Permit No.	Date	Document ID No.
36-12	**May 20, 2009**	**7419**

S&ME

RECEIVED
May 19, 2009
Solid Waste Section
Asheville Regional Office

APPROVED DOCUMENT
Division of Waste Management
Solid Waste Section
Date **December 9, 2009** By **LY Frost**

May 15, 2009

North Carolina Department of Environment and Natural Resources
Division of Waste Management
Solid Waste Section
2090 U.S. Highway 70
Swannanoa, NC 28778

Attention: Mr. Larry Frost

Reference: **Duke Energy - Allen Steam Station Retired Ash Basin (RAB) Ash Landfill**
Cell 1 Construction Certification Report
Submittal 1 of 2
Belmont, North Carolina
S&ME Project No. 1356-06-825 Ph. 9
S&ME Engineering License No. F-0176

Dear Mr. Frost:

On behalf of Duke Energy, S&ME, Inc. is pleased to present the attached Construction Quality Assurance (CQA) documentation for construction of the liner system for Cell 1 of the proposed Retired Ash Basin (RAB) – Ash Landfill at Duke Energy's Allen Steam Station in Belmont, North Carolina. Presented herein is Submittal 1 of the Construction Certification Report, which consists of:

- A general site introduction;
- CQA documentation for earthworks construction, which includes subgrade fill, structural fill, and compacted soil liner;
- Pre-installation CQA documentation for geosynthetics, which includes HDPE geomembrane, geosynthetic clay liner (GCL), and geocomposite drainage layer; and
- Construction photographs and project documentation thus far.

Submittal 2 of the Construction Certification Report will be provided upon the completion of construction, and it will consist of subsequent CQA documentation, construction photographs, and project documentation.

Upon reviewing the attached documentation, if you should have any questions or require additional information, please contact us.

Sincerely,

S&ME, Inc.

NORTH CAROLINA PROFESSIONAL SEAL 032153 ENGINEER KENNETH R. DALY

5/15/09

Kyle Baucom, E.I.
Staff Professional

Kenneth R. Daly, P.E.
Senior Project Engineer

Senior Reviewed by: Jason S. Reeves, P.E.

Attachments: Cell 1 Construction Certification Report
Submittal 1 of 2

Cc: Andy Tinsley, Duke Energy
Ted Manes, Duke Energy

CELL 1 CONSTRUCTION CERTIFICATION REPORT
SUBMITTAL 1 OF 2
RETIRED ASH BASIN (RAB) – ASH LANDFILL
ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

S&ME Project No. 1356-06-825 Ph. 9
S&ME Engineering License No. F-0176

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

May 15, 2009

TABLE OF CONTENTS

1. INTRODUCTION 1
1.1 Project Description 1
1.2 Landfill Area 1
1.3 Borrow Area 2
1.4 Earthworks Construction 2
1.5 Geosynthetics Pre-Installation 2
1.6 Certification 2
2. EARTHWORKS 3
2.1 Subgrade 3
2.1.1 Material 3
2.1.2 Construction 3
2.2 Structural Fill 3
2.2.1 Material 3
2.2.2 Construction 3
2.3 Compacted Soil Liner 4
2.3.1 Material 4
2.3.2 Construction 4
2.4 Observation & Testing 4
2.4.1 Field Testing - Subgrade and Structural Fill 5
2.4.2 Laboratory Testing (Subgrade and Structural Fill) 5
2.4.3 Field Testing (Compacted Soil Liner) 6
2.4.4 Laboratory Testing (Compacted Soil Liner) 7
3. GEOSYNTHETICS 9
3.1 Interface Friction Testing 9
3.2 Geosynthetic Clay Liner (GCL) 9
3.3 Geomembrane 10
3.4 Geocomposite Drainage Layer 10
3.5 Pre-Installation Testing 10
3.5.1 Manufacturer Quality Control (MQC) Testing 10
3.5.2 Conformance Testing 10
4. PROJECT DOCUMENTATION 11

TABLE OF CONTENTS (CONTINUED)

FIGURES

Figure 1: Site Aerial Map
Figure 2: Cell 1 Construction Site Aerial Photograph

TABLES

Frequency Verifiation Summary Tables

CONSTRUCTION CERTIFICATION STATEMENT

APPENDICES

I. EARTHWORKS

1. Subgrade
   - Subgrade Laboratory Test Results
   - Historical Proctors
   - Subgrade Field Test Results
   - Rough Subgrade As-Built Drawing
   - Final Subgrade As-Built Drawing
2. Structural Fill
   - Structural Fill Laboratory Test Results
   - Structural Fill Field Test Results
3. Compacted Soil Liner
   - Compacted Soil Liner Laboratory Test Results
   - Compacted Soil Liner Field Test Results
   - Compacted Soil Liner As-Built Drawing
   - Compacted Soil Liner Thickness Verification

II. GEOSYNTHETICS

1. Interface Friction Test Results
2. Geosynthetic Clay Liner (GCL)
   - MQC Test Results
   - Conformance Test Results
3. HDPE Geomembrane
   - MQC Test Results
   - Conformance Test Results
4. Geocomposite
   - 350-mil, LDS MQC Test Results
   - 350-mil, LDS Conformance Test Results
   - 300-mil, LCS MQC Test Results
   - 300-mil, LCS Conformance Test Results

III. PROJECT DOCUMENTATION

1. Construction Photographs
2. Field Reports
3. Meetings Minutes
4. Notices of Change

1. INTRODUCTION

1.1 Project Description

The Retired Ash Basin (RAB) Ash Landfill is owned and operated by Duke Energy. The facility is located at Allen Steam Station in Belmont, North Carolina. The proposed RAB Ash Landfill was permitted for Phase I (Cells 1 and 2) construction under Permit No. 36-12. This Certification Report documents the construction of the Cell 1 liner system in accordance with S&ME's "Permit to Construct Application" dated March 11, 2008 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." Presented herein is Submittal 1 of 2 of the Construction Certification Report for the Cell 1 liner system, which is organized into 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, and compacted soil liner;
- Section 3 - Discusses geosynthetics CQA documentation prior to installation including the geosynthetic clay liner (GCL), high density polyethylene (HDPE) geomembrane, and geocomposite drainage layers; and
- Section 4 - 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, record drawings, and project documentation are included in the Appendices. Submittal 2 of the Construction Certification Report will be submitted upon the completion of construction of the Cell 1 liner system. Submittal 2 will consist of subsequent geosynthetics installation and protective cover construction CQA documentation and additional project documentation.

The RAB Ash Landfill project site can be generally characterized into two areas: 1) the Landfill Area and 2) the Borrow Area. These two areas are shown on the Site Aerial Map, Figure 1, prior to construction. The Landfill Area is also illustrated on an Aerial Photograph, Figure 2, during Cell 1 construction.

1.2 Landfill Area

The Landfill Area for Cell 1 is located in the southwest corner of the RAB (see Drawing 1 of Appendix I, Section 1) with an approximate area of 10.7 acres. Construction activities thus far within the Landfill Area include earthworks fill for subgrade, structural fill, and compacted soil liner with on-going geosynthetics installation.

1.3 Borrow Area

The Borrow Area is located northeast of the intersection of South Point Road and Plant Allen Road near the entrance driveway of Duke Energy's Allen Steam Station. The Borrow Area is approximately 15.8 acres for Phase I construction. Construction activities within the Borrow Area generally consisted of installing erosion and sediment control measures, excavating soil, grading for drainage, and seeding.

1.4 Earthworks Construction

Construction of the subgrade fill was performed by Ash Basics Company, Inc. beginning in July 2008 and ending in February 2009. Subgrade fine grading, construction of the structural fill, and construction of the compacted soil liner was performed by Earnhardt Grading beginning in February 2009 and ending in April 2009. S&ME monitored construction activities and provided testing services during earthworks.

1.5 Geosynthetics Pre-Installation

S&ME also coordinated and verified pre-qualification and conformance testing for geosynthetics prior to installation.

1.6 Certification

Observation and testing results indicated that the earthworks construction and geosynthetics pre-installation for the RAB Ash Landfill were in general accordance with the approved CQA Plan. A Construction Certification Statement signed and sealed by an Engineer registered in the State of North Carolina is included as an attachment.

2. EARTHWORKS

Earthworks construction activities included three material types: subgrade, structural fill, and compacted soil liner materials. Material descriptions and general construction procedures for the three material types placed are summarized in Sections 2.1 through 2.3. Earthworks construction observation and testing activities are summarized in Section 2.4.

2.1 Subgrade

The subgrade material definition and subgrade general construction procedures are summarized in this section. Observation and testing results are reported in Section 2.4.

2.1.1 Material

Subgrade fill is defined as compacted fill placed to achieve proposed liner system subgrade elevations. Subgrade fill consists of fly ash from existing ash ponds located south of Cell 1.

2.1.2 Construction

Ash Basics Company, Inc. began subgrade fill placement in January 2008 with the beginning of the test fill study. The test fill site is located in the southeast corner of Cell 1 (see Figure 1), and it consists of an approximate 3 acre base area with 20 feet of in-place subgrade fill. Subgrade fill placement for the test fill study ended in April 2008 after the placement of approximately 88,590 cubic yards of subgrade fill. Construction of the subgrade fill for Cell 1 of the RAB Ash Landfill was also performed by Ash Basics Company, Inc. beginning in July 2008 and ending in February 2009. Approximately 417,000 cubic yards of material was placed to complete the Cell 1 subgrade fill. Subgrade fill thicknesses varied from approximately 10 feet on the southern perimeter to 32 feet in the northeast corner of Cell 1. The subgrade fill was compacted in approximate 18-inch thick lifts. The subgrade fill was constructed within the limit of waste and compacted to meet the specified requirements. Perimeter slopes (south and west slopes) were constructed at 2 horizontal to 1 vertical (2H:1V), while intracell slopes (north and east slopes) were constructed at 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 2.4.

2.2.1 Material

Structural fill is defined as compacted fill 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 consists 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

As previously mentioned, construction of the structural fill for Cell 1 of the RAB Ash Landfill was performed by Earnhardt Grading beginning in February 2009 and ending in

April 2009. Approximately 58,600 cubic yards of material was placed as structural fill for the Cell 1 construction. The structural fill was compacted in approximate 8-inch thick lifts. The structural fill was compacted to meet the specified requirements. The majority of structural fill was constructed in perimeter berms along the south and west subgrade perimeter slopes. Structural fill thicknesses varied from approximately 16 feet on the south perimeter berm to 36 feet in the north end of the west perimeter berm. Perimeter berms were constructed at 3H:1V slopes.

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 2.4.

2.3.1 Material

Compacted soil liner is defined as low permeability soil to be constructed in the liner system. Compacted soil liner consists of on-site borrow soils that were free of organic material, refuse, debris, and large rocks or clods consistent with technical specification requirements.

2.3.2 Construction

Construction of the compacted soil liner for Cell 1 was performed by Earnhardt Grading beginning at the end of December 2008 with the construction of a 35 foot by 100 foot compacted soil liner test pad. The test pad was removed and re-graded prior to full-scale compacted soil liner construction. Full-scale compacted soil liner construction began in March 2009 and ended in April 2009. Approximately 33,600 cubic yards of material was placed for the Cell 1 compacted soil liner. The compacted soil liner was constructed in three lifts. 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. The compacted soil liner was compacted to meet the specified requirements.

2.4 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 were in conformance with the project specifications.

Field and laboratory testing were performed at the specified frequencies summarized in this section. Field and laboratory testing frequency verifications were evaluated based on the in-place quantity for each material. With a known in-place quantity for each material, the volume was divided by the lift thickness and frequency area (i.e. one test per acre per lift) to calculate the number of tests necessary. Tables 1 and 2 summarize frequency verification for field and laboratory testing of earthworks.

2.4.1 Field Testing - Subgrade and Structural Fill

Field testing consisted of performing field density tests (ASTM D2937 and/or ASTM D6938 previously ASTM D2922) and moisture content tests (ASTM D2216). The drive cylinder method (ASTM D2937) of field density testing was the primary test method used during fill placement for the subgrade and structural fill. The nuclear density method (ASTM D 6938) of field density testing was used for several subgrade field density tests. Field density tests were performed at the following frequency with the specified moisture-density requirements:

Soil Type	Frequency	Moisture Requirement	Density Requirement
Subgrade	1 test per acre per 18” lift	±3% of OMC[1]	95% Standard Proctor MDD[2]
Structural Fill	1 test per acre per 8” lift	±3% of OMC[1]	95% Standard Proctor MDD[2]

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

Field density test results for the subgrade and structural fill are included in Appendix I. Approximate field density test locations generally referred to a grid system as shown in Drawings 3 and 4 in Appendix I.

One hundred and eighty-three (183) passing field density tests were performed on the subgrade fill. Sixty-three (63) passing field density tests were performed on the structural fill. Approximately 40 percent of subgrade tests and 20 percent of structural fill tests where outside of the specified ±3% moisture content range. S&ME allowed exceptions to the moisture content compaction criteria provided that the density requirements were achieved. If a field test did not meet the specified density requirements, the area was re-worked and re-tested until the density requirements were met. One (of 64) structural fill in-place density test did not meet requirements that was not re-worked and re-tested. Considering that test results for this location indicated a 93 percent compaction, exception was allowed for this one test. It is our opinion that the noted exceptions do not compromise the quality or integrity of the overlying liner system and overall landfill development.

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

2.4.2 Laboratory Testing (Subgrade and Structural Fill)

Subgrade and structural fill 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:

- 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. The quantity of subgrade and structural fill material placed and the number of laboratory tests conducted are reported in Table 1. Approximately 417,000 cubic yards of subgrade fill was placed. Twenty-six (26) suites of laboratory tests were performed on the subgrade fill resulting in a testing frequency of approximately one suite of tests per 16,000 cubic yards. The required laboratory testing frequencies for subgrade of one suite of tests per 10,000 cubic yards was initially followed. However, based on observed similar material classifications and characteristics throughout subgrade fill placement, the frequency of laboratory testing was relaxed.

Based on in-place material quantities and the number of laboratory tests performed as reported in Table 2, the required testing frequencies for structural fill were satisfied. Four additional standard Proctor curves are included with laboratory test results in Appendix I. These four Proctor curves were reference curves prepared during field testing in the early stages of subgrade construction prior to laboratory testing from the in-place subgrade materials being performed.

2.4.3 Field 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 100’ x 100’ grid per every other 6” lift	+ 2-5% of OMC[1]	95% Standard Proctor MDD[2]

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

The ultimate goal of compacted soil liner construction is achieving the specified permeability. Meeting moisture content requirements (wet of the optimum moisture content) is more significant than density requirements in achieving permeability. Eighteen (18) (approximately 21 percent) of field density tests had moisture contents greater than 5% wet of the optimum moisture content. Materials represented by these test results were allowed to remain in place on the basis that the density requirements were

met and that they were wet of the specified moisture content range. If test results indicated moisture contents less than 2% wet of the optimum moisture content, the area was moisture conditioned, re-worked and re-tested until the moisture requirements were met. Two of the field density tests did not meet the density requirements, with measured densities of 94 percent of the maximum dry density. Considering that 92 passing tests were performed overall and that the moisture content was achieved for these tests, the areas were not re-worked.

Field density test results for the compacted soil liner test pad construction and full-scale construction are included in Appendix I. Approximate field density test locations referred to a 100-foot by 100-foot grid system as shown in Drawing 5 in Appendix I. Field density tests were not performed in grids D-4 and D-6. However, based on in-place material quantities and the number of field tests performed as reported in Table 1, the required testing frequencies for compacted soil liner were satisfied.

Another important aspect of the compacted soil liner construction was verifying the specified 18-inch compacted soil liner thickness. The compacted soil liner thickness was verified by comparing the elevations of final subgrade survey points to final surface 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. A total of 559 final subgrade survey points and 644 compacted soil liner survey points were measured to verify the compacted soil liner thicknesses. Additional compacted soil liner survey points were a result of slope breaks points on an overbuilt compacted soil liner berm through the center corridor of Cell 1. Compacted soil liner thickness verification summary tables are included in Appendix I and illustrated in Drawing 6 in Appendix I. The thickness verification data indicates that the minimum 18-inch compacted soil liner thickness was achieved.

2.4.4 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. A summary table of compacted soil liner test pad laboratory test results is provided in Appendix I. Compacted soil liner test pad field density tests on the first lift had moisture contents below (or dry of) the specified moisture content range.

Permeability test results on two (2) undisturbed samples from the first lift did not meet the minimum specified permeability (i.e. hydraulic conductivity) of 1.0 x 10^{-5} cm/sec. Two (2) more permeability tests were conducted on undisturbed samples after test pad construction was completed by taking an 18-inch long Shelby tube sample and testing the bottom 6 inches. These additional permeability test results indicated that the first lift met minimum permeability requirements. Permeability test results for the second and third test pad lifts met the minimum permeability requirements. Following test pad construction, the test pad was removed and 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 in-place compacted soil liner material met the specified 1.0 x 10^{-5} cm/sec permeability requirement. Permeability samples were remolded to target molding conditions of 2% wet of its optimum moisture content (OMC) and 95% compaction of its standard Proctor maximum dry density (MDD). Remolded permeability tests were conducted at net confining pressures of 2.5 pounds per square inch (psi) and a gradient of approximately 2. The net confining pressure of 2.5 psi during testing conditions 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 with the exception of sample CSL-2. With a borderline permeability of 1.12 x 10^{-5} cm/sec, an additional in-place compacted soil liner sample was taken as a re-test. Laboratory test results for compacted soil liner full-scale construction are included in Appendix I.

Based on in-place 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 as noted herein, and the compacted soil liner thickness verification, we conclude the compacted soil liner satisfies the approved CQA Plan requirements.

3. GEOSYNTHETICS

Geosynthetics manufacturer quality control (MQC) testing and conformance testing was conducted prior to liner system construction to verify material conformance with the project requirements. Conformance testing included interface shear strength testing on representative samples and laboratory testing of site-specific samples independent of the manufacturer. MQC testing was performed and reported by the manufacturer. Materials tested included the GCL, HDPE geomembrane, and geocomposite drainage layer.

3.1 Interface Friction Testing

Prior to material production, interface friction testing was performed on representative liner material samples. The GCL is comprised of bentonite with a woven geotextile on one side and a non-woven geotextile on the other. The HDPE geomembrane has a slightly different texture pattern on either side: one with short spikes and the other with long spikes. Interface friction testing was performed on the various combinations of these materials including the following interfaces:

- Soil to GCL (woven geotextile – black side);
- Soil to GCL (non-woven geotextile – white side);
- GCL (woven geotextile – black side) to HDPE Geomembrane (short spike side);
- GCL (woven geotextile – black side) to HDPE Geomembrane (long spike side);
- GCL (non-woven geotextile – white side) to HDPE Geomembrane (short spike side);
- GCL (non-woven geotextile – white side) to HDPE Geomembrane (long spike side);
- HDPE Geomembrane (short spike side) to Geocomposite; and
- HDPE Geomembrane (long spike side) to Geocomposite.

Interface shear strength testing was conducted over the range of normal loads and test conditions (i.e. moisture and shearing rate) consistent with the project requirements. Interface friction results are included in Appendix II. Plots of the shear strength envelope (shear strength vs. normal load) are provided in Appendix II under the cover of project Record of Information No. 4. The laboratory test results and shear strength envelope plots indicate that the various geosynthetic interfaces satisfy the project strength requirements for peak interface shear strength.

3.2 Geosynthetic Clay Liner (GCL)

The geosynthetic clay liner (GCL) was a Bentomat ST product, 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 GCL, Bentomat ST, was manufactured by CETCO Lining Technologies of Cartersville, Georgia. Approximately 613,400 square feet of GCL was ordered for the project.

3.3 Geomembrane

The geomembrane was a 60-mil thick high density polyethylene (HDPE) double-sided textured geomembrane. The geomembrane, "Microspike™" was manufactured by Agru America of Georgetown, South Carolina. Approximately 1,243,200 square feet of geomembrane was ordered for the project.

3.4 Geocomposite Drainage Layer

The geocomposite drainage layers consisted of 350-mil thick geocomposite for the leak detection system (LDS) in the secondary liner system and a 300-mil thick geocomposite for the leachate collection system (LCS) in the primary liner system. The geocomposites consisted of a Transnet HDPE geonet drainage core with GE180 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 1,202,400 square feet of geocomposite drainage layer was ordered for the project.

3.5 Pre-Installation Testing

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

3.5.1 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. Review of the MQC test results indicates that the geosynthetic material properties satisfy the project requirements. Tables 3 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 3 through 7 indicates that the required testing frequencies were met.

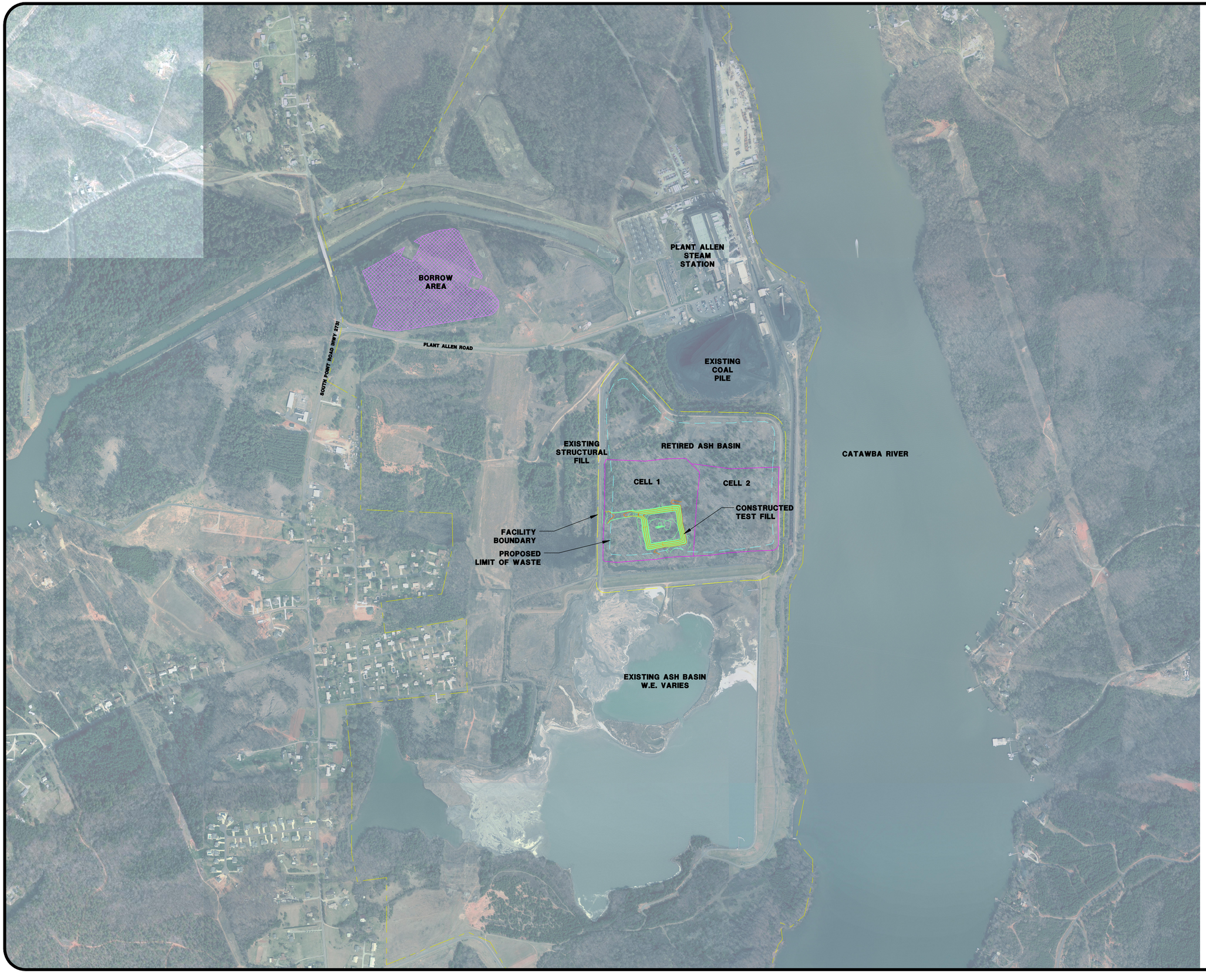
3.5.2 Conformance Testing

Conformance test samples were collected at the factory and sent to TRI Environmental, Inc. for conformance testing in accordance with the approved plans and specifications. In-plant sampling was coordinated by TRI Environmental. Conformance test results are presented in Appendix II. Review of the conformance test results indicates the geosynthetic material properties satisfy 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.

4. 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.

Site Figures



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE FACILITY BOUNDARY
- PROPOSED LIMIT OF WASTE
- CELL BOUNDARIES
- PROPOSED TEST FILL MINOR CONTOURS (2')
- PROPOSED TEST FILL MAJOR CONTOURS (10')
- BORROW AREA

400 0 200 400 800

(IN FEET)

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY

SITE AERIAL MAP

PHASE I RAB ASH LANDFILL
ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: KB	CHECKED BY:
DESIGNED BY:	APPROVED BY:
PROJECT NUMBER: 1356-06-825	
SCALE: 1" = 400'	DATE: 5-8-09
DRAWING: 1	OF: 6

DRAWING PATH: Q:\356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\GDT REPORT SITE FIGURE.DWG

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY

CELL 1 CONSTRUCTION AERIAL PHOTOGRAPH

PHASE I RAB ASH LANDFILL
ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY:
CHECKED BY:
DESIGNED BY:
APPROVED BY:
PROJECT NUMBER 1356-06-825
SCALE: NTS
DATE: 5-8-09
DRAWING: 2
OF: 6

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\ADV\CONSTRUCTION\CDR\T REPORT AERIAL.DWG

Frequency Verification Summary Tables

TABLE 1

EARTHWORKS FIELD TESTING FREQUENCY VERIFICATION

DESCRIPTION	TEST STANDARD	CELL 1 IN-PLACE VOLUME ESTIMATE (CY)	PROJECT SPECIFICATIONS	CONF. QA FIELD TEST FREQUENCY (per area per lift)		NUMBER OF TESTS	
						REQUIRED	PASSING
				AREA (ft^2)	LIFT THICKNESS (inches)	CONF. QA	CONF. QA
Subgrade							
Nuclear or Drive-Cyliner Density	ASTM D 6938 (previously D 2922) or ASTM D 2937	417,000[1]	95% Standard Proctor MDD	43,560	18	173	183
Moisture Content	ASTM D 2216		+ or - 3% of OMC				183
Structural Fill							
Nuclear or Drive-Cyliner Density	ASTM D 6938 (previously D 2922) or ASTM D 2937	58,600[2]	95% Standard Proctor MDD	43,560	8	55	63
Moisture Content	ASTM D 2216		+ or - 3% of OMC				63
Compacted Soil Liner							
Drive-Cyliner Density	ASTM D 2937	33,900[1]	95% Standard Proctor MDD	10,000	6	92	93
Moisture Content	ASTM D 2216		+ 2 - 5% of OMC				93

[1] Quantity based on as-built drawing and information

[2] Quantity based on engineer's quantity estimate

TABLE 2

EARTHWORKS LABORATORY TESTING FREQUENCY VERIFICATION

DESCRIPTION	TEST STANDARD	CELL 1 IN-PLACE VOLUME ESTIMATE (CY)	CONF. QA LAB TEST FREQUENCY (per CY)	NUMBER OF TESTS	
				REQUIRED	PASSING
				CONF. QA	CONF. QA
Subgrade					
Moisture Content	ASTM D 2216	417,000[2]	10,000	42	26[1]
Grain-size with Hydrometer	ASTM D 422			42	26[1]
Atterberg Limits	ASTM D 4318			42	26[1]
Standard Proctor	ASTM D 698			42	26[1]
Structural Fill					
Moisture Content	ASTM D 2216	58,600[3]	10,000	59	15
Grain-size with Hydrometer	ASTM D 422			59	15
Atterberg Limits	ASTM D 4318			59	15
Standard Proctor	ASTM D 698			59	15
Compacted Soil Liner					
Grain-size with Hydrometer	ASTM D 422	33,900[2]	3,000	12	12
Atterberg Limits	ASTM D 4318			12	12
Standard Proctor	ASTM D 698			12	12
Remolded Permeability	ASTM D 5084			12	12

[1] Frequency reduced based on material consistency

[2] Quantity based on as-built drawing and information

[3] Quantity based on engineer's quantity estimate

TABLE 3

INTERFACE FRICTION TEST SUMMARY

INTERFACE 1	INTERFACE 2	PEAK FRICTION ANGLE[1] (degrees)	PEAK ADHESION[1] (psf)	LARGE DISPLACEMENT FRICTION ANGLE (degrees)	LARGE DISPLACEMENT ADHESION (psf)
Compacted Soil Liner	GCL (woven geotextile - black side)	15.8	352	9.5	232
Compacted Soil Liner	GCL (nonwoven geotextile - white side)	20.7	340	13	329
GCL (woven geotextile - black side)	Geomembrane (short spike side)	17.7	261	10.6	264
GCL (woven geotextile - black side)	Geomembrane (long spike side)	14.3	948	11.4	525
GCL (nonwoven geotextile - white side)	Geomembrane (short spike side)	20.9	498	9.4	412
GCL (nonwoven geotextile - white side)	Geomembrane (long spike side)	24.5	181	11.9	491
Geomembrane (short spike side)	Geocomposite	21	497	8.6	342
Geomembrane (long spike side)	Geocomposite	24.3	0	15.8	0

[1] Peak shear strength envelope is characterized by peak friction angle and peak adhesion; see Appendix II for peak shear strength envelope plots, which show that the minimum project interface shear strength requirements are met

TABLE 4

GEOSYNTHETIC CLAY LINER 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	8	N/A	33	N/A
Bentonite Fluid Loss (mL)	ASTM D 5891	<18	50 tons	N/A	8	N/A	33	N/A
Geotextile								
Bentonite Mass/Area (lb/ft^2)	ASTM D 5993	>0.75	40,000 ft^2	100,000	16	7	76	7
Grab Tensile Strength (lb/in)	ASTM D 6768	>30	200,000 ft^2	100,000	4	7	76	7
Peel Strength (lb/in)	ASTM D 6496	>3.5	40,000 ft^2	100,000	16	7	76	7
Index Flux ($m^3/m^2/sec$)	ASTM D 5887	$<1.0 \times 10^{-8}$	Periodic	N/A	N/A	N/A	N/R	7
Hydraulic Conductivity (cm/sec)	ASTM D 5887	$<5.0 \times 10^{-9}$	Periodic	100,000	N/A	7	N/R	7
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:	273
Total Area of Rolls Delivered to Site (ft^2):	613,365
Total Weight of Rolls Delivered to Site (lbs):	758,421
Total Weight of Rolls Delivered to Site (tons):	380

TABLE 5

60-MIL, TEXTURED HDPE GEOMEMBRANE 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	132	19	132	21
Asperity Height (mil)	GM 12	10	every 2nd roll	N/A	66	N/A	132	N/A
Density (g/cm^3)	ASTM D 792 / ASTM D 1505	0.940	200,000	100,000	3	13	27	13
Yield Strength (lb/in)	ASTM D 6693	126	20,000	100,000	21	13	132	13
Yield Elongation (%)	ASTM D 6693	12	20,000	100,000	21	13	132	13
Break Strength (lb/in)	ASTM D 6693	90	20,000	100,000	21	13	132	13
Break Elongation (%)	ASTM D 6693	100	20,000	100,000	21	13	132	13
Tear Resistance (lb)	ASTM D 1004	42	45,000	100,000	10	13	132	13
Puncture Resistance (lb)	ASTM D 4833	90	45,000	N/A	10	N/A	132	N/A
Carbon Black Content (%)	ASTM D 4218	2 - 3	20,000	100,000	21	13	27	13
Carbon Black Dispersion	ASTM D 5596	9 in Categories 1 or 2 and 1 in Category 3	45,000	N/A	10	N/A	27	N/A
Oxidative Inductive Time - Standard (min)	ASTM D 3895	100	200,000	N/A	3	N/A	3	N/A
Oxidative Inductive Time - High Pressure (min)	ASTM D 5885	400	200,000	N/A	3	N/A	N/R	N/A
Oven Aging at 85° C - Standard (%)	ASTM D 3895	55	ea. formulation	N/A	3	N/A	N/R	N/A
Oven Aging at 85° C - High Pressure (%)	ASTM D 5885	80	ea. formulation	N/A	3	N/A	N/R	N/A

Total Number of Rolls Delivered to Site:	132
Total Area of Rolls Delivered to Site (ft^2):	1,243,201
Total Weight of Geomembrane Delivered to Site (lbs):	418,360
Total Number of Formulations:	3

TABLE 6

350-MIL, 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	350	50,000	100,000	13	7	14	7
Density (g/cm^3)	ASTM D 1505	0.94	50,000	100,000	13	7	14	7
Tensile Strength (lb/in)	ASTM D 5035	75	50,000	N/A	13	N/A	14	N/A
Carbon Black Content (%)	ASTM D 4218	2 - 3	50,000	N/A	13	N/A	14	N/A
Resin								
Polymer Density (g/cm^3)	ASTM D 1505	0.94	once per lot	N/A	2	N/A	2	N/A
Melt Flow Index (g/10 min)	ASTM D 1238	1	once per lot	N/A	2	N/A	2	N/A
Geotextile								
Mass per Unit Area (oz/yd^2)	ASTM D 5261	8	100,000	N/A	7	N/A	14	N/A
Grab Tensile Strength (lb)	ASTM D 4632	200	100,000	N/A	7	N/A	14	N/A
Puncture (lb)	ASTM D 4833	80	100,000	N/A	7	N/A	14	N/A
AOS, US Sieve	ASTM D 4751	70	540,000	N/A	2	N/A	14	N/A
Water Flow Rate (cm/s)	ASTM D 4491	$5.0x10^{-5}$	540,000	N/A	2	N/A	14	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	13	7	14	7
Transmissivity ($m^3/m/s$)	ASTM D 4716	$3.44x10^{-3}$	540,000	100,000	2	7	2	7

Total Number of Rolls Delivered to Site: 270

Total Area of Rolls Delivered to Site (ft^2): 648,000

Total Number of Formulations: 2

TABLE 7

300-MIL, LCS 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	270	50,000	100,000	12	6	16	7
Density (g/cm^3)	ASTM D 1505	0.94	50,000	100,000	12	6	16	7
Tensile Strength (lb/in)	ASTM D 5035	75	50,000	N/A	12	N/A	16	N/A
Carbon Black Content (%)	ASTM D 4218	2 - 3	50,000	N/A	12	N/A	16	N/A
Resin								
Polymer Density (g/cm^3)	ASTM D 1505	0.94	once per lot	N/A	2	N/A	2	N/A
Melt Flow Index (g/10 min)	ASTM D 1238	1	once per lot	N/A	2	N/A	2	N/A
Geotextile								
Mass per Unit Area (oz/yd^2)	ASTM D 5261	8	100,000	N/A	6	N/A	14	N/A
Grab Tensile Strength (lb)	ASTM D 4632	200	100,000	N/A	6	N/A	14	N/A
Puncture (lb)	ASTM D 4833	80	100,000	N/A	6	N/A	14	N/A
AOS, US Sieve	ASTM D 4751	70	540,000	N/A	2	N/A	14	N/A
Water Flow Rate (cm/s)	ASTM D 4491	$5.0x10^{-5}$	540,000	N/A	2	N/A	14	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	12	6	24	7
Transmissivity ($m^3/m/s$)	ASTM D 4716	$3.44x10^{-3}$	540,000	100,000	2	6	2	7

Total Number of Rolls Delivered to Site: 231

Total Area of Rolls Delivered to Site (ft^2): 554,400

Total Number of Formulations: 2

Construction Certification Statement

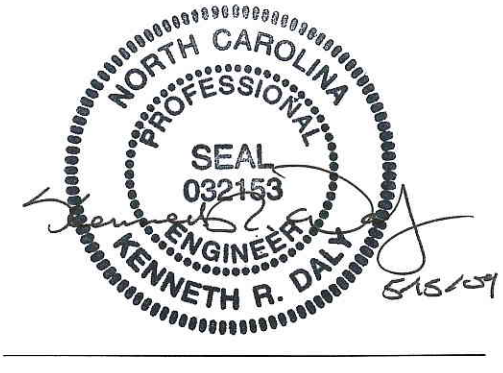
CONSTRUCTION CERTIFICATION STATEMENT
FOR
DUKE ENERGY – ALLEN STEAM STATION
RETIRED ASH BASIN (RAB) – ASH LANDFILL
CELL 1 CONSTRUCTION CERTIFICATION REPORT
SUBMITTAL 1 OF 2

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 Allen Steam Station Retired Ash Basin (RAB) Ash Landfill liner system construction was constructed in general accordance with the requirements of the approved Construction Quality Assurance (CQA) Plan.



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

APPENDIX I – EARTHWORKS

APPENDIX I – EARTHWORKS
Section 1 – Subgrade

Subgrade Laboratory Test Results
Historical Proctors
Subgrade Field Density Test Results
Subgrade Field Density Test Locations
Rough Subgrade As-Built Drawing
Final Subgrade As-Built Drawing

Subgrade Soil Laboratory Test Results

SUMMARY OF SUBGRADE LABORATORY TEST DATA

Sample No.[1]	Soil Description	USCS Classification	Natural Moisture Content (ASTM D2216)	% Finer No. 200 (ASTM D422)	Atterberg Limits (ASTM D4318)		Proctor Data (ASTM D698)	
					LL	PI	Max. Dry Density (pcf)	Opt. Moisture Content (%)
1	**Fly Ash** (Black Silt)	ML		88.4%	NP[2]	NP[2]	69.3	29.6%
2	**Fly Ash** (Black Gray Silt with Fine Sand)	ML	20.6%	79.8%	NP	NP	75.6	27.4%
3	**Fly Ash** (Black Gray Silty Fine to Medium Sand)	SM	43.2%	23.6%	NP	NP	60.4	47.1%
4	**Fly Ash** (Black Gray Fine to Medium Sandy Silt)	ML		62.2%	NP	NP	71.0	28.9%
5	**Fly Ash** (Black Gray Silt with Coarse to Fine Sand)	ML	25.3%	76.6%	NP	NP	72.8	26.3%
6	**Fly Ash** (Black Gray Silt with Fine Sand)	ML	24.6%	79.4%	NP	NP	72.7	29.5%
7	**Fly Ash** (Black Gray Silt with Fine Sand)	ML		75.3%	NP	NP	70.0	34.8%
8	**Fly Ash** (Black Gray Fine to Medium Sandy Silt)	ML		57.7%	NP	NP	69.0	34.0%
10	**Fly Ash** (Black Gray Fine Sandy Silt)	ML		50.1%	NP	NP	63.5	41.3%
11	**Fly Ash** (Black Gray Silt)	ML		88.6%	43	1	69.3	34.3%
12	**Fly Ash/Soil Mix** (Brown Gray Clayey Silt with Fine Sand)	ML		71.5%	40	1	72.1	32.0%
13	**Fly Ash** (Black Gray Silt)	ML		84.8%	NP	NP	73.1	30.9%
14	**Fly Ash** (Black Gray Silt)	ML		87.0%	NP	NP	72.9	28.2%
15	**Fly Ash** (Black Gray Silt with Medium to Fine Sand)	ML	10.9%	84.3%	NP	NP	72.1	31.1%
16	**Fly Ash** (Black Gray Medium to Fine Sandy Silt)	ML	8.0%	55.6%	NP	NP	71.5	28.4%
19	**Fly Ash** (Black Gray Silt with Fine Sand)	ML	34.1%	73.2%	NP	NP	69.9	32.5%
20	**Fly Ash** (Black Gray Silty Fine to Medium Sand)	SM	41.5%	45.4%	NP	NP	61.0	37.5%
22	**Fly Ash** (Black Gray Silt with Fine Sand)	ML	26.8%	76.8%	37	1	73.7	31.8%
23	**Fly Ash** (Black Gray Fine to Medium Sandy Silt)	ML	24.1%	68.0%	35	1	76.4	28.1%
24	**Fly Ash** (Black Gray Silty Fine to Medium Sand)	SM	24.7%	43.7%	NP	NP	70.3	32.3%
25	**Fly Ash** (Black Gray Silt with Fine Sand)	ML	28.5%	78.4%	37	NP	72.2	31.5%
26	**Fly Ash** (Black Gray Silt with Fine Sand)	ML	21.4%	70.9%	NP	NP	72.8	28.5%
27	**Fly Ash** (Black Gray Silt with Medium to Fine Sand)	ML	36.5%	83.3%	44	NP	73.5	32.5%
28	**Fly Ash** (Black Gray Silt with Medium to Fine Sand)	ML	24.1%	77.6%	NP	NP	74.2	31.0%
29	**Fly Ash** (Black Gray Silt with Medium to Fine Sand)	ML	29.1%	77.8%	37	NP	74.7	28.6%
30	**Fly Ash** (Black Gray Silt with Medium to Fine Sand)	ML	28.8%	78.5%	NP	NP	70.6	30.2%
Bulk 1[3]	**Fly Ash** (Gray Coarse to Fine Sandy Silt)	ML	20.3%	50.0%	NP	NP	85.4	21.0%
Bulk 2[3]	**Fly Ash** (Gray Silty Medium to Fine Sand)	SM	22.9%	31.5%	NP	NP	63.8	36.8%
Bulk 3[3]	**Fly Ash** (Gray Fine Sandy Silt)	ML	30.4%	84.5%	NP	NP	72.0	30.4%
S-1[3]	**Fly Ash**		37.2%	37.2%			65.3	37.8%

[1] All samples were bulk samples; 26 total laboratory test results for in-place subgrade during construction

[2] NP = non-plastic

[3] Historical samples that were not laboratory test results for in-place subgrade during construction; standard Proctor curves for these samples were used as reference curve initially during field density testing during subgrade construction

Liquid Limit, Plastic Limit, and Plastic Index

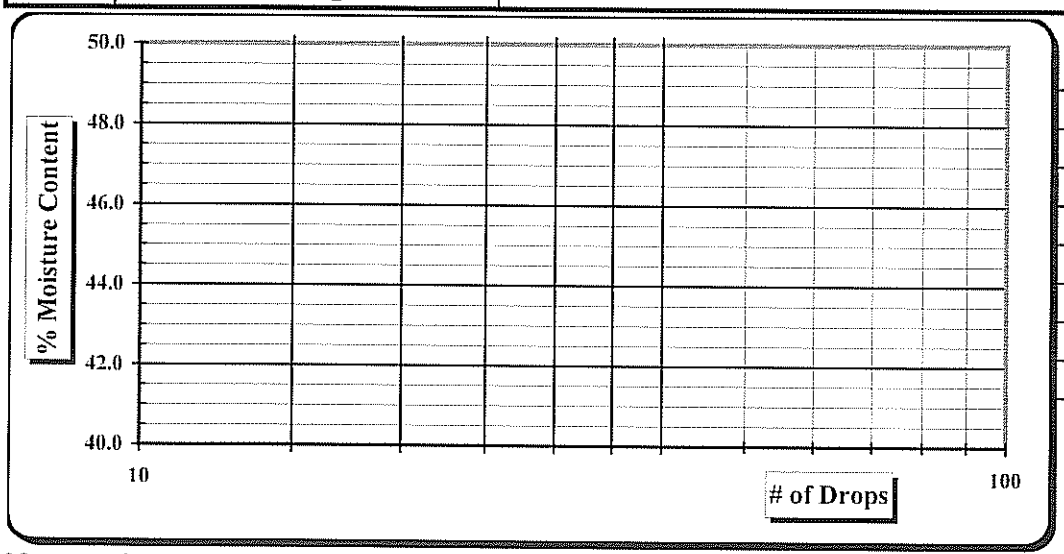
S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Report Date: 8/4/08
Test Date(s): 7/24-8/4/08

Boring #: Sample #: 1 Sample Date: 7/26/08
Location: Offset: Depth: Bulk
Sample Description: Black Silt (ML) Fly Ash

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Oven Temperature 60C. Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Karen Warner 117900 (Certification #)

Technical Responsibility: Ken Daly (Signature) Project Engineer (Position)

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Test Date(s): 7/24-30/08
Report Date: 7/30/08

Boring #: Sample #: 1 Sample Date: 7/14/08
Location: On Site Offset: Depth: Bulk
Sample Description: Black Silt (ML) Fly Ash

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.120**	
Hydrometer Jar #:							
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			327.85		Tare #	4	
Weight of Total Sample Air Dried:			327.85	A	Tare Wt.	14.01	
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.15	
Total Sample Oven Dried:			324.36	C	Dry Wt. + A	26.02	
Hydrometer Sample Oven Dried (**W**):			49.46	D	Water Wt. (B-C)	0.13	
% Passing #10:			99.3%	E	Dry Wt. (C-A)	12.01	
Correction Factor a (Table 1):			1.11		% Moisture (100 x D/E)	1.08%	

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"	0.0		100.0%
3/8"	0.0		100.0%
#4	1.3	Soil Mortar	99.6%
#10	2.4	**100.0%**	99.3%
#20	0.2	99.7%	99.0%
#40	0.4	99.2%	98.5%
#60	0.6	98.8%	98.1%
#100	1.3	97.4%	96.7%
#200	5.4	89.0%	88.4%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	11.2%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.4%	< 75 mm and > 4.75 mm	Silt & Clay:	88.4%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.3%	< 4.75 mm and > 2.00 mm	Silt:	85.4%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	0.8%	< 2.00 mm and > 0.425 mm	Clay:	3.0%	< 0.005 mm		
Fine Sand:	10.1%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	22.0	43.0	5.0		38.00	85.3%	84.7%	10.1	0.01617	0.05129
	2	22.0	27.5	5.0		22.50	50.5%	50.1%	12.6	0.01617	0.04059
	5	22.0	10.0	5.0		5.00	11.2%	11.1%	15.5	0.01617	0.02844
	15	22.0	8.5	5.0		3.50	7.9%	7.8%	15.7	0.01617	0.01655
	30	22.0	7.0	5.0		2.00	4.5%	4.5%	16.0	0.01617	0.01179
	60	22.0	6.5	5.0		1.50	3.4%	3.3%	16.0	0.01617	0.00836
	250	22.0	6.0	5.0		1.00	2.2%	2.2%	16.1	0.01617	0.00411
	1440	22.0	5.0	5.0		0.00	0.0%	0.0%	16.3	0.01617	0.00172

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Karen Warner 117900
Certification #

Technical Responsibility: Kenneth Daly
Signature

Project Engineer
Position

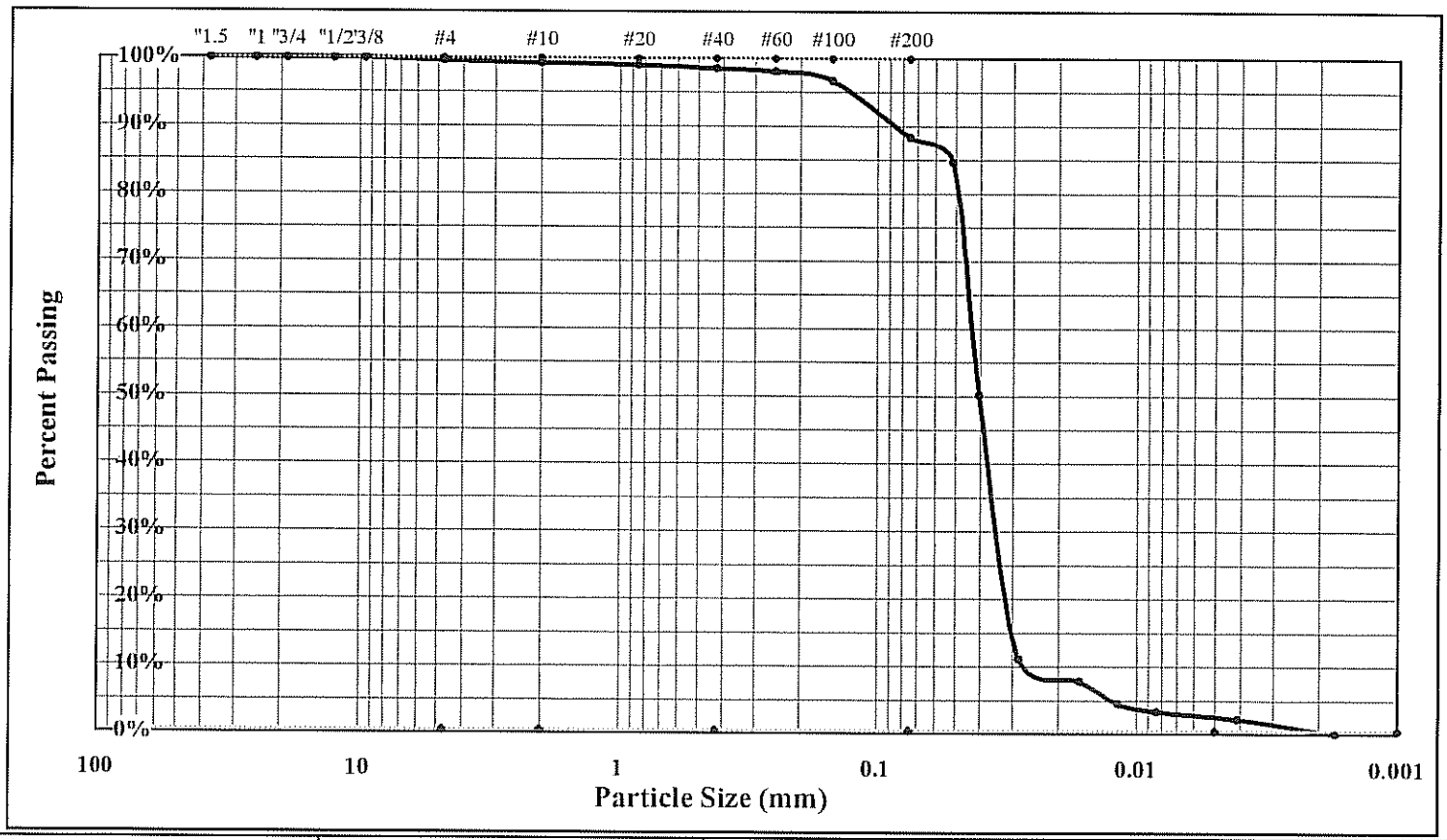
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	7/30/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	7/24-30/08
Client Name:			
Client Address:			

Boring #:		Sample #:	1	Sample Date:	7/14/08
Location:	On Site	Offset:		Depth:	Bulk
Sample Description:	Black Silt (ML) Fly Ash				



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	0	Gravel	0.4%	Silt	85.4%
Silt & Clay (% Passing #200)	88.4%	Sand	11.2%	Clay	3.0%
Apparent Relative Density (Assumed)	2.120	Moisture Content		Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Kenneth Daly _____ Project Engineer
Signature *Position*

Moisture - Density Relationship

S&ME

S&ME Project #:	**1356-06-825**	Test Date(s):	7/24-8/4/08
Project Name:	Allen Steam Station RAB Landfill	Report Date:	August 4, 2008
Client Name:			
Project Address:			
Boring #:	Sample #: 1	Sample Date:	July 14, 2008
Location:	Offset:	Depth:	Bulk
Sample Description:	Black Silt (ML) Fly Ash		

Liquid Limit: NP Specific Gravity: 2.120

Plastic Limit: NP Plastic Index: NP

Natural Moisture Content:

Moisture Content of the Oversize Fraction:

NOTES: Oven Temperature 60C

Sieve Size	% Passing
3/4"	100.0
1/2"	100.0
3/8"	100.0
#4	99.6

MDD: 69.3 **Opt. MC %:** 29.6

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:						
	Tare #:						
A. Tare Weight	A.	84.2	71.56	86.93	74.87	84.46	85.92
B. Wet Wt + Tare Wt	B.	681.46	603.9	711.79	723.76	630.2	751.02
C. Dry Wt. + Tare Wt.	C.	597.67	519.35	611.91	602.98	490.43	557.93
D. Water Weight	B-C	83.79	84.55	99.88	120.78	139.77	193.09
E. Dry Weight	C-A	513.47	447.79	524.98	528.11	405.97	472.01
F. Moisture Content	100*D/E	**16.3%**	**18.9%**	**19.0%**	**22.9%**	**34.4%**	**40.9%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5336	5360	5283	5432	5575	5560
H. Wt. of Mold	H.	4178	4178	4178	4178	4178	4178
I. Wt. of Soil (g. or lbs.)	G-H	1158.000	1182.000	1105.000	1254.000	1397.000	1382.000
J. Wt of Soil (Lbs.)	I/453.6 or I	2.553	2.606	2.436	2.765	3.080	3.047
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	76.6	78.1	73.1	82.9	92.4	91.4
M. Dry Density	L/(1+F)	**65.8**	**65.7**	**61.4**	**67.5**	**68.7**	**64.8**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity:	ASTM D 4318 ☒	AASHTO T 89 ☐		AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis:	ASTM C136 ☐	AASHTO T 27 ☐	ASTM D 422 ☒	AASHTO T 88 ☐
Specific Gravity of Soil:		ASTM D 854 ☒		AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction:		ASTM C 127 ☐		AASHTO T 85 ☐
Soil Classification:	ASTM D 2487 ☒	ASTM D 2488 ☐		AASHTO M 145 ☐

Technician Name: Karen Warner 117900 (Certification #)

Technical Responsibility: Kenneth Daly _____ (Signature) Project Engineer (Position)

Moisture - Density Report

S&ME

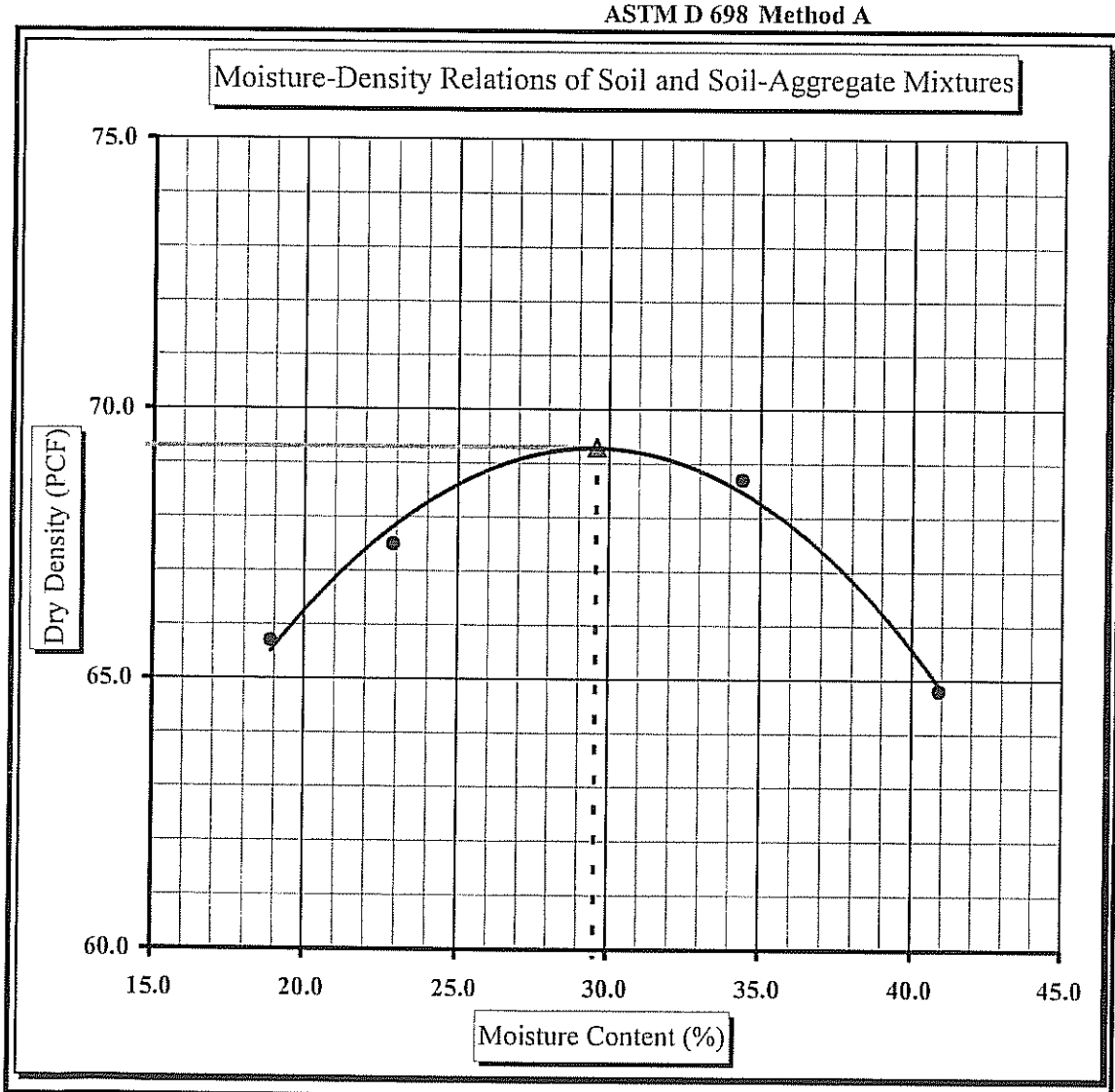
S&ME Project #: **1356-06-825**
Project Name: **Allen Steam Station RAB Landfill**
Client Name:
Project Address:

Report Date: August 4, 2008
Test Date(s): 7/24-8/4/08

Boring #: Sample #: 1 Sample Date: July 14, 2008
Location: Offset: Depth: Bulk
Sample Description: Black Silt (ML) Fly Ash

Maximum Dry Density 69.3 PCF. **Optimum Moisture Content 29.6 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: NP

Plastic Limit: NP

Plastic Index: NP

Specific Gravity: 2.120

% Passing

3/4"	100
1/2"	100
3/8"	100
#4	99.6

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Kenneth Daly _____ Project Engineer
Signature

Liquid Limit, Plastic Limit, and Plastic Index

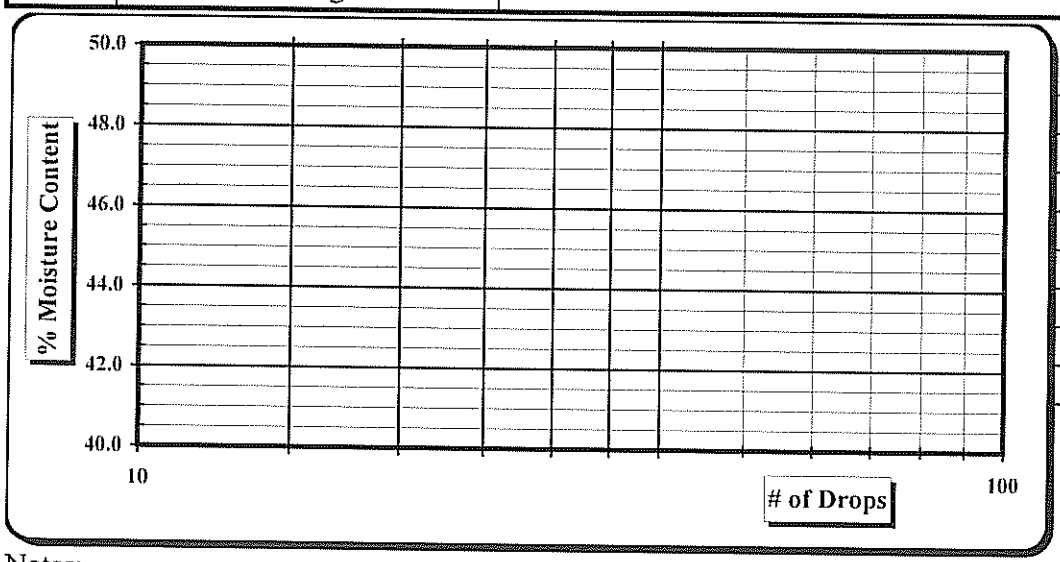
S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Report Date: 8/19/08
Test Date(s): 8/12/19/08

Boring #: Sample #: 2 Sample Date: 8/7/08
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Test Date(s): 8/12-18/08
Report Date: 8/18/08

Boring #: Sample #: 2 Sample Date: 8/7/08
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Pan #:	TYS	Beaker #:	RR		Apparent Relative Density		2.190		
Hydrometer Jar #:			8						
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			288.73		Tare #	33	G-13		
Weight of Total Sample Air Dried:			288.73	A	Tare Wt.	15.93	81.23		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.26	372.33		
Total Sample Oven Dried:			274.80	C	Dry Wt. + A	25.76	322.69		
Hydrometer Sample Oven Dried (W):			47.58	D	Water Wt. (B-C)	0.50	49.64		
% Passing #10:			99.7%	E	Dry Wt. (C-A)	9.83	241.46		
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	5.09%	20.6%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		RR	100.0%
1/2"			100.0%
3/8"	0.0		100.0%
#4	0.1	Soil Mortar	100.0%
#10	0.9	**100.0%**	99.7%
#20	0.8	98.4%	98.0%
#40	1.6	96.7%	96.4%
#60	2.6	94.5%	94.2%
#100	4.5	90.6%	90.3%
#200	9.5	80.1%	79.8%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	20.2%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	79.8%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.3%	< 4.75 mm and > 2.00 mm	Silt:	74.8%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	3.3%	< 2.00 mm and > 0.425 mm	Clay:	5.0%	< 0.005 mm		
Fine Sand:	16.6%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 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
Clock	T (Min.)	(0.5 °C)	Reading			R			L	K	
	2	21.5	36.0	4.5		31.50	72.2%	71.9%	11.1	0.01578	0.03722
	5	21.5	24.0	4.5		19.50	44.7%	44.5%	13.1	0.01578	0.02554
	15	21.5	13.0	4.5		8.50	19.5%	19.4%	14.9	0.01578	0.01573
	30	21.5	10.0	4.5		5.50	12.6%	12.6%	15.4	0.01578	0.01130
	60	22.0	8.0	4.0		4.00	9.2%	9.1%	15.6	0.01568	0.00801
	250	22.5	5.0	3.5		1.50	3.4%	3.4%	16.0	0.01560	0.00395
	1440	23.0	4.5	3.5		1.00	2.3%	2.3%	16.1	0.01551	0.00164
						#VALUE!	#VALUE!	2.3%	#VALUE!	#N/A	#N/A

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

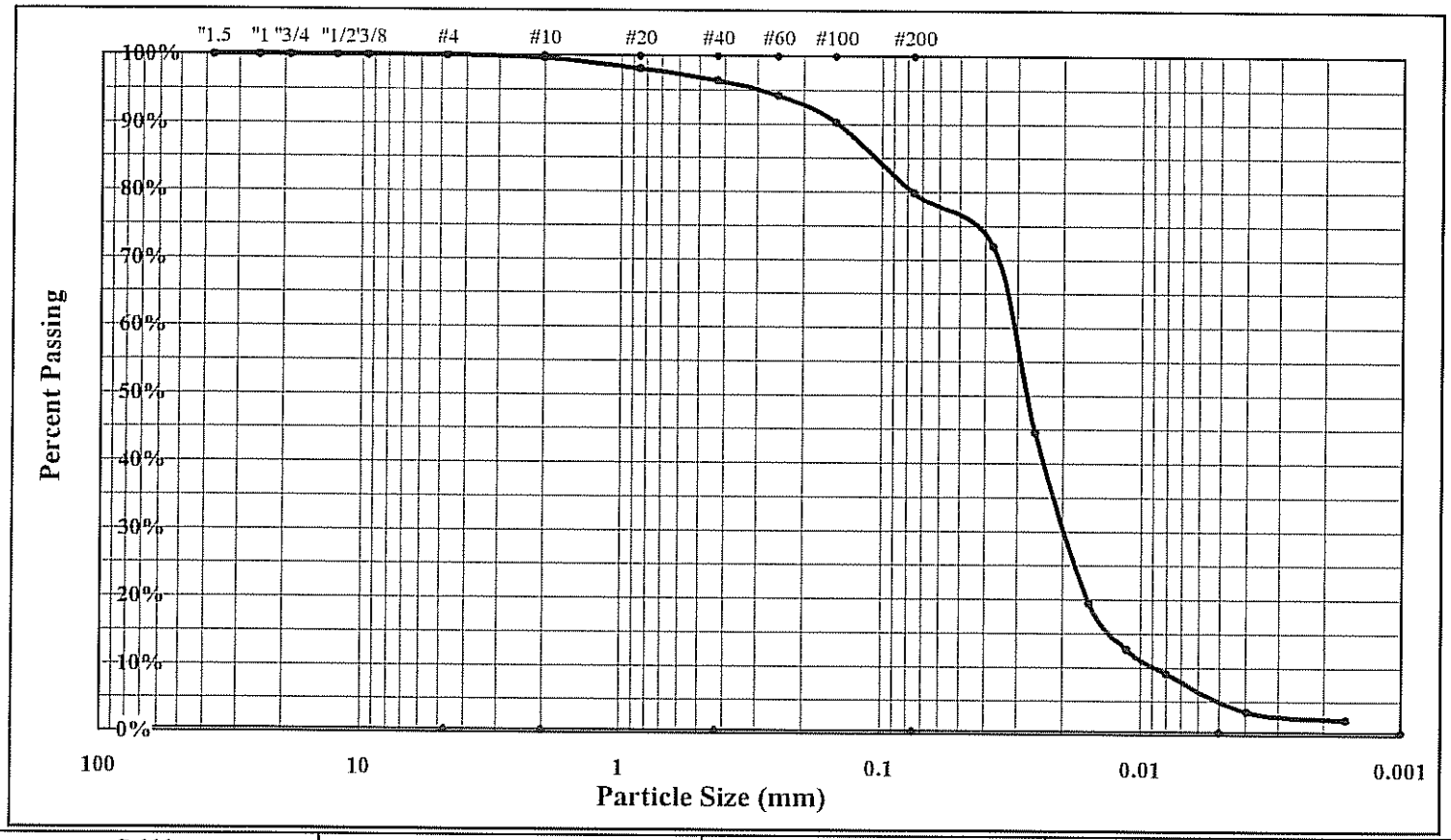
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	8/18/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	8/12-18/08
Client Name:			
Client Address:			

Boring #:		Sample #:	2	Sample Date:	8/7/08
Location:	fly ash for cell 1 subgrade	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]				



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	0	Gravel	0.0%	Silt	74.8%
Silt & Clay (% Passing #200)	79.8%	Sand	20.2%	Clay	5.0%
Apparent Relative Density	2.190	Moisture Content	20.6%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #: **1356-06-825** Test Date(s): 8/15-18/08
Project Name: Allen Steam Station RAB Ash Landfill Report Date: August 18, 2008
Client Name:
Client Address:
Boring #: Sample #: 2 Sample Date: August 7, 2008
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Liquid Limit: NP Specific Gravity: 2.190
Plastic Limit: NP Plastic Index: NP

Natural Moisture Content: 20.6%
Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: **75.6** **Opt. MC %:** **27.4**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	222	267	311	178	133	
	Tare #:	C	77	A-1	L-18	DJ	
A. Tare Weight	A.	84.4	71.6	86.5	87.3	107.8	
B. Wet Wt + Tare Wt	B.	460.3	583.1	581	575.6	535.2	
C. Dry Wt. + Tare Wt.	C.	379.4	466.4	458.1	478.1	456.9	
D. Water Weight	B-C	80.9	116.7	122.9	97.5	78.3	0
E. Dry Weight	C-A	295	394.8	371.6	390.8	349.1	0
F. Moisture Content	100*D/E	**27.4**	**29.6**	**33.1**	**24.9**	**22.4**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5633	5648	5631	5593	5542	
H. Wt. of Mold	H.	4176	4176	4176	4176	4176	4176
I. Wt. of Soil (g. or lbs.)	G-H	1457.000	1472.000	1455.000	1417.000	1366.000	-4176.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.212	3.245	3.208	3.124	3.011	-4176.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	96.3	97.3	96.2	93.7	90.3	-125238.2
M. Dry Density	L/(1+F)	**75.6**	**75.1**	**72.3**	**75.0**	**73.8**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Moisture - Density Report

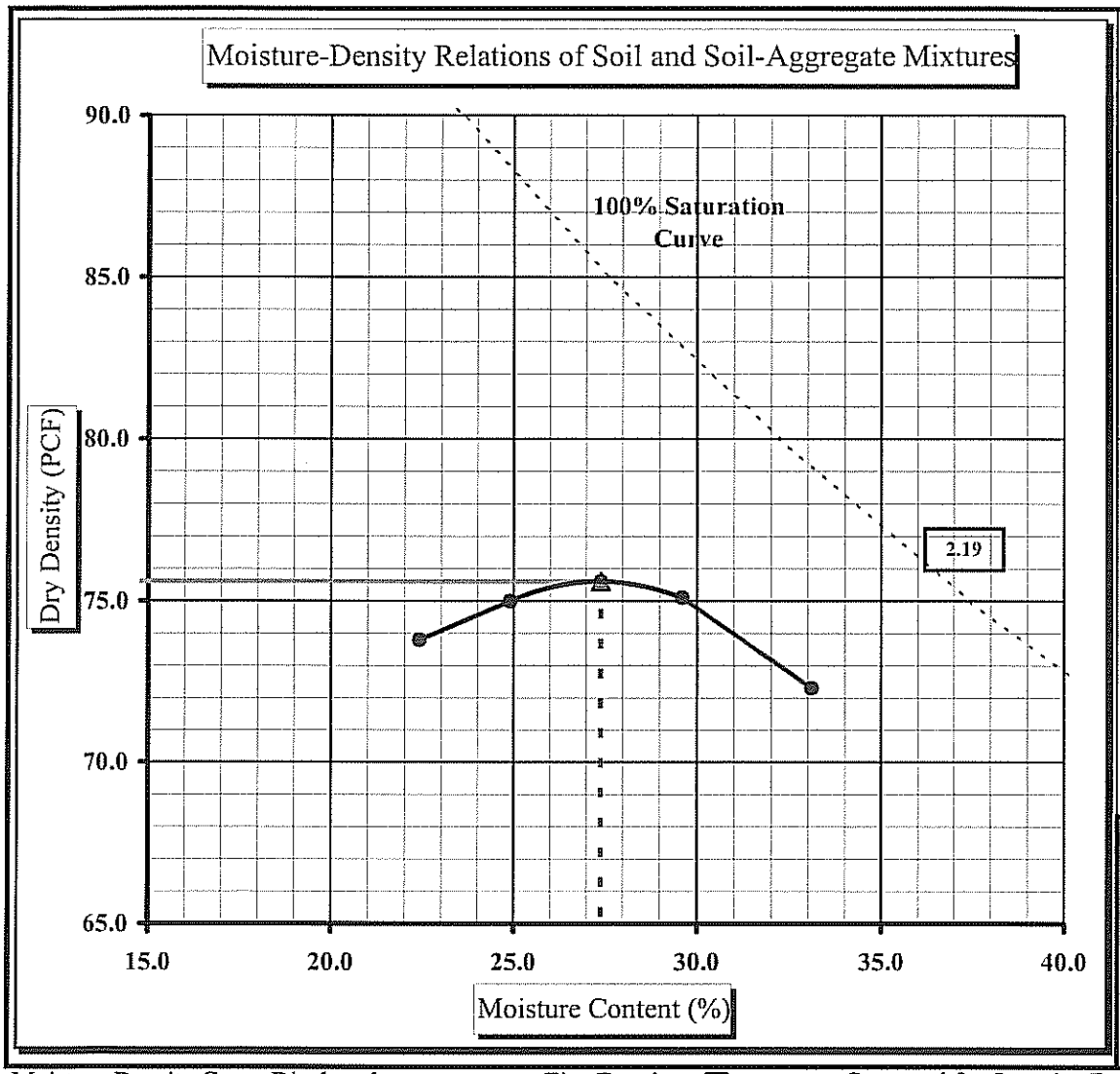
S&ME

S&ME Project #: **1356-06-825** Report Date: August 18, 2008
Project Name: **Allen Steam Station RAB Ash Landfill** Test Date(s): 8/15-18/08
Client Name:
Client Address:

Boring #: Sample #: 2 Sample Date: August 7, 2008
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Maximum Dry Density 75.6 PCF. **Optimum Moisture Content 27.4 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	20.6%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	2.190

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Soil Description is based on a visual classification.

Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

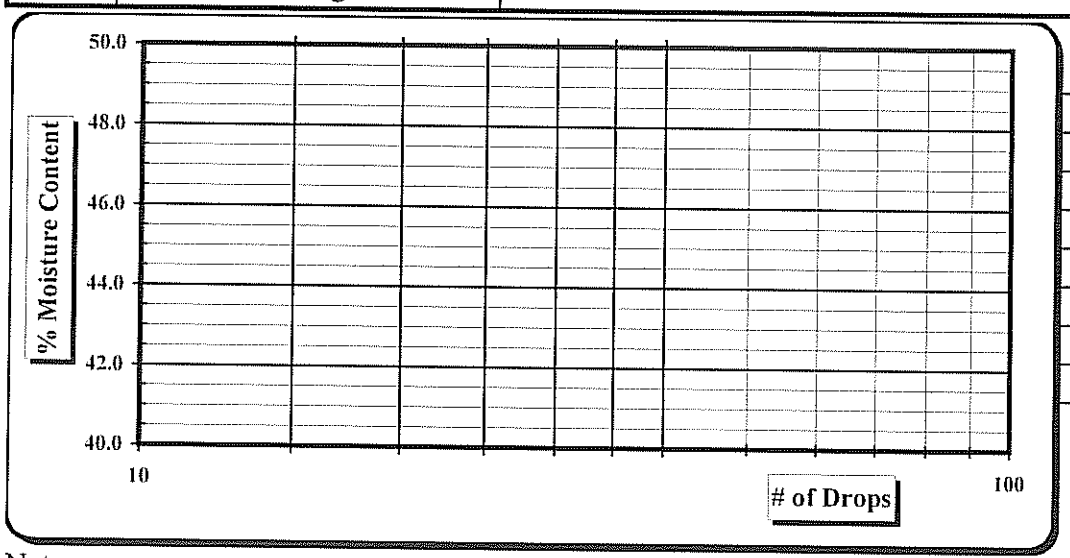
S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Report Date: 8/19/08
Test Date(s): 8/12/19/08

Boring #: Sample #: 3 Sample Date: 8/7/08
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	SM

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Test Date(s): 8/12-18/08
Report Date: 8/18/08

Boring #: Sample #: 3 Sample Date: 8/7/08
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]

Pan #:	L-10	Beaker #:	TY		Apparent Relative Density		2.090		
Hydrometer Jar #:			A						
Pan Tare Weight (grams):			0.00		Moisture Content	Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			336.80		Tare #	48	T-9		
Weight of Total Sample Air Dried:			336.80	A	Tare Wt.	13.98	81.68		
Weight of Air Dried Hydrometer Sample (g):			100.00	B	Wet Wt. + A	24.70	369.92		
Total Sample Oven Dried:			299.24	C	Dry Wt. + A	23.44	282.99		
Hydrometer Sample Oven Dried (W):			88.25	D	Water Wt. (B-C)	1.26	86.93		
% Passing #10:			94.2%	E	Dry Wt. (C-A)	9.46	201.31		
Correction Factor a (Table 1):			1.15		% Moisture (100 x D/E)	13.32%	43.2%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		FGD	100.0%
1/2"	0.0		100.0%
3/8"	0.8		99.7%
#4	5.9	Soil Mortar	98.0%
#10	17.2	**100.0%**	94.2%
#20	15.9	82.0%	77.2%
#40	28.8	67.3%	63.4%
#60	40.4	54.2%	51.1%
#100	52.0	41.1%	38.8%
#200	66.2	25.0%	23.6%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	74.5%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	2.0%	< 75 mm and > 4.75 mm	Silt & Clay:	23.6%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	3.8%	< 4.75 mm and > 2.00 mm	Silt:	21.6%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	30.8%	< 2.00 mm and > 0.425 mm	Clay:	2.0%	< 0.005 mm		
Fine Sand:	39.9%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	2	21.5	19.0	4.5		14.50	18.9%	17.8%	13.9	0.01649	0.04349
	5	21.5	12.0	4.5		7.50	9.8%	9.2%	15.1	0.01649	0.02862
	15	21.5	8.0	4.5		3.50	4.6%	4.3%	15.7	0.01649	0.01688
	30	21.5	6.5	4.5		2.00	2.6%	2.5%	16.0	0.01649	0.01203
	60	22.0	6.0	4.0		2.00	2.6%	2.5%	16.0	0.01639	0.00845
	250	22.5	5.0	3.5		1.50	2.0%	1.8%	16.0	0.01630	0.00413
	1440	23.0	4.0	3.5		0.50	0.7%	0.6%	16.2	0.01620	0.00172
						#VALUE!	#VALUE!	0.6%	#VALUE!	#N/A	#N/A

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

Signature *Position*

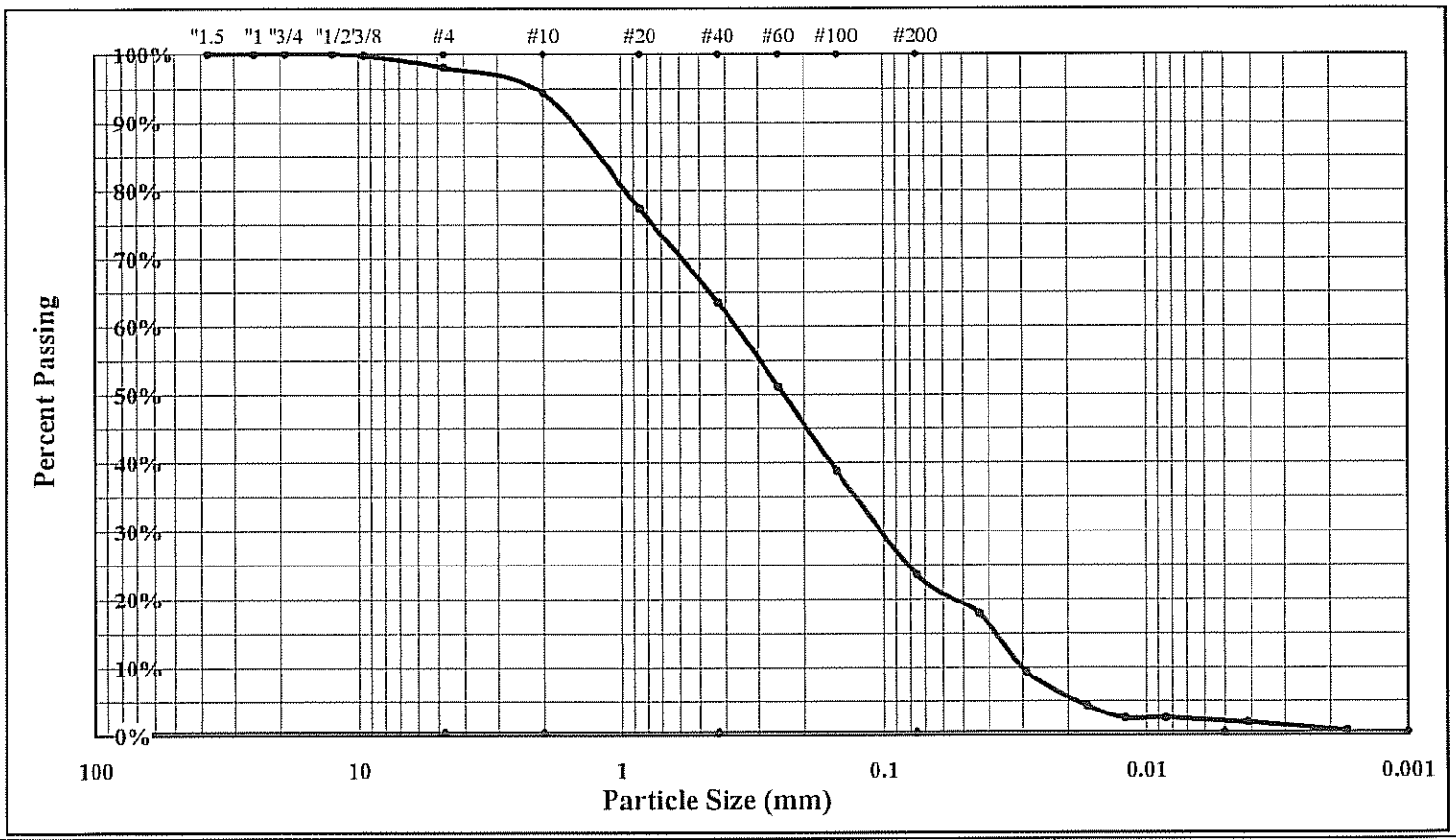
Particle Size Analysis of Soils

ASTM D 422

S&ME Project #: **1356-06-825**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name:
Client Address:

Report Date: 8/18/08
Test Date(s): 8/12-18/08

Boring #:	Sample #: 3	Sample Date: 8/7/08	
Location: fly ash for cell 1 subgrade	Offset:	Depth:	
Sample Description: Fly Ash [Black Gray Silty Fine to Medium 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	0	Gravel	2.0%	Silt	21.6%
Silt & Clay (% Passing #200)	23.6%	Sand	74.5%	Clay	2.0%
Apparent Relative Density	2.090	Moisture Content	43.2%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #: **1356-06-825** Test Date(s): 8/15-18/08
Project Name: Allen Steam Station RAB Ash Landfill Report Date: August 18, 2008
Client Name:
Client Address:
Boring #: Sample #: 3 Sample Date: August 7, 2008
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]

Liquid Limit: NP Specific Gravity: 2.090
Plastic Limit: NP Plastic Index: NP

Natural Moisture Content: 43.2%
Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	98.0

MDD: **60.4** **Opt. MC %:** **47.1**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	222	178	267	133	311	
	Tare #:	94	62	82	AN	L-42	
A. Tare Weight	A.	72	72.7	74.6	84.3	86	
B. Wet Wt + Tare Wt	B.	383.7	383	391.4	389.5	388.8	
C. Dry Wt. + Tare Wt.	C.	283.5	287.5	285.9	299.2	283.6	
D. Water Weight	B-C	100.2	95.5	105.5	90.3	105.2	0
E. Dry Weight	C-A	211.5	214.8	211.3	214.9	197.6	0
F. Moisture Content	100*D/E	**47.4**	**44.5**	**49.9**	**42.0**	**53.2**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5520	5476	5520	5440	5532	
H. Wt. of Mold	H.	4176	4176	4176	4176	4176	4176
I. Wt. of Soil (g. or lbs.)	G-H	1344.000	1300.000	1344.000	1264.000	1356.000	-4176.000
J. Wt of Soil (Lbs.)	I/453.6 or I	2.963	2.866	2.963	2.787	2.989	-4176.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	88.9	86.0	88.9	83.6	89.7	-125238.2
M. Dry Density	L/(1+F)	**60.3**	**59.5**	**59.3**	**58.8**	**58.5**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Moisture - Density Report

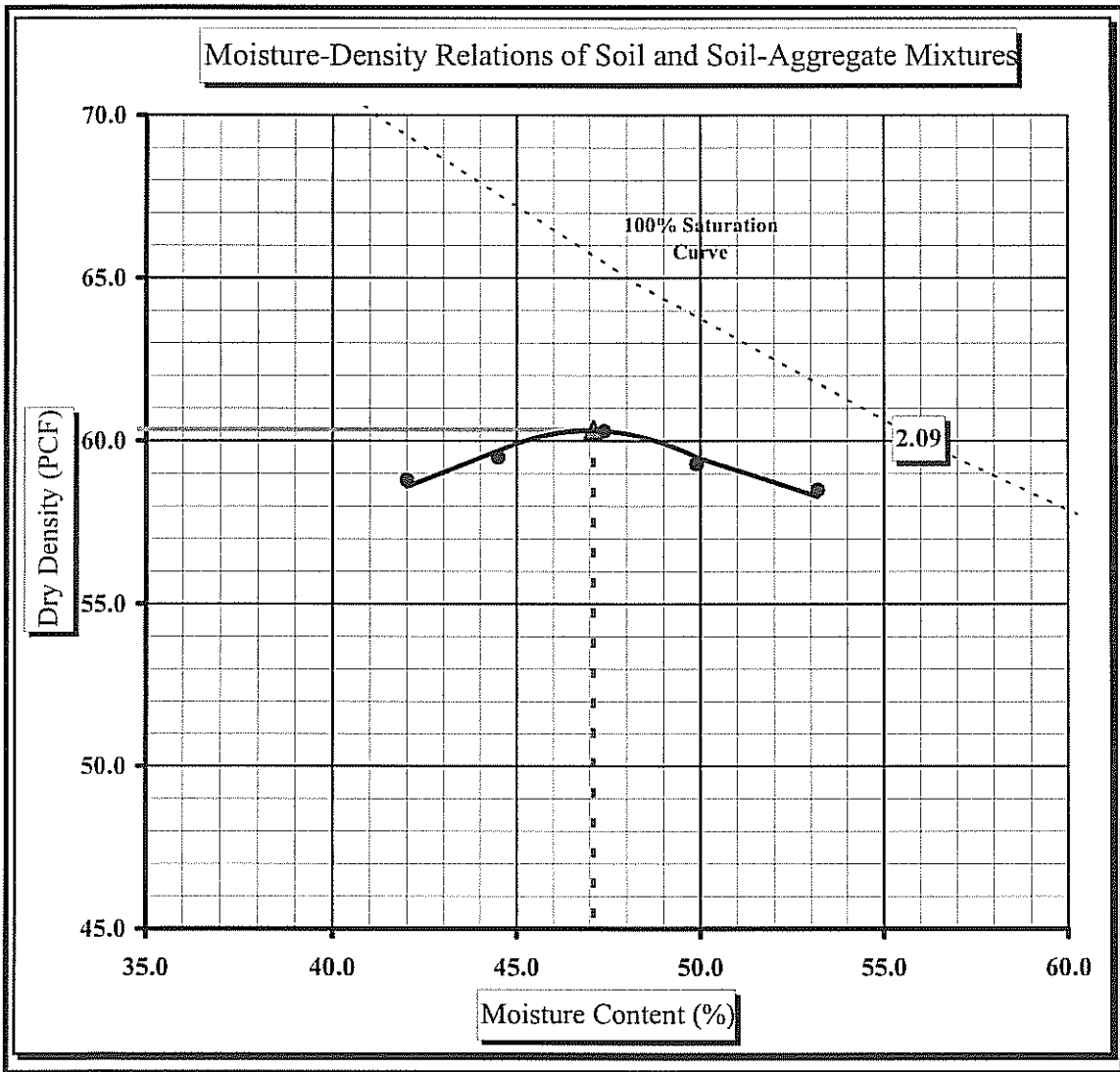
S&ME

S&ME Project #: **1356-06-825** Report Date: August 18, 2008
Project Name: **Allen Steam Station RAB Ash Landfill** Test Date(s): 8/15-18/08
Client Name:
Client Address:

Boring #: Sample #: 3 Sample Date: August 7, 2008
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]

Maximum Dry Density **60.4** **PCF.** **Optimum Moisture Content** **47.1** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	43.2%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	2.090

% Passing

3/4"	
1/2"	
3/8"	
#4	98

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Soil Description is based on a visual classification.

Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:
Boring #:

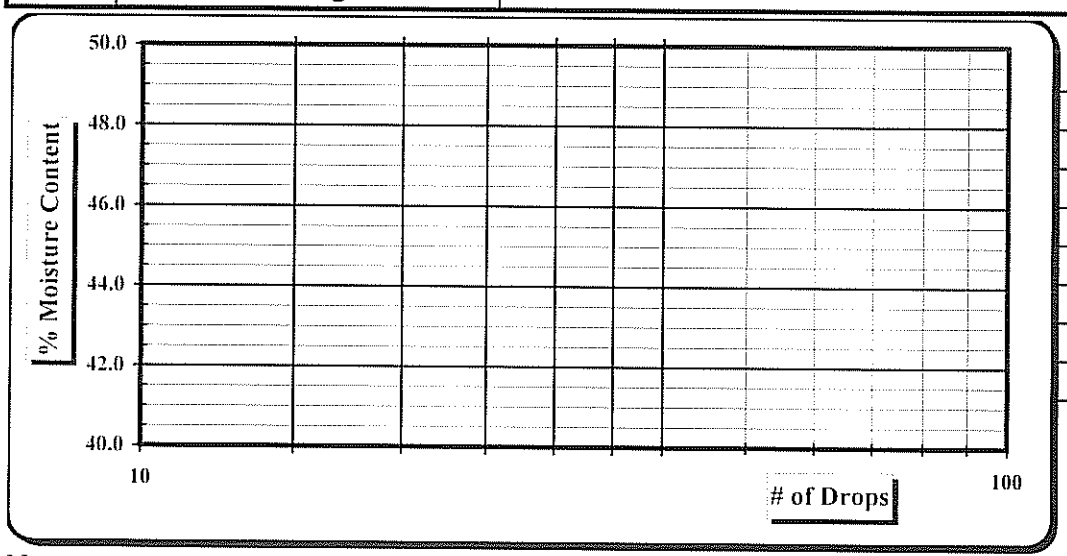
Report Date: 8/26/08
Test Date(s): 8/19-26/08

Sample #: 4 (Comp. 1 & 3)
Sample Date: 8/7/08

Location: fly ash for cell 1 subgrade
Offset:
Depth:

Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen — 117926 (Certification #)

Technical Responsibility: Ken Daly — Signature — Position

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Alllen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Test Date(s): 8/19-27/08
Report Date: 8/27/08

Boring #: Sample #: 4 (Comp. 1 & 3) Sample Date: 8/7/08
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

Pan #:	TYS	Beaker #:	RR	**Apparent Relative Density**		**2.170**	
Hydrometer Jar #:			8				
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			199.53	Tare #	BB		
Weight of Total Sample Air Dried:			199.53	A Tare Wt.	16.14		
Weight of Air Dried Hydrometer Sample (g):			50.00	B Wet Wt. + A	26.52		
Total Sample Oven Dried:			199.53	C Dry Wt. + A	26.52		
Hydrometer Sample Oven Dried (W):			50.00	D Water Wt. (B-C)	0.00		
% Passing #10:			98.6%	E Dry Wt. (C-A)	10.38		
Correction Factor a (Table 1):			1.10	% Moisture (100 x D/E)	0.00%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		6	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	2.8	**100.0%**	98.6%
#20	4.4	91.2%	89.9%
#40	7.3	85.4%	84.2%
#60	9.9	80.1%	79.0%
#100	12.9	74.2%	73.2%
#200	18.4	63.1%	62.2%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	37.8%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	62.2%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	1.4%	< 4.75 mm and > 2.00 mm	Silt:	61.2%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	14.4%	< 2.00 mm and > 0.425 mm	Clay:	1.0%	< 0.005 mm		
Fine Sand:	22.0%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	21.0	33.5	5.5		28.00	61.6%	60.7%	11.7	0.01601	0.05476
	2	21.0	27.0	5.5		21.50	47.3%	46.6%	12.8	0.01601	0.04045
	5	21.0	11.5	5.5		6.00	13.2%	13.0%	15.3	0.01601	0.02801
	15	21.0	8.0	5.5		2.50	5.5%	5.4%	15.9	0.01601	0.01647
	30	21.0	7.5	5.5		2.00	4.4%	4.3%	16.0	0.01601	0.01168
	60	21.0	6.5	5.5		1.00	2.2%	2.2%	16.1	0.01601	0.00830
	250	21.0	5.5	5.5		0.00	0.0%	0.0%	16.3	0.01601	0.00409
	1440	21.0	5.5	5.5		0.00	0.0%	0.0%	16.3	0.01601	0.00170

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

Signature *Position*

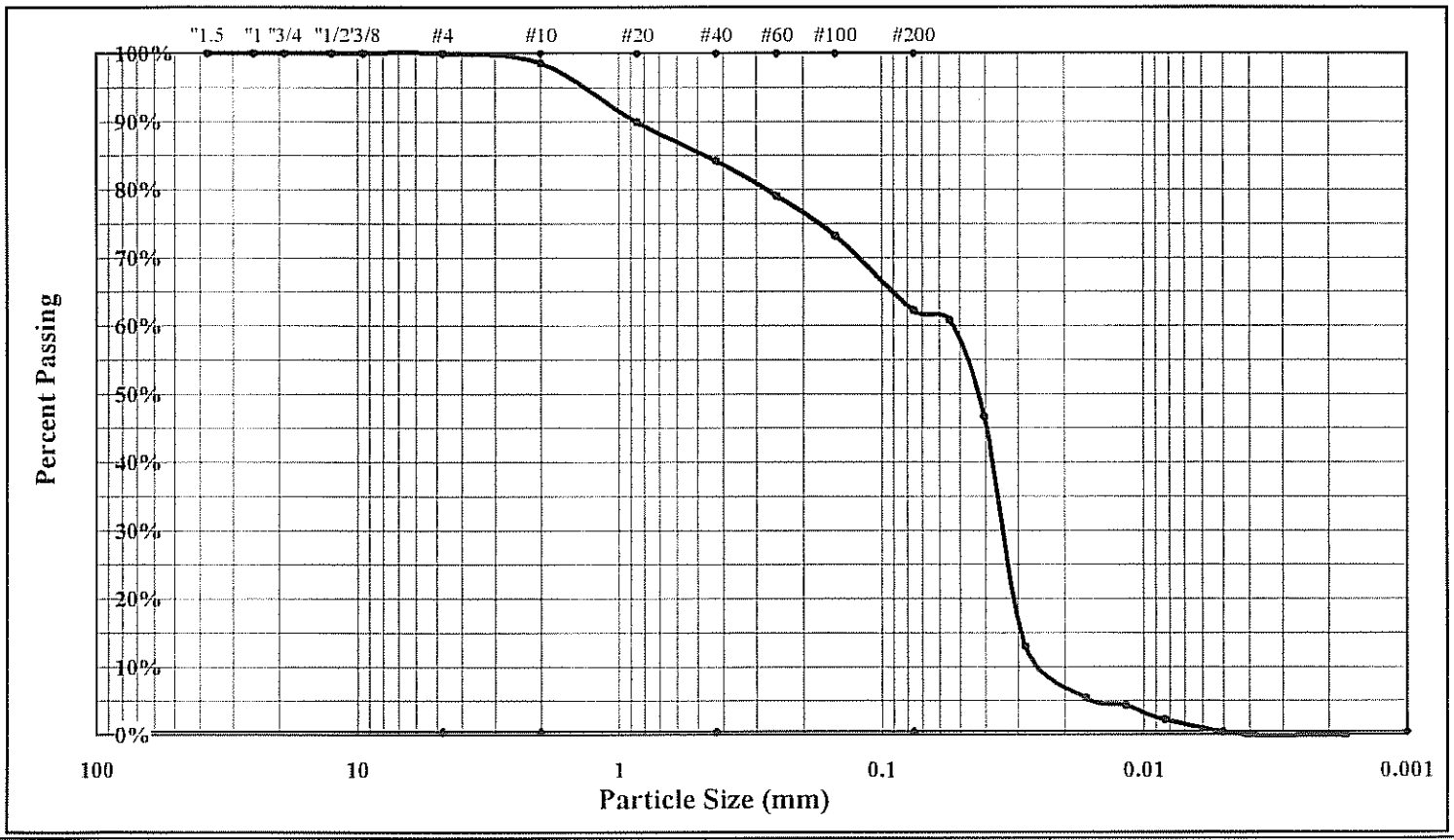
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	8/27/08
Project Name:	**Alllen Steam Station RAB Ash Landfill**	Test Date(s):	8/19-27/08
Client Name:			
Client Address:			

Boring #:		Sample #:	4 (Comp. 1 & 3)	Sample Date:	8/7/08
Location:	fly ash for cell 1 subgrade	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray Fine to Medium 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	0	Gravel	0.0%	Silt	61.2%
Silt & Clay (% Passing #200)	62.2%	Sand	37.8%	Clay	1.0%
Apparent Relative Density	2.170	Moisture Content		Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #: **1356-06-825** Test Date(s): 8/19-22/08
Project Name: Allen Steam Station RAB Ash Landfill Report Date: August 22, 2008
Client Name:
Client Address:
Boring #: Sample #: 4 Sample Date: August 7, 2008
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

Liquid Limit: NP Specific Gravity: 2.170
Plastic Limit: NP Plastic Index: NP

Natural Moisture Content:
Moisture Content of the Oversize Fraction:

NOTES: Composite of Samples 1 and 3

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: **71.0** **Opt. MC %:** **28.9**

Water Content Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	311	356	267	222	400	
	Tare #:	995	L-14	73	JR	MDJ	
A. Tare Weight	A.	72.4	86.8	74.2	109.9	85.6	
B. Wet Wt + Tare Wt	B.	380.1	533.2	521.2	530.1	664.6	
C. Dry Wt. + Tare Wt.	C.	310.7	427.8	427.2	449.3	524.8	
D. Water Weight	B-C	69.4	105.4	94	80.8	139.8	0
E. Dry Weight	C-A	238.3	341	353	339.4	439.2	0
F. Moisture Content	100*D/E	**29.1**	**30.9**	**26.6**	**23.8**	**31.8**	**#DIV/0!**

Compaction Data The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5562	5579	5526	5485	5566	
H. Wt. of Mold	H.	4176	4176	4176	4176	4176	4176
I. Wt. of Soil (g. or lbs.)	G-H	1386.000	1403.000	1350.000	1309.000	1390.000	-4176.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.056	3.093	2.976	2.886	3.064	-4176.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	91.6	92.8	89.3	86.5	91.9	-125238.2
M. Dry Density	L/(1+F)	**71.0**	**70.9**	**70.5**	**69.9**	**69.7**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

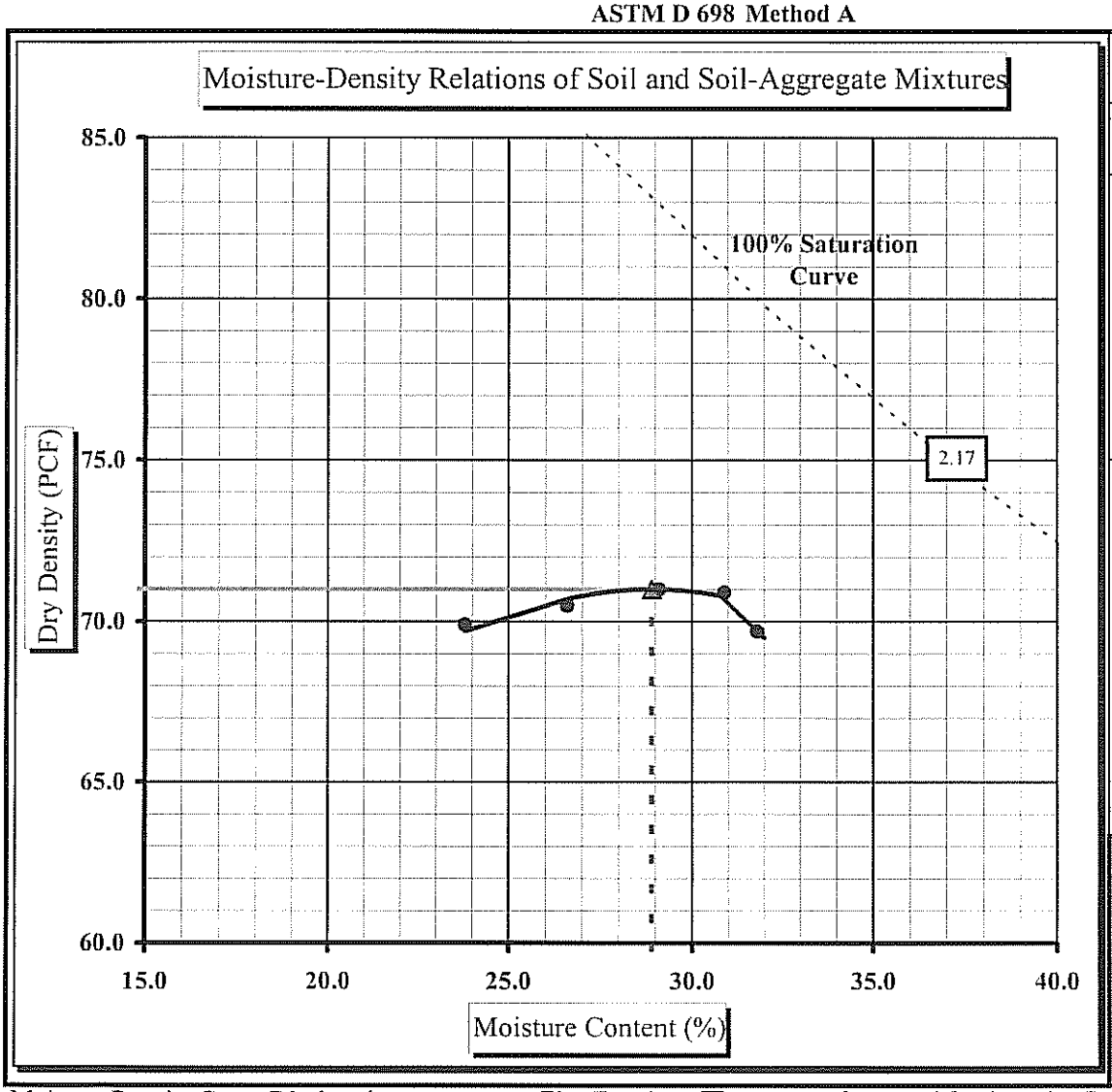
Moisture - Density Report

S&ME Project #: **1356-06-825** Report Date: August 22, 2008
Project Name: **Allen Steam Station RAB Ash Landfill** Test Date(s): 8/19-22/08
Client Name:
Client Address:

Boring #: Sample #: 4 Sample Date: August 7, 2008
Location: fly ash for cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

Maximum Dry Density 71.0 PCF. **Optimum Moisture Content 28.9 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: NP

Plastic Limit: NP

Plastic Index: NP

Specific Gravity: 2.170

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

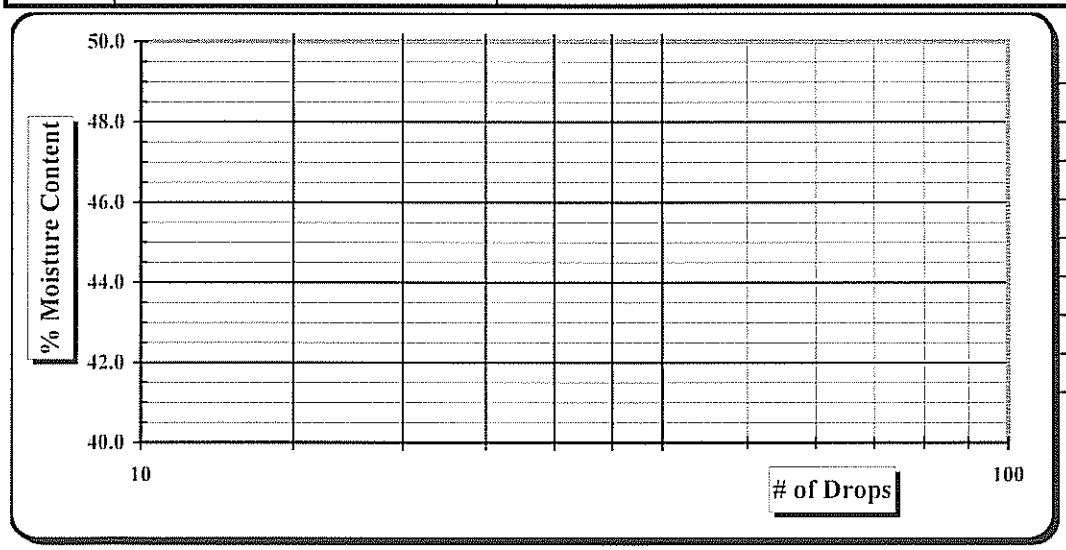
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/1/08
Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 10/2-11/1/08
Client Name:
Client Address:
Boring #: Sample #: S-5 Sample Date: 9/30/08
Location: Fly Ash for Cell 1 SG Offset: Depth:
Sample Description: Black Gray Silt w/Coarse to Fine Sand (ML) Fly Ash

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Karen Warner 117900
Certification #

Technical Responsibility: Ken Daly _____ Project Engineer
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Test Date(s): 10/2-10/08
Report Date: 10/12/08

Boring #: Sample #: S-5 Sample Date: 9/30/08
Location: Fly Ash for Cell 1 SG Offset: Depth:
Sample Description: Black Gray Silt w/Coarse to Fine Sand (ML) Fly Ash

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.200**			
Hydrometer Jar #:									
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural			
Total Sample Air Dried Wt. + tare wt. (grams):			310.00		Tare #	10	G-5		
Weight of Total Sample Air Dried:			310.00	A	Tare Wt.	13.98	81.73		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	24.21	386.32		
Total Sample Oven Dried:			309.41	C	Dry Wt. + A	24.19	324.80		
Hydrometer Sample Oven Dried (W):			49.90	D	Water Wt. (B-C)	0.02	61.52		
% Passing #10:			97.3%	E	Dry Wt. (C-A)	10.21	243.07		
Correction Factor a (Table 1):			1.10		% Moisture (100 x D/E)	0.20%	25.3%		

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		100.0%
#4	0.2	Soil Mortar	100.0%
#10	8.4	**100.0%**	97.3%
#20	0.0	100.0%	97.2%
#40	0.3	99.3%	96.6%
#60	1.2	97.6%	94.9%
#100	3.5	93.0%	90.5%
#200	10.6	78.8%	76.6%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	23.3%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	76.6%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	2.7%	< 4.75 mm and > 2.00 mm	Silt:	73.6%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	0.6%	< 2.00 mm and > 0.425 mm	Clay:	3.0%	< 0.005 mm		
Fine Sand:	20.0%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	21.0	39.0	5.0		34.00	74.9%	72.9%	10.7	0.01581	0.05175
	2	21.0	34.0	5.0		29.00	63.9%	62.2%	11.5	0.01581	0.03797
	5	21.0	17.0	5.0		12.00	26.5%	25.7%	14.3	0.01581	0.02676
	15	21.0	10.0	5.0		5.00	11.0%	10.7%	15.5	0.01581	0.01606
	30	21.0	9.5	5.0		4.50	9.9%	9.7%	15.6	0.01581	0.01138
	60	21.0	9.0	5.0		4.00	8.8%	8.6%	15.6	0.01581	0.00807
	250	21.0	5.5	5.0		0.50	1.1%	1.1%	16.2	0.01581	0.00403
	1440	21.0	5.5	5.0		0.50	1.1%	1.1%	16.2	0.01581	0.00168

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Karen Warner 117900
Certification #

Technical Responsibility: Ken Daly _____ *Project Engineer*
Signature *Position*

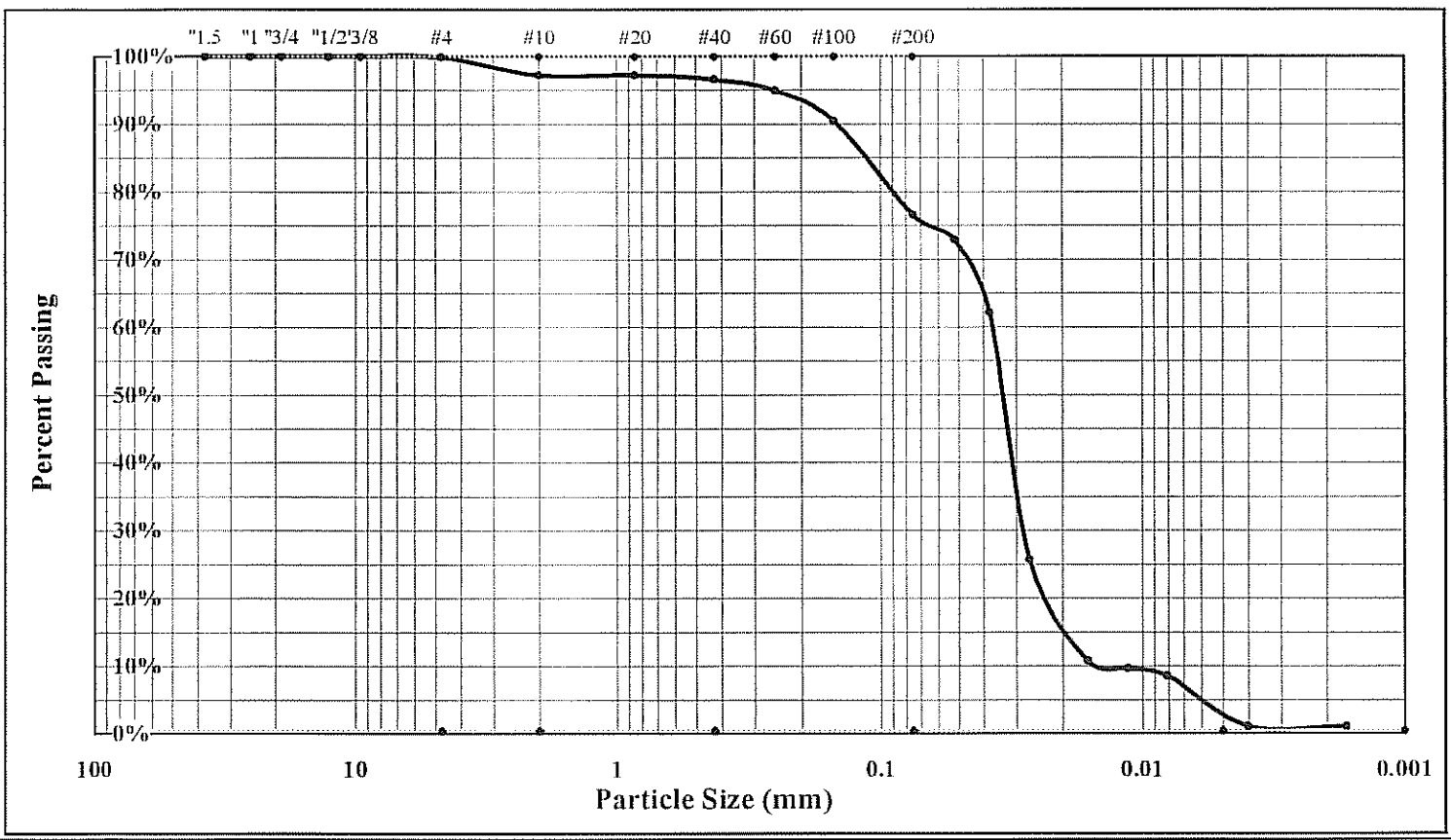
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	10/12/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	10/2-10/08
Client Name:			
Client Address:			

Boring #:		Sample #:	S-5	Sample Date:	9/30/08
Location:	Fly Ash for Cell 1 SG	Offset:		Depth:	
Sample Description:	Black Gray Silt w/Coarse to Fine Sand (ML) Fly Ash				



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	0	Gravel	0.0%	Silt	73.6%
Silt & Clay (% Passing #200)	76.6%	Sand	23.3%	Clay	3.0%
Apparent Relative Density (Assumed)	2.200	Moisture Content	25.3%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Oven Temperature Set at 60C

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature Position

Moisture - Density Relationship

S&ME

S&ME Project #: **1356-06-825** Test Date(s): 10/2-11/1/08

Project Name: Allen Steam Station RAB Ash Landfill Report Date: November 1, 2008

Client Name:

Project Address:

Boring #: Sample #: S-5 Sample Date: September 30, 2008

Location: Fly Ash for Cell 1 Subgrade Offset: Depth:

Sample Description: Black Gray Silt /Coarsed to Fine Sand (ML) Fly Ash

Liquid Limit: NP Specific Gravity:

Plastic Limit: NP Plastic Index: NP

Natural Moisture Content: 25.3%

Moisture Content of the Oversize Fraction:

NOTES: Oven Temperature Set 60C

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	100.0
#4	100.0

MDD: 72.8 **Opt. MC %:** 26.3

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

Sample #:							
Water Added:							
Tare #:							
A. Tare Weight	A.		162.99	154.21	156.51	155.67	151.72
B. Wet Wt + Tare Wt	B.		772.03	838.1	762.16	906.67	884.21
C. Dry Wt. + Tare Wt.	C.		680.27	714.66	644.25	704.18	721.21
D. Water Weight	B-C	0	91.76	123.44	117.91	202.49	163
E. Dry Weight	C-A	0	517.28	560.45	487.74	548.51	569.49
F. Moisture Content	100*D/E	**#DIV/0!**	**17.7%**	**22.0%**	**24.2%**	**36.9%**	**28.6%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.		5419	5505	5537	5527	5585
H. Wt. of Mold	H.		4174	4174	4174	4174	4174
I. Wt. of Soil (g. or lbs.)	G-H	0.000	1245.000	1331.000	1363.000	1353.000	1411.000
J. Wt of Soil (Lbs.)	I/453.6 or I	0.000	2.745	2.934	3.005	2.983	3.111
K. Mold Volume Factor	K.		29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	0.0	82.3	88.0	90.1	89.5	93.3
M. Dry Density	L/(1+F)	**#DIV/0!**	**69.9**	**72.1**	**72.6**	**65.3**	**72.5**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☐ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: Ken Daly *Signature* Project Engineer *Position*

Moisture - Density Report

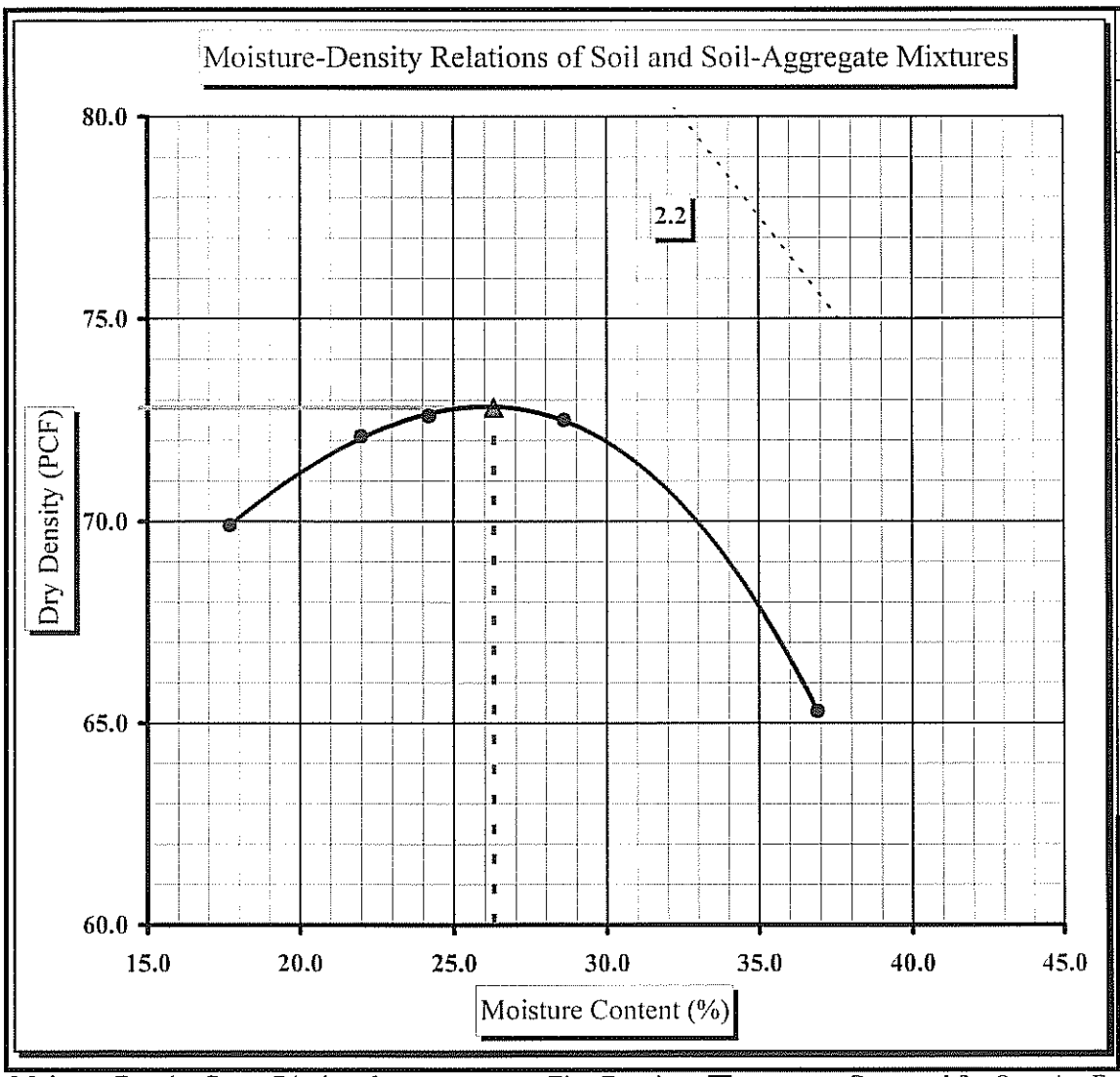
S&ME

S&ME Project #: **1356-06-825** Report Date: November 1, 2008
Project Name: **Allen Steam Station RAB Ash Landfill** Test Date(s): 10/2-11/1/08
Client Name:
Project Address:

Boring #: Sample #: S-5 Sample Date: September 30, 2008
Location: Fly Ash for Cell 1 Subgrade Offset: Depth:
Sample Description: Black Gray Silt /Coarsed to Fine Sand (ML) Fly Ash

Maximum Dry Density 72.8 PCF. **Optimum Moisture Content 26.3 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	25.3%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	100
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

S&ME

Project #: 1356-06-825 Report Date: 10/15/08

Project Name: Allen Steam Station Retired Ash Basin Test Date(s): 10/10-15/08

Client Name:

Client Address:

Sample by: JM Sample Dates: 10/2/08

Sampling Method:

Boring #	Sample #	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Wt.	Percent Moisture
		ft. or m.		grams	grams	grams	grams	%
NA	S-6	Bulk	G-15	81.40	378.42	319.70	58.72	**24.6%**

Notes: Oven Temperature Set At 60 C.

References: ASTM D2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician Name: Karen Warner 117900
Certification #

Technical Responsibility: Ken Daly _____ Project Engineer
Signature *Position*

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 10/19/08

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 10/17-19/08

Client Name:

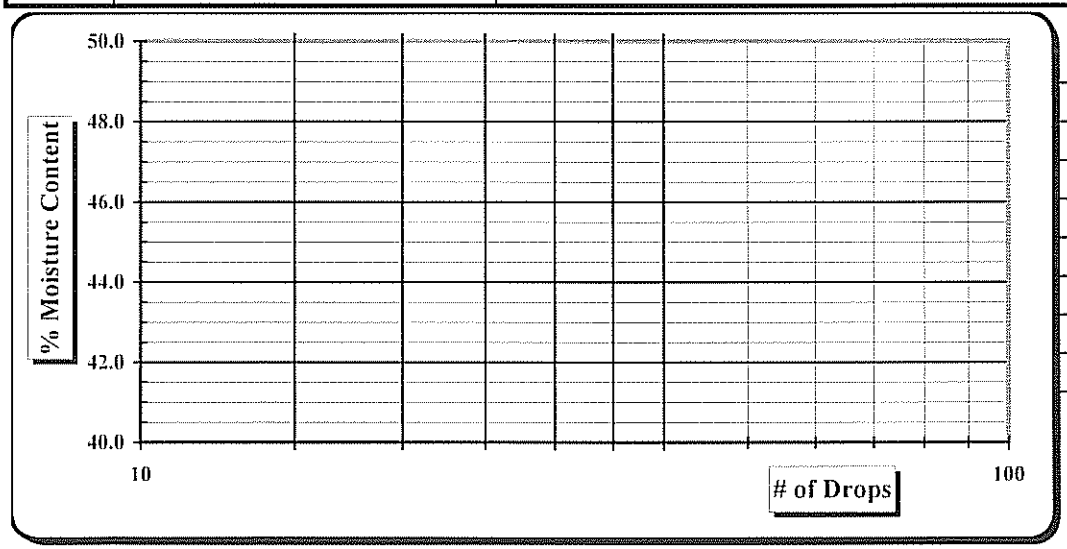
Client Address:

Boring #: Sample #: S-6 Sample Date: 10/2/08

Location: Fly Ash for Cell 1 SG Offset: Depth:

Sample Description: Black Gray Silt w/ Fine Sand (ML) Fly Ash

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Karen Warner 117900 (Certification #)

Technical Responsibility: Ken Daly (Signature) Project Engineer (Position)

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Test Date(s): 10/10-17/08
Report Date: 10/25/08

Boring #: Sample #: S-6 Sample Date: 10/2/08
Location: Fly Ash for Cell 1 SG Offset: Depth:
Sample Description: Black Gray Silt w/Fine Sand (ML) Fly Ash

Pan #:		Beaker #:	
Hydrometer Jar #:			
Pan Tare Weight (grams):			
Total Sample Air Dried Wt. + tare wt. (grams):	295.66		
Weight of Total Sample Air Dried:	295.66		
Weight of Air Dried Hydrometer Sample (g):	50.00		
Total Sample Oven Dried:	294.44		
Hydrometer Sample Oven Dried (W):	49.79		
% Passing #10:	99.3%		
Correction Factor a (Table 1):	1.10		

Apparent Relative Density (Assumed) 2.200

	Moisture Content	Hygroscopic	Natural
	Tare #	11	G-15
A	Tare Wt.	13.84	81.40
B	Wet Wt. + A	25.85	378.42
C	Dry Wt. + A	25.80	319.70
D	Water Wt. (B-C)	0.05	58.72
E	Dry Wt. (C-A)	11.96	238.30
	% Moisture (100 x D/E)	0.42%	24.6%

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		100.0%
#4	0.9	Soil Mortar	99.7%
#10	2.0	**100.0%**	99.3%
#20	0.0	100.0%	99.3%
#40	0.1	99.9%	99.2%
#60	1.4	97.3%	96.6%
#100	3.3	93.3%	92.7%
#200	10.0	79.9%	79.4%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	20.3%	< 4.74 mm and > 0.075 mm
% Gravel:	0.3%	< 75 mm and > 4.75 mm	Silt & Clay:	79.4%	< 0.075
Coarse Sand:	0.4%	< 4.75 mm and > 2.00 mm	Silt:	76.4%	< 0.075 and > 0.005 mm
Medium Sand:	0.1%	< 2.00 mm and > 0.425 mm	Clay:	3.0%	< 0.005 mm
Fine Sand:	19.9%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm

Type: Mechanical Stirring Apparatus (A)
Dispersion Time: 1 min.
Sodium Hexametaphosphate: 40 g./ Liter

Control Cylinder ☒ **Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 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
Clock	T (Min.)	(0.5 °C)	Reading			R			L	K	
	1	22.0	39.5	4.5		35.00	77.3%	76.8%	10.6	0.01562	0.05074
	2	22.0	32.0	4.5		27.50	60.8%	60.3%	11.8	0.01562	0.03791
	5	22.0	16.0	4.5		11.50	25.4%	25.2%	14.4	0.01562	0.02651
	15	22.0	10.0	4.5		5.50	12.2%	12.1%	15.4	0.01562	0.01582
	30	22.0	8.5	4.5		4.00	8.8%	8.8%	15.6	0.01562	0.01128
	60	22.0	8.0	4.5		3.50	7.7%	7.7%	15.7	0.01562	0.00800
	250	22.0	6.0	4.5		1.50	3.3%	3.3%	16.0	0.01562	0.00396
	1440	22.0	5.0	4.5		0.50	1.1%	1.1%	16.2	0.01562	0.00166

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
$L=L1+0.5(L2-(VB/A))$
(152H) .164cm per increment,
$V_B=67.0cm^3$, $L_2=14cm$, $A=27.8cm^2$

Technician Name: Karen Warner 117900
Certification #

Technical Responsibility: Ken Daly *Project Engineer*
Signature *Position*

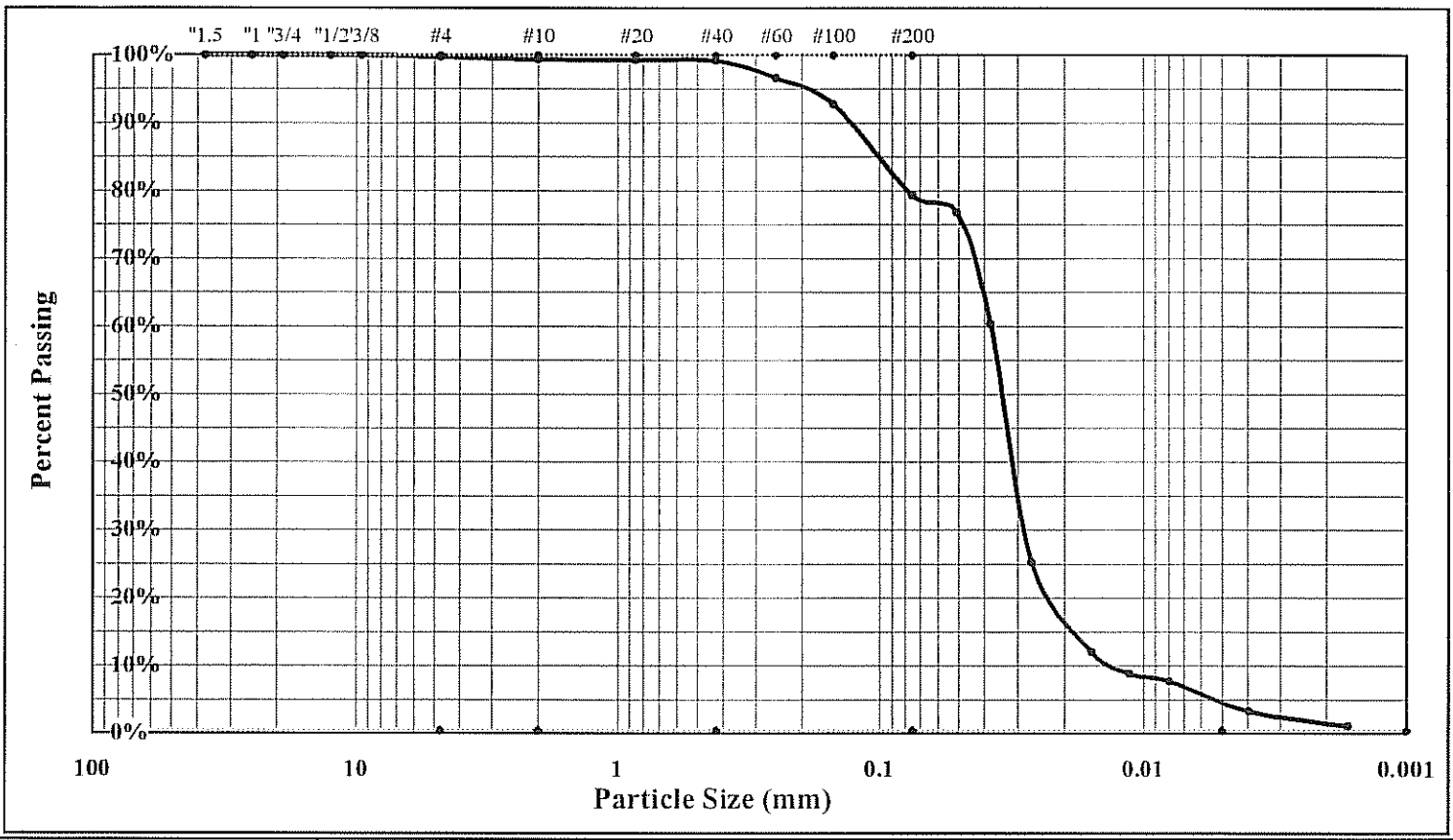
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	10/25/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	10/10-17/08
Client Name:			
Client Address:			

Boring #:		Sample #:	S-6	Sample Date:	10/2/08
Location:	Fly Ash for Cell 1 SG	Offset:		Depth:	
Sample Description:	Black Gray Silt w/Fine Sand (ML) Fly Ash				



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	0	Gravel	0.3%	Silt	76.4%
Silt & Clay (% Passing #200)	79.4%	Sand	20.3%	Clay	3.0%
Apparent Relative Density (Assumed)	2.200	Moisture Content	24.6%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Oven Temperature Set at 60C

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature *Position*

Moisture - Density Relationship

S&ME

S&ME Project #: 1356-06-825 Test Date(s): 10/10-11/12/08

Project Name: Allen Steam Station RAB Ash Landfill Report Date: November 12, 2008

Client Name:

Project Address:

Boring #: Sample #: S-6 Sample Date: October 2, 2008

Location: Fly Ash for Cell 1 SG Offset: Depth:

Sample Description: Black Gray Silt w/Fine Sand (ML) Fly Ash

Liquid Limit: NP Specific Gravity:

Plastic Limit: NP Plastic Index: NP

Natural Moisture Content: 24.6%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	100.0
#4	100.0

MDD: 72.7 **Opt. MC %:** 29.5

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:						
	Tare #:	AMRL	6910	5I	699	6911	DB
A. Tare Weight	A.	155.49	154.15	157.39	155.63	153.74	159.85
B. Wet Wt + Tare Wt	B.	775.47	839.74	736.64	807.43	747	903.56
C. Dry Wt. + Tare Wt.	C.	710.22	754.02	644.76	686.62	610.76	708.14
D. Water Weight	B-C	65.25	85.72	91.88	120.81	136.24	195.42
E. Dry Weight	C-A	554.73	599.87	487.37	530.99	457.02	548.29
F. Moisture Content	100*D/E	**11.8%**	**14.3%**	**18.9%**	**22.8%**	**29.8%**	**35.6%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5314	5355	5409	5472	5602	5580
H. Wt. of Mold	H.	4174	4174	4174	4174	4174	4174
I. Wt. of Soil (g. or lbs.)	G-H	1140.000	1181.000	1235.000	1298.000	1428.000	1406.000
J. Wt of Soil (Lbs.)	I/453.6 or I	2.513	2.604	2.723	2.862	3.148	3.100
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	75.4	78.1	81.7	85.8	94.4	93.0
M. Dry Density	L/(1+F)	**67.4**	**68.3**	**68.7**	**69.9**	**72.7**	**68.5**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: Ken Daly *Signature* Project Engineer *Position*

Moisture - Density Report

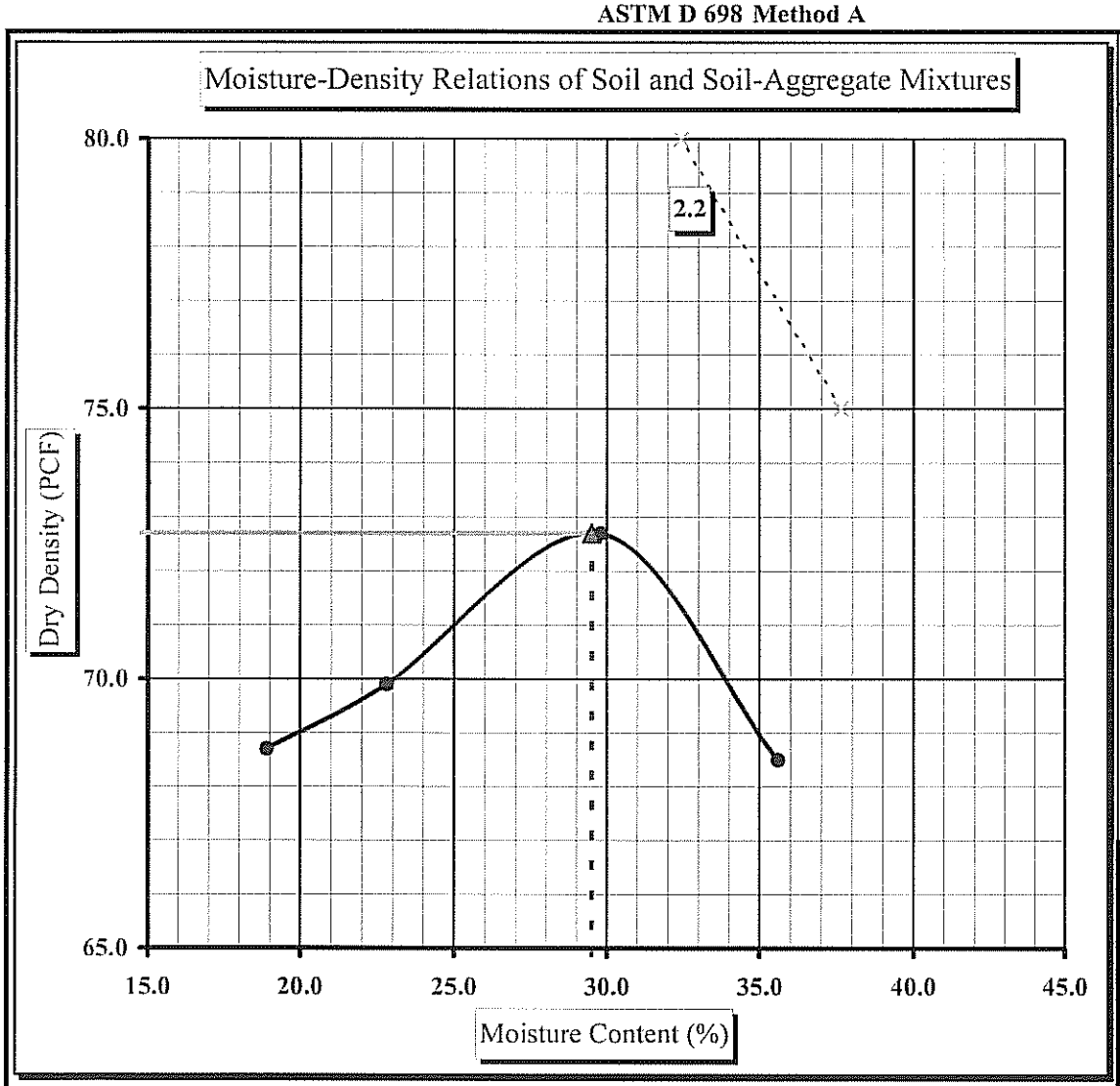
S&ME

S&ME Project #: **1356-06-825** Report Date: November 12, 2008
Project Name: **Allen Steam Station RAB Ash Landfill** Test Date(s): 10/10-11/12/08
Client Name:
Project Address:

Boring #: Sample #: S-6 Sample Date: October 2, 2008
Location: Fly Ash for Cell 1 SG Offset: Depth:
Sample Description: Black Gray Silt w/Fine Sand (ML) Fly Ash

Maximum Dry Density **72.7** **PCF.** **Optimum Moisture Content** **29.5** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	24.6%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	100
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

Liquid Limit, Plastic Limit, and Plastic Index

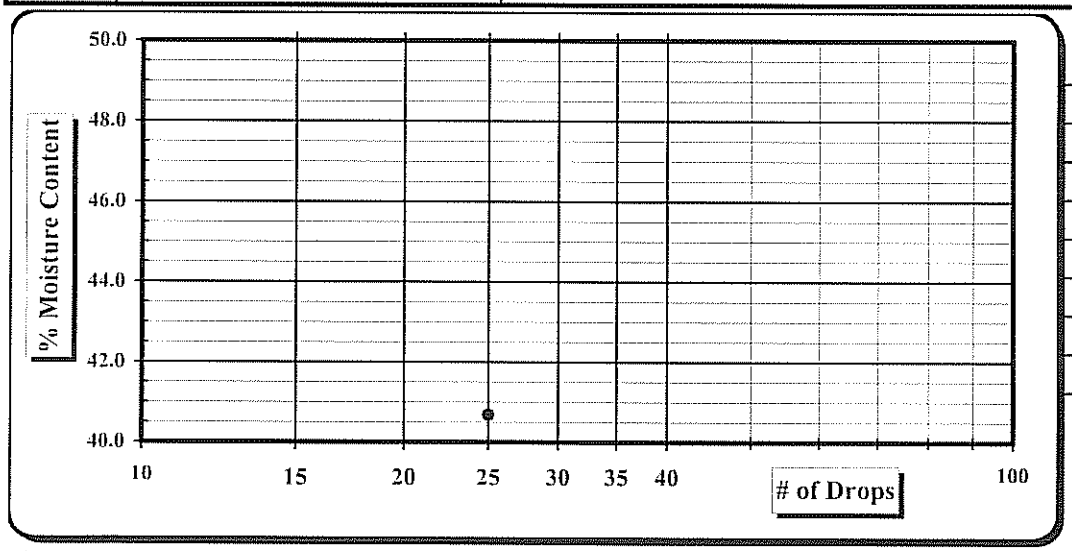
S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/3/08
Test Date(s): 11/11/08-12/3/08

Boring #: Sample #: 7 Sample Date: 10/24/08
Location: Fly ash for cell 1 SG & berm mat'l Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	FF						25	43	
A	Tare Weight	16.85						**14.32**	13.84	
B	Wet Soil Weight + A	27.50						20.75	19.97	
C	Dry Soil Weight + A	24.42						18.85	18.16	
D	Water Weight (B-C)	3.08						1.90	1.81	
E	Dry Soil Weight (C-A)	7.57						4.53	4.32	
F	% Moisture Content (D/E)*100	40.7%						41.9%	41.9%	
N	# OF DROPS	25						*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR	**40.7%**								
Ave.	Average	40.7%						41.9%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Ph. 9**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 11/6-18/08
Report Date: 11/18/08

Boring #: Sample #: 7 Sample Date: 10/24/08
Location: Fly ash for cell 1 SG & berm mat'l Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Pan #:	B	Beaker #:	PDQ	**Apparent Relative Density (Assumed)**		**2.180**		
Hydrometer Jar #:			1					
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			339.00		Tare #	50		
Weight of Total Sample Air Dried:			339.00	A	Tare Wt.	15.76		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.36		
Total Sample Oven Dried:			338.04	C	Dry Wt. + A	26.33		
Hydrometer Sample Oven Dried (W):			49.86	D	Water Wt. (B-C)	0.03		
% Passing #10:			99.8%	E	Dry Wt. (C-A)	10.57		
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.28%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed) 34 Soil Mortar	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"			100.0%
1/2"			100.0%
3/8"	0.0		100.0%
#4	0.2		99.9%
#10	0.7	**100.0%**	99.8%
#20	0.1	99.7%	99.5%
#40	0.6	98.8%	98.5%
#60	1.7	96.5%	96.3%
#100	4.9	90.2%	90.0%
#200	12.3	75.4%	75.3%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	24.7%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.1%	< 75 mm and > 4.75 mm	Silt & Clay:	75.3%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.2%	< 4.75 mm and > 2.00 mm	Silt:	71.3%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	1.2%	< 2.00 mm and > 0.425 mm	Clay:	4.0%	< 0.005 mm		
Fine Sand:	23.3%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	2	22.0	29.0	4.0		25.00	54.7%	54.5%	12.2	0.01575	0.03889
	5	22.0	11.5	4.0		7.50	16.4%	16.4%	15.1	0.01575	0.02734
	15	22.0	8.5	4.0		4.50	9.8%	9.8%	15.6	0.01575	0.01604
	30	22.0	7.5	4.0		3.50	7.7%	7.6%	15.7	0.01575	0.01140
	60	22.0	7.0	4.0		3.00	6.6%	6.5%	15.8	0.01575	0.00808
	250	22.0	5.5	4.0		1.50	3.3%	3.3%	16.0	0.01575	0.00399
	1440	22.0	4.5	4.0		0.50	1.1%	1.1%	16.2	0.01575	0.00167
						#VALUE!	#VALUE!	1.1%	#VALUE!	#N/A	#N/A

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

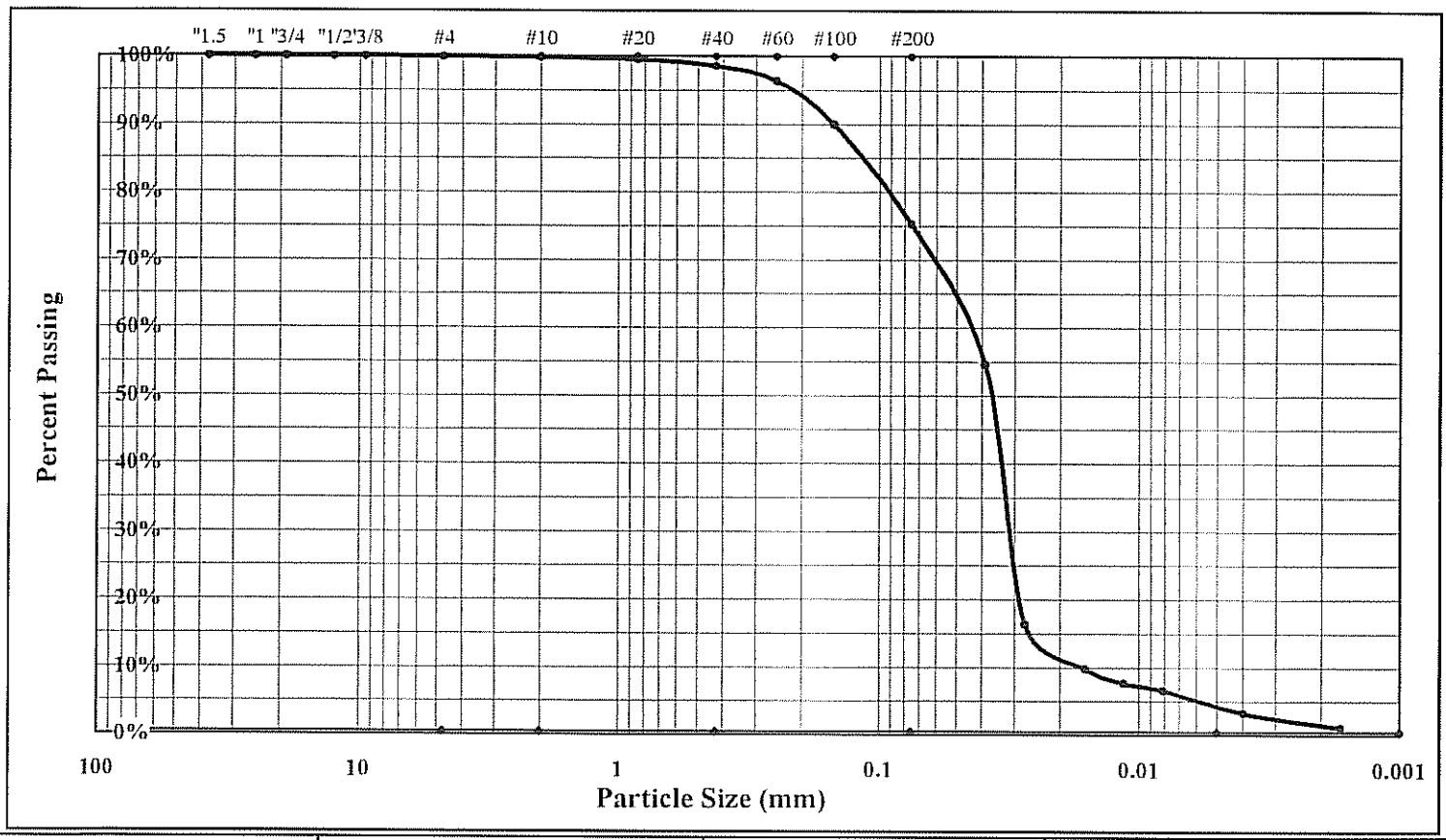
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	11/18/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	11/6-18/08
Client Name:	Duke Energy		
Client Address:			

Boring #:	Sample #: 7	Sample Date:	10/24/08
Location: Fly ash for cell 1 SG & berm mat'l		Depth:	
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]			



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	0	Gravel	0.1%	Silt	71.3%
Silt & Clay (% Passing #200)	75.3%	Sand	24.7%	Clay	4.0%
Apparent Relative Density (Assumed)	2.180	Moisture Content		Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature Position

Moisture - Density Relationship

S&ME Project #: **1356-06-825 Ph. 9** Test Date(s): 11/18-22/08
Project Name: Allen Steam Station RAB Ash Landfill Report Date: November 22, 2008
Client Name:
Client Address:
Boring #: Sample #: 7 Sample Date: October 24, 2008
Location: Fly Ash for Cell 1 subgrade and berm material Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Liquid Limit: NP Specific Gravity:
Plastic Limit: NP Plastic Index: NP

Natural Moisture Content:
Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	99.9

MDD: **70.0** **Opt. MC %:** **34.8**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	152	202	253	304	354	
	Tare #:	PFM	5E	AMRL 148	699	5F	
A. Tare Weight	A.	167	156	160.3	155.7	156.7	
B. Wet Wt + Tare Wt	B.	824.3	749.9	939.5	878.7	778.4	
C. Dry Wt. + Tare Wt.	C.	672	603.7	739.3	685.2	600	
D. Water Weight	B-C	152.3	146.2	200.2	193.5	178.4	0
E. Dry Weight	C-A	505	447.7	579	529.5	443.3	0
F. Moisture Content	100*D/E	**30.2**	**32.7**	**34.6**	**36.5**	**40.2**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5487	5542	5598	5601	5579	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1314.000	1369.000	1425.000	1428.000	1406.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	2.897	3.018	3.142	3.148	3.100	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	86.9	90.5	94.2	94.4	93.0	-125148.3
M. Dry Density	L/(1+F)	**66.7**	**68.2**	**70.0**	**69.1**	**66.3**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☐ Manual Hammer ☒ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Moisture - Density Report

S&ME

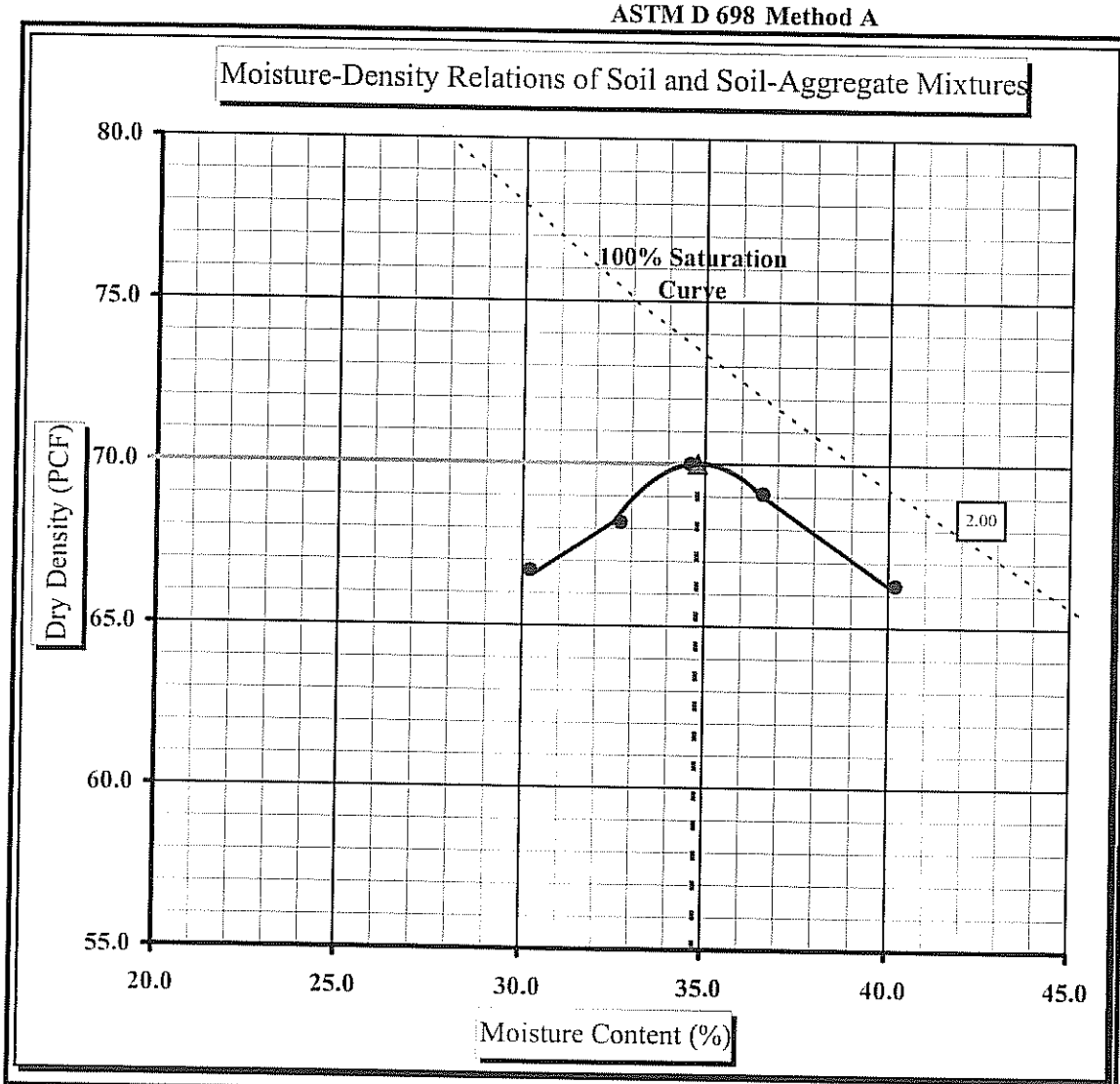
S&ME Project #: **1356-06-825 Ph. 9**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name:
Client Address:

Report Date: November 22, 2008
Test Date(s): 11/18-22/08

Boring #: Sample #: 7 Sample Date: October 24, 2008
Location: Fly Ash for Cell 1 subgrade and berm material Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Maximum Dry Density **70.0** **PCF.** **Optimum Moisture Content** **34.8** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: NP

Plastic Limit: NP

Plastic Index: NP

Specific Gravity:

% Passing

3/4"	
1/2"	
3/8"	
#4	99.9

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☐ Manual Hammer ☒ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly
Signature

0

Liquid Limit, Plastic Limit, and Plastic Index

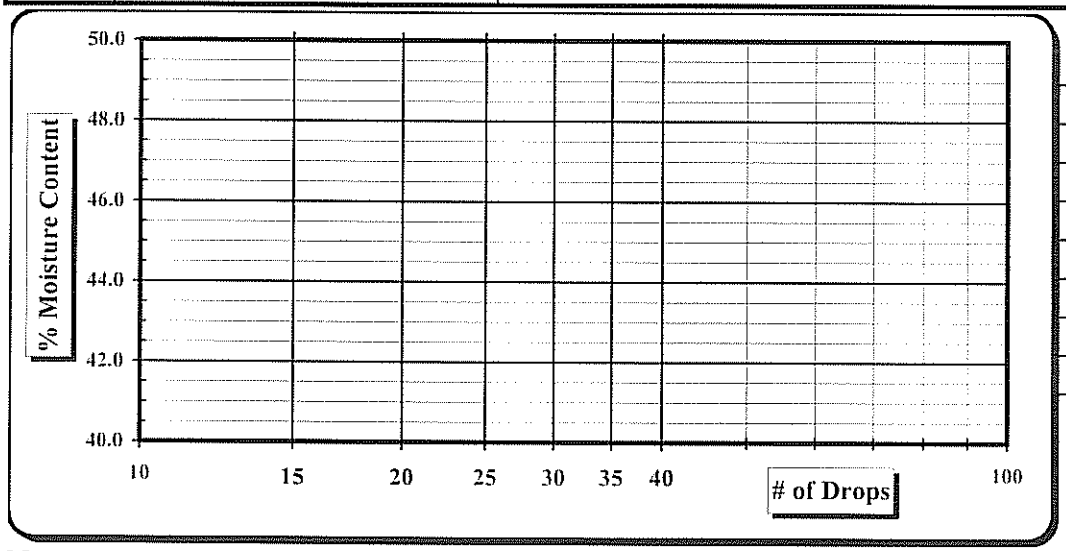
S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/1/08
Test Date(s): 11/11/08-12/1/08

Boring #: Sample #: 8 Sample Date: 10/24/08
Location: Fly ash for cell 1 SG & berm mat'l Depth:
Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Ph. 9**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 11/6-18/08
Report Date: 11/18/08

Boring #: Sample #: 8 Sample Date: 10/24/08
Location: Fly ash for cell 1 SG & berm mat'l Depth:
Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

Pan #:	105	Beaker #:	PP	**Apparent Relative Density (Assumed)**		**2.180**			
Hydrometer Jar #:			A						
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			277.10		Tare #	XX			
Weight of Total Sample Air Dried:			277.10	A	Tare Wt.	16.04			
Weight of Air Dried Hydrometer Sample (g):			100.00	B	Wet Wt. + A	27.14			
Total Sample Oven Dried:			276.36	C	Dry Wt. + A	27.11			
Hydrometer Sample Oven Dried (W):			99.73	D	Water Wt. (B-C)	0.03			
% Passing #10:			99.2%	E	Dry Wt. (C-A)	11.07			
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.27%			

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		SSS	100.0%
1/2"			100.0%
3/8"	0.0		100.0%
#4	0.3	Soil Mortar	99.9%
#10	2.1	**100.0%**	99.2%
#20	1.9	98.1%	97.3%
#40	7.0	93.0%	92.3%
#60	13.1	86.9%	86.2%
#100	23.3	76.7%	76.1%
#200	41.7	58.2%	57.7%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	42.2%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.1%	< 75 mm and > 4.75 mm	Silt & Clay:	57.7%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.7%	< 4.75 mm and > 2.00 mm	Silt:	55.2%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	6.9%	< 2.00 mm and > 0.425 mm	Clay:	2.5%	< 0.005 mm		
Fine Sand:	34.6%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	22.0	55.0	4.0		51.00	55.7%	55.3%	7.9	0.01575	0.04436
	2	22.0	40.5	4.0		36.50	39.9%	39.6%	10.3	0.01575	0.03576
	5	22.0	13.0	4.0		9.00	9.8%	9.8%	14.8	0.01575	0.02712
	15	22.0	9.5	4.0		5.50	6.0%	6.0%	15.4	0.01575	0.01596
	30	22.0	8.0	4.0		4.00	4.4%	4.3%	15.6	0.01575	0.01137
	60	22.0	7.5	4.0		3.50	3.8%	3.8%	15.7	0.01575	0.00806
	250	22.0	6.0	4.0		2.00	2.2%	2.2%	16.0	0.01575	0.00398
	1440	22.0	5.0	4.0		1.00	1.1%	1.1%	16.1	0.01575	0.00167

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

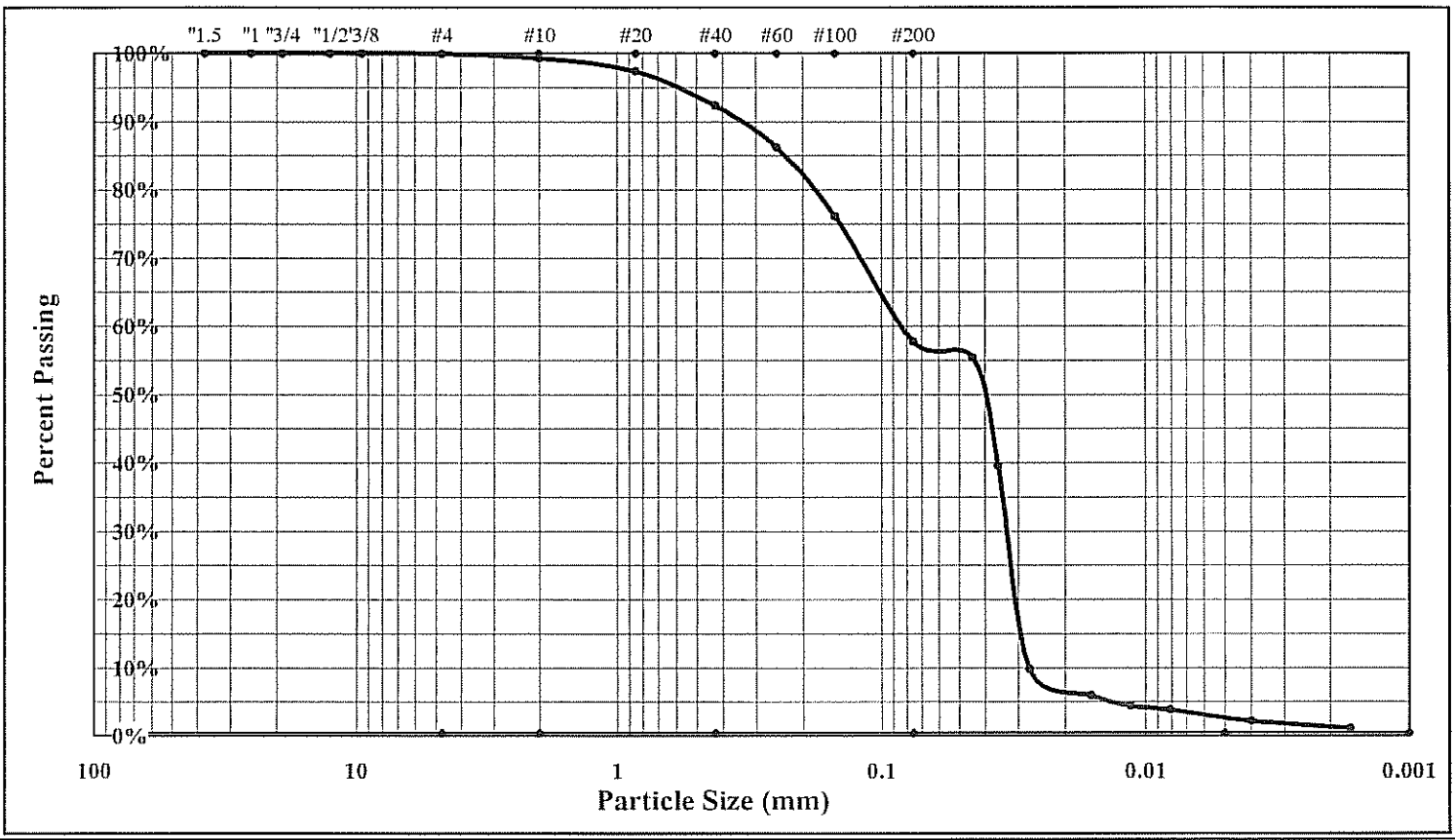
Technical Responsibility: Ken Daly _____ *Signature* _____ *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	11/18/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	11/6-18/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	8	Sample Date:	10/24/08
Location:	Fly ash for cell 1 SG	& berm mat'l		Depth:	
Sample Description:	Fly Ash [Black Gray Fine to Medium 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	0	Gravel	0.1%	Silt	55.2%
Silt & Clay (% Passing #200)	57.7%	Sand	42.2%	Clay	2.5%
Apparent Relative Density (Assumed)	2.180	Moisture Content		Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ _____
Signature Position

Moisture - Density Relationship

S&ME Project #: **1356-06-825 Ph. 9** Test Date(s): 11/23/08-12/3/08
Project Name: Allen Steam Station RAB Ash Landfill Report Date: December 3, 2008
Client Name:
Client Address:
Boring #: Sample #: 8 Sample Date: October 24, 2008
Location: Fly Ash for Cell 1 subgrade and berm material Offset: Depth:
Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

Liquid Limit: NP Specific Gravity:
Plastic Limit: NP Plastic Index: NP

Natural Moisture Content:
Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	99.9

