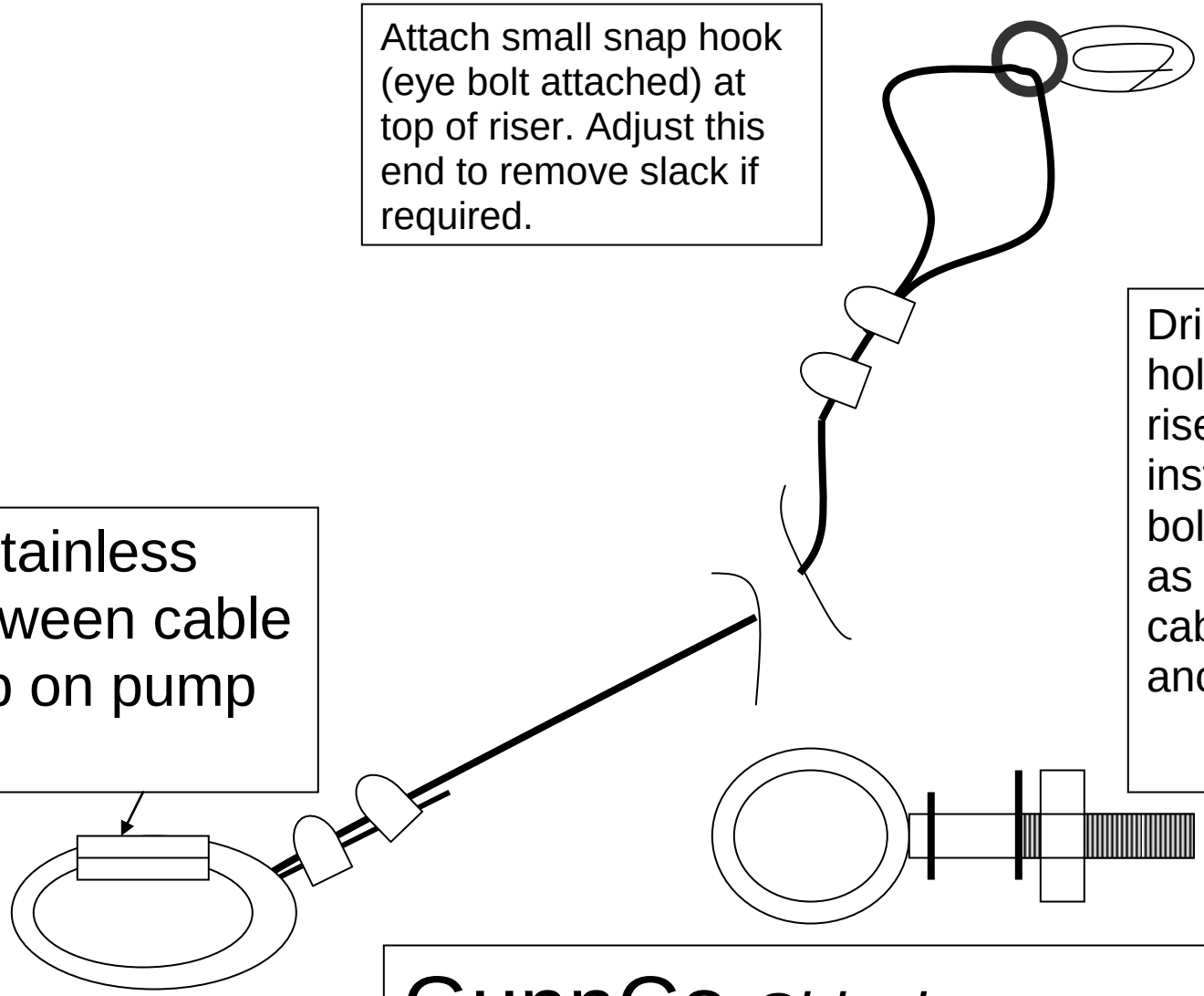
Pull cable through cable fitting and tighten cap to compress grommet. DO NOT OVERTIGHTEN



Cable Fitting Installation

The GunnCo *Sidesloper* pumping system is provided with riser pipe cable exit fittings to provide a neat and gas tight seals and allow cables to exit from the side wall of the riser pipe. The fittings allow the cables to be easily disconnected and removed if required and prevents gas from the riser pipe from migrating through conduit into the control panel where it will corrode and damage electrical components. The fittings are non-metallic and will not corrode and swell. Level

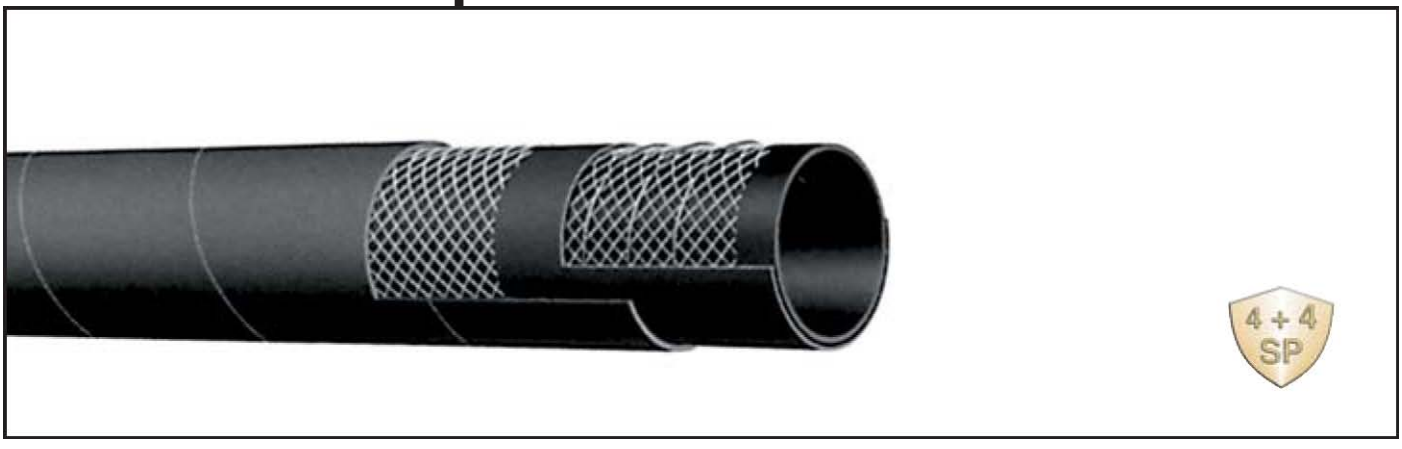
A matching set of cable fittings may be provided for the cables to enter conduit junction or control box. This leaves a short section of cable exposed but ensures the gas does not enter the control panel. An alternate version of this sealing system is to install the cable fittings on the inside of the riser and threaded conduit fittings on the outside of the riser-call to request details.



GunnCo *Sidesloper* Pumping System

Pull Cable Attachment mbg 1/2000

T202AA -150 PSI EPDM
Multi-Purpose Water Suction Hose



APPLICATION
Suction and delivery of non-corrosive liquids for irrigation, construction, fertilizers and lasso acid solutions.

COVER
Black weather and ozone-resistant EPDM rubber.

REINFORCEMENT
Spiralled high tensile textile cords and ***4*** highly flexible steel helix wires.

TUBE
Black EPDM rubber.

TEMPERATURE RANGE
-__°F to 176°F

STANDARD LENGTH
100 feet: 1" through 6" _0, 50 feet: 5" _0, _5, 50 feet: 6" _0, _5 feet: 8"

BRANDING
ALFAGOMMA – ITALY – T_0_ 10 BAR (150 PSI) GENERAL PURPOSE EPDM (in green letters)

Specifications

SERIES NO.	NOMINAL ID		NOMINAL OD		APPROX. WT. lbs./100 ft.	MAX. REC. WP (PSI)	MIN. BEND RADIUS (in.)
	(in.)	(mm)	(in.)	(mm)			
T202AA100	1	25	1.38	35	54	150	4
T202AA125	1 1/4	32	1.65	42	65	150	5
T202AA150	1 1/2	38	1.89	48	75	150	6
T202AA200	2	51	2.40	61	97	150	8
T202AA250	2 1/2	63	2.95	75	129	150	10
T202AA300	3	76	3.46	88	154	150	12
T202AA350	3 1/2	90	4.02	102	190	150	14
T202AA400	4	102	4.49	114	213	150	16
T202AA500	5	127	5.55	141	334	150	25
T202AA600	6	152	6.54	166	417	150	30

COUPLING SUGGESTIONS **Cam and groove, pin lug, short shank couplings or combination nipples attached with single bolt, double bolt, wire or band type clamps.**

Sideslopper™ PUMPING SYSTEM CONTROL
OPERATION-SIMPLEX "GC" Series" 101 Panel

The controller should provide automatic operation. Under normal conditions the pump should operate with the H-O-A switches in the A or automatic position.

EXTERIOR MOUNTED COMPONENTS:

Top Alarm Light-(optional) Indicates HIGH liquid level condition. See individual indicators for cause.

Duplex Receptacle-(optional) Provides up to 5 amp 120v electrical service.

INTERIOR DOOR MOUNTED OPERATOR CONTROLS:

Main Breaker Disconnect Handle-The main turns power off to the controller. This switch must be turned to the OFF position to open the interior door.

H-O-A Switch – The H-O-A switch should remain in the "A" setting for automatic operation. The "H" setting or hand is for testing only.

Indicating Controller-This device displays the level in the sump in inches and provides the pump ON/OFF and high-level ON/OFF operation. Check current setting or re-adjust set points as follows:

1) PUMP OFF-Turn center knob of the left to A-Reset. The current PUMP OFF set point will be displayed. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed.
2) PUMP ON- Turn center knob of the left to A-Set. The current PUMP ON set point will be displayed. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed. PLEASE NOTE: The pump will not start in the "A" position unless the level has surpassed the ON setting.
3) HIGH ALARM OFF-Turn center knob of the right to B-Reset. The current HIGH LEVEL OFF set point will be displayed. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed.
4) HIGH ALARM ON-Turn center knob of the right to B-Set. The current HIGH LEVEL ON set point will be displayed. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed.

LED is provided to indicate that the A or B relays are ON when lit. The level display will also flash during a high level condition. Pump ON and OFF settings should be sufficient difference to prevent pump rapid cycle-pump should not restart for 10 minutes or more (typically hours) after pump shuts off.

Flow Meter (OPTION)-The digital flow meter provides rate of flow (GPM-gallons per minute) on the upper/larger digits, and total accumulated flow (gallons) on the lower digits. Total may accumulate to 99999999 if the decimal point is eliminated. The right side arrow button resets the total to "0" when pressed. See flow meter instructions.

RUN Light-indicates pump is called to operate.

PHASE or VOLTAGE FAULT/FAIL Light-Indicates a phase loss, improper voltage, reversed phase (three phase only), blown sensor fuses damaged, or damaged voltage or phase sensor. Sensor is adjustable and should be set to actual operating voltage at the time of start-up.

OVERLOAD Light-Indicates a motor starter overload has occurred.

HIGH LEVEL Light (OPTION) Indicates a high level condition exists. Under this condition the level indicating display will flash.

TANK FULL Light (OPTION) –Indicates that the pump will not operate in the "A" mode because the panel is receiving a signal via a pair of wires that the remote storage tank or sump is full. Under this condition the pump will operate in the "H" mode.

OVERLOAD Reset Button-Reset the motor starter overload.

ETM-elapsed run time meters indicate hours of pump operation (to 1/10th). Under normal conditions hours of operation should be similar for each pump. This information can be recorded to determine estimated flows for the system.

Breakers-The motor, control, (and optional receptacle) breakers are accessible from the interior door. A tripped breaker typically indicates a short circuit. Please note that there are also fuses in the interior for the transformer or control power or optional receptacle. See additional information in interior components section.

INTERIOR COMPONENTS: Should be serviced with power off or by a qualified service personnel. NOTE: Power will be present in the incoming wiring to the main disconnect.
----------ELECTRICAL HAZARD EXISTS!----------

Motor Breaker-Three pole circuit breaker-typically located on upper far right is provided for the short circuit protection and allow service of the system. If a breaker trips check for a short circuit and reset. If the breaker trips again there may be an electrical problem which should be checked by a qualified electrician. Motor breaker switches off primary voltage to the motor starter contactors and pump.

Control Breaker-Single pole control circuit breaker-Typically located left position of the motor breaker is provided for the short circuit protection and allow service of the system. If a breaker trips check for a short circuit and reset. If the breaker trips again there may be an electrical problem which should be checked by a qualified electrician. There is also a fuse between the breaker and the control circuit. at the transformer which Control breaker switches off 120v control power to operator control components.

Receptacle Breaker (OPTION) -Single pole circuit breaker-Typically located far left position of the motor breaker is provided for the short circuit protection and protection of the system. There is also a fuse between the breaker and the receptacle which typically may blow due to overloaded circuit (limit usage to 5 amp service).

Transformer and Fuses (if applicable) – The transformer provides low 120 volt power for the control operations. There are three fuses mounted on top of the transformers, The upper two are the incoming power (230/460 volt) and the lower fuse is the control circuit power (120 volt). When replacing fuses use the identical type and rating as originally provided.

Relays ("ICE CUBE" relays)-These are plug in style relays which work between the level controller/H-O-A switch and the motor starter coil (and where applicable the high level lights) which minimizes the wear of the level controller contacts. Coil voltage is 120v.

Motor Starter/Overload relay -Contains overload protection and magnetic coil to energizes to allow power to the pump. Red bar resets overloads. Coil voltage is 120v.

Voltage/Phase Monitor- Plug in style device monitor incoming power and detects and protects motor from high or low voltage, loss of phase, or reversed phase (on three phase models). A led light indicates proper operation and adjustable knob allows for setting the unit to the normal operating voltage range. If the range exceeds approximately 10% of the set point the pump will be prevented from operating (motor starter coil will not pull in) until the problem is corrected. If the LED will not come on with adjustment check voltage and the associated fuses. High voltage surges may damage monitor. GunnCo normally stocks replacement units. At start-up the operating voltage should be set. Voltage must be within the range of the monitor. On three phase systems, if the unit will not energize at start-up after adjustment of range setting, the phases may need to be reversed at the monitor-to accomplish switch any two legs.

ISB-Intrinsically Safe Barrier-This devices provides a safety for the level control voltage and must be used to ensure safe operation where the sensor is in a hazardous location. The barrier contain two replaceable fuses.

24VDC Power Supply (OPTION)-Supplies power to the voltage meter. Plugs into socket.

Lock Out Relay (OPTION) –Provides sensing of a closed contact (float switch or relay) up to 5000' away through a pair of wires and provides panel pump lock out circuit function. Plugs into socket.

Motor Saver (OPTION)-Monitors motor load and provides protection for pump dry run, "dead head", and a variety of voltage and phase protection when the panel is in the "A" mode. A fault CODE is provided after a fault event is detected. May be programmed for specific protection category and ranges including short cycle (delay start), phase unbalance, high/low voltage, delay period before restart, and number of restarts after a fault. Typically programmed to provide backup overload and voltage protection. See instructions for programming and fault codes.

Heater & Thermostat-An enclosure heater is provided to minimize the formation of condensate within the enclosure to help ensure electrical components maintain minimum operating temperatures. The thermostat is adjustable but should typically be set around 90 for effective operation. If condensate continues to exist increase thermostat setting to 100 and/or check for sources of liquid into the enclosure.

Bellows-The panel is equipped with a bellow breather device which connects to the transducer breather to provide a closed venting loop to allow the transducer diaphragm to adjust.

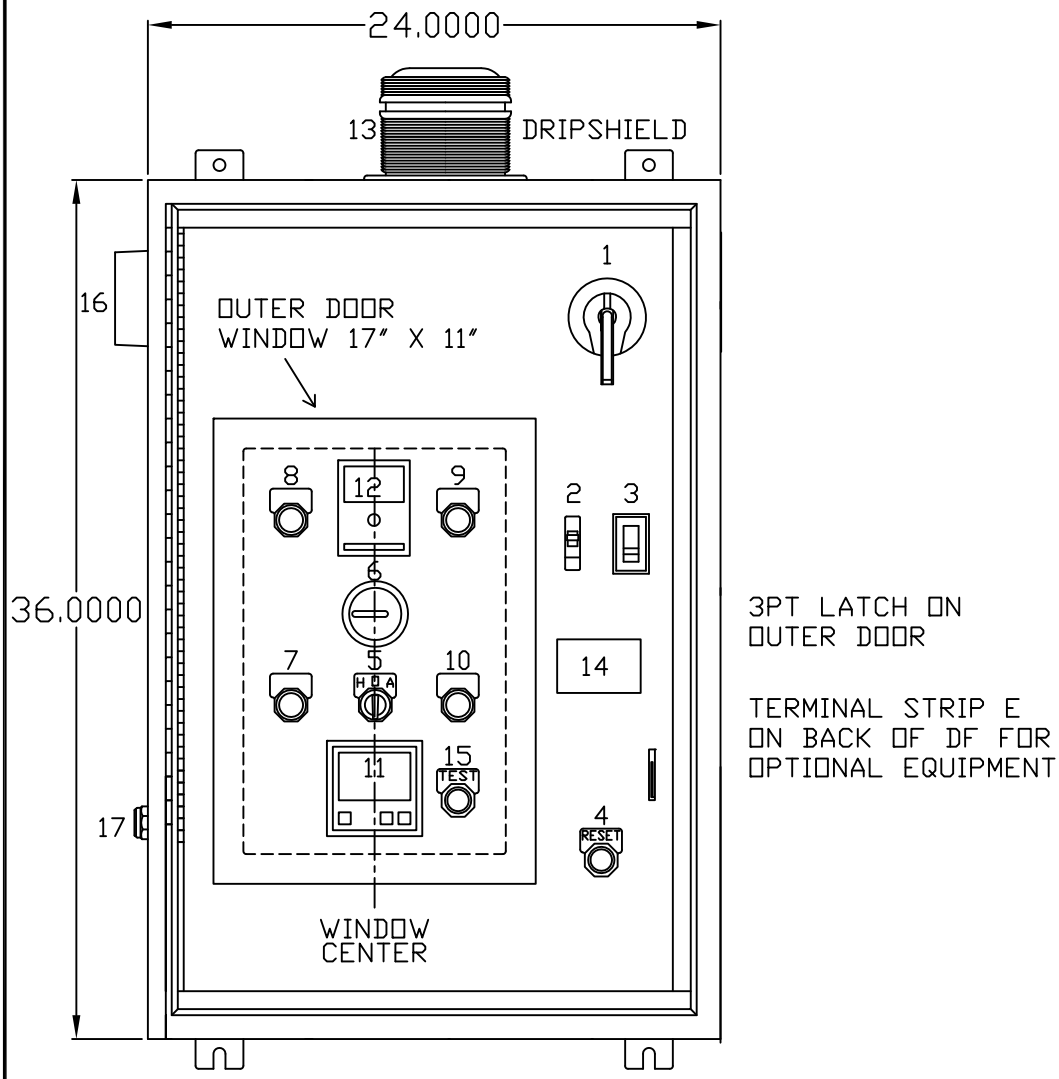
Surge Suppressor (110 Volt control circuit)-provides protection to the control circuit if a surge condition occurs. An indicating light is on when operating properly.

Surge Suppressor (24V/4-20Ma)-provide protection from surges entering panel from level sensor-Note that level sensor is also surge protected with an integral surge suppressor which is contained within the level sensor. If device damaged the signal between the sensor and the level indicating controller may will be lost and result in a negative level display of approximately –34.6. Also see ISB below.

TVSS Transient Voltage Surge Suppressor Lightning Arrestor-Square or rectangular device absorbs power line surges to protect the system. If the green LED light does not energize with power to the panel the unit may be no longer functional and replacement is required.

Lightning Capacitor-Cylinder Device mounted on the right of the enclosure. This device worked in conjunction to the Lightning Arrestor and is a "one shot" device, which absorbs high amperage line surges to protect the system. If a severe event occurs damage may be visual. If damaged the device should be immediate replaced. If damaged do not touch any exposed parts or wires.

Call GunnCo for assistance in operating and trouble shooting problems and for replacement parts or sources.
Our phone number is 770-889-7114.



OUTER DOOR HAS BEEN REMOVED FOR CLARITY

1 - MAIN BREAKER
2 - CONTROL BREAKER
3 - MOTOR BREAKER
4 - OVERLOAD RESET
5 - PUMP HAND-OFF-AUTO
6 - ELAPSE TIME METER
7 - RL1 PUMP RUN
8 - PL1 PHASE FAIL
9 - PL2 OVERLOAD
10 - PL3 PUMP LOCKOUT (OPTIONAL)
11 - FLOWMETER (OPTIONAL)
12 - PUMP CONTROLLER
13 - STROBE LIGHT
14 - PUMP SAVER CUTOUT (OPTIONAL)
15 - ALARM TEST
16 - AH ALARM HORN
17 - ASB ALARM SILENCE BUTTON

SIDESLOPER PUMPING SYSTEMS	
MODEL NO:	GCD-1-2.4-AACACAB
PROJECT:	MARSHALL STEAM PLANT
DATE:	9/8/2010
REVISION:	A

GUNNCO PUMP & CONTROL
515 INDUSTRIAL WAY
CUMMING, GA 30040
TEL. 770-889-7114

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TNT

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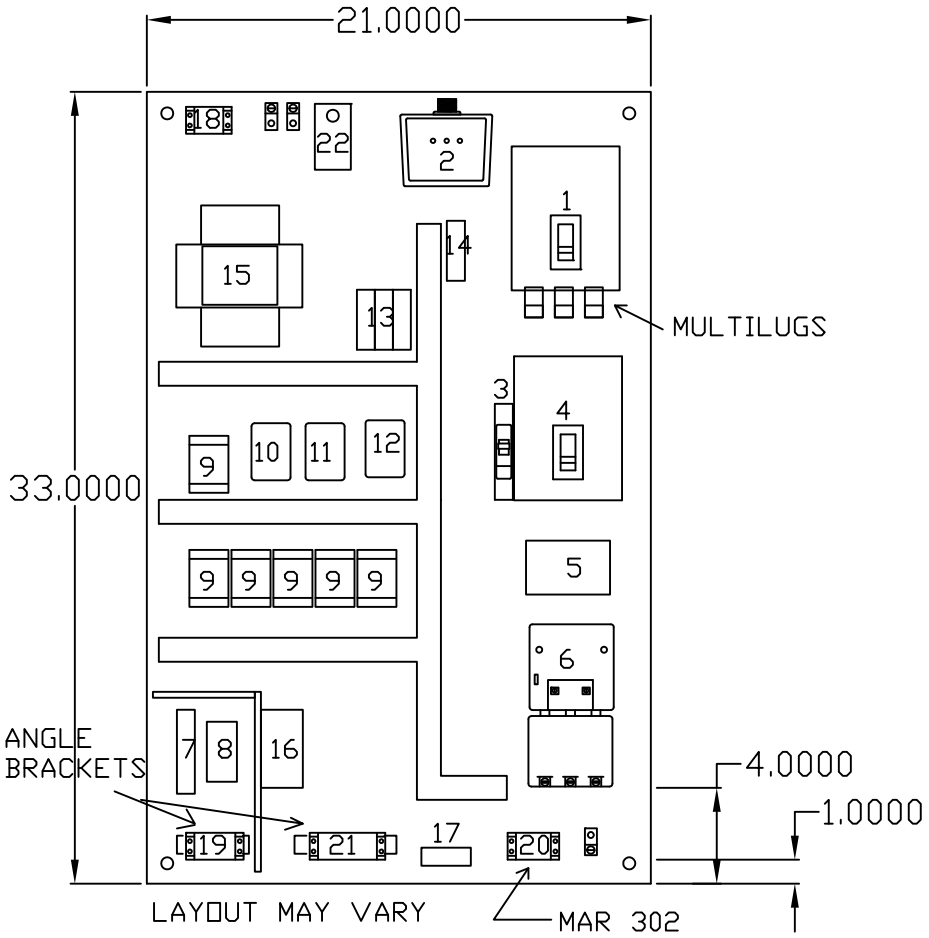

1 - MCB MAIN CIRCUIT BREAKER
2 - SA1 SURGE ARRESTOR 120V
3 - CCB CONTROL CIRCUIT BREAKER
4 - MB1 MOTOR BREAKER 1
5 - MOTOR SAVER (OPTIONAL)
6 - MS1 MOTOR STARTER 1
7 - ISB INTRINSCIALLY SAFE BARRIER
8 - SA2 SURGE ARRESTOR 4-20MA
9 - R1-6 CONTROL RELAY
10 - WAR LEVEL RELAY (OPTIONAL)
11 - PS POWER SUPPLY (OPTIONAL)
12 - PM PHASE MONITOR
13 - FUSE BLOCK
14 - TH THERMOSTAT
15 - CPT CONTROL POWER TRANSFORMER
16 - TRANSDUCER BREATHER
17 - HT HEATER STRIP
18 - TSA TERMINAL STRIP A
19 - TSB TERMINAL STRIP B
20 - TSC TERMINAL STRIP C
21 - TSD TERMINAL STRIP D
22 - N NEUTRAL BLOCK

SIDESLOPER PUMPING SYSTEMS

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PROJECT:	MARSHALL STEAM PLANT	
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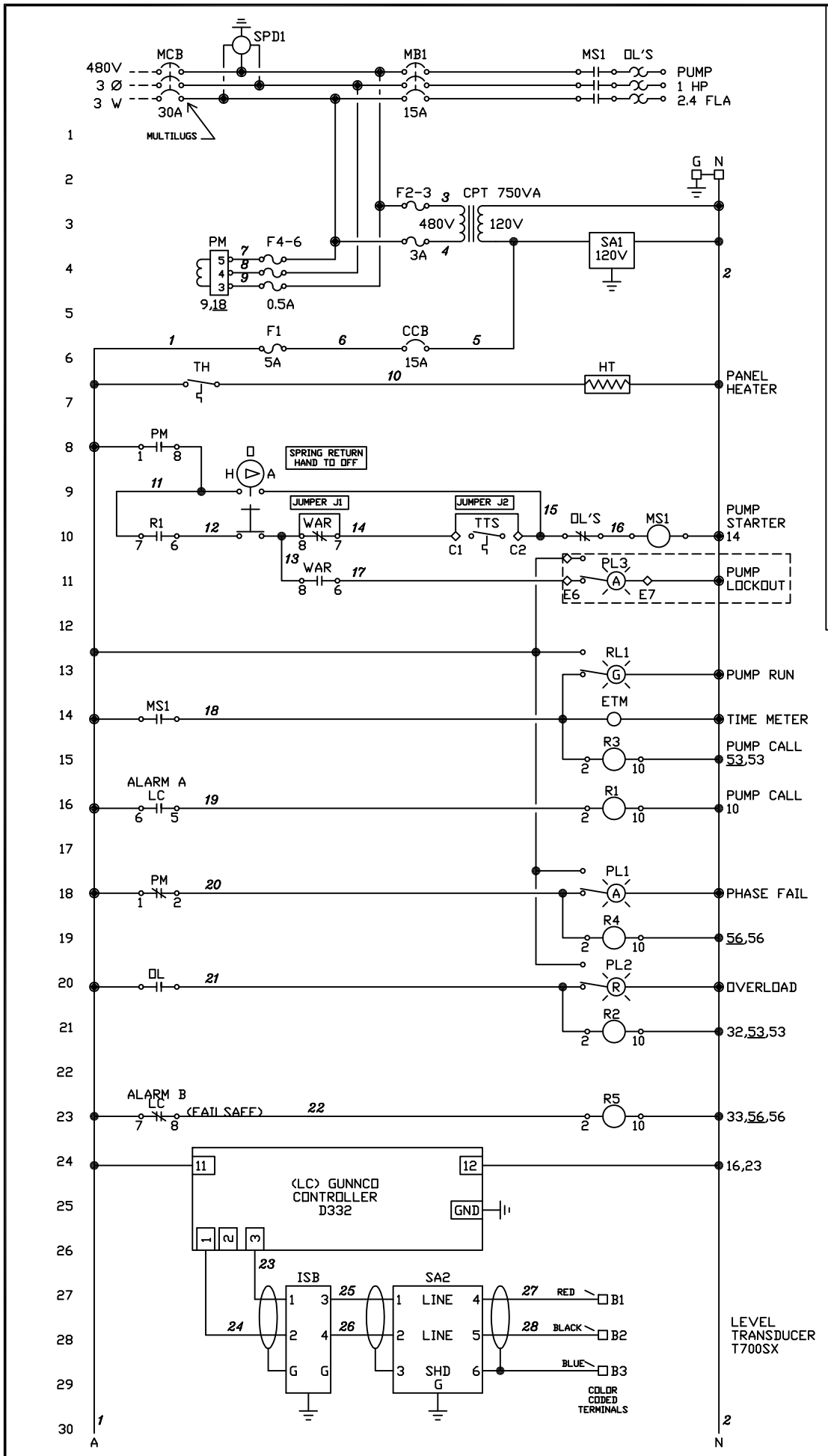

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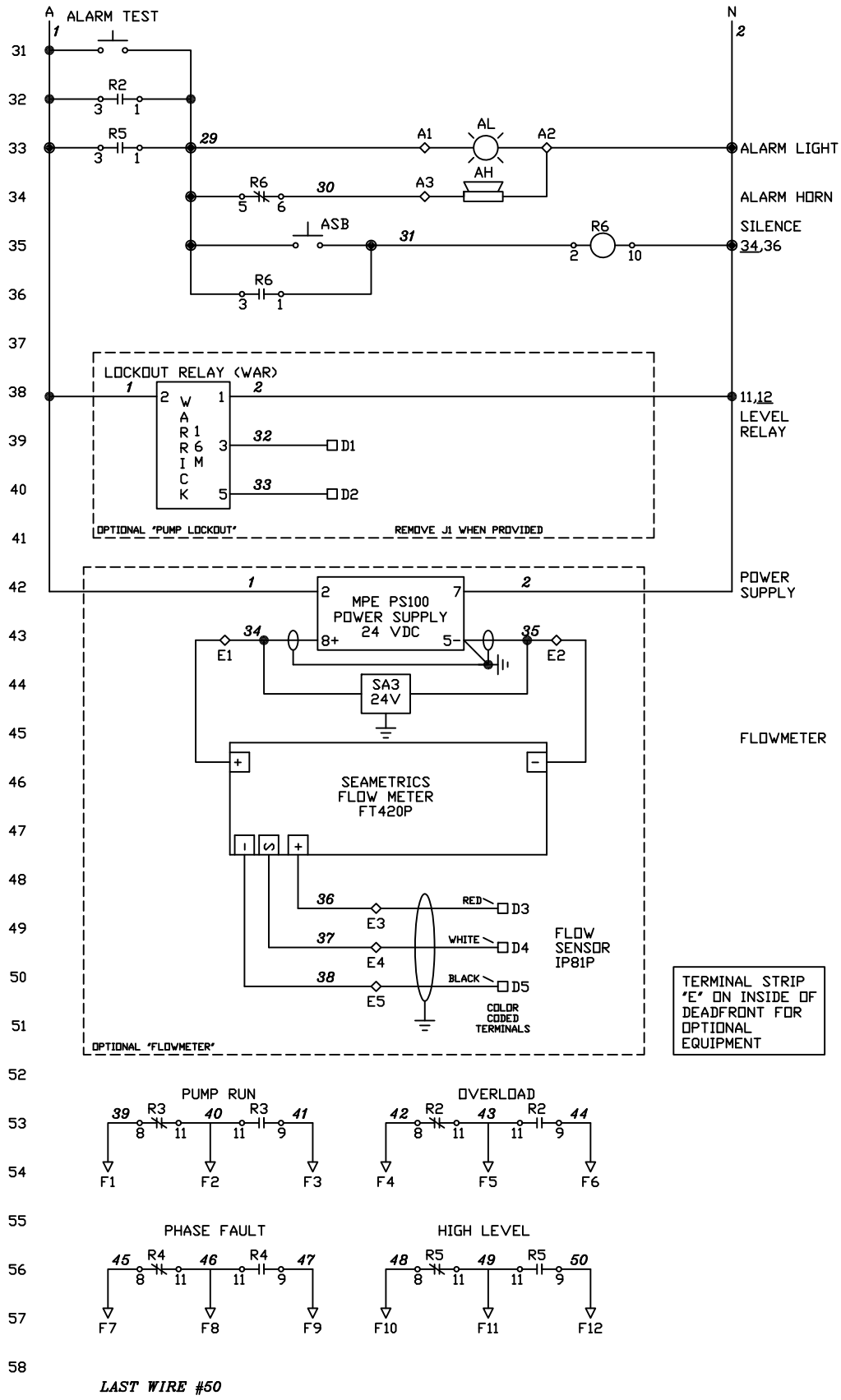

SIDESLOPER PUMPING SYSTEMS

MODEL NO: GCD-1-2.4-AACACAB

PROJECT: MARSHALL STEAM PLANT

DATE: 9/8/2010

REVISION: A

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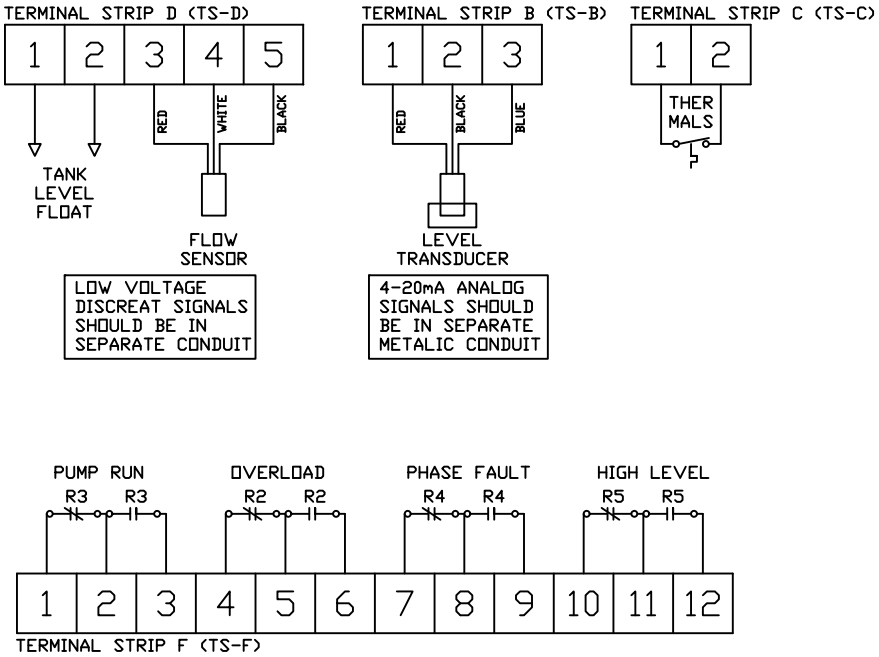

SQD Ground Busbar PK7GTA, PK12GTA, PK15GTA	
Wire Range AWG CU-AL	Torque lb-in.
14-10 CU, 12-10 AL	20
8	25
6-4	35
Two 14 or 12 CU, Two 12 or 10 AL	25

SQD Terminal Block GK6 + GR6	
Wire Range AWG CU	Torque lb-in.
(Type GK6) 22-10	11-12
(Type GR6) 22-8	18-20

Panduit Ground Lug One-Barrel	
Wire Range AWG CU	Torque lb-in.
(LAMA2-14-QY) 12-14	15
6-10	40
2-4	50
(LAMA1/0-14-QY) 10-14	35
8	40
4-6	45
2/0-3	50
(LAMA250-56-QY) 2-6	275
250-1	375
(LAMA350-38-QY) 2-6	275
350-1	375
(LAMA600-38-6Y) 600-4	500
Two-Barrel	
(LAM2A1/0-14-6Y) 10-14	35
8	40
4-6	45

CUSTOMER -
JOB NAME MARSHALL STEAM PLANT
ENCLOSURE UL TYPE RATING: UL TYPE 1
VOLTAGE 480V PHASE 3 HZ 60
H.P. #1 1 #2 X #3 X #4 X
F.L.A. 2.4A X X X
TOTAL F.L.A. 3.96A
SERIAL # 10- DATE:
SCCR: 5KA SYMMETRICAL RMS,480V. MAX.
MANUFACTURED BY:
STA CON INC 2525 S. OBT APOPKA FL 32703

SIDESLOPER PUMPING SYSTEMS

MODEL NO: GCD-1-2.4-AACACAB

PROJECT: MARSHALL STEAM PLANT

DATE: 9/8/2010 REVISION: A

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TNT

70236AA

GUNNCO PUMP & CONTROL, INC

BILL OF MATERIAL			BY: TNT
QUOTE NO.	70236AA	Date: 9/8/2010	Rev: A
JOB NAME	MARSHALL STEAM PLANT	SN:	
CUSTOMER		PO:	

QTY	LEGEND	DESCRIPTION	MFG.	PART #	Check Off
1		ENCLOSURE (4X SS) 36x24x10	HOFFMAN	A36H2410SSLP	[ ]
1		SUB PANEL	HOFFMAN *	A-36P24	[ ]
1		3 POINT LATCH (36”-48”)	HOFFMAN	A-L36CR	[ ]
1		WINDOW KIT (STAINLESS)	HOFFMAN	APWK1711NFSS	[ ]
1	N	ISOLATED NEUTRAL BLOCK 175 A. Line [2/0 to 14] – Load [4 to 14]	BUSSMANN	16321-1	[ ]
2	G	GROUND BUSS (#8-1)	SQD	PK7GTA	[ ]
1	MCB	MAIN CIRCUIT BREAKER	SQD	HDL36030	[ ]
1		MULTI-LUG KITS (6-#14-#6)	SQD	**PDC6HD6**	[ ]
1	OP M	OPERATOR MECHANISM	SQD	9421LZ250H43	[ ]
1	MB	MOTOR BREAKER	SQD	HDL36015	[ ]
1	CCB	CONTROL BREAKER	SQD	QOU115	[ ]
1	MS	MOTOR STARTER (SIZE 0)	SQD	8536-SBO2V02S	[ ]
1		JUMPER STRAP KIT	SQD	9998-SO31	[ ]
3	OL	OVERLOAD HEATERS	SQD	B 3.70	[ ]
1		OL AUXILIARY CONTACTS (NC, NO)	SQD	9999-SO4	[ ]
1	OL R	OVERLOAD RESET	SQD	9066-RA1	[ ]
1	CPT	CONTROL POWER TRANSFORMER	SQD	9070-TF750D1	[ ]
1	AL	ALARM LIGHT (STROBE)	INGRAM	SBN120AC	[ ]
1	AH	ALARM HORN W/TRIM RING (4X, 120VAC)	FEDERAL SIGNAL	350TR-120	[ ]
2		**ANGLE BRACKET KIT**	**SQD**	**9080MH82**	**[ ]**
19	**TS**	**TERMINAL STRIP (NATURAL)**	**SQD**	**9080-GK6**	**[ ]**
2	**TS**	**TERMINAL STRIP (RED)**	**SQD**	**9080-GKR6**	**[ ]**
2	**TS**	**TERMINAL STRIP (BLACK)**	**SQD**	**9080-GKB6**	**[ ]**
1	**TS**	**TERMINAL STRIP (BLUE)**	**SQD**	**9080-GKL6**	**[ ]**
1	**TS**	**TERMINAL STRIP (GREEN)**	**SQD**	**9080-GKG6**	**[ ]**
3	**TS**	**TERMINAL STRIP END BARRIER**	**SQD**	**9080-GK6B**	**[ ]**
1	TSA	TERMINAL STRIP	MARATHON	SERIES 200	[ ]
1	* F1	FUSE	BUSSMANN	KTK-R –5 /600V	[ ]
2	* F2-3	FUSE (750VA) (TIME DELAY AC-DC)	BUSSMANN	FNQ-R –3 /600V	[ ]
3	F	FUSE (PHASE/VOLTAGE MONITOR)	BUSSMANN	KTK-R-1/2 / 600V	[ ]
1	**HOA**	**HAND-OFF-AUTO SELECTOR**	**SQD**	**9001SKS63B**	**[ ]**
1		(NO, NC) CONTACT	SQD	9001-KA1	[ ]
1	RL1	RUN LIGHT (GREEN) (120VAC, PTT)	SQD	9001SKT38LG	[ ]
2	PL1	PILOT LIGHT (YELLOW) (120VAC, PTT)	SQD	9001SKT38LY	[ ]
1	PL2	PILOT LIGHT (RED) (120VAC, PTT)	SQD	9001SKT38LR	[ ]
2 2	P/B	PUSH BUTTON (NO) CONTACT	SQD SQD	9001-SKR1U 9001-KA2	[ ] [ ]
1	ETM	ELAPSED TIME METER	REDINGTON	710-0002	[ ]
5	R1-5	CONTROL RELAY (120VAC W/PL)	SQD	8501KP13P14V20	[ ]
5		11 PIN SOCKET	IDEC	SR3P-05	[ ]

2		8 PIN SOCKET 600V	CUSTOM CONN	RB08-PC	[ ]
1		12 PIN SOCKET	CUSTOM CONN	SD12-PC	[ ]
1	TH	THERMOSTAT	BILBEE	B-200	[ ]
1	HT	HEATER	HEATRON	HEATFLEX	[ ]
1	SPD	SURGE PROTECTION DEVICE 480Y/277V	APT	S50A277V3Y	[ ]

NOTES: *** OR EQUAL**

@ PROVIDED BY PUMP REP

PACKING LIST

Quote#: 70236AA	**Date: 9/8/2010**	**Rev: A**

SPARE PARTS

QTY	LEGEND	DESCRIPTION	MFG	PART #	
1	F	FUSE	BUSSMANN	KTK-R-5/600V	[ ]
2	F2-3	FUSE (750VA) (TIME DELAY AC-DC)	BUSSMANN	KLDR –3 /600V	[ ]
2	F	FUSE	BUSSMANN	KTK-R-1/2 /600V	[ ]
1		LIGHT BULB (6.3V) for SQD 120V PL	CANDELA CORP	755	[ ]

@ PARTS PROVIDED FOR PANEL INSTALLATION

QTY	LEGEND	DESCRIPTION	MFG	PART #	
1	LC	LEVEL CONTROLLER	GUNNCO	D332	[ ]
1		BREATHER	PRESSURE SYSTEMS	A-815	[ ]
1	PS	POWER SUPPLY	MPE	PS-100	[ ]
1	PM	PHASE MONITOR	MPE	001-440-118	[ ]
1	ISB	INTRINSICALLY SAFE BARRIER (XD)	STAHL	9002/13-280-110-01	[ ]
1	SA1	SURGE ARRESTOR	CITEL	DS40-120	[ ]
1	SA2	SURGE ARRESTOR	CITEL	DLA-24D3	[ ]
1	SA3	SURGE ARRESTOR	CITEL	DS210-24DC	[ ]

@ PARTS PROVIDED LOOSE

QTY	LEGEND	DESCRIPTION	MFG	PART #	
1		LEVEL TRANSDUCER	KPSI	T700SX100	[ ]

Sideslopper™ PUMPING SYSTEM CONTROL
OPERATION-DUPLEX "GC" Series" 202 Panel

The controller should provide automatic operation. Under normal conditions the pump should operate with the H-O-A switches in the A or automatic position.

EXTERIOR MOUNTED COMPONENTS:

Top Alarm Light-(optional) Indicates HIGH liquid level condition. See individual indicators for cause.

Duplex Receptacle-(optional) Provides up to 5 amp 120v electrical service.

INTERIOR DOOR MOUNTED OPERATOR CONTROLS:

Main Breaker Disconnect Handle-The main turns power off to the controller. This switch must be turned to the OFF position to open the interior door.

H-O-A Switch – The H-O-A switch should remain in the "A" setting for automatic operation. The "H" setting or hand is for testing only.

Indicating Controller-This device displays the level in the sump in inches and provides the pump ON/OFF and high-level ON/OFF operation. Check current setting or re-adjust set points as follows:

1) PUMP 1 OFF-Turn center knob of the left to A-Reset. The current PUMP OFF set point will be displayed. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed.
2) PUMP 1 ON- Turn center knob of the left to A-Set. The current PUMP ON set point will be displayed. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed.
3) PUMP 2 OFF-Turn center knob of the left to B-Reset. The current PUMP OFF set point will be displayed. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed.
4) PUMP 2 ON- Turn center knob of the left to B-Set. The current PUMP ON set point will be displayed. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed. PLEASE NOTE: The pump will not start in the "A" position unless the level has surpassed the ON setting.
5) HIGH ALARM OFF: Loop powered alarm set off. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed.
6) HIGH ALARM ON : Loop powered alarm set on. To re-adjust use a small screw driver and turn the associated screw or "pot" until the desired set point is displayed.

LED is provided to indicate that the A or B relays are ON when lit. The level display will also flash during a high level condition. Pump ON and OFF settings should be sufficient difference to prevent pump rapid cycle-pump should not restart for 10 minutes or more (typically hours) after pump shuts off.

Flow Meter (OPTION)-The digital flow meter provides rate of flow (GPM-gallons per minute) on the upper/larger digits, and total accumulated flow (gallons) on the lower digits. Total may accumulate to 99999999 if the decimal point is eliminated. The right side arrow button resets the total to "0" when pressed. See flow meter instructions.

RUN Light-indicates pump is called to operate.

PHASE or VOLTAGE FAULT/FAIL Light-Indicates a phase loss, improper voltage, reversed phase (three phase only), blown sensor fuses damaged, or damaged voltage or phase sensor. Sensor is adjustable and should be set to actual operating voltage at the time of start-up.

OVERLOAD Light-Indicates a motor starter overload has occurred.

HIGH LEVEL Light (OPTION) Indicates a high level condition exists. Under this condition the level indicating display will flash.

TANK FULL Light (OPTION) –Indicates that the pump will not operate in the "A" mode because the panel is receiving a signal via a pair of wires that the remote storage tank or sump is full. Under this condition the pump will operate in the "H" mode.

OVERLOAD Reset Button-Reset the motor starter overload.

ETM-elapsed run time meters indicate hours of pump operation (to 1/10th). Under normal conditions hours of operation should be similar for each pump. This information can be recorded to determine estimated flows for the system.

Breakers-The motor, control, (and optional receptacle) breakers are accessible from the interior door. A tripped breaker typically indicates a short circuit. Please note that there are also fuses in the interior for the transformer or control power or optional receptacle. See additional information in interior components section.

INTERIOR COMPONENTS: Should be serviced with power off or by a qualified service personnel. NOTE: Power will be present in the incoming wiring to the main disconnect.
----------ELECTRICAL HAZARD EXISTS!----------

Motor Breaker-Three pole circuit breaker-typically located on upper far right is provided for the short circuit protection and allow service of the system. If a breaker trips check for a short circuit and reset. If the breaker trips again there may be an electrical problem which should be checked by a qualified electrician. Motor breaker switches off primary voltage to the motor starter contactors and pump.

Control Breaker-Single pole control circuit breaker-Typically located left position of the motor breaker is provided for the short circuit protection and allow service of the system. If a breaker trips check for a short circuit and reset. If the breaker trips again there may be an electrical problem which should be checked by a qualified electrician. There is also a fuse between the breaker and the control circuit. at the transformer which Control breaker switches off 120v control power to operator control components.

Receptacle Breaker (OPTION) -Single pole circuit breaker-Typically located far left position of the motor breaker is provided for the short circuit protection and protection of the system. There is also a fuse between the breaker and the receptacle which typically may blow due to overloaded circuit (limit usage to 5 amp service).

Transformer and Fuses (if applicable) – The transformer provides low 120 volt power for the control operations. There are three fuses mounted on top of the transformers, The upper two are the incoming power (230/460 volt) and the lower fuse is the control circuit power (120 volt). When replacing fuses use the identical type and rating as originally provided.

Relays ("ICE CUBE" relays)-These are plug in style relays which work between the level controller/H-O-A switch and the motor starter coil (and where applicable the high level lights) which minimizes the wear of the level controller contacts. Coil voltage is 120v.

Motor Starter/Overload relay -Contains overload protection and magnetic coil to energizes to allow power to the pump. Red bar resets overloads. Coil voltage is 120v.

Voltage/Phase Monitor- Plug in style device monitor incoming power and detects and protects motor from high or low voltage, loss of phase, or reversed phase (on three phase models). A led light indicates proper operation and adjustable knob allows for setting the unit to the normal operating voltage range. If the range exceeds approximately 10% of the set point the pump will be prevented from operating (motor starter coil will not pull in) until the problem is corrected. If the LED will not come on with adjustment check voltage and the associated fuses. High voltage surges may damage monitor. GunnCo normally stocks replacement units. At start-up the operating voltage should be set. Voltage must be within the range of the monitor. On three phase systems, if the unit will not energize at start-up after adjustment of range setting, the phases may need to be reversed at the monitor-to accomplish switch any two legs.

ISB-Intrinsically Safe Barrier-This devices provides a safety for the level control voltage and must be used to ensure safe operation where the sensor is in a hazardous location. The barrier contain two replaceable fuses.

24VDC Power Supply (OPTION)-Supplies power to the voltage meter. Plugs into socket.

Lock Out Relay (OPTION) –Provides sensing of a closed contact (float switch or relay) up to 5000' away through a pair of wires and provides panel pump lock out circuit function. Plugs into socket.

Motor Saver (OPTION)-Monitors motor load and provides protection for pump dry run, "dead head", and a variety of voltage and phase protection when the panel is in the "A" mode. A fault CODE is provided after a fault event is detected. May be programmed for specific protection category and ranges including short cycle (delay start), phase unbalance, high/low voltage, delay period before restart, and number of restarts after a fault. Typically programmed to provide backup overload and voltage protection. See instructions for programming and fault codes.

Heater & Thermostat-An enclosure heater is provided to minimize the formation of condensate within the enclosure to help ensure electrical components maintain minimum operating temperatures. The thermostat is adjustable but should typically be set around 90 for effective operation. If condensate continues to exist increase thermostat setting to 100 and/or check for sources of liquid into the enclosure.

Bellows-The panel is equipped with a bellow breather device which connects to the transducer breather to provide a closed venting loop to allow the transducer diaphragm to adjust.

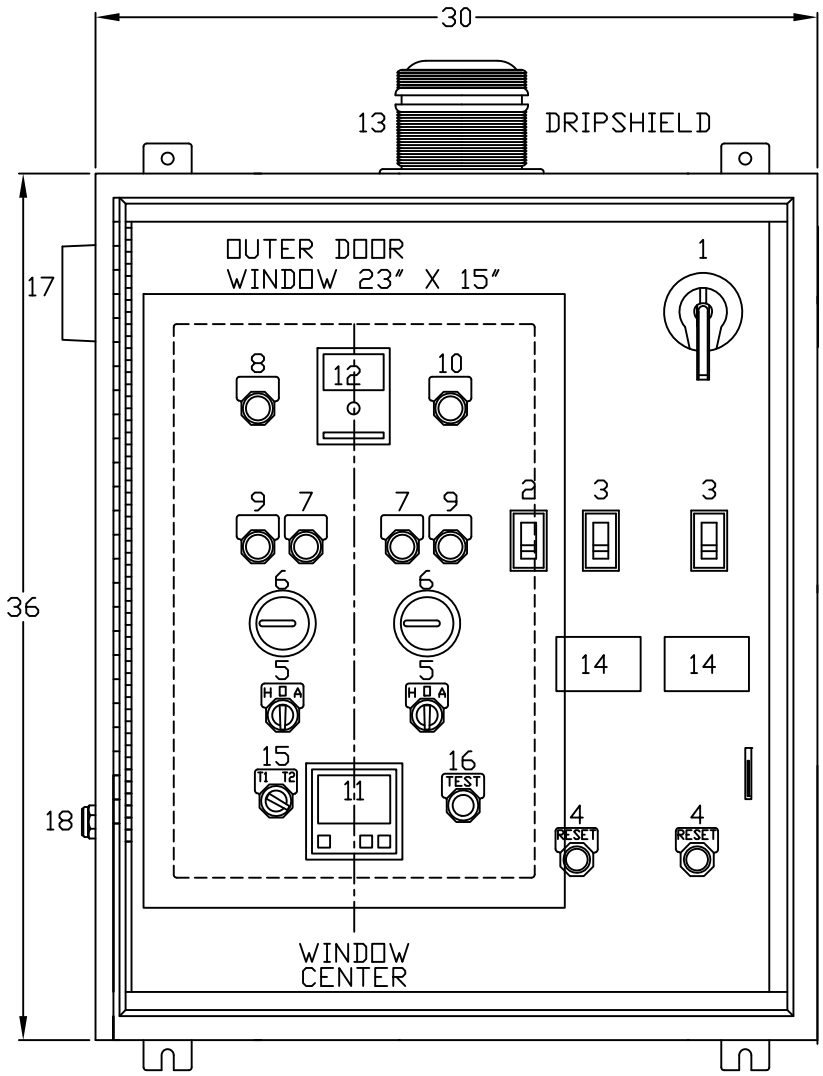
Surge Suppressor (110 Volt control circuit)-provides protection to the control circuit if a surge condition occurs. An indicating light is on when operating properly.

Surge Suppressor (24V/4-20Ma)-provide protection from surges entering panel from level sensor-Note that level sensor is also surge protected with an integral surge suppressor which is contained within the level sensor. If device damaged the signal between the sensor and the level indicating controller may will be lost and result in a negative level display of approximately –34.6. Also see ISB below.

TVSS Transient Voltage Surge Suppressor Lightning Arrestor-Square or rectangular device absorbs power line surges to protect the system. If the green LED light does not energize with power to the panel the unit may be no longer functional and replacement is required.

Lightning Capacitor-Cylinder Device mounted on the right of the enclosure. This device worked in conjunction to the Lightning Arrestor and is a "one shot" device, which absorbs high amperage line surges to protect the system. If a severe event occurs damage may be visual. If damaged the device should be immediate replaced. If damaged do not touch any exposed parts or wires.

Call GunnCo for assistance in operating and trouble shooting problems and for replacement parts or sources.
Our phone number is 770-889-7114.



OUTER DOOR HAS BEEN REMOVED FOR CLARITY

1 - MCB MAIN CIRCUIT BREAKER
2 - CCB CONTROL CIRCUIT BREAKER
3 - MB1-2 MOTOR BREAKER 1-2
4 - PL2-3 OVERLOAD RESET
5 - PUMP HAND-OFF-AUTO
6 - ETM ELAPSE TIME METER
7 - RL1-2 RUN LIGHT
8 - PL1 PHASE FAULT LIGHT
9 - OL1-2 OVERLOAD LIGHT 1-2
10 - PUMP LOCKOUT LIGHT (OPTIONAL)
11 - FLOWMETER (OPTIONAL)
12 - PUMP CONTROLLER
13 - STROBE LIGHT
14 - PUMP SAVER CUTOUTS
15 - TRANSDUCER SELECTOR SWITCH
16 - ALARM TEST
17 - AH ALARM HORN
18 - ASB ALARM SILENCE BUTTON

3PT LATCH ON
OUTER DOOR

TERMINAL STRIP E
ON BACK OF DF FOR
OPTIONAL EQUIPMENT

SIDESLOPER PUMPING SYSTEMS	
MODEL NO:	GCD-7.5-13.2-AACACAB
PROJECT:	MARSHALL STEAM PLANT
DATE: 9/8/2010	REVISION: A

GUNNCO PUMP & CONTROL
515 INDUSTRIAL WAY
CUMMING, GA 30040
TEL. 770-889-7114

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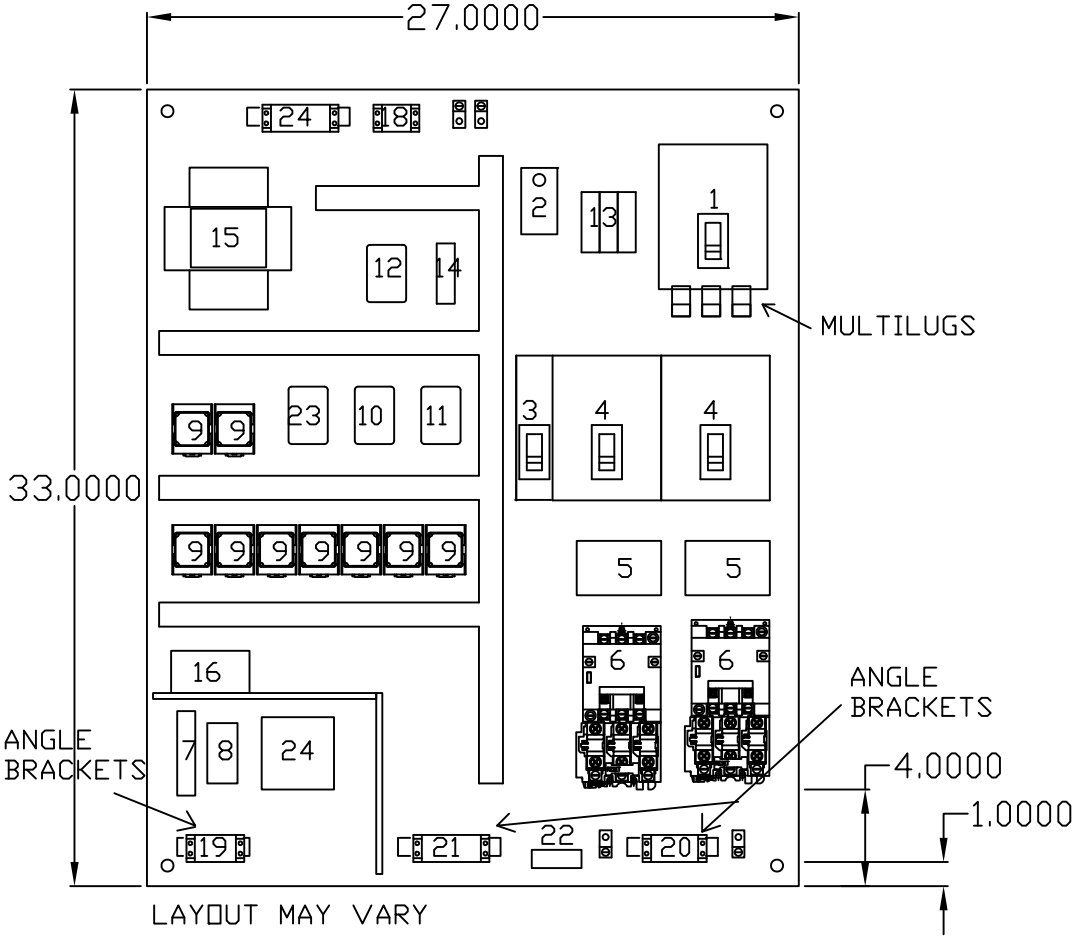

1 - MCB MAIN CIRCUIT BREAKER
2 - SA1 SURGE ARRESTOR 120V
3 - CCB CONTROL CIRCUIT BREAKER
4 - MB1-2 MOTOR BREAKER
5 - MOTOR SAVER 1-2
6 - MS1&2 MOTOR STARTER
7 - ISB INTRINSCIALLY SAFE BARRIER
8 - SA2 SURGE ARRESTOR 4-20MA
9 - R1-9 CONTROL RELAY
10 - WAR LEVEL RELAY (OPTIONAL)
11 - PS POWER SUPPLY (OPTIONAL)
12 - PM PHASE MONITOR
13 - PM FUSE BLOCK
14 - TH THERMOSTAT
15 - CPT CONTROL POWER TRANSFORMER
16 - TRANSDUCER BREATHER
17 - LPA LOOP POWERED ALARM
18 - TSA TERMINAL STRIP A
19 - TSB TERMINAL STRIP B
20 - TSC TERMINAL STRIP C
21 - TSD TERMINAL STRIP D
22 - HT HEATER STRIP
23 - ALT ALTERNATOR
24 - TSF TERMINAL STRIP F

SIDESLOPER PUMPING SYSTEMS			
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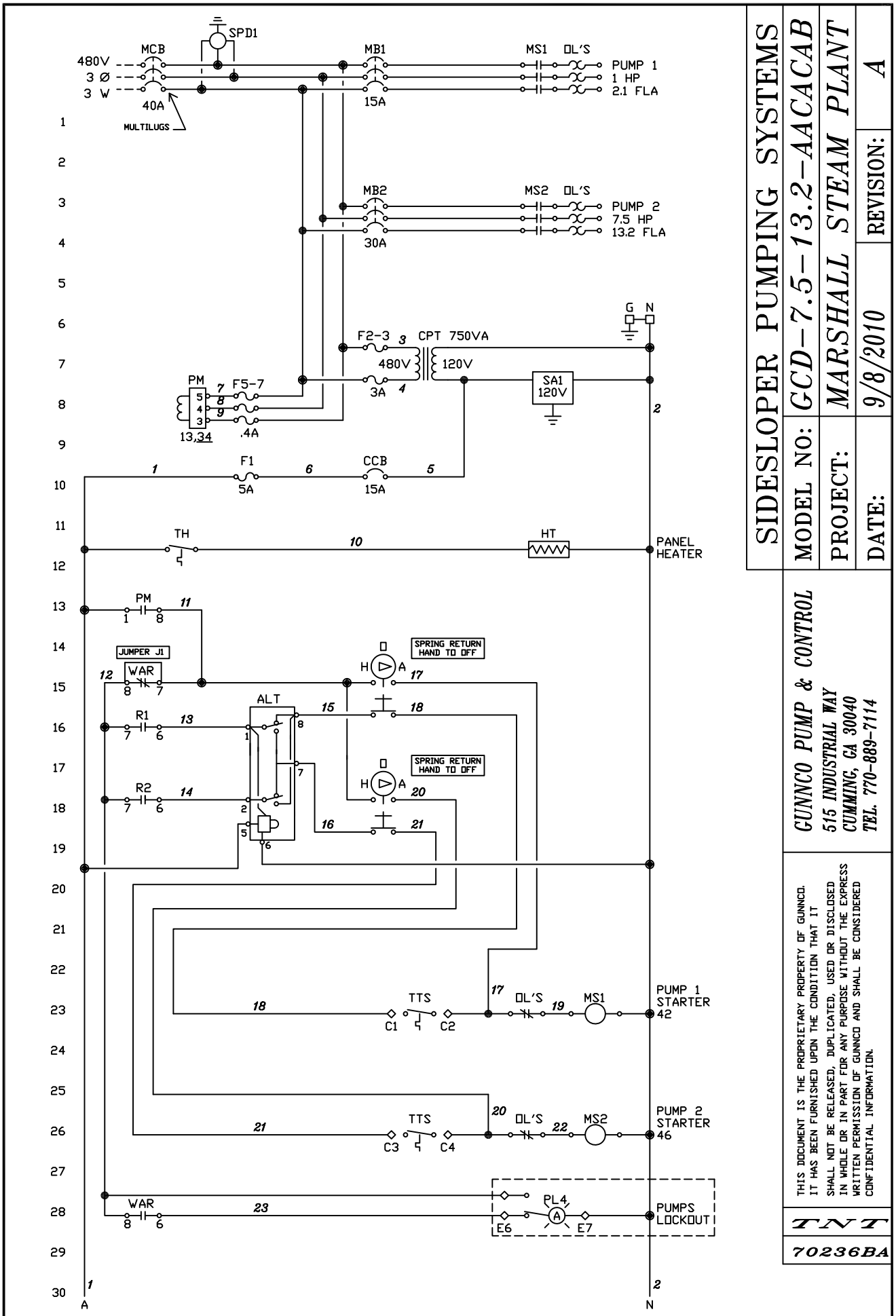

SIDESLOPER PUMPING SYSTEMS	
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PROJECT:	MARSHALL STEAM PLANT
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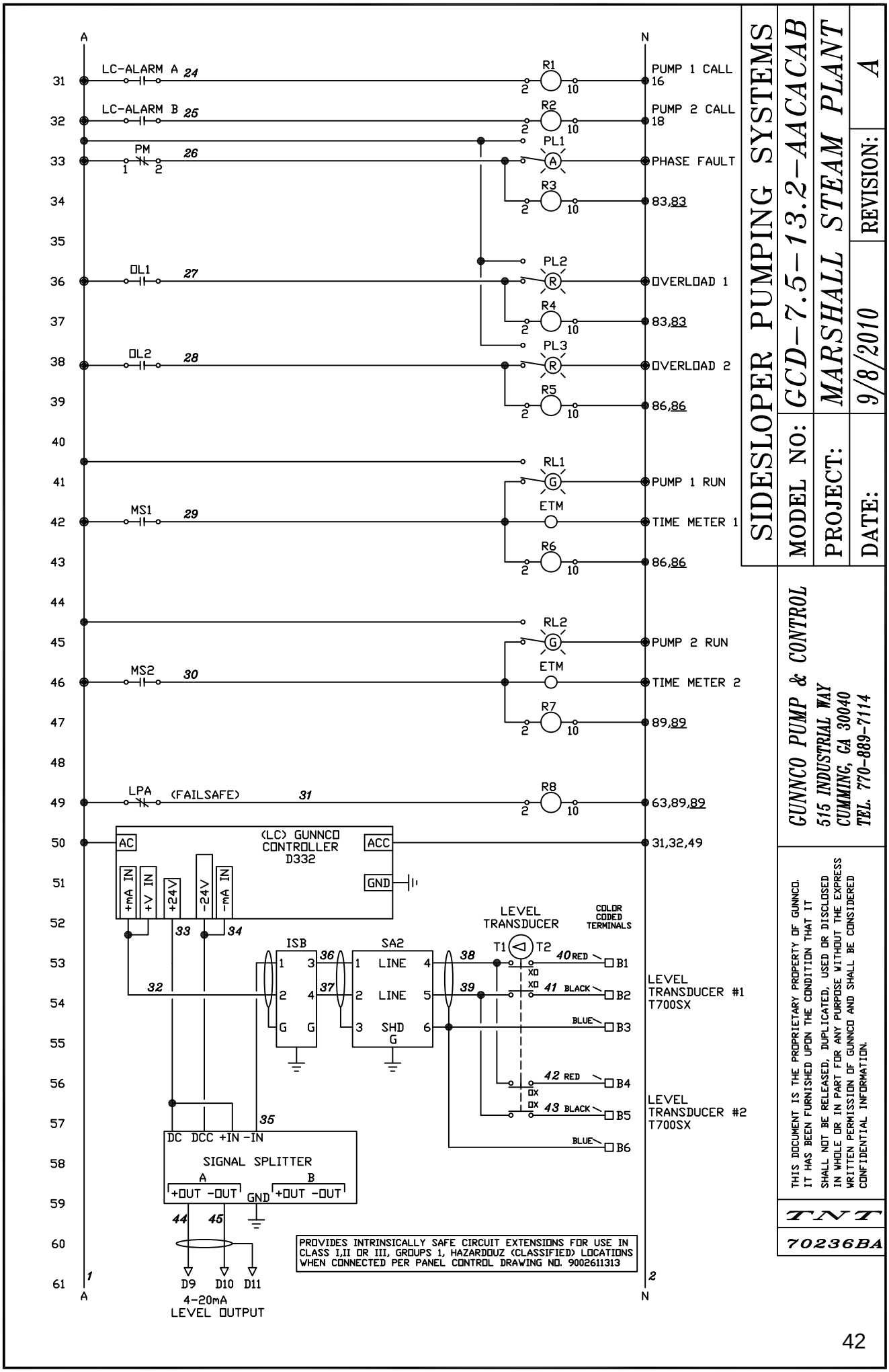
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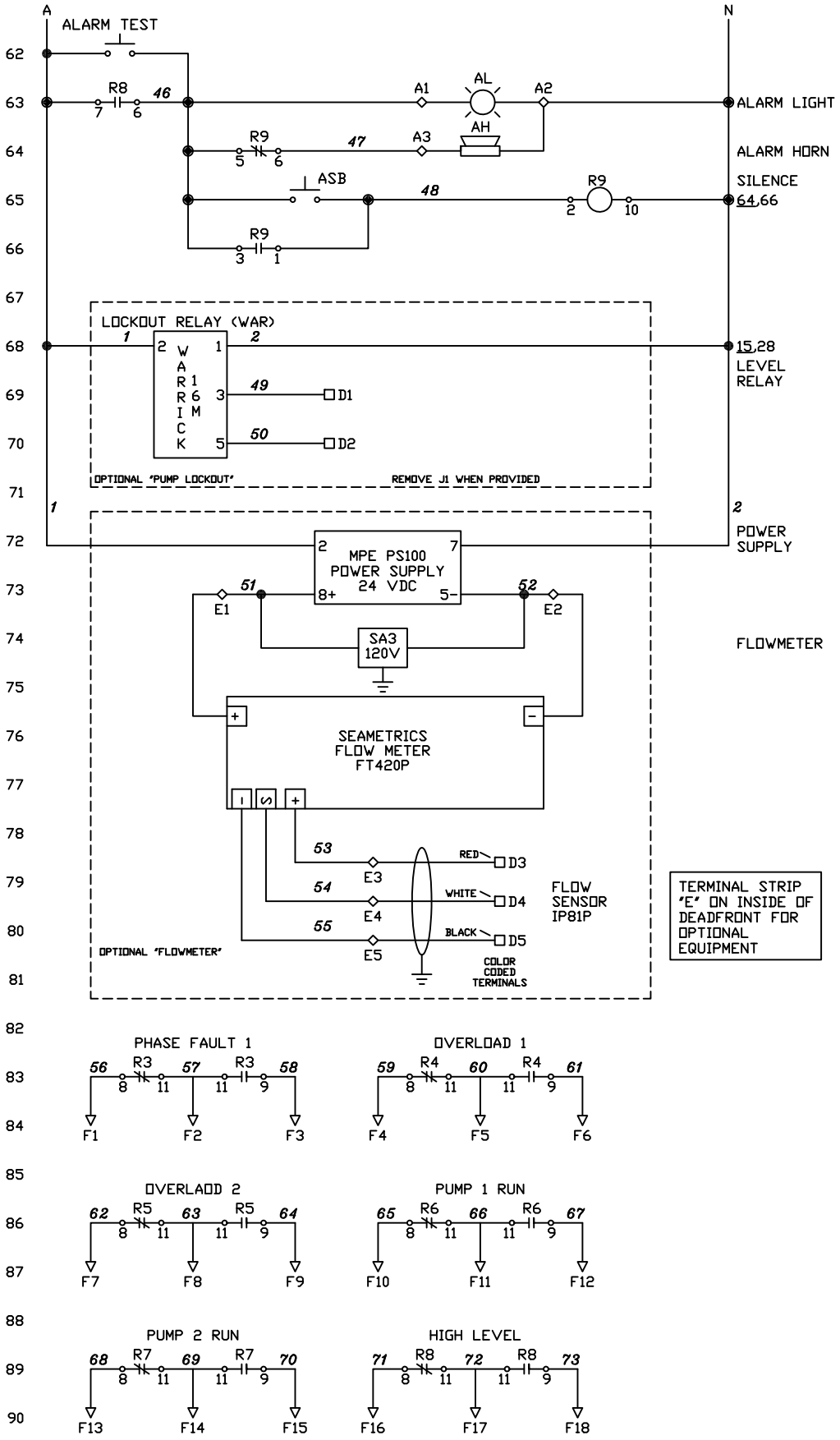
TNT
70236BA
LC-ALARM A 24
LC-ALARM B 25
PM 26
OL1 27
OL2 28
MS1 29
MS2 30
LPA (FAILSAFE) 31
R1
R2
PL1
R3
PL2
R4
PL3
R5
RL1
ETM
R6
RL2
ETM
R7
R8
PUMP 1 CALL 16
PUMP 2 CALL 18
PHASE FAULT
83,83
OVERLOAD 1
83,83
OVERLOAD 2
86,86
PUMP 1 RUN
TIME METER 1
86,86
PUMP 2 RUN
TIME METER 2
89,89
63,89,89
31,32,49
(LC) GUNNCO CONTROLLER D332
AC
ACC
GND
+mA IN
+V IN
+24V
-24V
-mA IN
ISB
SA2
LINE
SHD
LEVEL TRANSDUCER
COLOR CODED TERMINALS
T1
T2
40 RED
41 BLACK
BLUE
42 RED
43 BLACK
BLUE
B1
B2
B3
B4
B5
B6
LEVEL TRANSDUCER #1 T700SX
LEVEL TRANSDUCER #2 T700SX
DC DCC +IN -IN
SIGNAL SPLITTER
+OUT -OUT
GND
D9 D10 D11
4-20mA LEVEL OUTPUT
PROVIDES INTRINSICALLY SAFE CIRCUIT EXTENSIONS FOR USE IN CLASS I,II OR III, GROUPS 1, HAZARDOUZ (CLASSIFIED) LOCATIONS WHEN CONNECTED PER PANEL CONTROL DRAWING NO. 9002611313



SIDESLOPER PUMPING SYSTEMS

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PROJECT: MARSHALL STEAM PLANT

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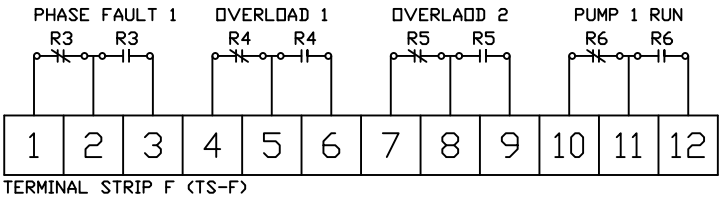
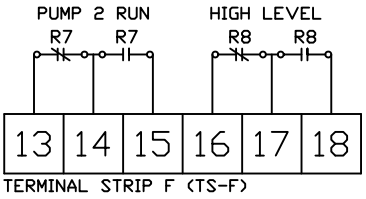
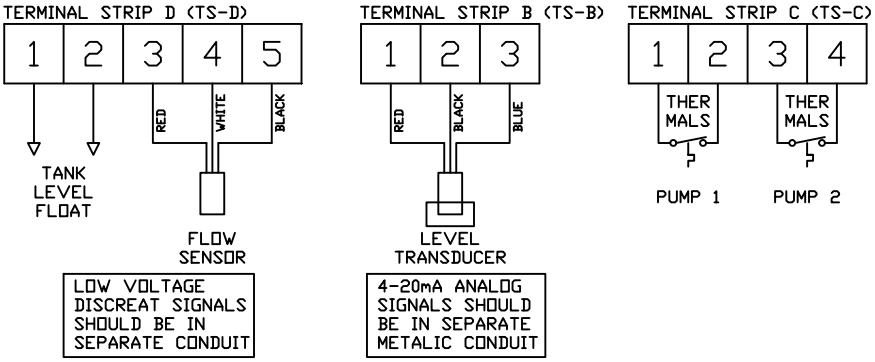
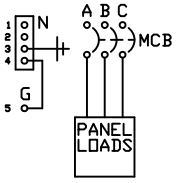






CUSTOMER	-
JOB NAME	MARSHALL STEAM PLANT
ENCLOSURE UL TYPE RATING:	UL TYPE 1
VOLTAGE	480V PHASE 3 HZ 60
H.P.	#1 1 #2 7.5 #3 X #4 X
F.L.A.	2.1A 13.2A X X
TOTAL F.L.A.	19.13A
SERIAL #	10- DATE: -
SCCR:	5KA SYMMETRICAL RMS,480V. MAX.