MDD: 69.0 **Opt. MC %:** 34.0

Water Content Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	202	202	253	304	354	315
	Tare #:	695	THAI	99	5A	SQ-1	PMB
A. Tare Weight	A.	157.1	153.6	156.6	157.5	158.8	160.6
B. Wet Wt + Tare Wt	B.	742.6	965.7	934.5	715	707.7	1012.4
C. Dry Wt. + Tare Wt.	C.	606.4	775.5	742.6	573.4	556.1	789.2
D. Water Weight	B-C	136.2	190.2	191.9	141.6	151.6	223.2
E. Dry Weight	C-A	449.3	621.9	586	415.9	397.3	628.6
F. Moisture Content	100*D/E	**30.3**	**30.6**	**32.7**	**34.0**	**38.2**	**35.5**

Compaction Data The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5493	5509	5539	5571	5555	5563
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1320.000	1336.000	1366.000	1398.000	1382.000	1390.000
J. Wt of Soil (Lbs.)	I/453.6 or I	2.910	2.945	3.011	3.082	3.047	3.064
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	87.3	88.3	90.3	92.4	91.4	91.9
M. Dry Density	L/(1+F)	**67.0**	**67.6**	**68.0**	**69.0**	**66.1**	**67.8**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐
Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez

Technical Responsibility: Ken Daly

Certification #

Signature *Position*

Moisture - Density Report

S&ME

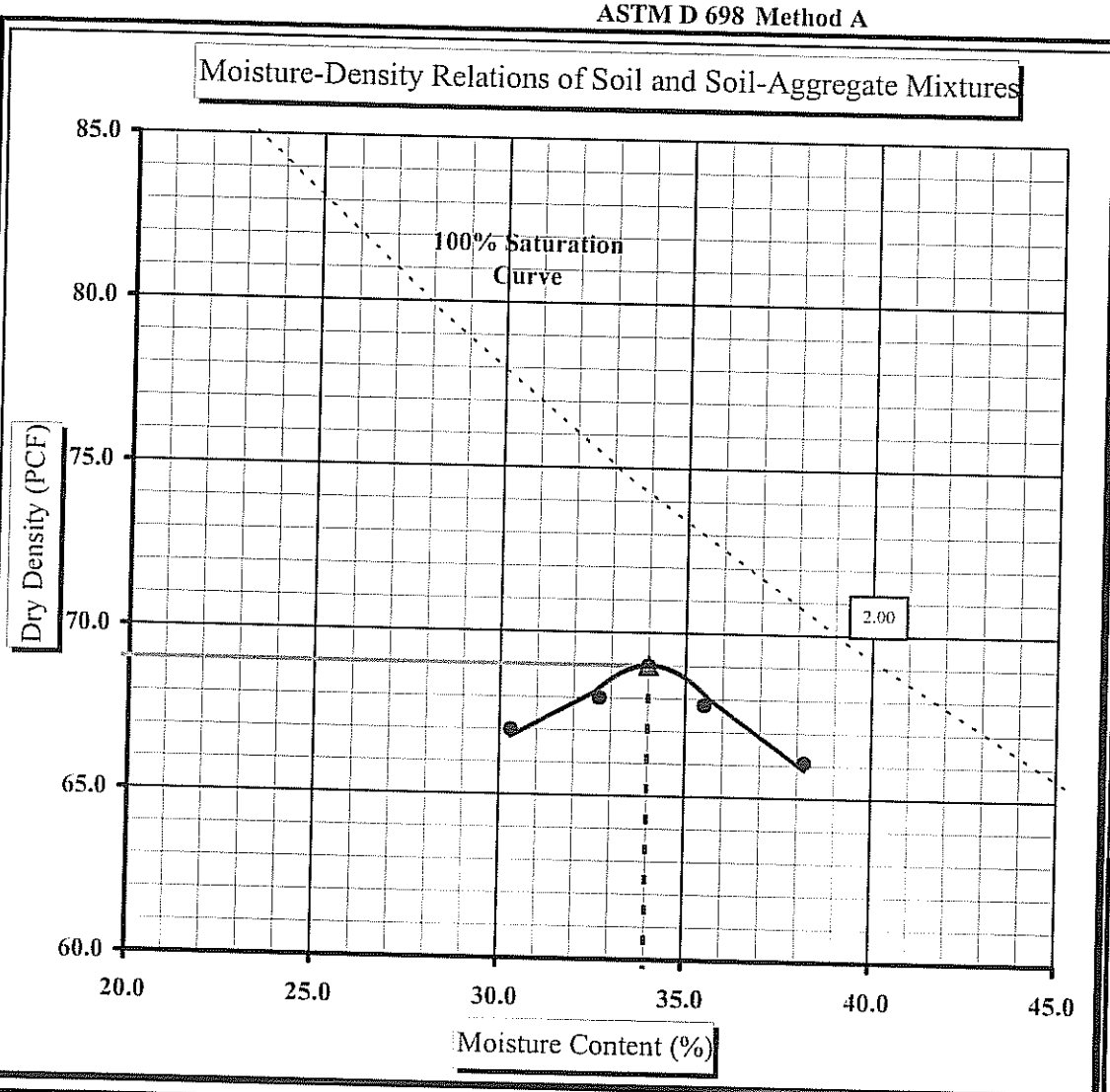
S&ME Project #: **1356-06-825 Ph. 9**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name:
Client Address:

Report Date: December 3, 2008
Test Date(s): 11/23/08-12/3/08

Boring #:
Sample #: 8
Sample Date: October 24, 2008
Location: Fly Ash for Cell 1 subgrade and berm materi
Offset:
Depth:
Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

Maximum Dry Density **69.0** **PCF.**
Optimum Moisture Content **34.0** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: NP

Plastic Limit: NP

Plastic Index: NP

Specific Gravity:

% Passing

3/4"	
1/2"	
3/8"	
#4	99.9

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly
Signature

0

Liquid Limit, Plastic Limit, and Plastic Index

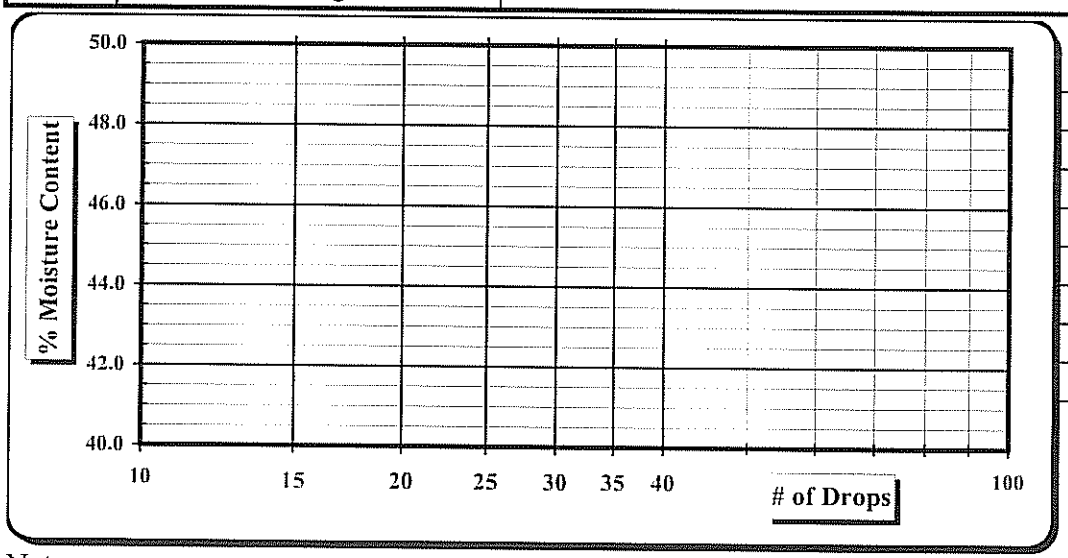
S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/1/08
Test Date(s): 11/11/08-12/1/08

Boring #: Sample #: 10 Sample Date: 10/30/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description:

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #:	**1356-06-825 Ph. 9**	Test Date(s):	11/11-25/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	11/25/08
Client Name:	Duke Energy		
Client Address:			

Boring #: Sample #: 10 Sample Date: 10/30/08

Location: Fly ash for cell 1 SG Offset: Depth:

Sample Description: Fly Ash [Black Gray Fine Sandy Silt (ML)]

Pan #:	RAHIM	Beaker #:	PDQ	**Apparent Relative Density (Assumed)**		**2.180**			
Hydrometer Jar #:			8						
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			253.70		Tare #	BB			
Weight of Total Sample Air Dried:			253.70	A	Tare Wt.	16.15			
Weight of Air Dried Hydrometer Sample (g):			100.00	B	Wet Wt. + A	28.05			
Total Sample Oven Dried:			252.85	C	Dry Wt. + A	28.01			
Hydrometer Sample Oven Dried (W):			99.66	D	Water Wt. (B-C)	0.04			
% Passing #10:			99.8%	E	Dry Wt. (C-A)	11.86			
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.34%			

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		50	100.0%
1/2"			100.0%
3/8"	0.0		100.0%
#4	0.1	Soil Mortar	100.0%
#10	0.6	**100.0%**	99.8%
#20	0.8	99.2%	99.0%
#40	3.5	96.5%	96.3%
#60	9.3	90.7%	90.5%
#100	23.4	76.5%	76.3%
#200	49.6	50.2%	50.1%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	49.9%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	50.1%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.2%	< 4.75 mm and > 2.00 mm	Silt:	48.6%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	3.5%	< 2.00 mm and > 0.425 mm	Clay:	1.5%	< 0.005 mm		
Fine Sand:	46.2%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 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
Clock	T (Min.)	(0.5 °C)	Reading			R			L	K	
	1	22.5	44.0	5.0		39.00	42.7%	42.6%	9.9	0.01566	0.04928
	2	22.5	31.5	5.0		26.50	29.0%	28.9%	11.9	0.01566	0.03828
	5	22.5	11.5	5.0		6.50	7.1%	7.1%	15.2	0.01566	0.02733
	15	22.5	7.5	5.0		2.50	2.7%	2.7%	15.9	0.01566	0.01612
	30	23.0	6.5	4.0		2.50	2.7%	2.7%	15.9	0.01557	0.01133
	60	23.0	6.0	4.0		2.00	2.2%	2.2%	16.0	0.01557	0.00803
	250	23.0	5.0	4.0		1.00	1.1%	1.1%	16.1	0.01557	0.00396
	1440	21.5	5.0	4.5		0.50	0.5%	0.5%	16.2	0.01585	0.00168

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)

$L=L1+0.5(L2-(VB/A))$

(152H) .164cm per increment,

$V_B=67.0cm^3$, $L_2=14cm$, $A=27.8cm^2$

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly _____ *Signature* _____ *Position*

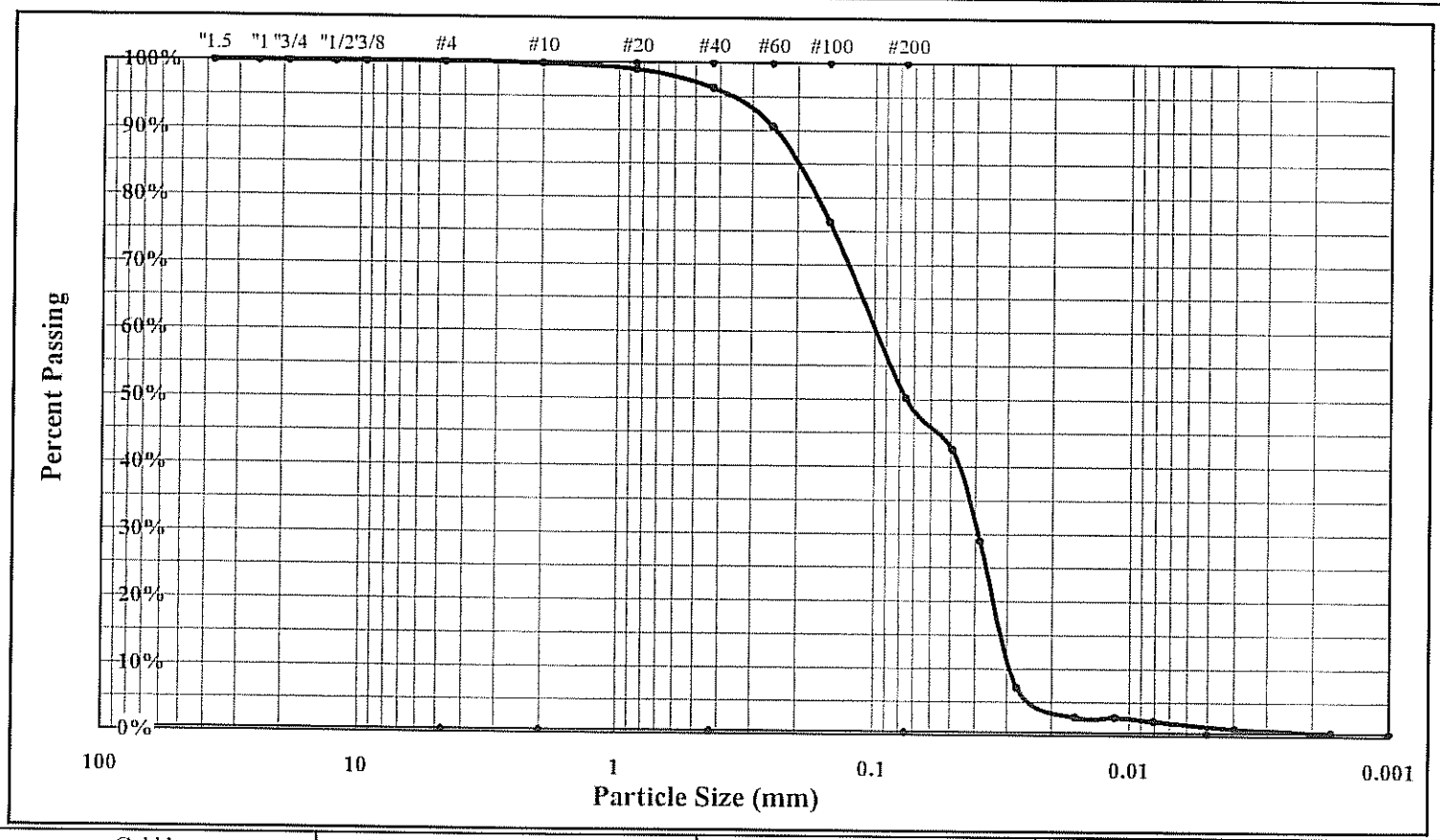
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	11/25/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	11/11-25/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	10	Sample Date:	10/30/08
Location:	Fly ash for cell 1 SG	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray 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	0	Gravel	0.0%	Silt	48.6%
Silt & Clay (% Passing #200)	50.1%	Sand	49.9%	Clay	1.5%
Apparent Relative Density (Assumed)	2.180	Moisture Content		Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature Position

Moisture - Density Relationship

S&ME Project #: **1356-06-825 Ph. 9** Test Date(s): 11/24/08-12/1/08
Project Name: Allen Steam Station RAB Ash Landfill Report Date: December 1, 2008
Client Name:
Client Address:
Boring #: Sample #: 10 Sample Date: October 30, 2008
Location: Fly Ash for Cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Fine Sandy Silt (ML)]

Liquid Limit: NP Specific Gravity:
Plastic Limit: NP Plastic Index: NP

Natural Moisture Content:
Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: **63.5** **Opt. MC %:** **41.3**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	202	253	304	354	405	
	Tare #:	JC	6911	DJM	JMD	DMJ	
A. Tare Weight	A.	157.2	153.9	159.6	163.3	162.5	
B. Wet Wt + Tare Wt	B.	792	807.6	709	768.5	733.9	
C. Dry Wt. + Tare Wt.	C.	627.9	624.6	550.7	587.1	555.3	
D. Water Weight	B-C	164.1	183	158.3	181.4	178.6	0
E. Dry Weight	C-A	470.7	470.7	391.1	423.8	392.8	0
F. Moisture Content	100*D/E	**34.9**	**38.9**	**40.5**	**42.8**	**45.5**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5433	5485	5521	5538	5515	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1260.000	1312.000	1348.000	1365.000	1342.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	2.778	2.892	2.972	3.009	2.959	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	83.3	86.7	89.1	90.2	88.7	-125148.3
M. Dry Density	L/(1+F)	**61.8**	**62.5**	**63.4**	**63.2**	**61.0**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐
Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez
Certification #
Technical Responsibility: Ken Daly
Signature Position

Moisture - Density Report

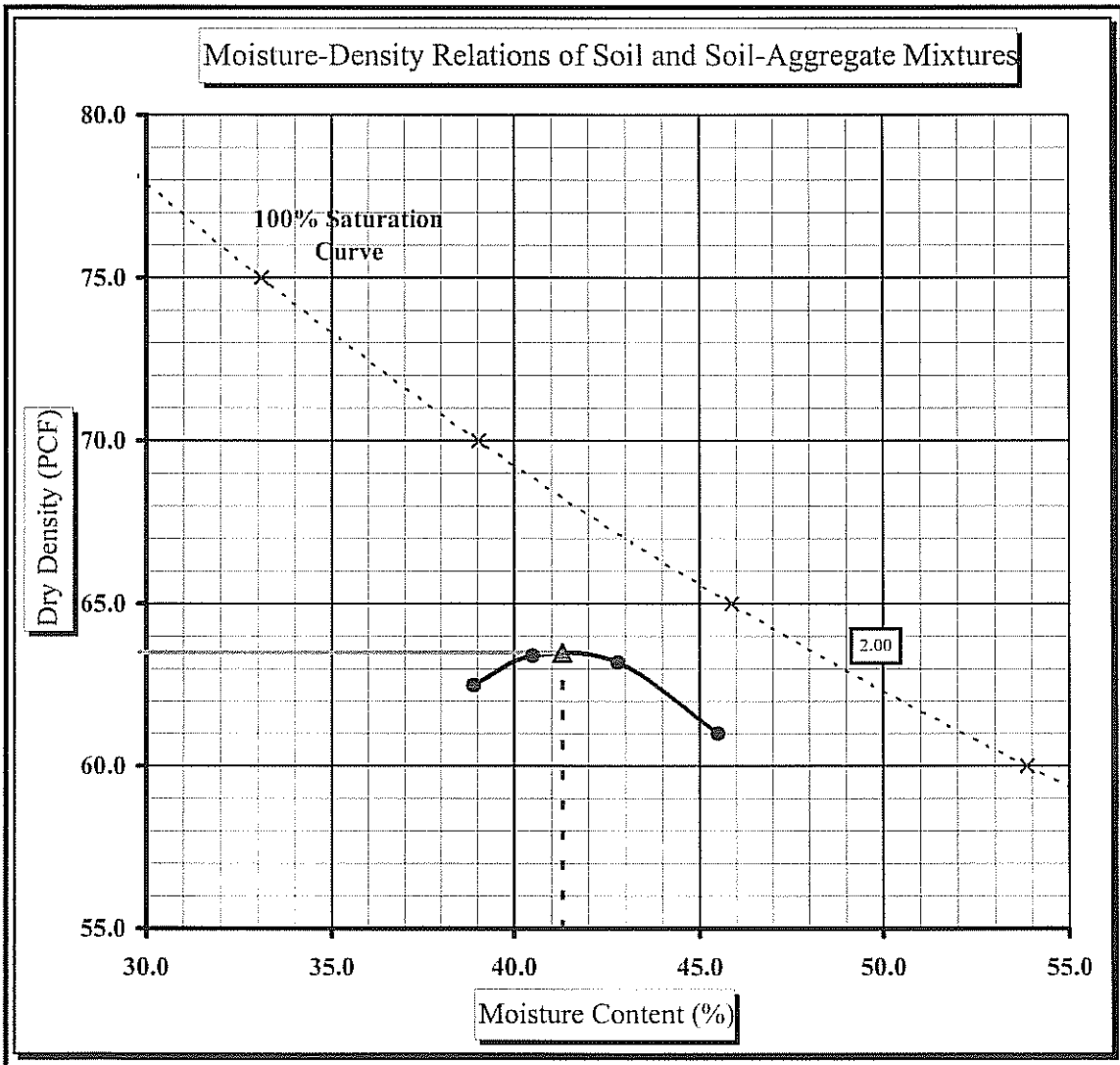
S&ME

S&ME Project #: **1356-06-825 Ph. 9** Report Date: December 1, 2008
Project Name: **Allen Steam Station RAB Ash Landfill** Test Date(s): 11/24/08-12/1/08
Client Name:
Client Address:

Boring #: Sample #: 10 Sample Date: October 30, 2008
Location: Fly Ash for Cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Fine Sandy Silt (ML)]

Maximum Dry Density 63.5 PCF. **Optimum Moisture Content 41.3 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: NP

Plastic Limit: NP

Plastic Index: NP

Specific Gravity:

% Passing

3/4"
1/2"
3/8"
#4 100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

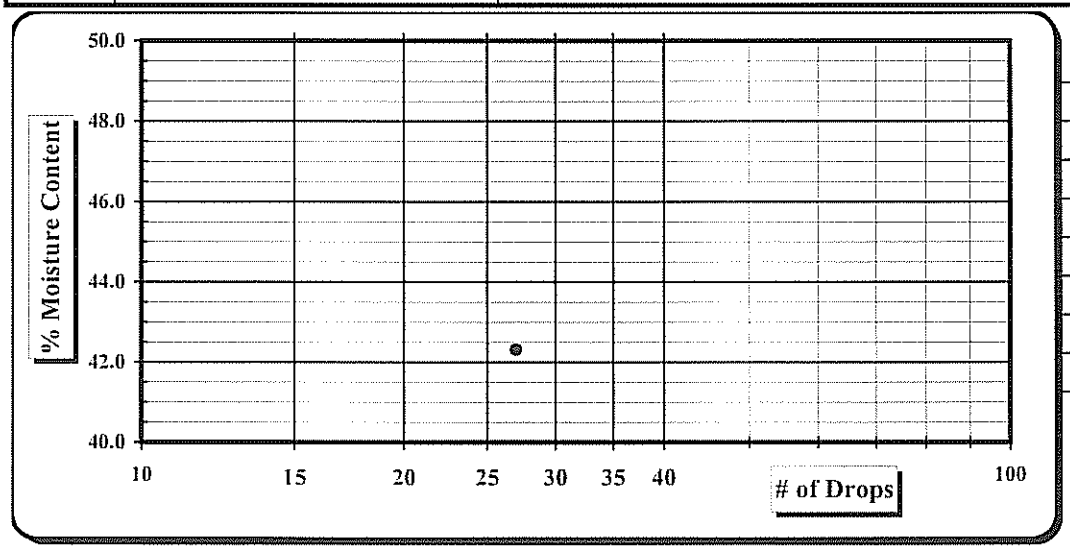
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 12/3/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 11/11/08-12/3/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: 11 Sample Date: 10/30/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	2						46	XY	
A	Tare Weight	15.77						13.75	15.92	
B	Wet Soil Weight + A	26.70						20.47	22.34	
C	Dry Soil Weight + A	23.45						18.46	20.44	
D	Water Weight (B-C)	3.25						2.01	1.90	
E	Dry Soil Weight (C-A)	7.68						4.71	4.52	
F	% Moisture Content (D/E)*100	42.3%						42.7%	42.0%	
N	# OF DROPS	27						*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR	**42.7%**								
Ave.	Average	42.7%						42.4%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	43
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	42
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	1
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Ph. 9**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 11/11-25/08
Report Date: 11/25/08

Boring #: Sample #: 11 Sample Date: 10/30/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Pan #:	531	Beaker #:	V	Apparent Relative Density (Assumed)		2.180	
Hydrometer Jar #:			7				
Pan Tare Weight (grams):			0.00	Moisture Content		Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):			277.05		Tare #	XX	
Weight of Total Sample Air Dried:			277.05	A	Tare Wt.	16.04	
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.71	
Total Sample Oven Dried:			276.27	C	Dry Wt. + A	26.68	
Hydrometer Sample Oven Dried (W):			49.86	D	Water Wt. (B-C)	0.03	
% Passing #10:			100.0%	E	Dry Wt. (C-A)	10.64	
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.28%	

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		17	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.0	**100.0%**	100.0%
#20	0.1	99.9%	99.9%
#40	0.2	99.6%	99.6%
#60	0.5	99.0%	99.0%
#100	1.7	96.7%	96.7%
#200	5.7	88.6%	88.6%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	11.4%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	88.6%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.0%	< 4.75 mm and > 2.00 mm	Silt:	86.1%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	0.4%	< 2.00 mm and > 0.425 mm	Clay:	2.5%	< 0.005 mm		
Fine Sand:	11.0%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **43** Plastic Limit **42** Plastic Index **1** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	22.5	42.0	5.0		37.00	80.9%	80.9%	10.2	0.01566	0.05009
	2	22.5	29.5	5.0		24.50	53.6%	53.6%	12.3	0.01566	0.03880
	5	23.0	10.0	4.0		6.00	13.1%	13.1%	15.3	0.01557	0.02725
	15	23.0	7.0	4.0		3.00	6.6%	6.6%	15.8	0.01557	0.01598
	30	23.0	6.0	4.0		2.00	4.4%	4.4%	16.0	0.01557	0.01136
	60	23.0	5.5	4.0		1.50	3.3%	3.3%	16.0	0.01557	0.00805
	250	23.0	5.0	4.0		1.00	2.2%	2.2%	16.1	0.01557	0.00396
	1440	21.5	5.0	4.5		0.50	1.1%	1.1%	16.2	0.01585	0.00168

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

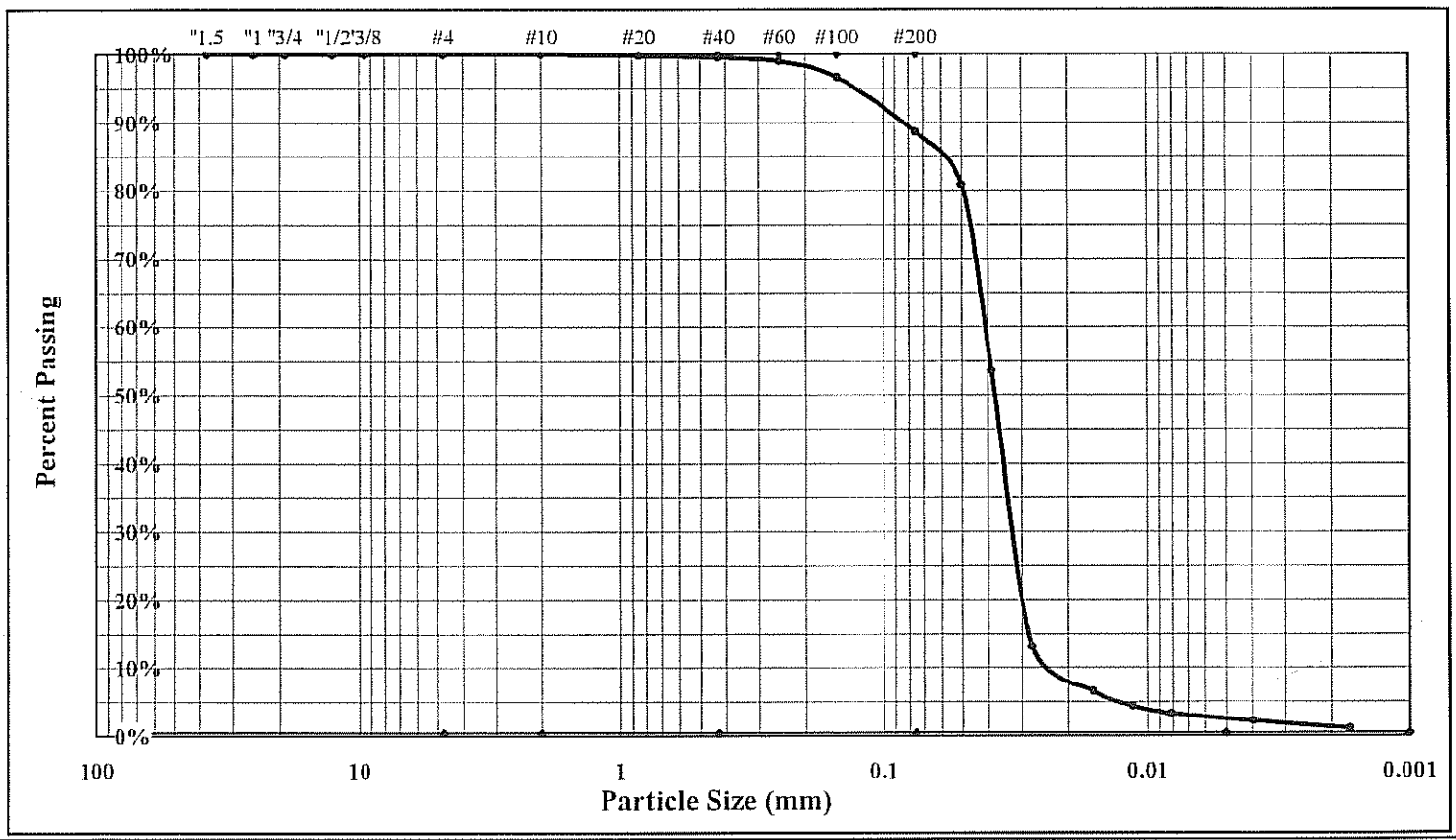
Technical Responsibility: Ken Daly _____ *Signature* _____ *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	11/25/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	11/11-25/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	11	Sample Date:	10/30/08
Location:	Fly ash for cell 1 SG	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray 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	0	Gravel	0.0%	Silt	86.1%
Silt & Clay (% Passing #200)	88.6%	Sand	11.4%	Clay	2.5%
Apparent Relative Density (Assumed)	2.180	Moisture Content		Colloids	
Liquid Limit	43	Plastic Limit	42	Plastic Index	1

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ _____
Signature Position

Moisture - Density Relationship

S&ME Project #: **1356-06-825 Ph. 9** Test Date(s): 11/24/08-12/3/08
Project Name: Allen Steam Station RAB Ash Landfill Report Date: December 3, 2008
Client Name:
Client Address:
Boring #: Sample #: 11 Sample Date: October 30, 2008
Location: Fly Ash for Cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Liquid Limit: 43 Specific Gravity:
Plastic Limit: 42 Plastic Index: 1

Natural Moisture Content:
Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: _____ **Opt. MC %:** _____

Water Content Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	152	202	253	304	362	101
	Tare #:	GH	5B	KO	5I	HK	5L
A. Tare Weight	A.	157.5	158.8	157.9	157.7	156	154.9
B. Wet Wt + Tare Wt	B.	903.7	838.5	896.4	729.9	812.2	923.5
C. Dry Wt. + Tare Wt.	C.	734	671.7	708.6	576.4	624.4	759.9
D. Water Weight	B-C	169.7	166.8	187.8	153.5	187.8	163.6
E. Dry Weight	C-A	576.5	512.9	550.7	418.7	468.4	605
F. Moisture Content	100*D/E	**29.4**	**32.5**	**34.1**	**36.7**	**40.1**	**27.0**

Compaction Data The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5494	5545	5578	5589	5574	5460
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1321.000	1372.000	1405.000	1416.000	1401.000	1287.000
J. Wt of Soil (Lbs.)	I/453.6 or I	2.912	3.025	3.097	3.122	3.089	2.837
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	87.3	90.7	92.9	93.6	92.6	85.1
M. Dry Density	L/(1+F)	**67.5**	**68.4**	**69.3**	**68.5**	**66.1**	**67.0**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez
Certification #
Technical Responsibility: Ken Daly
Signature *Position*

Moisture - Density Report

S&ME

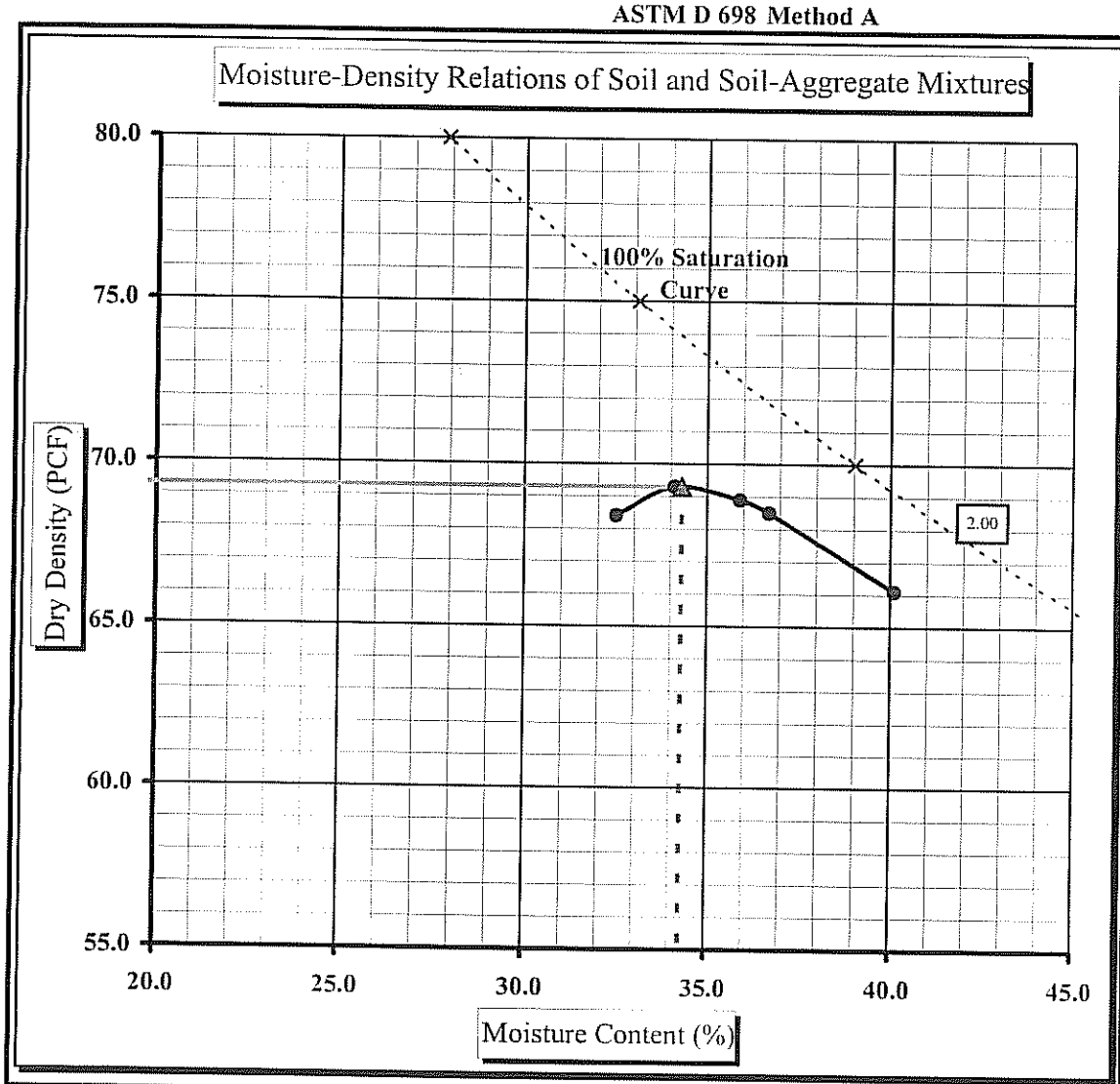
S&ME Project #: **1356-06-825 Ph. 9**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name:
Client Address:

Report Date: December 3, 2008
Test Date(s): 11/24/08-12/3/08

Boring #: Sample #: 11 Sample Date: October 30, 2008
Location: Fly Ash for Cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Maximum Dry Density **69.3** **PCF.** **Optimum Moisture Content** **34.3** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: 43

Plastic Limit: 42

Plastic Index: 1

Specific Gravity:

% Passing

3/4"
1/2"
3/8"
#4 100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

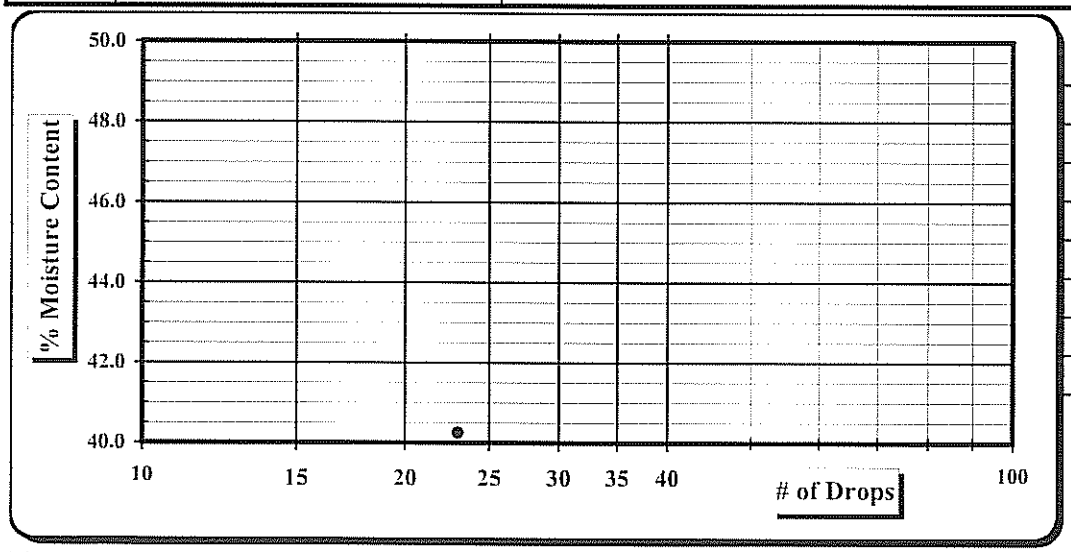
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 12/3/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 11/11/08-12/3/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: 12 Sample Date: 10/30/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash / Soil Mix [Brown Gray Clayey Silt (ML) with Fine Sand]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	5						50	PP	
A	Tare Weight	15.70						**15.77**	16.15	
B	Wet Soil Weight + A	25.70						21.98	22.63	
C	Dry Soil Weight + A	22.83						20.23	20.82	
D	Water Weight (B-C)	2.87						1.75	1.81	
E	Dry Soil Weight (C-A)	7.13						4.46	4.67	
F	% Moisture Content (D/E)*100	40.3%						39.2%	38.8%	
N	# OF DROPS	23						*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR	**39.9%**								
Ave.	Average	39.9%						39.0%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	40
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	39
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	1
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Ph. 9**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 11/11-25/08
Report Date: 11/25/08

Boring #: Sample #: 12 Sample Date: 10/30/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash / Soil Mix [Brown Gray Clayey Silt (ML) with Fine Sand]

Pan #:	180	Beaker #:	TY	**Apparent Relative Density (Assumed)**		**2.180**	
Hydrometer Jar #:			Q				
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			270.28		Tare #	RR	
Weight of Total Sample Air Dried:			270.28	A	Tare Wt.	15.27	
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.85	
Total Sample Oven Dried:			269.35	C	Dry Wt. + A	26.81	
Hydrometer Sample Oven Dried (W):			49.83	D	Water Wt. (B-C)	0.04	
% Passing #10:			99.4%	E	Dry Wt. (C-A)	11.54	
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.35%	

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		PP	100.0%
1/2"			100.0%
3/8"	0.0		100.0%
#4	0.6	Soil Mortar	99.8%
#10	1.5	**100.0%**	99.4%
#20	0.7	98.7%	98.1%
#40	2.2	95.5%	95.0%
#60	4.2	91.6%	91.1%
#100	7.6	84.8%	84.3%
#200	14.0	71.9%	71.5%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	28.3%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.2%	< 75 mm and > 4.75 mm	Silt & Clay:	71.5%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.3%	< 4.75 mm and > 2.00 mm	Silt:	55.5%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	4.4%	< 2.00 mm and > 0.425 mm	Clay:	16.0%	< 0.005 mm		
Fine Sand:	23.5%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **40** Plastic Limit **39** Plastic Index **1** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	23.0	35.5	4.0		31.50	68.9%	68.5%	11.1	0.01557	0.05195
	2	23.0	32.5	4.0		28.50	62.3%	62.0%	11.6	0.01557	0.03754
	5	23.0	27.5	4.0		23.50	51.4%	51.1%	12.4	0.01557	0.02457
	15	23.0	21.5	4.0		17.50	38.3%	38.1%	13.4	0.01557	0.01473
	30	23.0	17.5	4.0		13.50	29.5%	29.4%	14.1	0.01557	0.01067
	60	23.0	14.0	4.0		10.00	21.9%	21.8%	14.7	0.01557	0.00770
	250	23.0	10.0	4.0		6.00	13.1%	13.1%	15.3	0.01557	0.00385
	1440	21.5	8.0	4.5		3.50	7.7%	7.6%	15.7	0.01585	0.00166

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

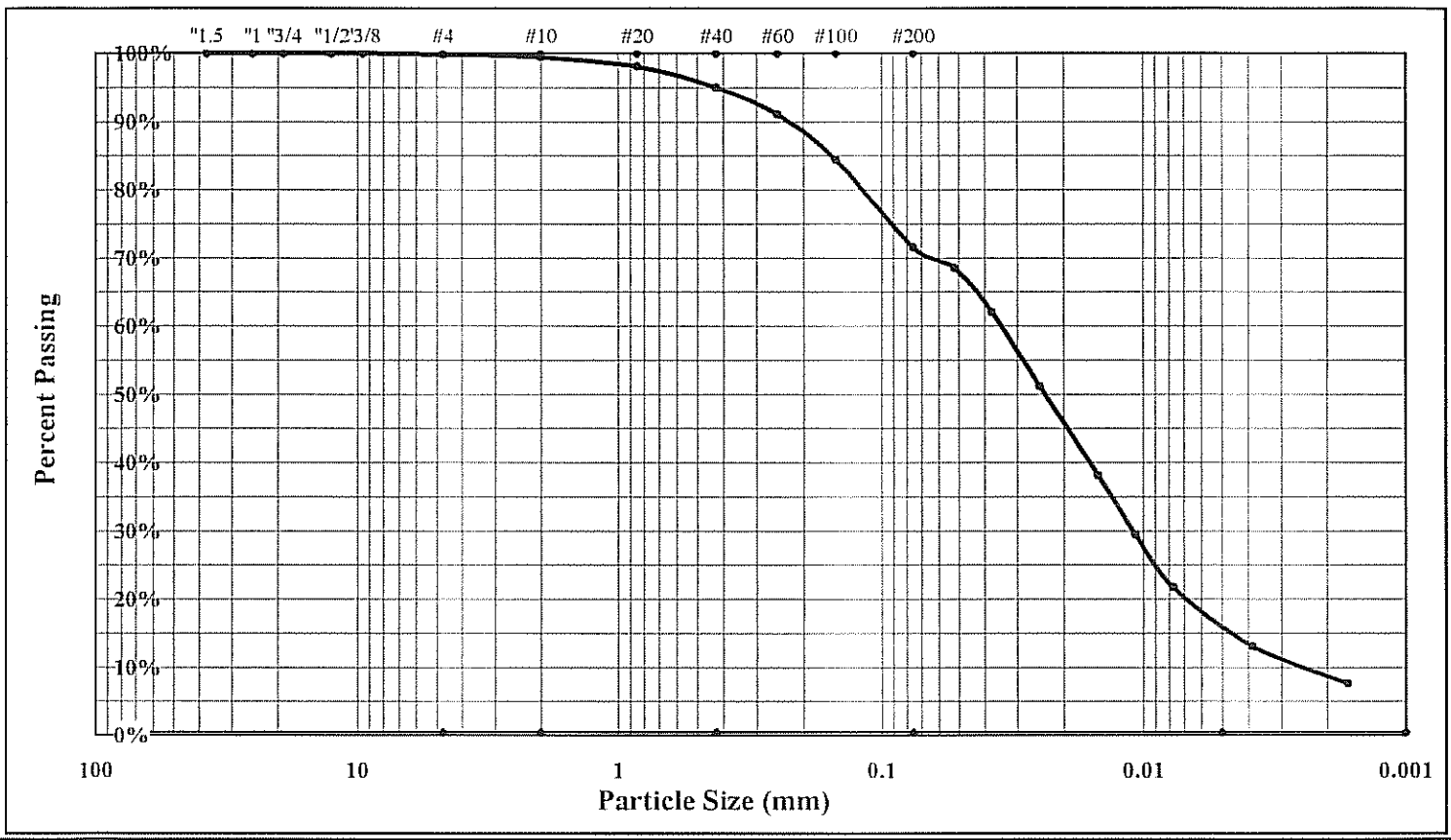
Technical Responsibility: Ken Daly _____ *Signature* _____ *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	11/25/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	11/11-25/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	12	Sample Date:	10/30/08
Location:	Fly ash for cell 1 SG	Offset:		Depth:	
Sample Description:	Fly Ash / Soil Mix [Brown Gray Clayey Silt (ML) with Fine Sand]				



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	0	Gravel	0.2%	Silt	55.5%
Silt & Clay (% Passing #200)	71.5%	Sand	28.3%	Clay	16.0%
Apparent Relative Density (Assumed)	2.180	Moisture Content		Colloids	
Liquid Limit	40	Plastic Limit	39	Plastic Index	1

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature Position

Moisture - Density Relationship

S&ME Project #:	**1356-06-825 Ph. 9**	Test Date(s):	11/18-22/08
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	November 22, 2008
Client Name:			
Client Address:			
Boring #:	Sample #: 12	Sample Date:	October 30, 2008
Location: Fly Ash for Cell 1 subgrade	Offset:	Depth:	
Sample Description:	Fly Ash / Soil Mix [Brown Gray Clayey Silt (ML) with Fine Sand]		

Liquid Limit: 40 Specific Gravity:

Plastic Limit: 39 Plastic Index: 1

Natural Moisture Content:

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	99.8

MDD: 72.1 **Opt. MC %:** 32.0

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	401	354	301	253	202	
	Tare #:	698	5B	JDM	691	PTL	
A. Tare Weight	A.	154.4	158.7	163.2	155.1	163.8	
B. Wet Wt + Tare Wt	B.	663.6	675.9	804.5	708.3	650	
C. Dry Wt. + Tare Wt.	C.	524.1	546.8	651.3	582.7	549.2	
D. Water Weight	B-C	139.5	129.1	153.2	125.6	100.8	0
E. Dry Weight	C-A	369.7	388.1	488.1	427.6	385.4	0
F. Moisture Content	100*D/E	**37.7**	**33.3**	**31.4**	**29.4**	**26.2**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5608	5634	5627	5557	5513	
H. Wt. of Mold	H.	4201	4201	4201	4201	4201	4201
I. Wt. of Soil (g. or lbs.)	G-H	1407.000	1433.000	1426.000	1356.000	1312.000	-4201.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.102	3.159	3.144	2.989	2.892	-4201.000
K. Mold Volume Factor	K.	30.11	30.11	30.11	30.11	30.11	30.11
L. Wet Density	J*K	93.4	95.1	94.7	90.0	87.1	-126492.1
M. Dry Density	L/(1+F)	**67.8**	**71.4**	**72.0**	**69.6**	**69.0**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☐ Manual Hammer ☒ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Moisture - Density Report

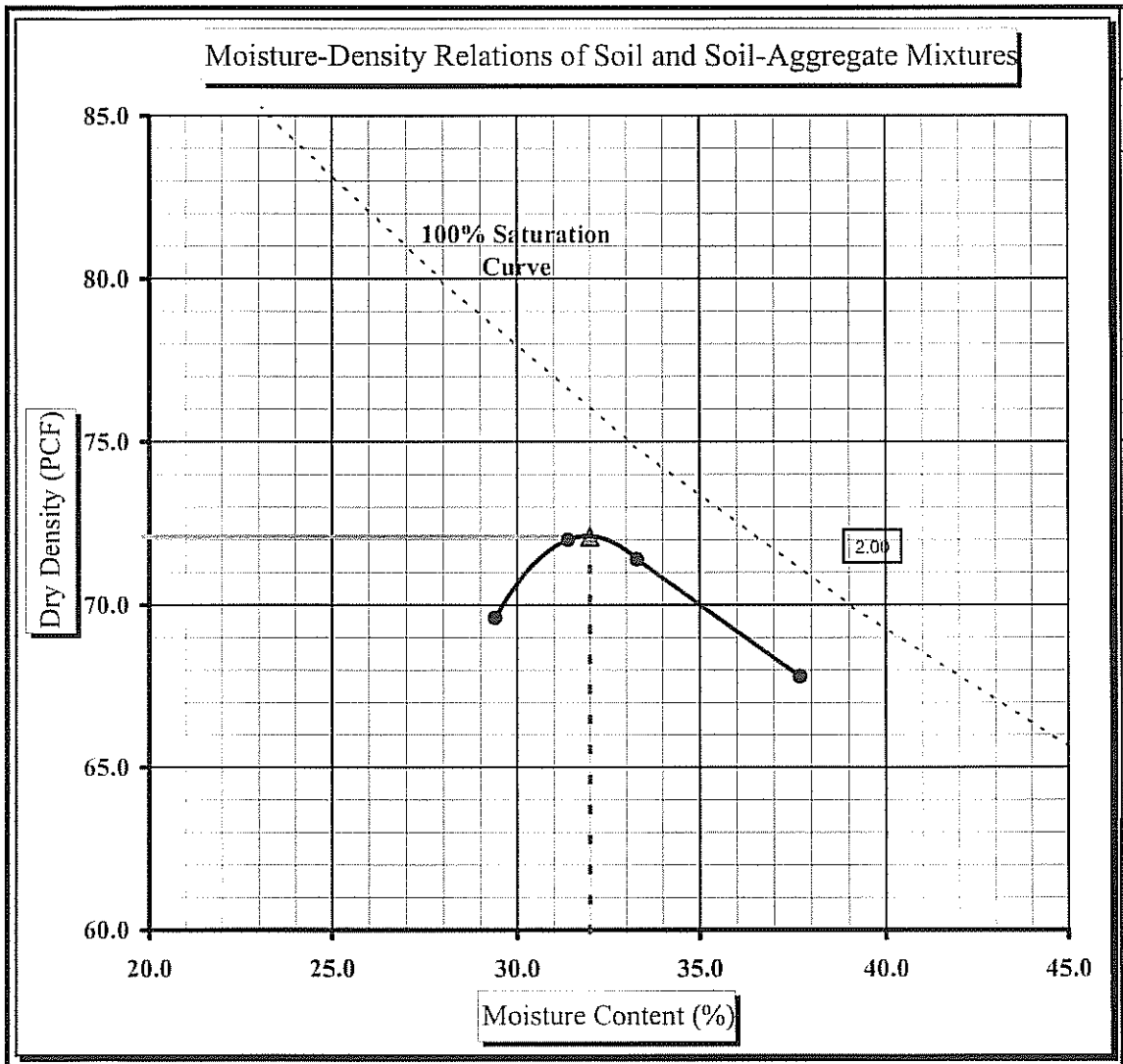
S&ME

S&ME Project #: **1356-06-825 Ph. 9** Report Date: November 22, 2008
Project Name: **Allen Steam Station RAB Ash Landfill** Test Date(s): 11/18-22/08
Client Name:
Client Address:

Boring #: Sample #: 12 Sample Date: October 30, 2008
Location: Fly Ash for Cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash / Soil Mix [Brown Gray Clayey Silt (ML) with Fine Sand]

Maximum Dry Density 72.1 PCF. **Optimum Moisture Content 32.0 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: 40

Plastic Limit: 39

Plastic Index: 1

Specific Gravity:

% Passing

3/4"
1/2"
3/8"
#4 99.8

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☐ Manual Hammer ☒ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

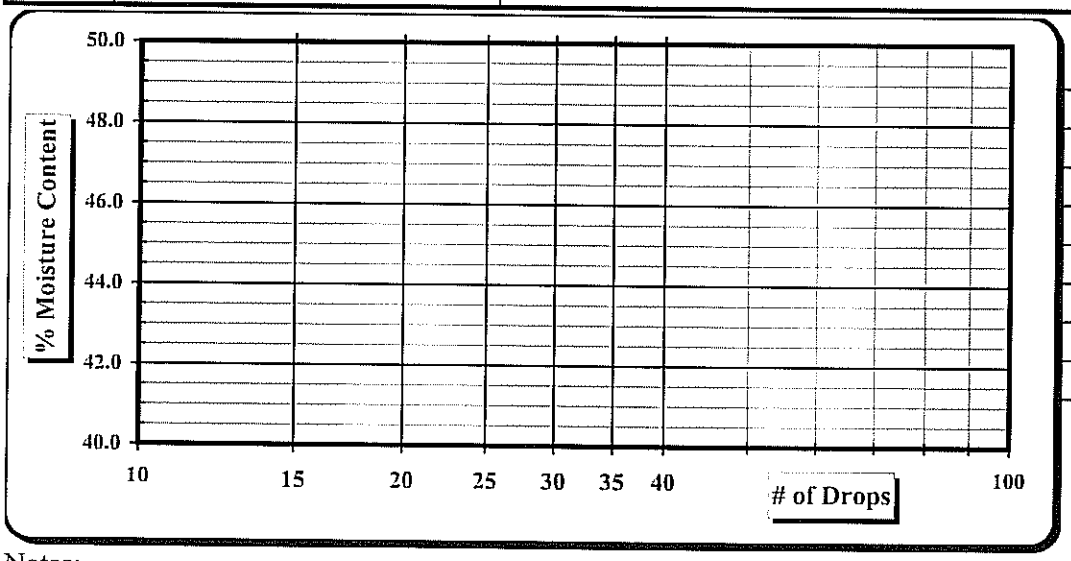
S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/3/08
Test Date(s): 11/11/08-12/3/08

Boring #: Sample #: 13 Sample Date: 11/3/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	17						33	SSS	
A	Tare Weight	13.98						**15.89**	16.54	
B	Wet Soil Weight + A	22.96						21.90	24.32	
C	Dry Soil Weight + A	20.60						20.28	22.26	
D	Water Weight (B-C)	2.36						1.62	2.06	
E	Dry Soil Weight (C-A)	6.62						4.39	5.72	
F	% Moisture Content (D/E)*100	35.6%						36.9%	36.0%	
N	# OF DROPS	27						*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR	**35.9%**								
Ave.	Average	35.9%						36.5%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Ph. 9**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 11/11-25/08
Report Date: 11/25/08

Boring #: Sample #: 13 Sample Date: 11/3/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Pan #:	MDJ	Beaker #:	C
Hydrometer Jar #:			4
Pan Tare Weight (grams):			0.00
Total Sample Air Dried Wt. + tare wt. (grams):			271.46
Weight of Total Sample Air Dried:			271.46
Weight of Air Dried Hydrometer Sample (g):			50.00
Total Sample Oven Dried:			270.55
Hydrometer Sample Oven Dried (W):			49.83
% Passing #10:			99.9%
Correction Factor a (Table 1):			1.09

Apparent Relative Density (Assumed) 2.180

	Moisture Content	Hygroscopic	Natural
	Tare #	23	
A	Tare Wt.	14.07	
B	Wet Wt. + A	26.01	
C	Dry Wt. + A	25.97	
D	Water Wt. (B-C)	0.04	
E	Dry Wt. (C-A)	11.90	
	% Moisture (100 x D/E)	0.34%	

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		5	100.0%
1/2"			100.0%
3/8"	0.0		100.0%
#4	0.1	Soil Mortar	100.0%
#10	0.2	**100.0%**	99.9%
#20	0.1	99.8%	99.8%
#40	0.4	99.3%	99.2%
#60	1.0	98.1%	98.0%
#100	3.7	92.6%	92.6%
#200	7.6	84.8%	84.8%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	15.2%	< 4.74 mm and > 0.075 mm
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	84.8%	< 0.075
Coarse Sand:	0.0%	< 4.75 mm and > 2.00 mm	Silt:	81.8%	< 0.075 and > 0.005 mm
Medium Sand:	0.7%	< 2.00 mm and > 0.425 mm	Clay:	3.0%	< 0.005 mm
Fine Sand:	14.5%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm

Type: Mechanical Stirring Apparatus (A)
Dispersion Time: 1 min.
Sodium Hexametaphosphate: 40 g./ Liter

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP**

Control Cylinder ☒ **Composite Correction** ☐
Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	23.0	39.5	4.0		35.50	77.7%	77.6%	10.5	0.01557	0.05040
	2	23.0	27.5	4.0		23.50	51.4%	51.4%	12.4	0.01557	0.03884
	5	23.0	12.0	4.0		8.00	17.5%	17.5%	15.0	0.01557	0.02696
	15	23.0	8.5	4.0		4.50	9.8%	9.8%	15.6	0.01557	0.01586
	30	23.0	7.0	4.0		3.00	6.6%	6.6%	15.8	0.01557	0.01130
	60	23.0	6.0	4.0		2.00	4.4%	4.4%	16.0	0.01557	0.00803
	250	23.0	5.0	4.0		1.00	2.2%	2.2%	16.1	0.01557	0.00396
	1440	21.5	5.0	4.5		0.50	1.1%	1.1%	16.2	0.01585	0.00168

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly

Signature *Position*

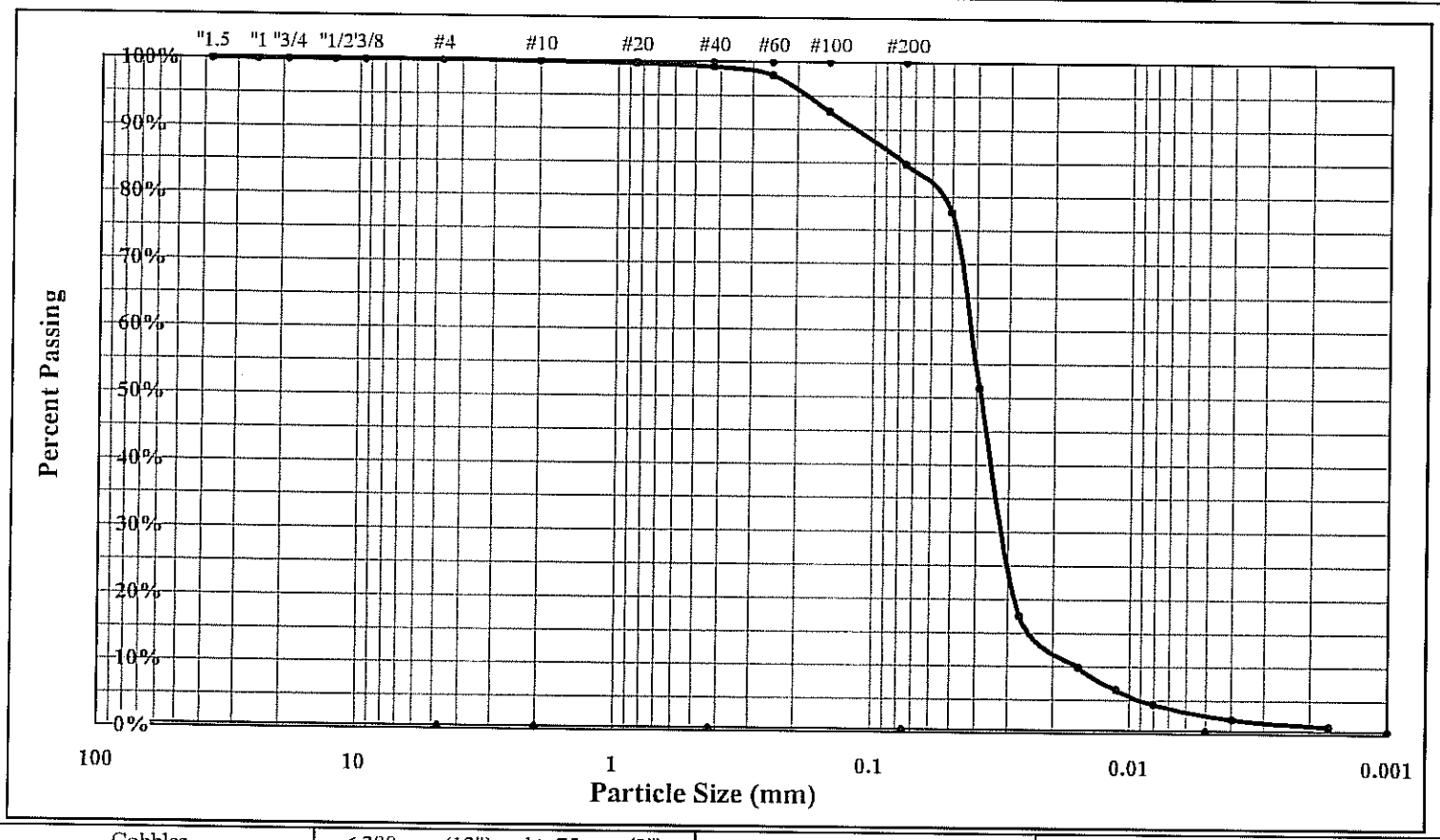
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	11/25/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	11/11-25/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	13	Sample Date:	11/3/08
Location:	Fly ash for cell 1 SG	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray 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	0	Gravel	0.0%	Silt	81.8%
Silt & Clay (% Passing #200)	84.8%	Sand	15.2%	Clay	3.0%
Apparent Relative Density (Assumed)	2.180	Moisture Content		Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature Position

Moisture - Density Relationship

S&ME Project #: **1356-06-825 Ph. 9** Test Date(s): 11/24/08-12/1/08
Project Name: Allen Steam Station RAB Ash Landfill Report Date: December 1, 2008
Client Name:
Client Address:
Boring #: Sample #: 13 Sample Date: November 3, 2008
Location: Fly Ash for Cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Liquid Limit: NP Specific Gravity:
Plastic Limit: NP Plastic Index: NP

Natural Moisture Content:
Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 73.1 **Opt. MC %:** 30.9

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	152	202	253	106		
	Tare #:	KH	PMB	13	EL		
A. Tare Weight	A.	156.9	159.9	155.4	157.1		
B. Wet Wt + Tare Wt	B.	808.9	707.6	716.8	938.3		
C. Dry Wt. + Tare Wt.	C.	656.5	570.8	567.4	764		
D. Water Weight	B-C	152.4	136.8	149.4	174.3	0	0
E. Dry Weight	C-A	499.6	410.9	412	606.9	0	0
F. Moisture Content	100*D/E	**30.5**	**33.3**	**36.3**	**28.7**	**#DIV/0!**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5616	5635	5624	5576		
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1443.000	1462.000	1451.000	1403.000	-4173.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.181	3.223	3.199	3.093	-4173.000	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	95.4	96.7	95.9	92.8	-125148.3	-125148.3
M. Dry Density	L/(1+F)	**73.1**	**72.5**	**70.4**	**72.1**	**#DIV/0!**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐
Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez
Technical Responsibility: Ken Daly

Certification #
Signature *Position*

Moisture - Density Report

S&ME

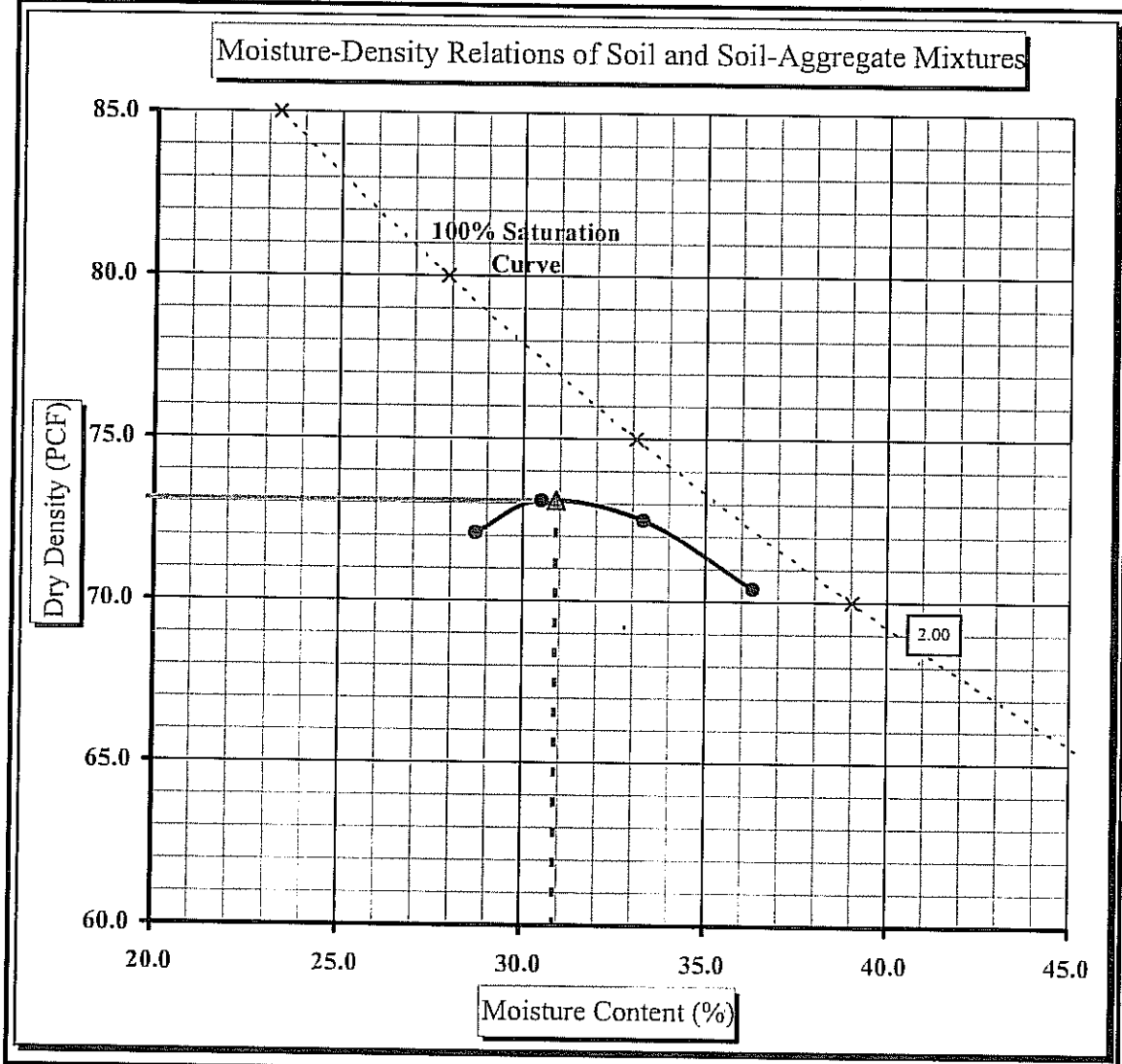
S&ME Project #: **1356-06-825 Ph. 9**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name:
Client Address:

Report Date: December 1, 2008
Test Date(s): 11/24/08-12/1/08

Boring #: Sample #: 13 Sample Date: November 3, 2008
Location: Fly Ash for Cell 1 subgrade Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Maximum Dry Density **73.1** **PCF.** **Optimum Moisture Content** **30.9** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: NP

Plastic Limit: NP

Plastic Index: NP

Specific Gravity:

% Passing

3/4"
1/2"
3/8"
#4 100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

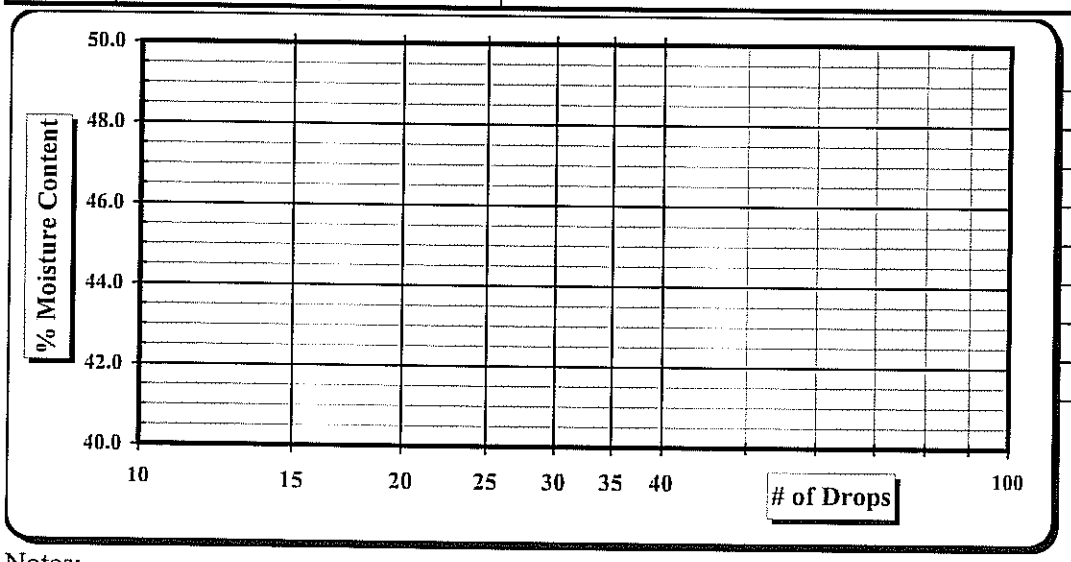
S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/3/08
Test Date(s): 11/11/08-12/3/08

Boring #: Sample #: 14 Sample Date: 11/3/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	24						41	PO	
A	Tare Weight	13.86						**15.77**	15.11	
B	Wet Soil Weight + A	24.12						21.79	21.61	
C	Dry Soil Weight + A	21.43						20.19	19.88	
D	Water Weight (B-C)	2.69						1.60	1.73	
E	Dry Soil Weight (C-A)	7.57						4.42	4.77	
F	% Moisture Content (D/E)*100	35.5%						36.2%	36.3%	
N	# OF DROPS	23						*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR	**35.1%**								
Ave.	Average	35.1%						36.2%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926 (Certification #)

Technical Responsibility: Ken Daly (Signature) (Position)

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Ph. 9**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 11/11-25/08
Report Date: 11/25/08

Boring #: Sample #: 14 Sample Date: 11/3/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML)]

Pan #:	539	Beaker #:	II	**Apparent Relative Density (Assumed)**		**2.180**	
Hydrometer Jar #:			CZ				
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):			311.20		Tare #	VV	
Weight of Total Sample Air Dried:			311.20	A	Tare Wt.	16.01	
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	27.31	
Total Sample Oven Dried:			309.55	C	Dry Wt. + A	27.25	
Hydrometer Sample Oven Dried (W):			49.73	D	Water Wt. (B-C)	0.06	
% Passing #10:			99.8%	E	Dry Wt. (C-A)	11.24	
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.53%	

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		FF	100.0%
1/2"			100.0%
3/8"	0.0		100.0%
#4	0.4	Soil Mortar	99.9%
#10	0.7	**100.0%**	99.8%
#20	0.2	99.7%	99.4%
#40	0.5	98.9%	98.7%
#60	1.0	97.9%	97.7%
#100	2.2	95.5%	95.3%
#200	6.4	87.2%	87.0%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	12.9%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.1%	< 75 mm and > 4.75 mm	Silt & Clay:	87.0%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.1%	< 4.75 mm and > 2.00 mm	Silt:	83.0%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	1.1%	< 2.00 mm and > 0.425 mm	Clay:	4.0%	< 0.005 mm		
Fine Sand:	11.7%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	23.0	41.0	4.0		37.00	81.1%	80.9%	10.2	0.01557	0.04980
	2	23.0	35.0	4.0		31.00	67.9%	67.8%	11.2	0.01557	0.03687
	5	23.0	18.5	4.0		14.50	31.8%	31.7%	13.9	0.01557	0.02598
	15	23.0	11.0	4.0		7.00	15.3%	15.3%	15.1	0.01557	0.01565
	30	23.0	9.0	4.0		5.00	11.0%	10.9%	15.5	0.01557	0.01119
	60	23.0	7.0	4.0		3.00	6.6%	6.6%	15.8	0.01557	0.00799
	250	23.0	5.5	4.0		1.50	3.3%	3.3%	16.0	0.01557	0.00395
	1440	22.0	5.0	4.0		1.00	2.2%	2.2%	16.1	0.01575	0.00167

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B =67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

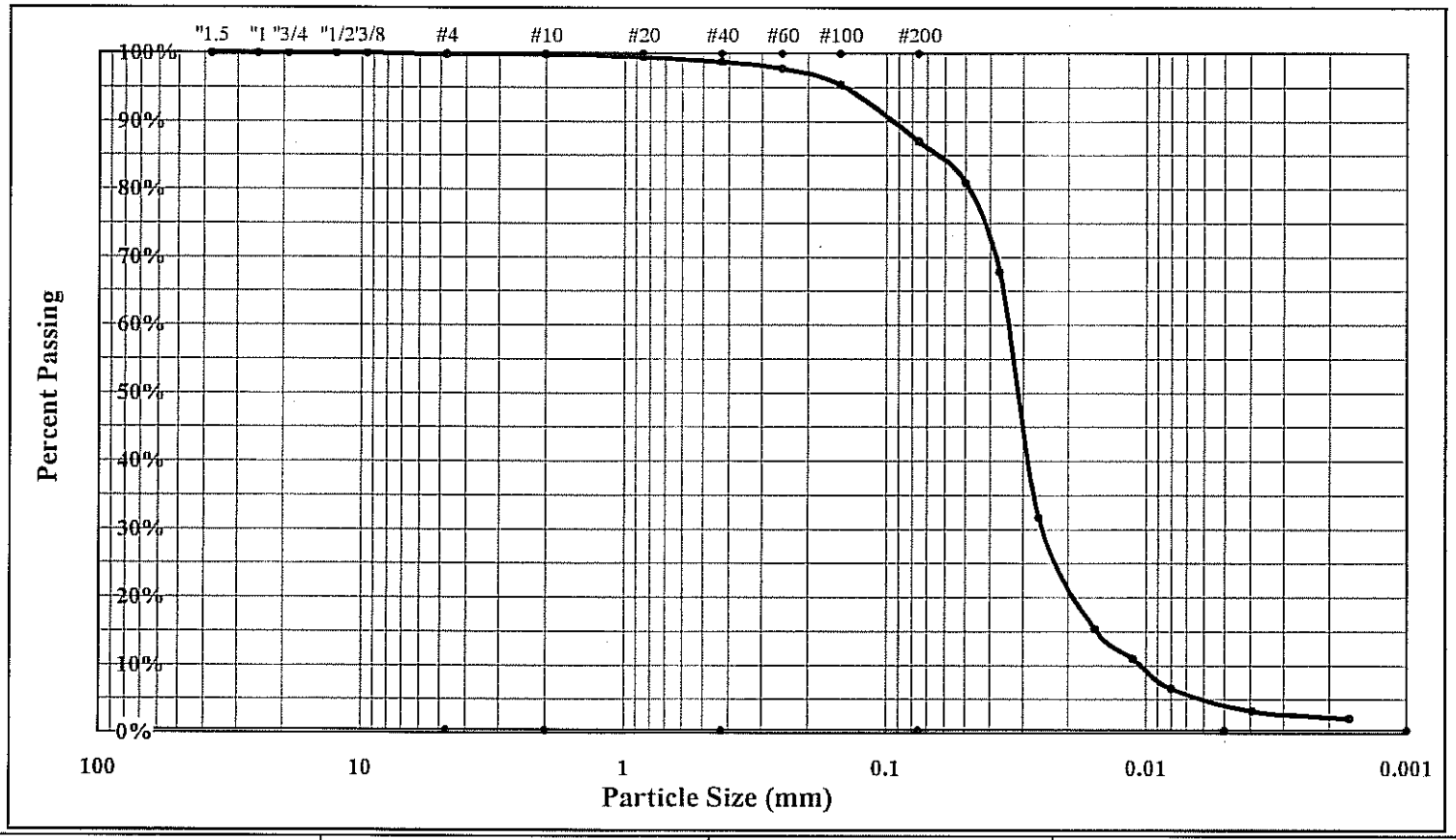
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	11/25/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	11/11-25/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	14	Sample Date:	11/3/08
Location:	Fly ash for cell 1 SG	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray 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	0	Gravel	0.1%	Silt	83.0%
Silt & Clay (% Passing #200)	87.0%	Sand	12.9%	Clay	4.0%
Apparent Relative Density (Assumed)	2.180	Moisture Content		Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME

S&ME Project #:	**1356-06-825 Phase 9**	Test Date(s):	11/24/-12/12/08
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	December 12, 2008
Client Name:	Duke Energy		
Project Address:			
Boring #:	Sample #: 14	Sample Date:	
Location: Fill Area	Offset:	Depth:	Bulk
Sample Description:	Black Gray Silt (ML) Fly Ash		

Liquid Limit: NP Specific Gravity:

Plastic Limit: NP Plastic Index: NP

Natural Moisture Content:

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	100.0
#4	99.9

MDD: 72.9 **Opt. MC %:** 28.2

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:						
	Tare #:						
A. Tare Weight	A.	152.85	154.93	155.56	155.04	152.71	157.56
B. Wet Wt + Tare Wt	B.	719.32	926.37	761.6	992.65	919.58	933.05
C. Dry Wt. + Tare Wt.	C.	588.74	798.47	656.21	830.35	759.66	761.42
D. Water Weight	B-C	130.58	127.9	105.39	162.3	159.92	171.63
E. Dry Weight	C-A	435.89	643.54	500.65	675.31	606.95	603.86
F. Moisture Content	100*D/E	**30.0%**	**19.9%**	**21.1%**	**24.0%**	**26.3%**	**28.4%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5631	5449	5413	5523	5560	5589
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1458.000	1276.000	1240.000	1350.000	1387.000	1416.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.214	2.813	2.734	2.976	3.058	3.122
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	96.4	84.4	82.0	89.3	91.7	93.6
M. Dry Density	L/(1+F)	**74.2**	**70.4**	**67.7**	**72.0**	**72.6**	**72.9**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☐ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez

Certification #

Technical Responsibility: Ken Daly

Signature

Project Engineer

Position

Moisture - Density Report

S&ME

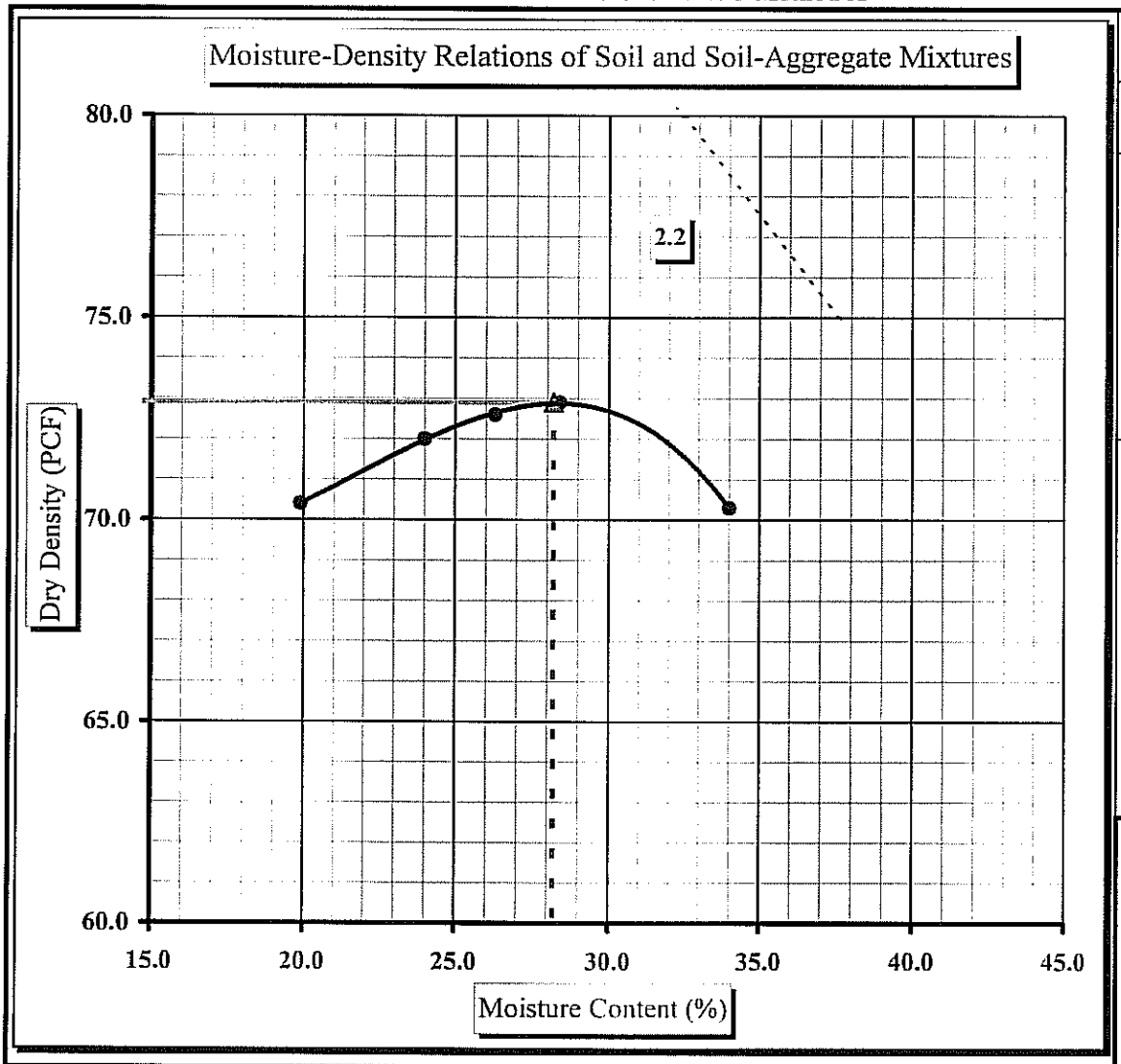
S&ME Project #: **1356-06-825 Phase 9**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name: Duke Energy
Project Address:

Report Date: December 12, 2008
Test Date(s): 11/24/-12/12/08

Boring #: Sample #: 14 Sample Date:
Location: Fill Area Offset: Depth: Bulk
Sample Description: Black Gray Silt (ML) Fly Ash

Maximum Dry Density 72.9 PCF. **Optimum Moisture Content 28.2 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: NP

Plastic Limit: NP

Plastic Index: NP

Specific Gravity:

% Passing

3/4"	
1/2"	
3/8"	100
#4	99.9

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☐ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

Liquid Limit, Plastic Limit, and Plastic Index

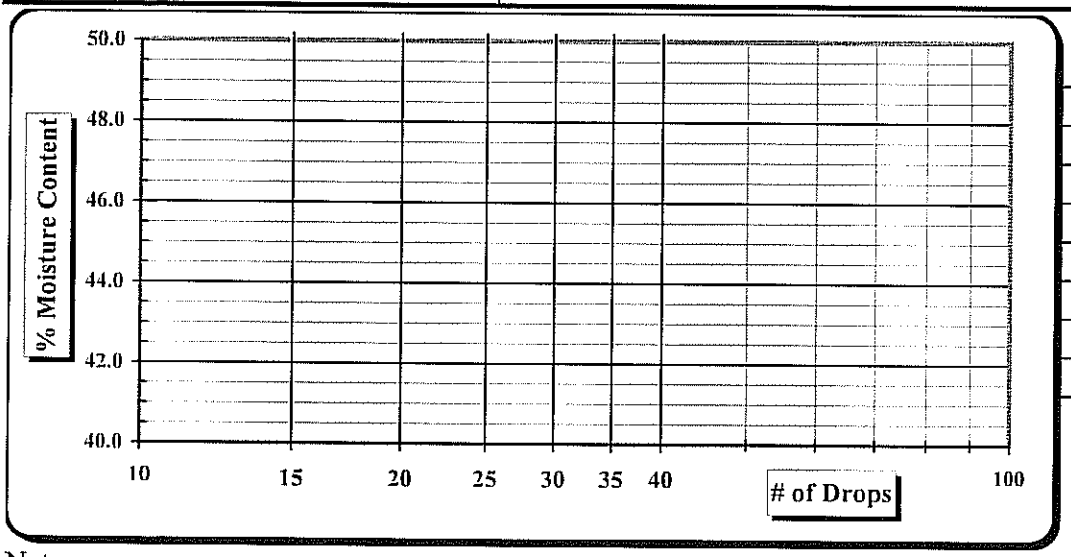
S&ME

Project #: **1356-06-825 Phase 9**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/9/08
Test Date(s): 12/2-9/08

Boring #: Sample #: 15 Sample Date: 11/6/08
Location: Alternate Borrow Site Soil Offset: Depth: Bulk
Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Karen Warner 117900 (Certification #)

Technical Responsibility: Ken Daly (Signature) Project Engineer (Position)

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Phase 9**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 12/1-12/08
Report Date: 12/12/08

Boring #: Sample #: 15 Sample Date: 11/19/08
Location: Alernate Borrow Site Soil Offset: Depth: Bulk
Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Pan #:		Beaker #:	
Hydrometer Jar #:			
Pan Tare Weight (grams):			
Total Sample Air Dried Wt. + tare wt. (grams):	357.80		
Weight of Total Sample Air Dried:	357.80		
Weight of Air Dried Hydrometer Sample (g):	50.00		
Total Sample Oven Dried:	356.26		
Hydrometer Sample Oven Dried (W):	49.78		
% Passing #10:	100.0%		
Correction Factor a (Table 1):	1.09		

Apparent Relative Density (Assumed) 2.200

	Moisture Content	Hygroscopic	Natural
	Tare #	25	699
A	Tare Wt.	14.33	155.80
B	Wet Wt. + A	25.92	514.30
C	Dry Wt. + A	25.87	479.00
D	Water Wt. (B-C)	0.05	35.30
E	Dry Wt. (C-A)	11.54	323.20
	% Moisture (100 x D/E)	0.43%	10.9%

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		100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.0	**100.0%**	100.0%
#20	0.1	99.8%	99.8%
#40	0.3	99.3%	99.3%
#60	0.8	98.5%	98.5%
#100	2.3	95.4%	95.4%
#200	7.8	84.3%	84.3%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	15.7%	< 4.74 mm and > 0.075 mm	Type: Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	84.3%	< 0.075	Dispersion Time: 1 min.
Coarse Sand:	0.0%	< 4.75 mm and > 2.00 mm	Silt:	80.3%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate: 40 g./ Liter
Medium Sand:	0.7%	< 2.00 mm and > 0.425 mm	Clay:	4.0%	< 0.005 mm	
Fine Sand:	15.0%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒ **Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	20.5	41.0	5.0		36.00	78.8%	78.8%	10.4	0.01591	0.05127
	2	20.5	35.5	5.0		30.50	66.8%	66.8%	11.3	0.01591	0.03780
	5	20.5	18.0	5.0		13.00	28.5%	28.5%	14.2	0.01591	0.02677
	15	20.5	10.5	5.0		5.50	12.0%	12.0%	15.4	0.01591	0.01611
	30	20.5	9.5	5.0		4.50	9.9%	9.9%	15.6	0.01591	0.01145
	60	20.5	7.5	5.0		2.50	5.5%	5.5%	15.9	0.01591	0.00818
	250	20.5	6.5	5.0		1.50	3.3%	3.3%	16.0	0.01591	0.00403
	1440	21.0	5.0	4.5		0.50	1.1%	1.1%	16.2	0.01581	0.00168

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Project Engineer* *Position*

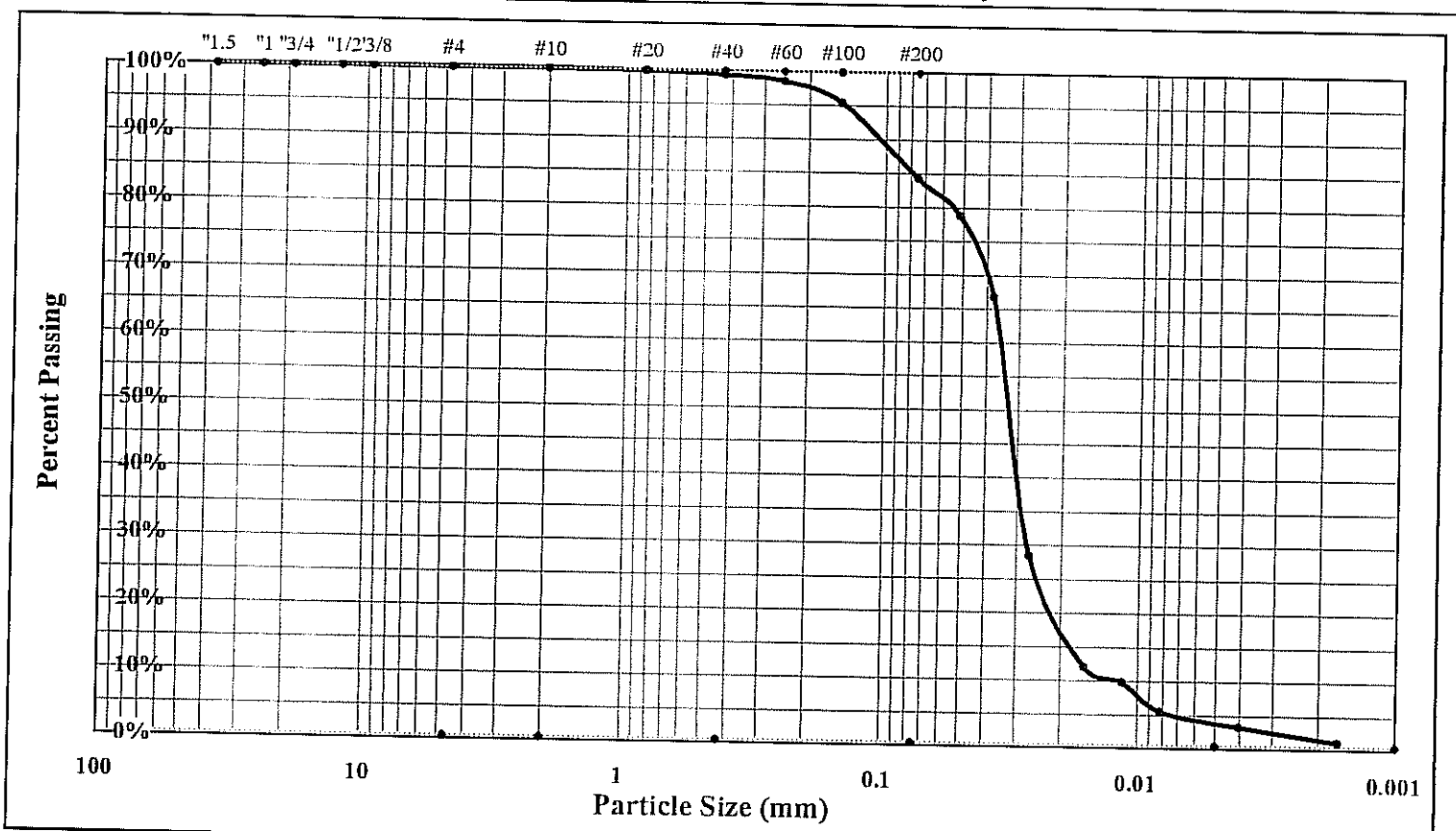
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825 Phase**	Report Date:	12/12/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/1-12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:	Sample #: 15	Sample Date:	11/19/08
Location: Alernate Borrow Site Soil	Offset:	Depth:	Bulk
Sample Description: Black Gray Silt w/Medium to Fine Sand (ML)		Fly Ash	



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	0	Gravel	0.0%	Silt	80.3%
Silt & Clay (% Passing #200)	84.3%	Sand	15.7%	Clay	4.0%
Apparent Relative Density (Assumed)	2.200	Moisture Content	10.9%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP
Oven Temperature Set at 60C					

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Ken Daly _____ Signature Project Engineer Position

Moisture - Density Relationship

S&ME

S&ME Project #:	**1356-06-825 Phase 9**	Test Date(s):	12/4-12/08
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	December 12, 2008
Client Name:	Duke Energy		
Project Address:			
Boring #:	Sample #: 15	Sample Date:	November 6, 2008
Location:	Alternate Borrow Site Soil Offset:	Depth:	Bulk
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		

Liquid Limit: NP Specific Gravity:

Plastic Limit: NP Plastic Index: NP

Natural Moisture Content: 10.9%

Moisture Content of the Oversize Fraction:

NOTES: Oven Temperature Set at 60C

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 72.1 **Opt. MC %: 31.1**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

Sample #:							
Water Added:							
Tare #:							
A. Tare Weight	A.	157.8	157.54	167.08	155.64	153.85	154.98
B. Wet Wt + Tare Wt	B.	807.55	669.07	841.59	765.93	652.14	880.53
C. Dry Wt. + Tare Wt.	C.	659.61	567.96	699.74	619.22	525.47	686.78
D. Water Weight	B-C	147.94	101.11	141.85	146.71	126.67	193.75
E. Dry Weight	C-A	501.81	410.42	532.66	463.58	371.62	531.8
F. Moisture Content	100*D/E	**29.5%**	**24.6%**	**26.6%**	**31.6%**	**34.1%**	**36.4%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5566	5482	5510	5618	5595	5581
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1393.000	1309.000	1337.000	1445.000	1422.000	1408.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.071	2.886	2.948	3.186	3.135	3.104
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	92.1	86.5	88.4	95.5	94.0	93.1
M. Dry Density	L/(1+F)	**71.1**	**69.4**	**69.8**	**72.6**	**70.1**	**68.2**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☐ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez

Technical Responsibility: Ken Daly

Certification #

Signature

Project Engineer

Position

Moisture - Density Report

S&ME

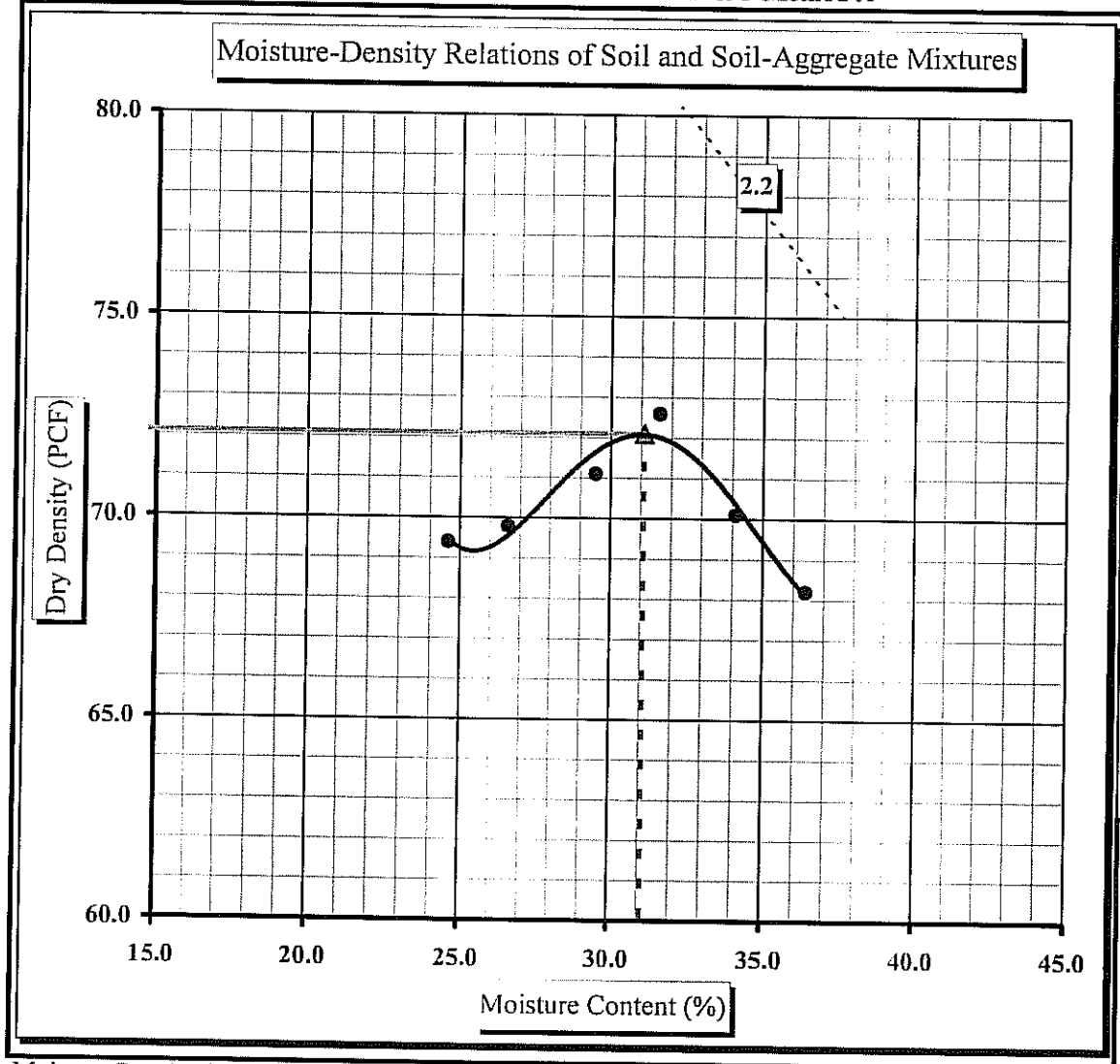
S&ME Project #: **1356-06-825 Phase 9**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name: Duke Energy
Project Address:

Report Date: December 12, 2008
Test Date(s): 12/4-12/08

Boring #: Sample #: 15 Sample Date: November 6, 2008
Location: Alternate Borrow Site Soil Offset: Depth: Bulk
Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Maximum Dry Density **72.1** **PCF.** **Optimum Moisture Content** **31.1** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	10.9%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

Liquid Limit, Plastic Limit, and Plastic Index

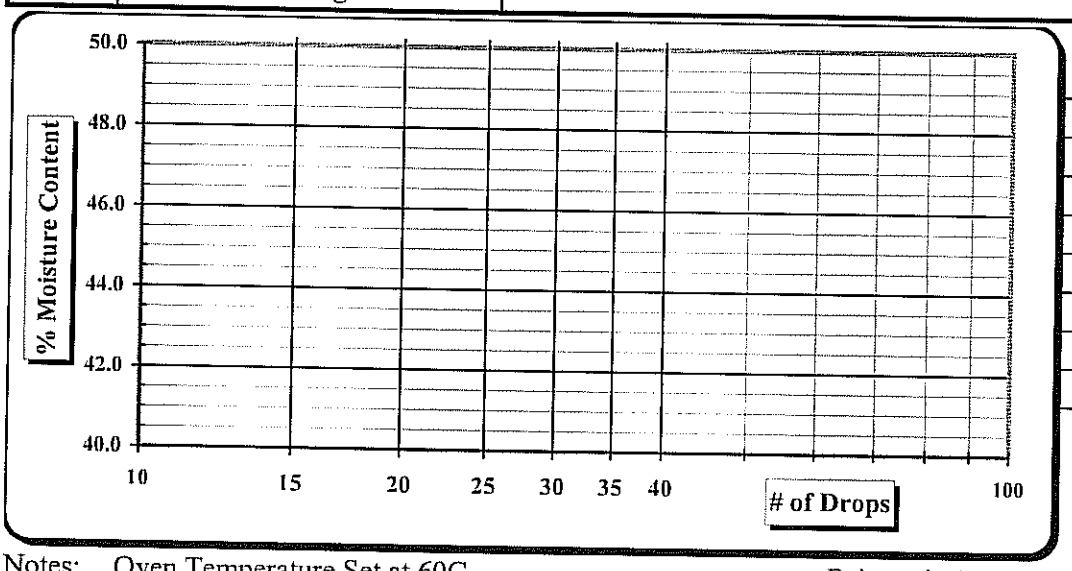
S&ME

Project #: **1356-06-825 Phase 9**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/11/08
Test Date(s): 12/11/08

Boring #: Sample #: 16 Sample Date: 11/6/08
Location: On Site Offset: Depth: Bulk
Sample Description: Black Gray Medium to Fine Sandy Silt (ML) Fly Ash

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Oven Temperature Set at 60C

Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic ☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol

Technician Name: Karen Warner 117900 (Certification #)

Technical Responsibility: Ken Daly _____ (Signature) Project Engineer

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Phase 9**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 12/1-12/08
Report Date: 12/12/08

Boring #: Sample #: 16 Sample Date: 11/6/08
Location: Offset: Depth: Bulk
Sample Description: Black Gray Medium to Fine Sandy Silt (ML) Fly Ash

Pan #:		Beaker #:	
Hydrometer Jar #:			
Pan Tare Weight (grams):			
Total Sample Air Dried Wt. + tare wt. (grams):	399.13		
Weight of Total Sample Air Dried:	399.13		
Weight of Air Dried Hydrometer Sample (g):	50.04		
Total Sample Oven Dried:	397.97		
Hydrometer Sample Oven Dried (W):	49.89		
% Passing #10:	99.8%		
Correction Factor a (Table 1):	1.09		

Apparent Relative Density (Assumed) 2.200

	Moisture Content	Hygroscopic	Natural
	Tare #	50	Jazz
A	Tare Wt.	15.77	81.19
B	Wet Wt. + A	26.05	299.51
C	Dry Wt. + A	26.02	283.26
D	Water Wt. (B-C)	0.03	16.25
E	Dry Wt. (C-A)	10.25	202.07
	% Moisture (100 x D/E)	0.29%	8.0%

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		100.0%
#4	0.3	Soil Mortar	99.9%
#10	0.9	**100.0%**	99.8%
#20	2.3	95.4%	95.2%
#40	5.3	89.5%	89.3%
#60	8.4	83.3%	83.1%
#100	13.2	73.5%	73.4%
#200	22.1	55.7%	55.6%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	44.4%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.1%	< 75 mm and > 4.75 mm	Silt & Clay:	55.6%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.2%	< 4.75 mm and > 2.00 mm	Silt:	51.6%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	10.5%	< 2.00 mm and > 0.425 mm	Clay:	4.0%	< 0.005 mm		
Fine Sand:	33.7%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	2	20.5	27.5	5.0		22.50	49.2%	49.0%	12.6	0.01591	0.03993
	5	20.5	11.5	5.0		6.50	14.2%	14.2%	15.2	0.01591	0.02776
	15	20.5	9.5	5.0		4.50	9.8%	9.8%	15.6	0.01591	0.01620
	30	20.5	8.5	5.0		3.50	7.6%	7.6%	15.7	0.01591	0.01151
	60	20.5	7.5	5.0		2.50	5.5%	5.4%	15.9	0.01591	0.00818
	250	20.5	6.5	5.0		1.50	3.3%	3.3%	16.0	0.01591	0.00403
	1440	20.5	6.0	4.5		1.50	3.3%	3.3%	16.0	0.01591	0.00168
						#VALUE!	#VALUE!	3.3%	#VALUE!	#N/A	#N/A

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Karen Warner 117900 *Certification #*

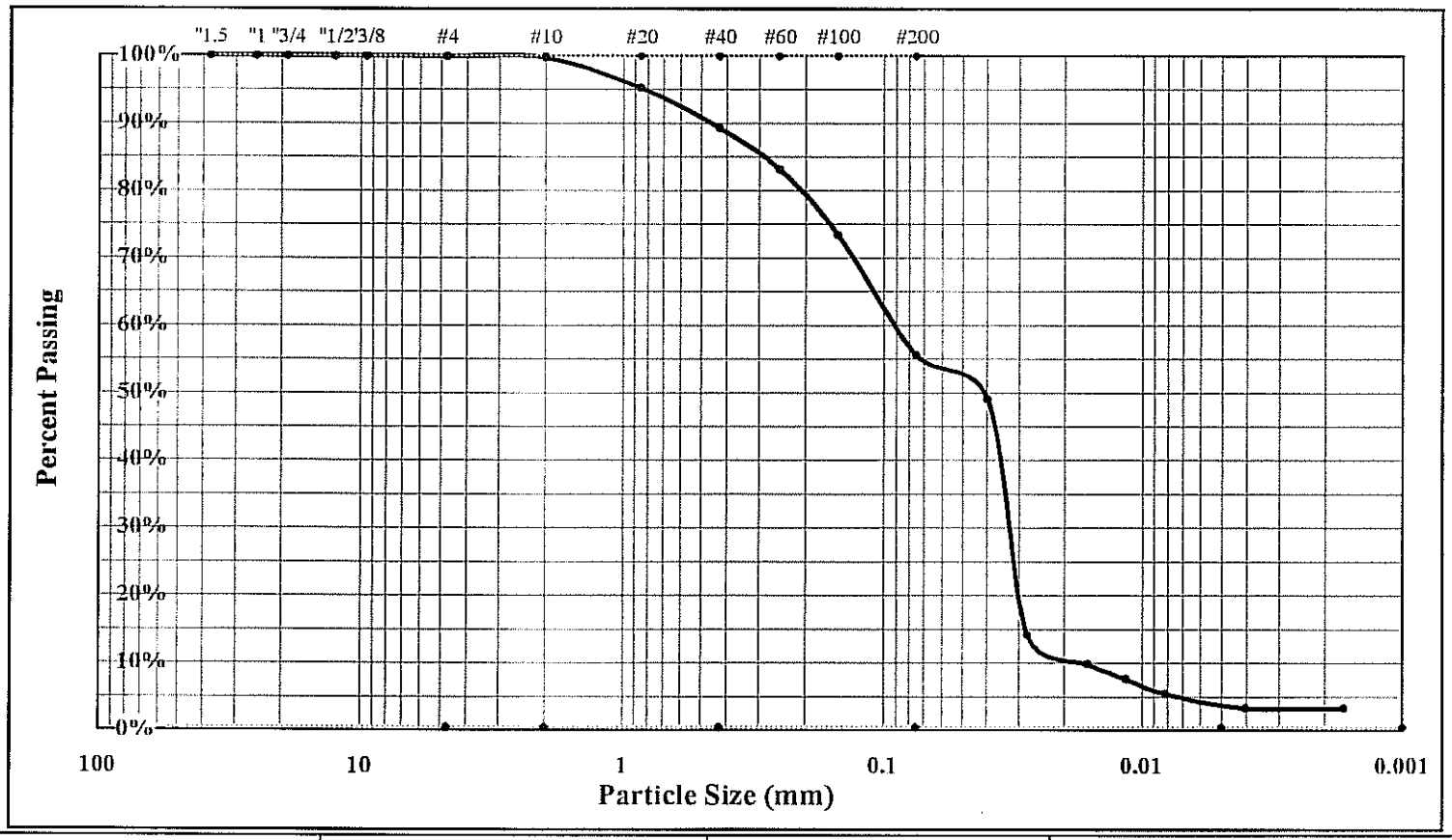
Technical Responsibility: Ken Daly _____ *Signature* *Project Engineer* *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825 Phase**	Report Date:	12/12/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/1-12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	16	Sample Date:	11/6/08
Location:		Offset:		Depth:	Bulk
Sample Description:	Black Gray Medium to Fine Sandy Silt (ML) Fly Ash				



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	0	Gravel	0.1%	Silt	51.6%
Silt & Clay (% Passing #200)	55.6%	Sand	44.4%	Clay	4.0%
Apparent Relative Density (Assumed)	2.200	Moisture Content	8.0%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Oven Temperature Set at 60C

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature Position

Moisture - Density Relationship

S&ME

S&ME Project #:	**1356-06-825 Phase 9**	Test Date(s):	12/3-12/08
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	December 12, 2008
Client Name:	Duke Energy		
Project Address:			
Boring #:	Sample #: 16	Sample Date:	November 6, 2008
Location: On Site	Offset:	Depth:	Bulk
Sample Description:	Black Gray Medium to Fine Sandy Silt (ML) Fly Ash		

Liquid Limit: NP Specific Gravity:

Plastic Limit: NP Plastic Index: NP

Natural Moisture Content: 8.0%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	100.0
#4	99.9

MDD: 71.5 **Opt. MC %: 28.4**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:						
	Tare #:						
A. Tare Weight	A.	156.74	159.71	160.67	155.83	155.99	154.31
B. Wet Wt + Tare Wt	B.	733.04	771.09	871.5	785.55	900.64	922.26
C. Dry Wt. + Tare Wt.	C.	587.69	664.13	734.32	655.26	736.58	743.28
D. Water Weight	B-C	145.35	106.96	137.18	130.29	164.06	178.98
E. Dry Weight	C-A	430.95	504.42	573.65	499.43	580.59	588.97
F. Moisture Content	100*D/E	**33.7%**	**21.2%**	**23.9%**	**26.1%**	**28.3%**	**30.4%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5568	5460	5497	5523	5566	5573
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1395.000	1287.000	1324.000	1350.000	1393.000	1400.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.075	2.837	2.919	2.976	3.071	3.086
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	92.2	85.1	87.5	89.3	92.1	92.6
M. Dry Density	L/(1+F)	**69.0**	**70.2**	**70.6**	**70.8**	**71.8**	**71.0**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez

Technical Responsibility: Ken Daly

Certification #

Signature

Project Engineer

Position

Moisture - Density Report

S&ME

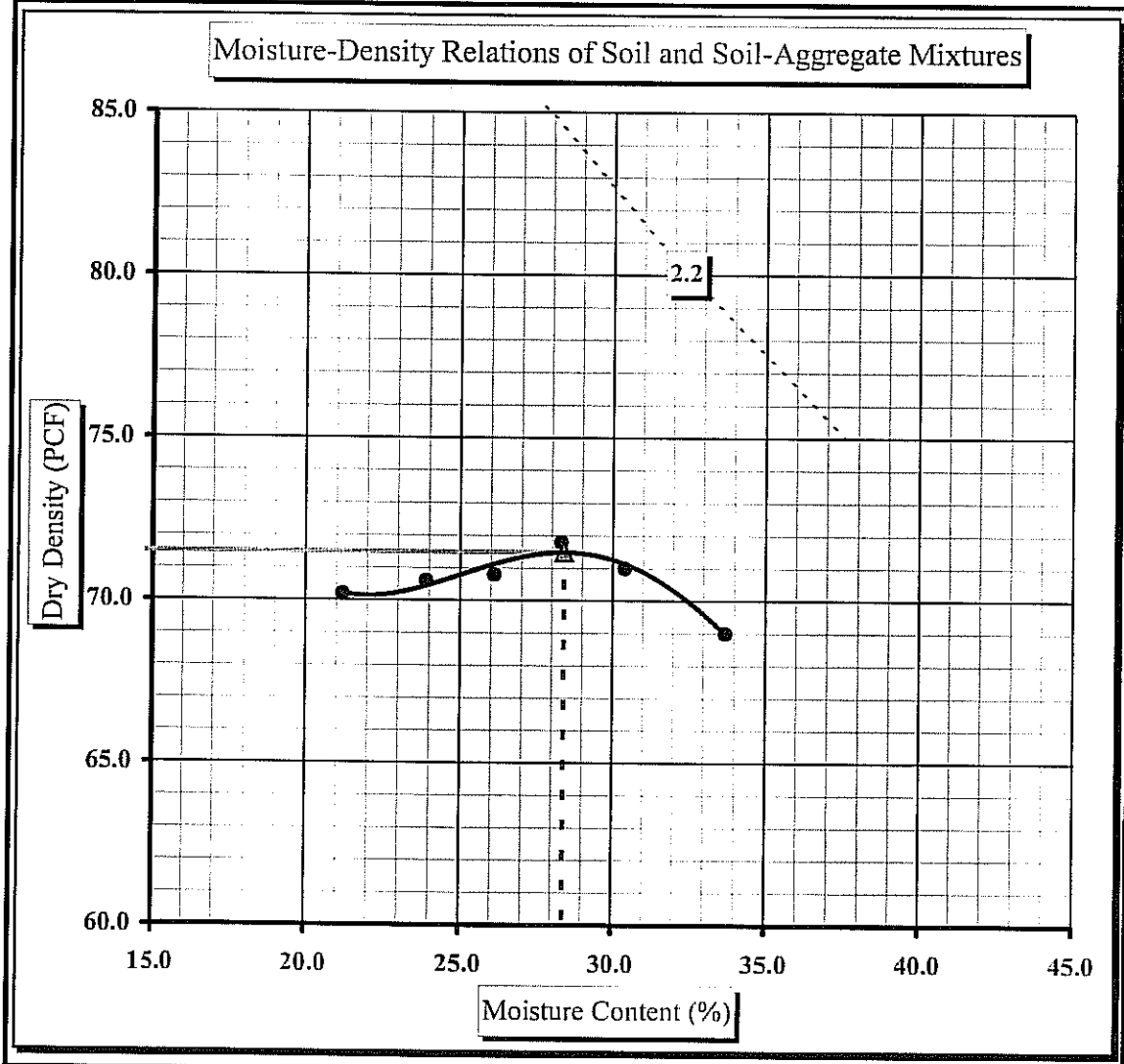
S&ME Project #: **1356-06-825 Phase 9**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name: Duke Energy
Project Address:

Report Date: December 12, 2008
Test Date(s): 12/3-12/08

Boring #: Sample #: 16 Sample Date: November 6, 2008
Location: On Site Offset: Depth: Bulk
Sample Description: Black Gray Medium to Fine Sandy Silt (ML) Fly Ash

Maximum Dry Density 71.5 PCF. **Optimum Moisture Content 28.4 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	8.0%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	100
#4	99.9

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

S&ME

Project #: **1356-06-825 Ph. 9** Report Date: 12/8/08

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 12/2-8/08

Client Name:

Client Address:

Sample by: Sample Dates: 11/19/08

Sampling Method:

Boring #	Sample #	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Wt.	Percent Moisture
		ft. or m.		grams	grams	grams	grams	%
	19		T-6	81.43	306.68	264.96	41.72	**22.7%**
	20		QQ	112.49	243.78	205.30	38.48	**41.5%**

Notes: Temperature used was 60 degrees Celsius.

References: ASTM D2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician Name: Eric Lopez / Jennifer Olsen / 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Liquid Limit, Plastic Limit, and Plastic Index

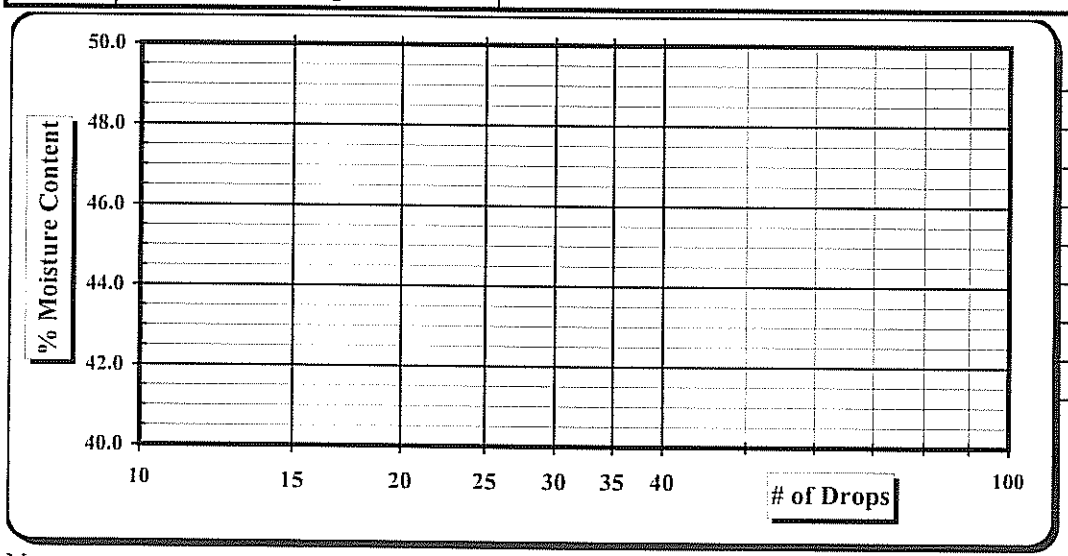
S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/9/08
Test Date(s): 12/2-9/08

Boring #: Sample #: 19 Sample Date: 11/19/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Ph. 9**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Test Date(s): 12/2-8/08
Report Date: 12/8/08

Boring #: Sample #: 19 Sample Date: 11/19/08
Location: Fly Ash for Cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Pan #:	L-42	Beaker #:	PDQ
Hydrometer Jar #:			CZ
Pan Tare Weight (grams):			0.00
Total Sample Air Dried Wt. + tare wt. (grams):			286.00
Weight of Total Sample Air Dried:			286.00
Weight of Air Dried Hydrometer Sample (g):			50.00
Total Sample Oven Dried:			280.84
Hydrometer Sample Oven Dried (W):			49.10
% Passing #10:			100.0%
Correction Factor a (Table 1):			1.09

Apparent Relative Density (Assumed) 2.180

	Moisture Content	Hygroscopic	Natural
	Tare #	OO	T-6
A	Tare Wt.	16.31	81.43
B	Wet Wt. + A	27.40	306.68
C	Dry Wt. + A	27.20	264.96
D	Water Wt. (B-C)	0.20	41.72
E	Dry Wt. (C-A)	10.89	183.53
	% Moisture (100 x D/E)	1.84%	22.7%

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		NN	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.1	**100.0%**	100.0%
#20	0.2	99.7%	99.6%
#40	0.5	98.9%	98.9%
#60	1.7	96.6%	96.5%
#100	5.2	89.5%	89.5%
#200	13.2	73.2%	73.2%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:		
% Gravel:	0.0%	< 75 mm and > 4.75 mm
Coarse Sand:	0.0%	< 4.75 mm and > 2.00 mm
Medium Sand:	1.1%	< 2.00 mm and > 0.425 mm
Fine Sand:	25.7%	< 0.425 mm and > 0.075 mm

Total Sand:	26.8%	< 4.74 mm and > 0.075 mm
Silt & Clay:	73.2%	< 0.075
Silt:	72.2%	< 0.075 and > 0.005 mm
Clay:	1.0%	< 0.005 mm
Colloids:		< 0.001 mm

Type: Mechanical Stirring Apparatus (A)
Dispersion Time: 1 min.
Sodium Hexametaphosphate: 40 g./ Liter

Control Cylinder ☒ **Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	2	21.0	28.5	4.0		24.50	54.4%	54.4%	12.3	0.01594	0.03949
	5	21.0	10.0	4.0		6.00	13.3%	13.3%	15.3	0.01594	0.02789
	15	21.0	7.5	4.0		3.50	7.8%	7.8%	15.7	0.01594	0.01632
	30	21.0	6.5	4.0		2.50	5.6%	5.5%	15.9	0.01594	0.01160
	60	21.0	6.0	4.0		2.00	4.4%	4.4%	16.0	0.01594	0.00822
	250	22.0	5.0	5.0		0.00	0.0%	0.0%	16.3	0.01575	0.00402
	1440	21.5	4.5	4.5		0.00	0.0%	0.0%	16.3	0.01585	0.00169
						#VALUE!	#VALUE!	0.0%	#VALUE!	#N/A	#N/A

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly

Signature *Position*

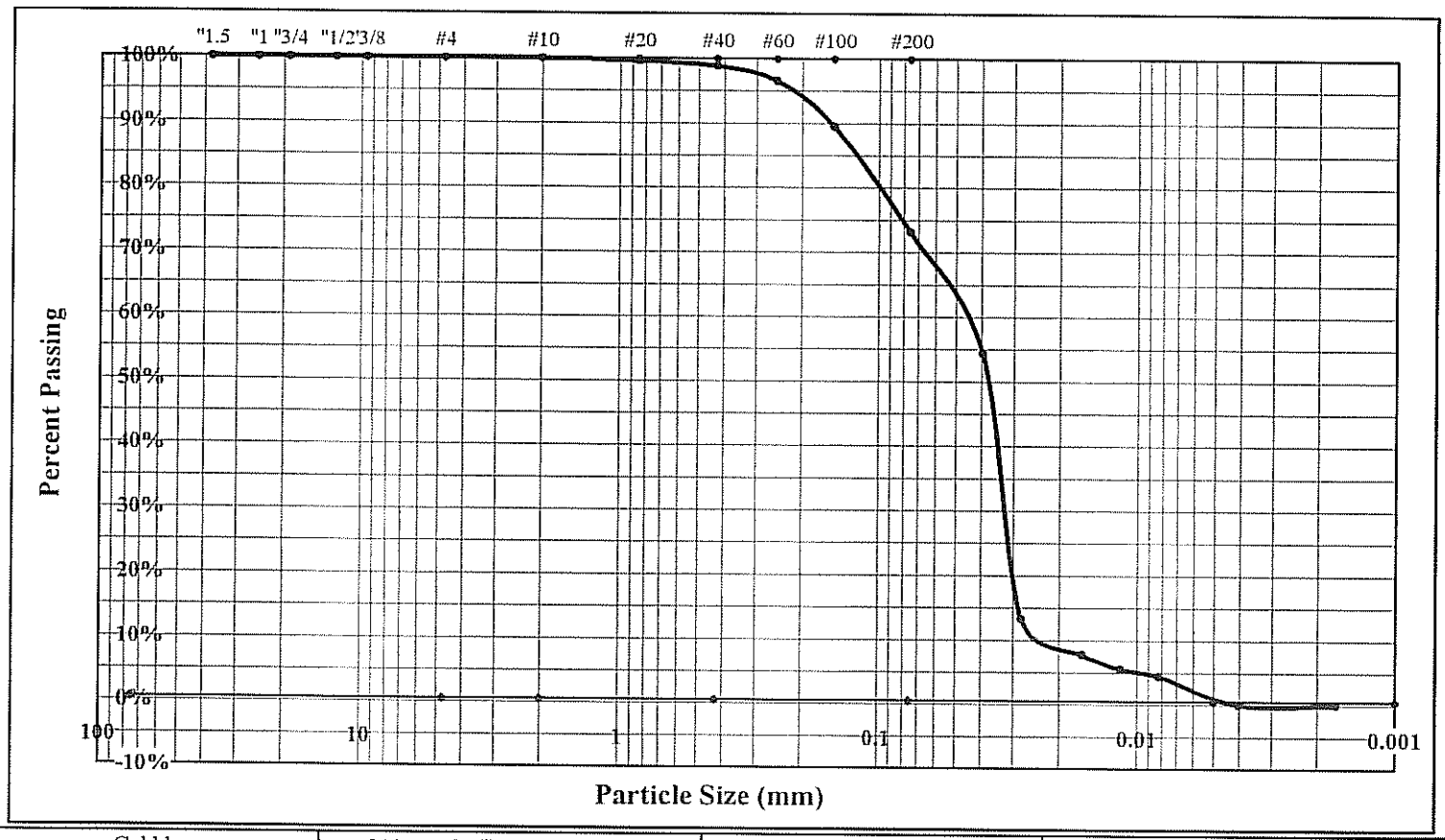
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	12/8/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/2-8/08
Client Name:			
Client Address:			

Boring #:		Sample #:	19	Sample Date:	11/19/08
Location:	Fly Ash for Cell 1 SG	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]				



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	0	Gravel	0.0%	Silt	72.2%
Silt & Clay (% Passing #200)	73.2%	Sand	26.8%	Clay	1.0%
Apparent Relative Density (Assumed)	2.180	Moisture Content	22.7%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME

S&ME Project #:	**1356-06-825 Phase 9**	Test Date(s):	12/5-12/08
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	December 12, 2008
Client Name:	Duke Energy		
Project Address:			
Boring #:	Sample #: 19	Sample Date:	November 19, 2008
Location: Fly Ash for Cell 1 SG	Offset:	Depth:	Bulk
Sample Description:	Gray Black Silt w/ Medium to Fine Sand (ML) Fly Ash		

Liquid Limit: NP Specific Gravity:

Plastic Limit: NP Plastic Index: NP

Natural Moisture Content: 34.1%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 69.9 **Opt. MC %:** 32.5

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:						
	Tare #:						
A. Tare Weight	A.	154.43	163.32	158.87	159.73	154.97	158.27
B. Wet Wt + Tare Wt	B.	711.41	818.32	891.83	665.62	626.28	588.53
C. Dry Wt. + Tare Wt.	C.	599.38	671.86	718.21	529.99	493.25	462.08
D. Water Weight	B-C	112.03	146.46	173.62	135.63	133.03	126.45
E. Dry Weight	C-A	444.95	508.54	559.34	370.26	338.28	303.81
F. Moisture Content	100*D/E	**25.2%**	**28.8%**	**31.0%**	**36.6%**	**39.3%**	**41.6%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5450	5520	5557	5594	5582	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	
I. Wt. of Soil (g. or lbs.)	G-H	1277.000	1347.000	1384.000	1421.000	1409.000	0.000
J. Wt of Soil (Lbs.)	I/453.6 or I	2.815	2.970	3.051	3.133	3.106	0.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	84.4	89.1	91.5	94.0	93.2	0.0
M. Dry Density	L/(1+F)	**67.4**	**69.1**	**69.8**	**68.8**	**66.9**	**0.0**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity:	ASTM D 4318 ☒	AASHTO T 89 ☐		AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis:	ASTM C136 ☐	AASHTO T 27 ☐	ASTM D 422 ☒	AASHTO T 88 ☐
Specific Gravity of Soil:		ASTM D 854 ☐		AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction:		ASTM C 127 ☐		AASHTO T 85 ☐
Soil Classification:	ASTM D 2487 ☒	ASTM D 2488 ☐		AASHTO M 145 ☐

Technician Name: Karen Warner 117900 (Certification #)

Technical Responsibility: Ken Daly (Signature) Project Engineer (Position)

Moisture - Density Report

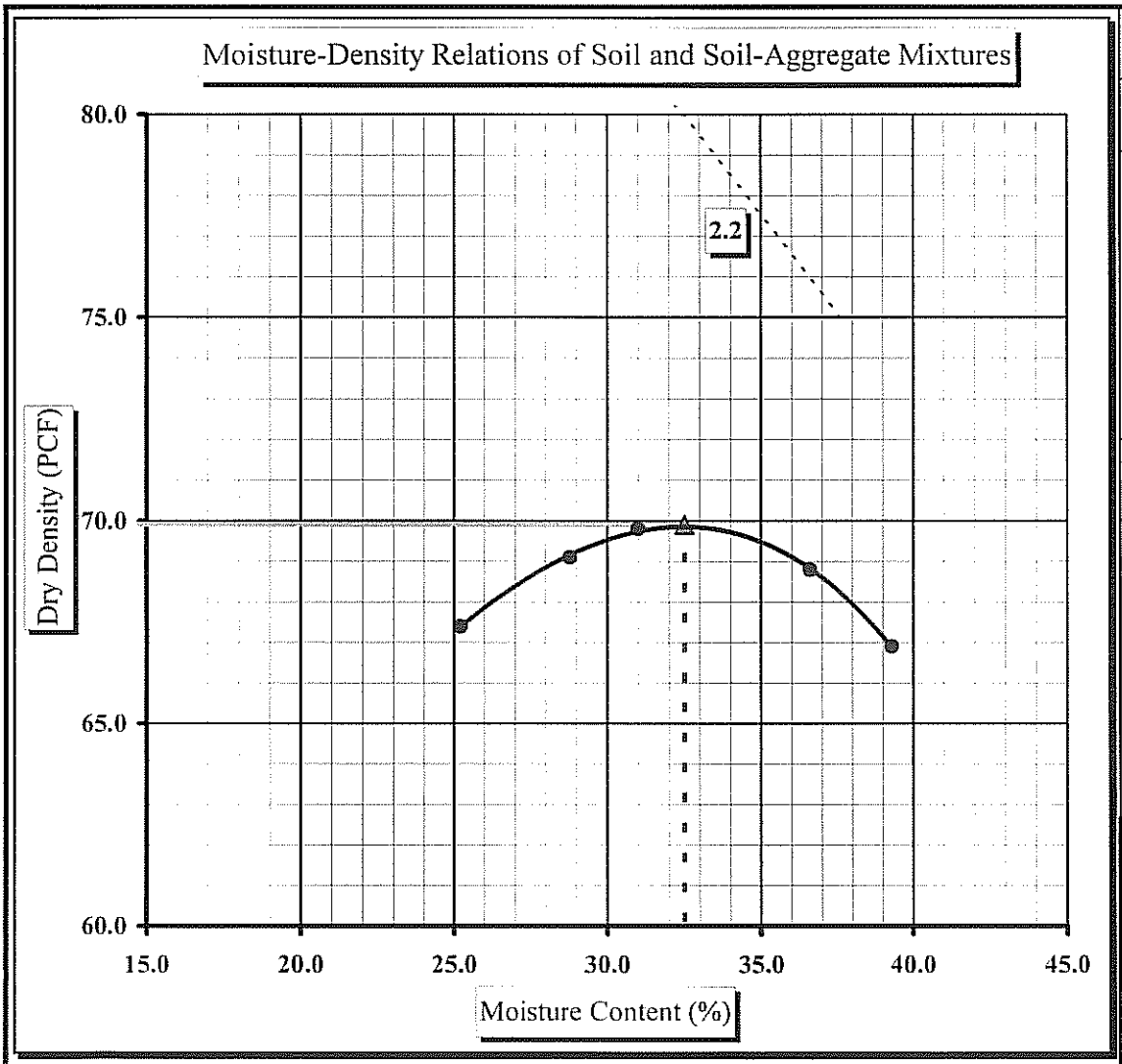
S&ME

S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	December 12, 2008
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/5-12/08
Client Name:	Duke Energy		
Project Address:			

Boring #:		Sample #:	19	Sample Date:	November 19, 2008
Location:	Fly Ash for Cell 1 SG	Offset:		Depth:	Bulk
Sample Description:	Gray Black Silt w/ Medium to Fine Sand (ML) Fly Ash				

Maximum Dry Density **69.9** **PCF.** **Optimum Moisture Content** **32.5** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	34.1%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

Liquid Limit, Plastic Limit, and Plastic Index

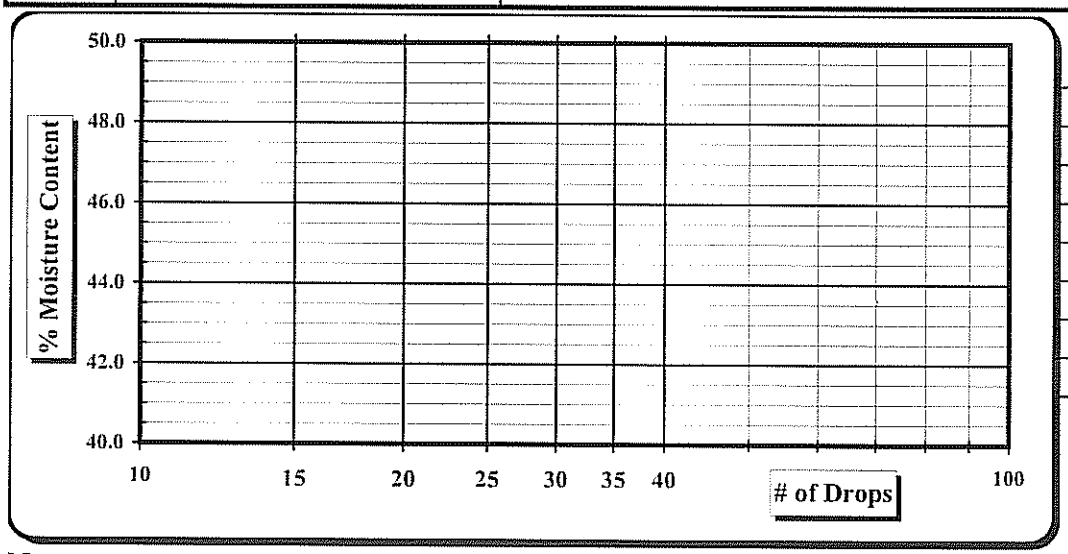
S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/9/08
Test Date(s): 12/2-9/08

Boring #: Sample #: 20 Sample Date: 11/19/08
Location: Fly ash for cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	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 Content (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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☒
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	SM

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Ph. 9**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name:
Client Address:

Test Date(s): 12/2-8/08
Report Date: 12/8/08

Boring #: Sample #: 20 Sample Date: 11/19/08
Location: Fly Ash for Cell 1 SG Offset: Depth:
Sample Description: Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]

Pan #:	AL	Beaker #:	TY	**Apparent Relative Density (Assumed)**			**2.180**		
Hydrometer Jar #:			1						
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			286.00		Tare #	VV	QQ		
Weight of Total Sample Air Dried:			286.00	A	Tare Wt.	16.05	112.49		
Weight of Air Dried Hydrometer Sample (g):			100.00	B	Wet Wt. + A	27.64	243.78		
Total Sample Oven Dried:			269.34	C	Dry Wt. + A	26.93	205.30		
Hydrometer Sample Oven Dried (W):			93.87	D	Water Wt. (B-C)	0.71	38.48		
% Passing #10:			94.8%	E	Dry Wt. (C-A)	10.88	92.81		
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	6.53%	41.5%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"	0.0		100.0%
3/4"	6.4	35	97.6%
1/2"	6.4		97.6%
3/8"	6.7		97.5%
#4	9.1	Soil Mortar	96.6%
#10	14.0	**100.0%**	94.8%
#20	3.7	96.1%	91.1%
#40	9.3	90.1%	85.4%
#60	15.4	83.6%	79.3%
#100	26.7	71.6%	67.9%
#200	48.9	47.9%	45.4%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	51.2%	< 4.74 mm and > 0.075 mm	Type: Mechanical Stirring Apparatus (A)
% Gravel:	3.4%	< 75 mm and > 4.75 mm	Silt & Clay:	45.4%	< 0.075	Dispersion Time: 1 min.
Coarse Sand:	1.8%	< 4.75 mm and > 2.00 mm	Silt:	44.4%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate: 40 g./ Liter
Medium Sand:	9.4%	< 2.00 mm and > 0.425 mm	Clay:	1.0%	< 0.005 mm	
Fine Sand:	40.0%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒ **Composite Correction** ☐

Liquid Limit **NP** Plastic Limit **NP** Plastic Index **NP** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	21.0	44.5	4.0		40.50	47.0%	44.6%	9.7	0.01594	0.04952
	2	21.0	30.5	4.0		26.50	30.8%	29.2%	11.9	0.01594	0.03896
	5	21.0	11.5	4.0		7.50	8.7%	8.3%	15.1	0.01594	0.02767
	15	21.0	8.0	4.0		4.00	4.6%	4.4%	15.6	0.01594	0.01628
	30	21.0	7.0	4.0		3.00	3.5%	3.3%	15.8	0.01594	0.01157
	60	21.0	6.5	4.0		2.50	2.9%	2.8%	15.9	0.01594	0.00820
	250	22.0	5.5	5.0		0.50	0.6%	0.6%	16.2	0.01575	0.00401
	1440	21.5	4.5	4.5		0.00	0.0%	0.0%	16.3	0.01585	0.00169

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly

Signature *Position*

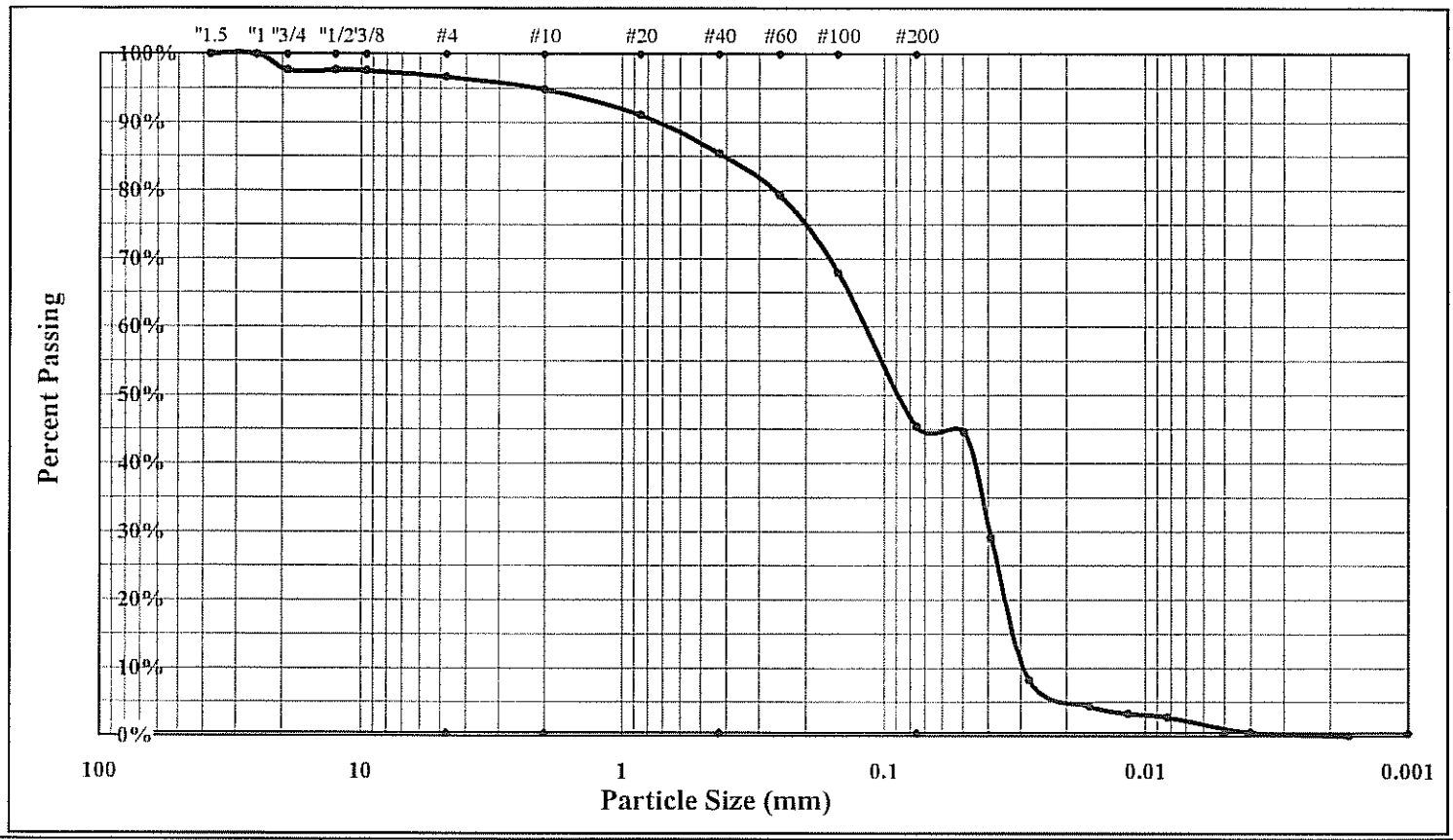
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	12/8/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/2-8/08
Client Name:			
Client Address:			

Boring #:		Sample #:	20	Sample Date:	11/19/08
Location:	Fly Ash for Cell 1 SG	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray Silty Fine to Medium 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	0	Gravel	3.4%	Silt	44.4%
Silt & Clay (% Passing #200)	45.4%	Sand	51.2%	Clay	1.0%
Apparent Relative Density (Assumed)	2.180	Moisture Content	41.5%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature Position

Moisture - Density Relationship

S&ME

S&ME Project #:	**1356-06-825 Task 9**	Test Date(s):	12/8-12/08
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	December 12, 2008
Client Name:	Duke Energy		
Project Address:			
Boring #:	Sample #: 20	Sample Date:	November 19, 2008
Location:	Ash for Cell 1 Subgrade Offset:	Depth:	Bulk
Sample Description:	Black Gray Silty Fine to Medium Sand (SM)		

Liquid Limit: NP Specific Gravity:

Plastic Limit: NP Plastic Index: NP

Natural Moisture Content: 41.5%

Moisture Content of the Oversize Fraction:

NOTES: Oven Temperature Set at 60C

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	99.7

MDD: 61.0 **Opt. MC %:** 37.5

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:						
	Tare #:						
A. Tare Weight	A.	155.65	159.44	155.36	157.77	160.2	158.97
B. Wet Wt + Tare Wt	B.	787.45	721.81	667.75	752.07	731.57	757.53
C. Dry Wt. + Tare Wt.	C.	628.07	572.8	522.3	582.24	566.17	571.23
D. Water Weight	B-C	159.38	149.01	145.45	169.83	165.4	186.3
E. Dry Weight	C-A	472.42	413.36	366.94	424.47	405.97	412.26
F. Moisture Content	100*D/E	**33.7%**	**36.0%**	**39.6%**	**40.0%**	**40.7%**	**45.2%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5395	5421	5451	5476	5486	5426
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1222.000	1248.000	1278.000	1303.000	1313.000	1253.000
J. Wt of Soil (Lbs.)	I/453.6 or I	2.694	2.751	2.817	2.873	2.895	2.762
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	80.8	82.5	84.5	86.1	86.8	82.8
M. Dry Density	L/(1+F)	**60.4**	**60.6**	**60.5**	**61.5**	**61.7**	**57.1**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity:	ASTM D 4318 ☒	AASHTO T 89 ☐		AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis:	ASTM C136 ☐	AASHTO T 27 ☐	ASTM D 422 ☒	AASHTO T 88 ☐
Specific Gravity of Soil:		ASTM D 854 ☐		AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction:		ASTM C 127 ☐		AASHTO T 85 ☐
Soil Classification:	ASTM D 2487 ☒	ASTM D 2488 ☐		AASHTO M 145 ☐

Technician Name: Eric Lopez

Technical Responsibility: Ken Daly

Certification #

Signature

Project Engineer

Position

Moisture - Density Report

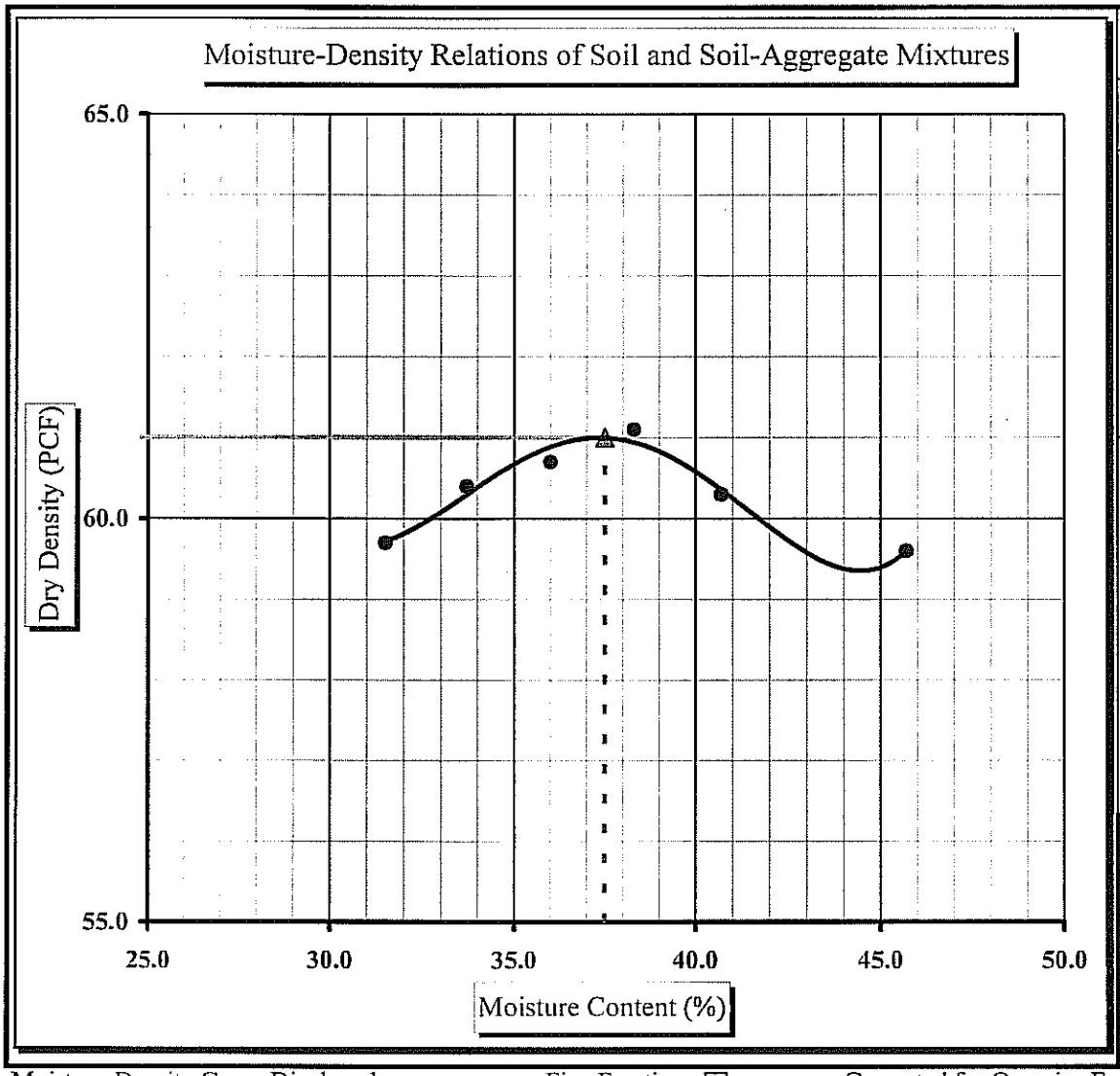
S&ME

S&ME Project #:	**1356-06-825 Task 9**	Report Date:	December 12, 2008
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/8-12/08
Client Name:	Duke Energy		
Project Address:			

Boring #:		Sample #:	20	Sample Date:	November 19, 2008
Location:	Ash for Cell 1 Subgrade	Offset:		Depth:	Bulk
Sample Description:	Black Gray Silty Fine to Medium Sand (SM)				

Maximum Dry Density 61.0 PCF. **Optimum Moisture Content 37.5 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	41.5%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	99.7

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

Form No: TR-D2216-T265-1
Revision No. 0
Revision Date: 02/22/08

Laboratory Determination of Water Content

S&ME

ASTM D 2216 ☑ *AASHTO T 265* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #: **1356-06-825 Ph. 9** Report Date: 2/23/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 2/11-16/09

Client Name:

Client Address:

Sample by: Sample Date(s): 1/17/09

Sampling Method: Drill Rig :

Method: **A (1%)** ☐ **B (0.1%)** ☑ *Balance ID.* *Calibration Date:*

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft. or m.		grams	grams	grams	grams	%	
	21		G-14	82.03	252.11	225.29	26.82	**18.7%**	
	22		Jazz	81.17	226.33	195.62	30.71	**26.8%**	
	23		G-11	82.94	288.73	248.73	40.00	**24.1%**	
	24		G-12	82.84	240.24	209.09	31.15	**24.7%**	
	25		S-3	82.26	243.87	208.03	35.84	**28.5%**	
	26		G-15	81.39	263.73	231.53	32.20	**21.4%**	

Notes / Deviations / References

No baggie or jar included, samples taken from bottom of buckets.

Temperature used for 22 through 26 was 60 degrees Celsius.