MANUFACTURED BY:
STA CON INC 2525 S. OBT APOPKA FL 32703



SERVICE	40 AMP	
WIRE	8 AWG	TABLE D
GROUND WIRE	8 AWG	TABLE C
TERMINAL 1	8 AWG	TABLE D
TERMINAL 2	8 AWG	TABLE D
TERMINAL 3	8 AWG	TABLE C
TERMINAL 4	8 AWG	TABLE C
TERMINAL 5	8 AWG	TABLE C

SIDESLOPER PUMPING SYSTEMS

MODEL NO: GCD-7.5-13.2-AACACAB

PROJECT: MARSHALL STEAM PLANT

DATE: 9/8/2010

REVISION: A

GUNNCO PUMP & CONTROL
515 INDUSTRIAL WAY
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TEL. 770-889-7114

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TNT

70236BA

GUNNCO PUMP & CONTROL, INC

BILL OF MATERIAL	BY: TNT

QUOTE NO.	**70236BA**	**Date: 9/8/2010**	**Rev: A**
JOB NAME	**MARSHALL STEAM PLANT**	**SN:**	
CUSTOMER		**PO:**	

QTY	LEGEND	DESCRIPTION	MFG.	PART #	Check Off
1		ENCLOSURE (4X SS) 36x30x10	HOFFMAN	A36H3010SSLP	[ ]
1		SUB PANEL	HOFFMAN *	A-36P30	[ ]
1		3 POINT LATCH (36”-48”)	HOFFMAN	A-L36CR	[ ]
1		WINDOW KIT (STAINLESS)	HOFFMAN	APWK2315NFSS	[ ]
1	**N**	**ISOLATED NEUTRAL BLOCK 175 A. (1-4) Line [2/0 to 14] – Load [4 to 14]**	**BUSSMANN**	**16220-1**	**[ ]**
1	MCB	MAIN CIRCUIT BREAKER	SQD	HDL36040	[ ]
1		MULTI-LUG KITS (6-#14-#6)	SQD	PDC6HD6	[ ]
1	OP M	OPERATOR MECHANISM ***5-1/2” to 21-3/8 MOUNTING DEPTH*** (H or J – FRAME)	SQD	9421LZL250H43	[ ]
1	MB	MOTOR BREAKER	SQD	HDL36015	[ ]
1	MB	MOTOR BREAKER	SQD	HDL36030	[ ]
1	CCB	CONTROL BREAKER	SQD	QOU115	[ ]
2	MS	MOTOR STARTER (SIZE 1)	SQD	8536-SCO3V02S	[ ]
3	OL	OVERLOAD HEATERS	SQD	B 3	[ ]
3	OL	OVERLOAD HEATERS	SQD	B 22	[ ]
2		OL AUXILIARY CONTACTS (NC, NO)	SQD	9999-SO4	[ ]
2	OL R	OVERLOAD RESET	SQD	9066-RA1	[ ]
1	CPT	CONTROL POWER TRANSFORMER	SQD	9070-TF750D1	[ ]
1	AL	ALARM LIGHT (STROBE)	INGRAM	SBN120AC	[ ]
1	AH	ALARM HORN W/TRIM RING (4X, 120VAC)	FEDERAL SIGNAL	350TR-120	[ ]
4		**ANGLE BRACKET KIT**	**SQD**	**9080MH82**	**[ ]**
34	**TS**	**TERMINAL STRIP (NATURAL)**	**SQD**	**9080-GK6**	**[ ]**
2	**TS**	**TERMINAL STRIP (RED)**	**SQD**	**9080-GKR6**	**[ ]**
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1	**TS**	**TERMINAL STRIP (BLUE)**	**SQD**	**9080-GKL6**	**[ ]**
4	**TS**	**TERMINAL STRIP END BARRIER**	**SQD**	**9080-GK6B**	**[ ]**
1	* F1	FUSE	BUSSMANN	KTK-R –5 /250V	[ ]
2	* F2-3	FUSE (750VA) (TIME DELAY AC-DC)	BUSSMANN	FNQ-R –3 /600V	[ ]
2	**HOA**	**HAND-OFF-AUTO SELECTOR**	**SQD**	**9001SKS63B**	**[ ]**
2		(NO, NC) CONTACT	SQD	9001-KA1	[ ]
1	SW	T1/T2 SWITCH	SQD	9001-SKS11B	[ ]
2		(NO, NC) CONTACT	SQD	9001-KA1	[ ]
2	RL	RUN LIGHT (GREEN) (120VAC, PTT)	SQD	9001SKT38LG	[ ]
1	PL	PILOT LIGHT (RED) (120VAC, PTT)	SQD	9001SKT38LR	[ ]
2	PL	PILOT LIGHT (YELLOW) (120VAC, PTT)	SQD	9001SKT38LY	[ ]
2 2	P/B	PUSH BUTTON (NO) CONTACT	SQD SQD	9001-SKR1U 9001-KA2	[ ] [ ]

1	ETM	ELAPSED TIME METER	REDINGTON	710-0016	[ ]
9	R1-9	CONTROL RELAY (120VAC W/PL)	SQD	8501KP13P14V20	[ ]
1	PMD	PHASE MONITOR DISCONNECT (MANUAL MS) (.25-.4 amps)	SQD	GV2ME03	[ ]
2		8 PIN SOCKET	IDEC	SR2P-06	[ ]
9		11 PIN SOCKET	IDEC	SR3P-05	[ ]
1		8 PIN SOCKET 600V	CUSTOM CONN	RB08	[ ]
1		12 PIN SOCKET	CUSTOM CONN	SD12	[ ]
1	TH	THERMOSTAT	BILBEE	S200-A	[ ]
1	HT	HEATER	HEATRON	HEATFLEX	[ ]

NOTES: *** OR EQUAL**
+ INDICATES LINE ITEM CHANGE
SPECIAL ITEMS **IN BOLD TYPE**
@ **PROVIDED BY PUMP REP**

PACKING LIST

Quote#: 70236BA	**Date: 9/8/2010**	**Rev: A**

SPARE PARTS

QTY	LEGEND	DESCRIPTION	MFG	PART #	
1	F	FUSE	BUSSMANN	KTK-R-5/250V	[ ]
2	F	FUSE	BUSSMANN	FNQ-R-3/600V	[ ]
1		LIGHT BULB (6.3V) for SQD 120V PL	CANDELA CORP	755	[ ]

PARTS PROVIDED FOR PANEL INSTALLATION

QTY	LEGEND	DESCRIPTION	MFG	PART #	
1	LC	LEVEL CONTROLLER	GUNNCO	D332	[ ]
1		BREATHER	PRESSURE SYSTEMS	A-815	[ ]
1	PM	PHASE MONITOR	MPE	001-440-118	[ ]
1	ISB	INTRINSICALLY SAFE BARRIER (XD)	STAHL	9002/13-280-110-01	[ ]
1	SA1	SURGE ARRESTOR	CITEL	DS40-120	[ ]
1	SA2	SURGE ARRESTOR	CITEL	DLA-24D3	[ ]
1	SA3	SURGE ARRESTOR	CITEL	DS210-24DC	[ ]
1	ALT	AUTO ALTERNATOR	MPE	008-120-13SP	[ ]
1	SI	SIGNAL ISOLATOR/ SPLITTER	MOORE INDUSTRIES	ECT/4-20Ma/2x4-20mA/24VDC/TX/DIN	[ ]

PARTS PROVIDED LOOSE

QTY	LEGEND	DESCRIPTION	MFG	PART #	
1		LEVEL TRANSDUCER	KPSI	T700SX100	[ ]

The differential between PUMP ON and PUMP OFF must allow at **least 10 minutes** between starts to prevent early (and non-warranty) motor failure. In some installation the pump may produce greater flow than the perforations of the riser pipe allow the pipe sump area to recharge. Under these conditions it is available to maximize the ON-OFF settings-Typically we suggest setting PUMP OFF to 6” and PUMP ON to 24” or above. Call GunnCo for details.

Typically:

PUMP OFF (A-RESET) is set to 6” to 12”.

PUMP ON (A-SET) is set to 12” to 24”.

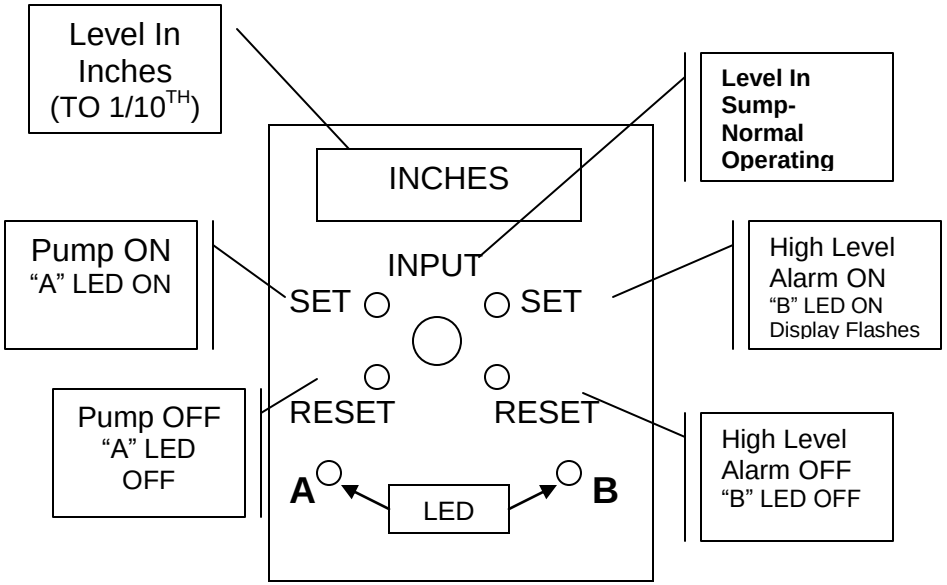
HIGH LEVEL ALARM ON (B-SET) is set to 30” or greater

HIGH LEVEL ALARM OFF (B-RESET)(is set 2” below the B-SET point.

(For deep sumps add 6” or more to each setting)

To check setting-Turn Knob to point and current setting will be displayed.

To change setting-Turn Knob to point and adjust screw until the desired new setting is displayed..



For programming and operating assistance PLEASE give us a call @ 770-889-7114.

GunnCo Devar 332 Indicating Controller

Series 700 Submersible Pressure Transducer

The Series 700 pressure transducer uses piezoresistive pressure cell sensing technology with a 316 stainless steel diaphragm. The housing is 316 stainless steel with Teflon wetted materials. Cable is a heavy duty polyurethane jacketed and shielded with polyethylene breather tube. Conductors are 22 AWG.

Signal is 4-20mA provided by a 24 volt powered control loop.

Standard pressure range for leachate cell pump applications is 0-5 psi with 0-10 psi available. Higher ranges are available for storage tank applications.

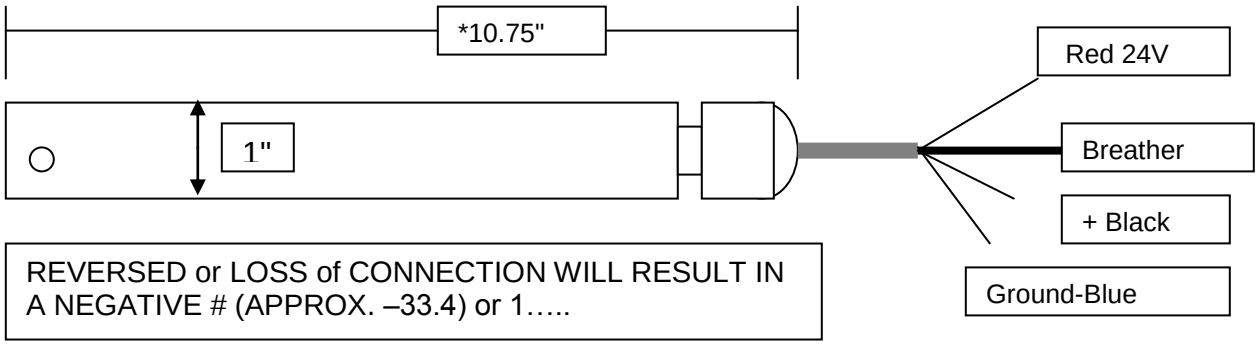
Accuracy is +/- 1.00 % of full range (for 0-5 psi accuracy is +/-1.4" minimum).

Rated burst pressure is 2X pressure range (10 psi minimum).

The standard Sidesloper unit is provided with an internal surge suppressor with more than 10,000 amperes peak surge. Protectors are multi-stage design, with a solid state section that intercepts the leading edge of the surge in a nanosecond. The second stage of the design contains a gas discharge tube which crowbars up to 20,000 ampere currents to ground. The tube remains in the crowbar start until the surge has passed, then rests to normal operation automatically.

Approvals are available for FM, CSA, and UL for Class 1, Div 1, Groups A, B, & C, and Class II, Div 1, group E, F, & G, and Class III, Div 1 hazardous locations. Hazardous location approvals are accomplished using approved electrical barrier.

A permanent bellows breather device mounted in the control panel allows the device to "breath" and prevents moisture from entering and condensing in the vent tube of the cable. This device replaces desiccant tubes which require periodic replacement.



GunnCo *Sidesloper*™

Pumps and Systems Warranty Policy

1. All ***Sidesloper***™ GunnCo packages sold as specified and complete systems (pump, panel, and level sensor) shall be covered by a 12-month warranty. The warranty period begins upon the date of shipment and covers all components against failure to function due to workmanship, component failure, or materials compatibility for the application as recommended and sold and paid for within quoted terms.
2. All ***Sidesloper***™ pumps or components not sold as a complete system are subject to a warranty period of one year from shipment date or per the manufacturers standard warranty, whichever expires first.
3. Claims under the warranty can be made by obtaining a return authorization number from GunnCo during the warranty period and returning the defective component(s), freight pre-paid to GunnCo or the proper service location as directed by GunnCo. Details of the problem should be included with the returned item along with the return authorization number. The defective component must be returned within 30 days of the authorization date. The option to repair, replace, or adjust the problem component shall be that of GunnCo. Costs associated with troubleshooting, removal or replacement of components, rental equipment, rush premium charges, and freight is not included under warranty.
4. Warranty does not cover normal wear, damage due to accident or physical damage (during shipment, installation, storage), acts of nature (lightning) (blown fuses and voltage monitors), misuse, abuse, improper storage, improper/defective electrical service (low/high voltage/surges), improper installation, improper selection, or improper or unauthorized service or modifications.
5. Warranty applies only to system as operating under the conditions at time of installation (clean leachate). Build up of abrasives in sump riser such as sludge, sand, silt or scale in pump/motor/carrier/transducer will void warranty.
6. GunnCo accepts no responsibility for damage, loss, or expenses incurred through the sale or use of its equipment. Under no condition shall GunnCo be held liable for any special, incidental, or consequential damage.

Service Labor, Repairs and Components/Parts Warranty Policy

1) Service labor is warranted for quality of provided service. Repairs by GunnCo or GunnCo representative are warranted for 90 days from original installation/service dates. Failure due to work by others, modifications, non-approval for proper repairs, temporary repairs, materials by others, abuse, misuse, acts of nature, and non-recommended parts or components may not be covered by this warranty.
2) Parts and component are subject to original manufacturer's warranty periods and limits and may be subject to manufacturer's final inspection of a failed items.
3) GunnCo retains right to replace, repair, or refund labor and materials under the warranty where applicable.
4) Repair warranty for shop repairs is 90 days and does not include freight, removal, installation, non-GunnCo provided components or as noted for above service warranty.

****

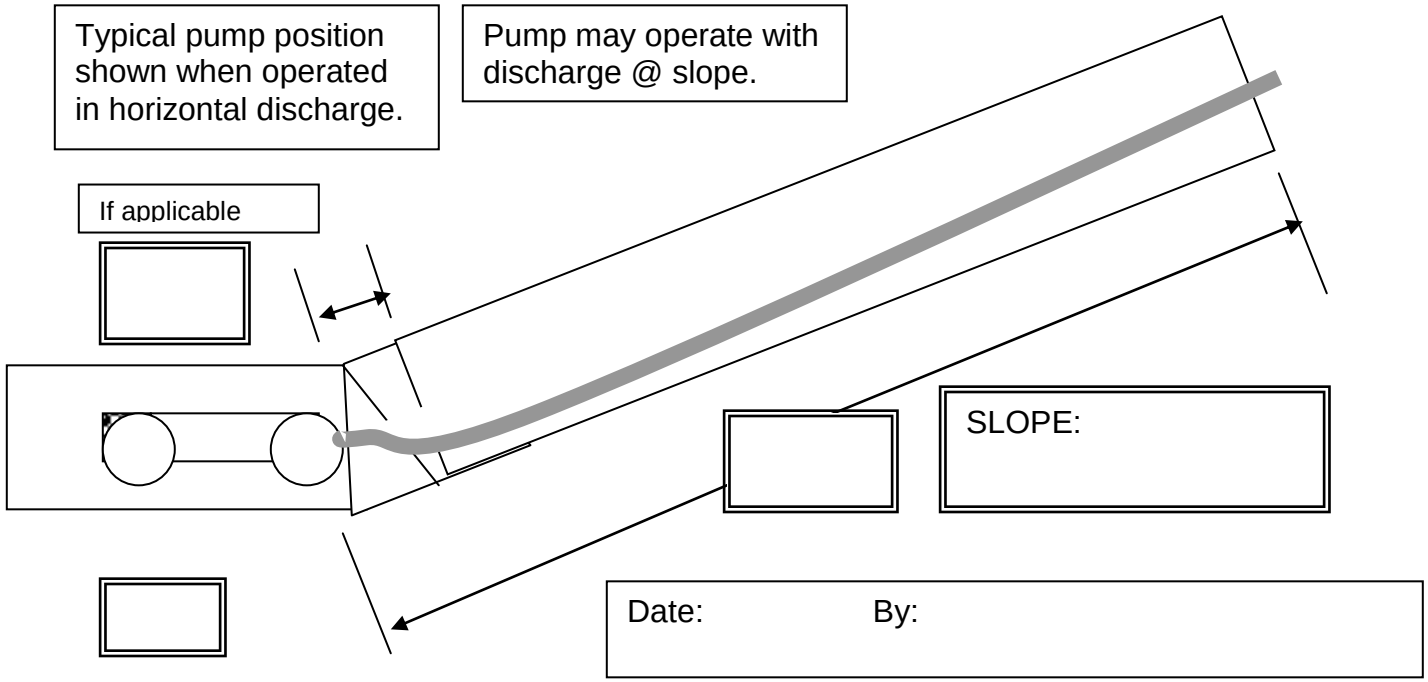
Please contact us immediately should you suspect there may be a problem or if you have any questions concerning the operation or installation of a system or component. By contacting us immediately we can assist in determining the problem and provide the fastest possible response.

GunnCo *Sidesloper* Leachate Pumping Systems- 1/2000

RISER AS BUILT DATA RECORD

Please Complete Data

How is riser constructed at toe of slope? (design of turn / number of miters / distance of transition):

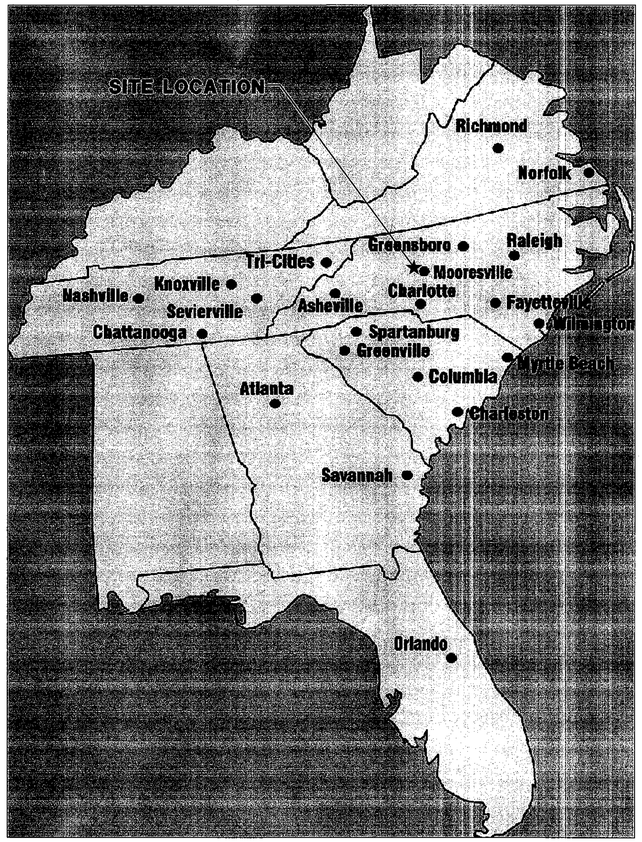


Date: By:

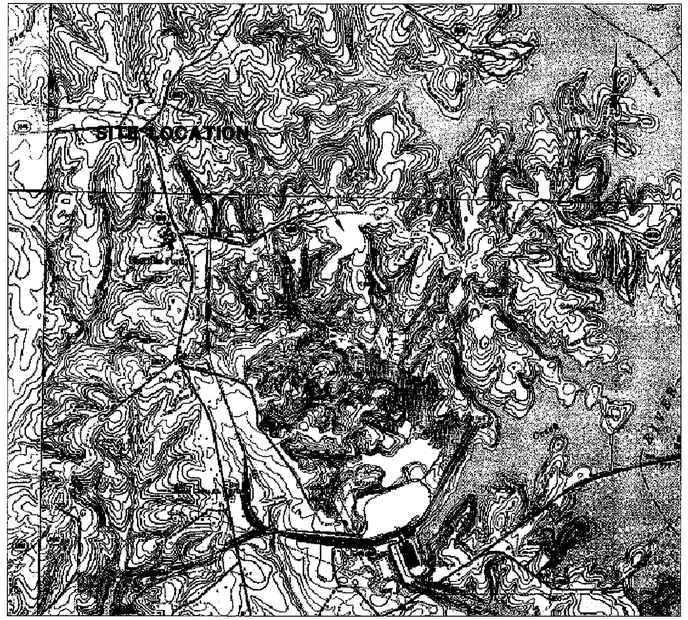
APPENDIX III – ANCILLARY FACILITIES
Section 2 – Electrical/Mechanical Drawing Set

CELLS 1 AND 2 CONSTRUCTION
MARSHALL STEAM STATION INDUSTRIAL LANDFILL NO. 1
ELECTRICAL/MECHANICAL COMPONENTS
JUNE 2010

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA



LOCATION / S&ME OFFICE MAP
NOT TO SCALE



SITE VICINITY MAP
NOT TO SCALE

INDEX OF DRAWINGS

DRAWING	TITLE
MECHANICAL COMPONENTS	
M1	SITE AERIAL PHOTOGRAPH
M2	EXISTING SITE CONDITIONS
M3	CELLS 1 AND 2 PROTECTIVE COVER
M4	CELLS 1 AND 2 FORCE MAIN
D1	LINER SYSTEM
D2	LCS/LDS
D3	LEACHATE PUMP CONTROL PANEL AND MANIFOLD PAD
D4	LEACHATE MANIFOLD AND JUNCTION BOX
D5	FORCE MAIN, GENERATOR AND POWER DISTRIBUTION PAD
D6	LDS SUMP AND RISER
D7	LCS SUMP AND RISER
ELECTRICAL COMPONENTS	
E1	ELECTRICAL RISER DIAGRAM
E2	ELECTRICAL PANEL SCHEDULES
E3	POWER PLAN - CELLS 1 & 2
E4	POWER PLAN SECTIONS & DETAILS
E5	UNDERGROUND ELEC. DUCTBANK
E6	PUMP HOUSE EQUIPMENT RACK LAYOUTS
E7	INSTRUMENT WIRING DIAGRAMS SHEET 1 OF 2
E8	INSTRUMENT WIRING DIAGRAMS SHEET 2 OF 2
E9	WIRELESS REPEATER LOCATIONS

NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALY 6/9/10

NORTH CAROLINA PROFESSIONAL SEAL 017757 ENGINEER ROBERT E. BIRRIS 6/9/10

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9751 SOUTHERN PINE BLVD.
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(704) 523-4726
WWW.SMEINC.COM
ENGINEERING LICENSE NO. F-0176

AND

PERIGON ENGINEERING
931 INDUSTRIAL DRIVE
MATTHEWS, NC 28105
(704) 246-2000
WWW.PERIGONENG.COM
ENGINEERING LICENSE NO. F-1101

S&ME PROJECT NO.
1356-08-122

ISSUED FOR CONSTRUCTION

MARSHALL STEAM STATION - INDUSTRIAL LANDFILL NO. 1

S&ME PROJECT NO. 1356-08-122

REFERENCE:
AERIAL PHOTOGRAPHY WAS SUPPLIED BY SANBORN MAP COMPANY DATED. JANUARY 29, 2009

ISSUED FOR CONSTRUCTION

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9751 SOUTHERN PINE BLVD.
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(704)523-4726
WWW.SMEINC.COM

NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. KRAY

NO.	DATE	DESCRIPTION	BY
1	6-9-10	ISSUED FOR CONSTRUCTION	KRD

SITE AERIAL PHOTOGRAPH
ELECTRICAL/MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: MAK
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-08-122	
SCALE: AS SHOWN	DATE: 6-8-10
DRAWING: M1	OF: 11

DRAWING PATH:Q:\1356\DUKE ENERGY\08-122 Marshall ILF\DWG\Industrial Landfill #1\Elec-Mech\M1 SITE AERIAL PHOTO.dwg

STAGE 1 OF PHASE 1 CLEARED, GRUBBED, AND STRIPPED AREA (PREVIOUSLY COMPLETED BY OTHERS)

FACILITY BOUNDARY

CELL 1 & 2 LIMIT OF WASTE

CELL 1 AND 2 LIMIT OF WASTE

ENERGY UNITED TRANSMISSION LINE (SHOWN FOR REFERENCE PURPOSES ONLY-TO BE RELOCATED BY OTHERS PRIOR TO CELL 3 & 4 CONSTRUCTION)

GROUND SURVEY LIMITS (SEE REFERENCE NOTE)

EXISTING HAUL ROAD (APPROXIMATE GRADES)

CLOSED C&D LANDFILL

CLOSED ASBESTOS LANDFILL

FUTURE STOCKPILE AREA

PROPOSED LEACHATE DISCHARGE AREA

N 687500
N 687000
N 686500
N 686000
N 685500
N 685000
E 1412500
E 1413000
E 1413500
E 1414000
E 1414500
E 1415000

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

LEGEND

- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- OBSCURED EXISTING MAJOR CONTOUR (10')
- OBSCURED EXISTING MINOR CONTOUR (2')
- POWER POLES
- PL — PROPERTY LINE
- LOW — LIMIT OF WASTE
- FB — FACILITY BOUNDARY
- ELEC — ENERGY UNITED TRANSMISSION LINE (SHOWN FOR REFERENCE PURPOSES ONLY) (TO BE RELOCATED BY OTHERS PRIOR TO CELL 3 & 4 CONSTRUCTION)

0 75 150 300
(IN FEET)
1 inch = 150 ft.

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KEVIN R. DAVIS

NO.	DATE	DESCRIPTION	BY
1	6-8-10	ISSUED FOR CONSTRUCTION	KRD

EXISTING SITE CONDITIONS
ELECTRICAL/MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD
CHECKED BY: [illegible]
DESIGNED BY: WMH
APPROVED BY: KRD

PROJECT NUMBER: 1356-08-122

SCALE: AS SHOWN
DATE: 6-8-10

DRAWING: M2
OF: 11

DRAWING PATH: J:\1356\DUKE ENERGY\08-122 Marshall Ash Landfill (FY)\Cad\Marshall Existing Site Conditions.dwg

EXISTING VEGETATED BERM - APPROXIMATE LOCATION

24 / D5 GENERATOR AND POWER DISTRIBUTION PAD AREA

25 / D6 CELL 1 AND 2 LCS SUMP PLAN

8 / D2 LCS / LDS RISER PLAN CROSS SECTION

9 / D2 CLEANOUT

16 / D3 LEACHATE PUMP CONTROL PANEL AND MANIFOLD PAD PLAN

DRAINAGE BLANKET 11 / D2

CHECK DAM 15 / D2

CELL 1

CELL 2

INTERCELL/INTERPHASE BERM, INTERIM CONDITION 4 / D1

7 / D2 CORRIDOR

FINAL SUBGRADE SLOPE FACE (BY OTHERS) (INCLUDES 1.5-FT SOIL COVER)

N 687500

N 687000

E 1413000

E 1413500

E 1414000

E 1414500

EPC3

ISSUE FOR CONSTRUCTION

LEGEND

- EXISTING CONSTRUCTED MAJOR CONTOUR (10')
- EXISTING CONSTRUCTED MINOR CONTOUR (2')
- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- PROPOSED GRADE MAJOR CONTOUR (10')
- PROPOSED GRADE MINOR CONTOUR (2')
- PL — PROPERTY LINE
- SILT FENCE
- SILT FENCE OUTLET
- RISER PIPES
- LCS/LDS CORRIDOR
- CHECK DAM
- DRAINAGE BLANKET
- CHANNEL REACH
- CQA — CQA LIMIT
- TACK-ON BENCH
- EPCS — PERIMETER CHANNEL
- PROPOSED FORCE MAIN ALIGNMENT AND LEACHATE FLOW DIRECTION (SEE DRAWING M4 FOR COMPLETE ALIGNMENT).
- 16 / D3 — DETAIL CALLOUT FOR ITEMS TO BE INSTALLED
- 1 / D1 — DETAIL CALLOUT FOR REFERENCE PURPOSES ONLY

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

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NORTH CAROLINA PROFESSIONAL SEAL 022185 ENGINEER KENNETH R. WOLFE

NO.	DATE	DESCRIPTION	BY
1	6-8-10	ISSUED FOR CONSTRUCTION	KRD

CELLS 1 AND 2 PROTECTIVE COVER
ELECTRICAL/MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: WMH
DESIGNED BY: WMH	APPROVED BY:
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 6-8-10
DRAWING: M3	OF: 11

DRAWING PATH:

N 687500

N 687000

N 686500

N 686000

N 685500

N 685000

E 1411500

E 1412000

E 1412500

E 1413000

E 1413500

E 1414000

E 1414500

E 1415000

22 D5 LEACHATE FORCE MAIN TRENCH, TYPE A
FROM STATION 0+00 TO STATION 12+50

LEACHATE FORCE MAIN TRENCH, TYPE C 22 D5
FROM STATION 12+50 TO STATION 23+76

22 D5 LEACHATE FORCE MAIN TRENCH, TYPE A
FROM STATION 23+76 TO STATION 26+79

23 D5 LEACHATE FORCE MAIN OUTLET APRON

LEGEND

- EXISTING CONSTRUCTED MAJOR CONTOUR (10')
- EXISTING CONSTRUCTED MINOR CONTOUR (2')
- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- POWER POLES
- PL — PROPERTY LINE
- 1+00 — PROPOSED FORCE MAIN ALIGNMENT AND LEACHATE FLOW DIRECTION

150 0 75 150 300

(IN FEET)
1 inch = 150 ft.

ISSUE FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 022253 ENGINEER KENNETH R. DAVIS

NO.	DATE	DESCRIPTION	BY
1	6-8-10	ISSUED FOR CONSTRUCTION	KRD

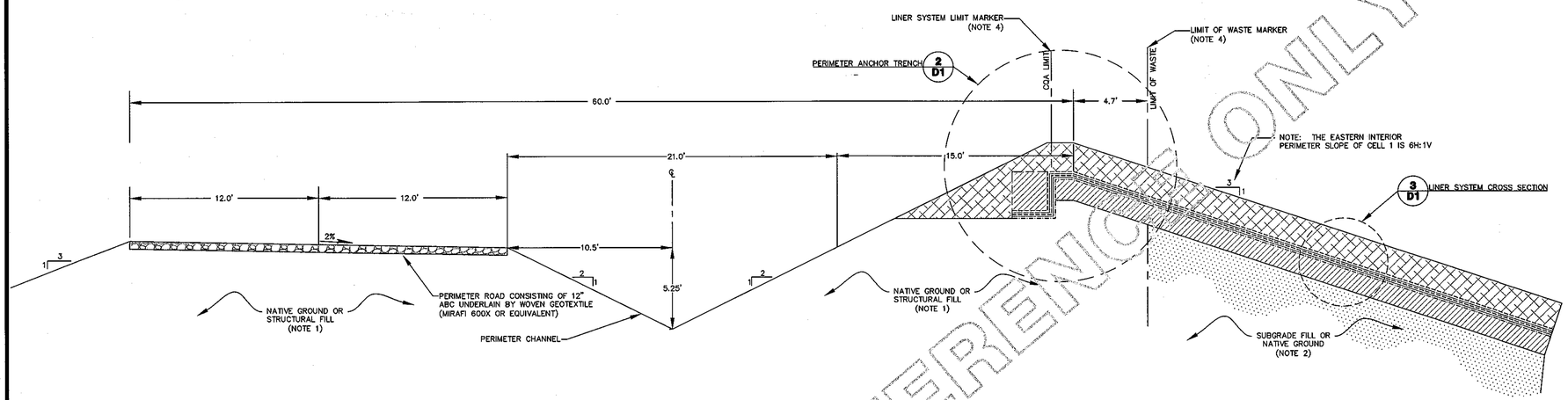
CELLS 1 AND 2 FORCE MAIN
ELECTRICAL/MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

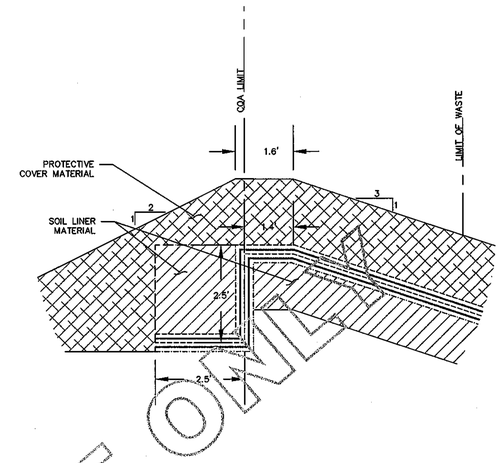
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY:
DESIGNED BY: WMH	APPROVED BY:
PROJECT NUMBER: 1356-08-122	
SCALE: 1" = 60'	DATE: 6-8-10
DRAWING: M4	OF: 11

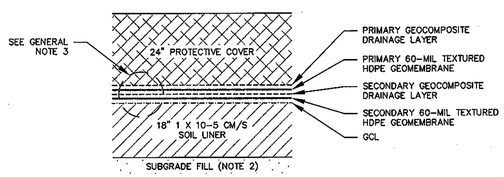
DRAWING PATH:



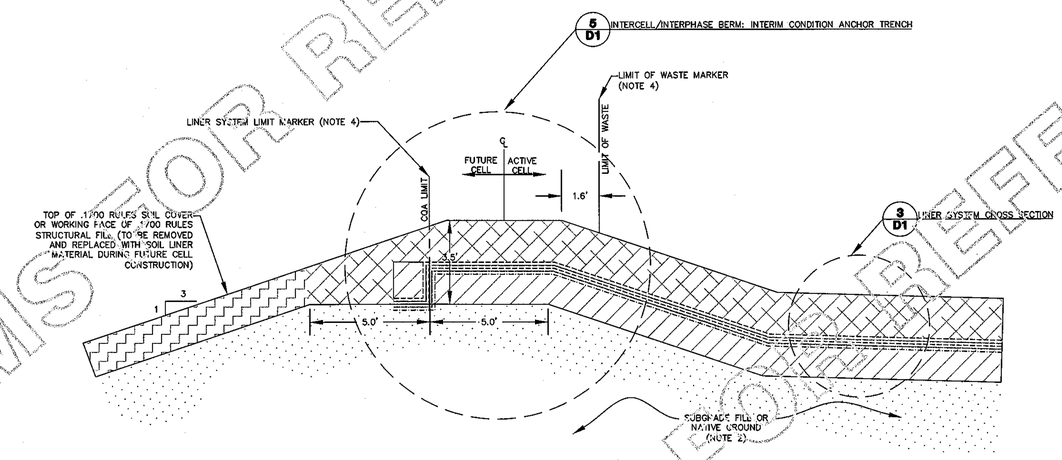
1 D1 TYPICAL PERIMETER
SCALE: 1" = 4'



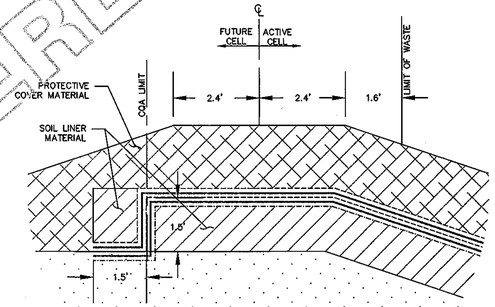
2 D1 PERIMETER ANCHOR TRENCH
SCALE: 1" =2'



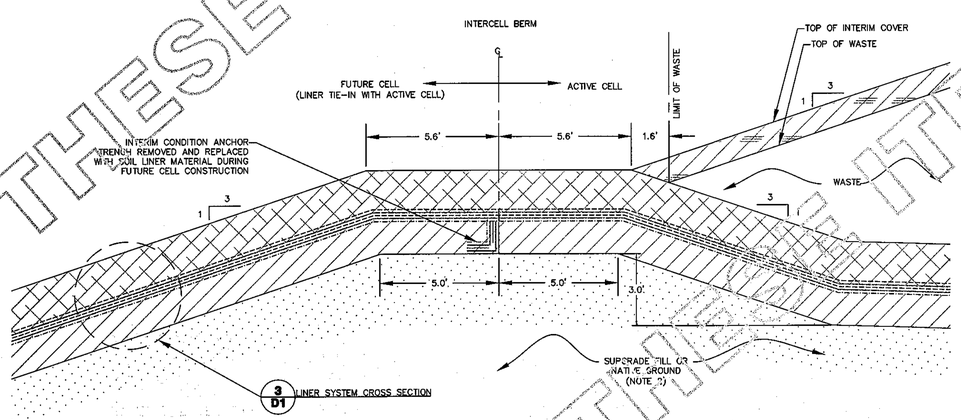
3 D1 LINER SYSTEM CROSS SECTION
SCALE: 1" = 2'



4 D1 INTERCELL/INTERPHASE BERM: INTERIM CONDITION
SCALE: 1" = 3'



6 D1 INTERCELL/INTERPHASE BERM: INTERIM CONDITION ANCHOR TRENCH
SCALE: 1" = 2'



6 D1 INTERCELL/INTERPHASE BERM: FINAL CONDITION
SCALE: 1" = 3'

NOTES:

1. STRUCTURAL FILL SHALL CONSIST OF BORROW SOILS CONSISTENT WITH SPECIFICATION SECTION 02320.
2. SUBGRADE FILL SHALL CONSIST OF BORROW SOILS AND/OR ASH FILL CONSISTENT WITH SPECIFICATION SECTION 02320.
3. DETAILS DRAWN TO SCALE AS SHOWN WITH THE EXCEPTION OF THE GEOSYNTHETIC COMPONENTS WHICH ARE EXAGGERATED FOR CLARITY.
4. THIN, FLEXIBLE HIGHWAY-TYPE MARKER TO BE PROVIDED AT CHANGES IN ALIGNMENT, SPACED AT 100' O.C. (MAX.) AND 25' O.C. ON CURVES. LABELS SHALL BE SPECIFICALLY MARKED AS "LIMIT OF WASTE" OR "CQA LIMIT".

THESE ITEMS FOR REFERENCE ONLY

ISSUED FOR CONSTRUCTION

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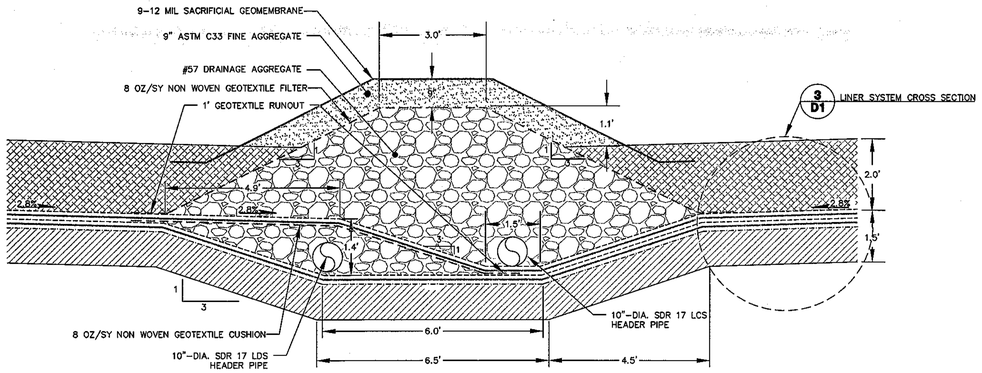
NORTH CAROLINA PROFESSIONAL SEAL 032135 ENGINEER KENNETH R. PLATT

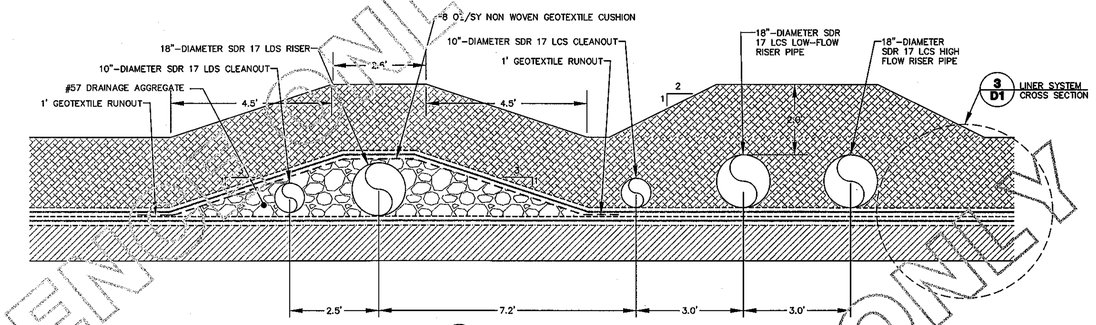
NO.	DATE	DESCRIPTION	BY
1	6-8-10	ISSUED FOR CONSTRUCTION	KRD

LINER SYSTEM
ELECTRICAL/MECHANICAL COMPONENTS
DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

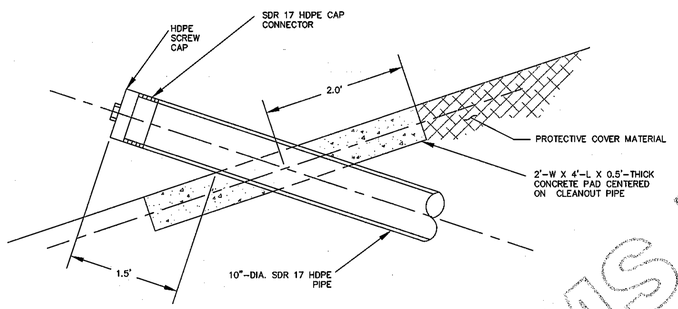
ENGINEERING LICENSE NO: F-0176
DRAWN BY: CLD
CHECKED BY: WMH
DESIGNED BY: WMH
APPROVED BY: KRD
PROJECT NUMBER: 1356-08-122
SCALE: AS SHOWN
DATE: 6-8-10
DRAWING: D1
OF: 11
DRAWING PATH:



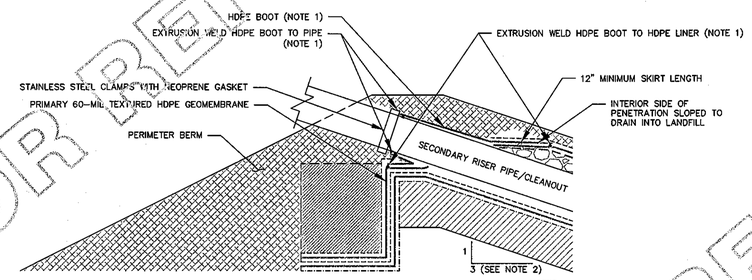
7 D2 CORRIDOR
SCALE: 1" = 2'



8 D2 LCS/LDS RISER PLAN CROSS SECTION
SCALE: 1" = 2'



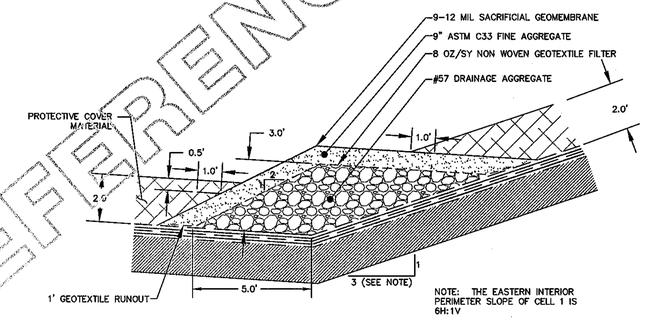
9 D2 CLEANOUT
SCALE: 1" = 1'



NOTES:

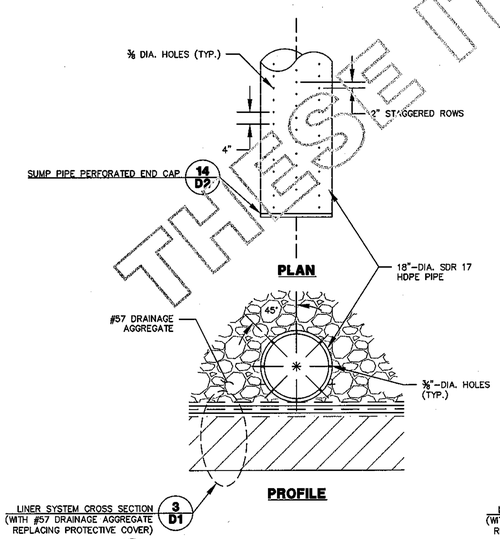
1. PREFABRICATED AND SPARK TESTED BOOT TO BE EXTRUSION WELDED TO HDPE PIPE AND PRIMARY LINER.
2. THE EASTERN INTERIOR PERIMETER SLOPE OF CELL 1 IS 6H:1V

10 D2 LDS RISER PIPE/CLEANOUT PENETRATION
SCALE: 1" = 2'

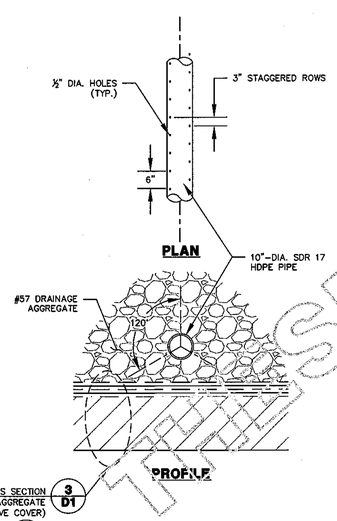


NOTE: THE EASTERN INTERIOR PERIMETER SLOPE OF CELL 1 IS 6H:1V

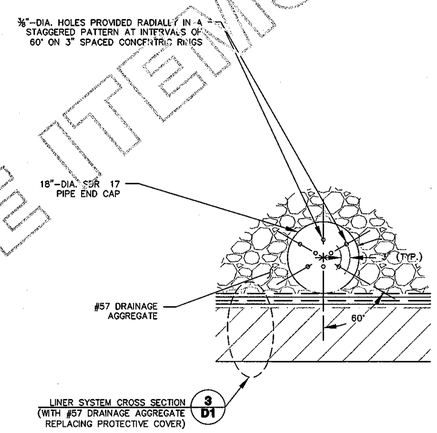
11 D2 DRAINAGE BLANKET
SCALE: 1" = 3'



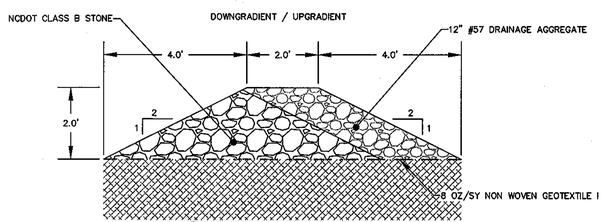
12 D2 SUMP PIPE PERFORATIONS
SCALE: 1"=2'



13 D2 LCS/LDS HEADER PIPE PERFORATIONS
SCALE: 1" = 2'



14 D2 SUMP PIPE PERFORATED END CAP
SCALE: 1" = 2'



15 D2 CHECK DAM
SCALE: 1" = 2'

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NORTH CAROLINA PROFESSIONAL SEAL 025 ENGINEER KENNETH R. DALY 6/7/10

NO.	DATE	DESCRIPTION	BY
1	6-9-10	ISSUED FOR CONSTRUCTION	KRD

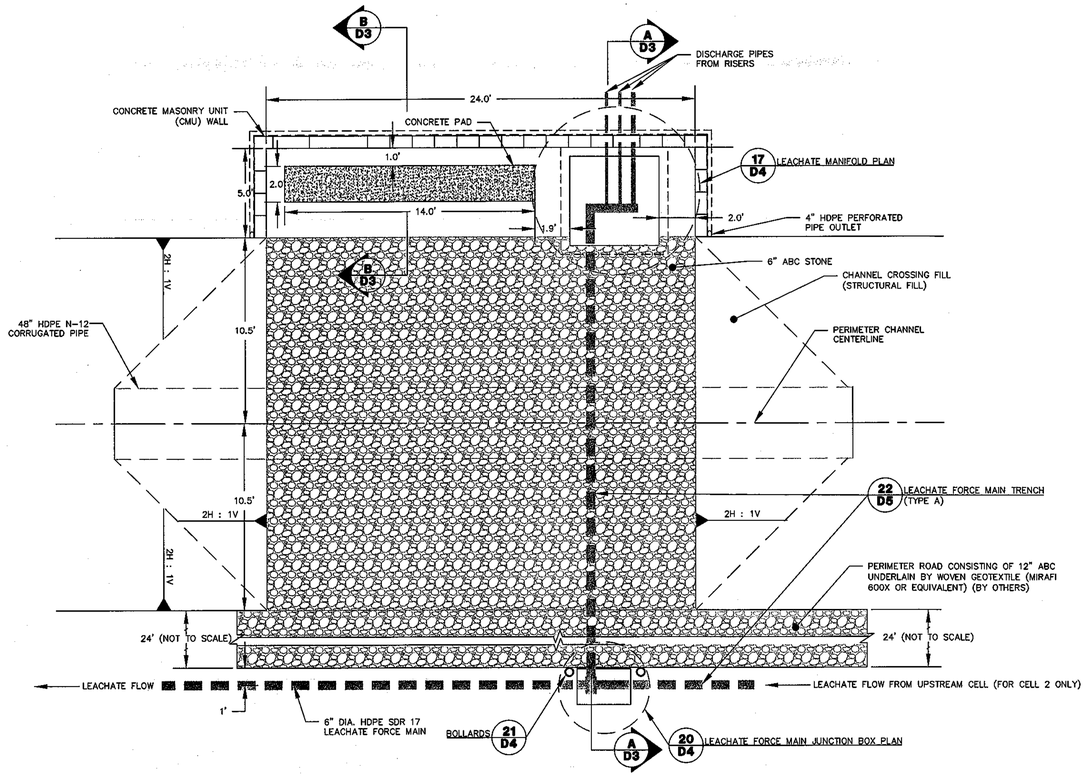
LCS/LDS
ELECTRICAL/MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

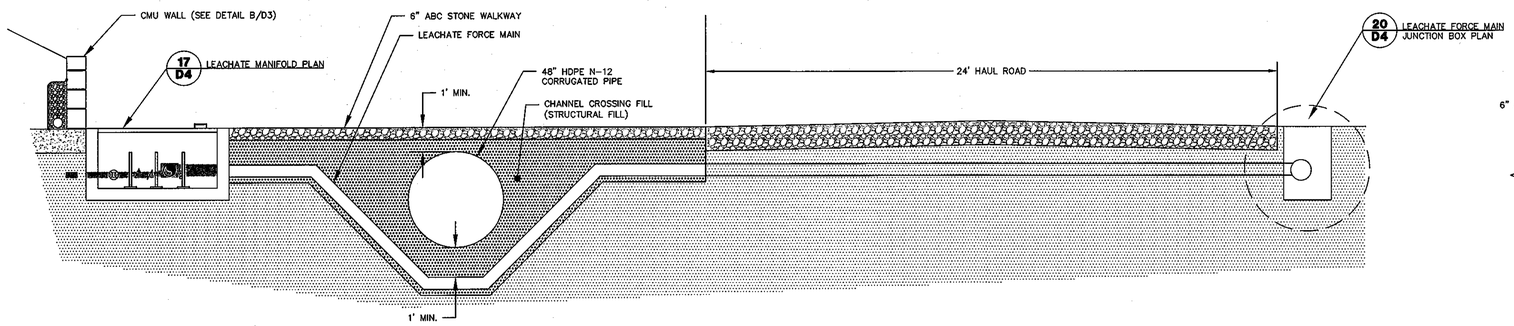
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: WMH
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: AS SHOWN	DATE: 6-8-10
DRAWING: D2	OF: 11

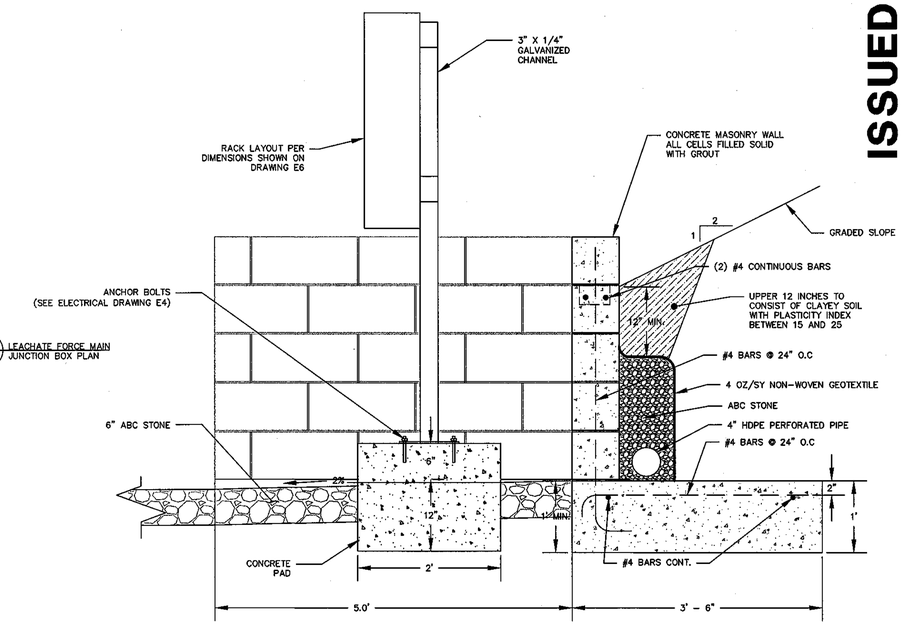
DRAWING PATH:



16 D3 LEACHATE PUMP CONTROL PANEL AND MANIFOLD PAD PLAN
SCALE: 1" = 4'



A D3 LEACHATE PUMP CONTROL PANEL AND MANIFOLD CROSS SECTION A
SCALE: 1" = 3'



B D3 LEACHATE PUMP CONTROL PANEL AND MANIFOLD CROSS SECTION B
SCALE: 1" = 1'

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NORTH CAROLINA PROFESSIONAL SEAL 032130 ENGINEER KENNETH R. PARKER 6/9/10

NO.	DATE	DESCRIPTION	BY
1	6-9-10	ISSUED FOR CONSTRUCTION	KRD

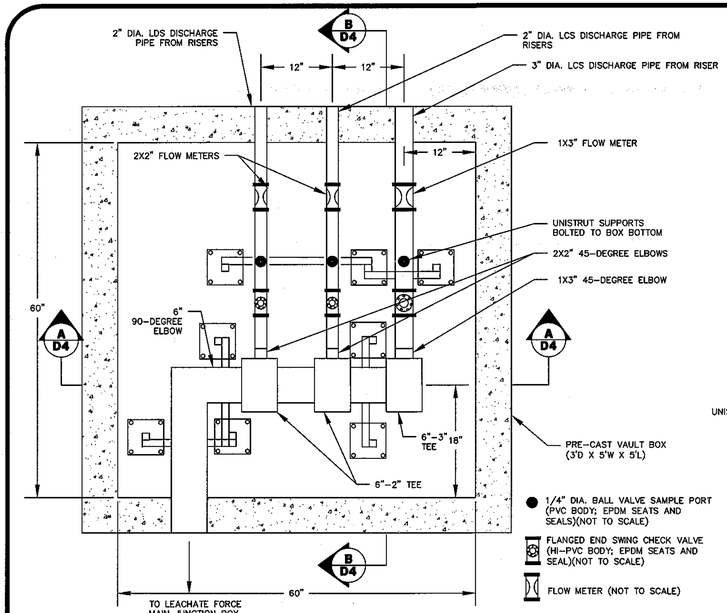
LEACHATE PUMP CONTROL PANEL AND MANIFOLD PAD
ELECTRICAL/MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

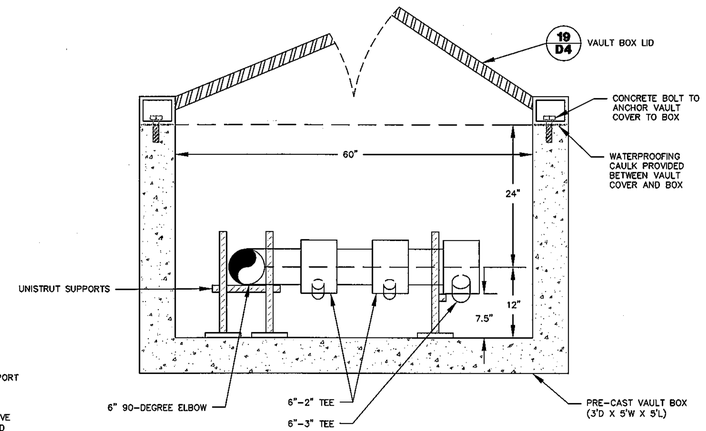
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY:
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: AS SHOWN	DATE: 6-8-10
DRAWING: D3	OF: 11

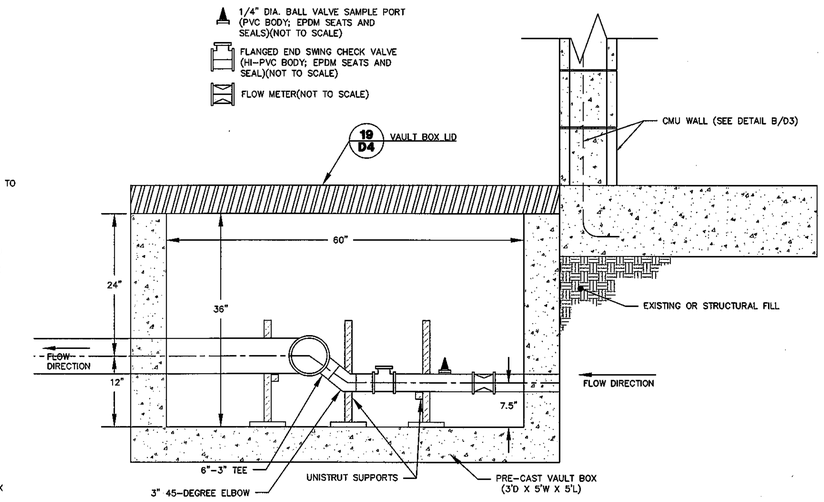
DRAWING PATH:



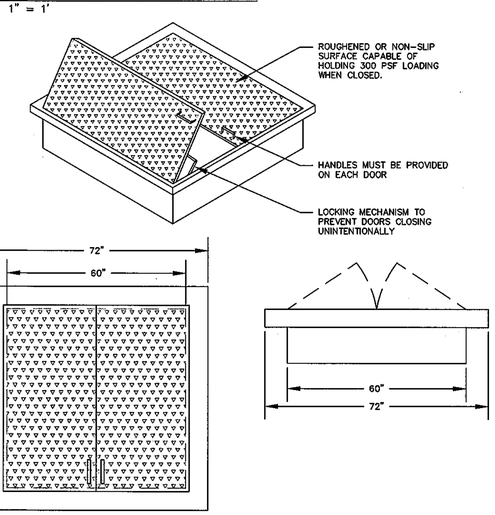
17/D4 LEACHATE MANIFOLD PLAN
SCALE: 1" = 1'



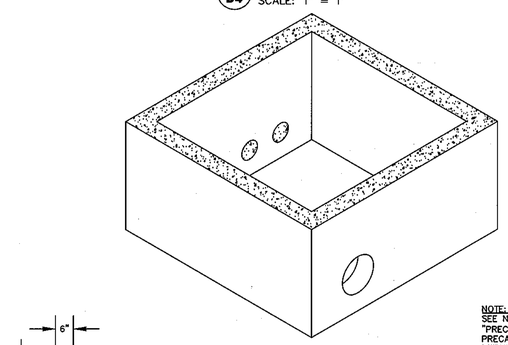
A/D4 LEACHATE MANIFOLD CROSS SECTION A
SCALE: 1" = 1'



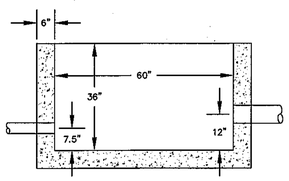
B/D4 LEACHATE MANIFOLD CROSS SECTION B
SCALE: 1" = 1'



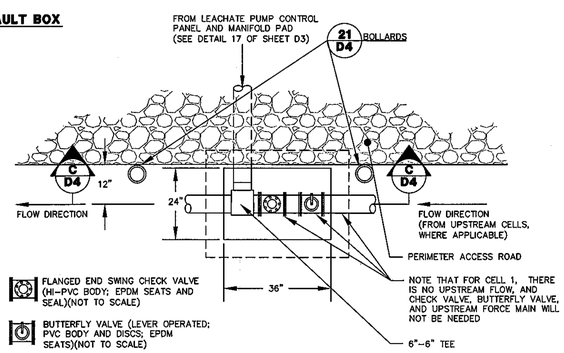
19/D4 VAULT BOX LID
SCALE: 1" = 2'



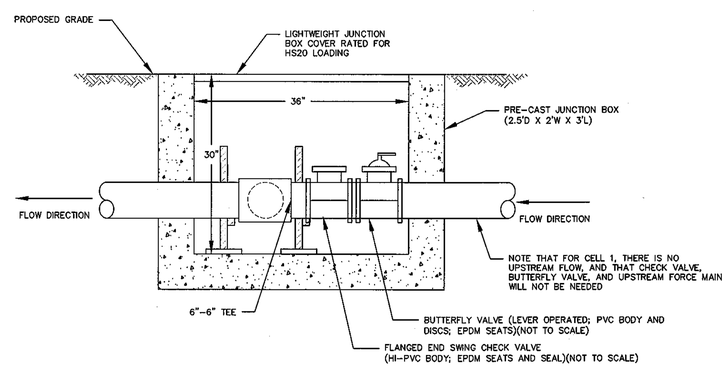
NOTE:
SEE NCDOT STANDARD DETAIL 840.45 "PRECAST DRAINAGE STRUCTURE" FOR PRECAST VAULT BOX REINFORCEMENT DETAILS.