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Jennifer Olsen		NICET/117926	2/23/2009
Technician Name	*Signature*	*Certification Type / No.*	*Date*
Ken Daly			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/23/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/11-23/09

Client Name:

Client Address:

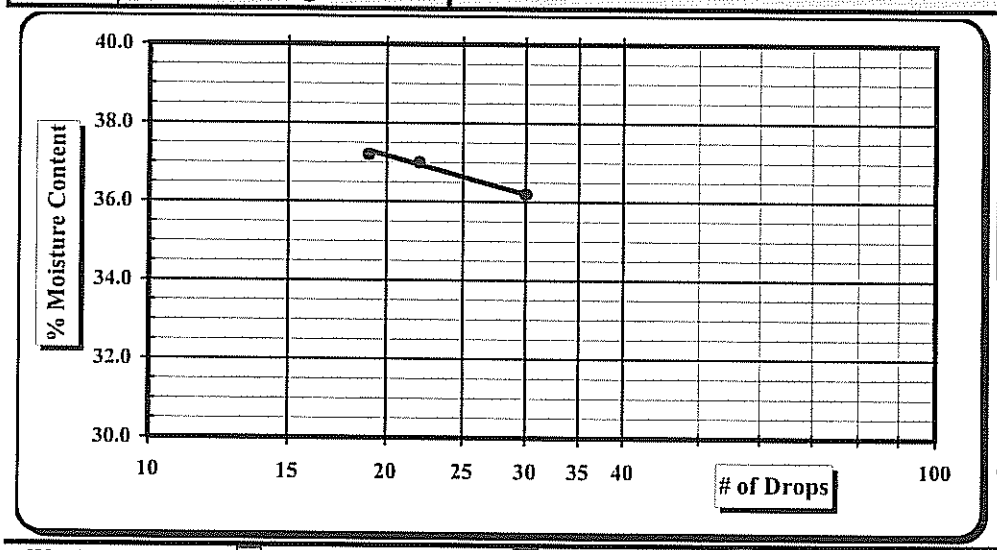
Boring #: Sample #: 22 Sample Date: 1/17/09

Location: Cell #1 E Side Offset: Elevation:

Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

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 #:	45	12	57	34	44		PP	EE	
A	Tare Weight		14.19	13.88	13.98	15.65		**16.15**	16.89	
B	Wet Soil Weight + A		26.36	25.88	26.76	27.78		22.40	22.90	
C	Dry Soil Weight + A		23.06	22.69	23.31	24.49		20.74	21.30	
D	Water Weight (B-C)		3.30	3.19	3.45	3.29		1.66	1.60	
E	Dry Soil Weight (C-A)		8.87	8.81	9.33	8.84		4.59	4.41	
F	% Moisture (D/E)*100		37.2%	36.2%	37.0%	37.2%		36.2%	36.3%	
N	# OF DROPS		19	30	22	19		*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**36.3%**		



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 **37**

Plastic Limit **36**

Plastic Index **1**

Group Symbol **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References: Note and deviations from the test method are recorded.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Jennifer Olsen	2/23/2009	Ken Daly	
Technician Name	*Date*	*Technical Responsibility*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/23/09
Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 2/11-23/09
Client Name: Address:
Boring #: Sample #: 22 Sample Date: 1/17/09
Location: Cell #1 E Side Offset: Elevation:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Pan #:	G	Beaker #:	PDQ	**Apparent Relative Density (Assumed)**		**2.180**			
Hydrometer Jar #:			1						
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural			
Total Sample Air Dried Wt. + tare wt. (grams):			227.06		Tare #	MM	Jazz		
Weight of Total Sample Air Dried:			227.06	A	Tare Wt.	16.58	81.17		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	27.78	226.33		
Total Sample Oven Dried:			226.86	C	Dry Wt. + A	27.77	195.62		
Hydrometer Sample Oven Dried (W):			49.96	D	Water Wt. (B-C)	0.01	30.71		
% Passing #10:			99.8%	E	Dry Wt. (C-A)	11.19	114.45		
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.09%	26.8%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		53	100.0%
1/2"			100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.2		99.9%
#10	0.5	**100.0%**	99.8%
#20	0.6	98.8%	98.6%
#40	1.7	96.7%	96.4%
#60	2.9	94.3%	94.1%
#100	5.4	89.3%	89.1%
#200	11.5	77.0%	76.8%

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. 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	20.5	36.5	5.0		31.50	68.7%	68.6%	11.1	0.01604	0.03784
5	20.5	21.5	5.0		16.50	36.0%	35.9%	13.6	0.01604	0.02644
15	20.5	11.0	5.0		6.00	13.1%	13.1%	15.3	0.01604	0.01621
30	21.0	9.0	4.5		4.50	9.8%	9.8%	15.6	0.01594	0.01148
60	21.0	7.5	4.5		3.00	6.5%	6.5%	15.8	0.01594	0.00818
250	22.0	6.0	4.0		2.00	4.4%	4.4%	16.0	0.01575	0.00398
1440	22.5	4.0	3.5		0.50	1.1%	1.1%	16.2	0.01566	0.00166
					#VALUE!	#VALUE!	1.1%	#VALUE!	#N/A	#N/A

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Jennifer Olsen	117926	Ken Daly		
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

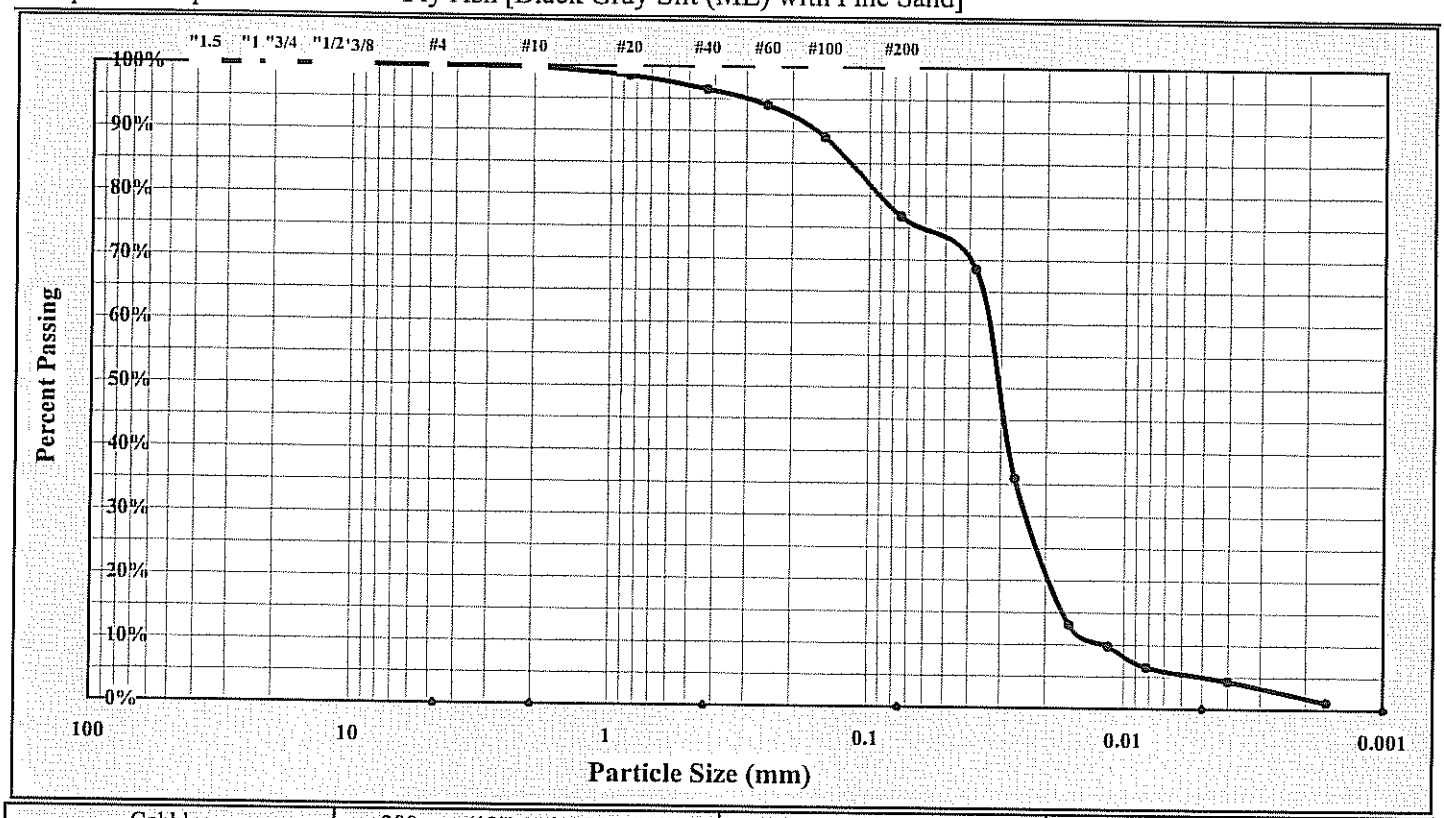
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	2/23/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/11-23/09
Client Name:			
Address:			
Boring #:	Sample #: 22	Sample Date:	1/17/09
Location:	Cell #1 E Side Offset:	Elevation:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]		



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:		Gravel:	0.0%	Silt	71.8%
Silt & Clay (% Passing #200):	76.8%	Total Sand:	23.1%	Clay	5.0%
ent Relative Density (Assumed)	2.180	Moisture Content	26.8%	Colloids	
Liquid Limit	37	Plastic Limit	36	Plastic Index	1
Coarse Sand:	0.1%	Medium Sand:	3.3%	Fine Sand:	19.7%

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: AASTM D 4318, D 854, D 2487

Ken Daly
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

S&ME

ASTM D558, D698, D1557, AASHTO T99, T180

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/16-19/09
Client Name:			
Client Address:			
Boring #:	Sample #: 22	Sample Date:	1/17/2009
Location:	Cell #1 E Side Offset:	Depth:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:	101	152	202	253	51	
	Tare #:	MDJ	5A	691	GH	5C	
A. Tare Weight	A.	158.8	158.1	156.4	159.7	155.0	
B. Wet Wt + Tare Wt	B.	751.5	852.0	823.4	780.7	721.6	
C. Dry Wt. + Tare Wt.	C.	623.8	687.1	658.4	621.4	609.1	
D. Water Weight	B-C	127.7	164.9	165.0	159.3	112.5	
E. Dry Weight	C-A	465.0	529.0	502.0	461.7	454.1	
F. Moisture Content	100*D/E	**27.5%**	**31.2%**	**32.9%**	**34.5%**	**24.8%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5551	5626	5639	5619	5500	
H. Wt. of Mold	H.	4170	4170	4170	4170	4170	
I. Wt. of Soil (g. or lbs.)	G-H	1381	1456	1469	1449	1330	
J. Wt of Soil (Lbs.)	I/453.6 or I	3.045	3.210	3.239	3.194	2.932	
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07	30.07	
L. Wet Density (PCF)	J*K	91.6	96.5	97.4	96.0	88.2	
M. Dry Density (PCF)	L/(1+F)	**71.8**	**73.6**	**73.3**	**71.4**	**70.7**	

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:

Jennifer Olsen		NICET/117926	2/16/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

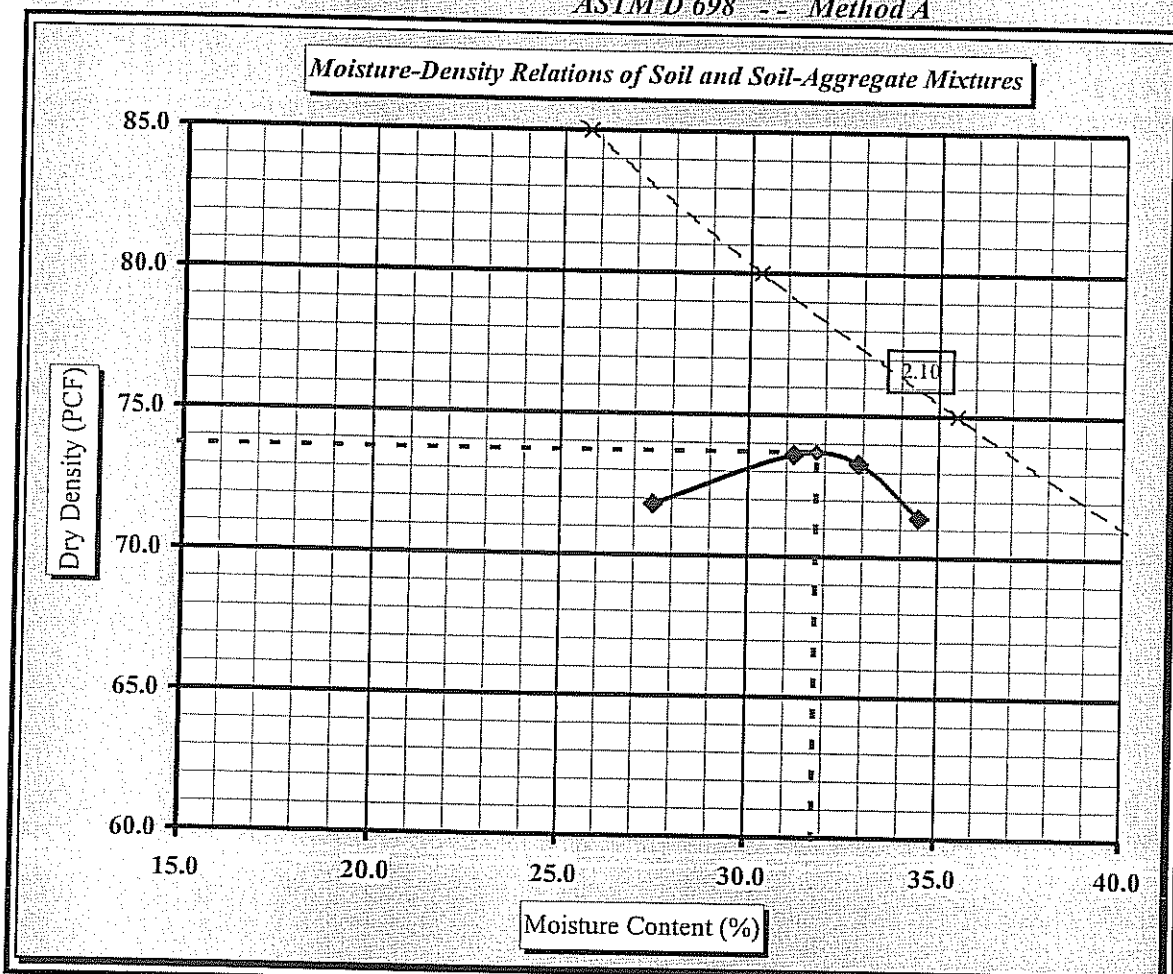
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/16-19/09
Client Name:			
Client Address:			
Boring #:	Sample #: 22	Sample Date:	1/17/2009
Location:	Cell #1 E Side Offset:	Depth:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]		

Maximum Dry Density 73.7 **PCF.** **Optimum Moisture Content** 31.8%

ASTM D 698 - - Method A



Soil Properties

Natural Moisture Content	**26.8%**
Specific Gravity of Soil	
Liquid Limit	**37**
Plastic Limit	**36**
Plastic Index	**1**

% Passing

3/4"	
3/8"	
#4	99.9%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Ken Daly
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/23/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/11-23/09

Client Name:

Client Address:

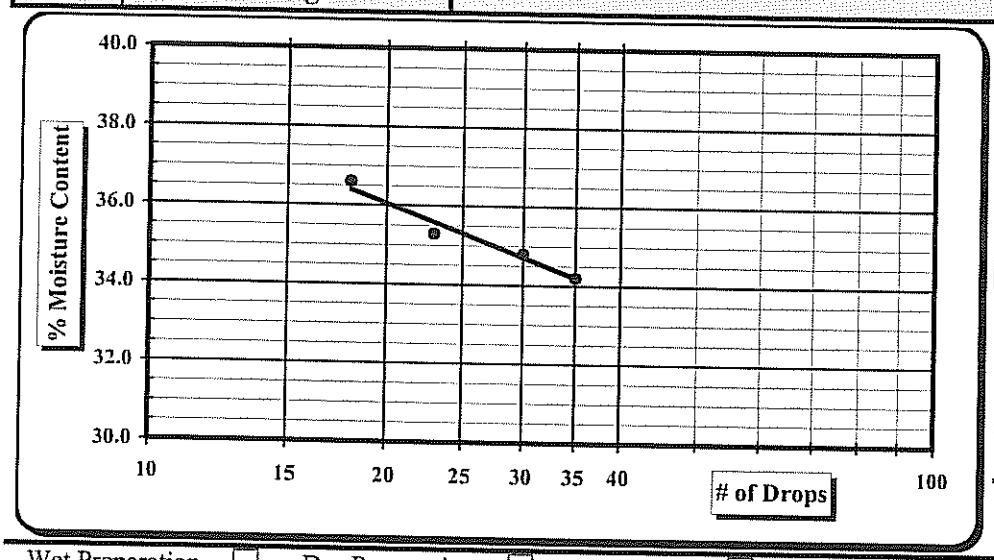
Boring #: Sample #: 23 Sample Date: 1/17/09

Location: Cell #1 NE Corner Offset: Elevation:

Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

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 #:	NN	SS	33	19			TT	23	
A	Tare Weight	15.28	16.53	15.94	15.82			**15.94**	14.05	
B	Wet Soil Weight + A	28.23	28.86	29.29	28.63			21.95	20.79	
C	Dry Soil Weight + A	24.93	25.68	25.81	25.20			20.43	19.08	
D	Water Weight (B-C)	3.30	3.18	3.48	3.43			1.52	1.71	
E	Dry Soil Weight (C-A)	9.65	9.15	9.87	9.38			4.49	5.03	
F	% Moisture (D/E)*100	34.2%	34.8%	35.3%	36.6%			33.9%	34.0%	
N	# OF DROPS	35	30	23	18			*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**34.0%**		



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 **35**

Plastic Limit **34**

Plastic Index **1**

Group Symbol **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References: Note and deviations from the test method are recorded.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Jennifer Olsen — *Technician Name*

2/23/2009 — *Date*

Ken Daly — *Technical Responsibility*

_____ — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/23/09
Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 2/11-23/09
Client Name: Address:
Boring #: Sample #: 23 Sample Date: 1/17/09
Location: Cell #1 NE Corner Offset: Elevation:
Sample Description: Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]

Pan #:	A32	Beaker #:	TY		**Apparent Relative Density (Assumed)**		**2.180**				
Hydrometer Jar #:			8								
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):			249.22		Tare #	1	G-11				
Weight of Total Sample Air Dried:			249.22	A	Tare Wt.	13.87	82.94				
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	25.78	288.73				
Total Sample Oven Dried:			249.01	C	Dry Wt. + A	25.77	248.73				
Hydrometer Sample Oven Dried (W):			49.96	D	Water Wt. (B-C)	0.01	40.00				
% Passing #10:			99.3%	E	Dry Wt. (C-A)	11.90	165.79				
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.08%	24.1%				

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		58	100.0%
1/2"			100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	1.0		99.6%
#10	1.9	**100.0%**	99.3%
#20	1.1	97.8%	97.0%
#40	3.0	93.9%	93.2%
#60	5.2	89.7%	89.0%
#100	8.8	82.5%	81.9%
#200	15.7	68.5%	68.0%

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. 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	20.5	33.5	5.0		28.50	62.2%	61.7%	11.6	0.01604	0.03867
5	20.5	27.0	5.0		22.00	48.0%	47.6%	12.7	0.01604	0.02555
15	21.0	14.5	4.5		10.00	21.8%	21.7%	14.7	0.01594	0.01576
30	21.0	11.0	4.5		6.50	14.2%	14.1%	15.2	0.01594	0.01136
60	21.0	9.0	4.5		4.50	9.8%	9.7%	15.6	0.01594	0.00812
250	22.0	6.5	4.0		2.50	5.5%	5.4%	15.9	0.01575	0.00397
1440	22.5	4.5	3.5		1.00	2.2%	2.2%	16.1	0.01566	0.00166
					#VALUE!	#VALUE!	2.2%	#VALUE!	#N/A	#N/A

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Jennifer Olsen — *Technician Name*
117926 — *Certification #*
Ken Daly — *Technical Responsibility*
Position
Date

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

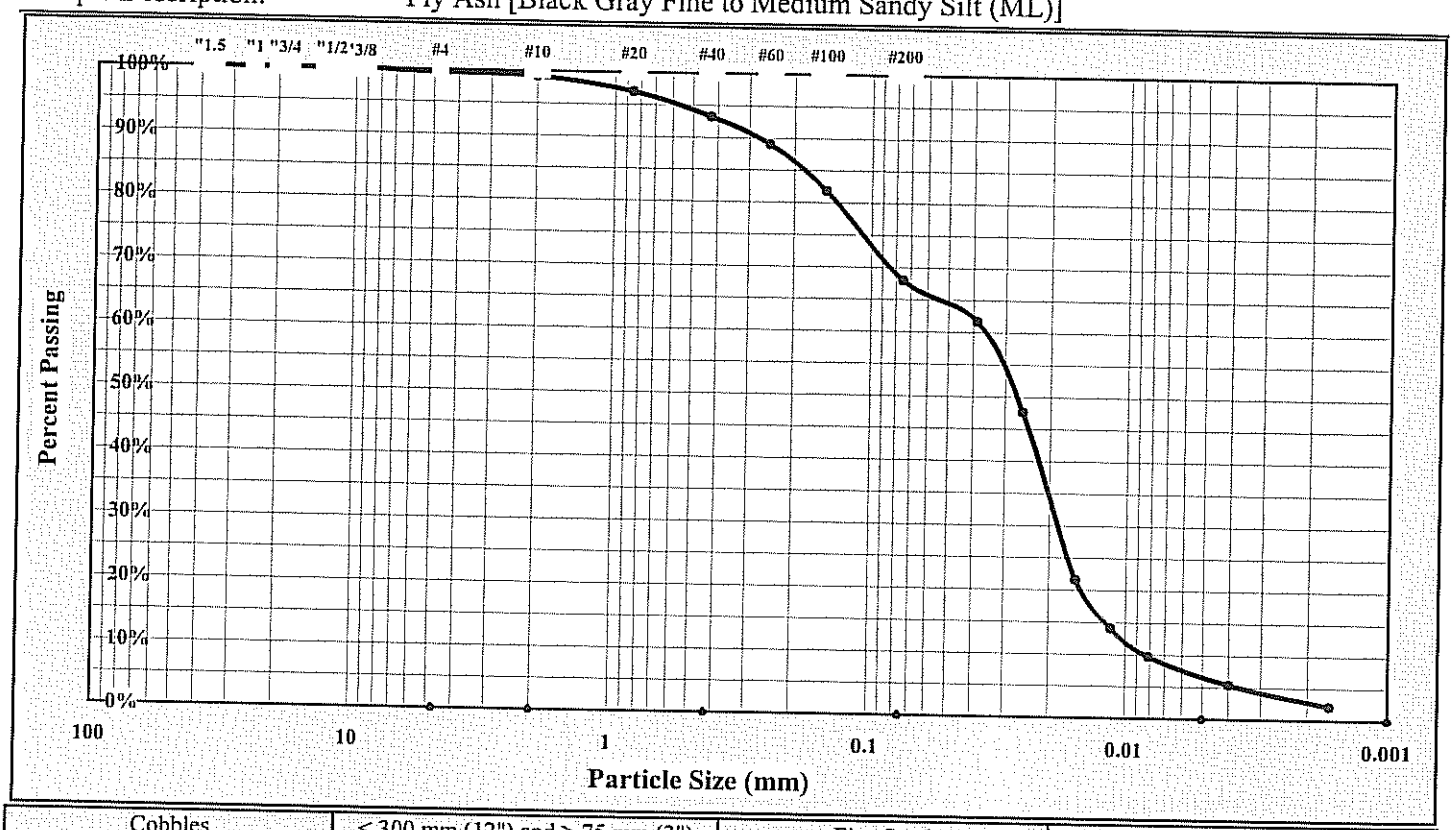
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	2/23/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/11-23/09
Client Name:			
Address:			
Boring #:	Sample #: 23	Sample Date:	1/17/09
Location:	Cell #1 NE Corner Offset:	Elevation:	
Sample Description:	Fly Ash [Black Gray Fine to Medium 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:		Gravel:	0.0%	Silt	61.0%
Silt & Clay (% Passing #200):	68.0%	Total Sand:	31.6%	Clay	7.0%
ent Relative Density (Assumed)	2.180	Moisture Content	24.1%	Colloids	
Liquid Limit	35	Plastic Limit	34	Plastic Index	1
Coarse Sand:	0.3%	Medium Sand:	6.0%	Fine Sand:	25.2%

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: AASTM D 4318, D 854, D 2487

Ken Daly
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

S&ME

ASTM D558, D698, D1557, AASHTO T99, T180

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/16-19/09
Client Name:			
Client Address:			
Boring #:	Sample #: 23	Sample Date:	1/17/2009
Location:	Cell #1 NE Corner	Offset:	Depth:
Sample Description:	Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:	354	405	455	506	557	Natural
	Tare #:	KO	6911	THAI	SR	DLB	
A. Tare Weight	A.	157.8	153.8	153.4	156.8	160.1	
B. Wet Wt + Tare Wt	B.	850.9	828.1	818.9	818.8	852.8	
C. Dry Wt. + Tare Wt.	C.	725.0	696.0	676.0	669.8	687.3	
D. Water Weight	B-C	125.9	132.1	142.9	149.0	165.5	
E. Dry Weight	C-A	567.2	542.2	522.6	513.0	527.2	
F. Moisture Content	100*D/E	**22.2%**	**24.4%**	**27.3%**	**29.0%**	**31.4%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5538	5580	5635	5648	5622	
H. Wt. of Mold	H.	4170	4170	4170	4170	4170	
I. Wt. of Soil (g. or lbs.)	G-H	1368	1410	1465	1478	1452	
J. Wt of Soil (Lbs.)	I/453.6 or I	3.016	3.108	3.230	3.258	3.201	
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07	30.07	
L. Wet Density (PCF)	J*K	90.7	93.5	97.1	98.0	96.3	
M. Dry Density (PCF)	L/(1+F)	**74.2**	**75.2**	**76.3**	**76.0**	**73.3**	

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:

Jennifer Olsen		NICET/117926	2/16/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

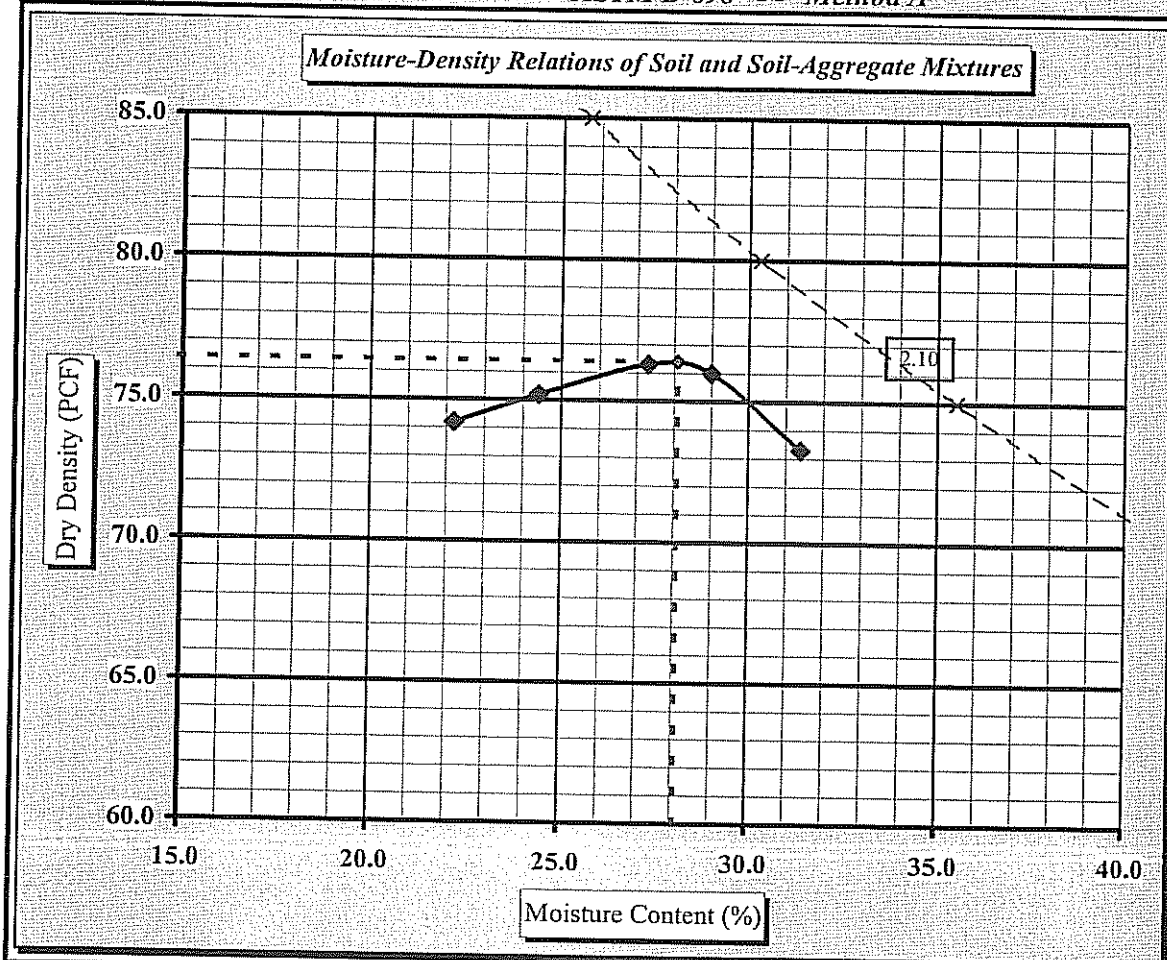
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/16-19/09
Client Name:			
Client Address:			
Boring #:	Sample #: 23	Sample Date:	1/17/2009
Location:	Cell #1 NE Corner Offset:	Depth:	
Sample Description:	Fly Ash [Black Gray Fine to Medium Sandy Silt (ML)]		

Maximum Dry Density 76.4 **PCF.** **Optimum Moisture Content** 28.1%

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	24.1%
Specific Gravity of Soil	
Liquid Limit	35
Plastic Limit	34
Plastic Index	1

% Passing

3/4"	
3/8"	
#4	99.6%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Ken Daly
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/18/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/11-18/09

Client Name:

Client Address:

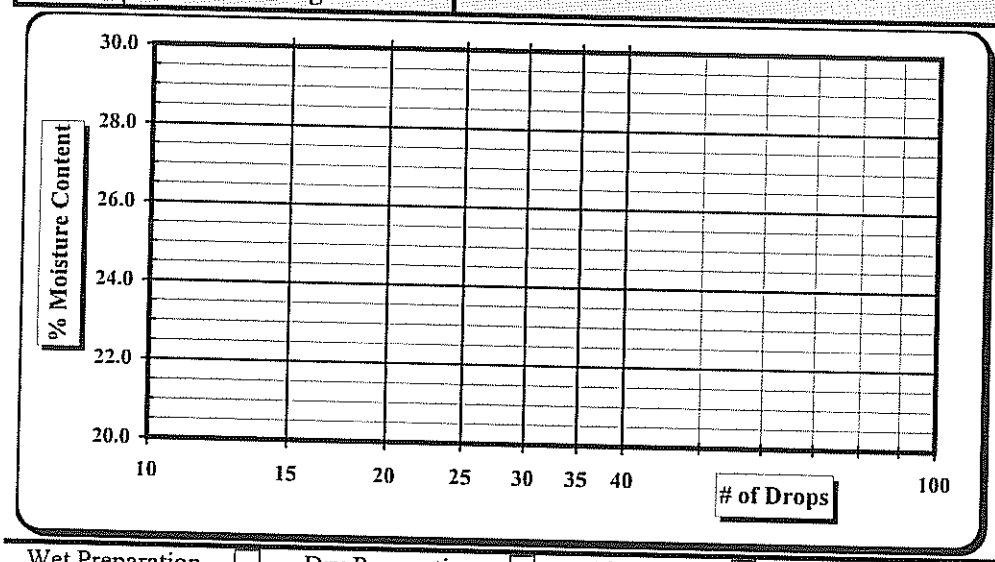
Boring #: Sample #: 24 Sample Date: 1/17/09

Location: Cell #1 N Middle Offset: Elevation:

Sample Description: Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]

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 #	Tare #:	Liquid Limit						Plastic Limit		
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									
LL	LL = F * FACTOR							*Moisture Contents determined by ASTM D 2216*		
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: Note and deviations from the test method are recorded.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Jennifer Olsen — *Technician Name*

2/23/2009 — *Date*

Ken Daly — *Technical Responsibility*

_____ — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/23/09
Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 2/11-23/09
Client Name: Address:
Boring #: Sample #: 24 Sample Date: 1/17/09
Location: Cell #1 N Middle Offset: Elevation:
Sample Description: Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]

Pan #:	FJW	Beaker #:	PP	**Apparent Relative Density (Assumed)**		**2.180**	
Hydrometer Jar #:			6				
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			239.75	Tare #	9	G-12	
Weight of Total Sample Air Dried:			239.75	A Tare Wt.	13.93	82.84	
Weight of Air Dried Hydrometer Sample (g):			100.00	B Wet Wt. + A	24.07	240.24	
Total Sample Oven Dried:			239.52	C Dry Wt. + A	24.06	209.09	
Hydrometer Sample Oven Dried (W):			99.90	D Water Wt. (B-C)	0.01	31.15	
% Passing #10:			97.8%	E Dry Wt. (C-A)	10.13	126.25	
Correction Factor a (Table 1):			1.09	% Moisture (100 x D/E)	0.10%	24.7%	

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		25	100.0%
1/2"			100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.9		99.6%
#10	5.2	**100.0%**	97.8%
#20	5.6	94.4%	92.3%
#40	13.4	86.6%	84.7%
#60	22.5	77.5%	75.8%
#100	36.7	63.3%	61.9%
#200	55.3	44.7%	43.7%

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)$^{1/2}$
1	20.5	45.5	5.0		40.50	44.2%	43.2%	9.7	0.01604	0.04984
2	20.5	32.5	5.0		27.50	30.0%	29.4%	11.8	0.01604	0.03894
5	20.5	12.5	5.0		7.50	8.2%	8.0%	15.1	0.01604	0.02784
15	21.0	8.0	4.5		3.50	3.8%	3.7%	15.7	0.01594	0.01632
30	21.0	7.0	4.5		2.50	2.7%	2.7%	15.9	0.01594	0.01160
60	21.0	6.0	4.5		1.50	1.6%	1.6%	16.0	0.01594	0.00824
250	22.0	5.0	4.0		1.00	1.1%	1.1%	16.1	0.01575	0.00400
1440	22.5	4.0	3.5		0.50	0.5%	0.5%	16.2	0.01566	0.00166

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Jennifer Olsen	117926	Ken Daly		
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

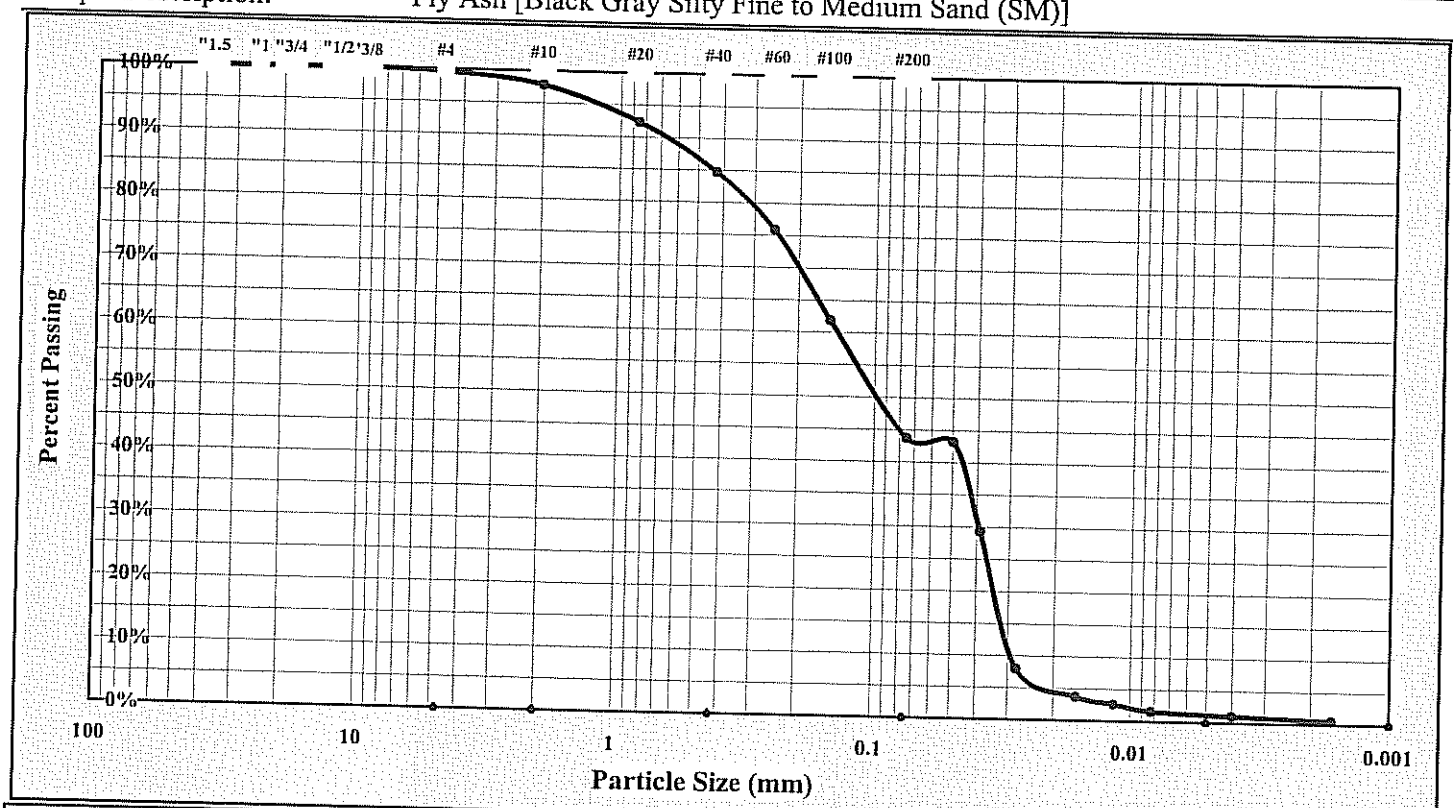
S&ME

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	2/23/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/11-23/09
Client Name:			
Address:			
Boring #:	Sample #: 24	Sample Date:	1/17/09
Location:	Cell #1 N Middle Offset:	Elevation:	
Sample Description:	Fly Ash [Black Gray Silty Fine to Medium 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:		Gravel:	0.0%	Silt	42.2%
Silt & Clay (% Passing #200):	43.7%	Total Sand:	55.9%	Clay	1.5%
ent Relative Density (Assumed)	2.180	Moisture Content	24.7%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	1.8%	Medium Sand:	13.1%	Fine Sand:	41.0%

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: AASTM D 4318, D 854, D 2487

Ken Daly
Technical Responsibility — *Signature* — *Position* — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

S&ME

ASTM D558, D698, D1557, AASHTO T99, T180

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	2/23/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/16-23/09
Client Name:			
Client Address:			
Boring #:	Sample #: 24	Sample Date:	1/17/2009
Location:	Cell #1 N Middle Offset:	Depth:	
Sample Description:	Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:	354	177	152	202	253	304
	Tare #:	18	18	5F	DMJ	HK	5B
A. Tare Weight	A.	154.9	155.1	159.1	165.3	157.8	159.3
B. Wet Wt + Tare Wt	B.	918.0	772.3	791.5	794.3	792.6	827.0
C. Dry Wt. + Tare Wt.	C.	727.6	612.1	666.1	663.9	650.2	666.8
D. Water Weight	B-C	190.4	160.2	125.4	130.4	142.4	160.2
E. Dry Weight	C-A	572.7	457.0	507.0	498.6	492.4	507.5
F. Moisture Content	100*D/E	**33.2%**	**35.1%**	**24.7%**	**26.2%**	**28.9%**	**31.6%**

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5577	5567	5440	5465	5503	5564
H. Wt. of Mold	H.	4170	4170	4170	4170	4170	4170
I. Wt. of Soil (g. or lbs.)	G-H	1407	1397	1270	1295	1333	1394
J. Wt of Soil (Lbs.)	I/453.6 or I	3.102	3.080	2.800	2.855	2.939	3.073
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07	30.07	30.07
L. Wet Density (PCF)	J*K	93.3	92.6	84.2	85.8	88.4	92.4
M. Dry Density (PCF)	L/(1+F)	**70.0**	**68.5**	**67.5**	**68.0**	**68.6**	**70.2**

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:

Jennifer Olsen		NICET/117926	2/23/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

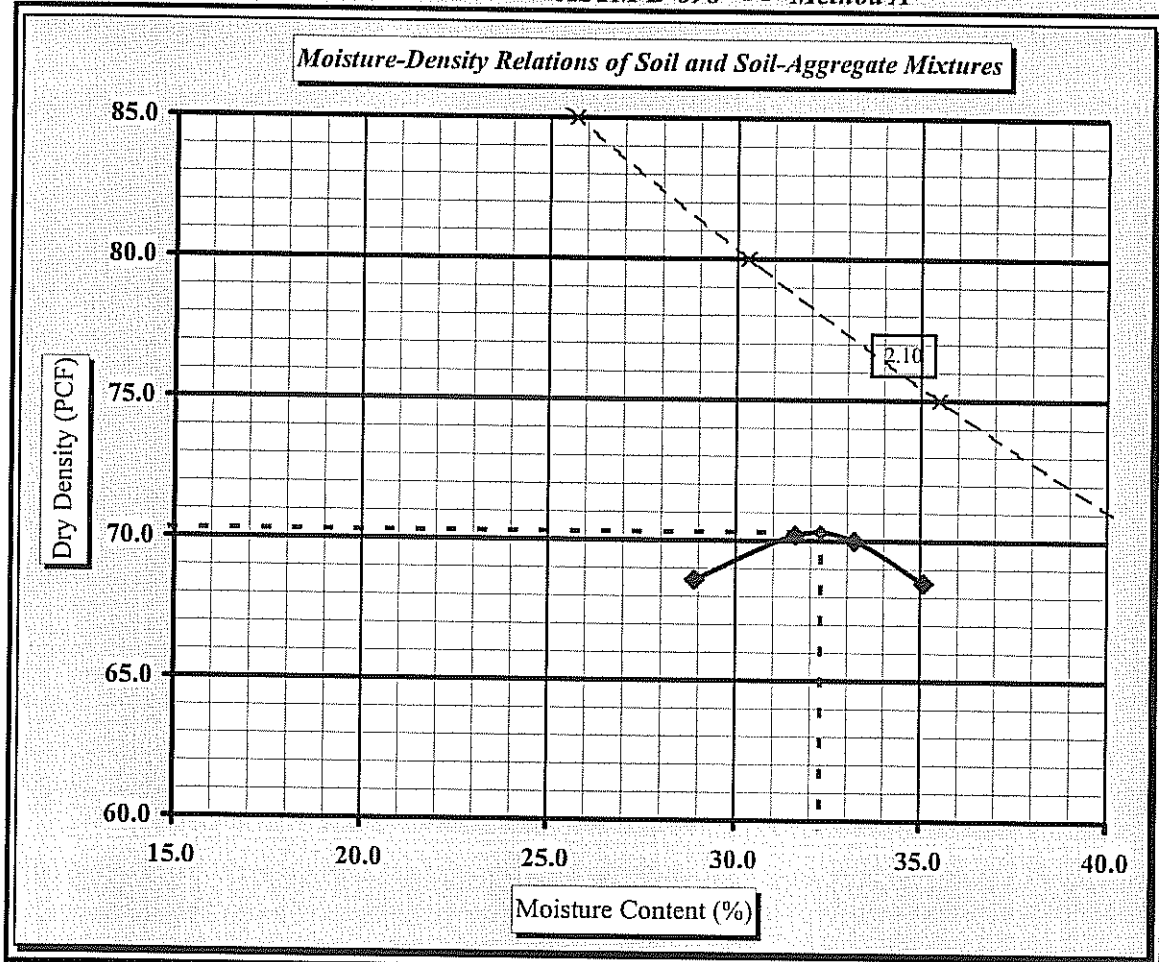
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	2/23/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/16-23/09
Client Name:			
Client Address:			
Boring #:	Sample #: 24	Sample Date:	1/17/2009
Location:	Cell #1 N Middle Offset:	Depth:	
Sample Description:	Fly Ash [Black Gray Silty Fine to Medium Sand (SM)]		

Maximum Dry Density 70.3 PCF. **Optimum Moisture Content 32.3%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**24.7%**
Specific Gravity of Soil	
Liquid Limit	**NP**
Plastic Limit	**NP**
Plastic Index	**NP**

% Passing

3/4"	
3/8"	
#4	99.6%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Ken Daly
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/23/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/11-23/09

Client Name:

Client Address:

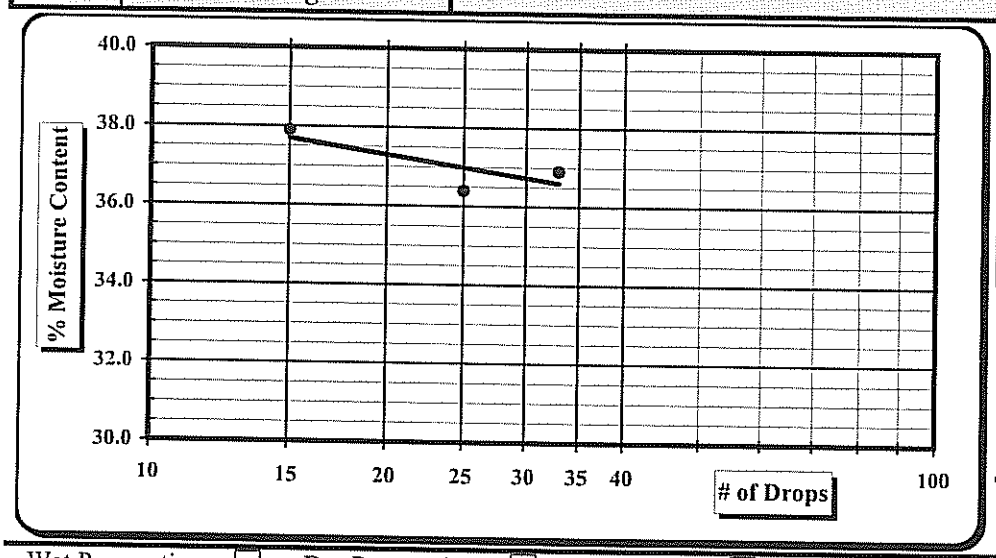
Boring #: Sample #: 25 Sample Date: 1/17/09

Location: Cell #1 NW Corner Offset: Elevation:

Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

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 #:	1	9	41				WN	VV	
A	Tare Weight	13.86	13.92	15.77				**16.57**	16.04	
B	Wet Soil Weight + A	26.88	25.57	25.81				23.60	22.05	
C	Dry Soil Weight + A	23.37	22.46	23.05				21.71	20.43	
D	Water Weight (B-C)	3.51	3.11	2.76				1.89	1.62	
E	Dry Soil Weight (C-A)	9.51	8.54	7.28				5.14	4.39	
F	% Moisture (D/E)*100	36.9%	36.4%	37.9%				36.8%	36.9%	
N	# OF DROPS	33	25	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**36.9%**		



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 **37**

Plastic Limit **37**

Plastic Index

Group Symbol **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References: Note and deviations from the test method are recorded.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Jennifer Olsen — *Technician Name*

2/23/2009 — *Date*

Ken Daly — *Technical Responsibility*

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/23/09
Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 2/11-23/09
Client Name: Address:
Boring #: Sample #: 25 Sample Date: 1/17/09
Location: Cell #1 NW Corner Offset: Elevation:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Pan #:	Z	Beaker #:	ZZ	**Apparent Relative Density (Assumed)**		**2.180**	
Hydrometer Jar #:			4				
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			241.68		Tare #	PP	S-3
Weight of Total Sample Air Dried:			241.68	A	Tare Wt.	16.15	82.26
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	27.64	243.87
Total Sample Oven Dried:			241.47	C	Dry Wt. + A	27.63	208.03
Hydrometer Sample Oven Dried (W):			49.96	D	Water Wt. (B-C)	0.01	35.84
% Passing #10:			99.9%	E	Dry Wt. (C-A)	11.48	125.77
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.09%	28.5%

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		CC	100.0%
1/2"			100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.2		99.9%
#10	0.3	**100.0%**	99.9%
#20	0.4	99.3%	99.2%
#40	1.1	97.8%	97.7%
#60	2.1	95.8%	95.7%
#100	4.4	91.2%	91.1%
#200	10.7	78.5%	78.4%

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.* *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	37.5	4.5		33.00	72.0%	71.9%	10.9	0.01594	0.03718
5	21.0	28.0	4.5		23.50	51.3%	51.2%	12.4	0.01594	0.02514
15	21.0	14.0	4.5		9.50	20.7%	20.7%	14.7	0.01594	0.01580
30	21.0	11.0	4.5		6.50	14.2%	14.2%	15.2	0.01594	0.01136
60	21.0	8.5	4.5		4.00	8.7%	8.7%	15.6	0.01594	0.00814
250	22.5	6.5	3.5		3.00	6.5%	6.5%	15.8	0.01566	0.00394
1440	22.5	4.5	3.5		1.00	2.2%	2.2%	16.1	0.01566	0.00166
					#VALUE!	#VALUE!	#VALUE!	#VALUE!	#N/A	#N/A

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Jennifer Olsen	117926	Ken Daly		
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

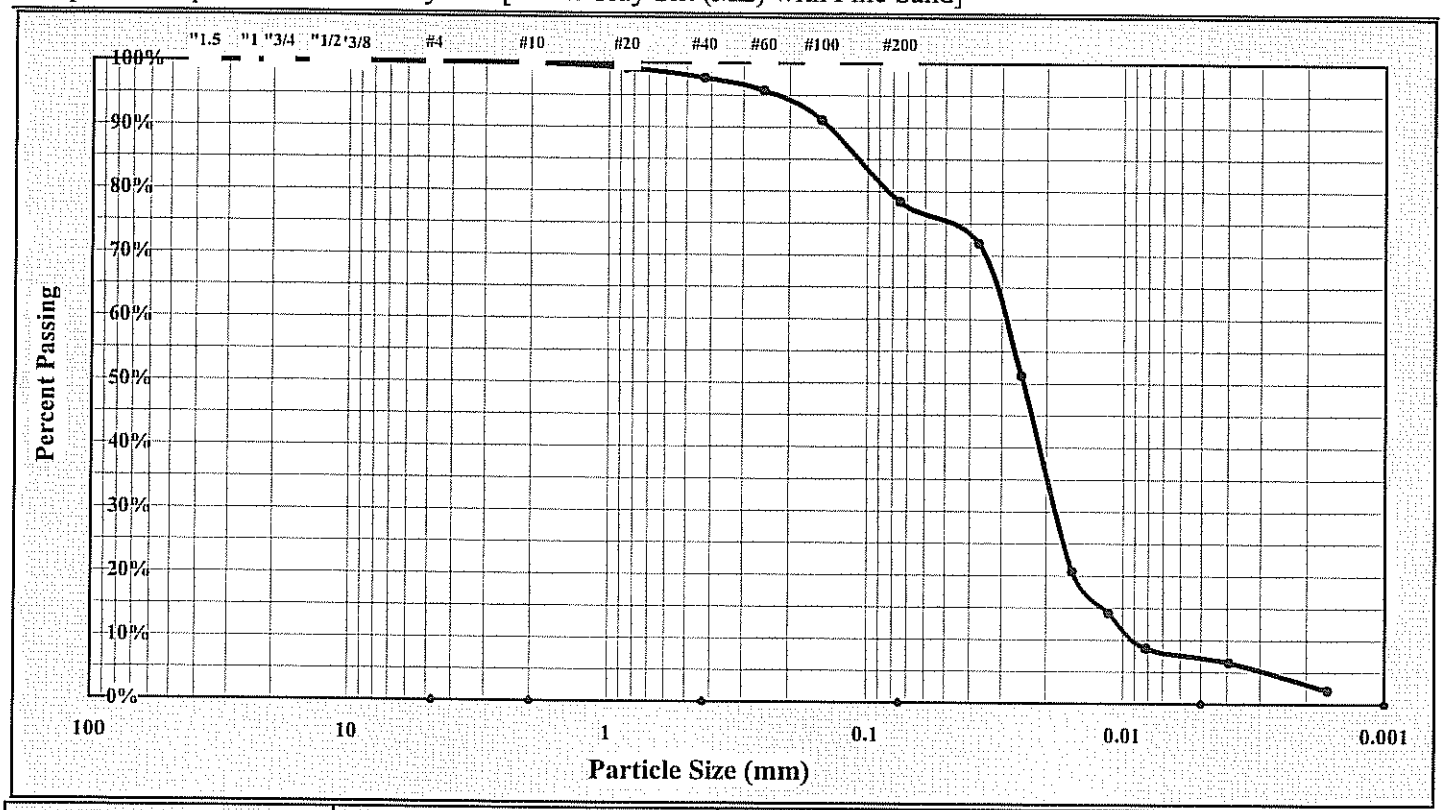
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	2/23/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/11-23/09
Client Name:			
Address:			
Boring #:	Sample #: 25	Sample Date:	1/17/09
Location:	Cell #1 NW Corner Offset:	Elevation:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]		



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:		Gravel:	0.0%	Silt	71.4%
Silt & Clay (% Passing #200):	78.4%	Total Sand:	21.5%	Clay	7.0%
ent Relative Density (Assumed)	2.180	Moisture Content	28.5%	Colloids	
Liquid Limit	37	Plastic Limit	37	Plastic Index	0
Coarse Sand:	0.0%	Medium Sand:	2.2%	Fine Sand:	19.3%

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: AASTM D 4318, D 854, D 2487

Ken Daly			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/17-19/09
Client Name:			
Client Address:			

Boring #:		Sample #:	25	Sample Date:	1/17/2009
Location:	Cell #1 NW Corner	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]				

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

Water Added:		506	557	607	455		
Tare #:		JC	JDM	698	AMRL		
A. Tare Weight	A.	157.7	163.1	155.8	154.9		
B. Wet Wt + Tare Wt	B.	798.9	855.6	812.0	813.0		
C. Dry Wt. + Tare Wt.	C.	652.5	688.9	644.2	671.8		
D. Water Weight	B-C	146.4	166.7	167.8	141.2		
E. Dry Weight	C-A	494.8	525.8	488.4	516.9		
F. Moisture Content	100*D/E	**29.6%**	**31.7%**	**34.4%**	**27.3%**		

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5594	5633	5625	5555		
H. Wt. of Mold	H.	4200	4200	4200	4200		
I. Wt. of Soil (g. or lbs.)	G-H	1394	1433	1425	1355		
J. Wt of Soil (Lbs.)	I/453.6 or I	3.073	3.159	3.142	2.987		
K. Mold Volume Factor	K.	30.11	30.11	30.11	30.11		
L. Wet Density (PCF)	J*K	92.5	95.1	94.6	89.9		
M. Dry Density (PCF)	L/(1+F)	**71.4**	**72.2**	**70.4**	**70.6**		

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:

Jennifer Olsen		NICET/117926	2/16/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

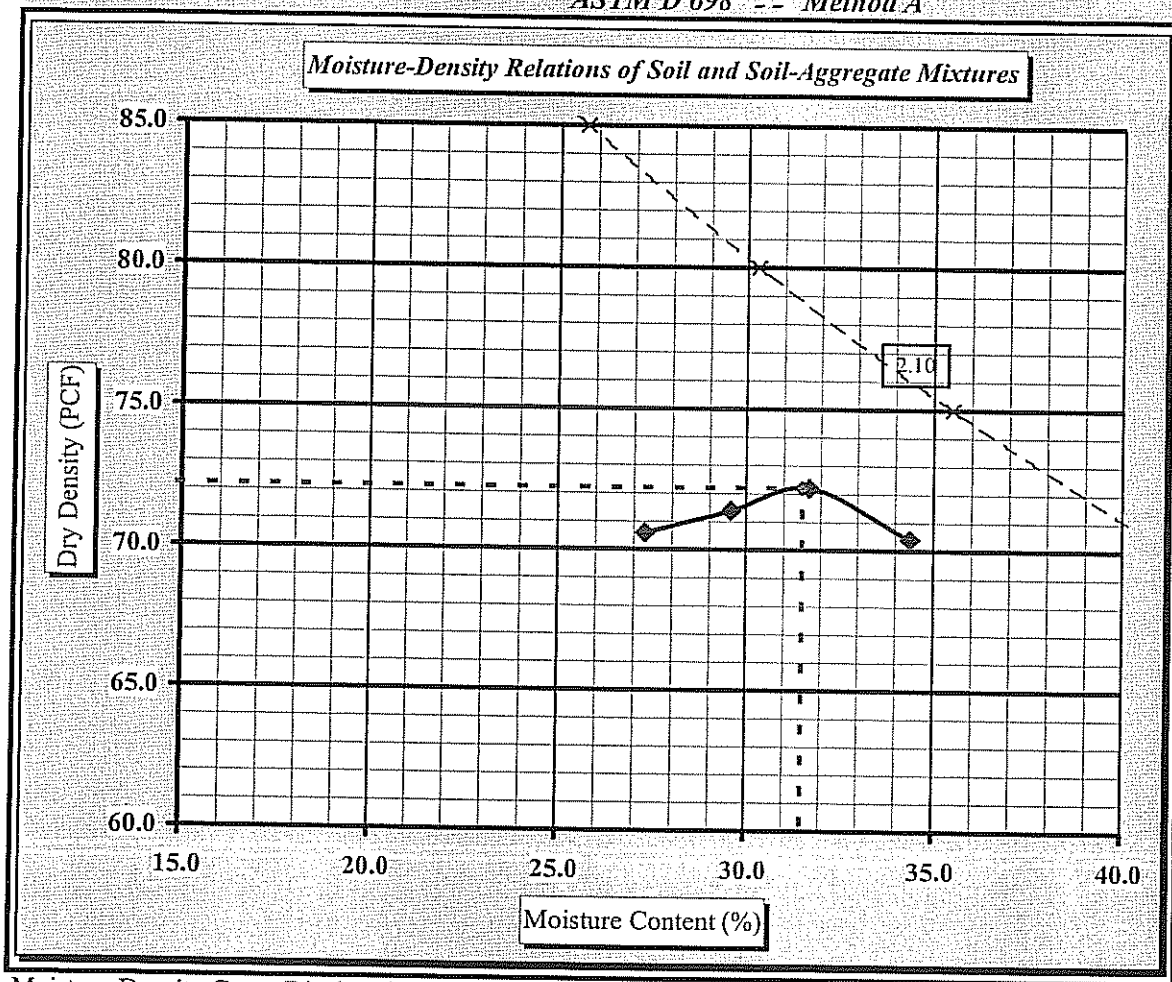
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/17-19/09
Client Name:			
Client Address:			
Boring #:	Sample #: 25	Sample Date:	1/17/2009
Location:	Cell #1 NW Corner Offset:	Depth:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]		

Maximum Dry Density 72.2 PCF. **Optimum Moisture Content 31.5%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**28.5%**
Specific Gravity of Soil	
Liquid Limit	**37**
Plastic Limit	**37**
Plastic Index	**0**

% Passing

3/4"	
3/8"	
#4	99.9%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Ken Daly
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/23/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/11-23/09

Client Name:

Client Address:

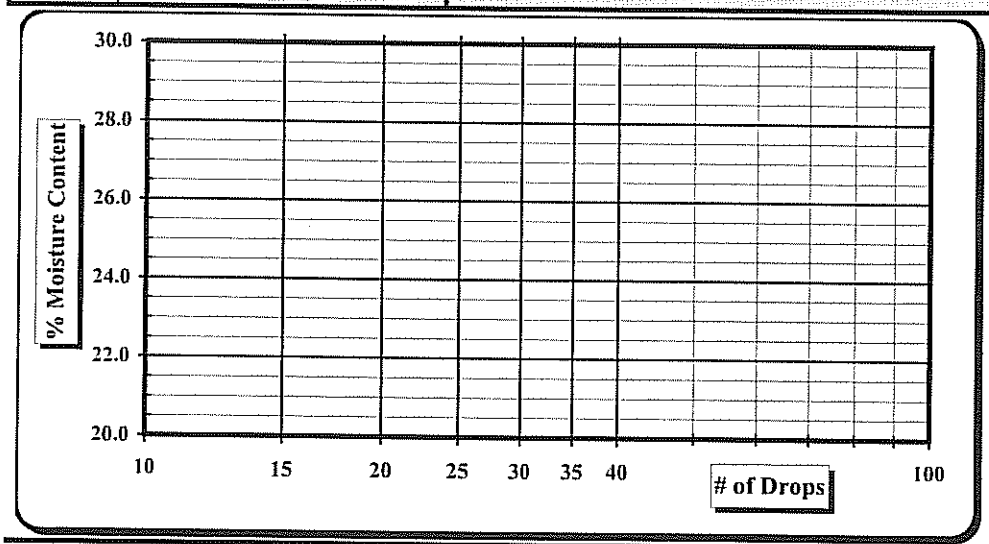
Boring #: Sample #: 26 Sample Date: 1/17/09

Location: Cell #1 W Side Offset: Elevation:

Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

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 #:									
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 **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References: Note and deviations from the test method are recorded.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Jennifer Olsen — *Technician Name*

2/23/2009 — *Date*

Ken Daly — *Technical Responsibility*

_____ — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 2/23/09
Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 2/11-23/09
Client Name: Address:
Boring #: Sample #: 26 Sample Date: 1/17/09
Location: Cell #1 W Side Offset: Elevation:
Sample Description: Fly Ash [Black Gray Silt (ML) with Fine Sand]

Pan #:	A3	Beaker #:	LL	**Apparent Relative Density (Assumed)**		**2.180**	
Hydrometer Jar #:			CZ				
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			240.28		Tare #	23	G-15
Weight of Total Sample Air Dried:			240.28	A	Tare Wt.	14.08	81.39
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	24.94	263.73
Total Sample Oven Dried:			240.28	C	Dry Wt. + A	24.94	231.53
Hydrometer Sample Oven Dried (W):			50.00	D	Water Wt. (B-C)	0.00	32.20
% Passing #10:			97.6%	E	Dry Wt. (C-A)	10.86	150.14
Correction Factor a (Table 1):			1.09		% Moisture (100 x D/E)	0.00%	21.4%

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"	0.0	27	100.0%
1/2"	3.4		98.6%
3/8"	3.4	Soil Mortar	98.6%
#4	4.7		98.0%
#10	5.8	**100.0%**	97.6%
#20	0.9	98.2%	95.8%
#40	2.4	95.3%	93.0%
#60	4.1	91.8%	89.5%
#100	7.4	85.3%	83.2%
#200	13.7	72.7%	70.9%

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. 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	31.0	4.5		26.50	57.8%	56.4%	11.9	0.01594	0.03896
5	21.0	12.0	4.5		7.50	16.4%	16.0%	15.1	0.01594	0.02767
15	21.0	8.0	4.5		3.50	7.6%	7.4%	15.7	0.01594	0.01632
30	21.0	6.5	4.5		2.00	4.4%	4.3%	16.0	0.01594	0.01163
60	21.0	5.5	4.5		1.00	2.2%	2.1%	16.1	0.01594	0.00827
250	22.5	4.0	3.5		0.50	1.1%	1.1%	16.2	0.01566	0.00399
1440	22.5	3.5	3.5		0.00	0.0%	0.0%	16.3	0.01566	0.00167
					#VALUE!	#VALUE!	0.0%	#VALUE!	#N/A	#N/A

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Jennifer Olsen	117926	Ken Daly		
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

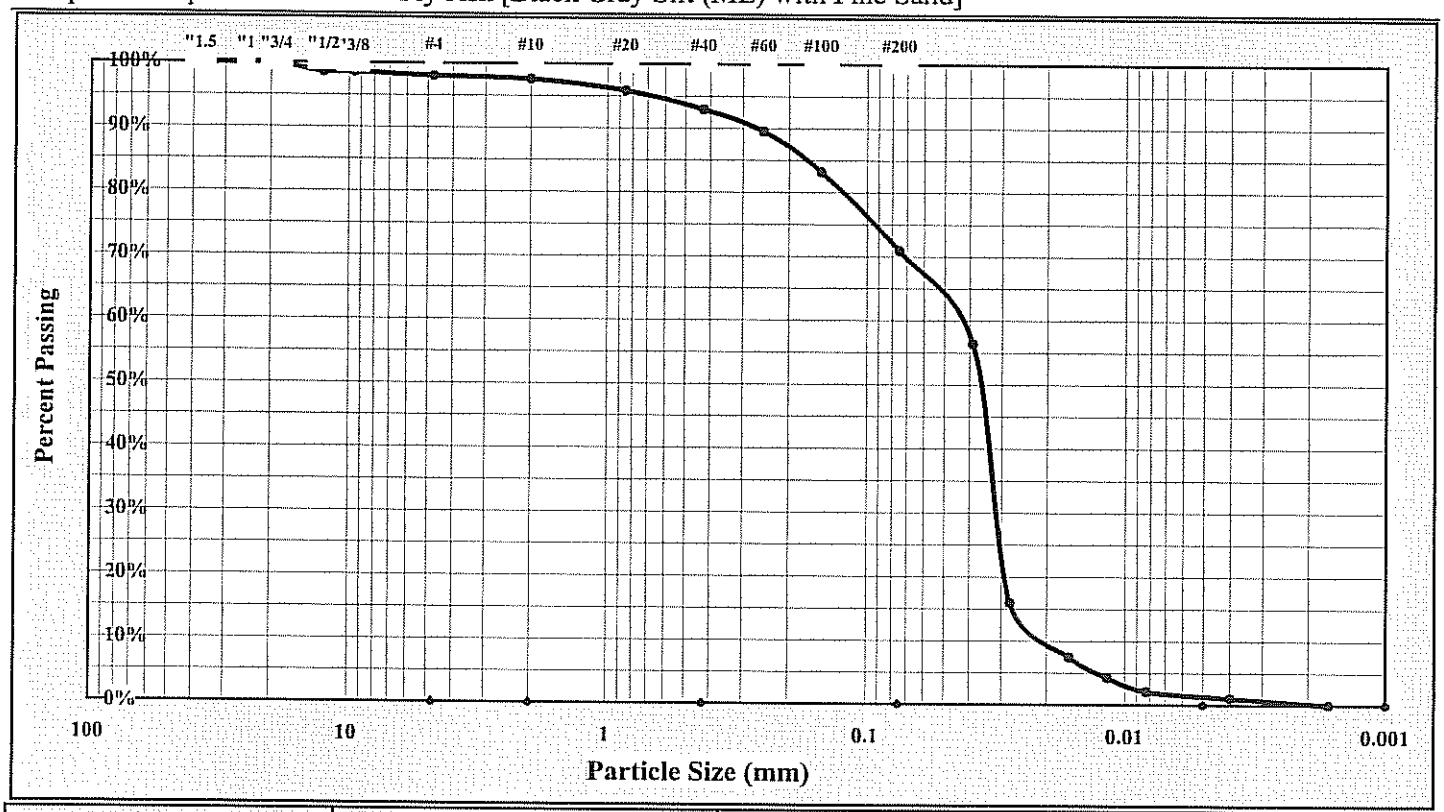
ASTM D422

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	2/23/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/11-23/09
Client Name:			
Address:			
Boring #:	Sample #: 26	Sample Date:	1/17/09
Location:	Cell #1 W Side Offset:	Elevation:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]		



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:		Gravel:	0.0%	Silt	69.4%
Silt & Clay (% Passing #200):	70.9%	Total Sand:	27.1%	Clay	1.5%
ent Relative Density (Assumed)	2.180	Moisture Content	21.4%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	0.4%	Medium Sand:	4.6%	Fine Sand:	22.0%

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: AASTM D 4318, D 854, D 2487

Ken Daly

Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

S&ME

ASTM D558, D698, D1557, AASHTO T99, T180

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/17-19/09
Client Name:			
Client Address:			

Boring #:		Sample #:	26	Sample Date:	1/17/2009
Location:	Cell #1 West Side	Offset:		Depth:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]				

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:	506	557	607	455	506	
	Tare #:	13	PFM	SQ-1	5F	695	
A. Tare Weight	A.	155.4	166.7	159.0	156.4	159.0	
B. Wet Wt + Tare Wt	B.	778.0	886.7	714.8	953.7	866.0	
C. Dry Wt. + Tare Wt.	C.	646.7	725.2	578.8	796.0	713.6	
D. Water Weight	B-C	131.3	161.5	136.0	157.7	152.4	
E. Dry Weight	C-A	491.3	558.5	419.8	639.6	554.6	
F. Moisture Content	100*D/E	**26.7%**	**28.9%**	**32.4%**	**24.7%**	**27.5%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5570	5615	5616	5533	5589	
H. Wt. of Mold	H.	4200	4200	4200	4200	4200	
I. Wt. of Soil (g. or lbs.)	G-H	1370	1415	1416	1333	1389	
J. Wt of Soil (Lbs.)	I/453.6 or I	3.020	3.119	3.122	2.939	3.062	
K. Mold Volume Factor	K.	30.11	30.11	30.11	30.11	30.11	
L. Wet Density (PCF)	J*K	90.9	93.9	94.0	88.5	92.2	
M. Dry Density (PCF)	L/(1+F)	**71.7**	**72.8**	**71.0**	**71.0**	**72.3**	

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:

Jennifer Olsen		NICET/117926	2/16/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

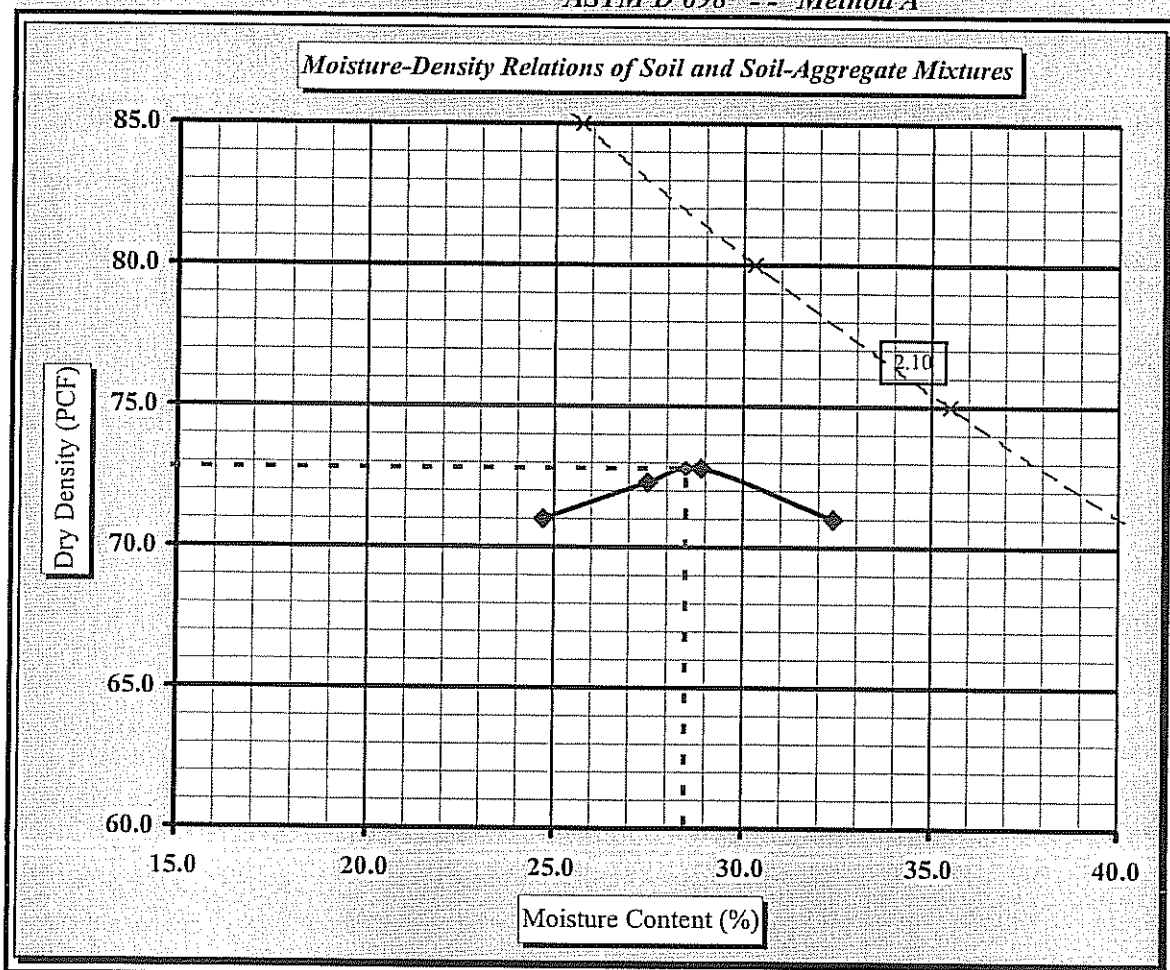
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/17-19/09
Client Name:			
Client Address:			
Boring #:	Sample #: 26	Sample Date:	1/17/2009
Location:	Cell #1 West Side Offset:	Depth:	
Sample Description:	Fly Ash [Black Gray Silt (ML) with Fine Sand]		

Maximum Dry Density 72.8 PCF. **Optimum Moisture Content 28.5%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**21.4%**
Specific Gravity of Soil	
Liquid Limit	**NP**
Plastic Limit	**NP**
Plastic Index	**NP**

% Passing

3/4"	
3/8"	
#4	98.0%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Ken Daly
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

S&ME

Project #:	**1356-06-825 Task 9**	Report Date:	2/6/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/3-6/09
Client Name:			
Client Address:			
Sample by:		Sample Dates:	1/29/09
Sampling Method:			

Boring #	Sample #	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Wt.	Percent Moisture
		ft. or m.		grams	grams	grams	grams	%
NA	27	Bulk	G-11	82.91	403.22	317.54	85.68	**36.5%**
NA	28	Bulk	G-15	81.35	373.00	316.36	56.64	**24.1%**
NA	29	Bulk	G-12	82.78	486.30	395.36	90.94	**29.1%**
NA	30	Bulk	S-3	82.25	383.00	315.75	67.25	**28.8%**

Notes: Oven Temperature Set at 60C

References: ASTM D2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician Name: Karen Warner — 117900 (*Certification #*)

Technical Responsibility: Ken Daly — _____ (*Signature*) — Project Engineer (*Position*)

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 #: **1356-06-825 Task 9** Report Date: 3/6/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/3-3/6/09

Client Name:

Client Address:

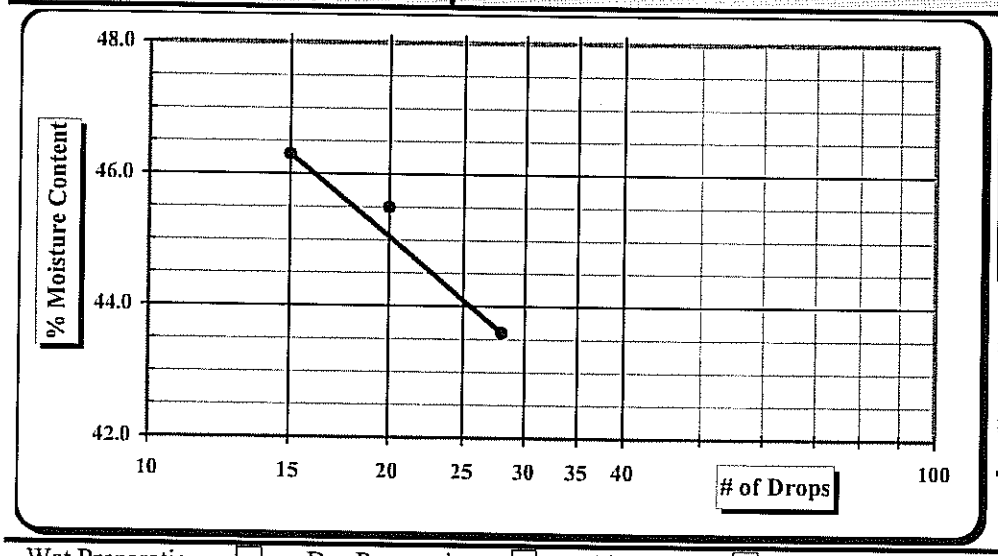
Boring #: Sample #: 27 Sample Date: 1/29/09

Location: Facility Area Offset: Elevation:

Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/13/2009	Grooving tool	20232	2/23/2009
LL Apparatus	20230	9/21/2008	Grooving tool		
Oven	10844	9/5/2008	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	EE	PP	58				56	NN	
A	Tare Weight	16.90	16.16	13.98				**15.68**	15.29	
B	Wet Soil Weight + A	26.05	26.49	23.11				21.90	21.82	
C	Dry Soil Weight + A	23.27	23.26	20.22				19.97	19.78	
D	Water Weight (B-C)	2.78	3.23	2.89				1.93	2.04	
E	Dry Soil Weight (C-A)	6.37	7.10	6.24				4.29	4.49	
F	% Moisture (D/E)*100	43.6%	45.5%	46.3%				45.0%	45.4%	
N	# OF DROPS	28	20	15				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**45.2%**		



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 **44**

Plastic Limit **45**

Plastic Index **-1**

Group Symbol **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References: Oven Temperature Set at 60C

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner — *Technician Name*

3/11/2009 — *Date*

Ken Daly — *Technical Responsibility*

_____ — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Task 9**	Report Date:	2/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/3-34/09

Client Name: Address:

Boring #: Sample #: 27 Sample Date: 1/29/09

Location: Facility Area Offset: Elevation:

Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.200**				
Hydrometer Jar #:										
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):		262.95		Tare #	PO	G-11				
Weight of Total Sample Air Dried:		262.95	A	Tare Wt.	15.13	82.91				
Weight of Air Dried Hydrometer Sample (g):		50.04	B	Wet Wt. + A	29.80	403.22				
Total Sample Oven Dried:		262.06	C	Dry Wt. + A	29.75	317.54				
Hydrometer Sample Oven Dried (W):		49.87	D	Water Wt. (B-C)	0.05	85.68				
% Passing #10:		99.7%	E	Dry Wt. (C-A)	14.62	234.63				
Correction Factor a (Table 1):		1.09		% Moisture (100 x D/E)	0.34%	36.5%				

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	0.2		99.9%
#10	0.7	**100.0%**	99.7%
#20	0.3	99.4%	99.2%
#40	0.7	98.7%	98.4%
#60	1.5	97.1%	96.8%
#100	3.3	93.3%	93.1%
#200	8.2	83.6%	83.3%

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. 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 n / 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	43.0	5.5		37.50	82.0%	81.7%	10.1	0.01562	0.04975
2	22.0	41.0	5.5		35.50	77.6%	77.4%	10.5	0.01562	0.03574
5	22.0	34.0	5.5		28.50	62.3%	62.1%	11.6	0.01562	0.02381
15	22.0	20.0	5.5		14.50	31.7%	31.6%	13.9	0.01562	0.01504
30	22.0	14.0	5.5		8.50	18.6%	18.5%	14.9	0.01562	0.01101
60	22.0	12.0	5.5		6.50	14.2%	14.2%	15.2	0.01562	0.00787
250	22.0	7.5	5.5		2.00	4.4%	4.4%	16.0	0.01562	0.00395
1440	22.0	5.5	5.5		0.00	0.0%	0.0%	16.3	0.01562	0.00166

References / Comments / Deviations ASTM D 422, D 2487, D 4318

OvenTemperature Set at 60C

Karen Warner	117900	Ken Daly	Project Engineer	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

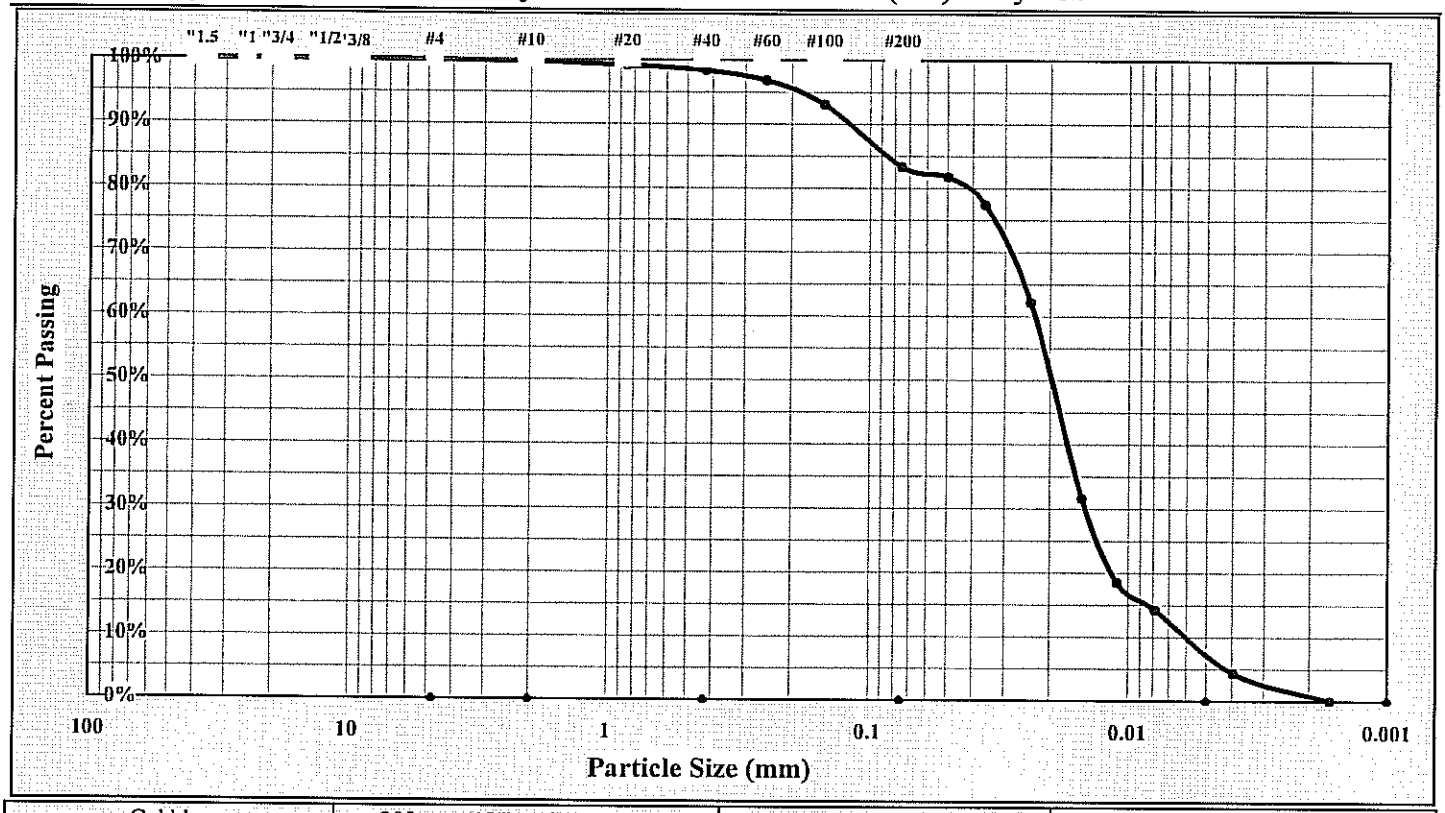
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	2/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/3-34/09
Client Name:			
Address:			
Boring #:	Sample #: 27	Sample Date:	1/29/09
Location:	Facility Area Offset:	Elevation:	
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		



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	75.3%
Silt & Clay (% Passing #200):	83.3%	Total Sand:	16.6%	Clay	8.0%
ent Relative Density (Assumed)	2.200	Moisture Content	36.5%	Colloids	
Liquid Limit	44	Plastic Limit	45	Plastic Index	-1
Coarse Sand:	0.2%	Medium Sand:	1.3%	Fine Sand:	15.1%

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: AASTM D 4318, D 854, D 2487

Oven Temperature Set at 60C.

Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Task 9**	Report Date:	3/9/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/24-3/9/09
Client Name:			
Client Address:			
Boring #:	Sample #: 27	Sample Date:	1/30/2009
Location:	Facility Area Offset:	Depth:	Bulk
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						
	Tare #:		72	L-2	70	995	MG
A. Tare Weight	A.		74.9	86.4	71.1	72.5	86.9
B. Wet Wt + Tare Wt	B.		673.9	744.4	665.8	608.7	724.6
C. Dry Wt. + Tare Wt.	C.		545.6	596.9	518.6	464.0	549.1
D. Water Weight	B-C		128.3	147.5	147.2	144.7	175.5
E. Dry Weight	C-A		470.7	510.5	447.5	391.5	462.2
F. Moisture Content	100*D/E		**27.3%**	**28.9%**	**32.9%**	**37.0%**	**38.0%**

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.		5534	5565	5644	5622	5600
H. Wt. of Mold	H.		4170	4170	4170	4170	4170
I. Wt. of Soil (g. or lbs.)	G-H		1364	1395	1474	1452	1430
J. Wt of Soil (Lbs.)	I/453.6 or I		3.007	3.075	3.250	3.201	3.153
K. Mold Volume Factor	K.		30.07	30.07	30.07	30.07	30.7
L. Wet Density (PCF)	J*K		90.4	92.5	97.7	96.3	96.8
M. Dry Density (PCF)	L/(1+F)		**71.0**	**71.8**	**73.5**	**70.3**	**70.1**

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: AASTM D 4318, D 854, D 2487, C 127

Oven Temperature Set at 60C

Karen Warner		NICET 117900	3/10/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

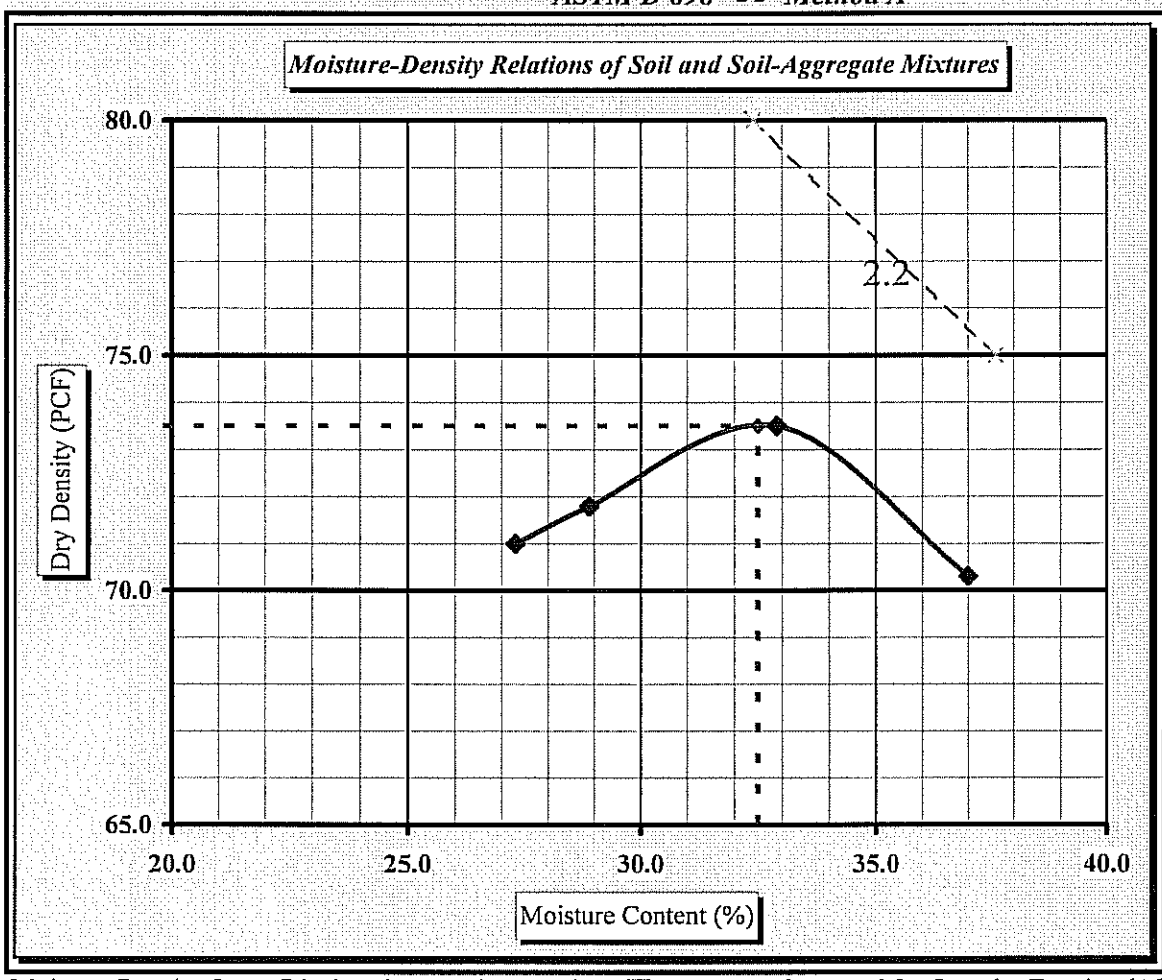
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Task 9**	Report Date:	3/9/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/24-3/9/09
Client Name:			
Client Address:			
Boring #:	Sample #: 27	Sample Date:	1/30/2009
Location:	Facility Area Offset:	Depth:	Bulk
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		

Maximum Dry Density 73.5 PCF. **Optimum Moisture Content 32.5%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**36.5%**
Specific Gravity of Soil	
Liquid Limit	**NP**
Plastic Limit	**NP**
Plastic Index	**NP**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.9%
#10	99.7%
#40	98.4%
#60	96.8%
#200	83.3%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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:

Oven Temperature Set at 60C

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

Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Task 9** Report Date: 3/6/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/3-3/6/09

Client Name:

Client Address:

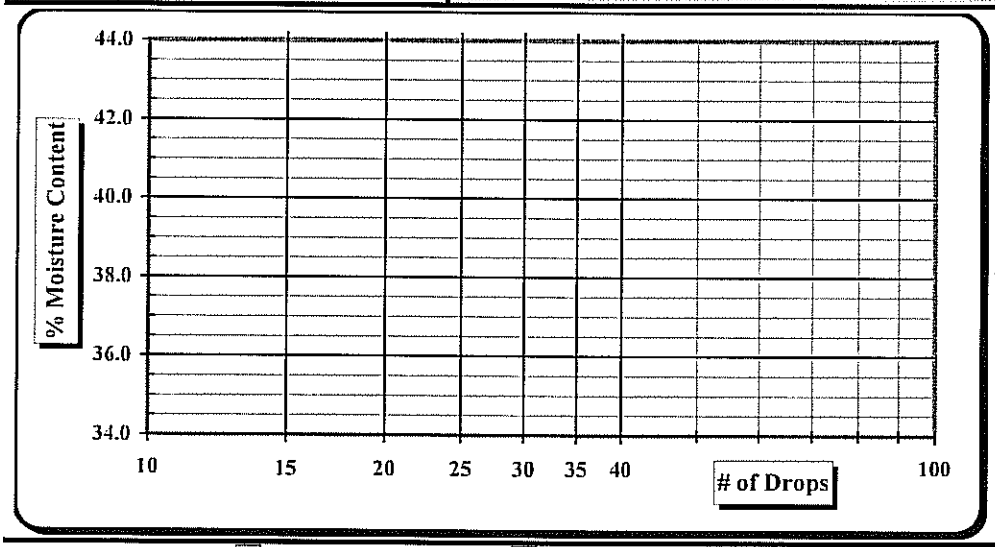
Boring #: Sample #: 28 Sample Date: 1/29/09

Location: Cell #1 South End Offset: Elevation:

Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/13/2009	Grooving tool	20232	2/23/2009
LL Apparatus	20230	9/21/2008	Grooving tool		
Oven	10844	9/5/2008	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

Multipoint Method ☐

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References: Oven Temperature Set at 60C.

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner — *Technician Name*

3/11/2009 — *Date*

Ken Daly — *Technical Responsibility*

_____ — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Task 9** Report Date: 2/24/09
Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 2/2-24/09
Client Name: Address:
Boring #: Sample #: 28 Sample Date: 1/30/09
Location: Cell #1 South End Offset: Elevation:
Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Pan #:		Beaker #:			**Apparent Relative Density (Assumed)**		**2.200**		
Hydrometer Jar #:									
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural			
Total Sample Air Dried Wt. + tare wt. (grams):	343.21			Tare #	39	G-15			
Weight of Total Sample Air Dried:	343.21		A	Tare Wt.	13.99	81.35			
Weight of Air Dried Hydrometer Sample (g):	50.00		B	Wet Wt. + A	24.37	373.00			
Total Sample Oven Dried:	342.24		C	Dry Wt. + A	24.34	316.36			
Hydrometer Sample Oven Dried (W):	49.86		D	Water Wt. (B-C)	0.03	56.64			
% Passing #10:	97.7%		E	Dry Wt. (C-A)	10.35	235.01			
Correction Factor a (Table 1):	1.09			% Moisture (100 x D/E)	0.29%	24.1%			

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	13	100.0%
1/2"	0.0		100.0%
3/8"	2.4	Soil Mortar	99.3%
#4	5.0		98.5%
#10	7.7	**100.0%**	97.7%
#20	0.4	99.1%	96.9%
#40	1.4	97.3%	95.1%
#60	2.6	94.8%	92.6%
#100	4.9	90.2%	88.2%
#200	10.3	79.4%	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.* *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
1	22.0	41.0	5.5		35.50	77.6%	75.9%	10.5	0.01562	0.05055
2	22.0	31.0	5.5		25.50	55.8%	54.5%	12.1	0.01562	0.03844
5	22.0	12.0	5.5		6.50	14.2%	13.9%	15.2	0.01562	0.02726
15	22.0	9.0	5.5		3.50	7.7%	7.5%	15.7	0.01562	0.01599
30	22.0	7.0	5.5		1.50	3.3%	3.2%	16.0	0.01562	0.01142
60	22.0	6.5	5.5		1.00	2.2%	2.1%	16.1	0.01562	0.00810
250	22.0	6.0	5.5		0.50	1.1%	1.1%	16.2	0.01562	0.00398
1440	22.0	5.5	5.5		0.00	0.0%	0.0%	16.3	0.01562	0.00166

References / Comments / Deviations ASTM D 422, D 2487, D 4318
Oven Temperature Set at 60C.

Karen Warner	117900	Ken Daly	Project Engineer	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

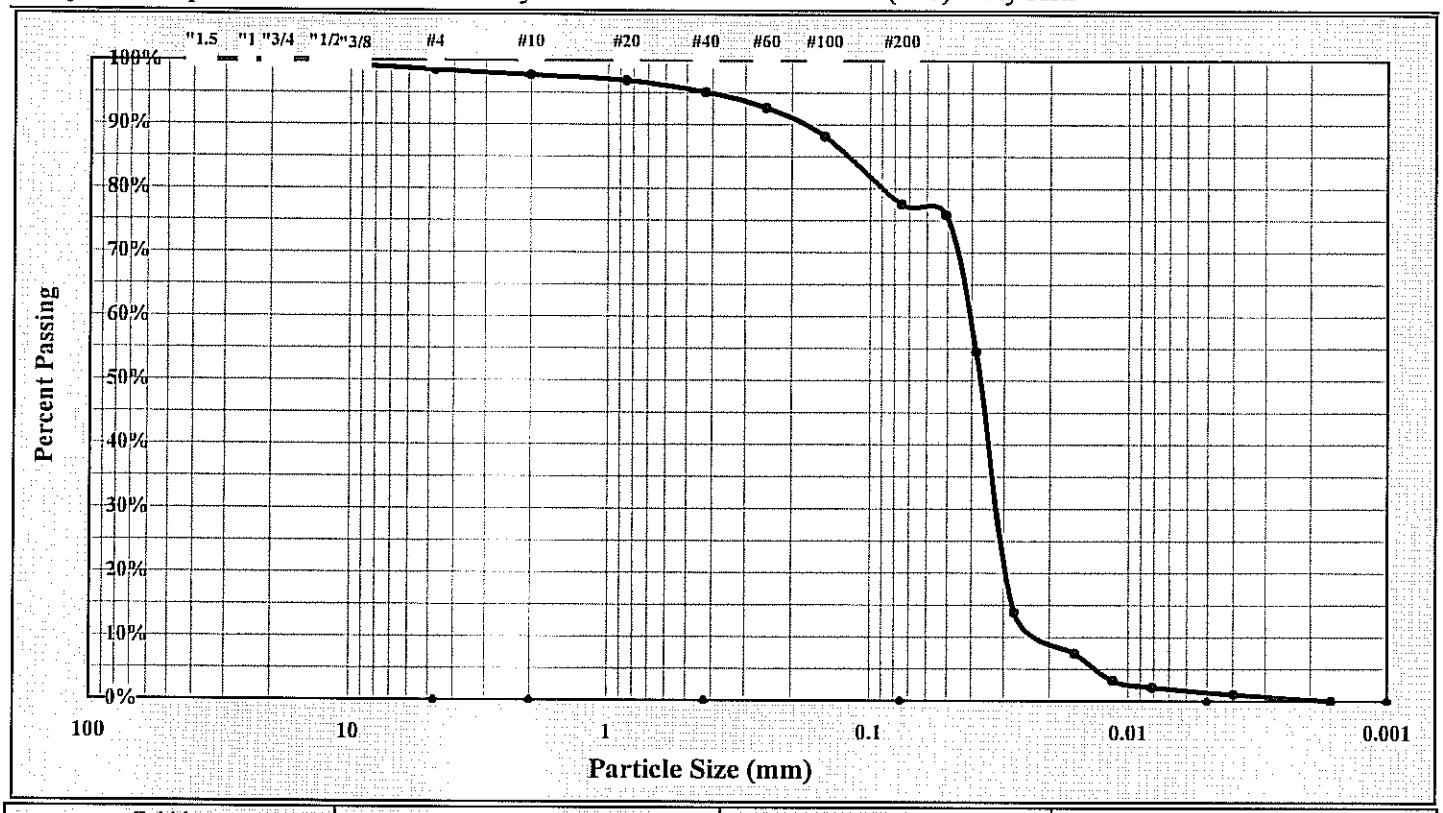
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	2/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/2-24/09
Client Name:			
Address:			
Boring #:	Sample #: 28	Sample Date:	1/30/09
Location:	Cell #1 South End Offset:	Elevation:	
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		



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	75.6%
Silt & Clay (% Passing #200):	77.6%	Total Sand:	20.9%	Clay	2.0%
ent Relative Density (Assumed)	2.200	Moisture Content	24.1%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	0.8%	Medium Sand:	2.7%	Fine Sand:	17.5%

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: AASTM D 4318, D 854, D 2487

Oven Temperature Set at 60C.

Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Task 9**	Report Date:	3/9/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/24-3/9/09
Client Name:			
Client Address:			
Boring #:	Sample #: 28	Sample Date:	1/29/2009
Location:	Cell #1 South End Offset:	Depth:	Bulk
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						
	Tare #:	HK	81	84	62	74	79
A. Tare Weight	A.	158.5	74.1	73.8	72.6	69.8	72.4
B. Wet Wt + Tare Wt	B.	792.2	678.0	616.6	691.9	703.5	687.8
C. Dry Wt. + Tare Wt.	C.	619.7	571.0	515.0	566.4	557.3	538.0
D. Water Weight	B-C	172.5	107.0	101.6	125.5	146.2	149.8
E. Dry Weight	C-A	461.2	496.9	441.2	493.8	487.5	465.6
F. Moisture Content	100*D/E	**37.4%**	**21.5%**	**23.0%**	**25.4%**	**30.0%**	**32.2%**

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5551	5475	5517	5541	5622	5609
H. Wt. of Mold	H.	4170	4170	4170	4170	4170	4170
I. Wt. of Soil (g. or lbs.)	G-H	1381	1305	1347	1371	1452	1439
J. Wt of Soil (Lbs.)	I/453.6 or I	3.045	2.877	2.970	3.022	3.201	3.172
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07	30.07	30.7
L. Wet Density (PCF)	J*K	91.6	86.5	89.3	90.9	96.3	97.4
M. Dry Density (PCF)	L/(1+F)	**66.7**	**71.2**	**72.6**	**72.5**	**74.1**	**73.7**

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: AASTM D 4318, D 854, D 2487, C 127

Oven Temperature Set at 60C.

Karen Warner		NICET 117900	3/10/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

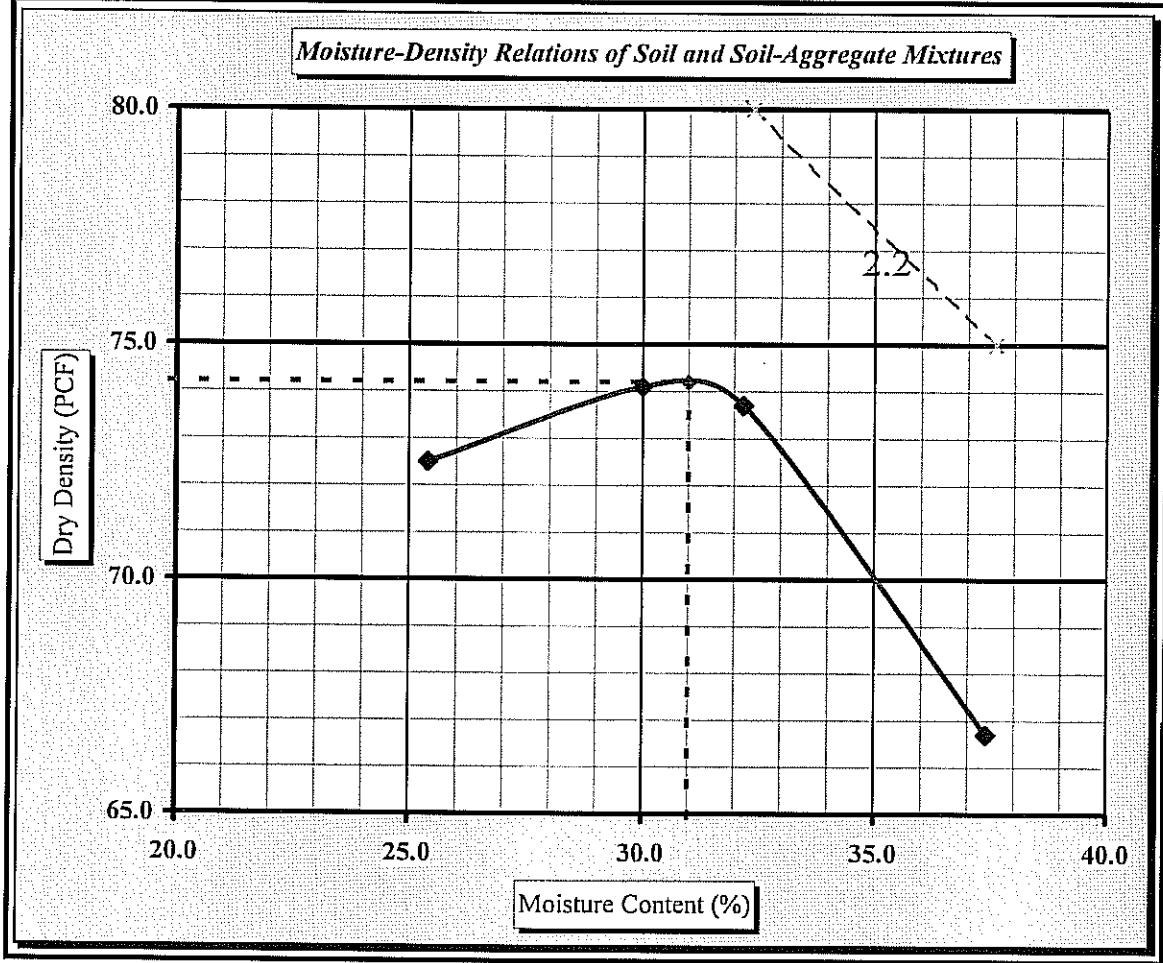
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Task 9**	Report Date:	3/9/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/24-3/9/09
Client Name:			
Client Address:			
Boring #:	Sample #: 28	Sample Date:	1/29/2009
Location:	Cell #1 South End Offset:	Depth:	Bulk
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		

Maximum Dry Density 74.2 PCF. **Optimum Moisture Content 31.0%**

ASTM D 698 - - Method A



Soil Properties

Natural Moisture Content	**24.1%**
Specific Gravity of Soil	
Liquid Limit	**NP**
Plastic Limit	**NP**
Plastic Index	**NP**

% Passing

3/4"	100.0%
3/8"	99.3%
#4	98.5%
#10	97.7%
#40	95.1%
#60	92.6%
#200	77.6%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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:

Oven Temperaure Set at 60C

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

Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Task 9** Report Date: 3/6/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/3-3/6/09

Client Name:

Client Address:

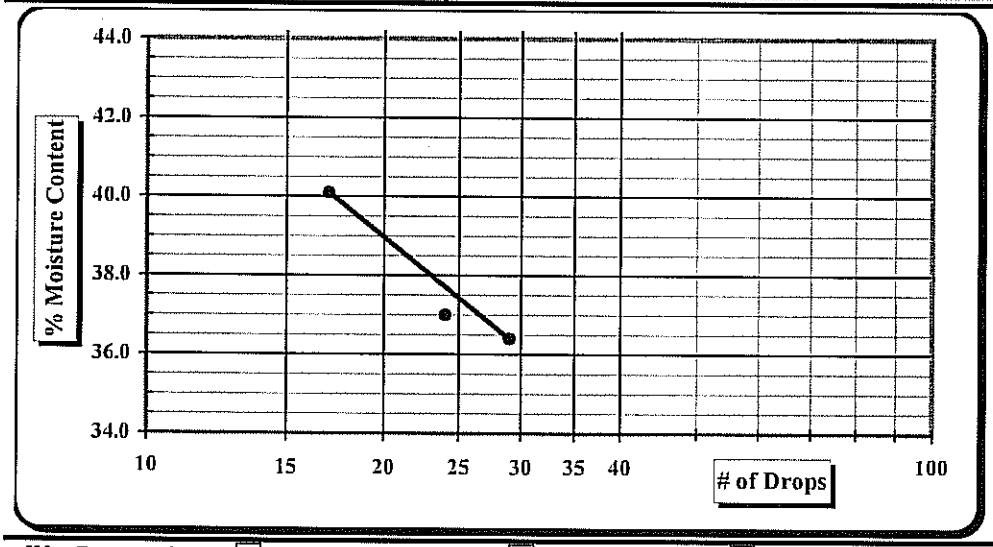
Boring #: Sample #: 29 Sample Date: 1/29/09

Location: NE Corner Cell #1 Offset: Elevation:

Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/13/2009	Grooving tool	20232	2/23/2009
LL Apparatus	20230	9/21/2008	Grooving tool		
Oven	10844	9/5/2008	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	CC	WN	BA				27	47	
A	Tare Weight	16.78	16.57	15.37				**13.90**	15.68	
B	Wet Soil Weight + A	25.13	27.78	24.98				20.43	22.31	
C	Dry Soil Weight + A	22.90	24.75	22.23				18.68	20.52	
D	Water Weight (B-C)	2.23	3.03	2.75				1.75	1.79	
E	Dry Soil Weight (C-A)	6.12	8.18	6.86				4.78	4.84	
F	% Moisture (D/E)*100	36.4%	37.0%	40.1%				36.6%	37.0%	
N	# OF DROPS	29	24	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**36.8%**		



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 **37**

Plastic Limit **37**

Plastic Index

Group Symbol **ML**

Multipoint Method ☑

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References: Oven Temperature Set at 60C

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner — *Technician Name*

3/11/2009 — *Date*

Ken Daly — *Technical Responsibility*

_____ — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Task 9** Report Date: 2/24/09
Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 2/3-24/09
Client Name: Address:
Boring #: Sample #: 29 Sample Date: 1/29/09
Location: NE Corner Cell #1 Offset: Elevation:
Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**		**2.200**			
Hydrometer Jar #:									
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural			
Total Sample Air Dried Wt. + tare wt. (grams):	309.03			Tare #	27	G-12			
Weight of Total Sample Air Dried:	309.03		A	Tare Wt.	13.90	81.35			
Weight of Air Dried Hydrometer Sample (g):	50.00		B	Wet Wt. + A	26.22	486.30			
Total Sample Oven Dried:	308.28		C	Dry Wt. + A	26.19	395.36			
Hydrometer Sample Oven Dried (W):	49.88		D	Water Wt. (B-C)	0.03	90.94			
% Passing #10:	99.2%		E	Dry Wt. (C-A)	12.29	314.01			
Correction Factor a (Table 1):	1.09			% Moisture (100 x D/E)	0.24%	29.0%			

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"	0.5	Soil Mortar	99.8%
#4	1.0		99.7%
#10	2.3	**100.0%**	99.2%
#20	0.4	99.2%	98.4%
#40	1.3	97.4%	96.6%
#60	2.4	95.2%	94.5%
#100	4.8	90.4%	89.7%
#200	10.8	78.4%	77.8%

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. 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)$^{1/2}$
1	22.0	41.0	5.5		35.50	77.6%	77.0%	10.5	0.01562	0.05055
2	22.0	37.0	5.5		31.50	68.8%	68.3%	11.1	0.01562	0.03684
5	22.0	23.5	5.5		18.00	39.3%	39.0%	13.3	0.01562	0.02552
15	22.0	12.0	5.5		6.50	14.2%	14.1%	15.2	0.01562	0.01574
30	22.0	9.5	5.5		4.00	8.7%	8.7%	15.6	0.01562	0.01128
60	22.0	8.0	5.5		2.50	5.5%	5.4%	15.9	0.01562	0.00804
250	22.0	7.0	5.5		1.50	3.3%	3.3%	16.0	0.01562	0.00396
1440	22.0	6.5	5.5		1.00	2.2%	2.2%	16.1	0.01562	0.00165

References / Comments / Deviations ASTM D 422, D 2487, D 4318
Oven Temperature Set at 60C

Karen Warner	117900	Ken Daly	Project Engineer	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

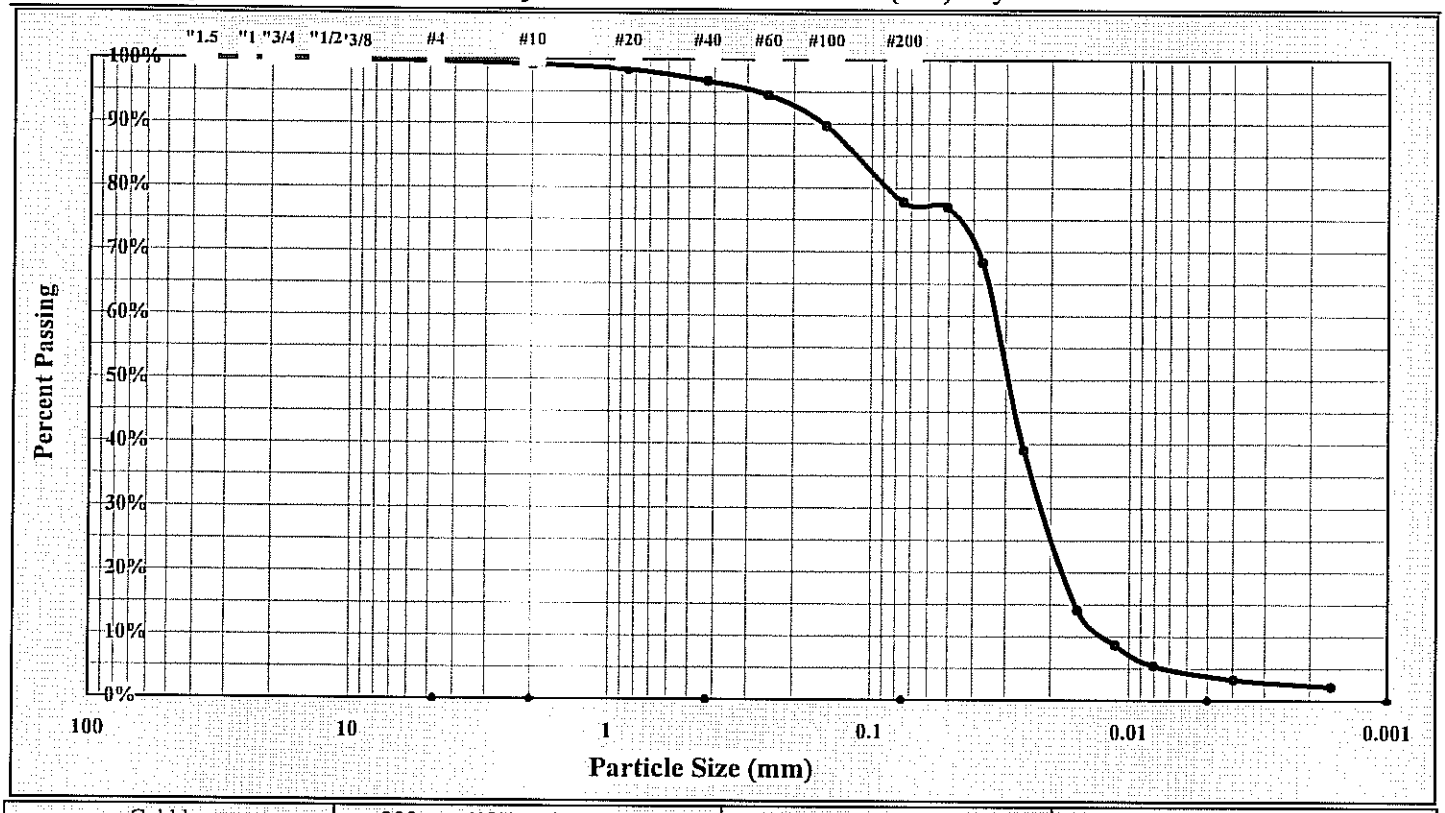
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	2/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/3-24/09
Client Name:			
Address:			
Boring #:	Sample #: 29	Sample Date:	1/29/09
Location:	NE Corner Cell #1 Offset:	Elevation:	
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		



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	73.8%
Silt & Clay (% Passing #200):	77.8%	Total Sand:	21.9%	Clay	4.0%
ent Relative Density (Assumed)	2.200	Moisture Content	29.0%	Colloids	
Liquid Limit	37	Plastic Limit	37	Plastic Index	0
Coarse Sand:	0.4%	Medium Sand:	2.6%	Fine Sand:	18.8%

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: AASTM D 4318, D 854, D 2487

Oven Temperature Set at 60C

Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

S&ME

ASTM D558, D698, D1557, AASHTO T99, T180

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Task 9**	Report Date:	3/9/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/24-3/9/09
Client Name:			
Client Address:			
Boring #:	Sample #: 29	Sample Date:	1/29/2009
Location:	NE Corner Cell #1 Offset:	Depth:	Bulk
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						
	Tare #:	98	87	101	72	70	L-2
A. Tare Weight	A.	72.0	74.8	74.7	74.8	71.0	86.9
B. Wet Wt + Tare Wt	B.	648.2	643.4	701.6	617.6	718.6	799.8
C. Dry Wt. + Tare Wt.	C.	541.8	532.8	567.1	496.7	563.8	619.8
D. Water Weight	B-C	106.4	110.6	134.5	120.9	154.8	180.0
E. Dry Weight	C-A	469.8	458.0	492.4	421.9	492.8	532.9
F. Moisture Content	100*D/E	**22.6%**	**24.1%**	**27.3%**	**28.7%**	**31.4%**	**33.8%**

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5497	5508	5596	5621	5641	5622
H. Wt. of Mold	H.	4170	4170	4170	4170	4170	4170
I. Wt. of Soil (g. or lbs.)	G-H	1327	1338	1426	1451	1471	1452
J. Wt of Soil (Lbs.)	I/453.6 or I	2.925	2.950	3.144	3.199	3.243	3.201
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07	30.07	30.7
L. Wet Density (PCF)	J*K	88.0	88.7	94.5	96.2	97.5	98.3
M. Dry Density (PCF)	L/(1+F)	**71.8**	**71.5**	**74.2**	**74.7**	**74.2**	**73.5**

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: AASTM D 4318, D 854, D 2487, C 127
Oven Temperature set at 60C

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

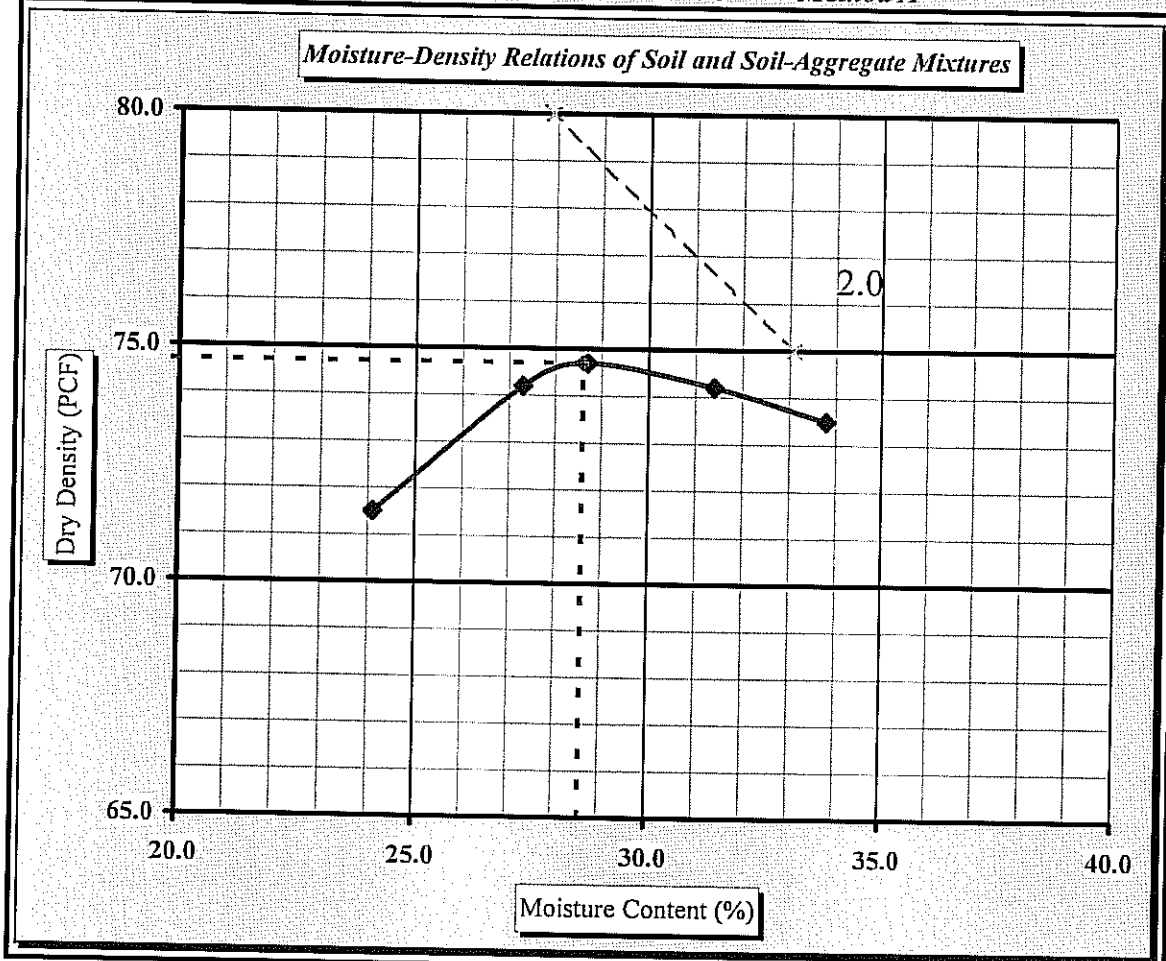
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Task 9**	Report Date:	3/9/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/24-3/9/09
Client Name:			
Client Address:			
Boring #:	Sample #: 29	Sample Date:	1/29/2009
Location:	NE Corner Cell #1 Offset:	Depth:	Bulk
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		

Maximum Dry Density **74.7** **PCF.** **Optimum Moisture Content** **28.6%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**29.1%**
Specific Gravity of Soil	
Liquid Limit	**NP**
Plastic Limit	**NP**
Plastic Index	**NP**

% Passing

3/4"	100.0%
3/8"	99.8%
#4	99.7%
#10	99.2%
#40	96.6%
#60	94.5%
#200	77.8%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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:

Oven Temperature Set at 60C

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

Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Task 9** Report Date: 3/6/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/3-3/6/09

Client Name:

Client Address:

Boring #: Sample #: 30 Sample Date: 1/29/09

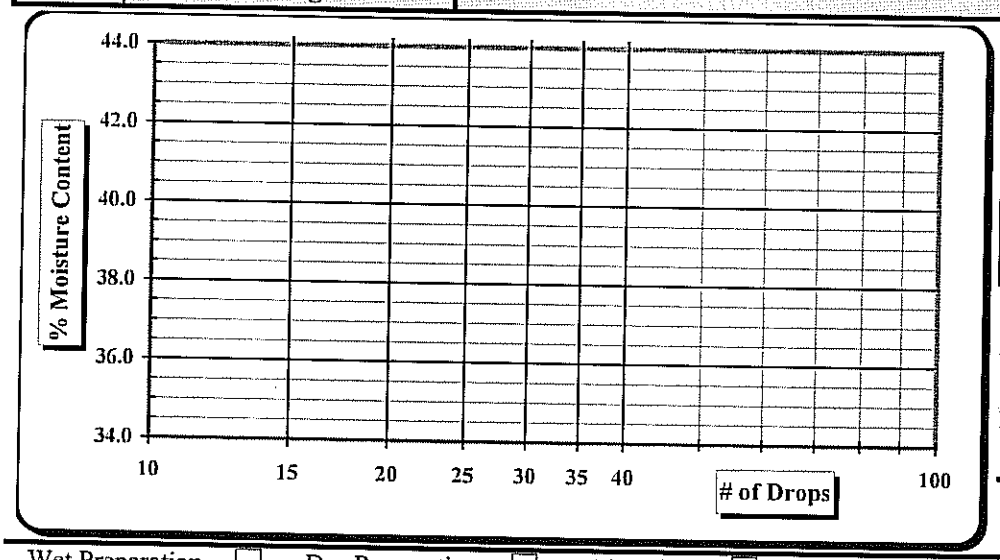
Location: NW Corner Cell #1 Offset: Elevation:

Sample Description: Black Gray Silt w/Medium toFine Sand (ML) Fly Ash

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/13/2009	Grooving tool	20232	2/23/2009
LL Apparatus	20230	9/21/2008	Grooving tool		
Oven	10844	9/5/2008	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									
LL	LL = F * FACTOR									
Ave.	*Average*									

Moisture Contents determined by ASTM D 2216



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 **ML**

Multipoint Method ☐

One-point Method ☐

Wet Preparation ☐ Dry Preparation ☑ Air Dried ☑ *Estimate the % Retained on the #40 Sieve:*

Notes / Deviations / References: Oven Temperature Set at 60C

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Karen Warner — *Technician Name*

3/11/2009 — *Date*

Ken Daly — *Technical Responsibility*

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Task 9** Report Date: 2/24/09
Project Name: Allen Steam Station RAB Ash Landfill Test Date(s): 2/3-24/09
Client Name: Address:
Boring #: Sample #: 30 Sample Date: 1/29/09
Location: NW Corner Cell #1 Offset: Elevation:
Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Pan #:		Beaker #:		**Apparent Relative Density (Assumed)**	**2.200**
Hydrometer Jar #:					
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):	280.79		Tare #	25	S-3
Weight of Total Sample Air Dried:	280.79	A	Tare Wt.	14.33	82.25
Weight of Air Dried Hydrometer Sample (g):	50.02	B	Wet Wt. + A	26.85	383.00
Total Sample Oven Dried:	279.90	C	Dry Wt. + A	26.81	315.75
Hydrometer Sample Oven Dried (W):	49.86	D	Water Wt. (B-C)	0.04	67.25
% Passing #10:	99.4%	E	Dry Wt. (C-A)	12.48	233.50
Correction Factor a (Table 1):	1.09		% Moisture (100 x D/E)	0.32%	28.8%

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	0.7		99.8%
#10	1.6	**100.0%**	99.4%
#20	0.2	99.5%	99.0%
#40	0.8	98.5%	97.9%
#60	1.7	96.5%	96.0%
#100	3.9	92.1%	91.6%
#200	10.5	79.0%	78.5%

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.* *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)$^{1/2}$
1	22.0	40.5	5.5	6.00	35.00	76.5%	76.1%	10.6	0.01562	0.05074
2	22.0	36.0	5.5	6.00	30.50	66.7%	66.3%	11.3	0.01562	0.03711
5	22.0	17.0	5.5	6.00	11.50	25.1%	25.0%	14.4	0.01562	0.02651
15	22.0	9.5	5.5	6.00	4.00	8.7%	8.7%	15.6	0.01562	0.01595
30	22.0	8.0	5.5	6.00	2.50	5.5%	5.4%	15.9	0.01562	0.01137
60	22.0	6.5	5.5	6.00	1.00	2.2%	2.2%	16.1	0.01562	0.00810
250	22.0	6.0	5.5	6.00	0.50	1.1%	1.1%	16.2	0.01562	0.00398
1440	22.0	5.5	5.5	6.00	0.00	0.0%	0.0%	16.3	0.01562	0.00166

References / Comments / Deviations ASTM D 422, D 2487, D 4318
Oven Temperature Set at 60C

Karen Warner	117900	Ken Daly	Project Engineer	
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

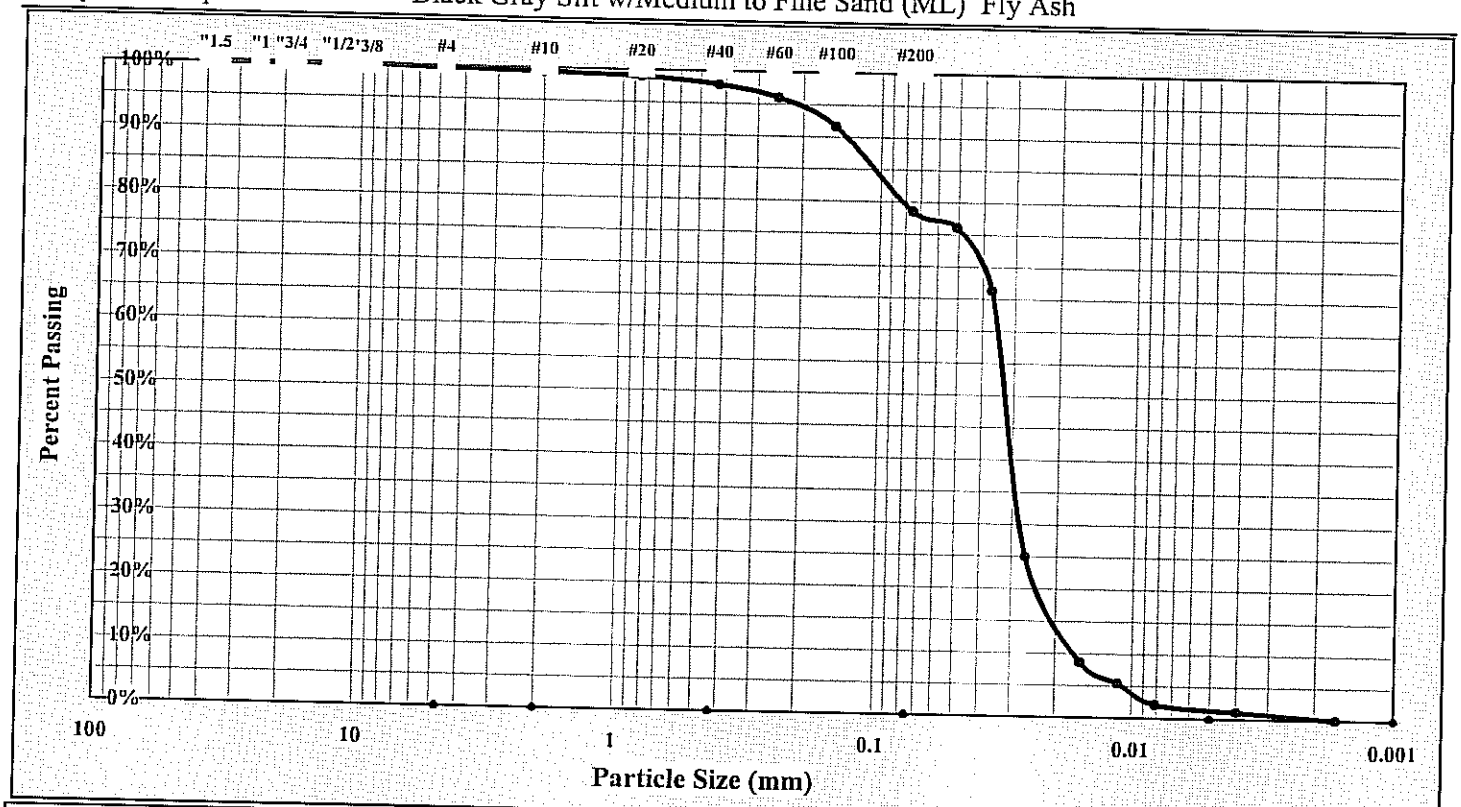
S&ME

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	2/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/3-24/09
Client Name:			
Address:			
Boring #:	Sample #: 30	Sample Date:	1/29/09
Location:	NW Corner Cell #1 Offset:	Elevation:	
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash		



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	76.5%
Silt & Clay (% Passing #200):	78.5%	Total Sand:	21.2%	Clay	2.0%
ent Relative Density (Assumed)	2.200	Moisture Content	28.8%	Colloids	
Liquid Limit	NP	Plastic Limit	NP	Plastic Index	NP
Coarse Sand:	0.3%	Medium Sand:	1.5%	Fine Sand:	19.4%

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: AASTM D 4318, D 854, D 2487

Oven Temperature Set at 60C

Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

S&ME

ASTM D558, D698, D1557, AASHTO T99, T180

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #: **1356-06-825 Task 9** | Report Date: 3/9/09
Project Name: Allen Steam Station RAB Ash Landfill | Test Date(s) 2/24-3/9/09
Client Name:
Client Address:

Boring #: | Sample #: 30 | Sample Date: 1/29/2009
Location: NW Corner Cell #1 | Offset: | Depth: Bulk
Sample Description: Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						
	Tare #:		98	5E	G	DLB	THAI
A. Tare Weight	A.		72.0	156.3	155.6	160.2	153.5
B. Wet Wt + Tare Wt	B.		594.1	763.2	776.9	893.8	797.2
C. Dry Wt. + Tare Wt.	C.		485.5	630.9	637.4	722.3	636.9
D. Water Weight	B-C		108.6	132.3	139.5	171.5	160.3
E. Dry Weight	C-A		413.5	474.6	481.8	562.1	483.4
F. Moisture Content	100*D/E		**26.3%**	**27.9%**	**29.0%**	**30.5%**	**33.2%**

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.		5481	5513	5540	5560	5516
H. Wt. of Mold	H.		4170	4170	4170	4170	4170
I. Wt. of Soil (g. or lbs.)	G-H		1311	1343	1370	1390	1346
J. Wt of Soil (Lbs.)	I/453.6 or I		2.890	2.961	3.020	3.064	2.967
K. Mold Volume Factor	K.		30.07	30.07	30.07	30.07	30.7
L. Wet Density (PCF)	J*K		86.9	89.0	90.8	92.1	91.1
M. Dry Density (PCF)	L/(1+F)		**68.8**	**69.6**	**70.4**	**70.6**	**68.4**

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: AASTM D 4318, D 854, D 2487, C 127
Oven Temperature Set at 60C

Karen Warner		NICET 117900	3/10/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

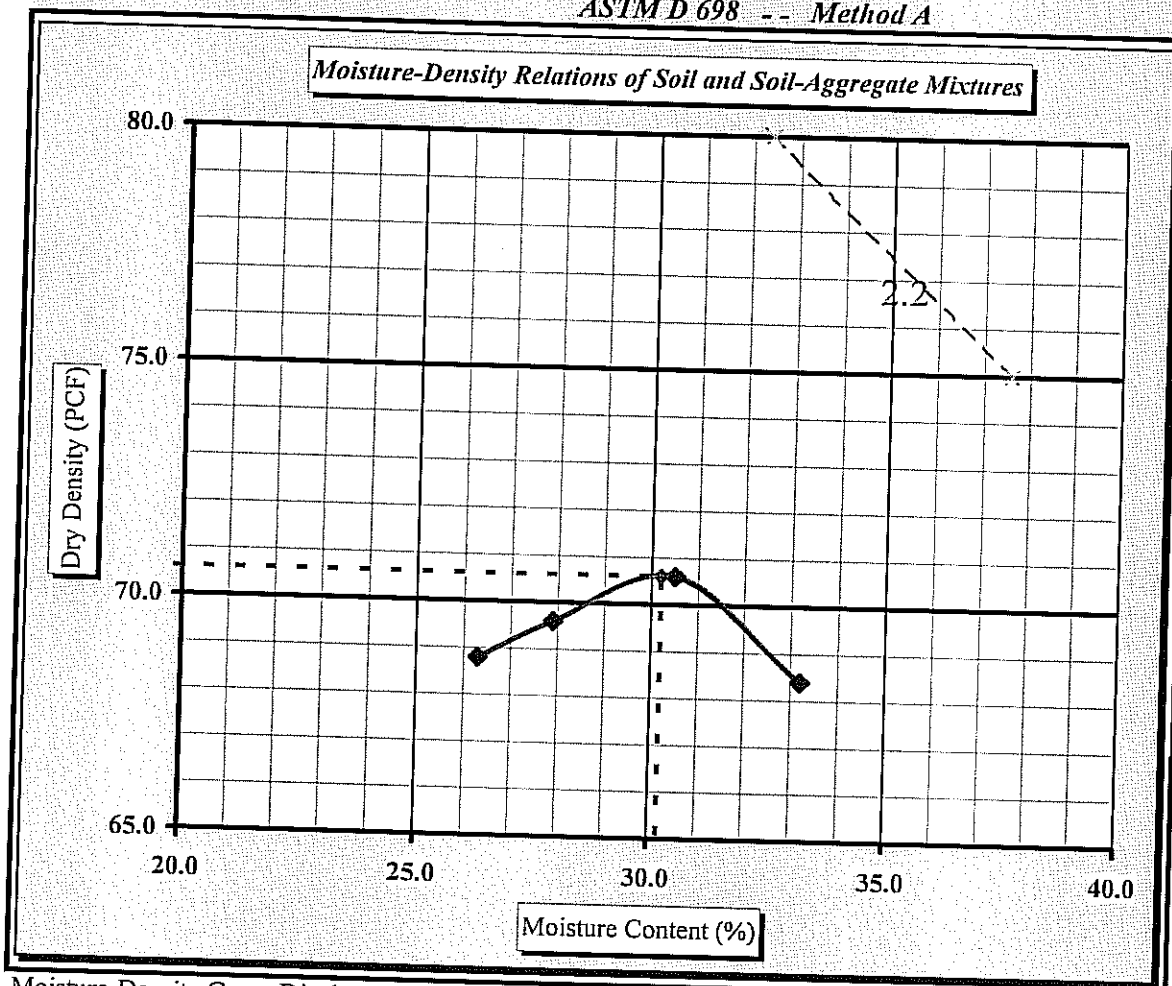
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Task 9**	Report Date:	3/9/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/24-3/9/09
Client Name:			
Client Address:			
Boring #:			
Location:	NW Corner Cell #1	Sample #: 30	Sample Date: 1/29/2009
Sample Description:	Black Gray Silt w/Medium to Fine Sand (ML) Fly Ash	Offset:	Depth: Bulk

Maximum Dry Density 70.6 PCF. **Optimum Moisture Content 30.2%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**28.8%**
Specific Gravity of Soil	
Liquid Limit	**NP**
Plastic Limit	**NP**
Plastic Index	**NP**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.8%
#10	99.4%
#40	97.9%
#60	96.0%
#200	78.5%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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:

Oven Temperature Set at 60C

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

Ken Daly		Project Engineer	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Historical Proctors

Moisture - Density Report

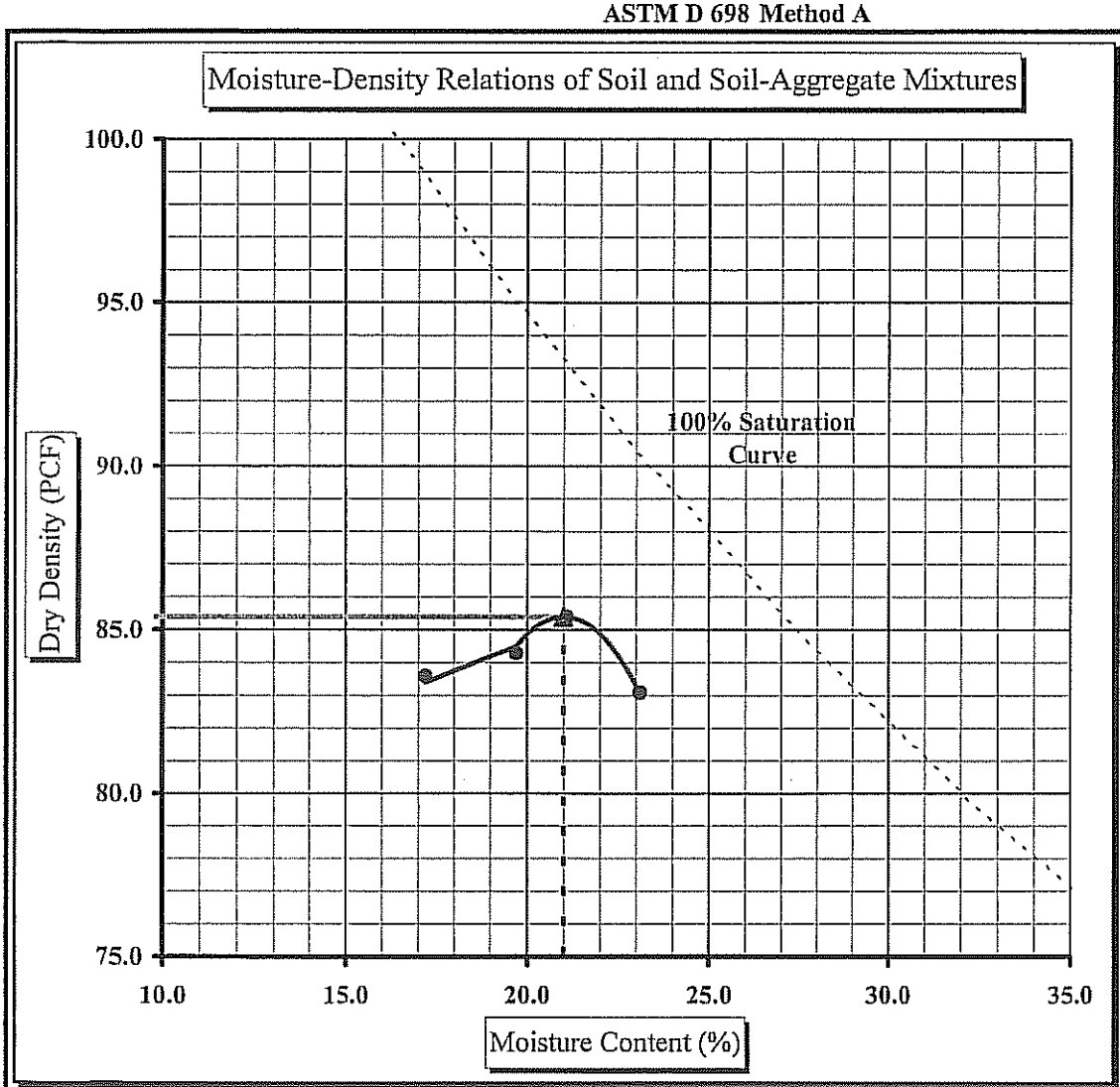
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	February 2, 2007
Project Name:	**Allen Steam Station Retired Ash Basin**	Test Date(s):	1/29/07-2/2/07
Client Name:	Duke Power		
Client Address:			

Boring #:	Bulk 1	Sample #:		Sample Date:	Various
Location:		Offset:		Depth:	0-2'
Sample Description:	Ash	Gray Coarse to Fine Sandy Silt (ML)			

Maximum Dry Density **85.4** **PCF.** **Optimum Moisture Content** **21.0** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	20.3%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	2.180

% Passing

3/4"	
1/2"	
3/8"	
#4	95.6

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Oven temperature used was 60 degrees Celsius.

Technical Responsibility: Julie Petersen / Ken Daly

Signature

Moisture - Density Report

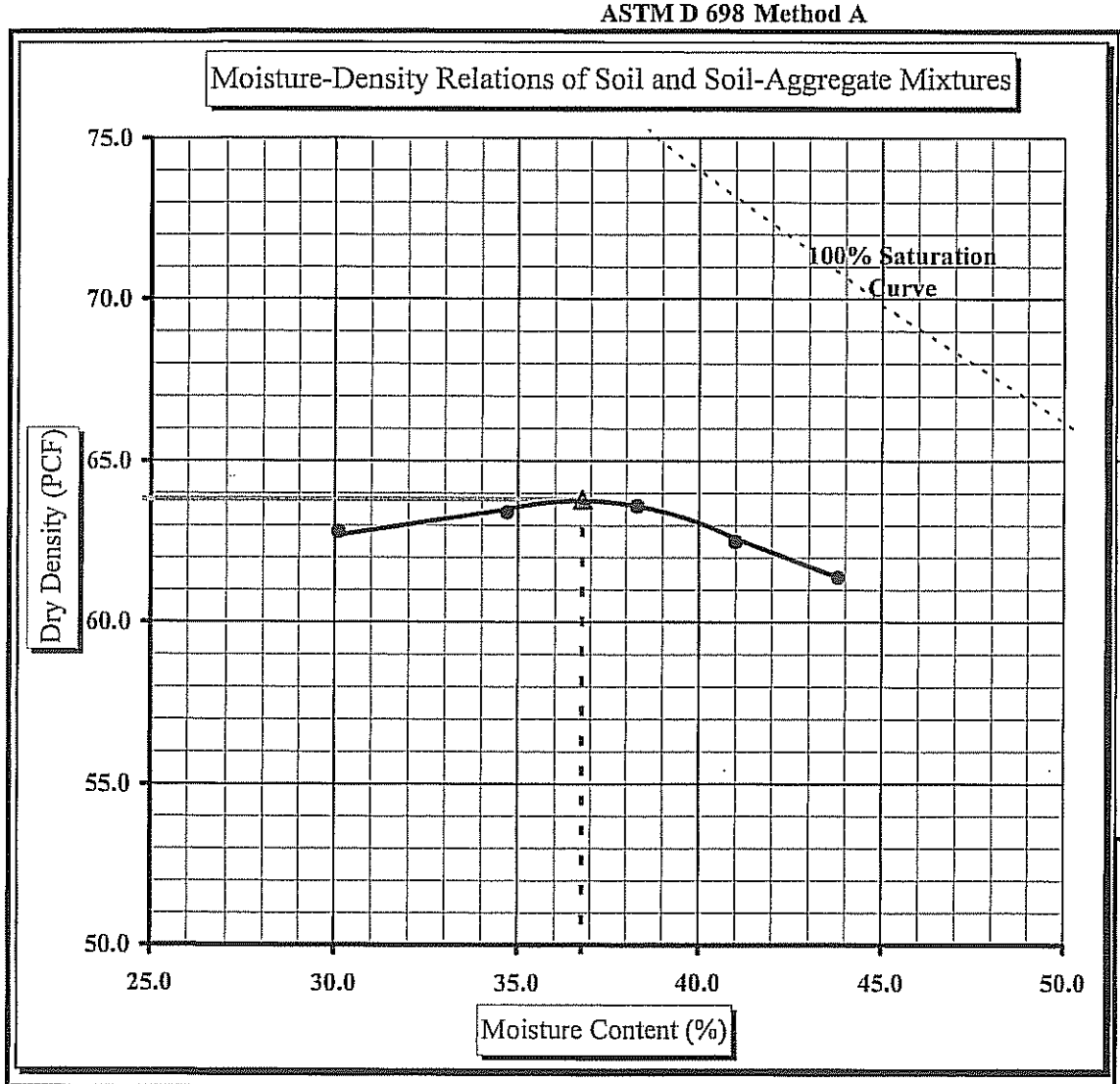
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	February 2, 2007
Project Name:	**Allen Steam Station Retired Ash Basin**	Test Date(s):	1/29/07-2/2/07
Client Name:	Duke Power		
Client Address:			

Boring #:	Bulk 2	Sample #:		Sample Date:	Various
Location:		Offset:		Depth:	0-2'
Sample Description:	Ash	Gray Silty Medium to Fine Sand (SM)			

Maximum Dry Density **63.8** **PCF.** **Optimum Moisture Content** **36.8** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	22.9%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	2.260

% Passing

3/4"	
1/2"	
3/8"	
#4	98.9

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Oven temperature used was 60 degrees Celsius.

Technical Responsibility: Julie Petersen / Ken Daly

Signature

Moisture - Density Report

S&ME

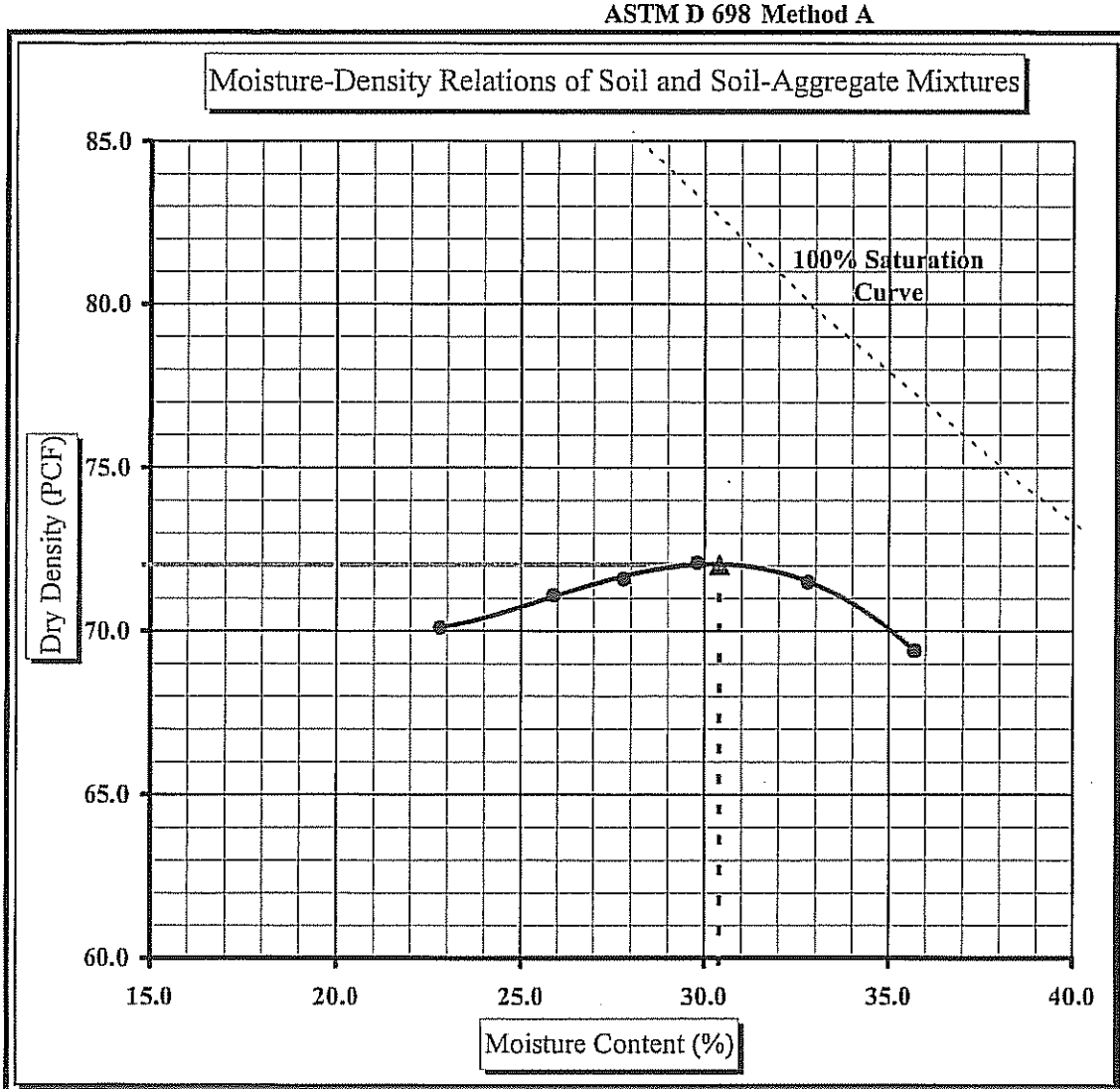
S&ME Project #: **1356-06-825**
Project Name: **Allen Steam Station Retired Ash Basin**
Client Name: Duke Power
Client Address:

Report Date: February 5, 2007
Test Date(s): 1/29/07-2/5/07

Boring #:	Bulk 3	Sample #:	Bulk 3	Sample Date:	Various
Location:		Offset:		Depth:	0-2'
Sample Description:	Ash	Gray Fine Sandy Silt (ML)			

Maximum Dry Density **72.0** **PCF.** **Optimum Moisture Content** **30.4** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	36.1%
Liquid Limit:	NP
Plastic Limit:	NP
Plastic Index:	NP
Specific Gravity:	2.220

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Oven temperature used was 60 degrees Celsius.

Technical Responsibility: Julie Petersen / Ken Daly _____ _____
Signature

Moisture - Density Report

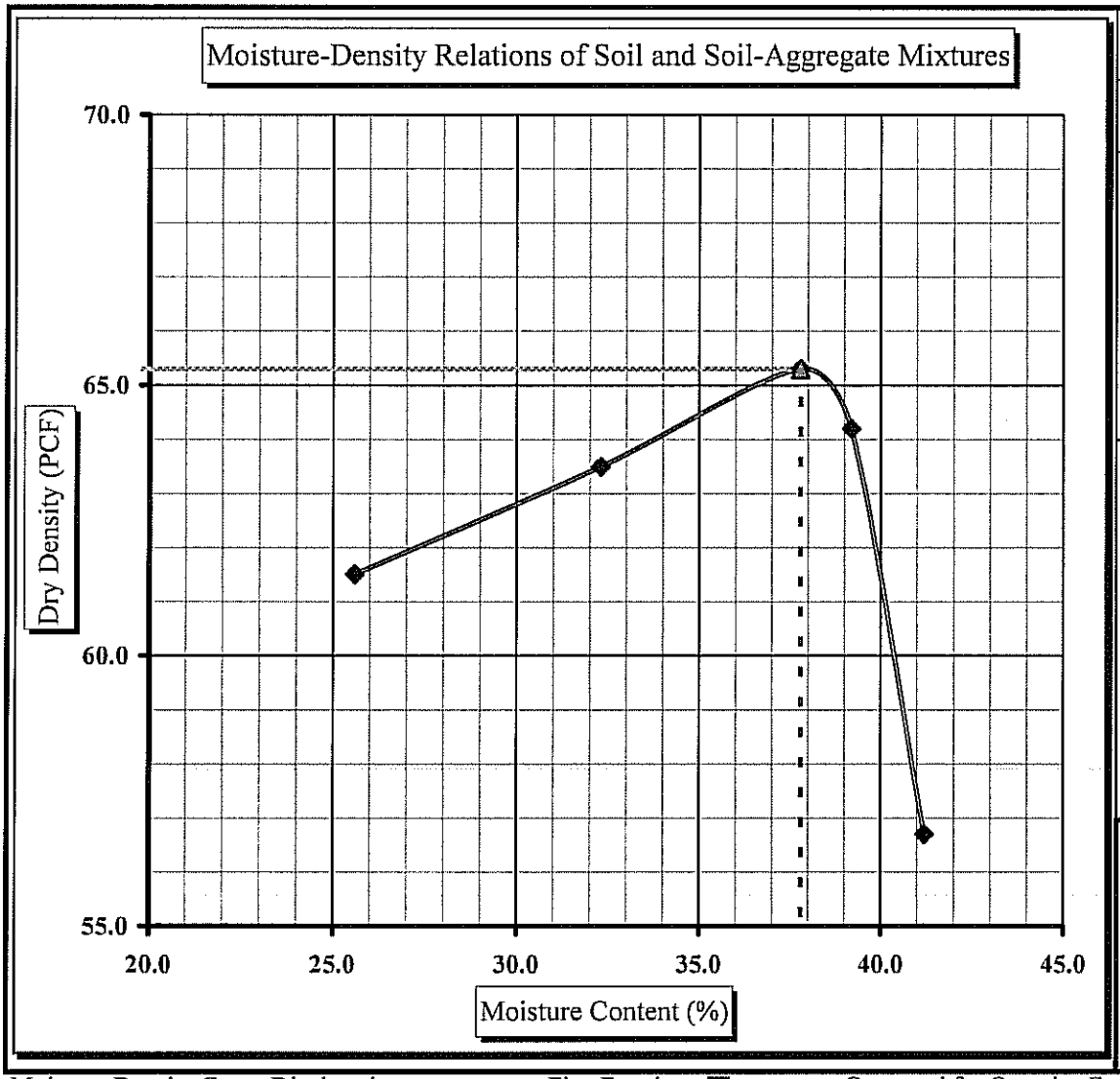
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	November 27, 2007
Project Name:	**Allen Steam Station-Retired Ash Bsin**	Test Date(s):	11/14-27/07
Client Name:	Duke Energy		
Project Address:	Belmont, NC		

Boring #:		Sample #:	S-1	Sample Date:	November 5, 2007
Location:	On Site - Structural Fill Area	Offset:		Depth:	Bulk
Sample Description:	Fly Ash				

Maximum Dry Density **65.3** **PCF.** **Optimum Moisture Content** **37.8** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	37.2%
Liquid Limit:	
Plastic Limit:	
Plastic Index:	
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☐

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technical Responsibility: Ken Daly *Signature*

Subgrade Field Density Test Results

S&ME

Summary of Density Test Results

(Test Fill Summary) (KB)

Page No. 1
Report Date: May 01, 2009
Project No.: 1356-06-825TF
Test Fill

Project Name: Duke-Allen Steam Stat. Ash LF

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

	Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
	No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
TF-	1	02/27/08	D 2937	**69.4**	**33.3**	64.6	27.4	D 698	S-1	69.0	34.0	95	**100+**	NW Quadrant	-15'
TF-	2	02/27/08	D 2937	**71.9**	**35.6**	63.8	24.2	D 698	S-1	71.0	34.0	95	**100+**	NE Quadrant	-15'
TF-	3	02/27/08	D 2937	**69.6**	**33.9**			D 698	S-1	69.0	34.0	95	**100+**	SE Quadrant	-15'
TF-	4	02/27/08	D 2937	**70.4**	**34.5**			D 698	S-1	71.0	34.0	95	**99**	SW Quadrant	-15'
TF-	5	03/10/08	D 2937	**64.2**	**37.9**			D 698	S-1	65.5	38.0	95	**98**	NE Quadrant	-13'
TF-	6	03/10/08	D 2937	**64.8**	**40.6**			D 698	S-1	65.5	38.0	95	**99**	SE Quadrant	-13'
TF-	7	03/10/08	D 2937	**64.4**	**39.7**			D 698	S-1	65.5	38.0	95	**98**	SW Quadrant	-13'
TF-	8	03/18/08	D 2937	**62.7**	**35.0**	60.5	30.6	D 698	S-1	66.0	38.0	95	**95**	NW Quadrant	-10'
TF-	9	03/18/08	D 2937	**64.4**	**36.4**			D 698	S-1	66.0	38.0	95	**98**	NE Quadrant	-10'
TF-	10	03/18/08	D 2937	**65.1**	**35.7**			D 698	S-1	66.0	38.0	95	**99**	SE Quadrant	-10'
TF-	11	03/18/08	D 2937	**62.5**	**34.8**			D 698	S-1	66.0	38.0	95	**95**	SW Quadrant	-10'
TF-	12	03/24/08	D 2937	**65.2**	**35.5**	68.9	31.2	D 698	S-1	67.0	35.0	95	**97**	SE Quadrant	-7'
TF-	13	03/24/08	D 2937	**70.2**	**39.4**	67.2	34.6	D 698	S-1	72.0	38.0	95	**97**	SW Quadrant	-7'
TF-	14	03/24/08	D 2937	**65.7**	**36.4**			D 698	S-1	67.0	35.0	95	**98**	NW Quadrant	-7'
TF-	15	03/24/08	D 2937	**64.2**	**33.9**			D 698	S-1	67.0	35.0	95	**96**	NE Quadrant	-7'
TF-	16	03/10/08	D 2937	**64.3**	**38.2**	61.9	32.9	D 698	S-1	65.5	38.0	95	**98**	NW Quadrant	-13'

* = Failed Specified Compaction. ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Ralph Maloney/Duke Energy

Ken Daly/S&ME, Inc.	Ken Daly (KB)	Civil Engineering Manager
Name (Technical Responsibility)	*Signature*	*Position*

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

Summary of Density Test Results

Report Date: April 30, 2009

Project No.: 1356-06-825SG

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Subgrade

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
1	07/21/08	D 2937	72.0	37.0**	71.2	33.3	D 698	B-3	71.2	31.6	95	100+	A-1	623
2	07/21/08	D 2937	64.6	34.1	66.5	29.9	D 698	B-3	66.9	33.0	95	97	B-1	623
3	07/21/08	D 2937	68.7	41.7**	71.2	33.3	D 698	B-3	71.2	31.6	95	96	A-2	623
4	07/22/08	D 2937	73.8	32.5	69.3	30.0	D 698	1	70.0	32.0	95	100+	B-1	623
5	07/31/08	D 2937	74.4	33.7	71.5	29.3	D 698	B-3	71.7	31.4	95	100+	A-2	623
6	07/31/08	D 2937	73.8	34.1	71.5	29.3	D 698	B-3	71.7	31.4	95	100+	A-3	623
7	08/04/08	D 2937	76.2	34.6	68.8	29.9	D 698	B-3	69.7	32.0	95	100+	D-1	624
8	08/04/08	D 2937	74.7	33.3	68.8	29.9	D 698	B-3	69.7	32.0	95	100+	D-2	624
9	08/05/08	D 2937	77.6	32.9	69.7	29.6	D 698	B-3	70.2	31.5	95	100+	E-1	
10	08/05/08	D 2937	76.0	31.4	69.7	29.6	D 698	B-3	70.2	31.5	95	100+	E-2	
11	08/06/08	D 2937	72.7	29.6	70.0	26.8	D 698	B-3	70.8	31.0	95	100+	B-3	622
12	08/06/08	D 2937	76.2	28.1	75.0	25.3	D 698	B-3	75.5	26.5	95	100+	B-3	622
13	08/11/08	D 2937	68.8	28.7	65.8	25.0	D 698	1	67.2	31.2	95	100+	C-3	622
14	08/11/08	D 2937	66.8	31.5	65.8	25.0	D 698	1	67.2	31.2	95	99	C-2	622
15	08/11/08	D 2937	66.9	29.0	65.8	25.0	D 698	1	67.2	31.2	95	100	C-1	622
16	08/15/08	D 2937	68.2	30.6	65.5	27.8	D 698	1	66.5	32.3	95	100+	A-1	
17	08/15/08	D 2937	67.7	30.3	65.5	27.8	D 698	1	66.5	32.3	95	100+	A-1	
18	08/15/08	D 2937	66.9	31.3	65.5	27.8	D 698	1	66.5	32.3	95	100+	D-2	
19	08/15/08	D 2937	68.3	30.8	65.5	27.8	D 698	1	66.5	32.3	95	100+	D-2	

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D6938: Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Distribution: Mark LeGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

Summary of Density Test Results

Report Date: April 30, 2009

Project No.: 1356-06-825SG

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
20	08/20/08	D 2937	68.1	30.5	68.4	30.0	D 698	1	68.4	30.0	95	100	C-1	624
21	08/20/08	D 2937	67.1	29.7	67.8	27.0	D 698	1	68.4	30.0	95	98	D-1	624
22	08/20/08	D 2937	67.6	29.4	67.8	27.0	D 698	1	68.4	30.0	95	99	B-2	623
23	08/20/08	D 2937	67.7	30.2	67.8	27.0	D 698	1	68.4	30.0	95	99	B-2	623
24	08/22/08	D 2937	69.8	32.3	66.8	29.7	D 698	1	67.3	32.0	95	100+	C-2	624
25	08/22/08	D 2937	68.6	28.5 **	66.8	29.7	D 698	1	67.3	32.0	95	100+	A-4	624
26	08/25/08	D 2937	75.7	33.6 **	71.4	29.1	D 698	4	71.8	30.1	95	100+	C-3	625
27	08/25/08	D 2937	76.8	31.2	71.4	29.1	D 698	4	71.8	30.1	95	100+	C-4	625
28	08/25/08	D 2937	73.4	33.2 **	71.4	29.1	D 698	4	71.8	30.1	95	100+	B-4	625
29	09/04/08	D 2937	72.4	35.1	71.1	28.9	D 698	4	71.7	30.1	95	100+	B-3	626
30	09/04/08	D 2937	69.0	37.2 **	67.3	30.7	D 698	1	68.6	33.3	95	100+	D-2	626
31	09/08/08	D 2937	75.2	33.3 **	75.0	26.9	D 698	2	75.1	27.4	95	100	D-1	626
32	09/08/08	D 2937	69.3	31.1	70.8	27.1	D 698	4	71.0	28.9	95	98	B-2	626
33	09/08/08	D 2937	72.5	33.6 **	70.8	27.1	D 698	2	75.1	27.4	95	97	C-1	626
34	09/08/08	D 2937	68.3	33.4 **	70.8	27.1	D 698	4	71.0	28.9	95	96	C-2	626
35	09/08/08	D 2937	71.1	26.0	70.8	27.1	D 698	4	71.0	28.9	95	100	A-3	624
36	09/08/08	D 2937	67.7	28.8 **	69.3	26.3	D 698	1	67.5	32.2	95	100	B-2	626
37	09/08/08	D 2937	71.5	28.9	69.3	26.3	D 698	4	71.0	28.9	95	100+	C-2	626
38	09/08/08	D 2937	69.4	32.3 **	69.3	26.3	D 698	4	71.0	28.9	95	98	B-1	628

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D6938: Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Distribution: Mark LeGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

Summary of Density Test Results

Report Date: April 30, 2009

Project No.: 1356-06-825SG

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
39	09/15/08	D 2937	69.4	34.2	65.2	30.9	D 698	1	66.5	34.0	95	100+	D-4	
40	09/18/08	D 2937	73.7	36.3**	72.8	30.7	D 698	2	73.0	31.7	95	100+	C-4	
41	09/18/08	D 2937	71.3	35.4**	72.8	30.7	D 698	2	73.0	31.7	95	98	B-4	
42	09/18/08	D 2937	72.9	36.6**	72.8	30.7	D 698	2	73.0	31.7	95	100	C-3	
43	09/18/08	D 2937	68.2	32.8	67.5	28.2	D 698	1	68.2	30.8	95	100	E-3	
44	09/19/08	D 2937	73.9	34.0	70.2	30.0	D 698	2	71.0	31.0	95	100+	C-2	
45	09/19/08	D 2937	72.0	35.0**	70.2	30.0	D 698	2	71.0	31.0	95	100+	E-1	
46	09/19/08	D 2937	71.9	33.0	70.2	30.0	D 698	2	71.0	31.0	95	100+	D-1	
47	09/19/08	D 2937	74.6	36.0**	71.5	31.0	D 698	2	72.3	32.5	95	100+	D-2	
48	09/24/08	D 2937	71.6	33.7**	69.2	29.8	D 698	1	69.3	29.6	95	100+	E-4	
49	09/24/08	D 2937	67.7	33.3**	69.2	29.8	D 698	1	69.3	29.6	95	98	E-3	
50	09/24/08	D 2937	66.2	44.2**	66.8	37.1	D 698	1	67.0	37.8	95	99	D-4	
51	09/24/08	D 2937	66.7	45.3**	66.8	37.1	D 698	1	67.0	37.8	95	100	C-4	
52	09/24/08	D 2937	70.2	33.3**	69.2	29.8	D 698	1	69.3	29.6	95	100+	B-4	
53	09/24/08	D 2937	70.8	33.5**	69.2	29.8	D 698	1	69.3	29.6	95	100+	A-3	
54	09/26/08	D 2937	71.7	36.0**	69.7	30.0	D 698	1	70.4	31.6	95	100+	C-3	
55	09/26/08	D 2937	71.1	31.0	66.7	27.0	D 698	1	69.2	32.5	95	100+	C-2	
56	09/26/08	D 2937	75.2	32.0	73.3	29.0	D 698	2	74.0	30.5	95	100+	B-1	
57	09/26/08	D 2937	77.6	34.0**	74.5	27.0	D 698	2	75.0	29.0	95	100+	B-2	

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D6938: Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Distribution: Mark LeGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

Summary of Density Test Results

Report Date: April 30, 2009
Project No.: 1356-06-825SG

Project Name: Allen Steam Stat. Ash Landfill
Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
58	10/06/08	D 2937	74.7	33.8**	68.6	29.5	D 698	4	69.0	30.2	95	100+	D-2	
59	10/06/08	D 2937	73.1	34.2**	68.6	29.5	D 698	4	69.0	30.2	95	100+	E-1	
60	10/13/08	D 2937	69.4	33.0	66.9	30.6	D 698	1	67.5	32.4	95	100+	D-4	
61	10/13/08	D 2937	69.2	32.5	66.9	30.6	D 698	1	67.5	32.4	95	100+	C-4	
62	10/13/08	D 2937	77.7	33.8	70.5	30.4	D 698	1	71.7	32.6	95	100+	B-4	
63	10/20/08	D 2937	71.8	29.9	70.3	26.9	D 698	1	72.0	30.0	95	100	E-2	
64	10/20/08	D 2937	72.2	33.2	69.7	30.0	D 698	2	71.5	33.2	95	100+	B-3	
65	10/21/08	D 2937	70.4	32.1	67.5	29.1	D 698	1	68.7	32.5	95	100+	B-2	
66	10/21/08	D 2937	69.2	30.3	67.5	29.1	D 698	1	68.7	32.5	95	100+	B-1	
67	10/21/08	D 2937	68.5	31.1	67.5	29.1	D 698	1	68.7	32.5	95	100	A-2	
68	10/21/08	D 2937	66.8	31.5	67.5	29.1	D 698	1	68.7	32.5	95	97	A-3	
69	10/28/08	D6938	74.3	20.2**			D 698	2	75.6	27.0	95	98	C-3	
70	10/28/08	D6938	73.5	24.3			D 698	2	75.6	27.0	95	97	C-2	
71	10/28/08	D6938	75.9	21.2**			D 698	2	75.6	27.0	95	100	B-2	
72	10/28/08	D6938	79.2	25.8			D 698	2	75.6	27.0	95	100+	B-3	
73	10/28/08	D6938	79.3	26.3			D 698	2	75.6	27.0	95	100+	C-1	
74	10/28/08	D6938	75.6	24.9			D 698	2	75.6	27.0	95	100	D-4	
75	10/31/08	D6938	82.4	21.6			D 698	B-1	85.4	21.0	95	96	C-4	
76	10/31/08	D6938	72.2	24.5**			D 698	B-3	72.0	30.0	95	100	B-3	

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D6938: Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

Summary of Density Test Results

Report Date: April 30, 2009

Project No.: 1356-06-825SG

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
77	10/31/08	D6938	81.2	23.9			D 698	B-1	85.4	21.0	95	95	B-2	
78	10/31/08	D6938	77.7	26.9			D 698	S-2	75.6	27.0	95	100+	B-1	
79	11/03/08	D6938	79.9	22.9**			D 698	S-2	75.6	27.0	95	100+	B-3	
80	11/03/08	D6938	83.5	21.0			D 698	B-1	85.4	21.0	95	98	E-3	
81	11/03/08	D6938	83.1	23.9			D 698	B-1	85.4	21.0	95	97	E-4	
82	11/04/08	D6938	79.0	23.6**			D 698	2	75.6	27.4	95	100+	E-3	
83	11/04/08	D6938	73.7	21.4**			D 698	2	75.6	27.4	95	98	B-4	
84	11/04/08	D6938	76.7	16.0**			D 698	2	75.6	27.4	95	100+	B-4	
85	11/04/08	D6938	75.9	20.0**			D 698	2	75.6	27.4	95	100	B-3	
86	11/04/08	D6938	76.0	23.5**			D 698	2	75.6	27.4	95	100+	C-3	
87	11/04/08	D6938	80.0	23.8**			D 698	2	75.6	27.4	95	100+	C-2	
88	11/04/08	D 2937	75.1	32.8**	75.2	28.6	D 698	2	75.6	27.4	95	99	E-1	
89	11/05/08	D6938	75.5	23.2**			D 698	2	75.6	27.4	95	100	C-3	
90	11/05/08	D6938	75.6	20.7**			D 698	2	75.6	27.4	95	100	C-2	
91	11/05/08	D 2937	72.9	32.7**	71.5	29.4	D 698	4	71.0	28.9	95	100+	C-4	
92	11/06/08	D 2937	67.3	31.7	69.3	28.7	D 698	1	69.2	28.7	95	97	C-1	
93	11/07/08	D6938	76.8	20.5**			D 698	2	75.6	27.4	95	100+	C-4	
94	11/07/08	D6938	76.9	25.7			D 698	2	75.6	27.4	95	100+	C-4	
95	11/07/08	D6938	75.3	26.6			D 698	2	75.6	27.4	95	100	B-4	

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D6938: Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

S&ME

Summary of Density Test Results

Report Date: April 30, 2009

Project No.: 1356-06-825SG

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
96	11/07/08	D6938	74.4	25.8			D 698	2	75.6	27.4	95	98	E-4	
97	11/07/08	D6938	80.2	25.2			D 698	2	75.6	27.4	95	100+	E-3	
98	11/07/08	D6938	78.7	23.0**			D 698	2	75.6	27.4	95	100+	E-3	
99	11/08/08	D6938	78.7	20.3**			D 698	2	75.6	33.0	95	100+	B-2	
100	11/08/08	D6938	72.5	23.9**			D 698	2	75.6	33.0	95	96	C-1	
101	11/08/08	D6938	83.2	21.5**			D 698	1	75.6	33.0	95	100+	B-1	
102	11/08/08	D6938	78.0	25.0**			D 698	2	75.6	33.0	95	100+	B-1	
103	11/08/08	D6938	84.4	22.4**			D 698	1	75.6	33.0	95	100+	C-3	
104	11/08/08	D6938	71.5	23.9**			D 698	3	75.6	33.0	95	95	C-2	
105	11/12/08	D6938	76.5	18.9**			D 698	2	75.6	27.4	95	100+	D-1	
106	11/12/08	D6938	79.4	21.4**			D 698	2	75.6	27.4	95	100+	D-1	
107	11/12/08	D6938	80.6	20.6			D 698	1	75.6	21.0	95	100+	D-2	
108	11/12/08	D6938	71.0	33.0**			D 698	5	72.3	29.0	95	98	B-4	
109	11/17/08	D 2937	75.8	32.9**	72.6	29.1	D 698	2	75.6	27.4	95	100	B03	
110	11/17/08	D6938	83.6	22.6**			D 698	2	75.6	27.4	95	100+	B-4	
111	11/17/08	D6938	79.2	22.9**			D 698	2	75.6	27.4	95	100+	B-4	
112	11/17/08	D6938	73.6	21.0**			D 698	2	75.6	27.4	95	97	C-4	
113	11/17/08	D6938	79.0	25.2			D 698	2	75.6	27.4	95	100+	C-3	
114	11/17/08	D6938	75.7	9.3**			D 698	2	75.6	27.4	95	100	C-2	

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D6938: Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

S&ME

Summary of Density Test Results

Report Date: April 30, 2009
Project No.: 1356-06-825SG

Project Name: Allen Steam Stat. Ash Landfill
Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
115	11/17/08	D6938	78.9	16.6**			D 698	2	75.6	27.4	95	100+	C-1	
116	11/17/08	D6938	83.5	17.9**			D 698	2	75.6	27.4	95	100+	B-3	
117	11/17/08	D6938	74.2	20.1**			D 698	2	75.6	27.4	95	98	B-2	
118	01/14/09	D 2937	70.7	25.9	65.8	20.0	D 698	5	72.8	26.3	95	97	B-4	-9
119	01/14/09	D 2937	71.4	28.2	65.8	20.0	D 698	5	72.8	26.3	95	98	B-3	-7.5
120	01/14/09	D 2937	66.7	31.1	54.9	26.4	D 698	7	69.0	34.0	95	97	B-2	-7.5
121	01/14/09	D 2937	65.3	29.3**	54.9	26.4	D 698	7	69.0	34.0	95	95	B-1	-9
122	01/14/09	D 2937	67.3	30.0**	54.9	26.4	D 698	7	69.0	34.0	95	98	C-1	-6
123	01/14/09	D 2937	69.2	28.2	54.9	26.4	D 698	5	72.8	26.3	95	95	C-2	-4.5
124	01/14/09	D 2937	70.5	33.1	64.3	28.9	D 698	13	73.0	32.0	95	97	C-3	-4.5
125	01/14/09	D 2937	69.6	32.4	64.3	28.9	D 698	13	73.0	32.0	95	95	C-4	-6
126	01/14/09	D 2937	71.6	35.3**	64.3	28.9	D 698	13	73.0	32.0	95	98	B-4	-7.5
127	01/15/09	D 2937	67.5	31.8	60.4	24.3	D 698	19	69.9	32.0	95	97	B-3	-6
128	01/15/09	D 2937	68.4	33.0	60.4	24.3	D 698	19	69.9	32.0	95	98	B-2	-6
129	01/15/09	D 2937	69.5	34.4	60.4	24.3	D 698	19	69.9	32.0	95	99	B-1	-7.5
130	01/16/09	D 2937	67.9	36.6	63.9	30.6	D 698	8	69.0	35.0	95	98	C-1	-4.5
131	01/16/09	D 2937	69.1	38.2**	63.9	30.6	D 698	8	69.0	35.0	95	100	C-2	-3
132	01/16/09	D 2937	73.7	35.3	63.0	26.9	D 698	15	71.0	33.5	95	100+	C-3	-3
133	01/16/09	D 2937	69.8	30.9	63.1	24.3	D 698	1	69.3	30.0	95	100+	C-4	-4.5

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D6938: Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

S&ME

Summary of Density Test Results

Report Date: April 30, 2009
Project No.: 1356-06-825SG

Project Name: Allen Steam Stat. Ash Landfill
Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
134	01/16/09	D 2937	71.1	31.9	63.1	24.3	D 698	1	69.3	30.0	95	100+	B-4	-6
135	01/16/09	D 2937	69.5	29.8	63.1	24.3	D 698	1	69.3	30.0	95	100	B-3	-4.5
136	01/22/09	D 2937	69.6	27.1	64.9	21.7	D 698	5	72.8	26.3	95	96	B-2	-4.5
137	01/22/09	D 2937	66.0	30.2**	61.4	23.8	D 698	1	68.5	34.0	95	96	B-1	-6
138	01/22/09	D 2937	71.3	28.4	61.4	23.8	D 698	5	72.8	26.3	95	98	C-1	-3
139	01/22/09	D 2937	67.6	34.1	61.4	23.8	D 698	7	69.8	35.8	95	97	C-2	-1.5
140	01/22/09	D 2937	68.0	32.3	61.9	25.6	D 698	1	68.3	35.0	95	99	C-3	-1.5
141	01/22/09	D 2937	68.8	36.3	62.1	29.2	D 698	7	69.8	35.8	95	99	C-4	-3
142	01/23/09	D 2937	67.9	28.9	63.8	23.8	D 698	4	71.0	28.0	95	96	B-4	-4.5
143	01/23/09	D 2937	68.3	29.1	63.8	23.8	D 698	4	71.0	28.0	95	96	B-3	-3
144	01/23/09	D 2937	65.8	35.6	59.9	28.3	D 698	8	69.0	34.0	95	95	B-2	-3
145	01/23/09	D 2937	64.8	40.9	59.6	34.6	D 698	10	66.5	41.0	95	97	B-1	-4.5
146	01/23/09	D 2937	74.3	28.3	69.7	22.8	D 698	5	72.8	26.3	95	100+	C-1	-1.5
147	01/23/09	D 2937	72.9	27.5	69.7	22.8	D 698	5	72.8	26.3	95	100	C-2	SG
148	01/24/09	D 2937	73.2	34.3	63.5	26.7	D 698	13	73.0	31.5	95	100	C-3	SG
149	01/24/09	D 2937	65.3	41.5	57.1	34.1	D 698	10	65.0	41.0	95	100	C-4	-1.5
150	01/24/09	D 2937	73.1	26.5	69.1	20.4	D 698	5	73.0	25.0	95	100	B-4	-3
151	01/24/09	D 2937	72.2	25.2	69.1	20.4	D 698	5	73.0	25.0	95	99	B-3	-1.5
152	01/24/09	D 2937	73.2	27.8	69.1	20.4	D 698	5	73.0	25.0	95	100	B-2	-1.5

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D6938: Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

S&ME

Summary of Density Test Results

Report Date: April 30, 2009
Project No.: 1356-06-825SG

Project Name: Allen Steam Stat. Ash Landfill
Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
153	01/24/09	D 2937	72.3	32.3	69.1	20.4	D 698	13	73.0	31.5	95	99	B-1	-3
154	01/24/09	D 2937	60.9	38.6	54.5	32.9	D 698	20	61.0	38.0	95	100	C-1	SG
155	01/24/09	D 2937	67.1	36.1	62.6	29.5	D 698	8	69.0	34.0	95	97	C-4	SG
156	01/24/09	D 2937	72.4	33.1	62.6	29.5	D 698	13	73.0	31.5	95	99	B-4	-1.5
157	01/24/09	D 2937	71.3	29.5	67.1	24.9	D 698	14	73.0	29.0	95	98	B-3	SG
158	01/27/09	D 2937	70.5	39.1	68.4	26.0	D 698	7	73.0	35.0	95	97	B-2	SG
159	01/27/09	D 2937	73.7	36.0	68.8	28.8	D 698	13	73.1	31.0	95	100+	B-1	-1.5
160	01/27/09	D 2937	74.3	30.8	66.0	23.3	D 698	2	75.5	28.0	95	98	C-1	
161	01/27/09	D 2937	73.9	30.8	66.0	23.3	D 698	2	75.5	28.0	95	98	D-1	
162	01/27/09	D 2937	69.1	38.0	66.0	23.3	D 698	7	73.0	35.0	95	95	B-1	SG
163	01/27/09	D 2937	69.1	38.1 **	66.0	23.3	D 698	7	73.0	35.0	95	95	B-4	SG
164	01/27/09	D 2937	73.1	29.2	66.0	23.3	D 698	2	75.5	28.0	95	97	E-1	
165	01/27/09	D 2937	72.9	30.0	66.0	23.3	D 698	2	75.5	28.0	95	97	E-2	
166	01/28/09	D 2937	71.1	29.9	68.1	22.7	D 698	4	71.0	28.0	95	100	C-1	
167	01/28/09	D 2937	69.9	27.9	68.1	22.7	D 698	4	71.0	28.0	95	98	D-1	

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

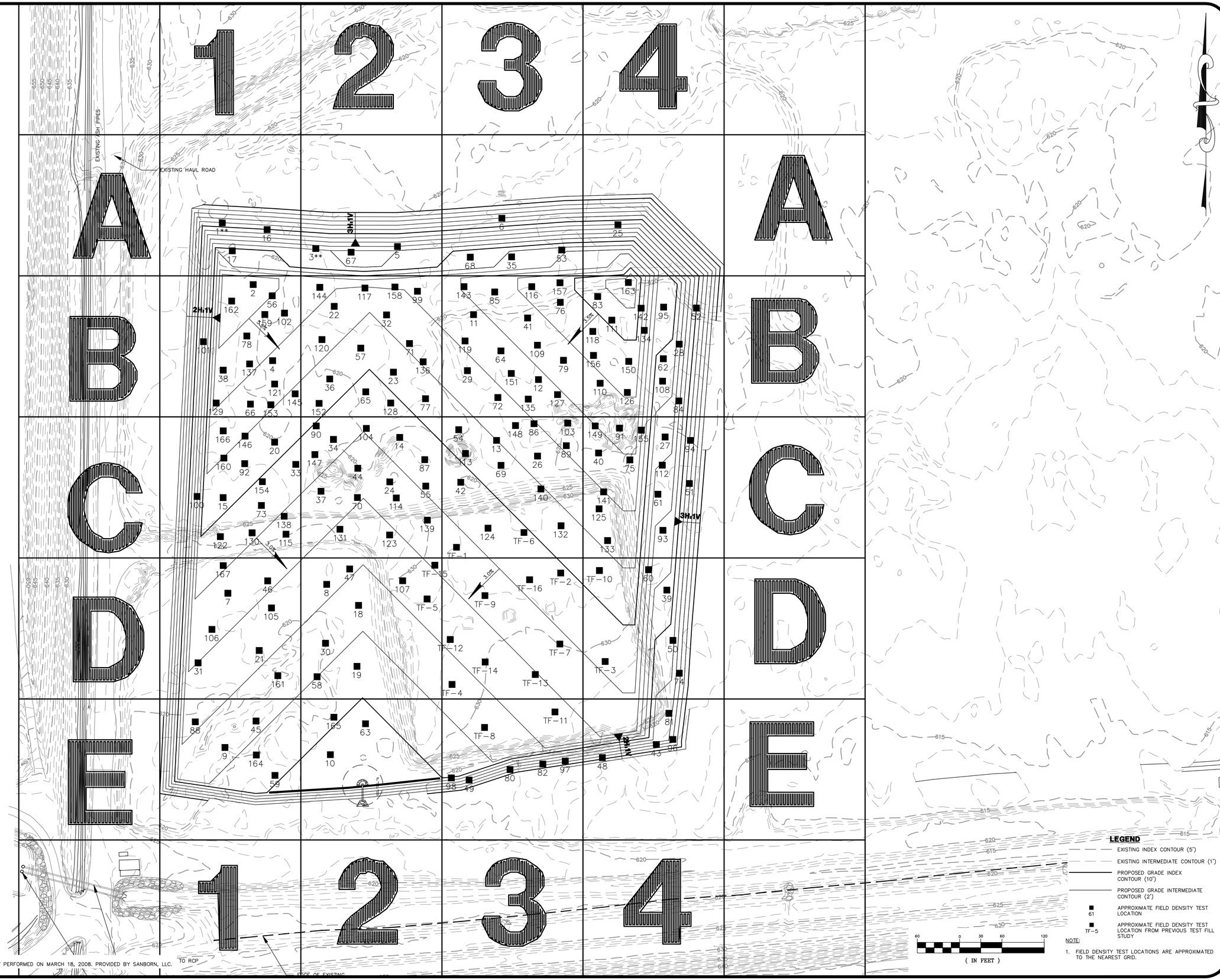
References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort, ASTM D6938: Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Distribution: Mark LeGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position



REFERENCE:
TOPOGRAPHIC MAP FROM AERIAL PHOTOGRAPHY PERFORMED ON MARCH 18, 2008. PROVIDED BY SANBORN, LLC.