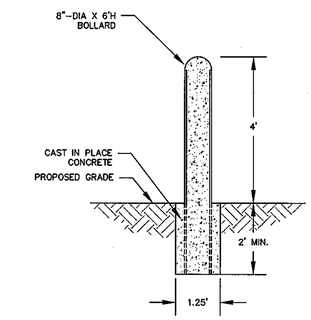
16/D4 PRE-CAST VAULT BOX
SCALE: 1" = 2'



20/D4 LEACHATE FORCE MAIN JUNCTION BOX PLAN
SCALE: 1" = 2'



C/D4 LEACHATE FORCE MAIN JUNCTION BOX CROSS SECTION C
SCALE: 1" = 1'



21/D4 BOLLARDS
SCALE: 1" = 2'

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NORTH CAROLINA PROFESSIONAL SEAL 022405 ENGINEER KENNETH R. DAVIS

NO.	DATE	DESCRIPTION	BY
1	6-9-10	ISSUED FOR CONSTRUCTION	KRD

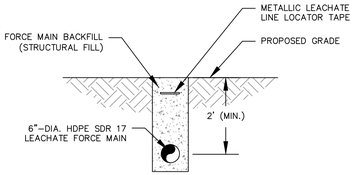
LEACHATE MANIFOLD AND JUNCTION BOX ELECTRICAL/MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

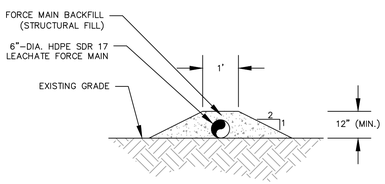
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY:
DESIGNED BY: WMH	APPROVED BY:
PROJECT NUMBER 1356-08-122	
SCALE: AS SHOWN	DATE: 6-8-10
DRAWING: D4	OF: 11

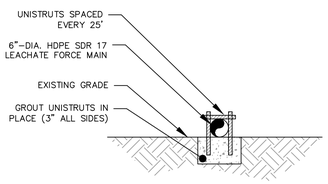
DRAWING PATH:



LEACHATE FORCE MAIN TRENCH: TYPE A



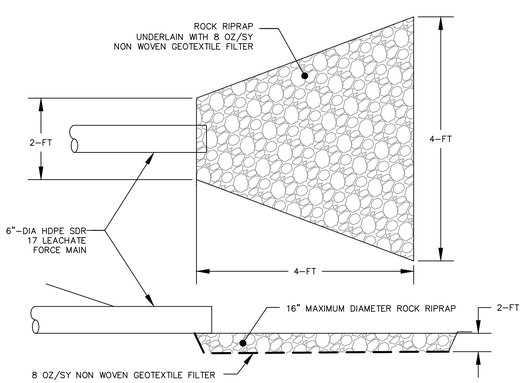
LEACHATE FORCE MAIN TRENCH: TYPE B (SEE NOTE)



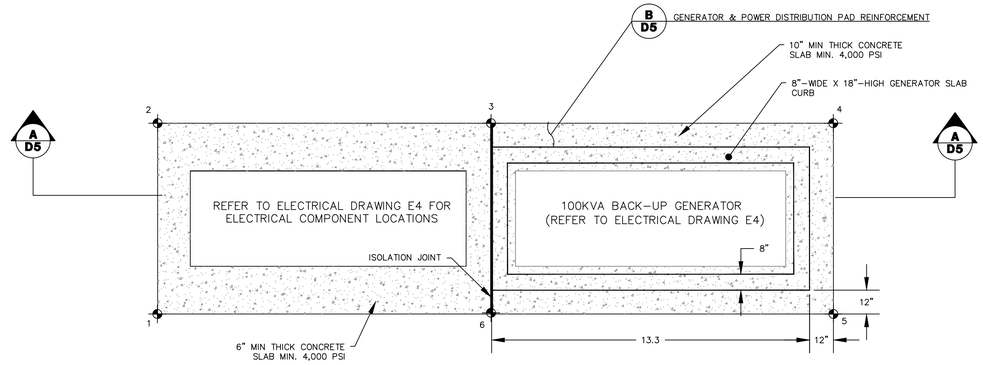
LEACHATE FORCE MAIN TRENCH: TYPE C (SEE NOTE)

NOTE: LEACHATE FORCE MAIN TRENCH TYPES B AND C TO BE USED TEMPORARILY PRIOR TO SUBSEQUENT CELL/PHASE CONSTRUCTION

22/D5 LEACHATE FORCE MAIN TRENCH
SCALE: 1" = 2'

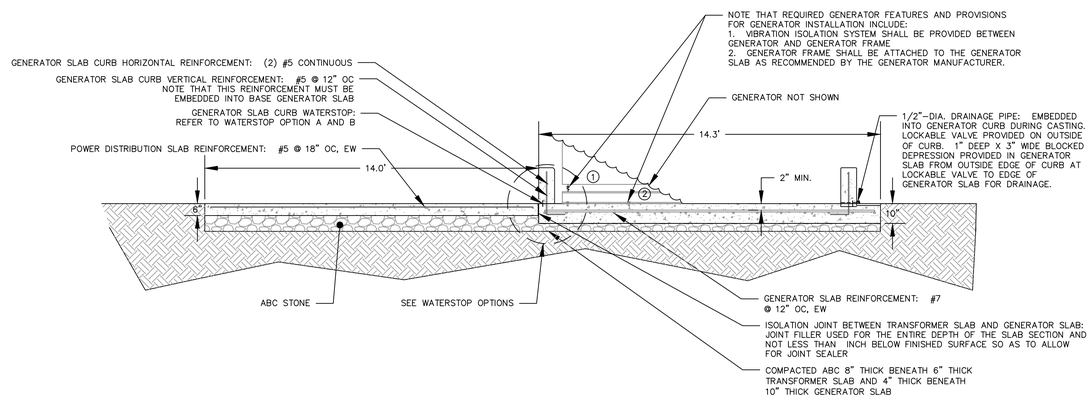


23/D5 LEACHATE FORCE MAIN OUTLET APRON
SCALE: 1" = 2'

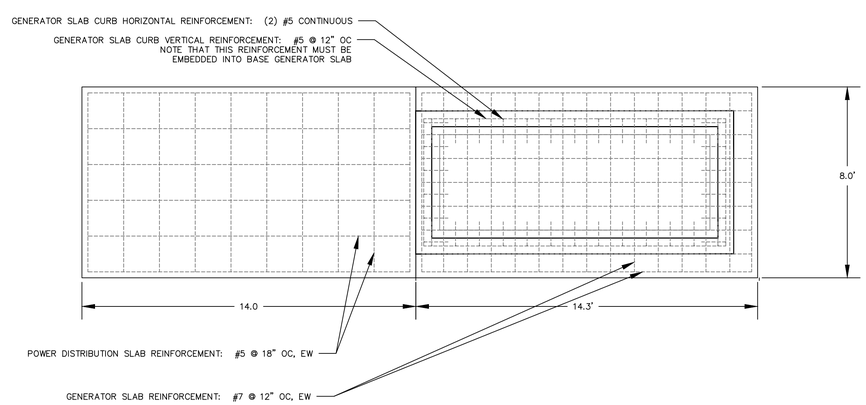


Point Number	Easting	Northing	Point Elevation
1	1414363.48	687644.57	867.97
2	1414368.51	687650.79	867.97
3	1414379.39	687641.98	867.97
4	1414390.53	687632.96	867.97
5	1414385.50	687626.75	867.97
6	141474.39	687635.76	866.61

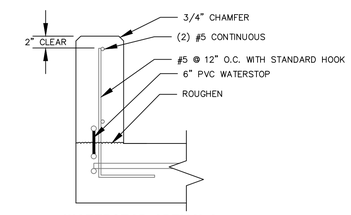
24/D5 GENERATOR AND POWER DISTRIBUTION PAD AREA PLAN
SCALE: 1" = 3'



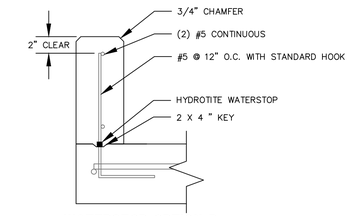
A/D5 GENERATOR AND POWER DISTRIBUTION PAD AREA CROSS SECTION
SCALE: 1" = 3'



B/D5 GENERATOR AND POWER DISTRIBUTION PAD REINFORCEMENT
SCALE: 1" = 3'



WATERSTOP OPTION A



WATERSTOP OPTION B

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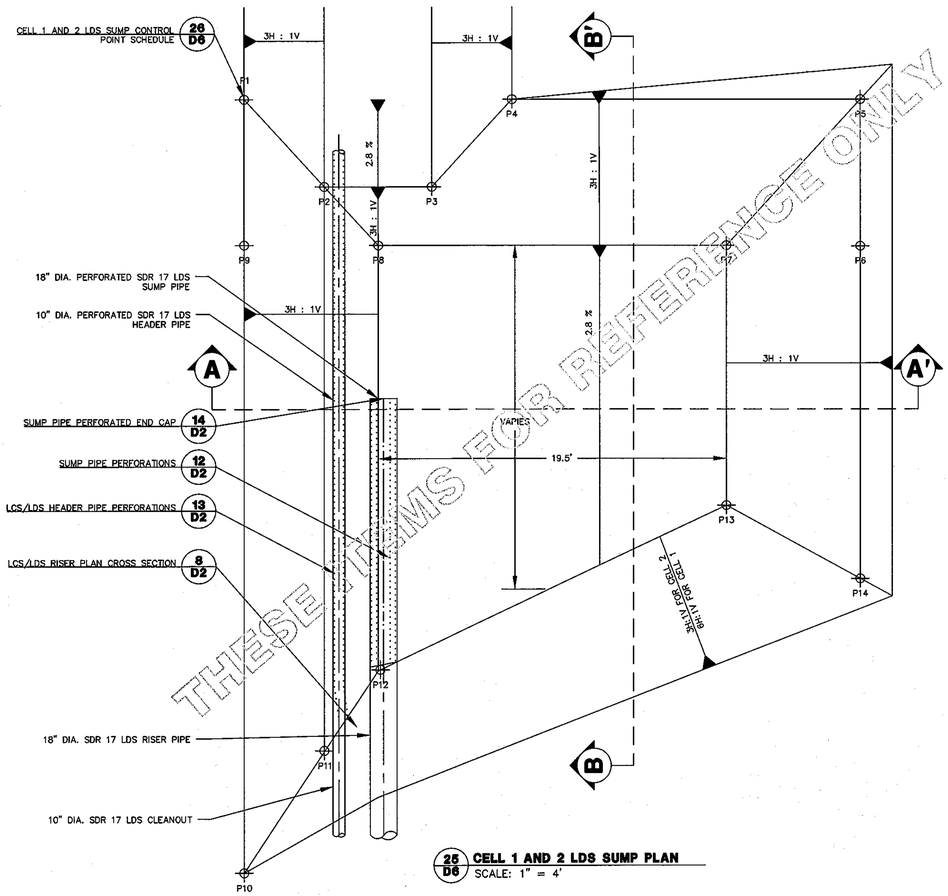
NO.	DATE	DESCRIPTION	BY
1	6-9-10	ISSUED FOR CONSTRUCTION	KRD

FORCE MAIN, GENERATOR AND POWER DISTRIBUTION PAD
ELECTRICAL/MECHANICAL COMPONENTS
DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

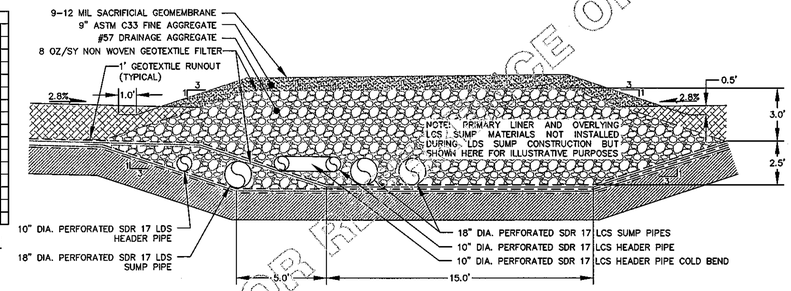
ENGINEERING LICENSE NO: F-0176
DRAWN BY: CLD
CHECKED BY:
DESIGNED BY: WMH
APPROVED BY:
PROJECT NUMBER: 1356-08-122
SCALE: AS SHOWN
DATE: 6-8-10
DRAWING: D5
OF: 11
DRAWING PATH:



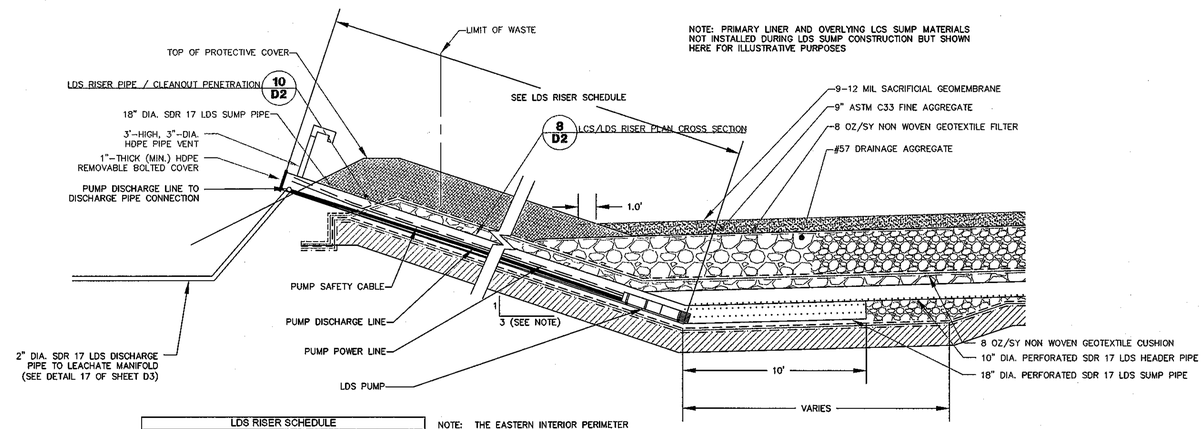
25 D6 CELL 1 AND 2 LDS SUMP PLAN
SCALE: 1" = 4'

SUMP CONTROL POINT LOCATION						
	CELL 1 LDS SUMP			CELL 2 LDS SUMP		
POINTS	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION
P1	687444.74	1414223.66	850.00	687014.74	1414226.22	849.93
P2	687449.22	1414228.55	848.37	687019.22	1414231.11	848.30
P3	687455.23	1414228.55	848.37	687025.23	1414231.11	848.30
P4	687459.71	1414223.66	850.00	687029.71	1414226.22	849.93
P5	687479.22	1414223.66	850.00	687049.22	1414226.22	849.93
P6	687479.22	1414231.85	849.77	687049.22	1414234.41	849.69
P7	687471.72	1414231.85	847.27	687041.72	1414234.41	847.20
P8	687452.24	1414231.85	847.27	687022.24	1414234.41	847.20
P9	687444.74	1414231.85	849.77	687014.74	1414234.41	849.70
P10	687444.74	1414283.57	848.32	687014.74	1414258.35	849.02
P11	687449.22	1414268.19	847.26	687019.22	1414255.18	847.62
P12	687452.24	1414257.81	846.54	687022.24	1414253.04	846.68
P13	687471.72	1414239.23	847.06	687041.72	1414257.66	846.55
P14	687479.22	1414250.67	849.24	687049.22	1414266.57	848.80

26 D6 CELL 1 AND 2 LDS SUMP CONTROL POINT SCHEDULE



27 D6 CELL 1 AND 2 LDS SUMP SECTION A-A'
SCALE: 1" = 4'



LDS RISER SCHEDULE	
CELL 1 LDS PIPE 1 LENGTH (FT)	184
CELL 2 LDS PIPE 1 LENGTH (FT)	73

NOTE: THE EASTERN INTERIOR PERIMETER SLOPE OF CELL 1 IS 6H:1V

28 D6 CELL 1 AND 2 LDS SUMP SECTION B-B'
SCALE: 1" = 4'

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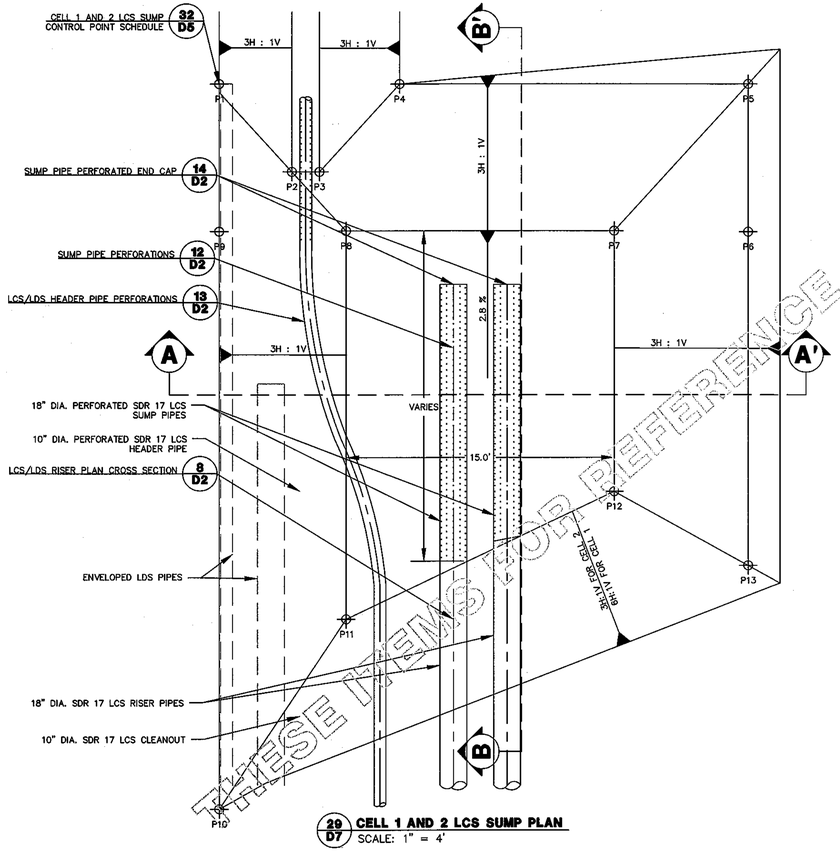
NO.	DATE	DESCRIPTION	BY
1	6-9-10	ISSUED FOR CONSTRUCTION	KRD

LDS SUMP AND RISER
ELECTRICAL/MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

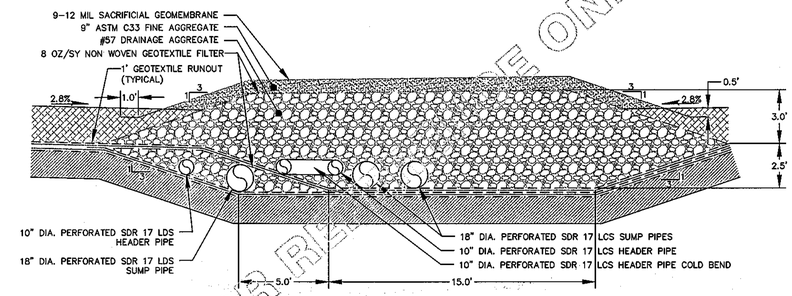
ENGINEERING LICENSE NO: F-0176
DRAWN BY: CLD
CHECKED BY:
DESIGNED BY: WMH
APPROVED BY:
PROJECT NUMBER: 1356-08-122
SCALE: AS SHOWN
DATE: 6-8-10
DRAWING: D6
OF: 11



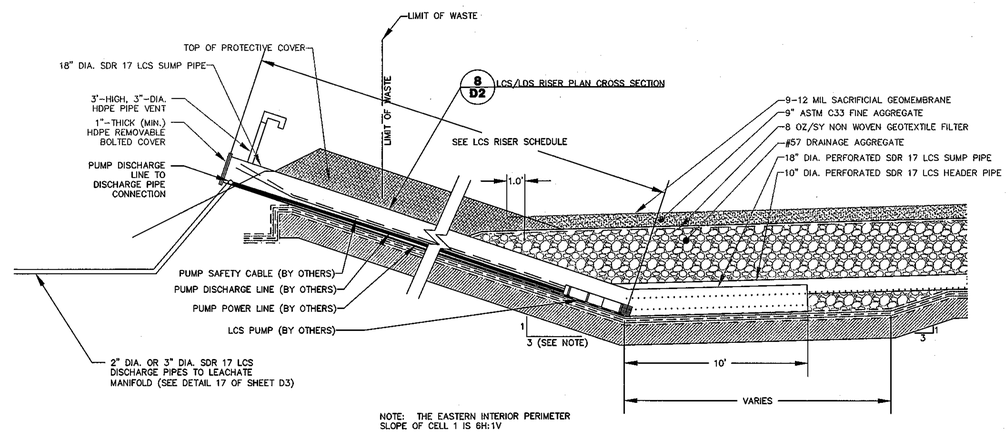
29/D7 CELL 1 AND 2 LCS SUMP PLAN
SCALE: 1" = 4'

SUMP CONTROL POINT LOCATION						
	CELL 1 LCS SUMP			CELL 2 LCS SUMP		
POINT ID	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION
P1	687444.74	1414223.66	850.00	687019.63	1414226.22	849.79
P2	687453.70	1414228.55	848.37	687023.70	1414231.11	848.30
P3	687455.23	1414228.55	848.37	687025.23	1414231.11	848.30
P4	687459.71	1414223.66	850.00	687029.71	1414226.22	849.93
P5	687479.22	1414223.66	850.00	687049.22	1414226.22	849.93
P6	687479.22	1414231.85	849.77	687049.22	1414234.41	849.70
P7	687471.72	1414231.85	847.27	687041.72	1414234.41	847.20
P8	687456.72	1414231.85	847.27	687026.72	1414234.41	847.20
P9	687449.63	1414231.85	849.63	687019.63	1414234.41	849.56
P10	687449.63	1414279.50	848.30	687019.63	1414259.13	848.87
P11	687456.72	1414253.54	846.66	687026.72	1414254.00	846.65
P12	687471.72	1414239.23	847.06	687041.72	1414257.66	846.55
P13	687479.22	1414250.67	849.24	687049.22	1414266.57	848.80

30/D7 CELL 1 AND 2 LCS SUMP CONTROL POINT SCHEDULE



31/D7 CELL 1 AND 2 LCS SUMP SECTION A-A'
SCALE: 1" = 4'



NOTE: THE EASTERN INTERIOR PERIMETER SLOPE OF CELL 1 IS 6H:1V

LCS RISER SCHEDULE	
CELL 1 LCS PIPE 1 LENGTH (FT)	200
CELL 1 LCS PIPE 2 LENGTH (FT)	196
CELL 2 LCS PIPE 1 LENGTH (FT)	73
CELL 2 LCS PIPE 2 LENGTH (FT)	73

32/D7 CELL 1 AND 2 LCS SUMP SECTION B-B'
SCALE: 1" = 4'

THESE ITEMS FOR REFERENCE ONLY

ISSUED FOR CONSTRUCTION

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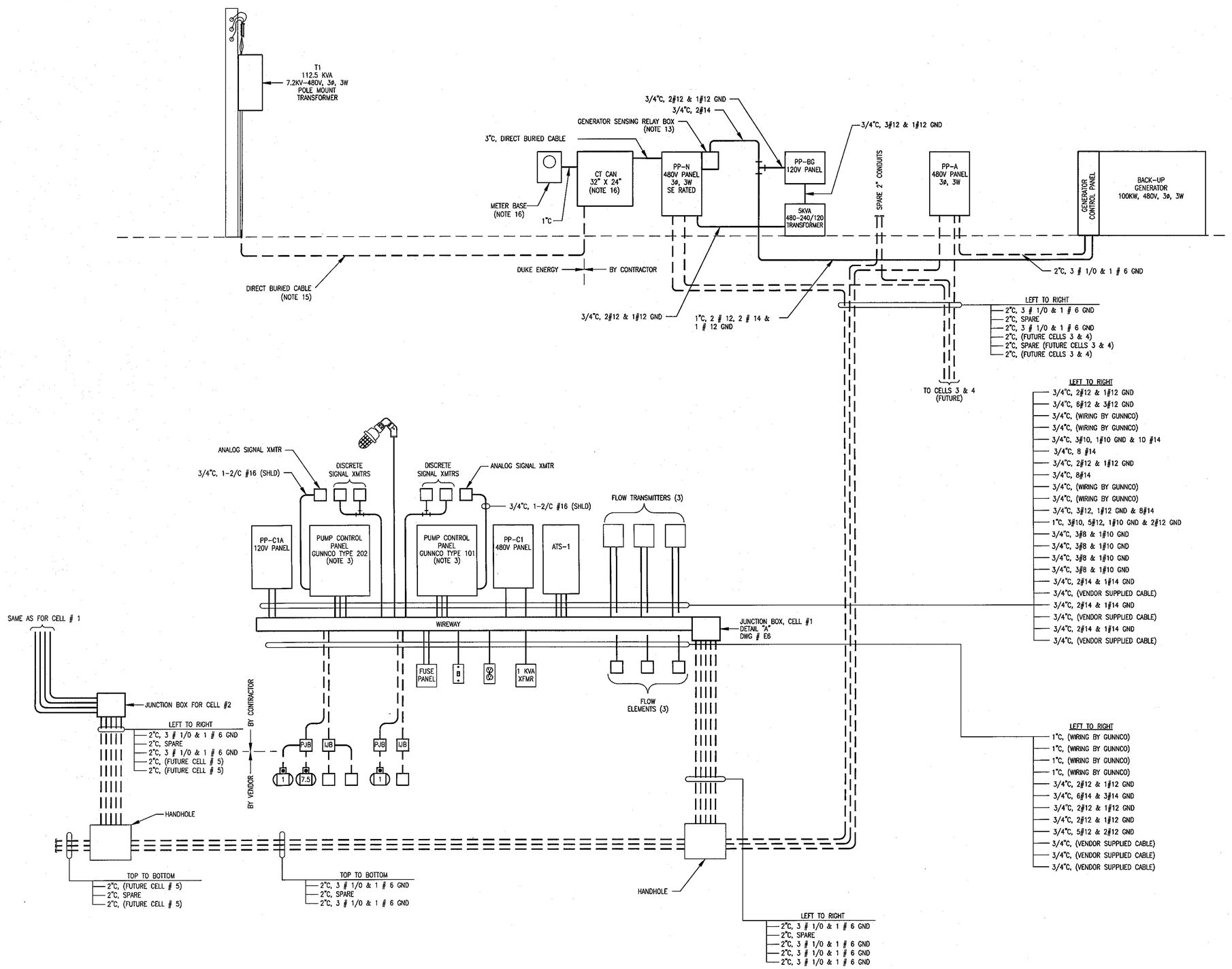
NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DAILY

NO.	DATE	DESCRIPTION	BY
1	6-9-10	ISSUED FOR CONSTRUCTION	KRD

LCS SUMP AND RISER
ELECTRICAL/MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176
DRAWN BY: CLD
CHECKED BY: WMH
DESIGNED BY: WMH
APPROVED BY: KRD
PROJECT NUMBER: 1356-08-122
SCALE: AS SHOWN
DATE: 6-8-10
DRAWING: D7
OF: 11
DRAWING PATH:



NOTES:

1. ALL INSTALLATIONS SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE SUITABLE FOR THEIR APPLICATION PER THE LISTING INSTRUCTIONS OF A NATIONALLY RECOGNIZED AND APPROVED TESTING LABORATORY.
3. PUMP CONTROL PANEL AND PUMP CONNECTIONS TO BE INSTALLED BY PUMP VENDOR.
4. SEE DRAWING E2 FOR PANEL SCHEDULES.
5. ALL GROUNDS OF DEVICES MOUNTED ON PANEL SHALL BE RUN TO A COMMON TERMINATION POINT WHICH IS TIED TO GROUND ROD.
6. ALL RACK METAL SHALL BE STAINLESS STEEL.
7. ALL CONDUIT CONNECTIONS SHALL BE MADE WITH WATERPROOF INSULATED THROAT HUBS.
8. ALL EXPOSED CONDUIT SHALL BE RGS UNLESS INDICATED OTHERWISE.
9. ALL COMPONENT AND JUNCTION BOXES SHALL BE RATED NEMA 3R OR BETTER.
10. ABOVE GROUND CONDUIT SHALL BE RGS. THE JUNCTION BETWEEN RGS AND PVC SHALL BE MADE A MINIMUM OF 6" BELOW GRADE.
11. ALL CONDUIT RUN UNDERGROUND SHALL BE SCHEDULE 80 PVC.
12. ALL WIRING SHALL BE STRANDED COPPER, THHW 75° 600V.
13. CONTRACTOR SHALL INSTALL ONE DPDT RELAY WITH A 480V COIL IN A NEMA 3R BOX MOUNTED TO THE SIDE OF PANEL PP-N. THE COIL SHALL BE WIRED TO PP-N CIRCUIT #8. THE NORMALLY CLOSED CONTACT SHALL BE WIRED TO THE BACK UP GENERATOR AUTO START CONTROL.
14. POWER SYSTEM SIZING AND VOLTAGE DROP CALCULATIONS ARE BASED ON THE FOLLOWING EQUIPMENT OPERATING AS EACH CELL COMES ON LINE. EXPECTED TOTAL TIME IS APPROXIMATELY 20 YEARS.
    - CELL #1: ONE HIGH VOLUME PUMP (7.5HP) & 2 LOW VOLUME PUMPS (1HP) IN OPERATION.
    - CELL #2: ONE HIGH VOLUME PUMP (7.5HP) & 2 LOW VOLUME PUMPS (1HP), PLUS THE TWO LOW VOLUME PUMPS OF CELL #1.
    - CELL #5; ONE HIGH VOLUME PUMP (7.5HP) & 2 LOW VOLUME PUMPS (1HP), PLUS THE TWO LOW VOLUME PUMPS OF CELLS 1 AND 2.
    - CELL #7: ONE HIGH VOLUME PUMP (7.5HP) & 2 LOW VOLUME PUMPS (1HP), PLUS THE TWO LOW VOLUME PUMPS OF CELLS 1, 2 AND 5
    - CELL #9: ONE HIGH VOLUME PUMP (7.5HP) & 2 LOW VOLUME PUMPS (1HP), PLUS THE LOW VOLUME PUMPS OF CELLS 1, 2, 5 AND 7.
    - CELL #11: ONE HIGH VOLUME PUMP (7.5HP) & 2 LOW VOLUME PUMPS (1HP), PLUS THE LOW VOLUME PUMPS OF CELLS 1, 2, 5, 7 AND 9.
    - CELL #13: ONE HIGH VOLUME PUMP (7.5HP) & 2 LOW VOLUME PUMPS (1HP), PLUS THE LOW VOLUME PUMPS OF CELLS 1, 2, 5, 7, 9 AND 11.
15. CONDUIT AND WIRE FROM THE POLE MOUNTED TRANSFORMER THROUGH THE CT CAN TO PANEL PP-N SHALL BE PROVIDED AND INSTALLED BY DUKE ENERGY.
16. THE CT CAN AND METER BASE SHALL BE PROVIDED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. DUKE ENERGY WILL PROVIDE AND INSTALL THE CT'S AND METER. DUKE ENERGY WILL PROVIDE AND INSTALL AND TERMINATE THE METER WIRING.

REFERENCE DRAWINGS:

E2	ELECTRICAL PANEL SCHEDULES
E3	POWER PLAN – CELLS 1 & 2
E4	POWER PLAN, MISC. SECTIONS & DETAILS
E5	UNDERGROUND ELECTRICAL DUCTBANK PLAN & DETAILS
E6	PUMP HOUSE EQUIIPMENT RACK LAYOUT
E7	INSTRUMENT WIRING DIAGRAM. SHT. 1 OF 2
E8	INSTRUMENT WIRING DIAGRAM, SHT. 2 OF 2
E9	WIRELESS REPEATER LOCATIONS

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Prepared with AutoCAD 2009 by
PERIGON

CURRENT PROJECT # 109580 | FILENAME: 109580-E-001
CURRENT MISC DETAIL # 5380 | PLOT FACTOR: 1
PREVIOUS PROJECT # N/A | SHEET SIZE: 24x36

NO.	DATE	DESCRIPTION	BY
0	6/9/10	APPROVED FOR CONSTRUCTION	JMW
C	6/1/10	ADDED INSTRUMENTS AND WIRING	JMW
B	5/18/10	BID ISSUE – NOT FOR CONSTRUCTION	JMW
A	4/2/10	ISSUED FOR COMMENT	JMW

ELECTRICAL RISER DIAGRAM
ELECTRICAL / MECHANICAL COMPONENTS
DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0178

DRAWN BY: JMW	CHECKED BY: REB
DESIGNED BY: JMW	APPROVED BY: REB
PROJECT NUMBER 1356-08-122	
SCALE: NONE	DATE: 4/2/10
DRAWING: E1	OF: 9

DRAWING: E-109580

PANEL NO. PP-N (NOTE 3)

FED FROM 100KVA TRANSFORMER T1 — LOCATION POWER DISTRIBUTION RACK

SERVICE 480V, 3ø, 3 WIRE — MAINS 250 AMPS WITH 150A MAIN BREAKER — CABINET SURFACE MOUNTED

IDENTIFICATION	LOAD	NO.	NO.	LOAD	IDENTIFICATION
PP-C1 & PP-C2 FUTURE CELLS: C5, C7, C9, C11 & C13	7973	1	2		FUTURE CELLS: C3, C4, C6, C8, C10, C12
	7973	3	4		
	7973	5	6		
PANEL PP-BG VIA 5KVA TRANSFORMER	2500	7	8	5	BACK UP GENERATOR START SENSING RELAY
	2500	9	10	5	
SPACE		11	12		SPACE
SPACE		13	14		SPACE
SPACE		15	16		SPACE
SPACE		17	18		SPACE

150A, 60A, 60A, 20A, 20A

CONN. LOAD: 28928 — ØA 10478 VA — ØB 10478 VA — ØC 7973 VA

PANEL NO. PP-A (NOTE 3)

FED FROM 100KW GENERATOR — LOCATION POWER DISTRIBUTION RACK

SERVICE 480V, 3ø, 3 WIRE — MAINS 250 AMPS WITH 150A MAIN BREAKER — CABINET SURFACE MOUNTED

IDENTIFICATION	LOAD	NO.	NO.	LOAD	IDENTIFICATION
PP-C1 & PP-C2 FUTURE CELLS: C5, C7, C9, C11 & C13	7973	1	2		FUTURE CELLS: C3, C4, C6, C8, C10, C12
	7973	3	4		
	7973	5	6		
SPACE		7	8		SPACE
SPACE		9	10		SPACE
SPACE		11	12		SPACE
SPACE		13	14		SPACE
SPACE		15	16		SPACE
SPACE		17	18		SPACE

150A, 60A, 60A

CONN. LOAD: 23,919 VA — ØA 7973 VA — ØB 7973 VA — ØC 7973 VA

NOTES:

1. ALL INSTALLATIONS SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE SUITABLE FOR THEIR APPLICATION PER THE LISTING INSTRUCTIONS OF A NATIONALLY RECOGNIZED AND APPROVED TESTING LABORATORY.
3. PANELS PP-N AND PP-A SHALL BE A 480V, 3ø, 3W, 18 CIRCUIT, SERVICE ENTRANCE RATED PANEL WITH A 150A MAIN CIRCUIT BREAKER, 14KAIC. SQUARE D "NF" SERIES OR APPROVED EQUAL. NEMA 3R ENCLOSURE.
4. PANELS PP-C1 AND PP-C2 SHALL BE A 480V, 3ø, 3W, 18 CIRCUITS WITH A 50A MAIN CIRCUIT BREAKER, 10KAIC. SQUARE D "NF" SERIES OR APPROVED EQUAL. NEMA 3R ENCLOSURE.
5. PANEL PP-C1A AND PP-C2A SHALL BE A 240/120V, 1ø, 3W, 18 CIRCUITS WITH A 35A MAIN CIRCUIT BREAKER, 10KAIC. SQUARE D 'NQOD' SERIES OR APPROVED EQUAL. NEMA 3R ENCLOSURE. NEUTRAL AND GROUND WIRES SHALL BE BONDED IN THE PANEL.
6. PANEL PP-BG SHALL BE 240/120V, 1ø, 3W, 18 CIRCUITS WITH A 35A MAIN CIRCUIT BREAKER, 10KAIC, SQUARE D "NQOD SERIES OR APPROVED EQUAL, NEMA 3R ENCLOSURE. NEUTRAL AND GROUND WIRES SHALL BE BONDED IN THE PANEL.

REFERENCE DRAWINGS:

E1	ELECTRICAL RISER DIAGRAM
E3	POWER PLAN - CELLS 1 & 2
E4	POWER PLAN, MISC. SECTIONS & DETAILS
E5	UNDERGROUND ELECTRICAL DUCTBANK PLAN & DETAILS
E6	PUMP HOUSE EQUIPMENT RACK LAYOUT
E7	INSTRUMENT WIRING DIAGRAM. SHT. 1 OF 2
E8	INSTRUMENT WIRING DIAGRAM, SHT. 2 OF 2
E9	IWIRELESS REPEATER LOCATIONS

PANEL NO. PP-C1 (NOTE 4)

FED FROM ATS-1 — LOCATION CELL #1 PUMP HOUSE

SERVICE 480V, 3ø, 3 WIRE — MAINS 100 AMPS WITH 50A MAIN BREAKER — CABINET SURFACE MOUNTED

IDENTIFICATION	LOAD	NO.	NO.	LOAD	IDENTIFICATION
PUMP CONTROL PANEL 101	305	1	2	3353	PUMP CONTROL PANEL 202
	305	3	4	3353	
	305	5	6	3353	
SPACE		7	8	500	1KVA XFMR FOR POWER PANEL PP-C1A
SPACE		9	10	500	
SPACE		11	12		SPACE
SPACE		13	14		SPACE
SPACE		15	16		SPACE
SPACE		17	18		SPACE

50A, 20A, 30A, 20A

CONN. LOAD: 11,974 VA — ØA 4158 VA — ØB 4158 VA — ØC 3658 VA

PANEL NO. PP-C2 (NOTE 4)

FED FROM ATS-2 — LOCATION CELL #2 PUMP HOUSE

SERVICE 480V, 3ø, 3 WIRE — MAINS 100 AMPS WITH 50A MAIN BREAKER — CABINET SURFACE MOUNTED

IDENTIFICATION	LOAD	NO.	NO.	LOAD	IDENTIFICATION
PUMP CONTROL PANEL 101	305	1	2	3353	PUMP CONTROL PANEL 202
	305	3	4	3353	
	305	5	6	3353	
SPACE		7	8	500	1KVA XFMR FOR POWER PANEL PP-C2A
SPACE		9	10	500	
SPACE		11	12		SPACE
SPACE		13	14		SPACE
SPACE		15	16		SPACE
SPACE		17	18		SPACE

50A, 20A, 30A, 20A

CONN. LOAD: 11,974 VA — ØA 4158 VA — ØB 4158 VA — ØC 3658 VA

PANEL NO. PP-C1A (NOTE 5)

FED FROM PANEL PP-C1 CKT#8 VIA 1KVA TRANSFORMER — LOCATION CELL 1 PUMP STATION

SERVICE 240/120V, 1ø, 3 WIRE — MAINS 100 AMPS WITH 35A MAIN BREAKER — CABINET SURFACE MOUNTED

IDENTIFICATION	LOAD	NO.	NO.	LOAD	IDENTIFICATION
70W HPS FIXTURE	100	1	2	100	INSTRUMENT POWER TO FUSE PANEL
SERVICE RECEPTACLE	180	3	4		SPARE
SPARE		5	6		SPACE
SPARE		7	8		SPACE
SPARE		9	10		SPACE
SPACE		11	12		SPACE
SPACE		13	14		SPACE
SPACE		15	16		SPACE
SPACE		17	18		SPACE

35A, 20A, 20A, 20A, 20A

CONN. LOAD: 380VA — ØA 200 VA — ØB 180 VA

PANEL NO. PP-C2A (NOTE 5)

FED FROM PANEL PP-C2 CKT#8 VIA 1KVA TRANSFORMER — LOCATION CELL 2 PUMP STATION

SERVICE 240/120V, 1ø, 3 WIRE — MAINS 100 AMPS WITH 35A MAIN BREAKER — CABINET SURFACE MOUNTED

IDENTIFICATION	LOAD	NO.	NO.	LOAD	IDENTIFICATION
70W HPS FIXTURE	100	1	2	100	INSTRUMENT POWER TO FUSE PANEL
SERVICE RECEPTACLE	180	3	4		SPARE
SPARE		5	6		SPACE
SPARE		7	8		SPACE
SPARE		9	10		SPACE
SPACE		11	12		SPACE
SPACE		13	14		SPACE
SPACE		15	16		SPACE
SPACE		17	18		SPACE

35A, 20A, 20A, 20A, 20A

CONN. LOAD: 380 VA — ØA 200 VA — ØB 180 VA

PANEL NO. PP-BG (NOTE 6)

FED FROM PANEL PP-N CKT # 7 VIA 5KVA TRANSFORMER — LOCATION POWER DISTRIBUTION RACK

SERVICE 240/120V, 1ø, 3 WIRE — MAINS 100 AMPS WITH 35A MAIN BREAKER — CABINET SURFACE MOUNTED

IDENTIFICATION	LOAD	NO.	NO.	LOAD	IDENTIFICATION
70W HPS FIXTURE	100	1	2	1000	BACK UP GENERATOR BATTERY CHARGER & HEATER
SERVICE RECEPTACLE	180	3	4		SPARE
SPARE		5	6		SPACE
SPARE		7	8		SPACE
SPARE		9	10		SPACE
SPACE		11	12		SPACE
SPACE		13	14		SPACE
SPACE		15	16		SPACE
SPACE		17	18		SPACE

35A, 20A, 20A, 20A, 20A

CONN. LOAD: 1280 VA — ØA 1100 VA — ØB 180 VA

NORTH CAROLINA PROFESSIONAL SEAL 017757 ENGINEER ROBERT E. BURRIS 4/8/10

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NO.	DATE	DESCRIPTION	BY
0	6/9/10	APPROVED FOR CONSTRUCTION	JMW
C	6/3/10	ADDED INSTRUMENTS AND WIRING	JMW
B	5/19/10	BID ISSUE - NOT FOR CONSTRUCTION	JMW
A	4/2/10	ISSUED FOR COMMENT	JMW

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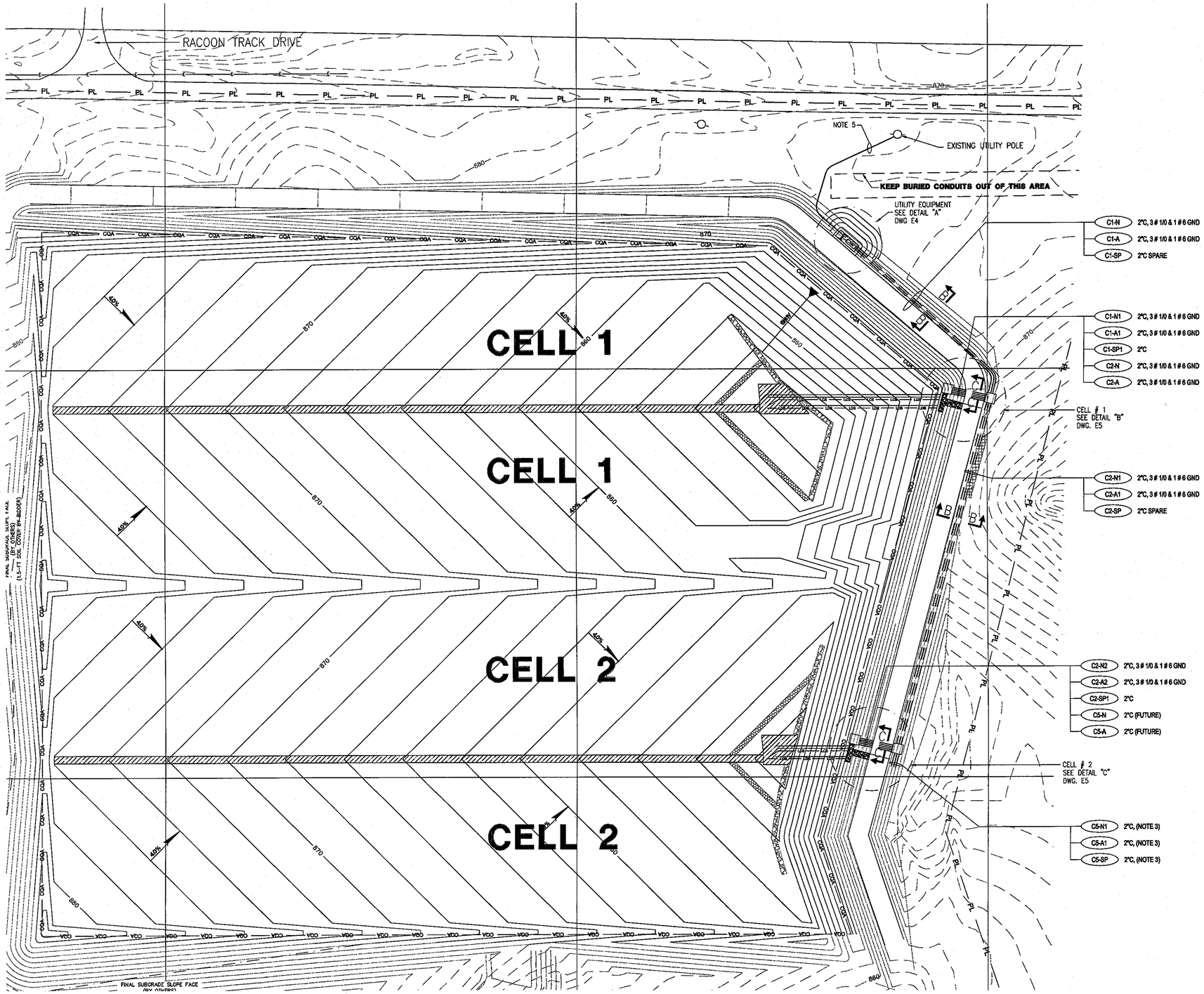
CURRENT PROJECT # 109580 FILENAME: 10980-F-002
CURRENT MISC DETAIL # 5410 PLOT FACTOR: 1
PREVIOUS PROJECT # N/A SHEET SIZE: 24x36

ELECTRICAL PANEL SCHEDULES
ELECTRICAL / MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176	
DRAWN BY: JMW	CHECKED BY: REB
DESIGNED BY: JMW	APPROVED BY: REB
PROJECT NUMBER 1356-08-122	
SCALE: NONE	DATE: 4/2/10
DRAWING: E2	OF: 9

DRAWING PATH:

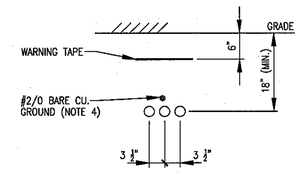


NOTES:

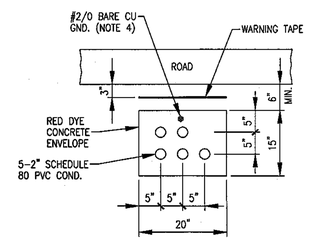
1. ALL INSTALLATIONS SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE SUITABLE FOR THEIR APPLICATION PER THE LISTING INSTRUCTIONS OF A NATIONALLY RECOGNIZED AND APPROVED TESTING LABORATORY.
3. CONSTRUCTION SHALL INSTALL AND CAP THREE (3) 2'-0" LENGTHS OF 2" CONDUIT FROM THE MANHOLE AT CELL #2 TOWARD CELL # 5 FOR FUTURE USE.
4. GROUND WIRES SHALL BE CADWELDED TOGETHER IN HAND HOLES.
5. DUKE ENERGY SHALL INSTALL AND TERMINATE DIRECT BURIED CABLE FROM THE TRANSFORMER SECONDARY THROUGH THE CT CAN TO POWER PANEL PP-N.

REFERENCE DRAWINGS:

E1	ELECTRICAL RISER DIAGRAMS
E2	ELECTRICAL PANEL SCHEDULES
E4	POWER PLAN, MISC. SECTIONS & DETAILS
E5	UNDERGROUND ELECTRICAL DUCTBANK PLAN & DETAILS
E6	PUMP HOUSE EQUIIPMENT RACK LAYOUT
E7	INSTRUMENT WIRING DIAGRAM, SHT. 1 OF 2
E8	INSTRUMENT WIRING DIAGRAM, SHT. 2 OF 2
E9	WIRELESS REPEATER LOCATIONS



SECTION "B-B"
SCALE: 3/4" = 1'-0"



SECTION "C-C"
SCALE: 3/4" = 1'-0"

NORTH CAROLINA PROFESSIONAL SEAL 017757 ENGINEER ROBERT E. BURNS 6/9/10

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CURRENT PROJECT # 109580
CURRENT MISC DETAIL # 5440
PREVIOUS PROJECT # N/A
FILENAME: 109480-E-003
PLOT FACTOR: 1
SHEET SIZE: 24x36

Prepared with AutoCAD® in 2004 by PERIGON

NO.	DATE	DESCRIPTION	BY
0	6/9/10	APPROVED FOR CONSTRUCTION	JMW
C	6/3/10	ADDED INSTRUMENTS AND WIRING	JMW
B	5/18/10	BID ISSUE – NOT FOR CONSTRUCTION	JMW
A	4/2/10	ISSUED FOR COMMENT	JMW

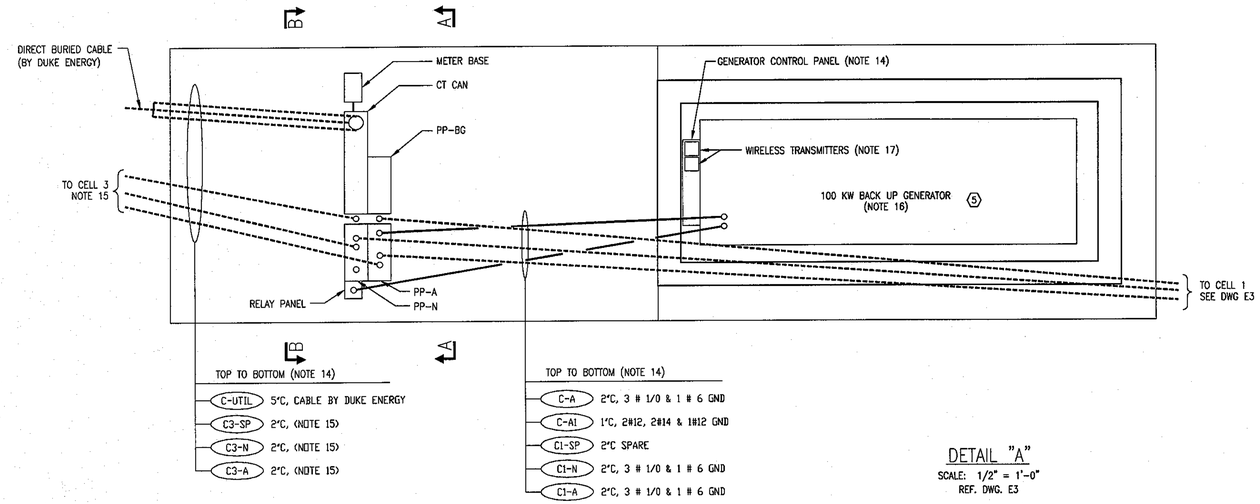
POWER PLAN - CELLS 1 & 2
ELECTRICAL / MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: JMW	CHECKED BY: REB
DESIGNED BY: JMW	APPROVED BY: REB
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 4/2/10
DRAWING: E3	OF: 9

DRAWING PATH:



DETAIL "A"
SCALE: 1/2" = 1'-0"
REF. DWG. E3

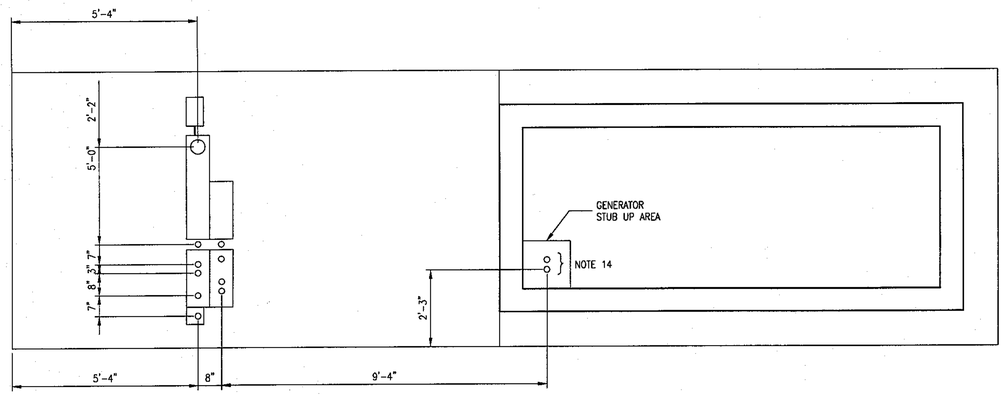
BILL OF MATERIALS		
ITEM	QTY.	DESCRIPTION
1	2	250A, 150A MAIN, 480V, 3ø POWER PANEL IN NEMA 3R ENCLOSURE (NOTE 10)
2	1	3/4" DIA. X 10' COPPER CLAD STEEL GROUND ROD
3	1	C.T. CAN, 24"X36"X12" (MIN.) (SIZE ACCORDING TO DUKE ENERGY "CUSTOMER METERING GUIDE"
4	1	CADWELD TYE "GR" CONNECTOR #2/0 WIRE TO VERTICAL GROUND ROD
5	1	BACK UP GENERATOR, CATERPILLER MODEL D100 (OR EQUAL) (NOTE 16)
6	1	5KVA, 480-240/120V, 1ø, 3W, NEMA 3R ENCLOSURE
7	1	100A, 35A MAIN, 240/120V, 1ø, 3W POWER PANEL IN NEMA 3R ENCLOSURE (NOTE 10)
8	1	RELAY BOX WITH DPDT, 480V COIL RELAY. SEE NOTE 13 ON DWG. E1 FOR DESCRIPTION.
9	1	70W HPS OUTDOOR FIXTURE 25' STANCHION MOUNT, 120V, W/GLOBE & GUARD. CROUSE-HINDS VMV SERIES OR EQUAL
10	1	DUPLEX RECEPTACLE, GFI, 120V, 20A IN WEATHERPROOF ENCLOSURE
11	1	SNAP SWITCH, 1P, 120V, 15A IN A NEMA 3R ENCLOSURE
12	1	METER BASE

NOTES:

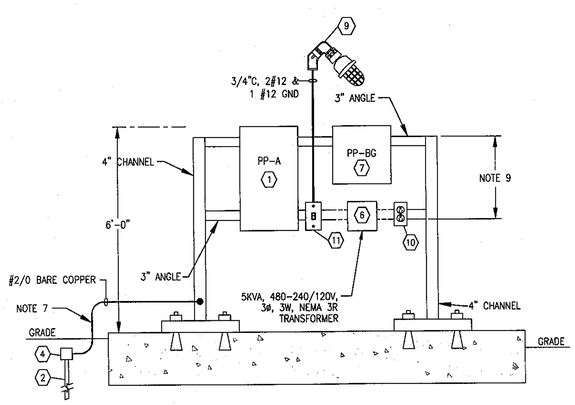
1. ALL INSTALLATIONS SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE SUITABLE FOR THEIR APPLICATION PER THE LISTING INSTRUCTIONS OF A NATIONALLY RECOGNIZED AND APPROVED TESTING LABORATORY.
3. ALL CONDUIT CONNECTIONS SHALL BE MADE WITH WATERPROOF INSULATED THROAT HUBS.
4. ALL EXPOSED CONDUIT SHALL BE RGS UNLESS INDICATED OTHERWISE.
5. ALL COMPONENT AND JUNCTION BOXES SHALL BE RATED NEMA 3R OR BETTER.
6. ABOVE GROUND CONDUIT SHALL BE RGS. THE JUNCTION BETWEEN RGS AND PVC SHALL BE MADE A MINIMUM OF 6" BELOW GRADE.
7. ALL GROUNDS OF DEVICES MOUNTED ON PANEL SHALL BE RUN TO A COMMON TERMINATION POINT WHICH IS TIED TO GROUND ROD.
8. ALL RACK METAL SHALL BE STAINLESS STEEL.
9. DIMENSIONS OF EQUIPMENT RACK CHANNELS SHALL BE VERIFIED WITH ACTUAL EQUIPMENT TO BE USED.
10. SEE DWG. #E2 FOR PANEL SCHEDULES AND SPECIFICATIONS.
11. PVC SCH 80 CONDUIT RUN UNDERGROUND.
12. ALL WIRING SHALL BE STRANDED COPPER, THWN 75' 600V.
13. CONDUITS SHALL STUB UP 6" ABOVE FINISHED GRADE. EACH CONDUIT SHALL BE CAPPED OR PLUGGED PRIOR TO CONCRETE POURING
14. CONDUIT STUB UP LOCATIONS SHALL BE FIELD VERIFIED BY CONTRACTOR WITH ACTUAL PURCHASED EQUIPMENT PRIOR TO INSTALLATION
15. CONTRACTOR SHALL RUN SPARE CONDUITS 2'-0" BEYOND CONCRETE PAD AND CAP THE CONDUITS FOR FUTURE USE.
16. BACK UP GENERATOR SPECIFICATIONS:
    - STAND BY DUTY RATED AT 100 KW, 480V, 3ø, 3 WIRE
    - REMOTE START/STOP CONTROL
    - EMERGENCY STOP PUSHBUTTON
    - OUTPUT CIRCUIT BREAKER
    - LCD DISPLAY WITH TEXT BASED ALARM/EVENT DESCRIPTIONS
    - ALARM HORN FOR ALARM & SHUTDOWN WITH HORN SILENCE SWITCH
    - COOL DOWN TIMER
    - SPEED ADJUST
    - DC ELECTRIC STARTING SYSTEM
    - HEAVY DUTY DIESEL STARTING BATTERY
    - AUTOMATIC CURRENT LIMITING BATTERY CHARGER
    - JACKET WATER HEATER
    - MINIMUM 48 HOUR FUEL CAPACITY DOUBLE WALL FUEL TANK
    - ALL SYSTEMS TO BE INSTALLED IN A SOUND ATTENUATED ENCLOSURE TO LIMIT SOUND TO LESS THAN 80DBA AT 25 FEET.
    - ALL EQUIPMENT TO BE SUITABLE FOR INSTALLATION OUTDOORS.
    - ALL ELECTRICAL ENCLOSURES SHALL BE NEMA 3R RATED MINIMUM
    - GENERATOR TO BE CATERPILLAR MODEL D100 OR APPROVED EQUAL.
    - SEE ADDITIONAL REQUIREMENTS ON CIVIL DRAWING D5.
17. CONSTRUCTION SHALL FABRICATE AND INSTALL MOUNTING BRACKETS FOR WIRELESS TRANSMITTERS AS REQUIRED. SEE DRAWING E7 FOR TRANSMITTER SIGNAL INPUT WIRING.
18. CONSTRUCTION SHALL INSTALL A 5" 90° RGS ELBOW BELOW THE GENERATOR PAD FOR DUKE ENERGY PROVIDED WIRING. THE TOP OF THE ELBOW SHALL BE A MINIMUM OF 30" BELOW GRADE. RGS CONDUIT SHALL EXTEND 2'-0" BEYOUND THE GENERATOR PAD AND SHALL EXTEND UPWARD AND BE CONNECTED TO THE CT CAN.

REFERENCE DRAWINGS:

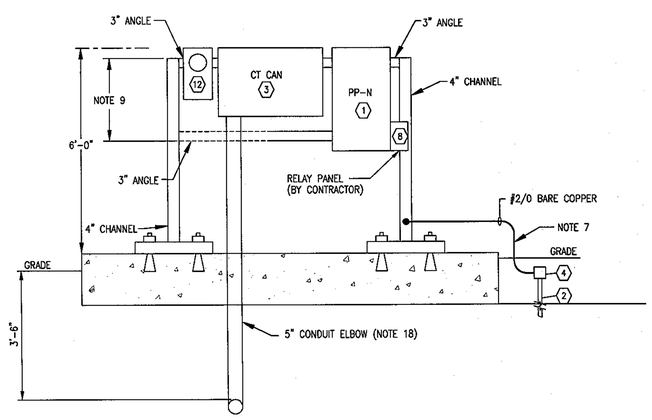
E1	ELECTRICAL RISER DIAGRAM
E2	ELECTRICAL PANEL SCHEDULES
E3	POWER PLAN - CELLS 1 & 2
E5	UNDERGROUND ELECTRICAL DUCTBANK PLAN & DETAILS
E6	PUMP HOUSE EQUIIPMENT RACK LAYOUT
E7	INSTRUMENT WIRING DIAGRAM. SHT. 1 OF 2
E8	INSTRUMENT WIRING DIAGRAM, SHT. 2 OF 2
E9	IWIRELESS REPEATER LOCATIONS



CONDUIT STUB-UP DIMENSIONS
SCALE: 1/2" = 1'-0"
SEE DETAIL "A"



SECTION A-A
POWER DISTRIBUTION PANELS
SCALE: 1/2" = 1'-0"



SECTION B-B
POWER DISTRIBUTION PANELS
SCALE: 1/2" = 1'-0"

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0	6/9/10	APPROVED FOR CONSTRUCTION	JMW
C	6/3/10	ADDED INSTRUMENTS AND WIRING	JMW
B	5/19/10	BID ISSUE - NOT FOR CONSTRUCTION	JMW
A	4/2/10	ISSUED FOR COMMENT	JMW

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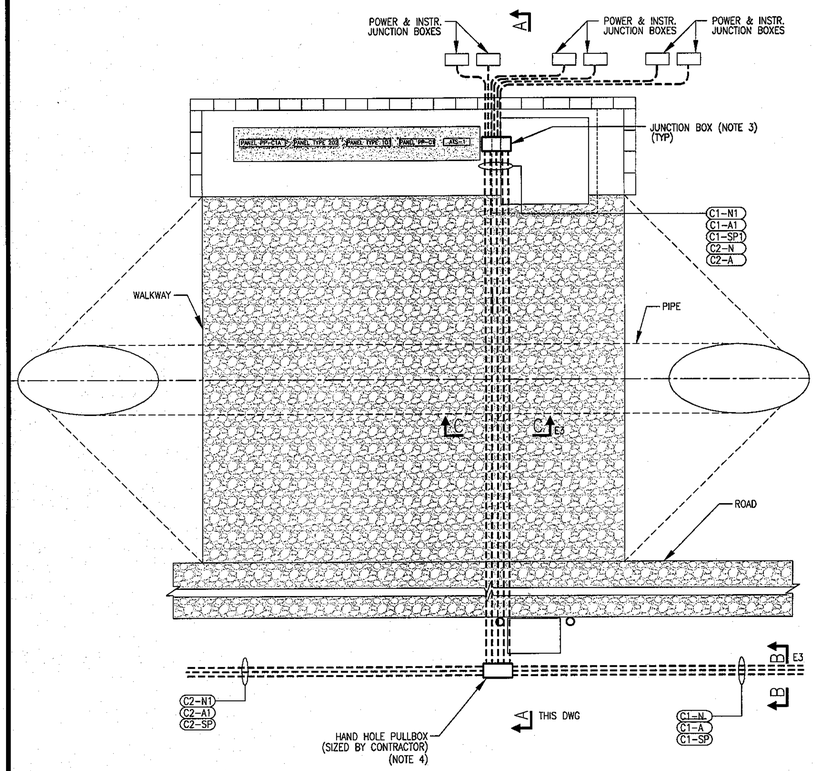
CURRENT PROJECT # 109580 FILENAME: 109580-E-00
CURRENT MISC DETAIL # 5440 PLOT FACTOR: 1
PREVIOUS PROJECT # N/A SHEET SIZE: 24x36

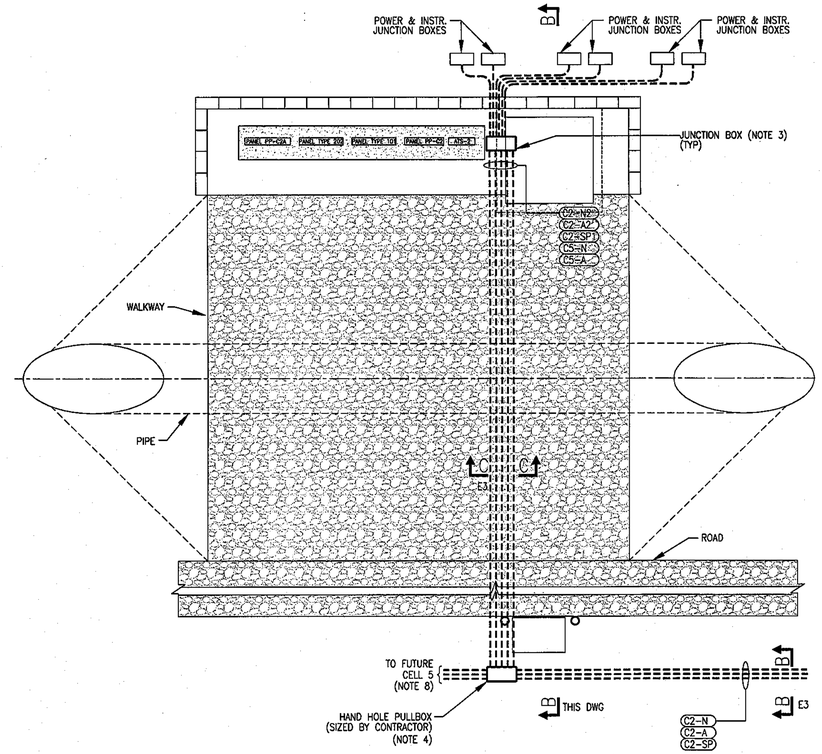
POWER PLAN SECTIONS & DETAILS
ELECTRICAL / MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

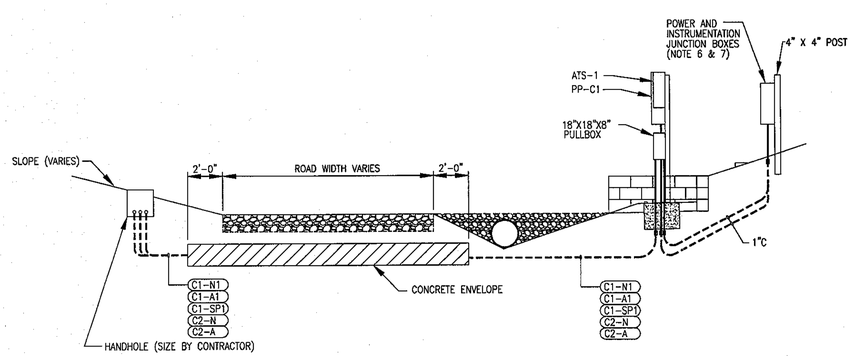
ENGINEERING LICENSE NO: F-0176
DRAWN BY: JMW
CHECKED BY: REB
DESIGNED BY: JMW
APPROVED BY: REB
PROJECT NUMBER 1356-08-122
SCALE: NONE
DATE: 4/2/10
DRAWING: E4
OF: 9



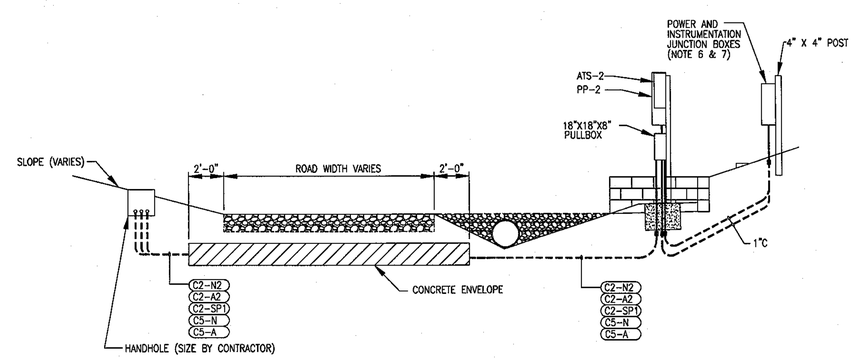
DETAIL "B"
PLAN-CELL # 1 PUMP HOUSE
SCALE: 1/4" = 1'-0"
REF. DWG. E3



DETAIL "C"
PLAN-CELL # 2 PUMP HOUSE
SCALE: 1/4" = 1'-0"
REF. DWG. E3



SECTION "A-A"
SCALE: 1/4" = 1'-0"



SECTION "B-B"
SCALE: 1/4" = 1'-0"

NOTES:

1. ALL INSTALLATIONS SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE SUITABLE FOR THEIR APPLICATION PER THE LISTING INSTRUCTIONS OF A NATIONALLY RECOGNIZED AND APPROVED TESTING LABORATORY.
3. CONTRACTOR SHALL DETERMINE ACTUAL CONDUIT/GROUND STUB-UP LOCATIONS.
4. CONSTRUCTION TO DETERMINE ELEVATION AND DIMENSIONS BASED ON ACTUAL UNDERGROUND CONDUIT ROUTING ON SLOPED BERM.
5. GROUND WIRES SHALL BE CADWELDED TOGETHER IN HAND HOLES.
6. CONTRACTOR SHALL INSTALL NEMA 3R POWER AND INSTRUMENT JUNCTION BOXES AT EACH PIPE RISER (TOTAL OF 6 PER PUMP STATION). ALL JB'S SHALL BE 8"X6"X4" EXCEPT THE POWER JB FOR THE 202 PANEL WHICH SHALL BE 10"X8"X4". REFER TO CIVIL DRAWINGS FOR RISER LOCATION.
7. GUNNCO (PUMP VENDOR) TO PROVIDE WIRING FROM PUMPS, THROUGH JUNCTION BOXES, TO CONTROL PANELS. GUNNCO TO PROVIDE CONDUITS FROM PUMPS TO JUNCTION BOXES.
8. CONSTRUCTION SHALL INSTALL THREE (3) 2" CONDUITS AND CAP THEM OFF FOR FUTURE CELL 5 POWER.
9. UNDERGROUND CONDUITS SHALL RUN PARALLEL AND BELOW THE 6" DIAMETER LEACHATE FORCE MAIN. SEE CIVIL DRAWING D3.

REFERENCE DRAWINGS:

E1	ELECTRICAL RISER DIAGRAM
E2	ELECTRICAL PANEL SCHEDULES
E3	POWER PLAN – CELLS 1 & 2
E4	POWER PLAN, MISC. SECTIONS & DETAILS
E6	PUMP HOUSE EQUIPMENT RACK LAYOUT
E7	INSTRUMENT WIRING DIAGRAM, SHT. 1 OF 2
E8	INSTRUMENT WIRING DIAGRAM, SHT. 2 OF 2
E9	WIRELESS REPEATER LOCATIONS
D3	LEACHATE PUMP CONTROL PANEL AND MANIFOLD PAD

NORTH CAROLINA PROFESSIONAL SEAL 017757 ENGINEER ROBERT E. BURRIS
Robert E. Burris 7/8/10

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A	4/2/10	ISSUED FOR COMMENT	JMW

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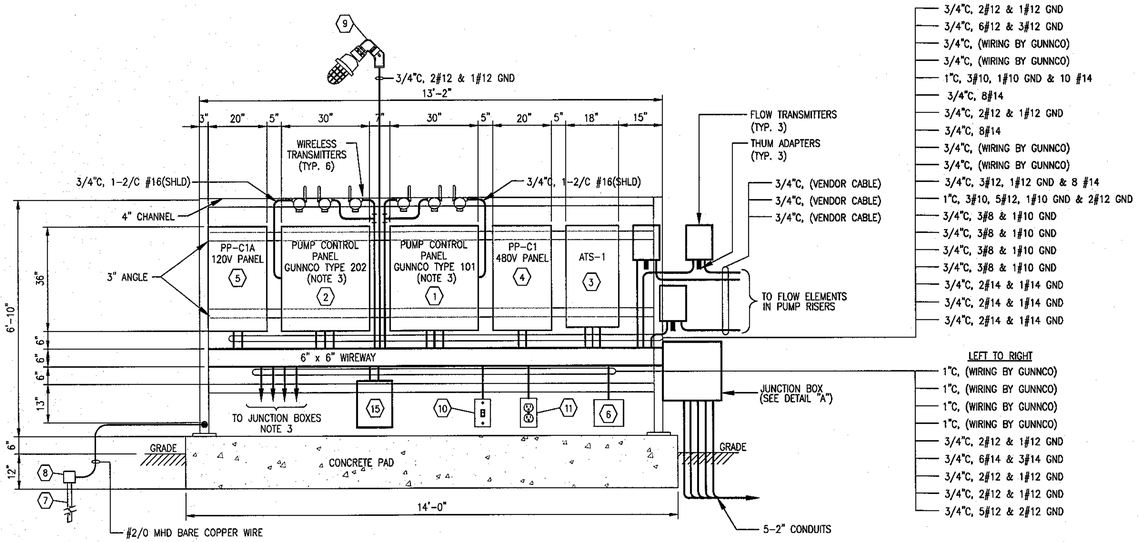
CURRENT PROJECT # 109580
CURRENT MISC DETAIL # 5440
PREVIOUS PROJECT # N/A
FILENAME: 109580-E-005
PLOT FACTOR: 1
SHEET SIZE: 24x36

UNDERGROUND ELEC DUCTBANK
ELECTRICAL / MECHANICAL COMPONENTS

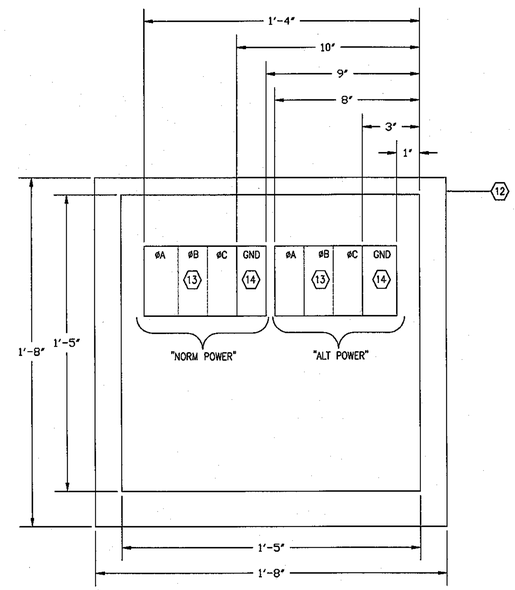
DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0178	
DRAWN BY: JMW	CHECKED BY: REB
DESIGNED BY: JMW	APPROVED BY: REB
PROJECT NUMBER: 1356-08-122	
SCALE: NONE	DATE: 4/2/10
DRAWING: E5	OF: 9

DRAWING PATH:



PUMP HOUSE CELL #1
RACK LAYOUT
SCALE: 1/2" = 1'-0"
(SEE DWG. E1)



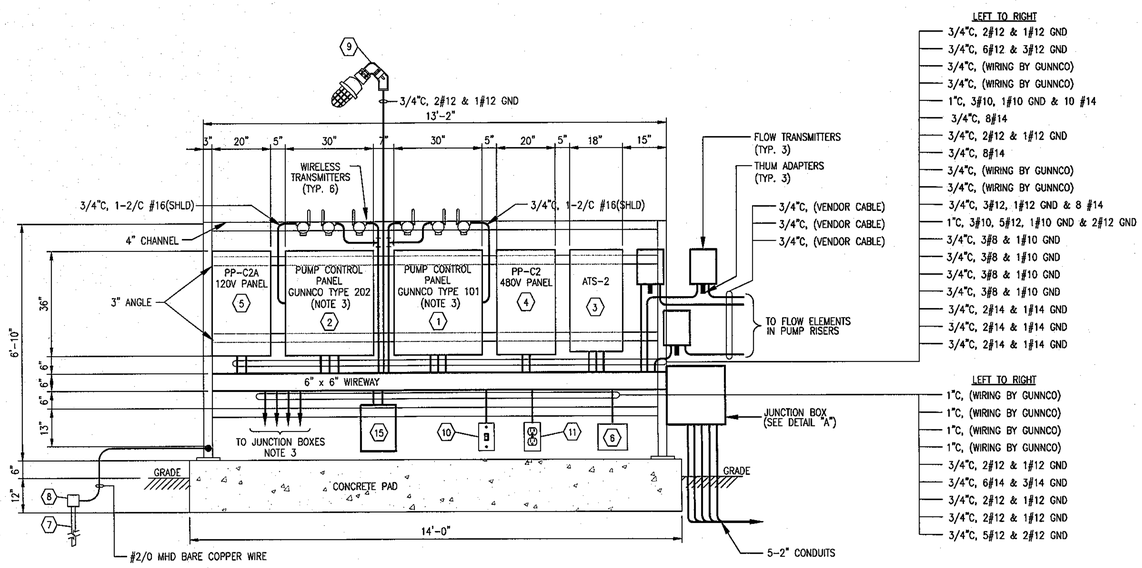
JUNCTION BOX LAYOUT
DETAIL "A"
SCALE: 3" = 1'-0"

NOTES:

1. ALL INSTALLATIONS SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE SUITABLE FOR THEIR APPLICATION PER THE LISTING INSTRUCTIONS OF A NATIONALLY RECOGNIZED AND APPROVED TESTING LABORATORY.
3. PUMP CONTROL PANEL AND PUMP CONNECTIONS TO BE INSTALLED BY PUMP VENDOR.
4. SEE DRAWING E2 FOR PANEL SCHEDULES.
5. ALL GROUNDS OF DEVICES MOUNTED ON PANEL SHALL BE RUN TO A COMMON TERMINATION POINT WHICH IS TIED TO GROUND ROD.
6. ALL RACK METAL SHALL BE STAINLESS STEEL.
7. ALL CONDUIT CONNECTIONS SHALL BE MADE WITH WATERPROOF INSULATED THROAT HUBS.
8. ALL EXPOSED CONDUIT SHALL BE RGS UNLESS INDICATED OTHERWISE.
9. ALL COMPONENT AND JUNCTION BOXES SHALL BE RATED NEMA 3R OR BETTER.
10. ABOVE GROUND CONDUIT SHALL BE RGS. THE JUNCTION BETWEEN RGS AND PVC SHALL BE MADE A MINIMUM OF 6" BELOW GRADE.
11. ALL CONDUIT RUN UNDERGROUND SHALL BE SCHEDULE 80 PVC.
12. ALL WIRING SHALL BE STRANDED COPPER, THWN 75° 600V.
13. FUSE PANELS SHALL BE FABRICATED BY CONSTRUCTION. SEE DRAWING E8 FOR PANEL LAYOUT AND BILL OF MATERIALS.

REFERENCE DRAWINGS:

E1	ELECTRICAL RISER DIAGRAM
E2	ELECTRICAL PANEL SCHEDULES
E3	POWER PLAN – CELLS 1 & 2
E4	POWER PLAN SECTIONS & DETAILS
E5	UNDERGROUND ELECTRICAL DUCTBANK PLAN & DETAILS
E7	INSTRUMENT WIRING DIAGRAM, SHT. 1 OF 2
E8	INSTRUMENT WIRING DIAGRAM, SHT. 2 OF 2
E9	WIRELESS REPEATER LOCATIONS



PUMP HOUSE CELL #2
RACK LAYOUT
SCALE: 1/2" = 1'-0"
(SEE DWG. E1)

BILL OF MATERIALS (ONE RACK)		
ITEM	QTY.	DESCRIPTION
1	1	GUNNCO SIDESLOPER 101 SERIES CONTROL PANEL (NOTE 3)
2	1	GUNNCO SIDESLOPER 202 SERIES CONTROL PANEL (NOTE 3)
3	1	70 A AUTOMATIC TRANSFER SWITCH WITH AUXILIARY CONTACTS AND EXTERNAL LED LIGHTS FOR SWITCH POSITION INDICATION (GREEN=NORMAL, RED=ALTERNATE), NEMA 3R ENCLOSURE. ASCO SERIES D-300 OR APPROVED EQUAL.
4	1	100A, 480V, 3ø POWER PANEL IN NEMA 3R ENCLOSURE (NOTE 4)
5	1	100A, 240V, 1ø, 3W POWER PANEL IN NEMA 3R ENCLOSURE (NOTE 4)
6	1	1KVA, 480-240/120V, 1ø, TRANSFORMER IN NEMA 3R ENCLOSURE
7	1	3/4" DIA. X 10' COPPER CLAD STEEL GROUND ROD
8	1	CADWELD TYPE "GR" CONNECTOR #2/0 WIRE TO GROUND ROD
9	1	70W HPS OUTDOOR FIXTURE 25' STANCHION MOUNT 120V, W/GLOBE & GUARD CROUSE HINDS VMV SERIES OR EQUAL
10	1	SNAP SWITCH, 1P, 120V, 15A IN A NEMA 3R ENCLOSURE
11	1	DUPLEX RECEPTACLE, GFI, 120V, 20A IN WEATHERPROOF ENCLOSURE.
12	1	NEMA 4X SS ENCLOSURE, 20"X20"X8", WITH 17"X17" PANEL. HOFFMAN # A20H2008SSLP OR EQUAL
13	2	POWER DISTRIBUTION BLOCK, 3ø, ALLEN-BRADLEY 1492-PD3C263 OR EQUAL
14	2	POWER DISTRIBUTION BLOCK, 1ø ALLEN-BRADLEY # 1492-BE OR EQUAL
15	2	FUSE PANEL (NOTE 3)

NORTH CAROLINA PROFESSIONAL SEAL 017757 ENGINEER ROBERT E. BURRIS
4/2/10

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0	6/9/10	APPROVED FOR CONSTRUCTION	JMW
C	6/3/10	ADDED INSTRUMENTS AND WIRING	JMW
B	5/18/10	BID ISSUE – NOT FOR CONSTRUCTION	JMW
A	4/2/10	ISSUED FOR COMMENT	JMW

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CURRENT PROJECT # 109580 | FILENAME: 109580-E-006
CURRENT MSC DEWG # 5440 | PLOT FACTOR: 1
PREVIOUS PROJECT # N/A | SHEET SIZE: 24x36

PUMP HOUSE EQUIP. RACK LAYOUT
ELECTRICAL / MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: P-0176

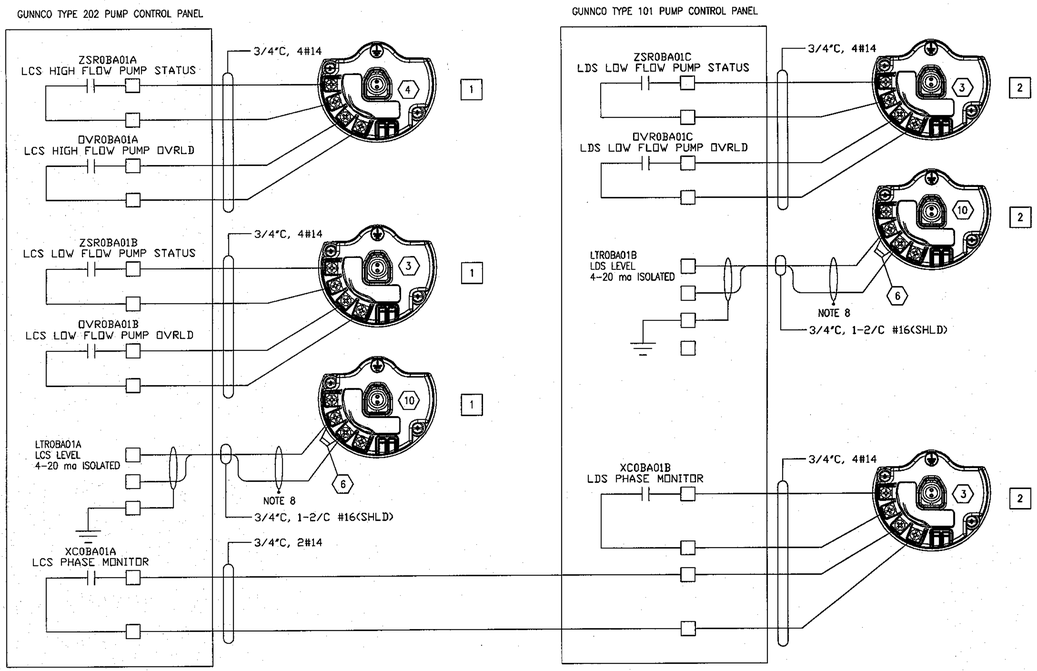
DRAWN BY:	CHECKED BY:
JMW	REB
DESIGNED BY:	APPROVED BY:
JMW	REB

PROJECT NUMBER 1356-08-122

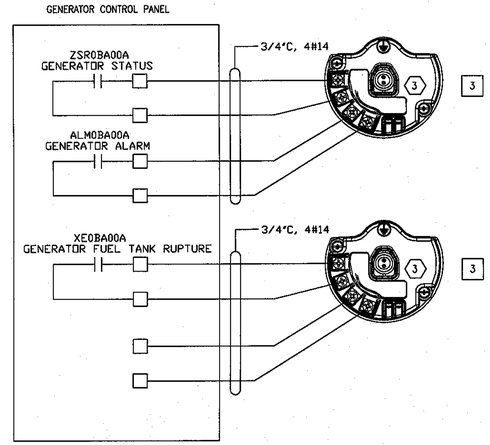
SCALE:	DATE:
NONE	4/2/10

DRAWING: E6 OF: 9

DRAWING PATH:



CELL # 1 WIRELESS TRANSMITTERS



GENERATOR WIRELESS TRANSMITTERS

NOTES:

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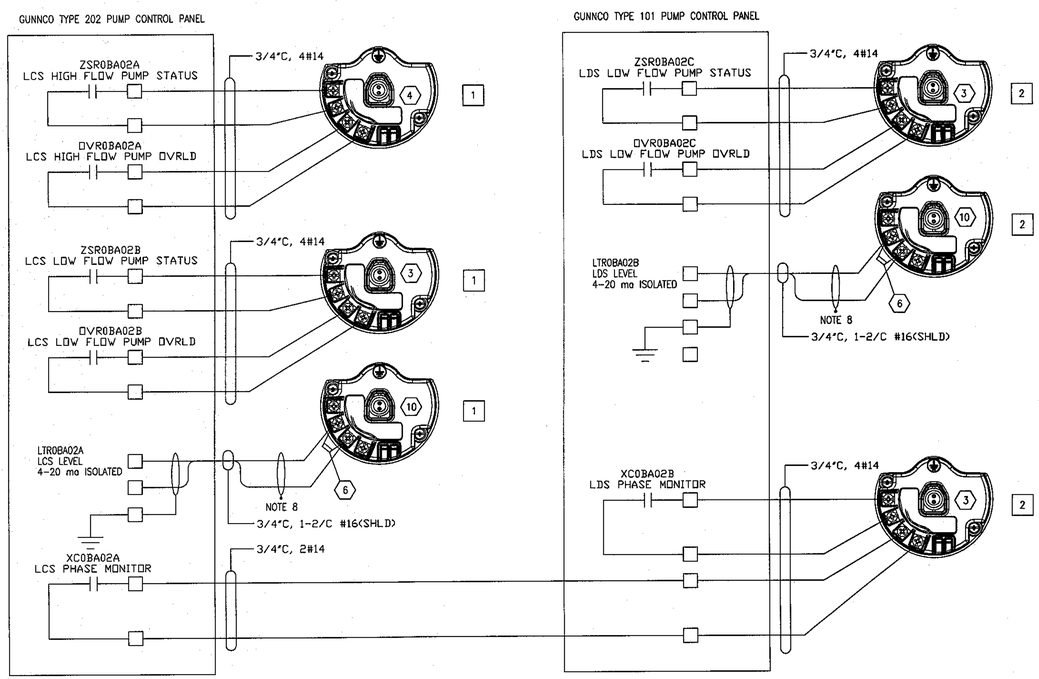
3. THE POWER MODULE SHOULD NOT BE INSTALLED ON ANY WIRELESS DEVICE UNTIL THE SMART WIRELESS GATEWAY ("GATEWAY") IS INSTALLED AND FUNCTIONING PROPERLY.
4. ALL SENSOR ELEMENT OR CONTACTS SHOULD BE WIRED TO A WIRELESS DEVICES BEFORE INSTALLATION OF ITS POWER MODULE
5. WIRELESS DEVICES SHOULD BE POWERED UP IN ORDER OF PROXIMITY FROM THE GATEWAY, BEGINNING WITH THE CLOSEST.
6. THE ANTENNA TO BE POSITIONED VERTICALLY AND NO CLOSER THAN 3FT. FROM ANY LARGE STRUCTURE BUILDING OR CONDUCTIVE SURFACE.
7. INITIAL POWER MODULE ACTIVATION OF ALL WIRELESS UNITS TO BE UNDER DIRECTION OF EMERSON/ROSEMOUNT FIELD SERVICE TECHNICIAN.
8. CUT AND TAPE SHIELD TO PREVENT GROUNDING AT THIS POINT.

LEGEND:

1	MOUNTED ON GUNNCO TYPE 202 PUMP CONTROL PANEL
2	MOUNTED ON GUNNCO TYPE 101 PUMP CONTROL PANEL
3	MOUNTED ON BACK UP GENERATOR CONTROL PANEL
4	MOUNTED ON PUMP STATION EQUIPMENT RACK
5	MOUNTED ON FLOW TRANSMITTER
6	LOCATED IN LEACHATE HEADER PIT

REFERENCE DRAWINGS:

E1	ELECTRICAL RISER DIAGRAM
E2	ELECTRICAL PANEL SCHEDULES
E3	POWER PLAN – CELLS 1 & 2
E4	POWER PLAN, MISC. SECTIONS & DETAILS
E5	UNDERGROUND ELECTRICAL DUCTBANK PLAN & DETAILS
E6	PUMP HOUSE EQUIPMENT RACK LAYOUT
E8	INSTRUMENT WIRING DIAGRAM, SHT. 2 OF 2
E9	WIRELESS REPEATER LOCATIONS



CELL # 2 WIRELESS TRANSMITTERS

INSTRUMENT BILL OF MATERIAL

ITEM	MANUF.	QTY	PART NO.	DESCRIPTION
1	ROSEMOUNT	1	1420A1A3N4	SMART WIRELESS GATEWAY
2	ROSEMOUNT	6	775XD11I5WA3WK9	SMART WIRELESS THUM(TM) ADAPTER LONG RANGE, INTEGRAL ANTENNA
3	ROSEMOUNT	8	702DX22D1I5WA3WK1	DISCRETE INPUT TRANSMITTER LONG RANGE, INTEGRAL ANTENNA
4	ROSEMOUNT	10	702DX22D1I5WA3WM1	DISCRETE INPUT TRANSMITTER EXTENDED RANGE, INTEGRAL ANTENNA
5	ROSEMONT	6	8705TSA030C1WON0F0247	MAGNETIC FLOWMETER FLOWTUBE CABLE GLAND +50' COMBO CABLE
6	BY CONSTR.	4	------	WIRE WOUND RESISTOR, 5 OHM, 1/2 W
7	BY CONSTR.	6	------	WIRE WOUND RESISTOR, 250 OHM, 1/2 W
8	ROSEMOUNT	22	00753-9220-0001	LITHIUM BATTERY MODULE
9	ROSEMOUNT	6	8712ESR1A1N0	MAGNETIC FLOWMETER TRANSMITTER-REMOTE 4-20ma HART PROTOCOL
10	ROSEMOUNT	4	648DX1D1I5WA3WK1	TEMPERATURE TRANSMITTER (4-20mA TRANSMITTER) LONG RANGE, INTEGRAL ANTENNA

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A	6/3/10	ISSUED FOR COMMENT	SHP

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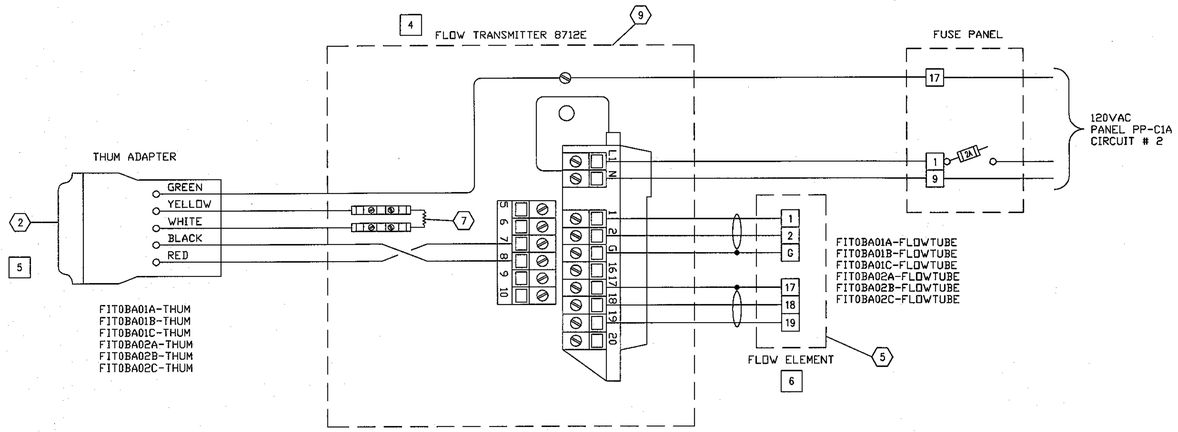
CURRENT PROJECT # 1 105580 FILENAME: 105580-E-001
CURRENT MISC DEPM # 5310 PLOT FACTOR: 1
PREVIOUS PROJECT # N/A SHEET SIZE: 24x36
Prepared with AutoCAD 2009 by

INSTR WIRING DIAG, SHT 1 OF 2
ELECTRICAL / MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

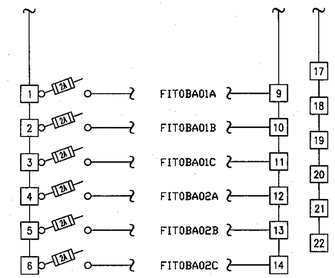
ENGINEERING LICENSE NO: F-0176
DRAWN BY: JMW
CHECKED BY: REB
DESIGNED BY: SHP
APPROVED BY: REB
PROJECT NUMBER: 1356-08-122
SCALE: NONE
DATE: 5/10/10
DRAWING: E7
OF: 9
DRAWING PATH:



FLOW TRANSMITTER WIRING DIAGRAM

(TYP. 6)

FIT0BA01A	LCS HIGH PUMP FLOW
FIT0BA01B	LCS LOW PUMP FLOW
FIT0BA01C	LDS LOW PUMP FLOW
FIT0BA02A	LCS HIGH PUMP FLOW
FIT0BA02B	LCS LOW PUMP FLOW
FIT0BA02C	LDS LOW PUMP FLOW



NOTES:

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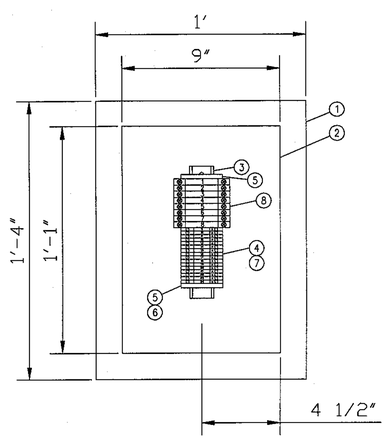
2. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE SUITABLE FOR THEIR APPLICATION PER THE LISTING INSTRUCTIONS OF A NATIONALLY RECOGNIZED AND APPROVED TESTING LABORATORY.
3. THE POWER MODULE SHOULD NOT BE INSTALLED ON ANY WIRELESS DEVICE UNTIL THE SMART WIRELESS GATEWAY ("GATEWAY") IS INSTALLED AND FUNCTIONING PROPERLY.
4. ALL SENSOR ELEMENT OR CONTACTS SHOULD BE WIRED TO A WIRELESS DEVICES BEFORE INSTALLATION OF ITS POWER MODULE
5. WIRELESS DEVICES SHOULD BE POWERED UP IN ORDER OF PROXIMITY FROM THE GATEWAY, BEGINNING WITH THE CLOSEST.
6. THE ANTENNA TO BE POSITIONED VERTICALLY AND NO CLOSER THAN 3FT. FROM ANY LARGE STRUCTURE BUILDING OR CONDUCTIVE SURFACE.
7. INITIAL POWER MODULE ACTIVATION OF ALL WIRELESS UNITS TO BE UNDER DIRECTION OF EMERSON/ROSEMOUNT FIELD SERVICE TECHNICIAN.
8. SEE DRAWING E7 FOR THE INSTRUMENT BILL OF MATERIALS.
9. NAMEPLATES SHALL BE WHITE PHENOLIC WITH BLACK LETTERS. NAMEPLATES SHALL BE ATTACHED USING STAINLESS STEEL SCREWS.

LEGEND:

1. MOUNTED ON GUNNCO TYPE 202 PUMP CONTROL PANEL
2. MOUNTED ON GUNNCO TYPE 101 PUMP CONTROL PANEL
3. MOUNTED ON BACK UP GENERATOR CONTROL PANEL
4. MOUNTED ON PUMP STATION EQUIPMENT RACK
5. MOUNTED ON FLOW TRANSMITTER
6. LOCATED IN LEACHATE HEADER PIT



BACK PANEL VIEW

SCALE: 3" = 1'-0"

FUSE PANEL BILL OF MATERIALS

ITEM	QTY	DESCRIPTION
1	1	ENCLOSURE – 16"H X 12"W X 6"D NEMA 4X STAINLESS STEEL, HOFFMAN #A-16H1206SS6LP
2	1	BACK PANEL – 13"H X 9"W, HOFFMAN # A-16P12
3	1'-0"	DIN RAIL – 35mm
4	16	TERMINAL BLOCK – WEIDMULLER FEED THROUGH, WDU 2.5
5	2	END CLAMP – WEIDMULLER WEW 35/2
6	1	END PLATE FOR WDU 2.5 TERMINAL BLOCK, WEIDMULLER WAP 2.5-10
7	3	BLANK MARKING TABS – FOR 6mm TERMINAL BLOCKS (10 PER PACK)
8	6	FUSED SWITCH TERMINAL BLOCK WEIDMULLER WSI SERIES

NAMEPLATE SCHEDULE

NP#	SIZE	LETTER HEIGHT	LINE 1	LINE 2	REMARKS
NP1	1" x 4"	3/16"	INSTRUMENT	FUSED SWITCHES	NOTE 9
NP2	1 1/4" X 1/2"	1/8"	TB1	--	NOTE 9

REFERENCE DRAWINGS:

E1	ELECTRICAL RISER DIAGRAM
E2	ELECTRICAL PANEL SCHEDULES
E3	POWER PLAN – CELLS 1 & 2
E4	POWER PLAN, MISC. SECTIONS & DETAILS
E5	UNDERGROUND ELECTRICAL DUCTBANK PLAN & DETAILS
E6	PUMP HOUSE EQUIPMENT RACK LAYOUT
E7	INSTRUMENT WIRING DIAGRAM. SHT. 1 OF 2
E9	WIRELESS REPEATER LOCATIONS

NORTH CAROLINA PROFESSIONAL SEAL 017757 ENGINEER ROBERT E. BURRIS

Prepared with AutoCAD 2009 by PERIGON

921 Industial Drive, Matthews, NC 28105 (704) 246-2000
NC Firm License No. F-1191 www.perigoneng.com

CURRENT PROJECT #	109580	FILENAME:	109580-E-008
CURRENT MISC. DETAIL #	5310	PLOT FACTOR:	1
PREVIOUS PROJECT #	N/A	SHEET SIZE:	24x36

NO.	DATE	DESCRIPTION	BY
0	6/9/10	APPROVED FOR CONSTRUCTION	JMW
A	4/2/10	ISSUED FOR COMMENT	SHP

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S&ME 9751 SOUTHERN PINE BLVD. CHARLOTTE, N.C. 28273 (704)523-4726 WWW.SMEINC.COM

INSTR. WIRING DIAG., SHT 2 OF 2
ELECTRICAL / MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: JMW	CHECKED BY: REB
DESIGNED BY: SHP	APPROVED BY: REB

PROJECT NUMBER 1356-08-122

SCALE: NONE	DATE: 5/26/10
DRAWING: E8	OF: 9

DRAWING PATH:

NORTH
DESIGNATE

AERIAL VIEW OF MARSHALL STEAM STATION

APPROXIMATE SCALE: 1"= 850'

NOTES:

1. ALL INSTALLATIONS SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL APPLICABLE STATE AND LOCAL CODES.
2. ALL ELECTRICAL EQUIPMENT AND DEVICES SHALL BE SUITABLE FOR THEIR APPLICATION PER THE LISTING INSTRUCTIONS OF A NATIONALLY RECOGNIZED AND APPROVED TESTING LABORATORY.
3. POLE LOCATIONS ARE APPROXIMATE, FINAL POLE LOCATIONS SHALL BE DETERMINED ON SITE.

LEGEND:

■ 16' WOOD POLE AND REPEATER

REFERENCE DRAWINGS:

E2	ELECTRICAL PANEL SCHEDULES
E3	POWER PLAN – CELLS 1 & 2
E4	POWER PLAN, MISC. SECTIONS & DETAILS
E5	UNDERGROUND ELECTRICAL DUCTBANK PLAN & DETAILS
E6	PUMP HOUSE EQUIPMENT RACK LAYOUT
E7	INSTRUMENT WIRING DIAGRAM, SHT. 1 OF 2
E8	INSTRUMENT WIRING DIAGRAM, SHT. 2 OF 2

NORTH CAROLINA PROFESSIONAL SEAL 017757 ENGINEER ROBERT E. BURRIS
Robert E. Burris 6/8/10

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PERIGON
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CURRENT PROJECT # 109580
CURRENT MISC DETAIL # 5440
PREVIOUS PROJECT # N/A
FILENAME: 109580-E-003
PLOT FACTOR: 1
SHEET SIZE: 24x36

NO.	DATE	DESCRIPTION	BY
0	6/9/10	APPROVED FOR CONSTRUCTION	JMW
A	6/3/10	ISSUED FOR COMMENT	SHP

WIRELESS REPEATER LOCATIONS
ELECTRICAL / MECHANICAL COMPONENTS

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
JMW	REB
DESIGNED BY:	APPROVED BY:
SHP	REB

PROJECT NUMBER 1356-08-122

SCALE:	DATE:
NONE	5/27/10
DRAWING:	OF:
E9	9

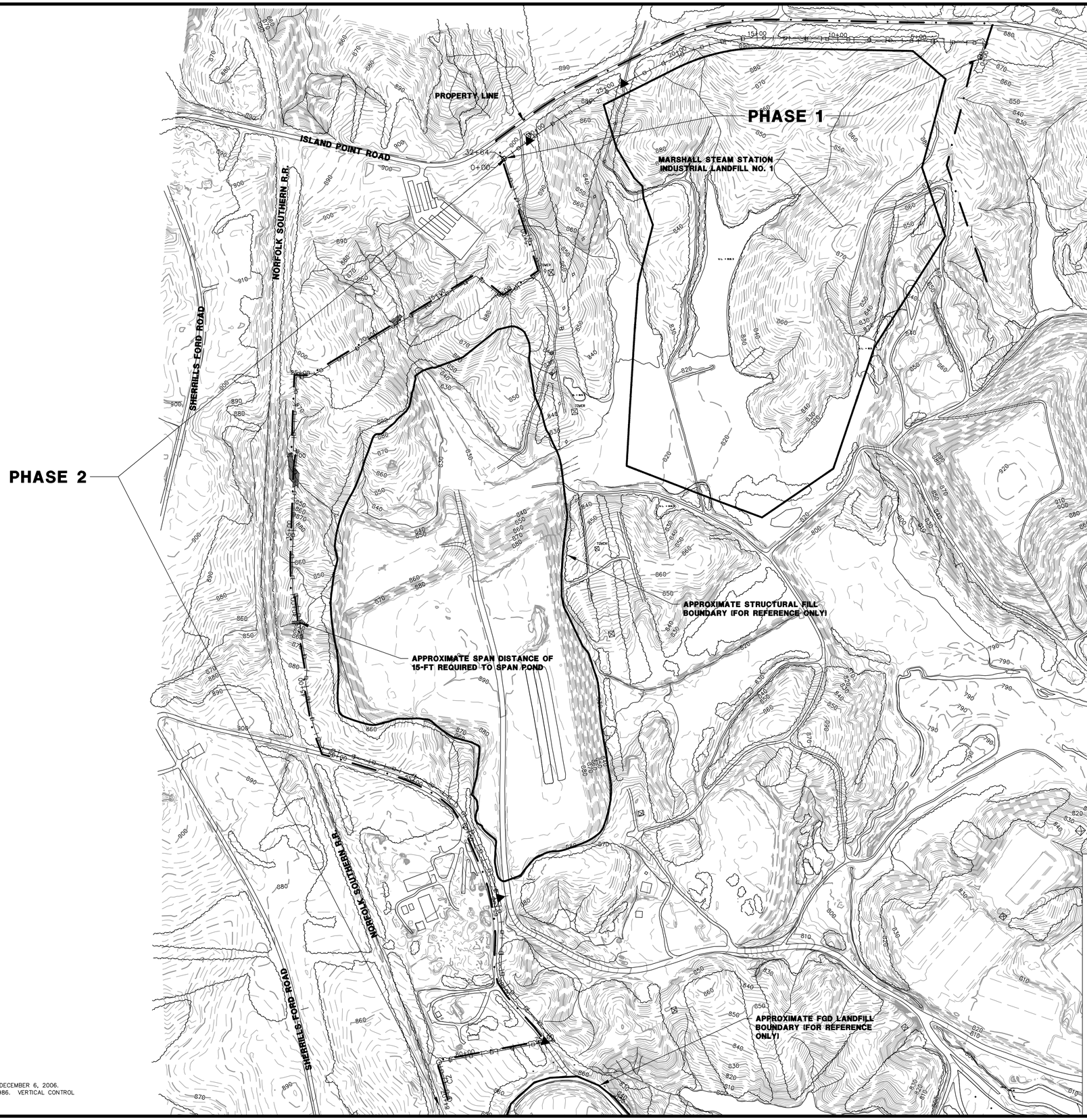
DRAWING PATH:

APPENDIX III – ANCILLARY FACILITIES
Section 3 – Fencing Plan Drawings

PHASE 1 FENCING ALIGNMENT				
PI Station	Northing	Easting	Distance	Direction
0+00.00	687,811.5697'	1,414,651.5398'		
			1.015'	N17° 41' 23"E
0+01.02	687,812.5357'	1,414,651.8483'		
			88.886'	N17° 41' 23"E
0+89.88	687,897.1997'	1,414,679.8513'		
			419.523'	N88° 10' 42"W
5+09.40	687,710.5354'	1,414,259.5399'		
			12.946'	N88° 38' 52"W
5+22.35	687,710.8409'	1,414,246.5955'		
			5.202'	N89° 22' 48"W
5+27.55	687,711.7102'	1,414,241.4669'		
			6.304'	N89° 00' 13"W
5+33.86	687,712.1499'	1,414,235.1783'		
			904.824'	N88° 48' 56"W
14+38.68	687,730.8549'	1,413,330.5476'		
			31.740'	N89° 31' 59"W
14+70.43	687,731.1135'	1,413,298.8035'		
			31.764'	S89° 01' 54"W
15+02.19	687,730.5767'	1,413,267.0441'		
			31.764'	S87° 35' 47"W
15+33.96	687,729.2445'	1,413,235.3081'		
			31.764'	S86° 09' 39"W
15+65.72	687,727.1177'	1,413,203.6154'		
			31.764'	S84° 43' 32"W
15+97.48	687,724.1978'	1,413,171.9660'		
			31.764'	S83° 17' 25"W
16+29.25	687,720.4865'	1,413,140.4398'		
			31.764'	S81° 51' 18"W
16+61.01	687,715.9863'	1,413,108.9661'		
			31.764'	S80° 20' 11"W
16+92.78	687,710.6998'	1,413,077.6752'		
			31.764'	S78° 59' 04"W
17+24.54	687,704.6304'	1,413,046.4965'		
			31.764'	S77° 32' 56"W
17+56.30	687,697.7919'	1,413,015.4796'		
			31.764'	S76° 06' 49"W
17+88.07	687,690.1587'	1,412,984.6440'		
			31.764'	S74° 40' 42"W
18+19.83	687,681.7655'	1,412,954.0090'		
			31.764'	S73° 14' 35"W
18+51.60	687,672.6070'	1,412,923.5939'		
			31.764'	S71° 48' 28"W
19+83.36	687,662.6906'	1,412,893.4177'		
			31.762'	S70° 22' 21"W
19+15.12	687,652.0217'	1,412,863.5014'		
			26.230'	S69° 01' 01"W
19+43.35	687,641.9129'	1,412,837.1437'		
			26.228'	S67° 44' 29"W
19+71.58	687,631.2206'	1,412,811.0194'		
			26.228'	S66° 27' 57"W
19+99.81	687,619.9495'	1,412,785.1397'		
			26.228'	S65° 11' 26"W
20+28.03	687,608.1051'	1,412,759.5173'		
			26.211'	S63° 54' 54"W
20+56.24	687,595.7006'	1,412,734.1798'		
			195.370'	S63° 18' 38"W
22+51.62	687,507.8452'	1,412,559.6723'		
			301.260'	S63° 18' 38"W
25+52.88	687,372.3759'	1,412,290.5891'		
			6.868'	S60° 12' 49"W
25+59.75	687,368.9643'	1,412,284.6287'		
			6.948'	S54° 05' 12"W
25+66.70	687,364.8888'	1,412,279.0014'		
			3.590'	S47° 57' 34"W
25+70.29	687,362.4847'	1,412,276.3352'		
			15.621'	S64° 48' 29"W
25+85.91	687,355.8272'	1,412,262.2035'		
			26.057'	S44° 34' 08"W
26+11.96	687,337.2639'	1,412,243.9173'		
			55.448'	S64° 48' 29"W
26+67.41	687,313.6330'	1,412,193.7562'		
			72.352'	S61° 38' 37"W
27+39.76	687,279.2688'	1,412,130.0860'		
			71.600'	S59° 08' 16"W
28+11.37	687,242.5362'	1,412,068.6185'		
			72.698'	S56° 37' 16"W
28+84.07	687,202.5394'	1,412,007.9119'		
			64.152'	S55° 13' 54"W
29+48.22	687,165.9103'	1,411,955.2454'		
			62.767'	S54° 20' 57"W
30+10.99	687,129.3269'	1,411,904.2420'		
			253.262'	S54° 01' 26"W
32+64.25	686,980.5483'	1,411,699.2868'		

PHASE 2 FENCING ALIGNMENT				
PI Station	Northing	Easting	Distance	Direction
0+00.00	686,980.5483'	1,411,699.2868'		
			735.334'	S17° 57' 10"E
7+35.33	686,281.0170'	1,411,925.9418'		
			283.391'	S55° 27' 57"W
10+18.73	686,120.3638'	1,411,692.4871'		
			212.514'	N51° 20' 19"W
12+31.24	686,253.1245'	1,411,526.5451'		
			1,183.377'	S59° 41' 38"W
24+14.62	685,638.2296'	1,410,515.4633'		
			27.406'	S59° 41' 38"W
24+42.02	685,623.9901'	1,410,492.0490'		
			81.279'	N87° 47' 18"W
25+23.30	685,627.1266'	1,410,410.8306'		
			126.819'	S2° 11' 41"W
26+50.12	685,500.4003'	1,410,405.9742'		
			332.001'	S2° 14' 17"W
29+82.12	685,168.6523'	1,410,393.0091'		
			25.003'	S85° 46' 43"E
30+07.12	685,167.6756'	1,410,417.9932'		
			19.465'	S2° 15' 12"W
30+26.59	685,148.2259'	1,410,417.2279'		
			93.52'	S7° 09' 06"W
31+20.12	685,055.4229'	1,410,405.6110'		
			546.159'	S2° 02' 17"W
36+66.27	684,509.6098'	1,410,386.1867'		
			236.314'	S0° 53' 43"E
39+02.59	684,273.3248'	1,410,389.8786'		
			23.913'	N86° 46' 17"E
39+26.40	684,274.6659'	1,410,413.6534'		
			192.287'	S6° 38' 43"E
41+08.69	684,093.5917'	1,410,434.6424'		
			110.302'	S6° 38' 43"E
42+18.99	683,984.0237'	1,410,447.3427'		
			159.955'	S9° 41' 43"E
43+78.94	683,826.4512'	1,410,474.2633'		
			17.331'	S9° 41' 43"E
43+96.18	683,809.3680'	1,410,477.1020'		
			94.028'	S5° 39' 17"W
44+90.20	683,725.7469'	1,410,468.9266'		
			268.395'	S10° 30' 19"E
47+48.60	683,461.8510'	1,410,587.8614'		
			69.573'	S20° 32' 27"E
48+18.17	683,396.7013'	1,410,542.2729'		
			70.523'	S20° 37' 41"E
48+88.70	683,330.6960'	1,410,567.1197'		
			56.919'	S74° 15' 53"E
49+45.62	683,315.2601'	1,410,621.9054'		
			299.592'	S73° 24' 23"E
52+45.21	683,229.7023'	1,410,909.0204'		
			100.251'	S72° 58' 24"E
53+45.46	683,200.3470'	1,411,004.8769'		
			50.696'	S71° 55' 47"E
53+96.34	683,184.5638'	1,411,053.2509'		
			51.505'	S70° 15' 21"E
54+47.84	683,167.1657'	1,411,101.7238'		
			51.840'	S67° 26' 23"E
54+99.68	683,147.2769'	1,411,149.5969'		
			52.035'	S64° 42' 11"E
55+51.72	683,125.0419'	1,411,196.6417'		
			51.933'	S61° 20' 50"E
56+03.65	683,100.1362'	1,411,242.2183'		
			51.250'	S58° 59' 12"E
56+54.91	683,073.7295'	1,411,286.1468'		
			53.128'	S57° 18' 13"E
57+08.04	683,045.0302'	1,411,330.8567'		
			105.292'	S59° 12' 00"E
58+13.29	682,977.6586'	1,411,411.7154'		
			109.791'	S31° 30' 00"E
59+23.08	682,894.0465'	1,411,469.0940'		
			339.670'	S23° 40' 00"E
62+62.75	682,572.9393'	1,411,605.4345'		
			103.974'	S19° 02' 00"E
63+66.73	682,474.6503'	1,411,639.3422'		
			103.404'	S12° 50' 00"E
64+70.21	682,373.7508'	1,411,662.3277'		
			102.866'	S9° 32' 00"E
65+73.08	682,272.3053'	1,411,679.3646'		
			104.330'	S5° 01' 00"E
66+77.41	682,168.3694'	1,411,688.4883'		
			197.361'	S2° 17' 00"W
68+74.77	681,971.1652'	1,411,680.6252'		
			42.859'	S12° 09' 00"E
69+17.63	681,929.2703'	1,411,689.6449'		
			43.740'	S12° 09' 00"E
69+61.37	681,886.5049'	1,411,698.8521'		
			89.117'	S33° 56' 00"E
70+50.49	681,812.5660'	1,411,748.5994'		
			253.867'	S41° 34' 00"E
73+04.36	681,622.6268'	1,411,917.0378'		
			143.640'	S33° 50' 00"E
74+48.00	681,509.1800'	1,412,005.1419'		
			715.909'	S69° 51' 24"W
82+88.34	681,262.6782'	1,411,333.1152'		
			118.749'	S13° 31' 16"E
84+06.95	681,147.2214'	1,411,360.8787'		

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE NOVA SURVEYING AND MAPPING, INC. DATED DECEMBER 6, 2006.
HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/1986. VERTICAL CONTROL SURVEYS BASED ON NAVD 88.



ISSUED FOR BID

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(704)523-4726
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY

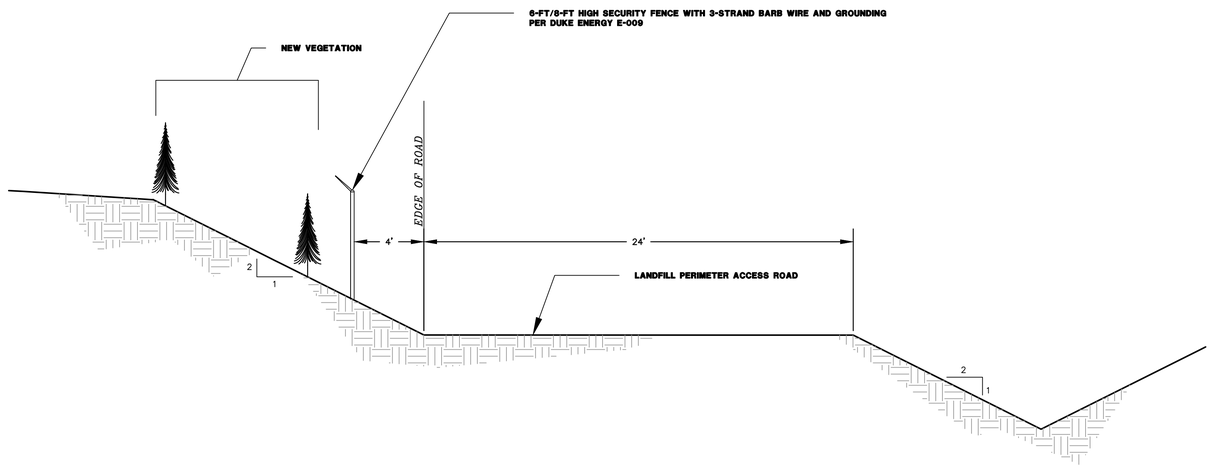
EXISTING SITE CONDITIONS
SECURITY FENCE PLAN

MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

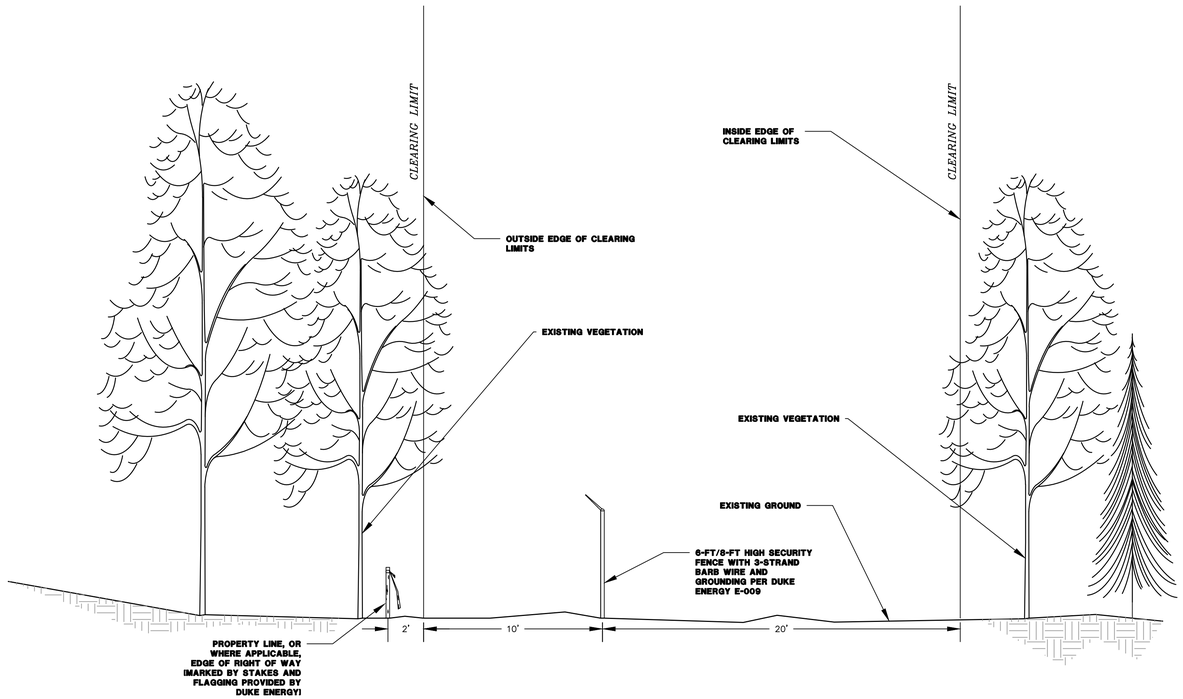
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY:
DESIGNED BY: WMH	APPROVED BY:
PROJECT NUMBER 1356-08-122	
SCALE: AS SHOWN	DATE: 9/10/2010
DRAWING: 1	OF: 2

DRAWING PATH: G:\1356\DUKE ENERGY\08-122 Marshall FEP\DWG\Industrial Landfill FV\EASS\Fencing Plan EASS\Fence Plan construction.dwg



TYPICAL PHASE 1 SECTION



TYPICAL PHASE 2 SECTION

ISSUED FOR BID

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(704)523-4726
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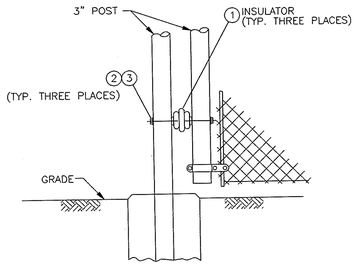
NO.	DATE	DESCRIPTION	BY

TYPICAL SECTIONS SECURITY FENCE PLAN

MARSHALL STEAM STATION TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176	
DRAWN BY: CLD	CHECKED BY:
DESIGNED BY: WMH	APPROVED BY:
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 4'	DATE: 9/10/2010
DRAWING: 2	OF: 2

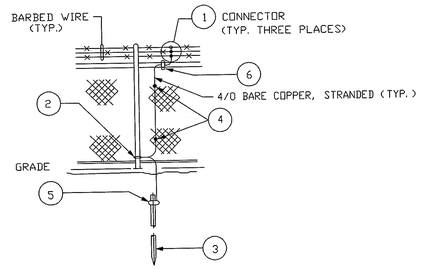
DRAWING PATH:



NOTE:
1. INSTALL THREE FIBERGLASS ISOLATION DEVICES AS REQUIRED TO PROVIDE PHYSICAL SEPARATION BETWEEN FENCE POSTS.
2. BOTTOM OF ISOLATED FENCE SECTION AND POST MUST BE ABOVE GROUND.

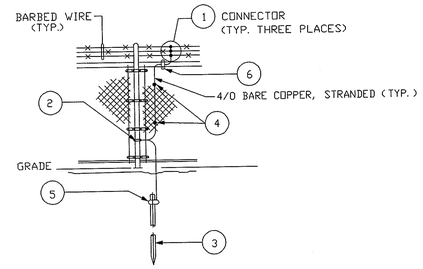
ITEM	DESCRIPTION	QTY
1	STANDOFF INSULATOR, FIBERGLASS, 3 1/2" (GLASTIC OR EQUIV.)	3
2	HEXHEAD BOLT, 1/2" DIA., 4 1/2" LONG, HDG	6
3	FLAT WASHER, 9/16" DIA., HDG	6

ASSEMBLY G52A
FENCE ISOLATION



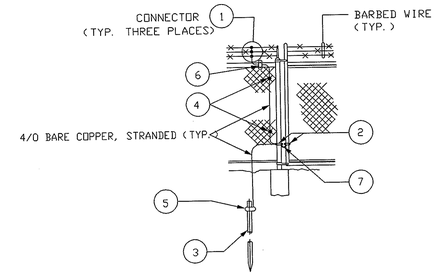
ASSEMBLY G52B
FENCE SPANS

ITEM	DESCRIPTION	QTY
1	CONNECTOR, GRND, 4/0 TO BARBED WIRE	3
2	CONNECTOR, PIPE TO CABLE	1
3	GROUND ROD, 3/4" DIA. ,COPPER, 10'-0" LONG	1
4	CONNECTOR, FENCE TO 4/0 BARE COPPER,STRANDED	2
5	COMPRESSION CONNECTION, 4/0 TO 3/4" GRND ROD	1
6	CONNECTOR, GROUND, ONE CABLE, #2/0-250, TO 1 1/4" STIFFENER	1



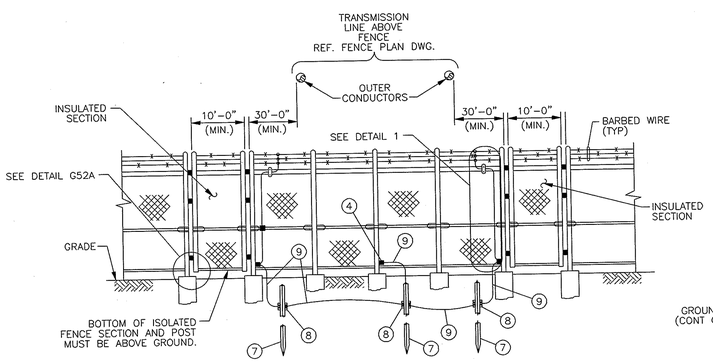
ASSEMBLY G52C
FENCE CORNERS

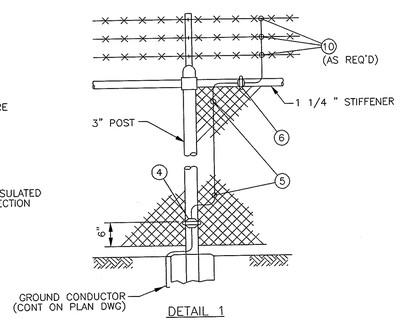
ITEM	DESCRIPTION	QTY
1	CONNECTOR, GRND, 4/0 TO BARBED WIRE	3
2	CONNECTOR, PIPE TO CABLE	1
3	GROUND ROD, 3/4" DIA. ,COPPER, 10'-0" LONG	1
4	CONNECTOR, FENCE TO 4/0 BARE COPPER,STRANDED	2
5	COMPRESSION CONNECTION, 4/0 TO 3/4" GRND ROD	1
6	CONNECTOR, GROUND, ONE CABLE, #2/0-250, TO 1 1/4" STIFFENER	1



ASSEMBLY G52D
FENCE GATE

ITEM	DESCRIPTION	QTY
1	CONNECTOR, GRND, 4/0 TO BARBED WIRE	3
2	CONNECTOR, PIPE TO CABLE	2
3	GROUND ROD, 3/4" DIA. ,COPPER, 10'-0" LONG	1
4	CONNECTOR, FENCE TO 4/0 BARE COPPER,STRANDED	2
5	COMPRESSION CONNECTION, 4/0 TO 3/4" GRND ROD	1
6	CONNECTOR, GROUND, ONE CABLE, #2/0-250, TO 1 1/4" STIFFENER	1
7	BRAIDED JUMPER	1





DETAIL 1

ITEM	DESCRIPTION	QTY
1	STANDOFF INSULATOR, FIBERGLASS, 3 1/2 ", LAPP #38029 OR #38031 OR EQUAL	12
2	HEXHEAD BOLT, 1/2 " DIA., 4 1/2 " LONG, HDG	24
3	FLAT WASHER, 9/16 " DIA., HDG	24
4	CONNECTOR, GROUND, ONE CABLE, #1-250, TO 3" POST	3
5	CONNECTOR, FENCE TO 4/0 BARE COPPER,STRANDED	4
6	CONNECTOR, GROUND, ONE CABLE, #2/0-250, TO 1 1/4 " STIFFENER	2
7	GROUND ROD, 3/4 " X 10'-0", COPPER CLAD STEEL	3
8	COMPRESSION CONNECTOR, GROUND ROD TAP, 1/C #3/0 AWG - 250 kcmil TAP, 3/4 " ROD, TYPE "YGHP-C"	7
9	WIRE, #4/0, CU, BARE STRANDED	(AS REQ'D)
10	CONNECTOR, GRND, 4/0 TO BARBED WIRE	6

TYPICAL FENCE ISOLATION & GROUNDING FOR OVERHEAD TRANSMISSION LINES

GENERAL NOTES:

1. FENCES, INCLUDING BARBED WIRE EXTENSIONS, SHALL BE GROUNDED IN ACCORDANCE WITH GENERAL REQUIREMENTS OF SECTION 92E OF THE NATIONAL ELECTRIC SAFETY CODE AND THE DESIGN DRAWINGS.
2. TEN-FOOT GROUNDING ELECTRODES SHALL BE DRIVEN AND BONDED TO ALL PERMANENT AND TEMPORARY FENCE AT THE FOLLOWING LOCATIONS:
   - AT CORNERS OR BENDS OF 45 DEGREES OR MORE
   - AT POSTS ON EACH SIDE OF A GATE
   - AT INTERVALS NOT EXCEEDING 75'
3. TEMPORARY FENCE INSTALLED UNDERNEATH TRANSMISSION LINES SHALL ALSO HAVE THE GROUNDING ELECTRODES INTER-CONNECTED WITH 4/0 BARE COPPER CONDUCTOR BURIED 24" BELOW GRADE 6' INSIDE THE FENCE. WHERE THE TEMPORARY FENCE LEAVES THE TRANSMISSION LINE RIGHT OF WAY ISOLATION SECTIONS SHALL BE INSTALLED PER ASSEMBLY G52A.
4. TEMPORARY FENCE NOT UNDER TRANSMISSION LINE RIGHT OF WAYS SHALL BE INSTALLED PER ASSEMBLY G52B BETWEEN ISOLATION SECTIONS (NO INTERCONNECTING BARE COPPER CONDUCTOR REQUIRED).
5. ELECTRICAL CONTINUITY AT HINGED GATES SHALL BE ENSURED BY BONDING NECESSARY PARTS TOGETHER WITH FLEXIBLE COPPER BRAID.
6. FENCE SHALL HAVE ISOLATED SECTIONS INSTALLED A MINIMUM OF 40' FROM MOTORIZED MAIN GATE ENTRANCE PER ASSEMBLY G52A (TYP. 2 PLACES).

KEY PLAN:

DRAWING NO.
CFD-8300-E-0090-000215

Duke Energy®
P.O. BOX 1007 CHARLOTTE, NC 28201-1007
PHONE: (704) 382-7188
FAX: (704) 382-4119

SEAL

MARSHALL STEAM STATION
Catawba County, North Carolina

Security Improvements Project

MARK	DATE	REVISION
3		
2		
1		
0	9/15/04	Released for Bids

PROJECT NO: 000215
DRAWING NUMBER
CFD-8300-E-0090-000215

ELECTRONIC FILE NUMBER:
DRAWN BY:
CHK'D BY:
E-MAIL:

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SHEET TITLE:
Fence & Gates Grounding & Isolation

SHEET NO.
E-009

APPENDIX III – ANCILLARY FACILITIES

Section 4 – Visual Screening Plan Drawings and Zoning Compliance Certificate

PROPERTY LINE (ISLAND POINT ROAD CENTERLINE)

RIGHT-OF-WAY

GRADING LIMIT

100 FOOT SETBACK FROM RIGHT OF WAY

LIMIT OF WASTE

CELLS 1 AND 2 PROPOSED VEGETATIVE SCREENING AREA

1,2 / 3 SINGLE AND DOUBLE ROW PLANTING

CELLS 3 AND 4 PROPOSED VEGETATIVE SCREENING AREA

1,2 / 3 SINGLE AND DOUBLE ROW PLANTING

WEST VEGETATED BERM

EAST VEGETATED BERM

PERIMETER ACCESS ROAD

EXISTING VEGETATION PROPOSED TO SERVE AS SCREEN IN THIS AREA

NOTE THAT CELLS 3 AND 4 FENCE WILL BE INSTALLED PRIOR TO CELLS 3 AND 4 OPERATION.

FENCE TERMINATION LOCATION TO BE DETERMINED

SCREENING MEASURES SHOWN IN CROSS-SECTIONS A-A' AND B-B' ON DRAWING 2 OF 4 AND FURTHER DETAILED ON DRAWING 3 OF 4 WILL BE USED TO SCREEN THE LANDFILL OPERATIONS FROM THE PROPERTY TO THE EAST.

1,2 / 3 SINGLE AND DOUBLE ROW PLANTING

CELL 3

CELL 4

PHASE 1

CELL 1

CELL 2

FENCE TERMINATION LOCATION TO BE DETERMINED

NOTE THAT CELLS 3 AND 4 ARE TO BE CONSTRUCTED AFTER CELLS 1 AND 2 AND THAT THE VEGETATIVE SCREENING AREA WILL BE INSTALLED PRIOR TO CELLS 3 AND 4 OPERATION

PERIMETER ACCESS ROAD

PERIMETER ACCESS ROAD

SEE DRAWING 4 OF 4 FOR FUTURE PHASES

LEGEND

- PROPERTY LINE (ISLAND POINT ROAD CENTERLINE)
- RIGHT-OF-WAY
- 100' SETBACK FROM RIGHT-OF-WAY
- GRADING LIMIT
- PROPOSED MAJOR CONTOUR (10')
- PROPOSED MINOR CONTOURS (2')
- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- PROPOSED FENCE LINE
- PROPOSED VEGETATIVE SCREENING AREA
- APPROXIMATE LIMITS OF EXISTING VEGETATION (FOR ILLUSTRATIVE PURPOSES ONLY)

80 0 40 80 160

(IN FEET)
1 inch = 80 ft.

S&ME
9751 SOUTHERN PINE BLVD.
CHARLOTTE, N.C. 28273
(704)523-4726
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
1	7-7-10	REVISED PER CATAWBA COUNTY COMMENTS	WMH

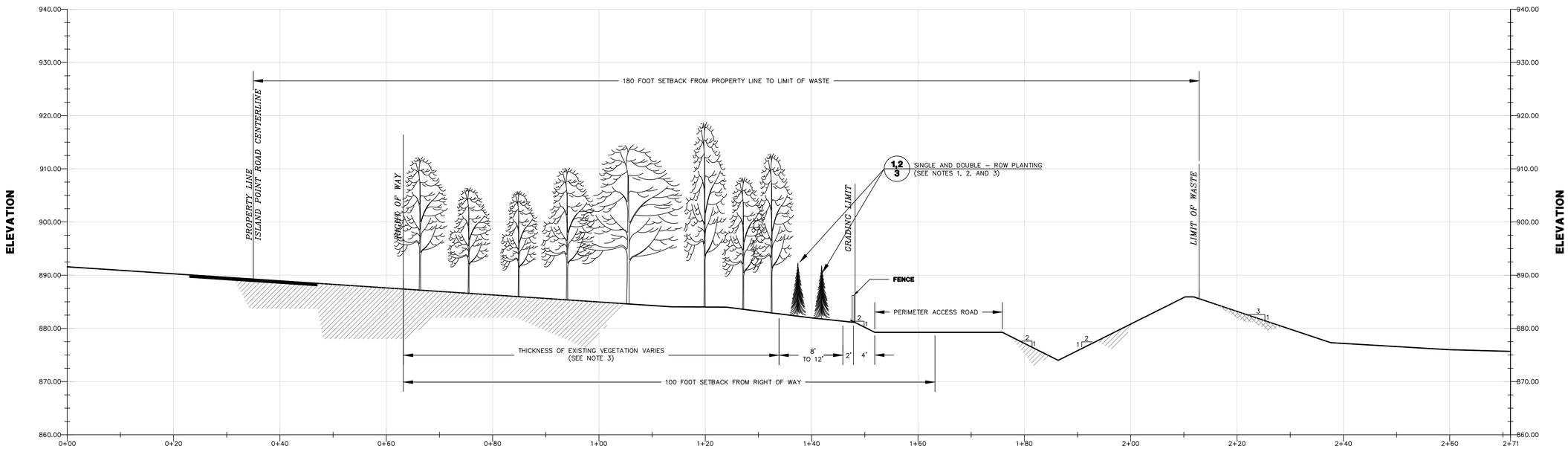
SUPPLEMENTAL PERIMETER SCREENING PLAN
INDUSTRIAL LANDFILL NO.1

DUKE ENERGY, MARSHALL STEAM STATION
CATAWBA COUNTY, NORTH CAROLINA

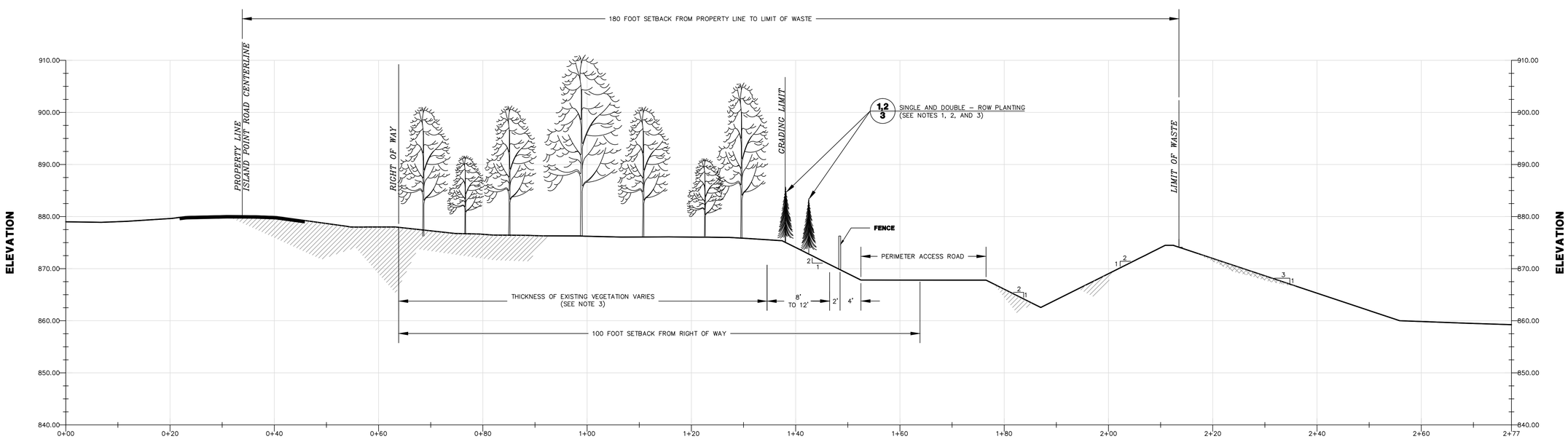
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KJRD
DESIGNED BY: WMH	APPROVED BY: KJRD
PROJECT NUMBER: 1356-08-122	
SCALE: AS SHOWN	DATE: 6-15-10
DRAWING: 1	OF: 4

DRAWING PATH: G:\1356\DUKE ENERGY\08-122 MARSHALL ILF\DWG\VEGETATIVE SCREEN\ZONING 6-1-10\REV. TO COMMENTS\01 GDP\LANTING PLAN - SECTION.DWG



CROSS SECTION A-A'



CROSS SECTION B-B'

NOTES:
1. PROPOSED VEGETATIVE SCREEN LAYOUT AND SPECIES:
   1.1. IF THE VEGETATIVE SCREENING AREA IS COMPOSED OF A SINGLE ROW, ACCEPTABLE SPECIES SHALL INCLUDE LEYLAND CYPRESS OR THUJA GREEN GIANT.
   1.2. IF THE VEGETATIVE SCREENING AREA IS COMPRISED OF A DOUBLE ROW, ACCEPTABLE SPECIES SHALL INCLUDE DEODAR CEDAR, LEYLAND CYPRESS OR THUJA GREEN GIANT.
2. DUKE ENERGY WILL MAINTAIN NEW VEGETATION THROUGHOUT LANDFILL OPERATIONS.
3. TREE SIZES AND DENSITY OF EXISTING VEGETATION SHOWN DO NOT REPRESENT ACTUAL OR PLANNED HEIGHTS AND ARE FOR ILLUSTRATIVE PURPOSES ONLY.

HORIZONTAL SCALE

10 0 5 10 20

(IN FEET)
1 inch = 10 ft.

VERTICAL SCALE

10 0 5 10 20

(IN FEET)
1 inch = 10 ft.

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NO.	DATE	DESCRIPTION	BY
1	7-7-10	REVISED PER CATAWBA COUNTY COMMENTS	WMH

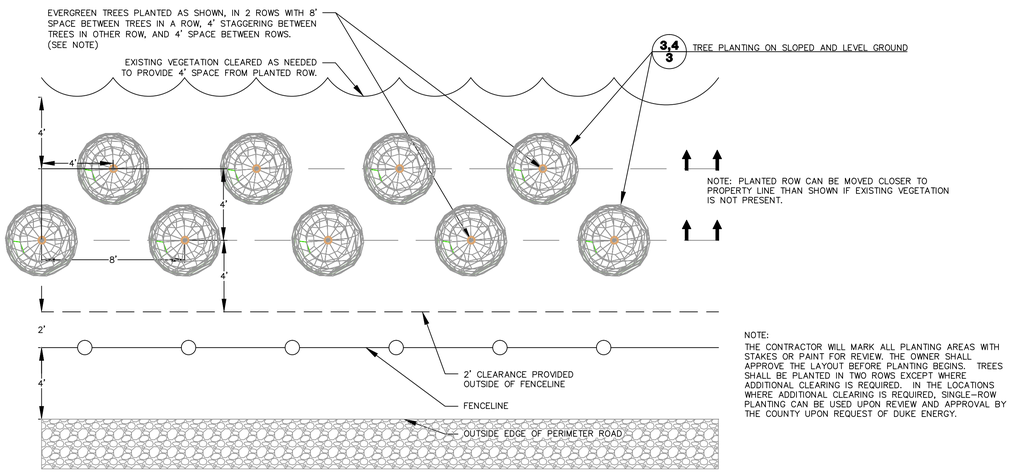
SUPPLEMENTAL PERIMETER SCREENING PLAN
CROSS SECTIONS
INDUSTRUSTRIAL LANDFILL NO.1

DUKE ENERGY, MARSHALL STEAM STATION
CATAWBA COUNTY, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

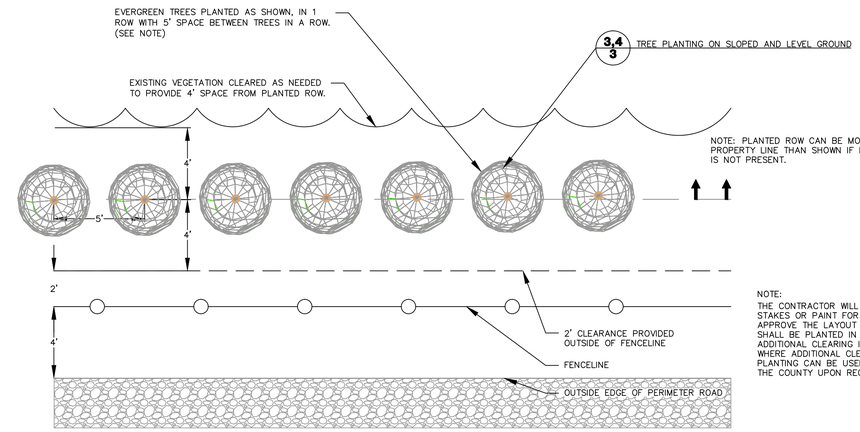
DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-08-122	
SCALE: AS SHOWN	DATE: 6-15-10
DRAWING: 2	OF: 4

DRAWING PATH: Q:\1356\DUKE ENERGY\08-122 MARSHALL S.P.\DWG\VEGETATIVE SCREEN\ZONING 6-11-10\VES. TO COMMENTS\01 GSPLANTING PLAN -XSECTION.DWG



NOTE:
THE CONTRACTOR WILL MARK ALL PLANTING AREAS WITH STAKES OR PAINT FOR REVIEW. THE OWNER SHALL APPROVE THE LAYOUT BEFORE PLANTING BEGINS. TREES SHALL BE PLANTED IN TWO ROWS EXCEPT WHERE ADDITIONAL CLEARING IS REQUIRED. IN THE LOCATIONS WHERE ADDITIONAL CLEARING IS REQUIRED, SINGLE-ROW PLANTING CAN BE USED UPON REVIEW AND APPROVAL BY THE COUNTY UPON REQUEST OF DUKE ENERGY.

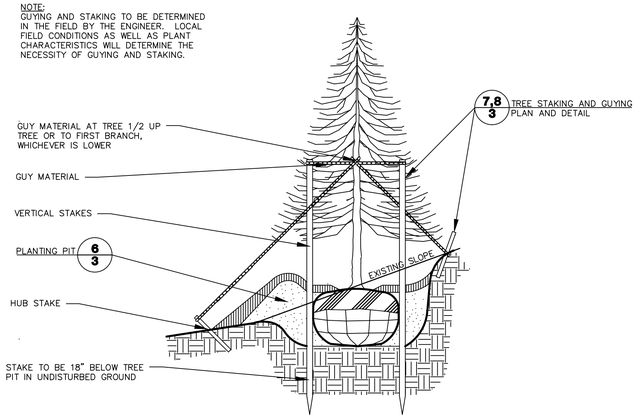
1/3 DOUBLE - ROW PLANTING
SCALE: NTS



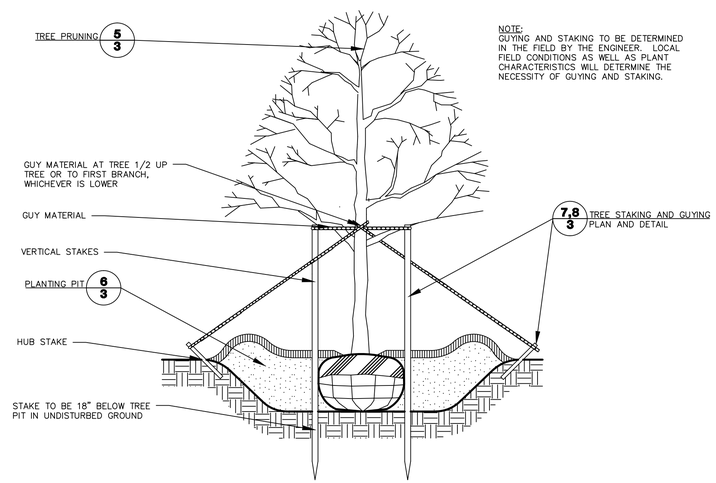
NOTE:
THE CONTRACTOR WILL MARK ALL PLANTING AREAS WITH STAKES OR PAINT FOR REVIEW. THE OWNER SHALL APPROVE THE LAYOUT BEFORE PLANTING BEGINS. TREES SHALL BE PLANTED IN TWO ROWS EXCEPT WHERE ADDITIONAL CLEARING IS REQUIRED. IN THE LOCATIONS WHERE ADDITIONAL CLEARING IS REQUIRED, SINGLE-ROW PLANTING CAN BE USED UPON REVIEW AND APPROVAL BY THE COUNTY UPON REQUEST OF DUKE ENERGY.

2/3 SINGLE - ROW PLANTING
SCALE: NTS

NOTE:
GUYING AND STAKING TO BE DETERMINED IN THE FIELD BY THE ENGINEER. LOCAL FIELD CONDITIONS AS WELL AS PLANT CHARACTERISTICS WILL DETERMINE THE NECESSITY OF GUYING AND STAKING.



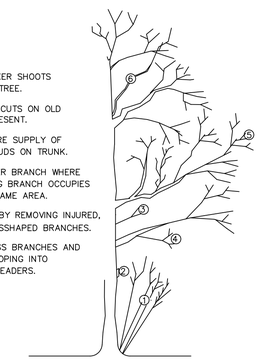
3/3 TREE PLANTING ON SLOPED GROUND
SCALE: NTS



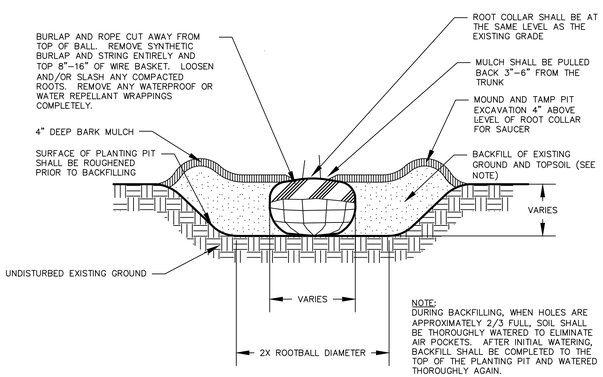
NOTE:
GUYING AND STAKING TO BE DETERMINED IN THE FIELD BY THE ENGINEER. LOCAL FIELD CONDITIONS AS WELL AS PLANT CHARACTERISTICS WILL DETERMINE THE NECESSITY OF GUYING AND STAKING.

4/3 TREE PLANTING ON LEVEL GROUND
SCALE: NTS

NOTE:
① REMOVE SUCKER SHOOTS AT BASE OF TREE.
② MAKE CLEAN CUTS ON OLD STUBS, IF PRESENT.
③ REMOVE ENTIRE SUPPLY OF TWIGS AND BUDS ON TRUNK.
④ REMOVE LOWER BRANCH WHERE AN OVERLYING BRANCH OCCUPIES ABOUT THE SAME AREA.
⑤ SHAPE TREE BY REMOVING INJURED, DEAD AND MISSHAPED BRANCHES.
⑥ REMOVE CROSS BRANCHES AND THOSE DEVELOPING INTO SECONDARY LEADERS.

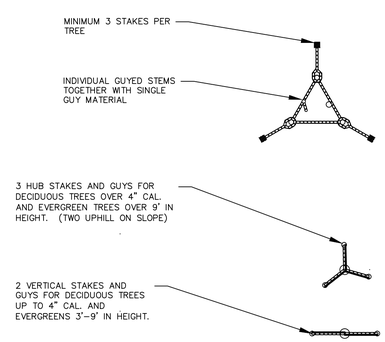


5/3 TREE PRUNING
SCALE: NTS

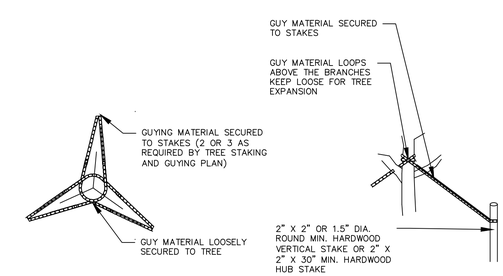


NOTE:
DURING BACKFILLING, WHEN HOLES ARE APPROXIMATELY 2/3 FULL, SOIL SHALL BE THOROUGHLY WATERED TO ELIMINATE AIR POCKETS. AFTER INITIAL WATERING, BACKFILL SHALL BE COMPLETED TO THE TOP OF THE PLANTING PIT AND WATERED THOROUGHLY AGAIN.

6/3 PLANTING PIT
SCALE: NTS



7/3 TREE STAKING AND GUYING PLAN
SCALE: NTS



NOTE:
PLASTIC CHAINLOCK (LANDSCAPE QUALITY AND SUITABLE STRENGTH FOR GUYING TREES) OR EQUIVALENT

8/3 TREE STAKING AND GUYING DETAIL
SCALE: NTS

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NO.	DATE	DESCRIPTION	BY
1	7-7-10	REVISED PER CATAWBA COUNTY COMMENTS	WMH

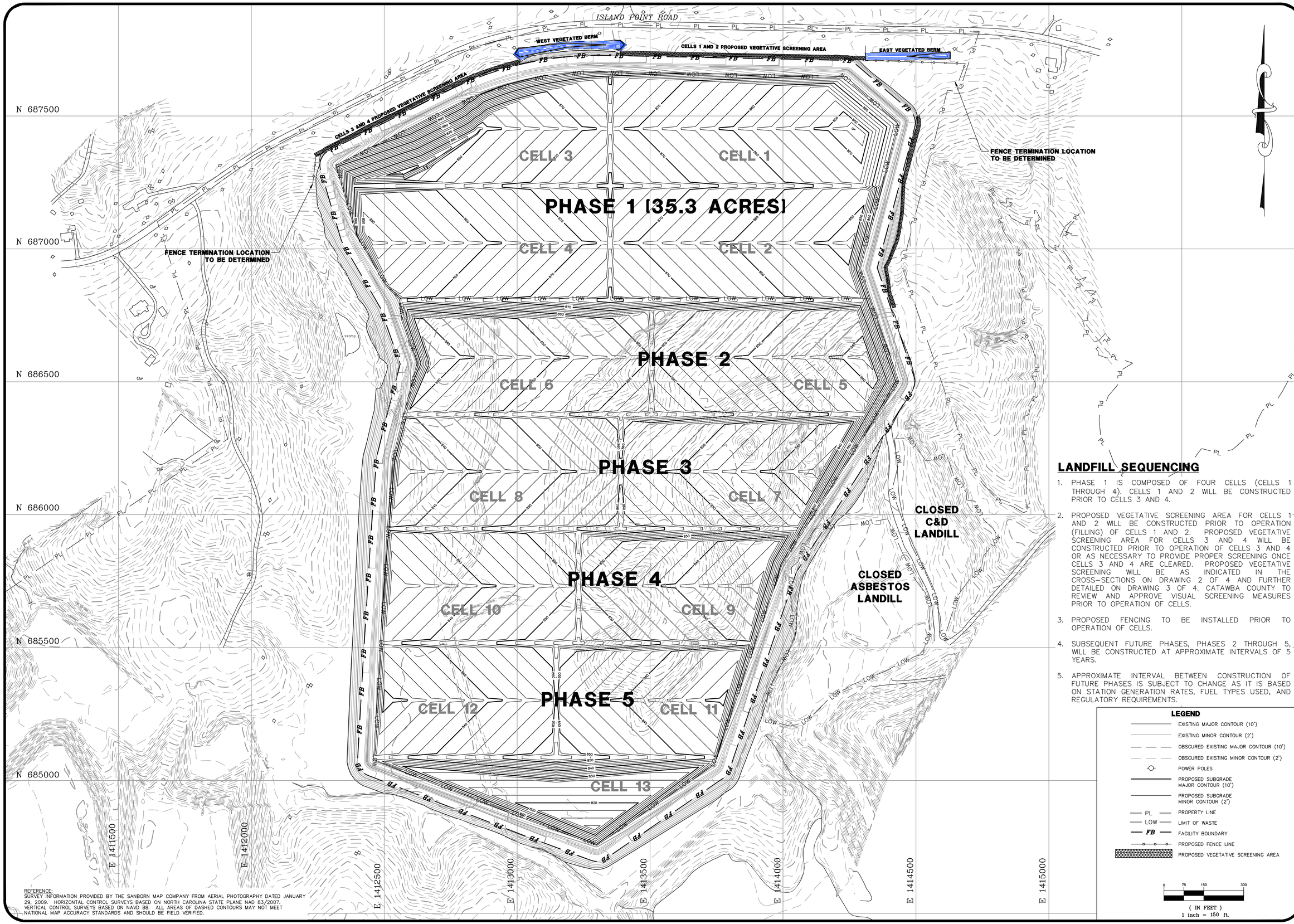
SUPPLEMENTAL PERIMETER SCREENING PLAN
PLANTING DETAILS
INDUSTRIAL LANDFILL NO. 1

DUKE ENERGY - MARSHALL STEAM STATION
CATAWBA COUNTY, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-08-122	
SCALE: AS SHOWN	DATE: 6-15-10
DRAWING: 3	OF: 4

DRAWING PATH: G:\1356\DUKE ENERGY\08-122 Marshall T&F\DWG\VEGETATIVE SCREEN\ZONING 6-1-10\rev. to comments\03 PLANTING DETAILS.dwg



LANDFILL SEQUENCING

1. PHASE 1 IS COMPOSED OF FOUR CELLS (CELLS 1 THROUGH 4). CELLS 1 AND 2 WILL BE CONSTRUCTED PRIOR TO CELLS 3 AND 4.
2. PROPOSED VEGETATIVE SCREENING AREA FOR CELLS 1 AND 2 WILL BE CONSTRUCTED PRIOR TO OPERATION (FILLING) OF CELLS 1 AND 2. PROPOSED VEGETATIVE SCREENING AREA FOR CELLS 3 AND 4 WILL BE CONSTRUCTED PRIOR TO OPERATION OF CELLS 3 AND 4 OR AS NECESSARY TO PROVIDE PROPER SCREENING ONCE CELLS 3 AND 4 ARE CLEARED. PROPOSED VEGETATIVE SCREENING WILL BE AS INDICATED IN THE CROSS-SECTIONS ON DRAWING 2 OF 4 AND FURTHER DETAILED ON DRAWING 3 OF 4. CATAWBA COUNTY TO REVIEW AND APPROVE VISUAL SCREENING MEASURES PRIOR TO OPERATION OF CELLS.
3. PROPOSED FENCING TO BE INSTALLED PRIOR TO OPERATION OF CELLS.
4. SUBSEQUENT FUTURE PHASES, PHASES 2 THROUGH 5, WILL BE CONSTRUCTED AT APPROXIMATE INTERVALS OF 5 YEARS.
5. APPROXIMATE INTERVAL BETWEEN CONSTRUCTION OF FUTURE PHASES IS SUBJECT TO CHANGE AS IT IS BASED ON STATION GENERATION RATES, FUEL TYPES USED, AND REGULATORY REQUIREMENTS.

LEGEND

- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- OBSCURED EXISTING MAJOR CONTOUR (10')
- OBSCURED EXISTING MINOR CONTOUR (2')
- POWER POLES
- PROPOSED SUBGRADE MAJOR CONTOUR (10')
- PROPOSED SUBGRADE MINOR CONTOUR (2')
- PL — PROPERTY LINE
- LOW — LIMIT OF WASTE
- FB — FACILITY BOUNDARY
- PROPOSED FENCE LINE
- PROPOSED VEGETATIVE SCREENING AREA

0 75 150 300
(IN FEET)
1 inch = 150 ft.

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED.

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NO.	DATE	DESCRIPTION	BY
1	7-7-10	REVISED PER CATAWBA COUNTY COMMENTS	WMH

SUPPLEMENTAL PERIMETER SCREENING PLAN
FUTURE PHASES SUBGRADE PLAN
INDUSTRIAL LANDFILL NO. 1

DUKE ENERGY - MARSHALL STEAM STATION
CATAWBA COUNTY, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	KWD
DESIGNED BY:	APPROVED BY:
WMH	KWD

PROJECT NUMBER: 1356-08-122

SCALE:	DATE:
AS SHOWN	6-15-10
DRAWING: 4	OF: 4

DRAWING PATH: S:\USR\DUKE ENERGY\JOB-122 Marshall S\F\DWG\VEGETATIVE SCREEN\DWG 2-11-10.dwg, by: cameron.pyle, Wednesday, March 17, 2010 - 9:44 am

ZONING COMPLIANCE CERTIFICATE

Certificate of Occupancy

ISSUED BY

CATAWBA COUNTY PLANNING, PARKS & DEVELOPMENT

TYPE OF WORK Other
PERMIT NO ZONC-7-10-9707
PIN NUMBER 461803426350
SITE ADDRESS 3590 MARSHALL RD, Terrell, NC
TYPE OF USE

This certificate is issued pursuant to the requirements of Chapter 44 of Catawba County Code of Ordinances. It is specifically understood that this certificate becomes null and void when changes in construction, occupancy or use are made without department approval.

APPLICANT	PARCEL OWNER
DUKE ENERGY CAROLINAS LLC PO BOX 1007 CHARLOTTE NC 28201-1007	

PROJECT DESCRIPTION: Marshall Steam Station expansion of landfill operations per site plan dated 6-15-10 and received on 7-19-10 and the response letter with the same date. Site plan includes 100 foot setback from right-of-way of Island Point Road for placement of waste materials and a series of screening and buffering measures along Island Point Road and the residential property along the eastern boundary of the landfill operations.
Also included in this permit review is a phasing plan and closure plan. The landfill operation is an accessory use to Marshall Steam Station and will only include material generated on-site.