NOTE:
1. FIELD DENSITY TEST LOCATIONS ARE APPROXIMATED TO THE NEAREST GRID.

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY

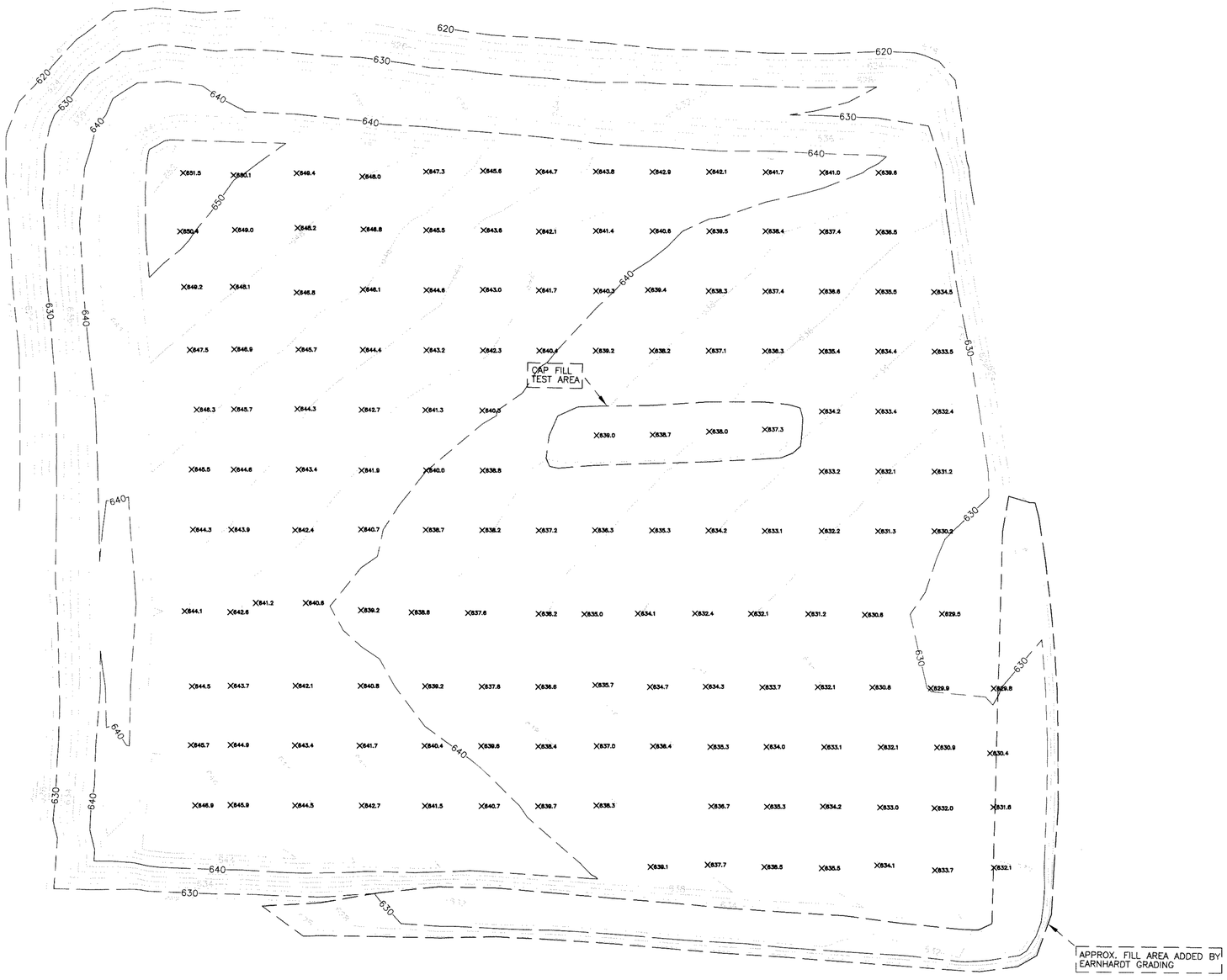
CELL 1 ROUGH SUBGRADE FIELD DENSITY TESTING GRID [200' X 200']

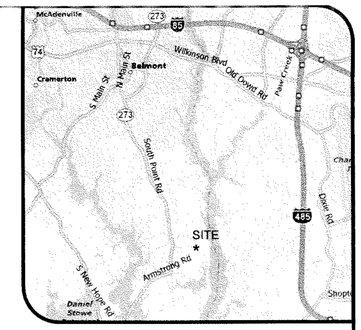
PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: KB	CHECKED BY:
DESIGNED BY:	APPROVED BY:
PROJECT NUMBER: 1356-06-825	
SCALE: 1" = 60'	DATE: 5-8-09
DRAWING: 3	OF: 6

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\GRIDS\SUBGRADE.DWG

Rough Subgrade As-Built Drawing





NOTES:

1. NO BOUNDARY SURVEY HAS BEEN PERFORMED BY MEADE GUNNELL ENGINEERING & SURVEYING, P.C. AT THIS TIME. BASE MAP INFORMATION WAS TAKEN FROM DIGITAL DRAWING PROVIDED BY S&ME.

2. THE PURPOSE OF THIS MAP IS TO SHOW THE EXISTING CONDITIONS, ELEVATIONS AND EDGE OF THE ASH LANDFILL SITE CELL #1 AS OF THE DATE OF THIS SURVEY.

3. HORIZONTAL AND VERTICAL CONTROL FOR THIS SURVEY WAS PROVIDED BY NOVA DIGITAL SYSTEMS, INC. VIA SHIELD ENGINEERING.

4. THIS MAP WAS PREPARED FROM AN ACTUAL FIELD SURVEY.

5. THIS MAP IS PRELIMINARY UNLESS THE SURVEYORS ORIGINAL SEAL AND SIGNATURE ARE SHOWN HEREON.

6. CONTOUR INTERVAL IS 2'.

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

NORTH CAROLINA PROFESSIONAL SEAL L-3276 LAND SURVEYOR GLENN E. GAMBLE

02/03/09

LEGEND

MAJOR CONTOUR

MINOR CONTOUR

PLANT GRID

SPOT ELEVATION +660.0

ASH LANDFILL SITE TOPOGRAPHIC SURVEY OF:

ALLEN STEAM STATION PLANT

GASTON CO., NC

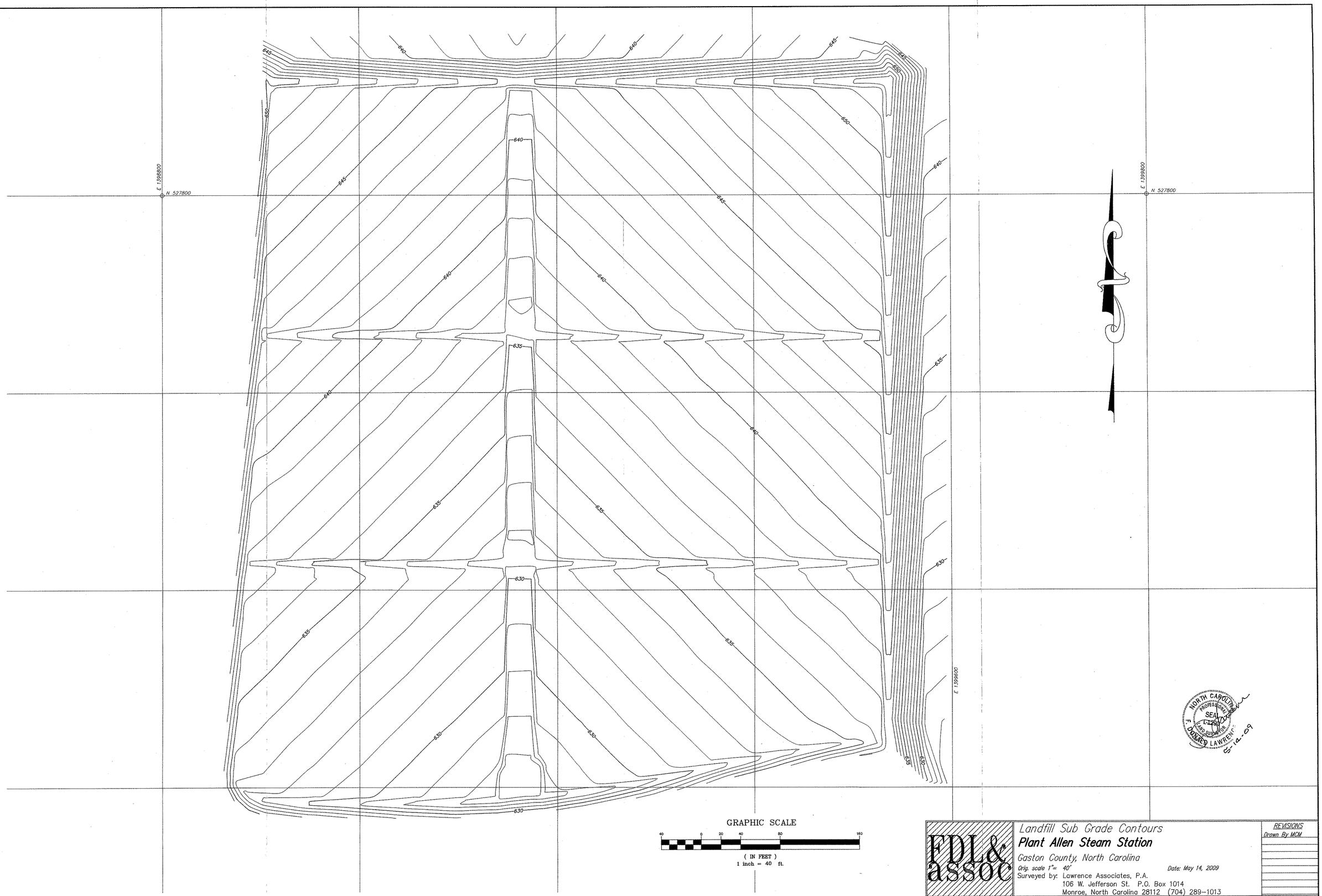
FOR:
S&ME, INC.
9751 SOUTHERN PINES BLVD.
CHARLOTTE, NC 28273

OWNER:
DUKE ENERGY CORPORATION
422 S CHURCH ST
CHARLOTTE NC 28242

JOB NUMBER: 970.00	*PARCEL ID: 192188*
DATE OF SURVEY: 01/28/09-1/29/09	
GASTON COUNTY	*CAD FILE: S&ME-TOPO-6.DWG*
NORTH CAROLINA	*SCALE: 1" = 50'*
	DRAWN BY: JBC
	CHECKED BY: GEC

MEADE GUNNELL
engineering & surveying, p.c.
19810-A West Catawba Avenue
Cornelius, N.C. 28031
704-655-7290 704-655-7291 (fax)

Final Subgrade As-Built Drawing



FDL & assoc

Landfill Sub Grade Contours

Plant Allen Steam Station

Gaston County, North Carolina

Orig. scale 1"= 40'

Date: May 14, 2009

Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St. P.O. Box 1014
Monroe, North Carolina 28112 (704) 289-1013

REVISIONS
Drawn By MCM

Job No. 1640 Drawing file: Sub&Clay_Contours.dwg Drawing no. 09/49

APPENDIX I – EARTHWORKS
Section 2 – Structural Fill

Structural Fill Laboratory Test Results
Structural Fill Field Density Test Results
Structural Fill Field Density Test Locations

Structural Fill Laboratory Test Results

SUMMARY OF STRUCTURAL FILL LABORATORY TEST DATA

Sample No.[1]	Sample Depth	Soil Description	USCS Classification	Natural Moisture Content (ASTM D2216)	% Finer No. 200 (ASTM D422)	Atterberg Limits (ASTM D4318)		Proctor Data (ASTM D698)	
						LL	PI	Max. Dry Density (pcf)	Opt. Moisture Content (%)
9	Composite	Tan Clayey **Silt** with Fine Sand and Mica	ML		84.0%	44	3	85.2	31.2%
17	Composite	Orange Red Coarse to Fine Sandy Clayey **Silt**	MH	6.3%	67.2%	56	14	94.0	24.1%
18	Composite	Orange Red Clayey **Silt**	MH	19.9%	93.1%	73	34	89.8	30.2%
21	Composite	Tan, Red Fine to Medium Clayey **Silt** with Mica	ML	18.7%	62.7%	48	10	95.1	24.1%
31	Composite	Orange Micaceous Silty Coarse to Fine to Medium **Sand**	SM	10.9%	49.6%	50	5	99.4	19.5%
TP-1	0.5' - 12'	Red Orange Brown Fine to Medium Sandy Clayey **Silt** with Mica and Roots	MH	16.9%	63.0%	53	16	97.4	21.7%
TP-2	4' - 12'	Orange Brown Clayey **Silt** with Fine to Medium Sand and Mica	MH	18.1%	82.5%	57	12	86.5	27.7%
TP-3	4' - 12'	Brown Fine to Medium Sandy Clayey **Silt** with Mica and Fine Roots	ML	18.9%	63.0%	48	4	89.2	25.2%
TP-4	4' - 12'	Tan Brown Fine to Medium Sandy Clayey **Silt** with Mica	ML	15.0%	61.2%	45	6	96.3	21.7%
TP-5	4' - 12'	Orange Tan Fine to Medium Sandy **Silt** with Mica	ML	10.4%	59.0%	44	6	105.1	17.2%
TP-6	4' - 12'	Orange Brown Fine to Medium Sandy Clayey **Silt** with Mica and Fine Roots	ML	18.6%	66.6%	46	6	92.7	24.2%
TP-7	0.5' - 8'	Red Fine to Medium Sandy Silty **Clay** with Mica	MH	21.5%	68.2%	68	34	97.8	24.0%
TP-8	0.5' - 12'	Red Orange Clayey **Silt**	MH	32.2%	89.8%	67	25	86.7	30.9%
TP-9	0 - 8'	Red Brown Silty **Clay** with Fine to Medium Sand and Mica	MH	21.2%	72.7%	68	32	98.0	23.8%
TP-10	8' - 14'	Orange Clayey **Silt**	MH	28.9%	87.7%	60	10	79.4	34.8%

[1] All samples were bulk samples; 15 total laboratory test results for in-place structural fill during construction

Liquid Limit, Plastic Limit, and Plastic Index

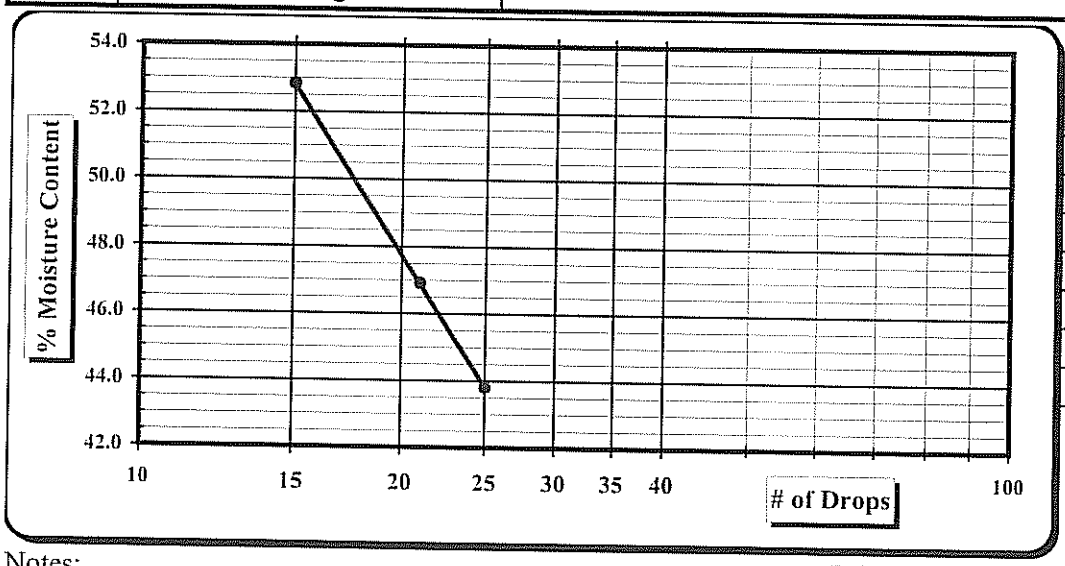
S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 11/21/08
Test Date(s): 11/13-21/08

Boring #: Sample #: 9 Sample Date: 10/24/08
Location: Fly ash for cell 1 SG & berm mat'l Depth:
Sample Description: Tan Clayey Silt (ML) with Fine Sand and Mica

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	Jordi	BA	NN				PO	TT	
A	Tare Weight	15.93	15.33	15.27				**15.11**	15.92	
B	Wet Soil Weight + A	34.99	30.76	33.37				22.81	22.48	
C	Dry Soil Weight + A	28.40	26.06	27.59				20.52	20.59	
D	Water Weight (B-C)	6.59	4.70	5.78				2.29	1.89	
E	Dry Soil Weight (C-A)	12.47	10.73	12.32				5.41	4.67	
F	% Moisture Content (D/E)*100	52.8%	43.8%	46.9%				42.3%	40.5%	
N	# OF DROPS	15	25	21				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							41.4%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	44
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	41
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	3
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: JSR/CF/EL

Technical Responsibility: Ken Daly

Certification #

Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Ph. 9**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 11/11-25/08
Report Date: 11/25/08

Boring #: Sample #: 9 Sample Date: 10/24/08
Location: Fly ash for cell 1 SG & berm mat'l Depth:
Sample Description: Tan Clayey Silt (ML) with Fine Sand and Mica

Pan #:	583	Beaker #:	ZZ
Hydrometer Jar #:			A
Pan Tare Weight (grams):			0.00
Total Sample Air Dried Wt. + tare wt. (grams):			390.20
Weight of Total Sample Air Dried:			390.20
Weight of Air Dried Hydrometer Sample (g):			50.00
Total Sample Oven Dried:			383.12
Hydrometer Sample Oven Dried (W):			49.09
% Passing #10:			100.0%
Correction Factor a (Table 1):			1.00

Apparent Relative Density (Assumed) 2.650

	Moisture Content	Hygroscopic	Natural
	Tare #	QQ	
A	Tare Wt.	16.90	
B	Wet Wt. + A	27.92	
C	Dry Wt. + A	27.72	
D	Water Wt. (B-C)	0.20	
E	Dry Wt. (C-A)	10.82	
	% Moisture (100 x D/E)	1.85%	

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"			100.0%
1/2"			100.0%
3/8"			100.0%
#4		Soil Mortar	100.0%
#10	0.0	**100.0%**	100.0%
#20	0.5	98.9%	98.9%
#40	1.9	96.1%	96.1%
#60	3.5	92.8%	92.8%
#100	5.2	89.4%	89.4%
#200	7.9	84.0%	84.0%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:		
% Gravel:	0.0%	< 75 mm and > 4.75 mm
Coarse Sand:	0.0%	< 4.75 mm and > 2.00 mm
Medium Sand:	3.9%	< 2.00 mm and > 0.425 mm
Fine Sand:	12.2%	< 0.425 mm and > 0.075 mm

Total Sand:	16.0%	< 4.74 mm and > 0.075 mm
Silt & Clay:	84.0%	< 0.075
Silt:	59.5%	< 0.075 and > 0.005 mm
Clay:	24.5%	< 0.005 mm
Colloids:		< 0.001 mm

Type: Mechanical Stirring Apparatus (A)
Dispersion Time: 1 min.
Sodium Hexametaphosphate: 40 g./ Liter

Control Cylinder ☒ **Composite Correction** ☐

Liquid Limit 44 Plastic Limit 41 Plastic Index 3 Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	22.5	43.0	5.0		38.00	77.4%	77.4%	10.1	0.01325	0.04202
	2	22.5	42.0	5.0		37.00	75.4%	75.4%	10.2	0.01325	0.02995
	5	22.5	34.0	5.0		29.00	59.1%	59.1%	11.5	0.01325	0.02012
	15	22.5	26.5	5.0		21.50	43.8%	43.8%	12.8	0.01325	0.01222
	30	23.0	21.5	4.0		17.50	35.6%	35.6%	13.4	0.01317	0.00881
	60	23.0	18.0	4.0		14.00	28.5%	28.5%	14.0	0.01317	0.00636
	250	23.0	13.0	4.0		9.00	18.3%	18.3%	14.8	0.01317	0.00321
	1440	21.5	9.5	4.5		5.00	10.2%	10.2%	15.5	0.01340	0.00139

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

Signature *Position*

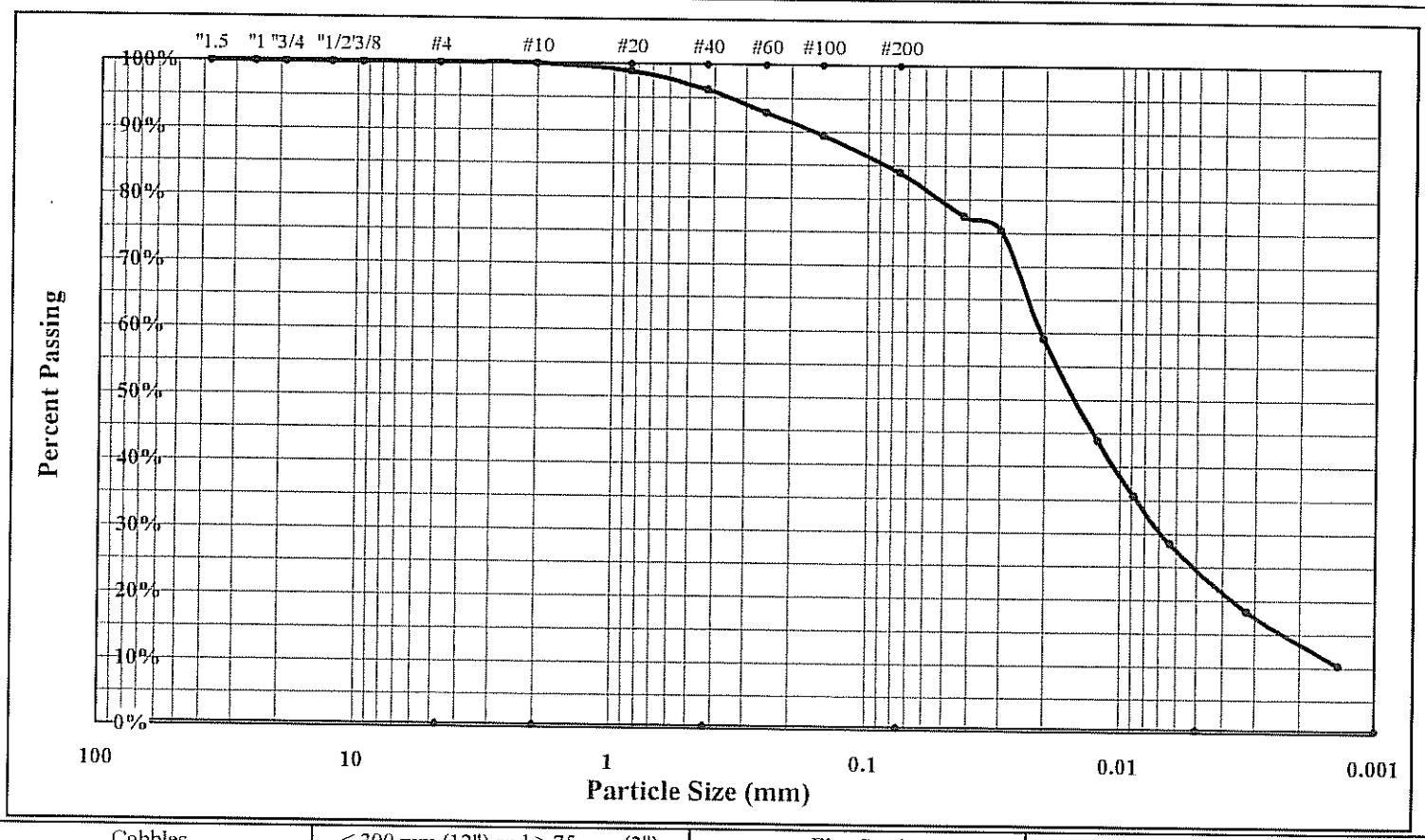
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	11/25/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	11/11-25/08
Client Name:	Duke Energy		
Client Address:			

Boring #:	Sample #: 9	Sample Date:	10/24/08
Location:	Fly ash for cell 1 SG & berm mat'l	Depth:	
Sample Description:	Tan Clayey Silt (ML) with Fine Sand 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	0	Gravel	0.0%	Silt	59.5%
Silt & Clay (% Passing #200)	84.0%	Sand	16.0%	Clay	24.5%
Apparent Relative Density (Assumed)	2.650	Moisture Content		Colloids	
Liquid Limit	44	Plastic Limit	41	Plastic Index	3

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #: **1356-06-825 Ph. 9** Test Date(s): 11/18-21/08
Project Name: Allen Steam Station RAB Ash Landfill Report Date: November 21, 2008
Client Name:
Client Address:
Boring #: Sample #: 9 Sample Date: October 24, 2008
Location: Fly Ash for Cell 1 subgrade and berm material Offset: Depth:
Sample Description: Tan Clayey Silt (ML) with Fine Sand and Mica

Liquid Limit: 44 Specific Gravity:
Plastic Limit: 41 Plastic Index: 3

Natural Moisture Content:
Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: **85.2** **Opt. MC %:** **31.2**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	600	300	360	420	480	540
	Tare #:	DJM	5I	KO	MAC	G	EL
A. Tare Weight	A.	159.4	157.5	157.7	161.9	155.8	157.1
B. Wet Wt + Tare Wt	B.	1168.9	927.2	890	1063.1	1117.2	1211.9
C. Dry Wt. + Tare Wt.	C.	907.6	783.3	740.1	866.3	893.8	954.2
D. Water Weight	B-C	261.3	143.9	149.9	196.8	223.4	257.7
E. Dry Weight	C-A	748.2	625.8	582.4	704.4	738	797.1
F. Moisture Content	100*D/E	**34.9**	**23.0**	**25.7**	**27.9**	**30.3**	**32.3**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5859	5713	5770	5789	5847	5873
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1686.000	1540.000	1597.000	1616.000	1674.000	1700.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.717	3.395	3.521	3.563	3.690	3.748
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	111.5	101.8	105.6	106.8	110.7	112.4
M. Dry Density	L/(1+F)	**82.6**	**82.8**	**84.0**	**83.5**	**85.0**	**84.9**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐
Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez
Technical Responsibility: Ken Daly

Certification #
Signature *Position*

Moisture - Density Report

S&ME

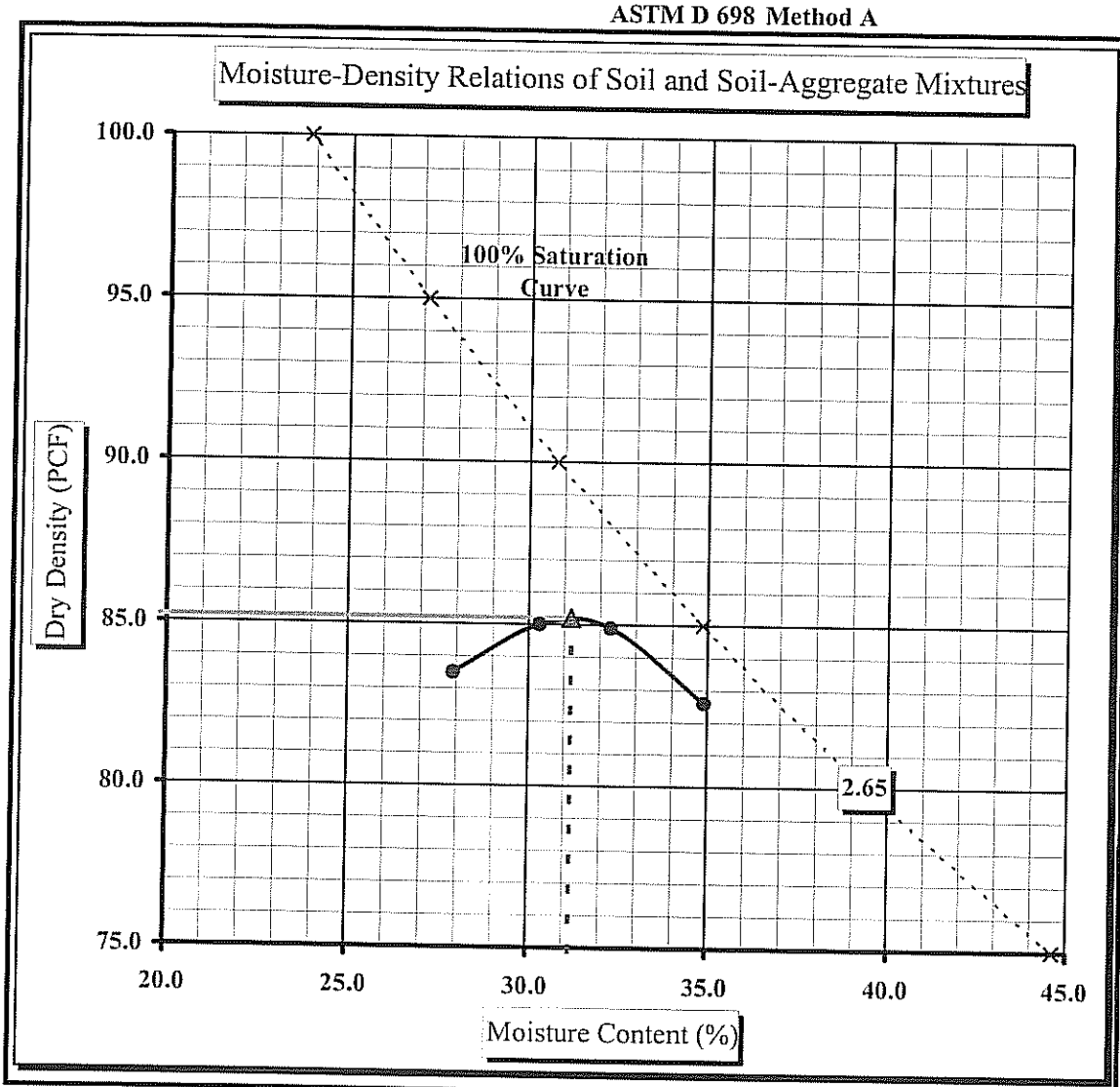
S&ME Project #: **1356-06-825 Ph. 9**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name:
Client Address:

Report Date: November 21, 2008
Test Date(s): 11/18-21/08

Boring #: Sample #: 9 Sample Date: October 24, 2008
Location: Fly Ash for Cell 1 subgrade and berm material Offset: Depth:
Sample Description: Tan Clayey Silt (ML) with Fine Sand and Mica

Maximum Dry Density **85.2** **PCF.** **Optimum Moisture Content** **31.2** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: 44

Plastic Limit: 41

Plastic Index: 3

Specific Gravity:

% Passing

3/4"
1/2"
3/8"
#4 100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly
Signature

S&ME, INC. 9751 Southern Pine Blvd., Charlotte, NC 28273

Liquid Limit, Plastic Limit, and Plastic Index

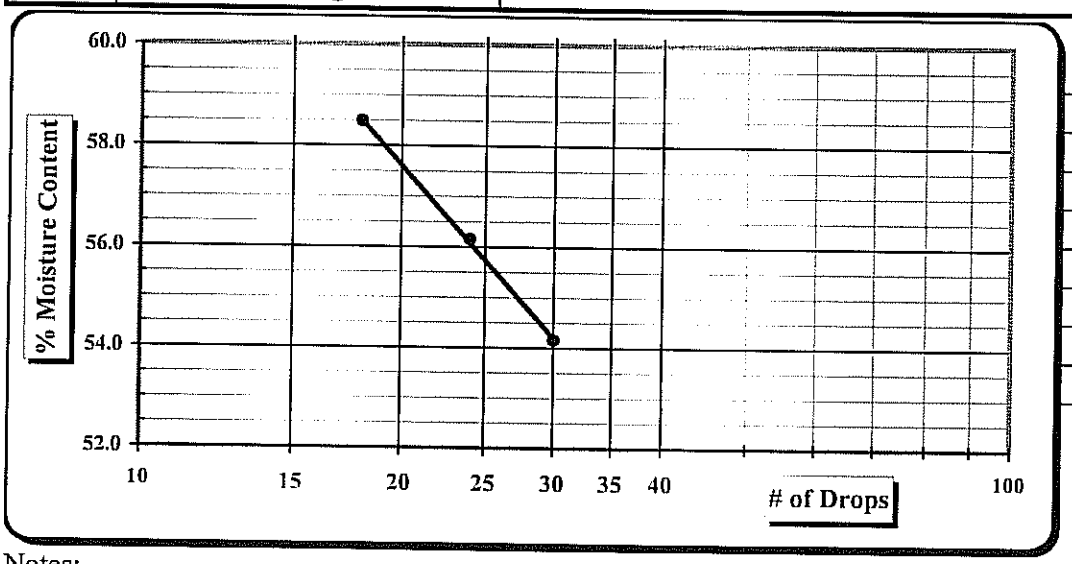
S&ME

Project #: **1356-06-825 Phase 9**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/11/08
Test Date(s): 12/1-11/08

Boring #: Sample #: 17 Sample Date: 11/6/08
Location: Fly Ash for Cell 1 Offset: Depth: Bulk
Sample Description: Orange Red Coarse to Fine Sandy Clayey Silt (MH)

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	51	LL	49				2	29	
A	Tare Weight	15.75	16.92	15.65				**15.79**	14.12	
B	Wet Soil Weight + A	25.94	27.96	24.70				22.71	20.72	
C	Dry Soil Weight + A	22.36	23.99	21.36				20.67	18.77	
D	Water Weight (B-C)	3.58	3.97	3.34				2.04	1.95	
E	Dry Soil Weight (C-A)	6.61	7.07	5.71				4.88	4.65	
F	% Moisture Content (D/E)*100	54.2%	56.2%	58.5%				41.8%	41.9%	
N	# OF DROPS	30	24	18				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							41.9%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	56
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	42
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	14
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	MH

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: K Daly. *Signature* Project Engineer *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: 1356-06-825 Phase 9
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 12/1-11/08
Report Date: 12/11/08

Boring #: Sample #: 17 Sample Date: 11/6/08
Location: Fly Ash for Cell 1 SG/Berı Offset: Depth: Bulk
Sample Description: Red Orange Coarse to Fine Sandy Clayey Silt (MH)

Pan #:		Beaker #:	
Hydrometer Jar #:			
Pan Tare Weight (grams):			
Total Sample Air Dried Wt. + tare wt. (grams):	404.95		
Weight of Total Sample Air Dried:	404.95		
Weight of Air Dried Hydrometer Sample (g):	50.02		
Total Sample Oven Dried:	399.25		
Hydrometer Sample Oven Dried (W):	49.31		
% Passing #10:	99.3%		
Correction Factor a (Table 1):	1.00		

Apparent Relative Density (Assumed) 2.650

	Moisture Content	Hygroscopic	Natural
	Tare #	23	G-15
A	Tare Wt.	14.06	81.39
B	Wet Wt. + A	26.06	366.75
C	Dry Wt. + A	25.89	349.87
D	Water Wt. (B-C)	0.17	16.88
E	Dry Wt. (C-A)	11.83	268.48
	% Moisture (100 x D/E)	1.44%	6.3%

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		100.0%
#4	0.8	Soil Mortar	99.8%
#10	2.7	100.0%	99.3%
#20	3.3	93.4%	92.7%
#40	7.4	85.1%	84.5%
#60	9.9	79.9%	79.4%
#100	11.9	75.9%	75.4%
#200	15.9	67.7%	67.2%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:		
% Gravel:	0.2%	< 75 mm and > 4.75 mm
Coarse Sand:	0.5%	< 4.75 mm and > 2.00 mm
Medium Sand:	14.8%	< 2.00 mm and > 0.425 mm
Fine Sand:	17.3%	< 0.425 mm and > 0.075 mm

Total Sand:	32.5%	< 4.74 mm and > 0.075 mm
Silt & Clay:	67.2%	< 0.075
Silt:	46.7%	< 0.075 and > 0.005 mm
Clay:	20.5%	< 0.005 mm
Colloids:		< 0.001 mm

Type: Mechanical Stirring Apparatus (A)
Dispersion Time: 1 min.
Sodium Hexametaphosphate: 40 g./ Liter

Liquid Limit 56 Plastic Limit 42 Plastic Index 14

Control Cylinder ☒ **Composite Correction** ☐
Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	20.5	38.0	5.0		33.00	66.9%	66.5%	10.9	0.01357	0.04475
	2	20.5	37.0	5.0		32.00	64.9%	64.5%	11.0	0.01357	0.03188
	5	20.5	30.5	5.0		25.50	51.7%	51.4%	12.1	0.01357	0.02111
	15	20.5	21.5	5.0		16.50	33.5%	33.2%	13.6	0.01357	0.01291
	30	20.5	19.5	5.0		14.50	29.4%	29.2%	13.9	0.01357	0.00924
	60	20.5	17.0	5.0		12.00	24.3%	24.2%	14.3	0.01357	0.00663
	250	20.5	13.0	5.0		8.00	16.2%	16.1%	15.0	0.01357	0.00332
	1440	21.0	10.0	4.5		5.50	11.2%	11.1%	15.4	0.01348	0.00139

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: K. Daly *Signature* *Project Engineer* *Position*

S&ME, INC. 9751Southern Pine Blvd., Charlotte, NC 28273

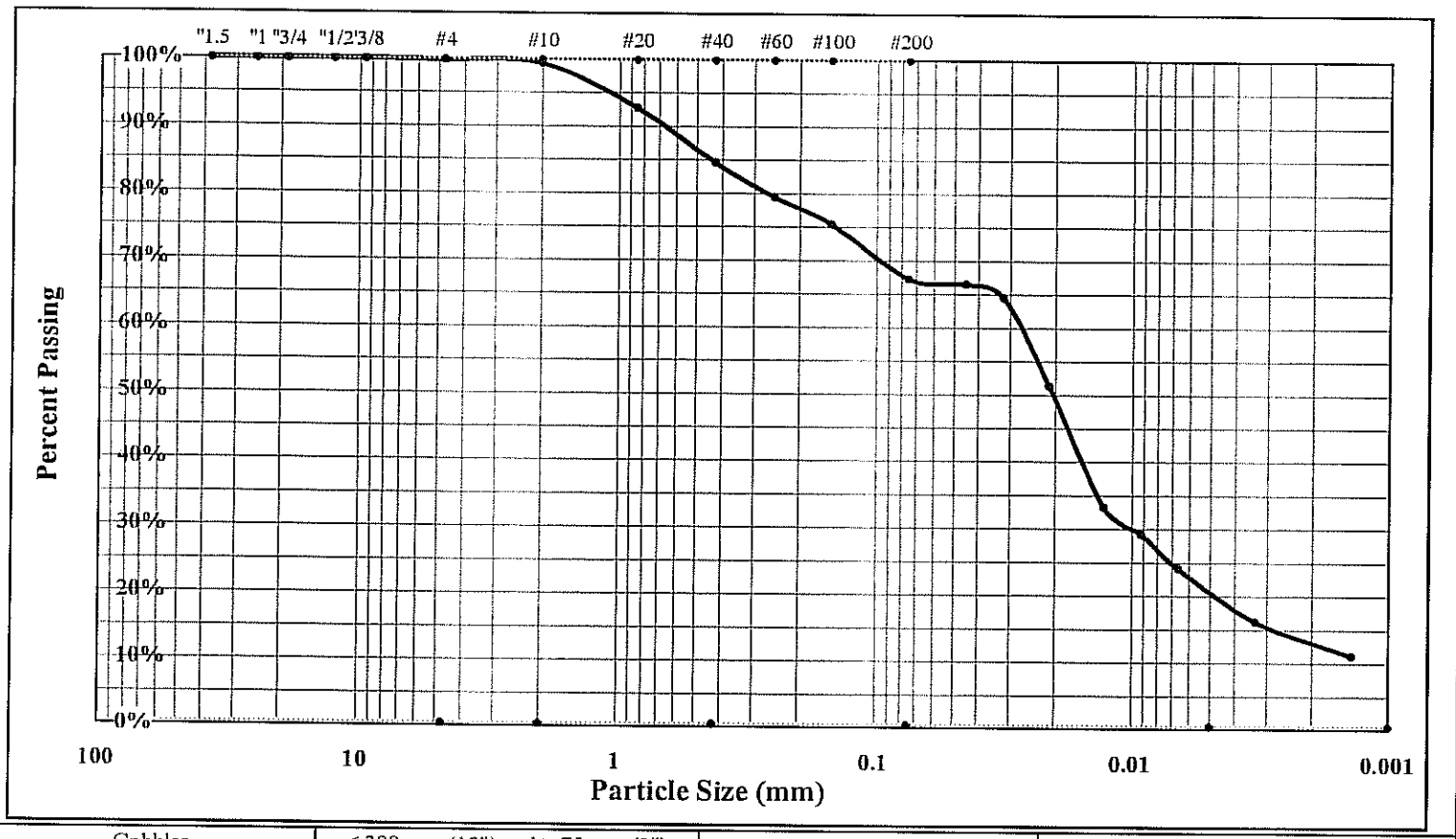
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825 Phase**	Report Date:	12/11/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/1-11/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	17	Sample Date:	11/6/08
Location:	Fly Ash for Cell 1	Offset:		Depth:	Bulk
Sample Description:	Red Orange 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	0	Gravel	0.2%	Silt	46.7%
Silt & Clay (% Passing #200)	67.2%	Sand	32.5%	Clay	20.5%
Apparent Relative Density (Assumed)	2.650	Moisture Content	6.3%	Colloids	
Liquid Limit	56	Plastic Limit	42	Plastic Index	14

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 854: Specific Gravity of Soils

Technical Responsibility: K. Daly _____ Project Engineer
Signature Position

Moisture - Density Relationship

S&ME

S&ME Project #:	**1356-06-825 Phase 9**	Test Date(s):	December 3, 2008
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	December 12, 2008
Client Name:	Duke Energy		
Project Address:			
Boring #:	Sample #: 17	Sample Date:	November 6, 2008
Location:	Alternate Borrow Site Soil Offset:	Depth:	Bulk
Sample Description:	Orange Brown Coarse to Fine Sandy Clayey Silt (MH)		

Liquid Limit: 56 Specific Gravity:

Plastic Limit: 42 Plastic Index: 14

Natural Moisture Content: 6.3%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	100.0
#4	99.8

MDD: 94.0 **Opt. MC %: 24.1**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:						
	Tare #:						
A. Tare Weight	A.	157.7	157.74	153.83	155.61	155.01	155.5
B. Wet Wt + Tare Wt	B.	915.07	762.1	888.45	898.94	937.92	736.31
C. Dry Wt. + Tare Wt.	C.	780.39	642.6	733.92	736.75	757.25	636.63
D. Water Weight	B-C	134.68	119.5	154.53	162.19	180.67	99.68
E. Dry Weight	C-A	622.69	484.86	580.09	581.14	602.24	481.13
F. Moisture Content	100*D/E	**21.6%**	**24.6%**	**26.6%**	**27.9%**	**30.0%**	**20.7%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5873	5949	5940	5943	5928	5917
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1700.000	1776.000	1767.000	1770.000	1755.000	1744.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.748	3.915	3.896	3.902	3.869	3.845
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	112.4	117.4	116.8	117.0	116.0	115.3
M. Dry Density	L/(1+F)	**92.4**	**94.2**	**92.3**	**91.5**	**89.3**	**95.5**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity:	ASTM D 4318 ☒	AASHTO T 89 ☐		AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis:	ASTM C136 ☐	AASHTO T 27 ☐	ASTM D 422 ☒	AASHTO T 88 ☐
Specific Gravity of Soil:		ASTM D 854 ☐		AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction:		ASTM C 127 ☐		AASHTO T 85 ☐
Soil Classification:	ASTM D 2487 ☒	ASTM D 2488 ☐		AASHTO M 145 ☐

Technician Name: Eric Lopez

Technical Responsibility: Ken Daly

Certification #

Signature

Project Engineer

Moisture - Density Report

S&ME

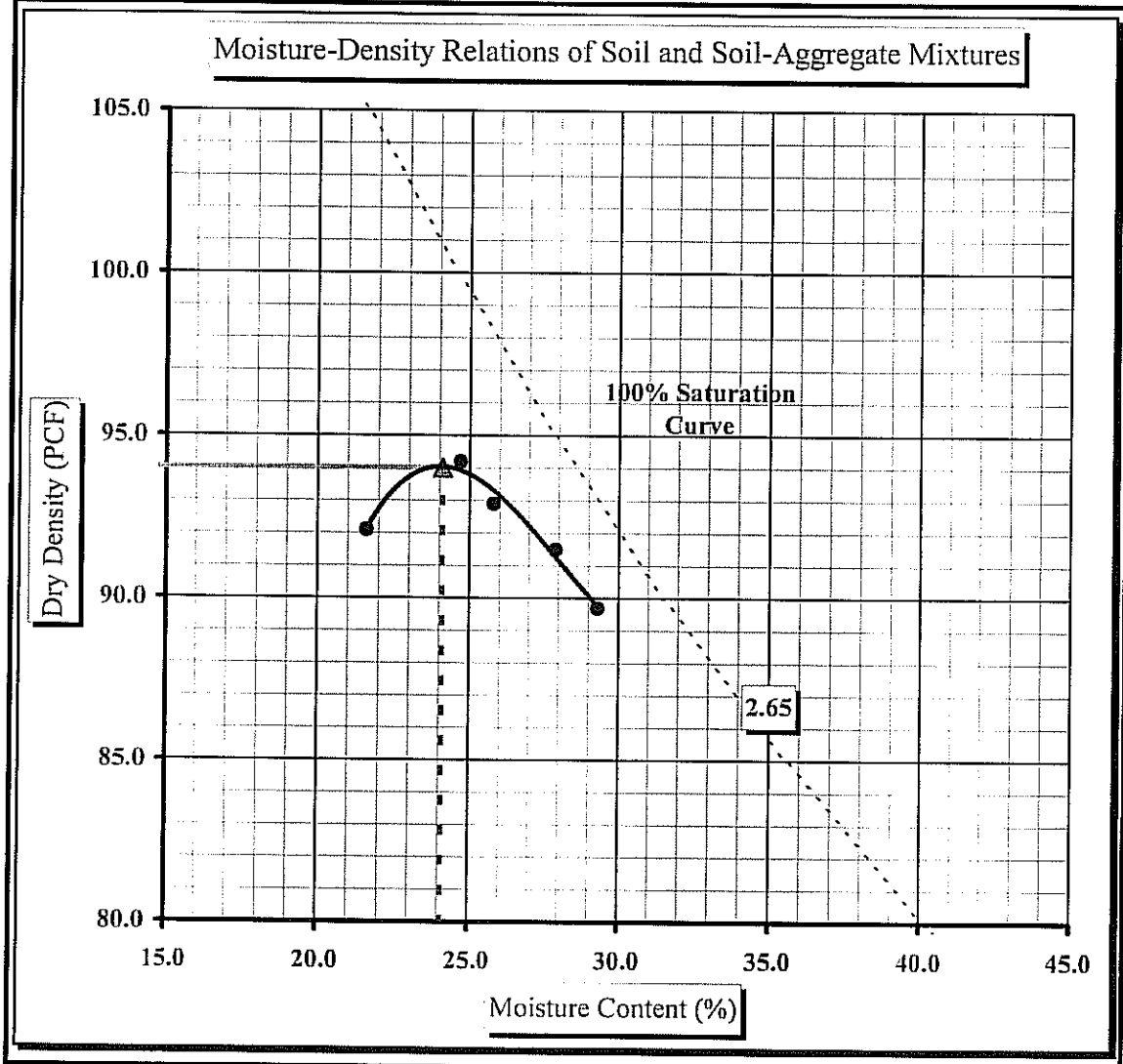
S&ME Project #: **1356-06-825 Phase 9**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name: Duke Energy
Project Address:

Report Date: December 12, 2008
Test Date(s): December 3, 2008

Boring #: Sample #: 17 Sample Date: November 6, 2008
Location: Alternate Borrow Site Soil Offset: Depth: Bulk
Sample Description: Orange Brown Coarse to Fine Sandy Clayey Silt (MH)

Maximum Dry Density 94.0 PCF. **Optimum Moisture Content 24.1 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	6.3%
Liquid Limit:	56
Plastic Limit:	42
Plastic Index:	14
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	100
#4	99.8

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

Liquid Limit, Plastic Limit, and Plastic Index

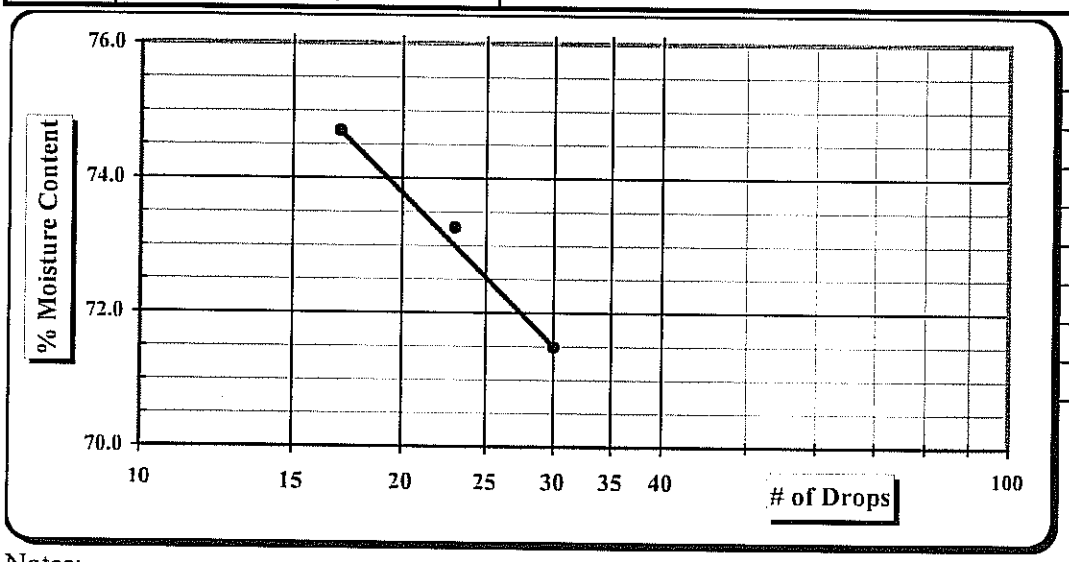
S&ME

Project #: **1356-06-825 Phase 9**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 12/11/08
Test Date(s): 12/1-11/08

Boring #: Sample #: 18 Sample Date: 11/6/08
Location: Borrow Site Offset: Depth: Bulk
Sample Description: Orange Red Clayey Silt (MH)

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	48	5	23				11	QQ	
A	Tare Weight	13.99	15.71	14.06				**13.84**	16.91	
B	Wet Soil Weight + A	21.93	24.46	23.04				20.23	23.64	
C	Dry Soil Weight + A	18.62	20.76	19.20				18.45	21.73	
D	Water Weight (B-C)	3.31	3.70	3.84				1.78	1.91	
E	Dry Soil Weight (C-A)	4.63	5.05	5.14				4.61	4.82	
F	% Moisture Content (D/E)*100	71.5%	73.3%	74.7%				38.6%	39.6%	
N	# OF DROPS	30	23	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							39.1%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	73
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	39
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	34
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	MH

Technician Name: Karen Warner 117900 (Certification #)

Technical Responsibility: K Daly. (Signature) Project Engineer (Position)

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825 Phase 9**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 12/1-11/08
Report Date: 12/11/08

Boring #: Sample #: 18 Sample Date: 11/6/08
Location: Borrow Site Offset: Depth: Bulk
Sample Description: Red Orange 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):			471.96		Tare #	45	691		
Weight of Total Sample Air Dried:			471.96	A	Tare Wt.	13.93	155.14		
Weight of Air Dried Hydrometer Sample (g):			50.20	B	Wet Wt. + A	24.28	760.60		
Total Sample Oven Dried:			462.87	C	Dry Wt. + A	24.08	660.20		
Hydrometer Sample Oven Dried (W):			49.23	D	Water Wt. (B-C)	0.20	100.40		
% Passing #10:			99.6%	E	Dry Wt. (C-A)	10.15	505.06		
Correction Factor a (Table 1):			0.99		% Moisture (100 x D/E)	1.97%	19.9%		

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		100.0%
#4	0.2	Soil Mortar	100.0%
#10	1.7	**100.0%**	99.6%
#20	0.4	99.3%	98.9%
#40	0.8	98.3%	97.9%
#60	1.2	97.5%	97.1%
#100	1.8	96.3%	95.9%
#200	3.2	93.4%	93.1%

Notes: Description of Sand & Gravel Particles: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	6.9%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	93.1%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.3%	< 4.75 mm and > 2.00 mm	Silt:	33.6%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	1.7%	< 2.00 mm and > 0.425 mm	Clay:	59.5%	< 0.005 mm		
Fine Sand:	4.9%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **73** Plastic Limit **39** Plastic Index **34** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	20.5	51.5	5.0		46.50	93.5%	93.2%	8.7	0.01336	0.03935
	2	20.5	51.0	5.0		46.00	92.5%	92.2%	8.8	0.01336	0.02795
	5	20.5	47.5	5.0		42.50	85.5%	85.2%	9.3	0.01336	0.01825
	15	20.5	43.0	5.0		38.00	76.4%	76.1%	10.1	0.01336	0.01095
	30	20.5	39.0	5.0		34.00	68.4%	68.1%	10.7	0.01336	0.00799
	60	20.5	36.0	5.0		31.00	62.3%	62.1%	11.2	0.01336	0.00578
	250	20.5	31.0	5.0		26.00	52.3%	52.1%	12.0	0.01336	0.00293
	1440	21.0	24.5	4.5		20.00	40.2%	40.1%	13.0	0.01328	0.00126

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B =67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Karen Warner 117900 *Certification #*

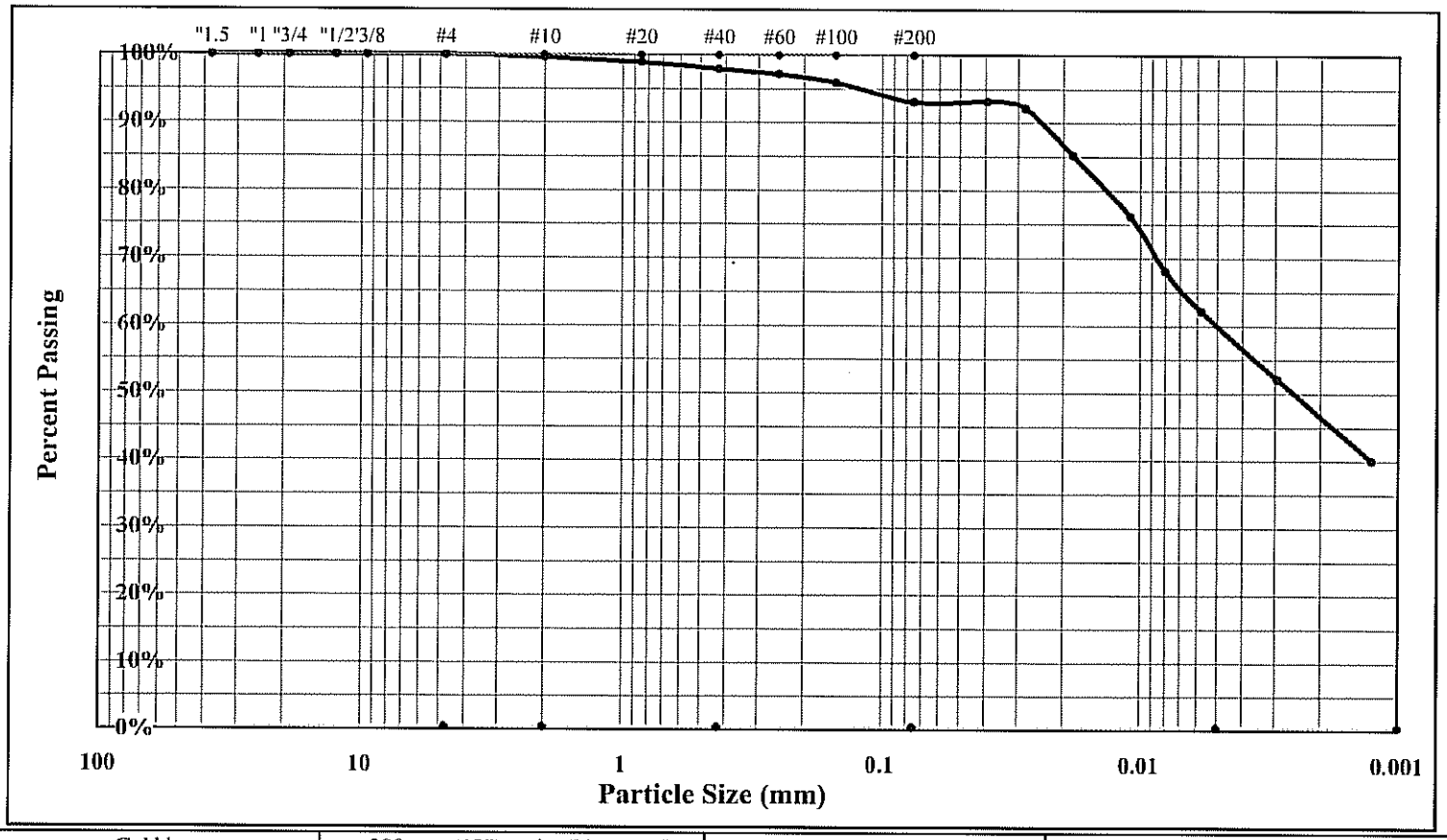
Technical Responsibility: K. Daly _____ *Signature* *Project Engineer* *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825 Phase**	Report Date:	12/11/08
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/1-11/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	18	Sample Date:	11/6/08
Location:	Borrow Site	Offset:		Depth:	Bulk
Sample Description:	Red Orange 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	0	Gravel	0.0%	Silt	33.6%
Silt & Clay (% Passing #200)	93.1%	Sand	6.9%	Clay	59.5%
Apparent Relative Density (Assumed)	2.700	Moisture Content	19.9%	Colloids	
Liquid Limit	73	Plastic Limit	39	Plastic Index	34

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: K. Daly _____ Project Engineer
Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825 Phase 9**	Test Date(s):	12/3-11/08
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	December 12, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: 18	Sample Date:	November 6, 2008
Location: Borrow Site	Offset:	Depth:	Bulk
Sample Description:	Red Orange Clayey Silt (MH)		

Liquid Limit: 73 Specific Gravity:

Plastic Limit: 39 Plastic Index: 34

Natural Moisture Content: 19.9%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 89.8 **Opt. MC %: 30.2**

Water Content Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	180	240	300	360		
	Tare #:	698	JMD	SQ-1	5L	PTL	
A. Tare Weight	A.	154.4	163.4	158.9	154.9	163.74	157.8
B. Wet Wt + Tare Wt	B.	896.6	924	976.1	825.5	914.38	807.55
C. Dry Wt. + Tare Wt.	C.	734.9	746.8	773.3	649.1	761.44	659.61
D. Water Weight	B-C	161.7	177.2	202.8	176.4	152.94	147.94
E. Dry Weight	C-A	580.5	583.4	614.4	494.2	597.7	501.81
F. Moisture Content	100*D/E	**27.9**	**30.4**	**33.0**	**35.7**	**25.6**	**29.5**

Compaction Data The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5894	5943	5952	5920	5852	5566
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1721.000	1770.000	1779.000	1747.000	1679.000	1393.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.794	3.902	3.922	3.851	3.701	3.071
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	113.8	117.0	117.6	115.5	111.0	92.1
M. Dry Density	L/(1+F)	**89.0**	**89.8**	**88.4**	**85.1**	**88.4**	**71.1**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☒ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez

Certification #

Technical Responsibility: Ken Daly _____ Project Engineer

Signature *Position*

Moisture - Density Report

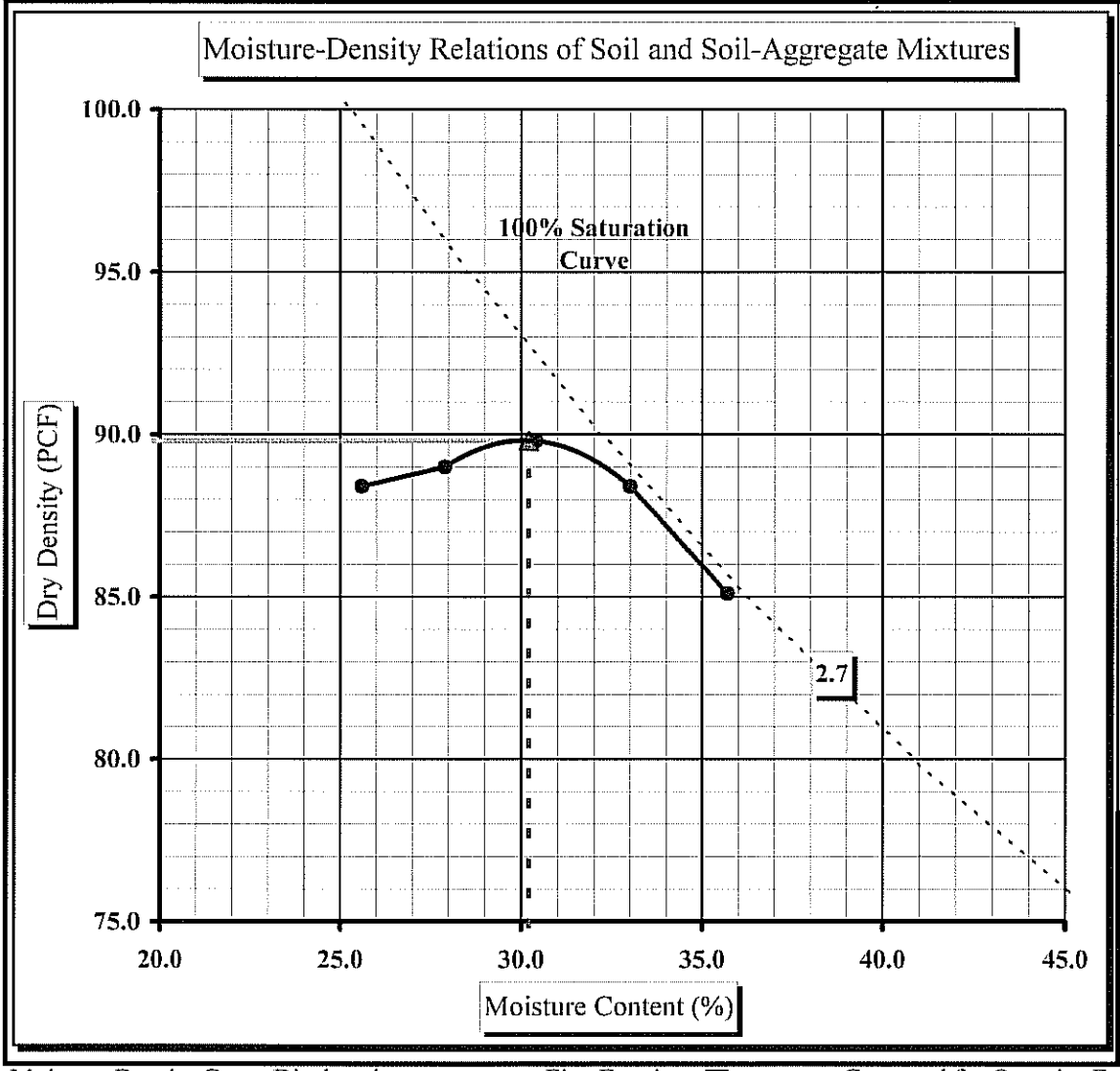
S&ME

S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	December 12, 2008
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/3-11/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	18	Sample Date:	November 6, 2008
Location:	Borrow Site	Offset:		Depth:	Bulk
Sample Description:	Red Orange Clayey Silt (MH)				

Maximum Dry Density **89.8** **PCF.** **Optimum Moisture Content** **30.2** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	19.9%
Liquid Limit:	73
Plastic Limit:	39
Plastic Index:	34
Specific Gravity:	

% Passing	
3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

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 #: **1356-06-825 Ph. 9** Report Date: 2/19/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/11-19/09

Client Name:

Client Address:

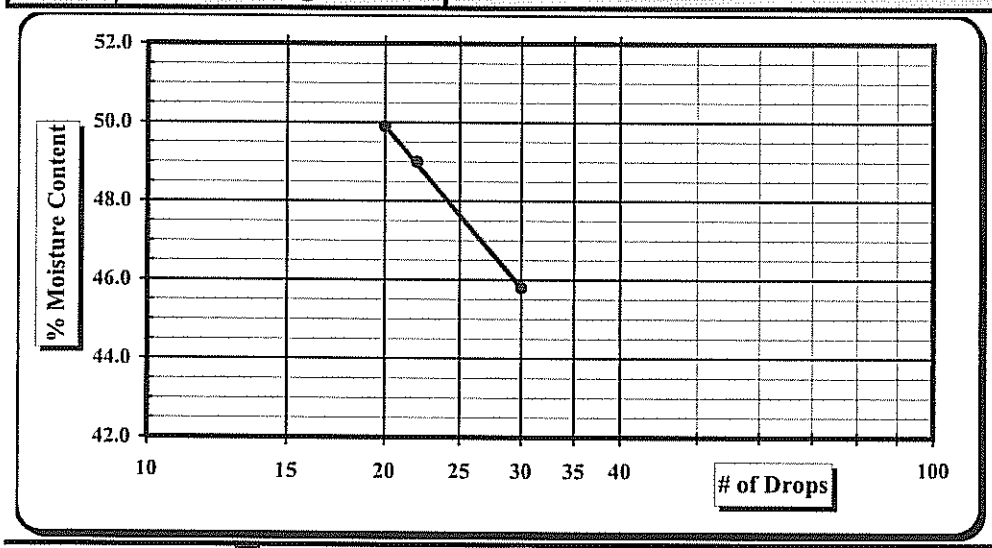
Boring #: Sample #: 21 Sample Date: 1/17/09

Location: Access/entrance rdwy Offset: Elevation:

Sample Description: Tan Red Fine to Medium Sandy Clayey Silt (ML) with 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 #:	33	41	WN				9	PP	
A	Tare Weight	15.95	15.76	16.56				**13.93**	16.14	
B	Wet Soil Weight + A	28.78	26.41	28.54				20.09	23.80	
C	Dry Soil Weight + A	24.75	22.91	24.55				18.38	21.68	
D	Water Weight (B-C)	4.03	3.50	3.99				1.71	2.12	
E	Dry Soil Weight (C-A)	8.80	7.15	7.99				4.45	5.54	
F	% Moisture (D/E)*100	45.8%	49.0%	49.9%				38.4%	38.3%	
N	# OF DROPS	30	22	20				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**38.4%**		



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 **48**

Plastic Limit **38**

Plastic Index **10**

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

Jennifer Olsen	2/19/2009	Ken Daly	
Technician Name	*Date*	*Technical Responsibility*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Ph. 9**	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/11-19/09

Client Name: Address:

Boring #: Sample #: 21 Sample Date: 1/17/09

Location: Access/entrance rdwy Offset: Elevation:

Sample Description: Tan Red Fine to Medium Sandy Clayey Silt (ML) with Mica

Pan #:	1	Beaker #:	II	**Apparent Relative Density (Assumed)**	**2.650**
Hydrometer Jar #:			A		
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):			334.37	Tare #	VV	G-14
Weight of Total Sample Air Dried:			334.37	A Tare Wt.	16.05	82.03
Weight of Air Dried Hydrometer Sample (g):			50.00	B Wet Wt. + A	27.45	252.11
Total Sample Oven Dried:			333.26	C Dry Wt. + A	27.41	225.29
Hydrometer Sample Oven Dried (W):			49.82	D Water Wt. (B-C)	0.04	26.82
% Passing #10:			94.4%	E Dry Wt. (C-A)	11.36	143.26
Correction Factor a (Table 1):			1.00	% Moisture (100 x D/E)	0.35%	18.7%

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	PO	100.0%
1/2"	5.8		98.2%
3/8"	9.4	Soil Mortar	97.2%
#4	15.4		95.4%
#10	18.7	**100.0%**	94.4%
#20	1.5	97.0%	91.6%
#40	6.3	87.4%	82.5%
#60	10.7	78.4%	74.0%
#100	13.9	72.1%	68.0%
#200	16.7	66.5%	62.7%

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	20.5	38.0	5.0		33.00	66.2%	62.5%	10.9	0.01357	0.03164
5	20.5	35.0	5.0		30.00	60.2%	56.8%	11.4	0.01357	0.02046
15	20.5	29.5	5.0		24.50	49.2%	46.4%	12.3	0.01357	0.01227
30	20.5	26.5	5.0		21.50	43.2%	40.7%	12.8	0.01357	0.00885
60	21.0	22.0	4.5		17.50	35.1%	33.2%	13.4	0.01348	0.00638
250	22.0	16.5	4.0		12.50	25.1%	23.7%	14.2	0.01332	0.00318
1440	22.5	14.0	3.5		10.50	21.1%	19.9%	14.6	0.01325	0.00133
					#VALUE!	#VALUE!	19.9%	#VALUE!	#N/A	#N/A

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Jennifer Olsen	117926	Ken Daly		
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

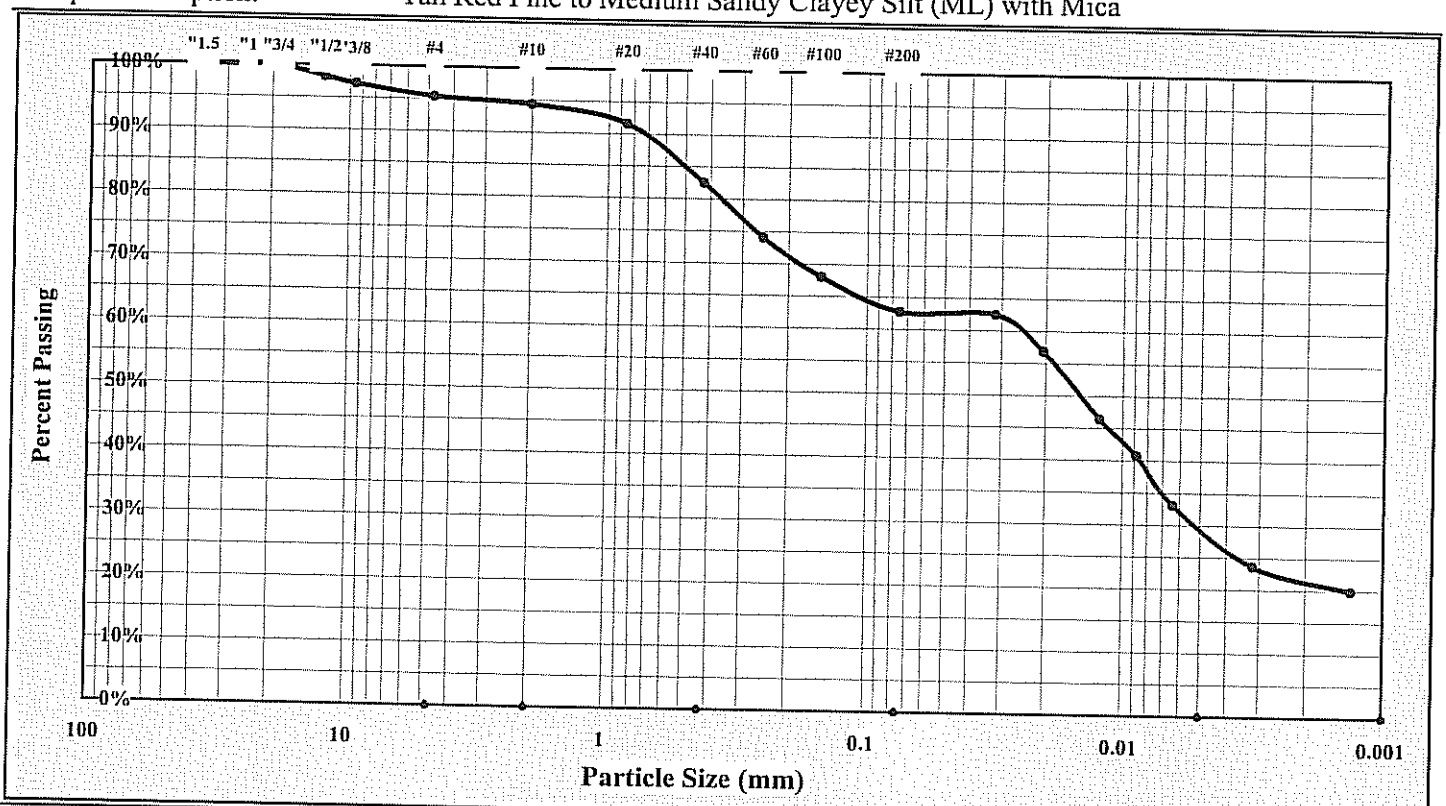
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	2/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/11-19/09
Client Name:			
Address:			
Boring #:	Sample #: 21	Sample Date:	1/17/09
Location:	Access/entrance rdwy Offset:	Elevation:	
Sample Description:	Tan Red Fine to Medium Sandy Clayey Silt (ML) with 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:		Gravel:	0.0%	Silt	33.7%
Silt & Clay (% Passing #200):	62.7%	Total Sand:	32.6%	Clay	29.0%
ent Relative Density (Assumed)	2.650	Moisture Content	18.7%	Colloids	
Liquid Limit	48	Plastic Limit	38	Plastic Index	10
Coarse Sand:	1.0%	Medium Sand:	11.9%	Fine Sand:	19.8%

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: AASTM D 4318, D 854, D 2487

Ken Daly
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

S&ME

ASTM D558, D698, D1557, AASHTO T99, T180

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	2/16/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/12-16/09
Client Name:			
Client Address:			

Boring #:		Sample #:	21	Sample Date:	1/17/2009
Location:	Access/Entrance Roadway	Offset:		Depth:	
Sample Description:	Tan Red Fine to Medium Sandy Clayey Silt (ML) with Mica				

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:	180	240	300	120		Natural
	Tare #:	691	5C	5K	PTL		
A. Tare Weight	A.	156.5	155.1	153.8	163.5		
B. Wet Wt + Tare Wt	B.	1023.9	1049.9	945.1	826.9		
C. Dry Wt. + Tare Wt.	C.	860.9	866.1	769.6	712.7		
D. Water Weight	B-C	163.0	183.8	175.5	114.2		
E. Dry Weight	C-A	704.4	711.0	615.8	549.2		
F. Moisture Content	100*D/E	**23.1%**	**25.9%**	**28.5%**	**20.8%**		

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5934	5968	5955	5886		
H. Wt. of Mold	H.	4170	4170	4170	4170		
I. Wt. of Soil (g. or lbs.)	G-H	1764	1798	1785	1716		
J. Wt of Soil (Lbs.)	I/453.6 or I	3.889	3.964	3.935	3.783		
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07		
L. Wet Density (PCF)	J*K	116.9	119.2	118.3	113.8		
M. Dry Density (PCF)	L/(1+F)	**95.0**	**94.7**	**92.1**	**94.2**		

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:

Jennifer Olsen		NICET/117926	2/16/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Ken Daly			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

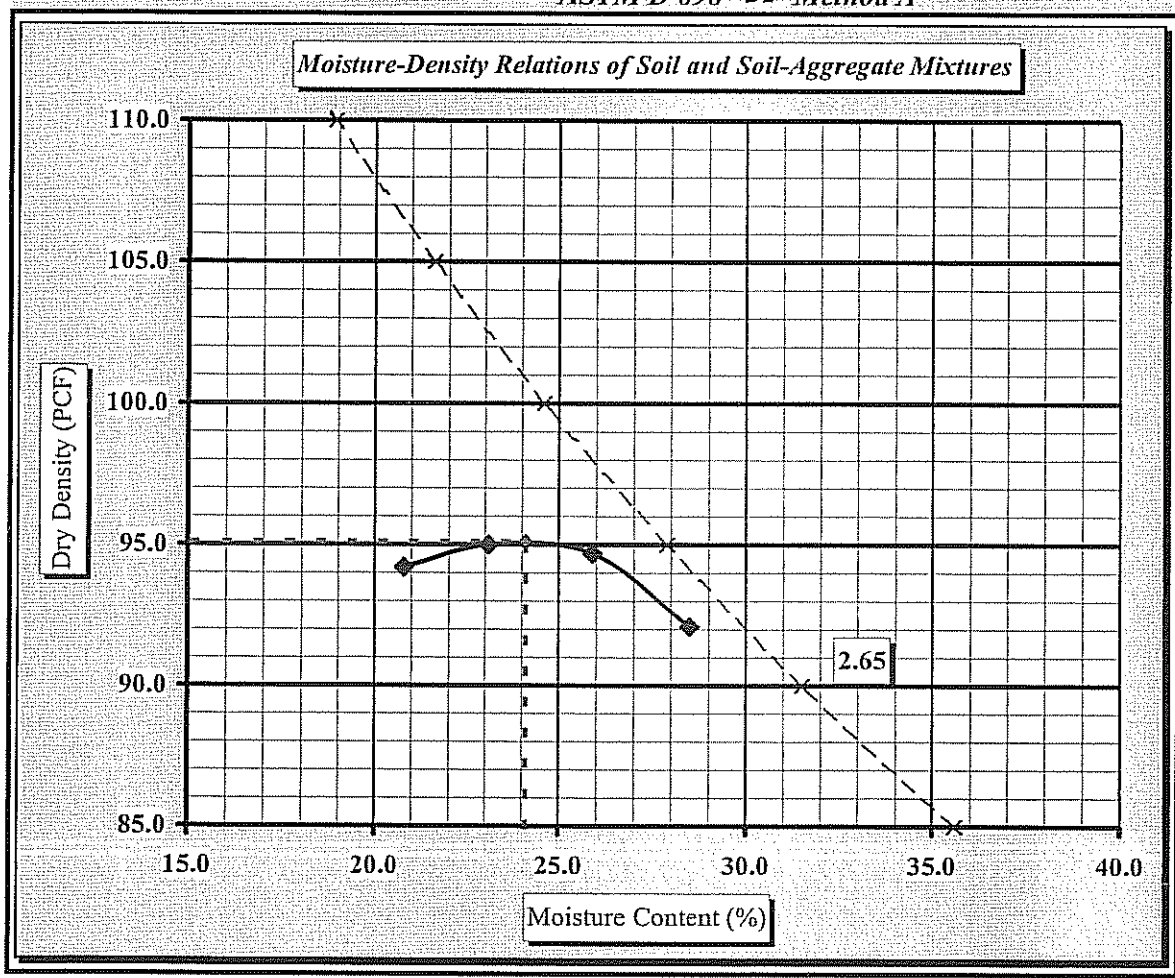
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	2/16/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/12-16/09
Client Name:			
Client Address:			
Boring #:	Sample #: 21	Sample Date:	1/17/2009
Location:	Access/Entrance Roadway Offset:	Depth:	
Sample Description:	Tan Red Fine to Medium Sandy Clayey Silt (ML) with Mica		

Maximum Dry Density 95.1 PCF. **Optimum Moisture Content 24.1%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**18.7%**
Specific Gravity of Soil	
Liquid Limit	**48**
Plastic Limit	**38**
Plastic Index	**10**

% Passing

3/4"	
3/8"	
#4	95.4%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Ken Daly
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Task 9** Report Date: 2/25/09

Project Name: Allen Steam Station RAB Ash Landfill Test Date(s) 2/11-25/09

Client Name:

Client Address:

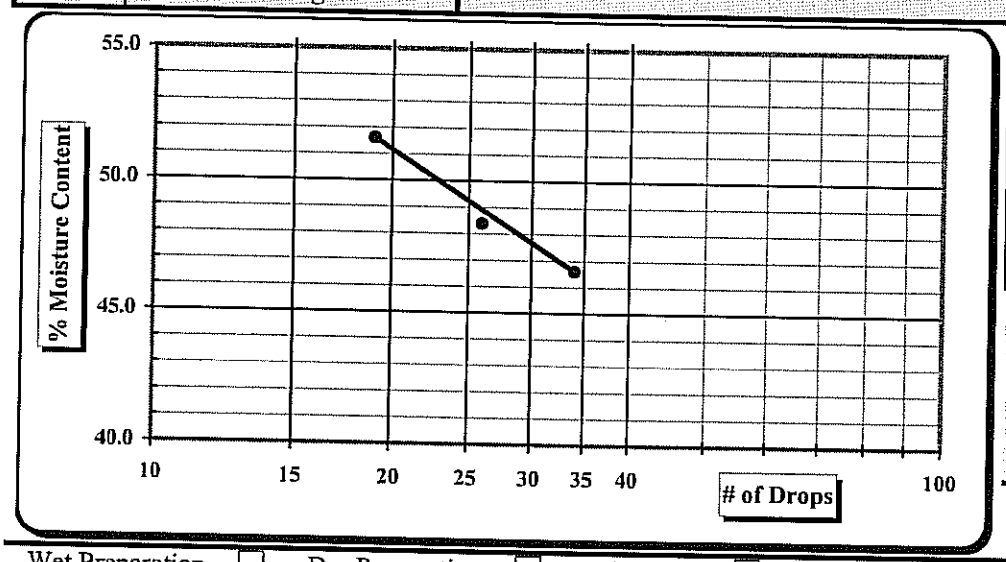
Boring #: Sample #: 31 Sample Date: 1/20/09

Location: Borrow Site Offset: Elevation: Bulk

Sample Description: Orange Micaceous Silty Coarse to Fine to Medium Sand (SM)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/13/2009	Grooving tool	20232	2/23/2009
LL Apparatus	20230	9/20/2009	Grooving tool		
Oven	10844	9/5/2008	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	TT	31	PP				44	WN	
A	Tare Weight	15.96	13.96	16.16				**15.69**	16.58	
B	Wet Soil Weight + A	28.29	25.88	26.80				22.54	22.68	
C	Dry Soil Weight + A	24.37	21.99	23.18				20.43	20.79	
D	Water Weight (B-C)	3.92	3.89	3.62				2.11	1.89	
E	Dry Soil Weight (C-A)	8.41	8.03	7.02				4.74	4.21	
F	% Moisture (D/E)*100	46.6%	48.4%	51.6%				44.5%	44.9%	
N	# OF DROPS	34	26	19				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**44.7%**		



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 **45**

Plastic Index **5**

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 — *Technician Name*

2/25/2009 — *Date*

Ken Daly — *Technical Responsibility*

_____ — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Task 9**	Report Date:	2/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/3-24/09
Client Name:		Address:	
Boring #:	Sample #: 31	Sample Date:	1/30/09
Location:	Offset:	Elevation:	
Sample Description:	Orange Micaceous Silty Coarse to Fine to Medium 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):	363.95		Tare #	1	O
Weight of Total Sample Air Dried:	363.95	A	Tare Wt.	13.86	81.52
Weight of Air Dried Hydrometer Sample (g):	50.05	B	Wet Wt. + A	27.46	360.60
Total Sample Oven Dried:	363.43	C	Dry Wt. + A	27.44	333.10
Hydrometer Sample Oven Dried (W):	49.98	D	Water Wt. (B-C)	0.02	27.50
% Passing #10:	98.0%	E	Dry Wt. (C-A)	13.58	251.58
Correction Factor a (Table 1):	1.00		% Moisture (100 x D/E)	0.15%	10.9%

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	59	100.0%
1/2"	0.0		100.0%
3/8"	0.0	Soil Mortar	100.0%
#4	0.0		100.0%
#10	7.2	**100.0%**	98.0%
#20	6.9	86.3%	84.6%
#40	13.5	73.1%	71.6%
#60	18.1	63.9%	62.6%
#100	21.0	57.9%	56.8%
#200	24.7	50.6%	49.6%

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. 3996 *Cal. Date:* 2/13/2009 Hydrometer: *ID No.* 3901 *Cal. Date:* 3/8/2008

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	22.0	27.5	5.5		22.00	44.0%	43.2%	12.7	0.01332	0.03355
5	22.0	25.0	5.5		19.50	39.0%	38.3%	13.1	0.01332	0.02156
15	22.0	18.0	5.5		12.50	25.0%	24.5%	14.2	0.01332	0.01298
30	22.0	13.5	5.5		8.00	16.0%	15.7%	15.0	0.01332	0.00941
60	22.0	13.0	5.5		7.50	15.0%	14.7%	15.1	0.01332	0.00667
250	22.0	10.0	5.5		4.50	9.0%	8.8%	15.6	0.01332	0.00332
1440	22.0	7.0	5.5		1.50	3.0%	2.9%	16.0	0.01332	0.00141
					#VALUE!	#VALUE!	2.9%	#VALUE!	#N/A	#N/A

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Ken Daly	Project Engineer	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

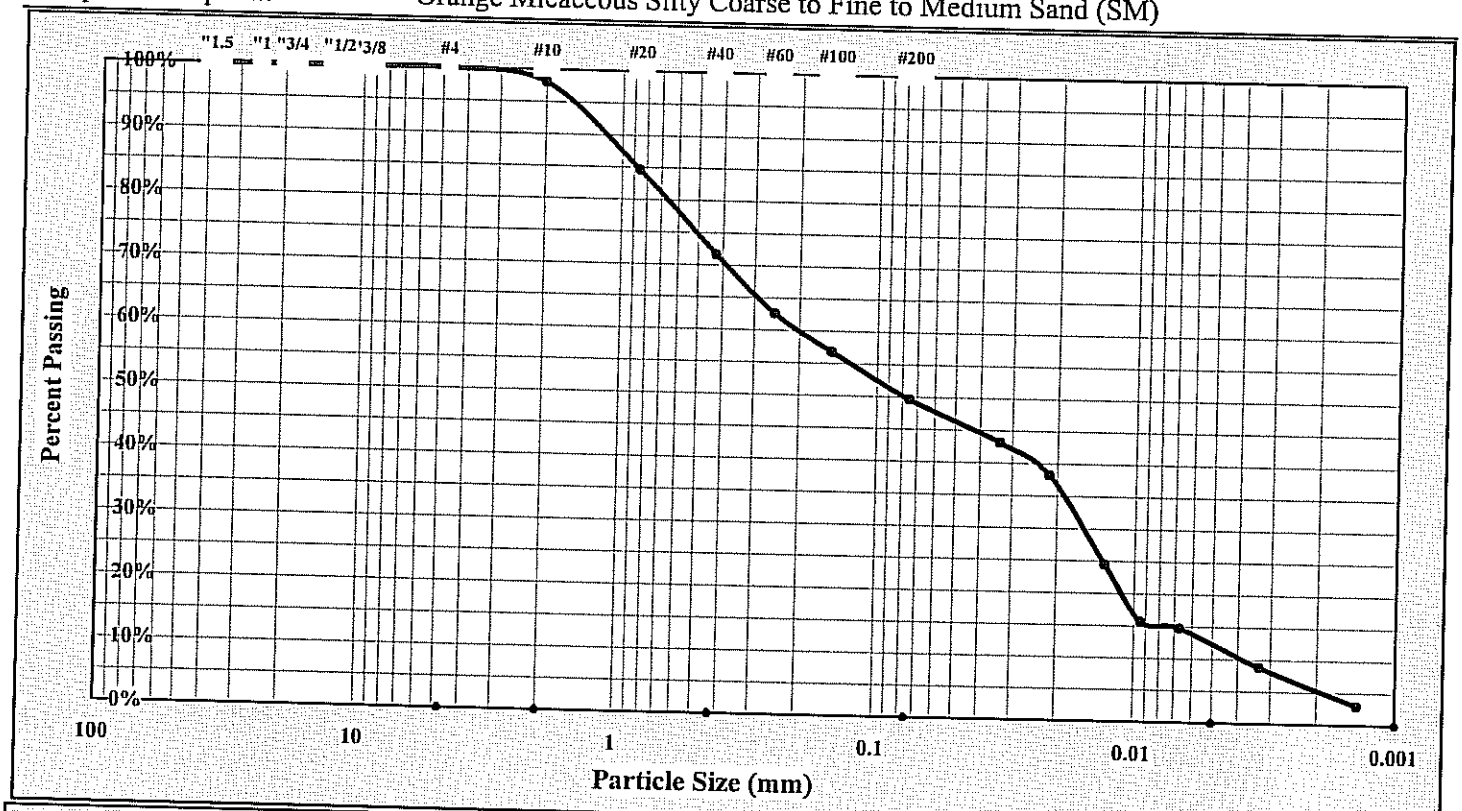
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	2/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/3-24/09
Client Name:			
Address:			
Boring #:	Sample #: 31	Sample Date:	1/30/09
Location:	Offset:	Elevation:	
Sample Description:	Orange Micaceous Silty Coarse to Fine to Medium 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	37.1%
Silt & Clay (% Passing #200):	49.6%	Total Sand:	50.4%	Clay	12.5%
ent Relative Density (Assumed)	2.650	Moisture Content	10.9%	Colloids	
Liquid Limit	50	Plastic Limit	45	Plastic Index	5
Coarse Sand:	2.0%	Medium Sand:	26.4%	Fine Sand:	22.0%

Description of Sand and Gravel: Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus A: Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References / Comments / Deviations: AASTM D 4318, D 854, D 2487

Ken Daly
Technical Responsibility

Signature

Project Engineer
Position

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

S&ME

ASTM D558, D698, D1557, AASHTO T99, T180

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Task 9**	Report Date:	3/4/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	2/24-3/3/09
Client Name:			
Client Address:			
Boring #:			
Location:	Borrow Area	Sample #: 31	Sample Date: 1/30/2009
Sample Description:	Orange Micaceous Silty Coarse to Fine to Medium Sand (SM)	Offset:	Depth: Bulk

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						
	Tare #:	60	L-42	74	79	62	60
A. Tare Weight	A.	74.4	85.9	69.6	72.4	72.6	74.9
B. Wet Wt + Tare Wt	B.	683.7	767.3	782.8	661.4	710.0	786.0
C. Dry Wt. + Tare Wt.	C.	619.9	681.2	679.7	567.9	596.6	650.7
D. Water Weight	B-C	63.8	86.1	103.1	93.5	113.4	135.3
E. Dry Weight	C-A	545.5	595.3	610.1	495.5	524.0	575.8
F. Moisture Content	100*D/E	**11.7%**	**14.5%**	**16.9%**	**18.9%**	**21.6%**	**23.5%**

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5799	5829	5900	5951	5981	5924
H. Wt. of Mold	H.	4168	4168	4168	4168	4168	4168
I. Wt. of Soil (g. or lbs.)	G-H	1631	1661	1732	1783	1813	1756
J. Wt of Soil (Lbs.)	I/453.6 or I	3.596	3.662	3.818	3.931	3.997	3.871
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07	30.07	30.7
L. Wet Density (PCF)	J*K	108.1	110.1	114.8	118.2	120.2	118.8
M. Dry Density (PCF)	L/(1+F)	**96.8**	**96.2**	**98.2**	**99.4**	**98.8**	**96.2**

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: AASTM D 4318, D 854, D 2487, C 127

Karen Warner *Technician Name*	Karen Warner *Signature*	NICET 117900 *Certification Type/No.*	3/3/09 *Date*
Ken Daly *Technical Responsibility*	*Signature*	Project Engineer *Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

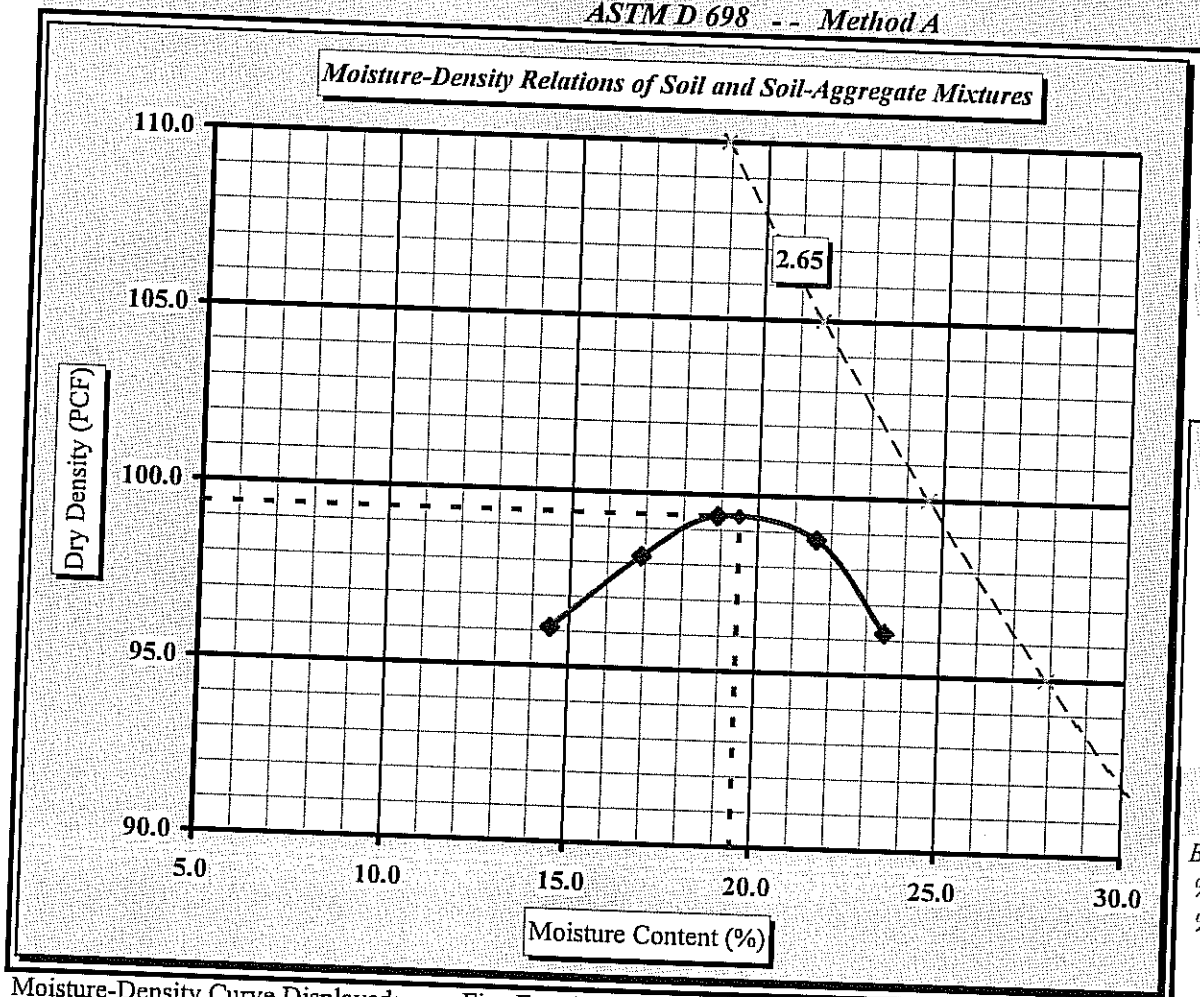
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	3/4/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	2/24-3/3/09
Client Name:			
Client Address:			
Boring #:			
Location:	Borrow Area	Sample #: 31	Sample Date: 1/30/2009
		Offset:	Depth: Bulk
Sample Description:	Orange Micaceous Silty Coarse to Fine to Medium Sand (SM)		

Maximum Dry Density 99.4 **PCF.** **Optimum Moisture Content** 19.5%

ASTM D 698 - - Method A



Soil Properties

Natural Moisture Content	**10.9%**
Specific Gravity of Soil	
Liquid Limit	**50**
Plastic Limit	**45**
Plastic Index	**5**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	98.0%
#40	71.6%
#60	62.6%
#200	49.6%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Ken Daly
Technical Responsibility

Signature

Project Engineer
Position

Date

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

S&ME

Project #:	**1356-06-825**	Report Date:	10/30/08
Project Name:	Plant Allen RAB Ash Landfill	Test Date(s):	10/29-30/08
Client Name:	Duke Energy		
Client Address:			
Sample by:	Kyle Baucom	Sample Dates:	10/21/08
Sampling Method:			

Boring #	Sample #	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Wt.	Percent Moisture
		ft. or m.		grams	grams	grams	grams	%
	TP-1	0.5-12'	G-12	82.87	314.02	280.59	33.43	**16.9%**
	TP-2	4-12'	G-14	81.99	305.54	271.30	34.24	**18.1%**
	TP-3	4-12'	S-9	83.22	297.57	263.43	34.14	**18.9%**
	TP-4	4-12'	S-7	81.51	321.13	289.94	31.19	**15.0%**
	TP-5	4-12'	G-3	81.40	368.01	341.02	26.99	**10.4%**
	TP-6	4-12'	G-2	82.31	334.35	294.82	39.53	**18.6%**
	TP-7	0.5-8'	T-9	81.72	365.07	315.00	50.07	**21.5%**
	TP-8	0.5-12'	T-8	81.11	350.90	285.24	65.66	**32.2%**
	TP-9	0-8'	G-10	81.42	374.87	323.62	51.25	**21.2%**
	TP-10	8-14'	77	71.57	359.44	294.89	64.55	**28.9%**

Notes: Temperature used was 110 +/- 5 Degrees Celsius.

References: ASTM D2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Technician Name: Jennifer Olsen 117926
Certification #

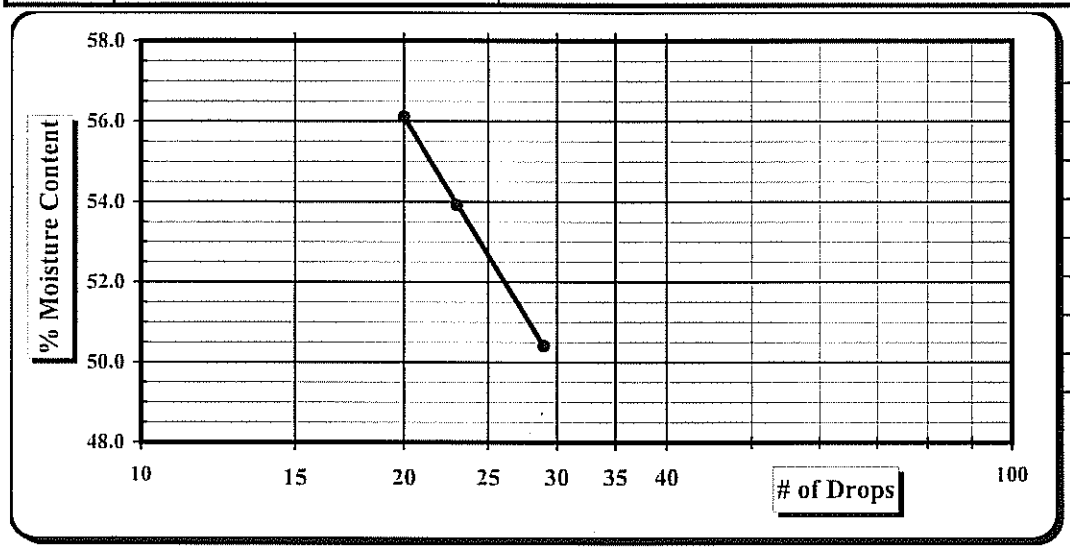
Technical Responsibility: Ken Daly _____ _____
Signature *Position*

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/7/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 10/29/08-11/7/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: TP-1 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 0.5-12'
Sample Description: Red Orange Brown Fine to Medium Sandy Clayey Silt with Mica and Roots

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	36	CC	XW				51	RR	
A	Tare Weight	15.66	16.78	15.22				**15.73**	15.26	
B	Wet Soil Weight + A	26.64	30.14	27.60				21.84	21.72	
C	Dry Soil Weight + A	22.96	25.46	23.15				20.18	19.99	
D	Water Weight (B-C)	3.68	4.68	4.45				1.66	1.73	
E	Dry Soil Weight (C-A)	7.30	8.68	7.93				4.45	4.73	
F	% Moisture Content (D/E)*100	50.4%	53.9%	56.1%				37.3%	36.6%	
N	# OF DROPS	29	23	20				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							36.9%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	53
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	37
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	16
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	MH

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly _____ *Signature* _____ *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: 1356-06-825
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-1 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 0.5-12'
Sample Description: Red Orange Brown Fine to Medium Sandy Clayey Silt with Mica and Roots

Pan #:	MTY	Beaker #:	Z	Apparent Relative Density (Assumed)		2.600	
Hydrometer Jar #:			1				
Pan Tare Weight (grams):			0.00	Moisture Content	Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			338.30		Tare #	1	G-12
Weight of Total Sample Air Dried:			338.30	A	Tare Wt.	13.87	82.87
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	24.16	314.02
Total Sample Oven Dried:			334.37	C	Dry Wt. + A	24.04	280.59
Hydrometer Sample Oven Dried (W):			49.42	D	Water Wt. (B-C)	0.12	33.43
% Passing #10:			99.7%	E	Dry Wt. (C-A)	10.17	197.72
Correction Factor a (Table 1):			1.01		% Moisture (100 x D/E)	1.18%	16.9%

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		58	100.0%
1/2"			100.0%
3/8"	0.0		100.0%
#4	0.0	Soil Mortar	100.0%
#10	1.0	**100.0%**	99.7%
#20	1.8	96.4%	96.1%
#40	8.3	83.3%	83.1%
#60	12.8	74.2%	73.9%
#100	15.7	68.3%	68.1%
#200	18.2	63.2%	63.0%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	37.0%	< 4.74 mm and > 0.075 mm	Type: Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	63.0%	< 0.075	Dispersion Time: 1 min.
Coarse Sand:	0.3%	< 4.75 mm and > 2.00 mm	Silt:	39.0%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate: 40 g./ Liter
Medium Sand:	16.6%	< 2.00 mm and > 0.425 mm	Clay:	24.0%	< 0.005 mm	
Fine Sand:	20.1%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒ Composite Correction ☐

Liquid Limit 53 Plastic Limit 37 Plastic Index 16 Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	2	22.0	36.0	5.0		31.00	63.4%	63.2%	11.2	0.01353	0.03203
	5	22.0	32.5	5.0		27.50	56.2%	56.0%	11.8	0.01353	0.02077
	15	22.0	26.0	5.0		21.00	42.9%	42.8%	12.9	0.01353	0.01252
	30	22.0	21.5	5.0		16.50	33.7%	33.6%	13.6	0.01353	0.00910
	60	22.0	18.5	5.0		13.50	27.6%	27.5%	14.1	0.01353	0.00655
	250	22.0	14.5	5.0		9.50	19.4%	19.4%	14.7	0.01353	0.00328
	1440	22.0	11.0	5.0		6.00	12.3%	12.2%	15.3	0.01353	0.00139
						#VALUE!	#VALUE!	12.2%	#VALUE!	#N/A	#N/A

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

Signature *Position*

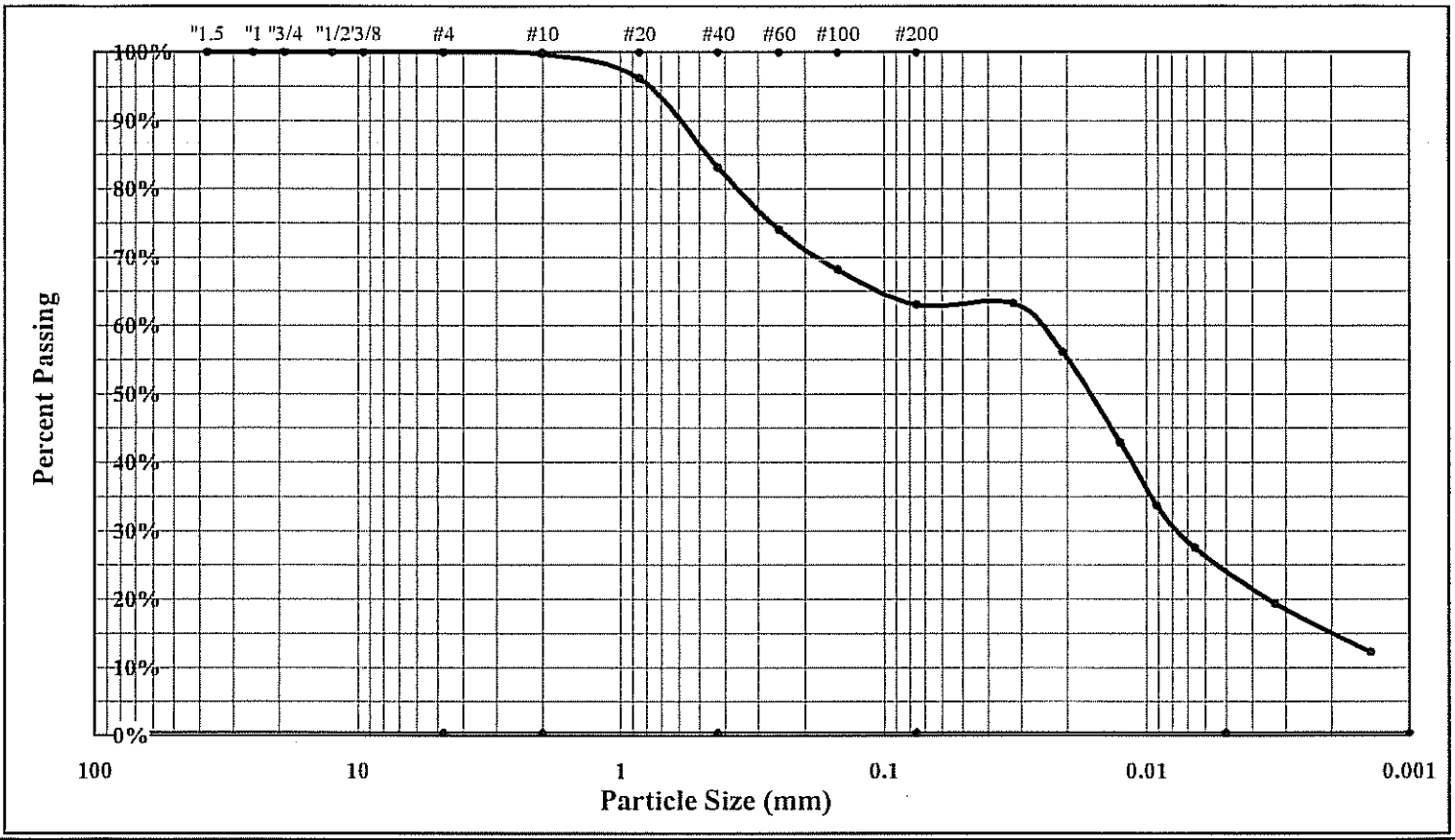
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-1	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	0.5-12'
Sample Description:	Red Orange Brown Fine to Medium Sandy Clayey Silt with Mica and Roots				



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	0	Gravel	0.0%	Silt	39.0%
Silt & Clay (% Passing #200)	63.0%	Sand	37.0%	Clay	24.0%
Apparent Relative Density (Assumed)	2.600	Moisture Content	16.9%	Colloids	
Liquid Limit	53	Plastic Limit	37	Plastic Index	16

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-1	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	0.5-12'
Sample Description:	Red Orange Brown Fine to Medium Sandy Clayey Silt with Mica and Roots		

Liquid Limit: 53 Specific Gravity:

Plastic Limit: 37 Plastic Index: 16

Natural Moisture Content: 16.9%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 97.4 **Opt. MC %:** 21.7

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	230	288	345	173		
	Tare #:	5B	698	5C	JMD		
A. Tare Weight	A.	159.2	154.2	155.4	163.6		
B. Wet Wt + Tare Wt	B.	924.8	803.5	894.8	797.6		
C. Dry Wt. + Tare Wt.	C.	794.4	681.9	745.2	699.5		
D. Water Weight	B-C	130.4	121.6	149.6	98.1	0	0
E. Dry Weight	C-A	635.2	527.7	589.8	535.9	0	0
F. Moisture Content	100*D/E	**20.5**	**23.0**	**25.4**	**18.3**	**#DIV/0!**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5942	5979	5962	5897		
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1769.000	1806.000	1789.000	1724.000	-4173.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.900	3.981	3.944	3.801	-4173.000	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	117.0	119.4	118.3	114.0	-125148.3	-125148.3
M. Dry Density	L/(1+F)	**97.0**	**97.0**	**94.3**	**96.3**	**#DIV/0!**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Moisture - Density Report

S&ME

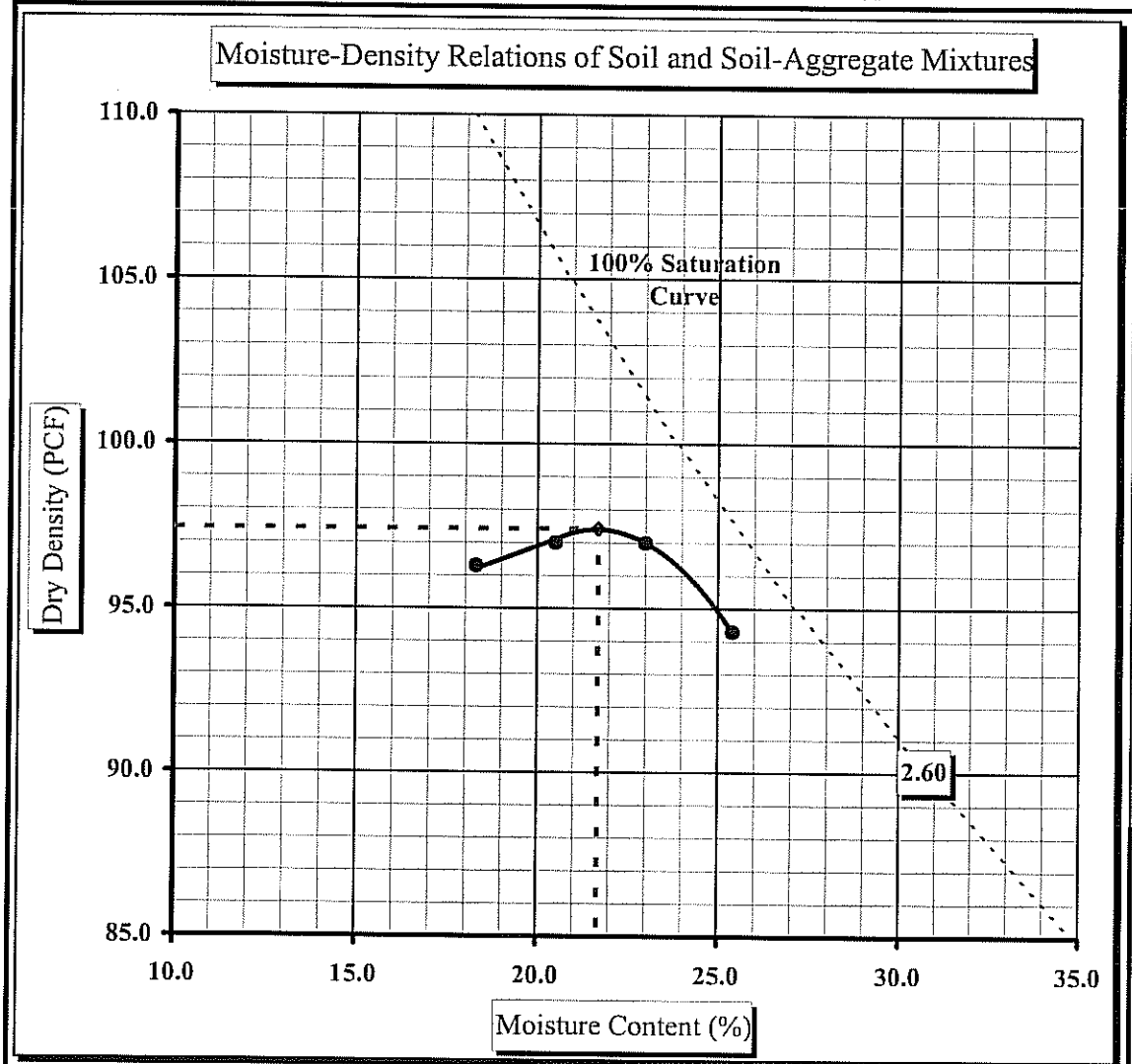
S&ME Project #: **1356-06-825**
Project Name: **Plant Allen RAB Ash Landfill**
Client Name: Duke Energy
Client Address:

Report Date: November 5, 2008
Test Date(s): 10/30/08-11/5/08

Boring #: Sample #: TP-1 Sample Date: October 21, 2008
Location: Plant Allen Borrow Area Offset: Depth: 0.5-12'
Sample Description: Red Orange Brown Fine to Medium Sandy Clayey Silt with Mica and Roots

Maximum Dry Density 97.4 PCF. **Optimum Moisture Content 21.7 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	16.9%
Liquid Limit:	53
Plastic Limit:	37
Plastic Index:	16
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

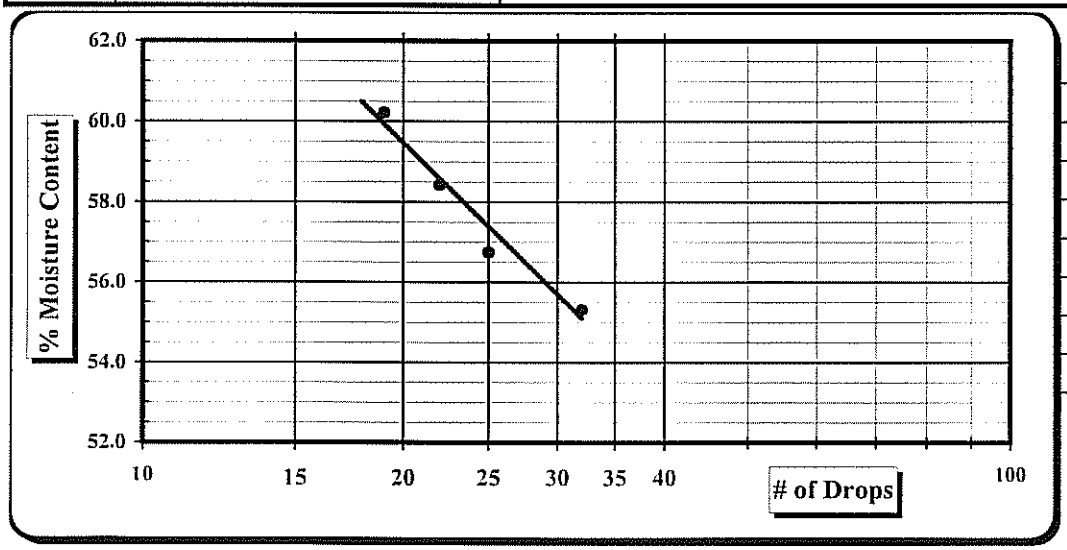
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/6/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 10/29/08-11/6/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: TP-2 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Orange Brown Clayey Silt (MH) with Fine to Medium Sand and Mica

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	17	27	4	XY			III	5	
A	Tare Weight	13.98	13.91	13.99	15.92			**15.18**	15.70	
B	Wet Soil Weight + A	25.52	26.92	25.46	27.76			21.54	21.94	
C	Dry Soil Weight + A	21.41	22.21	21.23	23.31			19.56	20.01	
D	Water Weight (B-C)	4.11	4.71	4.23	4.45			1.98	1.93	
E	Dry Soil Weight (C-A)	7.43	8.30	7.24	7.39			4.38	4.31	
F	% Moisture Content (D/E)*100	55.3%	56.7%	58.4%	60.2%			45.2%	44.8%	
N	# OF DROPS	32	25	22	19			*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							45.0%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation	☐	Dry Preparation	☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method	☒	One-point Method	☐		Liquid Limit	57
Classification:	ASTM D 2487	☒	AASHTO M 145	☐		Plastic Limit	45
Liquid limit Test:	ASTM D 4318	☒	AASHTO T 89	☐		Plastic Index	12
Plastic limit Test:	ASTM D 4318	☒	AASHTO T 90	☐		Group Symbol	MH

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-2 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Orange Brown Clayey Silt (MH) with Fine to Medium Sand and Mica

Pan #:	536	Beaker #:	K	**Apparent Relative Density (Assumed)**		**2.650**			
Hydrometer Jar #:			Q						
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			298.80		Tare #	PP	G-14		
Weight of Total Sample Air Dried:			298.80	A	Tare Wt.	16.15	81.99		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.42	305.54		
Total Sample Oven Dried:			293.28	C	Dry Wt. + A	26.23	271.30		
Hydrometer Sample Oven Dried (W):			49.07	D	Water Wt. (B-C)	0.19	34.24		
% Passing #10:			99.8%	E	Dry Wt. (C-A)	10.08	189.31		
Correction Factor a (Table 1):			1.00		% Moisture (100 x D/E)	1.88%	18.1%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		23	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.5	**100.0%**	99.8%
#20	1.1	97.8%	97.7%
#40	2.7	94.5%	94.3%
#60	4.1	91.7%	91.6%
#100	5.4	89.0%	88.8%
#200	8.5	82.6%	82.5%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	17.5%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	82.5%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.2%	< 4.75 mm and > 2.00 mm	Silt:	60.0%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	5.5%	< 2.00 mm and > 0.425 mm	Clay:	22.5%	< 0.005 mm		
Fine Sand:	11.8%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **57** Plastic Limit **45** Plastic Index **12** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	2	22.0	42.5	5.0		37.50	76.4%	76.3%	10.1	0.01332	0.03000
	5	22.0	37.0	5.0		32.00	65.2%	65.1%	11.0	0.01332	0.01980
	15	22.0	26.5	5.0		21.50	43.8%	43.7%	12.8	0.01332	0.01229
	30	22.0	22.5	5.0		17.50	35.7%	35.6%	13.4	0.01332	0.00891
	60	22.0	18.5	5.0		13.50	27.5%	27.5%	14.1	0.01332	0.00645
	250	22.0	13.0	5.0		8.00	16.3%	16.3%	15.0	0.01332	0.00326
	1440	22.0	10.0	5.0		5.00	10.2%	10.2%	15.5	0.01332	0.00138
						#VALUE!	#VALUE!	10.2%	#VALUE!	#N/A	#N/A

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

Signature *Position*

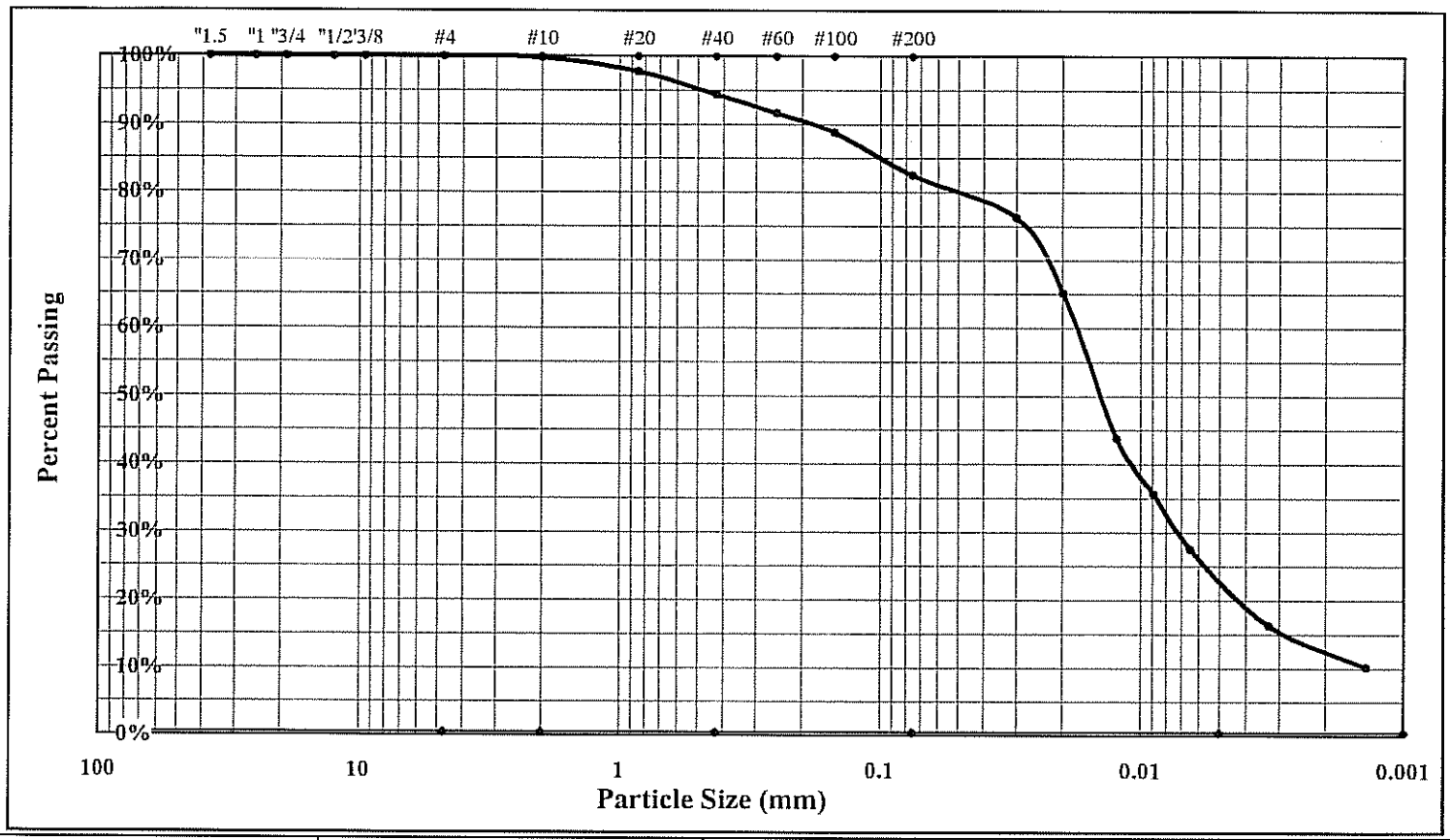
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-2	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	4-12'
Sample Description:	Orange Brown Clayey Silt (MH) with Fine to Medium Sand 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	0	Gravel	0.0%	Silt	60.0%
Silt & Clay (% Passing #200)	82.5%	Sand	17.5%	Clay	22.5%
Apparent Relative Density (Assumed)	2.650	Moisture Content	18.1%	Colloids	
Liquid Limit	57	Plastic Limit	45	Plastic Index	12

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-2	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	4-12'
Sample Description:	Orange Brown Clayey Silt (MH) with Fine to Medium Sand and Mica		

Liquid Limit: 57 Specific Gravity:

Plastic Limit: 45 Plastic Index: 12

Natural Moisture Content: 18.1%

Moisture Content of the Oversize Fraction:

NOTES:

MDD: 86.5 **Opt. MC %: 27.7**

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	403	460	345	518	288	
	Tare #:	5K	PMB	5L	L-10	6911	
A. Tare Weight	A.	152.8	160.6	155.8	84.8	153.9	
B. Wet Wt + Tare Wt	B.	765.1	764.7	891.1	763.1	730	
C. Dry Wt. + Tare Wt.	C.	628.4	622.1	737.2	591.6	618.7	
D. Water Weight	B-C	136.7	142.6	153.9	171.5	111.3	0
E. Dry Weight	C-A	475.6	461.5	581.4	506.8	464.8	0
F. Moisture Content	100*D/E	**28.7**	**30.9**	**26.5**	**33.8**	**23.9**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5852	5872	5825	5869	5761	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1679.000	1699.000	1652.000	1696.000	1588.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.701	3.746	3.642	3.739	3.501	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	111.0	112.3	109.2	112.1	105.0	-125148.3
M. Dry Density	L/(1+F)	**86.2**	**85.8**	**86.4**	**83.8**	**84.7**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 (Certification #)

Technical Responsibility: Ken Daly (Signature) (Position)

Moisture - Density Report

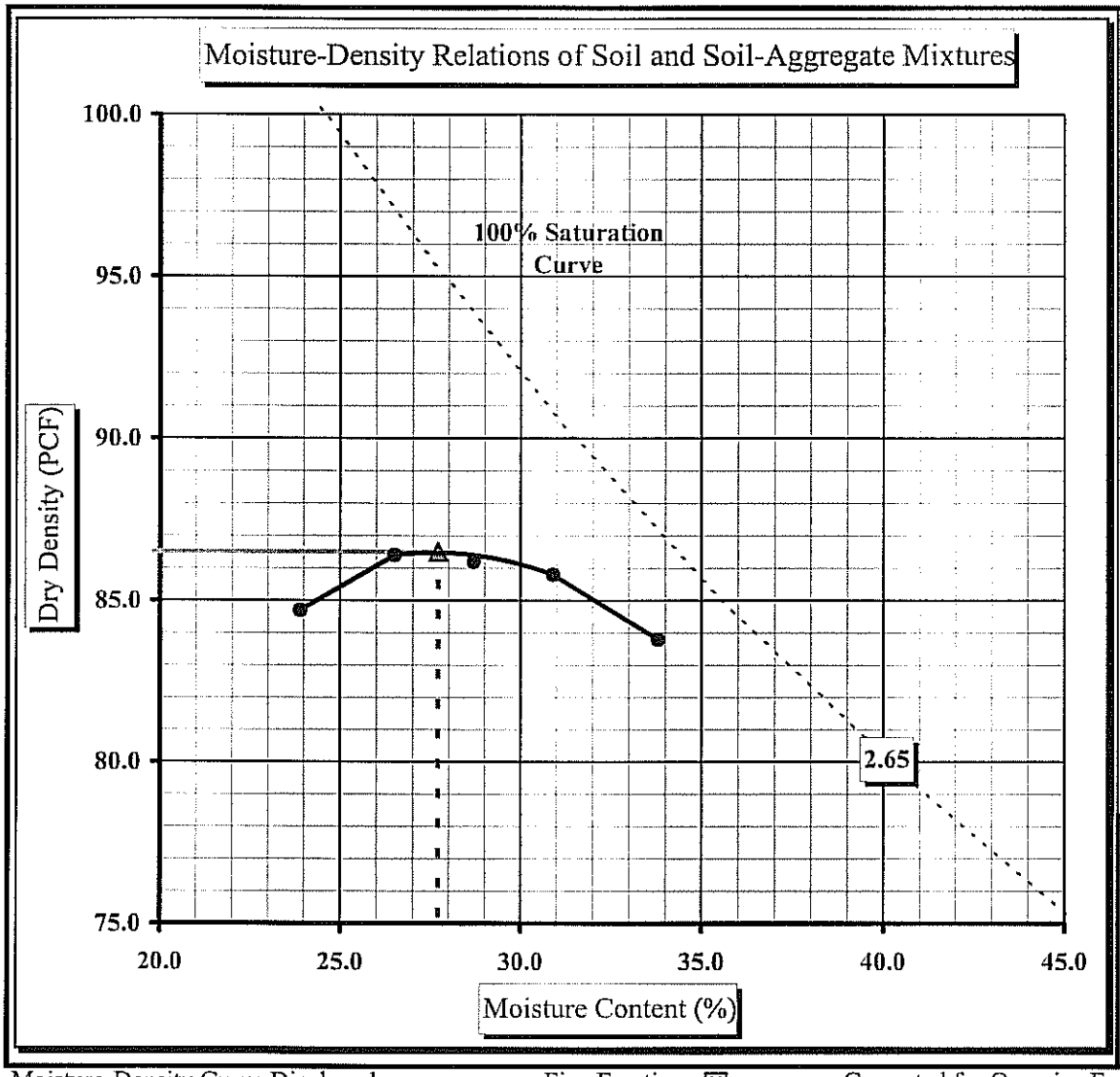
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	November 5, 2008
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/30/08-11/5/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-2	Sample Date:	October 21, 2008
Location:	Plant Allen Borrow Area	Offset:		Depth:	4-12'
Sample Description:	Orange Brown Clayey Silt (MH) with Fine to Medium Sand and Mica				

Maximum Dry Density **86.5** **PCF.** **Optimum Moisture Content** **27.7** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	18.1%
Liquid Limit:	57
Plastic Limit:	45
Plastic Index:	12
Specific Gravity:	

% Passing	
3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

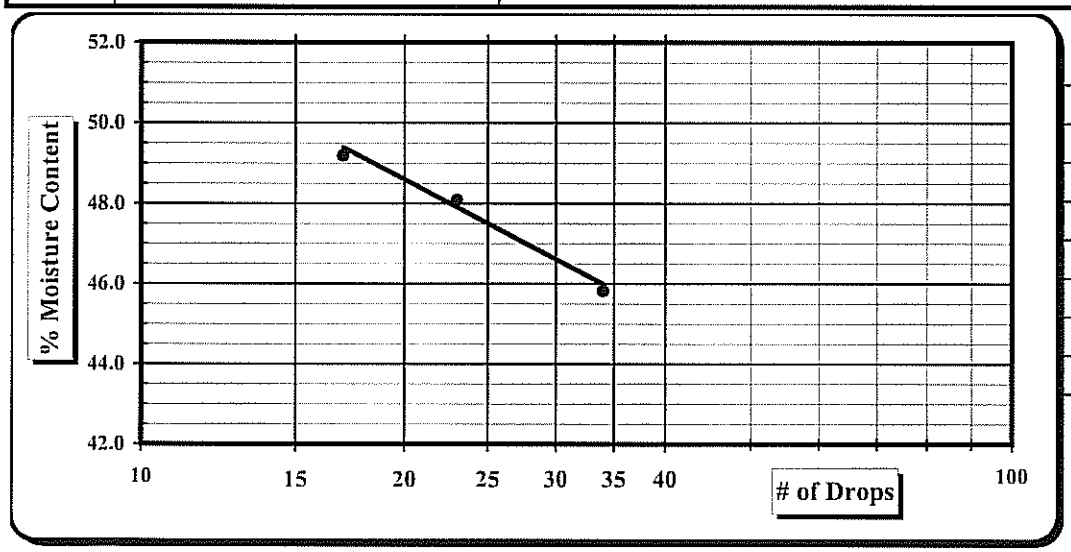
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/7/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 10/29/08-11/7/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: TP-3 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	QQ	50	SSS				PO	BB	
A	Tare Weight	16.88	15.79	16.54				**15.11**	16.15	
B	Wet Soil Weight + A	29.29	27.00	30.37				21.34	22.60	
C	Dry Soil Weight + A	25.39	23.36	25.81				19.43	20.62	
D	Water Weight (B-C)	3.90	3.64	4.56				1.91	1.98	
E	Dry Soil Weight (C-A)	8.51	7.57	9.27				4.32	4.47	
F	% Moisture Content (D/E)*100	45.8%	48.1%	49.2%				44.2%	44.3%	
N	# OF DROPS	34	23	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							44.3%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	48
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	44
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	4
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: 1356-06-825
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-3 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots

Pan #:	C	Beaker #:	PP	Apparent Relative Density (Assumed)			2.600				
Hydrometer Jar #:			B								
Pan Tare Weight (grams):			0.00	Moisture Content		Hygroscopic	Natural				
Total Sample Air Dried Wt. + tare wt. (grams):			268.30		Tare #	9	S-9				
Weight of Total Sample Air Dried:			268.30	A	Tare Wt.	13.92	83.22				
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	25.17	297.57				
Total Sample Oven Dried:			264.73	C	Dry Wt. + A	25.02	263.43				
Hydrometer Sample Oven Dried (W):			49.33	D	Water Wt. (B-C)	0.15	34.14				
% Passing #10:			99.8%	E	Dry Wt. (C-A)	11.10	180.21				
Correction Factor a (Table 1):			1.01		% Moisture (100 x D/E)	1.35%	18.9%				

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		KK	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.4	**100.0%**	99.8%
#20	0.3	99.4%	99.3%
#40	3.6	92.7%	92.6%
#60	8.1	83.6%	83.5%
#100	12.2	75.2%	75.1%
#200	18.2	63.1%	63.0%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	37.0%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	63.0%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.2%	< 4.75 mm and > 2.00 mm	Silt:	46.5%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	7.3%	< 2.00 mm and > 0.425 mm	Clay:	16.5%	< 0.005 mm		
Fine Sand:	29.6%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	Control Cylinder ☒	Composite Correction ☐

Liquid Limit 48 Plastic Limit 44 Plastic Index 4 Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	2	22.0	31.5	5.0		26.50	54.3%	54.2%	11.9	0.01353	0.03306
	5	22.0	26.5	5.0		21.50	44.0%	43.9%	12.8	0.01353	0.02162
	15	22.0	21.0	5.0		16.00	32.8%	32.7%	13.7	0.01353	0.01291
	30	22.0	17.5	5.0		12.50	25.6%	25.6%	14.2	0.01353	0.00932
	60	22.0	15.0	5.0		10.00	20.5%	20.4%	14.7	0.01353	0.00669
	250	22.0	11.0	5.0		6.00	12.3%	12.3%	15.3	0.01353	0.00335
	1440	22.0	8.0	5.0		3.00	6.1%	6.1%	15.8	0.01353	0.00142
						#VALUE!	#VALUE!	6.1%	#VALUE!	#N/A	#N/A

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

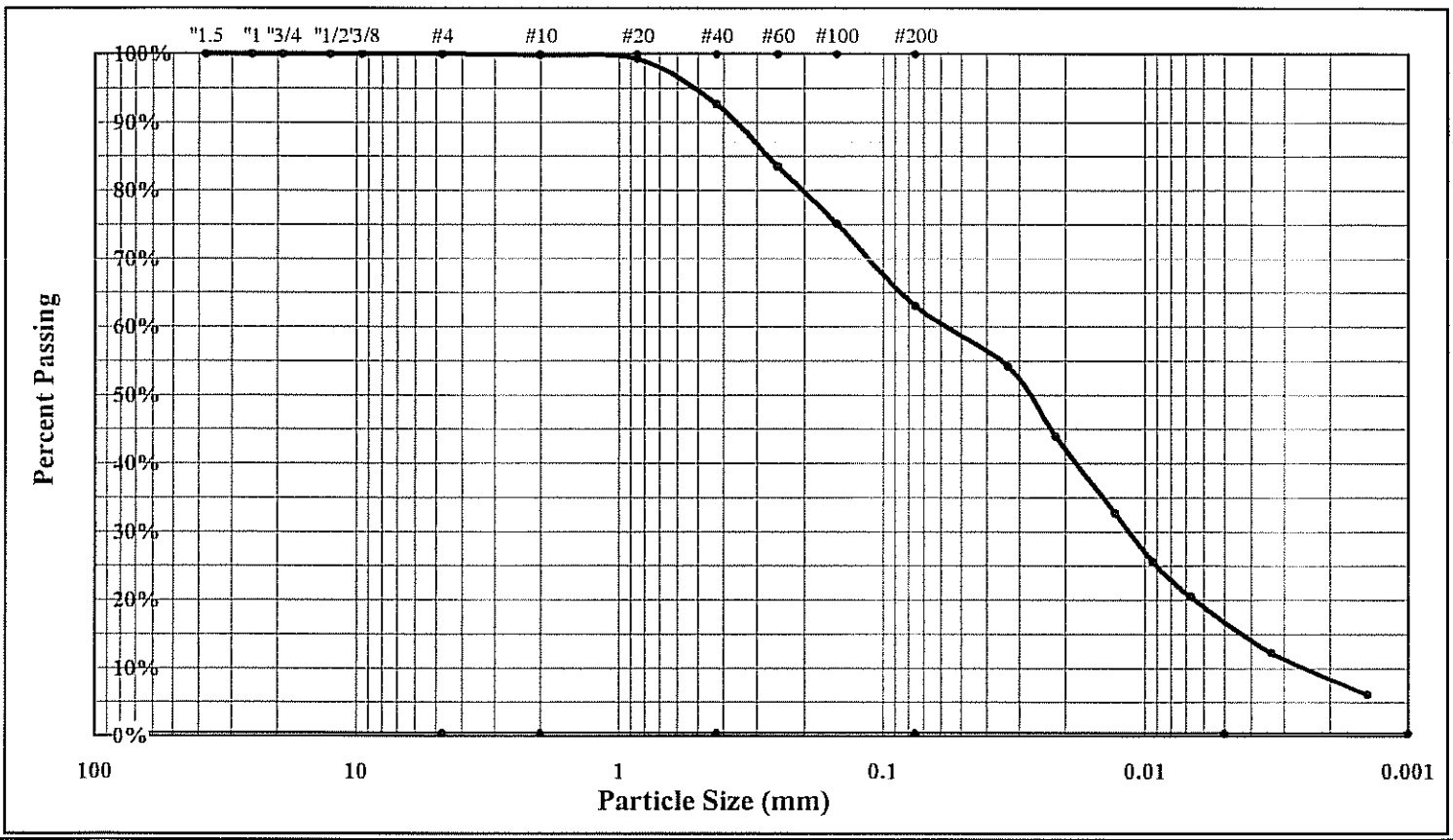
Technical Responsibility: Ken Daly _____ *Signature* _____ *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-3	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	4-12'
Sample Description:	Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots				



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	0	Gravel	0.0%	Silt	46.5%
Silt & Clay (% Passing #200)	63.0%	Sand	37.0%	Clay	16.5%
Apparent Relative Density (Assumed)	2.600	Moisture Content	18.9%	Colloids	
Liquid Limit	48	Plastic Limit	44	Plastic Index	4

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ _____
Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-3	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	4-12'
Sample Description:	Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots		

Liquid Limit: 48 Specific Gravity:

Plastic Limit: 44 Plastic Index: 4

Natural Moisture Content: 18.9%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 89.2 **Opt. MC %:** 25.2

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	288	345	230	173	403	
	Tare #:	5F	JDM	699	5E	62	
A. Tare Weight	A.	156.8	162.9	155.9	155.7	72.7	
B. Wet Wt + Tare Wt	B.	873.8	796.6	778.9	762.1	852.4	
C. Dry Wt. + Tare Wt.	C.	731.4	661.6	666.3	661.4	673.9	
D. Water Weight	B-C	142.4	135	112.6	100.7	178.5	0
E. Dry Weight	C-A	574.6	498.7	510.4	505.7	601.2	0
F. Moisture Content	100*D/E	**24.8**	**27.1**	**22.1**	**19.9**	**29.7**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5857	5882	5806	5776	5897	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1684.000	1709.000	1633.000	1603.000	1724.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.713	3.768	3.600	3.534	3.801	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	111.3	113.0	108.0	106.0	114.0	-125148.3
M. Dry Density	L/(1+F)	**89.2**	**88.9**	**88.5**	**88.4**	**87.9**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Moisture - Density Report

S&ME

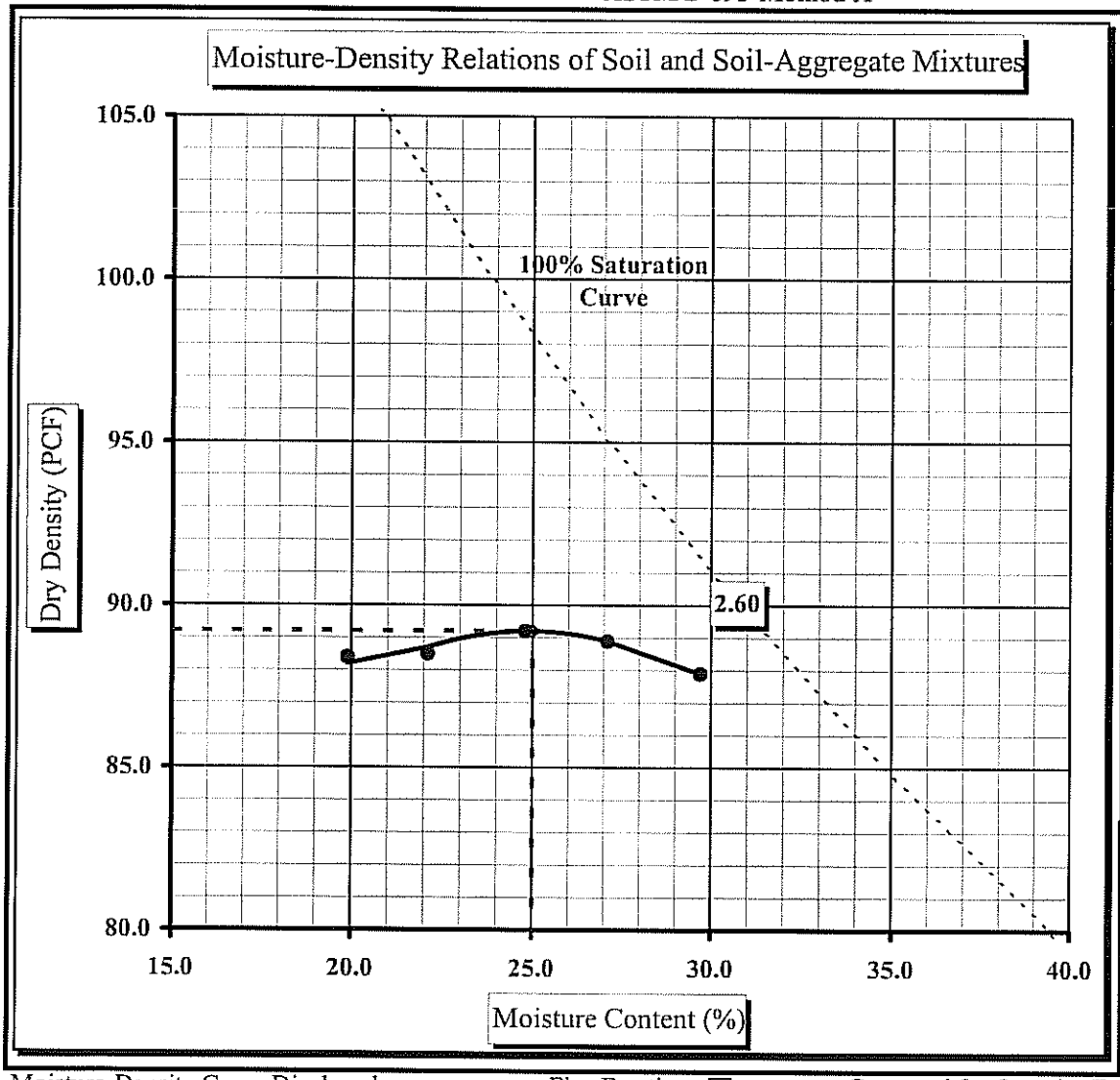
S&ME Project #: **1356-06-825**
Project Name: **Plant Allen RAB Ash Landfill**
Client Name: Duke Energy
Client Address:

Report Date: November 5, 2008
Test Date(s): 10/30/08-11/5/08

Boring #: Sample #: TP-3 Sample Date: October 21, 2008
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots

Maximum Dry Density 89.2 PCF. **Optimum Moisture Content 25.2 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	18.9%
Liquid Limit:	48
Plastic Limit:	44
Plastic Index:	4
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

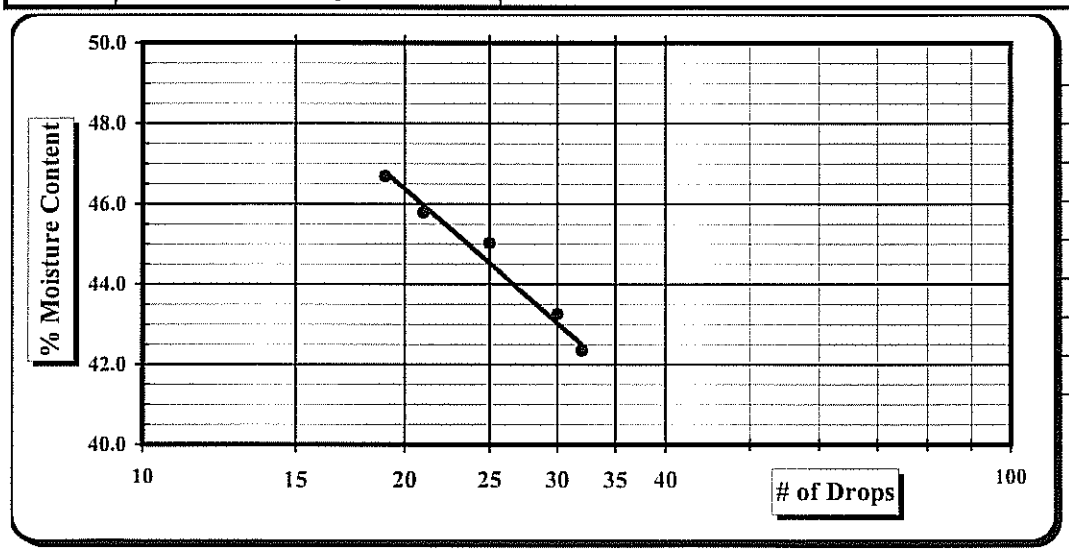
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/7/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 10/29/08-11/7/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: TP-4 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Tan Brown Fine to Medium Sandy Clayey Silt (ML) with Mica

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	PP	54	VV	MM	1		FF	2	
A	Tare Weight	16.14	14.10	16.02	16.55	13.87		**16.86**	15.77	
B	Wet Soil Weight + A	27.40	25.79	28.42	29.19	26.28		23.05	22.15	
C	Dry Soil Weight + A	24.05	22.26	24.57	25.22	22.33		21.30	20.35	
D	Water Weight (B-C)	3.35	3.53	3.85	3.97	3.95		1.75	1.80	
E	Dry Soil Weight (C-A)	7.91	8.16	8.55	8.67	8.46		4.44	4.58	
F	% Moisture Content (D/E)*100	42.4%	43.3%	45.0%	45.8%	46.7%		39.4%	39.3%	
N	# OF DROPS	32	30	25	21	19		*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							39.4%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	45
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	39
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	6
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-4 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Tan Brown Fine to Medium Sandy Clayey Silt (ML) with Mica

Pan #:	537	Beaker #:	RR	**Apparent Relative Density (Assumed)**			**2.600**		
Hydrometer Jar #:			CZ						
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			311.70		Tare #	SSS	S-7		
Weight of Total Sample Air Dried:			311.70	A	Tare Wt.	16.54	81.51		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	27.92	321.13		
Total Sample Oven Dried:			307.87	C	Dry Wt. + A	27.78	289.94		
Hydrometer Sample Oven Dried (W):			49.38	D	Water Wt. (B-C)	0.14	31.19		
% Passing #10:			99.9%	E	Dry Wt. (C-A)	11.24	208.43		
Correction Factor a (Table 1):			1.01		% Moisture (100 x D/E)	1.25%	15.0%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		VV	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.2	**100.0%**	99.9%
#20	0.7	98.6%	98.6%
#40	6.1	87.6%	87.6%
#60	11.7	76.3%	76.3%
#100	15.4	68.9%	68.8%
#200	19.2	61.2%	61.2%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	38.8%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	61.2%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.1%	< 4.75 mm and > 2.00 mm	Silt:	42.7%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	12.4%	< 2.00 mm and > 0.425 mm	Clay:	18.5%	< 0.005 mm		
Fine Sand:	26.4%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **45** Plastic Limit **39** Plastic Index **6** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	2	22.0	33.5	5.0		28.50	58.3%	58.3%	11.6	0.01353	0.03261
	5	22.0	28.5	5.0		23.50	48.1%	48.0%	12.4	0.01353	0.02134
	15	22.0	22.5	5.0		17.50	35.8%	35.8%	13.4	0.01353	0.01280
	30	22.0	19.0	5.0		14.00	28.6%	28.6%	14.0	0.01353	0.00924
	60	22.0	16.0	5.0		11.00	22.5%	22.5%	14.5	0.01353	0.00665
	250	22.0	12.0	5.0		7.00	14.3%	14.3%	15.1	0.01353	0.00333
	1440	22.0	9.0	5.0		4.00	8.2%	8.2%	15.6	0.01353	0.00141
						#VALUE!	#VALUE!	8.2%	#VALUE!	#N/A	#N/A