Zoning Official

Finaled Date 01-Nov-2010 **Print Date** 11/1/2010

APPENDIX IV – PROJECT DOCUMENTATION

Section 1 – Construction Photographs
Section 2 – Field Reports
Section 3 – Minutes of Key Meetings
Section 4 – Notices of Change
Section 5 – Issued for Construction Drawings

APPENDIX IV – PROJECT DOCUMENTATION
Section 1 – Construction Photographs

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Charlotte, NC 28273

Photograph 1

Date: 4-12-10

Photographer: William Harrison

Location / Orientation	Middle of Cell 1 Facing East
Remarks	Excavation to subgrade elevation

Photograph 2

Date: 4-29-10

Photographer: William Harrison

Location / Orientation	Northwest corner of Cell 1 South
Remarks	Cell 1 Compacted Soil Liner (CSL) construction with sheep's foot roller, smooth drum roller, and motor grader.

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Charlotte, NC 28273

Photograph 3

Date: 5-5-10

Photographer: Will Harrison

Location / Orientation	Southeastern corner of Cell 1 facing southwest
Remarks	Construction of .1700 Rules Structural Fill as subgrade for Cell 2 during Cell 1 CSL construction.

Photograph 4

Date: 6-14-10

Photographer: Ken Daly

Location / Orientation	Center of Cell 1 Facing Northwest
Remarks	Deployment of secondary geomembrane over GCL in the northwest corner of Cell 1

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Charlotte, NC 28273

Photograph 5

Date: 6-18-10

Photographer: Ken Daly

Location / Orientation	Center of Cell 1 Facing Northeast
Remarks	GCL deployed over southern portion of Cell 1 prior to secondary geomembrane deployment

Photograph 6

Date: 3-20-10

Photographer: Jimmy Addis

Location / Orientation	Eastern edge of Cell 1 facing southwest
Remarks	Excavation to Cell 2 subgrade in cut areas and fill to Cell 2 subgrade elevation in .1700 Rules Structural Fill area during GCL and secondary geomembrane deployment in Cell 1

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Charlotte, NC 28273

Photograph 7

Date: 6-18-10

Photographer: Ken Daly

Location / Orientation	Center of western edge of Cell 1 facing south
Remarks	Anchor trench at Intercell/Interphase Berm on western edge of Cell 1.

Photograph 8

Date: 7-08-10

Photographer: William Harrison

Location / Orientation	Southwestern corner of Cell 1 facing east
Remarks	Protective cover placement subsequent to primary geocomposite deployment in Cell 1

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Charlotte, NC 28273

Photograph 9

Date: 7-14-10

Photographer: William Harrison

Location / Orientation	Western end of Cells 1 and 2 intercell berm facing east
Remarks	Geosynthetic runout on intercell berm for subsequent Cell 2 to Cell 1 tie-in operations

Photograph 10

Date: 7-21-10

Photographer: Ken Daly

Location / Orientation	Western end of Cell 1 facing east
Remarks	Placement of drainage aggregate in the Cell 1 LCS corridor

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Charlotte, NC 28273

Photograph 11

Date: 8-17-10

Photographer: Jimmy Addis

Location / Orientation	West end of Cell 1 facing east
Remarks	Cell 1 corridor covered with nonwoven geotextile with check dams completed.

Photograph 12

Date: 7-20-10

Photographer: Jimmy Addis

Location / Orientation	Western end of Cells 1 and 2 intercell berm facing southeast
Remarks	Deployment of GCL in Cell 2 preceding secondary geomembrane installation

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Charlotte, NC 28273

Photograph 13

Date: 7-30-10

Photographer: Kyle Baucom

Location / Orientation	Eastern end of Cells 1 and 2 intercell berm facing southwest
Remarks	Primary geomembrane installed in Cell 2

Photograph 14

Date: 8-02-10

Photographer: Kyle Baucom

Location / Orientation	Center of Cell 2 facing southwest
Remarks	Seaming of LCS geocomposite in Cell 2

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Charlotte, NC 28273

Photograph 15

Date: 9-21-10

Photographer: Ken Daly

Location / Orientation	Leachate forcemain trench
Remarks	Pressure gauge prior to pressure testing of leachate forcemain

Photograph 16

Date: 9-21-10

Photographer: Ken Daly

Location / Orientation	Cell 1 Leachate Manifold
Remarks	Two LCS and one LDS discharge pipes from Cell 1 sumps with flow meters and check valves with tee connections to 6” diameter forcemain.

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Charlotte, NC 28273

Photograph 17

Date: 10-7-10

Photographer: Will Harrison

Location / Orientation	Southern perimeter of Cell 2 facing south
Remarks	Waste limit and liner limit markers.

Photograph 18

Date: 10-7-10

Photographer: Will Harrison

Location / Orientation	Northeast corner of Cell 1 facing southwest
Remarks	LCS modifications including riser pipes installed in Cell 1

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Charlotte, NC 28273

Photograph 19

Date: 10-7-10

Photographer: Will Harrison

Location / Orientation	Generator and power distribution pad at northeast corner of site
Remarks	Back-up emergency generator and power distribution panel installed

Photograph 20

Date: 12-14-10

Photographer: Will Harrison

Location / Orientation	East of Cell 2 facing west
Remarks	LCS/LDS pump control panels with visual and audible alarm features installed

APPENDIX IV – PROJECT DOCUMENTATION
Section 2 – Field Reports

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953

Field Report

Date	Job No.
03/23/10	1356-08-122 Ph. 7

Project/Location
Marshall Steam Station

Contractor	Weather/Temp
Earnhardt	Sunny / 68

Present at Site
Will Harrison-S&ME, Inc.
Travis Bowman-S&ME, Inc.
Wilson Warlick-EGI

Time	Mileage
0700-1145	80 mi. round trip

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density

Other (Explain)
Test Pit Excavation

Observations/Remarks:

Left S&ME Charlotte office for Marshall Steam Station (MSS) at approximately approx. 0710. Called Fred Brown of EGI to discuss excavator plan. Fred indicated excavator would be available when we arrive and to contact Wilson Warlick, EGI's site superintendant for this project. Called Travis and asked to meet at Lowe's before entering MSS to assist in picking up buckets and discussing test pit plan. Arrived at Lowe's off of HWY150 in Mooresville, NC at approx 0750 and met Travis Bowman. Purchased 18 buckets from Lowe's and discussed overall plan with Travis while in the Lowe's parking lot. Then crossed road to purchase baggies at Bloom while Travis left for Marshall Steam Station. Arrived at MSS at approx. 0815 and passed through rear gate.

Conducted tailgate safety meeting with Travis at Crowder's trailer area. Established contact with Wilson who informed us that EGI's trailer was arriving today and he would be arranging that. Informed Wilson of overall test pit plan and left for stockpile area with Travis. Haul road appeared in passable condition though some rutted areas encountered.

Arrived at stockpile area and pointed out the staked test pit locations. Discussed purpose of test pit observation and sampling, configuration of landfill liner system, and landfill layout. Discussed with Travis the method of sampling to be followed; baggie samples of every soil type encountered, and a bucket sample of the red-brown clayey silt material in the top few feet. Refer to attached figure for Test Pit layout.

Wilson arrived and noted that as the excavator was parked in the excavation area, that the test pits in that area could be done first to save time. The group agreed to start in the excavation area. Before leaving the stockpile area, presented Wilson with 2 copies of the Issued For Construction drawings, as previously requested by EGI. Noted that 4 of the test pits(EA-1,EE-1,EF-1,EG-1) in the excavation area were in the woods and discussed with Wilson that these could be observed after clearing. Wilson provided an EGI employee as operator for the CAT 365L excavator. Discussed test pit excavation plan with operator noting that in the excavation area, the test pits will be excavated to the bottom of the red brown clayey silt layer. Proceeded with test pit observation and soil sampling from west to east starting with ED-2, and following with EF-2, EG-2, and finally EH-2. Excavator became temporarily stuck in fly ash at NE corner of structural fill and had to reroute between EF-2 and EG-2.

Upon completion of test pit observation and sampling, travelled with Travis over to the stockpile area and discussed with operator that the stockpile test pits would be excavated to a depth of 8-FT. Discussed with Travis that baggie samples should be taken as well as one composite bucket sample at each test pit in the stockpile area. Discussed with Travis that test pit SB-3 was staked approx 20-Ft down the eastern slope of the stockpile and that this could be relocated up to the top of the slope should excavating on the sideslope prove unsafe. Assisted Travis before leaving by placing and labeling buckets at stockpile test pit locations and left the stockpile area.

Contacted Darrell Wolfe and informed him that I had 2 copies of Issued for Construction drawings for himself and Dean Snyder. Darrell agreed to meet at the back of the station administrative building. Met Darrell and discussed project issues. Left the site at approximately 11:45 AM for S&ME's Charlotte office.

END OF REPORT

ATTACHMENTS
3-23-2010 Test Pit Layout Figure

Wilson Warlick / EGI
On-Site Representative/Company

Will Harrison
S&ME Personnel

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S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953

Field Report

Date	Job No.
03/29/10	1356-08-122 Ph. 7

Project/Location
Marshall Steam Station

Contractor	Weather/Temp
Earnhardt	Sunny / 70+

Present at Site
Will Harrison-S&ME, Inc.
Travis Bowman-S&ME, Inc.
Wilson Warlick-EGI

Time	Mileage
0830-1630	80 mi. round trip

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density

Other (Explain)
Meeting/Site Visit

Observations/Remarks:

Left S&ME Charlotte office in S&ME vehicle T-875 (Ford Explorer SUV) for the landfill Pre-Construction Meeting at Marshall Steam Station (MSS) at approximately approx. 0830. Arrived at MSS at approx. 0930 and passed side gate and travelled up to the warehouse where the meeting was to be held. Pre-Construction meeting lasted from approximately 1000 to 1300. Following the meeting travelled with NCDENR and Duke personnel to visit the site. Due to impassable condition of the haul road, group decided to access the landfill site from along Island Point Road. Walked across road and noted condition of structural fill. Observed that no land disturbing activity had been performed by the landfill contractor. Discussed Cell 1 and Cell 2 layout with NCDENR personnel and concluded site visit at approximately 1330.

Travelled back to the warehouse with Dean Snyder and discussed excess .1700 rules structural fill. Discussed other change information as well. Carlton Allred joined the discussion. Discussed that S&ME was to estimate excess volume based on Fred Brown's (EGI) survey information. Left site at approximately 1530 arrived back at Charlotte office at approximately 1630

END OF REPORT

ATTACHMENTS
none

Darrell Wolfe / Allied Technical
On-Site Representative/Company

Will Harrison
S&ME Personnel

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Field Report

Date 3/30/10	Job No. 1356-08-122 P.9
Project/Location Marshall Steam station	
Contractor EGT	Weather/Temp clear
Present at Site T. Bowman	
Time 3	Mileage 0

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain) plan + spec review

Observations/Remarks:

Arrived to charlotte office to meet with will and ken to revew plans + specs. Read through specs and highlighted key points and got familar with plans.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

9751 Southern Pine Blvd.
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

FIELD REPORT

Date:	Job No.:
3/31/10	1356-08-122 PH 09

Project/Location: Marshall Steam Station

Contractor:	Weather/Temperature:
Earnhardt	Clear/70s

Present at Site:
Travis Bowman - S&ME, Inc.
Will Harrison - S&ME, Inc.
Wilson Warlick - EGI

Time:	Mileage:
4.5 hours	80 mi RT

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☒ Other (Explain)

Test Pit Excavation

Observations/Remarks:

S&ME Field Tech (T. Bowman) arrived on site at Marshall Steam Station as requested by contractor for six test pit observations. The six locations were EA-1, EE-1, EF-1, EG-1 which were located in the woods at North end of site with the other two EF-3 and EF-4 were in open area of cell. A tailgate safety meeting took place as soon as Will H arrived including Darrell with Duke and Will with S&ME and Travis with S&ME. Samples were taken by bag and bucket from test pits. One test pit was done at area to be called in by Jamie (EGI) to Will for location. The test pit was 3 feet deep. Bag and bucket samples were brought to lab. EGI was moving structural fill (fly ash) from cell one to cell two. S&ME asked Kevin (EGI) to inform Jamie of area where location was needed.

Wilson Warlick
On-Site Representative/Company

T. Bowman
S&ME Personnel

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S&ME
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Charlotte, NC 28273
(704) 523-4726
(704) 525-3953

Field Report

Date	Job No.
03/31/10	1356-08-122 Ph. 7

Project/Location
Marshall Steam Station

Contractor	Weather/Temp
Earnhardt	Sunny / 70+

Present at Site
Will Harrison-S&ME, Inc.
Travis Bowman-S&ME, Inc.
Wilson Warlick-EGI

Time	Mileage
0720-1200	80 mi. round trip

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density

Other (Explain)
Test Pits / Site Visit

Observations/Remarks:

Left S&ME Charlotte office in S&ME vehicle T-834 (Ford Explorer SUV) for Marshall Steam Station (MSS) at approximately approx. 0720. Arrived at MSS at approx. 0805, passed through rear gate and travelled to landfill site. Met Darrell Wolfe, Wilson Warlick, Travis Bowman, Fred Brown, and Jamie Lineberger on the Cell 1 structural fill. Observed that contractor was clearing trees on the north side of the landfill along Island Point Road as well as moving .1700 Rules structural fill (fly ash) from Cell 1 to Cell 2. Conducted tailgate safety meeting with Darrell Wolfe and Travis Bowman. Discussed layout of remaining test pits and plan of attack with Travis Bowman and Jamie Lineberger. Due to lack of fuel, test pit excavation was postponed for approximately 1 hour. In the mean time, walked the east side of the excavation area with Travis Bowman and discussed protective cover requirements and that Travis will need to sample the protective cover material after the clay test pits are conducted. Noted the area from which the sample should be taken (in the middle of the Stage 1 of Phase 1 borrow area within the excavation area). Following this, once the excavator was fueled up, stayed with Travis Bowman for first test pit and then left site at approximately 1100. Arrived back at Charlotte office at approximately 1200.

END OF REPORT

ATTACHMENTS
none

Wilson Warlick / EGI
On-Site Representative/Company

Will Harrison
S&ME Personnel

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S&ME
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Field Report

Date 4/1/10	Job No. 1856-08-122 P.9
Project/Location Marshall steam station	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 8:50	Mileage 80 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite for FDTs in cell two fill area. Two test were performed. EGI was shuttling fly ash from cell one and placing it in cell two. Tech also observed EGI clearing trees on north end of site. Tech picked up and delivered two proctor samples to lab for testing.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
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Field Report

Date 4/5/10	Job No. 1356-08-122 P.9
Project/Location Marshall steam station	
Contractor EGI	Weather/Temp clear/ 80's
Present at Site Travis W. Bowman	
Time 8	Mileage 80 r/t

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. S&ME was not onsite for the 7am safety meeting but observed the site conditions and the work being done to be aware of my surroundings and safety. EGI was using two offroad cat 740 trucks, a cat 365 trackhoe to load the fly ash into trucks in cell one and then fly ash was hauled to cell two and then spread out by a cat D6L Dozer. After the lift was complete EGI compacted the fly ash by rolling loaded off road trucks over it. S&ME had to perform two retest from Thursday due to low compaction. EGI superintendant Wilson Warlick was informed about the failing test and re-rolled the entire cell and the test were taken. EGI was also removing the debris from the cleared area in cell one and hauled to cell two. A Komatsu PC 350 trackhoe with the claw loaded two cat 740 offroad trucks and they hauled the wood debris to cell two and was piled up by a cat 963 loader. S&ME performed one density test on the fly ash and location is attached. Had a conversation with Wilson about schedule and he stated that we would not be needed until next week, also let Wilson and Dennis know that I was leaving site. The three test performed required 95% compaction. EGI moved 2,530 yds of fly ash from cell one to cell two. A total of 11,770 yds of fly ash was moved from cell one to cell two.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

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Field Report

Date 4/7/10	Job No. 1356-08-122
Project/Location Marshall steam station	
Contractor	Weather/Temp clear
Present at Site T. Bowman	
Time 1	Mileage

To: _____

Observations/Remarks:

On site as requested to perform sampling/testing for the following items:

☐ Subgrade Observations ☐ Proofroll

☐ Other _____

Deficiencies Noted ☐ Yes (see comments) ☐ No

Equipment Utilized: _____

Location: _____

Density testing of compacted material

☐ Soil ☐ Stone ☐ Asphalt

Using: ☐ Nuclear Density Gauge ☐ Test results and locations attached

☐ Drive Tubes All tests met specifications ☐ Yes ☐ No

☐ Sand Cone Collected Bulk Sample(s) ☐ Yes ☐ No

General locations: _____

Foundation bearing materials evaluation

Design allowable bearing capacity: _____ psf

☐ Deficiencies Noted ☐ Yes (see comments) ☐ No

Location: _____

Comments: Tech had meeting with Will and Ken about job specs. Had conversations with Jimmy with questions about site specifics.

On-Site Representative/Company

S&ME Personnel

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S&ME Form SRSF02

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953

Field Report

Date 04/09/10	**Job No.** 1356-08-122 Ph. 7
Project/Location Marshall Steam Station	
Contractor Earnhardt	**Weather/Temp** Sunny / 70+
Present at Site Will Harrison-S&ME, Inc. Travis Bowman-S&ME, Inc. Wilson Warlick-EGI	
Time 1100-1330	**Mileage** 80 mi. round trip

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density

Other (Explain)
Test Pad Preparation

Observations/Remarks:

Met Travis Bowman at the jobsite trailer. Met with Jamie Lineberger and Wilson Warlick, who were breaking for lunch, and discussed purpose of meeting on site, which was to prepare for test pad work to be performed on Monday of the following week (4/12/2010). After they left for lunch, travelled with Travis to the landfill area and observed that construction activities included excavation in and around the Stage 1 of Phase 1 borrow area as well as stripping the areas cleared in the last week (at the north end of the site). Discussed with Travis that it would be beneficial to practice driving the UD tubes to make Monday's work flow more efficient, as more people would be waiting on Monday. Attempted to drive the UD tubes with the bucket of an excavator. After 3 trials Wilson, who had arrived back from lunch, suggested the D6 blade be used to push the UD tubes as it had a flatter bottom and more vertical travel than the excavator.

The first attempt using the D6 proved successful and it was discussed that this method would work best on Monday.

Wilson Warlick asked several questions related to the compacted soil liner and the test pad. These questions are summarized below:

- How long will the test pad test samples take to test? I answered that we would prioritize them, but that they would take at least 1 week to complete.
- What moisture/density requirements are there? I answered that a good summary of the spec is to say 95% compaction and a moisture content at least equal to optimum. We discussed that the spec limits the moisture to less than 5% greater than optimum but that if the moisture was 5% greater than optimum, the density would likely fail to meet the 95% of maximum dry density requirement.
- What do preliminary results show, permeability wise? I answered that preliminary results indicated upper material at test pit ED-2 had permeability of $5*10^{-7}$ cm/s and that this was well below the specified maximum permeability of $1*10^{-5}$ cm/s.
- Could the test pit be built upon the residual soils instead of the ash? We discussed contamination of the ash into the clay material and agreed that we could construct the test pad in residual soils. As the thickness of the test pad lifts would be difficult to measure being built upon similar material, asked if Jamie Lineberger could survey points within the test pad to measure lift thickness. Wilson Warlick said that Jamie would be available all day and that this could be done.

After this discussion, walked the north end of the site with Jamie Lineberger after he had said some of the trees to be cleared had not yet been cleared owing to a note from Darrell Wolfe saying to stop clearing. After walking the area in question, concluded that this was fairly minor (a few additional trees to remove).

Collected equipment and left the site at approximately 1:30 PM.

END OF REPORT

ATTACHMENTS
none

Wilson Warlick / EGI
On-Site Representative/Company

Will Harrison
S&ME Personnel

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Mooresville, NC 28115-7899
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Field Report

Date 4/12/10	Job No. 1356-08-122
Project/Location Marshall Steam Station	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman, W. Harrison	
Time 12	Mileage 80 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by EGI to test and observe the 100' X 35' test pad being built in cell 2 for cell 1 fill. S&ME observed the 100' X 35' area with a proofroll with a volvo 740 offroad trk and the area appeared to be firm and suitable to build the test pad. SEFA was hauling ash into cell 2 which was being tested by sheildeng. EGI was hauling soils from cell 1 to an onsite stockpile using two volvo 740's and a cat 365 trackhoe. EGI was using a cat 315 trackhoe to load one volvo 740 offroad truck with clay material for test pad. The test pad was leveled with a cat dozer and rolled with a cat 815 roller. S&ME checked pad thickness with Jamie with EGI and his GPS. point one Lift 1 +0.49, point 2 Lift 1 +0.53 point 3 lift 1 point one lift 2 +1, point 2 Lift 2 +1, point 3 lift 2 +1 point one lift 3 +1.5, point 2 Lift 3 +1.5, point 3 lift 3 +1.5. The last lift was dry of optimum and water was added and was still not enough so EGI had to disc up the area and rewet and recompact. Site work did not get finished until 7pm. Wilson W. informed Darryl of late work

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
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(704) 525-3953

Field Report

Date	Job No.
04/12/10	1356-08-122 Ph. 7

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density

Other (Explain)
Test Pad Construction

Project/Location Marshall Steam Station	
Contractor Earnhardt	**Weather/Temp** Sunny / 70+
Present at Site Will Harrison-S&ME, Inc. Travis Bowman-S&ME, Inc. Wilson Warlick-EGI	
Time 0700-1145	**Mileage** 80 mi. round trip

Observations/Remarks:

Left S&ME Charlotte office for Marshall Steam Station (MSS) at approximately approx. 0615. Stopped at the Lowe's in Mooresville to purchase buckets for bulk sample collection. Arrived on site at approximately 7:20. Met Travis Bowman and travelled back to the landfill site, where the test pad area was staked. Conducted site safety assessment, noting that it would be critical to communicate well with the equipment operators as we would be working in very close proximity with them. Relayed ED-2 coordinates to Jamie Lineberger who directed the excavator to the location.

Test Pad Planning:

Coordinated with Travis Bowman and Wilson Warlick an efficient order of test pad operations:

-roll test pad base with loaded hauler and proofroll.
-if proofroll fails, redo
-spread freshly excavated material out and test moistures and perform one-point
-add moisture or dry out if necessary per results of previous step
-compact lift
-verify thickness at two locations per lift
-if lift fails thickness, redo, else,
-complete 3 in-place density tests and moistures per lift
-if lift fails compaction or moisture criteria, redo, else
-push UD tubes next to thickness verification points
-move on to next lift

Test Pad Construction: Observed from the test pad area that the material excavated from the ED-2 area appeared consistent in color, with the suitable clay liner material tested previously. Observed rolling of test pad subgrade and simultaneous proofrolling with Travis Bowman. Test pad subgrade proofrolled by a CAT 750 articulated hauler loaded with the first batch of clay liner material excavated from ED-2. Subgrade was accepted. Notified Wilson Warlick to have Jamie Lineberger get base elevations for the two points within the test pad to be used for thickness verification purposes. D6 dozer spread material in loose lift across test pad area. Obtained bulk sample from first lift. Moisture and one-point tests were performed prior to compaction. One point plotted on Family of Curves plot. Initial moisture appeared wet of optimum and material was left out to dry. Additional moisture samples were obtained from the side and center. Moistures indicated wet of and close to optimum. Relayed to Wilson Warlick that compaction could begin. Observed compaction of first lift by CAT 815B sheep foot roller with roller on each axle. 815B made 5 passes over the test pad. When compaction stopped had loose upper material pushed aside to provide smooth base for measurement and testing. Jamie Lineberger measured compacted lift thickness at two locations (Point 1 N687140.26, E1413970, Z at test pad subgrade 860.25 – Point 2 N687099.44, E1413969.51, Z at test pad subgrade 859.52). The thicknesses were 0.49 ft and 0.53 feet, close to the specified maximum lift thickness of 6 inches. Travis Bowman conducted three in-place density tests (two near the thickness verification points and one in between). While densities were being performed discussed Cell 2 structural fill issues with Darrell Wolfe, Carlton Allred, and Jerry Combs. Jerry Combs said that the Cell 2 area was slightly overbuilt to promote drainage into the ditch and that the southern end of Cell 2 would need to be overbuilt to intersect the drainage ditch. Densities were greater than 95% and moistures were all above and less than 5% greater than optimum. Took two UD samples (one near each thickness verification point). First UD tube was pushed with blade of 815 and ended up slightly crooked. Due to this, decided to jack in subsequent tubes. Second tube (jacked in using the 815 blade bar as a push point) sampled well. Left test pad area at approximately 11:45AM for the Charlotte office.

END OF REPORT

ATTACHMENTS

Wilson Warlick / EGI
On-Site Representative/Company

Will Harrison
S&ME Personnel

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S&ME
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Field Report

Date 4/13/10	Job No. 356-08-122 P.9
Project/Location Marshall steam station	
Contractor	Weather/Temp clear
Present at Site T. Bowman	
Time 1	Mileage Ø

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain)

Observations/Remarks:

Tech met with W. Harrison about schedule and watched Jennifer extract one VD tube.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF03

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date 4/14/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp Clear
Present at Site T. Bowman, W. Harrison, K. Daily	
Time 3.5	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain) Site Meeting

Observations/Remarks:

S&ME arrived onsite as requested by contractor for the scheduled meeting for schedule and site activities.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 4/15/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman	
Time: 9	Mileage: 120R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to perform field density test on soil being placed for the berm on west of cell one and south of cell one. The fill was placed paddle pan cat 623 E and compacted with the cat 815 B roller. EGI was cutting soils from east end of cell one and hauling to stockpile using the cat Trackhoe 365 B and cat Track hoe 330 c to load the cat 740 offroad trucks. EGI was using the cat Dozer D6N with GPS to move soils to track hoes. EGI was using the A25C offroad water truck to wet ash to keep dust down. S&ME performed five field density test on berm. Also the motor grader cat 14G was used in leveling the berm for the 815B cat roller.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
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(704) 662-8625
(704) 662-8735 fax

Field Report

Date 4/16/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 9	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to perform field density test on fill being placed for the south and west berms of cell one. S&ME performed five field density test. EGI was using the cat 623E paddle pan to place the fill and the cat motor grader 14G and used the cat 815B Roller. EGI was hauling soil from cell one to the stock pile and they were using cat trackhoe 365B and cat trackhoe 330C to load the cat 740 offroad trucks and the cat D6N Dozer with GPS to push soils to trackhoes to be loaded. EGI was using the A25C offroad water truck.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF03

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 4/19/10	Job No. 1355-08-122 P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman	
Time: 9	Mileage: 120 r/t

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to perform field density test on slafor the berm being placed on the south and west ends of cell one. S&ME perform five field density test. EGI was using cat 623E paddle to pickup and place the fill and the cat Dozer D6N with GPS to blade and spread it and the cat 815B roller to compact. EGI was using the A25C water trk to keep dust to a minimum. EGI was hauling soils to a stock pile and using the cat track hoe 365B and cat trackhoe 330C to load the cat 740 offroad trucks to haul material to stockpile. EGI also received a shipment of six tractor trailer loads of liner. Sefa was placing fly ash in cell two. Surveyors arrived onsite and started to check f/g&SL grade in cell one.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953

Field Report

Date 04/22/10	**Job No.** 1356-08-122 Ph. 7
Project/Location Marshall Steam Station	
Contractor Earnhardt	**Weather/Temp** Sunny / 70+
Present at Site Will Harrison-S&ME, Inc.	
Time 0900-1730 OST: 6.5hr	**Mileage** 80 mi. round trip

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ■ Proofrolling
- ☐ In-Place Density

Other (Explain)

Observations/Remarks:

Left S&ME Charlotte office for Marshall Steam Station (MSS) at approximately approx. 0900 in company vehicle T-834. Attended construction meeting with contractor and owner. Travelled out to work area.

Proofroll Planning:
Coordinated with Wilson Warrick an efficient order of proofroll operations. Discussed that surveyor was only approving the elevations at subgrade over the ash portion of Cell 1. Discussed that I intended to use a loaded CAT 750 hauler and that it should travel back and forth track to track.

Proofrolling:
Walked along with CAT 750 observing subgrade proofroll and probing next area to be proofrolled. Stayed in area with respect to truck driver, such that I was visible and not in the hauler's path of travel and such that I could observe subgrade. After about 50 feet of track to track proofrolling, and observing that the subgrade appeared well compacted, I instructed the CAT 750 driver to space out passes by half an axle. In this manner, the subgrade still received two passes in each direction, as specified. Subgrade on west half of was accepted. During proofrolling of east portion of the ash subgrade in Cell 1, observed 5 areas where subgrade was unsuitable and instructed EGI to remove subgrade material in these areas. These areas are shown in the attached documents. Instructed excavator to continue removing material to a depth where material probed well. Measured and verified dimensions of undercut areas with Jamie Lineberger of EGI and Wilson Warrick. The total volume of material was approximated at ~130CY. Instructed EGI to replace removed material with material from excavation area (observed to be tan fine sandy silt – SM and near optimum moisture content by manual classification). EGI used a sheep-foot roller followed by a smooth-drum roller and I accepted compacted new material by probing. Corridor probed well and subgrade in corridor in the ash fill region was accepted. Instructed Wilson Warrick to remove areas where roots were sticking out of subgrade in the corridor. Wilson Warrick indicated that this would be done but that the areas of subgrade where excavation was performed in soil did not need to be verified currently.

Verified with EGI surveyor Aubry (of Donnie Lawrence) that subgrade in ash regions was verified as on-grade.

END OF REPORT

ATTACHMENTS
Documents from Jamie Lineberger
- undercut areas photos
- quantity of undercut

Figure Showing Approximate Undercut Locations

Wilson Warlick / EGI
On-Site Representative/Company

Will Harrison
S&ME Personnel

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S&ME
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Suite 104
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(704) 662-8735 fax

Field Report

Date 4/27/10	Job No. 1356-08-122P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp cloudy/rainy
Present at Site T. Bowman	
Time 9.0	Mileage 120 ft

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to perform field density test on the 1st lift of compacted soil liner in cell one over ash. On the grid the area covered with clay was grid J-O and 5-7 and also grid 4L-M. EGI had already placed the lift but did not compact. EGI used the John Deere 7920 tractor with disc to disc up the area and then used the Cat A25C water truck to wet the clay 3 passes were made. EGI then used the cat 815B to compact 4 passes, then the cat 14G motor grader smoothed the area so the cat CS-563 smooth drum roller could compact and seal off the clay. S&ME performed five field density test with all meeting compaction and moisture requirements. I trained in the afternoon approx 3:20 pm so the rest of test would be completed tomorrow 4/28/10. EGI was hauling soils to the stockpile.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FDIF02

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 4/28/10	Job No.: 1356-08-122P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bo wman	
Time: 8.0	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to perform field density test on the first lift of compacted soil liner in cell one over ash. On the grid the area covered with clay was grid J-O and 5-7 and also grid 4 L-M. EGI did already have the area tested compacted but it was not tested yesterday due to rain. EGI used the John Deere 7920 tractor with disc to disc up the clay and then the cat A25C water truck sprayed the clay 3 passes. EGI use the Cat 815 B to compact 4 passes were made, then the cat 146 motorgrader smoothed the area for the cat CS-563 smooth drum roller could compact and seal off the clay. S&ME performed 5 FDTS and all meet compaction and moisture requirements. EGI began placing the second lift in the SW corner of cell one, they placed the whole lift and would compact tomorrow 4/29/10. EGI was hauling soil to the stockpile. EGI used the cat 330C track hoe to load the 2 cat 740 offroad trucks to place fill.

_____ On-Site Representative/Company

_____ S&ME Personnel

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S&ME Form FRLF03

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
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(704) 662-8735 fax

Field Report

Date 4/29/10	Job No. 1550-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman, W. Harrison	
Time 9	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to perform FDTS on the second lift of compacted soil liner in cell one over ash. Clay was placed over lift one in cell one grid J-O and 5-7 and 4 L-M. The clay was placed 4/28/10 but not all was compacted and will be compacted tomorrow 4/30/10. Six FDTS were performed. EGI used the John Deere 7920 tractor with disc, the cat 815B roller, cat A25C, cat 14G motor grader and cat CS-563. EGI was also placing soil in the stockpile. S&ME also attended the weekly meeting.

On-Site Representative/Company

S&ME Personnel

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S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date 4/30/10	Job No. 1556-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 7	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to perform FDTS on lift 2 in cell one. The test 19-21 area on grid was disced wet and rolled today but test 17+18 area was done yesterday. EGI used the John Deere 7920 tractor with the disc to disc up the clay, they used the cat 815B roller for compaction 4 passes they use the cat A 25C offroad water trk and the cat 14 G motor grader and cat CS-563 smooth drum roller. EGI was also placing soils in the stock pile. S&ME will be back onsite monday 5/3/10 for undercut observation.

On-Site Representative/Company

S&ME Personnel

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S&ME
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(704) 662-8735 fax

Field Report

Date: 5/3/10	Job No.: 1356-08-122 P-9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: cloudy/rainy
Present at Site: T. Bowman	
Time: 1	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor, but no work was or would be taking place due to rain.

On-Site Representative/Company

S&ME Personnel

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S&ME
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Field Report

Date 5/4/10	Job No. 1356-08-122 p.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 9	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. S&ME observed EGI hauling soil to the stock pile and the tunnel project. EGI used the cat 365B and cat 330C trackhoes to load the cat 740 offroad trucks. EGI also was keeping the site and haul road wet using the A25 C offroad water truck. S&ME also observed SEFA hauling ash into cell 2.

On-Site Representative/Company

S&ME Personnel

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S&ME
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Suite 104
Mooresville, NC 28115-7899
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(704) 662-8735 fax

Field Report

Date: 5/5/10	Job No.: 1356-08-122P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman	
Time: 10	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to observe EGI hauling soil to the stockpile. EGI was also hauling soil to the tunnel project. EGI was using the cat 365 B and cat 330 C trackhoes to load the cat 740 offroad trucks. EGI was using the A25C offroad water truck to keep site dust down. EGI was using the cat 14G motor grader for grading in cell one.

On-Site Representative/Company

S&ME Personnel

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S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/6/10	Job No.: 1356-08-122P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman, K. Daly	
Time: 8	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to observe EGI hauling soils to stock pile and the tunnel project. EGI was using the cat 365B and 330C track hoes to load the cat 740 off road trucks. EGI was also keeping site and road dust down by spraying water with the 725C offroad water truck. Attended meeting in EGI's office trailer with K. Daly and looked onsite for a new road bed with K. Daly and D. Wolfe along with Sefa. EGI was using the cat 140G motor grader in cell one for fine grading.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF02

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date	Job No.
5/7/10	1356-08-1224.9

Project/Location: Marshall

Contractor	Weather/Temp
EGI	clear

Present at Site: T. Bowman

Time	Mileage
9	120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to observe EGI hauling soil to the stock pile and the tunnel project. EGI was using the cat 365B and cat 330C trackhoes to load the cat 740 offroad trucks. EGI was using the cat 14G motor grader and the cat 623E paddle scan for fine grading in cell one. EGI was using the A25C offroad water truck to keep haul road and site dust down. S&ME verified that rolls of GCL were delivered to site 211212-211214, 211315-211324, 211326-211328, 211431-211446, 211547-211564, 211665-211684, 211785-211799, 211700-211704, 212101-212107. all were delivered to site.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/10/10	Job No.: 1356-08-122P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman	
Time: 6	Mileage: 120 r/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor for site observations. EGI was hauling soil to the stockpile and to the coal tunnel. EGI used the cat Trackhoe 365B and cat Trackhoe 330C to load the cat 740 off road trucks to haul soil to desired location. EGI was also fine grading the north end of cell One. SEFA was hauling fly ash to cell two. EGI was using the cat 14G motor grader for the fine grading.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF03

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/11/10	Job No.: 1356-08-122A9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman	
Time: 6	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor for site work and observations. EGI was loading the cat 740 offroad trucks with the cat 365B and cat 330 C track hoes. The 740s were hauling soil to the coal tunnel project. EGI was keeping road and site conditions sprayed with the A25C offroad water truck. SEFA was hauling flyash to cell two.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIEO2

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/12/10	Job No.: 1356-08-122P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman	
Time: 4	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite for site work and observations. S&ME observed a proofroll on the north end of cell one, see attached grid for locations. EGI was using the cat 330c to load offroad trucks to haul clay from L-N 3 grid and then graded cat dozer D6N with GPS and then rolled with the cat CS-563 Smooth drum roller to seal off. EGI was using the cat 365B Track hoe to load cat 740 offroad trucks to haul soil to the coal tunnel project. SEFA was hauling the Fly ash to cell two.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/13/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman, W. Harrison, K. Daly } S&ME	
Time: 8.5	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite for site work and observations. EGI continued to place clay liner material in the northend of cell one using the cat 330 trackloe to load the cat 740 offroad trucks and spreading the clay with the cat D6N bozer with GPS and then scaling the clay with the cat CS-563 smooth drum roller. EGI was also hauling soil to the coal tunnel project using the cat 365B trackloe to load the cat 740 offroad trucks. SEFA was hauling fly ash to cell two.

On-Site Representative/Company

S&ME Personnel

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S&ME
385 Timber Road
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Mooresville, NC 28115-7899
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(704) 662-8735 fax

Field Report

Date: 5/14/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: Clear
Present at Site: T. Bowman	
Time: 8	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor for site work and observations. EGI was placing clay on the north end of cell one. The cat 330C trackhoe was loading the cat 740 offroad trucks which then dumped for the cat D6N dozer with GPS to spread clay and the cat CS-563 smooth drum roller sealed off the clay. EGI was also using the cat 365 B trackhoe to load the cat 740 off road trucks to haul soil to the coal tunnel project. SEFA was hauling fly ash to cell two.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF03

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/17/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: cloudy/rainy
Present at Site: T. Bowman	
Time: 7	Mileage: 120R/T

To: _____

Observations/Remarks:

On site as requested to perform sampling/testing for the following items:

☐ Subgrade Observations ☐ Proofroll

☐ Other _____

Deficiencies Noted ☐ Yes (see comments) ☐ No

Equipment Utilized: _____

Location: _____

Density testing of compacted material

☐ Soil ☐ Stone ☐ Asphalt

Using: ☐ Nuclear Density Gauge ☐ Test results and locations attached

☐ Drive Tubes All tests met specifications ☐ Yes ☐ No

☐ Sand Cone Collected Bulk Sample(s) ☐ Yes ☐ No

General locations: _____

Foundation bearing materials evaluation

Design allowable bearing capacity: _____ psf

☐ Deficiencies Noted ☐ Yes (see comments) ☐ No

Location: _____

Comments: S+ME arrived onsite as requested by contractor. EGI unloaded 5 truck loads of GCL and covered it with plastic and placed it on plastic. No site work was done due to rainy conditions. EGI used two straps per roll of GCL to unload off of truck and place in storage area.

On-Site Representative/Company

S&ME Personnel

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ENVIRONMENTAL SERVICES

385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date 5/18/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp cloudy/rainy
Present at Site T. Bowman	
Time 7	Mileage 120 R/T

To: _____

Observations/Remarks:

On site as requested to perform sampling/testing for the following items:

☐ Subgrade Observations ☐ Proofroll

☐ Other _____

Deficiencies Noted ☐ Yes (see comments) ☐ No

Equipment Utilized: _____

Location: _____

Density testing of compacted material

☐ Soil ☐ Stone ☐ Asphalt

Using: ☐ Nuclear Density Gauge ☐ Test results and locations attached

☐ Drive Tubes All tests met specifications ☐ Yes ☐ No

☐ Sand Cone Collected Bulk Sample(s) ☐ Yes ☐ No

General locations: _____

Foundation bearing materials evaluation

Design allowable bearing capacity: _____ psf

☐ Deficiencies Noted ☐ Yes (see comments) ☐ No

Location: _____

Comments: S&ME arrives onsite as requested by contractor. EGI received 7 Truck loads of GCL which were unloaded with the cat 330C trackhoe using 2 straps and placing GCL on plastic and covering it with plastic. N/O site work was done due to rainy conditions.

On-Site Representative/Company

S&ME Personnel

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385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/19/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: cloudy/rainy
Present at Site: T. Bowman	
Time: 3	Mileage: 120 R/T

To: _____

Observations/Remarks:

On site as requested to perform sampling/testing for the following items:

☐ Subgrade Observations ☐ Proofroll

☐ Other _____

Deficiencies Noted ☐ Yes (see comments) ☐ No

Equipment Utilized: _____

Location: _____

Density testing of compacted material

☐ Soil ☐ Stone ☐ Asphalt

Using: ☐ Nuclear Density Gauge ☐ Test results and locations attached

☐ Drive Tubes All tests met specifications ☐ Yes ☐ No

☐ Sand Cone Collected Bulk Sample(s) ☐ Yes ☐ No

General locations: _____

Foundation bearing materials evaluation

Design allowable bearing capacity: _____ psf

☐ Deficiencies Noted ☐ Yes (see comments) ☐ No

Location: _____

Comments: S&ME arrived onsite as requested by contractor. EGI received One Truck load of GCL which was unloaded with the cat 330c trackloe and placed on plastic and covered with plastic. No site work due to rainy conditions.

On-Site Representative/Company

S&ME Personnel

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Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date 5/20/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman, will, Cedric } S&ME	
Time 9	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was hauling soil to the coal tunnel project using the cat 740 off road trucks which were being loaded by the cat 365B track hoe. EGI was also preparing part of cell one Grid 5 N-R for a proof roll at lunch time. S&ME also attended site meeting to discuss construction and schedule and various other topics. For proof roll see attached grid

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF03

S&ME
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Suite 104
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(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/21/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman	
Time: 9	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI used the John Deere tractor 1920 with disc to scarify disc up cell one P-T, 5-7 on grid. Then the A25C offroad water truck made 3 passes followed by the cat 815B sleeps foot roller then the cat 146 motor grader and then the cat CS-563 smooth drum roller. S&ME then performed FDTs. The clay conditions appeared to be clumpfree and less than 5% of organics which were removed by hand. EGI was also hauling soil to the tunnel project.

On-Site Representative/Company

S&ME Personnel

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S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date 5/24/10	Job No. 1356-08-124-Pg
Project/Location Marshall	
Contractor EGI	Weather/Temp cloudy
Present at Site T. Bowman	
Time 9	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was grading slope on north end of site and hauling soil to the tunnel project. EGI was using the A25C offroad water trk to keep site and soil pile conditions wet.

On-Site Representative/Company

S&ME Personnel

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S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 3/25/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: cloudy/clear
Present at Site: T. Bowman	
Time: 8	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived Onsite as requested by contractor, S&ME observed EGI loading the cat 740 offroad trucks with the cat 365B trackloe to haul soil to the coal tunnel project. EGI was also using the A25C offroad water truck to keep site dust down.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIEO2

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/26/10	Job No.: 1356-08-122 P.C
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear/cloudy
Present at Site: T. Bowman	
Time: 8	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was hauling soil to the coal tunnel project using the cat 740 offroad trucks being loaded with the cat 365 B track hoe. The soil being hauled to the coal tunnel was excavated from Cell 2. EGI also received shipments of Geo composite.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FR1503

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 5/27/10	Job No.: 1356-08-122P.G
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear
Present at Site: 1, 50 wman	
Time: 8	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was receiving shipments of Geo composite. EGI was hauling soil to the coal tunnel project using the cat 740 offroad trucks that were being loaded with the cat 365 B track hoe. EGI was also working on the berm on the north end of cell one using the cat D6N dozer with GPS.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF03

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date	Job No.
5/28/10	1356-06-122P.9

Project/Location: Marshall

Contractor	Weather/Temp
EGI	clear

Present at Site: T. BO wman

Time: 7

Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☑ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was proofrolling on the East end and the north end of cell one using a cat 740 offroad trk. EGI was hauling soil to the coal tunnel project using the cat 740 offroad trucks being loaded by the cat 365B trackhoe. EGI placed fill for exterior berm on NW of cell one. and S&ME performed FDTs.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FR1F07

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 6/1/10	Job No.: 1356-08-122 P.G
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: cloudy/rainy
Present at Site: T. Bowman	
Time: 6	Mileage: 120R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI received shipments of Geo composite and unloaded with a rubber tire loader and stacked 3 high with no large ~~tears~~ rips in plastic cover.

On-Site Representative/Company

S&ME Personnel

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S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date 6/2/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp Cloudy
Present at Site T. Bowman W. Harrison	
Time 8	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. S&ME attended the luncheon provided by EGI. EGI also received shipments of Geo composite. S&ME performed field density test in NW end of cell one. EGI was using the cat 365B trackhoe to load the cat 740 offroad trucks at the westend of the stockpile area. EGI was using the John deere tractor with disc (7920) to disc up the previous lift and the cat 815B cat roller and then the cat CS-563 smooth drum roller for compaction.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRUF03

S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date 6/3/10	Job No. 1356-08-122.P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman W. Harrison	
Time 5	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was receiving shipments of Geocomposite being unloaded with the rubber tire loader and stacked 3 high with no large rips in the plastic cover. EGI was also placing clay for lift 2 in cell one. S&ME also attended the weekly site meeting.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
385 Timber Road
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(704) 662-8625
(704) 662-8735 fax

Field Report

Date 6/4/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 8	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was receiving loads of Geo composite being unloaded with a rubber tire loader and stacked 3 high with 10 large rips in plastic. EGI was also placing clay in the nw end of cell one using the cat 740 offroad trks being loaded by the cat 365B trackloe and placed by the D6 Dozer. S&ME performed FDTs in cell one.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
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(704) 662-8625
(704) 662-8735 fax

Field Report

Date 6/5/10	Job No. 1358-08-122P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. BOWMAN	
Time 8	Mileage 120 Rt

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. S&ME performed FDTS on clay lift #2 in cell one that EGI compacted using the Cat 815B roller and the cat CS-563 smooth drum roller. when test passed EGI began placing lift 3 in the NW corner of cell one.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

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Field Report

Date 6/7/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 10	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was at the stockpile area with the cat 365B trackhoe loading the Cat 740 offroad trucks with clay and trucks were delivering clay to cell one for lift three. EGI was pumping water from cell one approx 5T on the grid. EGI was placing clay on the NE section of cell one to be compacted and tested tomorrow 6/8/10. EGI was using the Cat Dozer D6N with GPS to blade the clay and the Cat 815B roller and the cat CS-563 smooth drum rollers for compaction. S&ME performed field density test in the NW section of cell one on lift 3. the clay was placed on saturday and compacted today 6/7/10 for testing.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

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Field Report

Date 6/8/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 10	Mileage 120 RT

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was placing lift three in cell One SE section using the cat 365 B trackhoe to load the cat 740 offroad trucks and ~~[illegible]~~ using the cat D6N Dozer with GPS to level and then using the 815B Roller for compaction and the Cat CS-563 smooth drum roller also for compaction. S&ME performed FDTS on compacted clay in the NE section of cell one.

On-Site Representative/Company

S&ME Personnel

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Field Report

Date 6/9/10	Job No. 1356-08-122P,9
Project/Location Marshall	
Contractor EGI	Weather/Temp c
Present at Site T. Bowman	
Time 10	Mileage 120 R.T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was using the cat 365B to load cat 740 offroad trucks with soil from cell two and hauling it to onsite stock pile where it is bladed down using the cat D6H Dozer. EGI was compacting clay in the SE section of cell one using the cat 815B roller and the cat CS-563 roller for compaction. The cat 14G motor grader and the cat D6N Dozer with GPS were fine grading the north end of cell one. EGI's surveyor arrived onsite and staked cell one. S&ME performed FDTS on the NW section of cell one.

On-Site Representative/Company

S&ME Personnel

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Field Report

Date 6/10/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 8	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. EGI was working in cell one lift three. EGI was using the cat 14G motor grader and the cat CS-563 smooth drum roller for compaction. S&ME performed five FDB in the SE of cell one lift three.

On-Site Representative/Company

S&ME Personnel

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Field Report

Date 6/14/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI / ESI	Weather/Temp clear
Present at Site T. Bowman, J. Addis	
Time 10	Mileage 120R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. S&ME observed deployment of geo composite and geomembrane. geomembrane panels 1-28 were deployed in the NW section of cell one. S&ME observed placement.

On-Site Representative/Company

S&ME Personnel

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S&ME
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(704) 525-3953 fax

Field Report

Date	Job No.
June 14, 2010	1356-08-122-09

Project/Location: MSSILF Cell 1 / Terrell NC.

Contractor	Weather/Temp
EGI/ESI	Sunny/72-92°

Present at Site: Wilson Warlick, Mohammed Malimar, Travis Bowman, Daryl Wolfe

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Time	Mileage
13.0	100.0

Observations/Remarks:

Visually inspected compacted soil liner subgrade w/ EGI & ESI representatives, acceptance by all parties. ESI began deployment of the GCL-Bentomat ST on the NW corner of Cell 1, floor & slope covered out 500 feet to the East, stayed out of corridor. All cross seams of gcl were powdered w/ bentonite, and thermobonded. This afternoon geomembrane - 60 mil microspike secondary liner panels 1-28 were deployed over the gcl, approximately 100,518 sq. ft.. Travis monitored deployment, and observed some pressure test. I monitored trial seams, and production field seaming, w/ three wedges welding. Laid out LDT's 1-5. Tie-in weld made (Fusion) of floor panel 56 to North slope panels 7 thru 28. Ballast (geocomposite rolls) placed in anchor trench, and sandbags along leading edges. EGI performed subgrade surface maintenance for tomorrow's deployment area.

EGI mass excavating on East end of Cell 2, hauling to protective cover stockpile.

SEFA placing flyash on West end of Cell 2.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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S&ME
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Field Report

Date 6/15/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI/ESI	Weather/Temp clear
Present at Site T. Bowman J. Adkis	
Time 9.5	Mileage 120R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. S&ME ~~[illegible]~~ pulled destructs for panels 1-28. S&ME also pulled a total of 8 destructs and peels.

On-Site Representative/Company

S&ME Personnel

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S&ME
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Field Report

Date	Job No.
June 15, 2010	1356-08-122-09

Project/Location: MSSILF Cell 1 / Terrell NC.

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Contractor	Weather/Temp
EGI / ESI	Sunny-Hot/73-93°

Present at Site: Wilson W., Mohammed M., Travis B., Daryl W.

Time	Mileage
11.0	100.0

Observations/Remarks:

Jobsite received a half inch of rainfall last evening. EGI request that ESI not go into Cell 1 today, because it's to muddy. EGI dewatered Cell 1 sump area. I finished measuring field seams from yesterday. Marked LDT's 6-8. Trained Travis on tensiometer operation. Test LDT's 1-3, all passed.

EGI mass ~~excavat~~ excavating on ~~South~~ East end of Cell 2, hauling to protective cover stockpile.

SEFA placing flyash on West end of Cell 2.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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S&ME
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Field Report

Date 6/16/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI/ESI	Weather/Temp clear
Present at Site T. Bowman, J. Davis	
Time 9	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as req. ested by contractor. S&ME observed repairs and extrusion welds on secondary geomembrane in the NW corner GA cell one.

On-Site Representative/Company

S&ME Personnel

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S&ME
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(704) 525-3953 fax

Field Report

Date	Job No.
June 16, 2010	13560-08-122-09

Project/Location: MSSILF Cell 1 / Terrell NC

Contractor	Weather/Temp
EGI / ESI	Sunny-Hot / 70-92°

Present at Site: Wilson W., Mohammed M., Travis B., Daryl W.

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Time	Mileage
10.0	100.0

Observations/Remarks:

Rained a half inch onsite again last evening. Compacted soil liner subgrade to wet for geomembrane deployment this morning. EGI will try to prepare SW area of Cell 1 subgrade this afternoon for ESI to deploy on tomorrow. Travis and I monitored ESI as they detailed liner panels 1-28. I logged repairs and Travis observed vacuum box testing. I test LDT's 4-8, all passed job criteria.

EGI continues to mass excavate on the East end of Cell 2, hauling most of material to protective cover stockpile.

SEFA placing flyash on West end of Cell 2, getting close to subgrade.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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S&ME
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Field Report

Date 6/17/10	Job No. 1356-08-1229.9
Project/Location Marshall	
Contractor EGI/ESI	Weather/Temp clear
Present at Site T. Bowman, J. Addis	
Time 10.5	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. S&ME observed ESI placing geo composite and geomembrane in the SW section of cell one, geomembrane panels 29-39 were installed. ESI & S&ME layed out destructs and ESI cut them for S&ME to pull them.

On-Site Representative/Company

S&ME Personnel

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Field Report

Date	Job No.
June 17, 2010	1356-08-122-09

Project/Location: MSSILF Cell 1 / Terrell NC.

Contractor	Weather/Temp
EGI / ESI	Sunny-Hot / 73-93°

Present at Site: Wilson W., Mohammed M., Daryl W., Travis B.

Time	Mileage
13.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

Visually inspected clay subgrade w/ Wilson & Mohammed, was acceptable to all parties. ESI deployed GCL on the SW floor from the interphase berm over & thru corridor, squared off w/ 6/14/10 lined area. After lunch geomembrane panels 29-39 (113,832 sq.ft.) were deployed. I monitored field seaming of two fusion wedges. Marked repairs and laid out LDT's 9-19. ESI detailed panels 29-39 this afternoon. I observed pressure test of today's seams, and test LDT's 9-10, which passed. Travis monitored deployment and vacuum box testing of repairs. Panels 29-39 QC'd out. Leading edges of liner sand bagged.

EGI prepared clay subgrade for tomorrow.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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Field Report

Date	Job No.
June 18, 2010	1356-08-122-09

Project/Location: MSSILF/Cell 1/Terrell NC

Contractor	Weather/Temp
EGI/ESI	Sunny/72-92°

Present at Site: Wilson W., Mohammed M., Travis B., Darrell W., Ken D. - Will H., Fred B.

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Time	Mileage
13.0	100.0

Observations/Remarks:

Visually inspected clay subgrade surface w/ EGI & ESI reps. and found surface to be acceptable for installation of the geomembrane. ESI deployed GCL (Bentomat ST) on the North slope all the way across cell 1 floor to top of interphase berm, approximately 330 ft more to East end of cell. I pulled lab destruct samples 12-19, all passed spec. criteria. Set in on weekly const. progress meeting. This afternoon looked at super groove on underside of the gcl w/ Ken, he is concerned that groove is not continually exposed/open. ESI offered to powder seams if bentonite was provided, only enough powder ordered to do cross/butt seams. With the amount of gcl down already (3+acres), Ken o.k. w/ covering. Observe ESI as they deploy geomembrane panels 40-71 137,915 sq.ft. approximately. Observe trial seams ~ all o.k.. Track four fusion wedges this afternoon, laid out LDT's 20-30. Travis monitored deployment, and some pressure test. Tie-in welds made, one across cell floor, and the other along North slope.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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Field Report

Date 6/18/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor EGI/ESI	Weather/Temp clear
Present at Site T. Bowman, J. Aldis	
Time 10.5	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. S&ME observed ESI placing geocomposite in Cell one. ESI also placed geomembrane panels 40-71. S&ME observed deployment of geomembrane.

On-Site Representative/Company

S&ME Personnel

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Field Report

Date	Job No.
June 19, 2010	1356-08-122-09

Project/Location: MSSILF Cell 1 / Terrell NC.

Contractor	Weather/Temp
EG1/ES1	Sunny-Hot/74-94°

Present at Site: Kevin A., Mohammed M., Travis B.

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Time	Mileage
13.0	100.0

Observations/Remarks:

Visually inspected the clay subgrade surface w/ EG1 & ES1 and found it to be acceptable for installation of the geomembrane. Observe ES1 as they deploy gcl (Bentomat ST) on Cell 1 East floor and 6:1 slope, remaining subgrade completely covered now. ES1 deployed geomembrane panels 72-100 (approximately 95,068 sq.ft.), secondary liner install ~100%. I tracked three wedges, and laid out LDT's 31-37. One extrusion gun #5171, worked detailing all day. ES1 cut LDT's up to #33 today, patched holes. Ballast placed in East anchor trench.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date 6/19/10	Job No. 1356-08-122A9
Project/Location Marshall	
Contractor EGI/ESI	Weather/Temp clear
Present at Site T. Bowman, J. Addis	
Time 8-5	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor. S&ME observed ESI placing geo composite and geomembrane panels 72-100 in cell one. ESI cut destructs and S&ME would pull them.

On-Site Representative/Company

S&ME Personnel

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S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
June 20, 2010	1356-08-122-09

Project/Location: MSSLF Cell 1 / Terrell NC

Contractor:

Weather/Temp: Sunny / 70-92°

Present at Site:

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Time	Mileage
10.0	100.0

Observations/Remarks:

Finished measuring field seams from 6-19-10. Laid out LDT's 38-43. Mark and log repairs up to 135. Test Ldt's 20-25, all passed. Write field reports for the week.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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S&ME
385 Timber Road
Suite 104
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(704) 662-8735 fax

Field Report

Date: 6/21/10	Job No.: 1356-08-122P.9
Project/Location: Marshall	
Contractor: ESI/EGI	Weather/Temp: clear
Present at Site: T. Bowman, J. Addis	
Time: 11	Mileage: 120 Rt

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to observe geomembrane placement.

On-Site Representative/Company

S&ME Personnel

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S&ME
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(704) 525-3953

Field Report

Date	Job No.
06/21/10	1356-08-122 Ph. 7

Project/Location
Marshall Steam Station

Contractor	Weather/Temp
Earnhardt, ESI	Sunny / 95+

Present at Site
Ken Daly, Will Harrison, Travis Bowman -S&ME, Inc.

Time	Mileage
14:00 – 17:00	80 mi. round trip

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density

Other (Explain)

Observations/Remarks:

Arrived at Marshall Steam Station for meeting with Dean Snyder, Steve Immel, and Darrell Wolfe at about 14:00. Meeting to review the fencing and planting plan and discuss path forward.

About 16:00 travel to the landfill construction site to observe conditions. Reviewed safety subject with EGI's Dennis Pickel and signed-in at the job site. ESI observed in the process of shutting down for the day at this time. Observations indicate that about the western half of Cell 2 has been covered with GCL and geomembrane. EGI is placing the LCS corridor in Cell 1 and preparing/maintaining the compacted soil liner in the rest of Cell 2.

Met Will Harrison and Travis Bowman in the Cell 2 area. We observe the Cell 2 geosynthetics and Will and Travis provided me an update on activities today. We observed Cell 1 construction of LCS corridor. We observed the Cell 1 sump where sediment had been removed from prior rainfall/erosion. Observed 3 locations in/around the sump where the geocomposite was damaged by equipment removing the sediment. The damage appears to be to the top geotextile and geonet and not to the bottom geotextile. The geocomposite will be repaired in the near future by cutting the damaged pieces and patching. I instructed Will and Travis to observe the underlying geomembrane condition when the geocomposite is repaired.

I departed the site at about 16:55.

Ken Daly

On-Site Representative/Company **S&ME Personnel**

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S&ME
9751 Southern Pine Blvd
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(704) 523-4726
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Field Report

Date	Job No.
June 21, 2010	1356-08-122-09

Project/Location: MSSI LF Cell 1 / Terrell NC

Contractor	Weather/Temp
EGI / ESI	Sunny / 75-96°

Present at Site: Wilson W., Mohammed M., Darrell W., Travis B.

Time	Mileage
12.0	100.0

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

ESI detailed and performed non-destructive testing this morning on East half of cell. I finished up marking repairs up to 161. Travis observed v-box testing, this am, and during the afternoon he test Ldt's 25-42. All Ldt's passed job criteria for shear & peel values. After lunch ESI started deploying geocomposite (330-2-8 & some 350-2-8) on the SW corner, stingle towards and thru the corridor by one panel. A total of 46 rolls put out today, all were zip tied and sewed per specifications.

EGI started fine grading structural fill subgrade on North side of cell 2. Complete mass excavation in cell 2.

SEFA hauled a little flyash into cell 2 ~ SW area.

_____ On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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S&ME
385 Timber Road
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Field Report

Date 6/22/10	Job No. 1356-08-122 P.9
Project/Location Marshall	
Contractor FSI/EGI	Weather/Temp clear
Present at Site T. Bowman, J. Addis	
Time 7	Mileage 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to observe geomembrane placement in cell one.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FR1F02

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
June 22, 2010	1356-08-122-09

Project/Location: MSSI LF Cell 1 / Terrell NC

Contractor	Weather/Temp
EGI / ESI	Sunny / 74-95°

Present at Site: Wilson W., Mohammed M., Travis B., Darrell W.

Time	Mileage
12.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

Observe ESI as they deploy geocomposite (330-2-8) on the middle of the cell 1 floor, then moved to the East slope. Approximately 50 rolls put down today, tied & sewed inaccordance w/ project specifications. ESI's Kubota (deploy vehicle) brokedown late today. Mohammed request to use their skid steer loader (Bobcat T300). I called Will Harvelson to inform, and verify psi of this loader. ESI spent remaining part of today capping composite butt seams w/ 8 ounce geotextile.

EGI continued fine grading North half of Cell 2. Plastic Fusion (PFF) pipe technician onsite, started fusing 10 inch SDR-17 HDPE pipe for LDS header, this afternoon. Pipe being fused inside Cell 1 @ the corridor, 400 ft. of pipe welded today.

On-Site Representative/Company

Jimmy Addin
S&ME Personnel

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S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
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Field Report

Date	Job No.
June 23, 2010	13560-08-122-09

Project/Location: MSSILF Cell 1 / Terrell NC

Contractor	Weather/Temp
EGI/ESI	Sunny / 75-96°

Present at Site: Wilson W., Mohammed M., Travis B., Darrell W.

Time	Mileage
12.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

Observe ESI as they deploy geocomposite (330-2-8) on the SE floor, tied into East slope panels, South of corridor. Moved over to the North slope this afternoon, deploy composite back towards the West. Composite tied and sewn per specifications. Will approved use of T300 Bobcat skid steer loader to deploy geocomposite.

EGI, had soil subgrade (N half) in Cell 2 verified this morning. Travis proofrolled prior to survey, see his report. I observed test pit excavation (3) West of existing clay stockpile. These were done just incase stockpile runs out. I obtained a proctor sample for the soils lab. PFF finished fusing 10 inch LDS header pipe. This pipe was placed in corridor, and up 6:1 slope.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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S&ME
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Field Report

Date 6/23/10	Job No. 1356-08-122P.9
Project/Location Marshall	
Contractor ESI/EGI	Weather/Temp clear
Present at Site T. Bowman, J. Addis	
Time 9.5	Mileage 120R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to observe geomembrane placement in cell one. S&ME also proofrolled soil s/g in cell two.

On-Site Representative/Company

S&ME Personnel

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S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
June 24, 2010	1356-08-122-09

Project/Location: MSSILF Cell 1 / Terrell NC

Contractor	Weather/Temp
EGI / ESI	Sunny / 76-97°

Present at Site: Wilson W.-Fred B. Ken D.-Will H.-Travis B. Dean S.-Darrell W. Mohammed M.

Time	Mileage
11.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

One and a half inches of rainfall recorded onsite last evening. EGI had to blade access into construction area, this delayed usual start times for both contractors. ESI started deploying geocomposite around 8am, complete down to NW corner, drop back and fill in skipped over area on 6:1 slope this pm. Travis observed installation of composite. Secondary geocomposite deployment completed around 4pm. But there are still alot of butt seams to cap and patching to do on composite.

EGI started placing drainage aggregate around 10 inch LDS header, around 11am this morning, start on high end. Utilizing 2 skid steer loaders to place stone. EGI laid scrap liner over interphase berm & down slope entering Cell 1, but from there they travel across composite. Geocomposite starting to wrinkle vertically, where loaders are turning, probably will need to replace/repair, looked at this w/ Will. Also advised Travis to do a walkover prior to primary geomembrane install.

Set in on progress meeting 10-11am. Went over CQA duties w/ Will.

On-Site Representative/Company

Jimmy Adolph
S&ME Personnel

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(704) 662-8735 fax

Field Report

Date: 6/24/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: ESI / EGF	Weather/Temp: clear
Present at Site: T. Bowman, J. Adams	
Time: 10.5	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived on site as requested by contractor to observe geomembrane being placed in cell one.

On-Site Representative/Company

S&ME Personnel

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Field Report

Date 6/25/10	Job No. 1356-08-122P.9
Project/Location Marshall	
Contractor ESI/EGI	Weather/Temp clear
Present at Site T. Bowman W. Harrison	
Time 10.5	Mileage 120 RIT

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to observe primary liner being placed in cell one.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
385 Timber Road
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Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 6/26/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: ESI / EGI	Weather/Temp: clear
Present at Site: T. Bowman, W. Harrison	
Time: 10.5	Mileage: 120R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to observe primary liner in cell one.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
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(704) 662-8735 fax

Field Report

Date: 6/28/10	Job No.: 1356-08-127 P.9
Project/Location: Marshall	
Contractor: ESI / EGI	Weather/Temp: clear
Present at Site: T. Bowman, W. Harrison	
Time: 14	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to observe liner placement in cell One. S&ME also performed FDTs in cell two lift one see grid.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

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Field Report

Date: 6/29/10	Job No.: 1356-08-1228.5
Project/Location: Marshall	
Contractor: ESI/EGI	Weather/Temp: clear
Present at Site: T. Bowman, J. Addis	
Time: 9	Mileage: 120R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite as requested by contractor to inspect liner in cell One. S&ME also performed FDTS in cell two lift One, see grid.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
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Field Report

Date	Job No.
June 29, 2010	1356-08-122
Project/Location	
MSSLF Cell 1 / Terrell NC.	
Contractor	**Weather/Temp**
EGI / ESI	Sunny / 75-92°
Present at Site	
Wilson W. Darrell W. Mohammed M. Travis B. Will H.	
Time	**Mileage**
13.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

ESI detailed this morning on the East side of cell. I laid out destructs 38-43 for Will, and labeled remaining repairs. Travis observed non-destructive testing (V-box), see his report. I observed construction of 10 & 18 inch LDS pipe boots. ESI does not have a spark tester onsite, Mohammed said it is being shipped to jobsite this week. ESI started primary geocomposite placement around 10:30 this morning on the NW slope, dropping full rolls back to the East. A total of 35 rolls put down today, which were tied and sewn per specifications.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 6/30/10	Job No.: 1356-08-122 P.9
Project/Location: Marshell	
Contractor: ESI/EGI	Weather/Temp: clear
Present at Site: T. Bowman, J. Adams	
Time: 10.5	Mileage: 120 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite for geomembrane placement in cell one. S&ME tested clay for lift two in cell two.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF02

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
June 30, 2010	13560-08-122

Project/Location: MSS/LF Cell 1 / Terrell NC.

Contractor	Weather/Temp
EGI/ESI	PC / 72-86°

Present at Site: Wilson W., Mohammed M., Travis B., Darrell W.

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

ESI continued to deploy primary geocomposite on the North slope, around to the SE edge @ Cell 2, also covered sump area today. Approximately 50 rolls put down today, tied and sewn inaccordance w/ specifications. I test LDT's 17-23 and 38-43, all passed required physical properties for seam strength.

Travis testing clay liner in Cell 2, see his report.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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S&ME Form FRIF03

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(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
July 1, 2010	1356-08-122

Project/Location: MSSILF Cell 1/Terrell NC

Contractor	Weather/Temp
ESI	PC to sunny/70-84°

Present at Site: Mohammed M, Darrel W.

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☑ Other (Explain): Geosynthetics

Time	Mileage
13.0	100.0

Observations/Remarks:

ESI deployed primary geocomposite (5th layer) up the drainage corridor from just past sump to the West end ~8 panels wide. They then moved to the East end of the interphase berm and started dropping panels of composite (330-2-8) into the corridor panels, deploying to the West. I test LDT's 24-37 all passed required physical properties for seam strength. I ran nine density test on lift 3 of the compacted soil liner in Cell 2. Had two non-compliance test (out of spec. on moisture content), remaining test all passed. Will have EGI rework when they return on 7/6/10. Took in two protective cover soil samples for conformance testing, #'s 1 and 2. Soil was obtained out of stockpile.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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Field Report

Date	Job No.
July 2, 2010	1356-08-122

Project/Location: MSSILF Cell 1 / Terrell NC

Contractor	Weather/Temp
ESI	Sunny / 68-85°

Present at Site: Mohammed M., Darrell W.

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

ESI completed installation of the primary geocomposite (5th layer) today. Rolls of geomembrane were repositioned in the anchor trench on top of the 5th layer, for ballast, since EGI ~~pre~~ prefers not to backfill anchor trench at this time. ESI cleaned up inside of Cell 1, and around perimeter. ESI mobed off site this afternoon.

- 78 full rolls of geomembrane left
- 454 rolls of geocomposite left

I completed field reports for the week.

On-Site Representative/Company

Jimmy Addo
S&ME Personnel

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Field Report

Date	Job No.
July 6, 2010	1356-08-122
Project/Location	
MSSILF Cell 2 / Terrell NC.	
Contractor	**Weather/Temp**
EGI	Sunny / 74-91°
Present at Site	
Wilson Warlick	
Time	**Mileage**
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI completed conditioning on lift 3 of compacted soil liner on East end of Cell 2. Fdt test that I reported as failing on 7-1-10, actually were passing, consult w/ Will H on moisture content, spec. reads equal to or greater than the optimum, w/ maximum of 5% above. I performed six fdt's today, all test w/in required specifications. Informed contractor of test results. EGI started protective cover in Cell 1 this afternoon. Entered just South of the LDS riser pipes.

On-Site Representative/Company

Jimmy Ashley
S&ME Personnel

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Field Report

Date	Job No.
July 8, 2010	13560-08-122

Project/Location: MSSILF Cell 1 / Terrell NC

Contractor	Weather/Temp
EGI	Sunny-Hot/77-98°

Present at Site: Wilson W., Ken D. Will H., Donna B. Darrell W.

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☑ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Protective Cover

Time	Mileage
12.0	100.0

Observations/Remarks:

Technician proofrolled the South half of Cell 2 structural fill subgrade w/a loaded CAT 740 articulate dump truck. Observed one area that yielded on East side (old drainage ditch), approximately 30ft x 10ft. Recommended to remove this area down to stable soil conditions, remaining proofroll area was stable. Set in on construction progress meeting, tour jobsite w/ Ken-Will-Darrell & Donna. Monitor protective cover placement in Cell 1. Had EGI walk trackhoe into Cell 1 and spread soil out ahead of cover placement to minimize wrinkles. This procedure appears to be working o.k..

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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Field Report

Date	Job No.
July 12, 2010	1356-08-122-09

Project/Location: MSSILF / Terrell NC.

Contractor	Weather/Temp
EGI	Cloudy / 74°-

Present at Site: Wilson Warlick, Travis Bowman

Time	Mileage
4.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Transition w/ Travis, went over protective cover monitoring / observation w/ him. Spoke w/ Wilson about proposed schedule for Cells 1 & 2. Looked at compacted soil liner stockpile w/ Wilson, possibly might need to move else where to complete Cell 2. EGI put another crew onsite today, capable to work in both cells simultaneously now.

On-Site Representative/Company

Jimmy Adolis
S&ME Personnel

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S&ME Form FR1F03

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(704) 662-8625
(704) 662-8735 fax

Field Report

Date: 7/12/10	Job No.: 1356-08-122 P.9
Project/Location: Marshall	
Contractor: EGI	Weather/Temp: clear/cloudy
Present at Site: T. BOWMAN	
Time: 6	Mileage: 100 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to test clay material being placed in the south section in cell two. S&ME performed six density test at locations J10, L11, M10, N11, O10, P11. All compaction was 95% or better and moisture were above optimum. It started to rain around 1pm and shut site work down until tomorrow.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRIF03

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(704) 662-8625
(704) 662-8735 fax

Field Report

Date 7/13/10	Job No. 1356-08-122P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 6	Mileage 100R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to perform density test on clay material in cell two SE corner. Two test were performed. EGI was just removing mud/muck from sump area and got cell sealed off incase it rained again.

On-Site Representative/Company

S&ME Personnel

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Field Report

Date 7/14/10	Job No. 1350-08-122P.9
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 9	Mileage 100 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

StmE arrived onsite to test clay in cell two lift two. STX test were performed and 95% compaction or better was achieved. test locations were J11, L10, M11, N10, O11, P10.

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRI.F02

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(704) 525-3953 fax

Field Report

Date	Job No.
July 14, 2010	1356-08-122

Project/Location: MSSILF / Terrell NC.

Contractor	Weather/Temp
EGI	Sunny/77-91°

Present at Site: Wilson W. Fred B. Ken D. Will H Darrell W.

Time	Mileage
8.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Went onsite for weekly progress meeting. Checked stockpile at old structural fill area for potential compacted soil liner. Picked up a bucket sample for conformance testing. Type in secondary liner repairs 126-161 into LF CQA website.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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S&ME Form FRLF07

S&ME
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Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
July 15, 2010	1356-08-122

Project/Location: MSSILF Cells 1 & 2 / Terrell NC.

Contractor	Weather/Temp
EGI	Sunny / 74-90°

Present at Site: Wilson W. Darrell W.

Time	Mileage
11.5	100.0

To: file

Services Performed

- [ ] Concrete Testing
- [ ] Cylinder Pickup
- [ ] Asphalt Testing
- [ ] Steel Testing
- [ ] Asphalt Coring
- [ ] Concrete Coring
- [ ] Undercut Evaluation
- [ ] Foundation Evaluation
- [ ] Proofrolling
- [x] In-Place Density
- [x] Other (Explain): Protective Cover

Observations/Remarks:

EGI resumed compacted soil liner placement in Cell 2, south of corridor. Lift 2 completed today. I ran three fdt's on the soil liner, all test were inaccordance w/ the project specifications, refer to attached data sheet. Observe protective cover placement in Cell 1. EGI ramped in just north of the LDS riser pipes, proceed to push down 6:1 slope, widened out on cell floor. Stayed off sump area, its muddy from recent rainfall. Contractor sealed down lift 2 of soil liner w/ smooth drum. Continue to maintain soil liner in Cell 2.