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly

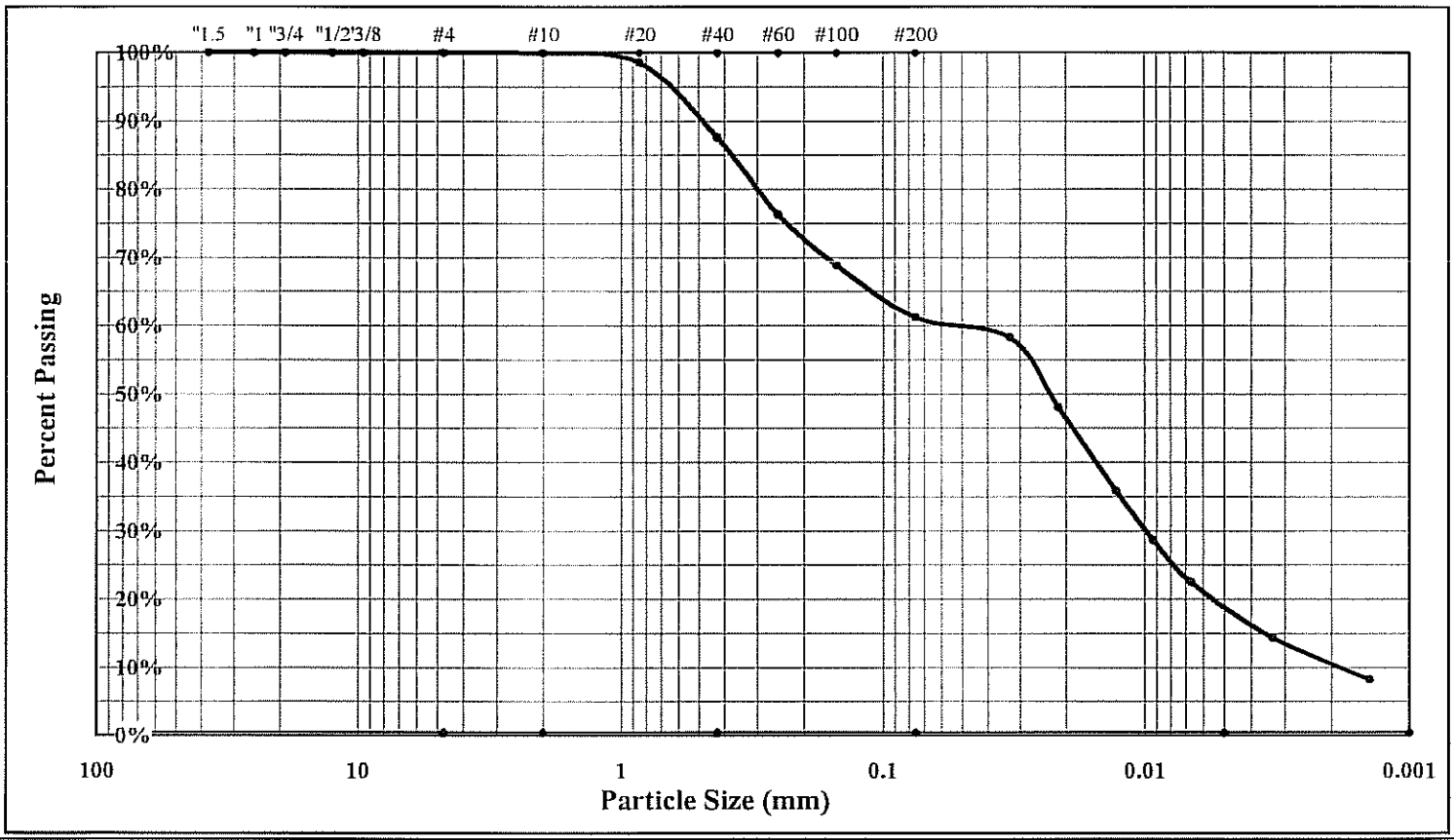
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-4	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	4-12'
Sample Description:	Tan Brown Fine to Medium Sandy Clayey Silt (ML) with 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	0	Gravel	0.0%	Silt	42.7%
Silt & Clay (% Passing #200)	61.2%	Sand	38.8%	Clay	18.5%
Apparent Relative Density (Assumed)	2.600	Moisture Content	15.0%	Colloids	
Liquid Limit	45	Plastic Limit	39	Plastic Index	6

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ _____
Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-4	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	4-12'
Sample Description:	Tan Brown Fine to Medium Sandy Clayey Silt (ML) with Mica		

Liquid Limit: 45 Specific Gravity:

Plastic Limit: 39 Plastic Index: 6

Natural Moisture Content: 15.0%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 96.3 **Opt. MC %: 21.7**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	345	403	288	230		
	Tare #:	DLB	691	6910	5I		
A. Tare Weight	A.	160	155.2	154.6	157.4		
B. Wet Wt + Tare Wt	B.	995.8	910.3	815	1033.4		
C. Dry Wt. + Tare Wt.	C.	840.9	757.2	703.2	900.1		
D. Water Weight	B-C	154.9	153.1	111.8	133.3	0	0
E. Dry Weight	C-A	680.9	602	548.6	742.7	0	0
F. Moisture Content	100*D/E	**22.7**	**25.4**	**20.4**	**17.9**	**#DIV/0!**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5957	5961	5921	5871		
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1784.000	1788.000	1748.000	1698.000	-4173.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.933	3.942	3.854	3.743	-4173.000	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	118.0	118.2	115.6	112.3	-125148.3	-125148.3
M. Dry Density	L/(1+F)	**96.1**	**94.2**	**96.0**	**95.2**	**#DIV/0!**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Moisture - Density Report

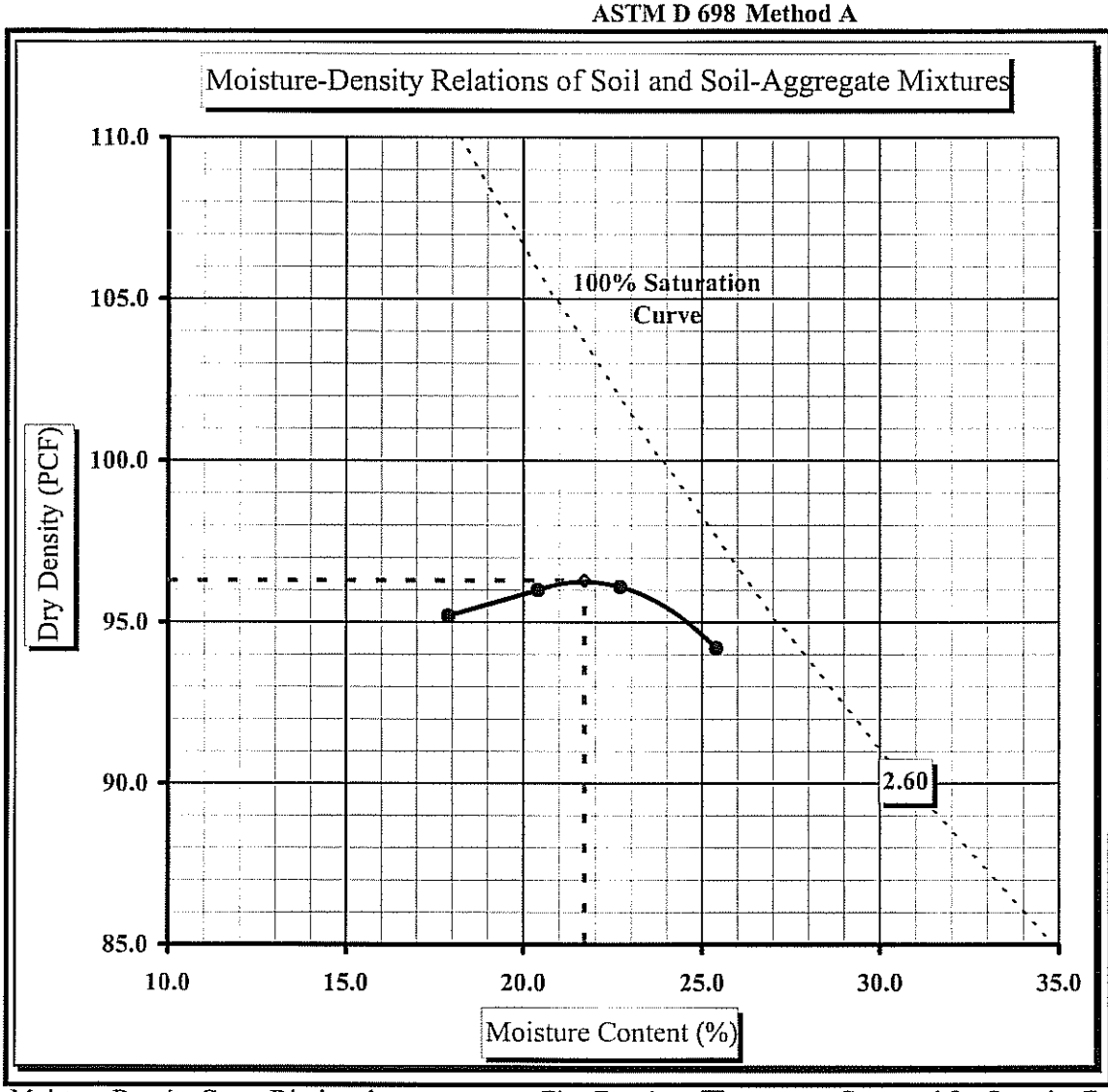
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	November 5, 2008
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/30/08-11/5/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-4	Sample Date:	October 21, 2008
Location:	Plant Allen Borrow Area	Offset:		Depth:	4-12'
Sample Description:	Tan Brown Fine to Medium Sandy Clayey Silt (ML) with Mica				

Maximum Dry Density **96.3** **PCF.** **Optimum Moisture Content** **21.7** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	15.0%
Liquid Limit:	45
Plastic Limit:	39
Plastic Index:	6
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

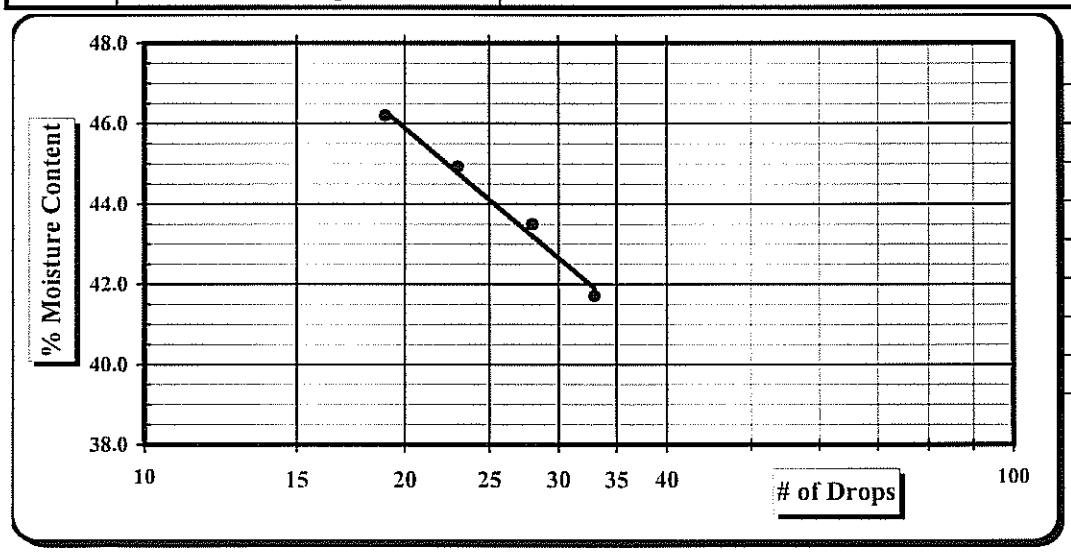
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/7/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 10/29/08-11/7/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: TP-5 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Orange Tan Fine to Medium Sandy Silt (ML) with Mica

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	11	23	5	9			KK	34	
A	Tare Weight	13.83	14.05	15.71	13.92			**16.05**	13.97	
B	Wet Soil Weight + A	26.91	27.51	29.58	27.02			22.72	20.36	
C	Dry Soil Weight + A	23.06	23.43	25.28	22.88			20.89	18.62	
D	Water Weight (B-C)	3.85	4.08	4.30	4.14			1.83	1.74	
E	Dry Soil Weight (C-A)	9.23	9.38	9.57	8.96			4.84	4.65	
F	% Moisture Content (D/E)*100	41.7%	43.5%	44.9%	46.2%			37.8%	37.4%	
N	# OF DROPS	33	28	23	19			*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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation	☐	Dry Preparation	☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method	☒	One-point Method	☐		Liquid Limit	44
Classification:	ASTM D 2487	☒	AASHTO M 145	☐		Plastic Limit	38
Liquid limit Test:	ASTM D 4318	☒	AASHTO T 89	☐		Plastic Index	6
Plastic limit Test:	ASTM D 4318	☒	AASHTO T 90	☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-5 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Orange Tan Fine to Medium Sandy Silt (ML) with Mica

Pan #:	64	Beaker #:	ZZ	**Apparent Relative Density (Assumed)**			**2.650**		
Hydrometer Jar #:			3						
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			414.00		Tare #	11	G-3		
Weight of Total Sample Air Dried:			414.00	A	Tare Wt.	13.84	81.40		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	25.56	368.01		
Total Sample Oven Dried:			411.97	C	Dry Wt. + A	25.50	341.02		
Hydrometer Sample Oven Dried (W):			49.74	D	Water Wt. (B-C)	0.06	26.99		
% Passing #10:			95.7%	E	Dry Wt. (C-A)	11.66	259.62		
Correction Factor a (Table 1):			1.00		% Moisture (100 x D/E)	0.51%	10.4%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		PO	100.0%
1/2"	0.0		100.0%
3/8"	1.3		99.7%
#4	4.9	Soil Mortar	98.8%
#10	17.5	**100.0%**	95.7%
#20	6.0	87.9%	84.2%
#40	10.7	78.5%	75.2%
#60	13.5	72.9%	69.8%
#100	15.6	68.6%	65.6%
#200	19.1	61.6%	59.0%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	39.8%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	1.2%	< 75 mm and > 4.75 mm	Silt & Clay:	59.0%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	3.1%	< 4.75 mm and > 2.00 mm	Silt:	50.5%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	20.6%	< 2.00 mm and > 0.425 mm	Clay:	8.5%	< 0.005 mm		
Fine Sand:	16.2%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **44** Plastic Limit **38** Plastic Index **6** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	22.0	33.0	5.0		28.00	56.3%	53.9%	11.7	0.01332	0.04557
	2	22.0	29.5	5.0		24.50	49.3%	47.2%	12.3	0.01332	0.03300
	5	22.0	25.0	5.0		20.00	40.2%	38.5%	13.0	0.01332	0.02149
	15	22.0	18.5	5.0		13.50	27.1%	26.0%	14.1	0.01332	0.01291
	30	22.0	14.5	5.0		9.50	19.1%	18.3%	14.7	0.01332	0.00934
	60	22.0	11.5	5.0		6.50	13.1%	12.5%	15.2	0.01332	0.00671
	250	22.0	7.5	5.0		2.50	5.0%	4.8%	15.9	0.01332	0.00336
	1440	22.0	5.5	5.0		0.50	1.0%	1.0%	16.2	0.01332	0.00141

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

Signature *Position*

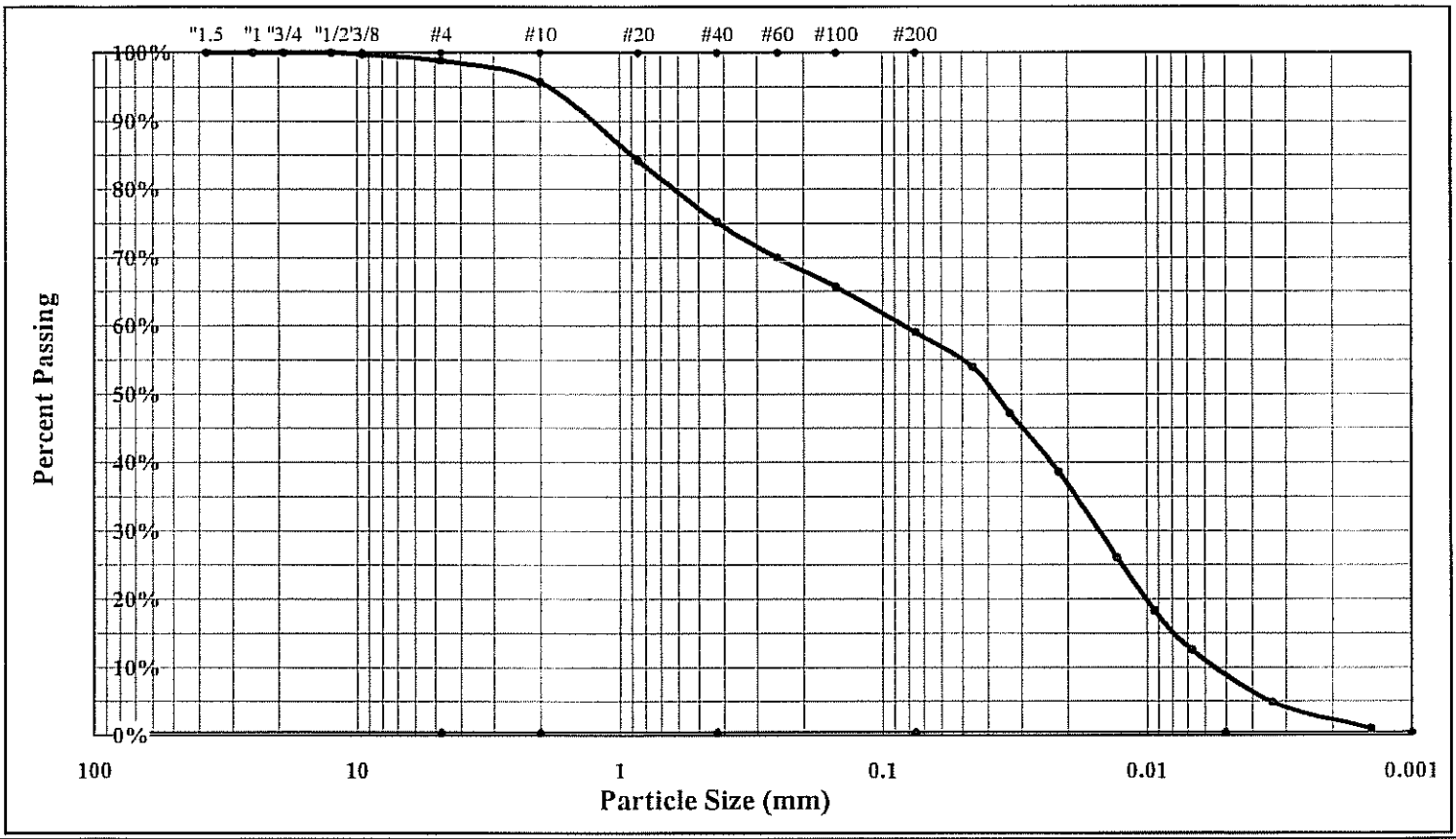
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-5	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	4-12'
Sample Description:	Orange Tan Fine to Medium Sandy Silt (ML) with 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	0	Gravel	1.2%	Silt	50.5%
Silt & Clay (% Passing #200)	59.0%	Sand	39.8%	Clay	8.5%
Apparent Relative Density (Assumed)	2.650	Moisture Content	10.4%	Colloids	
Liquid Limit	44	Plastic Limit	38	Plastic Index	6

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ _____
Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-5	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	4-12'
Sample Description:	Orange Tan Fine to Medium Sandy Silt (ML) with Mica		

Liquid Limit: 44 Specific Gravity:

Plastic Limit: 38 Plastic Index: 6

Natural Moisture Content: 10.4%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	98.8

MDD: 105.1 **Opt. MC %: 17.2**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	230	288	345	173	403	
	Tare #:	MJD	SQ-1	MAC	695	A	
A. Tare Weight	A.	158.5	158.8	162	157.3	259.3	
B. Wet Wt + Tare Wt	B.	1075.3	948.1	1092.3	895.2	1041.1	
C. Dry Wt. + Tare Wt.	C.	951	827.7	935.3	808.1	896.7	
D. Water Weight	B-C	124.3	120.4	157	87.1	144.4	0
E. Dry Weight	C-A	792.5	668.9	773.3	650.8	637.4	0
F. Moisture Content	100*D/E	**15.7**	**18.0**	**20.3**	**13.4**	**22.7**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	6003	6048	6066	5963	6023	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1830.000	1875.000	1893.000	1790.000	1850.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	4.034	4.134	4.173	3.946	4.078	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	121.0	124.0	125.2	118.3	122.3	-125148.3
M. Dry Density	L/(1+F)	**104.6**	**105.1**	**104.0**	**104.4**	**99.7**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Moisture - Density Report

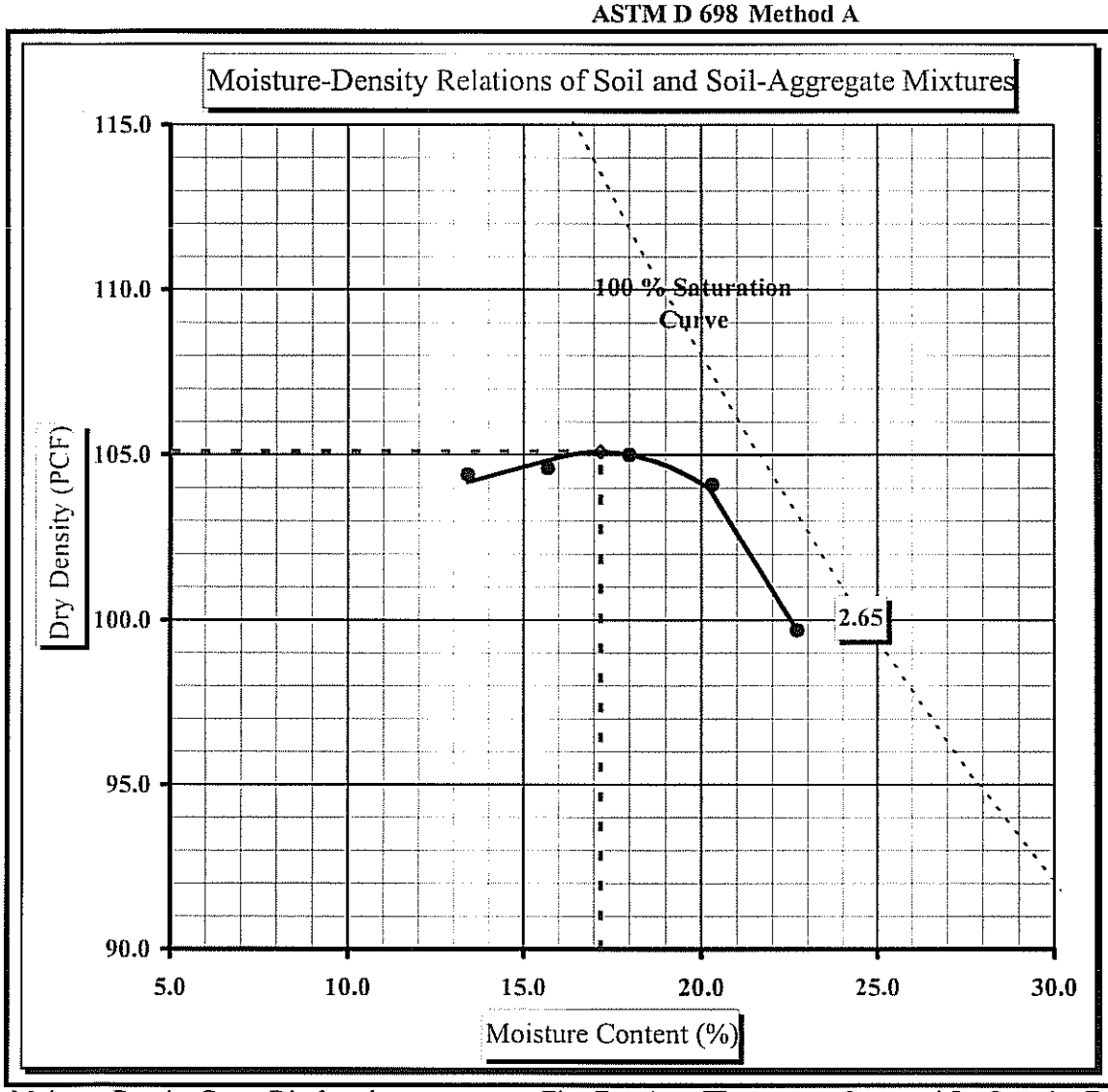
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	November 5, 2008
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/30/08-11/5/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-5	Sample Date:	October 21, 2008
Location:	Plant Allen Borrow Area	Offset:		Depth:	4-12'
Sample Description:	Orange Tan Fine to Medium Sandy Silt (ML) with Mica				

Maximum Dry Density **105.1** **PCF.** **Optimum Moisture Content** **17.2** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	10.4%
Liquid Limit:	44
Plastic Limit:	38
Plastic Index:	6
Specific Gravity:	

% Passing	
3/4"	
1/2"	
3/8"	
#4	98.8

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

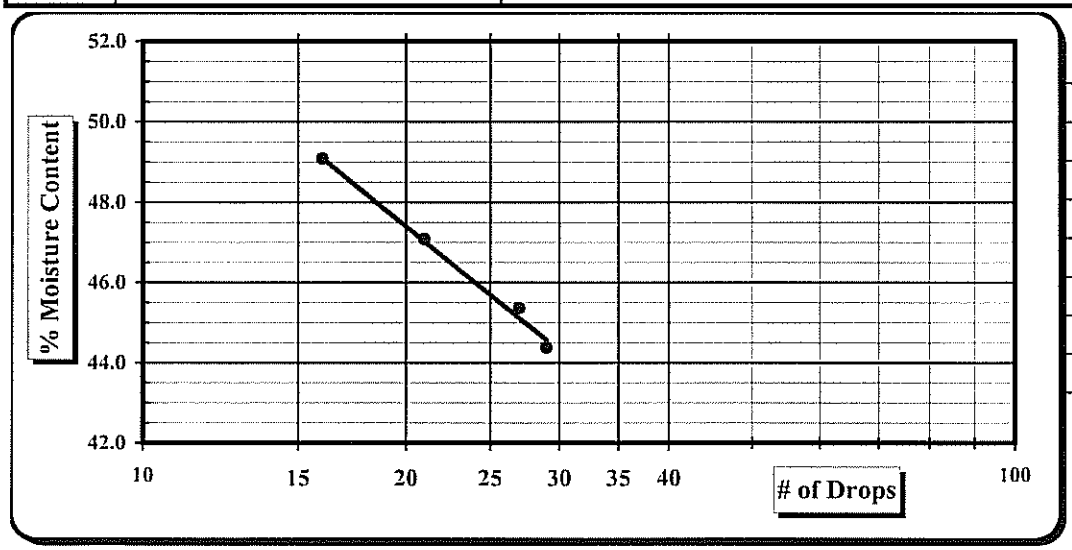
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/7/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 10/29/08-11/7/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: TP-6 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Orange Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	4	57	27	31			42	XY	
A	Tare Weight	13.99	13.89	13.92	13.94			**13.96**	15.93	
B	Wet Soil Weight + A	26.58	25.81	26.07	27.03			20.23	22.12	
C	Dry Soil Weight + A	22.71	22.09	22.18	22.72			18.44	20.36	
D	Water Weight (B-C)	3.87	3.72	3.89	4.31			1.79	1.76	
E	Dry Soil Weight (C-A)	8.72	8.20	8.26	8.78			4.48	4.43	
F	% Moisture Content (D/E)*100	44.4%	45.4%	47.1%	49.1%			40.0%	39.7%	
N	# OF DROPS	29	27	21	16			*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							39.8%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	46
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	40
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	6
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	ML

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-6 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 4-12'
Sample Description: Orange Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots

Pan #:	JR	Beaker #:	C		**Apparent Relative Density (Assumed)**		**2.600**		
Hydrometer Jar #:			4						
Pan Tare Weight (grams):			0.00		**Moisture Content**	Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			291.40		Tare #	34	G-2		
Weight of Total Sample Air Dried:			291.40	A	Tare Wt.	13.98	82.31		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	24.12	334.35		
Total Sample Oven Dried:			287.66	C	Dry Wt. + A	23.99	294.82		
Hydrometer Sample Oven Dried (W):			49.36	D	Water Wt. (B-C)	0.13	39.53		
% Passing #10:			100.0%	E	Dry Wt. (C-A)	10.01	212.51		
Correction Factor a (Table 1):			1.01		% Moisture (100 x D/E)	1.30%	18.6%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		RR	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.1	**100.0%**	100.0%
#20	0.4	99.3%	99.3%
#40	3.8	92.2%	92.2%
#60	8.9	81.9%	81.9%
#100	12.9	74.0%	74.0%
#200	16.5	66.6%	66.6%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	33.4%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	66.6%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.0%	< 4.75 mm and > 2.00 mm	Silt:	44.6%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	7.8%	< 2.00 mm and > 0.425 mm	Clay:	22.0%	< 0.005 mm		
Fine Sand:	25.7%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **46** Plastic Limit **40** Plastic Index **6** Hydrometer: 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
Clock	T (Min.)	(0.5 °C)	Reading			R			L	K	
	1	22.0	37.0	5.0		32.00	65.5%	65.5%	11.0	0.01353	0.04496
	2	22.0	35.0	5.0		30.00	61.4%	61.4%	11.4	0.01353	0.03226
	5	22.0	31.0	5.0		26.00	53.2%	53.2%	12.0	0.01353	0.02098
	15	22.0	25.0	5.0		20.00	40.9%	40.9%	13.0	0.01353	0.01260
	30	22.0	21.0	5.0		16.00	32.7%	32.7%	13.7	0.01353	0.00913
	60	22.0	18.0	5.0		13.00	26.6%	26.6%	14.2	0.01353	0.00657
	250	22.0	13.0	5.0		8.00	16.4%	16.4%	15.0	0.01353	0.00331
	1440	22.0	8.5	5.0		3.50	7.2%	7.2%	15.7	0.01353	0.00141

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

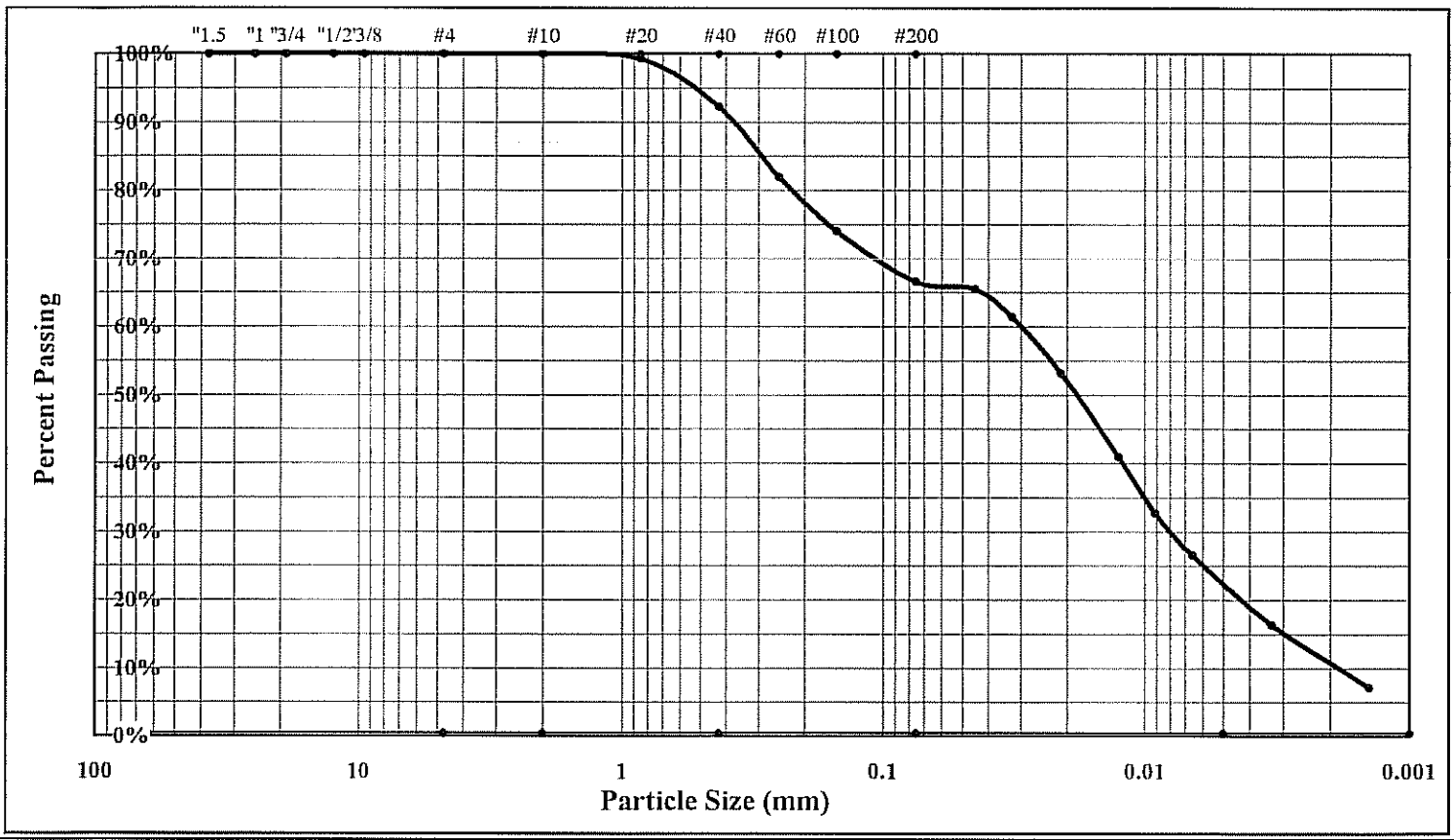
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-6	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	4-12'
Sample Description:	Orange Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots				



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	0	Gravel	0.0%	Silt	44.6%
Silt & Clay (% Passing #200)	66.6%	Sand	33.4%	Clay	22.0%
Apparent Relative Density (Assumed)	2.600	Moisture Content	18.6%	Colloids	
Liquid Limit	46	Plastic Limit	40	Plastic Index	6

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-6	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	4-12'
Sample Description:	Orange Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots		

Liquid Limit: 46 Specific Gravity:

Plastic Limit: 40 Plastic Index: 6

Natural Moisture Content: 18.6%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 92.7 **Opt. MC %:** 24.2

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	288	345	354	230	173	
	Tare #:	AMRL 148	5A	JRC	KBM	697	
A. Tare Weight	A.	160.3	157.9	155.3	152.4	153.2	
B. Wet Wt + Tare Wt	B.	775.9	855.6	807.5	897.6	810.8	
C. Dry Wt. + Tare Wt.	C.	652	706.8	659.4	760.4	700.3	
D. Water Weight	B-C	123.9	148.8	148.1	137.2	110.5	0
E. Dry Weight	C-A	491.7	548.9	504.1	608	547.1	0
F. Moisture Content	100*D/E	**25.2**	**27.1**	**29.4**	**22.6**	**20.2**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5927	5936	5923	5885	5837	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1754.000	1763.000	1750.000	1712.000	1664.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.867	3.887	3.858	3.774	3.668	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	116.0	116.6	115.7	113.2	110.0	-125148.3
M. Dry Density	L/(1+F)	**92.6**	**91.7**	**89.4**	**92.4**	**91.5**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 (Certification #)

Technical Responsibility: Ken Daly (Signature) (Position)

Moisture - Density Report

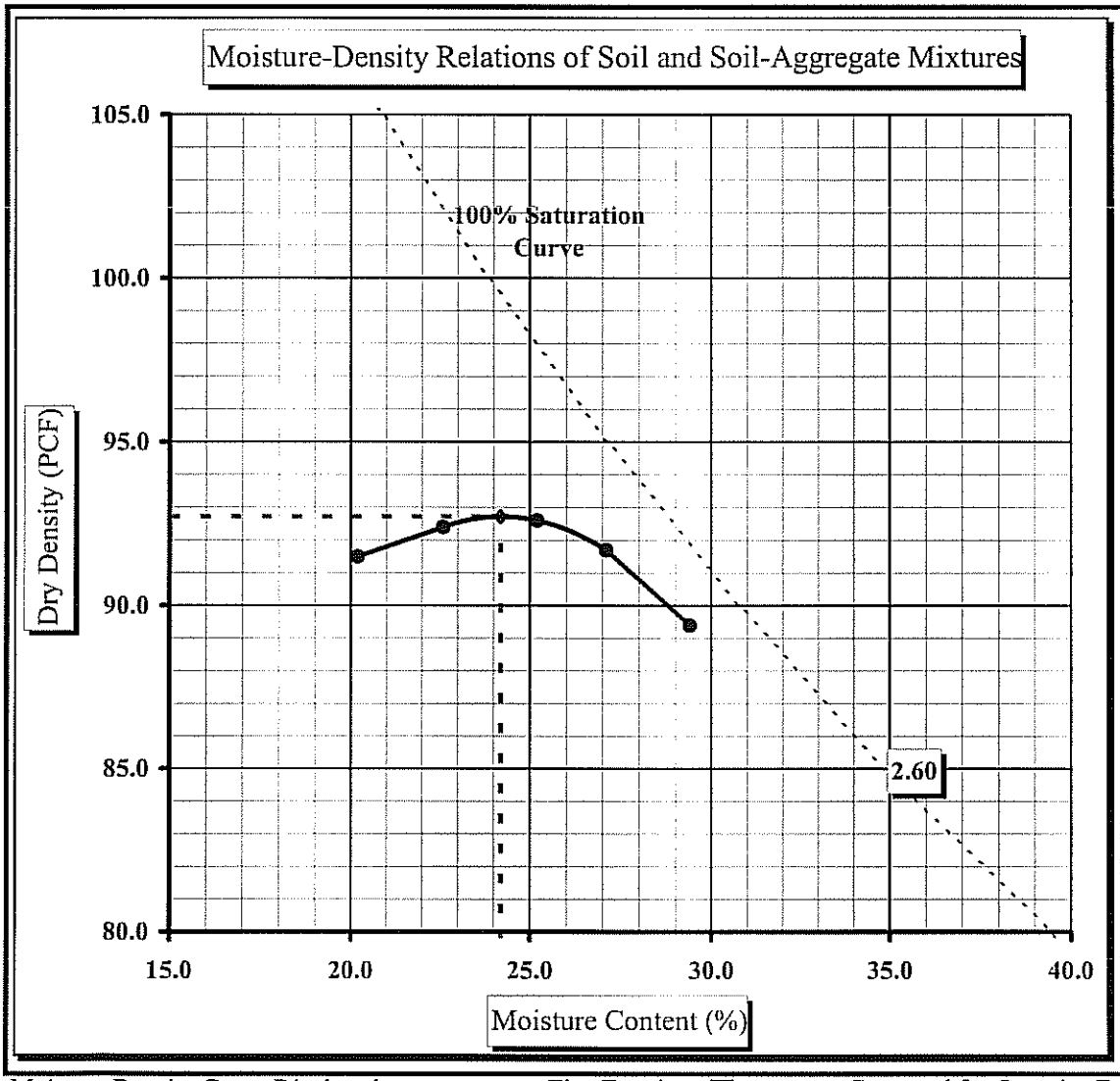
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	November 5, 2008
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/30/08-11/5/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-6	Sample Date:	October 21, 2008
Location:	Plant Allen Borrow Area	Offset:		Depth:	4-12'
Sample Description:	Orange Brown Fine to Medium Sandy Clayey Silt (ML) with Mica and Fine Roots				

Maximum Dry Density **92.7** **PCF.** **Optimum Moisture Content** **24.2** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	18.6%
Liquid Limit:	46
Plastic Limit:	40
Plastic Index:	6
Specific Gravity:	

% Passing	
3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

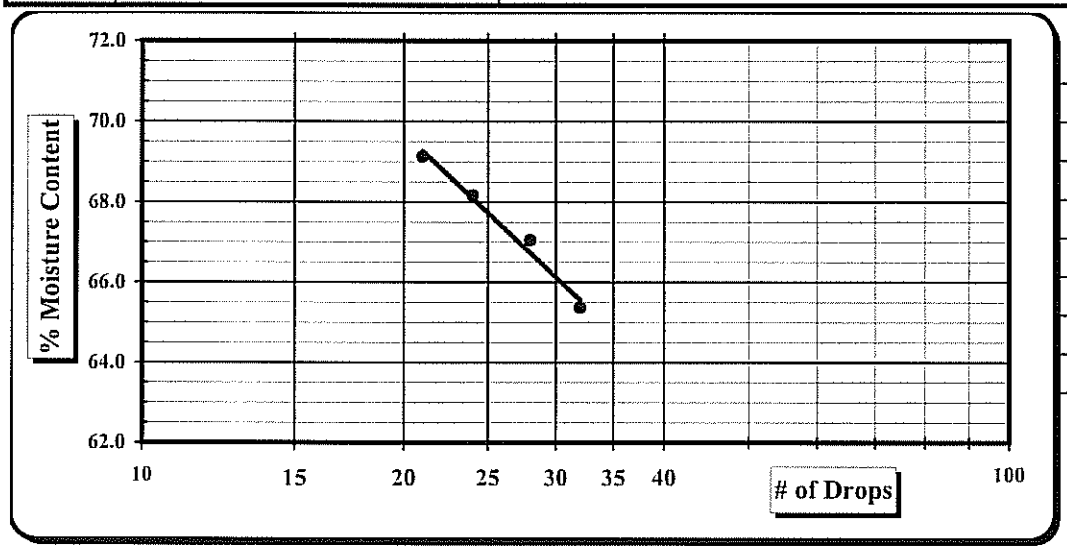
Report Date: 11/7/08
Test Date(s): 10/29/08-11/7/08

Boring #: Sample #: TP-7 Sample Date: 10/21/08

Location: Plant Allen Borrow Area Offset: Depth: 0.5-8'

Sample Description: Red Fine to Medium Sandy Silty Clay (MH) with Mica

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	LL	33	*	24			III	48	
A	Tare Weight	16.93	15.87	15.50	13.87			**15.19**	14.00	
B	Wet Soil Weight + A	28.01	26.01	28.23	25.76			21.41	20.28	
C	Dry Soil Weight + A	23.63	21.94	23.07	20.90			19.82	18.70	
D	Water Weight (B-C)	4.38	4.07	5.16	4.86			1.59	1.58	
E	Dry Soil Weight (C-A)	6.70	6.07	7.57	7.03			4.63	4.70	
F	% Moisture Content (D/E)*100	65.4%	67.1%	68.2%	69.1%			34.3%	33.6%	
N	# OF DROPS	32	28	24	21			*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							34.0%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	68
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	34
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	34
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	MH

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-7 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 0.5-8'
Sample Description: Red Fine to Medium Sandy Silty Clay (MH) with Mica

Pan #:	B	Beaker #:	II	**Apparent Relative Density (Assumed)**			**2.650**		
Hydrometer Jar #:			A						
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			416.10		Tare #	2	T-9		
Weight of Total Sample Air Dried:			416.10	A	Tare Wt.	15.77	81.72		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	27.06	365.07		
Total Sample Oven Dried:			409.94	C	Dry Wt. + A	26.89	315.00		
Hydrometer Sample Oven Dried (W):			49.25	D	Water Wt. (B-C)	0.17	50.07		
% Passing #10:			98.2%	E	Dry Wt. (C-A)	11.12	233.28		
Correction Factor a (Table 1):			1.00	% Moisture (100 x D/E)		1.53%	21.5%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		36	100.0%
1/2"			100.0%
3/8"	0.0		100.0%
#4	3.9	Soil Mortar	99.1%
#10	7.3	**100.0%**	98.2%
#20	2.8	94.3%	92.6%
#40	7.5	84.8%	83.3%
#60	10.9	77.9%	76.6%
#100	13.1	73.4%	72.1%
#200	15.1	69.4%	68.2%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	30.9%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.9%	< 75 mm and > 4.75 mm	Silt & Clay:	68.2%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.8%	< 4.75 mm and > 2.00 mm	Silt:	20.2%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	14.9%	< 2.00 mm and > 0.425 mm	Clay:	48.0%	< 0.005 mm		
Fine Sand:	15.2%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **68** Plastic Limit **34** Plastic Index **34** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	22.0	38.5	5.0		33.50	68.0%	66.8%	10.8	0.01332	0.04378
	2	22.0	37.5	5.0		32.50	66.0%	64.8%	11.0	0.01332	0.03119
	5	22.0	36.0	5.0		31.00	62.9%	61.8%	11.2	0.01332	0.01995
	15	22.0	33.5	5.0		28.50	57.9%	56.8%	11.6	0.01332	0.01172
	30	22.0	32.5	5.0		27.50	55.8%	54.8%	11.8	0.01332	0.00835
	60	22.0	30.0	5.0		25.00	50.8%	49.9%	12.2	0.01332	0.00601
	250	22.0	27.5	5.0		22.50	45.7%	44.9%	12.6	0.01332	0.00299
	1440	22.0	24.0	5.0		19.00	38.6%	37.9%	13.2	0.01332	0.00127

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

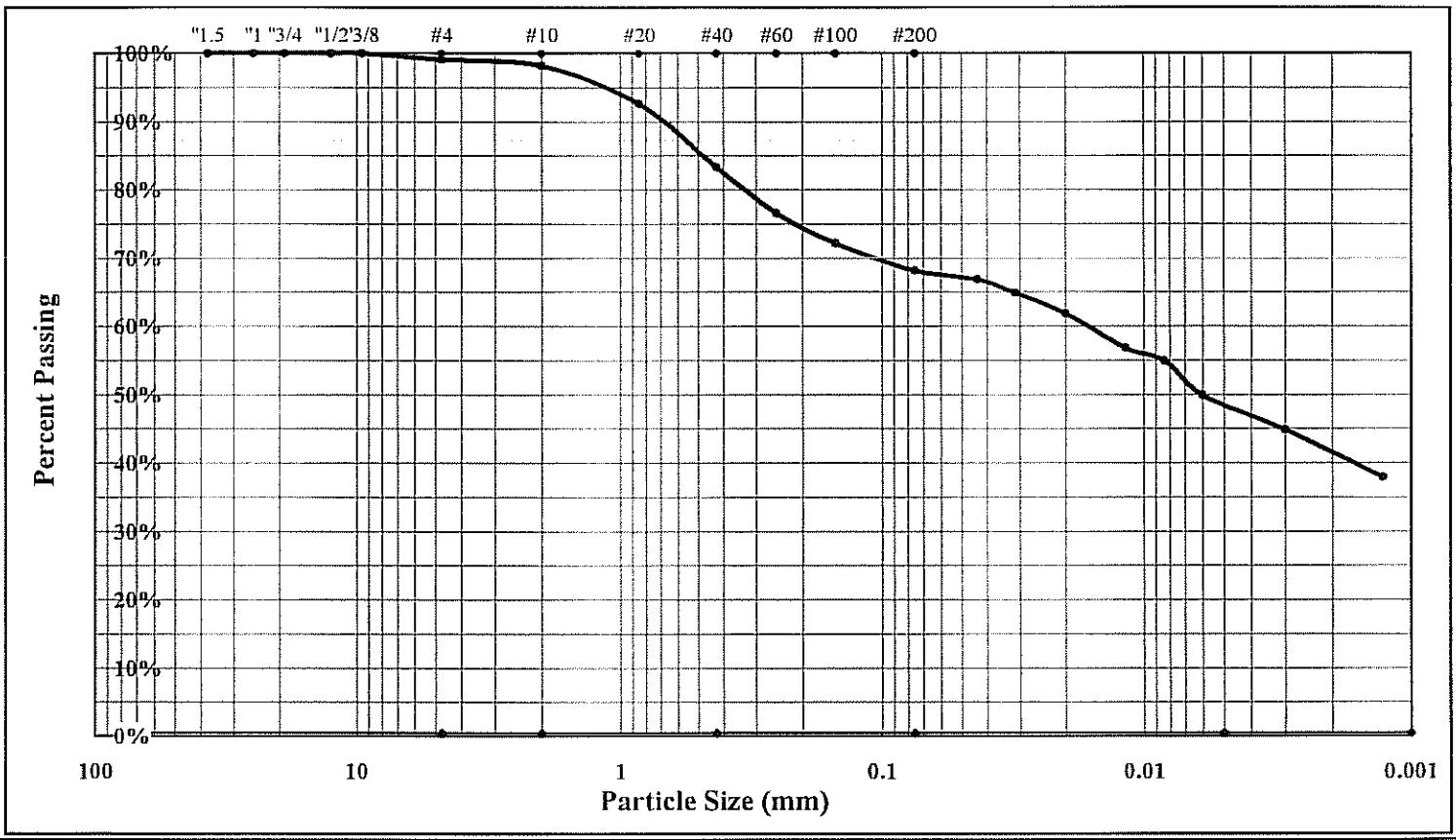
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-7	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	0.5-8'
Sample Description:	Red Fine to Medium Sandy Silty Clay (MH) with 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	0	Gravel	0.9%	Silt	20.2%
Silt & Clay (% Passing #200)	68.2%	Sand	30.9%	Clay	48.0%
Apparent Relative Density (Assumed)	2.650	Moisture Content	21.5%	Colloids	
Liquid Limit	68	Plastic Limit	34	Plastic Index	34

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-7	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	0.5-8'
Sample Description:	Red Fine to Medium Sandy Silty Clay (MH) with Mica		

Liquid Limit: 68 Specific Gravity:

Plastic Limit: 34 Plastic Index: 34

Natural Moisture Content: 21.5%

Moisture Content of the Oversize Fraction:

NOTES:

MDD: 97.8 **Opt. MC %: 24.0**

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	99.1

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	230	173	115	58	288	
	Tare #:	DMJ	DJM	PTL	THAI	PFM	
A. Tare Weight	A.	162.6	159.7	164.8	154	167.2	
B. Wet Wt + Tare Wt	B.	889.4	867.6	801.5	806.9	857.3	
C. Dry Wt. + Tare Wt.	C.	737.8	732.8	691.2	706	703.3	
D. Water Weight	B-C	151.6	134.8	110.3	100.9	154	0
E. Dry Weight	C-A	575.2	573.1	526.4	552	536.1	0
F. Moisture Content	100*D/E	**26.4**	**23.5**	**21.0**	**18.3**	**28.7**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	6005	5998	5905	5783	5958	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1832.000	1825.000	1732.000	1610.000	1785.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	4.039	4.023	3.818	3.549	3.935	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	121.1	120.7	114.5	106.4	118.0	-125148.3
M. Dry Density	L/(1+F)	**95.9**	**97.7**	**94.7**	**90.0**	**91.7**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 (Certification #)

Technical Responsibility: Ken Daly (Signature) (Position)

Moisture - Density Report

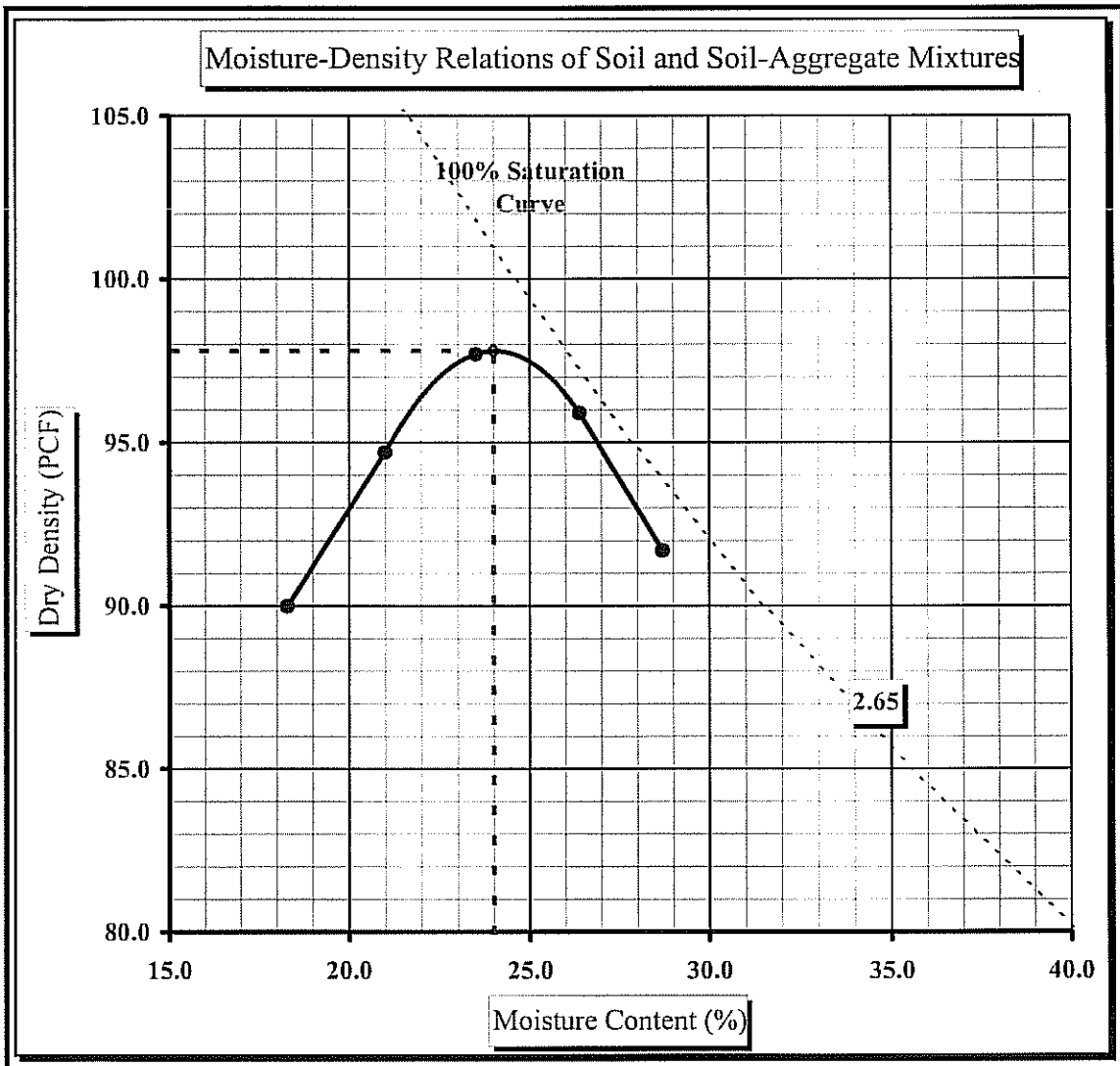
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	November 5, 2008
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/30/08-11/5/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-7	Sample Date:	October 21, 2008
Location:	Plant Allen Borrow Area	Offset:		Depth:	0.5-8'
Sample Description:	Red Fine to Medium Sandy Silty Clay (MH) with Mica				

Maximum Dry Density **97.8** **PCF.** **Optimum Moisture Content** **24.0** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	21.5%
Liquid Limit:	68
Plastic Limit:	34
Plastic Index:	34
Specific Gravity:	

% Passing	
3/4"	
1/2"	
3/8"	
#4	99.1

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

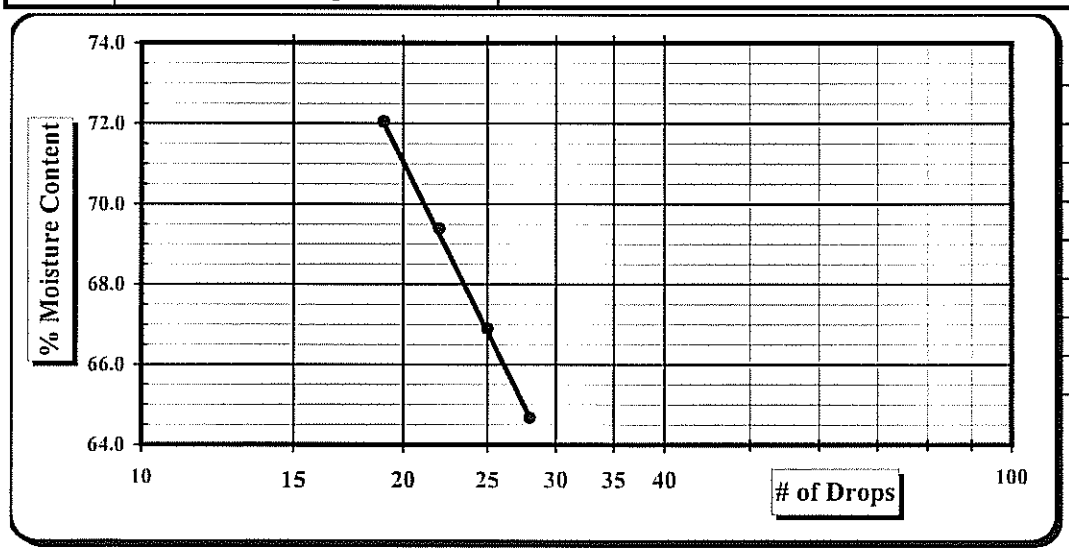
Technical Responsibility: Ken Daly 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/7/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 10/29/08-11/7/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: TP-8 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 0.5-12'
Sample Description: Red Orange Clayey Silt (MH)

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	OO	TT	Z	Jordi			46	43	
A	Tare Weight	16.29	15.93	16.88	15.94			**13.74**	13.83	
B	Wet Soil Weight + A	26.50	27.78	28.67	25.85			19.76	20.26	
C	Dry Soil Weight + A	22.49	23.03	23.84	21.70			17.96	18.36	
D	Water Weight (B-C)	4.01	4.75	4.83	4.15			1.80	1.90	
E	Dry Soil Weight (C-A)	6.20	7.10	6.96	5.76			4.22	4.53	
F	% Moisture Content (D/E)*100	64.7%	66.9%	69.4%	72.0%			42.7%	41.9%	
N	# OF DROPS	28	25	22	19			*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							42.3%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	67
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	42
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	25
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	MH

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-8 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 0.5-12'
Sample Description: Red Orange Clayey Silt (MH)

Pan #:	105	Beaker #:	FF
Hydrometer Jar #:			88
Pan Tare Weight (grams):			0.00
Total Sample Air Dried Wt. + tare wt. (grams):			269.96
Weight of Total Sample Air Dried:			269.96
Weight of Air Dried Hydrometer Sample (g):			50.00
Total Sample Oven Dried:			261.80
Hydrometer Sample Oven Dried (W):			48.49
% Passing #10:			100.0%
Correction Factor a (Table 1):			0.99

Apparent Relative Density (Assumed) 2.700

	Moisture Content	Hygroscopic	Natural
	Tare #	50	T-8
A	Tare Wt.	15.78	81.11
B	Wet Wt. + A	26.37	350.90
C	Dry Wt. + A	26.05	285.24
D	Water Wt. (B-C)	0.32	65.66
E	Dry Wt. (C-A)	10.27	204.13
	% Moisture (100 x D/E)	3.12%	32.2%

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		XW	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.1	**100.0%**	100.0%
#20	0.1	99.7%	99.7%
#40	0.6	98.8%	98.8%
#60	1.0	98.0%	98.0%
#100	2.0	96.0%	96.0%
#200	5.0	89.8%	89.8%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	10.2%	< 4.74 mm and > 0.075 mm
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	89.8%	< 0.075
Coarse Sand:	0.0%	< 4.75 mm and > 2.00 mm	Silt:	50.8%	< 0.075 and > 0.005 mm
Medium Sand:	1.2%	< 2.00 mm and > 0.425 mm	Clay:	39.0%	< 0.005 mm
Fine Sand:	9.0%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm

Type: Mechanical Stirring Apparatus (A)
Dispersion Time: 1 min.
Sodium Hexametaphosphate: 40 g./ Liter
Control Cylinder ☒ **Composite Correction** ☐

Liquid Limit **67** Plastic Limit **42** Plastic Index **25** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	22.0	47.0	5.0		42.00	85.8%	85.7%	9.4	0.01312	0.04025
	2	22.0	43.0	5.0		38.00	77.6%	77.6%	10.1	0.01312	0.02944
	5	22.0	40.0	5.0		35.00	71.5%	71.4%	10.6	0.01312	0.01907
	15	22.0	34.5	5.0		29.50	60.2%	60.2%	11.5	0.01312	0.01147
	30	22.0	30.5	5.0		25.50	52.1%	52.1%	12.1	0.01312	0.00834
	60	22.0	26.0	5.0		21.00	42.9%	42.9%	12.9	0.01312	0.00607
	250	22.0	20.5	5.0		15.50	31.6%	31.6%	13.8	0.01312	0.00308
	1440	22.0	16.0	5.0		11.00	22.5%	22.5%	14.5	0.01312	0.00132

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly _____ *Signature* _____ *Position*

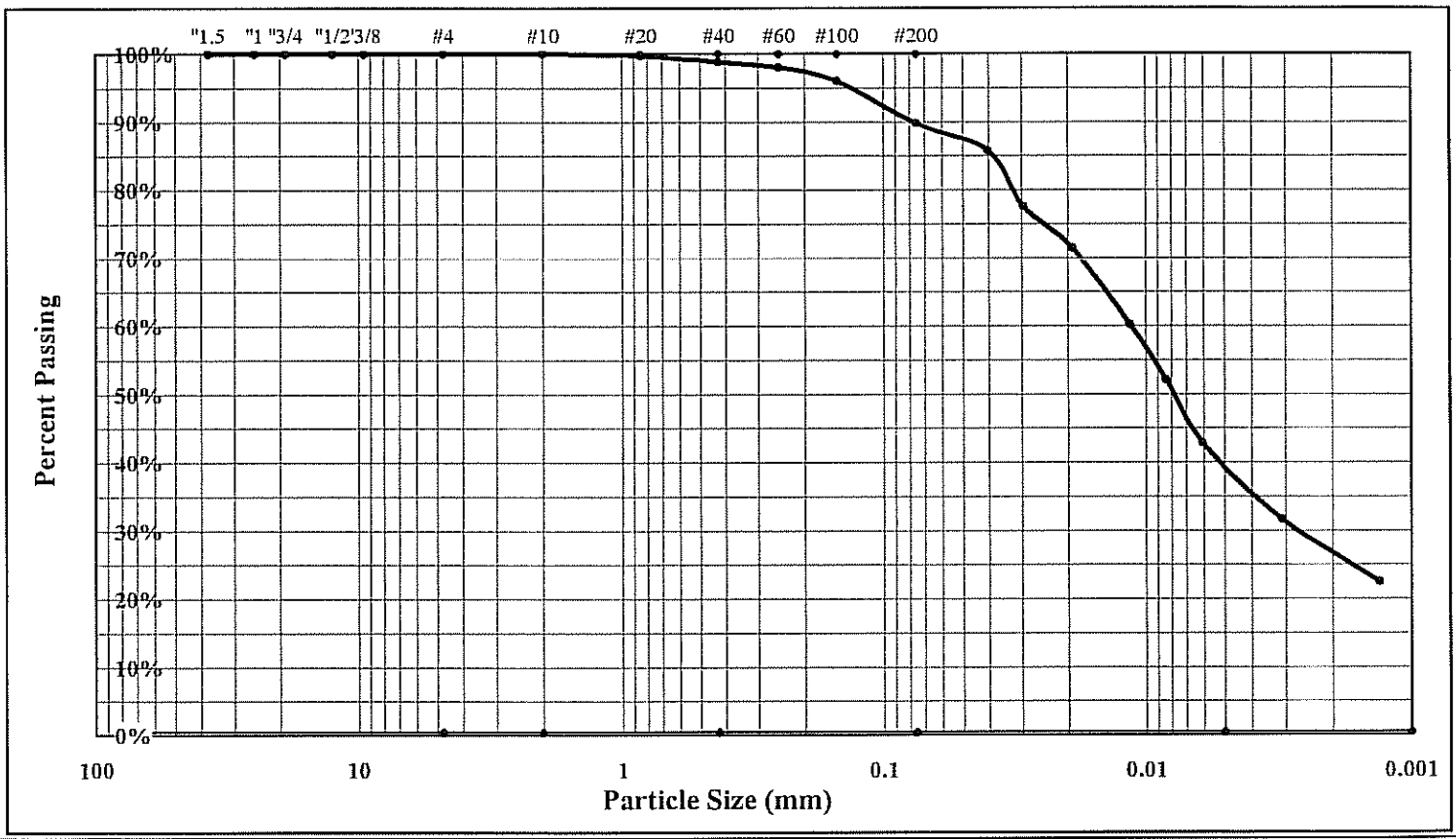
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-8	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	0.5-12'
Sample Description:	Red Orange 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	0	Gravel	0.0%	Silt	50.8%
Silt & Clay (% Passing #200)	89.8%	Sand	10.2%	Clay	39.0%
Apparent Relative Density (Assumed)	2.700	Moisture Content	32.2%	Colloids	
Liquid Limit	67	Plastic Limit	42	Plastic Index	25

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-8	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	0.5-12'
Sample Description:	Red Orange Clayey Silt (MH)		

Liquid Limit: 67 Specific Gravity:

Plastic Limit: 42 Plastic Index: 25

Natural Moisture Content: 32.2%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 86.7 **Opt. MC %:** 30.9

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	173	115	230	58	As Is	
	Tare #:	99	18	13	G	AMRL 147	
A. Tare Weight	A.	157.1	155.3	155.5	156.1	155.5	
B. Wet Wt + Tare Wt	B.	824.4	915.2	719.8	892.7	716.7	
C. Dry Wt. + Tare Wt.	C.	654.8	736.3	569.8	731.1	603.7	
D. Water Weight	B-C	169.6	178.9	150	161.6	113	0
E. Dry Weight	C-A	497.7	581	414.3	575	448.2	0
F. Moisture Content	100*D/E	**34.1**	**30.8**	**36.2**	**28.1**	**25.2**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5904	5888	5901	5836	5770	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1731.000	1715.000	1728.000	1663.000	1597.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.816	3.781	3.810	3.666	3.521	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	114.4	113.4	114.2	110.0	105.6	-125148.3
M. Dry Density	L/(1+F)	**85.4**	**86.7**	**83.9**	**85.8**	**84.3**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 (Certification #)

Technical Responsibility: Ken Daly (Signature) (Position)

Moisture - Density Report

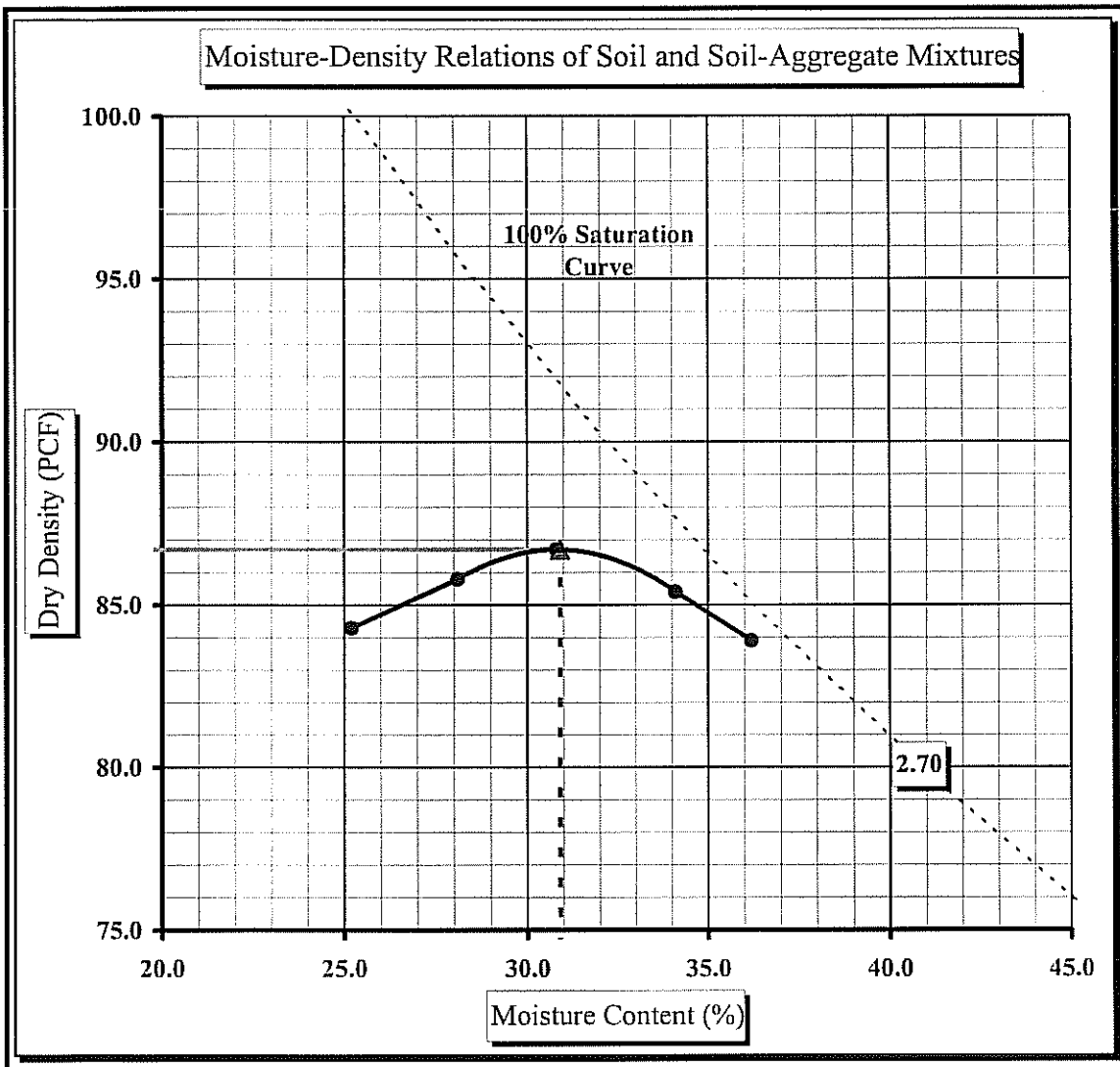
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	November 5, 2008
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/30/08-11/5/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-8	Sample Date:	October 21, 2008
Location:	Plant Allen Borrow Area	Offset:		Depth:	0.5-12'
Sample Description:	Red Orange Clayey Silt (MH)				

Maximum Dry Density 86.7 PCF. **Optimum Moisture Content 30.9 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	32.2%
Liquid Limit:	67
Plastic Limit:	42
Plastic Index:	25
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

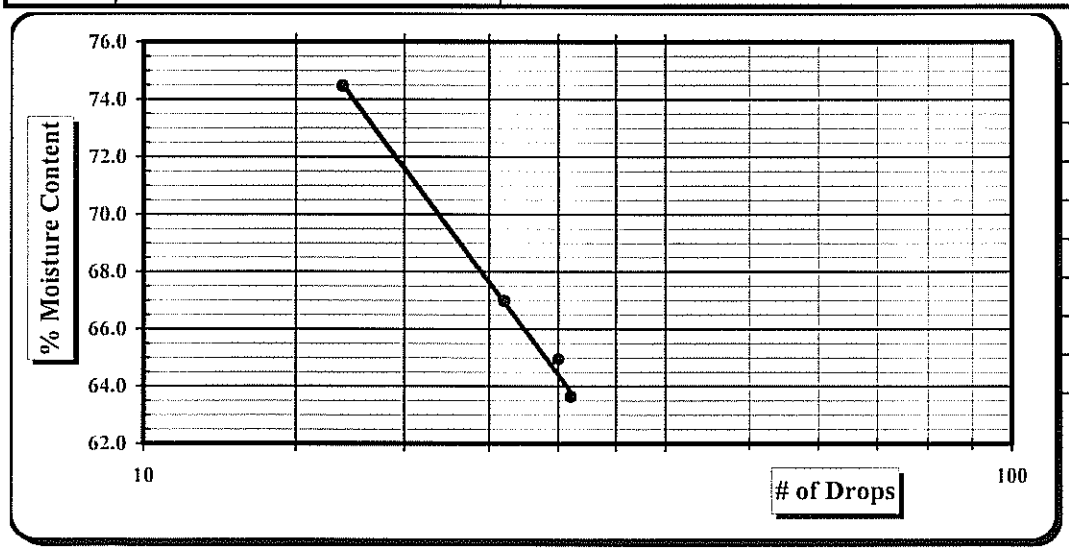
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/10/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 10/29/08-11/10/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: TP-9 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 0-8'
Sample Description: Red Brown Silty Clay (MH) with Fine to Medium Sand and Mica

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	XW	34	50	CC			51	BB	
A	Tare Weight	15.22	13.98	15.78	16.79			**15.75**	16.15	
B	Wet Soil Weight + A	27.51	25.18	27.72	27.66			21.94	22.80	
C	Dry Soil Weight + A	22.73	20.77	22.93	23.02			20.30	21.04	
D	Water Weight (B-C)	4.78	4.41	4.79	4.64			1.64	1.76	
E	Dry Soil Weight (C-A)	7.51	6.79	7.15	6.23			4.55	4.89	
F	% Moisture Content (D/E)*100	63.6%	64.9%	67.0%	74.5%			36.0%	36.0%	
N	# OF DROPS	31	30	26	17			*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							36.0%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation	☐	Dry Preparation	☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method	☒	One-point Method	☐		Liquid Limit	68
Classification:	ASTM D 2487	☒	AASHTO M 145	☐		Plastic Limit	36
Liquid limit Test:	ASTM D 4318	☒	AASHTO T 89	☐		Plastic Index	32
Plastic limit Test:	ASTM D 4318	☒	AASHTO T 90	☐		Group Symbol	MH

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-9 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 0-8'
Sample Description: Red Brown Silty Clay (MH) with Fine to Medium Sand and Mica

Pan #:	76	Beaker #:	TY	**Apparent Relative Density (Assumed)**			**2.700**		
Hydrometer Jar #:			7						
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			414.30		Tare #	MM	G-10		
Weight of Total Sample Air Dried:			414.30	A	Tare Wt.	16.56	81.42		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.58	374.87		
Total Sample Oven Dried:			408.15	C	Dry Wt. + A	26.43	323.62		
Hydrometer Sample Oven Dried (W):			49.25	D	Water Wt. (B-C)	0.15	51.25		
% Passing #10:			99.2%	E	Dry Wt. (C-A)	9.87	242.20		
Correction Factor a (Table 1):			0.99		% Moisture (100 x D/E)	1.52%	21.2%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed) 31 Soil Mortar	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"			100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0		100.0%
#10	3.4	**100.0%**	99.2%
#20	3.1	93.7%	92.9%
#40	7.2	85.4%	84.7%
#60	9.8	80.2%	79.5%
#100	11.4	76.9%	76.2%
#200	13.1	73.3%	72.7%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	27.3%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	72.7%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.8%	< 4.75 mm and > 2.00 mm	Silt:	28.2%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	14.5%	< 2.00 mm and > 0.425 mm	Clay:	44.5%	< 0.005 mm		
Fine Sand:	11.9%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **68** Plastic Limit **36** Plastic Index **32** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
				Control Cylinder	Composite Correction		P(-#10) =	P (total) =			D =
Clock	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	22.0	40.5	5.0		35.50	71.4%	70.8%	10.5	0.01312	0.04247
	2	22.0	39.5	5.0		34.50	69.3%	68.8%	10.6	0.01312	0.03026
	5	22.0	37.5	5.0		32.50	65.3%	64.8%	11.0	0.01312	0.01943
	15	22.0	33.5	5.0		28.50	57.3%	56.8%	11.6	0.01312	0.01155
	30	22.0	31.0	5.0		26.00	52.3%	51.8%	12.0	0.01312	0.00831
	60	22.0	28.5	5.0		23.50	47.2%	46.8%	12.4	0.01312	0.00598
	250	22.0	24.5	5.0		19.50	39.2%	38.9%	13.1	0.01312	0.00300
	1440	22.0	21.0	5.0		16.00	32.2%	31.9%	13.7	0.01312	0.00128

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly

Signature *Position*

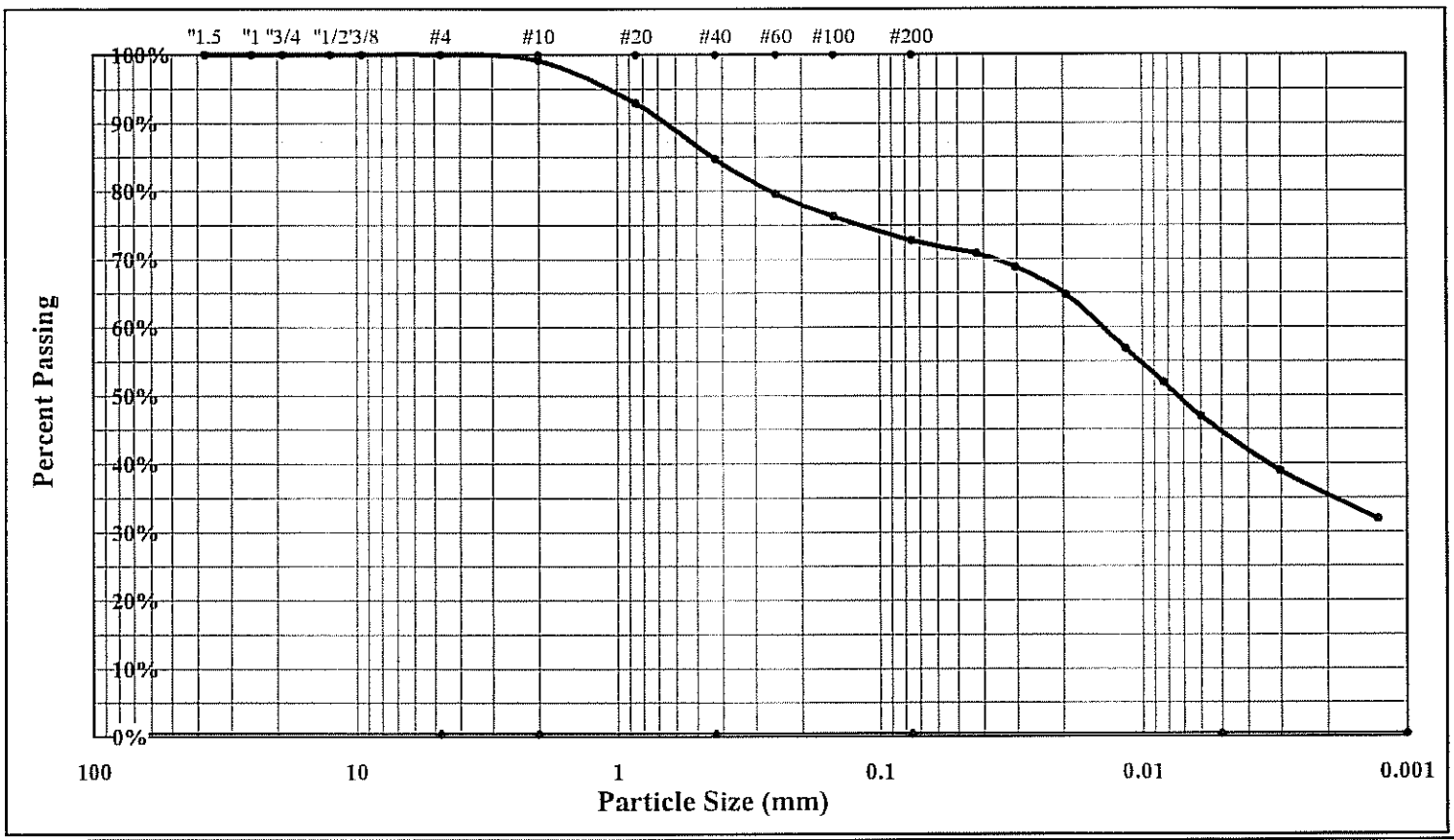
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-9	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	0-8'
Sample Description:	Red Brown Silty Clay (MH) with Fine to Medium Sand 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	0	Gravel	0.0%	Silt	28.2%
Silt & Clay (% Passing #200)	72.7%	Sand	27.3%	Clay	44.5%
Apparent Relative Density (Assumed)	2.700	Moisture Content	21.2%	Colloids	
Liquid Limit	68	Plastic Limit	36	Plastic Index	32

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-9	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	0-8'
Sample Description:	Red Brown Silty Clay (MH) with Fine to Medium Sand and Mica		

Liquid Limit: 68 Specific Gravity:

Plastic Limit: 36 Plastic Index: 32

Natural Moisture Content: 21.2%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 98.0 **Opt. MC %: 23.8**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	230	288	173	115	58	
	Tare #:	JC	GH	EL	KH	JLG	
A. Tare Weight	A.	157.3	157.5	156.9	156.9	159.6	
B. Wet Wt + Tare Wt	B.	955.8	936.4	877.5	887	727.4	
C. Dry Wt. + Tare Wt.	C.	789.4	763.4	739.7	758.5	638.4	
D. Water Weight	B-C	166.4	173	137.8	128.5	89	0
E. Dry Weight	C-A	632.1	605.9	582.8	601.6	478.8	0
F. Moisture Content	100*D/E	**26.3**	**28.6**	**23.6**	**21.4**	**18.6**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	6008	5977	6006	5940	5841	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1835.000	1804.000	1833.000	1767.000	1668.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	4.045	3.977	4.041	3.896	3.677	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	121.3	119.3	121.2	116.8	110.3	-125148.3
M. Dry Density	L/(1+F)	**96.0**	**92.8**	**98.0**	**96.3**	**93.0**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Moisture - Density Report

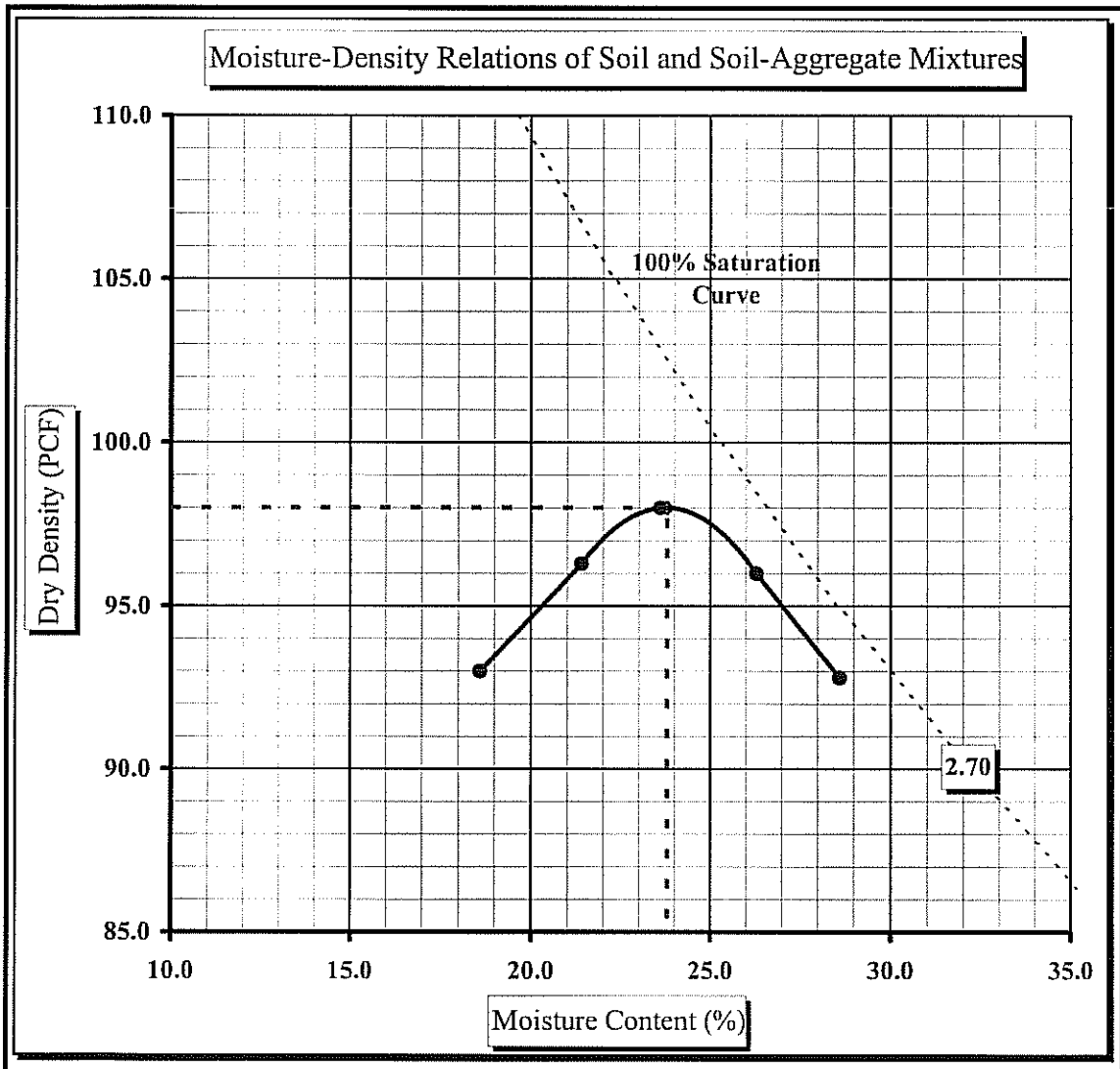
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	November 5, 2008
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/30/08-11/5/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-9	Sample Date:	October 21, 2008
Location:	Plant Allen Borrow Area	Offset:		Depth:	0-8'
Sample Description:	Red Brown Silty Clay (MH) with Fine to Medium Sand and Mica				

Maximum Dry Density 98.0 PCF. **Optimum Moisture Content 23.8 %**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	21.2%
Liquid Limit:	68
Plastic Limit:	36
Plastic Index:	32
Specific Gravity:	

% Passing	
3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

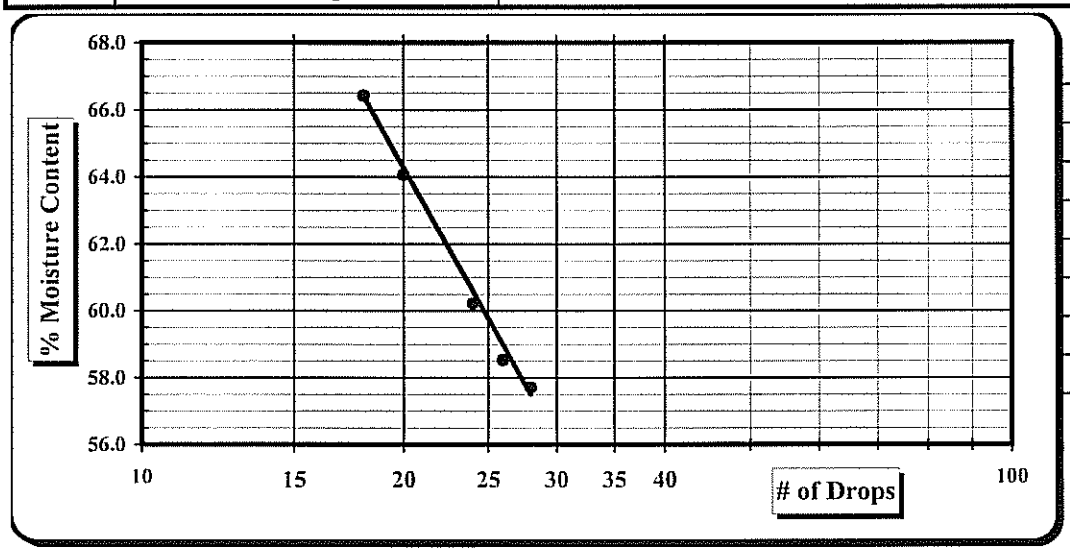
Technical Responsibility: Ken Daly _____ 0
Signature

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

Project #: **1356-06-825** Report Date: 11/10/08
Project Name: Plant Allen RAB Ash Landfill Test Date(s): 10/29/08-11/10/08
Client Name: Duke Energy
Client Address:
Boring #: Sample #: TP-10 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 8-14'
Sample Description: Orange Clayey Silt (MH)

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	SSS	MM	QQ	23	5		17	FF	
A	Tare Weight	16.54	16.56	16.89	14.05	15.71		**13.98**	16.86	
B	Wet Soil Weight + A	29.63	29.10	28.65	24.55	27.06		20.11	23.35	
C	Dry Soil Weight + A	24.84	24.47	24.23	20.45	22.53		18.08	21.18	
D	Water Weight (B-C)	4.79	4.63	4.42	4.10	4.53		2.03	2.17	
E	Dry Soil Weight (C-A)	8.30	7.91	7.34	6.40	6.82		4.10	4.32	
F	% Moisture Content (D/E)*100	57.7%	58.5%	60.2%	64.1%	66.4%		49.5%	50.2%	
N	# OF DROPS	28	26	24	20	18		*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							49.9%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	60
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	50
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	10
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	MH

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Plant Allen RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 10/29/08-11/12/08
Report Date: 11/12/08

Boring #: Sample #: TP-10 Sample Date: 10/21/08
Location: Plant Allen Borrow Area Offset: Depth: 8-14'
Sample Description: Orange Clayey Silt (MH)

Pan #:	77	Beaker #:	PDQ	**Apparent Relative Density (Assumed)**		**2.600**			
Hydrometer Jar #:			6						
Pan Tare Weight (grams):			0.00	**Moisture Content**		Hygroscopic	Natural		
Total Sample Air Dried Wt. + tare wt. (grams):			248.73		Tare #	BB	77		
Weight of Total Sample Air Dried:			248.73	A	Tare Wt.	16.16	71.57		
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	27.60	359.44		
Total Sample Oven Dried:			242.43	C	Dry Wt. + A	27.31	294.89		
Hydrometer Sample Oven Dried (W):			48.73	D	Water Wt. (B-C)	0.29	64.55		
% Passing #10:			100.0%	E	Dry Wt. (C-A)	11.15	223.32		
Correction Factor a (Table 1):			1.01		% Moisture (100 x D/E)	2.60%	28.9%		

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		48	100.0%
1/2"			100.0%
3/8"			100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.1	**100.0%**	100.0%
#20	0.1	99.9%	99.9%
#40	0.4	99.2%	99.1%
#60	1.1	97.8%	97.8%
#100	2.2	95.4%	95.4%
#200	6.0	87.7%	87.7%

Notes: Description of Sand & Gravel Particles — Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	12.3%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	87.7%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.0%	< 4.75 mm and > 2.00 mm	Silt:	62.2%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	0.8%	< 2.00 mm and > 0.425 mm	Clay:	25.5%	< 0.005 mm		
Fine Sand:	11.5%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **60** Plastic Limit **50** Plastic Index **10** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
				Control Cylinder	Composite Correction		P(-#10) =	P (total) =			D =
Clock	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	22.0	46.0	5.0		41.00	85.0%	84.9%	9.6	0.01353	0.04185
	2	22.0	41.5	5.0		36.50	75.6%	75.6%	10.3	0.01353	0.03071
	5	22.0	36.0	5.0		31.00	64.2%	64.2%	11.2	0.01353	0.02025
	15	22.0	28.5	5.0		23.50	48.7%	48.7%	12.4	0.01353	0.01232
	30	22.0	23.5	5.0		18.50	38.3%	38.3%	13.3	0.01353	0.00899
	60	22.0	20.0	5.0		15.00	31.1%	31.1%	13.8	0.01353	0.00650
	250	22.0	14.0	5.0		9.00	18.7%	18.6%	14.8	0.01353	0.00329
	1440	22.0	10.0	5.0		5.00	10.4%	10.4%	15.5	0.01353	0.00140

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Jennifer Olsen 117926
Certification #

Technical Responsibility: Ken Daly

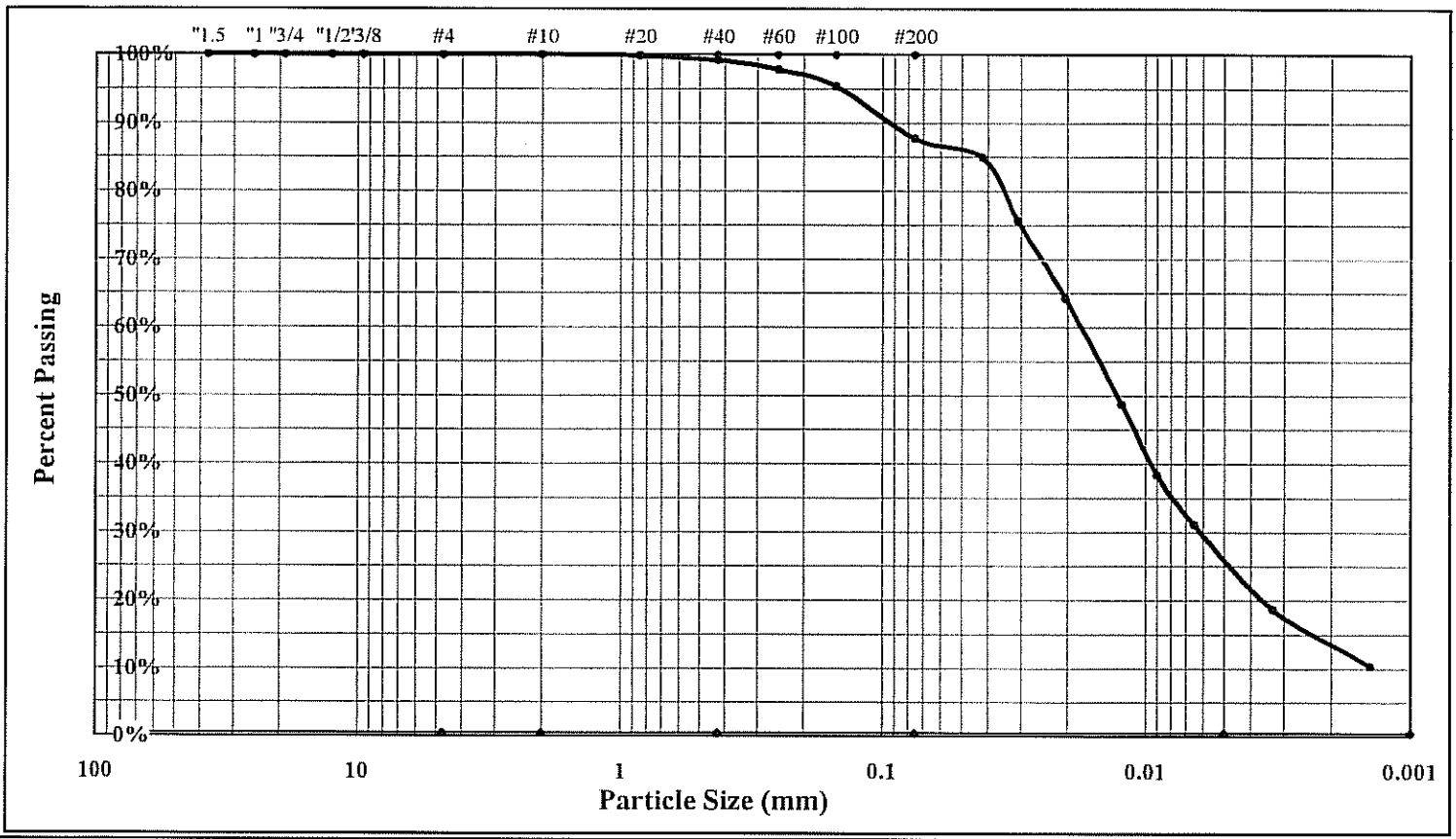
Signature *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME Project #:	**1356-06-825**	Report Date:	11/12/08
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/29/08-11/12/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-10	Sample Date:	10/21/08
Location:	Plant Allen Borrow Area	Offset:		Depth:	8-14'
Sample Description:	Orange 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	0	Gravel	0.0%	Silt	62.2%
Silt & Clay (% Passing #200)	87.7%	Sand	12.3%	Clay	25.5%
Apparent Relative Density (Assumed)	2.600	Moisture Content	28.9%	Colloids	
Liquid Limit	60	Plastic Limit	50	Plastic Index	10

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly

Signature *Position*

Moisture - Density Relationship

S&ME Project #:	**1356-06-825**	Test Date(s):	10/30/08-11/5/08
Project Name:	Plant Allen RAB Ash Landfill	Report Date:	November 5, 2008
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: TP-10	Sample Date:	October 21, 2008
Location: Plant Allen Borrow Area	Offset:	Depth:	8-14'
Sample Description:	Orange Clayey Silt (MH)		

Liquid Limit: 60 Specific Gravity:

Plastic Limit: 50 Plastic Index: 10

Natural Moisture Content: 28.9%

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 79.4 **Opt. MC %:** 34.8

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:	115	173	230	288	345	
	Tare #:	SR	HK	KO	JB	BE	
A. Tare Weight	A.	156.4	155.9	157.6	155.7	155	
B. Wet Wt + Tare Wt	B.	741.7	853.2	830.1	857.2	804	
C. Dry Wt. + Tare Wt.	C.	614.1	689.3	661.5	671.4	621	
D. Water Weight	B-C	127.6	163.9	168.6	185.8	183	0
E. Dry Weight	C-A	457.7	533.4	503.9	515.7	466	0
F. Moisture Content	100*D/E	**27.9**	**30.7**	**33.5**	**36.0**	**39.3**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5684	5728	5770	5805	5799	
H. Wt. of Mold	H.	4173	4173	4173	4173	4173	4173
I. Wt. of Soil (g. or lbs.)	G-H	1511.000	1555.000	1597.000	1632.000	1626.000	-4173.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.331	3.428	3.521	3.598	3.585	-4173.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	99.9	102.8	105.6	107.9	107.5	-125148.3
M. Dry Density	L/(1+F)	**78.1**	**78.6**	**79.1**	**79.3**	**77.2**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Jennifer Olsen 117926 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Position*

Moisture - Density Report

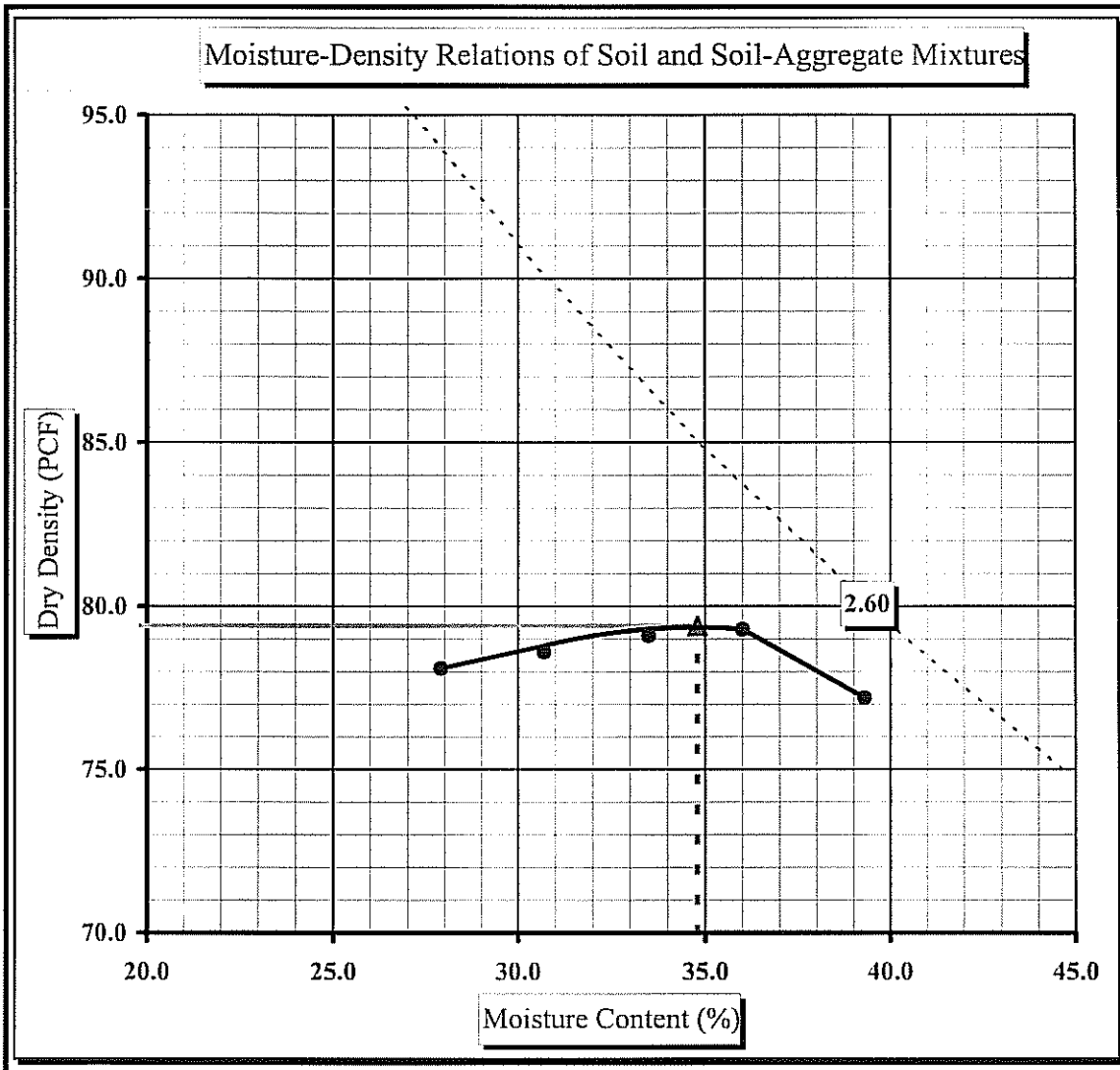
S&ME

S&ME Project #:	**1356-06-825**	Report Date:	November 5, 2008
Project Name:	**Plant Allen RAB Ash Landfill**	Test Date(s):	10/30/08-11/5/08
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	TP-10	Sample Date:	October 21, 2008
Location:	Plant Allen Borrow Area	Offset:		Depth:	8-14'
Sample Description:	Orange Clayey Silt (MH)				

Maximum Dry Density **79.4** **PCF.** **Optimum Moisture Content** **34.8** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	28.9%
Liquid Limit:	60
Plastic Limit:	50
Plastic Index:	10
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ 0
Signature

Structural Fill Field Density Test Results

Summary of Density Test Results

Report Date: May 01, 2009

Project No.: 1356-06-825SF

Structural Fill

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
1	02/04/09	D 2937	**88.2**	**25.0**	88.5	23.0	D 698	TP-2	89.2	25.2	95	**99**	W. side of Ash Fill 100'S of NW corner	
2	02/04/09	D 2937	**88.2**	**26.0**			D 698	TP-2	89.2	25.2	95	**99**	W. side of Ash Fill 200'S of NW corner	
3	02/04/09	D 2937	**92.5**	**25.0**	92.3	23.0	D 698	TP-6	92.6	25.0	95	**100**	W. side of Ash Fill 300'S of NW corner	
4	02/04/09	D 2937	**87.3**	**25.0**	88.5	23.0	D 698	TP-2	89.2	25.2	95	**98**	W. side of Ash Fiill 400'S of NW corner	
5	02/05/09	D 2937	**87.2**	**25.0**	87.9	23.0	D 698	TP-3	89.2	25.2	95	**98**	E. side of road 30'S of NW corner	+2
6	02/05/09	D 2937	**88.5**	**24.0**			D 698	TP-3	89.2	25.2	95	**99**	E. side of Road 100'S of NW corner	+2
7	02/05/09	D 2937	**88.3**	**26.0**			D 698	TP-3	89.2	25.2	95	**99**	E. side of Road 250'S of NW corner	+2
8	02/05/09	D 2937	**86.3**	**25.0**			D 698	TP-3	89.2	25.2	95	**97**	E side of Road 400'S of NW corner	+2
9	02/05/09	D 2937	**88.4**	**26.0**			D 698	TP-3	89.2	25.2	95	**99**	E side of Road 550'S of NW corner	+2
10	02/06/09	D 2937	**99.2**	**18.1**	98.7	15.1	D 698	TP-4	99.3	20.2	95	**100**	@ base of Ash Landfill starting @ N corner	
11	02/06/09	D 2937	**88.9**	**21.2**	91.9	18.1	D 698	TP-4	93.8	24.2	95	**95**	W base of Ash Landfill starting @ N corner @ 100 intervals	
12	02/06/09	D 2937	**90.0**	**17.6***	94.2	16.5	D 698	TP-1	96.3	21.7	95	**93 ***	W base of Ash Landfill starting @ N corner @ 100 intervals	
13	02/06/09	D 2937	**97.0**	**18.9**	98.0	17.1	D 698	TP-4	99.1	19.6	95	**98**	W base of Ash Landfill starting @ N corner @ 100 intervals	
14	02/06/09	D 2937	**95.9**	**26.6**	94.5	22.4	D 698	TP-1	94.8	23.6	95	**100+**	W base of Ash Landfill starting @ N corner @ 100 intervals	
15	02/06/09	D 2937	**99.1**	**26.2****	99.4	24.6	D 698	TP-5	100.0	21.3	95	**99**	W base of Ash Landfill @ S corner	
16	02/09/09	D 2937	**91.6**	**25.0**	89.7	22.0	D 698	TP-6	92.6	25.0	95	**99**	West side Phase I	+3'

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LeGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.		Staff Professional
Name (Technical Responsibility)	*Signature*	*Position*

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

Summary of Density Test Results

Report Date: May 01, 2009

Project No.: 1356-06-825SF

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
17	02/09/09	D 2937	**91.0**	**26.0**	89.7	22.0	D 698	TP-6	92.6	25.0	95	**98**	West side Phase I	+3'
18	02/09/09	D 2937	**94.2**	**24.0**	94.3	22.0	D 698	TP-4	95.2	23.5	95	**99**	West side Phase I	+3'
19	02/09/09	D 2937	**90.6**	**25.0**			D 698	TP-6	95.2	23.5	95	**95**	West side Phase I	+3'
20	02/09/09	D 2937	**91.7**	**25.0**			D 698	TP-6	95.2	23.5	95	**96**	West side Phase I	+3'
21	02/10/09	D 2937	**81.3**	**37.0**	78.8	31.0	D 698	TP10	79.4	34.8	95	**100+**		+4'
22	02/10/09	D 2937	**99.0**	**25.0****	96.0	23.0	D 698	TP1	97.4	21.7	95	**100+**		+4'
23	02/10/09	D 2937	**86.1**	**35.0****	83.5	31.0	D 698	TP-2	85.8	31.0	95	**100**		+4'
24	02/11/09	D 2937	**90.7**	**26.0**	85.5	23.0	D 698	TP-3	89.0	26.0	95	**100+**	Between Road Ash north end 100'S of NW End	+6'
25	02/11/09	D 2937	**90.6**	**25.0**			D 698	TP-3	89.0	26.0	95	**100+**	Between Road & Ash 350'S of NW End	+6'
26	02/11/09	D 2937	**89.3**	**26.0**			D 698	TP-3	89.0	26.0	95	**100**	Between Road & Ash 680'S of NW End	+6'
27	02/11/09	D 2937	**91.0**	**25.0**			D 698	TP-3	89.0	26.0	95	**100+**	Between Road & Ash 800'S of NW End	+6'
28	02/12/09	D 2937	**90.2**	**23.0**	90.4	20.0	D 698	TP-6	92.0	22.0	95	**98**	N End between Ash & Road 200'S of NW End of NW corner	+7'
29	02/12/09	D 2937	**88.0**	**30.0**	83.9	26.0	D 698	TP-2	86.3	28.0	95	**100+**	500'S of N End of NW corner	+7'
30	02/12/09	D 2937	**88.5**	**30.0**			D 698	TP-2	86.3	28.0	95	**100+**	750'S of NW corner of Ash fill	+7'
31	02/13/09	D 2937	**89.2**	**14.0****	85.6	14.0	D 698	TP-6	91.8	21.0	95	**97**		+8'
32	02/13/09	D 2937	**86.9**	**21.0****	85.4	21.0	D 698	TP-3	89.2	25.2	95	**97**		+8'
33	02/13/09	D 2937	**90.4**	**17.0****			D 698	TP-3	89.2	25.2	95	**100+**		+8'
34	02/16/09	D 2937	**85.6**	**20.0****	80.3	20.0	D 698	TP-3	86.1	26.1	95	**99**	N end between Road & Ash	+8'
34A	02/16/09	D 2937	**91.7**	**24.0**	88.4	22.0	D 698	TP-6	90.6	25.3	95	**100+**	Retest of #1 N end between Road & Ash	+8'

* = Failed Specified Compaction. ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.		Staff Professional
Name (Technical Responsibility)	*Signature*	*Position*

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

Summary of Density Test Results

Report Date: May 01, 2009

Project No.: 1356-06-825SF

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
35	02/16/09	D 2937	**88.8**	**20.0****	81.8	20.0	D 698	TP-3	88.0	27.0	95	**100+**	400'S of N End between Road & Ash	+8'
35A	02/16/09	D 2937	**91.9**	**24.0**	88.4	22.0	D 698	TP-6	90.6	25.3	95	**100+**	Retest of #2 400'S N end between Road & Ash	+8'
36	02/16/09	D 2937	**93.0**	**25.0**			D 698	TP-6	90.6	25.3	95	**100+**	200'N of South End between Road & Ash	+8'
37	02/19/09	D 2937	**99.7**	**21.0**	97.8	18.0	D 698	TP-5	100.0	20.5	95	**100**		+10'
38	02/19/09	D 2937	**99.6**	**21.0**			D 698	TP-5	100.0	20.5	95	**100**		+10'
39	02/19/09	D 2937	**95.3**	**24.0**	93.6	22.0	D 698	TP-6	94.1	23.5	95	**100+**		+10'
40	02/20/09	D 2937	**88.6**	**24.0**	89.4	23.0	D 698	TP-6	91.0	25.0	95	**97**	W-3	+11'
41	02/20/09	D 2937	**89.4**	**26.0**			D 698	TP-6	91.0	25.0	95	**98**	W-2	+11'
42	02/20/09	D 2937	**93.0**	**25.0**	94.3	23.0	D 698	TP-4	95.0	24.0	95	**98**	W-1	+12'
43	02/20/09	D 2937	**89.3**	**25.0**			D 698	TP-6	91.0	25.0	95	**98**	W-2	+12'
44	02/23/09	D 2937	**89.2**	**24.0**	89.7	22.0	D 698	TP-6	91.6	24.5	95	**97**	W slope	+14'
45	02/23/09	D 2937	**90.0**	**26.0**			D 698	TP-6	91.6	24.5	95	**98**	W slope	+14'
46	02/23/09	D 2937	**91.0**	**27.0**			D 698	TP-6	91.6	24.5	95	**99**	W slope	+15'
47	02/23/09	D 2937	**91.0**	**25.0**			D 698	TP-6	91.6	24.5	95	**99**	W slope	+15'
48	02/24/09	D 2937	**88.7**	**26.0**	88.9	24.0	D 698	TP-6	90.5	25.4	95	**98**	W slope	+16'
49	02/24/09	D 2937	**90.6**	**25.0**			D 698	TP-6	90.5	25.4	95	**100**	W slope	+17'
50	02/25/09	D 2937	**92.1**	**25.0**	88.2	21.0	D 698	TP-6	91.0	24.5	95	**100+**	W-1	+18'
51	02/25/09	D 2937	**89.5**	**26.1**			D 698	TP-6	91.0	24.5	95	**98**	W-1	+19'
52	02/25/09	D 2937	**90.2**	**24.0**			D 698	TP-6	91.0	24.5	95	**99**	W-1	+20'

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LeGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.

Name (Technical Responsibility)

Signature

Staff Professional

Position

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

Summary of Density Test Results

Report Date: May 01, 2009

Project No.: 1356-06-825SF

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
53	02/25/09	D 2937	**89.0**	**25.0**	88.2	21.0	D 698	TP-6	91.0	24.5	95	**98**	W-1	+21'
54	03/10/09	D 2937	**92.8**	**16.8** **	96.9	14.8	D 698	TP-1	99.0	20.0	95	**94 ***	S-2	
54A	03/11/09	D 2937	**90.5**	**24.7** **	89.1	25.2	D 698	TP14	91.5	29.1	95	**99**	Retest from Test #1 from 3-10-09	SG
55	03/10/09	D 2937	**85.4**	**22.7**	91.3	18.2	D 698	TP-6	93.0	23.3	95	**92 ***	S-2	
55A	03/11/09	D 2937	**93.5**	**22.3**	89.1	25.2	D 698	TP-4	95.2	22.6	95	**98**	Retest from test #2 from 3-10-09	SG
56	03/10/09	D 2937	**87.6**	**22.9**	92.0	18.5	D 698	TP-6	93.7	23.5	95	**94 ***	S-2	
56A	03/11/09	D 2937	**93.3**	**20.2**	89.1	25.2	D 698	TP-4	95.2	22.6	95	**98**	Retest from Test #3 from 3-10-09	SG
57	03/10/09	D 2937	**95.5**	**23.5**	95.8	24.8	D 698	TP10	96.1	22.3	95	**99**	S-1	
58	03/10/09	D 2937	**91.6**	**27.3** **	95.8	24.8	D 698	TP10	96.1	22.3	95	**95**	S-1	
59	03/10/09	D 2937	**89.1**	**23.1**	92.0	18.5	D 698	TP-6	93.7	23.5	95	**95**	W-3	
60	03/10/09	D 2937	**95.0**	**23.8**	95.8	24.8	D 698	TP10	96.1	22.3	95	**99**	W-3	
61	03/10/09	D 2937	**95.5**	**21.4**			D 698	TP10	96.1	22.3	95	**99**	W-3	
62	03/10/09	D 2937	**92.8**	**24.7**			D 698	TP10	96.1	22.3	95	**97**	W-2	
63	03/11/09	D 2937	**88.1**	**29.7**	89.1	25.2	D 698	TP14	91.5	29.1	95	**96**		SG
64	03/11/09	D 2937	**90.2**	**26.4**			D 698	TP14	91.5	29.1	95	**99**		SG

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

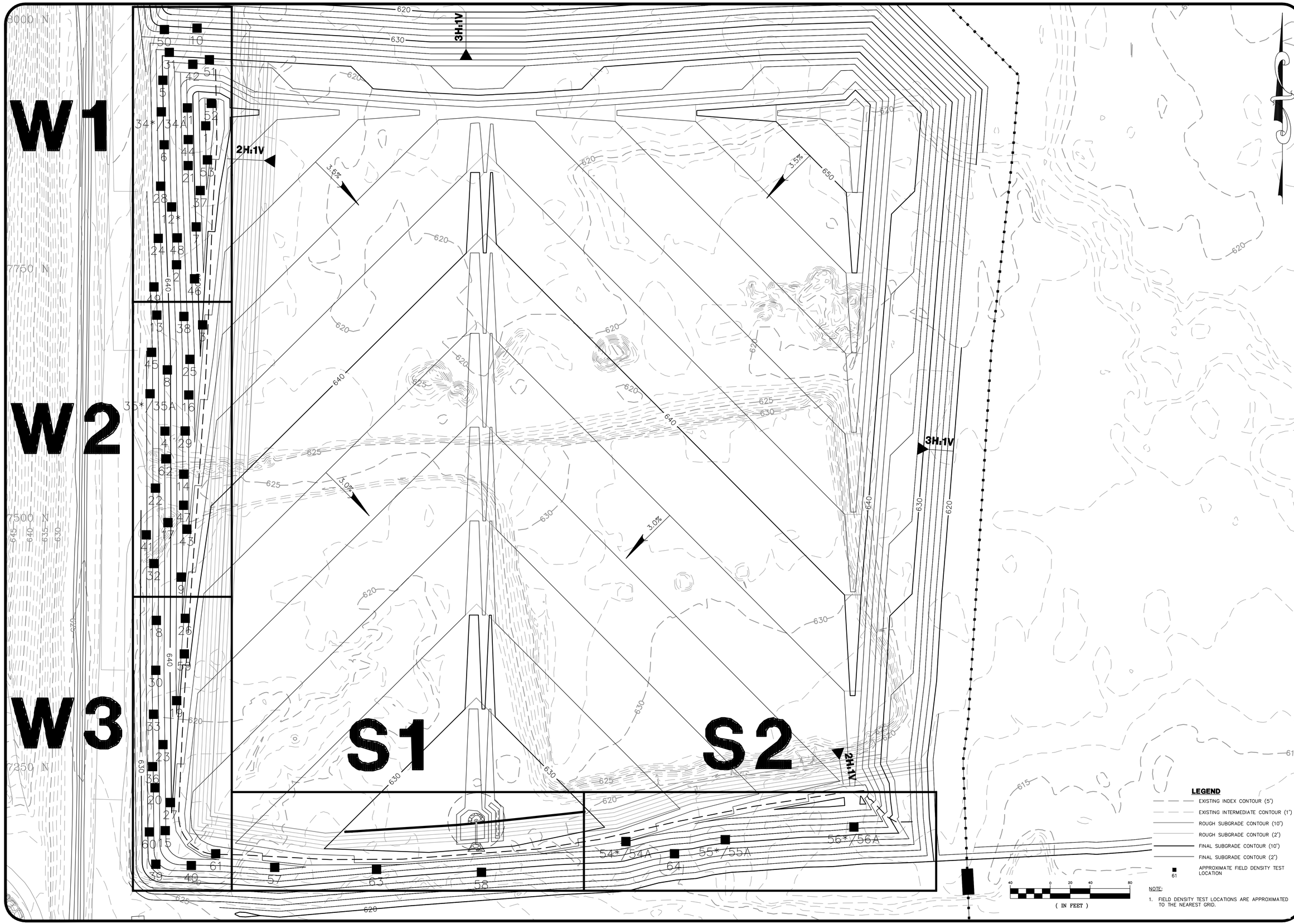
Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LeGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.		Staff Professional
Name (Technical Responsibility)	*Signature*	*Position*

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953



NOTE:

1. FIELD DENSITY TEST LOCATIONS ARE APPROXIMATED TO THE NEAREST GRID.

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY

CELL 1 STRUCTURAL FILL
FIELD DENSITY TESTING GRID
(300' X 100')

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: KB	CHECKED BY:
DESIGNED BY:	APPROVED BY:
PROJECT NUMBER 1356-06-825	
SCALE: 1" = 40'	DATE: 5-8-09
DRAWING: 4	OF: 6

DRAWING PATH: G:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\GRID\STRUCTURAL FILL.DWG

APPENDIX I – EARTHWORKS
Section 3 – Compacted Soil Liner

Compacted Soil Liner Test Pad Laboratory Test Results
Compacted Soil Liner Full Scale Laboratory Test Results
Compacted Soil Liner Field Density Test Results
Compacted Soil Liner Field Density Test Locations
Compacted Soil Liner As-Built Drawing
Compacted Soil Liner Thickness Verification

Compacted Soil Liner Laboratory Test Results

SUMMARY OF COMPACTED SOIL LINER (TEST PAD) LABORATORY TEST DATA

Sample No.	Sample Depth (ft)	Sample Type[1]	Soil Description	USCS Classification	% Finer No. 200 (ASTM D422)	Atterberg Limits (ASTM D4318)			Proctor Data (ASTM D698)		Hydraulic Conductivity (ASTM D5084)		
											Testing Conditions		k (cm/sec)
						LL	PL	PI	Max. Dry Density (pcf)	Opt. Moisture Content (%)	Dry Density (pcf)	Moisture Content (%)	
Perm #1[2]	Lift 1	UD	Or. Red Br. Cl. **Silt** with C. to F. Sand	MH							80.0	31.4	1.80×10^{-04}
Perm #2[2]	Lift 1	UD	Or. Red Br. Cl. **Silt** with C. to F. Sand	MH							86.8	30.7	1.87×10^{-05}
Perm #1A[3]	Lift 1	UD	Or. Red Br. Cl. **Silt** with C. to F. Sand	MH							91.2	28.7	1.50×10^{-06}
Perm #2A[3]	Lift 1	UD	Or. Red Br. Cl. **Silt** with C. to F. Sand	MH							91.5	31.3	1.64×10^{-06}
Perm #3	Lift 2	UD	Or. Red Br. Cl. **Silt** with M. to F. Sand	MH							87.5	32	5.40×10^{-06}
Perm #5	Lift 3	UD	Red Or. Br. M. to F. Sa. Cl. **Silt**	MH							93.1	27.6	5.30×10^{-06}
B-1	Lift 1	Bulk	Or. Red Br. Cl. **Silt** with C. to F. Sand	MH	74.2	71	37	34	94.9	24.3	89.5	26.3	5.25×10^{-06}
B-2	Lift 2	Bulk	Or. Red Br. Cl. **Silt** with M. to F. Sand	MH	76.1	72	44	28	96.1	24.4	90.8	27.8	1.76×10^{-06}
B-3	Lift 3	Bulk	Red Or. Br. M. to F. Sa. Cl. **Silt**	MH	69.3	67	38	29	88.4	29.9			

[1] UD = Undisturbed Sample (ASTM D-1587)

[2] Sample did not meet permeability requirement of 1×10^{-05} cm/sec

[3] Sample taken from 18" Shelby tube pushed through entire compacted soil liner; first 6" of sample tested to provide retest of Lift

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 09 Project Name: Allen Steam Station RAB Ash Landfill 1/2/2009

Sample Name: Perm #1 SCLTP-1 Lift 1

Sample Description: Orange Red Brown Clayey Silt w/Coarse to Fine Sand (MH)

Type of Sample: Undisturbed

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.193	Tare No.	G-12	γ_{wet} (pcf)				Panel No	4
Leng. (cm)	9.208	WWS+ Tare (gm)	245.87	γ_{dry} (pcf)				Cell P (psi)	72.5
Area (cm^2)	40.64	WDS+Tare (gm)	206.9	w (%)				Influent P (psi)	70.3
Vol. (cm^3)	374.18	WT of Water (gm)	38.97	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	630	WT of TARE (gm)	82.83	γ_{wet} (pcf)					
		WT Dry Soil (gm)	124.07	γ_{dry} (pcf)				Gradient	2.3
		w (%)	31.4	w (%)	31.4				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1					13	0.0	22.2				
	21			66	13	1.1	21.1	1.1	21.1	0.9760	1.75E-04
2					13	0.0	22.2				
	21			71	13	1.1	21.1	1.1	21.1	0.9760	1.62E-04
3					13	0.0	22.2				
	21			62	13	1.1	21.1	1.1	21.1	0.9760	1.86E-04
4					13	0.0	22.2				
	21			64	13	1.1	21.1	1.1	21.1	0.9760	1.80E-04
5					13	0.0	22.2				
	21			64	13	1.1	21.1	1.1	21.1	0.9760	1.80E-04
6					13	0.0	22.2				
	21			63	13	1.1	21.0	1.2	21.1	0.9760	1.91E-04
										Ave. K (cm/sec)	1.80E-04
										(Runs 2 thru 5)	
										Ave. K (m/sec)	1.8E-06

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 09 Project Name: Allen Steam Station RAB Ash Landfill 1/7/2009

Sample Name: Perm #2 Lift 1

Sample Description: Orange Red Brown Clayey Silt w/Coarse to Fine Sand (MH)

Type of Sample: Undisturbed

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.257	Tare No.	G-12	γ_{wet} (pcf)	112.6			Panel No	3
Leng. (cm)	7.071	WWS+ Tare (gm)	412.4	γ_{dry} (pcf)	86.1			Cell P (psi)	72.5
Area (cm^2)	41.36	WDS+Tare (gm)	335.07	w (%)	30.7			Influent P (psi)	70.2
Vol. (cm^3)	292.47	WT of Water (gm)	77.33	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	531.2	WT of TARE (gm)	82.86	γ_{wet} (pcf)	113.4				
		WT Dry Soil (gm)	252.21	γ_{dry} (pcf)	86.8			Gradient	2.0
		w (%)	30.7	w (%)	30.7				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		10	35		9	0.0	14.8				
	22	10	42	360	9.1	0.7	14.1	0.7	14.1	0.9530	2.25E-05
2		10	43		9.1	0.0	14.8				
	22	10	52	507	9.1	0.7	14.0	0.8	14.1	0.9530	1.71E-05
3		10	58		9.1	0.0	14.8				
	22	11	4	360	9.1	0.7	14.1	0.7	14.1	0.9530	2.25E-05
4		11	5		9.1	0.0	14.8				
	22	11	13	480	9.1	0.7	14.0	0.8	14.1	0.9530	1.81E-05
5		11	14		9.1	0.0	14.8				
	22	11	22	480	9.1	0.7	14.0	0.8	14.1	0.9453	1.79E-05
6		11	24		9.1	0.0	14.8				
	22	11	32	480	9.1	0.7	14.0	0.8	14.1	0.9453	1.79E-05
										Ave. K (cm/sec)	1.87E-05
										(Runs 2 thru 5)	
										Ave. K (m/sec)	1.87E-07

CONSTANT HEAD PERMEABILITY

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Steam Station RAB Ash Landfill 1/14/2009

Sample Name: Perm #1A SCLTP-1A

Sample Description:

Type of Sample: Undisturbed

Sample Data		Molding Moisture Content		Target Molding Conditon		Additonal Data	
Diam. (cm)	7.269	Tare No.	G-2	γ_{wet} (pcf)		Panel No	16
Leng. (cm)	6.67	WWS+ Tare (gm)	362.22	γ_{dry} (pcf)		Cell P (psi)	72.5
Area (cm^2)	41.50	WDS+Tare (gm)	299.81	w (%)		Influent P (psi)	70.2
Vol. (cm^3)	276.80	WT of Water (gm)	62.41	Actual Molding Condition		Effluent P (psi)	70.0
WWS (gm)	520.5	WT of TARE (gm)	82.36	γ_{wet} (pcf)	117.4		
		WT Dry Soil (gm)	217.45	γ_{dry} (pcf)	91.2	Gradient	2.1
		w (%)	28.7	w (%)	28.7		

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		11	5		14.6	0.0	14.8				
	21	11	58	3180	14.6	0.7	14.3	0.6	14.1	0.9760	2.10E-06
2		11	59		14.6	0.0	14.8				
	21	13	24	5100	14.6	0.7	14.0	0.8	14.1	0.9760	1.64E-06
3		13	25		14.6	0.0	14.8				
	21	14	50	5100	14.6	0.7	14.0	0.8	14.1	0.9760	1.64E-06
4		14	53		14.6	0.0	14.8				
	21	16	14	4860	14.6	0.7	14.1	0.7	14.1	0.9760	1.61E-06
5		9	1		14.7	0.0	14.8				
	21	11	7	7560	14.7	0.7	14.0	0.8	14.1	0.9760	1.11E-06
										Ave. K (cm/sec)	1.50E-06
										(Runs 2 thru 5)	
										Ave. K (m/sec)	1.5E-08

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Steam Station 2/3/2009

Sample Name: Perm #2A SCLTP-2A Lift 1

Sample Description:

Type of Sample: Undisturbed

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.249	Tare No.	S-9	γ_{wet} (pcf)				Panel No	16
Leng. (cm)	9.258	WWS+ Tare (gm)	435.4	γ_{dry} (pcf)				Cell P (psi)	72.5
Area (cm^2)	41.27	WDS+Tare (gm)	351.42	w (%)				Influent P (psi)	70.2
Vol. (cm^3)	382.09	WT of Water (gm)	83.98	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	734.9	WT of TARE (gm)	83.38	γ_{wet} (pcf)					
		WT Dry Soil (gm)	268.04	γ_{dry} (pcf)				Gradient	1.5
		w (%)	31.3	w (%)	31.3				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		9	3		11	0.0	14.8				
	22	10	15	4320	11	0.7	14.1	0.7	14.1	0.9530	2.46E-06
2		10	17		11	0.0	14.8				
	22	12	2	6300	11	0.7	14.1	0.7	14.1	0.9530	1.69E-06
3		12	25		11	0.0	14.8				
	22	14	18	6780	11	0.7	14.1	0.7	14.1	0.9530	1.57E-06
4		14	19		11	0.0	14.8				
	22	16	18	7140	11	0.7	14.1	0.7	14.1	0.9530	1.49E-06
5		8	29		11.1	0.0	14.8				
	21	10	2	5580	11.1	0.7	14.2	0.7	14.1	0.9760	1.81E-06
										Ave. K (cm/sec)	1.64E-06
										(Runs 2 thru 5)	
										Ave. K (m/sec)	1.64E-08

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 09 Project Name: Allen Steam Station RAB Ash Landfill 1/2/2009

Sample Name: Perm 3 SCLTP-3 Lift 2

Sample Description: Orange Red Brown Clayey Silt /Medium to Fine Sand (MH)

Type of Sample: Undisturbed

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.282	Tare No.	S-4	γ_{wet} (pcf)				Panel No	3
Leng. (cm)	8.176	WWS+ Tare (gm)	290.95	γ_{dry} (pcf)				Cell P (psi)	72.5
Area (cm^2)	41.65	WDS+Tare (gm)	239.95	w (%)				Influent P (psi)	70.3
Vol. (cm^3)	340.51	WT of Water (gm)	51	**Actual Molding Condition**				Effluent P (psi)	70.0
WWS (gm)	629.9	WT of TARE (gm)	80.65	γ_{wet} (pcf)					
		WT Dry Soil (gm)	159.3	γ_{dry} (pcf)				Gradient	2.6
		w (%)	32.0	w (%)	32.0				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		1	38		7.5	0.0	22.2				
	21	2	9	1860	7.5	1.1	21.0	1.2	21.1	0.9760	5.61E-06
2		2	10		7.5	0.0	22.2				
	21	2	42	1920	7.5	1.1	21.0	1.2	21.1	0.9760	5.44E-06
3		2	45		7.5	0.0	22.2				
	21	3	20	2100	7.5	1.2	20.9	1.3	21.1	0.9760	5.40E-06
4		3	45		7.6	0.0	22.2				
	21	4	20	2100	7.6	1.2	20.9	1.3	21.1	0.9760	5.40E-06
5		11	30		7.6	0.0	22.2				
	21	12	1	1860	7.6	1.2	21.2	1.1	21.1	0.9760	5.37E-06
										Ave. K (cm/sec)	5.40E-06
										(Runs 2 thru 5)	
										Ave. K (m/sec)	5.4E-08

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 09 Project Name: Allen Steam Station RAB Ash Landfill 1/2/2009

Sample Name: Perm 5 SCLTP-5 Lift 3

Sample Description: Red Orange Brown Medium to Fine Sandy Clayey Silt (MH)

Type of Sample: Undisturbed

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.262	Tare No.	S-2	γ_{wet} (pcf)				Panel No	5
Leng. (cm)	10.64	WWS+ Tare (gm)	241.5	γ_{dry} (pcf)				Cell P (psi)	72.5
Area (cm^2)	41.42	WDS+Tare (gm)	206.84	w (%)				Influent P (psi)	70.3
Vol. (cm^3)	440.70	WT of Water (gm)	34.66	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	838.5	WT of TARE (gm)	81.44	γ_{wet} (pcf)					
		WT Dry Soil (gm)	125.4	γ_{dry} (pcf)				Gradient	2.0
		w (%)	27.6	w (%)	27.6				

K = (Q x L) / (t x H x A)

Run	Temp. (°C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		1	40		12.5	0.0	22.2				
	21	2	18	2280	12.5	1.1	21.2	1.1	21.1	0.9760	5.47E-06
2		2	19		12.5	0.0	22.2				
	21	2	58	2340	12.5	1.1	21.2	1.1	21.1	0.9760	5.33E-06
3		3	8		12.5	0.0	22.2				
	21	3	52	2640	12.5	1.2	21.0	1.2	21.1	0.9760	5.40E-06
4		3	59		12.6	0.0	22.2				
	21	4	45	2760	12.6	1.2	21.0	1.2	21.1	0.9760	5.16E-06
5		11	32		12.6	0.0	22.0				
	21	12	13	2460	12.6	1.2	21.0	1.1	21.1	0.9760	5.31E-06
										Ave. K (cm/sec)	5.30E-06
										(Runs 2 thru 5)	
										Ave. K (m/sec)	5.3E-08

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 09 Project Name: Allen Steam Station RAB Ash Landfill 1/7/2009

Sample Name: B-1 S-1

Sample Description: Orange Red Brown Clayey Silt w/Coarse to Fine Sand (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon		Additonal Data	
Diam. (cm)	7.282	Tare No.	S-2	γ_{wet} (pcf)		Panel No	5
Leng. (cm)	7.78	WWS+ Tare (gm)	332.11	γ_{dry} (pcf)		Cell P (psi)	72.5
Area (cm^2)	41.65	WDS+Tare (gm)	279.83	w (%)		Influent P (psi)	70.2
Vol. (cm^3)	324.02	WT of Water (gm)	52.28	**Actual Molding Condition**		Effluent P (psi)	70.0
WWS (gm)	587.1	WT of TARE (gm)	81.4	γ_{wet} (pcf)	113.1		
		WT Dry Soil (gm)	198.43	γ_{dry} (pcf)	89.5	Gradient	1.8
		w (%)	26.3	w (%)	26.3 w_{opt} = 24.3 %		

K = (Q x L) / (t x H x A)

Run	Temp. (°C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		2	17		21	0.0	14.8				
	22	2	42	1500	21	0.7	14.1	0.7	14.1	0.9530	5.90E-06
2		2	43		21	0.0	14.8				
	22	3	12	1740	21	0.7	14.0	0.8	14.1	0.9530	5.45E-06
3		3	17		21	0.0	14.8				
	22	3	49	1920	21	0.7	14.0	0.8	14.1	0.9530	4.94E-06
4		3	50		21	0.0	14.8				
	22	4	16	1560	21	0.7	14.1	0.7	14.1	0.9530	5.68E-06
5		4	17		21	0.0	14.8				
	22	4	47	1800	21	0.7	14.1	0.7	14.1	0.9530	4.92E-06
										Ave. K (cm/sec)	5.25E-06
										(Runs 2 thru 5)	
										Ave. K (m/sec)	5.25E-08

Liquid Limit, Plastic Limit, and Plastic Index

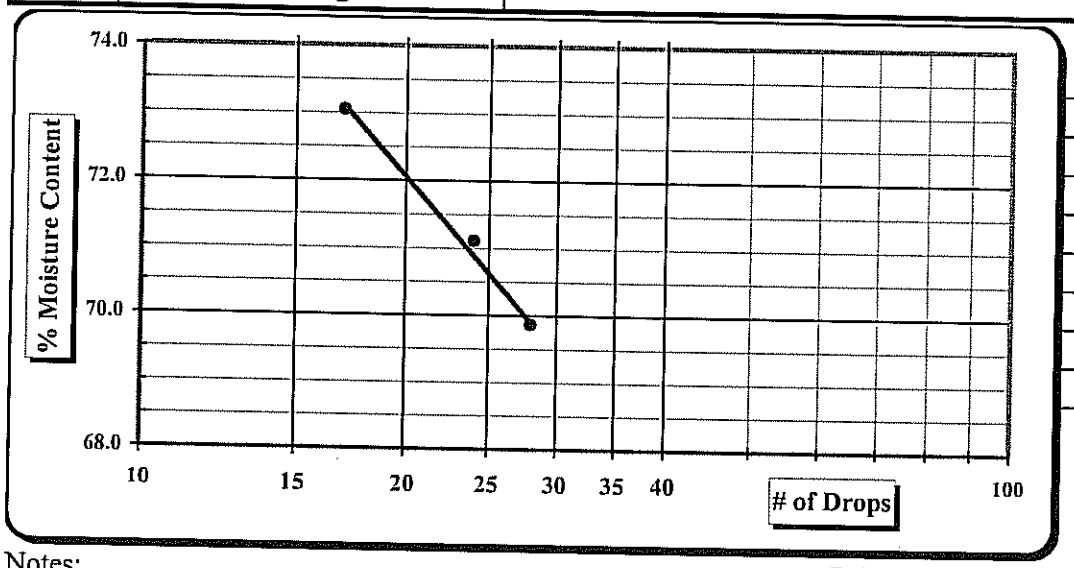
S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 1/6/09
Test Date(s): 12/30-1/6/09

Boring #: B-1 Sample #: Lift 1 Sample Date: 12/29/08
Location: Compacted Soil Liner TP Offset: Depth:
Sample Description: Orange Red Brown Clayey Silt w/Coarse to Fine Sand (MH)

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	FF	47	59				33	W	
A	Tare Weight	16.85	15.68	15.78				**15.87**	16.00	
B	Wet Soil Weight + A	24.63	24.92	25.99				22.28	22.69	
C	Dry Soil Weight + A	21.43	21.08	21.68				20.54	20.88	
D	Water Weight (B-C)	3.20	3.84	4.31				1.74	1.81	
E	Dry Soil Weight (C-A)	4.58	5.40	5.90				4.67	4.88	
F	% Moisture Content (D/E)*100	69.9%	71.1%	73.1%				37.3%	37.1%	
N	# OF DROPS	28	24	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							37.2%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	71
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	37
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	34
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	MH

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: Ken Daly *B-1* *Signature* Project Engineer *Position*

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 12/30-1/6/09
Report Date: 1/6/09

Boring #: B-1 Sample #: Lift 1 Sample Date: 12/29/08
Location: Compacted Soil Liner TP Offset: Depth: Bulk
Sample Description: Orange Red Brown Clayey Silt w/Coarse to Fine Sand (MH)

Pan #:		Beaker #:	
Hydrometer Jar #:			
Pan Tare Weight (grams):			
Total Sample Air Dried Wt. + tare wt. (grams):	341.17		
Weight of Total Sample Air Dried:	341.17		
Weight of Air Dried Hydrometer Sample (g):	50.03		
Total Sample Oven Dried:	338.56		
Hydrometer Sample Oven Dried (W):	49.64		
% Passing #10:	99.2%		
Correction Factor a (Table 1):	1.00		

Apparent Relative Density (Assumed) 2.650

	Moisture Content	Hygroscopic	Natural
	Tare #	33	
A	Tare Wt.	15.90	
B	Wet Wt. + A	30.14	
C	Dry Wt. + A	30.03	
D	Water Wt. (B-C)	0.11	
E	Dry Wt. (C-A)	14.13	
	% Moisture (100 x D/E)	0.78%	

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		100.0%
#4	0.0	Soil Mortar	100.0%
#10	2.9	**100.0%**	99.2%
#20	2.9	94.2%	93.4%
#40	6.5	86.9%	86.2%
#60	8.9	82.1%	81.4%
#100	10.6	78.6%	78.0%
#200	12.5	74.8%	74.2%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	25.8%	< 4.74 mm and > 0.075 mm	Type: Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	74.2%	< 0.075	Dispersion Time: 1 min.
Coarse Sand:	0.8%	< 4.75 mm and > 2.00 mm	Silt:	25.7%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate: 40 g./ Liter
Medium Sand:	13.0%	< 2.00 mm and > 0.425 mm	Clay:	48.5%	< 0.005 mm	
Fine Sand:	12.0%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒ **Composite Correction** ☐

Liquid Limit 71 Plastic Limit 37 Plastic Index 34 Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	21.5	42.0	5.0		37.00	74.5%	73.9%	10.2	0.01340	0.04285
	2	21.5	40.0	5.0		35.00	70.5%	69.9%	10.6	0.01340	0.03078
	5	21.5	37.5	5.0		32.50	65.5%	64.9%	11.0	0.01340	0.01984
	15	21.5	35.0	5.0		30.00	60.4%	59.9%	11.4	0.01340	0.01167
	30	21.5	31.5	5.0		26.50	53.4%	52.9%	11.9	0.01340	0.00846
	60	21.5	30.0	5.0		25.00	50.4%	49.9%	12.2	0.01340	0.00604
	250	21.5	27.0	5.0		22.00	44.3%	43.9%	12.7	0.01340	0.00302
	1440	21.5	24.0	5.0		19.00	38.3%	37.9%	13.2	0.01340	0.00128

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))

(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: Ken Daly *Signature* *Project Engineer* *Position*

S&ME, INC. **9751Southern Pine Blvd., Charlotte, NC 28273**

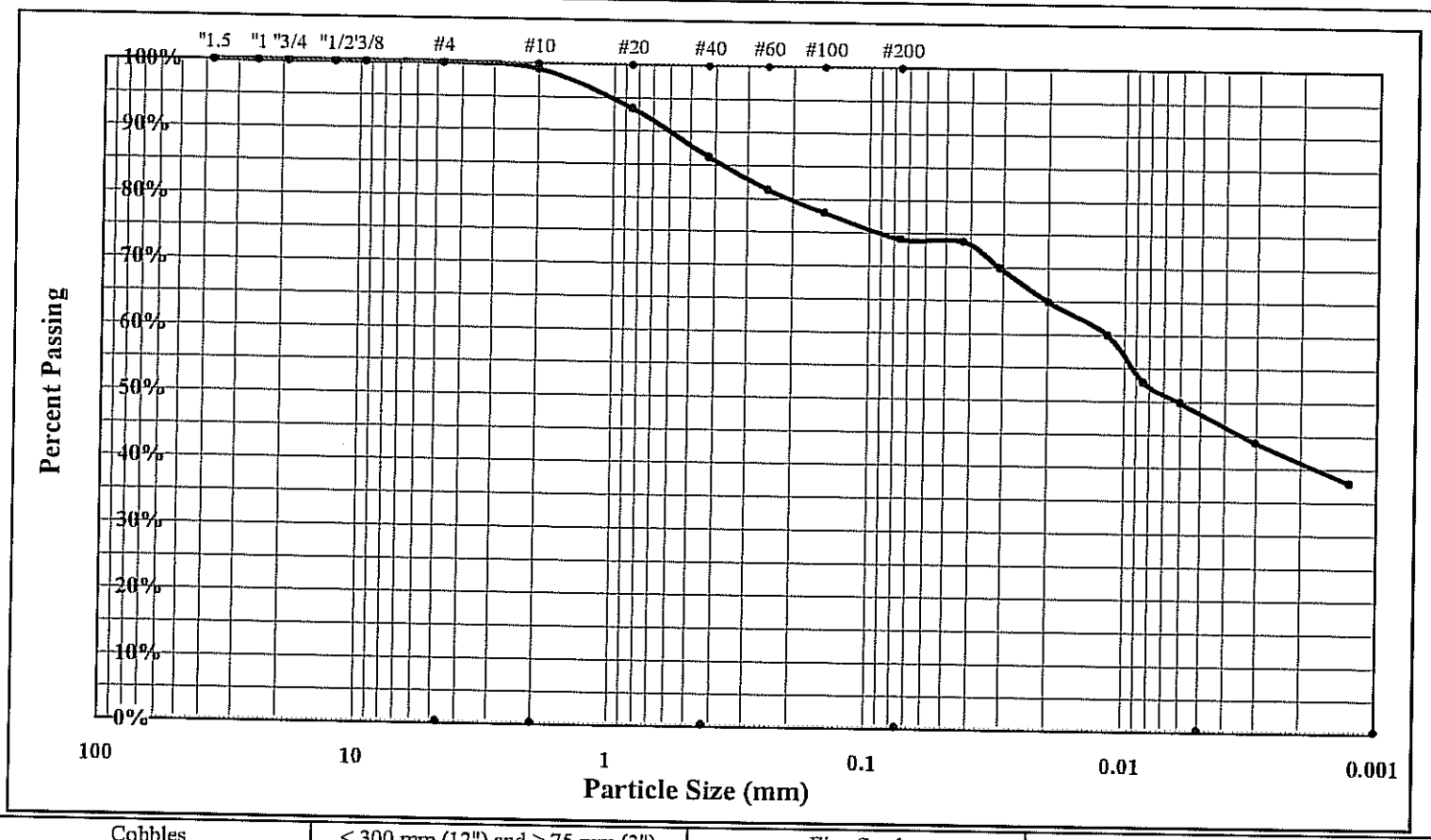
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	1/6/09
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/30-1/6/09
Client Name:	Duke Energy		
Client Address:			

Boring #:	B-1	Sample #:	Lift 1	Sample Date:	12/29/08
Location:	Compacted Soil Liner TP	Offset:		Depth:	Bulk
Sample Description:	Orange Red 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	0	Gravel	0.0%	Silt	25.7%
Silt & Clay (% Passing #200)	74.2%	Sand	25.8%	Clay	48.5%
Apparent Relative Density (Assumed)	2.650	Moisture Content		Colloids	
Liquid Limit	71	Plastic Limit	37	Plastic Index	34

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 421: Dry Preparation of Soil Samples
ASTM D 854: Specific Gravity of Soils

Technical Responsibility: Ken Daly _____ Project Engineer
Signature Position

Moisture - Density Relationship

S&ME

S&ME Project #: **1356-06-825 Phase 09** Test Date(s): 1/2-5/09
Project Name: Allen Steam Station RAB Ash Landfill Report Date: January 5, 2009
Client Name: Duke Energy
Project Address:
Boring #: 1 Sample #: S-1 Sample Date: December 29, 2008
Location: Compacted Soil Liner TP Offset: Depth: Bulk
Sample Description: Orange Red Brown Clayey Silt w/Coarse to Fine Sand (MH)

Liquid Limit: 71 Specific Gravity:
Plastic Limit: 37 Plastic Index: 34

Natural Moisture Content:
Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: **94.9** **Opt. MC %:** **24.3**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:						
	Tare #:						
A. Tare Weight	A.	159.17	155.87	159.26	161.78	157.66	160.28
B. Wet Wt + Tare Wt	B.	824.65	867.27	708.54	631.65	798.98	718.94
C. Dry Wt. + Tare Wt.	C.	721.31	744.15	605.32	536.57	659.82	589.17
D. Water Weight	B-C	103.34	123.12	103.22	95.08	139.16	129.77
E. Dry Weight	C-A	562.14	588.28	446.06	374.79	502.16	428.89
F. Moisture Content	100*D/E	**18.4%**	**20.9%**	**23.1%**	**25.4%**	**27.7%**	**30.3%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5740	5825	5935	5961	5966	5949
H. Wt. of Mold	H.	4172	4172	4172	4172	4172	4172
I. Wt. of Soil (g. or lbs.)	G-H	1568.000	1653.000	1763.000	1789.000	1794.000	1777.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.457	3.644	3.887	3.944	3.955	3.918
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	103.7	109.3	116.6	118.3	118.6	117.5
M. Dry Density	L/(1+F)	**87.6**	**90.4**	**94.7**	**94.3**	**92.9**	**90.2**

ASTM D558 ☐ ASTM D 698 ☐ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒
Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐
Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐
Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez

Technical Responsibility: Ken Daly

Certification #

Signature

Project Engineer
Position

Moisture - Density Report

S&ME

S&ME Project #: **1356-06-825 Phase 09**
Project Name: **Allen Steam Station RAB Ash Landfill**
Client Name: Duke Energy
Project Address:

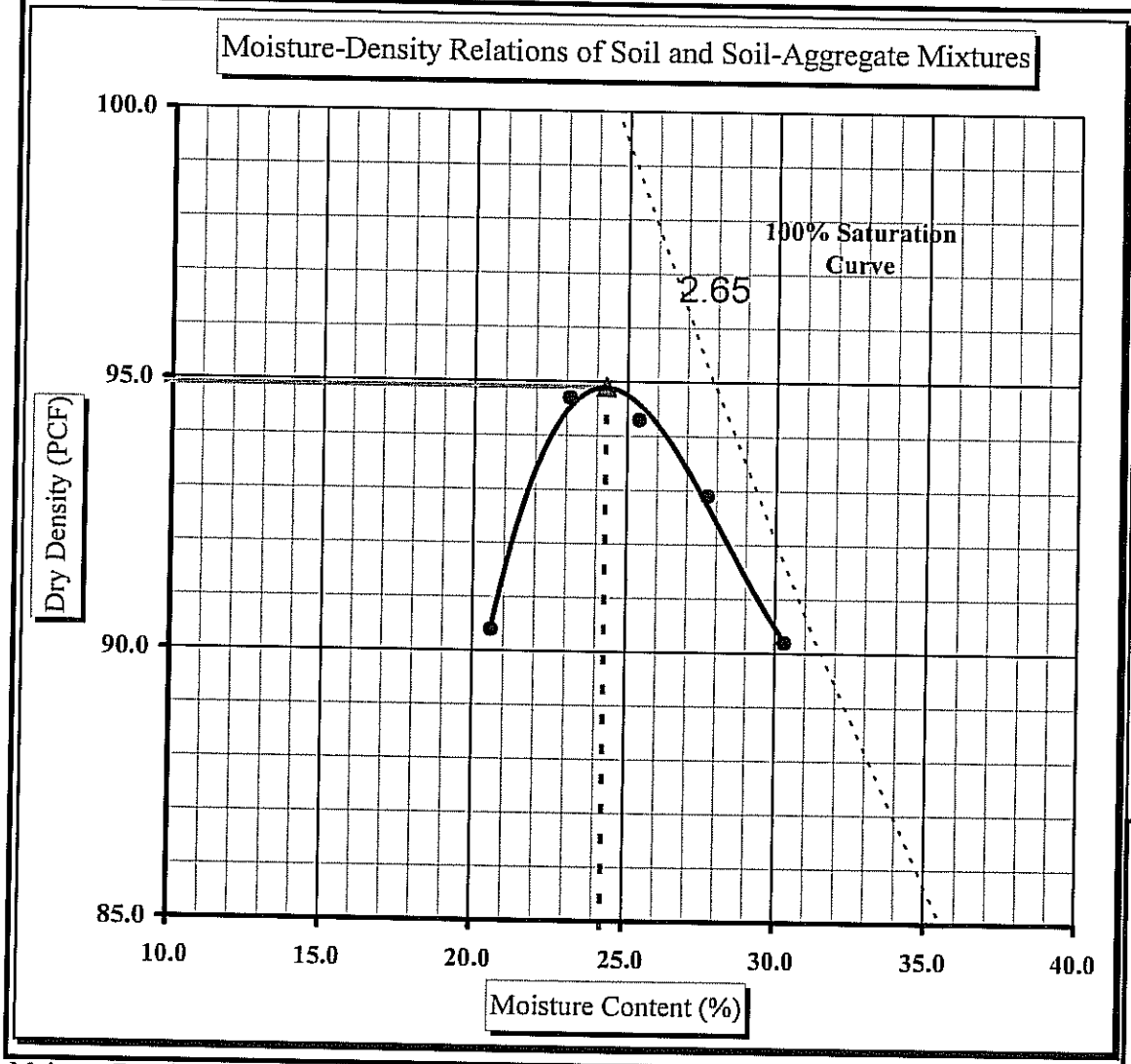
Report Date: January 5, 2009
Test Date(s): 1/2-5/09

CTP-1 (KB)

Boring #: 1 Sample #: ~~S-1~~ Sample Date: December 29, 2008
Location: Compacted Soil Liner TP Offset: Depth: Bulk
Sample Description: Orange Red Brown Clayey Silt w/Coarse to Fine Sand (MH)

Maximum Dry Density **94.9** **PCF.** **Optimum Moisture Content** **24.3** **%**

Method A



Soil Properties

Natural Moisture Content:

Liquid Limit: 71

Plastic Limit: 37

Plastic Index: 34

Specific Gravity:

% Passing

3/4"
1/2"
3/8"
#4 100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References:
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 09 Project Name: Allen Steam Station RAB Ash Landfill 1/7/2009

Sample Name: B-2 S-2

Sample Description: Orange Red Brown Clayey Silt w/Medium to Fine Sand (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon		Additonal Data	
Diam. (cm)	7.277	Tare No.	S-4	γ_{wet} (pcf)		Panel No	4
Leng. (cm)	7.699	WWS+ Tare (gm)	316.8	γ_{dry} (pcf)		Cell P (psi)	72.5
Area (cm^2)	41.59	WDS+Tare (gm)	265.45	w (%)		Influent P (psi)	70.2
Vol. (cm^3)	320.21	WT of Water (gm)	51.35	**Actual Molding Condition**		Effluent P (psi)	70.0
WWS (gm)	594.5	WT of TARE (gm)	80.64	γ_{wet} (pcf)	116.0		
		WT Dry Soil (gm)	184.81	γ_{dry} (pcf)	90.8	Gradient	1.8
		w (%)	27.8	w (%)	27.8		
				Wopt (%)	24.4		

K = (Q x L) / (t x H x A)

Run	Temp. (°C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		2	7		19	0.0	14.8				
	22	3	19	4320	19	0.7	14.3	0.6	14.1	0.9530	1.74E-06
2		3	20		19	0.0	14.8				
	22	4	45	5100	19	0.7	14.2	0.7	14.1	0.9530	1.60E-06
3		10	36		19.1	0.0	14.8				
	22	11	50	4440	19.1	0.7	14.1	0.7	14.1	0.9530	1.98E-06
4		8	43		19.1	0.0	14.8				
	22	10	1	4680	19.1	0.7	14.1	0.7	14.1	0.9530	1.87E-06
5		10	24		19.1	0.0	14.8				
	22	11	55	5460	19	0.7	14.1	0.7	14.1	0.9530	1.61E-06
										Ave. K (cm/sec)	1.76E-06
										(Runs 2 thru 5)	
										Ave. K (m/sec)	1.76E-08

Liquid Limit, Plastic Limit, and Plastic Index

S&ME

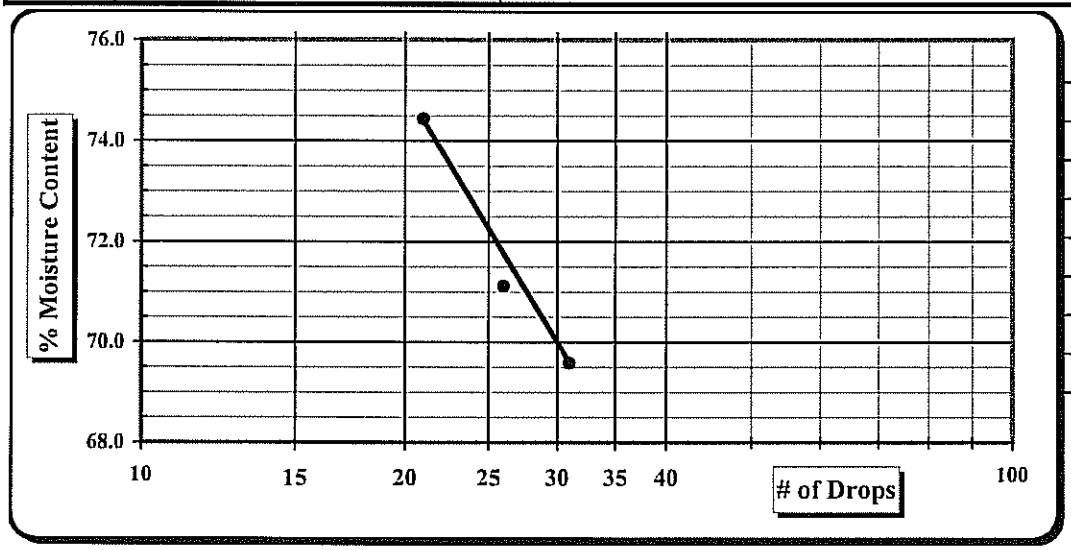
Project #:	**1356-06-825**	Report Date:	1/6/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	12/30-1/6/09
Client Name:	Duke Energy		
Client Address:			

Boring #: B-2 Sample #: Lift 2 Sample Date: 12/29/08

Location: Compacted Soil Liner TP Offset: Depth: Bulk

Sample Description: Orange Red Brown Clayey Silt w/Medium to Fine Sand (MH)

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	45	31	LL				34	PO	
A	Tare Weight	13.92	13.94	16.94				13.97	15.12	
B	Wet Soil Weight + A	22.45	22.53	25.54				21.04	21.46	
C	Dry Soil Weight + A	18.95	18.96	21.87				18.88	19.53	
D	Water Weight (B-C)	3.50	3.57	3.67				2.16	1.93	
E	Dry Soil Weight (C-A)	5.03	5.02	4.93				4.91	4.41	
F	% Moisture Content (D/E)*100	69.6%	71.1%	74.4%				44.0%	43.8%	
N	# OF DROPS	31	26	21				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							43.9%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	72
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	44
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	28
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	MH

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: Ken Daly _____ *Signature* Project Engineer *Position*

Moisture - Density Relationship

S&ME

S&ME Project #:	**1356-06-825 Phase 09**	Test Date(s):	1/2-5/09
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	January 5, 2009
Client Name:	Duke Energy		
Project Address:			
Boring #: 2	Sample #: S-2	Sample Date:	December 29, 2008
Location: Compacted Soil Liner TP	Offset:	Depth:	Bulk
Sample Description:	Orange Red Brown Clayey Silt w/Medium to Fine Sand (MH)		

Liquid Limit: 72 Specific Gravity:

Plastic Limit: 44 Plastic Index: 28

Natural Moisture Content:

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	
3/8"	
#4	100.0

MDD: 96.1 **Opt. MC %: 24.4**

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Sample #:						
	Water Added:						
	Tare #:						
A. Tare Weight	A.	151.92	153.55	157.81	163.16	166.81	
B. Wet Wt + Tare Wt	B.	819.29	842.65	708.06	730.52	809.92	
C. Dry Wt. + Tare Wt.	C.	707.51	717.1	597.88	606.9	711.81	
D. Water Weight	B-C	111.78	125.55	110.18	123.62	98.11	0
E. Dry Weight	C-A	555.59	563.55	440.07	443.74	545	0
F. Moisture Content	100*D/E	**20.1%**	**22.3%**	**25.0%**	**27.9%**	**18.0%**	**#DIV/0!**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5865	5937	5987	5969	5795	
H. Wt. of Mold	H.	4172	4172	4172	4172	4172	4172
I. Wt. of Soil (g. or lbs.)	G-H	1693.000	1765.000	1815.000	1797.000	1623.000	-4172.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.732	3.891	4.001	3.962	3.578	-4172.000
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	111.9	116.7	120.0	118.8	107.3	-125118.3
M. Dry Density	L/(1+F)	**93.2**	**95.4**	**96.0**	**92.9**	**90.9**	**#DIV/0!**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity: ASTM D 4318 ☒ AASHTO T 89 ☐ AASHTO T 90 ☐

Sieve Analysis / Particle Size Analysis: ASTM C136 ☐ AASHTO T 27 ☐ ASTM D 422 ☒ AASHTO T 88 ☐

Specific Gravity of Soil: ASTM D 854 ☐ AASHTO T 100 ☐

Bulk Gravity of Oversize Fraction: ASTM C 127 ☐ AASHTO T 85 ☐

Soil Classification: ASTM D 2487 ☒ ASTM D 2488 ☐ AASHTO M 145 ☐

Technician Name: Eric Lopez

Certification #

Technical Responsibility: Ken Daly _____ Project Engineer

Signature *Position*

Moisture - Density Report

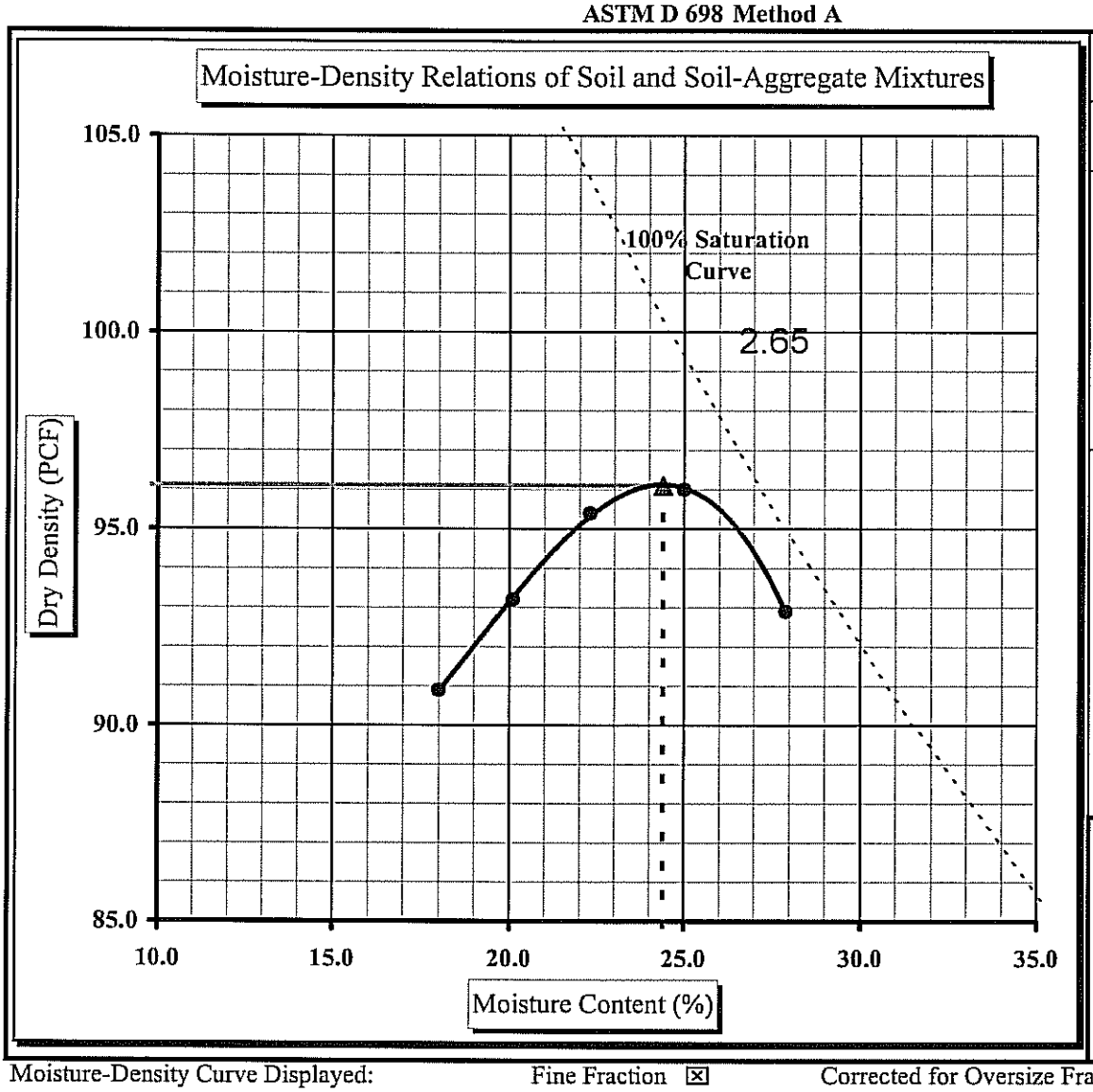
S&ME

S&ME Project #:	**1356-06-825 Phase 09**	Report Date:	January 5, 2009
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	1/2-5/09
Client Name:	Duke Energy		
Project Address:			

Boring #:	2	Sample #:	~~S-2~~ CTP-2 (KB)	Sample Date:	December 29, 2008
Location:	Compacted Soil Liner TP	Offset:		Depth:	Bulk
Sample Description:	Orange Red Brown Clayey Silt w/Medium to Fine Sand (MH)				

Maximum Dry Density **96.1** **PCF.** **Optimum Moisture Content** **24.4** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	
Liquid Limit:	72
Plastic Limit:	44
Plastic Index:	28
Specific Gravity:	

% Passing

3/4"	
1/2"	
3/8"	
#4	100

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 12/30-1/6/09
Report Date: 1/6/09

Boring #: B-2 Sample #: Lift 2 Sample Date: 12/29/08
Location: Compacted Soil Liner TP Offset: Depth: Bulk
Sample Description: Orange Red Brown Clayey Silt w/Medium to Fine Sand (MH)

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):		283.63		Tare #	59		
Weight of Total Sample Air Dried:		283.63	A	Tare Wt.	15.81		
Weight of Air Dried Hydrometer Sample (g):		50.02	B	Wet Wt. + A	26.47		
Total Sample Oven Dried:		281.77	C	Dry Wt. + A	26.40		
Hydrometer Sample Oven Dried (W):		49.69	D	Water Wt. (B-C)	0.07		
% Passing #10:		99.8%	E	Dry Wt. (C-A)	10.59		
Correction Factor a (Table 1):		1.00		% Moisture (100 x D/E)	0.66%		

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		100.0%
#4	0.0	Soil Mortar	100.0%
#10	0.4	**100.0%**	99.8%
#20	1.1	97.9%	97.7%
#40	4.7	90.5%	90.4%
#60	7.7	84.5%	84.4%
#100	9.8	80.4%	80.2%
#200	11.8	76.2%	76.1%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	23.9%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.0%	< 75 mm and > 4.75 mm	Silt & Clay:	76.1%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.2%	< 4.75 mm and > 2.00 mm	Silt:	26.1%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	9.4%	< 2.00 mm and > 0.425 mm	Clay:	50.0%	< 0.005 mm		
Fine Sand:	14.3%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **72** Plastic Limit **44** Plastic Index **28** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	21.5	42.5	5.0		37.50	75.5%	75.3%	10.1	0.01340	0.04268
	2	21.5	41.5	5.0		36.50	73.5%	73.3%	10.3	0.01340	0.03042
	5	21.5	39.5	5.0		34.50	69.4%	69.3%	10.6	0.01340	0.01954
	15	21.5	35.0	5.0		30.00	60.4%	60.3%	11.4	0.01340	0.01167
	30	21.5	32.0	5.0		27.00	54.3%	54.3%	11.9	0.01340	0.00843
	60	21.5	31.0	5.0		26.00	52.3%	52.2%	12.0	0.01340	0.00600
	250	21.5	27.5	5.0		22.50	45.3%	45.2%	12.6	0.01340	0.00301
	1440	22.0	24.5	5.0		19.50	39.2%	39.2%	13.1	0.01332	0.00127

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: Ken Daly _____ *Signature* *Project Engineer* *Position*

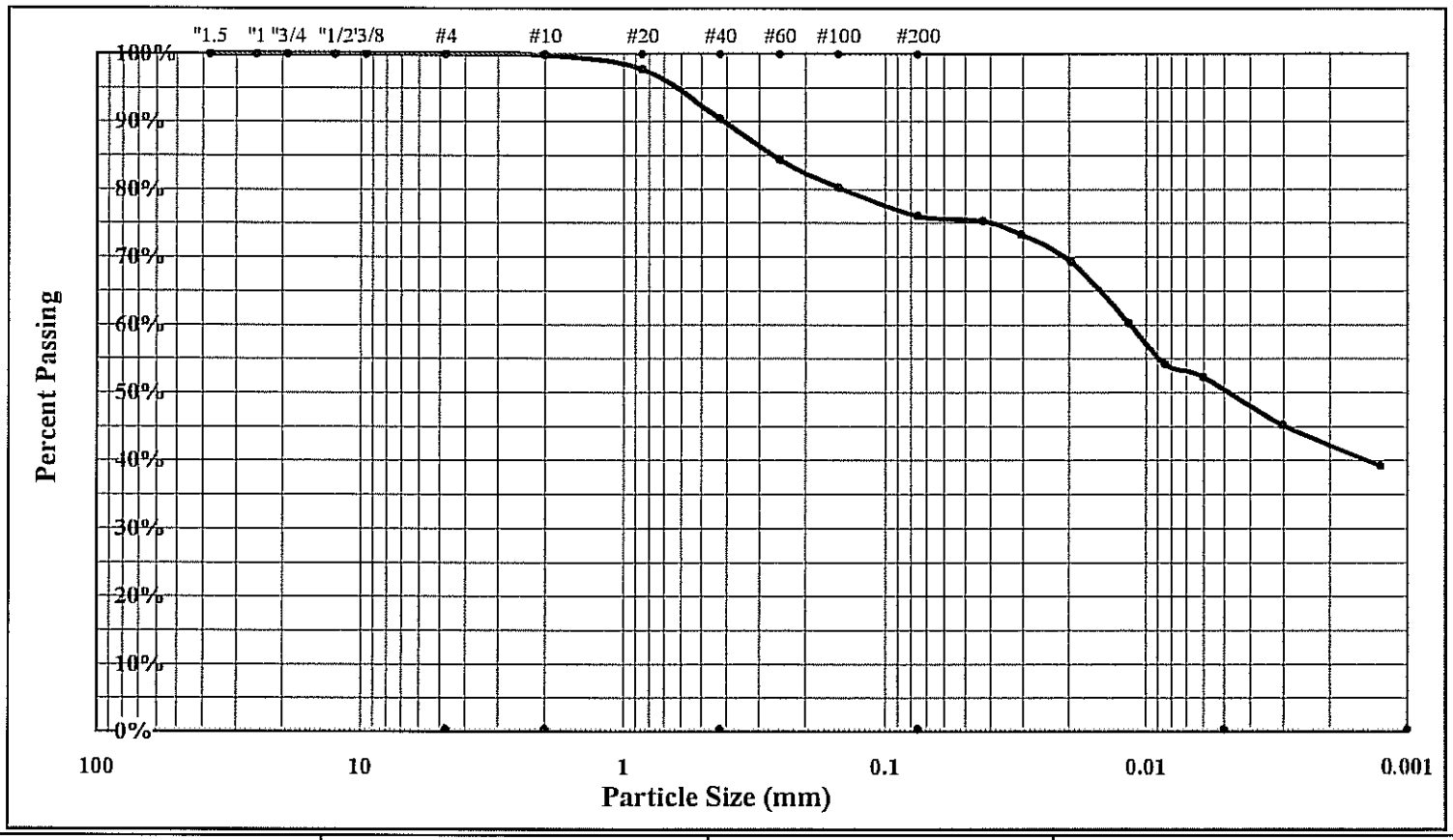
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	1/6/09
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/30-1/6/09
Client Name:	Duke Energy		
Client Address:			

Boring #:	B-2	Sample #:	Lift 2	Sample Date:	12/29/08
Location:	Compacted Soil Liner TP	Offset:		Depth:	Bulk
Sample Description:	Orange Red 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	0	Gravel	0.0%	Silt	26.1%
Silt & Clay (% Passing #200)	76.1%	Sand	23.9%	Clay	50.0%
Apparent Relative Density (Assumed)	2.650	Moisture Content		Colloids	
Liquid Limit	72	Plastic Limit	44	Plastic Index	28

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature *Position*

Liquid Limit, Plastic Limit, and Plastic Index

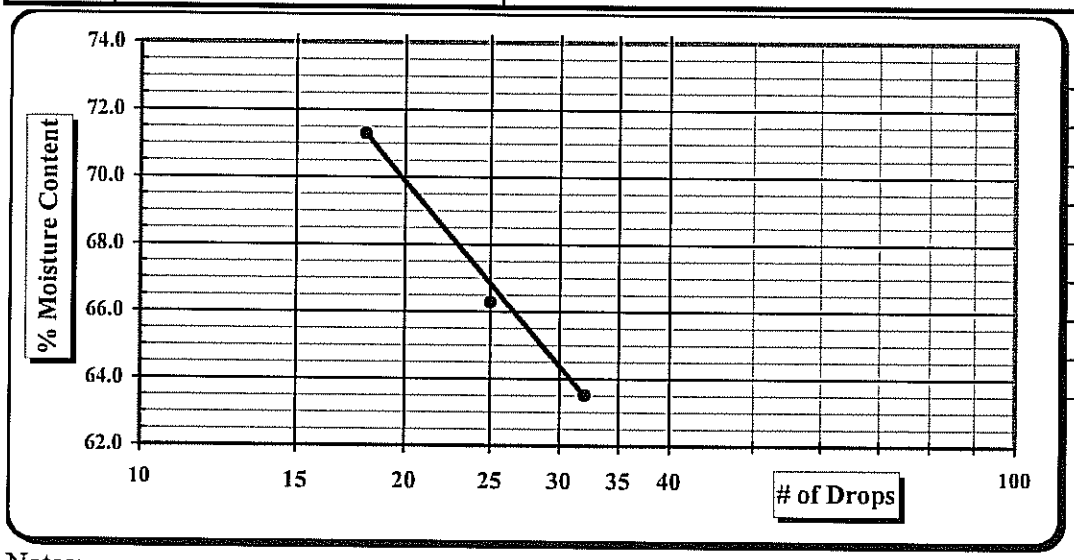
S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Report Date: 1/6/09
Test Date(s): 12/30-1/6/09

Boring #: B-3 Sample #: Lift 3 Sample Date: 12/29/08
Location: Compacted Soil Liner Test Offset: Depth: Bulk
Sample Description: Red Orange Brown Medium to Fine Sandy Clayey Silt (MH)

Pan #		Liquid Limit						Plastic Limit		
	Test #							1	2	3
	Tare #	27	25	WN				36	13	
A	Tare Weight	13.92	14.34	16.56				**15.66**	13.96	
B	Wet Soil Weight + A	23.60	23.02	24.08				21.85	20.43	
C	Dry Soil Weight + A	19.84	19.56	20.95				20.17	18.66	
D	Water Weight (B-C)	3.76	3.46	3.13				1.68	1.77	
E	Dry Soil Weight (C-A)	5.92	5.22	4.39				4.51	4.70	
F	% Moisture Content (D/E)*100	63.5%	66.3%	71.3%				37.3%	37.7%	
N	# OF DROPS	32	25	18				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	Average							37.5%		



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	0.990	29	1.018
24	0.995	30	1.022
25	1.000		

Notes: Estimate the % Retained on the #40 Sieve

Special Sampling Methods:

Sample Preparation:	Wet Preparation ☐	Dry Preparation ☒	Air Dried ☒	NP, Non-Plastic	☐
Liquid limit Test:	Multipoint Method ☒	One-point Method ☐		Liquid Limit	67
Classification:	ASTM D 2487 ☒	AASHTO M 145 ☐		Plastic Limit	38
Liquid limit Test:	ASTM D 4318 ☒	AASHTO T 89 ☐		Plastic Index	29
Plastic limit Test:	ASTM D 4318 ☒	AASHTO T 90 ☐		Group Symbol	MH

Technician Name: Karen Warner 117900 (Certification #)

Technical Responsibility: Ken Daly (Signature) Project Engineer (Position)

Particle Size Analysis of Soils

ASTM D 422

S&ME

Project #: **1356-06-825**
Project Name: Allen Steam Station RAB Ash Landfill
Client Name: Duke Energy
Client Address:

Test Date(s): 12/30-1/6/09
Report Date: 1/6/09

Boring #: B-3 Sample #: Lift 3 Sample Date: 12/29/08
Location: Compacted Soil Liner TP Offset: Depth: Bulk
Sample Description: Red Orange Brown Medium to Fine Sandy Clayey Silt (MH)

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):		350.52		Tare #	W				
Weight of Total Sample Air Dried:		350.52	A	Tare Wt.	16.03				
Weight of Air Dried Hydrometer Sample (g):		50.00	B	Wet Wt. + A	26.73				
Total Sample Oven Dried:		349.22	C	Dry Wt. + A	26.69				
Hydrometer Sample Oven Dried (W):		49.81	D	Water Wt. (B-C)	0.04				
% Passing #10:		99.5%	E	Dry Wt. (C-A)	10.66				
Correction Factor a (Table 1):		1.00		% Moisture (100 x D/E)	0.38%				

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"	1.4		99.6%
#4	1.4	Soil Mortar	99.6%
#10	1.8	**100.0%**	99.5%
#20	1.8	96.4%	96.0%
#40	6.6	86.8%	86.3%
#60	10.3	79.3%	78.9%
#100	12.8	74.3%	73.9%
#200	15.1	69.6%	69.3%

Notes: Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Maximum Particle Size:			Total Sand:	30.3%	< 4.74 mm and > 0.075 mm	Type:	Mechanical Stirring Apparatus (A)
% Gravel:	0.4%	< 75 mm and > 4.75 mm	Silt & Clay:	69.3%	< 0.075	Dispersion Time:	1 min.
Coarse Sand:	0.1%	< 4.75 mm and > 2.00 mm	Silt:	22.3%	< 0.075 and > 0.005 mm	Sodium Hexametaphosphate:	40 g./ Liter
Medium Sand:	13.2%	< 2.00 mm and > 0.425 mm	Clay:	47.0%	< 0.005 mm		
Fine Sand:	17.0%	< 0.425 mm and > 0.075 mm	Colloids:		< 0.001 mm	**Control Cylinder** ☒	**Composite Correction** ☐

Liquid Limit **67** Plastic Limit **38** Plastic Index **29** Hydrometer: 151H ☐ 152H ☒

Time		Temp.	Hydrometer	Corrections		Hydrometer	Percent Passing		Effective Depth	Table 3	Diameter
Clock	T (Min.)	(0.5 °C)	Reading	Control Cylinder	Composite Correction	R	P(-#10) = (R x a / W) x 100	P (total) = P x % Passing #10	L	K	D = K x ((L/T)^1/2
	1	21.5	39.0	5.0		34.00	68.3%	67.9%	10.7	0.01340	0.04387
	2	21.5	38.5	5.0		33.50	67.3%	66.9%	10.8	0.01340	0.03114
	5	21.5	36.0	5.0		31.00	62.2%	61.9%	11.2	0.01340	0.02007
	15	21.5	33.5	5.0		28.50	57.2%	56.9%	11.6	0.01340	0.01179
	30	21.5	31.0	5.0		26.00	52.2%	51.9%	12.0	0.01340	0.00849
	60	21.5	29.5	5.0		24.50	49.2%	48.9%	12.3	0.01340	0.00606
	250	21.5	25.5	5.0		20.50	41.2%	40.9%	12.9	0.01340	0.00305
	1440	22.0	20.0	5.0		15.00	30.1%	30.0%	13.8	0.01332	0.00131

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples ASTM D 854: Specific Gravity of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Effective Depth (cm)
L=L1+0.5(L2-(VB/A))
(152H) .164cm per increment,
V_B=67.0cm^3, L_2=14cm, A=27.8cm^2

Technician Name: Karen Warner 117900 *Certification #*

Technical Responsibility: Ken Daly _____ *Signature* *Project Engineer* *Position*

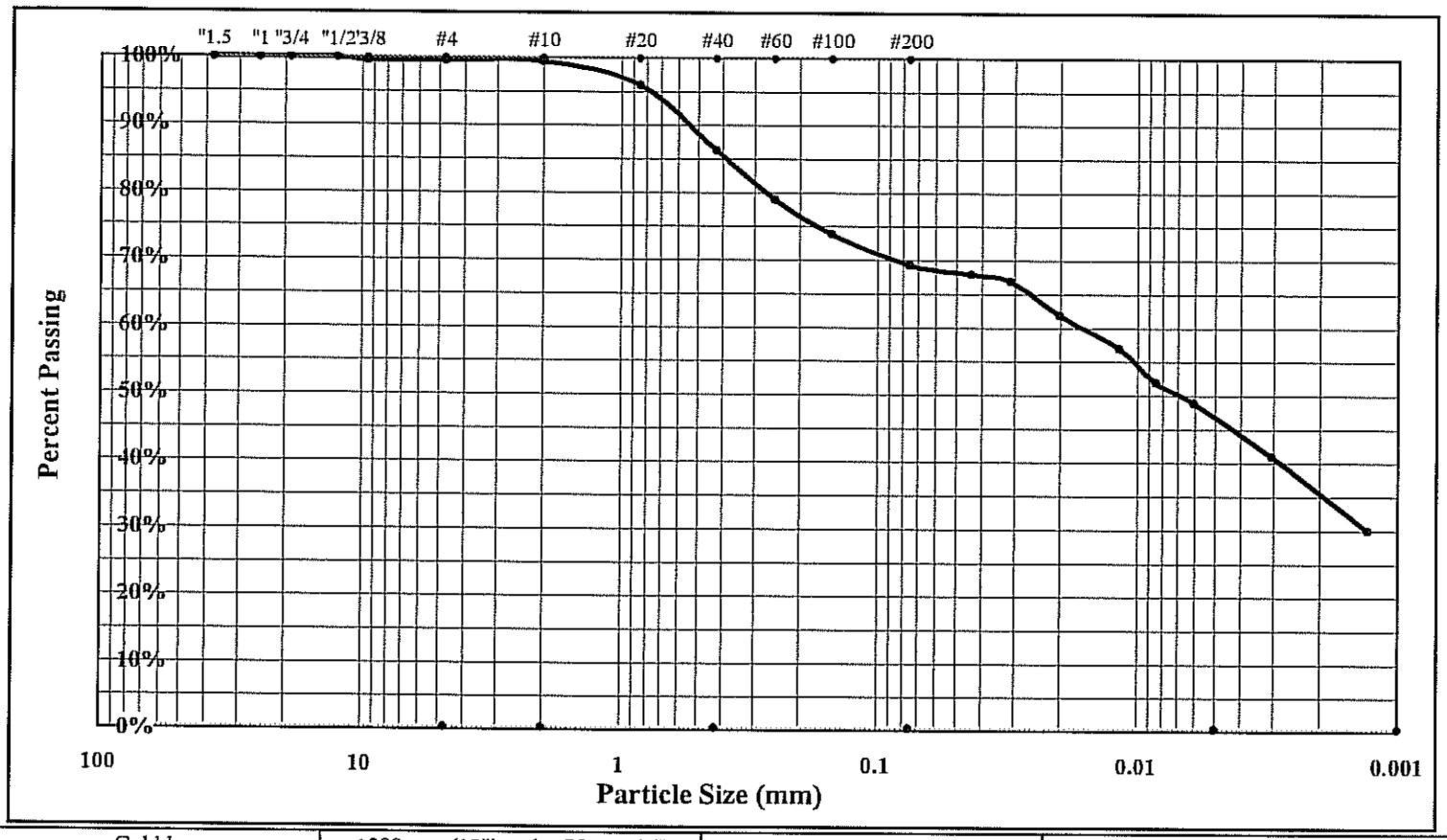
Particle Size Analysis of Soils

ASTM D 422

S&ME

S&ME Project #:	**1356-06-825**	Report Date:	1/6/09
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	12/30-1/6/09
Client Name:	Duke Energy		
Client Address:			

Boring #:	B-3	Sample #:	Lift 3	Sample Date:	12/29/08
Location:	Compacted Soil Liner TP	Offset:		Depth:	Bulk
Sample Description:	Red 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	0	Gravel	0.4%	Silt	22.3%
Silt & Clay (% Passing #200)	69.3%	Sand	30.3%	Clay	47.0%
Apparent Relative Density (Assumed)	2.650	Moisture Content		Colloids	
Liquid Limit	67	Plastic Limit	38	Plastic Index	29

Description of Sand & Gravel Particles Rounded ☐ Angular ☐ Hard & Durable ☐ Soft ☐ Weathered & Friable ☐

Mechanical Stirring Apparatus (A) Length of Dispersion Period: 1 min. Dispersing Agent: Sodium Hexametaphosphate: 40 g./ Liter

References: ASTM D 422: Particle Size Analysis of Soils ASTM D 421: Dry Preparation of Soil Samples
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils ASTM D 854: Specific Gravity of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature *Position*

Moisture - Density Relationship

S&ME

S&ME Project #:	**1356-06-825 Phase 09**	Test Date(s):	1/2-5/09
Project Name:	Allen Steam Station RAB Ash Landfill	Report Date:	January 5, 2009
Client Name:	Duke Energy		
Project Address:			
Boring #: 3	Sample #: S-3	Sample Date:	December 29, 2008
Location: Compacted Soil Liner TP	Offset:	Depth:	Bulk
Sample Description:	Red Orange Brown Medium to Fine Sandy Clayey Silt (MH)		

Liquid Limit: 67 Specific Gravity:

Plastic Limit: 38 Plastic Index: 29

Natural Moisture Content:

Moisture Content of the Oversize Fraction:

NOTES:

Sieve Size	% Passing
3/4"	
1/2"	100.0
3/8"	99.6
#4	99.6

MDD: 88.4 **Opt. MC %:** 29.9

Water Content

Water Content requires GP 2 Balance (0.1 gram Readability).

ASTM D2216 ☒		AASHTO T265 ☐		ASTM D4959 ☐		ASTM D4643 ☐	
	Sample #:						
	Water Added:						
	Tare #:						
A. Tare Weight	A.	156.51	156.5	155.1	155.94	151.86	160.35
B. Wet Wt + Tare Wt	B.	801.32	745.51	720.48	741.75	711.73	805.5
C. Dry Wt. + Tare Wt.	C.	685.73	629.46	601.26	608.4	573.54	635.16
D. Water Weight	B-C	115.59	116.05	119.22	133.35	138.19	170.34
E. Dry Weight	C-A	529.22	472.96	446.16	452.46	421.68	474.81
F. Moisture Content	100*D/E	**21.8%**	**24.5%**	**26.7%**	**29.5%**	**32.8%**	**35.9%**

Compaction Data

The Compaction Test requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability).

G. Wt of Soil + Mold	G.	5719	5781	5843	5902	5918	5877
H. Wt. of Mold	H.	4172	4172	4172	4172	4172	4172
I. Wt. of Soil (g. or lbs.)	G-H	1547.000	1609.000	1671.000	1730.000	1746.000	1705.000
J. Wt of Soil (Lbs.)	I/453.6 or I	3.410	3.547	3.684	3.814	3.849	3.759
K. Mold Volume Factor	K.	29.99	29.99	29.99	29.99	29.99	29.99
L. Wet Density	J*K	102.3	106.4	110.5	114.4	115.4	112.7
M. Dry Density	L/(1+F)	**83.9**	**85.4**	**87.2**	**88.3**	**86.9**	**83.0**

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

Moisture-Density Relation of: Fine Fraction ☒ Corrected for Coarse Fraction (ASTM D 4718) ☐

Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐

Mechanical Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

Soil Plasticity:	ASTM D 4318 ☒	AASHTO T 89 ☐		AASHTO T 90 ☐
Sieve Analysis / Particle Size Analysis:	ASTM C136 ☐	AASHTO T 27 ☐	ASTM D 422 ☒	AASHTO T 88 ☐
Specific Gravity of Soil:		ASTM D 854 ☐		AASHTO T 100 ☐
Bulk Gravity of Oversize Fraction:		ASTM C 127 ☐		AASHTO T 85 ☐
Soil Classification:	ASTM D 2487 ☒	ASTM D 2488 ☐		AASHTO M 145 ☐

Technician Name: Eric Lopez

Certification #

Technical Responsibility: Ken Daly

Signature

Project Engineer

Position

Moisture - Density Report

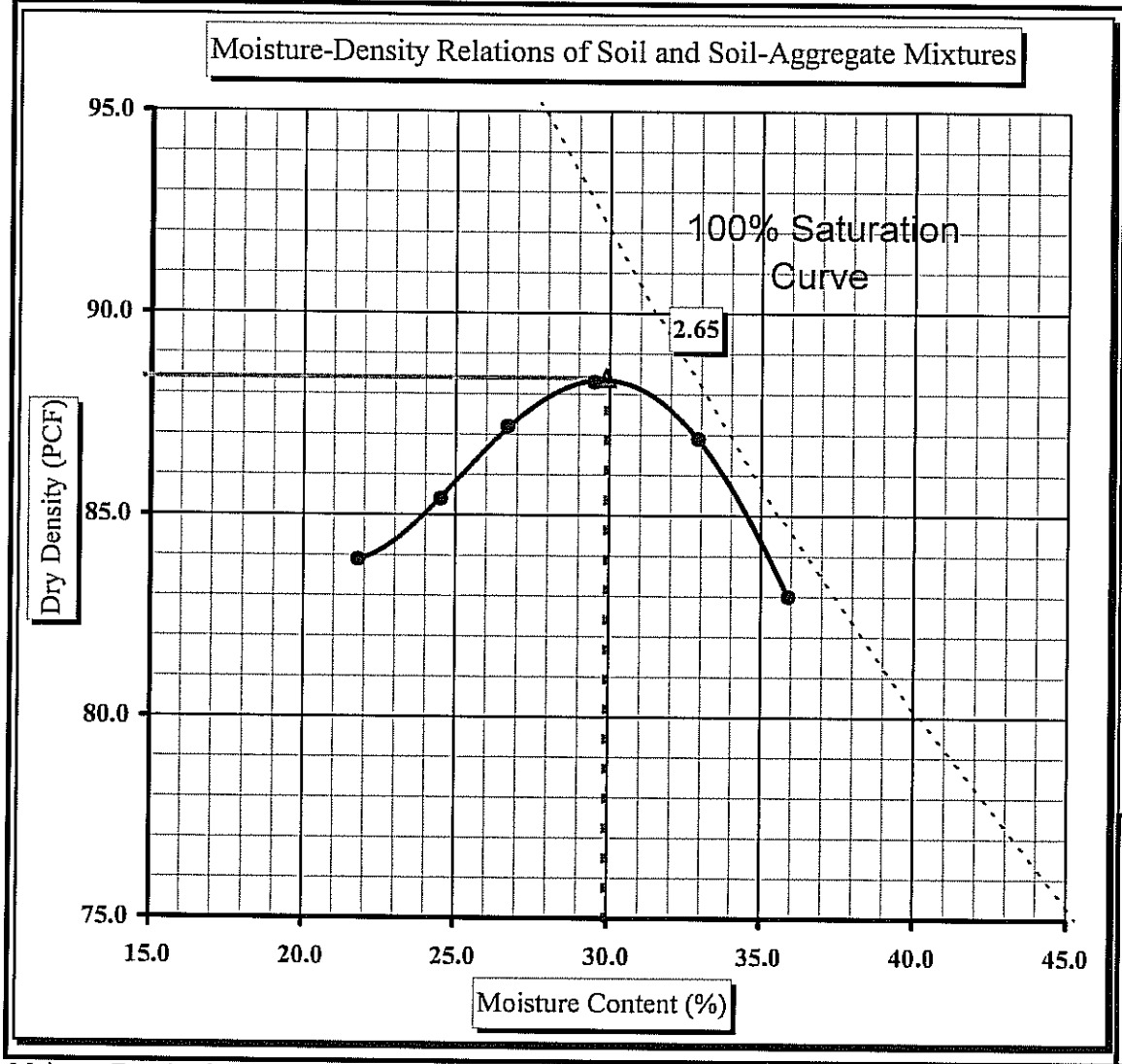
S&ME

S&ME Project #:	**1356-06-825 Phase 09**	Report Date:	January 5, 2009
Project Name:	**Allen Steam Station RAB Ash Landfill**	Test Date(s):	1/2-5/09
Client Name:	Duke Energy		
Project Address:			

Boring #:	3	Sample #:	~~S-3~~ CTP-3 (KB)	Sample Date:	December 29, 2008
Location:	Compacted Soil Liner TP	Offset:		Depth:	Bulk
Sample Description:	Red Orange Brown Medium to Fine Sandy Clayey Silt (MH)				

Maximum Dry Density **88.4** **PCF.** **Optimum Moisture Content** **29.9** **%**

ASTM D 698 Method A



Soil Properties

Natural Moisture Content:	
Liquid Limit:	67
Plastic Limit:	38
Plastic Index:	29
Specific Gravity:	

% Passing

3/4"	
1/2"	100
3/8"	99.6
#4	99.6

Oversize Fraction

Bulk Sp. Gravity
% Moisture
Oversize Fraction
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 Hammer ☒ Manual Hammer ☐ Moist Preparation ☐ Dry Preparation ☒

References: ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 422: Particle Size Analysis of Soils
ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils
ASTM D 2487: Classification of Soils for Engineering Purposes (Unified Soil Classification System)

Technical Responsibility: Ken Daly _____ Project Engineer
Signature

SUMMARY OF COMPACTED SOIL LINER LABORATORY TEST DATA

Sample No.[1]	Sample Depth (ft)	Sample Type	Soil Description	USCS Classification	% Finer No. 200 (ASTM D422)	Natural Moisture Content (%) (ASTM D2216)	Atterberg Limits (ASTM D4318)			Proctor Data (ASTM D698)		Remolded Hydraulic Conductivity (ASTM D5084)				
												Testing Conditions[3]				k (cm/sec)
							LL	PL	PI	Max. Dry Density (pcf)	Opt. Moisture Content (%)	Dry Density (pcf)	% Compaction	Moisture Content (%)	% Wet of OMC	
CSL-1	Lift 1	Bulk	Red, Orange, Brown Clayey **Silt** with Coarse to Fine to Medium Sand	MH	80.1	27.3	69	34	35	90.7	29.4	86.8	95.7%	31.3	1.9	1.89×10^{-06}
CSL-2[2]	Stockpile	Bulk	Orange, Brown Clayey **Silt** with Medium to Fine Sand	MH	79.5	26.4	69	40	29	93.9	23.9	89	94.8%	25.7	1.8	1.12×10^{-05}
CSL-3	Stockpile	Bulk	Red, Orange, Brown **Clay** with Fine to Medium Sand	CH	70.8	22.6	67	33	34	94.9	23.9	91.8	96.7%	26.1	2.2	1.53×10^{-06}
CSL-4	Lift 1	Bulk	Red, Orange Micaceous Coarse to Fine Sandy Clayey **Silt**	MH	67.9	21.1	68	40	28	93.2	24.9	89.4	95.9%	27.2	2.3	3.71×10^{-06}
CSL-5	Lift 1	Bulk	Orange, Brown Medium to Fine Sandy Clayey **Silt**	MH	63.1	17.6	56	40	16	94.8	23.4	90.0	94.9%	25.8	2.4	6.41×10^{-06}
CSL-6	Lift 1	Bulk	Orange, Brown Clayey **Silt** with Medium to Fine Sand	MH	84.8	28.1	74	40	34	88.8	29.2	84.1	94.7%	31.8	2.6	1.81×10^{-06}
CSL-7	Lift 1	Bulk	Red Clayey **Silt** with Medium to Fine Sand	MH	72.8	23.4	65	34	31	93.2	27.2	88.2	94.6%	29.5	2.3	1.43×10^{-06}
CSL-8	Lift 1	Bulk	Red Clayey **Silt** with Medium to Fine Sand	MH	77.3	24.1	73	38	35	92.1	28.1	88.4	96.0%	30.1	2.0	1.57×10^{-06}
CSL-9	Lift 1	Bulk	Red, Orange Silty **Clay** with Fine to Medium Sand and Mica	CH	76.6	25.6	71	33	38	98.1	24.3	91.8	93.6%	26.8	2.5	3.40×10^{-07}
CSL-10	Lift 3	Bulk	Brown, Red Fine to Mediums Sandy Silty **Clay** with Mica	CH	69.1	22.9	68	35	33	97.9	23.1	92.4	94.4%	25.0	1.9	8.52×10^{-07}
CSL-11	Lift 3	Bulk	Red, Orange Silty **Clay** with Fine to Medium Sand and Mica	CH	81.7	26.3	74	33	41	94.5	26.3	89.2	94.4%	28.4	2.1	8.60×10^{-07}
CSL-12	Lift 3	Bulk	Orange, Brown Clayey **Silt** with Medium to Fine Sand	MH	80.8	28.1	66	39	27	93.8	26.6	89.5	95.4%	28.5	1.9	4.51×10^{-06}
CSL-13	Lift 3	Bulk	Red, Orange Clayey **Silt** with Fine to Medium Sand	MH	74.6	24.5	63	36	27	98.1	23.7	94.6	96.4%	25.7	2.0	7.38×10^{-07}

[1] All samples were bulk samples; 12 total laboratory test results for in-place compacted soil liner during construction (excluding failing permeability test on sample CSL-2

[2] Sample did not meet permeability requirement of 1×10^{-05} cm/sec; additional in-place sample collected and tested as retest

[3] Samples were also tested at net confining pressures of approximately 2.5 psi and gradient of approximately 2 (see following permeability results for exact pressure and gradient)

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Retired Ash Basin (RAB) Ash Landfill 3/17/2009

Sample Name: CSL-1 (1st Lift)

Sample Description: Red Orange Brown Clayey Silt w/Coarse to Fine to Medium Sand (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.264	Tare No.	G-9	γ_{wet} (pcf)	113.9			Panel No	16
Leng. (cm)	7.62	WWS+ Tare (gm)	392.07	γ_{dry} (pcf)	86.8			Cell P (psi)	72.5
Area (cm^2)	41.44	WDS+Tare (gm)	318.18	w (%)	31.4			Influent P (psi)	70.2
Vol. (cm^3)	315.79	WT of Water (gm)	73.89	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	575.8	WT of TARE (gm)	82.28	γ_{wet} (pcf)	113.9				
		WT Dry Soil (gm)	235.9	γ_{dry} (pcf)	86.8			Gradient	1.8
		w (%)	31.3	w (%)	31.3				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		11	54		12.8	0.0	14.8				
	21	13	38	6240	12.8	1.1	14.0	1.0	14.1	0.9760	1.94E-06
2		13	39		12.8	0.0	14.8				
	21	15	41	7320	12.9	1.1	14.1	0.9	14.1	0.9760	1.57E-06
3		15	53		12.9	0.0	14.8				
	21	17	5	4320	12.9	0.7	14.1	0.7	14.1	0.9760	2.07E-06
4		10	18		12.9	0.0	14.8				
	22	11	31	4380	13	0.7	14.1	0.7	14.1	0.9530	1.99E-06
5		11	32		13	0.0	14.8				
	22	12	48	4560	13	0.7	14.1	0.7	14.1	0.9530	1.91E-06
6		12	49		13	0.0	14.8				
	22	14	4	4500	13.1	0.7	14.1	0.7	14.1	0.9530	1.94E-06
										Ave. K (cm/sec)	1.89E-06
										(Runs 2 thru 6)	
										Ave. K (m/sec)	1.89E-08

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 #:	**1356-06-825 Task 9**	Report Date:	3/17/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	3/11-17/09
Client Name:	Duke Energy		
Client Address:			

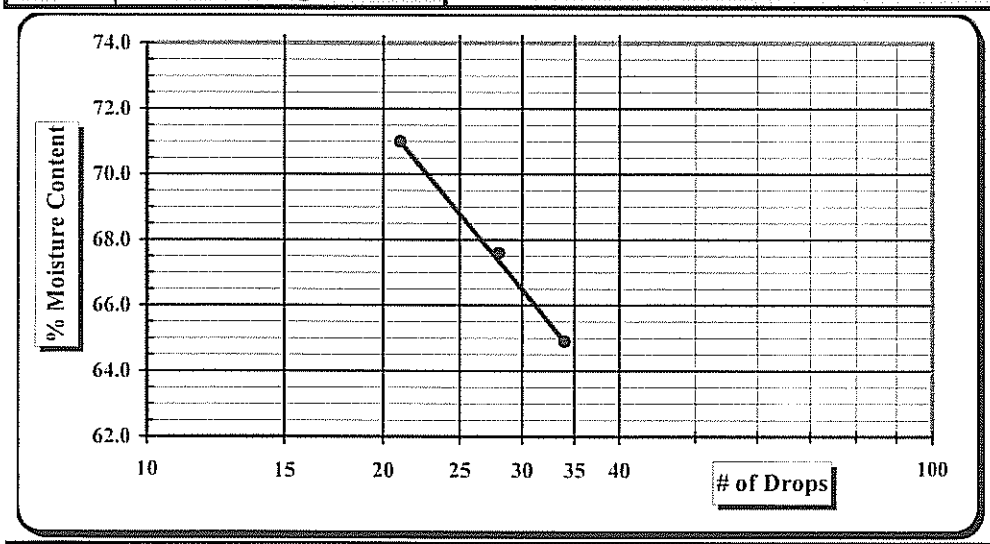
Boring #: Sample #: CSL-1 Sample Date: 3/11/09

Location: 1st Lift Offset: Elevation:

Sample Description: Red Orange Brown Clayey Silt w/Coarse to Fine to Medium Sand (MH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/13/2009	Grooving tool	20232	2/23/2009
LL Apparatus	20230	9/21/2008	Grooving tool		
Oven	10844	9/5/2008	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	BA	WW	MM				TT	PP	
A	Tare Weight	15.36	16.56	16.59				**15.95**	16.14	
B	Wet Soil Weight + A	24.99	24.64	25.96				22.50	22.82	
C	Dry Soil Weight + A	21.20	21.38	22.07				20.83	21.12	
D	Water Weight (B-C)	3.79	3.26	3.89				1.67	1.70	
E	Dry Soil Weight (C-A)	5.84	4.82	5.48				4.88	4.98	
F	% Moisture (D/E)*100	64.9%	67.6%	71.0%				34.2%	34.1%	
N	# OF DROPS	34	28	21				*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	69
Plastic Limit	34
Plastic Index	35
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* — *Date*

Kyle Baucom — *Technical Responsibility* — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	3/13/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	3/12-13/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-1	Sample Date:	3/11/2009
Location:	1st Lift	Offset:		Depth:	
Sample Description:	Red Orange Brown Clayey Silt w/Coarse to Fine to Medium Sand (MH)				

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						Natural
	Tare #:		72	MG	70	995	98
A. Tare Weight	A.		74.8	87.0	71.1	72.6	72.0
B. Wet Wt + Tare Wt	B.		637.6	715.2	626.6	718.7	795.3
C. Dry Wt. + Tare Wt.	C.		527.1	578.3	496.8	555.2	604.3
D. Water Weight	B-C		110.5	136.9	129.8	163.5	191.0
E. Dry Weight	C-A		452.3	491.3	425.7	482.6	532.3
F. Moisture Content	100*D/E		**24.4%**	**27.9%**	**30.5%**	**33.9%**	**35.9%**

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.		5848	5916	5950	5922	5884
H. Wt. of Mold	H.		4170	4170	4170	4170	4170
I. Wt. of Soil (g. or lbs.)	G-H		1678	1746	1780	1752	1714
J. Wt of Soil (Lbs.)	I/453.6 or I		3.699	3.849	3.924	3.862	3.779
K. Mold Volume Factor	K.		30.07	30.07	30.07	30.07	30.07
L. Wet Density (PCF)	J*K		111.2	115.7	118.0	116.1	113.6
M. Dry Density (PCF)	L/(1+F)		**89.4**	**90.5**	**90.4**	**86.7**	**83.6**

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:

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

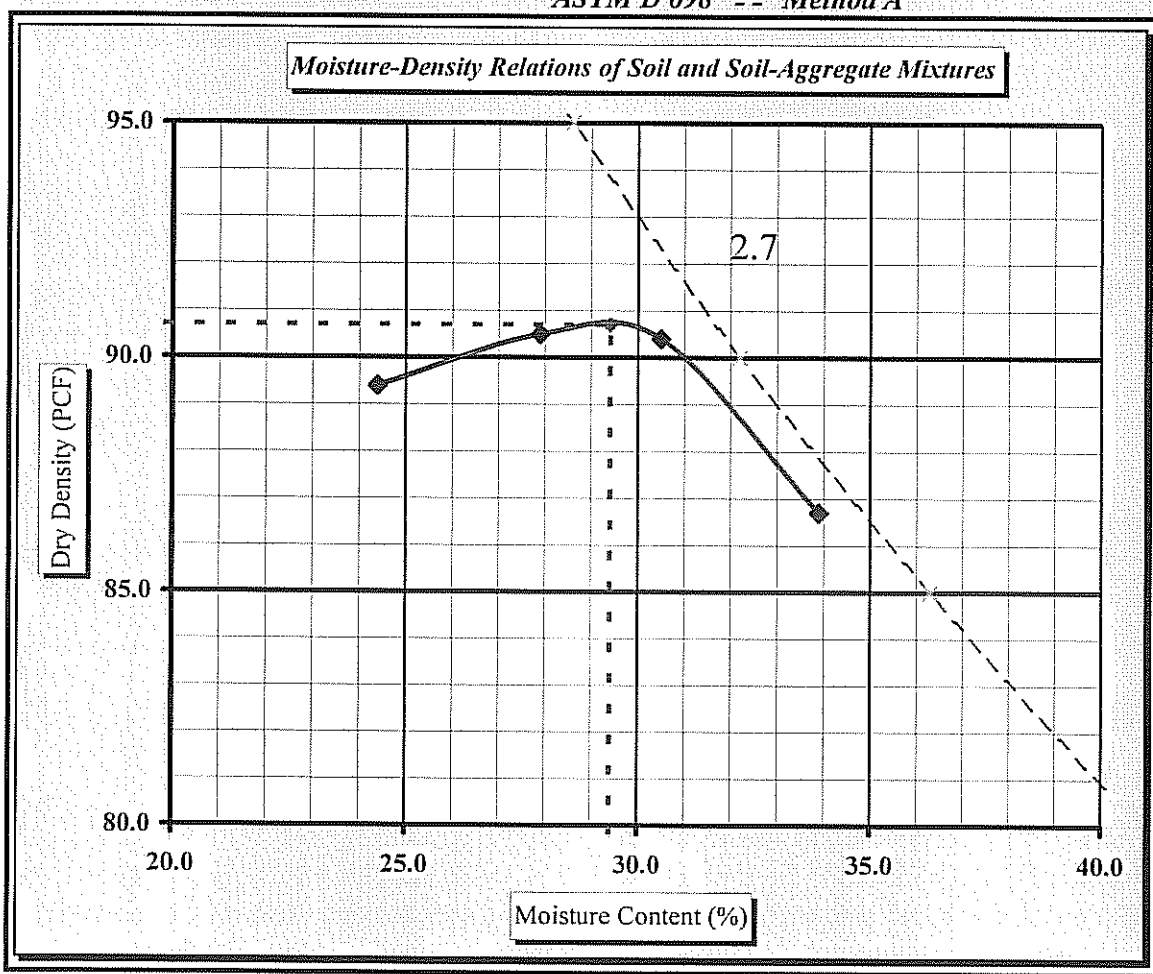
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	3/13/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/12-13/09
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: CSL-1	Sample Date:	3/11/2009
Location:	1st Lift Offset:	Depth:	
Sample Description:	Red Orange Brown Clayey Silt w/Coarse to Fine to Medium Sand (MH)		

Maximum Dry Density 90.7 PCF. **Optimum Moisture Content 29.4%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**27.3%**
Specific Gravity of Soil	
Liquid Limit	**69**
Plastic Limit	**34**
Plastic Index	**35**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.9%
#10	99.1%
#40	88.7%
#60	84.8%
#200	80.1%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Task 9**	Report Date:	3/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/11-19/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-1	Sample Date: 3/11/09
Location:	1st Lift	Offset:	Elevation:
Sample Description:	Red Orange Brown Clayey Silt w/Coarse to Fine to Medium 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):		281.34		Tare #	58	Jazz				
Weight of Total Sample Air Dried:		281.34	A	Tare Wt.	13.95	81.70				
Weight of Air Dried Hydrometer Sample (g):		50.01	B	Wet Wt. + A	24.63	423.10				
Total Sample Oven Dried:		277.16	C	Dry Wt. + A	24.47	349.93				
Hydrometer Sample Oven Dried (W):		49.26	D	Water Wt. (B-C)	0.16	73.17				
% Passing #10:		99.1%	E	Dry Wt. (C-A)	10.52	268.23				
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	1.52%	27.3%				

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	0.2		99.9%
#10	2.4	**100.0%**	99.1%
#20	2.4	95.1%	94.2%
#40	5.2	89.5%	88.7%
#60	7.1	85.5%	84.8%
#100	8.7	82.4%	81.7%
#200	9.5	80.8%	80.1%

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. 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
1	22.0	44.0	5.0		39.00	78.4%	77.7%	9.9	0.01312	0.04129
2	22.0	41.5	5.0		36.50	73.4%	72.7%	10.3	0.01312	0.02979
5	22.0	40.0	5.0		35.00	70.3%	69.7%	10.6	0.01312	0.01907
15	22.0	36.0	5.0		31.00	62.3%	61.8%	11.2	0.01312	0.01134
30	22.0	34.5	5.0		29.50	59.3%	58.8%	11.5	0.01312	0.00811
60	22.0	32.0	5.0		27.00	54.3%	53.8%	11.9	0.01312	0.00584
250	22.5	29.0	4.5		24.50	49.2%	48.8%	12.3	0.01305	0.00289
1440	22.5	24.0	4.5		19.50	39.2%	38.8%	13.1	0.01305	0.00124

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

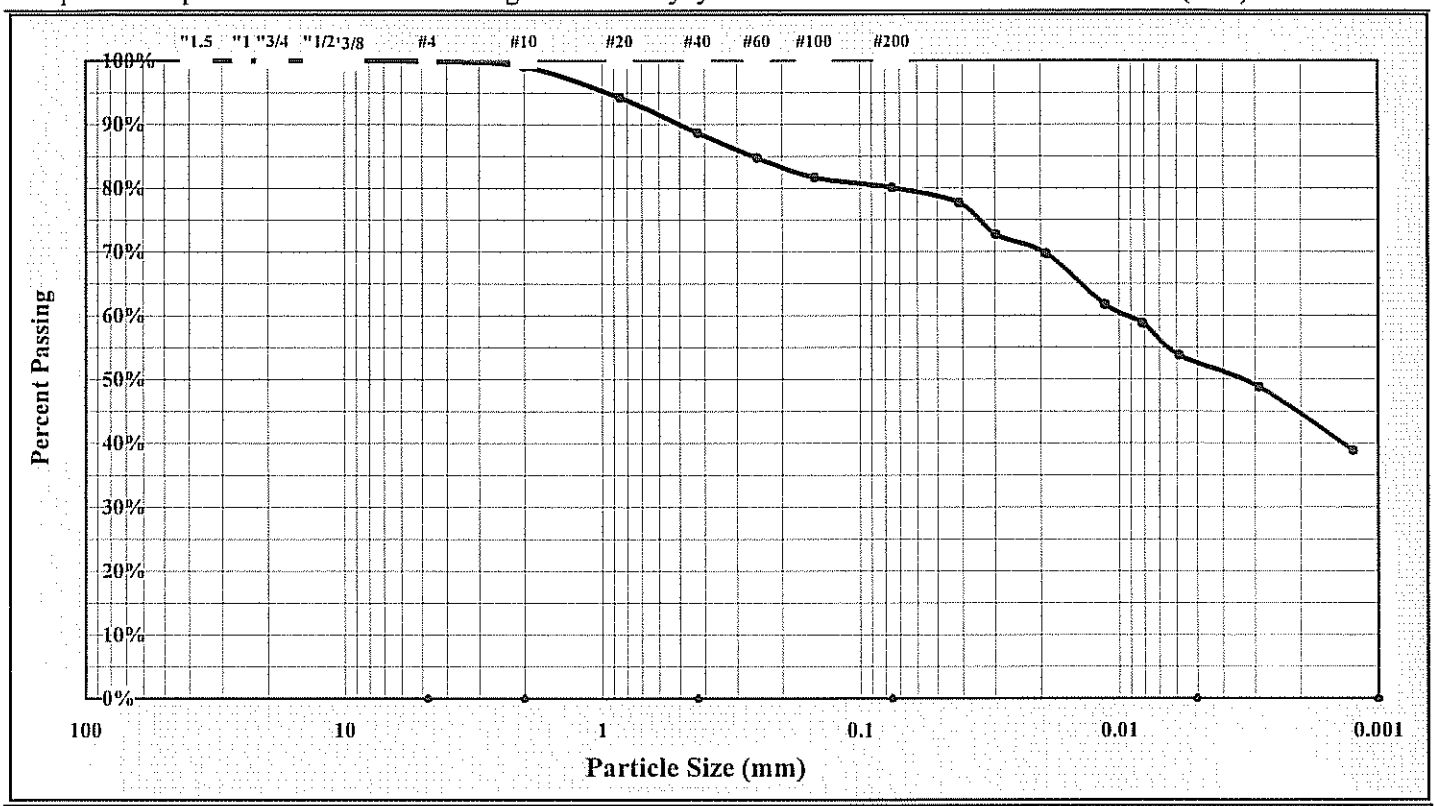
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	3/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/11-19/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-1	Sample Date:	3/11/09
Location:	1st Lift Offset:	Elevation:	
Sample Description:	Red Orange Brown Clayey Silt w/Coarse to Fine to Medium 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	27.1%
Silt & Clay (% Passing #200):	80.1%	Total Sand:	19.8%	Clay	53.0%
ent Relative Density (Assumed)	2.700	Moisture Content	27.3%	Colloids	20.5%
Liquid Limit	69	Plastic Limit	34	Plastic Index	35
Coarse Sand:	0.8%	Medium Sand:	10.4%	Fine Sand:	8.6%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Retired Ash Basin (RAB) Landfill 3/19/2009

Sample Name: CSL-2

Sample Description: Orange Brown Clayey Silt w/Medium to Fine Sand (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.264	Tare No.	G-9	γ_{wet} (pcf)	112.4			Panel No	5
Leng. (cm)	7.699	WWS+ Tare (gm)	391.45	γ_{dry} (pcf)	89.2			Cell P (psi)	72.5
Area (cm^2)	41.44	WDS+Tare (gm)	328.33	w (%)	25.9			Influent P (psi)	70.2
Vol. (cm^3)	319.06	WT of Water (gm)	63.12	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	571.9	WT of TARE (gm)	82.26	γ_{wet} (pcf)	111.9				
		WT Dry Soil (gm)	246.07	γ_{dry} (pcf)	89.0			Gradient	1.8
		w (%)	25.7	w (%)	25.7				

K = (Q x L) / (t x H x A)

Run	Temp. (°C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		16	43		9.2	0.0	14.8				
	22	16	56	780	9.2	0.7	14.1	0.7	14.1	0.9530	1.13E-05
2		16	57		9.2	0.0	14.8				
	22	17	11	840	9.2	0.7	14.0	0.8	14.1	0.9530	1.12E-05
3		8	26		9.2	0.0	14.8				
	21	8	38	720	9.3	0.7	14.1	0.7	14.1	0.9760	1.25E-05
4		8	41		9.3	0.0	14.8				
	21	8	54	780	9.3	0.7	14.1	0.7	14.1	0.9760	1.16E-05
5		8	55		9.3	0.0	14.8				
	21	9	10	900	9.3	0.7	14.1	0.7	14.1	0.9760	1.00E-05
6		9	15		9.3	0.0	14.8				
	21	9	29	840	9.4	0.7	14.1	0.7	14.1	0.9760	1.07E-05
										Ave. K (cm/sec)	1.12E-05
										(Runs 2 thru 6)	
										Ave. K (m/sec)	1.12E-07

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 #:	**1356-06-825 Task 9**	Report Date:	3/17/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	3/11-17/09
Client Name:	Duke Energy		
Client Address:			

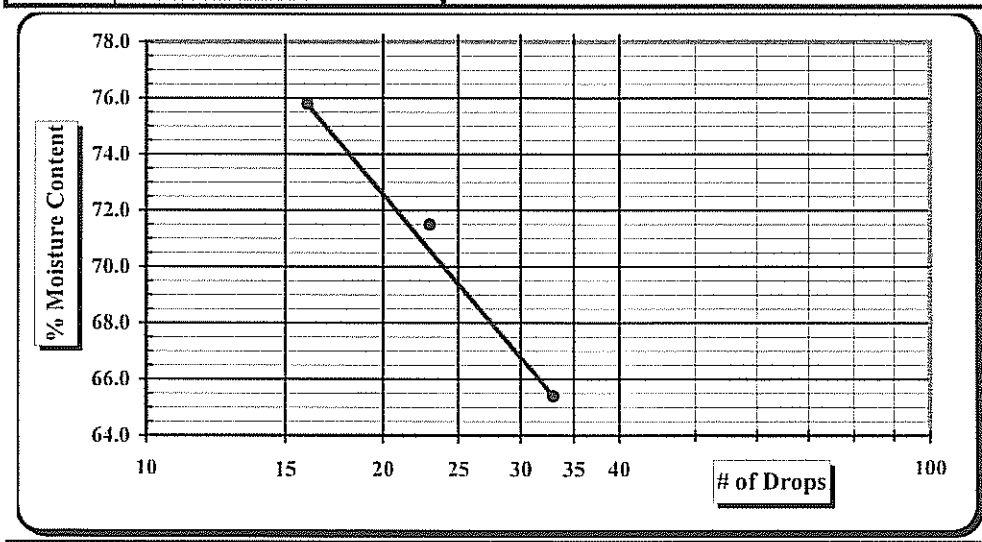
Boring #: Sample #: CSL-2 Sample Date: 3/11/09

Location: Stockpile Offset: Elevation:

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)	3996	2/13/2009	Grooving tool	20232	2/23/2009
LL Apparatus	20230	9/21/2008	Grooving tool		
Oven	10844	9/5/2008	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	39	9	56				LL	59	
A	Tare Weight	13.97	13.93	15.68				**16.97**	15.80	
B	Wet Soil Weight + A	22.44	21.70	22.94				23.94	22.10	
C	Dry Soil Weight + A	19.09	18.46	19.81				21.96	20.29	
D	Water Weight (B-C)	3.35	3.24	3.13				1.98	1.81	
E	Dry Soil Weight (C-A)	5.12	4.53	4.13				4.99	4.49	
F	% Moisture (D/E)*100	65.4%	71.5%	75.8%				39.7%	40.3%	
N	# OF DROPS	33	23	16				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**40.0%**		



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 **69**

Plastic Limit **40**

Plastic Index **29**

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* — *Date*

Kyle Baucom — *Technical Responsibility* — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	3/13/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	3/12-13/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-2	Sample Date:	3/11/2009
Location:	Stockpile	Offset:		Depth:	
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 (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						Natural
	Tare #:	995	L-42	79	74	84	97
A. Tare Weight	A.	72.5	85.8	72.3	69.7	73.8	73.2
B. Wet Wt + Tare Wt	B.	676.4	799.6	836.8	772.7	804.6	677.6
C. Dry Wt. + Tare Wt.	C.	568.1	660.0	671.3	606.3	617.4	575.6
D. Water Weight	B-C	108.3	139.6	165.5	166.4	187.2	102.0
E. Dry Weight	C-A	495.6	574.2	599.0	536.6	543.6	502.4
F. Moisture Content	100*D/E	**21.9%**	**24.3%**	**27.6%**	**31.0%**	**34.4%**	**20.3%**

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5877	5931	5946	5939	5892	5804
H. Wt. of Mold	H.	4170	4170	4170	4170	4170	4170
I. Wt. of Soil (g. or lbs.)	G-H	1707	1761	1776	1769	1722	1634
J. Wt of Soil (Lbs.)	I/453.6 or I	3.763	3.882	3.915	3.900	3.796	3.602
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07	30.07	30.07
L. Wet Density (PCF)	J*K	113.2	116.7	117.7	117.3	114.1	108.3
M. Dry Density (PCF)	L/(1+F)	**92.9**	**93.9**	**92.2**	**89.5**	**84.9**	**90.0**

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:

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

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

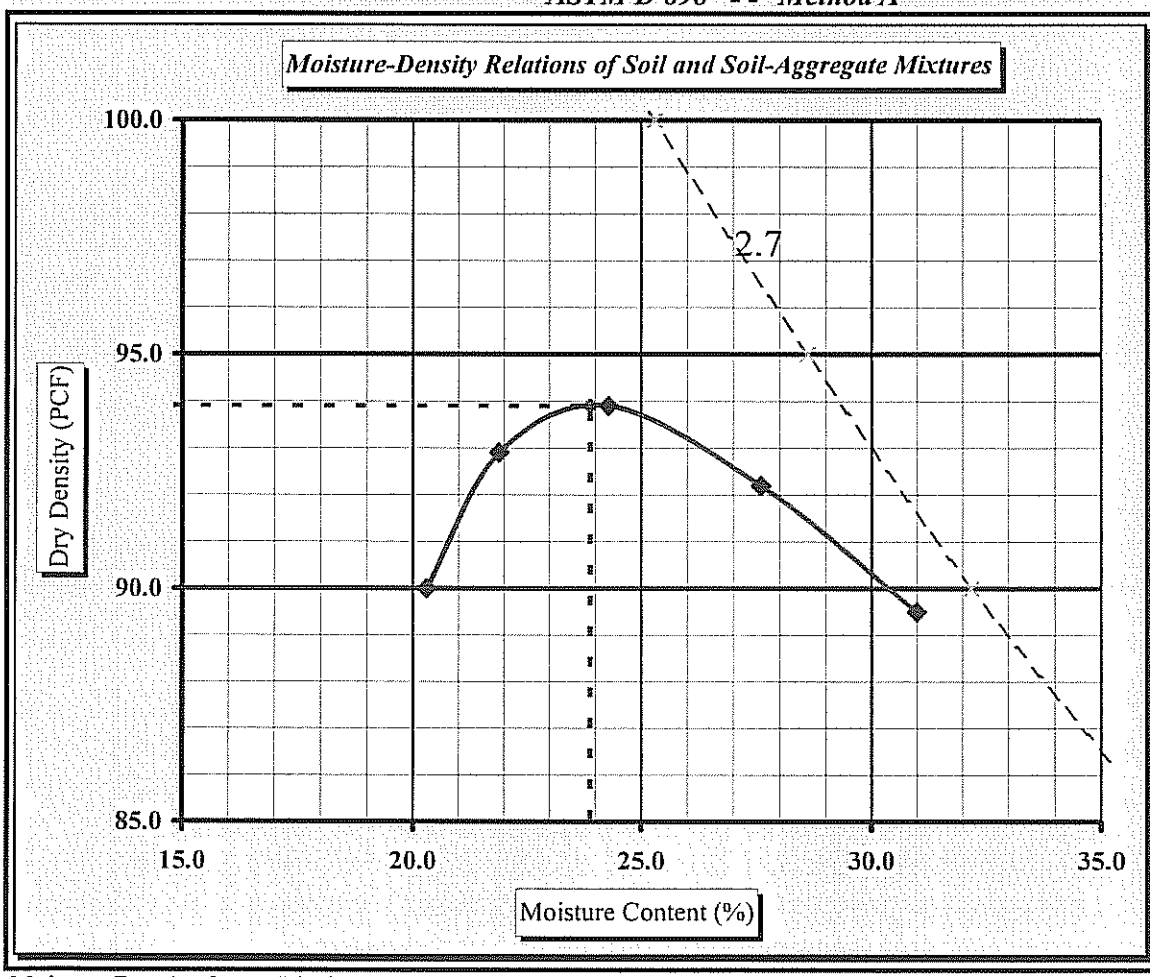
S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	3/13/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/12-13/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-2	Sample Date:	3/11/2009
Location:	Stockpile	Offset:		Depth:	

Sample Description: Orange Brown Clayey Silt w/Medium to Fine Sand (MH)

Maximum Dry Density 93.9 PCF. **Optimum Moisture Content 23.9%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**26.4%**
Specific Gravity of Soil	
Liquid Limit	**69**
Plastic Limit	**40**
Plastic Index	**29**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.9%
#40	92.8%
#60	86.2%
#200	79.5%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Task 9**	Report Date:	3/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/11-19/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-2	Sample Date: 3/11/09
Location:	Stockpile	Offset:	Elevation:
Sample Description:	Orange Brown 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):		251.05		Tare #	31	G-11
Weight of Total Sample Air Dried:		251.05	A	Tare Wt.	13.95	82.91
Weight of Air Dried Hydrometer Sample (g):		50.02	B	Wet Wt. + A	24.40	426.40
Total Sample Oven Dried:		247.69	C	Dry Wt. + A	24.26	354.68
Hydrometer Sample Oven Dried (W):		49.35	D	Water Wt. (B-C)	0.14	71.72
% Passing #10:		99.9%	E	Dry Wt. (C-A)	10.31	271.77
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	1.36%	26.4%

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	0.2	**100.0%**	99.9%
#20	0.7	98.7%	98.6%
#40	3.5	92.9%	92.8%
#60	6.8	86.2%	86.2%
#100	9.3	81.2%	81.1%
#200	10.1	79.6%	79.5%

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. 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
1	22.0	44.0	5.0		39.00	78.2%	78.2%	9.9	0.01312	0.04129
2	22.0	41.5	5.0		36.50	73.2%	73.2%	10.3	0.01312	0.02979
5	22.0	39.0	5.0		34.00	68.2%	68.2%	10.7	0.01312	0.01921
15	22.0	36.0	5.0		31.00	62.2%	62.2%	11.2	0.01312	0.01134
30	22.0	33.0	5.0		28.00	56.2%	56.1%	11.7	0.01312	0.00820
60	22.0	30.0	5.0		25.00	50.2%	50.1%	12.2	0.01312	0.00592
250	22.5	26.5	4.5		22.00	44.1%	44.1%	12.7	0.01305	0.00294
1440	22.5	20.0	4.5		15.50	31.1%	31.1%	13.8	0.01305	0.00128

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

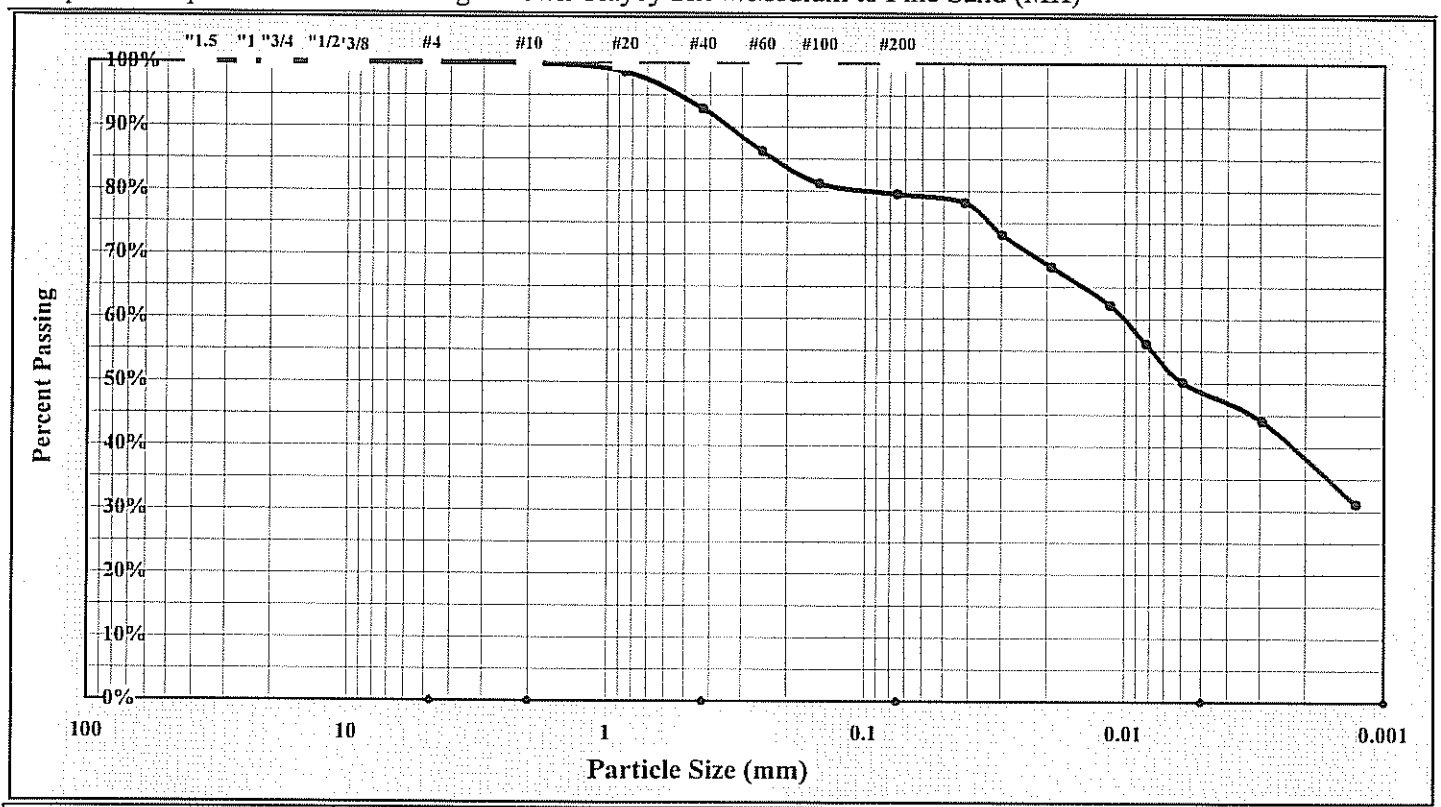
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	3/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/11-19/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-2	Sample Date:	3/11/09
Location:	Stockpile Offset:	Elevation:	
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	30.5%
Silt & Clay (% Passing #200):	79.5%	Total Sand:	20.5%	Clay	49.0%
ent Relative Density (Assumed)	2.700	Moisture Content	26.4%	Colloids	20.5%
Liquid Limit	69	Plastic Limit	40	Plastic Index	29
Coarse Sand:	0.1%	Medium Sand:	7.1%	Fine Sand:	13.3%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Retired Ash Basin (RAB) Landfill 3/19/2009

Sample Name: CSL-3

Sample Description: Red Orange Brown Clay w/Fine to Medium Sand (CH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.239	Tare No.	G-11	γ_{wet} (pcf)	113.5			Panel No	4
Leng. (cm)	7.62	WWS+ Tare (gm)	367.58	γ_{dry} (pcf)	90.2			Cell P (psi)	72.5
Area (cm^2)	41.16	WDS+Tare (gm)	308.73	w (%)	26.2			Influent P (psi)	70.2
Vol. (cm^3)	313.62	WT of Water (gm)	58.85	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	578.9	WT of TARE (gm)	82.97	γ_{wet} (pcf)	115.6				
		WT Dry Soil (gm)	225.76	γ_{dry} (pcf)	91.8			Gradient	1.8
		w (%)	26.1	w (%)	26.1				

K = (Q x L) / (t x H x A)

Run	Temp. (°C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		15	14		10.3	0.0	14.8				-
	22	16	52	5880	10.3	0.7	14.2	0.7	14.1	0.9530	1.39E-06
2		16	53		10.3	0.0	14.8				
	22	17	21	1680	10.3	0.2	14.6	0.2	14.1	0.9530	1.49E-06
3		8	18		10.3	0.0	14.8				
	21	9	44	5160	10.3	0.7	14.2	0.7	14.1	0.9760	1.62E-06
4		9	45		10.4	0.0	14.8				
	21	11	5	4800	10.4	0.7	14.2	0.7	14.1	0.9760	1.74E-06
5		11	6		10.4	0.0	14.8				
	21	13	27	8460	10.4	0.9	13.9	0.9	14.1	0.9760	1.37E-06
6		13	29		10.4	0.0	14.8				
	21	15	15	6360	10.5	0.7	14.1	0.7	14.1	0.9760	1.41E-06
										Ave. K (cm/sec)	1.53E-06
										(Runs 2 thru 6)	
										Ave. K (m/sec)	1.53E-08

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 #:	**1356-06-825 Task 9**	Report Date:	3/17/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s)	3/11-17/09
Client Name:	Duke Energy		
Client Address:			

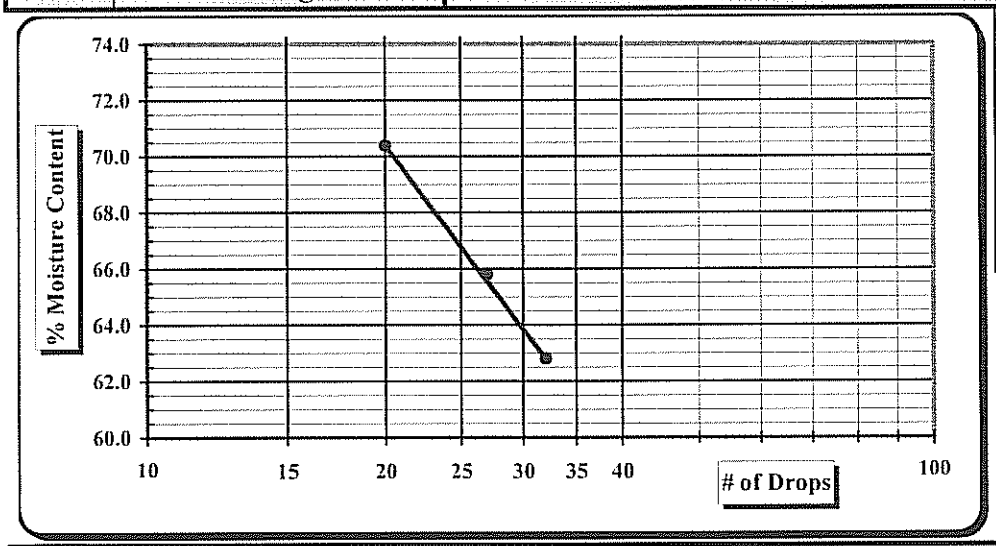
Boring #: Sample #: CSL-3 Sample Date: 3/11/09

Location: Stockpile Offset: Elevation:

Sample Description: Red Orange Brown Clay w/Fine to Medium Sand (CH)

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.01 g)	3996	2/13/2009	Grooving tool	20232	2/23/2009
LL Apparatus	20230	9/21/2008	Grooving tool		
Oven	10844	9/5/2008	Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	33	41	FF				25	1	
A	Tare Weight	15.82	15.77	16.85				**14.41**	13.87	
B	Wet Soil Weight + A	23.88	25.09	24.50				21.56	19.46	
C	Dry Soil Weight + A	20.77	21.39	21.34				19.80	18.08	
D	Water Weight (B-C)	3.11	3.70	3.16				1.76	1.38	
E	Dry Soil Weight (C-A)	4.95	5.62	4.49				5.39	4.21	
F	% Moisture (D/E)*100	62.8%	65.8%	70.4%				32.7%	32.8%	
N	# OF DROPS	32	27	20				*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 — *Technician Name* — *Date*

Ken Daly — *Technical Responsibility* — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	3/16/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	3/12-16/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-3	Sample Date:	3/11/2009
Location:	Stockpile	Offset:		Depth:	
Sample Description:	Red Orange Brown Clay w/Fine to Medium Sand (CH)				

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

Water Added:							
Tare #:		72	MG	70	84	L-42	
A. Tare Weight	A.	74.8	87.0	71.0	73.8	85.9	
B. Wet Wt + Tare Wt	B.	100.0	818.1	772.6	780.6	781.0	
C. Dry Wt. + Tare Wt.	C.	564.2	689.6	637.9	629.9	624.0	
D. Water Weight	B-C	-464.2	128.5	134.7	150.7	157.0	
E. Dry Weight	C-A	489.4	602.6	566.9	556.1	538.1	
F. Moisture Content	100*D/E	**-94.9%**	**21.3%**	**23.8%**	**27.1%**	**29.2%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5788	5862	5942	5950	5942	
H. Wt. of Mold	H.	4170	4170	4170	4170	4170	
I. Wt. of Soil (g. or lbs.)	G-H	1618	1692	1772	1780	1772	
J. Wt of Soil (Lbs.)	I/453.6 or I	3.567	3.730	3.907	3.924	3.907	
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07	30.07	
L. Wet Density (PCF)	J*K	107.3	112.2	117.5	118.0	117.5	
M. Dry Density (PCF)	L/(1+F)	**2103.9**	**92.5**	**94.9**	**92.8**	**90.9**	

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:

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

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

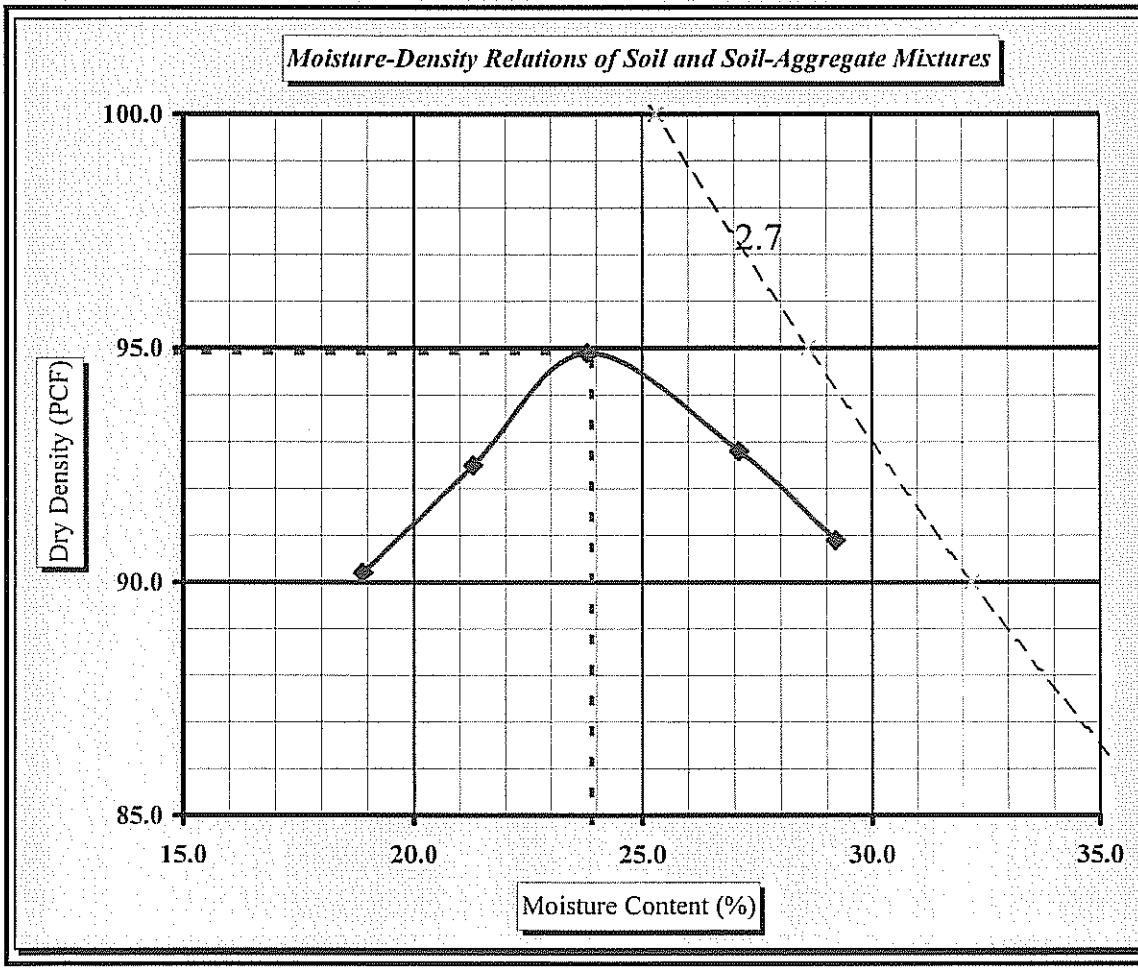
S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	3/16/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/12-16/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-3	Sample Date:	3/11/2009
Location:	Stockpile	Offset:		Depth:	

Sample Description: Red Orange Brown Clay w/Fine to Medium Sand (CH)

Maximum Dry Density 94.9 PCF. **Optimum Moisture Content 23.9%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**22.6%**
Specific Gravity of Soil	
Liquid Limit	**67**
Plastic Limit	**33**
Plastic Index	**34**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.5%
#10	98.8%
#40	83.5%
#60	78.2%
#200	70.8%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Task 9**	Report Date:	3/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/11-19/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-3	Sample Date: 3/11/09
Location:	Stockpile	Offset:	Elevation:
Sample Description:	Red Orange Brown Clay w/Fine to Medium 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):	328.16			Tare #	57	G-13
Weight of Total Sample Air Dried:	328.16		A	Tare Wt.	13.88	81.36
Weight of Air Dried Hydrometer Sample (g):	50.03		B	Wet Wt. + A	25.10	471.30
Total Sample Oven Dried:	322.96		C	Dry Wt. + A	24.92	399.35
Hydrometer Sample Oven Dried (W):	49.23		D	Water Wt. (B-C)	0.18	71.95
% Passing #10:	98.8%		E	Dry Wt. (C-A)	11.04	317.99
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	1.63%	22.6%

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	1.5		99.5%
#10	3.8	**100.0%**	98.8%
#20	3.5	92.8%	91.7%
#40	7.7	84.5%	83.5%
#60	10.3	79.1%	78.2%
#100	12.1	75.5%	74.6%
#200	14.0	71.7%	70.8%

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. 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)$^{1/2}$
1	22.0	40.0	5.0		35.00	70.4%	69.6%	10.6	0.01312	0.04263
2	22.0	38.0	5.0		33.00	66.4%	65.6%	10.9	0.01312	0.03061
5	22.0	37.0	5.0		32.00	64.4%	63.6%	11.0	0.01312	0.01951
15	22.0	34.5	5.0		29.50	59.3%	58.6%	11.5	0.01312	0.01147
30	22.0	33.0	5.0		28.00	56.3%	55.7%	11.7	0.01312	0.00820
60	22.0	31.0	5.0		26.00	52.3%	51.7%	12.0	0.01312	0.00588
250	22.5	28.5	4.5		24.00	48.3%	47.7%	12.4	0.01305	0.00290
1440	22.5	23.5	4.5		19.00	38.2%	37.8%	13.2	0.01305	0.00125

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

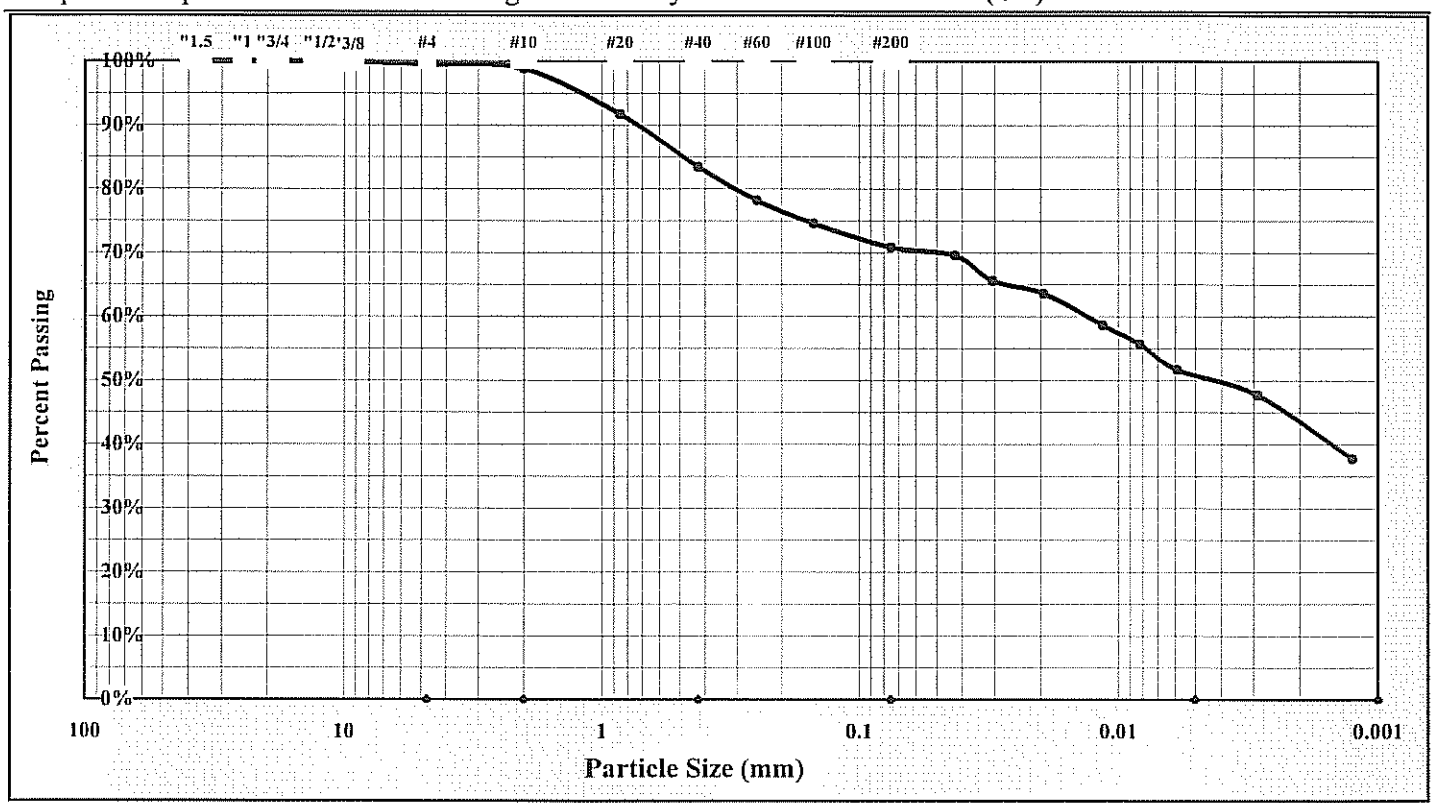
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	3/19/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/11-19/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-3	Sample Date:	3/11/09
Location:	Stockpile Offset:	Elevation:	
Sample Description:	Red Orange Brown Clay w/Fine to Medium 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	19.8%
Silt & Clay (% Passing #200):	70.8%	Total Sand:	28.7%	Clay	51.0%
ent Relative Density (Assumed)	2.700	Moisture Content	22.6%	Colloids	20.5%
Liquid Limit	67	Plastic Limit	33	Plastic Index	34
Coarse Sand:	0.7%	Medium Sand:	15.4%	Fine Sand:	12.6%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No: TR-D2216-T265-2
Revision No. 0
Revision Date: 02/22/08

Laboratory Determination of Water Content

S&ME

ASTM D 2216 ☑ *AASHTO T 265* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	3/13/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/12-13/09
Client Name:	Duke Energy		
Client Address:			
Sample by:	JM	Sample Date(s):	3/1109
Sampling Method:		Drill Rig :	

Method: A (1%) ☐ B (0.1%) ☐ *Balance ID.* *Calibration Date:*

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture
		ft. or m.		grams	grams	grams	grams	%
NA	CSL-1	1st Lift	Jazz	81.70	423.10	349.93	73.17	**27.3%**
NA	CSL-2	Stockpile	G-11	82.91	426.40	354.68	71.72	**26.4%**
NA	CSL-3	Stockpile	G-13	81.36	471.30	399.35	71.95	**22.6%**

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Karen Warner	Karen M Warner	NICET 117900	3/13/09
Technician Name	*Signature*	*Certification Type / No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Retired Ash Basin (RAB) Landfill 3/27/2009

Sample Name: CSL-4

Sample Description: Red Orange Micaceous Coarse to Fine Sandy Clayey Silt (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.29	Tare No.	T-1	γ_{wet} (pcf)	112.4			Panel No	6
Leng. (cm)	7.541	WWS+ Tare (gm)	392.96	γ_{dry} (pcf)	88.5			Cell P (psi)	72.5
Area (cm^2)	41.74	WDS+Tare (gm)	326.79	w (%)	26.9			Influent P (psi)	70.2
Vol. (cm^3)	314.76	WT of Water (gm)	66.17	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	573	WT of TARE (gm)	83.17	γ_{wet} (pcf)	113.7				
		WT Dry Soil (gm)	243.62	γ_{dry} (pcf)	89.4			Gradient	1.9
		w (%)	27.2	w (%)	27.2				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		1	35		6.1	0.0	14.8				
	20	2	26	3060	6.1	0.7	14.0	0.8	14.1	1.0000	3.15E-06
2		2	27		6.1	0.0	14.8				
	20	3	8	2460	6.1	0.7	14.1	0.7	14.1	1.0000	3.65E-06
3		3	9		6.1	0.0	14.8				
	20	3	49	2400	6.1	0.7	14.1	0.7	14.1	1.0000	3.74E-06
4		3	50		6.1	0.0	14.8				
	20	4	36	2760	6.1	0.8	14.0	0.8	14.1	1.0000	3.72E-06
										Ave. K (cm/sec)	3.71E-06
										(Runs 2 thru 4)	
										Ave. K (m/sec)	3.71E-08

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 #:	**1356-06-825 Phase 9**	Report Date:	4/6/09
Project Name:	Allen Retired Ash Landfill Basin (RAB) Ash Landfill	Test Date(s)	3/19-4/6/09
Client Name:	Duke Energy		
Client Address:			

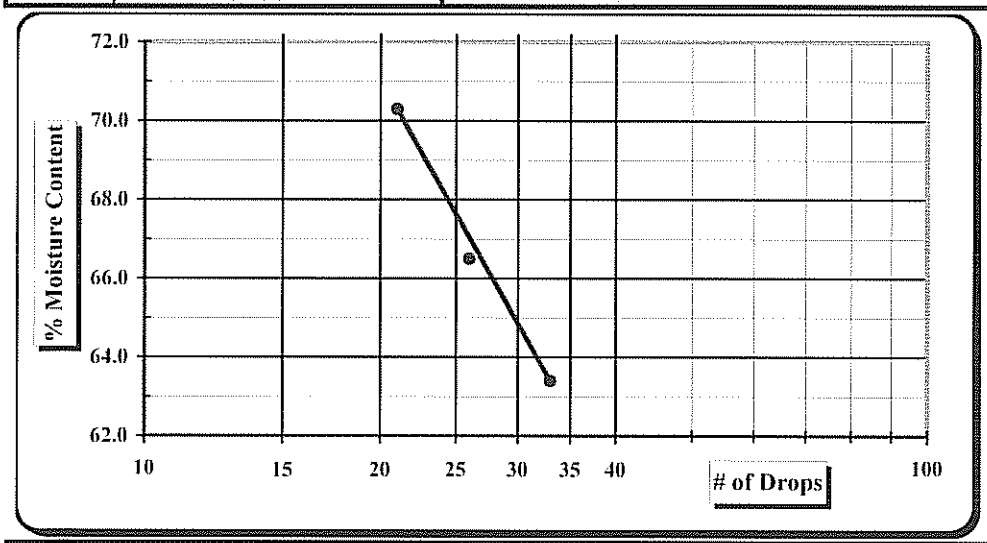
Boring #: Sample #: CSL-4 Sample Date: 3/18/09

Location: Compacted Soil Liner Offset: Elevation:

Sample Description: Red Orange Micaceous 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)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	FF	XX	8	4	5	6	BA	41	
A	Tare Weight	16.85	16.05	13.99				**15.36**	15.78	
B	Wet Soil Weight + A	27.11	24.36	24.77				22.06	22.35	
C	Dry Soil Weight + A	23.13	21.04	20.32				20.13	20.49	
D	Water Weight (B-C)	3.98	3.32	4.45				1.93	1.86	
E	Dry Soil Weight (C-A)	6.28	4.99	6.33				4.77	4.71	
F	% Moisture (D/E)*100	63.4%	66.5%	70.3%				40.5%	39.5%	
N	# OF DROPS	33	26	21				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**40.0%**		



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 **68**

Plastic Limit **40**

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 — *Technician Name* — _____ *Date*

Kyle Baucom — *Technical Responsibility* — _____ *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	3/24/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	3/24/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-4	Sample Date:	3/18/2009
Location:	Compacted soil liner (in place)	Offset:		Depth:	1st Lift
Sample Description:	Red Orange Micaceous Coarse to Fine Sandy Clayey Silt (MH)				

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						
	Tare #:		L-42	995	70	76	77
A. Tare Weight	A.		85.9	72.6	71.2	71.7	71.3
B. Wet Wt + Tare Wt	B.		782.4	750.3	727.9	862.7	851.5
C. Dry Wt. + Tare Wt.	C.		669.3	625.6	592.4	686.4	665.5
D. Water Weight	B-C		113.1	124.7	135.5	176.3	186.0
E. Dry Weight	C-A		583.4	553.0	521.2	614.7	594.2
F. Moisture Content	100*D/E		**19.4%**	**22.5%**	**26.0%**	**28.7%**	**31.3%**

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.		5786	5880	5939	5951	5930
H. Wt. of Mold	H.		4169	4169	4169	4169	4169
I. Wt. of Soil (g. or lbs.)	G-H		1617	1711	1770	1782	1761
J. Wt of Soil (Lbs.)	I/453.6 or I		3.565	3.772	3.902	3.929	3.882
K. Mold Volume Factor	K.		30.07	30.07	30.07	30.07	30.07
L. Wet Density (PCF)	J*K		107.2	113.4	117.3	118.1	116.7
M. Dry Density (PCF)	L/(1+F)		**89.8**	**92.6**	**93.1**	**91.8**	**88.9**

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:

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

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

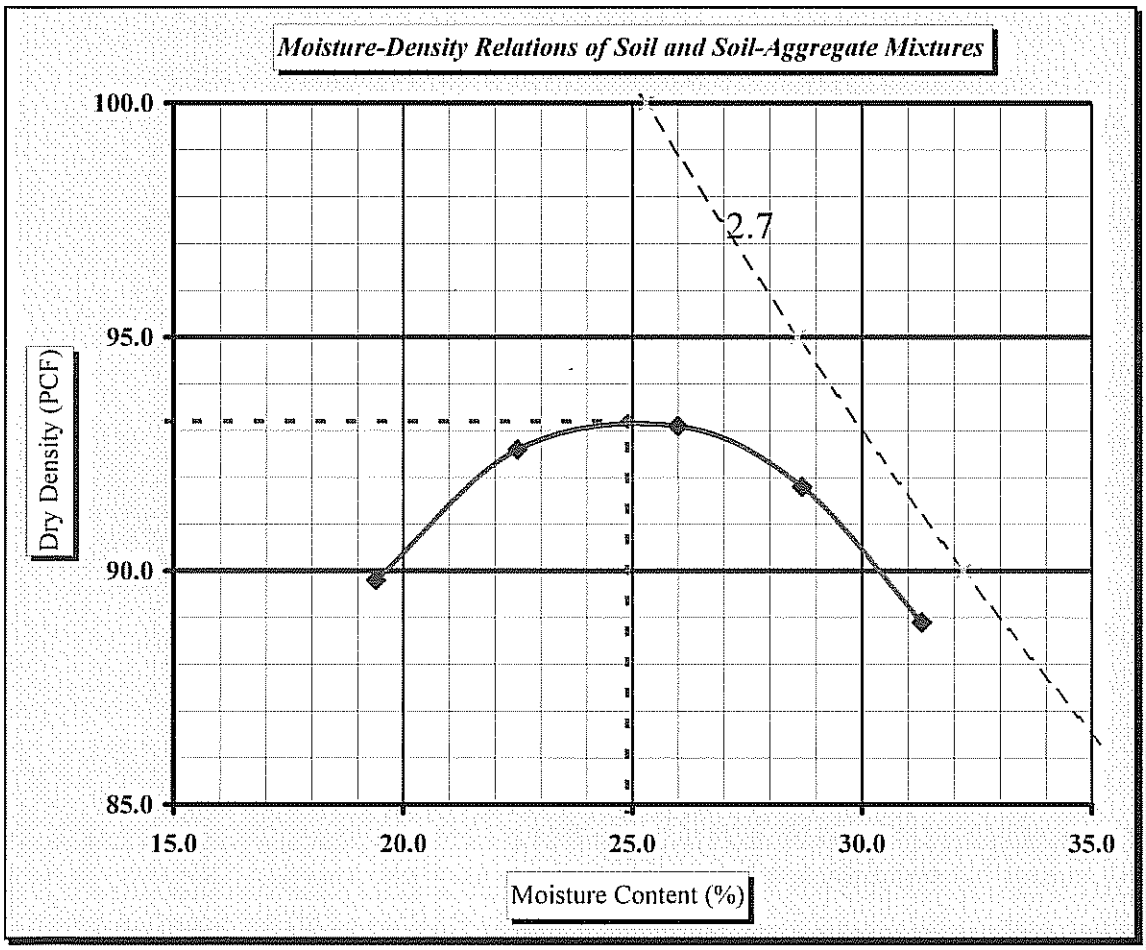
S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	3/24/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/24/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-4	Sample Date:	3/18/2009
Location:	Compacted soil liner (in	Offset:		Depth:	1st Lift

Sample Description: Red Orange Micaceous Coarse to Fine Sandy Clayey Silt (MH)

Maximum Dry Density 93.2 PCF. **Optimum Moisture Content 24.9%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**21.1%**
Specific Gravity of Soil	**ND**
Liquid Limit	**68**
Plastic Limit	**40**
Plastic Index	**28**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.3%
#40	85.4%
#60	78.1%
#200	67.9%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Phase 9**	Report Date:	4/8/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/11-19/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-4	Sample Date: 3/18/09
Location:	Compacted soil liner (in place)	Offset:	Elevation: 1st Lift
Sample Description:	Red Orange Micaceous 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):	378.16			Tare #	59	G-12				
Weight of Total Sample Air Dried:	378.16		A	Tare Wt.	15.81	82.84				
Weight of Air Dried Hydrometer Sample (g):	50.03		B	Wet Wt. + A	26.27	507.20				
Total Sample Oven Dried:	375.65		C	Dry Wt. + A	26.20	433.40				
Hydrometer Sample Oven Dried (W):	49.70		D	Water Wt. (B-C)	0.07	73.80				
% Passing #10:	99.3%		E	Dry Wt. (C-A)	10.39	350.56				
Correction Factor a (Table 1):	0.99			% Moisture (100 x D/E)	0.67%	21.1%				

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	2.7	**100.0%**	99.3%
#20	2.0	95.9%	95.2%
#40	6.9	86.0%	85.4%
#60	10.6	78.6%	78.1%
#100	13.2	73.5%	73.0%
#200	15.7	68.4%	67.9%

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. 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
1	21.0	39.5	5.0		34.50	68.7%	68.2%	10.6	0.01328	0.04331
2	21.0	38.0	5.0		33.00	65.7%	65.3%	10.9	0.01328	0.03098
5	21.0	36.5	5.0		31.50	62.8%	62.3%	11.1	0.01328	0.01981
15	21.0	32.5	5.0		27.50	54.8%	54.4%	11.8	0.01328	0.01177
30	21.0	28.5	5.0		23.50	46.8%	46.5%	12.4	0.01328	0.00855
60	21.0	27.0	5.0		22.00	43.8%	43.5%	12.7	0.01328	0.00611
250	22.0	23.0	4.5		18.50	36.9%	36.6%	13.3	0.01312	0.00302
1440	21.5	20.0	5.0		15.00	29.9%	29.7%	13.8	0.01320	0.00129

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

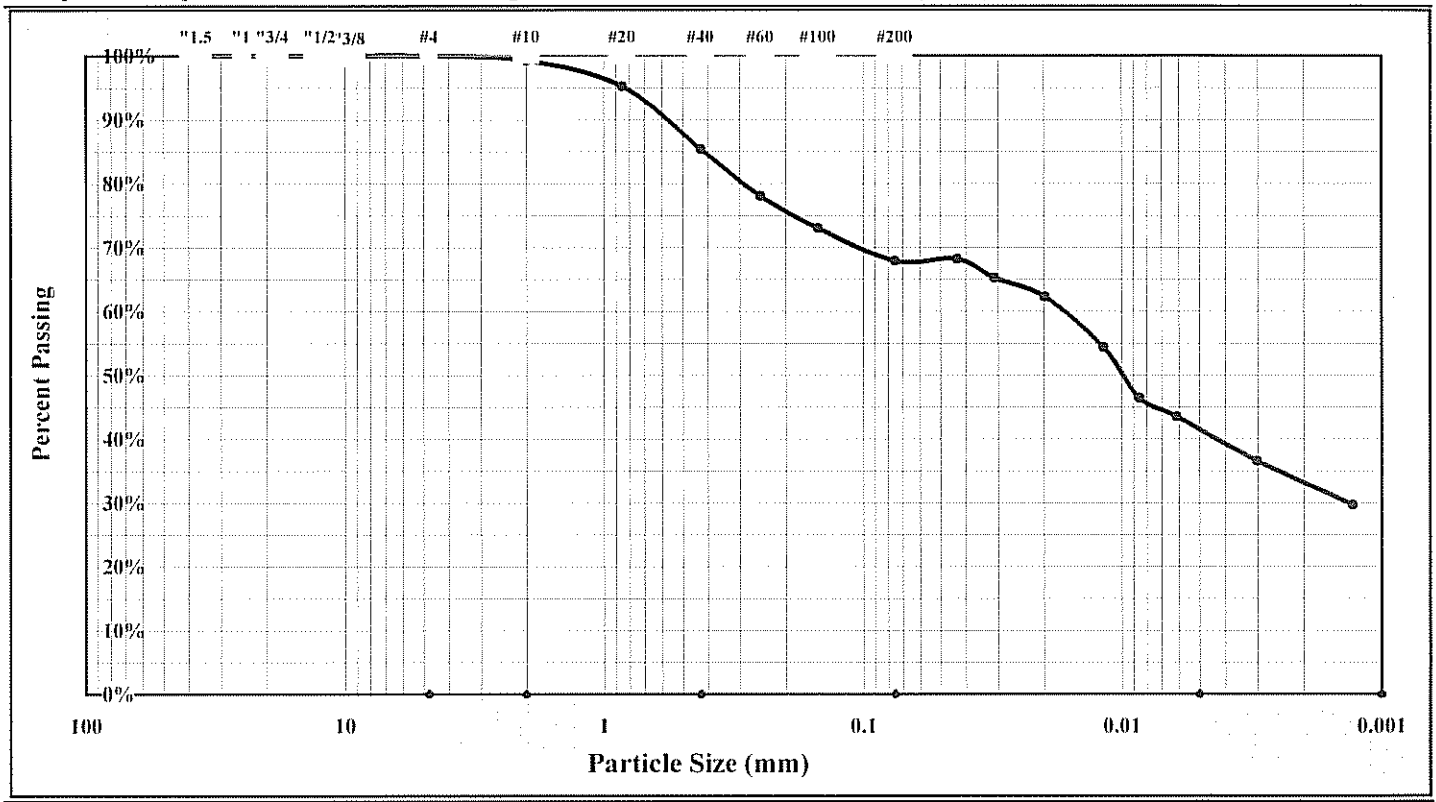
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Phase 9	Report Date:	4/8/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/11-19/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-4	Sample Date:	3/18/09
Location:	Compacted soil liner Offset:	Elevation:	1st Lift
Sample Description:	Red Orange Micaceous 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:	0.0%	Silt	42.0%
Silt & Clay (% Passing #200):	67.9%	Total Sand:	32.1%	Clay	29.0%
ent Relative Density (Assumed)	2.700	Moisture Content	21.1%	Colloids	28.5%
Liquid Limit	68	Plastic Limit	40	Plastic Index	28
Coarse Sand:	0.7%	Medium Sand:	13.9%	Fine Sand:	17.5%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 09 Project Name: Allen Steam Station RAB Ash Landfill 3/31/2009

Sample Name: CSL-5

Sample Description: Orange Brown Medium to Fine Sandy Clayey Silt (MH)

Type of Sample: Undisturbed

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.28	Tare No.	Jazz	γ_{wet} (pcf)	112.9			Panel No	5
Leng. (cm)	7.62	WWS+ Tare (gm)	410	γ_{dry} (pcf)	90.1			Cell P (psi)	72.5
Area (cm^2)	41.62	WDS+Tare (gm)	342.57	w (%)	25.4			Influent P (psi)	70.2
Vol. (cm^3)	317.18	WT of Water (gm)	67.43	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	575.3	WT of TARE (gm)	81.19	γ_{wet} (pcf)	113.3				
		WT Dry Soil (gm)	261.38	γ_{dry} (pcf)	90.0			Gradient	1.8
		w (%)	25.8	w (%)	25.8				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		10	52		3.7	0.0	14.8				
	21	11	18	1560	3.7	0.7	14.0	0.8	14.1	0.9760	6.10E-06
2		11	19		3.7	0.0	14.8				
	21	11	47	1680	3.7	0.8	14.0	0.8	14.1	0.9760	6.04E-06
3		11	50		3.7	0.0	14.8				
	21	12	15	1500	3.8	0.7	14.0	0.8	14.1	0.9760	6.35E-06
4		14	0		3.8	0.0	14.8				
	21	14	22	1320	3.8	0.7	14.1	0.7	14.1	0.9760	6.73E-06
5		14	23		3.8	0.0	14.8				
	21	14	49	1560	3.9	0.8	14.0	0.8	14.1	0.9760	6.51E-06
										Ave. K (cm/sec)	6.41E-06
										(Runs 2 thru 5)	
										Ave. K (m/sec)	6.41E-08

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 #: **1356-06-825 Phase 9** Report Date: 3/24/09

Project Name: Allen Retired Ash Landfill Basin (RAB) Ash Landfill Test Date(s) 3/19-24/09

Client Name: Duke Energy

Client Address:

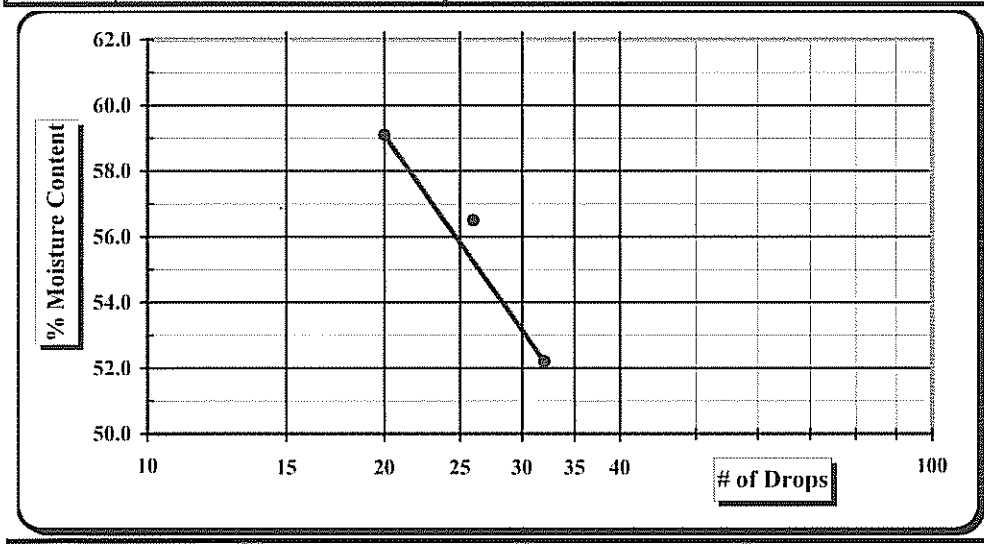
Boring #: Sample #: CSL-5 Sample Date: 3/18/09

Location: Compacted Soil Liner Offset: Elevation: 1st Lift

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)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	45	EE	58				SSS	39	
A	Tare Weight	13.96	16.90	13.98				**16.57**	14.01	
B	Wet Soil Weight + A	23.47	26.68	23.46				24.58	20.07	
C	Dry Soil Weight + A	20.21	23.15	19.94				22.29	18.35	
D	Water Weight (B-C)	3.26	3.53	3.52				2.29	1.72	
E	Dry Soil Weight (C-A)	6.25	6.25	5.96				5.72	4.34	
F	% Moisture (D/E)*100	52.2%	56.5%	59.1%				40.0%	39.6%	
N	# OF DROPS	32	26	20				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**39.8%**		



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 **56**

Plastic Limit **40**

Plastic Index **16**

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* — *Date*

Kyle Baucom — *Technical Responsibility* — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	3/24/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	3/24/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-5	Sample Date:	3/18/2009
Location:	Compacted soil liner (in place)	Offset:		Depth:	1st Lift
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 (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						
	Tare #:	DJ	82	84	L-2	MG	
A. Tare Weight	A.	170.8	74.6	73.8	86.4	86.9	
B. Wet Wt + Tare Wt	B.	708.5	815.5	702.6	819.8	785.3	
C. Dry Wt. + Tare Wt.	C.	622.7	680.2	573.9	659.1	619.3	
D. Water Weight	B-C	85.8	135.3	128.7	160.7	166.0	
E. Dry Weight	C-A	451.9	605.6	500.1	572.7	532.4	
F. Moisture Content	100*D/E	**19.0%**	**22.3%**	**25.7%**	**28.1%**	**31.2%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5846	5918	5957	5954	5909	
H. Wt. of Mold	H.	4169	4169	4169	4169	4169	
I. Wt. of Soil (g. or lbs.)	G-H	1677	1749	1788	1785	1740	
J. Wt of Soil (Lbs.)	I/453.6 or I	3.697	3.856	3.942	3.935	3.836	
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07	30.07	
L. Wet Density (PCF)	J*K	111.2	115.9	118.5	118.3	115.3	
M. Dry Density (PCF)	L/(1+F)	**93.4**	**94.8**	**94.3**	**92.3**	**87.9**	

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:

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

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

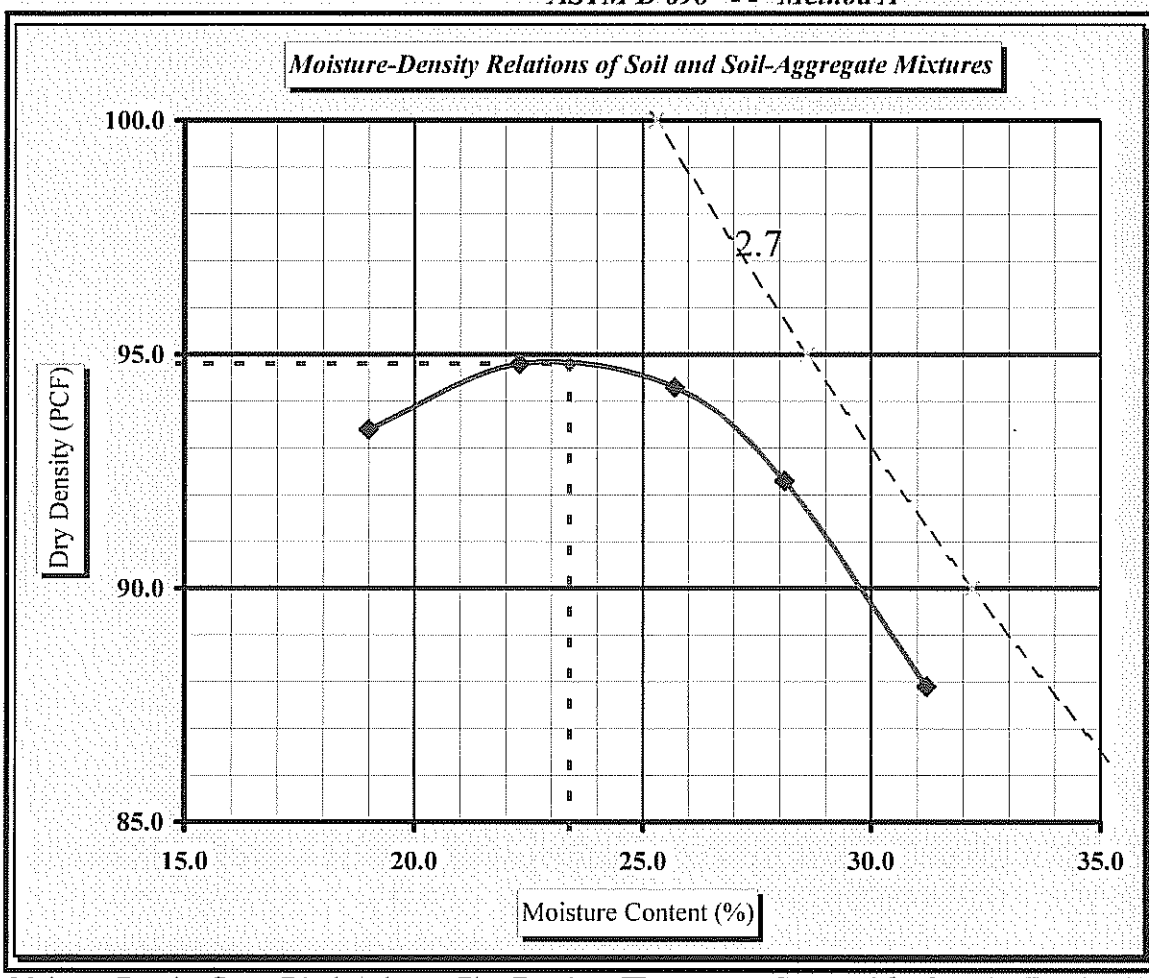
S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	3/24/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/24/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-5	Sample Date:	3/18/2009
Location:	Compacted soil liner (in	Offset:		Depth:	1st Lift

Sample Description: Orange Brown Medium to Fine Sandy Clayey Silt (MH)

Maximum Dry Density 94.8 PCF. **Optimum Moisture Content 23.4%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**17.6%**
Specific Gravity of Soil	**ND**
Liquid Limit	**56**
Plastic Limit	**40**
Plastic Index	**16**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.5%
#40	82.7%
#60	72.1%
#200	63.1%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Task 9**	Report Date:	3/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/19-24/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-5	Sample Date: 3/11/09
Location:	Compacted Soil Liner	Offset:	Elevation: 1st Lift
Sample Description:	Orange Brown Medium 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):		316.69		Tare #	39	S-3
Weight of Total Sample Air Dried:		316.69	A	Tare Wt.	13.98	82.26
Weight of Air Dried Hydrometer Sample (g):		50.02	B	Wet Wt. + A	24.35	427.00
Total Sample Oven Dried:		314.87	C	Dry Wt. + A	24.29	375.30
Hydrometer Sample Oven Dried (W):		49.73	D	Water Wt. (B-C)	0.06	51.70
% Passing #10:		99.5%	E	Dry Wt. (C-A)	10.31	293.04
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	0.58%	17.6%

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%**	99.5%
#20	1.9	96.3%	95.8%
#40	8.4	83.2%	82.7%
#60	13.7	72.5%	72.1%
#100	17.4	65.0%	64.6%
#200	18.2	63.4%	63.1%

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. 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
1	21.0	36.0	5.0		31.00	61.7%	61.4%	11.2	0.01328	0.04447
2	21.0	32.5	5.0		27.50	54.7%	54.5%	11.8	0.01328	0.03224
5	21.0	29.5	5.0		24.50	48.8%	48.5%	12.3	0.01328	0.02081
15	21.0	25.5	5.0		20.50	40.8%	40.6%	12.9	0.01328	0.01233
30	21.0	21.0	5.0		16.00	31.9%	31.7%	13.7	0.01328	0.00896
60	21.0	18.0	5.0		13.00	25.9%	25.7%	14.2	0.01328	0.00645
250	22.0	13.5	4.5		9.00	17.9%	17.8%	14.8	0.01312	0.00319
1440	21.5	13.0	5.0		8.00	15.9%	15.8%	15.0	0.01320	0.00135

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

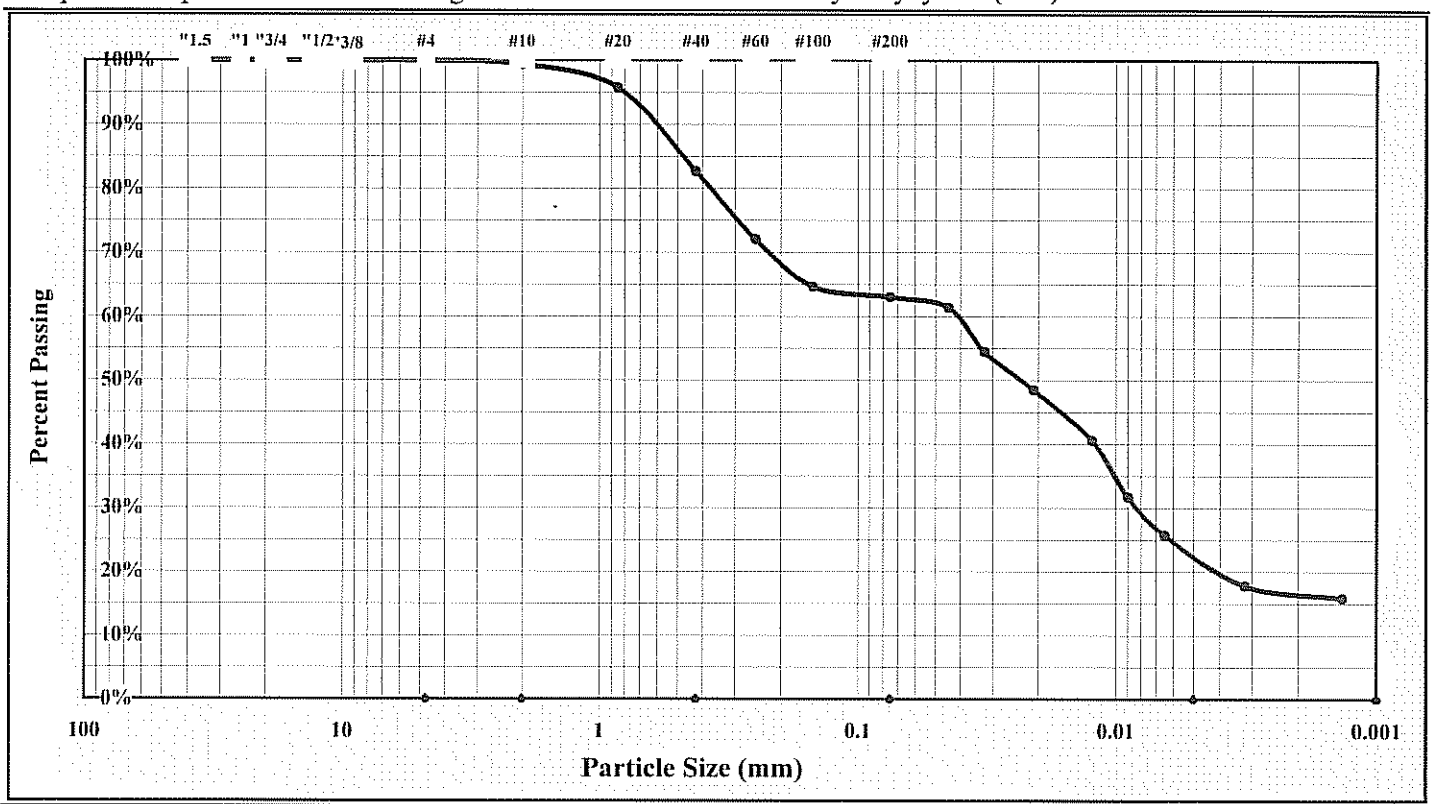
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	3/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/19-24/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-5	Sample Date:	3/11/09
Location:	Compacted Soil Liner Offset:	Elevation:	1st Lift
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	41.1%
Silt & Clay (% Passing #200):	63.1%	Total Sand:	36.9%	Clay	22.0%
ent Relative Density (Assumed)	2.700	Moisture Content	17.6%	Colloids	16.0%
Liquid Limit	56	Plastic Limit	40	Plastic Index	16
Coarse Sand:	0.5%	Medium Sand:	16.7%	Fine Sand:	19.7%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Retired Ash Basin (RAB) Landfill 3/30/2009

Sample Name: CSL-6

Sample Description: Orange Brown Clayey Silt w/Medium to Fine Sand (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.285	Tare No.	G-8	γ_{wet} (pcf)	110.7			Panel No	16
Leng. (cm)	7.62	WWS+ Tare (gm)	420.2	γ_{dry} (pcf)	84.4			Cell P (psi)	72.5
Area (cm^2)	41.68	WDS+Tare (gm)	338.55	w (%)	31.2			Influent P (psi)	70.2
Vol. (cm^3)	317.62	WT of Water (gm)	81.65	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	563.6	WT of TARE (gm)	81.57	γ_{wet} (pcf)	110.9				
		WT Dry Soil (gm)	256.98	γ_{dry} (pcf)	84.1			Gradient	1.8
		w (%)	31.8	w (%)	31.8				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		10	53		12	0.0	14.8				
	21	11	11	1080	12.1	0.7	14.1	0.7	14.1	0.9760	8.22E-06
2		11	12		12.1	0.0	14.8				
	21	12	31	4740	12	0.7	14.1	0.7	14.1	0.9760	1.87E-06
3		12	32		12	0.0	14.8				
	21	14	10	5880	12	0.8	14.0	0.8	14.1	0.9760	1.72E-06
4		14	12		12	0.0	14.8				
	21	15	33	4860	12	0.7	14.1	0.7	14.1	0.9760	1.83E-06
5		15	34		12	0.0	14.8				
	21	17	7	5580	12	0.8	14.0	0.8	14.1	0.9760	1.82E-06
										Ave. K (cm/sec)	1.81E-06
										(Runs 2 thru 5)	
										Ave. K (m/sec)	1.81E-08

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 #: **1356-06-825 Phase 9** Report Date: 3/27/09

Project Name: Allen Retired Ash Landfill Basin (RAB) Ash Landfill Test Date(s) 3/24-27/09

Client Name: Duke Energy

Client Address:

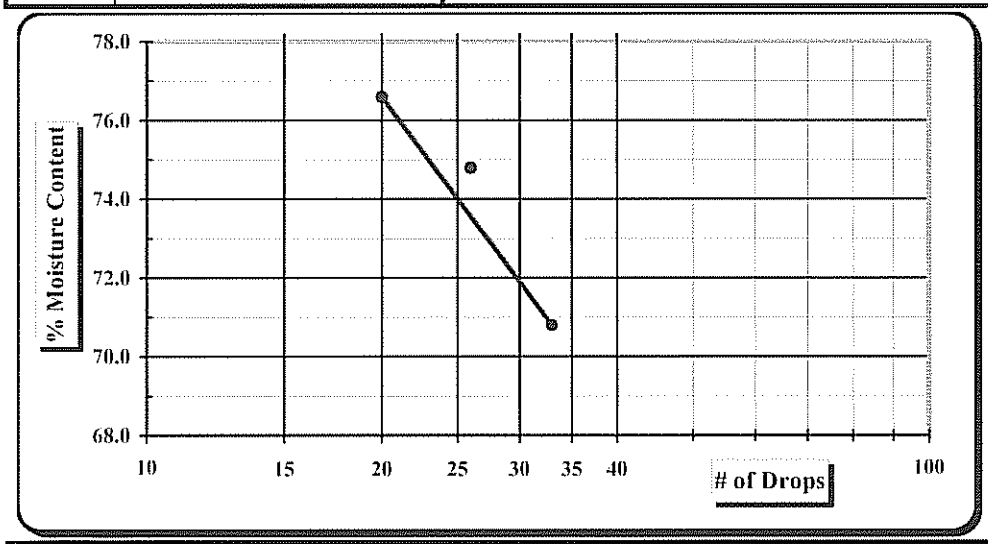
Boring #: Sample #: CSL-6 Sample Date: 3/23/09

Location: Compacted Soil Liner Offset: Elevation: 1st Lift

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)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	59	33	53				LL	TT	
A	Tare Weight	15.81	15.96	15.84				**16.97**	15.96	
B	Wet Soil Weight + A	24.28	24.07	23.17				23.75	22.33	
C	Dry Soil Weight + A	20.77	20.60	19.99				21.80	20.52	
D	Water Weight (B-C)	3.51	3.47	3.18				1.95	1.81	
E	Dry Soil Weight (C-A)	4.96	4.64	4.15				4.83	4.56	
F	% Moisture (D/E)*100	70.8%	74.8%	76.6%				40.4%	39.7%	
N	# OF DROPS	33	26	20				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**40.1%**		



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 **74**

Plastic Limit **40**

Plastic Index **34**

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* — *Date*

Kyle Baucom — *Technical Responsibility* — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	3/26/09
Project Name:	Allen Steam RAB Ash Landfill	Test Date(s)	3/24-26/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-6	Sample Date:	3/23/2009
Location:	Compacted Soil Liner	Offset:		Depth:	1st Lift
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 (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						Natural
	Tare #:		87	101	62	74	
A. Tare Weight	A.		74.8	74.7	72.6	69.7	
B. Wet Wt + Tare Wt	B.		642.0	847.2	818.1	803.9	
C. Dry Wt. + Tare Wt.	C.		530.5	675.6	637.5	612.0	
D. Water Weight	B-C		111.5	171.6	180.6	191.9	
E. Dry Weight	C-A		455.7	600.9	564.9	542.3	
F. Moisture Content	100*D/E		**24.5%**	**28.6%**	**32.0%**	**35.4%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.		5781	5891	5912	5909	
H. Wt. of Mold	H.		4169	4169	4169	4169	
I. Wt. of Soil (g. or lbs.)	G-H		1612	1722	1743	1740	
J. Wt of Soil (Lbs.)	I/453.6 or I		3.554	3.796	3.843	3.836	
K. Mold Volume Factor	K.		30.07	30.07	30.07	30.07	
L. Wet Density (PCF)	J*K		106.9	114.1	115.6	115.3	
M. Dry Density (PCF)	L/(1+F)		**85.9**	**88.7**	**87.6**	**85.2**	

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 4318, D 854, D 2487, D 422

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

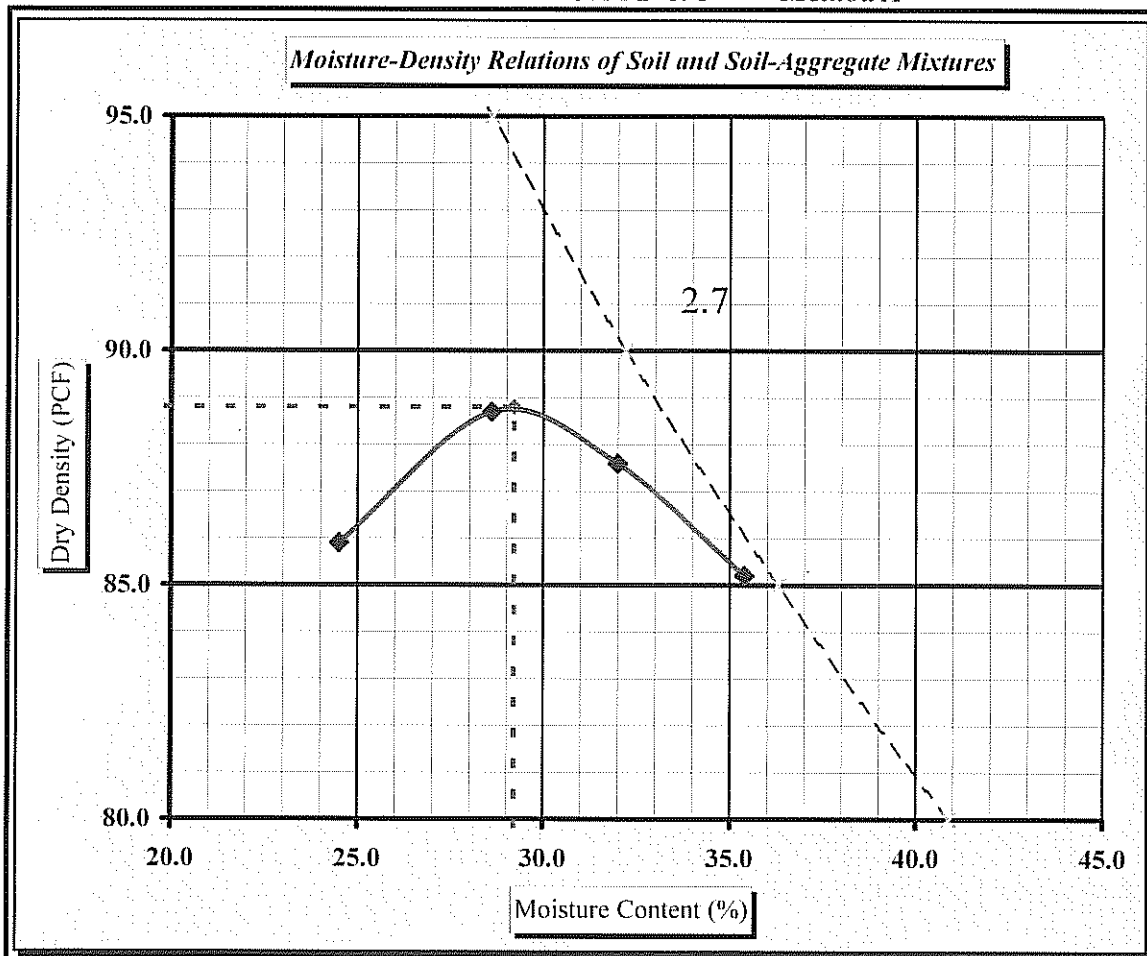
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	3/26/09
Project Name:	Allen Steam RAB Ash Landfill	Test Date(s):	3/24-26/09
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: CSL-6	Sample Date:	3/23/2009
Location:	Compacted Soil Liner Offset:	Depth:	1st Lift
Sample Description:	Orange Brown Clayey Silt w/Medium to Fine Sand (MH)		

Maximum Dry Density 88.8 PCF. **Optimum Moisture Content 29.2%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**27.1%**
Specific Gravity of Soil	**ND**
Liquid Limit	**74**
Plastic Limit	**40**
Plastic Index	**34**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.9%
#10	99.7%
#40	94.2%
#60	90.3%
#200	84.8%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Task 9**	Report Date:	3/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/19-24/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-6	Sample Date:
Location:	Compacted Soil Liner	Offset:	Elevation: 1st Lift
Sample Description:	Orange Brown 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):		286.59		Tare #	25	G-12				
Weight of Total Sample Air Dried:		286.59	A	Tare Wt.	14.33	82.86				
Weight of Air Dried Hydrometer Sample (g):		50.00	B	Wet Wt. + A	24.99	368.90				
Total Sample Oven Dried:		281.23	C	Dry Wt. + A	24.79	307.94				
Hydrometer Sample Oven Dried (W):		49.06	D	Water Wt. (B-C)	0.20	60.96				
% Passing #10:		99.7%	E	Dry Wt. (C-A)	10.46	225.08				
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	1.91%	27.1%				

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	0.2		99.9%
#10	0.9	**100.0%**	99.7%
#20	0.6	98.8%	98.5%
#40	2.7	94.5%	94.2%
#60	4.6	90.6%	90.3%
#100	6.4	86.9%	86.6%
#200	7.3	85.0%	84.8%

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. 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
1	21.0	47.0	5.0		42.00	84.8%	84.5%	9.4	0.01328	0.04073
2	21.0	45.5	5.0		40.50	81.7%	81.5%	9.7	0.01328	0.02918
5	21.0	41.5	5.0		36.50	73.7%	73.4%	10.3	0.01328	0.01907
15	21.0	36.5	5.0		31.50	63.6%	63.4%	11.1	0.01328	0.01144
30	21.0	35.0	5.0		30.00	60.5%	60.3%	11.4	0.01328	0.00818
60	21.0	30.5	5.0		25.50	51.5%	51.3%	12.1	0.01328	0.00597
250	22.0	26.5	4.5		22.00	44.4%	44.3%	12.7	0.01312	0.00296
1440	21.0	25.0	5.0		20.00	40.4%	40.2%	13.0	0.01328	0.00126

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

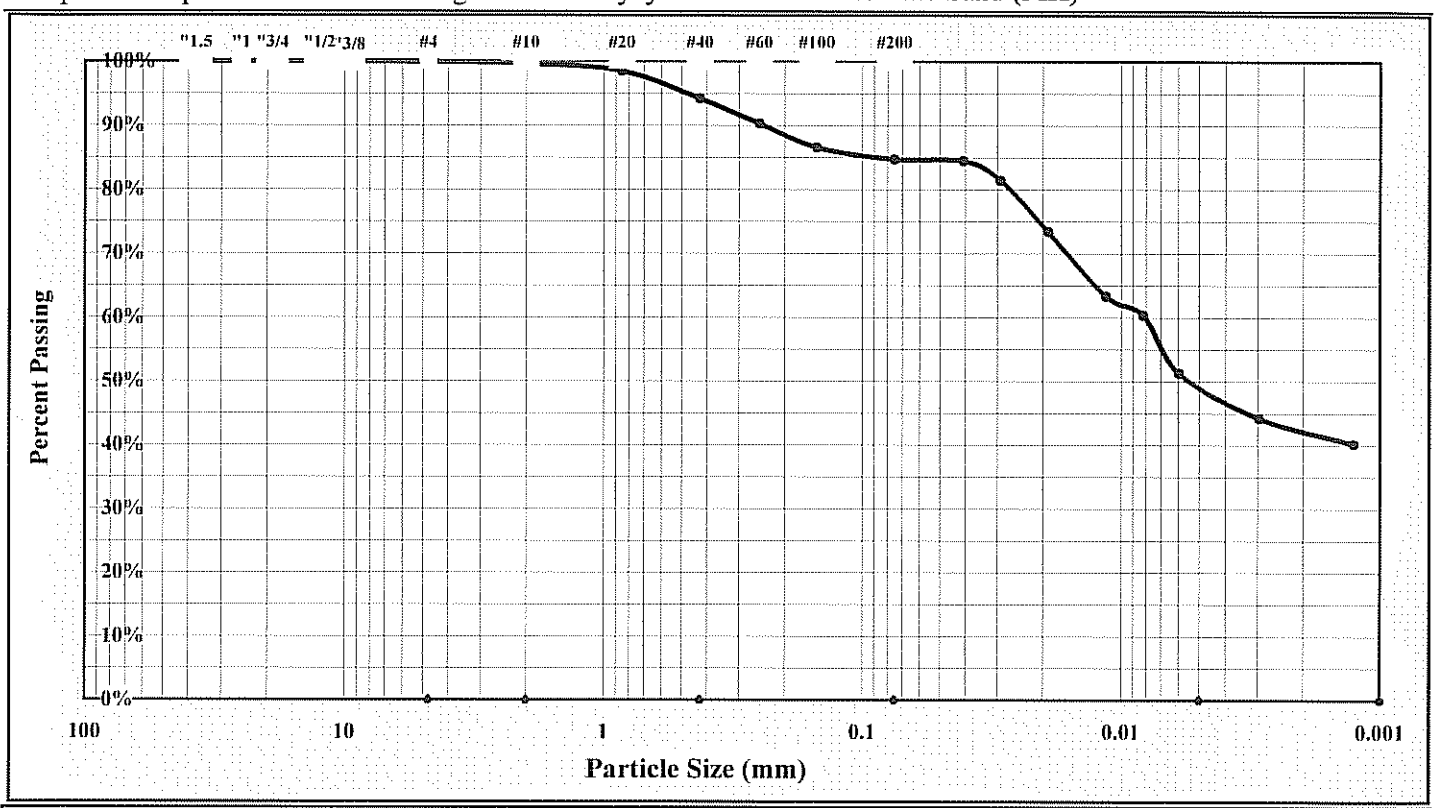
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	3/24/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/19-24/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-6	Sample Date:	
Location:	Compacted Soil Liner Offset:	Elevation:	1st Lift
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	35.3%
Silt & Clay (% Passing #200):	84.8%	Total Sand:	15.2%	Clay	49.5%
ent Relative Density (Assumed)	2.700	Moisture Content	27.1%	Colloids	40.0%
Liquid Limit	74	Plastic Limit	40	Plastic Index	34
Coarse Sand:	0.2%	Medium Sand:	5.4%	Fine Sand:	9.5%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Retired Ash Basin (RAB) Landfill 3/30/2009

Sample Name: CSL-7

Sample Description: Red Clayey Silt w/Medium to Fine Sand (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.28	Tare No.	S-7	γ_{wet} (pcf)	114.4			Panel No	16
Leng. (cm)	7.699	WWS+ Tare (gm)	379.22	γ_{dry} (pcf)	88.5			Cell P (psi)	72.5
Area (cm^2)	41.62	WDS+Tare (gm)	311.43	w (%)	29.2			Influent P (psi)	70.2
Vol. (cm^3)	320.47	WT of Water (gm)	67.79	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	586	WT of TARE (gm)	81.6	γ_{wet} (pcf)	114.2				
		WT Dry Soil (gm)	229.83	γ_{dry} (pcf)	88.2			Gradient	1.8
		w (%)	29.5	w (%)	29.5				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		11	2		12.1	0.0	14.8				
	21	12	2	3600	12.1	0.7	14.2	0.7	14.1	0.9760	2.32E-06
2		12	4		12.1	0.0	14.8				
	21	13	22	4680	12.1	0.7	14.2	0.7	14.1	0.9760	1.78E-06
3		13	24		12.1	0.0	14.8				
	22	15	24	7200	12.1	0.8	14.0	0.8	14.1	0.9530	1.39E-06
4		15	35		12.1	0.0	14.8				
	21	17	45	7800	12.1	0.7	14.1	0.7	14.1	0.9760	1.15E-06
5		8	45		12.3	0.0	14.8				
	21	10	44	7140	12.3	0.8	14.0	0.8	14.1	0.9760	1.44E-06
6		10	47		12.3	0.0	14.8				
	21	13	0	7980	12.3	0.8	13.9	0.9	14.1	0.9760	1.37E-06
										Ave. K (cm/sec)	1.43E-06
										(Runs 2 thru 6)	
										Ave. K (m/sec)	1.43E-08

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

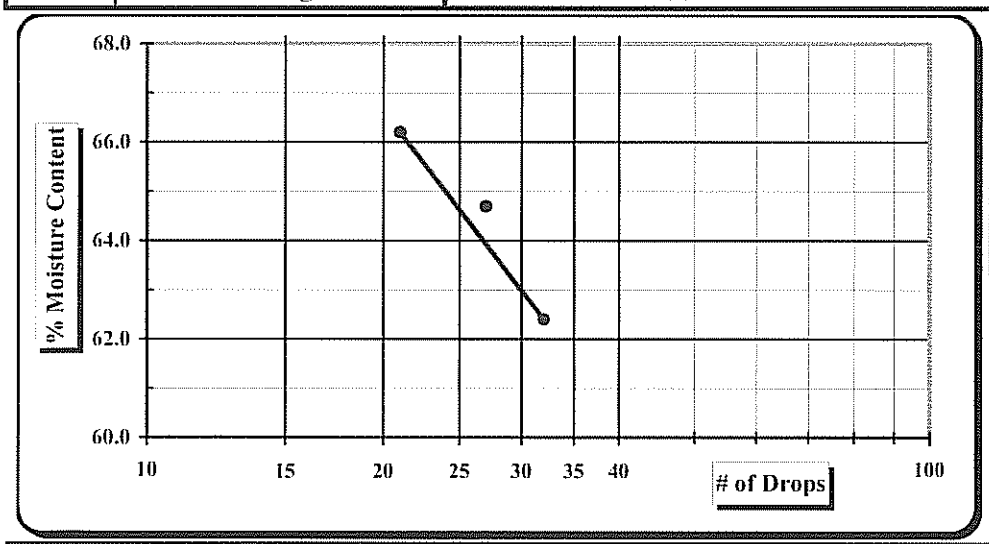
Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	4/4/09
Project Name:	Allen Retired Ash Landfill Basin (RAB) Ash Landfill	Test Date(s)	3/19-4/4/09
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: CSL-7	Sample Date: 3/23/09	
Location:	E Berm & Bench B-8 Offset:	Elevation: 1st Lift	
Sample Description:	Red 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)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	25	31	9				WN	7	
A	Tare Weight	14.33	14.00	13.94				**16.56**	15.71	
B	Wet Soil Weight + A	23.67	22.68	22.30				22.10	23.03	
C	Dry Soil Weight + A	20.08	19.27	18.97				20.68	21.16	
D	Water Weight (B-C)	3.59	3.41	3.33				1.42	1.87	
E	Dry Soil Weight (C-A)	5.75	5.27	5.03				4.12	5.45	
F	% Moisture (D/E)*100	62.4%	64.7%	66.2%				34.5%	34.3%	
N	# OF DROPS	32	27	21				*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	**65**
Plastic Limit	**34**
Plastic Index	**31**
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		Kyle Baucom	
Technician Name	*Date*	*Technical Responsibility*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07
#NAME?

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME
Quality Assurance

Project #:	**1356-06-825 Phase 9**	Report Date:	3/26/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	3/24-26/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-7	Sample Date:	3/23/2009
Location:	East Berm & Bench B-8	Offset:		Depth:	1st Lift
Sample Description:	Red 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 (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

Water Added:							
Tare #:			81	98	63	AW	
A. Tare Weight	A.		73.9	72.0	72.2	84.5	
B. Wet Wt + Tare Wt	B.		833.2	771.6	853.1	930.9	
C. Dry Wt. + Tare Wt.	C.		691.4	623.7	672.2	721.4	
D. Water Weight	B-C		141.8	147.9	180.9	209.5	
E. Dry Weight	C-A		617.5	551.7	600.0	636.9	
F. Moisture Content	100*D/E		**23.0%**	**26.8%**	**30.2%**	**32.9%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.		5862	5953	5964	5916	
H. Wt. of Mold	H.		4169	4169	4169	4169	
I. Wt. of Soil (g. or lbs.)	G-H		1693	1784	1795	1747	
J. Wt of Soil (Lbs.)	I/453.6 or I		3.732	3.933	3.957	3.851	
K. Mold Volume Factor	K.		30.07	30.07	30.07	30.07	
L. Wet Density (PCF)	J*K		112.2	118.3	119.0	115.8	
M. Dry Density (PCF)	L/(1+F)		**91.2**	**93.3**	**91.4**	**87.1**	

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:

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

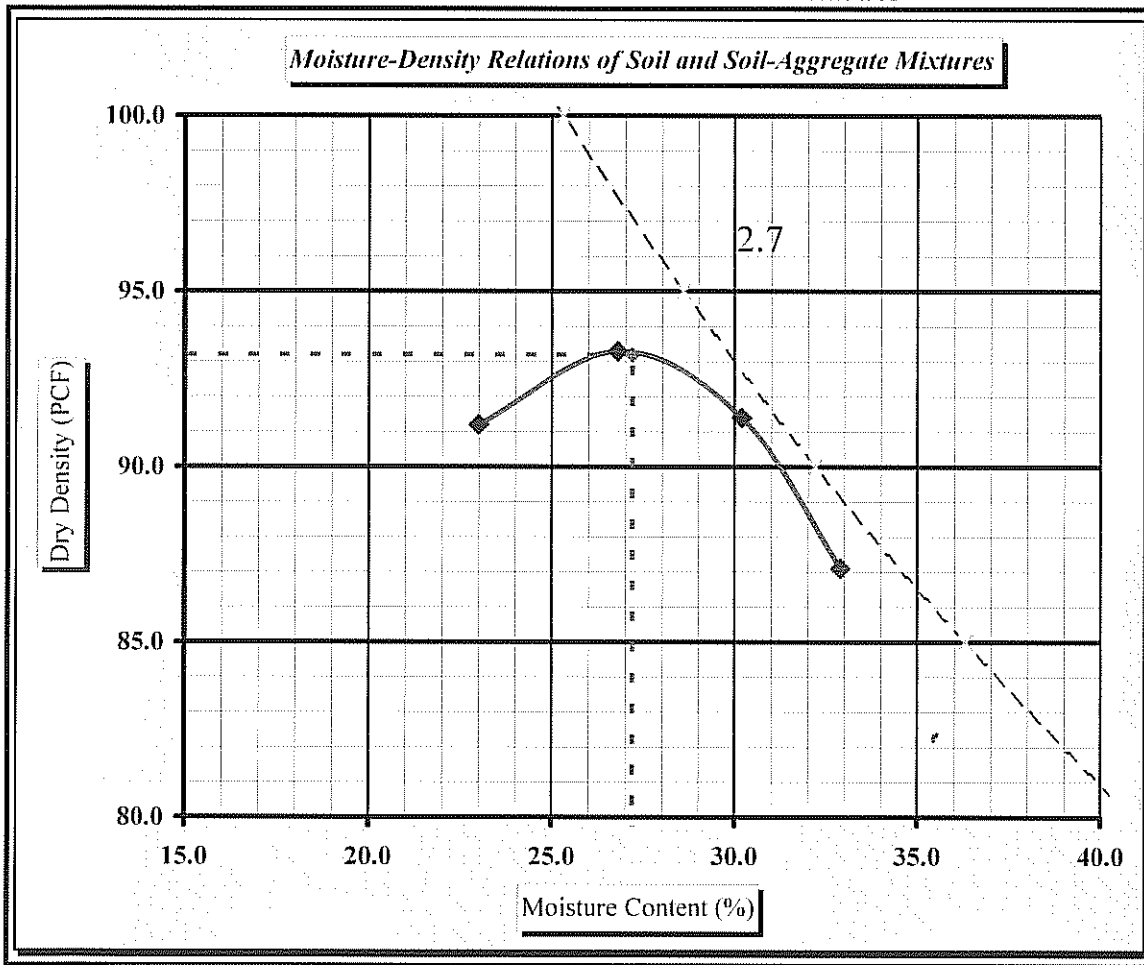
Quality Assurance

0

S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	3/26/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/24-26/09
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: CSL-7	Sample Date:	3/23/2009
Location:	East Berm & Bench B-8 Offset:	Depth:	1st Lift
Sample Description:	Red Clayey Silt w/Medium to Fine Sand (MH)		

Maximum Dry Density 93.2 PCF. **Optimum Moisture Content 27.2%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**23.4%**
Specific Gravity of Soil	
Liquid Limit	**65**
Plastic Limit	**34**
Plastic Index	**31**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	100.0%
#40	88.8%
#60	81.9%
#200	72.8%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Task 9**	Report Date:	4/6/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/19-4/6/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-7	Sample Date: 3/23/09
Location:	E Berm & Bench B-8	Offset:	Elevation: 1st Lift
Sample Description:	Red 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):		353.60		Tare #	SSS	S-3				
Weight of Total Sample Air Dried:		353.60	A	Tare Wt.	16.57	82.31				
Weight of Air Dried Hydrometer Sample (g):		50.03	B	Wet Wt. + A	27.06	461.70				
Total Sample Oven Dried:		349.89	C	Dry Wt. + A	26.95	389.78				
Hydrometer Sample Oven Dried (W):		49.51	D	Water Wt. (B-C)	0.11	71.92				
% Passing #10:		100.0%	E	Dry Wt. (C-A)	10.38	307.47				
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	1.06%	23.4%				

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	0.0	**100.0%**	100.0%
#20	1.2	97.6%	97.6%
#40	5.6	88.8%	88.8%
#60	9.0	81.9%	81.9%
#100	11.3	77.1%	77.1%
#200	13.5	72.8%	72.8%

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. 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
1	21.0	41.0	5.0		36.00	72.0%	72.0%	10.4	0.01328	0.04281
2	21.0	39.0	5.0		34.00	68.0%	68.0%	10.7	0.01328	0.03074
5	21.0	37.0	5.0		32.00	64.0%	64.0%	11.0	0.01328	0.01974
15	21.0	35.0	5.0		30.00	60.0%	60.0%	11.4	0.01328	0.01156
30	21.0	31.5	5.0		26.50	53.0%	53.0%	11.9	0.01328	0.00838
60	21.0	31.0	5.0		26.00	52.0%	52.0%	12.0	0.01328	0.00595
250	22.0	25.5	4.5		21.00	42.0%	42.0%	12.9	0.01312	0.00298
1440	21.5	23.0	4.5		18.50	37.0%	37.0%	13.3	0.01320	0.00127

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

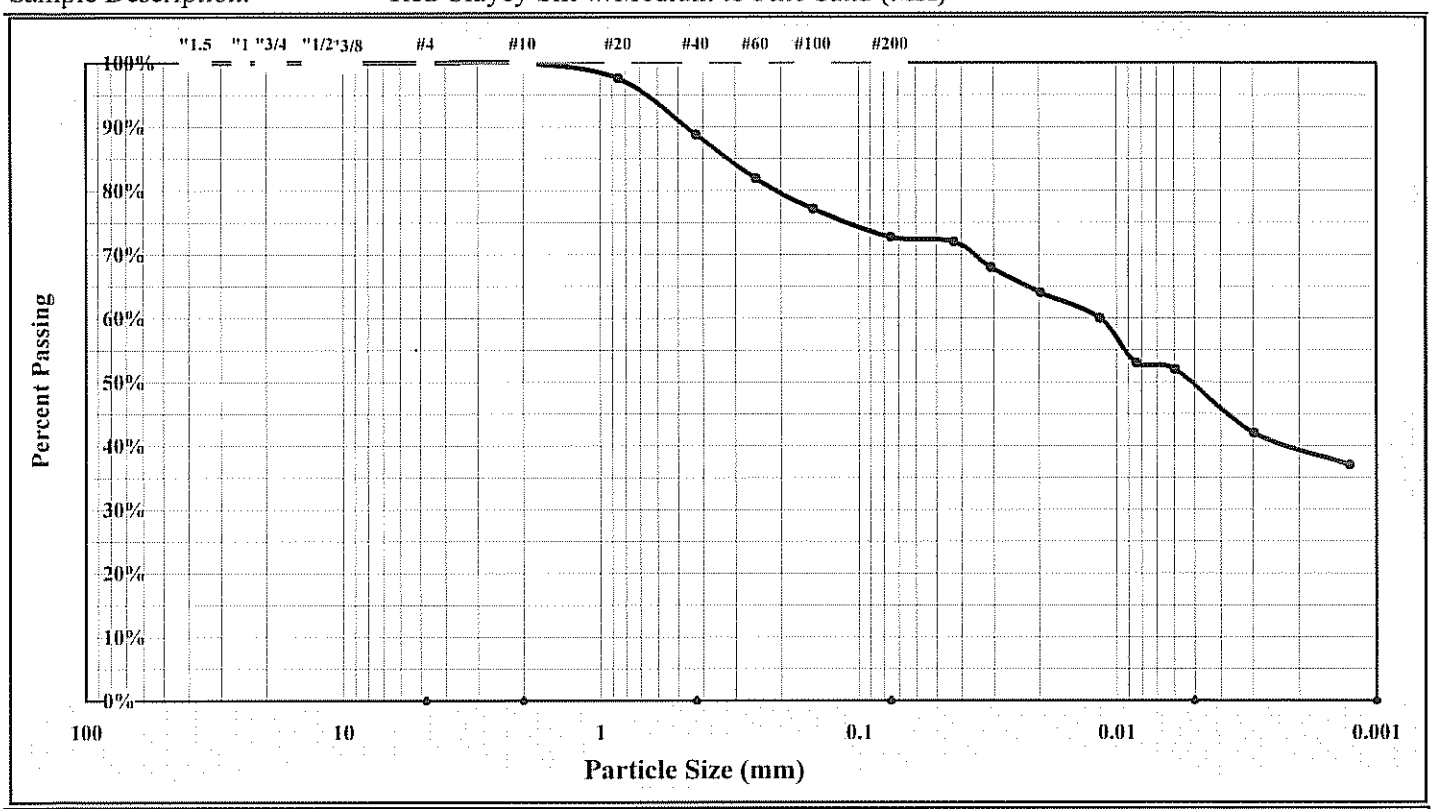
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	4/6/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/19-4/6/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-7	Sample Date:	3/23/09
Location:	E Berm & Bench B-8 Offset:	Elevation:	1st Lift
Sample Description:	Red 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	23.8%
Silt & Clay (% Passing #200):	72.8%	Total Sand:	27.2%	Clay	49.0%
ent Relative Density (Assumed)	2.700	Moisture Content	23.4%	Colloids	36.0%
Liquid Limit	65	Plastic Limit	34	Plastic Index	31
Coarse Sand:	0.0%	Medium Sand:	11.2%	Fine Sand:	16.0%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Retired Ash Basin (RAB) Landfill 4/1/2009

Sample Name: CSL-8

Sample Description: Red Clayey Silt w/Medium to Fine Sand (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.29	Tare No.	333	γ_{wet} (pcf)	113.8			Panel No	6
Leng. (cm)	7.541	WWS+ Tare (gm)	381.62	γ_{dry} (pcf)	87.5			Cell P (psi)	72.5
Area (cm^2)	41.74	WDS+Tare (gm)	312.49	w (%)	30.1			Influent P (psi)	70.2
Vol. (cm^3)	314.76	WT of Water (gm)	69.13	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	579.5	WT of TARE (gm)	82.87	γ_{wet} (pcf)	115.0				
		WT Dry Soil (gm)	229.62	γ_{dry} (pcf)	88.4			Gradient	1.9
		w (%)	30.1	w (%)	30.1				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		9	54		8.2	0.0	14.8				
	20	11	4	4200	8.2	0.8	14.1	0.8	14.1	1.0000	2.29E-06
2		11	6		8.2	0.0	14.8				
	20	12	14	4080	8.2	0.7	14.1	0.7	14.1	1.0000	2.20E-06
3		12	15		8.2	0.0	14.8				
	20	14	38	8580	8.2	0.7	14.1	0.7	14.1	1.0000	1.05E-06
4		15	9		8.2	0.0	14.8				
	20	17	11	7320	8.2	0.8	14.0	0.8	14.1	1.0000	1.40E-06
5		13	5		8.5	0.0	14.8				
	21	14	15	4200	8.5	0.7	14.1	0.7	14.1	0.9760	2.09E-06
6		15	7		8.5	0.0	14.8				
	21	17	26	8340	8.5	0.7	14.0	0.8	14.1	0.9760	1.13E-06
										Ave. K (cm/sec)	1.57E-06
										(Runs 2 thru 6)	
										Ave. K (m/sec)	1.57E-08

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 #: **1356-06-825 Phase 9** Report Date: 4/4/09

Project Name: Allen Retired Ash Landfill Basin (RAB) Ash Landfill Test Date(s) 3/19-4/4/09

Client Name: Duke Energy

Client Address:

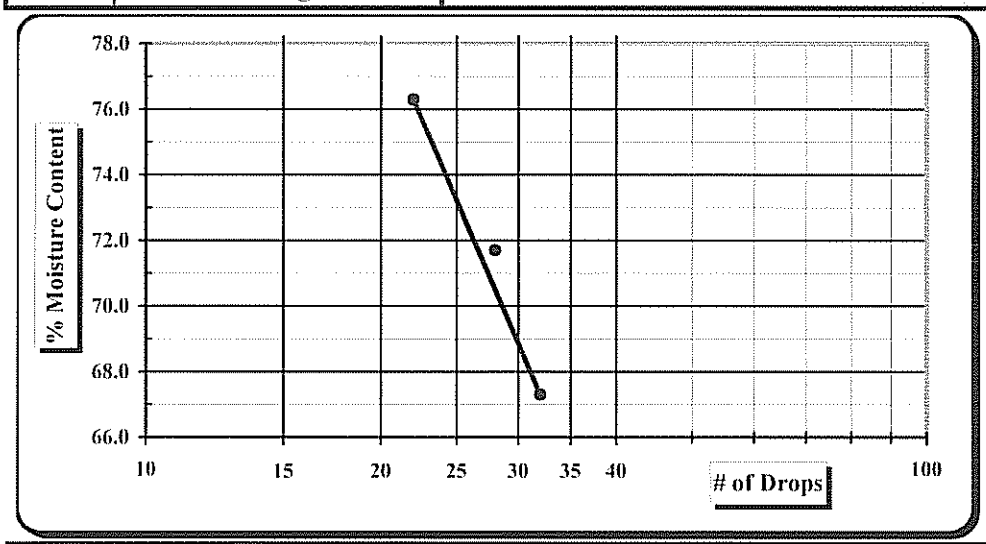
Boring #: Sample #: CSL-8 Sample Date: 3/23/09

Location: E Side N End of Cell Offset: Elevation: 1st Lift

Sample Description: Red 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)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	27	43	NN				57	35	
A	Tare Weight	13.80	13.84	15.27				**13.88**	15.61	
B	Wet Soil Weight + A	22.30	20.83	23.38				19.91	22.82	
C	Dry Soil Weight + A	18.88	17.91	19.87				18.27	20.82	
D	Water Weight (B-C)	3.42	2.92	3.51				1.64	2.00	
E	Dry Soil Weight (C-A)	5.08	4.07	4.60				4.39	5.21	
F	% Moisture (D/E)*100	67.3%	71.7%	76.3%				37.4%	38.4%	
N	# OF DROPS	32	28	22				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**37.9%**		



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 **73**

Plastic Limit **38**

Plastic Index **35**

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* — _____ *Date*

Kyle Baucom — *Technical Responsibility* — _____ *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07
28.1

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME
Quality Assurance

Project #:	**1356-06-825 Phase 9**	Report Date:	3/27/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	3/25-27/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-8	Sample Date:	3/23/2009
Location:	E Side N End of Cell	Offset:		Depth:	1st Lift
Sample Description:	Red 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 (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

Water Added:							
Tare #:			74	98	81	180	
A. Tare Weight	A.		69.7	72.0	73.9	72.1	
B. Wet Wt + Tare Wt	B.		774.6	805.0	848.4	685.4	
C. Dry Wt. + Tare Wt.	C.		644.1	652.0	673.7	537.4	
D. Water Weight	B-C		130.5	153.0	174.7	148.0	
E. Dry Weight	C-A		574.4	580.0	599.8	465.3	
F. Moisture Content	100*D/E		**22.7%**	**26.4%**	**29.1%**	**31.8%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.		5839	5917	5959	5941	
H. Wt. of Mold	H.		4169	4169	4169	4169	
I. Wt. of Soil (g. or lbs.)	G-H		1670	1748	1790	1772	
J. Wt of Soil (Lbs.)	I/453.6 or I		3.682	3.854	3.946	3.907	
K. Mold Volume Factor	K.		30.07	30.07	30.07	30.07	
L. Wet Density (PCF)	J*K		110.7	115.9	118.7	117.5	
M. Dry Density (PCF)	L/(1+F)		**90.2**	**91.7**	**91.9**	**89.2**	

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:

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

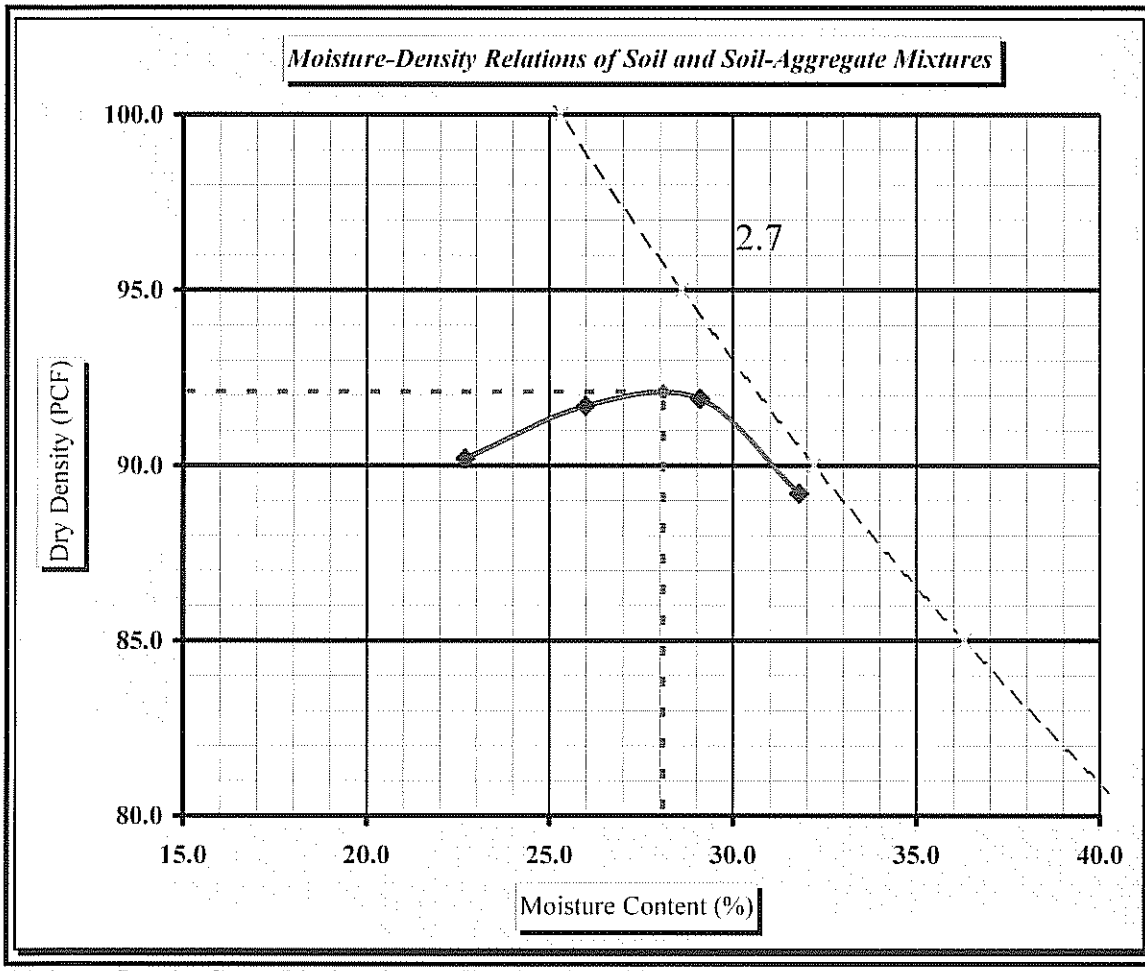
Quality Assurance

0

S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	3/27/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/25-27/09
Client Name:	Duke Energy		
Client Address:			
Boring #:	Sample #: CSL-8	Sample Date:	3/23/2009
Location:	E Side N End of Cell Offset:	Depth:	1st Lift
Sample Description:	Red Clayey Silt w/Medium to Fine Sand (MH)		

Maximum Dry Density 92.1 PCF. **Optimum Moisture Content 28.1%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**24.1%**
Specific Gravity of Soil	
Liquid Limit	**73**
Plastic Limit	**38**
Plastic Index	**35**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.7%
#40	89.4%
#60	84.2%
#200	77.3%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Task 9**	Report Date:	4/6/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/19-4/6/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-8	Sample Date: 3/23/09
Location:	E Side N End of Cell	Offset:	Elevation: 1st Lift
Sample Description:	Red 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):		335.40		Tare #	LL	T-6				
Weight of Total Sample Air Dried:		335.40	A	Tare Wt.	16.96	81.45				
Weight of Air Dried Hydrometer Sample (g):		50.00	B	Wet Wt. + A	27.30	481.20				
Total Sample Oven Dried:		330.87	C	Dry Wt. + A	27.16	403.51				
Hydrometer Sample Oven Dried (W):		49.32	D	Water Wt. (B-C)	0.14	77.69				
% Passing #10:		99.7%	E	Dry Wt. (C-A)	10.20	322.06				
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	1.37%	24.1%				

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	0.9	**100.0%**	99.7%
#20	1.4	97.2%	96.9%
#40	5.1	89.7%	89.4%
#60	7.7	84.4%	84.2%
#100	9.6	80.6%	80.4%
#200	11.1	77.5%	77.3%

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. 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
1	21.0	43.0	5.0		38.00	76.3%	76.1%	10.1	0.01328	0.04213
2	21.0	42.0	5.0		37.00	74.3%	74.1%	10.2	0.01328	0.03003
5	21.0	40.0	5.0		35.00	70.3%	70.1%	10.6	0.01328	0.01930
15	21.0	38.5	5.0		33.50	67.2%	67.1%	10.8	0.01328	0.01127
30	21.0	34.5	5.0		29.50	59.2%	59.1%	11.5	0.01328	0.00821
60	21.0	31.0	5.0		26.00	52.2%	52.0%	12.0	0.01328	0.00595
250	22.0	27.5	4.5		23.00	46.2%	46.0%	12.5	0.01312	0.00294
1440	20.5	20.0	4.5		15.50	31.1%	31.0%	13.8	0.01336	0.00131

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

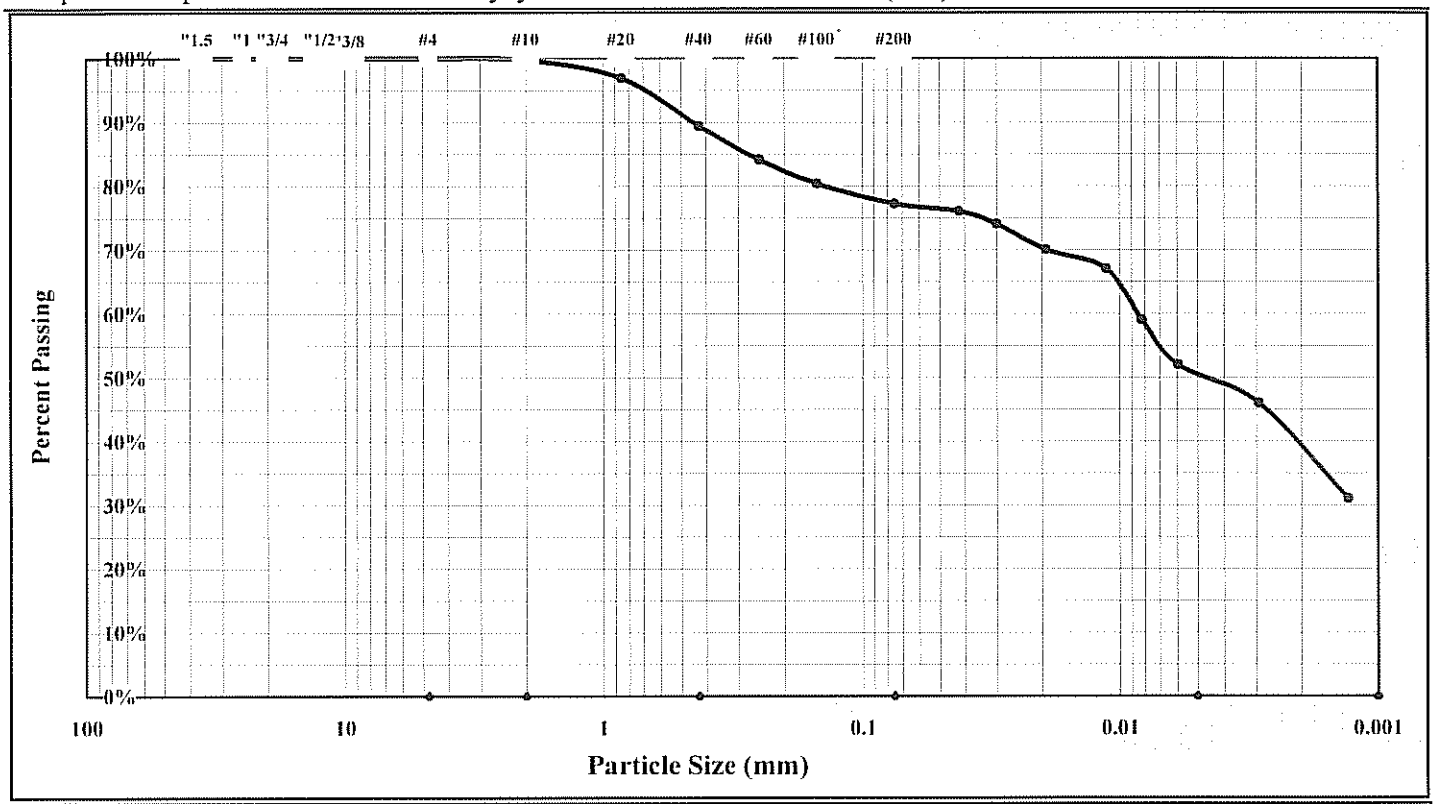
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Task 9	Report Date:	4/6/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	3/19-4/6/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-8	Sample Date:	3/23/09
Location:	E Side N End of Cell Offset:	Elevation:	1st Lift
Sample Description:	Red 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	26.3%
Silt & Clay (% Passing #200):	77.3%	Total Sand:	22.7%	Clay	51.0%
ent Relative Density (Assumed)	2.700	Moisture Content	24.1%	Colloids	29.0%
Liquid Limit	73	Plastic Limit	38	Plastic Index	35
Coarse Sand:	0.3%	Medium Sand:	10.3%	Fine Sand:	12.2%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Ph. 9 Project Name: Allen Retired Ash Basin (RAB) Ash Landfill 4/2/2009

Sample Name: CSL-9

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand and Mica

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.262	Tare No.	T-7	γ_{wet} (pcf)	118.5			Panel No	1
Leng. (cm)	7.767	WWS+ Tare (gm)	449.6	γ_{dry} (pcf)	93.2			Cell P (psi)	82.5
Area (cm^2)	41.42	WDS+Tare (gm)	371.89	w (%)	27.1			Influent P (psi)	80.2
Vol. (cm^3)	321.70	WT of Water (gm)	77.71	**Actual Molding Condition**				Effluent P (psi)	80.0
WWS (gm)	599.5	WT of TARE (gm)	81.78	γ_{wet} (pcf)	116.4				
		WT Dry Soil (gm)	290.11	γ_{dry} (pcf)	91.8			Gradient	2.0
		w (%)	26.8	w (%)	26.8				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1	21				6.9	1.1	17.3				
	21			4560	6.7	1.3	17.1	0.2	15.5	0.9760	5.18E-07
2	21				6.7	1.0	17.3				
	21.5			11040	6.9	1.4	16.9	0.4	15.5	0.9530	4.18E-07
										Ave. K (cm/sec)	
										(Runs 3 thru 6)	
										Ave. K (m/sec)	

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Ph. 9 Project Name: Allen Retired Ash Basin (RAB) Ash Landfill 4/2/2009

Sample Name: CSL-9

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand and Mica

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.262	Tare No.	T-7	γ_{wet} (pcf)	118.5			Panel No	1
Leng. (cm)	7.767	WWS+ Tare (gm)	449.6	γ_{dry} (pcf)	93.2			Cell P (psi)	82.5
Area (cm^2)	41.42	WDS+Tare (gm)	371.89	w (%)	27.1			Influent P (psi)	80.5
Vol. (cm^3)	321.70	WT of Water (gm)	77.71	Actual Molding Condition				Effluent P (psi)	80.0
WWS (gm)	599.5	WT of TARE (gm)	81.78	γ_{wet} (pcf)	116.4				
		WT Dry Soil (gm)	290.11	γ_{dry} (pcf)	91.8			Gradient	4.5
		w (%)	26.8	w (%)	26.8				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
3	20.5				7.9	4.0	5.8				
	21			11340	8	4.8	5.0	0.8	35.2	0.9760	3.67E-07
4	20				11	4.0	5.8				
	21			14580	10.9	5.0	4.9	1.0	35.2	0.9760	3.39E-07
5	21				10.9	4.0	5.8				
	21			14280	10.9	4.9	4.9	0.9	35.2	0.9760	3.28E-07
6	20				11.2	4.0	5.8				
	21			15900	11.2	5.0	4.8	1.0	35.2	0.9760	3.27E-07
										Ave. K (cm/sec)	3.40E-07
										(Runs 3 thru 6)	
										Ave. K (m/sec)	3.4E-09

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 #: **1356-06-825 Ph. 9** Report Date: 4/3/09

Project Name: Allen Retired Ash Basin (RAB) Ash Landfill Test Date(s) 3/26/09-4/3/09

Client Name: Duke Energy

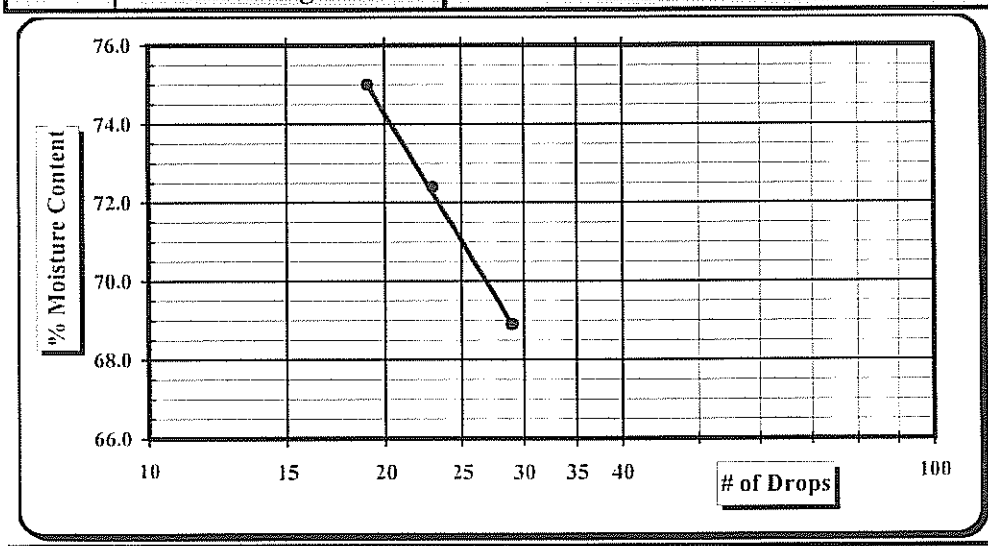
Client Address:

Location: Compacted soil liner (in-place) (F-7) Sample #: CSL-9 Offset: Sample Date: 3/25/09 Elevation: 1st lift

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand 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 #:	BA	MM	VV				33	8	
A	Tare Weight	15.33	16.59	16.04				**15.95**	14.00	
B	Wet Soil Weight + A	26.12	27.66	28.29				21.97	20.32	
C	Dry Soil Weight + A	21.72	23.01	23.04				20.48	18.77	
D	Water Weight (B-C)	4.40	4.65	5.25				1.49	1.55	
E	Dry Soil Weight (C-A)	6.39	6.42	7.00				4.53	4.77	
F	% Moisture (D/E)*100	68.9%	72.4%	75.0%				32.9%	32.5%	
N	# OF DROPS	29	23	19				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**32.7%**		



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 **71**

Plastic Limit **33**

Plastic Index **38**

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

Jennifer Olsen	4/3/2009	Kyle Baucom	
Technician Name	*Date*	*Technical Responsibility*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	3/31/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	3/26-31/09
Client Name:	Duke Energy		
Client Address:			

Location:	Compacted soil liner	Sample #:	CSL-9	Sample Date:	3/25/2009
	(In place) (F-7)	Offset:		Depth:	1st Lift
Sample Description:	Red Orange Silty Clay (CH) with Fine to Medium Sand and Mica				

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:	60	120	180	As Is		Natural
	Tare #:	DJ	101	62	79		
A. Tare Weight	A.	107.9	74.7	72.6	72.4		
B. Wet Wt + Tare Wt	B.	978.1	834.2	847.7	779.3		
C. Dry Wt. + Tare Wt.	C.	816.3	680.2	678.6	660.9		
D. Water Weight	B-C	161.8	154.0	169.1	118.4		
E. Dry Weight	C-A	708.4	605.5	606.0	588.5		
F. Moisture Content	100*D/E	**22.8%**	**25.4%**	**27.9%**	**20.1%**		

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5976	6018	5994	5867		
H. Wt. of Mold	H.	4168	4168	4168	4168		
I. Wt. of Soil (g. or lbs.)	G-H	1808	1850	1826	1699		
J. Wt of Soil (Lbs.)	I/453.6 or I	3.986	4.078	4.026	3.746		
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07		
L. Wet Density (PCF)	J*K	119.9	122.6	121.1	112.6		
M. Dry Density (PCF)	L/(1+F)	**97.6**	**97.8**	**94.7**	**93.8**		

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: AASTM D 4318, D 854, D 2487, D 422

Jennifer Olsen		NICET/117926	3/31/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

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

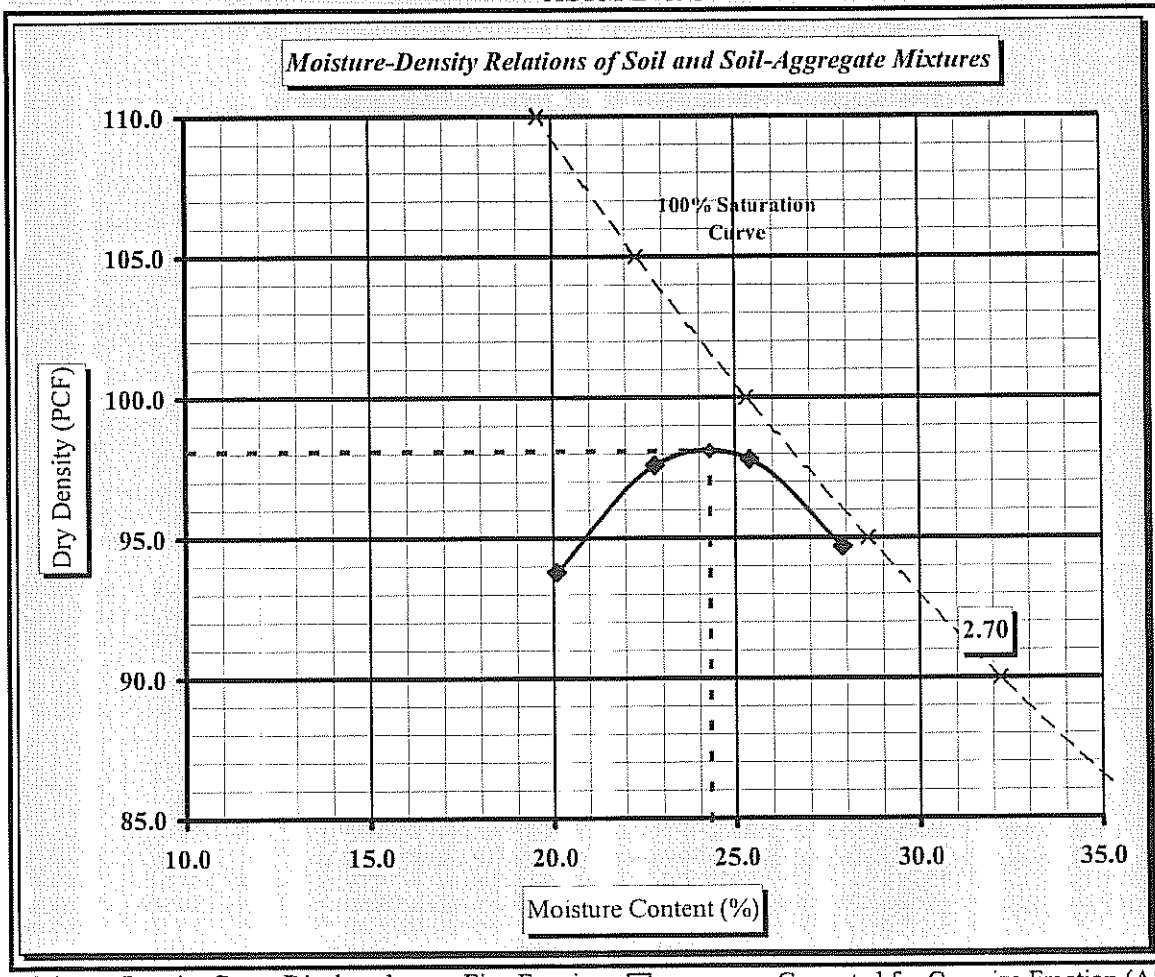
S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	3/31/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/26-31/09
Client Name:	Duke Energy		
Client Address:			

Location:	Compacted soil liner	Sample #:	CSL-9	Sample Date:	3/25/2009
	(In place) (F-7)	Offset:		Depth:	1st Lift

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand and Mica

Maximum Dry Density 98.1 PCF. **Optimum Moisture Content 24.3%**

ASTM D 698 - - Method A



Soil Properties

Natural Moisture Content	**25.6%**
Specific Gravity of Soil	
Liquid Limit	**71**
Plastic Limit	**33**
Plastic Index	**38**

% Passing

3/4"	
3/8"	
#4	98.7%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S& ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 4/3/09
Project Name: Allen Retired Ash Basin (RAB) Ash Landfill Test Date(s): 3/26/09-4/3/09
Client Name: Duke Energy Address:
Location: Compacted soil liner Sample #: CSL-9 Sample Date: 3/25/09
(in-place) (F-7) Offset: Elevation: 1st Lift
Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand and Mica

Pan #:	FJW	Beaker #:	PP	Apparent Relative Density (Assumed)		2.700
Hydrometer Jar #:			3			
Pan Tare Weight (grams):			0.00	Moisture Content	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):			258.70		Tare #	VV	333
Weight of Total Sample Air Dried:			258.70	A	Tare Wt.	16.05	82.86
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	27.79	290.35
Total Sample Oven Dried:			257.19	C	Dry Wt. + A	27.72	248.03
Hydrometer Sample Oven Dried (W):			49.70	D	Water Wt. (B-C)	0.07	42.32
% Passing #10:			98.1%	E	Dry Wt. (C-A)	11.67	165.17
Correction Factor a (Table 1):			0.99		% Moisture (100 x D/E)	0.60%	25.6%

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	CC	100.0%
1/2"	0.0		100.0%
3/8"	2.0	Soil Mortar	99.2%
#4	3.3		98.7%
#10	4.8	**100.0%**	98.1%
#20	2.1	95.9%	94.1%
#40	5.4	89.2%	87.5%
#60	7.8	84.3%	82.8%
#100	9.4	81.1%	79.6%
#200	10.9	78.0%	76.6%

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. 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
1	21.0	43.0		6.20	36.80	73.3%	71.9%	10.3	0.01328	0.04254
2	21.0	42.5		6.20	36.30	72.3%	71.0%	10.3	0.01328	0.03020
5	21.0	40.5		6.20	34.30	68.3%	67.1%	10.7	0.01328	0.01940
15	21.0	39.0		6.20	32.80	65.3%	64.1%	10.9	0.01328	0.01133
30	21.0	37.0		6.20	30.80	61.3%	60.2%	11.2	0.01328	0.00813
60	21.0	33.5		6.20	27.30	54.4%	53.4%	11.8	0.01328	0.00589
250	22.0	29.5		6.00	23.50	46.8%	45.9%	12.4	0.01312	0.00293
1440	21.5	25.5		6.10	19.40	38.6%	37.9%	13.1	0.01320	0.00126

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Jennifer Olsen	117926	Kyle Baucom		
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

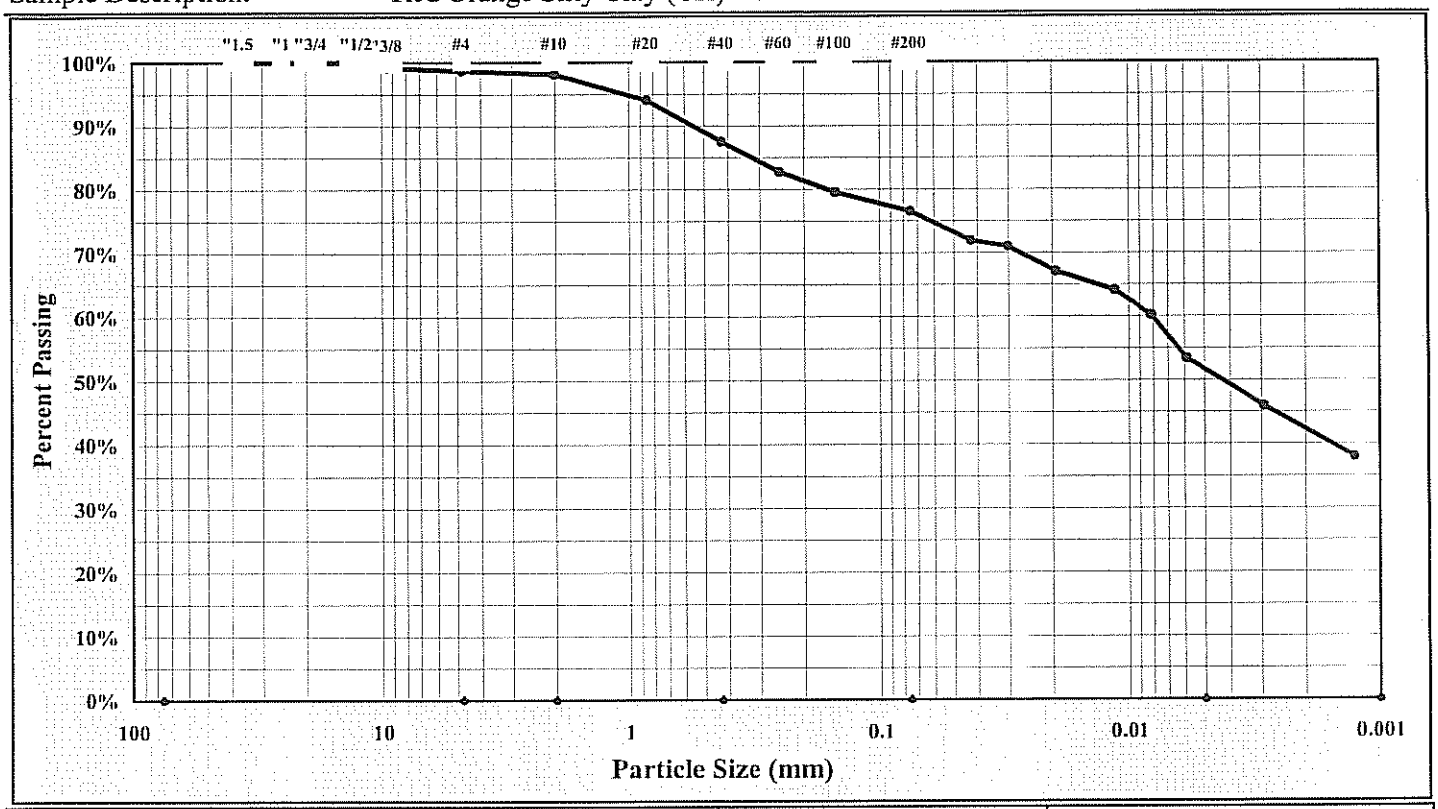
ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	4/3/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	3/26/09-4/3/09
Client Name:	Duke Energy		
Address:			
Location:	Compacted soil liner (in-place) (F-7)	Sample #: CSL-9 / Offset:	Sample Date: 3/25/09 / Elevation: 1st Lift

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand 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:		Gravel:	0.0%	Silt	24.6%
Silt & Clay (% Passing #200):	76.6%	Total Sand:	22.2%	Clay	52.0%
ent Relative Density (Assumed)	2.700	Moisture Content	25.6%	Colloids	20.5%
Liquid Limit	71	Plastic Limit	33	Plastic Index	38
Coarse Sand:	0.6%	Medium Sand:	10.6%	Fine Sand:	11.0%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom
Technical Responsibility — *Signature* — *Position* — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No: TR-D2216-T265-1
Revision No. 0
Revision Date: 02/22/08

Laboratory Determination of Water Content

S&ME

ASTM D 2216 ☑ *AASHTO T 265* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #: **1356-06-825 Ph. 9** Report Date: 3/30/09

Project Name: Allen Retired Ash Basin (RAB) Ash Landfill Test Date(s): 3/26-30/09

Client Name: Duke Energy

Client Address:

Sample by: Jim McCutcheon Sample Date(s): 3/25/09

Sampling Method: Drill Rig :

Method: **A (1%)** ☐ **B (0.1%)** ☑ *Balance ID.* *Calibration Date:*

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft. or m.		grams	grams	grams	grams	%	
	CSL-9	1st Lift	333	82.86	290.35	248.03	42.32	**25.6%**	

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

Jennifer Olsen		NICET/117926	3/30/2009
Technician Name	*Signature*	*Certification Type / No.*	*Date*
Kyle Baucom			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Ph. 9 Project Name: Allen Retired Ash Basin (RAB) Ash Landfill 4/9/2009

Sample Name: CSL-10

Sample Description: Brown Red Fine to Medium Sandy Silty Clay (MH) with Mica

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.261	Tare No.	S-9	γ_{wet} (pcf)	116.6			Panel No	1
Leng. (cm)	7.703	WWS+ Tare (gm)	493.8	γ_{dry} (pcf)	93			Cell P (psi)	82.5
Area (cm^2)	41.41	WDS+Tare (gm)	411.6	w (%)	25.4			Influent P (psi)	80.2
Vol. (cm^3)	318.96	WT of Water (gm)	82.2	Actual Molding Condition				Effluent P (psi)	80.0
WWS (gm)	590.3	WT of TARE (gm)	83.38	γ_{wet} (pcf)	115.6				
		WT Dry Soil (gm)	328.22	γ_{dry} (pcf)	92.4			Gradient	2.0
		w (%)	25.0	w (%)	25.0				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1	20.5				7.4	1.1	17.3				
	20			10440	7.4	1.9	16.6	0.8	15.5	1.0000	8.63E-07
2	20				7.5	1.0	17.3				
	20			19530	7.5	1.7	16.7	0.7	15.5	1.0000	4.00E-07
3	21				8	1.0	17.3				
	20			10020	8	1.7	16.8	0.6	15.5	1.0000	7.19E-07
4	20				9.4	1.0	17.3				
	20			10620	9.3	1.9	16.4	0.9	15.5	1.0000	1.02E-06
5	20				9.3	1.0	17.3				
	20.5			11280	9.3	1.8	16.5	0.8	15.5	0.9760	8.32E-07
6	20.5				9.3	1.0	17.3				
	21			11160	9.3	1.8	16.5	0.8	15.5	0.9760	8.41E-07
										Ave. K (cm/sec)	8.52E-07
										(Runs 3 thru 6)	
										Ave. K (m/sec)	8.52E-09

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

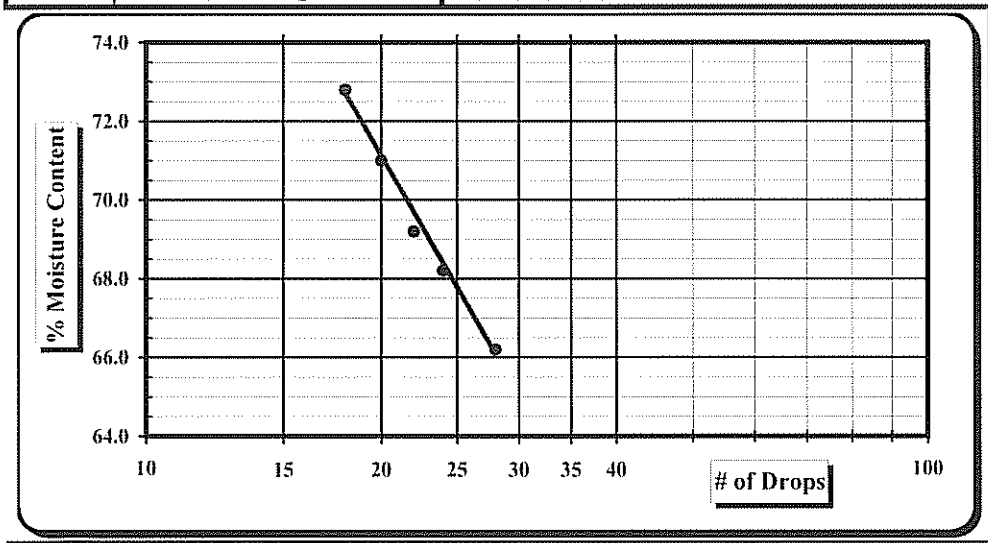
Project #:	**1356-06-825 Ph. 9**	Report Date:	4/9/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	4/2-9/09
Client Name:	Duke Energy		
Client Address:			

Location: Compacted Soil Liner (In-place) (D-6) Sample #: CSL-10 Offset: Sample Date: 4/1/09 Elevation: 3rd Lift

Sample Description: Brown Red Fine to Medium Sandy Silty Clay (MH) with 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 #:	19	CC	34	VV	47		Y	44	
A	Tare Weight	15.82	16.76	13.97	16.03	15.65		**15.41**	15.69	
B	Wet Soil Weight + A	28.92	30.23	27.83	27.71	27.90		22.23	21.81	
C	Dry Soil Weight + A	23.70	24.77	22.16	22.86	22.74		20.44	20.22	
D	Water Weight (B-C)	5.22	5.46	5.67	4.85	5.16		1.79	1.59	
E	Dry Soil Weight (C-A)	7.88	8.01	8.19	6.83	7.09		5.03	4.53	
F	% Moisture (D/E)*100	66.2%	68.2%	69.2%	71.0%	72.8%		35.6%	35.1%	
N	# OF DROPS	28	24	22	20	18		*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**35.4%**		



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 **68**

Plastic Limit **35**

Plastic Index **33**

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

Jennifer Olsen	4/9/2009	Kyle Baucom	
Technician Name	*Date*	*Technical Responsibility*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	4/7/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	4/3-7/09
Client Name:	Duke Energy		
Client Address:			

Location:	Compacted soil liner	Sample #:	CSL-10	Sample Date:	4/1/2009
	(In-place) (D-6)	Offset:		Depth:	3rd Lift

Sample Description: Brown Red Fine to Medium Sandy Silty Clay (MH) with Mica

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:	120	180	60	As Is		Natural
	Tare #:	89	L-2	81	78		
A. Tare Weight	A.	75.1	86.4	74.0	76.4		
B. Wet Wt + Tare Wt	B.	886.8	818.5	796.1	753.4		
C. Dry Wt. + Tare Wt.	C.	723.5	658.7	662.9	640.2		
D. Water Weight	B-C	163.3	159.8	133.2	113.2		
E. Dry Weight	C-A	648.4	572.3	588.9	563.8		
F. Moisture Content	100*D/E	**25.2%**	**27.9%**	**22.6%**	**20.1%**		

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	6089	6075	6065	5977		
H. Wt. of Mold	H.	4260	4260	4260	4260		
I. Wt. of Soil (g. or lbs.)	G-H	1829	1815	1805	1717		
J. Wt of Soil (Lbs.)	I/453.6 or I	4.032	4.001	3.979	3.785		
K. Mold Volume Factor	K.	30.13	30.13	30.13	30.13		
L. Wet Density (PCF)	J*K	121.5	120.6	119.9	114.0		
M. Dry Density (PCF)	L/(1+F)	**97.0**	**94.3**	**97.8**	**94.9**		

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: AASTM D 4318, D 854, D 2487, D 422

Jennifer Olsen		NICET/117926	4/7/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

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

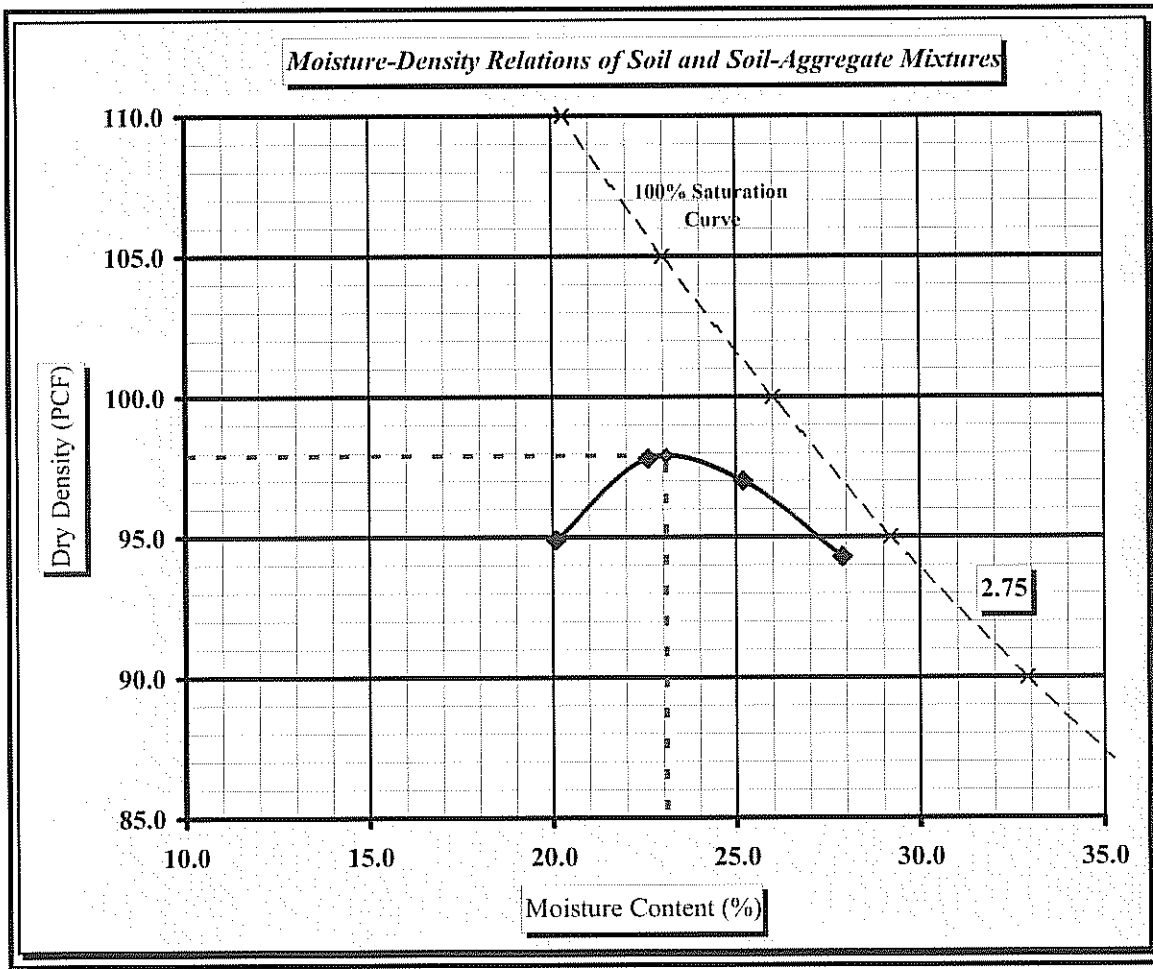
S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	4/7/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/3-7/09
Client Name:	Duke Energy		
Client Address:			

Location:	Compacted soil liner	Sample #:	CSL-10	Sample Date:	4/1/2009
	(In-place) (D-6)	Offset:		Depth:	3rd Lift

Sample Description: Brown Red Fine to Medium Sandy Silty Clay (MH) with Mica

Maximum Dry Density 97.9 PCF. **Optimum Moisture Content 23.1%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**22.9%**
Specific Gravity of Soil	
Liquid Limit	**68**
Plastic Limit	**35**
Plastic Index	**33**

% Passing

3/4"	
3/8"	
#4	100.0%
#10	
#40	
#60	
#200	

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Ph. 9**	Report Date:	4/9/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/2-9/09
Client Name:	Duke Energy	Address:	
Location:	Compacted soil liner	Sample #: CSL-10	Sample Date: 4/1/09
Location:	(In-place) (D-6)	Offset:	Elevation: 3rd. Lift
Sample Description:	Brown Red Fine to Medium Sandy Silty Clay (MH) with Mica		

Pan #:	531	Beaker #:	PP	**Apparent Relative Density (Assumed)**		**2.750**		Sieve	Retained Wt.	Percent Passing	
Hydrometer Jar #:			3					3.0"	0.0	Pan # (washed)	100.0%
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural		1.5"	0.0		100.0%
Total Sample Air Dried Wt. + tare wt. (grams):			314.30	Tare #	BA	G-5		1.0"	0.0		100.0%
Weight of Total Sample Air Dried:			314.30	A Tare Wt.	15.35	82.05		3/4"	0.0	MM	100.0%
Weight of Air Dried Hydrometer Sample (g):			50.00	B Wet Wt. + A	26.82	337.42		1/2"	0.0		100.0%
Total Sample Oven Dried:			296.60	C Dry Wt. + A	26.17	289.86		3/8"	0.0	Soil Mortar	100.0%
Hydrometer Sample Oven Dried (W):			47.17	D Water Wt. (B-C)	0.65	47.56		#4	0.0		100.0%
% Passing #10:			99.3%	E Dry Wt. (C-A)	10.82	207.81		#10	2.0	**100.0%**	99.3%
Correction Factor a (Table 1):			0.98	% Moisture (100 x D/E)	6.01%	22.9%		#20	3.8	92.0%	91.4%
								#40	7.9	83.2%	82.7%
								#60	10.7	77.4%	76.9%
								#100	12.6	73.3%	72.8%
								#200	14.4	69.6%	69.1%

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. 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	39.5	6.0		33.50	69.6%	69.1%	10.8	0.01309	0.03042
5	21.0	37.0	6.0		31.00	64.4%	64.0%	11.2	0.01309	0.01960
15	21.0	33.0	6.0		27.00	56.1%	55.7%	11.9	0.01309	0.01164
30	21.0	30.0	6.0		24.00	49.9%	49.5%	12.4	0.01309	0.00840
60	21.0	27.5	6.0		21.50	44.7%	44.4%	12.8	0.01309	0.00604
250	21.0	24.0	6.0		18.00	37.4%	37.1%	13.3	0.01309	0.00302
1440	21.5	19.0	4.0		15.00	31.2%	31.0%	13.8	0.01301	0.00128
					#VALUE!	#VALUE!	31.0%	#VALUE!	#N/A	#N/A

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Jennifer Olsen	117926	Kyle Baucom		
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

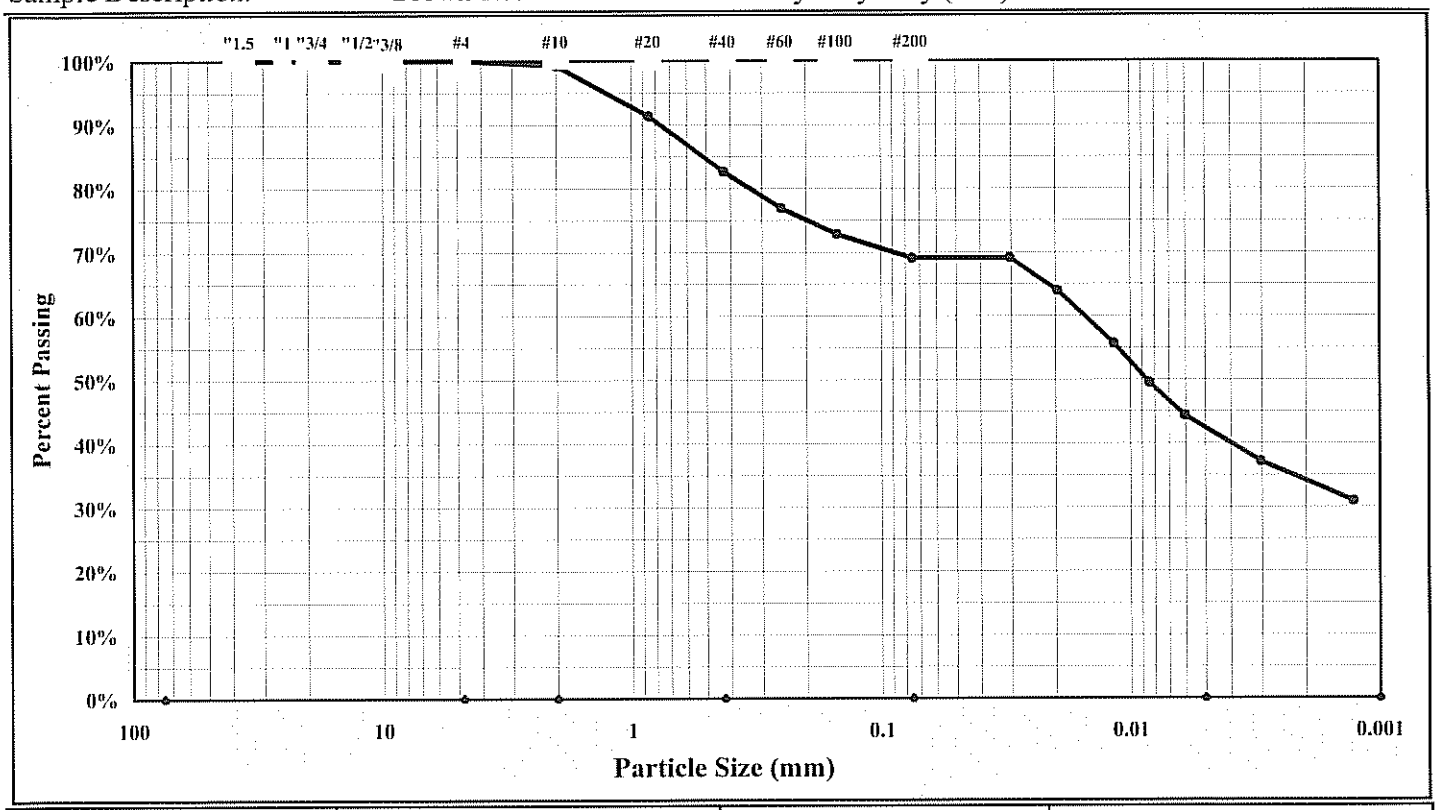
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	4/9/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/2-9/09
Client Name:	Duke Energy		
Address:			
Location:	Compacted soil liner Sample #: CSL-10	Sample Date:	4/1/09
Location:	(In-place) (D-6) Offset:	Elevation:	3rd. Lift
Sample Description:	Brown Red Fine to Medium Sandy Silty Clay (MH) with 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:		Gravel:	0.0%	Silt	26.6%
Silt & Clay (% Passing #200):	69.1%	Total Sand:	30.9%	Clay	42.5%
ent Relative Density (Assumed)	2.750	Moisture Content	22.9%	Colloids	
Liquid Limit	68	Plastic Limit	35	Plastic Index	33
Coarse Sand:	0.7%	Medium Sand:	16.7%	Fine Sand:	13.6%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom
Technical Responsibility *Signature* *Position* *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No: TR-D2216-T265-1
Revision No. 0
Revision Date: 02/22/08

Laboratory Determination of Water Content

S&ME

ASTM D 2216 ☑ *AASHTO T 265* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	4/3/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/2-3/09
Client Name:	Duke Energy		
Client Address:			
Sample by:	Jim McCutcheon	Sample Date(s):	4/1/09
Sampling Method:		Drill Rig :	

Method: A (1%) ☐ B (0.1%) ☑ *Balance ID.* *Calibration Date:*

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft. or m.		grams	grams	grams	grams	%	
	CSL-10	3rd Lift	G-5	82.05	337.42	289.86	47.56	**22.9%**	

Notes / Deviations / References

AASHTO T 265: Laboratory Determination of Moisture Content of Soils

Jennifer Olsen		NICET/117926	3/30/2009
Technician Name	*Signature*	*Certification Type / No.*	*Date*
Kyle Baucom			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Ph. 9 Project Name: Allen Retired Ash Basin (RAB) Ash Landfill 4/15/2009

Sample Name: CSL-11

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand and Mica

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.249	Tare No.	S-9	γ_{wet} (pcf)	114.9			Panel No	1
Leng. (cm)	7.691	WWS+ Tare (gm)	474.3	γ_{dry} (pcf)	89.8			Cell P (psi)	82.5
Area (cm^2)	41.27	WDS+Tare (gm)	387.73	w (%)	28.0			Influent P (psi)	80.2
Vol. (cm^3)	317.42	WT of Water (gm)	86.57	Actual Molding Condition				Effluent P (psi)	80.0
WWS (gm)	581.8	WT of TARE (gm)	83.39	γ_{wet} (pcf)	114.5				
		WT Dry Soil (gm)	304.34	γ_{dry} (pcf)	89.2			Gradient	2.0
		w (%)	28.4	w (%)	28.4				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1	20				4.3	1.1	17.3				
	20.4			7140	4.1	1.9	16.7	0.7	15.5	1.0000	1.18E-06
2	20.4				4.1	1.0	17.3				
	21			11280	4.1	1.9	16.4	0.9	15.5	0.9760	9.37E-07
3	21				4.2	1.0	17.3				
	21			10800	4.2	1.8	16.5	0.8	15.5	0.9760	8.70E-07
4	20				4.6	1.0	17.3				
	20			10650	4.6	1.8	16.5	0.8	15.5	1.0000	9.04E-07
5	20				4.6	1.0	17.3				
	20.5			12870	4.7	1.8	16.5	0.8	15.5	0.9760	7.30E-07
6											
										Ave. K (cm/sec)	8.60E-07
										(Runs 2 thru 5)	
										Ave. K (m/sec)	8.6E-09

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 #: **1356-06-825 Ph. 9** Report Date: 4/16/09

Project Name: Allen Retired Ash Basin (RAB) Ash Landfill Test Date(s) 4/8-16/09

Client Name: Duke Energy

Client Address:

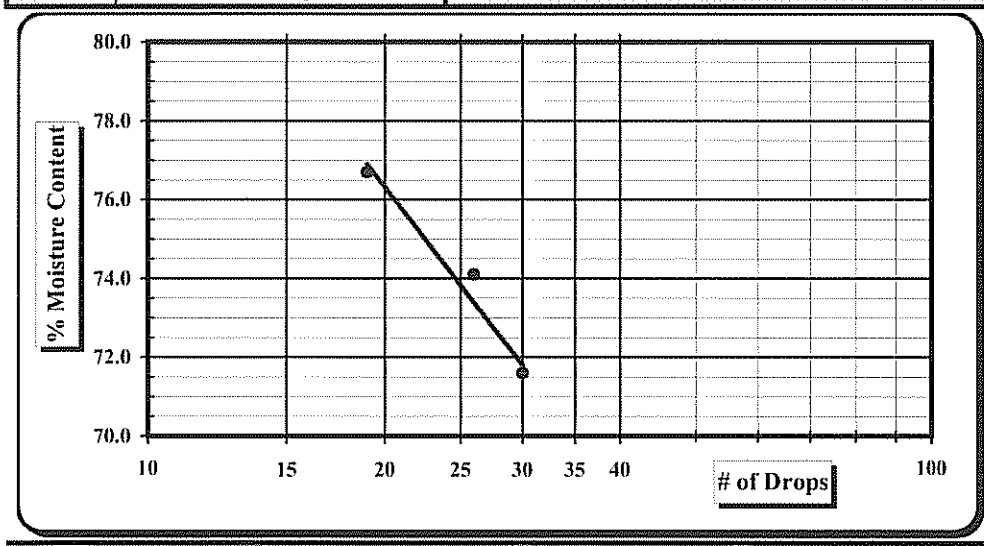
Location: Compacted soil Sample #: CSL-11 Sample Date: 4/6/09

liner (In-place) Offset: Elevation: 3rd Lift

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand 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 #:	SSS	44	8				56	MM	
A	Tare Weight	16.57	15.66	13.92				**15.69**	16.57	
B	Wet Soil Weight + A	28.36	27.92	26.04				22.34	23.31	
C	Dry Soil Weight + A	23.44	22.70	20.78				20.72	21.65	
D	Water Weight (B-C)	4.92	5.22	5.26				1.62	1.66	
E	Dry Soil Weight (C-A)	6.87	7.04	6.86				5.03	5.08	
F	% Moisture (D/E)*100	71.6%	74.1%	76.7%				32.2%	32.7%	
N	# OF DROPS	30	26	19				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**32.5%**		



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 **74**

Plastic Limit **33**

Plastic Index **41**

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

Jennifer Olsen	4/16/2009	Kyle Baucom	
Technician Name	*Date*	*Technical Responsibility*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Ph. 9**	Report Date:	4/10/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	4/8-10/09
Client Name:	Duke Energy		
Client Address:			

Location:	Compacted soil liner	Sample #:	CSL-11	Sample Date:	4/6/2009
	(In-place)	Offset:		Depth:	3rd Lift

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand and Mica

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:	120	180	240	60		Natural
	Tare #:	81	74	89	995		
A. Tare Weight	A.	73.9	69.7	75.1	72.5		
B. Wet Wt + Tare Wt	B.	826.5	824.7	785.5	818.7		
C. Dry Wt. + Tare Wt.	C.	674.2	658.0	617.7	681.3		
D. Water Weight	B-C	152.3	166.7	167.8	137.4		
E. Dry Weight	C-A	600.3	588.3	542.6	608.8		
F. Moisture Content	100*D/E	**25.4%**	**28.3%**	**30.9%**	**22.6%**		

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.	5949	5981	5960	5819		
H. Wt. of Mold	H.	4168	4168	4168	4168		
I. Wt. of Soil (g. or lbs.)	G-H	1781	1813	1792	1651		
J. Wt of Soil (Lbs.)	I/453.6 or I	3.926	3.997	3.951	3.640		
K. Mold Volume Factor	K.	30.07	30.07	30.07	30.07		
L. Wet Density (PCF)	J*K	118.1	120.2	118.8	109.5		
M. Dry Density (PCF)	L/(1+F)	**94.2**	**93.7**	**90.8**	**89.3**		

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: AASTM D 4318, D 2487, D 422

Jennifer Olsen		NICET/117926	4/10/2009
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

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

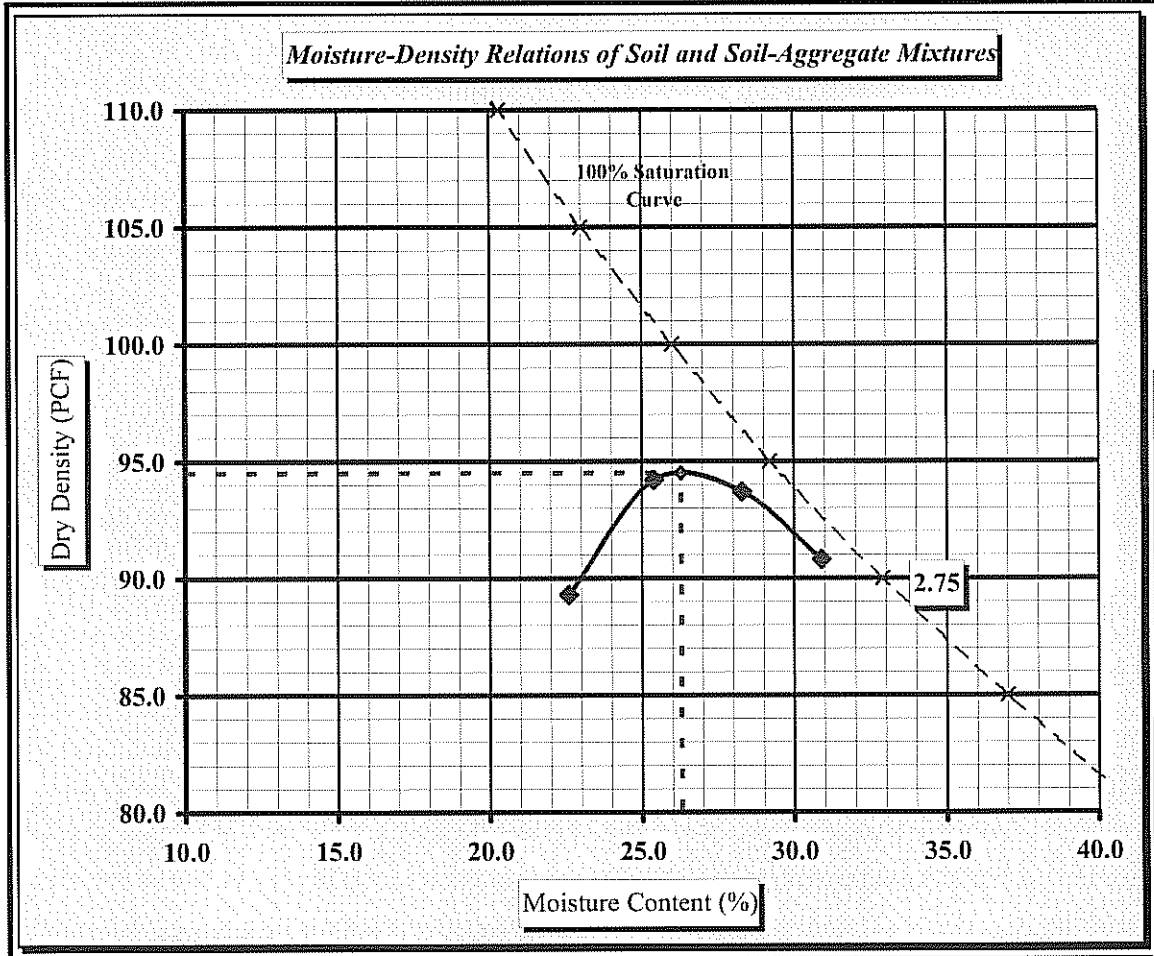
S&ME Project #:	**1356-06-825 Ph. 9**	Report Date:	4/10/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/8-10/09
Client Name:	Duke Energy		
Client Address:			

Location:	Compacted soil liner	Sample #:	CSL-11	Sample Date:	4/6/2009
	(In-place)	Offset:		Depth:	3rd Lift

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand and Mica

Maximum Dry Density 94.5 PCF. **Optimum Moisture Content 26.3%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**26.3%**
Specific Gravity of Soil	
Liquid Limit	**74**
Plastic Limit	**33**
Plastic Index	**41**

% Passing

3/4"	
3/8"	
#4	100.0%
#10	
#40	
#60	
#200	

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #: **1356-06-825 Ph. 9** Report Date: 4/16/09
Project Name: Allen Retired Ash Basin (RAB) Ash Landfill Test Date(s): 4/8-16/09
Client Name: Duke Energy Address:
Location: Compacted soil Sample #: CSL-11 Sample Date: 4/6/09
liner (In-place) Offset: Elevation: 3rd Lift
Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand and Mica

Sieve	Retained Wt.	Percent Passing	
3.0"		Pan # (washed)	100.0%
1.5"			100.0%
1.0"			100.0%
3/4"		47	100.0%
1/2"			100.0%
3/8"		Soil Mortar	100.0%
#4	0.0		100.0%
#10	1.5	**100.0%**	99.5%
#20	2.1	95.8%	95.3%
#40	4.7	90.5%	90.1%
#60	6.6	86.8%	86.4%
#100	7.8	84.4%	84.0%
#200	8.9	82.1%	81.7%

Pan #:	180	Beaker #:	PDQ	**Apparent Relative Density (Assumed)**		**2.750**	
Hydrometer Jar #:			8				
Pan Tare Weight (grams):			0.00	**Moisture Content**	Hygroscopic	Natural	
Total Sample Air Dried Wt. + tare wt. (grams):			297.70		Tare #	VV	Jazz
Weight of Total Sample Air Dried:			297.70	A	Tare Wt.	16.04	81.19
Weight of Air Dried Hydrometer Sample (g):			50.00	B	Wet Wt. + A	26.42	384.40
Total Sample Oven Dried:			296.84	C	Dry Wt. + A	26.39	321.25
Hydrometer Sample Oven Dried (W):			49.86	D	Water Wt. (B-C)	0.03	63.15
% Passing #10:			99.5%	E	Dry Wt. (C-A)	10.35	240.06
Correction Factor a (Table 1):			0.98		% Moisture (100 x D/E)	0.29%	26.3%

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. 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
1	21.0	46.5	4.5		42.00	82.6%	82.2%	9.4	0.01309	0.04015
2	21.0	45.0	4.5		40.50	79.6%	79.2%	9.7	0.01309	0.02876
5	21.0	43.5	4.5		39.00	76.7%	76.3%	9.9	0.01309	0.01842
15	21.0	39.0	4.5		34.50	67.8%	67.5%	10.6	0.01309	0.01102
30	21.0	38.0	4.5		33.50	65.9%	65.5%	10.8	0.01309	0.00785
60	21.0	35.5	4.5		31.00	60.9%	60.6%	11.2	0.01309	0.00566
250	21.0	31.5	4.5		27.00	53.1%	52.8%	11.9	0.01309	0.00285
1440	21.5	26.5	4.0		22.50	44.2%	44.0%	12.6	0.01301	0.00122

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Jennifer Olsen	117926	Kyle Baucom		
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

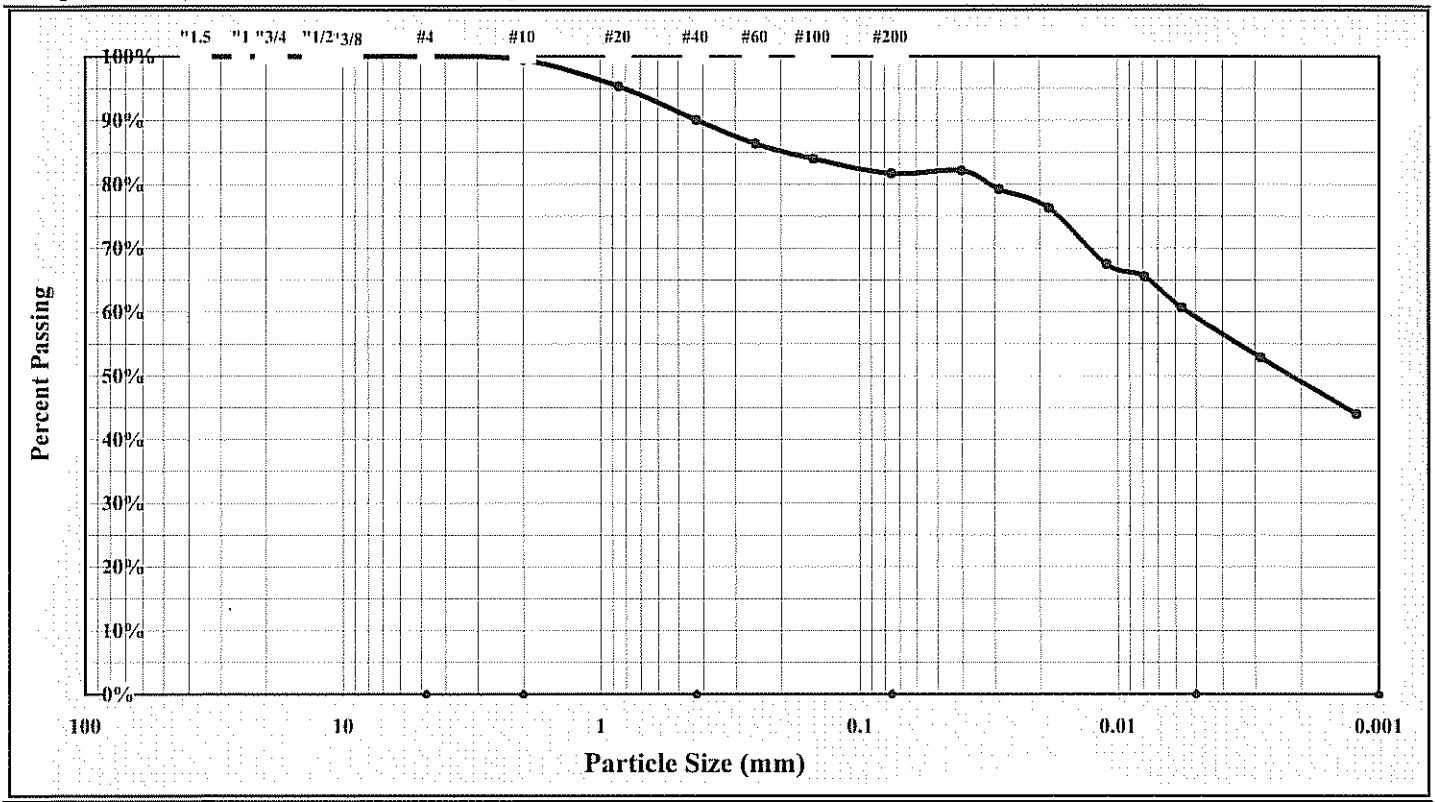
ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Ph. 9	Report Date:	4/16/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/8-16/09
Client Name:	Duke Energy		
Address:			
Location:	Compacted soil liner (In-place)	Sample #: CSL-11 / Offset:	Sample Date: 4/6/09 / Elevation: 3rd Lift

Sample Description: Red Orange Silty Clay (CH) with Fine to Medium Sand 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:		Gravel:	0.0%	Silt	22.7%
Silt & Clay (% Passing #200):	81.7%	Total Sand:	18.3%	Clay	59.0%
ent Relative Density (Assumed)	2.750	Moisture Content	26.3%	Colloids	
Liquid Limit	74	Plastic Limit	33	Plastic Index	41
Coarse Sand:	0.5%	Medium Sand:	9.4%	Fine Sand:	8.4%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom
Technical Responsibility — *Signature* — *Position* — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No: TR-D2216-T265-1
Revision No. 0
Revision Date: 02/22/08

Laboratory Determination of Water Content

S&ME

ASTM D 2216 ☑ *AASHTO T 265* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #: **1356-06-825 Ph. 9** Report Date: 4/8/09
Project Name: Allen Retired Ash Basin (RAB) Ash Landfill Test Date(s): 4/7-8/09
Client Name: Duke Energy
Client Address:
Sample by: Jim McCutcheon Sample Date(s): 4/6/09
Sampling Method: Drill Rig :

Method: **A (1%)** ☐ **B (0.1%)** ☑ *Balance ID.* *Calibration Date:*

Boring No.	Sample No.	Sample Depth	Tare #	Tare Weight	Tare Wt.+ Wet Wt	Tare Wt. + Dry Wt	Water Weight	Percent Moisture	Note
		ft. or m.		grams	grams	grams	grams	%	
	CSL-11	3rd Lift	Jazz	81.19	384.40	321.25	63.15	**26.3%**	

Notes / Deviations / References

ASTM D 2216: Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Jennifer Olsen		NICET/117926	4/8/2009
Technician Name	*Signature*	*Certification Type / No*	*Date*
Kyle Baucom			
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 09 Project Name: Allen Steam Station RAB Ash Landfill 4/17/2009

Sample Name: CSL-12

Sample Description: Oragne Brown Clayey Silt w/Medium to Fine Sand (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.275	Tare No.	S-9	γ_{wet} (pcf)	114.6			Panel No	5
Leng. (cm)	7.62	WWS+ Tare (gm)	374.92	γ_{dry} (pcf)	89.1			Cell P (psi)	72.5
Area (cm^2)	41.57	WDS+Tare (gm)	310.21	w (%)	28.6			Influent P (psi)	70.2
Vol. (cm^3)	316.75	WT of Water (gm)	64.71	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	582.9	WT of TARE (gm)	83.4	γ_{wet} (pcf)	115.0				
		WT Dry Soil (gm)	226.81	γ_{dry} (pcf)	89.5			Gradient	1.8
		w (%)	28.5	w (%)	28.5				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		2	30		5.8	0.0	14.8				
	22	2	46	960	5.8	0.7	14.0	0.8	14.1	0.9530	9.70E-06
2		2	47		5.8	0.0	14.8				
	22	3	19	1920	5.8	0.7	14.1	0.7	14.1	0.9530	4.53E-06
3		3	48		5.8	0.0	14.8				
	22	4	18	1800	5.8	0.7	14.1	0.7	14.1	0.9530	4.83E-06
4		4	19		5.8	0.0	14.8				
	22	4	51	1920	5.9	0.7	14.1	0.7	14.1	0.9530	4.53E-06
5		8	23		6.2	0.0	14.8				
	20	8	58	2100	6.2	0.7	14.1	0.7	14.1	1.0000	4.34E-06
6		9	0		6.2	0.0	14.8				
	20	9	40	2400	6.2	0.8	14.0	0.8	14.1	1.0000	4.34E-06
										Ave. K (cm/sec)	4.51E-06
										(Runs 2 thru 5)	
										Ave. K (m/sec)	4.51E-08

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 #: **1356-06-825 Phase 9** Report Date: 4/22/09

Project Name: Allen Retired Ash Basin (RAB) Ash Landfill Test Date(s) 4/8-22/09

Client Name: Duke Energy

Client Address:

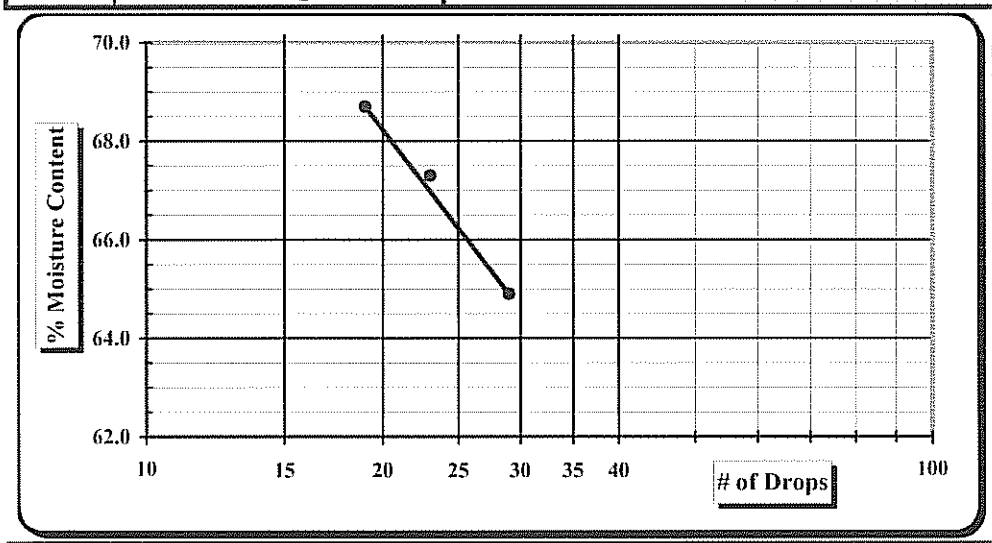
Boring #: Sample #: CSL-12 Sample Date: 4/8/09

Location: Cell 1 NW Section Offset: Elevation: 3rd Lift

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)			Grooving tool		
LL Apparatus			Grooving tool		
Oven			Grooving tool		

Pan #		Liquid Limit						Plastic Limit		
	Tare #:	MM	41	PO				56	44	
A	Tare Weight	16.57	15.75	15.12				**15.69**	15.70	
B	Wet Soil Weight + A	25.69	22.81	23.91				21.75	22.39	
C	Dry Soil Weight + A	22.10	19.97	20.33				20.07	20.53	
D	Water Weight (B-C)	3.59	2.84	3.58				1.68	1.86	
E	Dry Soil Weight (C-A)	5.53	4.22	5.21				4.38	4.83	
F	% Moisture (D/E)*100	64.9%	67.3%	68.7%				38.4%	38.5%	
N	# OF DROPS	29	23	19				*Moisture Contents determined by ASTM D 2216*		
LL	LL = F * FACTOR									
Ave.	*Average*							**38.5%**		



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 **66**

Plastic Limit **39**

Plastic Index **27**

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* — *Date*

Kyle Baucom — *Technical Responsibility* — *Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07
26

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME
Quality Assurance

Project #:	**1356-06-825 Phase 9**	Report Date:	4/16/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	4/11-16/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-12	Sample Date:	4/8/2009
Location:	Cell 1 NW Section	Offset:		Depth:	3rd Lift
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 (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:
ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						
	Tare #:		PIL	51	MAC	53	
A. Tare Weight	A.		163.9	158.0	161.7	155.1	
B. Wet Wt + Tare Wt	B.		919.4	918.4	955.9	921.1	
C. Dry Wt. + Tare Wt.	C.		776.4	760.2	771.6	731.3	
D. Water Weight	B-C		143.0	158.2	184.3	189.8	
E. Dry Weight	C-A		612.5	602.2	609.9	576.2	
F. Moisture Content	100*D/E		**23.3%**	**26.3%**	**30.2%**	**32.9%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check:
ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐
Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.		5875	5952	5970	5952	
H. Wt. of Mold	H.		4167	4167	4167	4167	
I. Wt. of Soil (g. or lbs.)	G-H		1708	1785	1803	1785	
J. Wt of Soil (Lbs.)	I/453.6 or I		3.765	3.935	3.975	3.935	
K. Mold Volume Factor	K.		30.07	30.07	30.07	30.07	
L. Wet Density (PCF)	J*K		113.2	118.3	119.5	118.3	
M. Dry Density (PCF)	L/(1+F)		**91.8**	**93.7**	**91.8**	**89.0**	

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:

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

Quality Assurance

0

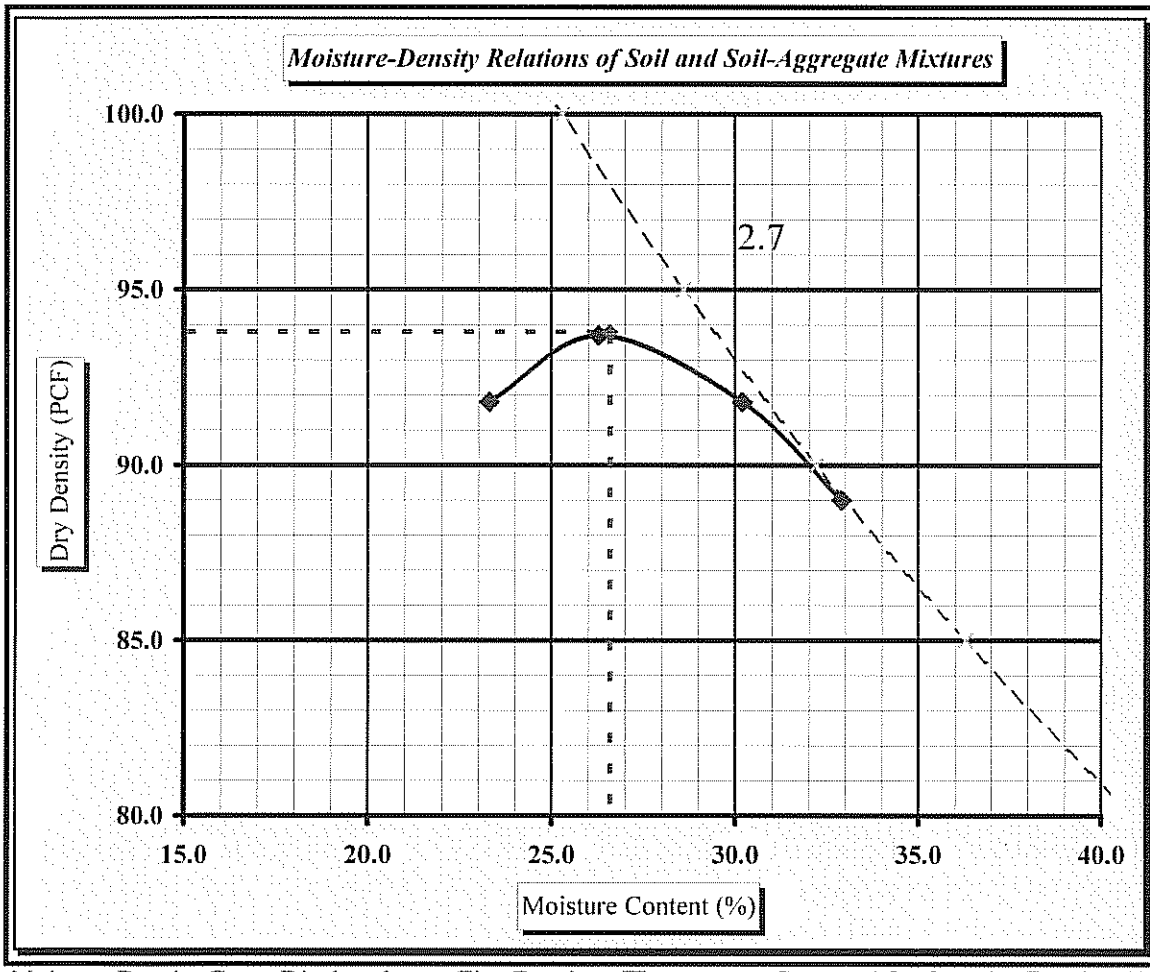
S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	4/16/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/11-16/09
Client Name:	Duke Energy		
Client Address:			

Boring #:		Sample #:	CSL-12	Sample Date:	4/8/2009
Location:	Cell 1 NW Section	Offset:		Depth:	3rd Lift

Sample Description: Orange Brown Clayey Silt w/Medium to Fine Sand (MH)

Maximum Dry Density 93.8 PCF. **Optimum Moisture Content 26.6%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**28.1%**
Specific Gravity of Soil	**ND**
Liquid Limit	**66**
Plastic Limit	**39**
Plastic Index	**27**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	100.0%
#10	99.7%
#40	92.6%
#60	88.5%
#200	80.8%

Oversize Fraction

Bulk Gravity	
% Moisture	
% Oversize	#DIV/0!
MDD	**#DIV/0!**
Opt. MC	**#DIV/0!**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Phase 9**	Report Date:	4/13/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	4/8-13/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-12	Sample Date: 4/8/09
Location:	Cell 1 NW Section	Offset:	Elevation: 3rd Lift
Sample Description:	Orange Brown Clayey Silt 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):		295.64		Tare #	NN	JAZZ
Weight of Total Sample Air Dried:		295.64	A	Tare Wt.	15.30	81.22
Weight of Air Dried Hydrometer Sample (g):		50.00	B	Wet Wt. + A	30.10	449.10
Total Sample Oven Dried:		278.30	C	Dry Wt. + A	29.23	368.38
Hydrometer Sample Oven Dried (W):		47.06	D	Water Wt. (B-C)	0.87	80.72
% Passing #10:		99.7%	E	Dry Wt. (C-A)	13.93	287.16
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	6.25%	28.1%

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	0.7	**100.0%**	99.7%
#20	1.0	97.8%	97.5%
#40	3.4	92.9%	92.6%
#60	5.3	88.7%	88.5%
#100	7.0	85.1%	84.9%
#200	8.9	81.0%	80.8%

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. 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
1	21.0	42.5	4.5		38.00	79.9%	79.7%	10.1	0.01328	0.04213
2	21.0	42.0	4.5		37.50	78.9%	78.7%	10.1	0.01328	0.02991
5	21.0	39.0	4.5		34.50	72.6%	72.4%	10.6	0.01328	0.01937
15	21.0	33.0	4.5		28.50	60.0%	59.8%	11.6	0.01328	0.01169
30	21.0	30.0	4.5		25.50	53.6%	53.5%	12.1	0.01328	0.00844
60	21.0	29.0	4.5		24.50	51.5%	51.4%	12.3	0.01328	0.00601
250	21.5	24.0	4.5		19.50	41.0%	40.9%	13.1	0.01320	0.00302
1440	21.0	19.5	4.5		15.00	31.6%	31.5%	13.8	0.01328	0.00130

References / Comments / Deviations

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

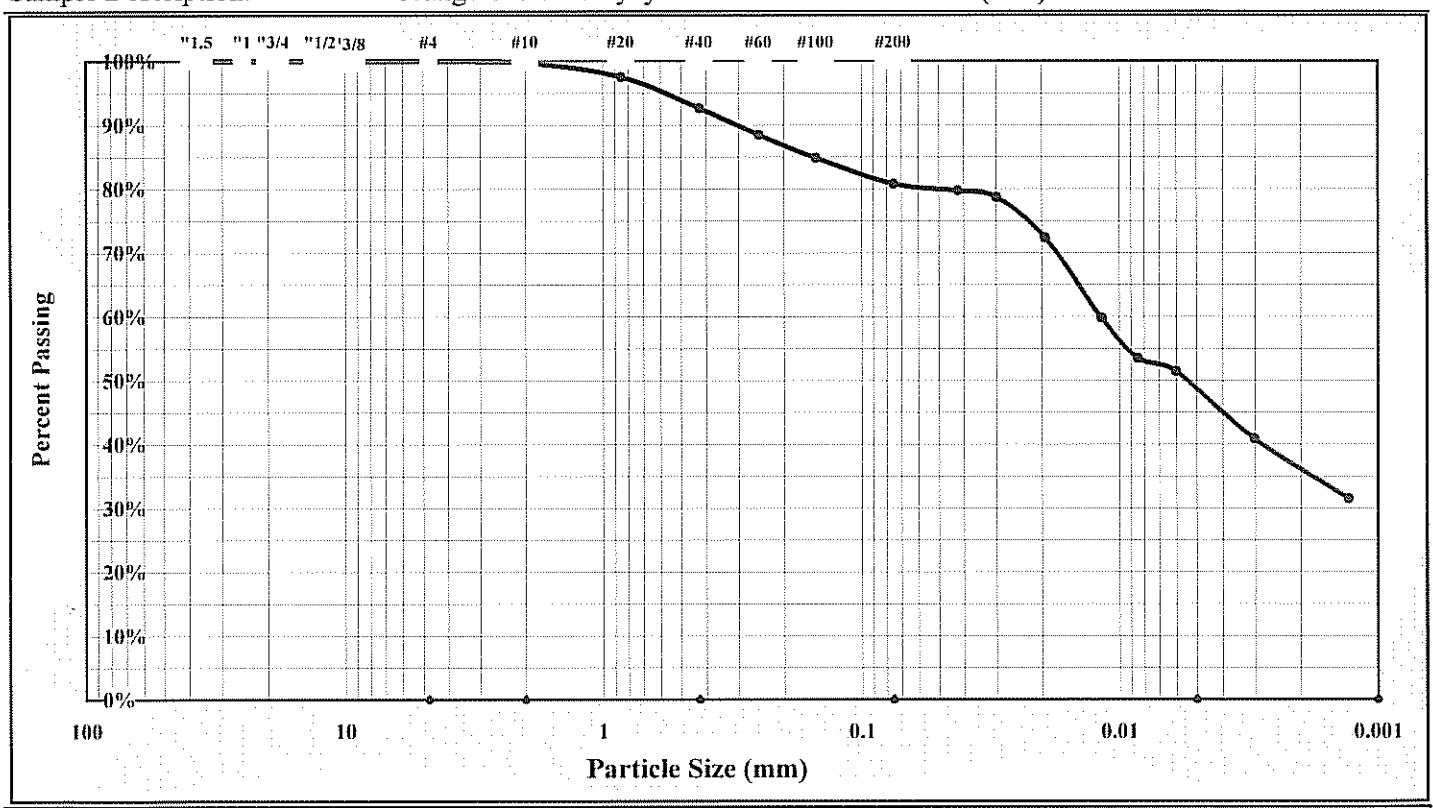
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Phase 9	Report Date:	4/13/09
Project Name:	Allen Steam Station RAB Ash Landfill	Test Date(s):	4/8-13/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-12	Sample Date:	4/8/09
Location:	Cell 1 NW Section Offset:	Elevation:	3rd Lift
Sample Description:	Orange Brown Clayey Silt 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	32.3%
Silt & Clay (% Passing #200):	80.8%	Total Sand:	19.2%	Clay	48.5%
ent Relative Density (Assumed)	2.700	Moisture Content	28.1%	Colloids	29.0%
Liquid Limit	66	Plastic Limit	39	Plastic Index	27
Coarse Sand:	0.3%	Medium Sand:	7.1%	Fine Sand:	11.8%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professiona;	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

CONSTANT HEAD PERMEABILITY

ASTM D5084

S&ME Project Number: 1356-06-825 Phase 9 Project Name: Allen Retired Ash Basin (RAB) Ash Landfill 4/24/2009

Sample Name: CSL-13

Sample Description: Red Orange Clayey Silt w/Fine to Medium Sand (MH)

Type of Sample: Remolded

Sample Data		Molding Moisture Content		Target Molding Conditon				Additonal Data	
Diam. (cm)	7.287	Tare No.	G-12	γ_{wet} (pcf)	117.1			Panel No	4
Leng. (cm)	7.541	WWS+ Tare (gm)	392.45	γ_{dry} (pcf)	93.2			Cell P (psi)	72.5
Area (cm^2)	41.70	WDS+Tare (gm)	329.18	w (%)	25.7			Influent P (psi)	70.2
Vol. (cm^3)	314.50	WT of Water (gm)	63.27	Actual Molding Condition				Effluent P (psi)	70.0
WWS (gm)	599.2	WT of TARE (gm)	82.81	γ_{wet} (pcf)	119.0				
		WT Dry Soil (gm)	246.37	γ_{dry} (pcf)	94.6			Gradient	1.9
		w (%)	25.7	w (%)	25.7				

K = (Q x L) / (t x H x A)

Run	Temp. (^{0}C)	Hour	Minute	Time, t (sec)	Cell Burette (cc)	Influent Burette(cc)	Effluent Burette (cc)	Q (cc)	Δ H (cm)	Temp Corr.	K(cm/sec)
1		9	55		12.3	0.0	14.8				
	20	11	13	4680	12.3	0.7	14.1	0.7	14.1	1.0000	1.92E-06
2		11	14		12.3	0.0	14.8				
	21	14	36	12120	12.3	0.7	14.1	0.7	14.1	0.9760	7.24E-07
3		2	37		12.3	0.0	14.8				
	22	5	3	8760	12.4	0.4	14.2	0.5	14.1	0.9530	6.99E-07
4		8	53		12.4	0.0	14.8				
	20	11	23	9000	12.4	0.7	14.2	0.7	14.1	1.0000	9.28E-07
5		11	25		12.4	0.0	14.8				
	22	14	52	12420	12.4	0.7	14.1	0.7	14.1	0.9530	6.90E-07
5		14	53		12.4	0.0	14.8				
	22	16	59	7560	12.4	0.4	14.4	0.4	14.1	0.9530	6.48E-07
										Ave. K (cm/sec)	7.38E-07
										(Runs 2 thru 5)	
										Ave. K (m/sec)	7.38E-09

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

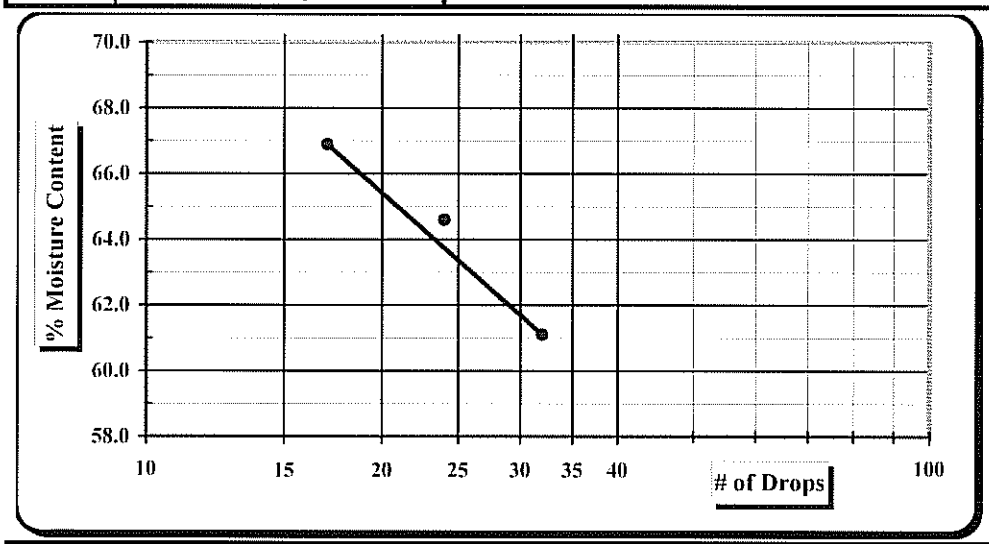
Another code *ASTM D 4318* ☒ *AASHTO T 89* ☐ *AASHTO T 90* ☐ ***Quality Assurance***

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	5/7/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	4/23-5/7/09
Client Name:	Duke Energy		
Client Address:			
Boring #:	CSL-13	Sample Date: 4/16/09	
Location:	Compacted soil liner (HI) Offset:	Elevation: 3rd Lift	
Sample Description:	Red Orange Clayey Silt w/Fine to Medium Sand (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 #:	44	43	PP				34	23	
A	Tare Weight	15.69	13.84	16.13				**13.99**	14.07	
B	Wet Soil Weight + A	24.68	23.50	25.06				20.28	21.32	
C	Dry Soil Weight + A	21.27	19.71	21.48				18.62	19.42	
D	Water Weight (B-C)	3.41	3.79	3.58				1.66	1.90	
E	Dry Soil Weight (C-A)	5.58	5.87	5.35				4.63	5.35	
F	% Moisture (D/E)*100	61.1%	64.6%	66.9%				35.9%	35.5%	
N	# OF DROPS	32	24	17				*Moisture Contents determined by ASTM D 2216*		
LL	LL = **F** * FACTOR									
Ave.	*Average*							**35.7%**		



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 **63**

Plastic Limit **36**

Plastic Index **27**

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	_____	Kyle Baucom	_____
Technician Name	*Date*	*Technical Responsibility*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Form No. TR-D698-1
Revision No. 0
Revision Date: 11/21/07

Moisture - Density Relationship

ASTM D558, D698, D1557, AASHTO T99, T180

S&ME

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

Project #:	**1356-06-825 Phase 9**	Report Date:	4/24/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s)	4/23-24/09
Client Name:	Duke Energy		
Client Address:			
Boring #:	CSL-13	Sample Date:	4/16/2009
Location:	Compacted soil liner (Hl) Offset:	Depth:	3rd Lift
Sample Description:	Red Orange Clayey Silt w/Fine to Medium Sand (MH)		

Type and Specification	*S&ME ID #*	*Cal Date:*	*Type and Specification*	*S&ME ID #*	*Cal Date:*
Balance (0.1 g)			Compaction Mold		
Balance			Compaction Hammer		
Straightedge			Oven		
Sieve					

Water Content Water Content requires GP 2 Balance (0.1 gram Readability). Check:

ASTM D2216 ☒ AASHTO T265 ☐ ASTM D4959 ☐ ASTM D4643 ☐

	Water Added:						Natural
	Tare #:		70	DBL	KO	6911	
A. Tare Weight	A.		76.5	160.1	158.2	154.2	
B. Wet Wt + Tare Wt	B.		734.3	791.1	857.8	922.4	
C. Dry Wt. + Tare Wt.	C.		630.4	679.3	719.4	750.6	
D. Water Weight	B-C		103.9	111.8	138.4	171.8	
E. Dry Weight	C-A		553.9	519.2	561.2	596.4	
F. Moisture Content	100*D/E		**18.8%**	**21.5%**	**24.7%**	**28.8%**	

Compaction Data Requires a GP 5 Balance for ASTM (1 gram or .0022 Lb. readability). Check: 1000/1000

ASTM D558 ☐ ASTM D 698 ☒ ASTM D1557 ☐ AASHTO T99 ☐ AASHTO T180 ☐

Method A ☒ Method B ☐ Method C ☐ Method D (ASTM 1978) ☐ AASHTO Method D ☐

G. Wt of Soil + Mold	G.		5832	5945	6010	5975	
H. Wt. of Mold	H.		4168	4168	4168	4168	
I. Wt. of Soil (g. or lbs.)	G-H		1664	1777	1842	1807	
J. Wt of Soil (Lbs.)	I/453.6 or I		3.668	3.918	4.061	3.984	
K. Mold Volume Factor	K.		30.07	30.07	30.07	30.07	
L. Wet Density (PCF)	J*K		110.3	117.8	122.1	119.8	
M. Dry Density (PCF)	L/(I+F)		**92.8**	**97.0**	**97.9**	**93.0**	

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: AASTM D 4318, D 854, D 2487, C 127

Karen Warner		NICET 117900	
Technician Name	*Signature*	*Certification Type/No.*	*Date*
Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full without the written approval of S&ME, Inc.

Form No. TR-D698-2
Revision No. : 0
Revision Date: 11/21/07

Moisture - Density Report

S&ME

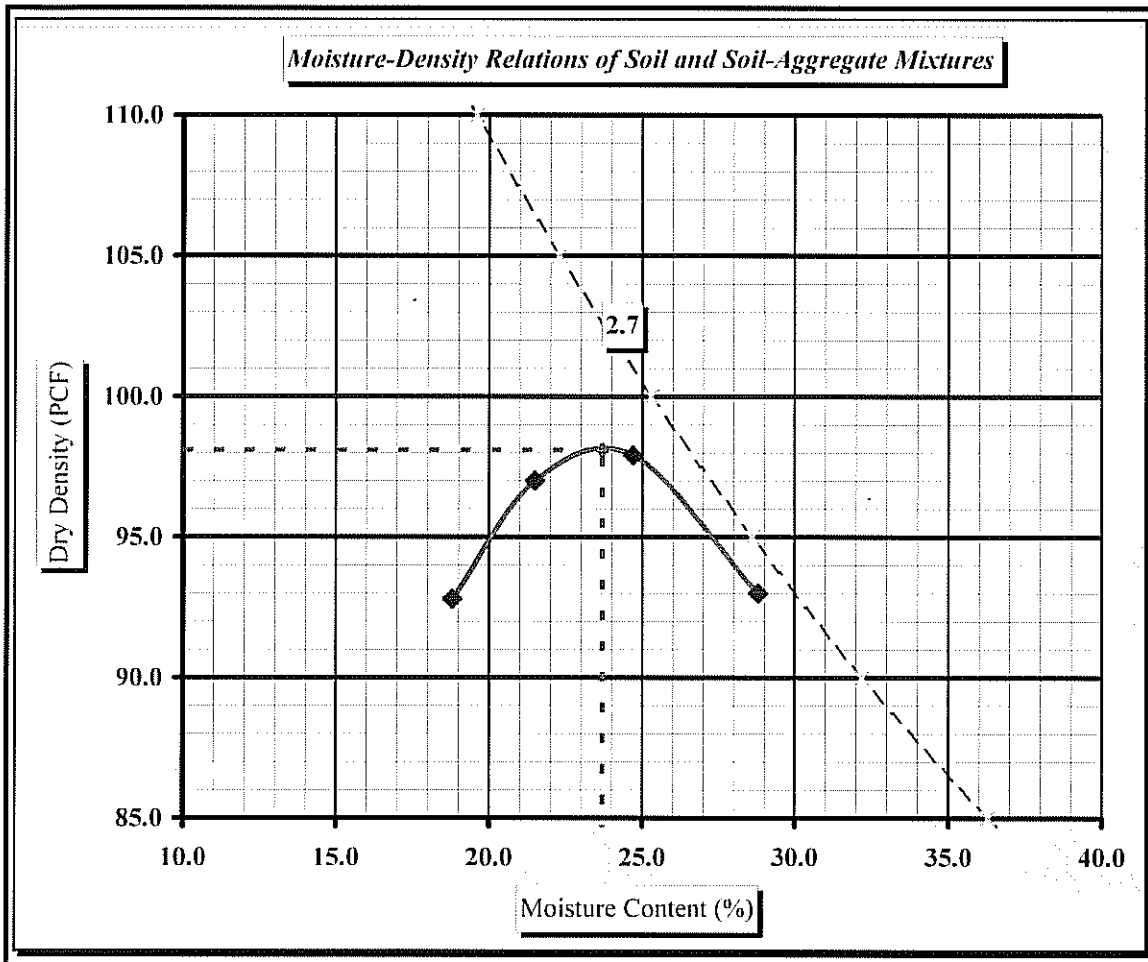
Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	**1356-06-825 Phase 9**	Report Date:	4/24/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/23-24/09
Client Name:	Duke Energy		
Client Address:			
Boring #:	CSL-13	Sample Date:	4/16/2009
Location:	Compacted soil liner (Hl) Offset:	Depth:	3rd Lift
Sample Description:	Red Orange Clayey Silt w/Fine to Medium Sand (MH)		

Maximum Dry Density 98.1 PCF. **Optimum Moisture Content 23.7%**

ASTM D 698 -- Method A



Soil Properties

Natural Moisture Content	**24.5%**
Specific Gravity of Soil	**ND**
Liquid Limit	**63**
Plastic Limit	**36**
Plastic Index	**27**

% Passing

3/4"	100.0%
3/8"	100.0%
#4	99.7%
#10	99.6%
#40	86.3%
#60	80.7%
#200	74.6%

Oversize Fraction

Bulk Gravity	2.700
% Moisture	0.8%
% Oversize	9.2%
MDD	**102.0**
Opt. MC	**21.6%**

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

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

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 #:	**1356-06-825 Phase 9**	Report Date:	5/7/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/23-5/1/09
Client Name:	Duke Energy	Address:	
Boring #:		Sample #: CSL-13	Sample Date: 4/16/09
Location:	Compacted soil liner (HI)	Offset:	Elevation: 3rd Lift
Sample Description:	Red Orange Clayey Silt w/Fine to Medium Sand (MH)		

Pan #:	text	Beaker #:		**Apparent Relative Density**		**2.700**
Hydrometer Jar #:						
Pan Tare Weight (grams):				**Moisture Content**	Hygroscopic	Natural
Total Sample Air Dried Wt. + tare wt. (grams):		283.86		Tare #	EE	G-12
Weight of Total Sample Air Dried:		283.86	A	Tare Wt.	16.91	82.85
Weight of Air Dried Hydrometer Sample (g):		50.00	B	Wet Wt. + A	29.06	453.10
Total Sample Oven Dried:		281.30	C	Dry Wt. + A	28.95	380.14
Hydrometer Sample Oven Dried (**W**):		49.55	D	Water Wt. (B-C)	0.11	72.96
% Passing #10:		99.6%	E	Dry Wt. (C-A)	12.04	297.29
Correction Factor a (Table 1):		0.99		% Moisture (100 x D/E)	0.91%	24.5%

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	1.0		99.7%
#10	1.2	**100.0%**	99.6%
#20	2.5	94.9%	94.5%
#40	6.6	86.7%	86.3%
#60	9.4	81.0%	80.7%
#100	11.3	77.2%	76.9%
#200	12.5	74.9%	74.6%

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. 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
1	21.0	42.0	4.5		37.50	74.9%	74.6%	10.1	0.01328	0.04230
2	21.0	41.0	4.5		36.50	72.9%	72.6%	10.3	0.01328	0.03015
5	21.0	38.0	4.5		33.50	66.9%	66.7%	10.8	0.01328	0.01952
15	21.0	35.0	4.5		30.50	60.9%	60.7%	11.3	0.01328	0.01152
30	21.0	33.0	4.5		28.50	56.9%	56.7%	11.6	0.01328	0.00827
60	21.0	29.5	4.5		25.00	50.0%	49.7%	12.2	0.01328	0.00599
250	22.0	25.0	4.0		21.00	42.0%	41.8%	12.9	0.01312	0.00298
1440	21.0	21.0	4.5		16.50	33.0%	32.8%	13.6	0.01328	0.00129

References / Comments / Deviations ASTM D 422, D 2487, D 4318

Karen Warner	117900	Kyle Baucom	Staff Professional	
Technician Name	*Certification #*	*Technical Responsibility*	*Position*	*Date*

Form No. TR-D422-3
Revision No. 0
Revision Date: 02/20/08

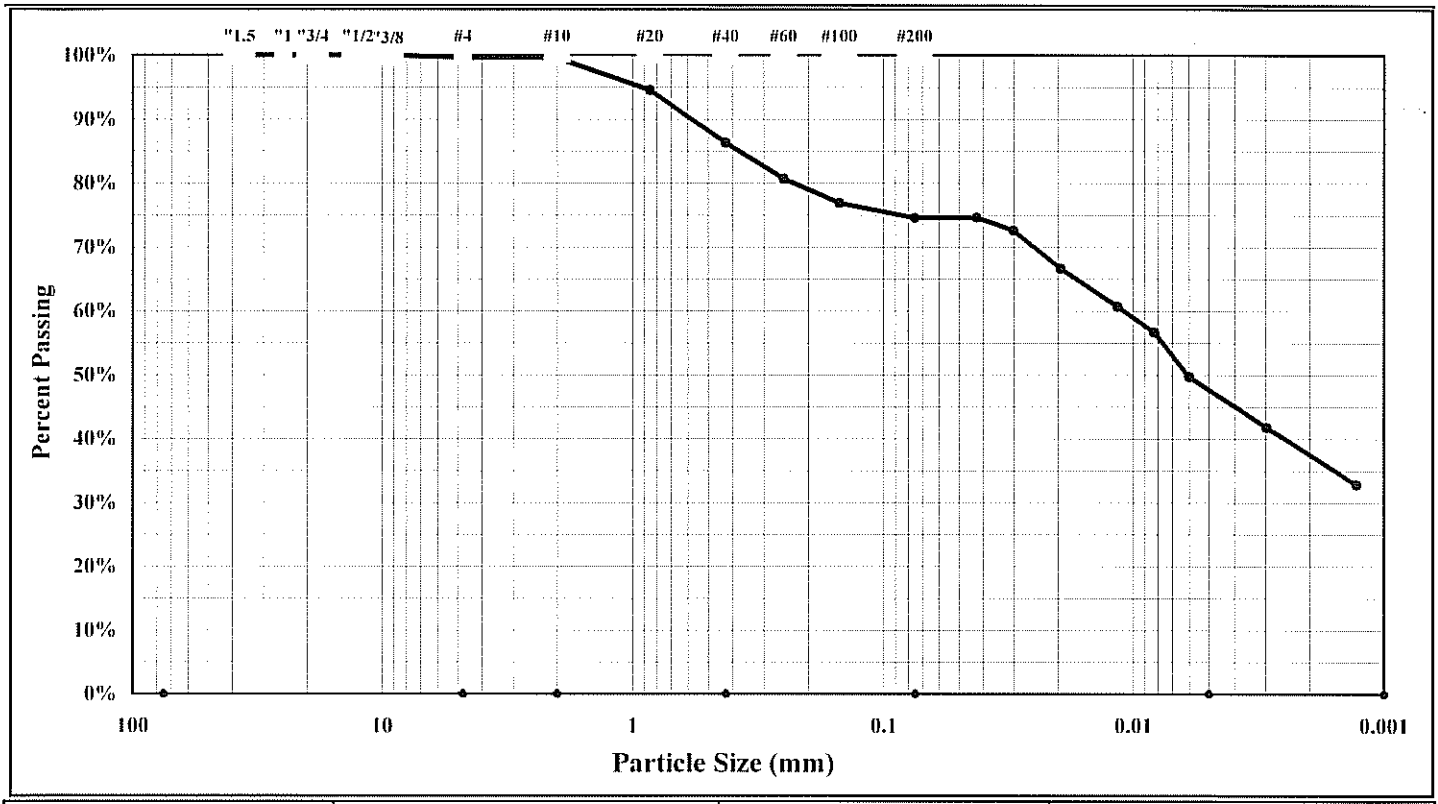
Particle Size Analysis of Soils

ASTM D422

Quality Assurance

S&ME, Inc. ~ 9751 Southern Pine Boulevard ~ Charlotte, NC 28273

S&ME Project #:	1356-06-825 Phase 9	Report Date:	5/7/09
Project Name:	Allen Retired Ash Basin (RAB) Ash Landfill	Test Date(s):	4/23-5/1/09
Client Name:	Duke Energy		
Address:			
Boring #:	Sample #: CSL-13	Sample Date:	4/16/09
Location:	Compacted soil liner Offset:	Elevation:	3rd Lift
Sample Description:	Red Orange Clayey Silt w/Fine to Medium 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	27.1%
Silt & Clay (% Passing #200):	74.6%	Total Sand:	25.1%	Clay	47.5%
Apparent Relative Density	2.700	Moisture Content	24.5%	Colloids	31.0%
Liquid Limit	63	Plastic Limit	36	Plastic Index	27
Coarse Sand:	0.1%	Medium Sand:	13.3%	Fine Sand:	11.7%

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: AASTM D 4318, D 854, D 2487

Kyle Baucom		Staff Professional	
Technical Responsibility	*Signature*	*Position*	*Date*

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

Compacted Soil Liner Field Density Test Results

S&ME

Summary of Density Test Results

(Compacted Soil Liner Test Pad)

Report Date: May 08, 2009

Project No.: 1356-06-825

Project Name: Duke Allen Steam Stat. Ash. LF

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
1	12/29/08	D 2937	**91.2**	**26.5****	91.9	26.9	D 698	18	92.4	27.2	95	**99**	1st Lift N side (Test Pad)	-12"
2	12/29/08	D 2937	**87.0**	**33.3**	87.4	28.9	D 698	18	88.5	29.8	95	**98**	1st Lift S side (Test Pad)	-12"
3	12/29/08	D 2937	**89.1**	**30.4****			D 698	18	88.5	29.8	95	**100+**	2nd Lift N side (Test Pad)	-6"
4	12/29/08	D 2937	**88.0**	**31.2****			D 698	18	88.5	29.8	95	**99**	2nd Lift S side (Test Pad)	-6"
5	12/29/08	D 2937	**92.6**	**28.9****			D 698	18	92.4	27.2	95	**100**	3rd Lift N side (Test Pad)	SG
6	12/29/08	D 2937	**93.9**	**27.0****			D 698	18	92.4	27.2	95	**100+**	3rd Lift S side (Test Pad)	SG

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.		Staff Professional
Name (Technical Responsibility)	*Signature*	*Position*

S&ME, Inc. 9751 So. Pine Blvd., Charlotte, NC 28273 (704) 523-4726 Fax (704) 525-3953

S&ME

Summary of Density Test Results

(Compacted Soil Liner Full Scale)

Report Date: May 08, 2009

Project No.: 1356-06-825CL

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
1	03/12/09	D 2937	**92.4**	**27.9****	87.3	21.7	D 698	TP14	93.1	26.5	95	**99**	A-2 Lift 1	-12"
1A	04/04/09	D 2937	**92.5**	**29.6**	90.6	24.4	D 698	CSL7	91.9	27.2	95	**100+**	Retest of 1, A-2 Lift 1	12"
2	03/12/09	D 2937	**93.0**	**30.7**	87.3	21.7	D 698	TP14	93.1	26.5	95	**100**	A-4 Lift 1	-12"
3	03/12/09	D 2937	**91.1**	**31.3**	89.4	25.3	D 698	TP14	91.3	27.2	95	**100**	A-6 Lift 1	-12"
4	03/12/09	D 2937	**91.4**	**32.9**	89.4	25.3	D 698	TP14	91.3	27.2	95	**100**	A-8 Lift 1	-12"
5	03/18/09	D 2937	**88.7**	**30.9****	89.1	27.8	D 698	TP14	90.7	29.4	95	**98**	B-5 Lift 1	-12"
5A	04/04/09	D 2937	**89.6**	**31.2**	92.5	22.6	D 698	CSL4	93.2	24.9	95	**96**	Retest of 5, B-5 Lift 1	-12"
6	03/18/09	D 2937	**89.4**	**29.6****	89.1	27.8	D 698	TP14	90.7	29.4	95	**99**	C-4 Lift 1	-12"
6A	04/04/09	D 2937	**91.8**	**30.6**	88.5	23.4	D 698	CSL8	90.4	28.4	95	**100+**	Retest of 6, C-4 Lift 1	-12"
7	03/18/09	D 2937	**91.1**	**27.4**	90.2	21.9	D 698	TP14	94.1	24.3	95	**97**	C-6 Lift 1	-12"
8	03/18/09	D 2937	**88.0**	**31.9**	89.1	27.8	D 698	TP14	90.7	29.4	95	**97**	B-7 Lift 1	-12"
9	03/18/09	D 2937	**90.0**	**30.2**	90.2	21.9	D 698	TP14	94.1	24.3	95	**96**	B-3 Lift 1	-12"
10	03/18/09	D 2937	**88.5**	**27.2**	92.0	20.5	D 698	TP-7	94.1	24.3	95	**94 ***	C-2 Lift 1	-12"
11	03/18/09	D 2937	**85.9**	**32.0**	89.1	27.8	D 698	TP14	90.7	29.4	95	**95**	B-1 Lift 1	-12"
12	03/18/09	D 2937	**90.7**	**30.0**	92.0	20.5	D 698	TP7	94.1	24.3	95	**96**	C-8 Lift 1	-12"
13	03/19/09	D 2937	**91.2**	**30.5**	92.8	25.7	D 698	CSL3	93.5	26.4	95	**98**	A-1 Lift 2	-6"
14	03/19/09	D 2937	**87.6**	**34.6**	91.6	24.7	D 698	CTP1	92.3	26.0	95	**95**	A-3 Lift 2	-6"
15	03/19/09	D 2937	**88.1**	**35.5**	88.5	26.5	D 698	CSL1	89.5	31.0	95	**98**	A-5 Lift 2	-6"
16	03/19/09	D 2937	**86.2**	**37.4**	88.5	26.5	D 698	CSL1	89.5	31.0	95	**96**	A-7 Lift 2	-6"

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

Summary of Density Test Results

Report Date: May 08, 2009

Project No.: 1356-06-825CL

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
17	03/19/09	D 2937	**91.9**	**29.8**	91.6	24.7	D 698	CTP1	92.3	26.0	95	**100**	C-8 Lift 2	-6"
18	03/19/09	D 2937	**92.7**	**30.6**	91.6	24.7	D 698	CTP1	92.3	26.0	95	**100**	E-8 Lift 1	-12"
19	03/20/09	D 2937	**91.0**	**31.1**	91.3	25.4	D 698	CSL2	92.9	26.5	95	**98**	B-8 Lift 2	-6"
20	03/20/09	D 2937	**92.2**	**29.4**	91.3	25.4	D 698	CSL2	92.9	26.5	95	**99**	D-8 Lift 2	-6"
21	03/20/09	D 2937	**89.0**	**33.0**	94.5	27.0	D 698	CSL3	94.8	28.0	95	**94 ***	F-8 Lift 2	-6"
22	03/20/09	D 2937	**91.7**	**30.2**	91.3	25.4	D 698	CSL2	92.9	26.5	95	**99**	H-8 Lift 2	-6"
23	03/20/09	D 2937	**92.3**	**29.4**	91.3	25.4	D 698	CSL2	92.9	26.5	95	**99**	A-2 Lift 3	SG
24	03/20/09	D 2937	**90.0**	**31.7**	91.3	25.4	D 698	CSL2	92.9	26.5	95	**97**	A-4 Lift 3	SG
25	03/20/09	D 2937	**90.6**	**32.1**	91.3	25.4	D 698	CSL2	92.9	26.5	95	**98**	A-6 Lift 3	SG
26	03/20/09	D 2937	**87.4**	**34.8**	85.6	29.4	D 698	CSL1	86.8	31.5	95	**100+**	A-8 Lift 3	SG
27	03/23/09	D 2937	**90.2**	**29.7**	91.3	25.7	D 698	CSL2	92.8	26.6	95	**97**	C-5 Lift 2	-6"
28	03/23/09	D 2937	**94.1**	**23.7**	92.5	20.4	D 698	CSL2	95.2	21.7	95	**99**	C-7 Lift 2	-6"
29	03/23/09	D 2937	**89.7**	**30.3**	91.3	25.7	D 698	CSL2	92.8	26.6	95	**97**	B-4 Lift 2	-6"
30	03/23/09	D 2937	**90.2**	**29.1**	91.3	25.7	D 698	CSL2	92.8	26.6	95	**97**	B-6 Lift 2	-6"
31	03/23/09	D 2937	**86.1**	**36.5**	89.1	29.2	D 698	CSL1	89.8	31.2	95	**96**	E-7 Lift 1	-12"
32	03/23/09	D 2937	**87.2**	**35.5**	89.8	29.2	D 698	CSL1	89.8	31.2	95	**97**	E-5 Lift 1	-12"
33	03/23/09	D 2937	**89.1**	**32.6**	89.1	29.2	D 698	CSL2	92.8	26.6	95	**96**	D-7 Lift 1	-12"
34	03/23/09	D 2937	**88.0**	**34.4**	89.1	29.2	D 698	CSL1	89.8	31.2	95	**98**	D-5 Lift 1	-12"
35	03/24/09	D 2937	**88.1**	**34.2**	87.0	27.7	D 698	TP14	90.6	29.9	95	**97**	F-6 Lift 1	-12"

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.		Staff Professional
Name (Technical Responsibility)	*Signature*	*Position*

Summary of Density Test Results

Report Date: May 08, 2009

Project No.: 1356-06-825CL

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
36	03/24/09	D 2937	**90.3**	**33.2**	87.0	27.7	D 698	TP14	90.6	29.9	95	**100**	F-4 Lift 1	-12"
37	03/24/09	D 2937	**91.0**	**32.4**	87.0	27.7	D 698	TP14	90.6	29.9	95	**100**	C-8 Lift 3	SG
38	03/24/09	D 2937	**86.3**	**36.5**	88.2	25.7	D 698	CSL1	89.9	30.0	95	**96**	E-8 Lift 3	SG
39	03/24/09	D 2937	**85.4**	**36.0**	88.2	25.7	D 698	CSL1	89.9	30.0	95	**95**	G-8 Lift 3	SG
40	03/24/09	D 2937	**90.3**	**32.6**	87.0	27.7	D 698	TP14	90.6	29.9	95	**100**	F-7 Lift 3	SG
41	03/24/09	D 2937	**93.0**	**29.4***	89.6	24.6	D 698	CSL4	92.6	27.5	95	**100**	B-7 Lift 3	SG
41A	04/04/09	D 2937	**91.5**	**30.4**	88.5	23.4	D 698	CSL8	90.4	28.4	95	**100+**	Retest of 41, D-7 Lift 3	SG
42	03/24/09	D 2937	**89.2**	**29.5**	89.6	24.6	D 698	CSL4	92.6	27.5	95	**96**	D-7 Lift 3	SG
43	03/30/09	D 2937	**93.3**	**29.2**	91.7	22.5	D 698	CSL3	94.6	24.8	95	**99**	E-4 Lift 2	-6"
44	03/30/09	D 2937	**89.8**	**33.0**	92.7	26.7	D 698	TP14	93.8	28.0	95	**96**	E-6 Lift 2	-6"
45	03/30/09	D 2937	**91.7**	**30.2**	92.7	26.7	D 698	TP14	93.8	28.0	95	**98**	F-5 Lift 2	-6"
46	03/31/09	D 2937	**90.2**	**32.9**	91.3	27.1	D 698	CSL1	91.7	28.5	95	**98**	H-4 Lift 1	-12"
47	03/31/09	D 2937	**90.7**	**30.5**	91.3	27.1	D 698	CSL1	91.7	28.5	95	**99**	H-6 Lift 1	-12"
48	03/31/09	D 2937	**92.7**	**30.0**	91.7	24.6	D 698	CSL4	93.2	26.0	95	**99**	C-4 Lift 3	SG
49	03/31/09	D 2937	**90.3**	**32.6**	91.7	24.6	D 698	CSL1	91.7	28.5	95	**98**	B-5 Lift 3	SG
50	03/31/09	D 2937	**88.5**	**35.3**	91.7	24.6	D 698	CSL1	91.7	28.5	95	**96**	C-6 Lift 3	SG
51	03/31/09	D 2937	**92.0**	**29.7**	91.7	24.6	D 698	CSL4	93.2	26.0	95	**99**	D-5 Lift 3	SG
52	03/31/09	D 2937	**91.1**	**31.4**	91.7	24.6	D 698	CSL1	91.7	28.5	95	**99**	G-4 Lift 2	-6"
53	03/31/09	D 2937	**92.1**	**31.0**	91.7	24.6	D 698	CSL4	93.2	26.0	95	**99**	G-6 Lift 2	-6"

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.		Staff Professional
Name (Technical Responsibility)	*Signature*	*Position*

Summary of Density Test Results

Report Date: May 08, 2009

Project No.: 1356-06-825CL

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
54	03/31/09	D 2937	**92.5**	**28.3**	91.7	24.6	D 698	CSL4	93.2	26.0	95	**99**	B-2 Lift 2	-6"
55	03/31/09	D 2937	**89.2**	**32.8**	91.7	24.6	D 698	CSL1	91.7	28.5	95	**97**	C-1 Lift 2	-6"
56	04/01/09	D 2937	**91.9**	**29.2**	92.2	25.5	D 698	CSL2	93.2	26.1	95	**99**	C-3 Lift 2	-6"
57	04/01/09	D 2937	**88.5**	**33.6**	86.5	28.1	D 698	CSL3	88.4	30.5	95	**100**	H-5 Lift 2	-6"
58	04/01/09	D 2937	**88.8**	**33.5**	86.5	28.1	D 698	CSL3	88.4	30.5	95	**100**	H-6 Lift 2	-6"
59	04/01/09	D 2937	**92.4**	**28.3**	92.2	25.5	D 698	CSL2	93.2	26.1	95	**99**	E-5 Lift 3	SG
60	04/01/09	D 2937	**93.4**	**29.0**	92.2	25.5	D 698	CSL2	93.2	26.1	95	**100**	E-7 Lift 3	SG
61	04/01/09	D 2937	**93.4**	**28.7**	92.2	25.5	D 698	CSL2	93.2	26.1	95	**100**	F-4 Lift 3	SG
62	04/06/09	D 2937	**89.0**	**33.1**	89.7	26.6	D 698	CSL8	90.4	28.9	95	**98**	F-6 Lift 3	SG
63	04/06/09	D 2937	**89.2**	**32.7**	89.7	26.6	D 698	CSL8	90.4	28.9	95	**99**	G-5 Lift 3	SG
64	04/06/09	D 2937	**89.3**	**34.0**	89.7	26.6	D 698	CSL8	90.4	28.9	95	**99**	G-7 Lift 3	SG
65	04/06/09	D 2937	**89.6**	**31.2**	89.7	26.6	D 698	CSL8	90.4	28.9	95	**99**	H-4 Lift 3	SG
66	04/06/09	D 2937	**88.8**	**33.8**	89.7	26.6	D 698	CSL8	90.4	28.9	95	**98**	H-6 Lift 3	SG
67	04/08/09	D 2937	**91.5**	**29.0**	90.2	24.4	D 698	CSL3	91.4	25.7	95	**100**	D-1 Lift 1	-12"
68	04/08/09	D 2937	**88.9**	**31.1**	85.6	24.6	D 698	CTP1	89.1	28.5	95	**100**	D-3 Lift 1	-12"
69	04/08/09	D 2937	**91.4**	**29.7**	90.2	24.4	D 698	CSL3	91.4	25.7	95	**100**	E-2 Lift 1	-12"
70	04/08/09	D 2937	**91.0**	**30.4**	90.2	24.4	D 698	CSL3	91.4	25.7	95	**100**	F-1 Lift 1	-12"
71	04/08/09	D 2937	**91.4**	**30.8**	90.2	24.4	D 698	CSL3	91.4	25.7	95	**100**	F-3 Lift 1	-12"
72	04/09/09	D 2937	**82.0**	**36.0**	83.1	27.8	D 698	CSL3	85.5	31.2	95	**96**	B-1 Lift 3	SG

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LeGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

Summary of Density Test Results

Report Date: May 08, 2009

Project No.: 1356-06-825CL

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
73	04/09/09	D 2937	**87.7**	**33.6**	85.4	25.4	D 698	CSL1	88.3	30.4	95	**99**	B-3 Lift 3	SG
74	04/09/09	D 2937	**82.6**	**34.9**	83.1	27.8	D 698	CSL3	85.4	31.2	95	**97**	C-2 Lift 3	SG
75	04/09/09	D 2937	**86.3**	**35.3**	85.4	25.4	D 698	CLS1	88.3	30.4	95	**98**	D-2 Lift 2	-6"
76	04/09/09	D 2937	**86.6**	**36.2**	85.4	25.4	D 698	CSL1	88.3	30.4	95	**98**	E-1 Lift 2	-6"
77	04/09/09	D 2937	**87.7**	**34.4**	85.4	25.4	D 698	CSL1	88.3	30.4	95	**99**	E-3 Lift 2	-6"
78	04/09/09	D 2937	**88.3**	**32.6**	85.4	25.4	D 698	CSL1	88.3	30.4	95	**100**	F-2 Lift 2	-6"
79	04/09/09	D 2937	**89.3**	**32.3**	85.4	25.4	D 698	CSL1	88.3	30.4	95	**100+**	G-2 Lift 1	-12"
80	04/09/09	D 2937	**90.6**	**33.5**	85.4	25.4	D 698	CSL1	88.3	30.4	95	**100+**	H-1 Lift 1	-12"
81	04/09/09	D 2937	**86.1**	**36.2**	83.6	29.6	D 698	TP-8	85.0	31.8	95	**100+**	H-3 Lift 1	-12"
82	04/13/09	D 2937	**92.9**	**31.5**	87.4	26.9	D 698	CSL1	90.1	29.0	95	**100+**	D-1 Lift 3	SG
83	04/13/09	D 2937	**91.0**	**32.0**	87.4	26.9	D 698	CSL1	90.1	29.0	95	**100+**	D-3 Lift 3	SG
84	04/13/09	D 2937	**88.7**	**34.5**	82.5	30.2	D 698	CSL6	84.5	32.5	95	**100+**	E-2 Lift 3	SG
85	04/15/09	D 2937	**88.8**	**34.2**	87.2	29.7	D 698	CSL2	88.5	30.0	95	**100**	G-1 2nd Lift	-6"
86	04/15/09	D 2937	**89.8**	**35.7**	87.2	29.7	D 698	CSL2	88.5	30.0	95	**100+**	G-3 2nd Lift	-6"
87	04/15/09	D 2937	**87.7**	**35.6**	87.2	29.7	D 698	CSL2	88.5	30.0	95	**99**	H-2 2nd Lift	-6"
88	04/15/09	D 2937	**88.6**	**33.0**	87.2	29.7	D 698	CSL2	88.5	30.0	95	**100**	F-1 3rd Lift	SG
89	04/15/09	D 2937	**88.8**	**33.5**	87.2	29.7	D 698	CSL2	85.5	30.0	95	**100+**	F-3 3rd Lift	SG
90	04/16/09	D 2937	**88.6**	**34.7**	84.9	28.1	D 698	CSL3	86.5	31.5	95	**100+**	G-2 3rd Lift	SG
91	04/16/09	D 2937	**86.7**	**36.4**	84.9	28.1	D 698	CSL3	86.5	31.5	95	**100**	H-1 3rd Lift	SG

* = Failed Specified Compaction, ** = Failed Specified Moisture Content

All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LeGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.
Name (Technical Responsibility)

Signature

Staff Professional
Position

Summary of Density Test Results

Report Date: May 08, 2009

Project No.: 1356-06-825CL

Project Name: Allen Steam Stat. Ash Landfill

Client: Duke Energy Corporation, Post Office Box 1006 (EC10Q), 526 South Church Street, Charlotte, N. C. 28201-1006

Test		In-Place Density Test			Check Plug Data		Reference Standard				Compaction		Location	Elevation or Stone Depth
No.	Date	Type	Dry Density	Moisture Content	Dry Density	Moisture Content	Type	Ref. Curve	MDD	Optimum Moisture Content	Percent Specified	Percent In-Place		
92	04/16/09	D 2937	**89.4**	**33.7**	84.9	28.1	D 698	CSL3	86.5	31.5	95	**100+**	H-3 3rd Lift	SG
93	04/23/09	D 2937	**91.0**	**31.1**	88.5	35.8	D 698	#17	90.0	26.5	95	**100+**	H-3, Lift 3	SG
94	04/23/09	D 2937	**90.5**	**30.0**			D 698	#17	90.0	26.5	95	**100+**	H-4, Lift 3	SG
95	04/23/09	D 2937	**92.0**	**30.9**			D 698	#17	90.0	26.5	95	**100+**	H-4, Lift 3	SG

* = Failed Specified Compaction, ** = Failed Specified Moisture Content.

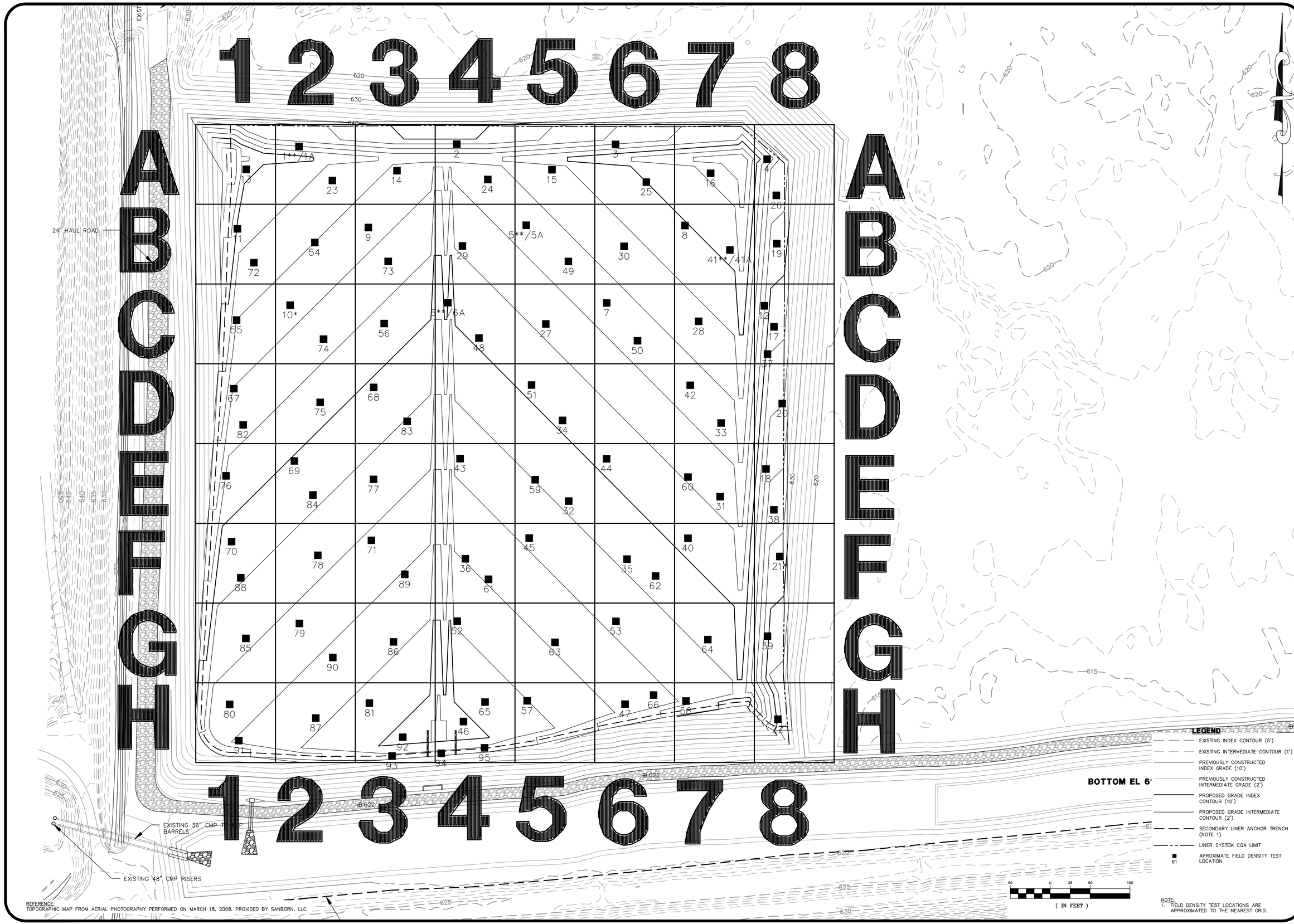
All Test Locations and Elevations are Approximate

Notes:

References: ASTM D 2937: Density of Soil In Place by the Drive Cylinder Method, ASTM D 698: Laboratory Compaction Characteristics of Soil Using Standard Effort

Distribution: Mark LaGrand/Earnhardt(EMAIL), Ted Manes/Duke Energy(EMAIL)

Kyle Baucom/S&ME, Inc.		Staff Professional
Name (Technical Responsibility)	*Signature*	*Position*



REFERENCE:
TOPOGRAPHIC MAP FROM AERIAL PHOTOGRAPHY PERFORMED ON MARCH 18, 2008. PROVIDED BY SANBORN, LLC.

NOTE:
1. FIELD DENSITY TEST LOCATIONS ARE APPROXIMATED TO THE NEAREST GRID.

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY

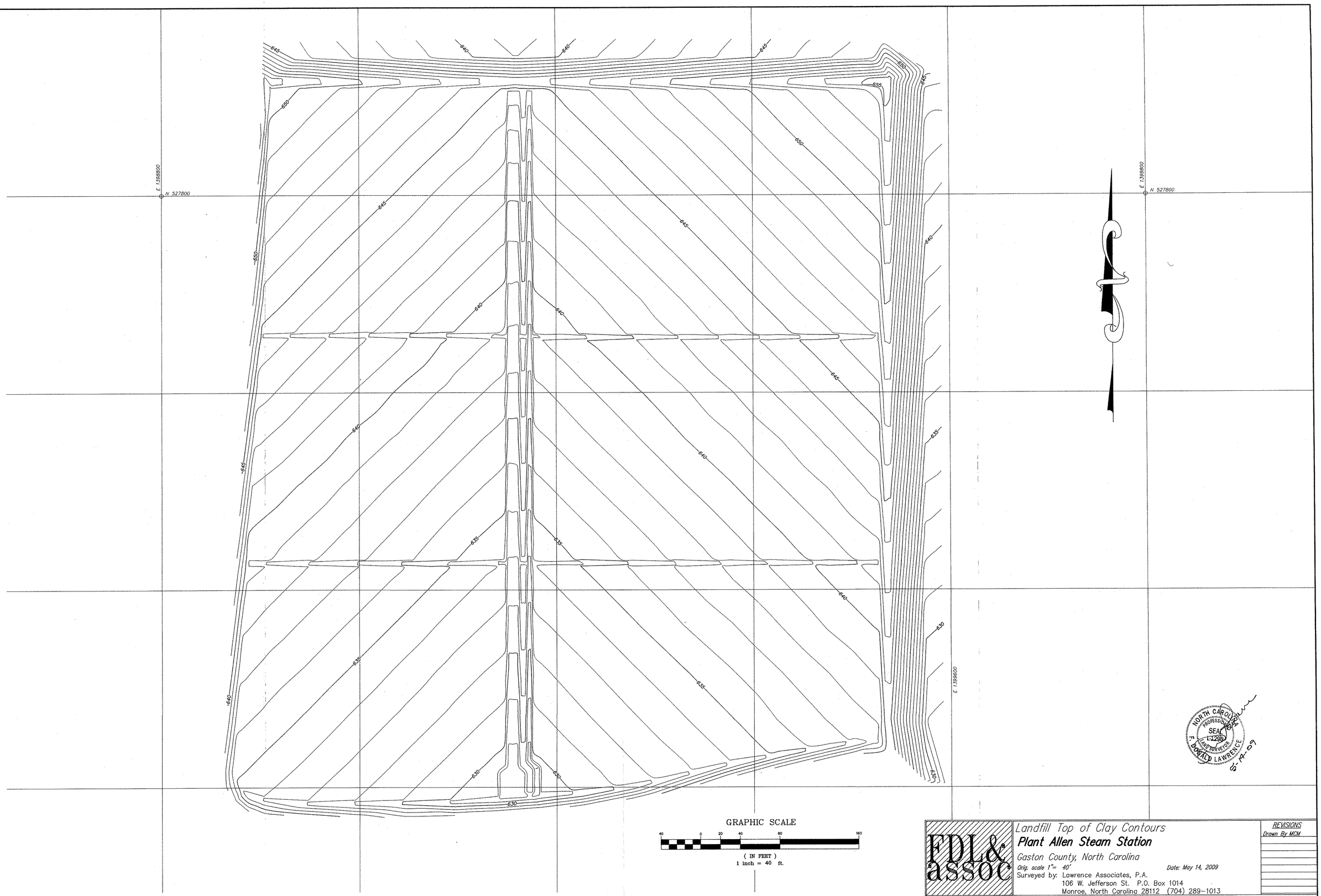
CELL 1 COMPACTED SOIL LINER FIELD DENSITY TESTING GRID [100' X 100']

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: KB	CHECKED BY:
DESIGNED BY:	APPROVED BY:
PROJECT NUMBER 1356-06-825	
SCALE: 1" = 50'	DATE: 5-8-09
DRAWING: 5	OF: 6

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\DRGS\COMPACTED SOIL LINER.DWG

Compacted Soil Liner As-Built Drawing



FDL & assoc

Landfill Top of Clay Contours

Plant Allen Steam Station

Gaston County, North Carolina

Orig. scale 1"= 40' Date: May 14, 2009

Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St. P.O. Box 1014
Monroe, North Carolina 28112 (704) 289-1013

REVISIONS
Drawn By MCM

Job No. 1640 Drawing file: subcon.dwg Drawing no. 09/50

Compacted Soil Liner Thickness Verification

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1301	527217.68	1398861.82	637.02	2301	527217.65	1398861.98	638.62	1.60
1302	527200.77	1398863.86	636.46	2302	527201.11	1398864.13	638.16	1.70
1303	527186.26	1398872.61	635.99	2303	527186.35	1398872.74	637.50	1.51
1304	527176.21	1398886.36	635.43	2304	527176.67	1398886.55	637.04	1.61
1305	527172.31	1398903.00	634.80	2305	527172.87	1398902.61	636.42	1.62
1306	527169.91	1398946.31	633.90	2306	527171.69	1398946.25	635.52	1.62
1307	527169.21	1398996.32	632.80	2307	527170.33	1398996.46	634.74	1.94
1308	527168.74	1399046.33	631.81	2308	527169.10	1399046.26	633.44	1.63
1309	527169.08	1399096.53	631.06	2309	527171.60	1399096.47	633.00	1.94
1310	527172.08	1399139.37	630.61	2310	527174.87	1399139.11	632.50	1.89
1311	527175.68	1399186.44	630.87	2311	527178.38	1399186.02	632.52	1.65
1312	527180.62	1399226.96	631.30	2312	527181.50	1399226.88	633.24	1.94
1313	527188.62	1399276.89	631.93	2313	527188.59	1399277.16	634.12	2.19
1314	527192.11	1399300.52	632.47	2314	527192.17	1399300.79	634.86	2.39
1315	527198.53	1399327.07	633.14	2315	527198.53	1399327.07	635.52	2.38
1316	527209.87	1399377.50	634.97	2316	527210.56	1399377.16	636.85	1.88
1317	527220.39	1399427.28	635.70	2317	527220.20	1399427.24	638.18	2.48
1318	527228.41	1399477.47	637.35	2318	527228.49	1399477.27	639.44	2.09
1319	527231.14	1399500.09	637.90	2319	527232.04	1399500.03	639.95	2.05
1320	527237.36	1399532.74	638.49	2320	527237.07	1399532.53	640.10	1.61
1321	527236.91	1399542.85	638.40	2321	527237.10	1399542.71	640.03	1.63
1322	527244.57	1399524.87	636.05	2322	527245.72	1399524.06	637.68	1.63
1323	527243.76	1399500.04	634.34	2323	527243.46	1399499.28	636.19	1.85
1324	527247.00	1399501.31	634.50	2324	527246.89	1399499.78	636.18	1.68
1325	527249.30	1399502.29	635.28	2325	527249.29	1399502.14	637.17	1.89
1326	527268.82	1399526.85	636.56	2326	527268.28	1399526.33	638.11	1.55
1327	527268.97	1399532.87	638.57	2327	527268.73	1399532.54	640.19	1.62
1328	527268.89	1399537.32	638.55	2328	527268.56	1399537.93	640.20	1.65
1329	527315.22	1399537.34	639.58	2329	527315.66	1399537.96	641.26	1.68
1330	527315.23	1399533.17	639.58	2330	527315.49	1399532.71	641.19	1.61
1331	527315.35	1399526.81	637.53	2331	527315.05	1399526.53	639.14	1.61
1332	527362.55	1399527.10	638.59	2332	527362.57	1399526.87	640.12	1.53
1333	527362.45	1399533.16	640.62	2333	527362.78	1399532.94	642.22	1.60
1334	527362.55	1399537.82	640.64	2334	527362.88	1399538.03	642.23	1.59
1335	527409.51	1399537.79	641.66	2335	527409.59	1399538.23	643.28	1.62
1336	527409.44	1399533.38	641.69	2336	527409.67	1399533.24	643.31	1.62
1337	527409.48	1399527.52	639.51	2337	527409.82	1399527.10	641.11	1.60
1338	527422.71	1399527.02	639.77	2338	527424.22	1399526.85	641.37	1.60
1339	527425.61	1399524.76	638.82	2339	527425.38	1399524.49	640.43	1.61
1340	527429.35	1399524.82	638.80	2340	527428.50	1399524.61	640.44	1.64
1341	527433.62	1399527.70	639.94	2341	527429.89	1399526.94	641.50	1.56
1342	527456.86	1399527.52	640.64	2342	527456.70	1399526.88	642.17	1.53
1343	527456.75	1399533.49	642.55	2343	527456.90	1399533.30	644.17	1.62
1344	527456.78	1399538.31	642.52	2344	527456.79	1399538.52	644.16	1.64
1345	527503.74	1399538.21	643.66	2345	527503.70	1399539.00	645.27	1.61
1346	527503.86	1399533.68	643.67	2346	527503.78	1399533.07	645.37	1.70
1347	527504.50	1399527.72	641.80	2347	527503.73	1399526.81	643.40	1.60
1348	527551.12	1399527.88	642.86	2348	527551.01	1399527.09	644.56	1.70
1349	527550.85	1399533.97	644.82	2349	527551.08	1399533.54	646.68	1.86
1350	527550.84	1399538.38	644.85	2350	527551.01	1399538.83	646.75	1.90
1351	527597.94	1399538.75	646.00	2351	527598.18	1399539.27	647.59	1.59
1352	527598.04	1399534.05	646.01	2352	527598.07	1399533.93	647.61	1.60
1353	527598.05	1399528.38	644.06	2353	527598.04	1399527.66	645.71	1.65
1354	527645.06	1399528.65	645.21	2354	527645.18	1399527.84	646.90	1.69

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1355	527651.15	1399528.33	645.40	2355	527652.36	1399527.14	647.01	1.61
1356	527653.59	1399526.35	644.46	2356	527654.21	1399525.38	646.12	1.66
1357	527659.21	1399526.55	644.44	2357	527657.34	1399524.48	645.98	1.54
1358	527664.75	1399528.58	645.63	2358	527659.89	1399527.43	647.15	1.52
1359	527645.37	1399534.37	647.19	2359	527645.09	1399534.16	648.86	1.67
1360	527645.34	1399539.03	647.20	2360	527645.37	1399539.35	648.91	1.71
1361	527692.20	1399539.08	648.35	2361	527692.23	1399539.42	650.00	1.65
1362	527692.21	1399534.45	648.37	2362	527691.95	1399534.04	650.08	1.71
1363	527692.74	1399528.70	646.37	2363	527692.40	1399527.42	648.00	1.63
1364	527746.13	1399528.65	647.73	2364	527746.05	1399528.47	649.38	1.65
1365	527746.28	1399534.79	649.69	2365	527746.22	1399534.38	651.41	1.72
1366	527746.31	1399539.45	649.70	2366	527746.38	1399539.90	651.40	1.70
1367	527799.74	1399539.43	651.06	2367	527800.10	1399540.28	652.77	1.71
1368	527799.77	1399534.94	651.06	2368	527799.99	1399534.38	652.80	1.74
1369	527800.02	1399529.15	649.06	2369	527800.62	1399528.36	650.69	1.63
1370	527854.43	1399529.28	650.33	2370	527854.77	1399528.88	651.97	1.64
1371	527854.17	1399535.24	652.39	2371	527854.53	1399534.97	654.00	1.61
1372	527853.94	1399539.88	652.41	2372	527853.93	1399540.23	654.01	1.60
1373	527916.53	1399540.08	653.84	2373	527916.76	1399540.24	655.49	1.65
1374	527911.94	1399535.50	653.83	2374	527910.12	1399533.83	655.58	1.75
1375	527905.60	1399529.41	651.74	2375	527904.92	1399528.57	653.33	1.59
1376	527916.29	1399479.44	652.43	2376	527916.85	1399479.12	654.14	1.71
1377	527912.44	1399479.10	652.43	2377	527911.81	1399479.33	654.09	1.66
1378	527905.86	1399479.22	650.44	2378	527905.13	1399479.47	652.05	1.61
1379	527854.09	1399478.71	649.12	2379	527853.93	1399478.92	650.77	1.65
1380	527799.02	1399478.99	647.80	2380	527799.99	1399478.62	649.37	1.57
1381	527746.22	1399479.41	646.45	2381	527746.39	1399478.50	648.12	1.67
1382	527692.59	1399479.22	645.14	2382	527692.50	1399478.76	646.79	1.65
1383	527664.03	1399478.75	644.32	2383	527659.92	1399478.52	645.92	1.60
1384	527658.03	1399478.93	643.17	2384	527657.67	1399478.48	644.78	1.61
1385	527654.34	1399478.63	643.20	2385	527654.43	1399478.69	644.77	1.57
1386	527651.71	1399478.73	644.21	2386	527652.28	1399478.80	645.74	1.53
1387	527644.78	1399479.25	644.07	2387	527645.28	1399478.72	645.59	1.52
1388	527598.19	1399478.32	642.80	2388	527598.30	1399478.53	644.45	1.65
1389	527551.26	1399478.16	641.64	2389	527551.20	1399478.46	643.25	1.61
1390	527504.05	1399477.87	640.55	2390	527504.13	1399478.35	642.10	1.55
1391	527457.00	1399477.66	639.47	2391	527457.15	1399478.12	641.06	1.59
1392	527433.63	1399477.14	638.88	2392	527430.42	1399477.86	640.49	1.61
1393	527428.58	1399477.67	637.60	2393	527428.90	1399477.76	639.42	1.82
1394	527425.04	1399477.33	637.58	2394	527425.26	1399477.82	639.40	1.82
1395	527420.59	1399477.79	638.65	2395	527423.71	1399477.88	640.32	1.67
1396	527409.79	1399477.77	638.53	2396	527410.13	1399477.62	640.08	1.55
1397	527363.10	1399477.59	637.47	2397	527362.43	1399477.19	639.13	1.66
1398	527315.90	1399478.36	636.49	2398	527315.62	1399478.01	638.06	1.57
1399	527268.89	1399477.14	635.45	2399	527268.47	1399477.60	637.11	1.66
1400	527248.11	1399476.86	634.62	2400	527245.33	1399477.27	636.58	1.96
1401	527243.34	1399476.80	633.72	2401	527243.16	1399477.91	635.64	1.92
1402	527239.97	1399477.18	634.02	2402	527240.22	1399477.35	635.64	1.62
1403	527232.03	1399427.50	632.73	2403	527232.04	1399427.05	634.39	1.66
1404	527235.33	1399426.63	632.59	2404	527234.98	1399427.03	634.40	1.81
1405	527240.40	1399426.66	633.69	2405	527237.13	1399427.21	635.32	1.63
1406	527268.65	1399427.17	634.43	2406	527268.16	1399427.09	636.09	1.66
1407	527316.11	1399426.37	635.42	2407	527315.89	1399427.75	636.99	1.57
1408	527363.01	1399427.57	636.49	2408	527362.94	1399427.80	638.02	1.53

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1409	527410.25	1399427.69	637.40	2409	527410.26	1399427.58	638.99	1.59
1410	527420.66	1399427.50	637.66	2410	527423.83	1399427.66	639.26	1.60
1411	527424.66	1399427.44	636.69	2411	527425.50	1399427.71	638.29	1.60
1412	527428.61	1399427.65	636.71	2412	527428.48	1399427.65	638.36	1.65
1413	527433.99	1399427.37	637.83	2413	527430.57	1399427.66	639.43	1.60
1414	527457.18	1399428.53	638.46	2414	527457.40	1399428.05	640.00	1.54
1415	527504.33	1399427.98	639.39	2415	527504.25	1399428.16	640.99	1.60
1416	527551.32	1399428.15	640.42	2416	527551.34	1399428.04	642.00	1.58
1417	527598.42	1399429.27	641.58	2417	527598.27	1399428.42	643.17	1.59
1418	527646.06	1399428.54	642.83	2418	527645.66	1399428.15	644.35	1.52
1419	527651.77	1399428.65	643.00	2419	527652.56	1399428.47	644.54	1.54
1420	527654.25	1399428.61	641.98	2420	527654.41	1399428.64	643.52	1.54
1421	527658.37	1399428.58	641.94	2421	527657.18	1399428.28	643.53	1.59
1422	527661.95	1399428.86	643.18	2422	527659.76	1399428.72	644.73	1.55
1423	527693.06	1399428.58	643.96	2423	527692.65	1399428.63	645.58	1.62
1424	527746.19	1399428.89	645.28	2424	527746.89	1399428.71	646.88	1.60
1425	527800.45	1399428.37	646.57	2425	527800.25	1399429.08	648.19	1.62
1426	527854.06	1399429.45	647.92	2426	527854.01	1399429.36	649.56	1.64
1427	527906.38	1399429.36	649.28	2427	527905.21	1399429.21	650.80	1.52
1428	527912.07	1399429.36	651.20	2428	527911.84	1399429.48	652.83	1.63
1429	527916.68	1399429.08	651.18	2429	527917.08	1399429.08	652.74	1.56
1430	527916.76	1399379.27	649.93	2430	527916.84	1399379.20	651.50	1.57
1431	527912.19	1399378.93	649.95	2431	527911.91	1399379.42	651.53	1.58
1432	527906.93	1399378.88	648.01	2432	527905.78	1399379.64	649.60	1.59
1433	527853.53	1399379.19	646.73	2433	527854.30	1399379.17	648.27	1.54
1434	527799.59	1399377.43	645.37	2434	527800.49	1399379.03	646.92	1.55
1435	527746.60	1399377.64	644.07	2435	527746.63	1399378.96	645.61	1.54
1436	527692.63	1399378.21	642.69	2436	527692.77	1399378.89	644.29	1.60
1437	527664.44	1399377.97	641.92	2437	527659.28	1399378.81	643.46	1.54
1438	527658.12	1399378.15	640.71	2438	527657.65	1399378.65	642.35	1.64
1439	527654.37	1399378.23	640.75	2439	527654.11	1399378.76	642.33	1.58
1440	527651.57	1399378.58	641.71	2440	527652.65	1399378.68	643.28	1.57
1441	527645.45	1399378.15	641.51	2441	527645.49	1399378.66	643.10	1.59
1442	527598.51	1399377.75	640.33	2442	527598.94	1399378.16	641.93	1.60
1443	527551.48	1399378.24	639.30	2443	527551.53	1399378.15	640.88	1.58
1444	527504.37	1399377.95	638.33	2444	527504.50	1399377.79	639.91	1.58
1445	527457.38	1399377.77	637.32	2445	527457.53	1399377.88	638.94	1.62
1446	527433.47	1399378.08	636.77	2446	527430.50	1399377.89	638.37	1.60
1447	527429.17	1399377.86	635.52	2447	527428.51	1399378.00	637.29	1.77
1448	527424.98	1399377.74	635.47	2448	527425.64	1399378.28	637.24	1.77
1449	527420.29	1399377.58	636.45	2449	527423.71	1399378.11	638.20	1.75
1450	527410.20	1399377.67	636.42	2450	527410.63	1399377.64	637.98	1.56
1451	527363.10	1399377.49	635.41	2451	527363.03	1399377.70	636.92	1.51
1452	527316.10	1399378.84	634.41	2452	527316.22	1399377.47	635.93	1.52
1453	527268.94	1399377.28	633.41	2453	527269.33	1399377.18	634.95	1.54
1454	527232.00	1399376.50	632.54	2454	527227.45	1399377.07	634.05	1.51
1455	527225.72	1399376.58	631.13	2455	527225.60	1399377.01	633.14	2.01
1456	527222.16	1399377.10	631.20	2456	527222.64	1399377.53	633.14	1.94
1457	527210.92	1399327.02	629.93	2457	527211.09	1399327.16	631.82	1.89
1458	527214.41	1399326.49	629.68	2458	527213.98	1399326.60	631.83	2.15
1459	527220.03	1399326.38	630.98	2459	527215.83	1399326.72	632.74	1.76
1460	527221.97	1399327.08	631.28	2460	527222.08	1399327.02	632.87	1.59
1461	527268.32	1399326.06	632.26	2461	527269.25	1399327.12	633.89	1.63
1462	527316.38	1399327.20	633.36	2462	527316.38	1399327.20	634.87	1.51

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1463	527363.35	1399327.46	634.28	2463	527362.89	1399327.89	635.96	1.68
1464	527410.54	1399327.57	635.27	2464	527411.07	1399327.37	636.94	1.67
1465	527422.62	1399327.07	635.60	2465	527423.46	1399327.70	637.17	1.57
1466	527425.13	1399327.05	634.51	2466	527424.96	1399327.48	636.13	1.62
1467	527429.50	1399326.90	634.52	2467	527428.72	1399327.08	636.16	1.64
1468	527434.08	1399326.32	635.70	2468	527430.40	1399327.20	637.29	1.59
1469	527457.33	1399327.64	636.31	2469	527458.53	1399327.40	637.88	1.57
1470	527504.45	1399327.95	637.35	2470	527504.80	1399328.02	638.89	1.54
1471	527551.63	1399327.94	638.34	2471	527551.70	1399328.31	639.92	1.58
1472	527599.06	1399328.12	639.24	2472	527599.20	1399328.35	640.82	1.58
1473	527645.66	1399328.33	640.26	2473	527645.84	1399328.26	641.87	1.61
1474	527651.46	1399328.59	640.43	2474	527653.42	1399328.49	642.04	1.61
1475	527654.31	1399328.49	639.51	2475	527654.67	1399328.72	641.10	1.59
1476	527658.25	1399328.69	639.49	2476	527657.38	1399328.87	641.12	1.63
1477	527663.80	1399328.43	640.60	2477	527658.94	1399329.04	642.20	1.60
1478	527692.56	1399328.45	641.42	2478	527693.88	1399328.39	643.02	1.60
1479	527746.14	1399328.79	642.78	2479	527746.86	1399329.12	644.36	1.58
1480	527799.82	1399328.86	644.10	2480	527800.61	1399328.94	645.69	1.59
1481	527854.07	1399328.54	645.43	2481	527854.51	1399329.29	647.01	1.58
1482	527906.90	1399328.94	646.70	2482	527905.66	1399329.20	648.38	1.68
1483	527912.25	1399328.91	648.65	2483	527911.99	1399329.23	650.30	1.65
1484	527916.83	1399328.93	648.65	2484	527916.95	1399329.43	650.25	1.60
1485	527916.77	1399279.22	647.43	2485	527917.27	1399278.97	649.03	1.60
1486	527912.20	1399278.98	647.44	2486	527912.09	1399279.28	649.07	1.63
1487	527906.67	1399279.02	645.48	2487	527906.14	1399279.40	647.10	1.62
1488	527854.45	1399278.89	644.18	2488	527854.44	1399279.13	645.80	1.62
1489	527801.30	1399278.69	642.85	2489	527800.70	1399278.54	644.48	1.63
1490	527746.71	1399278.31	641.53	2490	527747.09	1399278.64	643.12	1.59
1491	527693.07	1399278.56	640.18	2491	527693.21	1399278.60	641.79	1.61
1492	527664.48	1399278.42	639.55	2492	527659.23	1399278.36	641.13	1.58
1493	527658.17	1399278.15	638.34	2493	527657.62	1399278.38	640.02	1.68
1494	527654.18	1399278.44	638.42	2494	527654.60	1399278.58	639.98	1.56
1495	527651.34	1399277.95	639.30	2495	527653.28	1399278.71	640.93	1.63
1496	527644.83	1399278.46	639.16	2496	527646.58	1399278.36	640.78	1.62
1497	527598.97	1399277.85	638.20	2497	527599.02	1399278.28	639.79	1.59
1498	527551.75	1399278.02	637.23	2498	527552.06	1399278.05	638.83	1.60
1499	527504.77	1399278.09	636.24	2499	527505.31	1399277.65	637.81	1.57
1500	527457.16	1399277.70	635.22	2500	527457.83	1399277.80	636.79	1.57
1501	527433.88	1399278.35	634.67	2501	527430.26	1399277.88	636.25	1.58
1502	527429.01	1399277.84	633.41	2502	527428.50	1399278.11	635.13	1.72
1503	527424.79	1399277.87	633.44	2503	527425.35	1399278.14	635.11	1.67
1504	527419.66	1399277.91	634.47	2504	527423.80	1399278.28	636.12	1.65
1505	527410.50	1399277.71	634.27	2505	527410.57	1399277.15	635.84	1.57
1506	527363.44	1399277.60	633.21	2506	527362.94	1399277.79	634.84	1.63
1507	527315.79	1399277.39	632.23	2507	527316.18	1399277.28	633.83	1.60
1508	527269.22	1399277.38	631.26	2508	527269.73	1399277.16	632.86	1.60
1509	527221.03	1399277.23	630.20	2509	527222.60	1399276.98	631.90	1.70
1510	527209.55	1399276.09	629.84	2510	527205.02	1399277.32	631.47	1.63
1511	527203.44	1399276.28	628.31	2511	527203.07	1399277.43	630.54	2.23
1512	527199.52	1399277.02	628.91	2512	527199.74	1399277.57	630.50	1.59
1513	527193.26	1399226.90	627.47	2513	527193.37	1399227.08	629.24	1.77
1514	527197.13	1399226.57	627.44	2514	527196.44	1399226.90	629.24	1.80
1515	527202.44	1399226.47	628.73	2515	527198.88	1399226.94	630.28	1.55
1516	527221.82	1399227.12	629.15	2516	527222.15	1399226.87	630.77	1.62

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1517	527269.43	1399227.63	630.16	2517	527270.16	1399226.72	631.82	1.66
1518	527316.50	1399227.18	631.15	2518	527316.53	1399227.45	632.74	1.59
1519	527363.54	1399227.50	632.14	2519	527363.82	1399227.52	633.76	1.62
1520	527410.64	1399227.75	633.15	2520	527410.01	1399227.57	634.75	1.60
1521	527421.14	1399228.02	633.34	2521	527424.03	1399227.40	635.06	1.72
1522	527425.07	1399227.53	632.31	2522	527425.65	1399227.19	634.00	1.69
1523	527428.55	1399227.70	632.28	2523	527429.16	1399226.83	634.09	1.81
1524	527432.81	1399227.92	633.59	2524	527430.89	1399226.99	635.18	1.59
1525	527457.86	1399227.28	634.14	2525	527457.78	1399227.99	635.74	1.60
1526	527504.84	1399228.36	635.17	2526	527505.24	1399227.64	636.75	1.58
1527	527552.04	1399228.53	636.17	2527	527552.25	1399226.29	637.74	1.57
1528	527599.13	1399228.28	637.15	2528	527599.08	1399228.09	638.74	1.59
1529	527646.12	1399227.62	638.13	2529	527645.35	1399228.06	639.72	1.59
1530	527651.57	1399227.70	638.30	2530	527652.53	1399228.43	639.93	1.63
1531	527654.20	1399228.00	637.29	2531	527654.66	1399228.37	638.93	1.64
1532	527658.04	1399227.89	637.20	2532	527658.01	1399228.50	638.97	1.77
1533	527664.43	1399228.68	638.47	2533	527659.80	1399228.13	640.10	1.63
1534	527692.43	1399228.44	639.12	2534	527693.24	1399228.28	640.72	1.60
1535	527746.42	1399228.51	640.30	2535	527746.44	1399228.83	641.89	1.59
1536	527800.37	1399228.20	641.62	2536	527801.07	1399229.13	643.23	1.61
1537	527854.77	1399229.11	642.95	2537	527854.76	1399229.20	644.57	1.62
1538	527907.22	1399228.56	644.22	2538	527905.97	1399229.34	645.86	1.64
1539	527912.41	1399228.76	646.23	2539	527912.17	1399229.42	647.86	1.63
1540	527916.84	1399228.67	646.20	2540	527917.21	1399230.04	647.85	1.65
1541	527917.01	1399178.76	645.02	2541	527917.73	1399179.14	646.61	1.59
1542	527912.44	1399178.77	645.00	2542	527912.26	1399178.82	646.57	1.57
1543	527912.44	1399160.01	644.50	2543	527912.21	1399159.41	646.09	1.59
1544	527917.06	1399159.87	644.51	2544	527918.57	1399159.64	646.15	1.64
1545	527917.04	1399148.49	644.79	2545	527918.43	1399148.16	646.38	1.59
1546	527912.38	1399148.54	644.77	2546	527911.97	1399148.31	646.36	1.59
1547	527907.36	1399148.20	643.28	2547	527907.21	1399150.20	644.85	1.57
1548	527905.86	1399152.83	641.99	2548	527903.62	1399152.57	643.50	1.51
				2549	527903.64	1399162.11	643.50	1.52
				2550	527906.54	1399165.04	644.61	2.63
				2551	527906.50	1399169.58	644.58	2.60
				2552	527904.49	1399172.13	643.60	1.62
1553	527905.08	1399174.84	641.97	2553	527904.25	1399174.82	643.55	1.58
1554	527906.87	1399179.81	643.00	2554	527906.59	1399177.64	644.58	1.58
1555	527855.26	1399147.25	641.95	2555	527855.29	1399148.08	643.50	1.55
1556	527855.15	1399152.04	639.97	2556	527854.92	1399152.15	641.57	1.60
				2557	527854.84	1399162.00	641.60	1.64
				2558	527854.97	1399166.26	643.50	3.54
				2559	527854.91	1399168.66	643.50	3.54
				2560	527854.70	1399172.47	641.50	1.54
1561	527855.13	1399174.79	639.95	2561	527854.63	1399174.55	641.51	1.56
1562	527855.18	1399179.30	641.68	2562	527854.56	1399177.51	643.30	1.62
1563	527800.68	1399147.55	640.60	2563	527801.03	1399148.08	642.22	1.62
1564	527800.45	1399151.65	638.62	2564	527801.06	1399151.66	640.19	1.57
				2565	527800.71	1399161.67	640.17	1.53
				2566	527800.64	1399165.82	642.17	3.53
				2567	527800.70	1399168.33	642.17	3.53
				2568	527800.88	1399172.14	640.20	1.56
1569	527800.69	1399174.53	638.66	2569	527801.06	1399174.35	640.18	1.52
1570	527800.13	1399179.69	640.46	2570	527800.77	1399177.48	641.97	1.51