On-Site Representative/Company

Jimmy Robbins
S&ME Personnel

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S&ME Form FRLF03

S&ME
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(704) 662-8625
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Field Report

Date 7/15/10	Job No. 1356-08-122P,G
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman, J. Addis	
Time 6	Mileage 100R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to test ck/ in cell two lift one in the sump area of cell two

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRLF03

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Field Report

Date 7/16/10	Job No. 1356-08-122
Project/Location Marshall	
Contractor EGI	Weather/Temp clear
Present at Site T. Bowman	
Time 8.5	Mileage 100 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to perform FDTS
On clay in cell two lift three SE section.
Ten test were performed and all meet requirements.

On-Site Representative/Company

S&ME Personnel

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Field Report

Date	Job No.
7/19/10	1356-08-122

Project/Location: Marshall

Contractor	Weather/Temp
EGI/ESI	clear

Present at Site: T. Bowman

Time	Mileage
8	100 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to observe EGI fine grade the south end of cell two, ESI bagged sand in sand bags for liner placement tomorrow.

On-Site Representative/Company

S&ME Personnel

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Field Report

Date: 7/20/10	Job No.: 1356-08-122
Project/Location: Marshall	
Contractor: EGI/EST	Weather/Temp: clear
Present at Site: T. Bowman, W. Harrison	
Time: 12	Mileage: 100 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to observe GCL and Liner be placed in cell two. Panels one - nine were deployed and destructs were cut. rained during seeme 7/8, 8/9

On-Site Representative/Company

S&ME Personnel

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FIELD REPORT

Date:	Job No.:
7/20/10	1356-08-122 Phase 07

Project/Location: Terrell, NC

Contractor:	Weather/Temperature:
EGI/ESI/Plastic Fusion	High 80s Partly Cloudy - Scattered T-Storms

Present at Site:
Mohammed Malimar (ESI)
Dennis Flotz (EGI)
Wilson Warlick (EGI)

Time:	Mileage:
2:45 pm	80 miles

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☒ Other (Explain)

Earthworks and Geosynthetics CQA

Observations/Remarks:

Arrived on site at approximately 2:45PM. Discussed site safety issues with Travis Bowman (another on-site S&ME technician assigned to the Marshall job).

Cell 1: Observed EGI placing protective cover with articulated hauler trucks and a caterpillar dozer. A Plastic Fusion employee was on-site fusing 10" and 18" LCS pipes. Discussed with Dennis Flotz that care was to be taken in aligning the perforations in the 10" LCS pipe per plan (with one row of perforations running at the top of the pipe such that the other two rows of perforations would be located near the bottom of the pipe). Observed EGI personnel dewatering and dredging the Cell 1 sump area, which had become inundated from the previous days rainfall. Six locations in the sump appeared damaged. Discussed with Dennis Flotz that these areas would need to be inspected and repaired. Dennis Flotz said that he would have the sump emptied out by the tomorrow and that repairs would be performed tomorrow or the following day.

Cell 2: Observed that ESI had deployed GCL across the northwest corner of Cell 2 (approximately 2 and a quarter acres) and was in the process of deploying geomembrane to cover the GCL. Questioned Travis Bowman on GCL installation. Travis Bowman said that ESI and Duke had approved the subgrade prior to GCL deployment and that ESI had deployed GCL according to spec. Travis Bowman noted that the supergroove (an imbedded line of exposed bentonite in the GCL) appeared to be in place that he did not notice any defective supergroove areas. With full panel runs running east/west and moving north to south (~500-ft) ESI deployed and seamed together (panels 1-9) 9 secondary liner system geomembrane panels as well as a tie-in seam with Cell 1 secondary liner panels 39 and 40, however, it began to rain while seaming panels 7, 8, and 9 (two seams). Prior to the rainfall, observed seaming and seam testing, and located and labeled repairs and destructive lab samples. Discussed potential lightning hazard with Travis Bowman and agreed to wait out the rain inside our vehicles. ESI worked through the rain and finished seaming panels 7,8, and 9. Following rainfall, continued labeling destructive lab samples. Left the job-site at approximately 6:30 PM.

Wilson Warlick
On-Site Representative/Company

S&ME Personnel

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Field Report

Date 7/21/10	Job No. 1356-08-122
Project/Location Marshall	
Contractor EGI/ESI	Weather/Temp clear
Present at Site T. Bowman, W. Harrison	
Time 13	Mileage 100 R/T

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

S&ME arrived onsite to observe ESI deploy liner in cell two SW corner GCL was placed followed by liner panels 10-20 and the destructs were cut and taken to trailer. S&ME also performed one density test in cell two lift three due to area being tore up by ESI's Lull. EGI recompacted the area before testing

On-Site Representative/Company

S&ME Personnel

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ENVIRONMENTAL SERVICES

9751 Southern Pine Blvd.
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

FIELD REPORT

Date:	Job No.:
7/21/10	1356-08-122 Phase 07

Project/Location: Terrell, NC

Contractor:	Weather/Temperature:
EGI/ESI/Plastic Fusion	High 80s Partly Cloudy - Scattered T-Storms

Present at Site:
Mohammed Malimar (ESI)
Dennis Flotz (EGI)
Wilson Warlick (EGI)

Time:	Mileage:
6:45 am	80 miles

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☒ Other (Explain)

Earthworks and Geosynthetics CQA

Observations/Remarks:

Arrived on-site at approximately 6:45AM.

Cell 1: Observed that EGI was placing protective cover as well as covering 10" LCS corridor pipe with drainage aggregate. Observed that perforations had been aligned per plan. Observed EGI removing water from the Cell 1 LCS sump and working with flat-faced shovels to remove sediment from the sump. Located 6 repair areas and marked with orange spray paint. Discussed with Wilson Warlick that these areas would need to be repaired. Observed plastic fusion fusing the 10" pipes together noticed some areas where the pipe weld flaps were damaged. Discussed this with Plastic Fusion employee who demonstrated that the actual weld between the pipes was still in tact by peeling back some of the weld flaps and certified verbally that it was an in-tact weld. Called Ken Daly (Engineer of Record for Marshall landfill w/ S&ME) who, upon hearing description of the nature of the apparent weld damage, agreed with the Plastic Fusion employee that the pipe weld was not damaged, and that the weld flap was not functional.

Cell 2: Prior to GCL deployment, walked subgrade on southwestern corner of Cell 2 with Travis Bowman. Discussed with Kevin (EGI) that visible roots would need to be removed and that the area to be deployed over would need to be smooth drum rolled. Kevin (EGI) noted that he would need some space to smooth out the corridor from small rills created by runoff from the previous days rainfall, approximately 2 panel lengths. Smoothing of the corridor was performed by a long-reach volvo 240 excavator. While EGI prepared the southwest corner and corridor, observed ESI trial seam testing and cutting of destructive lab samples laid out the previous day. Upon completion of subgrade preparation by EGI, and reinspection by myself and Travis Bowman, conferred with Mohammed Malimar (ESI), who said that the subgrade was acceptable to ESI. Observed ESI personnel through deployment of GCL followed by geomembrane over the southhwest corner of Cell 2 (approximately 2 and a half acres). With full panel runs(~500 ft) running east/west and moving south to north from the southern intercell berm of Cell 2 to the northern intercell berm between Cells 1 and 2. Discussed with Mohammed Malimar (ESI) and Robert Gann (ESI by phone) that ESI had a concern that they would run out of liner and GCL for Cell 2. Discussed that samples should be sent to Geotechnics just in case conformance tests were needed. Left the site briefly for lunch and returned to test destructive samples. Completed tests on 3 samples which were located on the tie-in seam (1 sample) and the two seams completed during rainfall (2 samples). Tested samples met specification requirements. Returned ESI deployed and seamed together (panels 10-20) 11 panels as well as the tie-in to panel 9 from the previous day. Observed seaming and seam testing, and located and labeled repairs and destructive lab samples. Ken Daly (Engineer of Record for the Marshall landfill) arrived at approximately 5:00PM with whom Travis Bowman and I toured the site. Following the tour and after ESI was finished for the day, went with Travis Bowman to the job-site trailer and tested the remaining destructive samples from the previous day. Left the job-site at approximately 6:30 PM.

Wilson Warlick
On-Site Representative/Company

S&ME Personnel

S&ME
ENGINEERING • TESTING
ENVIRONMENTAL SERVICES

9751 Southern Pine Blvd.
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(704) 523-4726
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FIELD REPORT

Date:	Job No.:
7/22/10	1356-08-122 Phase 07

Project/Location: Terrell, NC

Contractor: EGI/ESI

Weather/Temperature: High 80s Partly Cloudy - Scattered T-Storms

Present at Site:
Mohammed Malimar (ESI)
Dennis Flotz (EGI)
Wilson Warlick (EGI)

Time: 6:50 am

Mileage: 80 miles

To:

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☒ Other (Explain)

Earthworks and Geosynthetics CQA

Observations/Remarks:

Arrived on-site at approximately 6:50AM. Stayed in job-site trailer until approximately 10:00AM.

Cell 1: Observed that repairs had been made to the Cell 1 geocomposite that had been damaged in the sump area. Measured distance from pre-fabricated elbows in the sump up to the daylighting portion of the two parallel 18"-diameter LCS riser pipes. Recorded lengths in visible area as requested by Gunnco (pump vendor) personnel.

Cell 2: Instructed Travis Bowman to inspect subgrade and to make sure following any geosynthetics deployment, that Mohammed Malimar (ESI)had seen and approved the subgrade. Traveled to the site following completion of work in the job-site trailer and observed GCL deployment by ESI over the northeast corner of the landfill (approximately 2 and a quarter acres). Discussed with Mohammaed Malimar that GCL butt seams on the sideslopes were not permitted in the specification and had ESI remove 1 butt seam on the sideslopes to be replaced by a full run down the sideslopes and past the toe of slope. Visually inspected GCL installation quality (was acceptable). Observed ESI vacuum box testing of defect repairs on the western half of Cell 2. Observed ESI personnel through deployment of geomembrane over the northeast corner of Cell 2 (approximately 2 and a half acres). With panel runs running east/west and moving north to south with panels 21 through 29 on the cell floor and then, adjacent to these and on the sideslopes to the east, panels 30 through 38. Left the site briefly for lunch with Travis Bowman from 1200 to 1300. Returned to site and instructed Travis Bowman to return to siteESI deployed and seamed together (panels 10-20) 11 panels as well as the tie-in to panel 9 from the previous day. Observed seaming and seam testing, and located and labeled repairs and destructive lab samples. After ESI was finished for the day, finished laying out destructive samples and returned to job-site trailer. Left the job-site at approximately 7:30 PM.

Wilson Warlick
On-Site Representative/Company

William M. Bonner
S&ME Personnel

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S&ME
385 Timber Road
Suite 104
Mooresville, NC 28115-7899
(704) 662-8625
(704) 662-8735 fax

Field Report

Date	Job No.
July 30, 2010	13556-08-122-09

Project/Location: MSSILF Cell 2 / Terrell NC.

Contractor	Weather/Temp
EGI / ESI	Sunny / 79-92°

Present at Site: Wilson Warlick, Mohammed Malimar, Will Harrison, Carlos Dease

Time	Mileage
13.0 (onsite: 11.0)	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

Observe ESI as they deployed primary geomembrane panels 38-48 (113,487 sq.ft.) on SE floor/slope in Cell 2. I monitored deployment and production field seaming. Tie-in weld made on panels 27-37 to 38-48. Marked & logged defects this pm. ESI blacked in primary geomembrane today.

EGI worked on Cell 1 infiltration system today, also clearing for forcemain.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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Field Report

Date	Job No.
July 31, 2010	1356-08-122

Project/Location: MSSI LF Cell 2/Terrell

Contractor: ESI

Weather/Temp: PC/70-86°

Present at Site: Mohammed M. Dennis P.

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Time	Mileage
13.0	100.0

onsite: 11.0

Observations/Remarks:

I monitored non destructive testing (V box) this am on remaining repairs. Complete repair testing logs. Observe ESI as they start deployment of the primary geocomposite (330-2-8) on the East slope & adjacent floor, sump covered. I test LDT's 30-43, all passed, informed Mohammed.

On-Site Representative/Company

Jimmy A Adkins
S&ME Personnel

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Field Report

Date	Job No.
August 2, 2010	1356-08-122-09

Project/Location: MSSILF Cell 2/Terrell NC

Contractor	Weather/Temp
EGI/ESI	Cloudy/72-88°

Present at Site: Wilson W.-Dennis F. Mohammed M.

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Time	Mileage
12.0	100.0

Observations/Remarks:

ESI completed primary geocomposite on the South side of Cell 2. Cleaned up South side of Cell 2. Moved to NE area of Cell 2 and started deploying primary geocomposite.

EGI working on Cell 1 infiltration system and check dams. Start placing protective cover on South side of Cell 2, this afternoon.

On-Site Representative/Company

Jimmy Adding
S&ME Personnel

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Field Report

Date	Job No.
August 3, 2010	1356-08-122-09

Project/Location: MSSLF Cell 2 / Terrell NC

Contractor	Weather/Temp
EGI / ESI	Cloudy / 74-92°

Present at Site: Wilson W. - Dennis F. Mohammed M.

Time	Mileage
12.0	100.0

To: _____

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Geosynthetics

Observations/Remarks:

Observe ESI as they complete repairs on the primary geocomposite. Cleaned up in cell and ground site. Geosynthetics 100% complete, ESI mobed offsite. I test LDT's 4 thru 10, all passed job criteria.

Monitor placement of the protective cover in Cell 2 on the South side. Trucks entering approximately midway from the South and cover is being pushed to the West (high end). Picked up two protective cover samples for conformance testing. EGI completed work on Cell 1 infiltration system today.

_____ On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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Field Report

Date	Job No.
August 4, 2010	1356-08-122-09

Project/Location: MSSILF Cell 2 / Terrell NC.

Contractor	Weather/Temp
EGI	PC/75-95°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
6.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): Protective Cover

Observations/Remarks:

Observed protective cover placement on the SW area of Cell 2. Composite lining system laying down good this am. EGI started drainage ditch excavation on the NW side of Cell 1, for access road. This soil is being hauled to Cell 2 for protective cover. Informed EGI if any clayey soil are encountered, these loads should be stockpiled. Left site @ 11:15.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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Field Report

Date	Job No.
August 6, 2010	13556-08-122-09

Project/Location: MSSILF Cell 2 / Terrell NC

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Contractor	Weather/Temp
EGI	PC/70's

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
5.0	100.0

Observations/Remarks:

Site had 1.75 inches of rainfall yesterday. EGI dewatering sump area in Cell 2. Bladed off haul roads between cells and stockpile. Started hauling protective cover into North side of Cell 2 around 9am. Trucks entering thru Cell 1 from the East end, going out about 400ft. then into Cell 2 across interphase berm. Travis onsite @8:30, took over observation.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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Field Report

Date	Job No.
August 9, 2010	1356-08-122-09

Project/Location: MSSI LF Cell 2 / Terrell NC.

Contractor	Weather/Temp
EGI	Sunny / 70-95°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed EGI placing protective cover on the Northeast side of Cell 2. Composite lining system laying down good as 2 feet of cover is pushed across. Continued excavation of perimeter ditch around Cell 1, soils being used for protective cover. Called Will H. about future well abandonment for fence clearing.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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Field Report

Date	Job No.
August 10, 2010	1356-08-122

Project/Location: MSSILF Cell 2 / Terrell NC.

Contractor	Weather/Temp
EGI / PFF	Sunny / 73-96°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
11.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed EGI placing protective cover on the NW side of Cell 2, finished this area late pm today, moved operation to NE end of Cell 2. Continued excavation of perimeter ditch around Cell 1, soils used for protective cover in Cell 2. PFF back onsite, fusing 10 inch SDR-17 HDPE pipe (perforated) for LCS cleanout Cell 2. Dewatered Cell 2 sump this pm. Picked up and transported into soils lab, two protective cover samples.

On-Site Representative/Company

Jimmy Addie
S&ME Personnel

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Field Report

Date	Job No.
August 11, 2010	1356-08-122-09

Project/Location: MSSILF Cell 2 / Terrell NC

Contractor	Weather/Temp
EGI / PFF	PC / 75-97°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed EGI placing protective cover on the NE side of Cell 2, only lack 3:1 slope N of riser pipes and close in entire corridor to be 100% complete. Composite lining system laying down good during cover placement. The 18inch LCS cleanout pipe was positioned into corridor today, EGI started placing #57 drainage aggregate around. PFF tech. fused together both 18 inch LCS riser pipes today. Both of these pipes were set in sump today. #57 drainage aggregate placed over risers & sump was filled in also, ~~#57~~ covered w/a 8 ounce non-woven geotextile, which was run out 1ft. and then thermabonded to primary geocomposite. PFF extrusion welded screw caps onto 18 inch cleanout risers @ Cell 1.

On-Site Representative/Company

Jimmy Ashley
S&ME Personnel

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S&ME
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Field Report

Date	Job No.
August 16, 2010	13560-08-122-09

Project/Location: MSSI LF Cell 2 / Terrell NC.

Contractor	Weather/Temp
EGI	PC / 75-92°

Present at Site: Dennis Foltz, Darrell Wolfe, Jeff Vaughn

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed EGI excavating down to the primary geocomposite, for infiltration system installation (blanket drain). No damage done to composite lining system. EGI also cutting out access road along East side of Cell 2, soils being hauled to protective cover stockpile. Crowder Const. pressure testing (air) a segment of the 6 inch forcemain (+/- 1000 lf) 40 psi @ 2:30, will leave overnight.

On-Site Representative/Company

Jimmy Addix
S&ME Personnel

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Field Report

Date	Job No.
August 17, 2010	1356-08-122-09

Project/Location: MSSLF Cell 2/Terrell NC.

Contractor	Weather/Temp
EGI	Sunny/73-90°

Present at Site: Dennis Foltz, Darrell Wolfe, Will Harrelson

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed EGI installing the infiltration system, finished up the blanket drain today. EGI continues access road grading. Walked fence clearing line w/ Will-Darrell & Nick. Crowder Const. pressure test passed, held 40psi for over four hours.

On-Site Representative/Company _____ **S&ME Personnel** _____

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Field Report

Date	Job No.
August 18, 2010	13560-08-122-09

Project/Location: MSSILF Cell 2 / Terrell NC

Contractor	Weather/Temp
EGI	PC / 74-92°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
11.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed contractor as they worked on the infiltration system, excavating out protective cover in front of blanket drain, a couple of tears in the primary composite geotextile were patched w/ 8 ounce non-woven geotextile. Placing drainage aggregate & C33 sand in excavation area. EGI continued access road grading.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

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Field Report

Date	Job No.
August 19, 2010	1356-08-122-09

Project/Location: MSSI LF Cell 2 / Terrell NC

Contractor	Weather/Temp
EGI	Cloudy Rain / 70's

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
3.0	100

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

No construction activity today, heavy rain falling this am onsite, nearly one inch by 8am today.

On-Site Representative/Company

Jimmy Addup
S&ME Personnel

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S&ME Form FRIEF03

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Field Report

Date	Job No.
August 23 2010	1356-08-122-09

Project/Location: MSSILF Cell 2/Terrell NC.

Contractor	Weather/Temp
EGI	Sunny/70-92°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
8.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Three and a quarter inches of rainfall recorded onsite last week (18th & 19th). EGI continued to dewater Cell 1 into Cell 2, then out of #2 South to open area. Start process of mucking out the South side of sump in Cell 2, mud hauled to stockpile area and piled up. Laid 8 oz. non-woven geotextile on top of protective cover, placed class B rip-rap on 2ft. high, and faced w/ #57 washstone. Complete 2nd check dam on North side of corridor in Cell 2. Resume C33 sand placement over corridor towards the west in Cell 2, cover w/ 8 oz. non-woven geotextile ~~which~~ w/ edges buried into protective cover.

On-Site Representative/Company

Jimmy Adelup
S&ME Personnel

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S&ME
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(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
August 24, 2010	1356-08-122-09

Project/Location: MSSILF Cell 2 / Terrell NC.

Contractor	Weather/Temp
EG1	PC / 72-88°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed EG1 as they mucked out 1/2 of the South side of the Cell 2 sump, no damage done to composite lining system. Drainage aggregate (#57 washstone) 2 feet of, placed back into mucked out area for infiltration. Excavated down to the primary geocomposite (both sides) for infiltration zones at Western most check dam. Had contractor patch tears in the primary geocomposite, no damage to primary liner. Both sides backfilled w/ #57 washstone, covered w/ 8 ounce non-woven geotextile. Topped both areas w/ C33 sand (9") which was also covered w/ 8oz. geotextile. Finished mucking out mud on South side of sump for infiltration zone. Crowder Const. poured concrete over duct bank and generator pad walls today, @ Cell 1.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

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Field Report

Date	Job No.
August 25, 2010	1356-08-122-09

Project/Location: MSSILF Cell 2 / Terrell NC

Contractor: EGI

Weather/Temp: PC / 68-85°

Present at Site: Dennis Foltz, Darrell Wolfe

Time: 11.0

Mileage: 100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observe contractor as they built check dams (3), two at corridor fartherest west and one on the South side of sump at infiltration zones. Placed remaining drainage aggregate (#57 washstone) on South side of sump, covered w/ 8 ounce non-woven geotextile. Placed C33 sand over geotextile nine inches thick, covered this w/ geotextile also and thermobonded. Started mucking out mud off North side of infiltration zone at sump.

On-Site Representative/Company

Jimmy Adelip
S&ME Personnel

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Field Report

Date	Job No.
August 26, 2010	1356-08-122-09

Project/Location: MSSI LF Cell 2/Terrell NC.

Contractor	Weather/Temp
EGI	Sunny / 60-89°

Present at Site: Dennis Foltz, Darrell Wolfe, Will Harrison

Time	Mileage
10.5	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI completed infiltration zone on the South side of sump. Installed check dams on North side of sump and South side of corridor at first infiltration zone to the West. Complete clean off of mud over North of sump infiltration zone. Set in on weekly construction meeting. ESI sent 3 tractor trailers to jobsite. EGI loaded all remaining GCL-Geocomposite and some of the 60mil partial rolls. Well abandoment continued by S&ME.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

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Field Report

Date	Job No.
August 30, 2010	1356-08-122-09

Project/Location: MSSILF Cells 1 & 2

Contractor	Weather/Temp
EGI	Sunny / 71-91°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Contractor fine grading in Cell 2, on the South half. Dewatering sump in Cell 1, pumped into perimeter ditch. Built rip-rap apron on outflow end of culvert at the SE corner of Cell 2. Excavated out for culverts on the N side of Cell 1.

On-Site Representative/Company

Jimmy Adolup
S&ME Personnel

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S&ME
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Field Report

Date	Job No.
Sept. 1, 2010	1356-08-122
Project/Location	
MSSILF Cells 1 & 2/Terrell NC	
Contractor	**Weather/Temp**
EGI/Crowder	Sunny/69°-93°
Present at Site	
Dennis Foltz Jerry Vanney Darrell Wolfe	
Time	**Mileage**
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI in process of fine grading the protective cover on South half of Cell 1. Laid 12" culverts (2 locations) on the North perimeter road, each were 40 lf. Placed rip-rap splash pads aprons at each 12" culvert.

Crowder Const. started excavating for forcemain trench (Type A) at approximately sta. 13+50.

On-Site Representative/Company

Jimmy Adelin
S&ME Personnel

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Field Report

Date	Job No.
Sept. 2, 2010	1356-08-122

Project/Location: MSSI LF Cells 1 & 2 / Terrell NC

Contractor	Weather/Temp
EGI/Crowder	Sunny/66-91°

Present at Site: Dennis Foltz, Darrell Wolfe, Jerry Vannoy

Time	Mileage
11.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI fine grading in Cell 1, South side of corridor. Set culverts 1 and 2, both 40lf, backfilled. Started fine grading the North side of perimeter road. Set in on weekly progress meeting.

Crowder Const. started backfilling the leachate force main. I performed three fdt's on backfill, all exceeded 95% compaction. Informed contractor of test results.

On-Site Representative/Company

Jimmy Adolph
S&ME Personnel

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Field Report

Date	Job No.
Sept. 3 2010	1356-08-122
Project/Location	
MSSI LF Cells 1 & 2/ Terrell NC	
Contractor	**Weather/Temp**
EGI	Sunny/65-92°
Present at Site	
Dennis Foltz Darrell Wolfe	
Time	**Mileage**
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☑ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continues to fine grade the perimeter road. I proofrolled the North section from NW end of road down to EPC2 channel reach w/a loaded 3500 gallon tandem-axle water truck. The soil subgrade appeared stable, no movement noticed. Surveyors onsite verifying protective cover. I ran two fdt's on Crowder Const. leachate forcemain backfill, both test passed. Wrote field reports for the week.
NE

EGI started placing ABC stone on perimeter road this pm.

On-Site Representative/Company

Jimmy Aldrip
S&ME Personnel

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Field Report

Date	Job No.
Sept. 7, 2010	1356-08-122

Project/Location: MSSILF Cells 1 & 2 / Terrell NC.

Contractor	Weather/Temp
EGI / Crowder	Sunny / 63-90°

Present at Site: Dennis Foltz, Jerry Vannoy, Darrell Wolfe

Time	Mileage
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI excavated in Cell 1 for protective cover modification. The geotextile was cut and laid back, C33 sand & #57 drainage aggregate removed down to approximately 9 inches above geosynthetic liner. EGI tried to put pipe (40 lf-10" SDR-17) into tee (12"-SDR-11) would not slide into. Had to reorder 12" tees, SDR-17 this time. Placing ABC stone on perimeter road, North side, in 6 inch lift. Started clearing for fence installation.

Crowder Const. excavating for 6 inch leachate forcemain. I monitored backfilling of forcemain, two fdt's performed, both passed.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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Field Report

Date	Job No.
Sept. 8, 2010	13556-08-122

Project/Location: MSSILF Cells 1 & 2/ Terrell NC.

Contractor	Weather/Temp
EGI / Crowder	PC / 67-88°

Present at Site: Dennis Foltz, Jerry Vannoy, Darrell Wolfe

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continued to place ABC stone on perimeter road, in 6 inch lift. Clearing for fence installation, brush being hauled to stockpile area. Worked on protective cover modification in Cell 1 this pm, one riser (10") installed.

Observed Crowder backfilling leachate forcemain, two fdt's run, both exceed 95% compaction.

On-Site Representative/Company

Jimmy Adcock
S&ME Personnel

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(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
Sept. 9, 2010	1356-08-122

Project/Location: MSSI LF Cells 1 & 2 / Terrell NC.

Contractor	Weather/Temp
EGI	Sunny / 66-90°

Present at Site: Dennis Foltz - Fred Brown, Ken Daly - Will Harrelson, Darrell Wolfe - Dean Synder

Time	Mileage
9.5	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continues to clear for fence installation. Placing ABC on perimeter road, Northeast side of Cell 1. Working on protective cover modification. Set in an weekly progress meeting.

Crowder fusing up leachate manifold pipes, problem w/ vault not enough room to fit everything.

On-Site Representative/Company

Jimmy Adolop
S&ME Personnel

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S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
Sept. 10, 2010	1356-08-122

Project/Location: MSSLF Cells 1 & 2 / Terrell NC

Contractor	Weather/Temp
EGI	Sunny / 64-89°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
9.5	180.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI clearing for fence, on the west side of Energy United line now. Started fine grading ABC stone on perimeter road, North side. Continue work on protective cover modification, installed 125lf of 10 inch SDR-17 HDPE pipe @ Cell 1 sump. Placed 18 inch riser over 10" riser, put #57 washstone up to 5ft. around. Put geotextile over top of 18 inch riser. Concreted (4000psi) around cleanout pipes, both cells.

On-Site Representative/Company

Jimmy Adding
S&ME Personnel

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S&ME Form FRLF03

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(704) 525-3953 fax

Field Report

Date: 9/13/10	Job No.: 1356-08-122 P9
Project/Location: Marshall Landfill	
Contractor: EGI	Weather/Temp: clear
Present at Site: T. Bowman, J. Adams	
Time: 7.5	Mileage: 100 R/T

To: _____

Observations/Remarks:

On site as requested to perform sampling/testing for the following items:

☐ Subgrade Observations ☐ Proofroll

☐ Other _____

Deficiencies Noted ☐ Yes (see comments) ☐ No

Equipment Utilized: _____

Location: _____

Density testing of compacted material

☐ Soil ☑ Stone ☐ Asphalt

Using: ☑ Nuclear Density Gauge ☑ Test results and locations attached

☐ Drive Tubes All tests met specifications ☑ Yes ☐ No

☐ Sand Cone Collected Bulk Sample(s) ☐ Yes ☐ No

General locations: _____

Foundation bearing materials evaluation

Design allowable bearing capacity: _____ psf

☐ Deficiencies Noted ☐ Yes (see comments) ☐ No

Location: _____

Comments: S&ME arrived onsite to test ABC stone that had been placed on the north road. S&ME was informed that there were two lifts of 6 inches so test were performed at -10" and -4".

On-Site Representative/Company

S&ME Personnel

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S&ME Form FRSF03

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Charlotte, NC 28273
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Field Report

Date	Job No.
Sept. 13, 2010	13560-08-122
Project/Location	
MSSILF Cells 1 & 2/Terrell	
Contractor	**Weather/Temp**
EGI	Sunny/61-86°
Present at Site	
Dennis Foltz Darrell Wolfe	
Time	**Mileage**
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed EGI installing protective cover modification in Cell 1 @ center check dam. Thirty five feet of 10" perf. SDR-17 HDPE pipe / 1~12" SDR-17 tee / 1~5' SDR-17 riser and 10'~18" corrugated riser (perforated) w/ 5' of washstone around. Capped top of 18" riser w/a piece of geotextile. Also set 18" riser w/ 5' of washstone around in Cell 1 @ farthest check dam to the West. Clearing for fence line, until trackhoe went down. Loaded out topsoil from clearing area, hauled to stockpile area. Sides seeding put up silt fence and outlet wire cloth in two areas along clearing for new fence. EGI put washstone in front of outlets.

On-Site Representative/Company

Jimmy Aldrip
S&ME Personnel

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S&ME Form FRI.F02

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9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
Sept. 14, 2010	1356-08-122
Project/Location	
MSSILF Cells 1 & 2 / Terrell NC	
Contractor	**Weather/Temp**
EGI	Sunny / 60-88°
Present at Site	
Dennis Foltz Darrell Wolfe	
Time	**Mileage**
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI started protective cover modifications in Cell 2 @ the Sump. Cleared trees along the North perimeter road, finished Phase I clearing. Started flooring in hollow for fence road late this pm. Crowder set vault base for Cell 1.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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S&ME Form FRLF02

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(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
Sept. 15, 2010	1356-08-122

Project/Location: MSSI LF Cells 1 & 2 / Terrell NC

Contractor	Weather/Temp
EGI	Sunny / 64-90°

Present at Site: Dennis Foltz, Darrell Wolfe, Jerry Vanney

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continued work on protective cover modification at sump in Cell 2. During excavation of the drainage aggregate, the primary geocomposite was torn, resulting in a tear in the primary geomembrane (1" long). Hole was on the South top of corridor, where sideout elbow is to be located. Not sure why grade was off in that area. EGI completed excavation, w/ no problems, never encountered geocomposite again. Installed pipe & riser to w/in 10' of liner repair area, replaced aggregate around pipe and C33 sand. Observed structural fill placement on fence road. Performed four field density test, all exceeded 95% compaction. Informed contractor of test results.

On-Site Representative/Company

Jimmy Adolp
S&ME Personnel

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S&ME Form FRLF03

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Field Report

Date	Job No.
Sept. 16, 2010	13560-08-122

Project/Location: MSSILF Cells 1 & 2 / Terrell NC

Contractor	Weather/Temp
EGI / Crowder	Sunny / 61-89°

Present at Site: Dennis Foltz, Danny Reaves - PFF, Jerry Vannoy - Jeff Vaughn, Darrell Wolfe

Time	Mileage
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed PFF technician as he made repair to the primary geomembrane in Cell 2. Trail seam: DR/#52/250-260°/Extrusion/70°/8am Shear=159-157-154 Peel=81-83-84. Vacuum Box ~ pass 12"x12" patch. EGI gps'd repair location. EGI complete modification at Cell 2 sump. Moved to middle check dam in Cell 2, cut open geotextile and started removing C33 sand. Finish structural fill on fence road, I ran two fdt's, both passed, Tack-on bench started. Sides started seeding, completed clay borrow area - EPC1 & North half of Cell 1.

Crowder did hydrostatic test on leachate forcemain from just North of junction box for Cell 2 to ends of manifold for Cell 1, held 40psi for 4 hours.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

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S&ME Form FR1F02

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
Sept. 17, 2010	1356-08-122

Project/Location: MSSILF Cells 1 & 2 / Terrell NC

Contractor	Weather/Temp
EGI	PC / 65-89°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
10.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continued work on the tack-on bench, pushing material up slope w/a D6 dozer. Then a D6 equipped w/ GPS is shaping, only compactive effort is tracking by the dozer, not wide enough to put sheepsfoot on, and is to steep for sheepsfoot to pull up. The 18 inch riser was set over the 18 inch riser at Cell 2 sump, backfilled around w/ #57 washstone halfway up pipe. Started matting EPC1 w/ DS-75. Sides completed seeding of South half of Cell 1 and North half of Cell 2.

Crowder worked on Cell 1 leachate pump control pad.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

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S&ME Form FRLF03

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Field Report

Date	Job No.
Sept. 20, 2010	1356-08-122

Project/Location: MSSILF / Tenell NC.

Contractor	Weather/Temp
EGI / Crowder	Sunny / 62-90°

Present at Site: Dennis Foltz, Jerry Vannoy, Darrell Wolfe

Time	Mileage
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Observed EGI as they continued installing erosion control matting (DS-75) in EPC1 down to the NE corner of Cell 1. Did not bury matting, increased sod staple useage. Shaping and tracking in East side upper & lower tack-on benches w/a D6N bulldozer. I performed two fdt's on benches both test passed. Informed contractor of test results. Continued fence road grading.

Crowder fusing Cell 2 manifold pipes. Finished cmu wall for Cell 1.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

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S&ME Form FRIF03

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Field Report

Date	Job No.
Sept. 21, 2010	1356-08-122

Project/Location: MSSILF / Terrell NC

Contractor	Weather/Temp
EGI/Crowder	PC/61-89°

Present at Site: Dennis Foltz, Jerry Vanway, Darrell Wolfe

Time	Mileage
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☑ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI resumed work in Cell 2 on the protective cover modification, cut geotextile and removed C33 sand and drainage aggregate. Placed approximately 40 lf of 10 inch perf. HDPE pipe (SDR-17) and 12 inch tee & 5 lf 10 inch riser. Put drainage aggregate and C33 sand back in place, separated each w/ 8 ounce non-woven geotextile, ~~thre~~ thermo-bonded. Continued shaping & tracking in South side tack-on benches. I ran two fdt's on benches, both test passed. Informed contractor of test results. Continued grading along fence road.

On-Site Representative/Company

Jimmy Addington
S&ME Personnel

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Field Report

Date	Job No.
Sept. 22, 2010	1356-08-122

Project/Location: MSSILF / Terrell NC.

Contractor	Weather/Temp
EGI	Sunny / 64-88°

Present at Site: Dennis Foltz, Darrell Wolfe

Time	Mileage
6.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI working on protective cover modification in Cell 2, installing 12inch perf. riser (10lf ea.) and placing #57 washstone around and half way up risers. Grading fence road. Crowder forming leachate pump control pad for Cell 2.

On-Site Representative/Company

Jimmy Ashley
S&ME Personnel

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Field Report

Date	Job No.
Sept. 23 2010	1356-08-122

Project/Location: MSSILF / Terrell NC

Contractor	Weather/Temp
EGI / Crowder	Sunny / 65-90°

Present at Site: Dennis Foltz, Jerry Vannoy, Darrell Walfe, Ken D. - Will H.

Time	Mileage
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI started excavation of the 18 inch down drain pipe. Continued fence road grading. Set in on weekly progress meeting. Looked at infiltration modifications w/ Ken & Will. Observed Crowder's hydrostatic test on the leachate forcemain, from high point (vacuum valve) thru Cell 2 manifold ends, ~ 8:30 - 12:30 held 40 psi. CMU ftg. converted.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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S&ME
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Field Report

Date	Job No.
Sept. 24, 2010	13560-08-122
Project/Location	
MSSILF / Terrell NC	
Contractor	**Weather/Temp**
EGI	Sunny / 65-91°
Present at Site	
Dennis Foltz Jerry Vannoy Darrell Wolfe	
Time	**Mileage**

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continued grading operations on the fence road, hauling excess soils to stockpile. The 18 inch down drain was completed today. Inlets were concreted w/ sakrete ready mix. Sides seeding did not show up.

Crowder built cmu wall at Cell 2.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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Field Report

Date	Job No.
Oct. 4, 2010	13560-08-122

Project/Location: MSSILF No. 1 / Terrell NC.

Contractor	Weather/Temp
EGI / Crowder	PC / 50-70's

Present at Site: Nick Linderman, Darrell Wolfe

Time	Mileage
5.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Over 7 inches of rainfall recorded onsite last week. A lot of water standing in sump area of Cells 1 and 2. EGI moved pumps back into each cell, and began dewatering. Had problem w/ pump in Cell 1. Laid slope back behind Cell 2 valve boxes along perimeter road. Installed anchor trench and limit of waste markers around Cells 1 and 2.
Crowder Const. installing braces for control panels at Cell 2.
Spoke w/ Darrell about starting a punchlist.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

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Field Report

Date	Job No.
Oct. 5, 2010	1356-08-122

Project/Location: MSSI LF No. 1 / Terrell NC.

Contractor	Weather/Temp
EGI	Sunny / 45-70°

Present at Site: Nick Linderman, Darrell Wolfe

Time	Mileage
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continues to dewater Cell 2, hose run thru culvert and discharging down EPC3. Cell 1 pump still down, part ordered. Additional clearing for proposed fence started this am. Clearing material being hauled to cover stockpile, burning in progress. Lower tack-on bench matted today w/ DS-75, also fertilized (10-10-10) and seeded (tall fescue). Repaired matting in EPC1. Crowder started pulling wire to Cell 1 panel area.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

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Field Report

Date	Job No.
Oct. 6, 2010	1356-08-122

Project/Location: MSSILF No. 1 / Terrell NC.

Contractor	Weather/Temp
EGI	Sunny / 44-72°

Present at Site: Nick L., Darrell W.

Time	Mileage
2.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continued additional clearing, silt fence outlet installed. Matting (DS-75) being installed on upper tack-on bench, regrading completed. Cell 2 dewatering done, pump moved to Cell 1, start dewatering. Sides started planting trees on East side, single row of leyland cypress. Fertilizing and watering.

On-Site Representative/Company

Jimmy Adelup
S&ME Personnel

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S&ME Form FRLF03

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Field Report

Date	Job No.
Oct. 7, 2010	1356-08-122

Project/Location: MSSILF No. 1 / Terrell NC.

Contractor	Weather/Temp
EGI	Sunny / 46-81°

Present at Site: Nick L. Fred B. Darrell W. Ken D. Will H. Jeff L.

Time	Mileage
8.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continues additional clearing work, down to 1st wetlands crossing today. Dewatering Cell 1 into EPC2. Set in on construction progress meeting. Toured jobsite w/ Ken & Will. Sides on North side today w/ tree planting, double row of leyland cypress. Continue fertilizing and watering trees.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

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Field Report

Date	Job No.
Oct. 8, 2010	1356-08-122

Project/Location: MSSILF No. 1

Contractor	Weather/Temp
EGI	Sunny / 46-81°

Present at Site: Nick Linderman

Time	Mileage
3.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI complete dewatering in Cell 1, moved pump out. Placed crane mats on top of geotextile, and crossed over first wetland area, continued clearing for fence. Sides planting trees (double row) along Phase 2.

On-Site Representative/Company

Jimmy Adolio
S&ME Personnel

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Field Report

Date	Job No.
Oct. 11, 2010	1356-08-122

Project/Location: MSSILF No. 1 / Terrell NC

Contractor	Weather/Temp
EGI	Sunny / 53-86°

Present at Site: Nick Linderman, Jeff Leopard

Time	Mileage
3.5	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continues clearing for fence installation, nearing second wetland area. Installing E&S control measures. Crowder working at Cells 1&2 control area, mounting power panels.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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Field Report

Date	Job No.
Oct. 13, 2010	1356-08-122

Project/Location: MSSILF No. 1 / Terrell NC.

Contractor	Weather/Temp
EGI	Cloudy / 55-77°

Present at Site: Nick Linderman, Darrell Wolfe

Time	Mileage
2.5	—

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continues w/ additional clearing, and installing erosion & sediment control measures. Crowder poured footings for stairs at the generator pad. Gaston fence onsite, doing layout.

On-Site Representative/Company

Jimmy Adolis
S&ME Personnel

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Field Report

Date	Job No.
Oct. 18, 2010	1356-08-122

Project/Location: MSSi LF No. 1 / Terrell NC

Contractor	Weather/Temp
EGI/Crowder/Gaston	PC / 80°

Present at Site: Nick Linderman, Jeff Leopard, Darrell Wolfe

Time	Mileage
2.0	0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Checked on site progress. EGI continues work on additional clearing for fence. Second wetlands area now being crossed, wooden mats inplace. Contractor bedding for second pipe installation at first stream crossing. Crowder doing electrical work at Cell 1 panel. Gaston Fence setting post on North side of Cell 1.

GunnCo to be onsite next week, per Jeff w/ Crowder.

On-Site Representative/Company

Jimmy Addup
S&ME Personnel

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Field Report

Date	Job No.
Oct. 19, 2010	1356-08-122

Project/Location: MSSILF No. 1 / Terrell NC

Contractor	Weather/Temp
EGI	Sunny / 46-81°

Present at Site: Nick Linderman, Darrell Wolfe

Time	Mileage
4.5	0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI clearing past wetlands now. Looked at fence staking w/ Nick. At the first stream crossing, access path only about 8 feet wide, need to move fence back 4 feet to maintain 12 foot access, there is room to accommodate. Called Will H. to inform. Gaston setting fence post today, nearing Duke transmission line.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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Field Report

Date	Job No.
Oct. 20, 2010	1356-08-122

Project/Location: MSSILF No. 1 / Terrell NC.

Contractor	Weather/Temp
EGI	Cloudy-Rain / 45-75 am

Present at Site: Nick Linderman, Darrell Wolfe

Time	Mileage
4.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continues doing additional clearing. Also working on erosion and sediment control measures. Informed Darrell about fence relocation @ 1st stream crossing. GunnCo to be onsite next tuesday the 26th.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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Field Report

Date	Job No.
Oct. 21, 2010	1356-08-122

Project/Location: MSSILF No. 1 / Terrell NC

Contractor	Weather/Temp
EGI	Sunny / 42-77°

Present at Site: Nick Linderman, Darrell Wolfe

Time	Mileage
6.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continues work on additional clearing. Working on erosion and sediment control measures. Started dewatering LCS riser pipe in Cell 2, put pump into riser, discharging into perimeter ditch. Crowder done w/ electrical work. Gaston fence onsite.

On-Site Representative/Company | **S&ME Personnel**

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S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
October 22, 2010	13566-08-122

Project/Location: MSSILF No.1 / Terrell NC

Contractor	Weather/Temp
EGI	Cloudy-Rain

Present at Site: Nick Linderman-Bobby Lynn Darrell Wolfe

Time	Mileage
9.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI continues clearing along Steam Plant Road. Installing silt fence outlets beyond wetland area. Issues w/ fence alignment again, Darrell request Will to come up on Monday. I called Will to inform. Fine grading of remaining access road started this morning. Pump was taken out of Cell 2 LCS riser, and moved to Cell 1, for dewatering. Contractor could not get pump any further than approximately 100 feet down LCS pipe. Pulled pump out and moved back to Cell 2, reinstalled into Cell 2 LCS riser pipe. Gaston boring for fence post, past 1st stream crossing now. I proofrolled the East portion of access road w/a loaded CAT 740 articulate off-road dump truck. Area proofrolled appeared stable, o.k. to place ABC on.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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Field Report

Date	Job No.
Oct. 25, 2010	1356-08-122

Project/Location: MSSILF No.1 / Terrell NC

Contractor	Weather/Temp
EGI	Cloudy / 60's

Present at Site: Nick Linderman - Bobby Lynn, Darrell Wolfe, Will Harrison

Time	Mileage
5.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI working on additional clearing along Steam Plant Road. Remaining access road (NE corner of Cell 1 over to EPC3 culvert) was covered w/ 180N mirafi. EGI started placing 1st lift (6") of ABC stone, from South to North. Trucks not allowed on the mirafi. Looked at fence issues w/ Darrell & Will. JetClean onsite, no activity from them today. Site rained out around 10:30 this am.

On-Site Representative/Company

Jimmy Addison
S&ME Personnel

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S&ME Form FRIF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
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Field Report

Date	Job No.
Oct. 26, 2010	1356-08-122

Project/Location: MSSILF No. 1 / Terrell NC.

Contractor	Weather/Temp
EGI	Cloudy / 60's

Present at Site: Nick Linderman

Time	Mileage
2.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Over an inch of rainfall onsite the past 24 hours. No construction activity today. GunnCo to be onsite later today.

On-Site Representative/Company

Jimmy Aldrip
S&ME Personnel

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S&ME Form FRLF03

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(704) 523-4726
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Field Report

Date Oct. 27, 2010	**Job No.** 1356-08-122
Project/Location MSSILF No. 1 / Terrell NC	
Contractor EGI	**Weather/Temp** Cloudy/64-78°
Present at Site Nick L. Darrell W. Dave M. Jeff L. Andre w/ GunnCo	
Time 9.0	**Mileage** 100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Rained another 8/10's last evening, no clearing or earthwork by EGI today. EGI did blade off access for GunnCo & JetClean to get to the cells. EGI removed the portions of mirafi not covered w/ ABC to allow truck access and drying time along roadway. JetClean ran camera into each 18 inch riser pipe at Cells 1 & 2. All were clear - no obstructions, but LCS ones still full of water. Crowder working on discharge lines connections to riser pipes. GunnCo working on pump discharge lines, and install.

On-Site Representative/Company

Jimmy Addlip
S&ME Personnel

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S&ME Form FRLF03

CCTV Surveys List for Earnhardt

Number of surveys in this list is 6 as of Wednesday, October 27, 2010 Unit of measure: ft

Setup	Date	Street	Start MH	Finish MH	Dir	Size inch	Pre Clean	Vid Cassette	Scheduled Length	Surveyed Length
1	10/27/2010		18 LDS	18 LDSA	U	18		1		82.9
2	10/27/2010	Marshall Steam	18 LCS1 CELL 2	18 LCS1A CELL2	D	18		1	Low Flow	79.7
3	10/27/2010	Marshall Steam	18 LCS2 CELL2	18 LCS2A CELL2	D	18		1	High Flow	80.8
4	10/27/2010	Marshall Steam	18 LDS CELL1	18 LDSA CELL1	D	18		1		191.3
5	10/27/2010	Marshall Steam	18 LCS CELL1	18 LCS1 CELL1	D	18		1	Low Flow	199.2
6	10/27/2010	Marshall Steam	18 LCS2 CELL1	18 LCS21 CELL1	D	18		1	High Flow	203.8

Total Scheduled Length 0.0

Total Length Surveyed 837.7

S&ME
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Field Report

Date	Job No.
Oct. 28, 2010	1356-09-122-09

Project/Location: MSSILF No. 1 / Terrell NC

Contractor	Weather/Temp
EGI	Sunny / 66-80°

Present at Site: Nick Linderman, Darrell Wolfe - Dean Synder, Jeff Leopard - Will Harrison

Time	Mileage
8.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

Had recordable rain again onsite last evening (6/10's). No construction activity from EGI today. GunnCo installing pumps @ Cell 1 today, having problem w/ high flow LCS, only traveling about 50 feet into riser. Will try again tomorrow. Control panels delivered to site late today. Set in on construction progress meeting. Walked newly planted tree line w/ Catawba Co. ~~zoning~~ zoning officials. 629 new trees planted per Nick w/ EGI.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
Oct. 29 2010	1356-08-122-09

Project/Location: MSSILF No.1 / Terrell NC.

Contractor	Weather/Temp
EGI	Sunny /

Present at Site: Nick Linderman, Jeff Leopard, Darrell Wolfe

Time	Mileage
8.0	100.0

To: File

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☐ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☐ Other (Explain)

Observations/Remarks:

EGI resumed work on additional clearing, also installing erosion control measures. GunnCo and Crowder, wiring up pumps @ Cell 1, and mounting control panels @ Cells 1 & 2. Unsuccessful on high flow LCS pump reaching its destination. Crowder has a leak at blind flange (Cell 2 LCS) on manifold. New junction box set @ Cell 2 for LDS. All pumps wired, control panels operateable. Crowder still has some work to do at Cell 1, GunnCo done for now. No true start up today. Gaston putting up fence fabric and barb wire along North side of Cell 1 today.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

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S&ME Form FRLF03

APPENDIX IV – PROJECT DOCUMENTATION
Section 3 – Minutes of Key Meetings

3-29-10 Pre-Construction Meeting
5-20-10 Geosynthetics Pre-Installation Meeting

MEMORANDUM

TO: Attendees

CC: None

FROM: Will Harrison and Ken Daly, S&ME, Inc.

DATE: April 2, 2010

SUBJECT: **March 29, 2010 Meeting – Discussion Item Summary**
Pre-Construction Meeting
Marshall Steam Station Industrial Landfill No. 1
S&ME Project No. 1356-08-122

MEETING ATTENDEES:

Duke Energy (Duke): Robert Dorroh; Todd Canestraro; Dean Snyder; Monica Sehgal; Lewis Withers; Donna Burrell; Ed Sullivan

Allied Technical Resources (ATR): Darrell Wolfe; Tom Newbey

North Carolina Department of Environment and Natural Resources (NCDENR): Larry Frost; John Murray; Deb Aja; Elizabeth Werner

Earnhardt Grading, Inc.(EGI): Fred Brown; Jamie Lineberger

S&ME, Inc.(S&ME): Ken Daly; Will Harrison

The meeting was held at Marshall Steam Station (MSS) from approximately 10:00 AM to 2:00 AM.

This discussion item summary is intended to provide a general summary of the subject meeting conclusions and findings. This discussion item summary is based on the notes and memory of the authors. This is not intended to be a rigorous and complete record of the meeting.

DISCUSSION ITEM SUMMARY:

1. **Sign-in, Welcome, and Level 1 Safety Assessment:** Darrell Wolfe distributed a sign-in sheet. Dean Snyder welcomed the group and noted that safety is always a priority at Duke sites, and that a Level 1 Safety Assessment be conducted. Todd Canestraro conducted the Level 1 Safety Assessment,

noting pinch-points, trip hazards, and evacuation procedures, including routes and gathering points.

2. **Introduction/Designation of Responsible Personnel:** Starting with Dean Snyder, introductions were made. Ken Daly described the roles of various parties as follows:

   2.1 Owner: Duke is the project owner and Dean Snyder is Duke's project manager for this project.
   2.2 Contractor: EGI is the contractor constructing the landfill. Fred Brown is the EGI's project manager for this project.
   2.3 Subcontractors: Subcontractors include ESI for geosynthetics and Sides Seeding for erosion and sediment control (E&SC) measures.
   2.4 Design Engineer: S&ME is the design engineer. Ken Daly is the engineer of record and S&ME's project manager for this project.
   2.5 Construction Quality Assurance (CQA)
      2.5.1 Soil CQA Testing Laboratory: S&ME's soils lab will be used as the soil CQA testing laboratory.
      2.5.2 Geosynthetic CQA Testing Laboratory: Geotechnics, Inc. facilities will be used as the geosynthetic CQA testing lab.
   2.6 Regulators/Inspectors: Larry Frost, Elizabeth Werner, and John Murray work in the Permitting branch of NDENR Solid Waste Section and Deb Aja works in the field operations branch of NCDENR Solid Waste Section.

3. **Environment, Health and Safety:** Todd Canestraro led the discussion on Environment, Health and Safety issues following Ken Daly's introduction.

   3.1 Safe Work Practices: Ken Daly noted that Duke has a safe work practices manual and that everyone involved should be aware of the manual.
   3.2 Procedures / Incident Reporting: Todd Canestraro said that any injury, no matter how minor, should be reported to the Duke contact immediately and that paperwork would be generated within 24-hours of the report, documenting the incident. He added that reporting and discussing "near misses" is strongly encouraged as it promotes a safer work environment.
   3.3 Drug Screening: Todd Canestraro explained that everyone working on site should have a MICCS or COATS certified or have a CDL, or have drug screen with chain-of-custody form.
   3.4 Safety Meetings: Fred Brown and Darrell Wolfe discussed that there would be a pre-job meeting at the start of every day. He added that anytime someone is starting a new task, that they will also meet and discuss safety with the new task. Fred Brown added that he had discussed and initiated a "tell-me" program with Dean Snyder. Todd Canestraro said that EGI representatives will be required to attend Marshall Steam Station safety steering committee on the 2nd Thursday of every month at 9:30AM.

3.5 First Aid: Todd Canestraro said that Duke has first responders on-site and said that for hard-wired phones, dialing 7521 will connect to the first responders and that from an outside phone or cell phone, the number is 828-478-7521.

3.6 Site Assembly / Evacuation: Todd Canestraro said that the assembly plan and evacuation route are to be worked out soon but that generally, if an alarm sounds, the personnel on the landfill site should stay away from the station. Todd Canestraro said that the main assembly point for persons at the station is on the gravel pad at the bottom of the hill adjacent to the coal piles designated by signage. Donna Burrell asked if there was a daily sign-in sheet. Darrell Wolfe said that someone will make a list of the personnel on-site and this would probably be done during the daily morning safety meeting. Todd Canestraro said that someone must be accountable for making sure the list represents who is on site and who has left. Jamie Lineberger asked if the sign-in sheets would need to be taken to the station. The group went on to discuss, with ID tags having been provided, whether or this would be required. Darrell Wolfe agreed to check with Charles Seaford to find out if list can be generated from ID tag use.

3.7 Spill Reporting: Donna Burrell said that any spill, regardless of quantity, should be reported to her. Darrell Wolfe said that MSDS sheets for materials should be provided for chemicals used for this job.

3.8 Job Hazard Analysis (JHA) Preparation: Todd Canestraro said that he had received the JHAs from EGI and that they were acceptable.

4. Permits: Donna Burrell asked that 3 copies be provided to the station of each permit application and other project related documents.

4.1 Permit to Construct: Was issued February 25, 2010.

4.2 E&SC Permit: Donna Burrell noted that the actual permit needs to be posted on-site. Ed Sullivan agreed to provide the original permit from Duke personnel. Discussing E&SC inspections, the group noted that Stage 3 completely supersedes Stage 2 but that some Stage 2 measures are left over which still need to be maintained. Fred Brown said that some of these measures should be inspected by SEFA and that the new ones can be inspected by EGI. The group agreed that this needed to be worked out in greater detail. Donna Burrell requested that the inspection forms be sent to her Monday of each week.

4.3 Burn Permits: The group noted that burn permits are valid for 10 days. Larry Frost said that he will need a copy of the burn permits before burning at the landfill site. Ed Sullivan asked if it was just a notification or is approval required. Larry Frost said it would be a notification and would not require approval. Donna Burrell asked if burning would be done frequently. Fred Brown answered that would burn only once or twice. Deb Aja asked how much clearing would be done. Fred Brown said approximately 4 acres in the landfill area and more in the inactive ash

basin. Ken Daly explained that most of the clearing near the inactive ash basin will be pushing over vegetation and leaving it in place. Deb Aja asked if there was a landfill for this material. Ken Daly said that this area was for the stockpile of excavated material and that it would be covered by a bridge lift over the ash basin area probably 5-6 ft thick. Ken Daly showed the group an aerial view of the landfill and noted the inactive ash basin area.

5. **Distribution and Review of Contract Documents:** Ken Daly said that Duke and EGI have copies of the issued-for-construction documents.

5.1 Construction Drawings: Ken Daly discussed three changes to the drawings including:

5.1.1 Changed slope on perimeter access road to drain to the perimeter ditch

5.1.2 Changed alignment of riser pipes to promote cleanout of pipes

5.1.3 Reduced stockpile area in the inactive ash basin

5.2 Technical Specifications: Will Harrison said the technical specifications in the packet include the changes made in Addendum 02 during the bid process.

5.2.1 Surveys: Ken Daly discussed survey requirements and noted that they must be completed by a PLS, they must maintain at least 2 benchmarks, and that these benchmarks must be provided on the record drawings. Ken Daly noted the Surveys to be included in the record drawings:

5.2.1.1. Existing Conditions Survey: after bush hogging and clearing, before stripping.

5.2.1.2. Final Subgrade Survey: after excavation, cut, and fill to subgrade elevations.

5.2.1.3. Compacted Soil Liner Survey: after placement of compacted soil liner. Fred Brown said he is currently developing this grid.

5.2.1.4. Secondary Geomembrane As-Built Drawing: including geomembrane panel corners, changes in panel geometry, and repair locations.

5.2.1.5. Primary Geomembrane As-Built Drawings: including geomembrane panel corners, changes in panel geometry, and repair locations.

5.2.1.6. Protective Cover Survey: after placement of protective cover

5.2.1.7. Installed Stormwater and leachate piping and structure elevations and locations.

5.2.2 Compacted Soil Liner Material:

5.2.2.1. Material Source: Ken Daly discussed the source areas for this material that they include the

excavation area and the stockpile area. Will Harrison said that approximately 30,000 CY of material in the excavation area will be suitable for use, that 4 test pits had been excavated in this area and that at least 4 more will be completed soon as well. Fred Brown asked that S&ME send Jamie Lineberger the coordinates for the remaining test pit locations.

5.2.2.2. Test Pad: Ken Daly discussed test pad requirements noting that it should be 35-ftx100-ft. Ken Daly asked if Larry Frost had any requirements on test pad location. Larry Frost said he had no requirements but that he would prefer it on the subgrade. Ken Daly explained the conformance testing program for the test pad area. Ken Daly said that proof rolling of subgrade prior to compacted soil liner construction is required. Ken Daly added that an overbuild of 3" or a sacrificial geomembrane would be required in the interim period, prior to geosynthetics placement.

5.3 CQA Plan: Ken Daly said the CQA plan is included in the information given to Duke and EGI.

6. Schedule

6.1 Contract Duration: Fred Brown requested to work 6 days per week to make up time due to a later than planned start and to meet the scheduled completion date of August 6th. Dean Snyder, Ed Sullivan and Donna Burrell discussed that the pending EPA regulations influencing Duke's current completion date have been delayed, and that the date that Cell 1 would need to be operational could probably be relaxed. Considering the pending EPA rule delays Dean Snyder stated that the schedule could be relaxed to September 6th, 2010.

6.2 Dean Snyder said the intent is to construct the landfill per the involved parties' requirements. Dean Snyder said that he would like to keep NCDENR apprised of landfill construction activities, and asked if NCDENR permitting and/or compliance personnel plan to visit the site regularly. Larry Frost and Deb Aja said that they do not plan to visit on a scheduled frequency and that they are available to visit as requested or needed.

6.3 Ken Daly asked if EGI could submit a revised schedule showing this date. Fred Brown said he would try to keep the August 6th date anyway, just to be safe from a schedule perspective and that the schedule would be the same as the current schedule unless changes occur. Fred Brown added that the schedule will be updated every week.

6.4 Construction Schedule: Fred Brown said that EGI should be starting with land disturbing activities tomorrow (March 30th, 2010).

6.4.1 The subgrade should be completed by May 21st, 2010.

6.4.2 The compacted soil liner for Cell 1 should be completed by June 21st, 2010.

6.4.3 The geosynthetics for Cell 1 should be started by June 15th, 2010.

6.5 Critical Work Sequences: Ken Daly and Fred Brown discussed critical work sequences. Fred Brown said that submittals are important and that he and Jamie Lineberger have been looking through submittals for upcoming work items. Ken Daly said that S&ME had prepared a submittal list already and would furnish a copy to Fred Brown.

6.6 Changes: Fred Brown noted that the schedule would be updated every week.

6.7 Progress Reporting: The group discussed that the expectation is progress reports would be prepared once per month. Dean Snyder proposed that regular weekly meetings start two weeks from now on Thursday. Dean Snyder confirmed with Robert Dorroh that the project schedule is independent of the plant schedule.

6.8 2 week look ahead: Fred Brown said he had installed the E&SC measures and that they would be grading Cell 1 and start excavating for Cell 1 and Cell 2. He added that they would take 1 week to 10 days to complete clearing.

7. Submittals and Shop Drawings: Ken Daly said that submittals had already been discussed and that submittal requirements are located in the specifications. He noted that EGI's submittal form was acceptable and requested that they provide sequential submittal numbers on the project.

8. CM Requirements, Procedures, Protocols

8.1 Project Progress Meetings: The group had discussed that these will be held every week. The dates and time is yet to be determined.

8.2 Geosynthetic Pre-construction Meeting: Larry Frost said that he would like to attend the geosynthetics pre-construction meeting and to give a 2 week notice. Referencing Fred Brown's schedule dates, Ken Daly said this could tentatively be scheduled on May 27th, 2010.

8.3 Construction Phase Management: Darrell Wolfe and S&ME will share construction management responsibilities on the project.

8.4 Scheduling: Ken Daly noted that Duke requires monthly schedule updates from the contractor.

8.5 Project Closeout: Ken Daly said as part of project closeout, record drawings will be required.

8.6 Pre-Operations Meeting: Larry Frost noted that a pre-operations meeting is required. He requested that if there is time of some months between completing construction and starting operations that the pre-operations meeting be conducted 1 month before operations begins.

9. CQA Regulations, Procedures, Protocols:

9.1 Laboratory and Field Testing: Ken Daly explained that CQA procedures and protocols are summarized in the CQA Plan and specifications. He noted that conformance tests are required for the geosynthetics and that S&ME has prioritized interface strength testing.

10. Record Drawings: Ken Daly said that the required record drawings are outlined in the CQA Plan. Fred Brown asked if panel layouts will be required as written in the specifications. Ken Daly said this can be discussed with the installer.

11. Use of Site

11.1 Entrance: The group discussed that project personnel will use the gypsum haul road entrance to enter the site.
11.2 Office Trailer: Fred Brown said the trailer had been delivered and set up behind Crowder's construction trailer but that it did not yet have power.
11.3 Deliveries: Fred Brown said that deliveries will use the road that runs along the dry ash silos.
11.4 Storage Areas: Fred Brown said that EGI has a few storage locations in mind that he would like S&ME to review.
11.5 On-Site Stockpile: Ken Daly described the soil stockpile areas on-site.
11.6 Security: Ken Daly said that the contractor would be responsible for securing contractor's property. Fred Brown asked when the security fence would go up. Dean Snyder said he wants it to be installed before liner system installation. Donna Burrell asked if an E&SC permit was required for this work. Ken Daly said it probably would not be required since the fencing work would just include clearing.
11.7 Site Survey Control: Ken Daly said EGI will need at least 2 control points. Jamie Lineberger said 3 control points exist.
11.8 Protection of Site Features: Ken Daly said EGI is responsible for maintaining the site and protecting finished work until Duke assumes project ownership. Fred Brown said he agreed with the exception of slopes which are left exposed (referring to the western and southern slope of Cells 1 and 2 that SEFA is responsible for covering). Ken Daly said that they would clarify the slope covering with SEFA. Donna Burrell asked what would happen if the landfill is constructed but is not used for a period of time. The group discussed options such as temporary stabilization and agreed to clarify this later.

12. Site Visit: Dean Snyder, Ed Sullivan, Larry Frost, Elizabeth Werner, Deb Aja, Ken Daly, and Will Harrison visited the site after the meeting.

MEMORANDUM

TO: Attendees

CC: None

FROM: Will Harrison and Cedric Ruhl, S&ME, Inc.

DATE: May 25, 2010

SUBJECT: **May 20, 2010 Meeting – Discussion Item Summary**
Geosynthetics Pre-Installation Meeting (Construction Meeting # 7)
Marshall Steam Station Industrial Landfill No. 1
S&ME Project No. 1356-08-122

MEETING ATTENDEES:

Duke Energy (Duke): Monica Sehgal; Tom Newby; Carlton Allred; James Wallace; Dean Snyder; Donna Burrell

Earnhardt Grading, Inc. (EGI): Fred Brown; Wilson Warlick, Jamie Lineberger

Environmental Solutions, Inc.: Robert Gann, Bill Smola, Mohammed Malimar

S&ME, Inc. (S&ME): Travis Bowman; Will Harrison; Cedric Ruhl

The meeting was held in EGI's jobsite trailer at Marshall Steam Station (MSS) from approximately 11:00 AM to approximately 11:45 AM.

This discussion item summary is intended to provide a general summary of the subject meeting conclusions and findings. This discussion item summary is based on the notes and memory of the authors. This is not intended to be a rigorous and complete record of the meeting.

DISCUSSION ITEM SUMMARY:

1. **Level I Safety Assessment and Sign-in sheet:** Completed in preceding meeting.

2. Introduction/Designation of Responsible Personnel

2.1 The group introduced each other. Will Harrison summarized saying that Duke is the owner, S&ME is the Owner's Engineer, EGI is the Contractor, and ESI is the Contractor's geosynthetics installer.

3. Environment, Health, and Safety: Donna Burrell discussed environment, health, and safety issues.

3.1 MICCS Cards/Worker Documentation Requirements: Fred Brown and Donna Burrell discussed that the installer's personnel will receive site specific training and that Todd Canestraro had authorized EGI's safety coordinator (Dennis Pickell) to administer the site specific training to the new personnel. Donna Burrell explained that the safety training would need to be documented by EGI. Will Harrison asked whether gate badges were required. Fred Brown said that gate badge paperwork was in progress and noted that everyone will have to badge in and out as they enter and leave the site, even if there are multiple people in one vehicle. Donna Burrell said that any spills or injuries are to be reported.

3.2 Job Hazard Analyses: Fred Brown said that ESI and EGI will perform JHA every morning. Will Harrison said that S&ME personnel would attend these morning meetings.

3.3 List of Chemicals, MSDS Sheets: Donna Burrell said that MSDS sheets would be required for any chemicals on site. Robert Gann said that the only chemical that ESI would bring on site would be WD-40. Fred Brown suggested that ESI just notify their suppliers to provide MSDS sheets to ESI on all supplied materials. Dean Snyder and Donna Burrell discussed that an equipment list from the contractor is not required.

4. Schedule

4.1 Work Days and Hours: During the preceding meeting, Fred Brown had requested that work schedule be extended to 6-10 hour days per week and asked if 6-12 hour days would be acceptable. Dean Snyder had approved the 6-10 hour days request and said that any additional work could be considered as needed.

4.2 Start/Finish: Bill Smola asked what time ESI would need to be on site. Fred Brown said that the morning safety meeting starts at 6:30 AM and that work will start at 7:00 AM.

5. Geosynthetics Submittal Status, CQA Plan, Specifications

5.1 GCL – Will Harrison said that GCL conformance testing was underway. Cedric Ruhl said that ESI will need to sign a subgrade approval form prior to GCL placement. Cedric Ruhl asked that ESI provide S&ME their subgrade certification form for review. Cedric Ruhl and Robert Gann discussed that Supergroove GCL would be used and that S&ME would periodically observe the quality of the grooves.

5.2 Geocomposite –

5.2.1 Will Harrison said that conformance testing for Cell 1 geocomposites is complete and that MQC data for Cell 1 and 2 have been received and reviewed.

5.2.2 Cedric Ruhl discussed that heat bonding by torch or Lyster gun of the geotextile portion of the geocomposite panels may be acceptable for the leachate detection layer only, pending a field demonstration. Robert Gann and Mohammed Malimar discussed that ESI prefers to sew the geocomposite anyway, but they did note that they use a Lyster gun on GCL seams, in addition to the supergroove on edge-to-edge seams and granulated bentonite on end-to-end (butt) seams.

5.3 Geomembrane –

5.3.1 Will Harrison said that conformance testing for Cell 2 geomembrane was received and that S&ME will have a response out shortly.

5.3.2 Robert Gann and Bill Smola discussed with Will Harrison and Cedric Ruhl that ESI is changing the panel layout and that ESI would need to submit another panel layout figure. Cedric Ruhl added that butt seams should be avoided on sideslopes.

5.3.3 Cedric Ruhl discussed seaming. Mohammed Malimar and Robert Gann said that they would have 2 wedge welders during the project and that they weld at 24-25ft/min. Cedric Ruhl noted that a trial seam would be needed for each type of seam to be completed that day (i.e. smooth to smooth, texture to texture, etc.) ESI discussed with Cedric Ruhl that one of the welders and welder operators would be dedicated to butt seams. Cedric Ruhl noted that trial seam test samples would be taken every 5 hours, after a change in the operator, and/or after shutdown and restarting of machinery.

5.3.4 Cedric Ruhl said that destructive test sampling would be performed an average of every 500-ft of seam, and upon discussion with ESI, said that S&ME would mark destructive test sample locations. Cedric Ruhl discussed that the sample would consist of three pieces, and that one would go to the installer, one would go to S&ME, and one would go to the archive. Robert Gann discussed that ESIs sample piece will not be as large as specified but will still result in the same number of samples which will be taken at various places along the destructive test sample, to reduce the repair size.

5.3.5 Cedric Ruhl discussed panel numbering and that the panels are numbered sequentially. Will Harrison and Robert Gann discussed that back up welders would be available if necessary.

6. Roundtable

6.1 Cedric Ruhl discussed with Robert Gann and Mohammed Molina that S&ME will have it's own on-site tensiometer.
6.2 Cedric Ruhl discussed that the installer would need to keep independent records.
6.3 Mohammed Malimar asked if destructive test samples were allowed to cool before testing. Cedric Ruhl replied that they would be allowed to cool.

APPENDIX IV – PROJECT DOCUMENTATION
Section 4 – Notices of Change

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date: 05/28/10**	**Job No.: 1356-08-122-07**
DESCRIPTION:	Intercell Berm	Cells 1 & 2 Construction	
		Industrial Landfill No. 1	
NOTICE OF CHANGE NO.	1	Duke Energy – Marshall Steam Station	
CHANGE ORDER NOS:	N/A	Terrell, North Carolina	

Description of design change:

Intercell berm between Cells 1 and 2 modified. Geosynthetics anchor trench in intercell berm between Cells 1 and 2 replaced with flat run out instead with the following provisions:

1 – That the subgrade elevations and compacted soil liner thickness are verified at least up to where the tie-in to Cell 2 geosynthetics will be made.

2 – That the GCL is covered up by at least 1 geomembrane layer.

3 – That the geocomposite geotextile not be exposed for more than 40 days.

4 – That if the geocomposite geotextile is exposed for more than 40 days, the engineer will evaluate the condition of the geotextile and that the contractor may need to cover the material.

Reason for design change:

There will be no significant gap between Cell 1 and Cell 2 construction. As such, a temporary anchor trench in the intercell berm between Cells 1 and 2 is not required.

Effective date of design change:

05/28/2010

Financial and schedule considerations:

Anchor trench line item removed (no cost for revised anchor trench)

Attachment:

None

12/6/10		12/6/10	
Engineer of Record	**Date**	**Prepared By**	**Date**
Name		Name	

Copies to:

- ☒ Dean Snyder, Duke Energy
- ☒ Darrell Wolfe, Duke Energy
- ☒ S&ME File No. 1356-08-122-07
- ☐
- ☐
- ☐

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date: 07/14/10**	**Job No.: 1356-08-122-07**
DESCRIPTION:	Culverts at Northern Perimeter Channel	Cells 1 & 2 Construction	
		Industrial Landfill No. 1	
NOTICE OF CHANGE NO.	2	Duke Energy – Marshall Steam Station	
CHANGE ORDER NOS:	N/A	Terrell, North Carolina	

Description of design change:
Two (2) culverts installed in areas of fill on the northern perimeter of Cell 1. Culverts convey water from the outside edge of the road to an outlet protection apron in the perimeter channel.

Reason for design change:
Fill placed to attain planned grade would impound water north of the road at two locations. Culverts were added at these two locations.

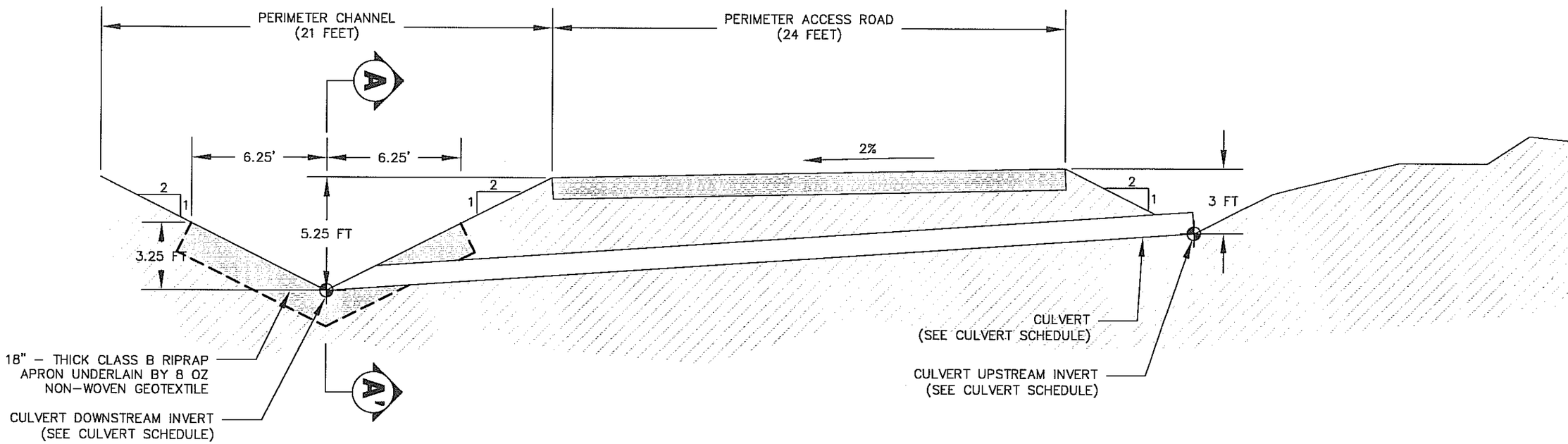
Effective date of design change:
07/14/2010

Financial and schedule considerations:
Culverts and outlets added to the project cost.

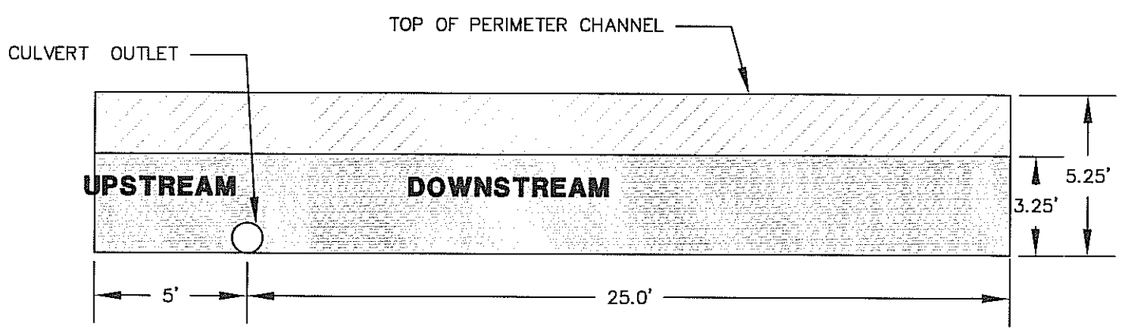
Attachment:
Figure 1 – Additional Culverts

12/6/10		12/6/10	
Engineer of Record Name	**Date**	**Prepared By** Name	**Date**

Copies to:
- ☒ Dean Snyder, Duke Energy
- ☒ Darrell Wolfe, Duke Energy
- ☒ S&ME File No. 1356-08-122-07
- ☐
- ☐
- ☐



CULVERT SCHEDULE									
CULVERT ID	TYPE	DIAMETER (FT)	APPROX. LENGTH (FT)	CULVERT UPSTREAM INVERT COORDINATES			CULVERT DOWNSTREAM INVERT COORDINATES		
				EASTING (FT)	NORTHING (FT)	ELEVATION (FT)	EASTING (FT)	NORTHING (FT)	ELEVATION (FT)
NRC1	HDPE N-12	1	40.5	1413471.77	687730.80	877.75	1413471.48	687690.43	875.00
NRC2	HDPE N-12	1	40.5	1413684.80	687726.53	873.50	1413684.76	687686.02	870.75



SECTION A-A'

GRAPHIC SCALE

5 0 2.5 5 10

(IN FEET)

DATE: 6/23/2010
DRAWN BY: CLD
CHECKED BY:
SCALE: AS SHOWN
PROJECT NO. 1356–08–122

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ADDITIONAL CULVERTS
CELL 1 CONSTRUCTION

MARSHALL STEAM STATION INDUSTRIAL LANDFILL NO. 1
TERRELL, NORTH CAROLINA

FIGURE NO.
1

Q:\1356\DUKE ENERGY\08-122 Marshall ILF#1\DWG\Industrial Landfill #1\ISSED FOR CONTRUCTION 2010\Construction Edits\CULVERT LOCATIONS.dwg

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date: 07/26/10**	**Job No.: 1356-08-122-07**
DESCRIPTION:	Protective Cover Modifications	Cells 1 & 2 Construction	
		Industrial Landfill No. 1	
NOTICE OF CHANGE NO.	3	Duke Energy – Marshall Steam Station	
CHANGE ORDER NOS:	N/A	Terrell, North Carolina	

Description of design change:

Protective cover is modified to include 3 infiltration zones in each cell. In each cell two infiltration zones are placed upstream of the sump area along the LCS header corridor and one infiltration zone is placed in the sump area itself. Each infiltration zone features perforated riser pipes and distribution pipes. The perforated distribution pipes are installed to distribute water from the riser pipe throughout the infiltration zone. The perforated riser pipe will collect standing surface water through operations from the waste surface down into the infiltration zones and into the LCS. The infiltration zone section consists of, from top to bottom, a nonwoven geotextile filter fabric, 9" thick layer of C33 fine aggregate, a nonwoven geotextile filter and separator fabric, and a 24" thick layer of #57 drainage aggregate. The infiltration zone sits directly upon the LCS geocomposite. Check dams are installed on the protective cover adjacent to the infiltration zones.

Reason for design change:

Protective cover modified to improve infiltration of leachate to the LCS and reduce the likelihood of clogging.

Effective date of design change:

07/26/2010

Financial and schedule considerations:

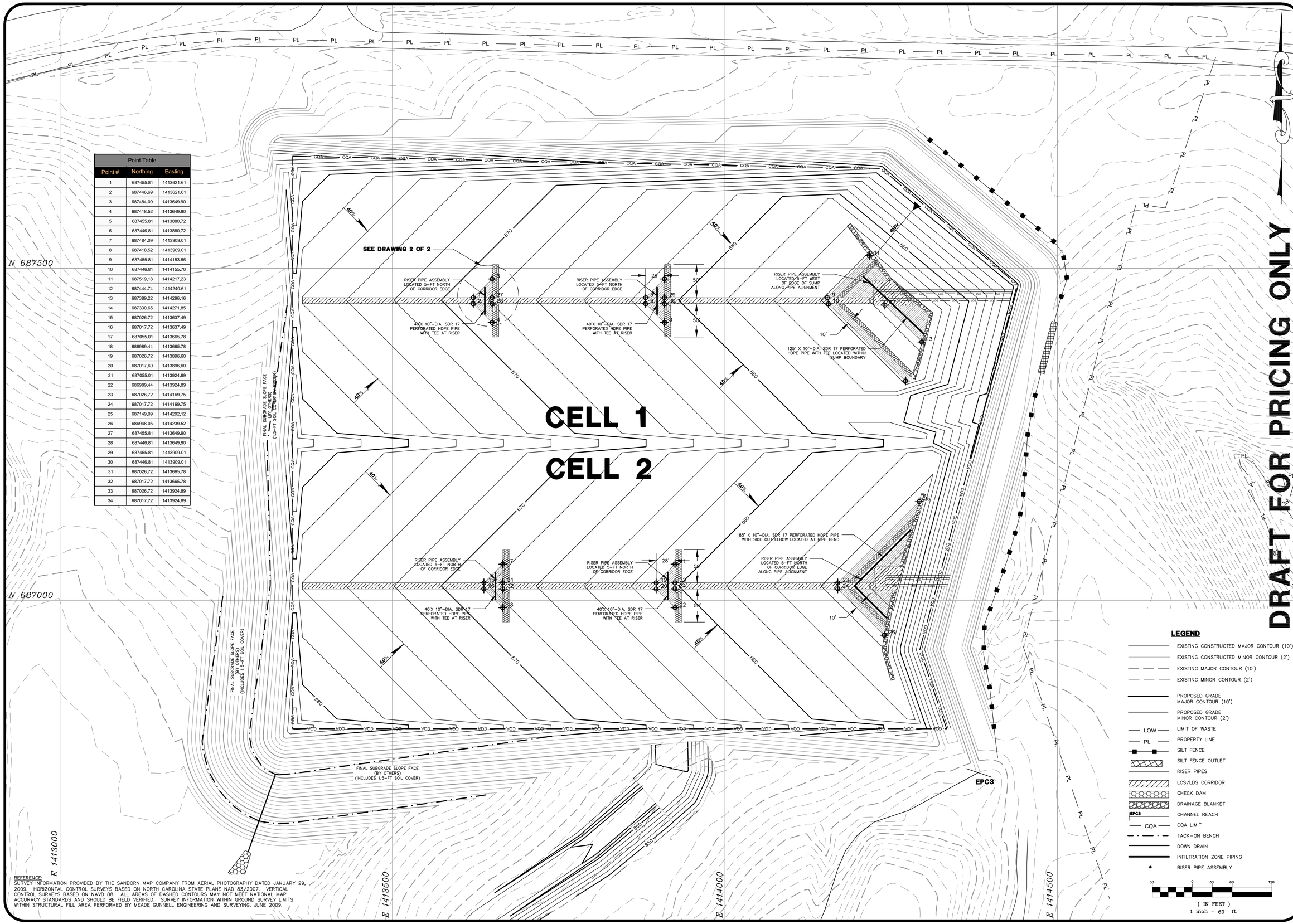
Protective cover modifications added to the project cost and affected schedule.

Attachment:

Drawing 1 of 2 – Protective Cover Modifications Plan
Drawing 2 of 2 – Protective Cover Modifications Detail

12/6/10		12/6/10	
Engineer of Record Name	**Date**	**Prepared By** Name	**Date**

Copies to:
- ☒ Dean Snyder, Duke Energy
- ☒ Darrell Wolfe, Duke Energy
- ☒ S&ME File No. 1356-08-122-07
- ☐
- ☐
- ☐



Point Table		
Point #	Northing	Easting
1	687455.81	1413621.61
2	687446.69	1413621.61
3	687484.09	1413649.90
4	687418.52	1413649.90
5	687455.81	1413880.72
6	687446.81	1413880.72
7	687484.09	1413909.01
8	687418.52	1413909.01
9	687455.81	1414153.86
10	687446.81	1414155.70
11	687519.18	1414217.23
12	687444.74	1414240.61
13	687389.22	1414296.16
14	687330.65	1414271.85
15	687026.72	1413637.49
16	687017.72	1413637.49
17	687055.01	1413665.78
18	686989.44	1413665.78
19	687026.72	1413896.60
20	687017.60	1413896.60
21	687055.01	1413924.89
22	686989.44	1413924.89
23	687026.72	1414169.75
24	687017.72	1414169.75
25	687149.09	1414292.12
26	686948.05	1414239.52
27	687455.81	1413649.90
28	687446.81	1413649.90
29	687455.81	1413909.01
30	687446.81	1413909.01
31	687026.72	1413665.78
32	687017.72	1413665.78
33	687026.72	1413924.89
34	687017.72	1413924.89

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

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S&ME
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NO.	DATE	DESCRIPTION	BY
			KRD

PROTECTIVE COVER MODIFICATION CELLS 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY:
DESIGNED BY: WMH	APPROVED BY:
PROJECT NUMBER: 1356-08-122	
SCALE: 1" = 60'	DATE: 7-26-10
DRAWING: 1	OF: 2

DRAWING PATH: Q:\SUBGRADE ENERGY\02-Marshall SE\Drawings\Permit Layouts\ISSUED FOR CONSTRUCTION 2010\Construction Sheets\C-01 CELL 2 PROTECTIVE COVER.dwg Q:\SUBGRADE ENERGY\02-02 MARSHALL SE\Drawings\Initial Layouts\ISSUED FOR CONSTRUCTION 2010\Construction Sheets\C-01 CELL 2 PROTECTIVE COVER.dwg

PLAN VIEW
SCALE: 1" = 5'

CROSS-SECTION D-D' (RISER PIPE ASSEMBLY)
SCALE: 1" = 4'

CROSS-SECTION A-A'
SCALE: 1" = 5'

CROSS-SECTION B-B'
SCALE: 1" = 5'

INFILTRATION ZONE PIPING CROSS-SECTION
SCALE: 1" = 5'

CROSS-SECTION C-C'
SCALE: 1" = 5'

DRAFT FOR PRICING ONLY

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NO.	DATE	DESCRIPTION	BY
			KRD

PROTECTIVE COVER MODIFICATION
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

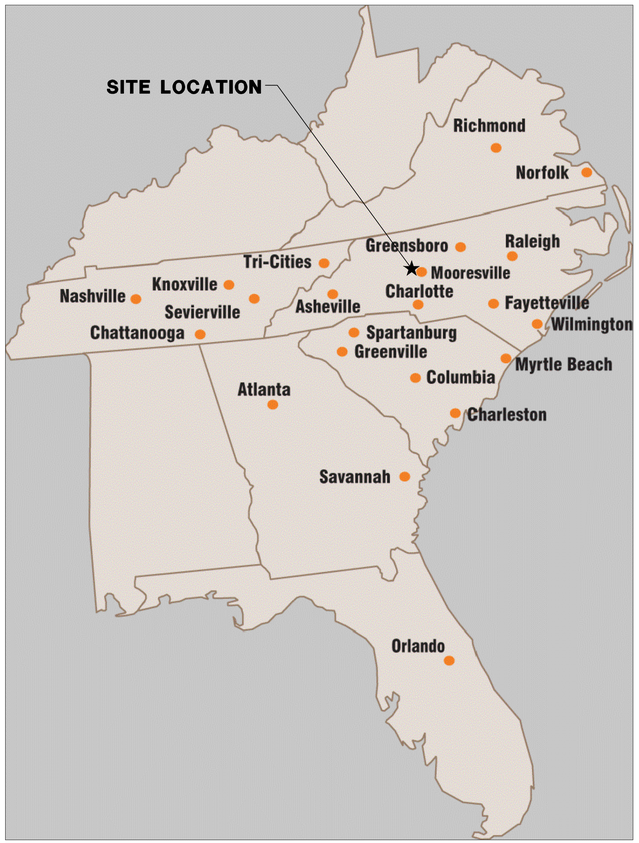
ENGINEERING LICENSE NO: F-0176	
DRAWN BY: CLD	CHECKED BY:
DESIGNED BY: WMH	APPROVED BY:
PROJECT NUMBER 1356-08-122	
SCALE: AS SHOWN	DATE: 7-26-10
DRAWING: 2	OF: 2

DRAWING PATH:

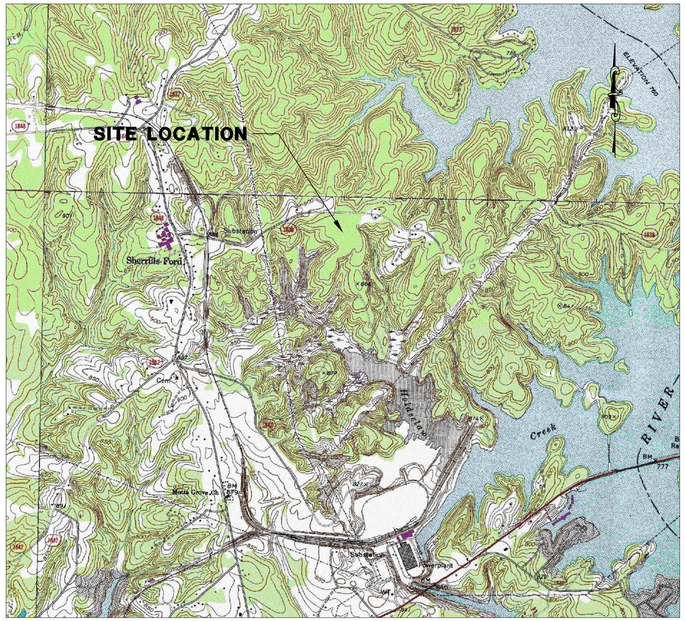
APPENDIX IV – PROJECT DOCUMENTATION
Section 5 – Issued for Construction Drawings

CELLS 1 AND 2 CONSTRUCTION
MARSHALL STEAM STATION INDUSTRIAL LANDFILL NO. 1
ISSUED FOR CONSTRUCTION
MARCH 2010

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA



LOCATION / S&ME OFFICE MAP
NOT TO SCALE



SITE VICINITY MAP
NOT TO SCALE

INDEX OF DRAWINGS

DRAWING	TITLE
C1	SITE AERIAL PHOTOGRAPH
C2	EXISTING SITE CONDITIONS
C3	CELL 1 ROUGH SUBGRADE
C4	CELL 1 FINAL SUBGRADE
C5	CELL 1 LEAK DETECTION SYSTEM
C6	CELL 1 LEACHATE COLLECTION SYSTEM
C7	CELL 1 PROTECTIVE COVER
C8	CELL 2 ROUGH SUBGRADE
C9	CELL 2 FINAL SUBGRADE
C10	CELL 2 LEAK DETECTION SYSTEM
C11	CELL 2 LEACHATE COLLECTION SYSTEM
C12	CELL 2 PROTECTIVE COVER
C13	CELLS 1 AND 2 BORROW/STOCKPILE AREA
C14	CELLS 1 AND 2 FORCE MAIN
C15	TOP OF BEDROCK
C16	ESTIMATED LONG TERM SEASONAL HIGH GROUNDWATER
D1	LINER SYSTEM DETAILS
D2	LCS/LDS DETAILS 1
D3	LCS/LDS DETAILS 2
D4	LDS DETAILS
D5	LCS DETAILS
D6	E&SC DETAILS 1
D7	E&SC DETAILS 2
D8	STORMWATER MANAGEMENT DETAILS

NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALTON
3/19/10

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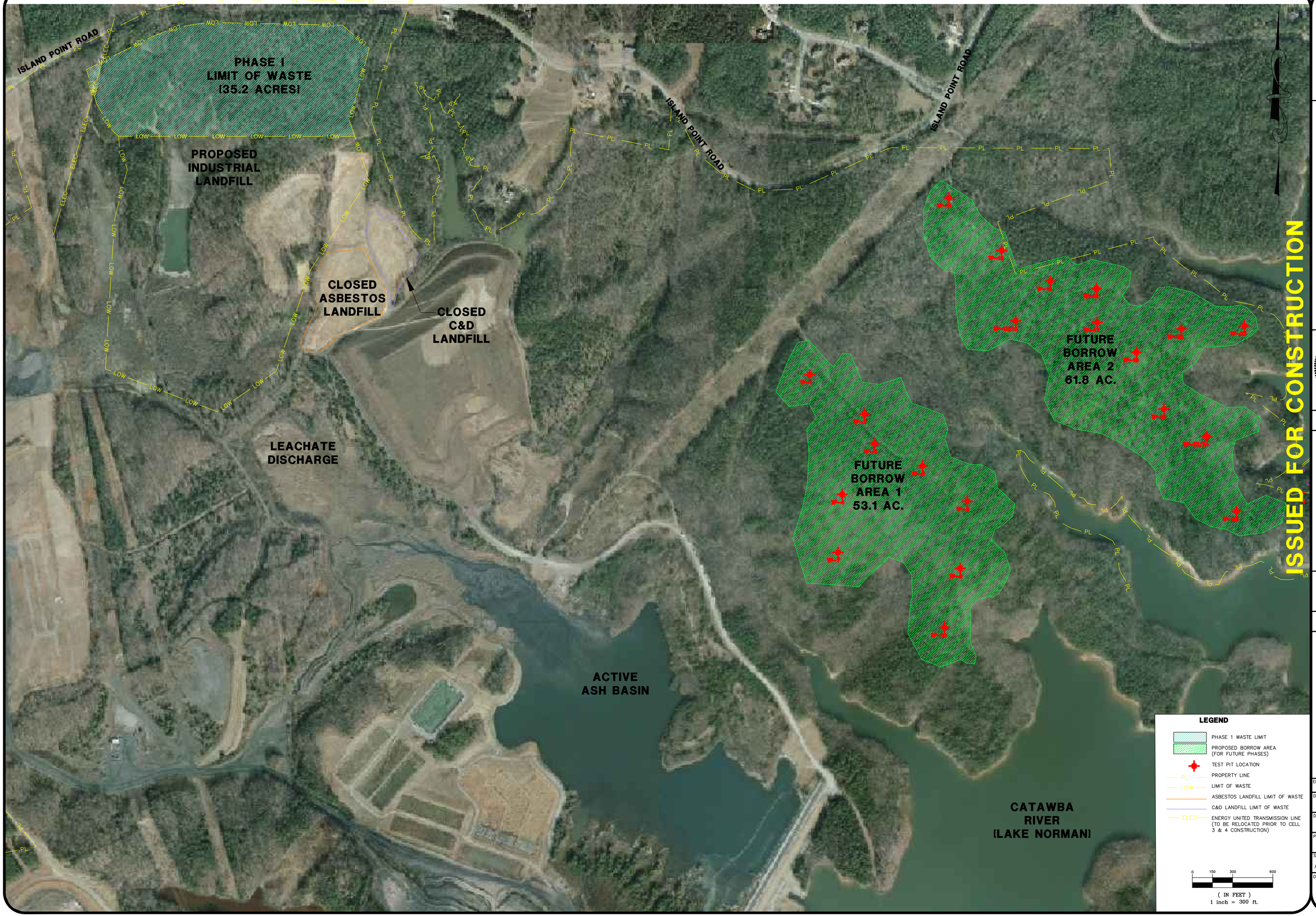
S&ME PROJECT NO.
1356-08-122

S&ME PROJECT NO. 1356-08-122

MARSHALL STEAM STATION - INDUSTRIAL LANDFILL NO. 1



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NORTH CAROLINA PROFESSIONAL SEAL 022153 ENGINEER KENNETH R. DAVIS

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

SITE AERIAL PHOTOGRAPH
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

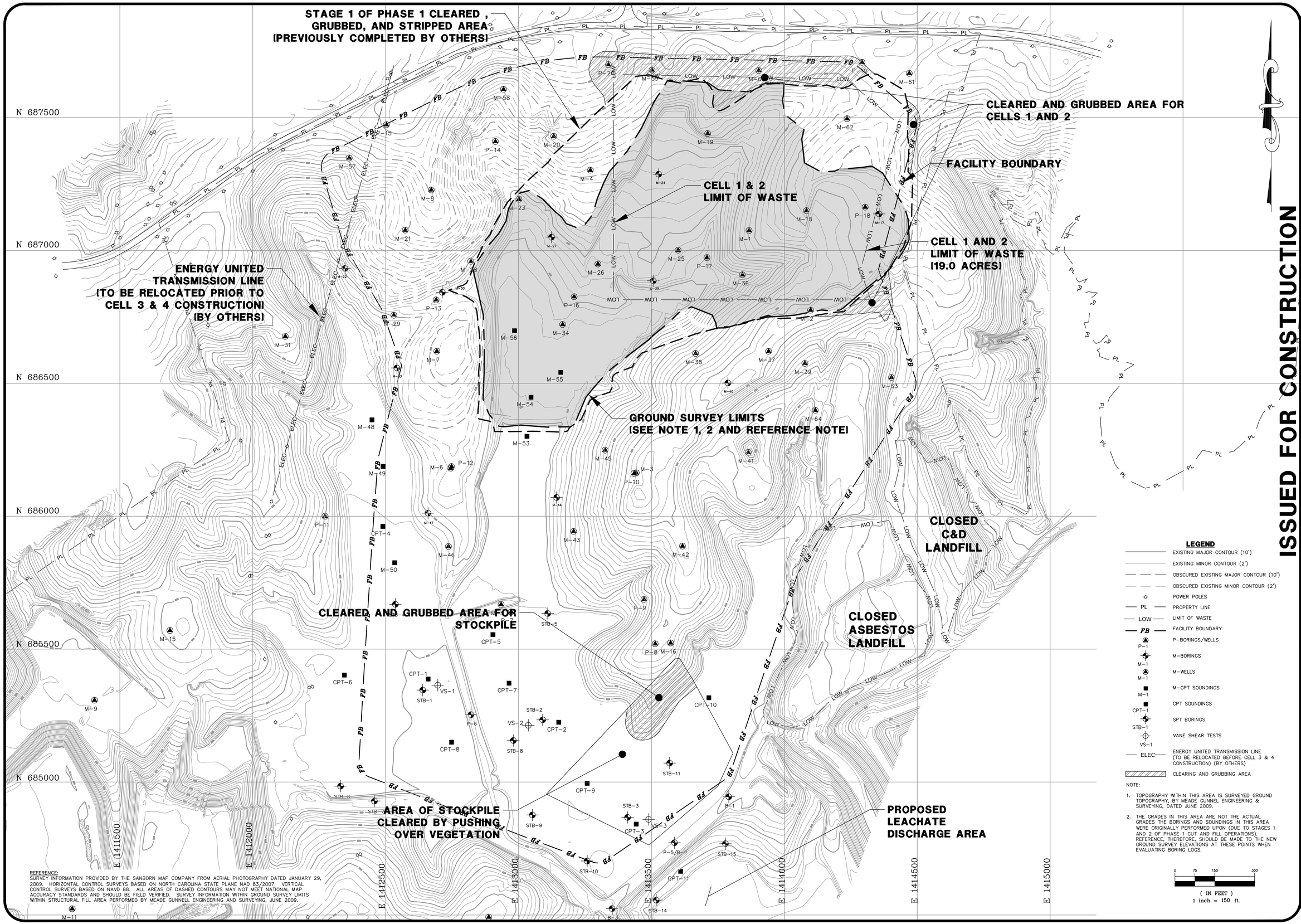
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD

PROJECT NUMBER: 1356-08-122

SCALE: AS SHOWN	DATE: 12-9-09
DRAWING: C1	OF: 24

DRAWING PATH:



REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

LEGEND

- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- OBSCURED EXISTING MAJOR CONTOUR (10')
- OBSCURED EXISTING MINOR CONTOUR (2')
- POWER POLES
- PL — PROPERTY LINE
- LOW — LIMIT OF WASTE
- FB — FACILITY BOUNDARY
- P-1 — P-BORINGS/WELLS
- M-1 — M-BORINGS
- M-1 — M-WELLS
- M-1 — M-CPT SOUNDINGS
- CPT-1 — CPT SOUNDINGS
- STB-1 — SPT BORINGS
- VS-1 — VANE SHEAR TESTS
- ELEC — ENERGY UNITED TRANSMISSION LINE (TO BE RELOCATED BEFORE CELL 3 & 4 CONSTRUCTION) (BY OTHERS)
- CLEARING AND GRUBBING AREA

NOTE:

1. TOPOGRAPHY WITHIN THIS AREA IS SURVEYED GROUND TOPOGRAPHY, BY MEADE GUNNEL ENGINEERING & SURVEYING, DATED JUNE 2009.
2. THE GRADES IN THIS AREA ARE NOT THE ACTUAL GRADES THE BORINGS AND SOUNDINGS IN THIS AREA WERE ORIGINALLY PERFORMED UPON (DUE TO STAGES 1 AND 2 OF PHASE 1 CUT AND FILL OPERATIONS). REFERENCE, THEREFORE, SHOULD BE MADE TO THE NEW GROUND SURVEY ELEVATIONS AT THESE POINTS WHEN EVALUATING BORING LOGS.

0 75 150 300
(IN FEET)
1 inch = 150 ft.

ISSUED FOR CONSTRUCTION

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PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. KRIEG NORTH CAROLINA

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

EXISTING SITE CONDITIONS CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-08-122	
SCALE: AS SHOWN	DATE: 12-09-09
DRAWING: C2	OF: 24

DRAWING PATH: S:\DEV\DUKE ENERGY\DB-132 Marshall A\FINAL\marshall cell1 & 2\2010 FOR CONSTRUCTION 2010\FIGURE C2 EXISTING SITE CONDITIONS.dwg

1 D1 TYPICAL PERIMETER

EPC1

NR EPC1 EPC2

CULVERT C1 BY OTHERS

C1

C1E

C2

CULVERT C2 BY OTHERS

N 687500

N 687000

E 1413000

E 1413500

E 1414000

E 1414500

NOTE THAT FILL PLACED WITHIN THIS BOUNDARY WILL BE PERFORMED BY OTHERS

ROUGH SUBGRADE TOP DECK (BY OTHERS)

ROUGH SUBGRADE COMPACTED FACE (BY OTHERS) (TO BE COVERED WITH 1.5-FT SOIL)

ROUGH SUBGRADE WORKING FACE (BY OTHERS)

CELL 1

CELL 2

NOTE THAT ROUGH SUBGRADE FILLING (PERFORMED BY OTHERS) WILL PROCEED SOUTHWARDS WHILE CELL 1 CONSTRUCTION IS UNDERWAY

NOTE THAT CELL 2 ROUGH SUBGRADE WILL BE EXCAVATED DURING CELL 1 CONSTRUCTION

NOTE THAT THE GRADES SHOWN WITHIN THE PERIMETER ROAD REPRESENT THE TOP OF THE ROAD SURFACING

NOTE THAT CONTRACTOR IS RESPONSIBLE FOR PUMPING ANY COLLECTED WATER IN SUMP AREAS UNTIL CELL CONSTRUCTION IS COMPLETE

38 D7 SILT FENCE OUTLET

37 D7 SILT FENCE

32 D6 GRASS LINED CHANNELS

EPC2

EPC3

4.0%

3H:1V

2H:1V

LEGEND

- EXISTING CONSTRUCTED MAJOR CONTOUR (10')
- EXISTING CONSTRUCTED MINOR CONTOUR (2')
- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- PROPOSED GRADE MAJOR CONTOUR (10')
- PROPOSED GRADE MINOR CONTOUR (2')
- PL — PROPERTY LINE
- SILT FENCE
- SILT FENCE OUTLET
- EPC1 — CHANNEL REACH
- C1 — CULVERT

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 022153 ENGINEER KENNETH R. DALY

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 1 ROUGH SUBGRADE CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176	
DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: JSR
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 12-9-09
DRAWING: C3	OF: 24

DRAWING PATH: Q:\CORPORATE ENERGY\09-322 Marshall ash pond closure\Engineering\Permit\ISSUED FOR CONSTRUCTION 2009\09-C3 CELL 1 ROUGH SUBGRADE.dwg Q:\CORPORATE ENERGY\09-322 MARSHALL ASH POND CLOSURE\Engineering\Permit\ISSUED FOR CONSTRUCTION 2009\09-C3 CELL 1 ROUGH SUBGRADE.DWG

1 / D1 TYPICAL PERIMETER

7 / D2 CORRIDOR

4 / D1 INTERCELL/INTERPHASE BERM, INTERIM CONDITION

FINAL SUBGRADE DIFFERS FROM ROUGH SUBGRADE AT THE CORRIDORS AND AT THE INTERCELL BERMS

38 / D7 SILT FENCE OUTLET

37 / D7 SILT FENCE

32 / D6 GRASS LINED CHANNELS

CELL 1

CELL 2

FINAL SUBGRADE SLOPE (BY OTHERS) (1.5-FT SOIL COVER BY BIDDER)

ROUGH SUBGRADE WORKING FACE (BY OTHERS)

4.0%

6H:1V

3H:1V

2H:1V

EPC3

N 687500

N 687000

1413000

E 1413500

E 1414000

E 1414500

LEGEND

- EXISTING CONSTRUCTED MAJOR CONTOUR (10')
- EXISTING CONSTRUCTED MINOR CONTOUR (2')
- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- PROPOSED GRADE MAJOR CONTOUR (10')
- PROPOSED GRADE MINOR CONTOUR (2')
- PL — PROPERTY LINE
- SILT FENCE
- SILT FENCE OUTLET
- EPC3 — CHANNEL REACH

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 022153 ENGINEER KENNETH R. CRIVELLI

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 1 FINAL SUBGRADE
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

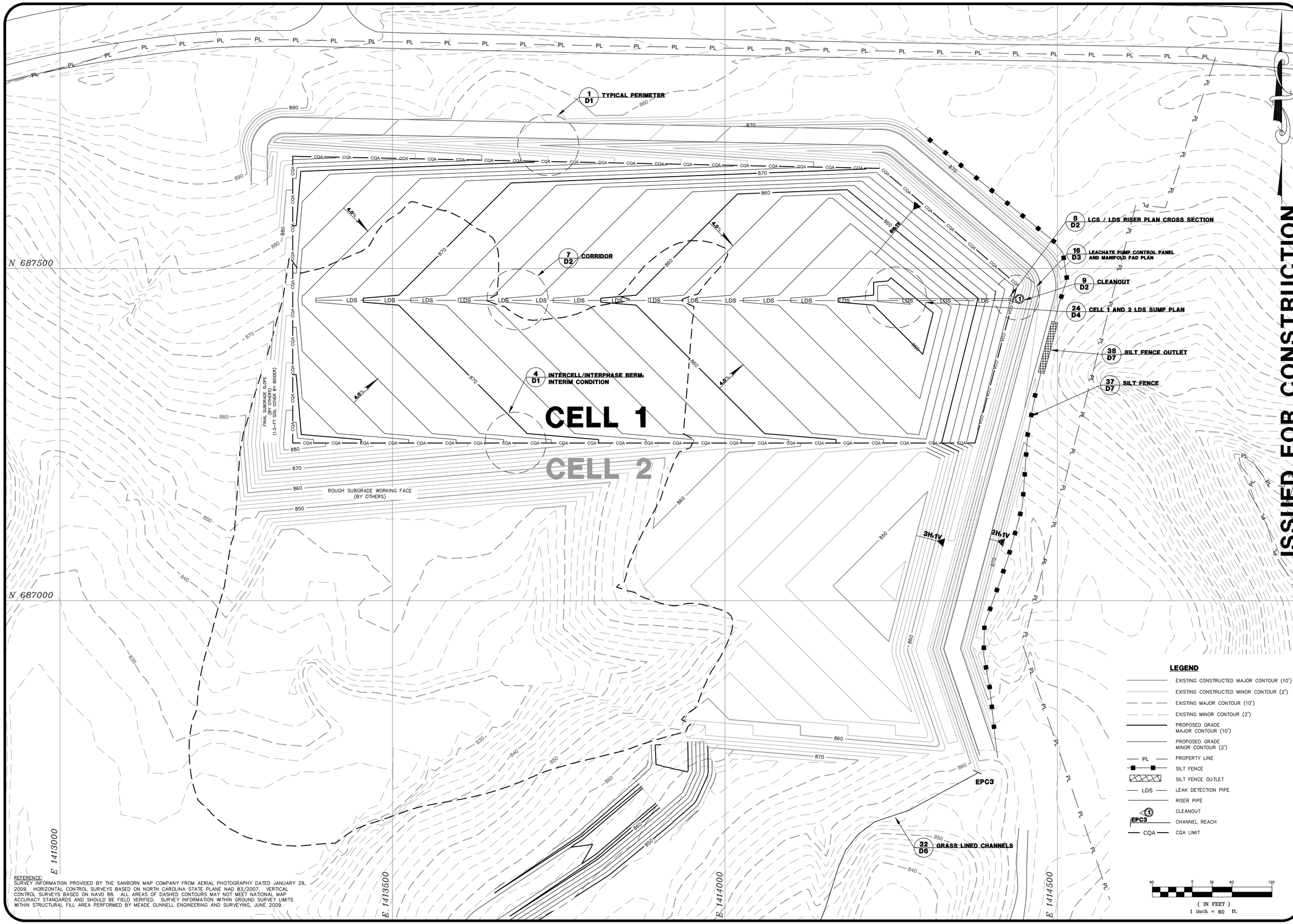
DRAWN BY:	CHECKED BY:
CLD	KRD
DESIGNED BY:	APPROVED BY:
WMH	KRD

PROJECT NUMBER: 1356-08-122

SCALE:	DATE:
1" = 60'	12-9-09

DRAWING:	OF:
C4	24

DRAWING PATH: Q:\DESIGN\DUKE ENERGY\02 MARSHALL\FLOW\DRAWING LAYOUT\ISSUED FOR CONSTRUCTION\2010\REV C-CELL 1 FINAL SUBGRADE.DWG



REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALY

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 1 LEAK DETECTION SYSTEM CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176	
DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 12-9-09
DRAWING: C5	OF: 24

DRAWING PATH: Q:\CORPORATE ENERGY\08-1272 Marshall EF\ENGINEERING\MRB FILES\FOR CONSTRUCTION 2009\RD-C5-CELL 1 LDS.DWG

1 D1 TYPICAL PERIMETER

7 D2 CORRIDOR

4 D1 INTERCELL/INTERPHASE BERM, INTERIM CONDITION

CELL 1

CELL 2

8 D2 LCS / LDS RISER PLAN CROSS SECTION

9 D2 CLEANOUT

16 D3 LEACHATE PUMP CONTROL PANEL AND MANIFOLD PAD PLAN

28 D5 CELL 1 AND 2 LCS SUMP PLAN

38 D7 SILT FENCE OUTLET

37 D7 SILT FENCE

LCS GRADES DIFFER FROM LDS GRADES IN THE CORRIDOR AND IN THE SUMP

FINAL SUBGRADE SLOPE (1.5-FT SOIL COVER BY BIDDER)

ROUGH SUBGRADE WORKING FACE (BY OTHERS)

EPC3

32 D6 GRASS LINED CHANNELS

N 687500

N 687000

E 1413000

E 1413500

E 1414000

E 1414500

LEGEND

- EXISTING CONSTRUCTED MAJOR CONTOUR (10')
- EXISTING CONSTRUCTED MINOR CONTOUR (2')
- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- PROPOSED GRADE MAJOR CONTOUR (10')
- PROPOSED GRADE MINOR CONTOUR (2')
- PL — PROPERTY LINE
- SILT FENCE
- SILT FENCE OUTLET
- LCS — LEACHATE COLLECTION PIPE
- LDS — LEACHATE DETECTION PIPE
- RISER PIPE
- CLEANOUT
- EPC3 — CHANNEL REACH
- CQA — CQA LIMIT

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

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NORTH CAROLINA PROFESSIONAL SEAL 022153 ENGINEER KENNETH R. KRAUSE

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 1 LEACHATE COLLECTION SYSTEM
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	KRD
DESIGNED BY:	APPROVED BY:
WMH	KRD

PROJECT NUMBER 1356-08-122

SCALE:	DATE:
1" = 60'	12-9-09

DRAWING:	OF:
C6	24

DRAWING PATH: Q:\CORPORATE\ENERGY\08-122 Marshall\FIELD\WORK\Permit\ISSUED FOR CONSTRUCTION 20200ID-CS-CELL 1 LCS.dwg Q:\CORPORATE\ENERGY\08-122 MARSHALL\FIELD\WORK\Permit\LANDFILL ISSUED FOR CONSTRUCTION 20200ID-CS-CELL 1 LCS.DWG

1 D1 TYPICAL PERIMETER

7 D2 CORRIDOR

DRAINAGE BLANKET 11 D2

8 D2 CELL 1 LCS / LDS RISER PLAN CROSS SECTION

9 D2 CLEANOUT

16 D3 LEACHATE PUMP CONTROL PANEL AND MANIFOLD PAD PLAN

28 D5 CELL 1 AND 2 LCS SUMP PLAN

CHECK DAM 15 D2

38 D7 SILT FENCE OUTLET

37 D7 SILT FENCE

4 D1 INTERCELL/INTERPHASE BERM, INTERIM CONDITION

CELL 1

CELL 2

FINAL SUBGRADE SLOPE (BY OTHERS) (1.5-FT SOIL COVER BY BIDDER)

ROUGH SUBGRADE WORKING FACE (BY OTHERS)

TERMINATION OF PROTECTIVE COVER SHOWN IN THIS AREA ASSUMES SUBGRADE FILL (BY OTHERS) HAS PROGRESSED THE ROUGH SUBGRADE FILL TOP OF SLOPE AT LEAST 20-FT SOUTH

EPC3

32 D6 GRASS LINED CHANNELS

N 687500

N 687000

E 1413500

E 1414000

E 1414500

LEGEND

- EXISTING CONSTRUCTED MAJOR CONTOUR (10')
- EXISTING CONSTRUCTED MINOR CONTOUR (2')
- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- PROPOSED GRADE MAJOR CONTOUR (10')
- PROPOSED GRADE MINOR CONTOUR (2')
- PL — PROPERTY LINE
- SILT FENCE
- SILT FENCE OUTLET
- RISER PIPES
- LCS/LDS CORRIDOR
- CHECK DAM
- DRAINAGE BLANKET
- CQA — CQA LIMIT
- EPC3 — CHANNEL REACH ID

(IN FEET)
1 inch = 60 ft.

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. KRAUSE

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 1 PROTECTIVE COVER
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176	
DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 12-9-09
DRAWING: C7	OF: 24

DRAWING PATH: Q:\1356\DUKE ENERGY\08-122 Marshall ILF\Dwg\Industrial Landfill ILF\ISSED FOR CONSTRUCTION 2010\BID C7 CELL 1 PROTECTIVE COVER-Page2.\1356\DUKE ENERGY\08-122 MARSHALL ILF\DWG\INDUSTRIAL LANDFILL ILF\ISSED FOR CONSTRUCTION 2010\BID C7 CELL 1 PROTECTIVE COVER.DWG

1 D1 TYPICAL PERIMETER

4 D1 INTERCELL/INTERPHASE BERM, INTERIM CONDITION

38 D7 SILT FENCE OUTLET

37 D7 SILT FENCE

32 D6 GRASS LINED CHANNELS

CELL 1

CELL 2

NOTE THAT CONTRACTOR IS RESPONSIBLE FOR PUMPING ANY COLLECTED WATER IN SUMP AREAS UNTIL CELL CONSTRUCTION IS COMPLETE

ROUGH SUBGRADE TOP DECK (BY OTHERS)

ROUGH SUBGRADE COMPLETED FACE (BY OTHERS) (TO BE COVERED WITH 1.5-FT SOIL)

FINAL SUBGRADE SLOPE (1.5-FT SOIL COVER BY BIDDER)

EPC3

4.0%

3H:1V

2H:1V

N 687500

N 687000

E 1413000

E 1413500

E 1414000

E 1414500

LEGEND

- EXISTING CONSTRUCTED MAJOR CONTOUR (10')
- EXISTING CONSTRUCTED MINOR CONTOUR (2')
- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- PROPOSED GRADE MAJOR CONTOUR (10')
- PROPOSED GRADE MINOR CONTOUR (2')
- PL — PROPERTY LINE
- SILT FENCE
- SILT FENCE OUTLET
- RISER PIPES
- LCS/LDS CORRIDOR
- CHECK DAM
- DRAINAGE BLANKET
- EPC3 — CHANNEL REACH

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

ISSUED FOR CONSTRUCTION

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PROFESSIONAL ENGINEER SEAL 022153 NORTH CAROLINA KENNETH R. CHANDLER

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 2 ROUGH SUBGRADE CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

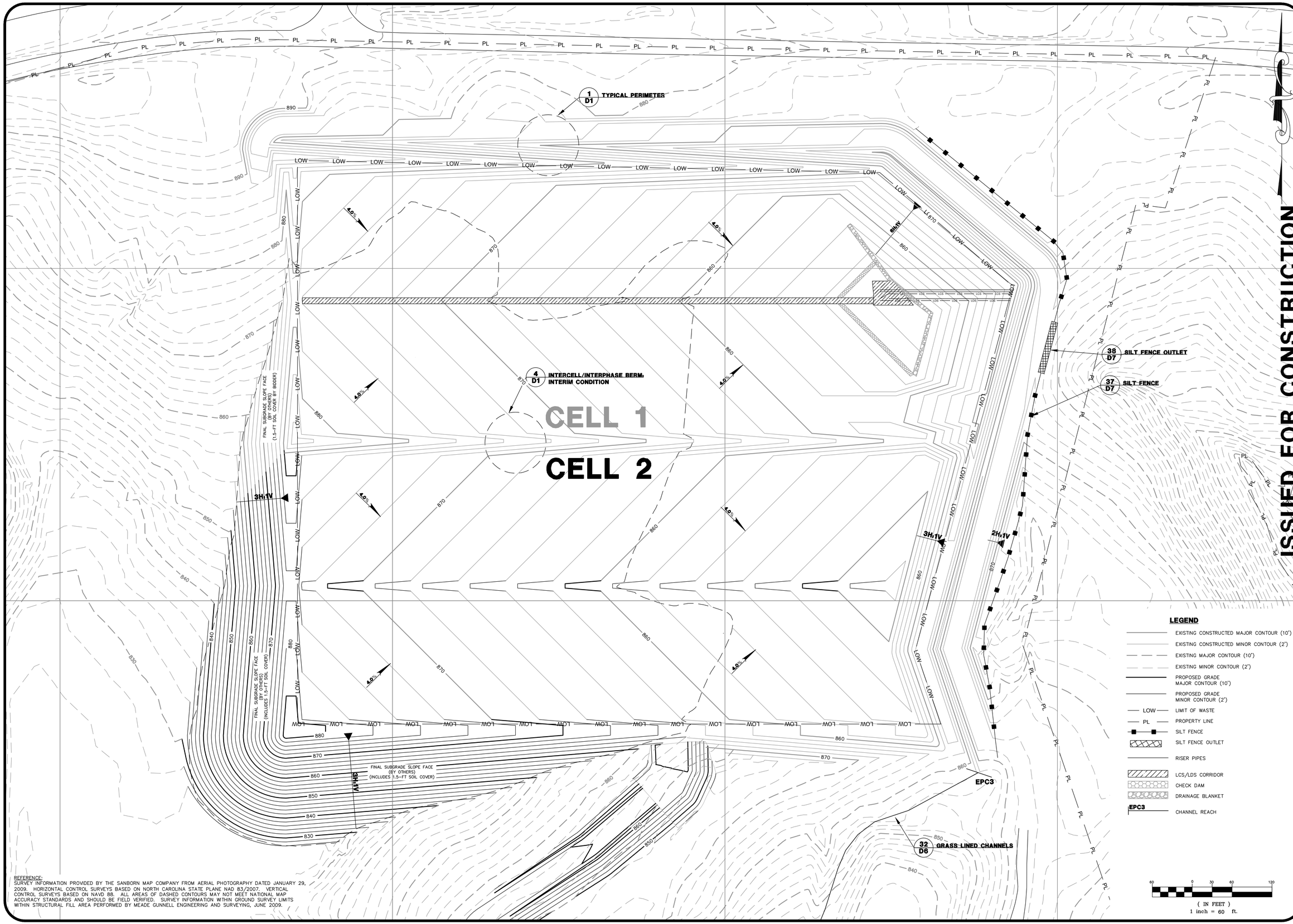
ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	KRD
DESIGNED BY:	APPROVED BY:
WMH	KRD

PROJECT NUMBER 1356-08-122

SCALE:	DATE:
1" = 60'	12-9-09
DRAWING:	OF:
C8	24

DRAWING PATH: Q:\SSDIVISION\E ENERGY\22 Marshall S E\DWG\Marshall Landfill\ISSUED FOR CONSTRUCTION 2009\C8 CELL 2 ROUGH SUBGRADE.dwg Q:\SSDIVISION\E ENERGY\22 MARSHALL S E\DWG\INDUSTRIAL LANDFILL 2 ISSUED FOR CONSTRUCTION 2009\C8 CELL 2 ROUGH SUBGRADE.DWG



REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 022153 ENGINEER KENNETH R. DAVIS

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

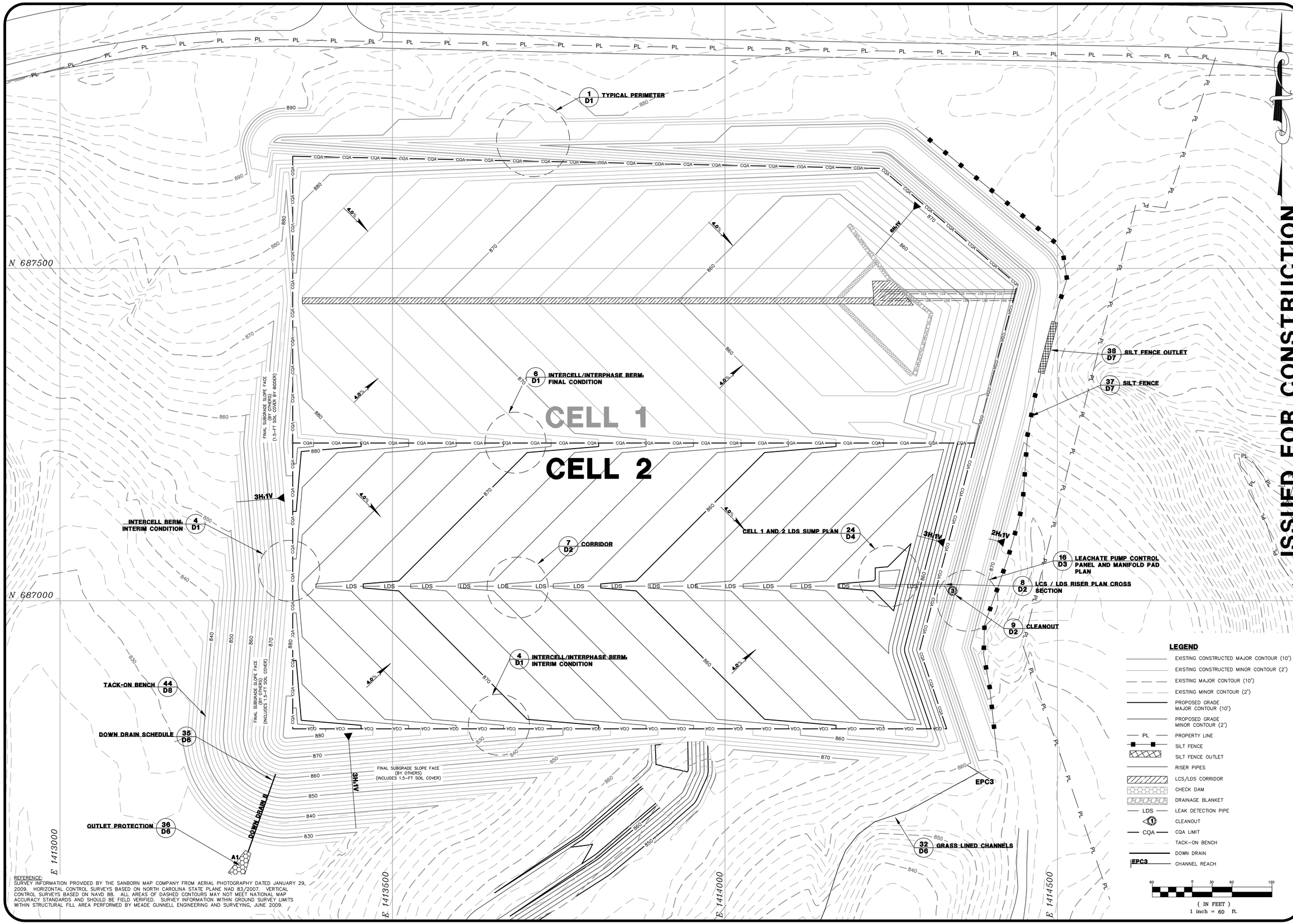
CELL 2 FINAL SUBGRADE
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-08-122	
SCALE: 1" = 60'	DATE: 12-9-09
DRAWING: C9	OF: 24

DRAWING PATH: OUTSOURCE ENERGY/22 Marshall SE FSD/WORKING/dwg/ISSUED FOR CONSTRUCTION 2010/ISD C9 CELL 2 FINAL SUBGRADE.dwg OUTSOURCE ENERGY/22 MARSHALL SE FSD/WORK/ISSUED FOR CONSTRUCTION 2010/ISD C9 CELL 2 FINAL SUBGRADE.DWG



REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

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NORTH CAROLINA PROFESSIONAL SEAL 022153 ENGINEER KENNETH R. DRAKE

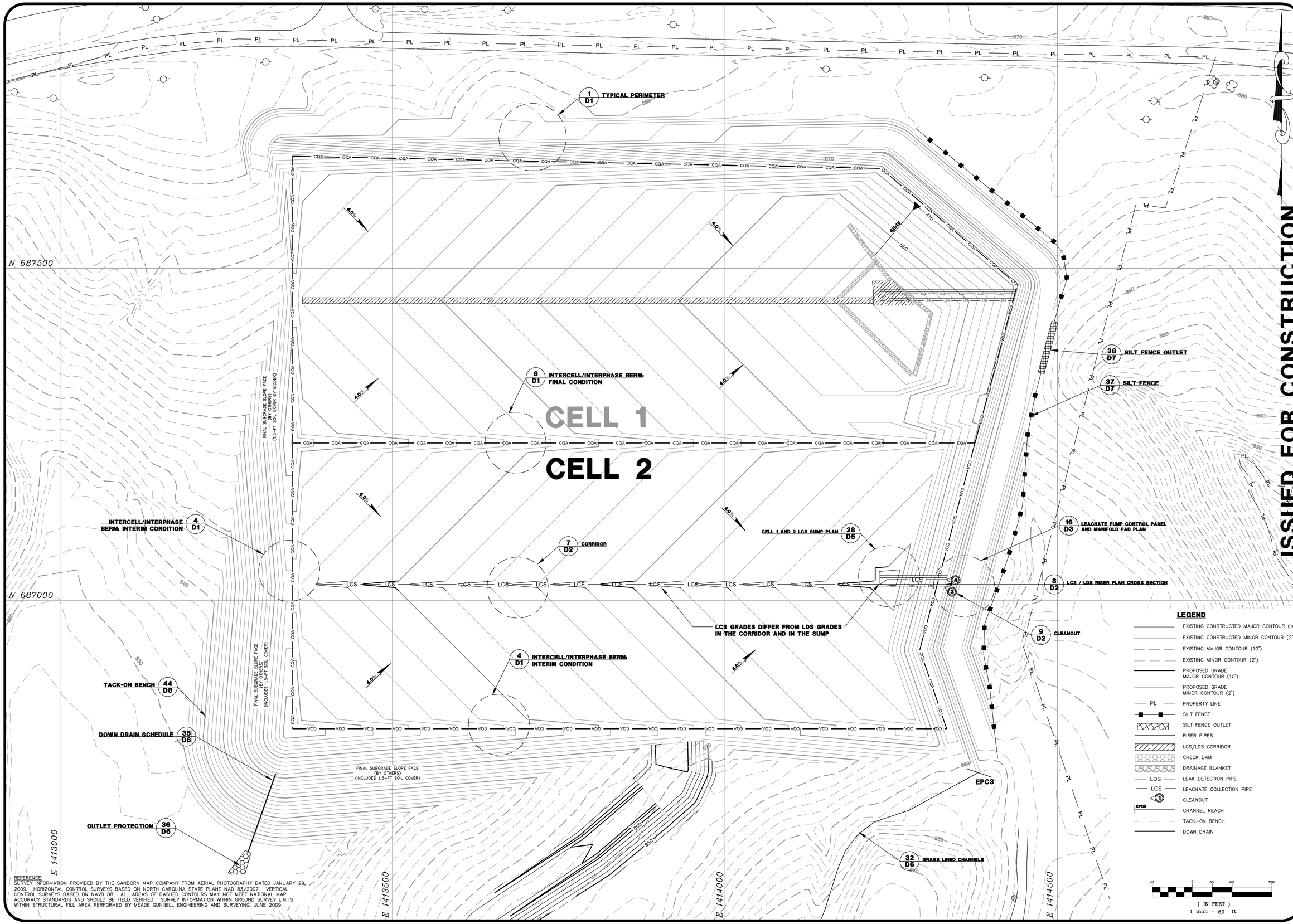
NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 2 LEAK DETECTION SYSTEM
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176	
DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 12-9-09
DRAWING: C10	OF: 24

DRAWING PATH: Q:\CORPORATE ENERGY\09-122 Marshall ash pond\Working Layers\1 ISSUED FOR CONSTRUCTION\ISSUED CLCD\C10-2 Grading CLS\ISSUED FOR CONSTRUCTION ISSUED CLCD C10-2.DWG



REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 022153 ENGINEER KENNETH R. DAVIS

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 2 LEACHATE COLLECTION SYSTEM
CELLS 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL , NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	KRD
DESIGNED BY:	APPROVED BY:
WMH	KRD

PROJECT NUMBER 1356-08-122

SCALE:	DATE:
1" = 60'	12-4-09
DRAWING:	OF:
C11	24

DRAWING PATH: Q:\CORPORATE ENERGY\09-322 Marshall ash\Engineering\Permit\ISSUED FOR CONSTRUCTION 2009\REV-0\C11 CELL 2 FOR Permit Construction 2009\REV-0 C11 CELL 2 FOR Permit Construction 2009\REV-0 C11 CELL 2.DWG

CELL 1

CELL 2

N 687500

N 687000

E 1413000

E 1413500

E 1414000

E 1414500

INTERCELL/INTERPHASE BERM, INTERIM CONDITION 4 D1

TACK-ON BENCH 44 D8

DOWN DRAIN SCHEDULE 35 D6

OUTLET PROTECTION 36 D6

7 D2 CORRIDOR

DRAINAGE BLANKET 11 D2

CHECK DAM 15 D2

28 D5 CELL 1 AND 2 LCS SUMP PLAN

8 D2 LCS / LDS RISER PLAN CROSS SECTION

9 D2 CLEANOUT

16 D3 LEACHATE PUMP CONTROL PANEL AND MANIFOLD PAD PLAN

38 D7 SILT FENCE OUTLET

37 D7 SILT FENCE

32 D6 GRASS LINED CHANNELS

EPC3

FINAL SUBGRADE SLOPE FACE (BY OTHERS) (1.5-FT SOIL COVER BY BIDDER)

FINAL SUBGRADE SLOPE FACE (BY OTHERS) (INCLUDES 1.5-FT SOIL COVER)

FINAL SUBGRADE SLOPE FACE (BY OTHERS) (INCLUDES 1.5-FT SOIL COVER)

6%±1V

4.0%

870

860

850

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

LEGEND

- EXISTING CONSTRUCTED MAJOR CONTOUR (10')
- EXISTING CONSTRUCTED MINOR CONTOUR (2')
- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- PROPOSED GRADE MAJOR CONTOUR (10')
- PROPOSED GRADE MINOR CONTOUR (2')
- LOW — LIMIT OF WASTE
- PL — PROPERTY LINE
- SILT FENCE
- SILT FENCE OUTLET
- RISER PIPES
- LCS/LDS CORRIDOR
- CHECK DAM
- DRAINAGE BLANKET
- EPC3 — CHANNEL REACH
- CQA — CQA LIMIT
- TACK-ON BENCH
- DOWN DRAIN

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. CLAY

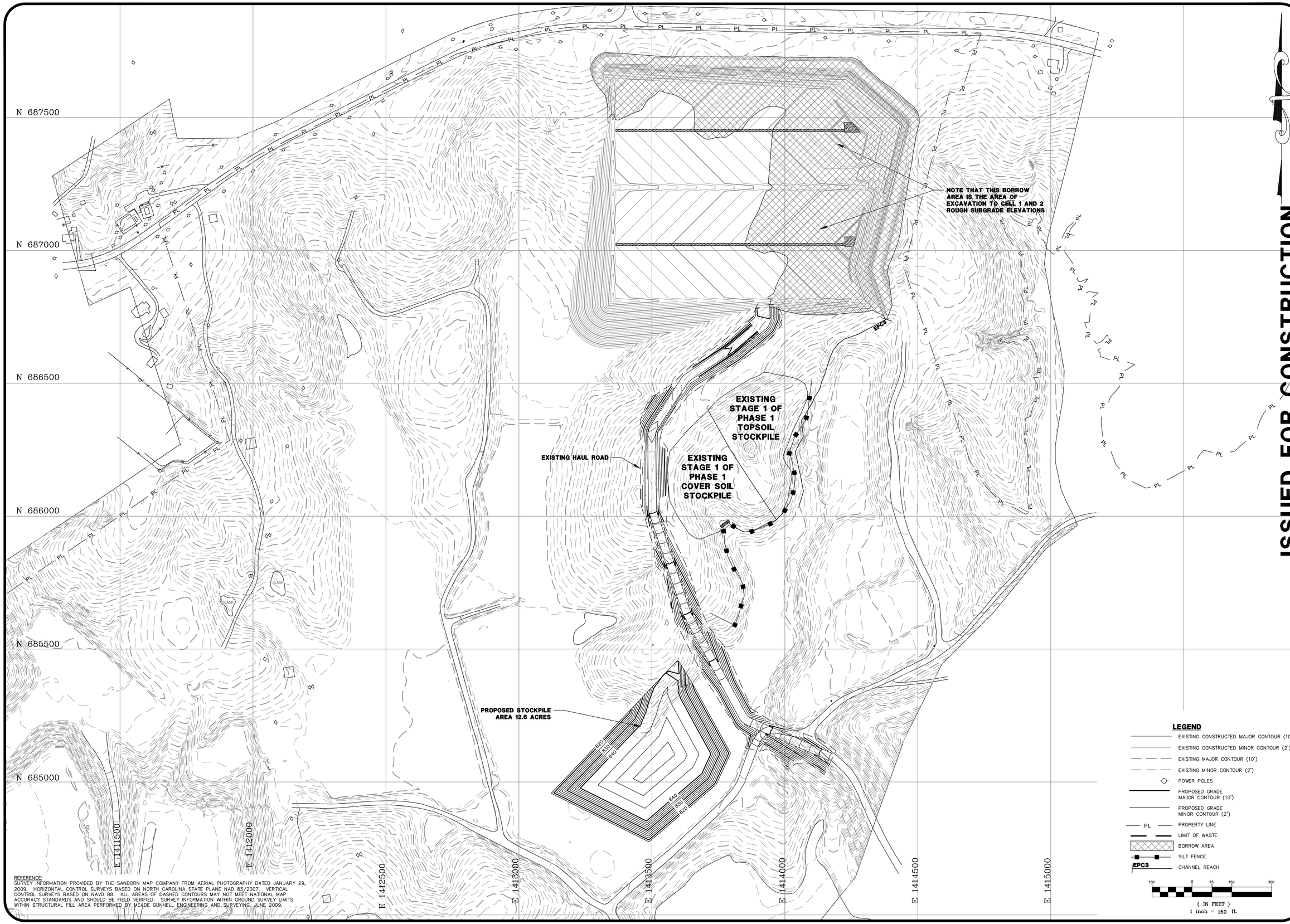
NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 2 PROTECTIVE COVER CELLS 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176	
DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 12-9-09
DRAWING: C12	OF: 24

DRAWING PATH: Q:\DESIGN\DUKE ENERGY\PROJ 1356\MARSHALL\FIELD\WORK\MARSHALL LANDFILL ISSUED FOR CONSTRUCTION\2010\CELL 2 PROTECTIVE COVER\DWG\C12 CELL 2 PROTECTIVE COVER.DWG



REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DAVIS

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELLS 1 AND 2 BORROW / STOCKPILE AREA
CELLS 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 12-9-09
DRAWING: C13	OF: 24

DRAWING PATH: C:\USERS\DUKE ENERGY\DESKTOP\22 Marshall EPS\DWG\Marshall Landfill ISSUED FOR CONSTRUCTION 2010\REV 0\C13 CELLS 1 AND 2 BORROW STOCKPILE AREA PLAN.dwg C:\USERS\DUKE ENERGY\DESKTOP\22 MARSHALL EPS\DWG\INDUSTRIAL LANDFILL ISSUED FOR CONSTRUCTION 2010\REV 0\C13 CELLS 1 AND 2 BORROW STOCKPILE AREA PLAN.DWG

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

ISSUED FOR CONSTRUCTION

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CHARLOTTE, N.C. 28273
(704)523-4726
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NORTH CAROLINA PROFESSIONAL SEAL 022153 ENGINEER KENNETH R. DARGAL

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

CELL 1 AND 2 FORCE MAIN
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-08-122	
SCALE: 1" = 60'	DATE: 12-9-09
DRAWING: C14	OF: 24

DRAWING PATH: C:\USERS\DUKE ENERGY\DOCS\22 Marshall\SP\SDWG\drawings\permit\ISSUED FOR CONSTRUCTION 2009\DEC\C14 CELLS 1 AND 2 FORCE MAIN PLAN.dwg C:\USERS\DUKE ENERGY\DOCS\22 MARSHALL\SP\SDWG\INDUSTRIAL LANDFILL\ISSUED FOR CONSTRUCTION 2009\DEC\C14 CELLS 1 AND 2 FORCE MAIN PLAN.DWG

ISLAND POINT ROAD

N 687500

N 687000

E 1413000

E 1413500

E 1414000

E 1414500

CELL 1

CELL 2

SEE NOTE 1

EPC2

3H:1V

4.0%

2.8%

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED.

LEGEND

- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- OBSCURED EXISTING MAJOR CONTOUR (10')
- OBSCURED EXISTING MINOR CONTOUR (2')
- PROPOSED SUBGRADE MAJOR CONTOUR (10')
- PROPOSED SUBGRADE MINOR CONTOUR (2')
- LOW — LIMIT OF WASTE
- PL — PROPERTY LINE
- LIMITS OF STAGE 2 OF PHASE 1 .1700 RULES STRUCTURAL FILL FOR CELL 1 & 2 (PERFORMED BY OTHERS)
- SILT FENCE
- SILT FENCE OUTLET
- EPC3 — CHANNEL REACH
- TOP OF BEDROCK

NOTE:
1. EXISTING STRUCTURAL FILL HAUL ROAD WAS CONSTRUCTED AFTER TOPOGRAPHIC MAP SHOWN. GRADE SHOWN IN THIS AREA ARE APPROXIMATE. CONTRACTOR SHALL CONSTRUCT SUBGRADE AS SHOWN AND WORK AROUND AND FIELD FIT GRADES AT EXISTING STRUCTURAL FILL HAUL ROAD.

0 30 60 120
(IN FEET)
1 inch = 60 ft.

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALY

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

TOP OF BEDROCK
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	KRD
DESIGNED BY:	APPROVED BY:
WMH	KRD

PROJECT NUMBER: 1356-08-122

SCALE:	DATE:
AS SHOWN	12-9-09

DRAWING:	OF:
C15	24

DRAWING PATH:

ISLAND POINT ROAD

CELL 1

CELL 2

EPC3

N 687500

N 687000

E 1413000

E 1413500

E 1414000

E 1414500

REFERENCE:
SURVEY INFORMATION PROVIDED BY THE SANBORN MAP COMPANY FROM AERIAL PHOTOGRAPHY DATED JANUARY 29, 2009. HORIZONTAL CONTROL SURVEYS BASED ON NORTH CAROLINA STATE PLANE NAD 83/2007. VERTICAL CONTROL SURVEYS BASED ON NAVD 88. ALL AREAS OF DASHED CONTOURS MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS AND SHOULD BE FIELD VERIFIED. SURVEY INFORMATION WITHIN GROUND SURVEY LIMITS WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.
WITHIN STRUCTURAL FILL AREA PERFORMED BY MEADE GUNNELL ENGINEERING AND SURVEYING, JUNE 2009.

LEGEND

- EXISTING MAJOR CONTOUR (10')
- EXISTING MINOR CONTOUR (2')
- OBSCURED EXISTING MAJOR CONTOUR (10')
- OBSCURED EXISTING MINOR CONTOUR (2')
- PROPOSED SUBGRADE MAJOR CONTOUR (10')
- PROPOSED SUBGRADE MINOR CONTOUR (2')
- LOW — LIMIT OF WASTE
- PL — PROPERTY LINE
- LIMITS OF STAGE 2 OF PHASE 1 .1700 RULES STRUCTURAL FILL FOR CELL 1 & 2 (PERFORMED BY OTHERS)
- SILT FENCE
- SILT FENCE OUTLET
- EPC3 — CHANNEL REACH
- ESTIMATED LONG TERM SEASONAL HIGH GROUNDWATER

60 0 30 60 120

(IN FEET)
1 inch = 60 ft.

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALY

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

EST. LONG TERM SEASONAL HIGH GROUDWATER
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

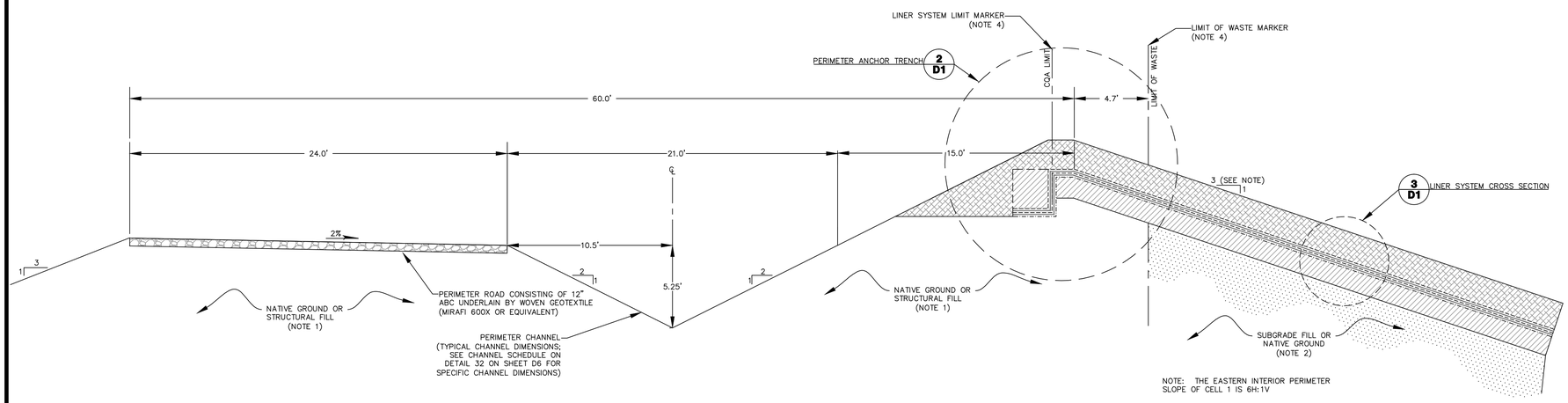
ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	KRD
DESIGNED BY:	APPROVED BY:
WMH	JSR

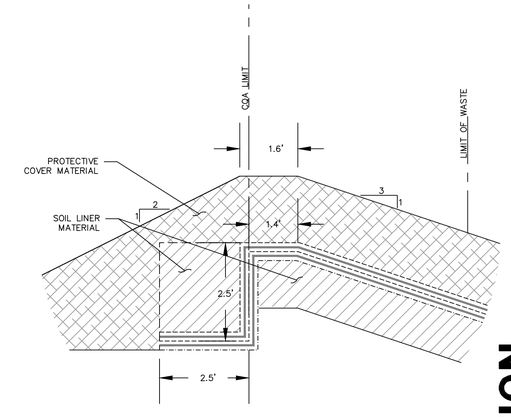
PROJECT NUMBER 1356-08-122

SCALE:	DATE:
AS SHOWN	12-9-09
DRAWING:	OF:
C16	24

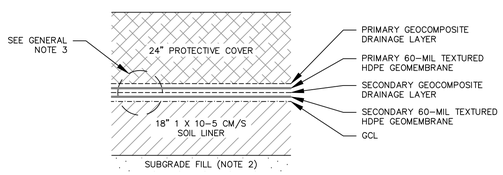
DRAWING PATH:



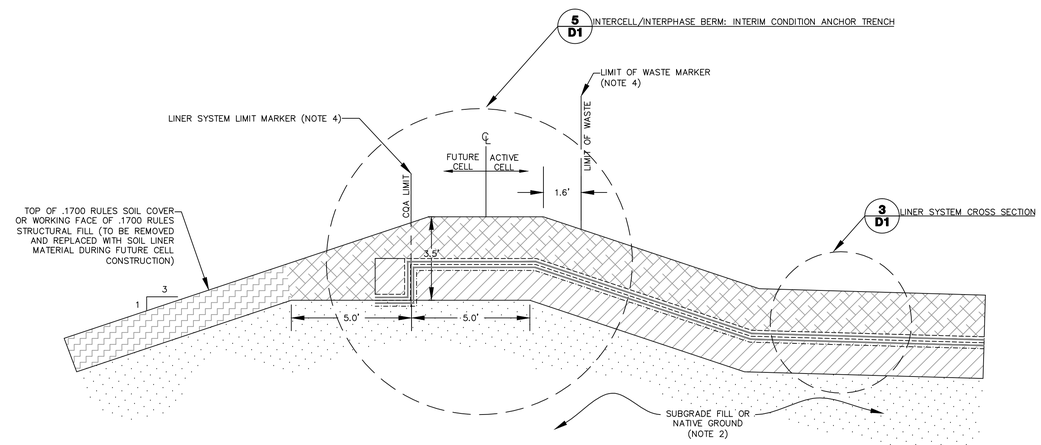
1 D1 TYPICAL PERIMETER
SCALE: 1" = 4'



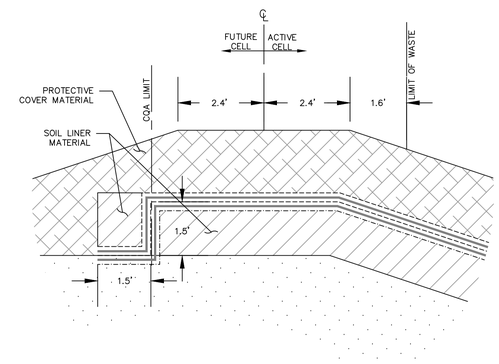
2 D1 PERIMETER ANCHOR TRENCH
SCALE: 1" =2'



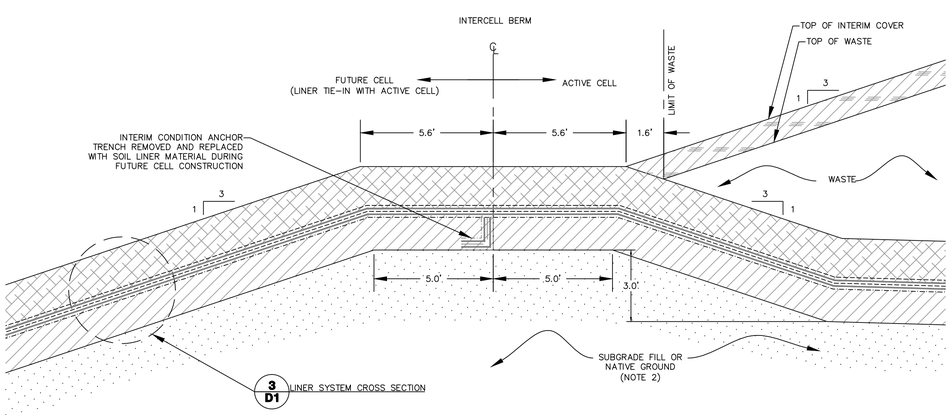
3 D1 LINER SYSTEM CROSS SECTION
SCALE: 1" = 2'



4 D1 INTERCELL/INTERPHASE BERM: INTERIM CONDITION
SCALE: 1" = 3'



5 D1 INTERCELL/INTERPHASE BERM : INTERIM CONDITION ANCHOR TRENCH
SCALE: 1" = 2'



6 D1 INTERCELL/INTERPHASE BERM: FINAL CONDITION
SCALE: 1" = 3'

NOTES:

1. STRUCTURAL FILL SHALL CONSIST OF BORROW SOILS CONSISTENT WITH SPECIFICATION SECTION 02320.
2. SUBGRADE FILL SHALL CONSIST OF BORROW SOILS AND/OR ASH FILL CONSISTENT WITH SPECIFICATION SECTION 02320.
3. DETAILS DRAWN TO SCALE AS SHOWN WITH THE EXCEPTION OF THE GEOSYNTHETIC COMPONENTS WHICH ARE EXAGGERATED FOR CLARITY.
4. THIN, FLEXIBLE HIGHWAY-TYPE MARKER TO BE PROVIDED AT CHANGES IN ALIGNMENT, SPACED AT 100' O.C. (MAX.) AND 25' O.C. ON CURVES. LABELS SHALL BE SPECIFICALLY MARKED AS "LIMIT OF WASTE" OR "CQA LIMIT".