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1571	527747.93	1399146.90	639.29	2571	527747.20	1399147.94	640.88	1.59
1572	527747.85	1399151.73	637.30	2572	527747.32	1399151.11	638.84	1.54
				2573	527746.95	1399161.19	638.86	1.57
				2574	527746.91	1399165.56	640.85	3.56
				2575	527746.94	1399168.05	640.83	3.54
				2576	527747.08	1399171.98	638.84	1.55
1577	527748.12	1399174.20	637.28	2577	527747.03	1399174.23	638.86	1.58
1578	527747.33	1399179.90	639.22	2578	527746.99	1399177.84	640.80	1.58
1579	527693.78	1399146.70	637.96	2579	527693.55	1399147.63	639.51	1.55
1580	527692.90	1399151.37	635.99	2580	527693.41	1399151.50	637.60	1.61
				2581	527693.19	1399161.25	637.53	1.57
				2582	527693.42	1399165.28	639.52	3.56
				2583	527693.57	1399167.91	639.52	3.56
				2584	527693.49	1399171.89	637.51	1.55
1585	527693.90	1399174.15	635.93	2585	527693.62	1399174.14	637.52	1.59
1586	527692.72	1399178.84	638.09	2586	527693.21	1399177.57	639.76	1.67
1587	527661.42	1399146.30	637.26	2587	527660.90	1399147.49	638.89	1.63
1588	527659.37	1399149.27	636.10	2588	527658.72	1399149.39	637.77	1.67
1589	527654.84	1399148.94	636.10	2589	527655.30	1399149.37	637.69	1.59
1590	527651.14	1399145.60	637.11	2590	527653.60	1399147.71	638.67	1.56
				2591	527652.44	1399165.12	638.67	2.49
				2592	527652.84	1399168.35	638.68	2.50
				2593	527655.65	1399162.79	637.70	1.52
				2594	527655.62	1399169.74	637.77	1.59
				2595	527658.13	1399170.01	637.75	1.57
				2596	527658.19	1399163.05	637.71	1.53
				2597	527661.98	1399165.04	638.85	2.67
				2598	527661.73	1399167.87	638.86	2.68
1599	527665.46	1399179.90	637.44	2599	527660.78	1399178.20	639.04	1.60
1600	527660.16	1399176.77	636.27	2600	527658.50	1399176.03	637.91	1.64
1601	527654.68	1399176.40	636.25	2601	527655.87	1399176.44	637.85	1.60
1602	527653.21	1399179.74	637.23	2602	527653.19	1399178.43	638.83	1.60
1603	527645.69	1399146.34	636.90	2603	527646.39	1399147.60	638.53	1.63
1604	527647.51	1399151.90	634.92	2604	527646.69	1399151.36	636.56	1.64
				2605	527646.15	1399160.93	636.52	1.58
				2606	527646.18	1399164.82	638.51	3.57
				2607	527646.63	1399167.63	638.52	3.58
				2608	527646.07	1399171.72	636.51	1.57
1609	527645.83	1399174.17	634.97	2609	527646.19	1399173.97	636.51	1.54
1610	527644.62	1399178.97	637.11	2610	527646.05	1399178.09	638.69	1.58
1611	527599.64	1399145.22	635.91	2611	527599.28	1399146.93	637.56	1.65
1612	527599.69	1399150.99	634.00	2612	527598.94	1399151.26	635.59	1.59
				2613	527598.86	1399160.65	635.57	1.62
				2614	527599.09	1399164.75	637.52	3.57
				2615	527599.03	1399167.79	637.50	3.55
				2616	527598.97	1399171.53	635.53	1.58
1617	527598.70	1399174.72	633.90	2617	527599.02	1399173.90	635.51	1.61
1618	527598.26	1399178.94	636.06	2618	527599.21	1399178.19	637.66	1.60
1619	527552.39	1399147.10	634.90	2619	527551.96	1399147.53	636.52	1.62
1620	527552.55	1399150.81	633.00	2620	527552.38	1399151.23	634.53	1.53
				2621	527551.53	1399160.02	634.50	1.55
				2622	527552.23	1399164.75	636.51	3.56
				2623	527552.32	1399168.22	636.50	3.55
				2624	527552.25	1399171.50	634.58	1.63

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1625	527551.88	1399173.67	632.91	2625	527552.35	1399173.46	634.57	1.66
1626	527551.90	1399179.02	635.09	2626	527552.00	1399177.64	636.66	1.57
1627	527504.75	1399146.45	633.91	2627	527504.96	1399147.36	635.56	1.65
1628	527505.27	1399151.06	632.00	2628	527504.88	1399150.74	633.51	1.51
				2629	527504.95	1399160.15	633.59	1.63
				2630	527505.23	1399164.80	635.53	3.57
				2631	527505.33	1399168.16	635.51	3.55
				2632	527505.25	1399171.50	633.50	1.54
1633	527504.91	1399173.49	631.92	2633	527505.52	1399173.93	633.58	1.66
1634	527504.92	1399177.99	634.09	2634	527505.27	1399177.00	635.66	1.57
1635	527457.97	1399147.02	632.90	2635	527458.21	1399146.90	634.59	1.69
1636	527458.09	1399150.75	630.96	2636	527457.92	1399150.96	632.54	1.58
				2637	527457.49	1399159.72	632.50	1.54
				2638	527457.86	1399164.14	634.52	3.56
				2639	527458.07	1399167.37	634.52	3.56
				2640	527458.19	1399170.73	632.51	1.55
1641	527458.05	1399173.61	630.95	2641	527458.30	1399173.09	632.53	1.58
1642	527457.81	1399177.97	633.07	2642	527457.44	1399177.56	634.66	1.59
1643	527434.22	1399143.21	632.37	2643	527430.69	1399146.66	633.98	1.61
1644	527428.95	1399148.60	631.13	2644	527428.56	1399148.72	632.84	1.71
1645	527425.15	1399147.61	631.14	2645	527425.39	1399148.29	632.86	1.72
1646	527421.21	1399144.26	632.17	2646	527423.69	1399146.77	633.85	1.68
				2647	527424.22	1399164.02	633.77	2.65
				2648	527423.66	1399167.41	633.77	2.65
				2649	527425.47	1399163.06	632.85	1.73
				2650	527425.01	1399169.63	632.82	1.70
				2651	527428.58	1399169.87	632.87	1.75
				2652	527428.47	1399162.59	632.85	1.73
				2653	527430.93	1399164.41	633.94	2.82
				2654	527430.84	1399167.57	633.93	2.81
1655	527433.34	1399179.10	632.50	2655	527430.17	1399177.58	634.09	1.59
1656	527428.62	1399178.48	631.07	2656	527428.35	1399174.71	633.00	1.93
1657	527424.91	1399178.53	631.13	2657	527425.94	1399175.17	633.03	1.90
1658	527419.19	1399179.59	632.33	2658	527424.37	1399177.65	633.95	1.62
1659	527410.97	1399146.86	631.95	2659	527410.77	1399147.00	633.50	1.55
1660	527410.78	1399150.60	629.92	2660	527411.34	1399150.60	631.56	1.64
				2661	527411.33	1399160.62	631.56	1.61
				2662	527410.99	1399164.06	633.50	3.55
				2663	527411.02	1399167.67	633.53	3.58
				2664	527411.23	1399171.06	631.51	1.56
1665	527410.96	1399173.36	629.98	2665	527411.24	1399173.19	631.50	1.52
1666	527410.15	1399181.37	632.09	2666	527410.62	1399177.23	633.66	1.57
1667	527364.06	1399145.38	630.93	2667	527363.70	1399147.47	632.54	1.61
1668	527363.93	1399150.59	629.00	2668	527363.71	1399151.26	630.60	1.60
				2669	527363.41	1399159.89	630.59	1.61
				2670	527363.21	1399163.87	632.52	3.53
				2671	527363.55	1399167.81	632.51	3.52
				2672	527363.50	1399170.88	630.52	1.53
1673	527363.52	1399173.24	628.97	2673	527363.94	1399172.87	630.50	1.53
1674	527364.14	1399177.81	631.08	2674	527363.58	1399176.82	632.66	1.58
1675	527316.94	1399145.86	629.99	2675	527316.56	1399146.88	631.60	1.61
1676	527316.25	1399150.23	627.98	2676	527316.74	1399151.44	629.60	1.62
				2677	527316.60	1399159.23	629.60	1.63
				2678	527316.53	1399163.98	631.51	3.54

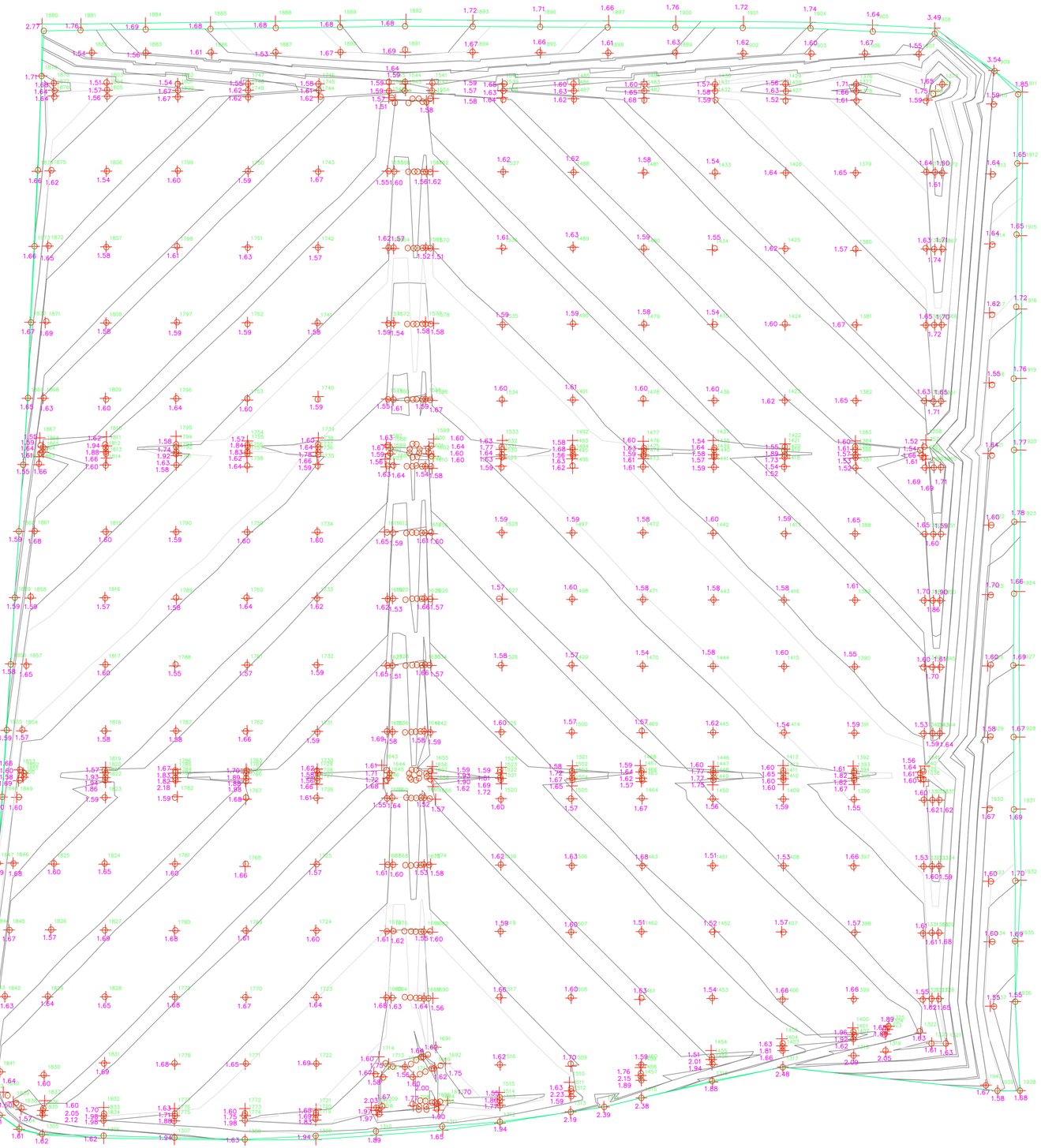
SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
				2679	527316.38	1399167.22	631.51	3.54
				2680	527316.28	1399170.91	629.55	1.58
1681	527316.28	1399173.27	627.96	2681	527316.37	1399172.93	629.51	1.55
1682	527315.93	1399179.08	630.07	2682	527316.52	1399177.47	631.67	1.60
1683	527269.59	1399145.96	628.92	2683	527269.54	1399146.59	630.60	1.68
1684	527269.40	1399149.85	626.95	2684	527269.43	1399150.69	628.58	1.63
				2685	527269.90	1399159.56	628.59	1.65
				2686	527269.65	1399163.42	630.50	3.56
				2687	527269.37	1399167.48	630.50	3.56
				2688	527269.20	1399170.21	628.59	1.65
1689	527269.16	1399173.15	626.93	2689	527268.94	1399173.11	628.57	1.64
1690	527269.14	1399179.31	629.10	2690	527269.08	1399176.19	630.66	1.56
1691	527234.42	1399181.40	628.26	2691	527229.09	1399175.92	629.88	1.62
1692	527222.88	1399188.24	628.11	2692	527221.47	1399184.89	629.86	1.75
1693	527196.70	1399189.97	627.65	2693	527195.80	1399184.49	629.35	1.70
1694	527193.40	1399183.46	626.31	2694	527194.28	1399182.76	628.31	2.00
1695	527189.85	1399183.37	626.44	2695	527190.78	1399182.26	628.34	1.90
1696	527194.62	1399180.51	625.46	2696	527195.26	1399180.89	627.08	1.62
				2697	527195.27	1399178.82	627.06	1.67
				2698	527219.24	1399178.39	627.04	1.59
1699	527219.69	1399180.63	625.43	2699	527219.31	1399180.07	627.05	1.62
1700	527228.13	1399172.68	625.89	2700	527227.74	1399172.72	627.53	1.64
				2701	527227.46	1399171.10	627.55	1.65
				2702	527225.33	1399167.59	629.53	3.63
				2703	527222.52	1399163.97	629.51	3.62
				2704	527215.36	1399170.21	629.52	4.07
				2705	527217.09	1399174.15	629.53	4.08
				2706	527196.37	1399174.12	629.51	4.12
				2707	527196.67	1399170.56	629.53	4.14
1708	527192.98	1399165.65	625.32	2708	527194.12	1399164.94	627.09	1.77
1709	527191.77	1399143.30	625.43	2709	527192.57	1399143.64	627.10	1.67
1710	527213.43	1399143.28	625.50	2710	527213.07	1399144.25	627.08	1.58
1711	527213.39	1399165.72	625.48	2711	527213.24	1399165.16	627.08	1.60
1712	527220.58	1399159.59	625.90	2712	527220.48	1399159.63	627.46	1.56
1713	527222.55	1399148.06	625.73	2713	527220.78	1399151.03	627.48	1.75
1714	527227.65	1399141.19	628.00	2714	527223.05	1399145.97	629.60	1.60
1715	527215.75	1399137.61	627.90	2715	527215.21	1399138.77	629.57	1.67
1716	527191.63	1399135.79	627.31	2716	527191.49	1399139.45	629.34	2.03
1717	527189.55	1399139.23	626.33	2717	527189.71	1399140.71	628.30	1.97
1718	527186.61	1399140.27	626.31	2718	527187.08	1399141.43	628.28	1.97
1719	527182.76	1399096.43	627.09	2719	527183.66	1399096.23	628.92	1.83
1720	527186.32	1399096.42	627.21	2720	527186.41	1399096.50	628.90	1.69
1721	527190.59	1399096.62	628.26	2721	527188.07	1399096.60	629.91	1.65
1722	527222.63	1399096.69	628.97	2722	527222.85	1399096.92	630.66	1.69
1723	527269.60	1399096.93	630.02	2723	527269.87	1399096.93	631.66	1.64
1724	527317.21	1399096.40	630.97	2724	527317.03	1399097.03	632.57	1.60
1725	527364.07	1399096.40	632.00	2725	527364.15	1399097.13	633.57	1.57
1726	527410.95	1399097.68	633.02	2726	527411.10	1399096.89	634.63	1.61
1727	527420.76	1399097.46	633.21	2727	527423.08	1399097.51	634.87	1.66
1728	527424.69	1399097.23	632.27	2728	527425.14	1399097.40	633.83	1.56
1729	527428.99	1399097.23	632.30	2729	527428.35	1399098.01	633.88	1.58
1730	527431.51	1399097.54	633.41	2730	527430.34	1399097.38	635.03	1.62
1731	527458.26	1399097.63	633.98	2731	527457.69	1399097.60	635.57	1.59
1732	527505.43	1399097.71	635.00	2732	527505.19	1399097.06	636.59	1.59

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1733	527552.79	1399097.47	635.96	2733	527552.39	1399097.40	637.58	1.62
1734	527599.18	1399097.50	636.98	2734	527599.72	1399097.68	638.58	1.60
1735	527647.44	1399098.13	637.98	2735	527646.51	1399097.87	639.57	1.59
1736	527653.11	1399097.33	638.11	2736	527654.36	1399098.27	639.77	1.66
1737	527655.93	1399097.40	636.98	2737	527656.42	1399098.22	638.76	1.78
1738	527659.94	1399097.59	637.12	2738	527659.43	1399098.26	638.76	1.64
1739	527666.26	1399098.37	638.36	2739	527661.61	1399098.18	639.96	1.60
1740	527695.50	1399098.09	639.17	2740	527693.53	1399097.84	640.76	1.59
1741	527747.20	1399097.41	640.54	2741	527747.75	1399097.83	642.12	1.58
1742	527801.23	1399098.15	641.83	2742	527801.13	1399098.08	643.40	1.57
1743	527855.21	1399098.41	643.16	2743	527854.82	1399098.13	644.83	1.67
1744	527907.75	1399098.33	644.50	2744	527908.03	1399099.83	646.12	1.62
1745	527912.47	1399098.75	646.04	2745	527912.56	1399098.65	647.65	1.61
1746	527917.10	1399098.71	646.02	2746	527917.05	1399098.38	647.60	1.58
1747	527917.14	1399048.72	647.27	2747	527917.07	1399048.48	648.82	1.55
1748	527912.63	1399048.58	647.23	2748	527912.58	1399048.42	648.85	1.62
1749	527907.93	1399048.53	645.68	2749	527907.52	1399048.60	647.30	1.62
1750	527854.97	1399048.54	644.40	2750	527855.35	1399048.43	645.99	1.59
1751	527801.56	1399048.11	643.05	2751	527801.08	1399048.33	644.68	1.63
1752	527747.87	1399048.16	641.77	2752	527747.05	1399048.11	643.36	1.59
1753	527693.00	1399048.05	640.37	2753	527694.02	1399047.95	641.97	1.60
1754	527664.01	1399048.18	639.64	2754	527661.36	1399048.13	641.21	1.57
1755	527660.85	1399048.37	638.26	2755	527659.86	1399048.20	640.10	1.84
1756	527655.51	1399047.74	638.26	2756	527656.61	1399048.09	640.09	1.83
1757	527653.05	1399047.85	639.40	2757	527655.14	1399048.06	641.02	1.62
1758	527645.66	1399047.94	639.25	2758	527646.51	1399047.92	640.89	1.64
1759	527599.67	1399047.99	638.07	2759	527599.42	1399047.77	639.67	1.60
1760	527552.53	1399047.84	637.05	2760	527553.03	1399047.43	638.69	1.64
1761	527505.23	1399047.98	636.05	2761	527505.33	1399047.81	637.62	1.57
1762	527458.63	1399047.89	635.06	2762	527458.24	1399046.86	636.72	1.66
1763	527431.47	1399047.24	634.45	2763	527430.41	1399047.55	636.15	1.70
1764	527428.85	1399047.33	633.02	2764	527428.41	1399047.12	634.91	1.89
1765	527424.60	1399046.97	633.02	2765	527425.22	1399047.26	634.90	1.88
1766	527421.73	1399047.04	633.98	2766	527423.05	1399047.18	635.96	1.98
1767	527410.12	1399046.94	634.04	2767	527411.25	1399047.08	635.72	1.68
1768	527362.57	1399046.45	633.06	2768	527364.36	1399046.90	634.72	1.66
1769	527316.86	1399047.30	632.06	2769	527317.12	1399046.70	633.67	1.61
1770	527269.75	1399047.13	631.03	2770	527269.86	1399046.53	632.70	1.67
1771	527222.55	1399046.58	630.05	2771	527222.82	1399047.02	631.70	1.65
1772	527190.90	1399046.34	629.35	2772	527187.52	1399046.35	630.95	1.60
1773	527185.90	1399046.53	628.21	2773	527185.83	1399045.91	629.96	1.75
1774	527182.37	1399046.34	627.95	2774	527182.78	1399046.24	629.93	1.98
1775	527182.19	1398996.30	629.10	2775	527182.27	1398996.13	630.98	1.88
1776	527185.96	1398996.31	629.25	2776	527185.65	1398996.78	630.96	1.71
1777	527190.97	1398996.42	630.35	2777	527187.40	1398996.73	631.98	1.63
1778	527222.48	1398996.62	631.10	2778	527223.07	1398996.49	632.78	1.68
1779	527270.11	1398996.50	632.08	2779	527270.04	1398996.60	633.76	1.68
1780	527316.91	1398996.42	633.09	2780	527317.25	1398997.01	634.77	1.68
1781	527364.29	1398996.79	634.18	2781	527364.37	1398996.87	635.78	1.60
1782	527411.93	1398998.47	635.17	2782	527411.36	1398996.78	636.76	1.59
1783	527422.71	1398997.03	634.87	2783	527423.56	1398997.18	637.05	2.18
1784	527425.32	1398997.21	634.20	2784	527425.43	1398996.99	636.02	1.82
1785	527428.60	1398997.03	634.22	2785	527429.03	1398997.00	636.05	1.83
1786	527431.37	1398997.09	635.52	2786	527430.54	1398997.03	637.19	1.67

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1787	527458.52	1398997.33	636.15	2787	527458.63	1398997.69	637.73	1.58
1788	527504.65	1398996.68	637.13	2788	527505.65	1398997.27	638.68	1.55
1789	527552.07	1398997.82	638.13	2789	527552.98	1398997.54	639.71	1.58
1790	527599.74	1398997.31	639.29	2790	527599.54	1398997.77	640.88	1.59
1791	527646.93	1398997.67	640.47	2791	527646.90	1398997.89	642.05	1.58
1792	527653.65	1398997.83	640.60	2792	527654.83	1398997.52	642.23	1.63
1793	527655.64	1398997.62	639.37	2793	527656.51	1398997.71	641.29	1.92
1794	527660.82	1398997.51	639.58	2794	527659.72	1398997.55	641.32	1.74
1795	527667.35	1398997.54	640.83	2795	527661.63	1398997.65	642.41	1.58
1796	527694.01	1398997.38	641.61	2796	527694.11	1398997.78	643.25	1.64
1797	527747.73	1398997.61	642.96	2797	527748.10	1398998.26	644.55	1.59
1798	527801.15	1398998.20	644.30	2798	527802.02	1398998.28	645.91	1.61
1799	527855.25	1398998.34	645.61	2799	527855.68	1398998.85	647.21	1.60
1800	527907.98	1398998.75	646.91	2800	527907.76	1398998.71	648.58	1.67
1801	527912.57	1398998.66	648.46	2801	527912.31	1398998.94	650.13	1.67
1802	527917.20	1398998.67	648.48	2802	527917.04	1398998.71	650.05	1.57
1803	527917.25	1398948.75	649.79	2803	527918.04	1398948.27	651.30	1.51
1804	527912.66	1398948.66	649.77	2804	527912.85	1398948.73	651.34	1.57
1805	527908.31	1398948.60	648.21	2805	527908.18	1398948.82	649.77	1.56
1806	527855.20	1398948.16	646.90	2806	527855.32	1398948.64	648.44	1.54
1807	527801.59	1398947.96	645.53	2807	527801.37	1398948.22	647.11	1.58
1808	527747.66	1398947.86	644.20	2808	527747.98	1398948.30	645.78	1.58
1809	527694.26	1398947.51	642.86	2809	527693.58	1398948.04	644.46	1.60
1810	527667.03	1398948.28	642.05	2810	527661.55	1398947.32	643.67	1.62
1811	527660.53	1398948.28	640.63	2811	527659.31	1398947.64	642.57	1.94
1812	527656.30	1398947.31	640.67	2812	527656.53	1398947.85	642.55	1.88
1813	527651.98	1398948.25	641.81	2813	527654.99	1398947.98	643.47	1.66
1814	527647.06	1398947.51	641.70	2814	527646.70	1398947.70	643.30	1.60
1815	527599.73	1398948.13	640.52	2815	527599.73	1398947.66	642.12	1.60
1816	527552.93	1398947.18	639.38	2816	527552.69	1398947.35	640.95	1.57
1817	527505.53	1398947.29	638.18	2817	527505.65	1398947.56	639.78	1.60
1818	527458.52	1398947.63	637.19	2818	527458.64	1398946.85	638.77	1.58
1819	527432.86	1398947.66	636.60	2819	527430.70	1398946.90	638.17	1.57
1820	527428.90	1398947.37	635.12	2820	527428.66	1398947.69	637.05	1.93
1821	527425.49	1398947.07	635.08	2821	527425.76	1398947.47	637.02	1.94
1822	527422.13	1398947.63	636.16	2822	527423.67	1398947.39	638.02	1.86
1823	527411.31	1398947.54	636.17	2823	527411.43	1398946.95	637.76	1.59
1824	527364.12	1398946.78	635.14	2824	527364.61	1398946.92	636.79	1.65
1825	527364.29	1398910.95	635.92	2825	527364.61	1398911.04	637.52	1.60
1826	527317.66	1398908.72	635.00	2826	527317.69	1398909.10	636.57	1.57
1827	527317.43	1398947.50	634.15	2827	527317.36	1398947.02	635.84	1.69
1828	527270.12	1398947.71	633.19	2828	527270.22	1398947.03	634.84	1.65
1829	527270.02	1398906.50	634.04	2829	527270.41	1398906.75	635.68	1.64
1830	527214.28	1398904.19	632.94	2830	527214.85	1398903.78	634.54	1.60
1831	527223.34	1398946.97	632.15	2831	527222.94	1398946.49	633.84	1.69
1832	527191.70	1398946.30	631.33	2832	527187.38	1398946.59	633.03	1.70
1833	527185.81	1398946.36	630.04	2833	527185.45	1398946.29	632.02	1.98
1834	527182.21	1398946.43	630.04	2834	527182.49	1398946.14	632.02	1.98
1835	527186.17	1398902.62	630.86	2835	527186.78	1398902.95	632.98	2.12
1836	527189.59	1398903.10	630.94	2836	527189.55	1398903.05	632.99	2.05
1837	527196.53	1398904.44	632.38	2837	527191.17	1398903.59	633.98	1.60
1838	527190.29	1398887.84	631.78	2838	527191.17	1398888.12	633.33	1.55
1839	527195.64	1398882.29	631.93	2839	527195.01	1398884.32	633.53	1.60
1840	527202.68	1398875.13	632.75	2840	527200.28	1398878.25	634.78	2.03

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1841	527216.96	1398872.76	633.62	2841	527217.11	1398872.93	635.26	1.64
1842	527270.26	1398876.25	634.70	2842	527270.64	1398876.37	636.33	1.63
1843	527270.55	1398865.18	638.08	2843	527270.74	1398865.36	639.75	1.67
1844	527317.68	1398868.06	639.04	2844	527317.76	1398868.40	640.68	1.64
1845	527317.55	1398879.27	635.59	2845	527317.46	1398879.64	637.26	1.67
1846	527364.89	1398882.04	636.53	2846	527364.65	1398882.49	638.21	1.68
1847	527364.64	1398871.30	640.02	2847	527364.89	1398871.41	641.61	1.59
1848	527411.76	1398874.28	640.93	2848	527411.83	1398874.41	642.53	1.60
1849	527411.49	1398884.61	637.48	2849	527411.65	1398886.37	639.08	1.60
1850	527423.25	1398885.92	637.69	2850	527423.66	1398886.76	639.38	1.69
1851	527425.70	1398889.13	636.78	2851	527426.10	1398889.94	638.36	1.58
1852	527428.67	1398889.25	636.77	2852	527428.56	1398889.97	638.37	1.60
1853	527430.94	1398886.48	637.85	2853	527431.15	1398886.91	639.51	1.66
1854	527458.66	1398888.32	638.43	2854	527459.34	1398888.72	640.00	1.57
1855	527458.92	1398877.28	642.03	2855	527459.22	1398877.63	643.62	1.59
1856	527506.00	1398880.30	643.12	2856	527505.77	1398880.40	644.70	1.58
1857	527505.88	1398891.32	639.33	2857	527504.93	1398891.53	640.98	1.65
1858	527552.74	1398894.39	640.67	2858	527553.63	1398894.63	642.26	1.59
1859	527553.07	1398883.26	644.22	2859	527552.99	1398883.36	645.81	1.59
1860	527599.96	1398886.26	645.30	2860	527600.07	1398886.29	646.89	1.59
1861	527600.13	1398897.18	641.77	2861	527600.22	1398897.49	643.45	1.68
1862	527647.30	1398889.23	646.43	2862	527647.14	1398889.22	647.98	1.55
1863	527647.21	1398900.35	642.89	2863	527647.96	1398900.50	644.55	1.66
1864	527652.98	1398900.66	643.11	2864	527655.48	1398901.40	644.72	1.61
1865	527656.04	1398903.48	642.08	2865	527656.49	1398903.01	643.72	1.64
1866	527659.95	1398903.58	642.10	2866	527659.48	1398903.46	643.69	1.59
1867	527666.20	1398901.00	643.26	2867	527660.92	1398901.54	644.81	1.55
1868	527694.27	1398903.25	643.97	2868	527694.63	1398903.71	645.60	1.63
1869	527694.20	1398892.38	647.49	2869	527694.53	1398892.66	649.14	1.65
1870	527748.25	1398894.12	648.75	2870	527748.06	1398894.85	650.42	1.67
1871	527747.92	1398904.87	645.25	2871	527748.82	1398905.62	646.94	1.69
1872	527802.11	1398906.63	646.58	2872	527802.42	1398907.35	648.23	1.65
1873	527801.96	1398896.98	650.07	2873	527802.03	1398897.30	651.73	1.66
1874	527855.15	1398899.32	651.57	2874	527855.91	1398899.74	653.23	1.66
1875	527855.46	1398908.34	647.85	2875	527855.99	1398909.29	649.47	1.62
1876	527908.41	1398910.61	649.13	2876	527907.94	1398911.35	650.77	1.64
1877	527912.65	1398910.65	650.66	2877	527912.27	1398911.57	652.30	1.64
1878	527917.34	1398910.77	650.64	2878	527917.76	1398911.01	652.32	1.68
1879	527922.77	1398902.23	650.64	2879	527922.62	1398902.38	652.35	1.71
1880	527959.57	1398902.64	642.20	2880	527954.63	1398903.80	644.97	2.77
1881	527959.51	1398930.11	642.54	2881	527955.14	1398929.90	644.30	1.76
1882	527938.98	1398937.67	642.82	2882	527939.24	1398938.08	644.36	1.54
1883	527938.97	1398976.04	641.89	2883	527939.22	1398976.18	643.45	1.56
1884	527960.11	1398975.82	641.37	2884	527955.65	1398976.01	643.06	1.69
1885	527960.81	1399021.99	640.22	2885	527956.08	1399021.97	641.90	1.68
1886	527938.73	1399022.78	640.70	2886	527939.40	1399022.16	642.31	1.61
1887	527938.82	1399068.35	639.61	2887	527939.53	1399067.94	641.14	1.53
1888	527961.39	1399067.93	639.09	2888	527956.69	1399068.10	640.77	1.68
1889	527961.89	1399113.86	637.95	2889	527957.32	1399113.61	639.63	1.68
1890	527939.46	1399113.91	638.40	2890	527939.61	1399113.94	640.07	1.67
1891	527939.51	1399159.84	637.24	2891	527941.33	1399159.70	638.93	1.69
1892	527962.71	1399160.29	636.77	2892	527957.91	1399159.76	638.45	1.68
1893	527962.15	1399207.69	637.96	2893	527957.71	1399207.64	639.68	1.72
1894	527939.27	1399207.66	638.44	2894	527939.73	1399207.48	640.11	1.67

SUBGRADE				COMPACTED SOIL LINER				CSL Thickness (ft)
Point Number	Northing	Easting	Elevation (ft)	Point Number	Northing	Easting	Elevation (ft)	
1895	527939.16	1399255.49	639.66	2895	527939.45	1399254.84	641.32	1.66
1896	527961.85	1399255.47	639.13	2896	527957.42	1399255.42	640.84	1.71
1897	527961.75	1399303.95	640.36	2897	527957.13	1399303.25	642.02	1.66
1898	527938.74	1399303.31	640.91	2898	527939.13	1399303.77	642.52	1.61
1899	527938.69	1399351.81	642.07	2899	527939.34	1399350.88	643.70	1.63
1900	527961.41	1399351.46	641.55	2900	527956.94	1399351.09	643.31	1.76
1901	527961.24	1399399.41	642.76	2901	527956.70	1399398.90	644.48	1.72
1902	527938.46	1399398.77	643.27	2902	527938.83	1399399.52	644.89	1.62
1903	527938.10	1399446.76	644.53	2903	527938.64	1399447.50	646.13	1.60
1904	527960.77	1399446.72	643.96	2904	527956.43	1399446.86	645.70	1.74
1905	527958.71	1399490.84	645.12	2905	527954.16	1399490.98	646.76	1.64
1906	527938.09	1399485.09	645.43	2906	527938.76	1399485.48	647.10	1.67
1907	527937.78	1399523.75	646.45	2907	527938.21	1399523.50	648.00	1.55
1908	527956.58	1399534.84	644.41	2908	527952.44	1399534.80	647.90	3.49
1909	527926.54	1399576.76	641.91	2909	527926.17	1399577.25	645.45	3.54
1910	527902.79	1399575.31	641.99	2910	527902.52	1399576.57	643.58	1.59
1911	527911.28	1399597.01	641.93	2911	527909.71	1399593.88	643.78	1.85
1912	527860.73	1399597.07	640.61	2912	527860.75	1399593.33	642.26	1.65
1913	527853.31	1399574.46	640.84	2913	527852.92	1399576.01	642.48	1.64
1914	527803.76	1399573.91	639.69	2914	527803.10	1399575.69	641.33	1.64
1915	527809.56	1399596.34	639.32	2915	527810.34	1399592.81	640.97	1.65
1916	527757.49	1399596.33	638.05	2916	527759.01	1399592.64	639.77	1.72
1917	527754.86	1399573.74	638.47	2917	527753.49	1399575.51	640.09	1.62
1918	527705.19	1399573.39	637.26	2918	527703.82	1399575.48	638.81	1.55
1919	527708.38	1399595.93	636.76	2919	527708.25	1399590.79	638.52	1.76
1920	527657.68	1399595.72	635.50	2920	527657.61	1399591.00	637.27	1.77
1921	527655.13	1399572.71	635.97	2921	527653.73	1399575.38	637.61	1.64
1922	527604.45	1399572.99	634.72	2922	527604.49	1399574.97	636.32	1.60
1923	527606.67	1399595.35	634.23	2923	527606.73	1399591.20	636.01	1.78
1924	527557.38	1399594.94	633.15	2924	527555.80	1399591.02	634.81	1.66
1925	527555.12	1399572.33	633.49	2925	527554.87	1399574.62	635.19	1.70
1926	527504.61	1399572.28	632.35	2926	527505.40	1399574.59	633.95	1.60
1927	527505.18	1399594.62	631.98	2927	527505.03	1399590.51	633.67	1.69
1928	527454.27	1399594.97	630.59	2928	527454.26	1399590.70	632.26	1.67
1929	527454.09	1399572.37	631.10	2929	527454.65	1399574.42	632.68	1.58
1930	527404.24	1399572.10	629.70	2930	527403.41	1399573.72	631.37	1.67
1931	527403.27	1399595.26	629.29	2931	527402.93	1399590.87	630.98	1.69
1932	527352.70	1399595.96	627.98	2932	527352.36	1399591.91	629.68	1.70
1933	527351.99	1399572.91	628.46	2933	527351.91	1399574.67	630.06	1.60
1934	527309.14	1399573.52	627.39	2934	527309.22	1399575.70	628.99	1.60
1935	527309.50	1399593.81	626.92	2935	527309.64	1399591.74	628.61	1.69
1936	527266.71	1399591.91	625.95	2936	527266.71	1399591.91	627.50	1.55
1937	527263.52	1399574.24	626.29	2937	527263.21	1399576.87	627.84	1.55
1938	527203.65	1399595.19	625.82	2938	527203.65	1399595.19	627.50	1.68
1939	527203.50	1399579.35	628.25	2939	527203.51	1399579.32	629.83	1.58
1940	527207.64	1399571.07	630.75	2940	527207.37	1399571.08	632.42	1.67
				2941	527192.46	1399169.61	628.00	2.61
				2942	527192.32	1399174.65	628.07	2.68
				2943	527190.23	1399174.93	628.09	2.70
				2944	527190.20	1399169.45	628.01	2.62



LEGEND

- TOP OF COMPACTED SOIL LINER SURVEY POINT
- 1751 TOP OF FINAL SUBGRADE SURVEY POINT (POINT NO.)
- 1.63 COMPACTED SOIL LINER THICKNESS

40 0 20 40 80

(IN FEET)
1 inch = 40 ft.

Duke Energy ©

S&ME
WWW.SMEINC.COM

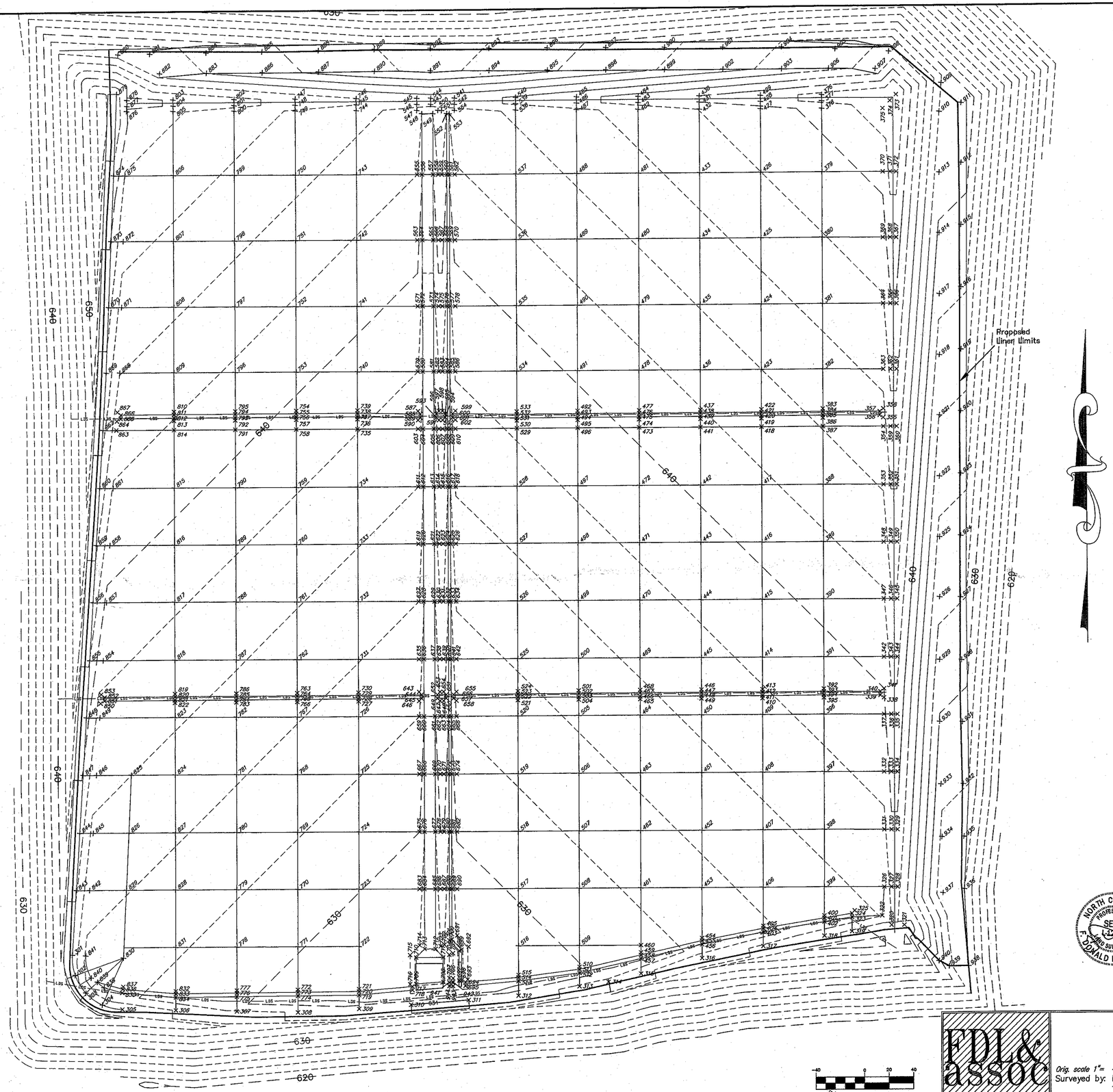
NO.	DATE	DESCRIPTION	BY

COMPACTED SOIL LINER THICKNESS VERIFICATION

PHASE I RAB ASH LANDFILL
ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: KB	CHECKED BY:
DESIGNED BY:	APPROVED BY:
PROJECT NUMBER 1356-06-825	
SCALE: 1" = 40'	DATE: 5/12/09
DRAWING: 6	OF: 6

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\AS-BUILTS\SUBGRADE VS CLAY.DWG



SHEET 1

FDL & assoc

Landfill As-Built

Plant Allen Steam Station

Gaston County, North Carolina

Orig. scale 1"= 40' Date: May 4, 2009

Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St. P.O. Box 1014
Monroe, North Carolina 28112 (704) 289-1013

REVISIONS
Drawn By JLH

Job No. 1640 Drawing file: alnverify.dwg Drawing no. 09/45

Proposed					Subgrade			Top of Clay			Top of Clay - Subgrade
Point #	Northing	Easting	Elevation	Desc.	Point #	Elevation	Desc.	Point #	Elevation	Desc.	
301	527217.54	1398861.90	637.12	STK	1301	637.02	SUB	2301	638.62	TCY	1.60
302	527200.91	1398864.19	636.56	STK	1302	636.46	SUB	2302	638.16	TCY	1.70
303	527186.51	1398872.81	636.00	STK	1303	635.99	SUB	2303	637.50	TCY	1.51
304	527176.63	1398886.37	635.45	STK	1304	635.43	SUB	2304	637.04	TCY	1.61
305	527172.86	1398902.73	634.89	STK	1305	634.80	SUB	2305	636.42	TCY	1.62
306	527171.73	1398946.39	633.94	STK	1306	633.90	SUB	2306	635.52	TCY	1.62
307	527170.44	1398996.39	633.22	STK	1307	632.80	SUB	2307	634.74	TCY	1.94
308	527169.15	1399046.36	631.90	STK	1308	631.81	SUB	2308	633.44	TCY	1.63
309	527171.63	1399096.39	631.42	STK	1309	631.06	SUB	2309	633.00	TCY	1.94
310	527174.87	1399139.10	631.00	STK	1310	630.61	SUB	2310	632.50	TCY	1.89
311	527178.44	1399186.09	631.00	STK	1311	630.87	SUB	2311	632.52	TCY	1.65
312	527181.54	1399226.85	631.74	STK	1312	631.30	SUB	2312	633.24	TCY	1.94
313	527188.75	1399276.92	632.61	STK	1313	631.93	SUB	2313	634.12	TCY	2.19
314	527192.18	1399300.70	633.36	STK	1314	632.47	SUB	2314	634.86	TCY	2.39
315	527198.79	1399327.00	634.02	STK	1315	633.14	SUB	2315	635.52	TCY	2.38
316	527211.08	1399377.08	635.33	STK	1316	634.97	SUB	2316	636.85	TCY	1.88
317	527220.43	1399427.16	636.60	STK	1317	635.70	SUB	2317	638.18	TCY	2.48
318	527226.37	1399477.23	637.85	STK	1318	637.35	SUB	2318	639.44	TCY	2.09
319	527231.99	1399500.00	638.43	STK	1319	637.90	SUB	2319	639.95	TCY	2.05
320	527237.15	1399532.49	638.50	STK	1320	638.49	SUB	2320	640.10	TCY	1.61
321	527237.10	1399542.85	636.50	STK	1321	638.40	SUB	2321	640.03	TCY	1.63
322	527245.04	1399524.80	636.10	STK	1322	636.05	SUB	2322	637.68	TCY	1.63
323	527243.79	1399500.00	634.62	STK	1323	634.34	SUB	2323	636.19	TCY	1.85
324	527246.82	1399500.00	634.62	STK	1324	634.50	SUB	2324	636.18	TCY	1.68
325	527249.20	1399502.20	635.67	STK	1325	635.28	SUB	2325	637.17	TCY	1.89
326	527268.51	1399526.62	636.60	STK	1326	636.56	SUB	2326	638.11	TCY	1.55
327	527268.49	1399532.62	638.64	STK	1327	638.57	SUB	2327	640.19	TCY	1.62
328	527268.46	1399537.62	638.64	STK	1328	638.55	SUB	2328	640.20	TCY	1.65
329	527315.57	1399537.81	639.68	STK	1329	639.58	SUB	2329	641.26	TCY	1.68
330	527315.59	1399532.81	639.68	STK	1330	639.58	SUB	2330	641.19	TCY	1.61
331	527315.61	1399526.82	637.60	STK	1331	637.53	SUB	2331	639.14	TCY	1.61
332	527362.70	1399527.01	638.60	STK	1332	638.59	SUB	2332	640.12	TCY	1.53
333	527362.68	1399533.01	640.72	STK	1333	640.62	SUB	2333	642.22	TCY	1.60
334	527362.67	1399538.01	640.72	STK	1334	640.64	SUB	2334	642.23	TCY	1.59
335	527409.76	1399538.20	641.76	STK	1335	641.66	SUB	2335	643.28	TCY	1.62
336	527409.78	1399533.20	641.76	STK	1336	641.69	SUB	2336	643.31	TCY	1.62
337	527409.80	1399527.21	639.60	STK	1337	639.51	SUB	2337	641.11	TCY	1.60
338	527423.50	1399527.26	639.84	STK	1338	639.77	SUB	2338	641.37	TCY	1.60
339	527425.50	1399524.27	638.84	STK	1339	638.82	SUB	2339	640.43	TCY	1.61
340	527428.50	1399524.29	638.84	STK	1340	638.80	SUB	2340	640.44	TCY	1.64
341	527430.82	1399527.30	640.00	STK	1341	638.94	SUB	2341	641.50	TCY	1.56
342	527456.89	1399527.40	640.64	STK	1342	640.64	SUB	2342	642.17	TCY	1.53
343	527456.87	1399533.40	642.57	STK	1343	642.55	SUB	2343	644.17	TCY	1.62
344	527456.86	1399538.40	642.57	STK	1344	642.52	SUB	2344	644.16	TCY	1.64
345	527503.95	1399538.59	643.74	STK	1345	643.66	SUB	2345	645.27	TCY	1.61
346	527503.97	1399533.59	643.74	STK	1346	643.67	SUB	2346	645.37	TCY	1.70
347	527503.99	1399527.60	641.81	STK	1347	641.80	SUB	2347	643.40	TCY	1.60
348	527551.08	1399527.79	642.97	STK	1348	642.86	SUB	2348	644.56	TCY	1.70
349	527551.06	1399533.79	644.92	STK	1349	644.82	SUB	2349	646.68	TCY	1.86
350	527551.05	1399538.79	644.92	STK	1350	644.85	SUB	2350	646.75	TCY	1.90
351	527598.14	1399538.98	646.09	STK	1351	646.00	SUB	2351	647.59	TCY	1.59
352	527598.16	1399533.98	646.09	STK	1352	646.01	SUB	2352	647.61	TCY	1.60
353	527598.17	1399527.99	644.14	STK	1353	644.06	SUB	2353	645.71	TCY	1.65
354	527645.27	1399528.18	645.30	STK	1354	645.21	SUB	2354	646.90	TCY	1.69
355	527652.51	1399528.13	645.47	STK	1355	645.40	SUB	2355	647.01	TCY	1.61
356	527654.50	1399525.22	644.47	STK	1356	644.46	SUB	2356	646.12	TCY	1.66
357	527657.50	1399525.23	644.47	STK	1357	644.44	SUB	2357	645.98	TCY	1.54
358	527659.86	1399528.24	645.65	STK	1358	645.63	SUB	2358	647.15	TCY	1.52
359	527645.25	1399534.18	647.27	STK	1359	647.19	SUB	2359	648.86	TCY	1.67
360	527645.24	1399539.18	647.27	STK	1360	647.20	SUB	2360	648.91	TCY	1.71
361	527692.33	1399539.37	648.45	STK	1361	648.35	SUB	2361	650.00	TCY	1.65
362	527692.35	1399534.37	648.45	STK	1362	648.37	SUB	2362	650.08	TCY	1.71
363	527692.36	1399528.38	646.47	STK	1363	646.37	SUB	2363	648.00	TCY	1.63
364	527746.18	1399528.60	647.79	STK	1364	647.73	SUB	2364	649.38	TCY	1.65
365	527746.16	1399534.60	649.79	STK	1365	649.69	SUB	2365	651.41	TCY	1.72
366	527746.14	1399539.60	649.79	STK	1366	649.70	SUB	2366	651.40	TCY	1.70
367	527799.95	1399539.82	651.13	STK	1367	651.06	SUB	2367	652.77	TCY	1.71
368	527799.97	1399534.82	651.13	STK	1368	651.06	SUB	2368	652.80	TCY	1.74
369	527799.99	1399528.82	649.11	STK	1369	649.06	SUB	2369	650.69	TCY	1.63
370	527853.80	1399529.04	650.43	STK	1370	650.33	SUB	2370	651.97	TCY	1.64
371	527853.78	1399535.04	652.48	STK	1371	652.39	SUB	2371	654.00	TCY	1.61
372	527853.77	1399540.04	652.48	STK	1372	652.41	SUB	2372	654.01	TCY	1.60
373	527916.74	1399540.30	653.93	STK	1373	653.84	SUB	2373	655.49	TCY	1.65
374	527911.75	1399535.28	653.93	STK	1374	653.83	SUB	2374	655.58	TCY	1.75
375	527905.46	1399529.26	651.75	STK	1375	651.74	SUB	2375	653.33	TCY	1.59
376	527916.82	1399479.24	652.48	STK	1376	652.43	SUB	2376	654.14	TCY	1.71
377	527911.82	1399479.23	652.48	STK	1377	652.43	SUB	2377	654.09	TCY	1.66
378	527905.72	1399479.21	650.52	STK	1378	650.44	SUB	2378	652.05	TCY	1.61
379	527853.94	1399479.08	649.19	STK	1379	649.12	SUB	2379	650.77	TCY	1.65
380	527800.13	1399478.90	647.87	STK	1380	647.80	SUB	2380	649.37	TCY	1.57
381	527746.32	1399478.74	646.55	STK	1381	646.45	SUB	2381	648.12	TCY	1.67
382	527692.51	1399478.59	645.23	STK	1382	645.14	SUB	2382	646.79	TCY	1.65
383	527659.86	1399478.49	644.42	STK	1383	644.32	SUB	2383	645.92	TCY	1.60
384	527657.50	1399478.48	643.24	STK	1384	643.17	SUB	2384	644.78	TCY	1.61
385	527654.50	1399478.47	643.24	STK	1385	643.20	SUB	2385	644.77	TCY	1.57
386	527652.50	1399478.47	644.24	STK	1386	644.21	SUB	2386	645.74	TCY	1.53
387	527645.41	1399478.45	644.07	STK	1387	644.07	SUB	2387	645.59	TCY	1.52
388	527598.32	1399478.31	642.90	STK	1388	642.80	SUB	2388	644.45	TCY	1.65
389	527551.23	1399478.17	641.74	STK	1389	641.64	SUB	2389	643.25	TCY	1.61
390	527504.13	1399478.03	640.57	STK	1390	640.55	SUB	2390	642.10	TCY	1.55
391	527457.04	1399477.90	639.55	STK	1391	639.47	SUB	2391	641.06	TCY	1.59
392	527430.82	1399477.82	638.98	STK	1392	638.88	SUB	2392	640.49	TCY	1.61
393	527428.50	1399477.81	637.82	STK	1393	637.60	SUB	2393	639.42	TCY	1.82
394	527425.50	1399477.80	637.82	STK	1394	637.58	SUB	2394	639.40	TCY	1.82
395	527423.50	1399477.80	638.82	STK	1395	638.65	SUB	2395	640.32	TCY	1.67
396	527409.94	1399477.76	638.55	STK	1396	638.53	SUB	2396	640.08	TCY	1.55
397	527362.85	1399477.62	637.56	STK	1397	637.47	SUB	2397	639.13	TCY	1.66
398	527315.75	1399477.48	636.55	STK	1398	636.49	SUB	2398	638.06	TCY	1.57
399	527268.66	1399477.34	635.55	STK	1399	635.45	SUB	2399	637.11	TCY	1.66
400	527245.18	1399477.28	635.05	STK	1400	634.62	SUB	2400	636.58	TCY	1.96
401	527243.15	1399477.27	634.04	STK	1401	633.72	SUB	2401	635.64	TCY	1.92
402	527240.11	1399477.26	634.04	STK	1402	634.02	SUB	2402	635.64	TCY	1.62
403	527232.01	1399427.19	632.81	STK	1403	632.73	SUB	2403	634.39	TCY	1.66
404	527235.07	1399427.20	632.81	STK	1404	632.59	SUB	2404	634.40	TCY	1.81
405	527237.10	1399427.20	633.81	STK	1405	633.69	SUB	2405	635.32	TCY	1.63
406	527268.80	1399427.30	634.49	STK	1406	634.43	SUB	2406	636.09	TCY	1.66
407	527315.90	1399427.43	635.49	STK	1407	635.42	SUB	2407	636.99	TCY	1.57
408	527362.99	1399427.57	636.49	STK	1408	636.49	SUB	2408	638.02	TCY	1.53
409	527410.09	1399427.71	637.49	STK	1409	637.40	SUB	2409	638.99	TCY	1.59
410	527423.50	1399427.75	637.76	STK	1410	637.66	SUB	2410	639.26	TCY	1.60
411	527425.50	1399427.76	636.76	STK	1411	636.69	SUB	2411	638.29	TCY	1.60
412	527428.50	1399427.76	636.76	STK	1412	636.71	SUB	2412	638.36	TCY	1.65
413	527430.82	1399427.77	637.92	STK	1413	637.83	SUB	2413	639.43	TCY	1.60
414	527457.18	1399427.85	638.49	STK	1414	638.46	SUB	2414	640.00	TCY	1.54
415	527504.28	1399427.99	639.49	STK	1415	639.39	SUB	2415	640.99	TCY	1.60
416	527551.37	1399428.12	640.50	STK	1416	640.42	SUB	2416	642.00	TCY	1.58
417	527598.47	1399428.26	641.67	STK	1417	641.58	SUB	2417	643.17	TCY	1.59
418	527645.56	1399428.40	642.83	STK	1418	642.83	SUB	2418	644.35	TCY	1.52
419	527652.50	1399428.42	643.00	STK	1419	643.00	SUB	2419	644.54	TCY	1.54
420	527654.50	1399428.43	642.00	STK	1420	641.98	SUB	2420	643.52	TCY	1.54
421	527657.50	1399428.43	642.00	STK	1421	641.94	SUB	2421	643.53	TCY	1.59
422	527659.86	1399428.44	643.18	STK	1422	643.18	SUB	2422	644.73	TCY	1.55
423	527692.66	1399428.54	644.00	STK	1423	643.96	SUB	2423	645.58	TCY	1.62
424	527746.47	1399428.70	645.33	STK	1424	645.28	SUB	2424	646.88	TCY	1.60
425	527800.28	1399428.85	646.66	STK	1425	646.57	SUB	2425	648.19	TCY	1.62
426	527854.09	1399429.01	647.99	STK	1426	647.92	SUB	2426	649.56	TCY	1.64
427	527905.95	1399429.16	649.28	STK	1427	649.28	SUB	2427	650.80	TCY	1.52
428	527911.88	1399429.18	651.24	STK	1428	651.20	SUB	2428	652.83	TCY	1.63
429	527916.88	1399429.19	651.24	STK	1429	651.18	SUB	2429	652.74	TCY	1.56
430	527916.94	1399379.15	650.00	STK	1430	649.93	SUB	2430	651.50	TCY	1.57
431	527911.94	1399379.13	650.00	STK	1431	649.95	SUB	2431	651.53	TCY	1.58
432	527906.19	1399379.11	648.04	STK	1432	648.01	SUB	2432	649.60	TCY	1.59
433	527854.24	1399378.96	646.75	STK	1433	646.73	SUB	2433	648.27	TCY	1.54
434	527800.43	1399378.81	645.42	STK	1434	645.37	SUB	2434	646.92	TCY	1.55
435	527746.61	1399378.65	644.09	STK	1435	644.07	SUB	2435	645.61	TCY	1.54
436	527692.80	1399378.49	642.76	STK	1436	642.69	SUB	2436	644.29	TCY	1.60
437	527659.86	1399378.39	641.94	STK	1437	641.92	SUB	2437	643.46	TCY	1.54
438	527657.50	1399378.39	640.76	STK	1438	640.71	SUB	2438	642.35	TCY	1.64
439	527654.50	1399378.38	640.76	STK	1439	640.75	SUB	2439	642.33	TCY	1.58
440	527652.50	1399378.37	641.76	STK	1440	641.71	SUB	2440	643.28	TCY	1.57
441	527645.71	1399378.35	641.59	STK	1441	641.51	SUB	2441	643.10	TCY	1.59
442	527598.61	1399378.21	640.43	STK	1442	640.33	SUB	2442	641.93	TCY	1.60
443	527551.52	1399378.08	639.38	STK	1443	639.30	SUB	2443	640.88	TCY	1.58
444	527504.42	1399377.94	638.41	STK	1444	638.33	SUB	2444	639.91	TCY	1.58
445	527457.33	1399377.80	637.42	STK	1445	637.32	SUB	2445	638.94	TCY	1.62
446	527430.82	1399377.72	636.85	STK	1446	636.77	SUB	2446	638.37	TCY	1.60
447	527428.50	1399377.72	635.69	STK	1447	635.52	SUB	2447	637.29	TCY	1.77
448	527425.50	1399377.71	635.69	STK	1448	635.47	SUB	2448	637.24	TCY	1.77
449	527423.50	1399377.70	636.69	STK	1449	636.45	SUB	2449	638.20	TCY	1.75
450	527410.23	1399377.66	636.42	STK	1450	636.42	SUB	2450	637.98	TCY	1.56
451	527363.14	1399377.53	635.42	STK	1451	635.41	SUB	2451	636.92	TCY	1.51
452	527316.04	1399377.39	634.42	STK	1452	634.41	SUB	2452	635.93	TCY	1.52
453	527268.95	1399377.25	633.42	STK	1453	633.41	SUB	2453	634.95	TCY	1.54
454	527227.42	1399377.13	632.55	STK	1454	632.54	SUB	2454	634.05	TCY	1.51
455	527225.37	1399377.12	631.55	STK	1455	631.13	SUB	2455	633.14	TCY	2.01
456	527222.29	1399377.11	631.55	STK	1456	631.20	SUB	2456	633.14	TCY	1.94
457	527211.01	1399327.03	630.24	STK	1457	629.93	SUB	2457	631.82	TCY	1.89
458	527214.05	1399327.04	630.24	STK	1458	629.68	SUB	2458	631.83	TCY	2.15
459	527216.08	1399327.05	631.24	STK	1459	630.98	SUB	2459	632.74	TCY	1.76
460	527222.00	1399327.06	631.37	STK	1460	631.28	SUB	2460	632.87	TCY	1.59
461	527269.10	1399327.20	632.36	STK	1461	632.26	SUB	2461	633.89	TCY	1.63

Proposed					Subgrade			Top of Clay			Top of Clay - Subgrade
Point #	Northing	Easting	Elevation	Desc.	Point #	Elevation	Desc.	Point #	Elevation	Desc.	
462	527316.19	1399327.34	633.36	STK	1462	633.36	SUB	2462	634.87	TCY	1.51
463	527363.29	1399327.48	634.36	STK	1463	634.28	SUB	2463	635.96	TCY	1.68
464	527410.38	1399327.62	635.36	STK	1464	635.27	SUB	2464	636.94	TCY	1.67
465	527423.50	1399327.65	635.63	STK	1465	635.60	SUB	2465	637.17	TCY	1.57
466	527425.50	1399327.66	634.63	STK	1466	634.51	SUB	2466	636.13	TCY	1.62
467	527428.50	1399327.67	634.63	STK	1467	634.52	SUB	2467	636.16	TCY	1.64
468	527430.82	1399327.68	635.79	STK	1468	635.70	SUB	2468	637.29	TCY	1.59
469	527457.46	1399327.75	636.36	STK	1469	636.31	SUB	2469	637.88	TCY	1.57
470	527504.57	1399327.89	637.36	STK	1470	637.35	SUB	2470	638.89	TCY	1.54
471	527551.68	1399328.03	638.35	STK	1471	638.34	SUB	2471	639.92	TCY	1.58
472	527598.76	1399328.17	639.32	STK	1472	639.24	SUB	2472	640.82	TCY	1.58
473	527645.85	1399328.31	640.35	STK	1473	640.26	SUB	2473	641.87	TCY	1.61
474	527652.50	1399328.32	640.52	STK	1474	640.43	SUB	2474	642.04	TCY	1.61
475	527654.50	1399328.33	639.52	STK	1475	639.51	SUB	2475	641.10	TCY	1.59
476	527657.50	1399328.34	639.52	STK	1476	639.49	SUB	2476	641.12	TCY	1.63
477	527659.86	1399328.35	640.70	STK	1477	640.60	SUB	2477	642.20	TCY	1.60
478	527692.95	1399328.44	641.52	STK	1478	641.42	SUB	2478	643.02	TCY	1.60
479	527746.76	1399328.60	642.85	STK	1479	642.78	SUB	2479	644.36	TCY	1.58
480	527800.57	1399328.76	644.18	STK	1480	644.10	SUB	2480	645.69	TCY	1.59
481	527854.38	1399328.92	645.51	STK	1481	645.43	SUB	2481	647.01	TCY	1.58
482	527906.42	1399329.07	646.80	STK	1482	646.70	SUB	2482	648.38	TCY	1.68
483	527912.01	1399329.08	648.75	STK	1483	648.65	SUB	2483	650.30	TCY	1.65
484	527917.01	1399329.10	648.75	STK	1484	648.65	SUB	2484	650.25	TCY	1.60
485	527917.07	1399279.05	647.51	STK	1485	647.43	SUB	2485	649.03	TCY	1.60
486	527912.07	1399279.04	647.51	STK	1486	647.44	SUB	2486	649.07	TCY	1.63
487	527906.65	1399279.02	645.56	STK	1487	645.48	SUB	2487	647.10	TCY	1.62
488	527854.53	1399278.87	644.27	STK	1488	644.18	SUB	2488	645.80	TCY	1.62
489	527800.72	1399278.71	642.94	STK	1489	642.85	SUB	2489	644.48	TCY	1.63
490	527746.91	1399278.55	641.61	STK	1490	641.53	SUB	2490	643.12	TCY	1.59
491	527693.10	1399278.40	640.28	STK	1491	640.18	SUB	2491	641.79	TCY	1.61
492	527659.86	1399278.30	639.61	STK	1492	639.55	SUB	2492	641.13	TCY	1.58
493	527657.50	1399278.29	638.43	STK	1493	638.34	SUB	2493	640.02	TCY	1.68
494	527654.50	1399278.28	638.43	STK	1494	638.42	SUB	2494	639.98	TCY	1.56
495	527652.50	1399278.28	639.43	STK	1495	639.30	SUB	2495	640.93	TCY	1.63
496	527646.00	1399278.26	639.28	STK	1496	639.16	SUB	2496	640.78	TCY	1.62
497	527598.91	1399278.12	638.28	STK	1497	638.20	SUB	2497	639.79	TCY	1.59
498	527551.81	1399277.98	637.29	STK	1498	637.23	SUB	2498	638.83	TCY	1.60
499	527504.72	1399277.84	636.29	STK	1499	636.24	SUB	2499	637.81	TCY	1.57
500	527457.62	1399277.71	635.29	STK	1500	635.22	SUB	2500	636.79	TCY	1.57
501	527430.82	1399277.63	634.73	STK	1501	634.67	SUB	2501	636.25	TCY	1.58
502	527428.50	1399277.62	633.57	STK	1502	633.41	SUB	2502	635.13	TCY	1.72
503	527425.50	1399277.61	633.57	STK	1503	633.44	SUB	2503	635.11	TCY	1.67
504	527423.50	1399277.61	634.57	STK	1504	634.47	SUB	2504	636.12	TCY	1.65
505	527410.53	1399277.57	634.30	STK	1505	634.27	SUB	2505	635.84	TCY	1.57
506	527363.43	1399277.43	633.30	STK	1506	633.21	SUB	2506	634.84	TCY	1.63
507	527316.34	1399277.29	632.30	STK	1507	632.23	SUB	2507	633.83	TCY	1.60
508	527269.24	1399277.15	631.30	STK	1508	631.26	SUB	2508	632.86	TCY	1.60
509	527222.15	1399277.02	630.30	STK	1509	630.20	SUB	2509	631.90	TCY	1.70
510	527204.73	1399276.97	629.94	STK	1510	629.84	SUB	2510	631.47	TCY	1.63
511	527202.73	1399276.96	628.94	STK	1511	628.31	SUB	2511	630.54	TCY	2.23
512	527199.73	1399276.95	628.94	STK	1512	628.91	SUB	2512	630.50	TCY	1.59
513	527193.54	1399226.89	627.74	STK	1513	627.47	SUB	2513	629.24	TCY	1.77
514	527196.64	1399226.89	627.74	STK	1514	627.44	SUB	2514	629.24	TCY	1.80
515	527198.54	1399226.90	628.74	STK	1515	628.73	SUB	2515	630.28	TCY	1.55
516	527222.29	1399226.97	629.24	STK	1516	629.15	SUB	2516	630.77	TCY	1.62
517	527269.39	1399227.11	630.24	STK	1517	630.16	SUB	2517	631.82	TCY	1.66
518	527316.48	1399227.25	631.24	STK	1518	631.15	SUB	2518	632.74	TCY	1.59
519	527363.58	1399227.38	632.24	STK	1519	632.15	SUB	2519	633.76	TCY	1.62
520	527410.67	1399227.52	633.23	STK	1520	633.15	SUB	2520	634.75	TCY	1.60
521	527423.50	1399227.56	633.50	STK	1521	633.34	SUB	2521	635.06	TCY	1.72
522	527425.50	1399227.56	632.50	STK	1522	632.31	SUB	2522	634.00	TCY	1.69
523	527428.50	1399227.57	632.50	STK	1523	632.28	SUB	2523	634.09	TCY	1.81
524	527430.82	1399227.58	633.66	STK	1524	633.59	SUB	2524	635.18	TCY	1.59
525	527457.77	1399227.66	634.23	STK	1525	634.14	SUB	2525	635.74	TCY	1.60
526	527504.86	1399227.80	635.23	STK	1526	635.17	SUB	2526	636.75	TCY	1.58
527	527551.96	1399227.93	636.23	STK	1527	636.17	SUB	2527	637.74	TCY	1.57
528	527599.05	1399228.07	637.23	STK	1528	637.15	SUB	2528	638.74	TCY	1.59
529	527646.15	1399228.21	638.22	STK	1529	638.13	SUB	2529	639.72	TCY	1.59
530	527652.50	1399228.23	638.39	STK	1530	638.30	SUB	2530	639.93	TCY	1.63
531	527654.50	1399228.23	637.39	STK	1531	637.29	SUB	2531	638.93	TCY	1.64
532	527657.50	1399228.24	637.39	STK	1532	637.20	SUB	2532	638.97	TCY	1.77
533	527659.86	1399228.25	638.57	STK	1533	638.47	SUB	2533	640.10	TCY	1.63
534	527693.24	1399228.35	639.19	STK	1534	639.12	SUB	2534	640.72	TCY	1.60
535	527747.05	1399228.51	640.37	STK	1535	640.30	SUB	2535	641.89	TCY	1.59
536	527800.86	1399228.66	641.70	STK	1536	641.62	SUB	2536	643.23	TCY	1.61
537	527854.68	1399228.82	643.03	STK	1537	642.95	SUB	2537	644.57	TCY	1.62
538	527906.89	1399228.97	644.32	STK	1538	644.22	SUB	2538	645.86	TCY	1.64
539	527912.13	1399228.99	646.27	STK	1539	646.23	SUB	2539	647.86	TCY	1.63
540	527917.13	1399229.00	646.27	STK	1540	646.20	SUB	2540	647.85	TCY	1.65
541	527917.20	1399178.96	645.02	STK	1541	645.02	SUB	2541	646.61	TCY	1.59
542	527912.20	1399178.94	645.02	STK	1542	645.00	SUB	2542	646.57	TCY	1.57
543	527912.22	1399159.73	644.55	STK	1543	644.50	SUB	2543	646.09	TCY	1.59
544	527917.22	1399159.74	644.55	STK	1544	644.51	SUB	2544	646.15	TCY	1.64
545	527917.24	1399148.39	644.82	STK	1545	644.79	SUB	2545	646.38	TCY	1.59
546	527912.24	1399148.37	644.82	STK	1546	644.77	SUB	2546	646.36	TCY	1.59
547	527907.27	1399148.36	643.30	STK	1547	643.28	SUB	2547	644.85	TCY	1.57
548	527904.58	1399152.35	642.00	STK	1548	641.99	SUB	2548	643.50	TCY	1.51
549	527904.57	1399161.35	642.00	STK				2549	643.5	TCY	
550	527907.19	1399165.50	643.08	STK				2550	644.61	TCY	
551	527907.17	1399168.50	643.08	STK				2551	644.68	TCY	
552	527904.56	1399172.56	642.00	STK				2552	643.6	TCY	
553	527904.55	1399174.56	642.00	STK	1553	641.97	SUB	2553	643.55	TCY	1.58
554	527907.12	1399178.93	643.08	STK	1554	643.00	SUB	2554	644.58	TCY	1.58
555	527854.91	1399148.20	642.00	STK	1555	641.95	SUB	2555	643.50	TCY	1.55
556	527854.90	1399152.20	640.00	STK	1556	639.97	SUB	2556	641.57	TCY	1.60
557	527854.87	1399161.20	640.00	STK				2557	641.6	TCY	
558	527854.86	1399165.35	642.00	STK				2558	643.5	TCY	
559	527854.85	1399168.35	642.00	STK				2559	643.5	TCY	
560	527854.84	1399172.44	640.00	STK				2560	641.5	TCY	
561	527854.84	1399174.44	640.00	STK	1561	639.95	SUB	2561	641.51	TCY	1.56
562	527854.82	1399178.77	641.79	STK	1562	641.68	SUB	2562	643.30	TCY	1.62
563	527801.10	1399148.05	640.67	STK	1563	640.60	SUB	2563	642.22	TCY	1.62
564	527801.09	1399152.05	638.67	STK	1564	638.62	SUB	2564	640.19	TCY	1.57
565	527801.06	1399161.05	638.67	STK				2565	640.17	TCY	
566	527801.05	1399165.19	640.67	STK				2566	642.17	TCY	
567	527801.04	1399168.19	640.67	STK				2567	642.17	TCY	
568	527801.03	1399172.28	638.67	STK				2568	640.2	TCY	
569	527801.02	1399174.28	638.67	STK	1569	638.66	SUB	2569	640.18	TCY	1.52
570	527801.01	1399178.62	640.46	STK	1570	640.46	SUB	2570	641.97	TCY	1.51
571	527747.29	1399147.89	639.33	STK	1571	639.29	SUB	2571	640.88	TCY	1.59
572	527747.28	1399151.89	637.33	STK	1572	637.30	SUB	2572	638.84	TCY	1.54
573	527747.25	1399160.89	637.33	STK				2573	638.86	TCY	
574	527747.24	1399165.03	639.33	STK				2574	640.85	TCY	
575	527747.23	1399168.03	639.33	STK				2575	640.83	TCY	
576	527747.22	1399172.12	637.33	STK				2576	638.84	TCY	
577	527747.21	1399174.12	637.33	STK	1577	637.28	SUB	2577	638.86	TCY	1.58
578	527747.20	1399178.46	639.30	STK	1578	639.22	SUB	2578	640.80	TCY	1.58
579	527693.48	1399147.73	638.00	STK	1579	637.96	SUB	2579	639.51	TCY	1.55
580	527693.47	1399151.73	636.00	STK	1580	635.99	SUB	2580	637.60	TCY	1.61
581	527693.44	1399160.73	636.00	STK				2581	637.53	TCY	
582	527693.43	1399164.87	638.00	STK				2582	639.52	TCY	
583	527693.42	1399167.87	638.00	STK				2583	639.52	TCY	
584	527693.41	1399171.97	636.00	STK				2584	637.51	TCY	
585	527693.40	1399173.97	636.00	STK	1585	635.93	SUB	2585	637.52	TCY	1.59
586	527693.39	1399178.30	638.16	STK	1586	638.09	SUB	2586	639.76	TCY	1.67
587	527660.86	1399147.63	637.35	STK	1587	637.26	SUB	2587	638.89	TCY	1.63
588	527658.46	1399149.63	636.17	STK	1588	636.10	SUB	2588	637.77	TCY	1.67
589	527655.46	1399149.62	636.17	STK	1589	636.10	SUB	2589	637.69	TCY	1.59
590	527653.50	1399147.61	637.17	STK	1590	637.11	SUB	2590	638.67	TCY	1.56
591	527653.50	1399164.76	637.17	STK				2591	638.67	TCY	
592	527653.50	1399167.76	637.17	STK				2592	638.68	TCY	
593	527655.50	1399162.62	636.17	STK				2593	637.7	TCY	
594	527655.50	1399169.85	636.17	STK				2594	637.77	TCY	
595	527658.50	1399169.86	636.17	STK				2595	637.75	TCY	
596	527658.50	1399162.63	636.17	STK				2596	637.71	TCY	
597	527660.86	1399164.78	637.35	STK				2597	638.85	TCY	
598	527660.86	1399167.78	637.35	STK				2598	638.86	TCY	
599	527660.86	1399178.20	637.51	STK	1599	637.44	SUB	2599	639.04	TCY	1.60
600	527658.55	1399175.86	636.33	STK	1600	636.27	SUB	2600	637.91	TCY	1.64
601	527655.55	1399175.85	636.33	STK	1601	636.25	SUB	2601	637.85	TCY	1.60
602	527653.50	1399178.16	637.33	STK	1602	637.23	SUB	2602	638.83	TCY	1.60
603	527646.38	1399147.59	637.00	STK	1603	636.90	SUB	2603	638.53	TCY	1.63
604	527646.37	1399151.59	635.00	STK	1604	634.92	SUB	2604	636.56	TCY	1.64
605	527646.35	1399160.59	635.00	STK				2605	636.52	TCY	
606	527646.33	1399164.74	637.00	STK				2606	638.51	TCY	
607	527646.32	1399167.74	637.00	STK				2607	638.52	TCY	
608	527646.31	1399171.83	635.00	STK				2608	636.51	TCY	
609	527646.31	1399173.83	635.00	STK	1609	634.97	SUB	2609	636.51	TCY	1.54
610	527646.29	1399178.16	637.16	STK	1610	637.11	SUB	2610	638.69	TCY	1.58
611	527599.29	1399147.45	636.00	STK	1611	635.91	SUB	2611	637.56	TCY	1.65
612	527599.28	1399151.45	634.00	STK	1612	634.00	SUB	2612	635.59	TCY	1.59
613	527599.25	1399160.45	634.00	STK				2613	635.57	TCY	
614	527599.24	1399164.60	636.00	STK				2614	637.52	TCY	
615	527599.23	1399167.60	636.00	STK				2615	637.5	TCY	
616	527599.22	1399171.69	634.00	STK				2616	635.53	TCY	
617	527599.21	1399173.69	634.00	STK	1617	633.90	SUB	2617	635.51	TCY	1.61
618	527599.20	1399178.02	636.16	STK	1618	636.06	SUB	2618	637.66	TCY	1.60
619	527552.19	1399147.32	635.00	STK	1619	634.90	SUB	2619	636.52	TCY	1.62
620	527552.18	1399151.32	633.00	STK	1620	633.00	SUB	2620	634.53	TCY	1.53
621	527552.16	1399160.32	633.00	STK				2621	634.5	TCY	
622	527552.14	1399164.46	635.00	STK				2622	636.51	TCY	

Proposed					Subgrade			Top of Clay			Top of Clay - Subgrade
Point #	Northing	Easting	Elevation	Desc.	Point #	Elevation	Desc.	Point #	Elevation	Desc.	
623	527552.13	1399167.46	635.00	STK				2623	636.5	TCY	
624	527552.12	1399171.55	633.00	STK				2624	634.58	TCY	
625	527552.12	1399173.55	633.00	STK	1625	632.91	SUB	2625	634.57	TCY	1.66
626	527552.10	1399177.89	635.16	STK	1626	635.09	SUB	2626	636.66	TCY	1.57
627	527505.10	1399147.18	634.00	STK	1627	633.91	SUB	2627	635.56	TCY	1.65
628	527505.09	1399151.19	632.00	STK	1628	632.00	SUB	2628	633.51	TCY	1.51
629	527505.06	1399160.18	632.00	STK				2629	633.59	TCY	
630	527505.05	1399164.32	634.00	STK				2630	635.53	TCY	
631	527505.04	1399167.32	634.00	STK				2631	635.51	TCY	
632	527505.03	1399171.41	632.00	STK				2632	633.5	TCY	
633	527505.02	1399173.41	632.00	STK	1633	631.92	SUB	2633	633.58	TCY	1.66
634	527505.01	1399177.75	634.16	STK	1634	634.09	SUB	2634	635.66	TCY	1.57
635	527458.00	1399147.04	633.00	STK	1635	632.90	SUB	2635	634.59	TCY	1.69
636	527457.99	1399151.04	631.00	STK	1636	630.96	SUB	2636	632.54	TCY	1.58
637	527457.97	1399160.04	631.00	STK				2637	632.5	TCY	
638	527457.96	1399164.19	633.00	STK				2638	634.52	TCY	
639	527457.95	1399167.19	633.00	STK				2639	634.52	TCY	
640	527457.93	1399171.28	631.00	STK				2640	632.51	TCY	
641	527457.93	1399173.28	631.00	STK	1641	630.95	SUB	2641	632.53	TCY	1.68
642	527457.91	1399177.61	633.16	STK	1642	633.07	SUB	2642	634.66	TCY	1.59
643	527430.82	1399146.96	632.43	STK	1643	632.37	SUB	2643	633.98	TCY	1.61
644	527428.50	1399145.95	631.27	STK	1644	631.13	SUB	2644	632.84	TCY	1.71
645	527425.50	1399148.95	631.27	STK	1645	631.14	SUB	2645	632.86	TCY	1.72
646	527423.50	1399146.94	632.27	STK	1646	632.17	SUB	2646	633.85	TCY	1.68
647	527423.50	1399164.08	632.27	STK				2647	633.77	TCY	
648	527423.50	1399167.08	632.27	STK				2648	633.77	TCY	
649	527425.50	1399161.95	631.27	STK				2649	632.85	TCY	
650	527428.50	1399169.18	631.27	STK				2650	632.82	TCY	
651	527428.50	1399169.19	631.27	STK				2651	632.87	TCY	
652	527428.50	1399161.95	631.27	STK				2652	632.85	TCY	
653	527430.82	1399164.11	632.43	STK				2653	633.94	TCY	
654	527430.82	1399167.11	632.43	STK				2654	633.93	TCY	
655	527430.82	1399177.53	632.59	STK	1655	632.50	SUB	2655	634.09	TCY	1.59
656	527428.50	1399175.19	631.43	STK	1656	631.07	SUB	2656	633.00	TCY	1.93
657	527425.50	1399175.18	631.43	STK	1657	631.13	SUB	2657	633.03	TCY	1.90
658	527423.50	1399177.51	632.43	STK	1658	632.33	SUB	2658	633.95	TCY	1.62
659	527410.91	1399146.90	632.00	STK	1659	631.95	SUB	2659	633.50	TCY	1.55
660	527410.90	1399150.90	630.00	STK	1660	629.92	SUB	2660	631.56	TCY	1.64
661	527410.87	1399159.90	630.00	STK				2661	631.56	TCY	
662	527410.86	1399164.05	632.00	STK				2662	633.5	TCY	
663	527410.85	1399167.05	632.00	STK				2663	633.53	TCY	
664	527410.84	1399171.14	630.00	STK				2664	631.51	TCY	
665	527410.83	1399173.14	630.00	STK	1665	629.98	SUB	2665	631.50	TCY	1.52
666	527410.82	1399177.47	632.16	STK	1666	632.09	SUB	2666	633.66	TCY	1.57
667	527363.81	1399146.77	631.00	STK	1667	630.93	SUB	2667	632.54	TCY	1.61
668	527363.80	1399150.77	629.00	STK	1668	629.00	SUB	2668	630.60	TCY	1.60
669	527363.78	1399159.77	629.00	STK				2669	630.59	TCY	
670	527363.76	1399163.91	631.00	STK				2670	632.52	TCY	
671	527363.76	1399166.91	631.00	STK				2671	632.51	TCY	
672	527363.74	1399171.00	629.00	STK				2672	630.52	TCY	
673	527363.74	1399173.00	629.00	STK	1673	628.97	SUB	2673	630.50	TCY	1.53
674	527363.73	1399177.34	631.16	STK	1674	631.08	SUB	2674	632.66	TCY	1.58
675	527316.72	1399146.63	630.00	STK	1675	629.99	SUB	2675	631.60	TCY	1.61
676	527316.71	1399150.63	628.00	STK	1676	627.98	SUB	2676	629.60	TCY	1.62
677	527316.68	1399159.63	628.00	STK				2677	629.6	TCY	
678	527316.67	1399163.77	630.00	STK				2678	631.51	TCY	
679	527316.66	1399166.77	630.00	STK				2679	631.51	TCY	
680	527316.65	1399170.86	628.00	STK				2680	629.55	TCY	
681	527316.64	1399172.86	628.00	STK	1681	627.96	SUB	2681	629.51	TCY	1.55
682	527316.63	1399177.20	630.16	STK	1682	630.07	SUB	2682	631.67	TCY	1.60
683	527269.62	1399146.49	629.00	STK	1683	628.92	SUB	2683	630.60	TCY	1.68
684	527269.61	1399150.49	627.00	STK	1684	626.95	SUB	2684	628.58	TCY	1.63
685	527269.59	1399159.49	627.00	STK				2685	628.59	TCY	
686	527269.57	1399163.63	629.00	STK				2686	630.5	TCY	
687	527269.56	1399166.63	629.00	STK				2687	630.5	TCY	
688	527269.55	1399170.72	627.00	STK				2688	628.59	TCY	
689	527269.55	1399172.72	627.00	STK	1689	626.93	SUB	2689	628.57	TCY	1.64
690	527269.54	1399177.06	629.16	STK	1690	629.10	SUB	2690	630.66	TCY	1.56
691	527231.27	1399176.95	628.36	STK	1691	628.26	SUB	2691	629.88	TCY	1.62
692	527221.98	1399186.17	628.36	STK	1692	628.11	SUB	2692	629.86	TCY	1.75
693	527195.18	1399185.44	627.75	STK	1693	627.65	SUB	2693	629.35	TCY	1.70
694	527193.02	1399183.44	626.75	STK	1694	626.31	SUB	2694	628.31	TCY	2.00
695	527190.01	1399183.44	626.75	STK	1695	626.44	SUB	2695	628.34	TCY	1.90
696	527184.54	1399180.44	625.50	STK	1696	625.46	SUB	2696	627.08	TCY	1.62
697	527194.38	1399178.44	626.60	STK				2697	627.06	TCY	
698	527218.78	1399178.44	625.50	STK				2698	627.04	TCY	
699	527219.60	1399180.44	625.50	STK	1699	625.43	SUB	2699	627.05	TCY	1.62
700	527228.05	1399172.60	626.00	STK	1700	625.89	SUB	2700	627.53	TCY	1.64
701	527227.25	1399170.60	626.00	STK				2701	627.55	TCY	
702	527223.77	1399166.50	628.00	STK				2702	629.53	TCY	
703	527222.55	1399163.50	628.00	STK				2703	629.51	TCY	
704	527215.47	1399170.44	628.00	STK				2704	629.52	TCY	
705	527216.70	1399173.44	628.00	STK				2705	629.53	TCY	
706	527198.36	1399173.44	628.00	STK				2706	629.51	TCY	
707	527196.56	1399170.44	628.00	STK				2707	629.53	TCY	
708	527193.39	1399165.44	625.50	STK	1708	625.32	SUB	2708	627.09	TCY	1.77
709	527191.76	1399143.44	625.50	STK	1709	625.43	SUB	2709	627.10	TCY	1.67
710	527213.39	1399143.44	625.50	STK	1710	625.50	SUB	2710	627.08	TCY	1.58
711	527213.39	1399165.44	625.50	STK	1711	625.48	SUB	2711	627.08	TCY	1.60
712	527220.38	1399159.35	625.95	STK	1712	625.90	SUB	2712	627.46	TCY	1.56
713	527220.38	1399150.35	625.95	STK	1713	625.73	SUB	2713	627.48	TCY	1.75
714	527223.38	1399146.35	628.00	STK	1714	628.00	SUB	2714	629.60	TCY	1.60
715	527215.46	1399138.44	628.00	STK	1715	627.90	SUB	2715	629.57	TCY	1.67
716	527191.61	1399138.44	627.75	STK	1716	627.31	SUB	2716	629.34	TCY	2.03
717	527189.77	1399140.28	626.75	STK	1717	626.33	SUB	2717	628.30	TCY	1.97
718	527186.77	1399140.28	626.75	STK	1718	626.31	SUB	2718	628.28	TCY	1.97
719	527182.93	1399096.42	627.32	STK	1719	627.09	SUB	2719	628.92	TCY	1.83
720	527185.93	1399096.43	627.32	STK	1720	627.21	SUB	2720	628.90	TCY	1.69
721	527187.93	1399096.44	628.32	STK	1721	628.26	SUB	2721	629.91	TCY	1.65
722	527222.68	1399096.54	629.06	STK	1722	628.97	SUB	2722	630.66	TCY	1.69
723	527269.77	1399096.68	630.06	STK	1723	630.02	SUB	2723	631.66	TCY	1.64
724	527316.87	1399096.81	631.06	STK	1724	630.97	SUB	2724	632.57	TCY	1.60
725	527363.96	1399096.95	632.06	STK	1725	632.00	SUB	2725	633.57	TCY	1.57
726	527411.06	1399097.09	633.06	STK	1726	633.02	SUB	2726	634.63	TCY	1.61
727	527423.50	1399097.13	633.33	STK	1727	633.21	SUB	2727	634.87	TCY	1.66
728	527425.50	1399097.13	632.33	STK	1728	632.27	SUB	2728	633.83	TCY	1.56
729	527428.50	1399097.14	632.33	STK	1729	632.30	SUB	2729	633.88	TCY	1.58
730	527430.82	1399097.15	633.49	STK	1730	633.41	SUB	2730	635.03	TCY	1.62
731	527458.15	1399097.23	634.06	STK	1731	633.98	SUB	2731	635.57	TCY	1.59
732	527505.24	1399097.37	635.06	STK	1732	635.00	SUB	2732	636.59	TCY	1.59
733	527552.34	1399097.50	636.06	STK	1733	635.96	SUB	2733	637.58	TCY	1.62
734	527599.43	1399097.64	637.06	STK	1734	636.98	SUB	2734	638.58	TCY	1.60
735	527646.53	1399097.78	638.07	STK	1735	637.98	SUB	2735	639.57	TCY	1.59
736	527654.50	1399097.80	638.26	STK	1736	638.11	SUB	2736	639.77	TCY	1.66
737	527656.50	1399097.81	637.26	STK	1737	636.98	SUB	2737	638.76	TCY	1.78
738	527659.50	1399097.82	637.26	STK	1738	637.12	SUB	2738	638.76	TCY	1.64
739	527661.86	1399097.82	638.44	STK	1739	638.36	SUB	2739	639.96	TCY	1.60
740	527693.62	1399097.92	639.24	STK	1740	639.17	SUB	2740	640.76	TCY	1.59
741	527747.44	1399098.08	640.57	STK	1741	640.54	SUB	2741	642.12	TCY	1.58
742	527801.25	1399098.23	641.90	STK	1742	641.83	SUB	2742	643.40	TCY	1.57
743	527855.06	1399098.39	643.24	STK	1743	643.16	SUB	2743	644.83	TCY	1.67
744	527907.50	1399098.54	644.54	STK	1744	644.50	SUB	2744	646.12	TCY	1.62
745	527912.30	1399098.56	646.06	STK	1745	646.04	SUB	2745	647.65	TCY	1.61
746	527917.30	1399098.57	646.06	STK	1746	646.02	SUB	2746	647.60	TCY	1.58
747	527917.36	1399048.57	647.31	STK	1747	647.27	SUB	2747	648.82	TCY	1.55
748	527912.36	1399048.56	647.31	STK	1748	647.23	SUB	2748	648.85	TCY	1.62
749	527907.73	1399048.54	645.77	STK	1749	645.68	SUB	2749	647.30	TCY	1.62
750	527855.20	1399048.39	644.47	STK	1750	644.40	SUB	2750	645.99	TCY	1.59
751	527801.39	1399048.23	643.14	STK	1751	643.05	SUB	2751	644.68	TCY	1.63
752	527747.58	1399048.08	641.81	STK	1752	641.77	SUB	2752	643.36	TCY	1.59
753	527693.77	1399047.92	640.47	STK	1753	640.37	SUB	2753	641.97	TCY	1.60
754	527661.86	1399047.82	639.68	STK	1754	639.64	SUB	2754	641.21	TCY	1.57
755	527659.50	1399047.82	638.50	STK	1755	638.28	SUB	2755	640.10	TCY	1.84
756	527656.50	1399047.81	638.50	STK	1756	638.26	SUB	2756	640.09	TCY	1.83
757	527654.50	1399047.80	639.50	STK	1757	639.40	SUB	2757	641.02	TCY	1.62
758	527646.68	1399047.78	639.31	STK	1758	639.25	SUB	2758	640.89	TCY	1.64
759	527599.58	1399047.64	638.14	STK	1759	638.07	SUB	2759	639.67	TCY	1.60
760	527552.49	1399047.50	637.12	STK	1760	637.05	SUB	2760	638.69	TCY	1.64
761	527505.39	1399047.37	636.12	STK	1761	636.05	SUB	2761	637.62	TCY	1.57
762	527458.30	1399047.23	635.12	STK	1762	635.06	SUB	2762	636.72	TCY	1.66
763	527430.82	1399047.15	634.55	STK	1763	634.45	SUB	2763	636.15	TCY	1.70
764	527428.50	1399047.14	633.39	STK	1764	633.02	SUB	2764	634.91	TCY	1.89
765	527425.50	1399047.13	633.39	STK	1765	633.02	SUB	2765	634.90	TCY	1.88
766	527423.50	1399047.13	634.39	STK	1766	633.98	SUB	2766	635.96	TCY	1.98
767	527411.20	1399047.09	634.12	STK	1767	634.04	SUB	2767	635.72	TCY	1.68
768	527364.11	1399046.95	633.12	STK	1768	633.06	SUB	2768	634.72	TCY	1.66
769	527317.01	1399046.82	632.12	STK	1769	632.06	SUB	2769	633.67	TCY	1.61
770	527269.92	1399046.68	631.12	STK	1770	631.03	SUB	2770	632.70	TCY	1.67
771	527222.82	1399046.54	630.12	STK	1771	630.05	SUB	2771	631.70	TCY	1.65
772	527187.71	1399046.44	629.36	STK	1772	629.35	SUB	2772	630.95	TCY	1.60
773	527186.71	1399046.43	628.36	STK	1773	628.21	SUB	2773	629.96	TCY	1.75
774	527182.71	1399046.42	628.36	STK	1774	627.95	SUB	2774	629.93	TCY	1.98
775	527182.48	1398996.42	629.39	STK	1775	629.10	SUB	2775	630.98	TCY	1.88
776	527185.48	1398998.43	629.39	STK	1776	629.25	SUB	2776	630.96	TCY	1.71
777	527187.48	1398996.44	630.39	STK	1777	630.35	SUB	2777	631.98	TCY	1.63
778	527222.97	1398996.54	631.18	STK	1778	631.10	SUB	2778	632.78	TCY	1.68
779	527270.06	1398996.68	632.18	STK	1779	632.08	SUB	2779	633.76	TCY	1.68
780	527317.16	1398996.82	633.18	STK	1780	633.09	SUB	2780	634.77	TCY	1.68
781	527364.25	1398996.95	634.18	STK	1781	634.18	SUB	2781	635.78	TCY	1.60
782	527411.35	1398997.09	635.18	STK	1782	635.17	SUB	2782	636.76	TCY	1.59
783	527423.50	1398997.13	635.45	STK	1783	634.87	SUB	2783	637.05	TCY	2.18

Proposed					Subgrade			Top of Clay			Top of Clay - Subgrade
Point #	Northing	Easting	Elevation	Desc.	Point #	Elevation	Desc.	Point #	Elevation	Desc.	
784	527425.50	1398997.13	634.45	STK	1784	634.20	SUB	2784	636.02	TCY	1.82
785	527428.50	1398997.14	634.45	STK	1785	634.22	SUB	2785	636.05	TCY	1.83
786	527430.82	1398997.15	635.61	STK	1786	635.52	SUB	2786	637.19	TCY	1.67
787	527458.44	1398997.23	636.18	STK	1787	636.15	SUB	2787	637.73	TCY	1.58
788	527505.54	1398997.37	637.18	STK	1788	637.13	SUB	2788	638.68	TCY	1.55
789	527552.63	1398997.50	638.21	STK	1789	638.13	SUB	2789	639.71	TCY	1.58
790	527599.73	1398997.64	639.38	STK	1790	639.29	SUB	2790	640.88	TCY	1.59
791	527646.82	1398997.78	640.54	STK	1791	640.47	SUB	2791	642.05	TCY	1.58
792	527654.50	1398997.80	640.73	STK	1792	640.60	SUB	2792	642.23	TCY	1.63
793	527656.50	1398997.81	639.73	STK	1793	639.37	SUB	2793	641.29	TCY	1.92
794	527659.50	1398997.82	639.73	STK	1794	639.58	SUB	2794	641.32	TCY	1.74
795	527661.86	1398997.82	640.91	STK	1795	640.83	SUB	2795	642.41	TCY	1.58
796	527693.92	1398997.92	641.71	STK	1796	641.61	SUB	2796	643.25	TCY	1.64
797	527747.73	1398998.08	643.04	STK	1797	642.96	SUB	2797	644.55	TCY	1.59
798	527801.54	1398998.23	644.38	STK	1798	644.30	SUB	2798	645.91	TCY	1.61
799	527855.35	1398998.39	645.71	STK	1799	645.61	SUB	2799	647.21	TCY	1.60
800	527907.97	1398998.54	647.01	STK	1800	646.91	SUB	2800	648.58	TCY	1.67
801	527912.43	1398998.56	648.55	STK	1801	648.46	SUB	2801	650.13	TCY	1.67
802	527917.43	1398998.57	648.55	STK	1802	648.48	SUB	2802	650.05	TCY	1.57
803	527917.49	1398948.57	649.79	STK	1803	649.79	SUB	2803	651.30	TCY	1.51
804	527912.49	1398948.56	649.79	STK	1804	649.77	SUB	2804	651.34	TCY	1.57
805	527908.20	1398948.55	648.25	STK	1805	648.21	SUB	2805	649.77	TCY	1.56
806	527855.50	1398948.39	646.94	STK	1806	646.90	SUB	2806	648.44	TCY	1.54
807	527801.69	1398948.23	645.61	STK	1807	645.53	SUB	2807	647.11	TCY	1.58
808	527747.87	1398948.08	644.28	STK	1808	644.20	SUB	2808	645.78	TCY	1.58
809	527694.06	1398947.92	642.95	STK	1809	642.86	SUB	2809	644.46	TCY	1.60
810	527661.86	1398947.82	642.15	STK	1810	642.05	SUB	2810	643.67	TCY	1.62
811	527659.50	1398947.82	640.97	STK	1811	640.63	SUB	2811	642.57	TCY	1.94
812	527656.50	1398947.81	640.97	STK	1812	640.67	SUB	2812	642.55	TCY	1.88
813	527654.50	1398947.80	641.97	STK	1813	641.81	SUB	2813	643.47	TCY	1.66
814	527646.97	1398947.78	641.78	STK	1814	641.70	SUB	2814	643.30	TCY	1.60
815	527599.87	1398947.64	640.61	STK	1815	640.52	SUB	2815	642.12	TCY	1.60
816	527552.78	1398947.50	639.45	STK	1816	639.38	SUB	2816	640.95	TCY	1.57
817	527505.68	1398947.37	638.28	STK	1817	638.18	SUB	2817	639.78	TCY	1.60
818	527458.59	1398947.23	637.24	STK	1818	637.19	SUB	2818	638.77	TCY	1.58
819	527430.82	1398947.15	636.67	STK	1819	636.60	SUB	2819	638.17	TCY	1.57
820	527428.50	1398947.14	635.51	STK	1820	635.12	SUB	2820	637.05	TCY	1.93
821	527425.50	1398947.13	635.51	STK	1821	635.08	SUB	2821	637.02	TCY	1.94
822	527423.50	1398947.13	636.51	STK	1822	636.16	SUB	2822	638.02	TCY	1.86
823	527411.49	1398947.09	636.24	STK	1823	636.17	SUB	2823	637.76	TCY	1.59
824	527364.40	1398946.95	635.24	STK	1824	635.14	SUB	2824	636.79	TCY	1.65
825	527364.50	1398911.07	636.00	STK	1825	635.92	SUB	2825	637.52	TCY	1.60
826	527317.42	1398908.78	635.05	STK	1826	635.00	SUB	2826	636.57	TCY	1.57
827	527317.30	1398946.82	634.24	STK	1827	634.15	SUB	2827	635.84	TCY	1.69
828	527270.21	1398946.68	633.24	STK	1828	633.19	SUB	2828	634.84	TCY	1.65
829	527270.33	1398906.49	634.09	STK	1829	634.04	SUB	2829	635.68	TCY	1.64
830	527214.84	1398903.81	632.97	STK	1830	632.94	SUB	2830	634.54	TCY	1.60
831	527223.11	1398946.54	632.24	STK	1831	632.15	SUB	2831	633.84	TCY	1.69
832	527187.28	1398946.43	631.43	STK	1832	631.33	SUB	2832	633.03	TCY	1.70
833	527185.27	1398946.43	630.43	STK	1833	630.04	SUB	2833	632.02	TCY	1.98
834	527182.26	1398946.42	630.43	STK	1834	630.04	SUB	2834	632.02	TCY	1.98
835	527186.45	1398902.80	631.47	STK	1835	630.86	SUB	2835	632.98	TCY	2.12
836	527189.41	1398903.15	631.47	STK	1836	630.94	SUB	2836	632.99	TCY	2.05
837	527191.39	1398903.52	632.47	STK	1837	632.38	SUB	2837	633.98	TCY	1.60
838	527190.62	1398887.87	631.79	STK	1838	631.78	SUB	2838	633.33	TCY	1.55
839	527195.28	1398882.40	632.00	STK	1839	631.93	SUB	2839	633.53	TCY	1.60
840	527198.81	1398877.28	633.19	STK	1840	632.75	SUB	2840	634.78	TCY	2.03
841	527216.83	1398872.87	633.66	STK	1841	633.62	SUB	2841	635.26	TCY	1.64
842	527270.42	1398876.32	634.73	STK	1842	634.70	SUB	2842	636.33	TCY	1.63
843	527270.45	1398865.29	638.16	STK	1843	638.08	SUB	2843	639.75	TCY	1.67
844	527317.53	1398868.32	639.13	STK	1844	639.04	SUB	2844	640.68	TCY	1.64
845	527317.50	1398879.34	635.67	STK	1845	635.59	SUB	2845	637.26	TCY	1.67
846	527364.59	1398882.36	636.61	STK	1846	636.53	SUB	2846	638.21	TCY	1.68
847	527364.62	1398871.34	640.08	STK	1847	640.02	SUB	2847	641.61	TCY	1.59
848	527411.71	1398874.37	641.03	STK	1848	640.93	SUB	2848	642.53	TCY	1.60
849	527411.67	1398885.39	637.55	STK	1849	637.48	SUB	2849	639.08	TCY	1.60
850	527423.50	1398886.15	637.78	STK	1850	637.69	SUB	2850	639.38	TCY	1.69
851	527425.50	1398889.28	636.78	STK	1851	636.78	SUB	2851	638.36	TCY	1.58
852	527428.50	1398889.47	636.78	STK	1852	636.77	SUB	2852	638.37	TCY	1.60
853	527430.82	1398886.62	637.93	STK	1853	637.85	SUB	2853	639.51	TCY	1.66
854	527458.76	1398886.41	638.49	STK	1854	638.43	SUB	2854	640.00	TCY	1.67
855	527458.79	1398877.39	642.11	STK	1855	642.03	SUB	2855	643.62	TCY	1.59
856	527505.88	1398880.42	643.20	STK	1856	643.12	SUB	2856	644.70	TCY	1.58
857	527505.85	1398891.44	639.42	STK	1857	639.33	SUB	2857	640.98	TCY	1.65
858	527552.93	1398894.46	640.76	STK	1858	640.67	SUB	2858	642.26	TCY	1.59
859	527552.97	1398883.44	644.29	STK	1859	644.22	SUB	2859	645.81	TCY	1.59
860	527600.05	1398886.46	645.38	STK	1860	645.30	SUB	2860	646.89	TCY	1.59
861	527600.02	1398897.48	641.85	STK	1861	641.77	SUB	2861	643.45	TCY	1.68
862	527647.14	1398889.49	646.48	STK	1862	646.43	SUB	2862	647.98	TCY	1.55
863	527647.11	1398900.51	642.95	STK	1863	642.89	SUB	2863	644.55	TCY	1.66
864	527654.50	1398900.98	643.12	STK	1864	643.11	SUB	2864	644.72	TCY	1.61
865	527656.50	1398904.12	642.12	STK	1865	642.08	SUB	2865	643.72	TCY	1.64
866	527659.50	1398904.31	642.12	STK	1866	642.10	SUB	2866	643.69	TCY	1.59
867	527661.86	1398901.46	643.29	STK	1867	643.26	SUB	2867	644.81	TCY	1.55
868	527694.19	1398903.48	644.04	STK	1868	643.97	SUB	2868	645.60	TCY	1.63
869	527694.23	1398892.40	647.58	STK	1869	647.49	SUB	2869	649.14	TCY	1.65
870	527748.03	1398894.76	648.84	STK	1870	648.75	SUB	2870	650.42	TCY	1.67
871	527748.00	1398905.28	645.34	STK	1871	645.25	SUB	2871	646.94	TCY	1.69
872	527801.81	1398907.09	646.63	STK	1872	646.58	SUB	2872	648.23	TCY	1.65
873	527801.84	1398897.13	650.15	STK	1873	650.07	SUB	2873	651.73	TCY	1.66
874	527855.64	1398898.49	651.66	STK	1874	651.57	SUB	2874	653.23	TCY	1.66
875	527855.61	1398908.90	647.92	STK	1875	647.85	SUB	2875	649.47	TCY	1.62
876	527908.38	1398910.67	649.19	STK	1876	649.13	SUB	2876	650.77	TCY	1.64
877	527912.54	1398910.89	650.72	STK	1877	650.66	SUB	2877	652.30	TCY	1.64
878	527917.54	1398910.89	650.72	STK	1878	650.64	SUB	2878	652.32	TCY	1.68
879	527922.52	1398902.44	653.51	STK	1879	650.64	SUB	2879	652.35	TCY	1.71
880	527954.63	1398903.85	643.37	STK	1880	642.20	SUB	2880	644.97	TCY	2.77
881	527954.96	1398929.87	642.71	STK	1881	642.54	SUB	2881	644.30	TCY	1.76
882	527939.00	1398937.79	642.85	STK	1882	642.82	SUB	2882	644.36	TCY	1.54
883	527939.11	1398976.01	641.95	STK	1883	641.89	SUB	2883	643.45	TCY	1.56
884	527955.56	1398975.85	641.55	STK	1884	641.37	SUB	2884	643.06	TCY	1.69
885	527956.13	1399021.84	640.39	STK	1885	640.22	SUB	2885	641.90	TCY	1.68
886	527939.23	1399021.95	640.79	STK	1886	640.70	SUB	2886	642.31	TCY	1.61
887	527939.36	1399067.89	639.64	STK	1887	639.61	SUB	2887	641.14	TCY	1.53
888	527956.71	1399067.82	639.23	STK	1888	639.09	SUB	2888	640.77	TCY	1.68
889	527957.30	1399113.80	638.07	STK	1889	637.95	SUB	2889	639.63	TCY	1.68
890	527939.48	1399113.83	638.48	STK	1890	638.40	SUB	2890	640.07	TCY	1.67
891	527939.61	1399159.77	637.33	STK	1891	637.24	SUB	2891	638.93	TCY	1.69
892	527957.88	1399159.81	636.91	STK	1892	636.77	SUB	2892	638.45	TCY	1.68
893	527957.60	1399207.61	638.11	STK	1893	637.96	SUB	2893	639.68	TCY	1.72
894	527939.39	1399207.58	638.53	STK	1894	638.44	SUB	2894	640.11	TCY	1.67
895	527939.18	1399255.39	639.73	STK	1895	639.66	SUB	2895	641.32	TCY	1.66
896	527957.32	1399255.43	639.31	STK	1896	639.13	SUB	2896	640.84	TCY	1.71
897	527957.04	1399303.25	640.51	STK	1897	640.36	SUB	2897	642.02	TCY	1.66
898	527938.96	1399303.20	640.93	STK	1898	640.91	SUB	2898	642.52	TCY	1.61
899	527938.75	1399351.01	642.14	STK	1899	642.07	SUB	2899	643.70	TCY	1.63
900	527956.75	1399351.07	641.71	STK	1900	641.55	SUB	2900	643.31	TCY	1.76
901	527956.47	1399398.89	642.91	STK	1901	642.76	SUB	2901	644.48	TCY	1.72
902	527938.53	1399398.82	643.34	STK	1902	643.27	SUB	2902	644.89	TCY	1.62
903	527938.31	1399446.63	644.54	STK	1903	644.53	SUB	2903	646.13	TCY	1.60
904	527956.19	1399446.71	644.11	STK	1904	643.96	SUB	2904	645.70	TCY	1.74
905	527954.08	1399490.57	645.26	STK	1905	645.12	SUB	2905	646.76	TCY	1.64
906	527938.14	1399485.05	645.50	STK	1906	645.43	SUB	2906	647.10	TCY	1.67
907	527937.97	1399523.46	646.47	STK	1907	646.45	SUB	2907	648.00	TCY	1.55
908	527951.87	1399534.63	646.40	STK	1908	644.41	SUB	2908	647.90	TCY	3.49
909	527926.00	1399577.24	642.00	STK	1909	641.91	SUB	2909	645.45	TCY	3.54
910	527902.62	1399575.39	642.00	STK	1910	641.99	SUB	2910	643.58	TCY	1.59
911	527909.73	1399593.41	642.00	STK	1911	641.93	SUB	2911	643.78	TCY	1.85
912	527860.80	1399593.03	640.74	STK	1912	640.61	SUB	2912	642.26	TCY	1.65
913	527852.95	1399575.11	640.88	STK	1913	640.84	SUB	2913	642.48	TCY	1.64
914	527803.27	1399574.82	639.74	STK	1914	639.69	SUB	2914	641.33	TCY	1.64
915	527809.99	1399592.63	639.44	STK	1915	639.32	SUB	2915	640.97	TCY	1.65
916	527759.18	1399592.23	638.18	STK	1916	638.05	SUB	2916	639.77	TCY	1.72
917	527753.60	1399574.54	638.51	STK	1917	638.47	SUB	2917	640.09	TCY	1.62
918	527703.92	1399574.26	637.28	STK	1918	637.26	SUB	2918	638.81	TCY	1.55
919	527708.37	1399591.83	636.93	STK	1919	636.76	SUB	2919	638.52	TCY	1.76
920	527657.56	1399591.43	635.67	STK	1920	635.50	SUB	2920	637.27	TCY	1.77
921	527654.24	1399573.98	636.05	STK	1921	635.97	SUB	2921	637.61	TCY	1.64
922	527604.57	1399573.70	634.82	STK	1922	634.72	SUB	2922	636.32	TCY	1.60
923	527606.75	1399591.03	634.41	STK	1923	634.23	SUB	2923	636.01	TCY	1.78
924	527555.94	1399590.63	633.23	STK	1924	633.15	SUB	2924	634.81	TCY	1.66
925	527554.89	1399573.42	633.59	STK	1925	633.49	SUB	2925	635.19	TCY	1.70
926	527505.22	1399573.14	632.36	STK	1926	632.35	SUB	2926	633.95	TCY	1.60
927	527505.13	1399590.23	632.08	STK	1927	631.98	SUB	2927	633.67	TCY	1.69
928	527454.22	1399590.65	630.75	STK	1928	630.59	SUB	2928	632.26	TCY	1.67
929	527454.38	1399572.85	631.10	STK	1929	631.10	SUB	2929	632.68	TCY	1.58
930	527403.55	1399572.56	629.84	STK	1930	629.70	SUB	2930	631.37	TCY	1.67
931	527403.36	1399591.08	629.41	STK	1931	629.29	SUB	2931	630.98	TCY	1.69
932	527352.54	1399591.51	628.08	STK	1932	627.98	SUB	2932	629.68	TCY	1.70
933	527352.26	1399573.27	628.55	STK	1933	628.46	SUB	2933	630.06	TCY	1.60
934	527309.34	1399573.86	627.47	STK	1934	627.39	SUB	2934	628.99	TCY	1.60
935	527309.60	1399591.74	627.04	STK	1935	626.92	SUB	2935	628.61	TCY	1.69
936	527266.65	1399591.95	626.00	STK	1936	625.95	SUB	2936	627.60	TCY	1.55
937	527263.31	1399574.49	626.31	STK	1937	626.29	SUB	2937	627.84	TCY	1.55
938	527203.53	1399595.03	625.90	STK	1938	625.82	SUB	2938	627.50	TCY	1.68
939	527203.28	1399579.32	626.72	STK	1939	628.25	SUB	2939	629.83	TCY	1.58
940	527207.64	1399571.07	630.38	STK	1940	630.75	SUB	2940	632.42	TCY	1.67
941	527192.91	1399170.44	626.45	STK				2941	628.00	TCY	
942	527192.92	1399173.44	626.52	STK				2942	628.07	TCY	
943	527189.92	1399173.44	626.52	STK				2943	628.09	TCY	
944	527189.91	1399170.44	626.45	STK				2944	628.01	TCY	

NORTH CAROLINA PROFESSIONAL SEAL L-1290 LAND SURVEYOR F. DONALD LAWRENCE

5-6-09

Sheet 2

REVISIONS

Drawn By JLH

Landfill As-Built

Plant Allen Steam Station

Gaston County, North Carolina

Orig. scale

Date: May 4, 2009

Surveyed by: Lawrence Associates, P.A.
106 W. Jefferson St. P.O. Box 1014
Monroe, North Carolina 28112 (704) 289-1013

Job No. 1640 | Drawing file: alnverify.dwg | Drawing no. 09/45

APPENDIX II – GEOSYNTHETICS

APPENDIX II – GEOSYNTHETICS
Section 1 – Interface Friction Testing

Interface Friction Test Results
ROI 4 – Shear Envelope Plots

Interface Friction Testing

GCL: Cetco "Bentomat ST"
Geomembrane: Agru America "60-mil HDPE Microspike"
Geocomposite: Skaps "TN300-2-8"

Interface Friction Test Results Summary[1]

Interface	Interface Description	Peak Friction Angle (degrees)	Peak Adhesion (psf)	Large Displacement Friction Angle (degrees)	Large Displacement Adhesion (psf)
1	Soil to GCL (woven geotextile - black side)	15.8	352	9.5	232
2	Soil to GCL (nonwoven geotextile - white side)	20.7	340	13	329
3	GCL (woven geotextile - black side) to Geomembrane (short spike side)	17.7	261	10.6	264
4	GCL (woven geotextile - black side) to Geomembrane (long spike side)	14.3	948	11.4	525
5	GCL (nonwoven geotextile - white side) to Geomembrane (short spike side)	20.9	498	9.4	412
6	GCL (nonwoven geotextile - white side) to Geomembrane (long spike side)	24.5	181	11.9	491
7	Geomembrane (short spike side) to Geocomposite	21	497	8.6	342
8	Geomembrane (long spike side) to Geocomposite	24.3	0	15.8	0

[1] See attached ROI 4 peak and large displacement shear strength envelope plots versus project specifications

TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

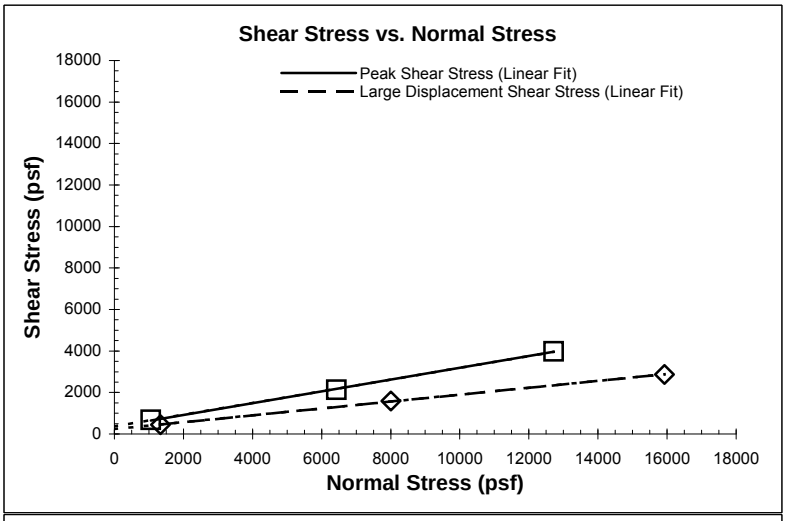
Interface Friction Test Report

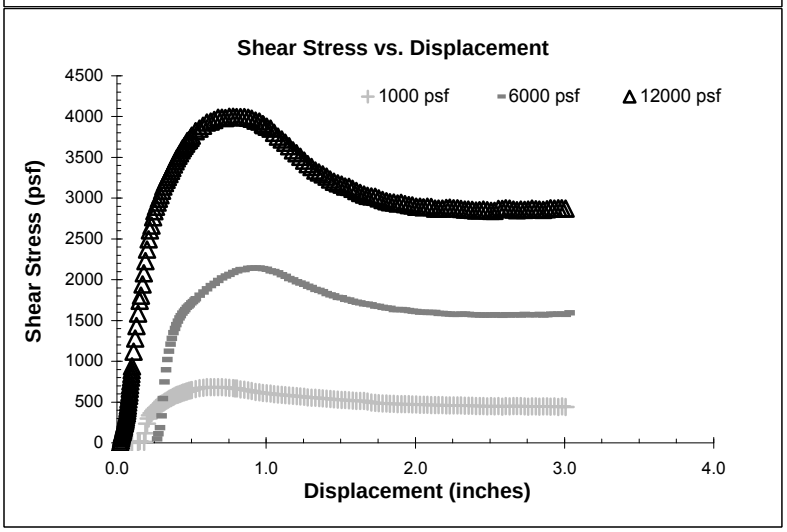
Client: **S & ME**
Project: **Allen Steam Station, RAB Ash Landfill**
Test Date: 11/21/08-11/25/08

TRI Log#: E2308-81-06
Test Method: ASTM D 6243

John M. Allen, E.I.T., 11/25/2008
Quality Review/Date

Tested Interface: Bentomat ST GCL (5162) vs. Compacted Soil Liner





Test Results

	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	15.8	9.5
Y-intercept or Adhesion (psf):	352	232

Note: Regression angles include an area correction.

Test Conditions

Upper Box & Bentomat ST GCL (black side to soil)

Lower Box Compacted Soil Liner remolded to 91.3 pcf at 28% moisture content

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 24 hours prior to shear.

Test Condition: Wet

Shearing Rate: 0.04 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	18	65	122
Area Corrected Normal Stress (psf)	1053	6430	12719
Area Corrected Peak Shear Stress (psf)	681	2121	3987
Area Corrected Large Displacement Normal Stress (psf)	1334	8006	15923
Area Corrected Large Displacement Shear Stress (psf)	441	1591	2875
Peak Secant Angle (degrees)	32.9	18.3	17.4
Large Displacement Secant Angle (degrees)	18.3	11.2	10.2

Soil Characterization

USCS:	Proctor Type:	standard
LL:	Max. Dry Density (pcf):	96.1
PL:	Optimum Moisture Content:	25.5

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

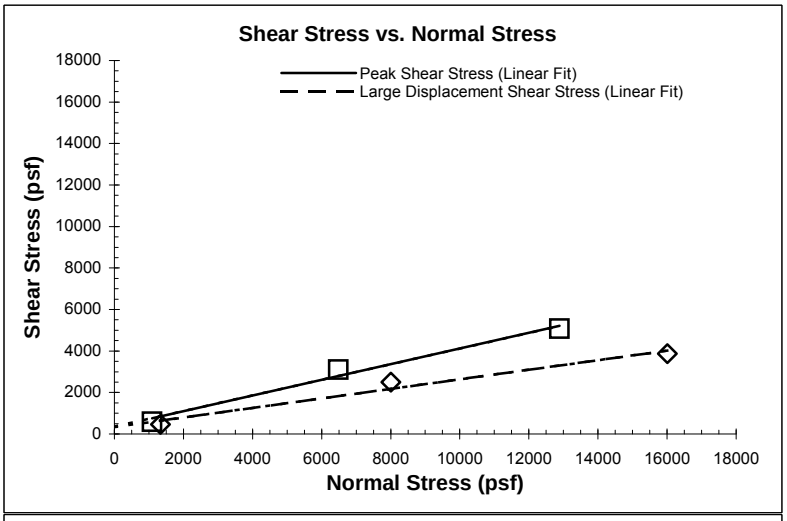
Interface Friction Test Report

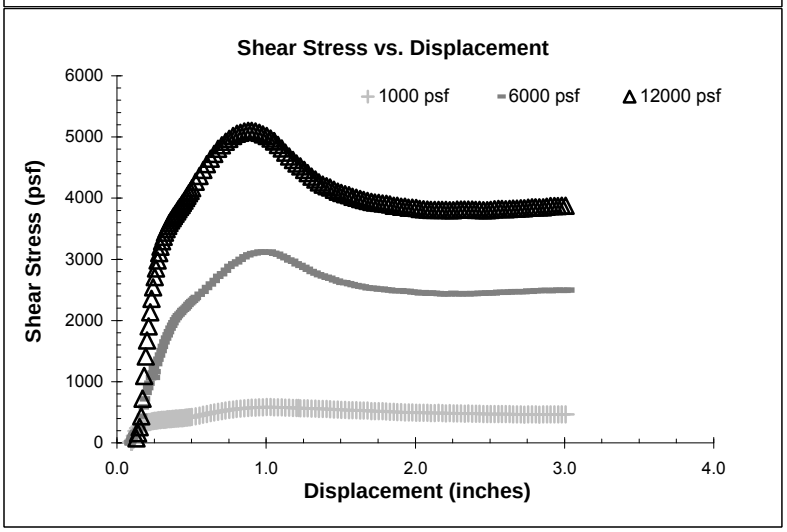
Client: **S & ME**
Project: **Allen Steam Station, RAB Ash Landfill**
Test Date: 11/19/08-11/21/08

TRI Log#: E2308-81-06
Test Method: ASTM D 6243

John M. Allen, E.I.T., 11/21/2008
Quality Review/Date

Tested Interface: Bentomat ST GCL (5162) vs. Compacted Soil Liner





Test Results

	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	20.7	13.0
Y-intercept or Adhesion (psf):	340	329

Note: Regression angles include an area correction.

Test Conditions

Upper Box & Bentomat ST GCL (white side to soil)

Lower Box Compacted Soil Liner remolded to 91.3 pcf at 28% moisture content

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 24 hours prior to shear.

Test Condition: Wet

Shearing Rate: 0.04 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	18	65	122
Area Corrected Normal Stress (psf)	1091	6488	12890
Area Corrected Peak Shear Stress (psf)	584	3103	5070
Area Corrected Large Displacement Normal Stress (psf)	1334	8005	16012
Area Corrected Large Displacement Shear Stress (psf)	463	2493	3877
Peak Secant Angle (degrees)	28.2	25.6	21.5
Large Displacement Secant Angle (degrees)	19.2	17.3	13.6

Soil Characterization

USCS:	Proctor Type:	standard
LL:	Max. Dry Density (pcf):	96.1
PL:	Optimum Moisture Content:	25.5

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

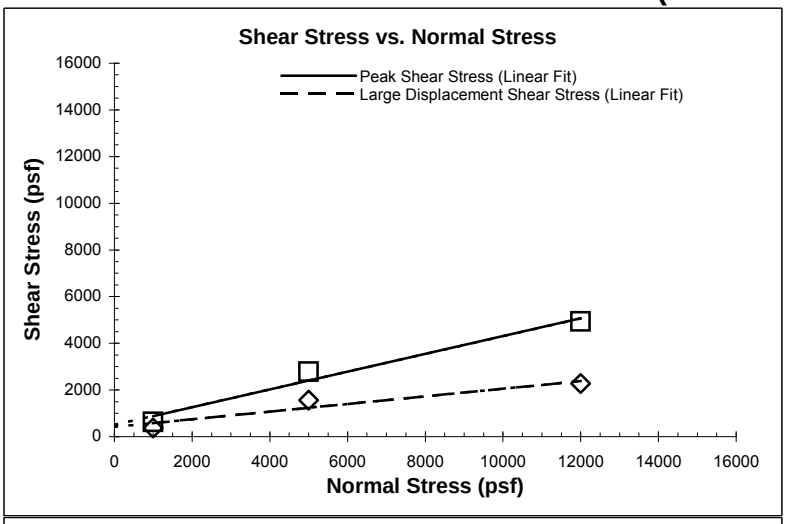
Interface Friction Test Report

Client: **S & ME**
Project: **Allen Steam Station, RAB Ash Landfill**
Test Date: 11/20/08-11/21/08

TRI Log#: E2308-81-06
Test Method: ASTM D 6243

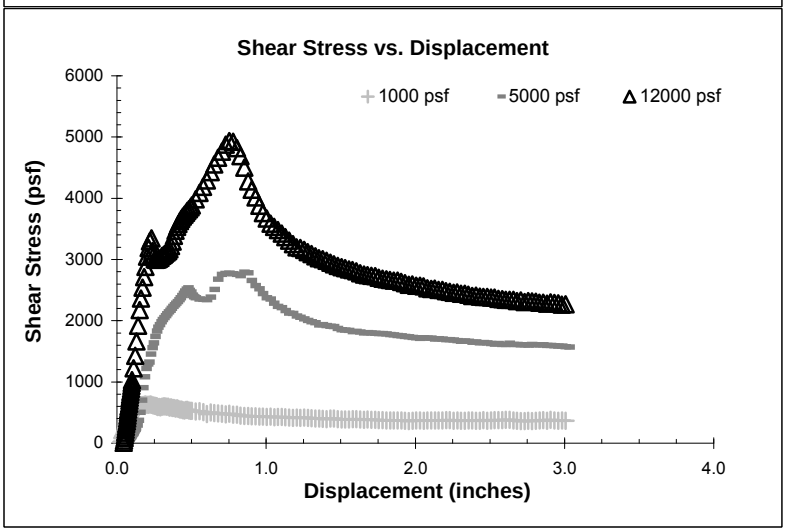
John M. Allen, E.I.T., 11/21/2008
Quality Review/Date

Tested Interface: Bentomat ST GCL (5162) vs. Agru 60 mil HDPE Microspike Geomembrane (114709.08)



Test Results

	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	20.9	9.4
Y-intercept or Adhesion (psf):	498	412



Test Conditions

Upper Box & Lower Box: Bentomat ST GCL (black side to geomembrane)

Lower Box: Agru 60 mil HDPE Microspike geomembrane (short spike to GCL)

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 24 hours prior to shear.

Test Condition: Wet

Shearing Rate: 0.04 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	18	56	122
Normal Stress (psf)	1000	5000	12000
Corrected Peak Shear Stress (psf)	634	2790	4934
Corrected Large Displacement Shear Stress (psf)	366	1568	2270
Peak Secant Angle (degrees)	32.4	29.2	22.4
Large Displacement Secant Angle (degrees)	20.1	17.4	10.7
Asperity (mils)	27.0	26.6	27.2

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

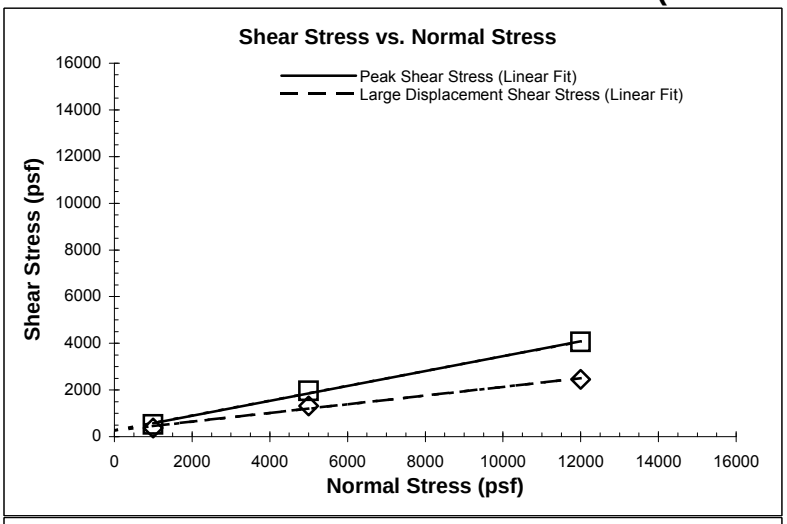
Interface Friction Test Report

Client: **S & ME**
Project: **Allen Steam Station, RAB Ash Landfill**
Test Date: 11/21/08-11/24/08

TRI Log#: E2308-81-06
Test Method: ASTM D 6243

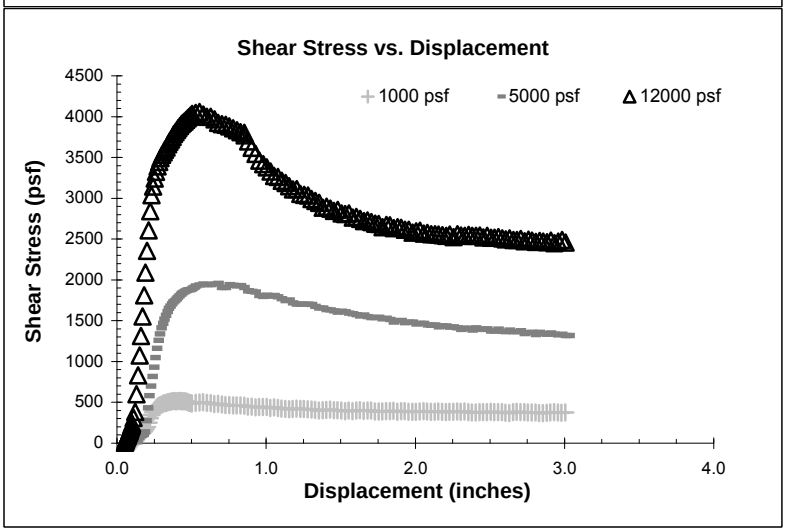
John M. Allen, E.I.T., 11/24/2008
Quality Review/Date

Tested Interface: Bentomat ST GCL (5162) vs. Agru 60 mil HDPE Microspike Geomembrane (114709.08)



Test Results

	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	17.7	10.6
Y-intercept or Adhesion (psf):	261	264



Test Conditions

Upper Box & Lower Box: Bentomat ST GCL (black side to geomembrane)

Lower Box: Agru 60 mil HDPE Microspike geomembrane (long spike to GCL)

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 24 hours prior to shear.

Test Condition: Wet

Shearing Rate: 0.04 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	18	56	122
Normal Stress (psf)	1000	5000	12000
Corrected Peak Shear Stress (psf)	518	1955	4055
Corrected Large Displacement Shear Stress (psf)	374	1317	2459
Peak Secant Angle (degrees)	27.4	21.4	18.7
Large Displacement Secant Angle (degrees)	20.5	14.8	11.6
Asperity (mils)	33.4	33.0	33.0

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

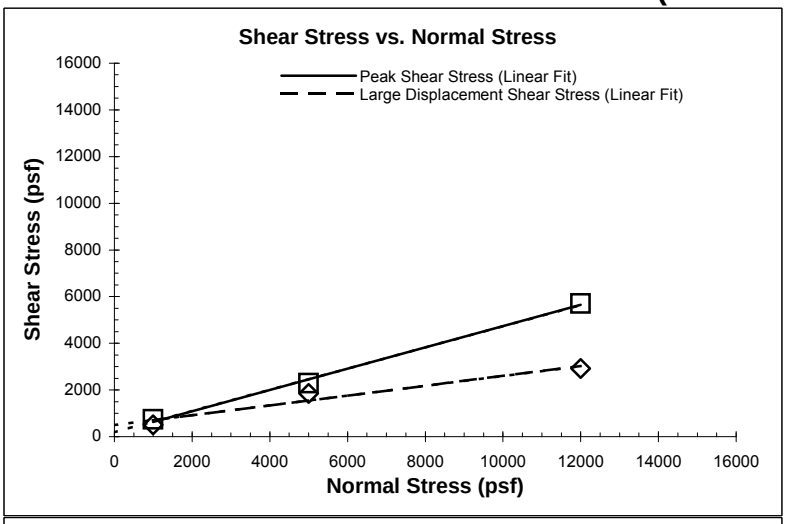
Interface Friction Test Report

Client: **S & ME**
Project: **Allen Steam Station, RAB Ash Landfill**
Test Date: 11/19/08-11/21/08

TRI Log#: E2308-81-06
Test Method: ASTM D 6243

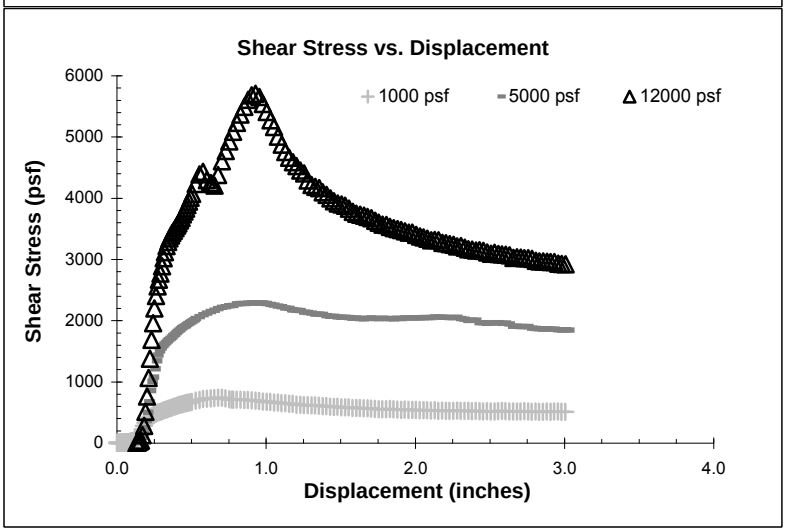
John M. Allen, E.I.T., 11/21/2008
Quality Review/Date

Tested Interface: Bentomat ST GCL (5162) vs. Agru 60 mil HDPE Microspike Geomembrane (114709.08)



Test Results

	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	24.5	11.9
Y-intercept or Adhesion (psf):	181	491



Test Conditions

Upper Box & Lower Box: Bentomat ST GCL (white side to geomembrane)

Lower Box: Agru 60 mil HDPE Microspike geomembrane (short spike to GCL)

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 24 hours prior to shear.

Test Condition: Wet

Shearing Rate: 0.04 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	18	56	122
Normal Stress (psf)	1000	5000	12000
Corrected Peak Shear Stress (psf)	743	2292	5709
Corrected Large Displacement Shear Stress (psf)	513	1846	2922
Peak Secant Angle (degrees)	36.6	24.6	25.4
Large Displacement Secant Angle (degrees)	27.2	20.3	13.7
Asperity (mils)	28.4	28.0	26.0

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

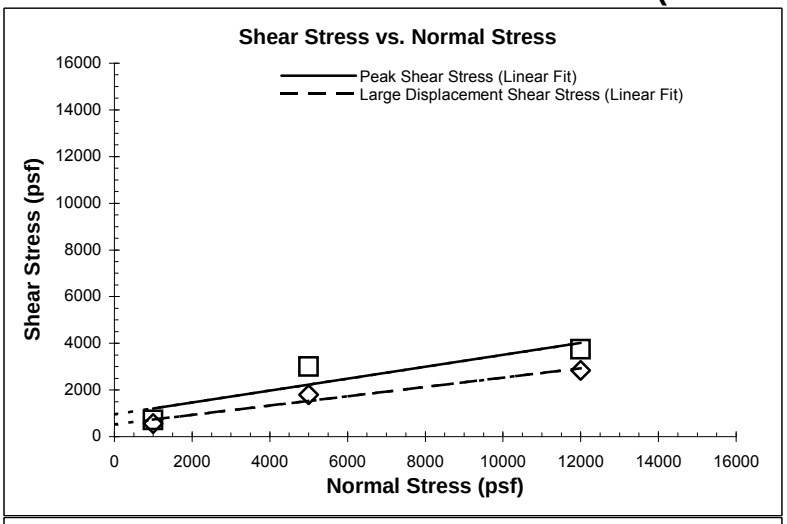
Interface Friction Test Report

Client: **S & ME**
Project: **Allen Steam Station, RAB Ash Landfill**
Test Date: 11/21/08-11/24/08

TRI Log#: E2308-81-06
Test Method: ASTM D 6243

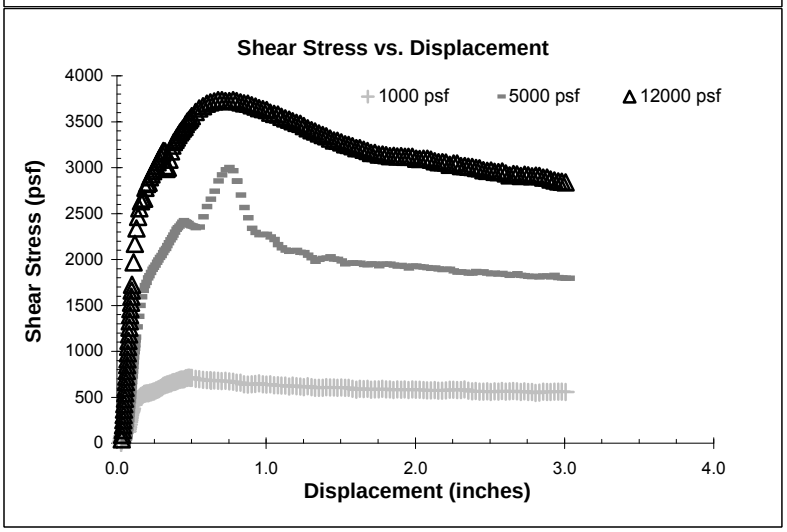
John M. Allen, E.I.T., 11/24/2008
Quality Review/Date

Tested Interface: Bentomat ST GCL (5162) vs. Agru 60 mil HDPE Microspike Geomembrane (114709.08)



Test Results

	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	14.3	11.4
Y-intercept or Adhesion (psf):	948	525



Test Conditions

Upper Box & Lower Box: Bentomat ST GCL (white side to geomembrane)

Lower Box: Agru 60 mil HDPE Microspike geomembrane (long spike to GCL)

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 24 hours prior to shear.

Test Condition: Wet

Shearing Rate: 0.04 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	18	56	122
Normal Stress (psf)	1000	5000	12000
Corrected Peak Shear Stress (psf)	713	2999	3737
Corrected Large Displacement Shear Stress (psf)	556	1796	2839
Peak Secant Angle (degrees)	35.5	31.0	17.3
Large Displacement Secant Angle (degrees)	29.1	19.8	13.3
Asperity (mils)	33.8	32.6	32.4

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

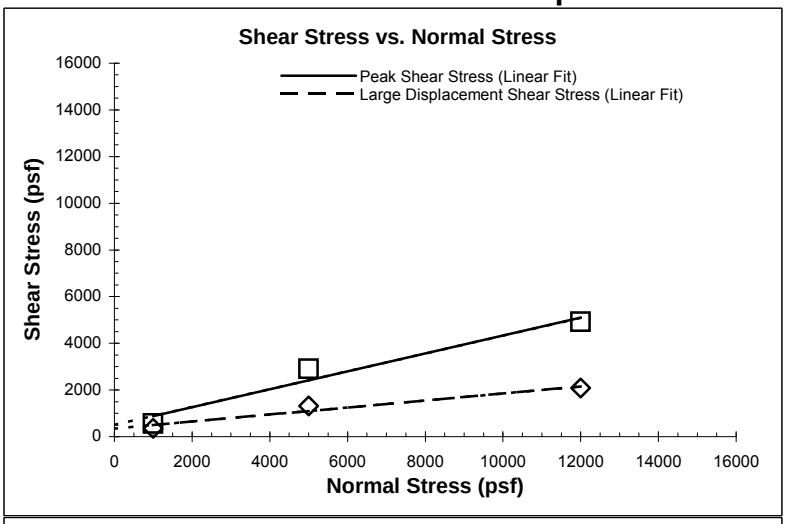
Interface Friction Test Report

Client: **S & ME**
Project: **Allen Steam Station, RAB Ash Landfill**
Test Date: 11/19/08-11/19/08

TRI Log#: E2308-81-06
Test Method: ASTM D 5321

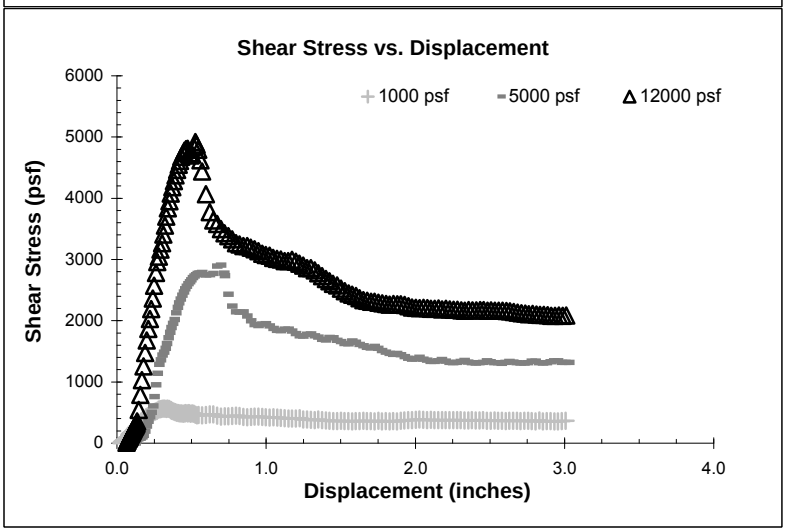
John M. Allen, E.I.T., 11/21/2008
Quality Review/Date

Tested Interface: Skaps TN300-2-8 Double-sided Geocomposite vs. Agru 60 mil HDPE Microspike Geomembrane (114709.08)



Test Results

	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	21.0	8.6
Y-intercept or Adhesion (psf):	497	342



Test Conditions

Upper Box & Lower Box: Skaps TN300-2-8 double-sided geocomposite

Lower Box: Agru 60 mil HDPE Microspike geomembrane (short spike to geocomposite)

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 1 hour prior to shear.

Test Condition: Wet

Shearing Rate: 0.2 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	18	56	122
Normal Stress (psf)	1000	5000	12000
Corrected Peak Shear Stress (psf)	567	2907	4918
Corrected Large Displacement Shear Stress (psf)	355	1317	2080
Peak Secant Angle (degrees)	29.5	30.2	22.3
Large Displacement Secant Angle (degrees)	19.5	14.8	9.8
Asperity (mils)	28.4	28.2	28.6

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

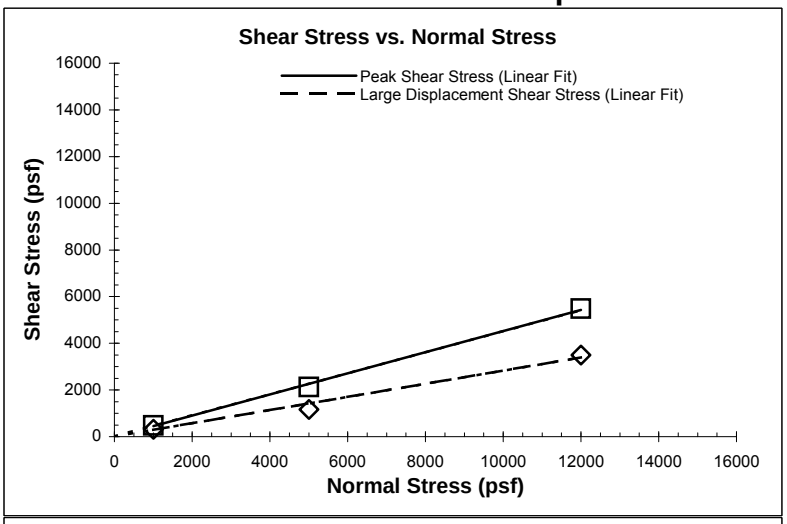
Interface Friction Test Report

Client: **S & ME**
Project: **Allen Steam Station, RAB Ash Landfill**
Test Date: 11/20/08-11/20/08

TRI Log#: E2308-81-06
Test Method: ASTM D 5321

John M. Allen, E.I.T., 11/21/2008
Quality Review/Date

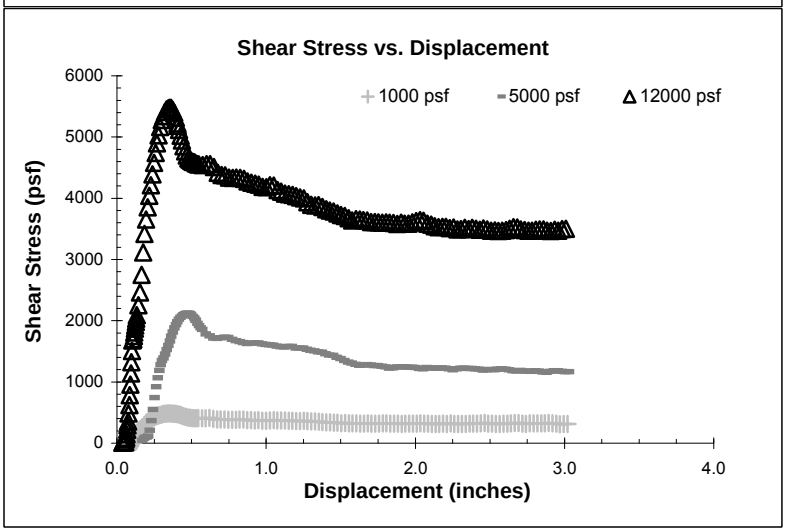
Tested Interface: Skaps TN300-2-8 Double-sided Geocomposite vs. Agru 60 mil HDPE Microspike Geomembrane (114709.08)



Test Results

	Peak	Large Displacement (@ 3.0 in.)
Friction Angle (degrees):	24.3	15.8
Y-intercept or Adhesion (psf):	0	0

Regression friction angles include the origin.



Test Conditions

Upper Box & Lower Box: Skaps TN300-2-8 double-sided geocomposite

Lower Box: Agru 60 mil HDPE Microspike geomembrane (long spike to geocomposite)

Box Dimensions: 12"x12"x4"

Interface Conditioning: Interface soaked and loading applied for a minimum of 1 hour prior to shear.

Test Condition: Wet

Shearing Rate: 0.2 inches/minute

Test Data

Specimen No.	1	2	3
Bearing Slide Resistance (lbs)	18	56	122
Normal Stress (psf)	1000	5000	12000
Corrected Peak Shear Stress (psf)	485	2124	5478
Corrected Large Displacement Shear Stress (psf)	315	1166	3499
Peak Secant Angle (degrees)	25.9	23.0	24.5
Large Displacement Secant Angle (degrees)	17.5	13.1	16.3
Asperity (mils)	30.2	30.8	30.2

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

9063 Bee Caves Road □ Austin, TX 78733-6201 □ (512) 263-2101 □ (512) 263-2558 □ 1-800-880-TEST

Figure 1: Soil to GCL - Woven Geotextile (Black Side)

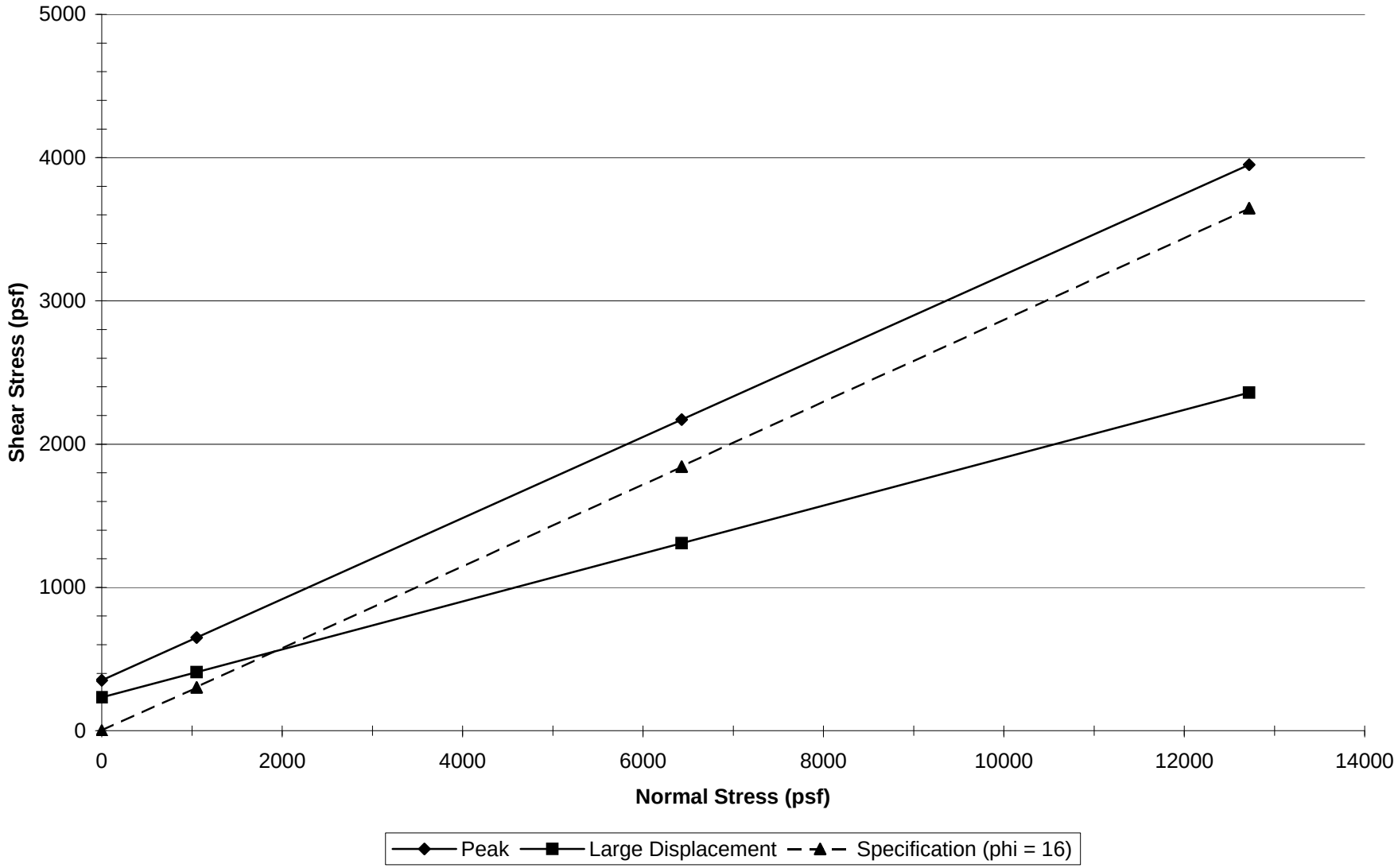


Figure 2: Soil to GCL - Nonwoven Geotextile (White Side)

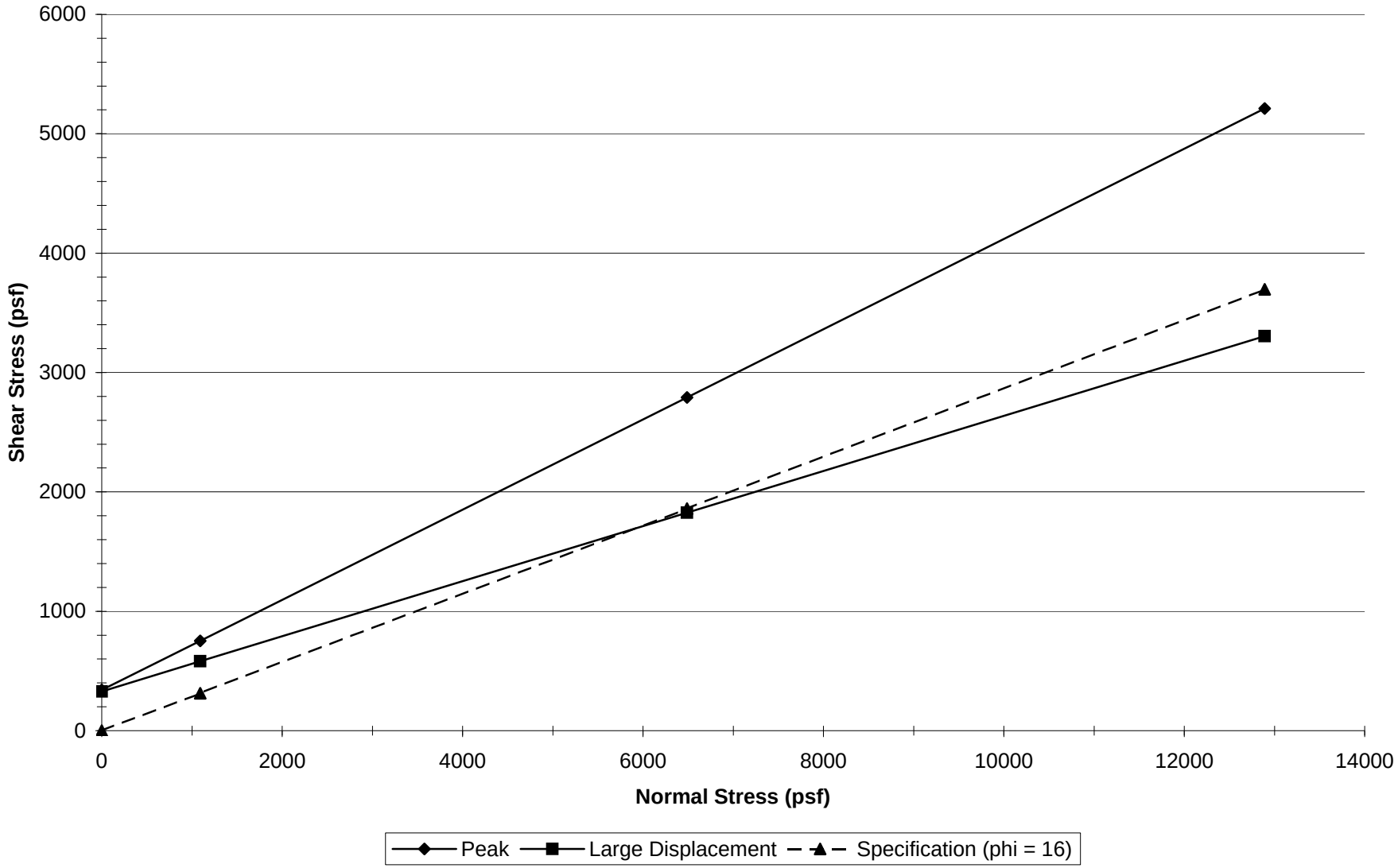


Figure 3: GCL - Woven Geotextile (Black Side) to HDPE Geomembrane (Short Spike Side)

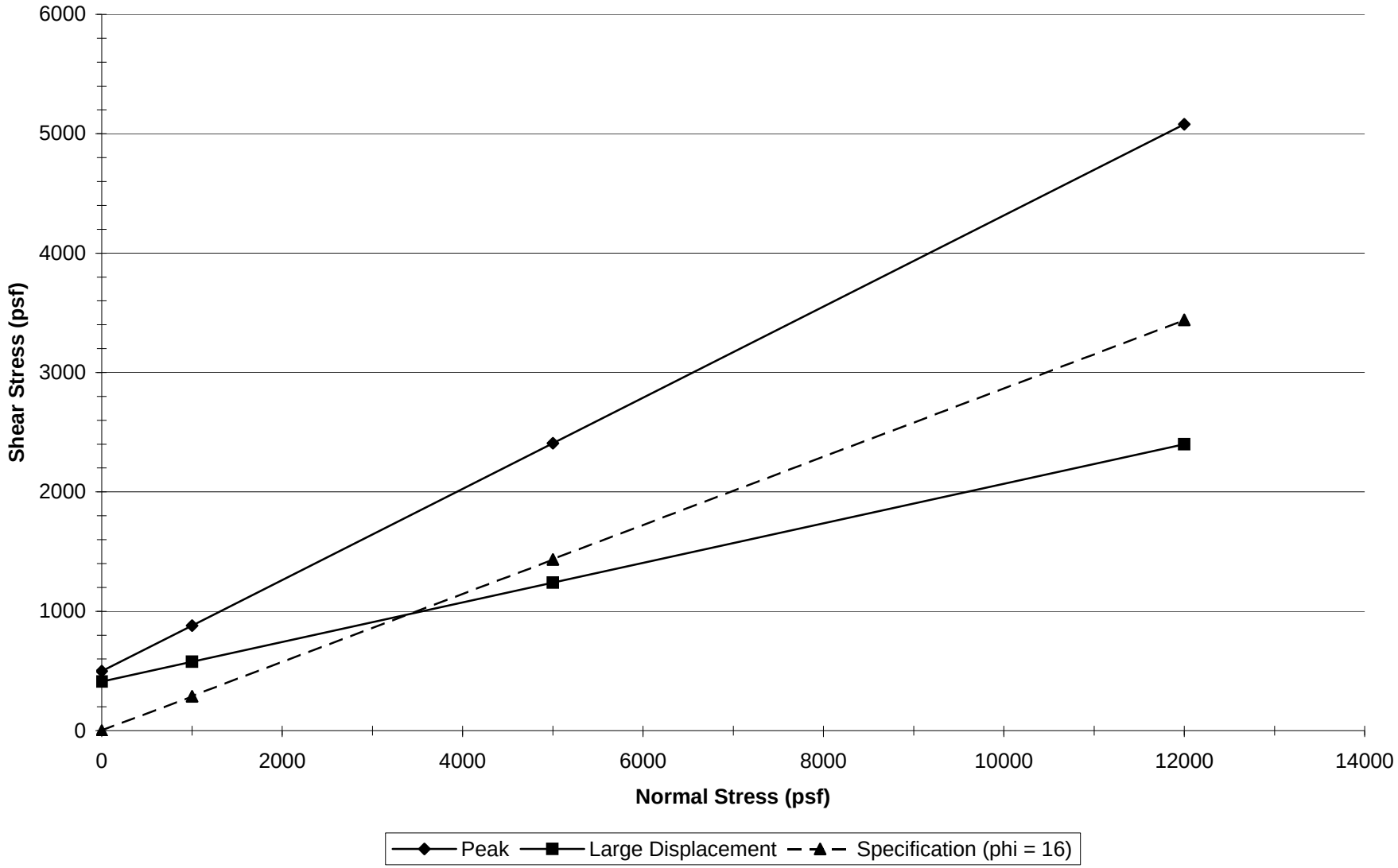


Figure 4: GCL - Woven Geotextile (Black Side) to HDPE Geomembrane (Long Spike Side)

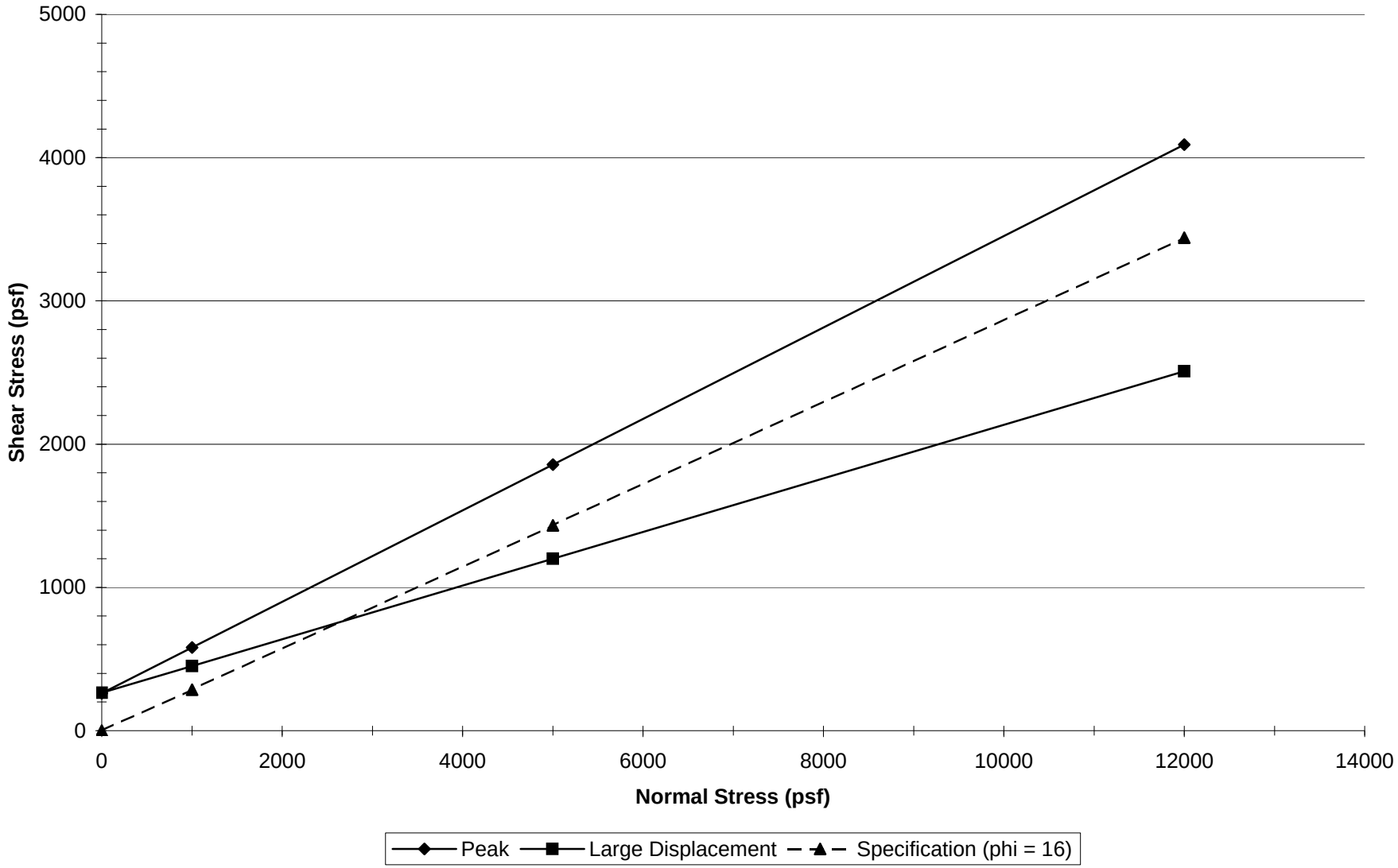


Figure 5: GCL - Nonwoven Geotextile (White Side) to HDPE Geomembrane (Short Spike Side)