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DOAR

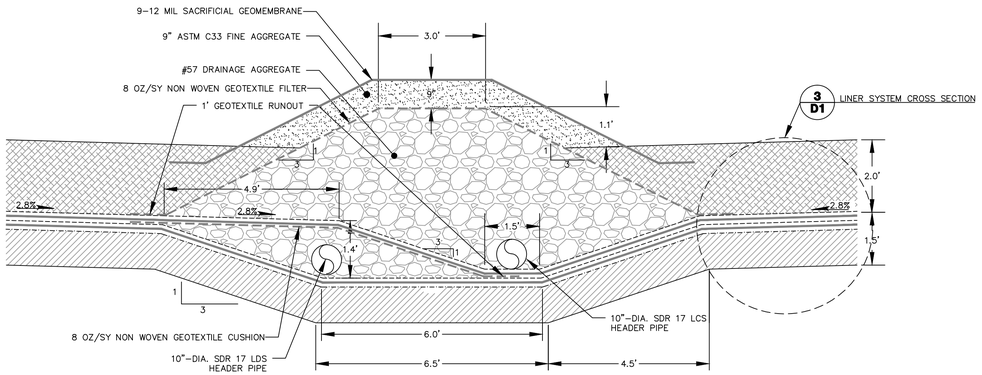
NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

LINER SYSTEM DETAILS CELL 1 AND 2 CONSTRUCTION

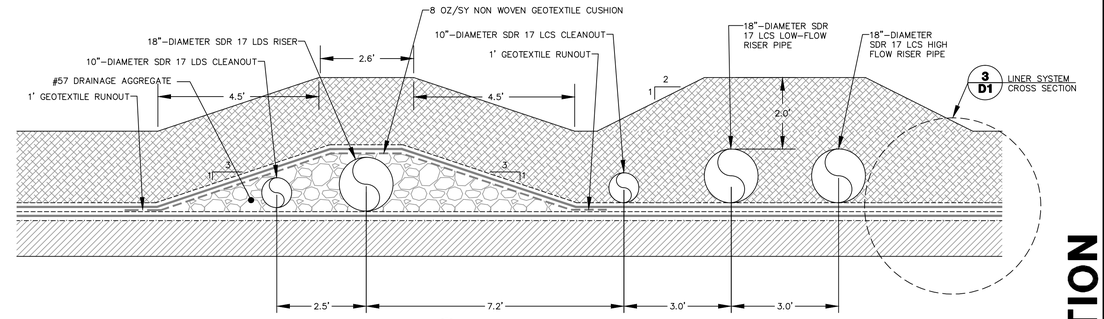
DUKE ENERGY - MARSHALL STEAM STATION TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176	
DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: JSR
PROJECT NUMBER 1356-08-122	
SCALE: AS SHOWN	DATE: 12-09-09
DRAWING: D1	OF: 24

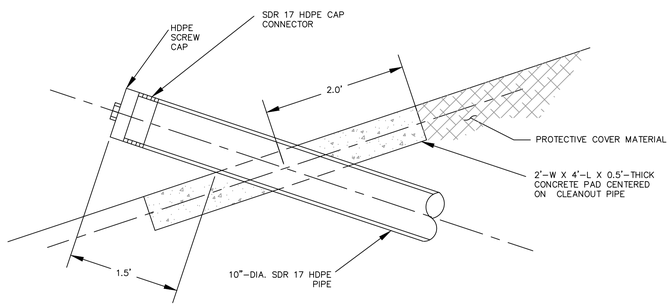
DRAWING PATH:



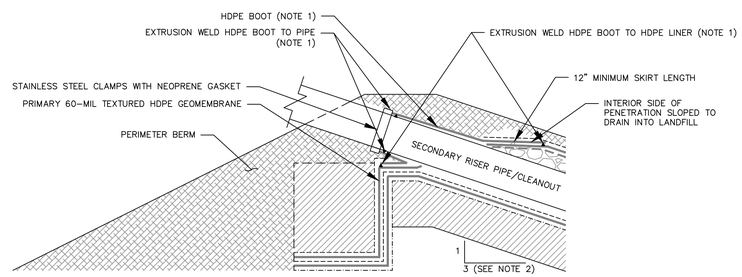
7 D2 CORRIDOR
SCALE: 1" = 2'



8 D2 LCS/LDS RISER PLAN CROSS SECTION
SCALE: 1" = 2'



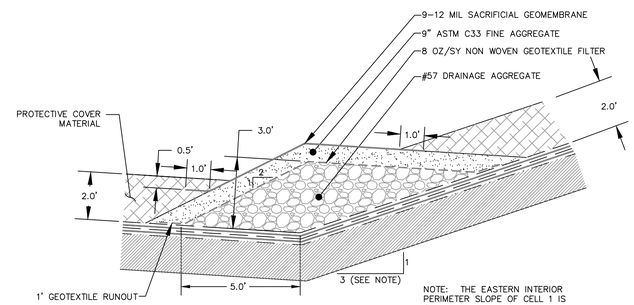
9 D2 CLEANOUT
SCALE: 1" = 1'



NOTES:

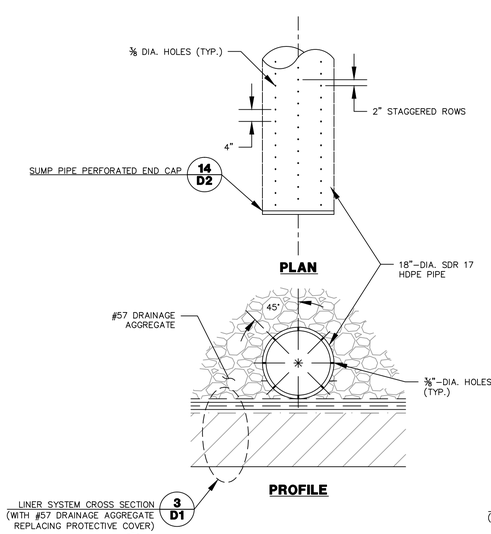
1. PREFABRICATED AND SPARK TESTED BOOT TO BE EXTRUSION WELDED TO HDPE PIPE AND PRIMARY LINER.
2. THE EASTERN INTERIOR PERIMETER SLOPE OF CELL 1 IS 6H:1V

10 D2 LDS RISER PIPE/CLEANOUT PENETRATION
SCALE: 1" = 2'

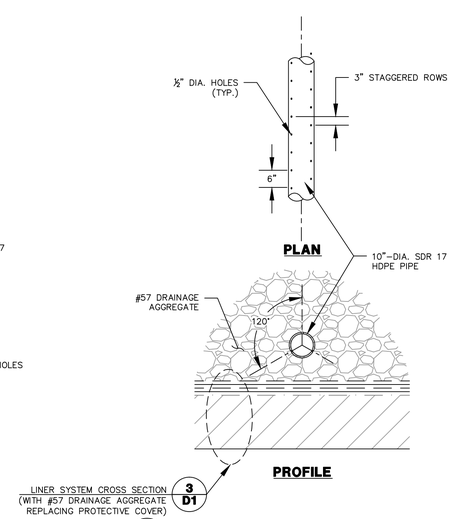


NOTE: THE EASTERN INTERIOR PERIMETER SLOPE OF CELL 1 IS 6H:1V

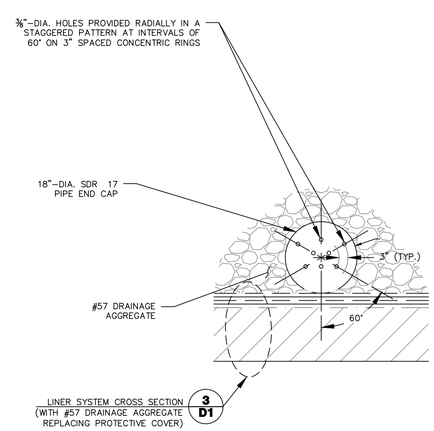
11 D2 DRAINAGE BLANKET
SCALE: 1" = 3'



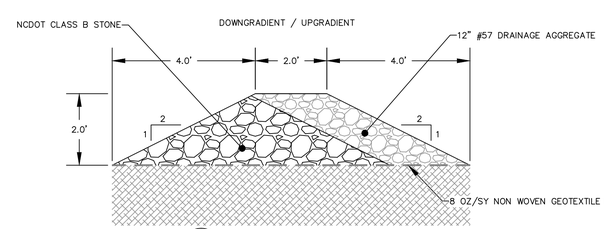
12 D2 SUMP PIPE PERFORATIONS
SCALE: 1"=2'



13 D2 LCS/LDS HEADER PIPE PERFORATIONS
SCALE: 1" = 2'



14 D2 SUMP PIPE PERFORATED END CAP
SCALE: 1" = 2'



15 D2 CHECK DAM
SCALE: 1" = 2'

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. GRAY

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

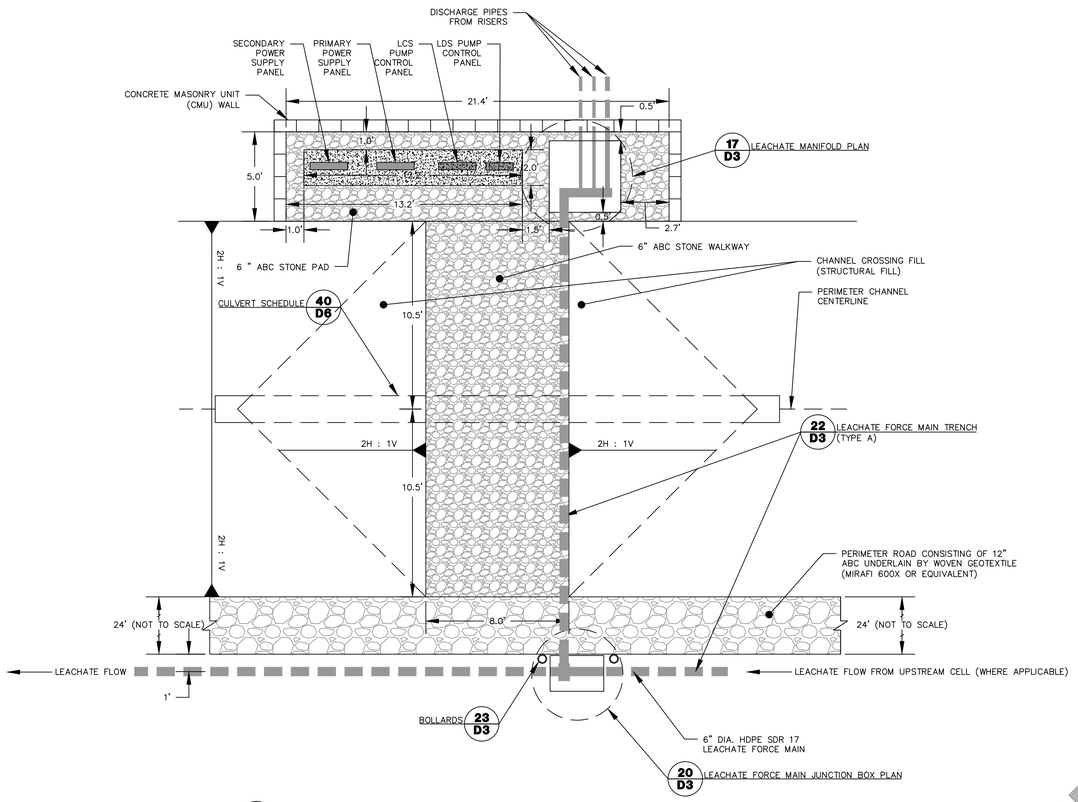
LCS/LDS DETAILS 1
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

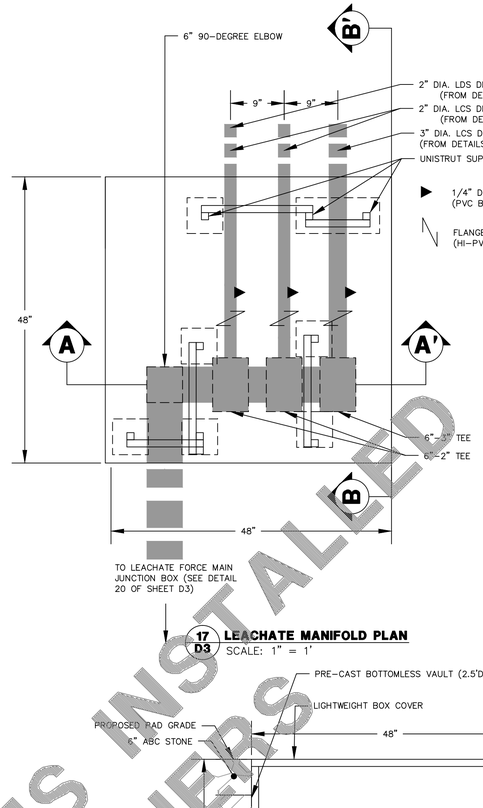
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: JSR
PROJECT NUMBER: 1356-08-122	
SCALE: AS SHOWN	DATE: 12-09-09
DRAWING: D2	OF: 24

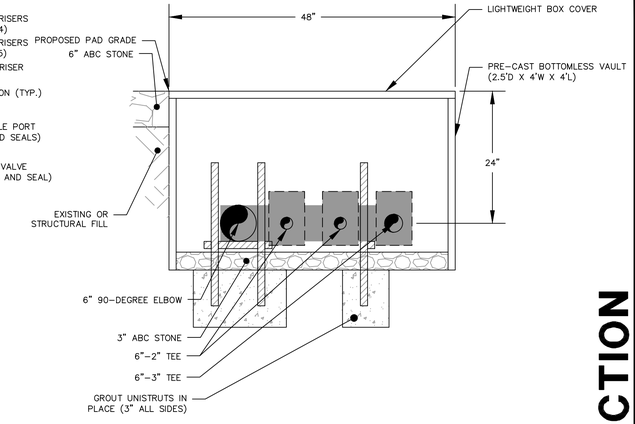
DRAWING PATH:



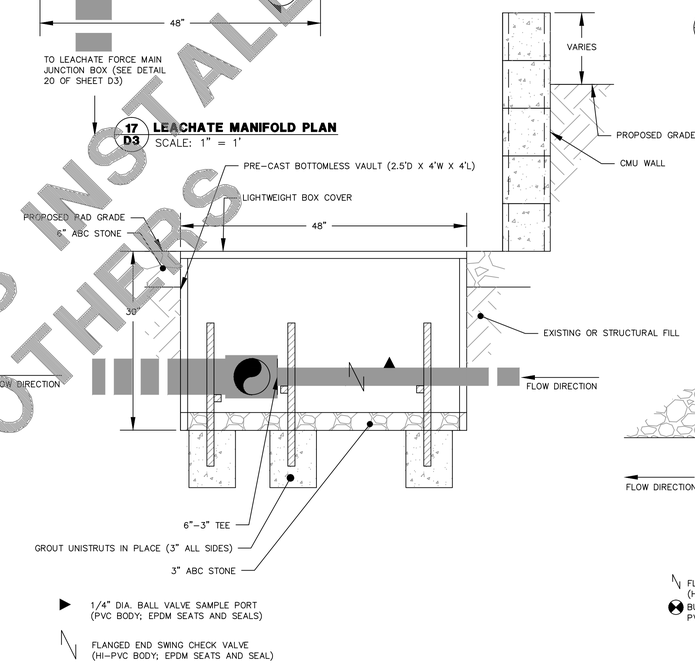
16 D3 LEACHATE PUMP CONTROL PANEL AND MANIFOLD PAD PLAN
SCALE: 1" = 4'



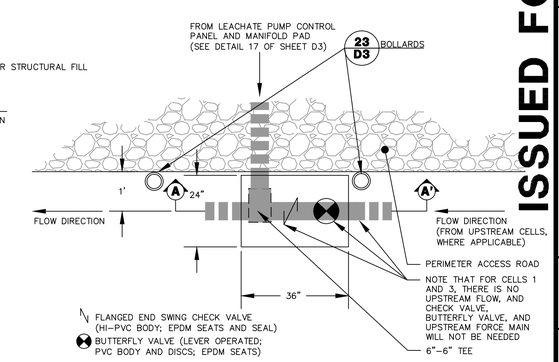
17 D3 LEACHATE MANIFOLD PLAN
SCALE: 1" = 1'



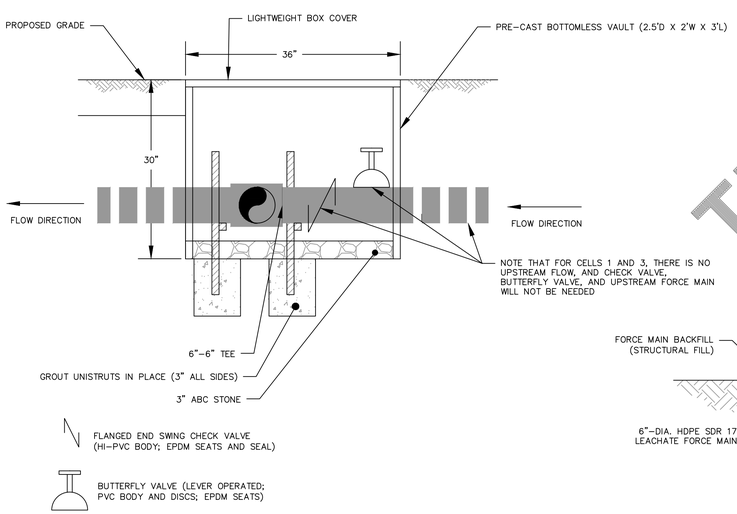
18 D3 LEACHATE MANIFOLD CROSS SECTION A-A'
SCALE: 1" = 1'



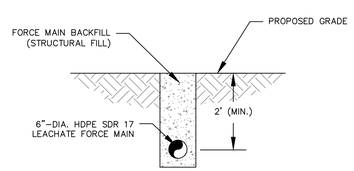
19 D3 LEACHATE MANIFOLD CROSS SECTION B-B'
SCALE: 1" = 1'



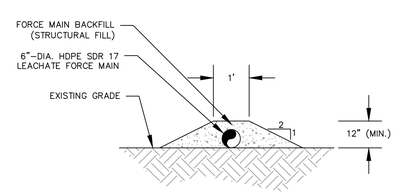
20 D3 LEACHATE FORCE MAIN JUNCTION BOX PLAN
SCALE: 1" = 2'



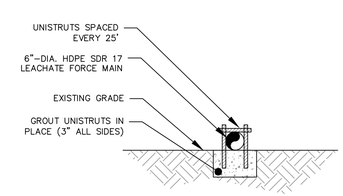
21 D3 LEACHATE FORCE MAIN JUNCTION BOX CROSS SECTION A-A'
SCALE: 1" = 2'



LEACHATE FORCE MAIN TRENCH: TYPE A



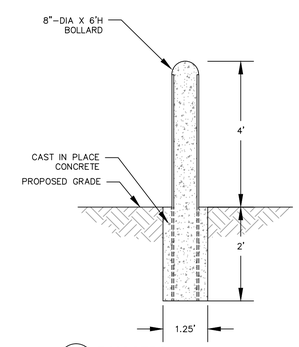
LEACHATE FORCE MAIN TRENCH: TYPE B (SEE NOTE)



LEACHATE FORCE MAIN TRENCH: TYPE C (SEE NOTE)

NOTE: LEACHATE FORCE MAIN TRENCH TYPES B AND C TO BE USED TEMPORARILY PRIOR TO SUBSEQUENT CELL/PHASE CONSTRUCTION

22 D3 LEACHATE FORCE MAIN TRENCH
SCALE: 1" = 2'



23 D3 BOLLARDS
SCALE: 1" = 2'

THESE ITEMS INSTALLED BY OTHERS

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. GALLAGHER

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

LCS/LDS DETAILS 2
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

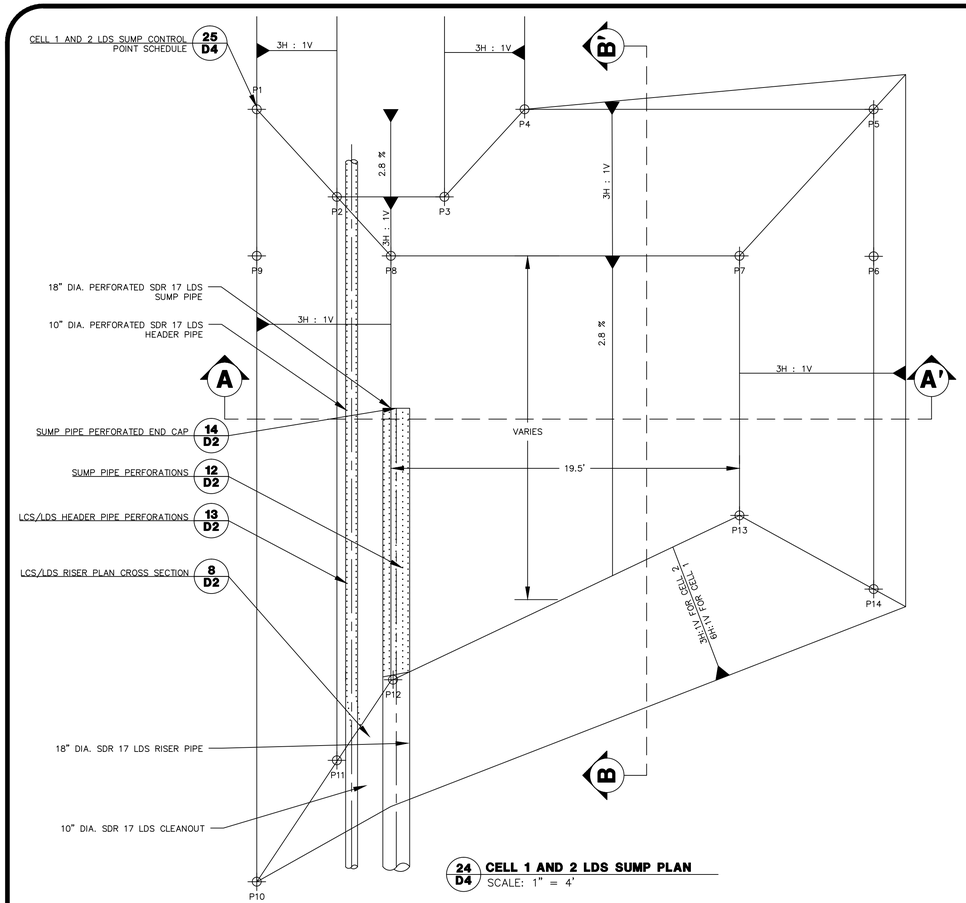
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: JSR

PROJECT NUMBER: 1356-08-122

SCALE: AS SHOWN	DATE: 12-09-09
DRAWING: D3	OF: 24

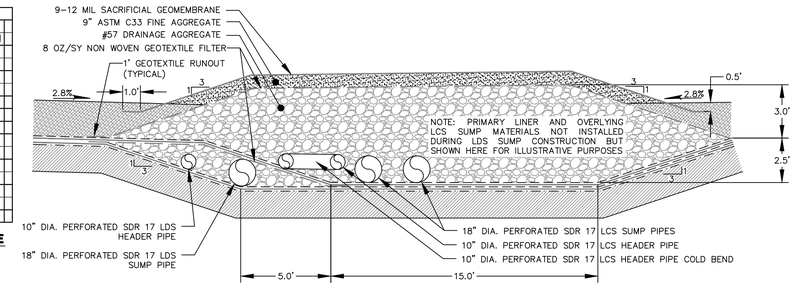
DRAWING PATH:



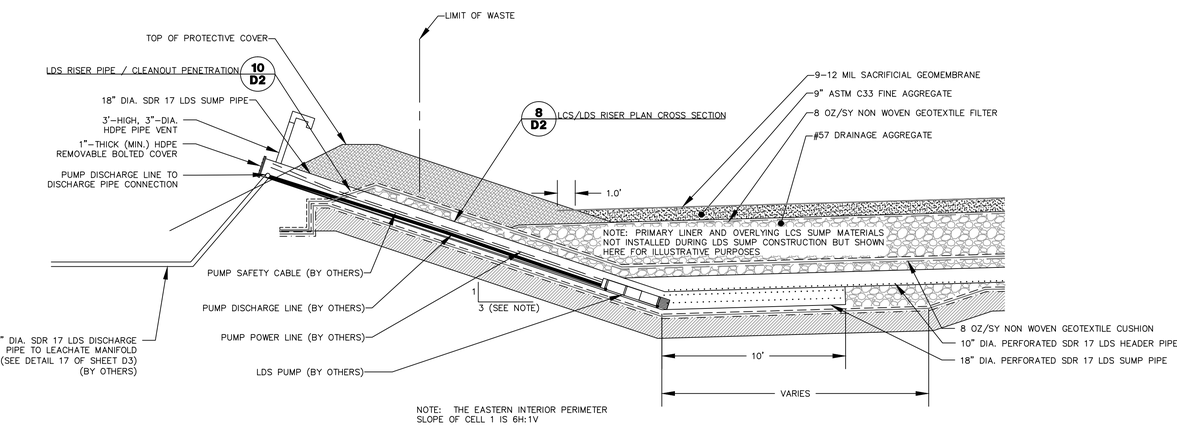
24 D4 CELL 1 AND 2 LDS SUMP PLAN
SCALE: 1" = 4'

SUMP CONTROL POINT LOCATION						
	CELL 1 LDS SUMP			CELL 2 LDS SUMP		
POINTS	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION
P1	687444.74	1414223.66	850.00	687014.74	1414226.22	849.93
P2	687449.22	1414228.55	848.37	687019.22	1414231.11	848.30
P3	687455.23	1414228.55	848.37	687025.23	1414231.11	848.30
P4	687459.71	1414223.66	850.00	687029.71	1414226.22	849.93
P5	687479.22	1414223.66	850.00	687049.22	1414226.22	849.93
P6	687479.22	1414231.85	849.77	687049.22	1414234.41	849.69
P7	687471.72	1414231.85	847.27	687041.72	1414234.41	847.20
P8	687452.24	1414231.85	847.27	687022.24	1414234.41	847.20
P9	687444.74	1414231.85	849.77	687014.74	1414234.41	849.70
P10	687444.74	1414283.57	848.32	687014.74	1414258.35	849.02
P11	687449.22	1414268.19	847.26	687019.22	1414255.18	847.62
P12	687452.24	1414257.81	846.54	687022.24	1414253.04	846.68
P13	687471.72	1414239.23	847.06	687041.72	1414257.66	846.55
P14	687479.22	1414250.67	849.24	687049.22	1414266.57	848.80

25 D4 CELL 1 AND 2 LDS SUMP CONTROL POINT SCHEDULE



26 D4 CELL 1 AND 2 LDS SUMP SECTION A-A'
SCALE: 1" = 4'



27 D4 CELL 1 AND 2 LDS SUMP SECTION B-B'
SCALE: 1" = 4'

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DAVIS

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

LDS DETAILS
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

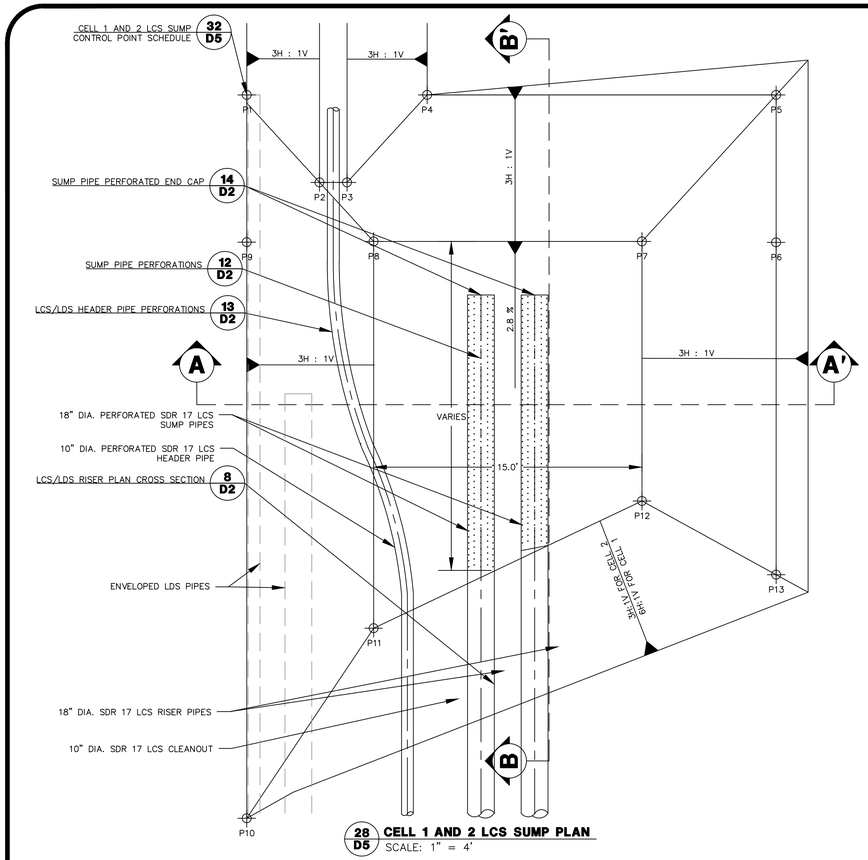
ENGINEERING LICENSE NO: **F-0176**

DRAWN BY:	CHECKED BY:
CLD	KRD
DESIGNED BY:	APPROVED BY:
WMH	JSR

PROJECT NUMBER 1356-08-122

SCALE:	DATE:
AS SHOWN	12-09-09
DRAWING:	OF:
D4	24

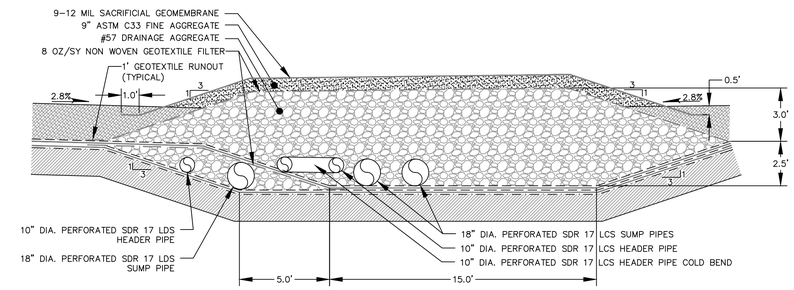
DRAWING PATH:



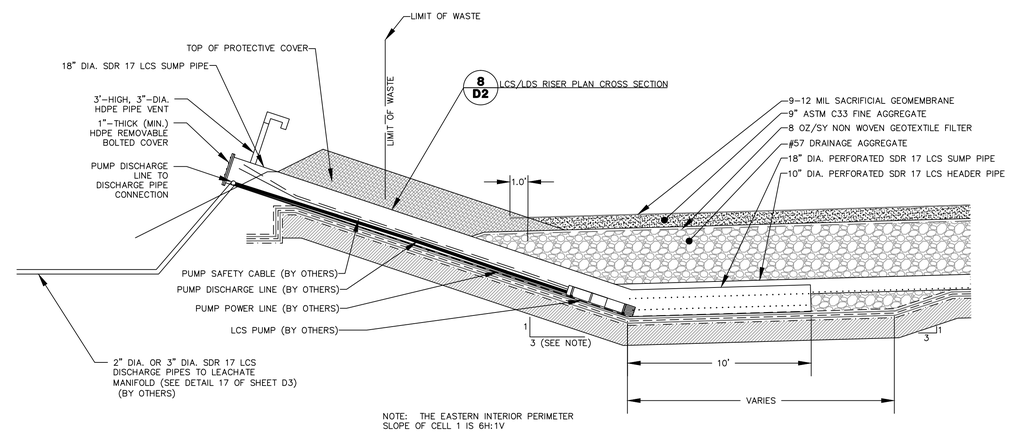
28 D5 CELL 1 AND 2 LCS SUMP PLAN
SCALE: 1" = 4'

SUMP CONTROL POINT LOCATION						
	CELL 1 LCS SUMP			CELL 2 LCS SUMP		
POINT ID	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION
P1	687444.74	1414223.66	850.00	687019.63	1414226.22	849.79
P2	687453.70	1414228.55	848.37	687023.70	1414231.11	848.30
P3	687455.23	1414228.55	848.37	687025.23	1414231.11	848.30
P4	687459.71	1414223.66	850.00	687029.71	1414226.22	849.93
P5	687479.22	1414223.66	850.00	687049.22	1414226.22	849.93
P6	687479.22	1414231.85	849.77	687049.22	1414234.41	849.70
P7	687471.72	1414231.85	847.27	687041.72	1414234.41	847.20
P8	687456.72	1414231.85	847.27	687026.72	1414234.41	847.20
P9	687449.63	1414231.85	849.63	687019.63	1414234.41	849.56
P10	687449.63	1414279.50	848.30	687019.63	1414259.13	848.87
P11	687456.72	1414253.54	846.66	687026.72	1414254.09	846.65
P12	687471.72	1414239.23	847.06	687041.72	1414257.66	846.55
P13	687479.22	1414250.67	849.24	687049.22	1414266.57	848.80

29 D5 CELL 1 AND 2 LCS SUMP CONTROL POINT SCHEDULE



30 D5 CELL 1 AND 2 LCS SUMP SECTION A-A'
SCALE: 1" = 4'



NOTE: THE EASTERN INTERIOR PERIMETER SLOPE OF CELL 1 IS 6H:1V

31 D5 CELL 1 AND 2 LCS SUMP SECTION B-B'
SCALE: 1" = 4'

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALTON

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

LCS DETAILS
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

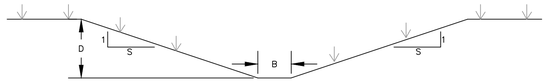
ENGINEERING LICENSE NO: F-0176

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: JSR

PROJECT NUMBER 1356-08-122

SCALE: AS SHOWN	DATE: 12-09-09
DRAWING: D5	OF: 24

DRAWING PATH:



DEFINITION

A CHANNEL WITH VEGETATIVE LINING CONSTRUCTED TO DESIGN CROSS SECTION AND GRADE FOR CONVEYANCE OF RUNOFF.

PURPOSE

TO CONVEY AND DISPOSE OF CONCENTRATED SURFACE RUNOFF WITHOUT DAMAGE FROM EROSION, DEPOSITION, OR FLOODING.

CONSTRUCTION SPECIFICATIONS

1. REMOVE ALL TREES, BRUSH, STUMPS, AND OTHER OBJECTIONABLE MATERIAL FROM THE FOUNDATION AREA AND DISPOSE OF PROPERLY.
2. PLACE FILL TO CONSTRUCT THE CHANNEL AND SHAPE IT TO DIMENSIONS SHOWN ON THE CHANNEL SCHEDULES PLUS A 0.2–FT OVERCUT AROUND THE CHANNEL PERIMETER TO ALLOW FOR BULKING DURING SEEDBED PREPARATIONS AND SOD BUILDUP.
3. REMOVE AND PROPERLY DISPOSE OF ALL EXCESS SOIL SO THAT SURFACE WATER MAY ENTER THE CHANNEL FREELY.
4. THE PROCEDURE USED TO ESTABLISH GRASS IN THE CHANNEL WILL DEPEND UPON THE SEVERITY OF THE CONDITIONS AND SELECTION OF GRASS SPECIES (SEE GENERAL SEEDING SPECIFICATIONS). PROTECT THE CHANNEL WITH TEMPORARY MATTING SUFFICIENT TO WITHSTAND ANTICIPATED VELOCITIES DURING THE ESTABLISHMENT PERIOD (SEE CHANNEL SCHEDULES).

MAINTENANCE

DURING THE ESTABLISHMENT PERIOD, CHECK GRASS–LINED CHANNELS AFTER EVERY RAINFALL. AFTER GRASS IS ESTABLISHED, PERIODICALLY CHECK THE CHANNEL; CHECK IT AFTER EVERY HEAVY RAINFALL EVENT. IMMEDIATELY MAKE REPAIRS. IT IS PARTICULARLY IMPORTANT TO CHECK THE CHANNEL OUTLET AND ALL ROAD CROSSINGS FOR BANK STABILITY AND EVIDENCE OF PIPING OR SCOUR HOLES.

REMOVE ALL SIGNIFICANT SEDIMENT ACCUMULATIONS TO MAINTAIN THE DESIGN CARRYING CAPACITY. KEEP THE GRASS IN A HEALTHY, VIGOROUS CONDITION AT ALL TIMES, SINCE IT IS THE PRIMARY EROSION PROTECTION FOR THE CHANNEL (SEE SEEDING SPECIFICATIONS).

INSPECT ALL MULCHES PERIODICALLY, AND AFTER RAINSTORMS TO CHECK FOR RILL EROSION, DISLOCATION, OR FAILURE. WHERE EROSION IS OBSERVED, APPLY ADDITIONAL MULCH. IF WASHOUT OCCURS, REPAIR THE SLOPE GRADE, RESEED, AND REINSTALL MULCH. CONTINUE INSPECTIONS UNTIL VEGETATION IS FIRMLY ESTABLISHED.

GENERAL NOTES

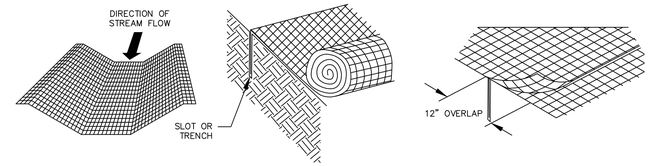
1. CHANNELS ARE TO BE LINED WITH NORTH AMERICAN GREEN MATTING OR APPROVED EQUIVALENT AS SPECIFIED IN THE CHANNEL SCHEDULES.
2. MATTING PRODUCTS SPECIFIED IN THE CHANNEL SCHEDULES SHOULD BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE MATTING DETAIL 33 OF SHEET D6.

CELLS 1 & 2 CHANNEL SCHEDULE

CHANNEL ID	REACH	SIDE SLOPES (S) (H:V)	BASE WIDTH (B) (FT)	DEPTH (D) (FT)	SLOPE (FT/FT)	E&S MATTING
EAST PERIMETER CHANNEL (EPC)	1	2	0	5.25	0.0200	DS75
	2	2	0	5.25	0.0041	DS75
	3	2	3	1.50	0.0445	C125

NOTE: ALL TACK–ON BENCHES SHALL BE MATTED WITH DS75 MATTING

32 / D6 GRASS LINED CHANNELS
SCALE: NTS



IN CHANNELS, ROLL OUT STRIPS OF MATTING PARALLEL TO THE DIRECTION OF FLOW.

ANCHOR MATTING IN A 12" TRENCH

JOIN STRIPS BY ANCHORING AND OVERLAPPING

GENERAL NOTES:

1. CHANNELS MUST BE MATTED WITH SPECIFIED (OR EQUIVALENT) MATERIALS PRESENTED IN THE CHANNEL SCHEDULES.
2. APPLY SEED (IN ACCORDANCE WITH THE GENERAL SEEDING SPECIFICATION) BEFORE LAYING THE NET OR MAT. IF OPEN–WEAVE NETTING IS USED, LIME MAY BE INCORPORATED BEFORE INSTALLING THE NET AND FERTILIZER AND SEED MAY BE SPRAYED ON AFTERWARD.
3. START LAYING THE NET FROM THE TOP OF THE CHANNEL OR SLOPE AND UNROLL IT DOWN THE GRADE. ALLOW NETTING TO LAY LOOSELY ON THE SOIL BUT WITHOUT WRINKLES–DO NOT STRETCH.
4. TO SECURE THE NET, BURY THE UPSLOPE END IN A SLOT OR TRENCH NO LESS THAN 12 INCHES DEEP, COVER WITH SOIL, AND TAMP FIRMLY. STAPLE THE NET EVERY 12 INCHES ACROSS THE TOP END EVERY 3 FEET AROUND THE EDGES AND BOTTOM (OR, AS SPECIFIED BY THE MANUFACTURER). WHERE 2 STRIPS OF NET ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHOULD BE OVERLAPPED 3 INCHES AND STAPLED TOGETHER (OR, AS SPECIFIED BY THE MANUFACTURER). EACH STRIP OF MATTING SHOULD ALSO BE STAPLED DOWN THE CENTER, EVERY 3 FEET (OR, AS SPECIFIED BY THE MANUFACTURER).
5. OTHER MATTING INSTALLATION METHODS (IF EQUIVALENT) MUST BE APPROVED BY THE ENGINEER.

MAINTENANCE NOTES:

1. INSPECT ROLLED EROSION CONTROL PRODUCTS (RECP) AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (0.5" OR GREATER) RAIN FALL EVENT.
2. GOOD CONTACT WITH THE GROUND MUST BE MAINTAINED, AND EROSION MUST NOT OCCUR BENEATH THE RECP.
3. ANY AREAS OF THE RECP THAT ARE DAMAGED OR NOT IN CLOSE CONTACT WITH THE GROUND SHALL BE REPAIRED AND STAPLED.
4. IF EROSION OCCURS DUE TO POORLY CONTROLLED DRAINAGE, THE PROBLEM SHALL BE FIXED AND THE ERODED AREA PROTECTED.

33 / D6 MATTING
SCALE: NTS

CELLS 1 & 2 CULVERT SCHEDULE

CULVERT ID	CULVERT TYPE	MATERIAL	DIA. (IN)	NUMBER OF CULVERTS
CELL 1 (C1) (BY OTHERS)	CIRCULAR	HDPE	42	1
CELL 2 (C2) (BY OTHERS)	CIRCULAR	HDPE	48	1
CELL 1 ENTRANCE ROAD (C1E)	CIRCULAR	HDPE	42	1
NORTH HAUL ROAD (NR)	CIRCULAR	HDPE	24	1

34 / D6 CULVERT SCHEDULE

CELLS 1 & 2 DOWN DRAIN SCHEDULE

DOWN DRAIN ID	NOMINAL INSIDE PIPE DIAMETER (IN)
B	18

35 / D6 DOWN DRAIN SCHEDULE
SCALE: NA

DEFINITION:

A STRUCTURE DESIGNED TO CONTROL EROSION AT THE OUTLET OF A CHANNEL OR CONDUIT.

PURPOSE:

TO PREVENT EROSION AT THE OUTLET OF A CHANNEL OR CONDUIT BY REDUCING THE VELOCITY OF FLOW AND DISSIPATING THE ENERGY.

CONSTRUCTION SPECIFICATIONS:

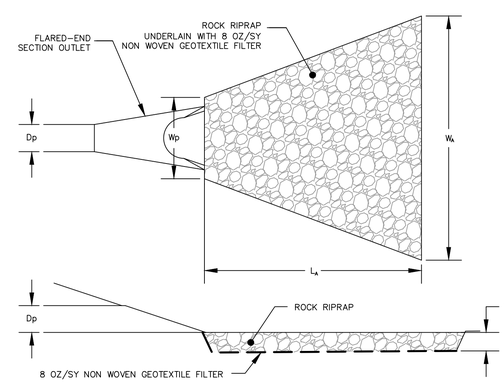
1. ENSURE THAT THE SUBGRADE FOR THE FILTER AND RIPRAP FOLLOWS THE REQUIRED LINES AND GRADES SHOWN IN THE PLAN. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO THE DENSITY OF THE SURROUNDING DISTURBED MATERIAL. LOW AREAS IN THE SUBGRADE ON UNDISTURBED SOIL MAY ALSO BE FILLED BY INCREASING THE RIPRAP THICKNESS.
2. THE RIPRAP AND GRAVEL FILTER MUST CONFORM TO THE SPECIFIED GRADING LIMITS SHOWN ON THE PLANS.
3. FILTER CLOTH, WHEN USED, MUST MEET DESIGN REQUIREMENTS AND BE PROPERLY PROTECTED FROM PUNCHING OR TEARING DURING INSTALLATION. REPAIR ANY DAMAGE BY REMOVING THE RIPRAP AND PLACING ANOTHER PIECE OF FILTER CLOTH OVER THE DAMAGED AREA. ALL CONNECTING JOINTS SHOULD OVERLAP SO THE TOP LAYER IS ABOVE THE DOWNSTREAM LAYER A MINIMUM OF 1 FT. IF THE DAMAGE IS EXTENSIVE, REPLACE THE ENTIRE FILTER CLOTH.
4. RIPRAP MAY BE PLACED BY EQUIPMENT, BUT TAKE CARE TO AVOID DAMAGING THE FILTER.
5. THE MINIMUM THICKNESS OF THE RIPRAP SHOULD BE 1.5 TIMES THE MAXIMUM STONE DIAMETER.
6. RIPRAP SHALL BE NCDOT RIPRAP CLASS AS SPECIFIED IN THE OUTLET PROTECTION SCHEDULE, OR APPROVED EQUIVALENT. IT SHOULD BE HARD, ANGULAR, HIGHLY WEATHER–RESISTANT AND WELL GRADED.
7. CONSTRUCT THE APRON ON ZERO GRADE WITH NO OVERFILL AT THE END. MAKE THE TOP OF THE RIPRAP AT THE DOWNSTREAM END LEVEL WITH THE RECEIVING AREA OR SLIGHTLY BELOW IT.
8. ENSURE THAT THE APRON IS PROPERLY ALIGNED WITH THE RECEIVING STEAM AND PREFERABLY STRAIGHT THROUGHOUT ITS LENGTH. IF A CURVE IS NEEDED TO FIT SITE CONDITIONS, PLACE IN THE UPPER SECTION OF THE APRON.
9. IMMEDIATELY AFTER CONSTRUCTION, STABILIZE ALL DISTURBED AREAS WITH VEGETATION.

MAINTENANCE:

INSPECT RIPRAP OUTLET STRUCTURES WEEKLY AND AFTER SIGNIFICANT (0.5 INCH OR GREATER) RAINFALL EVENTS TO SEE IF ANY EROSION AROUND OR BELOW THE RIPRAP HAS TAKEN PLACE, OR IF STONES HAVE BEEN DISLODGED. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT FURTHER DAMAGE.

REFERENCE:

6.41.5 NC EROSION AND SEDIMENTATION CONTROL PLANNING AND DESIGN MANUAL, 2006



TYPICAL OUTLET PROTECTION SCHEDULE

APRON LABEL	DISCHARGE LOCATION	D_P (FT)	L_A (FT)	W_P (FT)	W_A (FT)	NCDOT RIPRAP CLASS	D_{50} (IN)	D_{MAX} (IN)	T (IN)
A1	DD-B (CELLS 1 & 2)	1.5	17	4.5	18.5	CLASS B	8	12	18

36 / D6 OUTLET PROTECTION
SCALE: NTS

ISSUED FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. GRAY

NO.	DATE	DESCRIPTION	BY
0	3–19–10	ISSUED FOR CONSTRUCTION	KRD

E&SC DETAILS 1
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

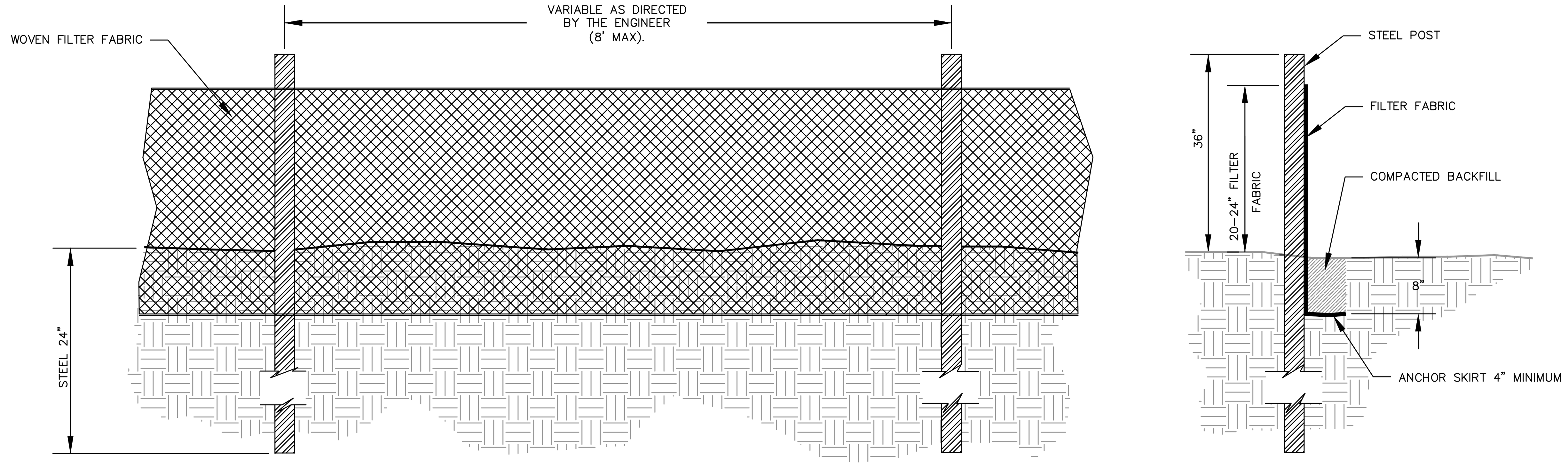
DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: JSR

PROJECT NUMBER 1356–08–122

SCALE: AS SHOWN	DATE: 12–09–09

DRAWING: D6 OF: 24

DRAWING PATH:



GENERAL NOTES:

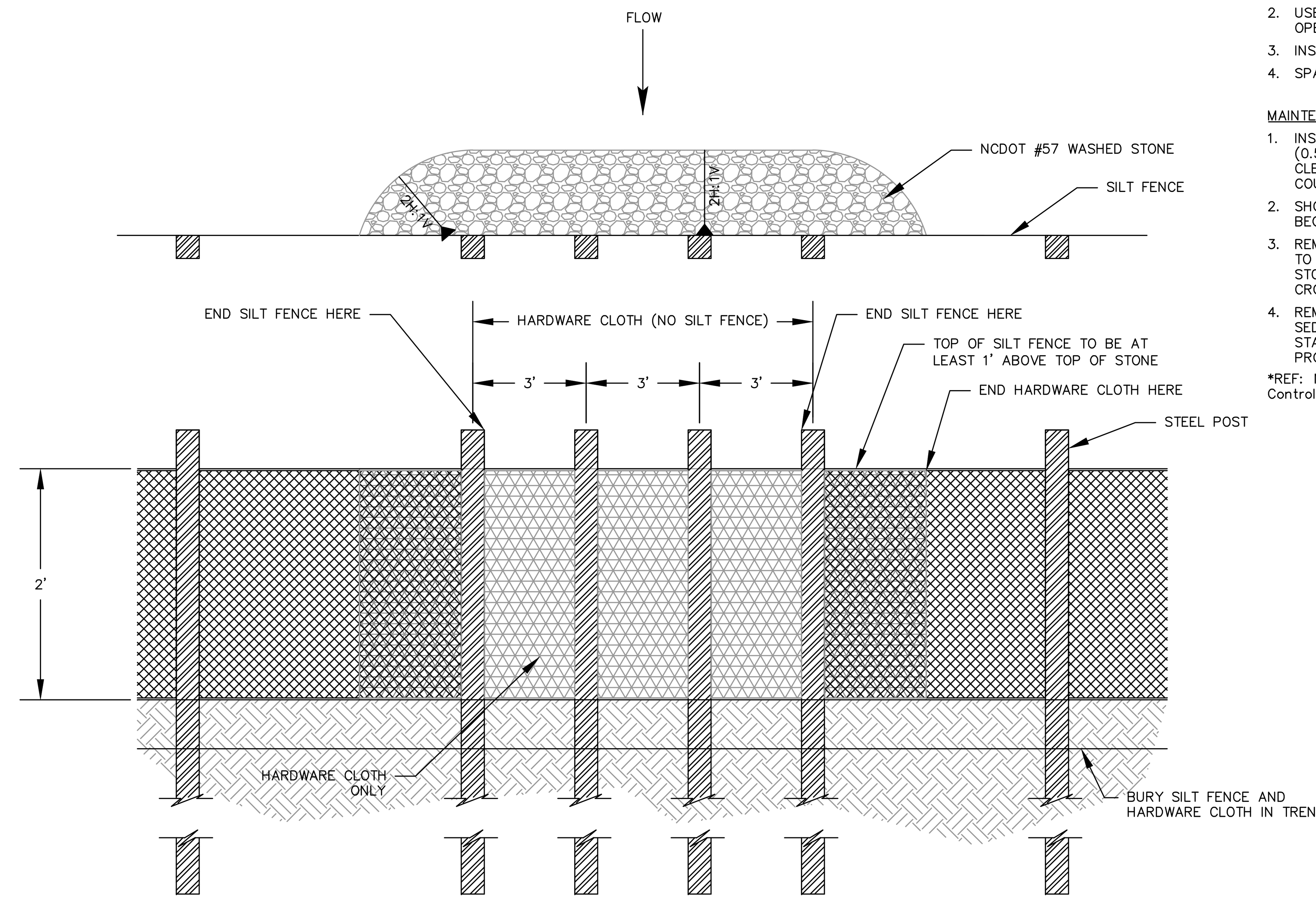
1. PREFABRICATED SILT FENCE IS NOT ACCEPTABLE ON THIS PROJECT.
2. STEEL POSTS SHALL BE USED ON THIS PROJECT INSTEAD OF WOOD POSTS.
3. FILTER FABRIC FENCE SHALL BE A MINIMUM OF 32" IN WIDTH AND SHALL HAVE A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.
4. WOVEN FILTER FABRIC SHALL BE USED WHERE SILT FENCE IS TO REMAIN FOR A PERIOD OF MORE THAN 30 DAYS.
5. STEEL POSTS SHALL BE 5'–0" IN HEIGHT AND BE OF THE SELF–FASTENER ANGLE STEEL TYPE.
6. TURN SILT FENCE UP SLOPE AT ENDS.
7. SILT FENCE SHALL BE STANDARD STRENGTH FILTER FABRIC WITH WIRE MESH REINFORCEMENT OR EXTRA STRENGTH FILTER FABRIC.
8. WHEN FABRIC IS USED WITH WIRE MESH, 8' CENTERED POSTS MAY BE USED.
9. THE USE OF SILT FENCE IN AREAS OF CONCENTRATED FLOW IS INAPPROPRIATE

MAINTENANCE NOTES:

1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEANOUT.
4. REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

*REF: 6.62.7 NC Erosion and Sediment Control Planning and Design Manual, 2006

37/D7 **SILT FENCE**
SCALE: NTS



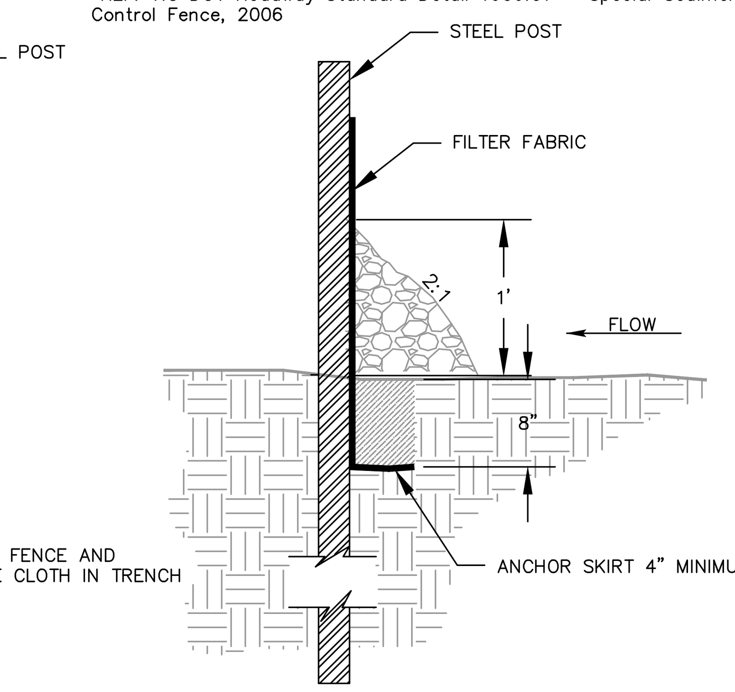
GENERAL NOTES:

1. USE NO. 5 OR NO. 57 STONE FOR SEDIMENT CONTROL
2. USE HARDWARE CLOTH 24 GAUGE WIRE MESH WITH ¼" MESH OPENINGS.
3. INSTALL 5' SELF FASTENER ANGLE STEEL POST 2' DEEP MINIMUM
4. SPACE POST A MAXIMUM OF 3'.

MAINTENANCE NOTES:

1. INSPECT OUTLETS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (0.5" OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY. CLEAN OUT SEDIMENT, STRAW, LIMBS, OR OTHER DEBRIS THAT COULD CLOG THE OUTLET WHEN NEEDED.
2. SHOULD THE FABRICS OF THE OUTLET COLLAPSE, TEAR, OR BECOME INEFFECTIVE REPLACE THEM PROMPTLY.
3. REMOVE SEDIMENT ACCUMULATED BEHIND THE OUTLET AS NEEDED TO PREVENT DAMAGE SILT FENCE AND OUTLET MEASURES. ADD STONE TO OUTLET AS NEEDED TO MAINTAIN DESIGN HEIGHT AND CROSS SECTION.
4. REMOVE ALL FENCING AND OUTLET MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

*REF: NC DOT Roadway Standard Detail 1606.01 – Special Sediment Control Fence, 2006



38/D7 **SILT FENCE OUTLET**
SCALE: NTS

DEFINITION
Controlling runoff and erosion on disturbed areas by establishing perennial vegetative cover with seed.

PURPOSE
To reduce erosion and decrease sediment yield from disturbed areas, and to permanently stabilize such areas in a manner that is economical, adapts to site conditions, and allows selection of the most appropriate plant materials.

SPECIFICATIONS

SEEDBED REQUIREMENTS
Establishment of vegetation should not be attempted on sites that are unsuitable due to excessive soil compaction, inappropriate soil texture, poor drainage, concentrated overland flow, or steepness of slope until measures have been taken to correct these problems.

To maintain a good stand of vegetation, the soil must meet certain minimum requirements as a growth medium. The existing soil should have these criteria:

- Enough fine–grained (silt and clay) material to maintain adequate moisture and nutrient supply (available water capacity of at least .05 inches water to 1 inch of soil).
- Sufficient pore space to permit root penetration.
- Sufficient depth of soil to provide an adequate root zone. The depth to rock or impermeable layers such as hardpans should be 12 inches or more, except on slopes steeper than 2:1 where the addition of soil is not feasible.
- A favorable pH range for plant growth, usually 6.0 – 6.5.
- Free from large roots, branches, stones, large clods of earth, or trash of any kind. Clods and stones may be left on slopes steeper than 3:1 if they are to be hydro seeded.

If any of the above criteria are not met – i.e., if existing soil is too coarse, dense, shallow or acidic to foster vegetation – special amendments are required. The soil conditioners described below may be beneficial or, preferably, topsoil may be applied.

SEEDBED PREPARATION
Install necessary mechanical erosion and sedimentation control practices before seeding, and complete grading according to the approved plan.

Lime and fertilizer needs should be determined by soil tests. Directions, sample cartons, and information sheets are available through county Agricultural Extension offices. Testing is also done by commercial laboratories.

When soil tests results are not available, follow rates suggested in the seeding specifications shown at right. Application rates usually fall into the following ranges:

- Ground agricultural limestone:
  Light–textured, sandy soils: 1 to 1–1/2 tons/acre
  Heavy–textured, clayey soils: 2–3 tons/acre
- Fertilizer:
  Grasses: 800–1200 lb/acre of 10–10–10 (or the equivalent)
  Grass–legume mixtures: 800–1200 lb/acre of 5–10–10 (or the equivalent)

Apply lime and fertilizer evenly and incorporate into the top 4–6 inches of soil by disking or other suitable means. Operate machinery on the contour. When using a hydro seeder, apply lime and fertilizer to a rough, loose surface.

Roughen surfaces prior to seeding.

Complete seedbed preparation by breaking up large clods and raking into a smooth, uniform surface (slopes less than 3:1). Fill in or level depressions that can collect water. Broadcast seed into a freshly loosened seedbed that has not been sealed by rainfall.

SEEDING
Seeding dates given in the seeding mixture specifications are designated as "best" or "possible". Seedings properly carried out within the "best" dates have a high probability of success. It is also possible to have satisfactory establishment when seeding outside these dates. However, as you deviate from them, the probability of failure increases rapidly. Seeding on the last date shown under "possible" may reduce chances of success by 30–50%. Always take this into account in scheduling land–disturbing activities.

Use certified seed for permanent seeding whenever possible.

Labeling of non–certified seed is also required by law. Labels contain important information on seed purity, germination, and presence of wood seeds. Seeds must meet State standards for content of noxious weeds. Do no accept seed containing "prohibited" noxious weed seed.

Inoculate legume seed with the Rhizobium bacteria appropriate to the species of legume. Apply seed uniformly with a cyclone seeder, drop–type spreader, drill, cultipacker seeder, or hydro seeder on a firm, friable seedbed.

When using a drill or cultipacker seeder, plant small grains no more than 1 inch deep, grasses and legumes no more than 1/2 inch. Equipment should be calibrated in the field for the desired seeding rate.

When using broadcast–seeding methods, subdivide the area into workable sections and determine the amount of seed needed for each section. Apply one–half the seed while moving back and forth across the area, making a uniform pattern: then apply the second half in the same way, but moving at right angles to the first pass.

Mulch all plantings immediately after seeding.

HYDRO SEEDING
Surface roughening is particularly important when hydro seeding, as a roughened slope will provide some natural coverage for lime, fertilizer, and seed. The surface should not be compacted or smooth. Fine seedbed preparation is not necessary for hydro seeding operations: large clods, stones, and irregularities provide cavities in which seeds can lodge.

Rate of wood fiber (cellulose) application should be at least 2,000 lb/acre.

Apply legume inoculants at four times the recommended rate when adding inoculant to a hydro seeder slurry.

If a machinery breakdown of 1/2 to 2 hours occurs, add 50% more seed to the tank, based on the proportion of the slurry remaining. This should compensate for damage to seed. Beyond 2 hours, a full rate of new seed may be necessary.

Lime is not normally applied with a hydraulic seeder because it is abrasive. It can be blown onto steep slopes in dry form.

MAINTENANCE
Generally, a stand of vegetation cannot be determined to be fully established until soil cover has been maintained for one full year from planting. Inspect seeded areas for failure and make necessary repairs and reseedings within the same season, if possible.

Reseeding––If a stand has inadequate cover, re–evaluate choice of plant materials and quantities of lime and fertilizer. Re–establish the stand after seedbed preparation or over– seed the stand. Consider seeding temporary, annual species if the time of year is not appropriate for permanent seeding.

If vegetation fails to grow, soil must be tested to determine if acidity or nutrient imbalance is responsible.

Fertilization––On the typical disturbed site, full establishment usually requires re–fertilization in the second growing season. Fine turf requires annual maintenance fertilization. Use soil tests if possible or follow the guidelines given for the specific seeding mixture.

TEMPORARY SEEDING SPECIFICATIONS

Seeding mixture (fall)

Species*	Rate (lb/acre)
Rye Grain (*Secale cereale*)	120

Seeding Mixture (late winter early spring)

Species*	Rate (lb/acre)
Rye Grain (*Secale cereale*)	120
Annual (Korean) Lespedeza (*Kummerowia stipulacea*)	50

Seeding mixture (summer)

Species*	Rate (lb/acre)
German Millet (*Setaria italica*)	40

Seeding dates (Piedmont)

Fall:	Aug. 15 – Dec. 30
Late winter (early spring):	Jan. 1 – May 1 Late
Summer:	May 1 – Aug. 15

Soil amendments
Follow recommendations of soil tests or apply 2,000 lb/acre ground agricultural limestone and 750 lb/acre 10–10–10 fertilizer.

Mulch
Apply 4,000–5,000 lb/acre grain straw or equivalent cover of another suitable mulching material. Anchor mulch by tacking with asphalt, roving, or netting. A disk with blades set nearly straight can be used as a mulch anchoring tool. Netting is the preferred anchoring method on steep slopes.

Maintenance
Re–fertilize if growth is not fully adequate. Reseed, re–fertilize and mulch immediately following erosion or other damage.

Pursuant to G.S. 113A–57(2), the angle for graded slopes and fills shall be no greater than the angle that can be retained by vegetative cover or other adequate erosion–control devices or structures. In any event, slopes left exposed will, within 21 calendar days of completion of any phase of grading, be planted or otherwise provided with temporary or permanent ground cover, devices, or structures sufficient to restrain erosion.

Pursuant to G.S. 113A–57(3), provisions for permanent groundcover sufficient to restrain erosion must be accomplished for all disturbed areas within 15 working days or 90 calendar days (whichever is shorter) following completion of construction or development.

*REF: 6.10 A,B and C, NC Erosion and Sediment Control Planning and Design Manual, 2006

PERMANENT SEEDING SPECIFICATIONS

Seeding mixture

Species*	Rate (lb/acre)
Tall fescue (*Festuca arundinacea*) (Grass lined Channels)	200
Tall fescue (*Festuca arundinacea*) (Other Areas)	100

Nurse plants
Between May 1 and Aug. 15, add 10 lb/acre German millet (*Setaria italica*) or 15 lb/acre Sudan grass. Prior to May 1 or after Aug. 15, add 40 lb/acre Rye Grain (*Festuca arundinacea*).

Seeding dates

	Best	Possible
Fall:	Aug. 25 – Sept. 15	Aug. 20 – Oct. 25
Late winter:	Feb. 15 – Mar. 21	Feb. 1 –Apr. 15

Fall is best for tall fescue (*Festuca arundinacea*) and late winter or summer for lespedeza. Over seeding of Kobe lespedeza (*Kummerowia striata)* over fall–seeded tall fescue is very effective.

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

Mulch
Apply 4,000–5,000 lb/acre grain straw or equivalent cover of another suitable mulching material. Anchor mulch by tacking with asphalt, roving, or netting. A disk with blades set nearly straight can be used as a mulch anchoring tool. Netting is the preferred anchoring method on steep slopes.

Maintenance
Re–fertilize in the second year unless growth is fully adequate. May be mowed once or twice a year, but mowing is not necessary. Reseed, fertilize, and mulch damaged areas immediately.

Pursuant to G.S. 113A–57(3), provisions for permanent groundcover sufficient to restrain erosion must be accomplished for all disturbed areas within 15 working days or 90 calendar days (whichever is shorter) following completion of construction or development.

*REF: 6.11L NC Erosion and Sediment Control Planning and Design Manual, 2006

GENERAL SEEDING SPECIFICATIONS

39/D7 **SEEDING SCHEDULE**

ISSUED FOR CONSTRUCTION

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S&ME
9751 SOUTHERN PINE BLVD.
CHARLOTTE, N.C. 28273
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 032153 KENNETH R. DAL[L]

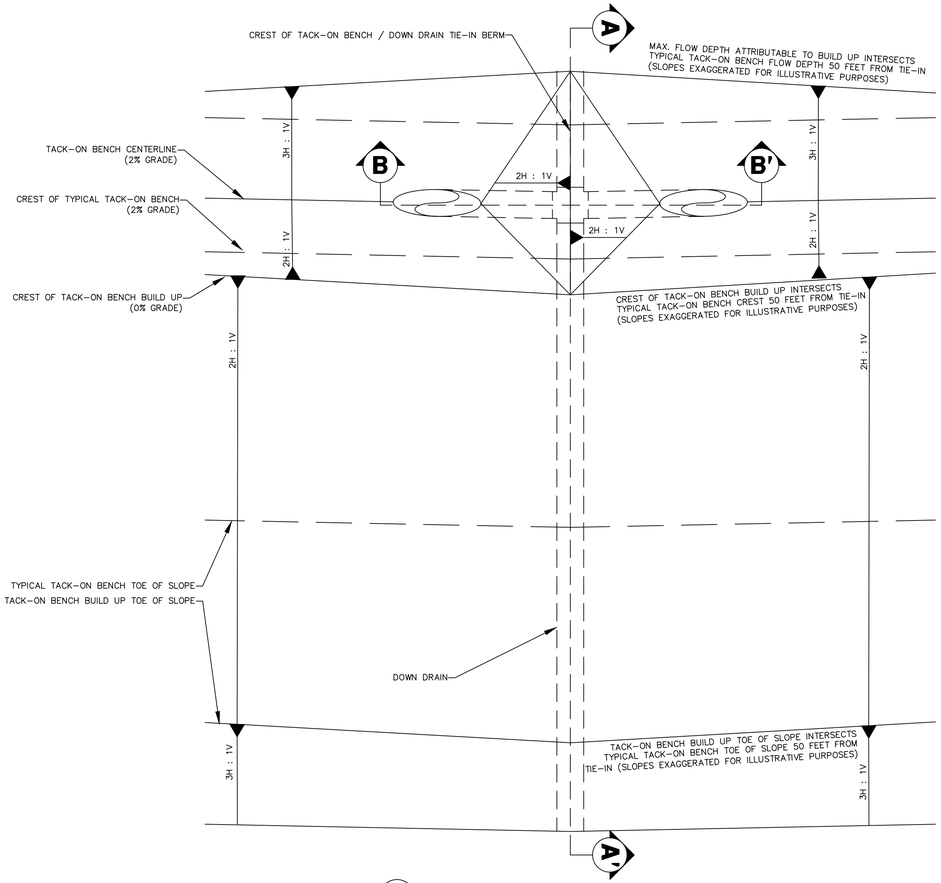
NO.	DATE	DESCRIPTION	BY
0	3–19–10	ISSUED FOR CONSTRUCTION	KRD

E&SC DETAILS 2
CELL 1 AND 2 CONSTRUCTION

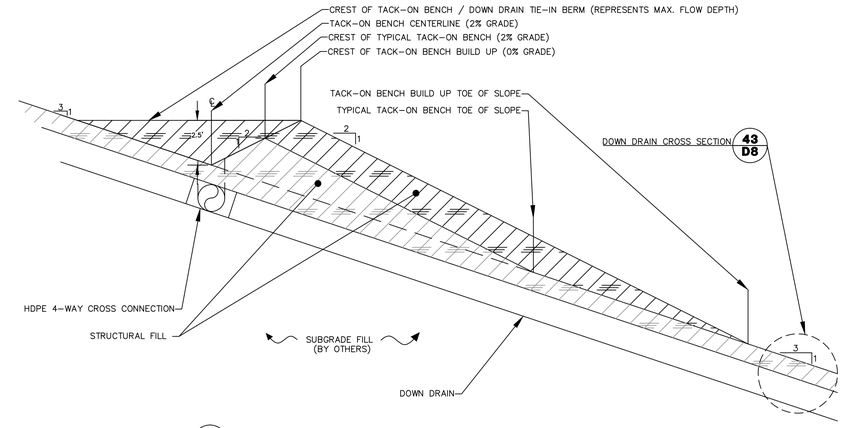
DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: **F-0176**	
DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: JSR
PROJECT NUMBER 1356–08–122	
SCALE: AS SHOWN	DATE: 12–09–09
DRAWING: **D7**	OF: **24**

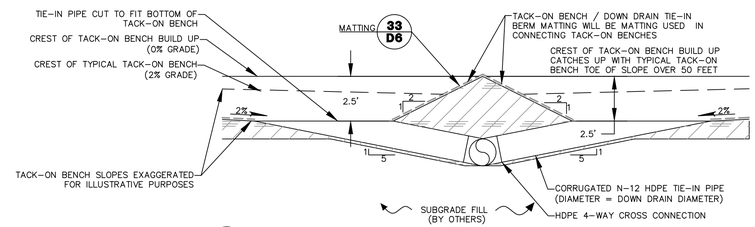
DRAWING PATH:



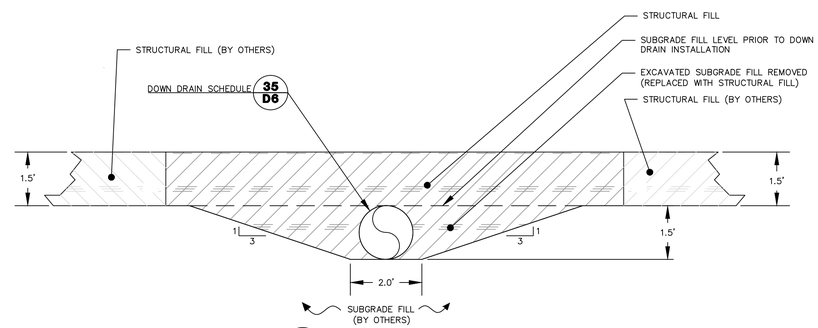
40 / D8 TACK-ON BENCH / DOWN DRAIN TIE-IN PLAN
SCALE: 1" = 4'



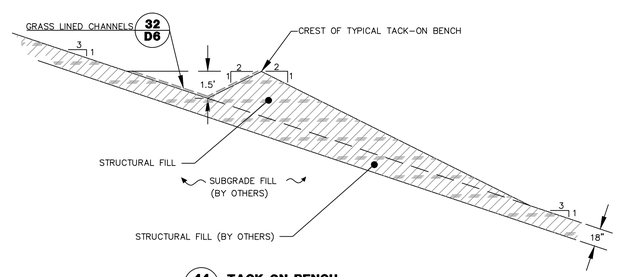
41 / D8 TACK-ON BENCH / DOWN DRAIN TIE-IN CROSS SECTION A-A'
SCALE: 1" = 4'



42 / D8 TACK-ON BENCH / DOWN DRAIN TIE-IN CROSS SECTION B-B'
SCALE: 1" = 4'



43 / D8 DOWN DRAIN CROSS SECTION
SCALE: 1" = 2'



44 / D8 TACK-ON BENCH
SCALE: 1" = 4'

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NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALY

NO.	DATE	DESCRIPTION	BY
0	3-19-10	ISSUED FOR CONSTRUCTION	KRD

STORMWATER MANAGEMENT DETAILS
CELL 1 AND 2 CONSTRUCTION

DUKE ENERGY - MARSHALL STEAM STATION
TERRELL, NORTH CAROLINA

ENGINEERING LICENSE NO: F-0176

DRAWN BY:	CHECKED BY:
CLD	KRD
DESIGNED BY:	APPROVED BY:
WMH	JSR

PROJECT NUMBER: 1356-08-122

SCALE:	DATE:
AS SHOWN	12-09-09

DRAWING:	OF:
D8	24

DRAWING PATH: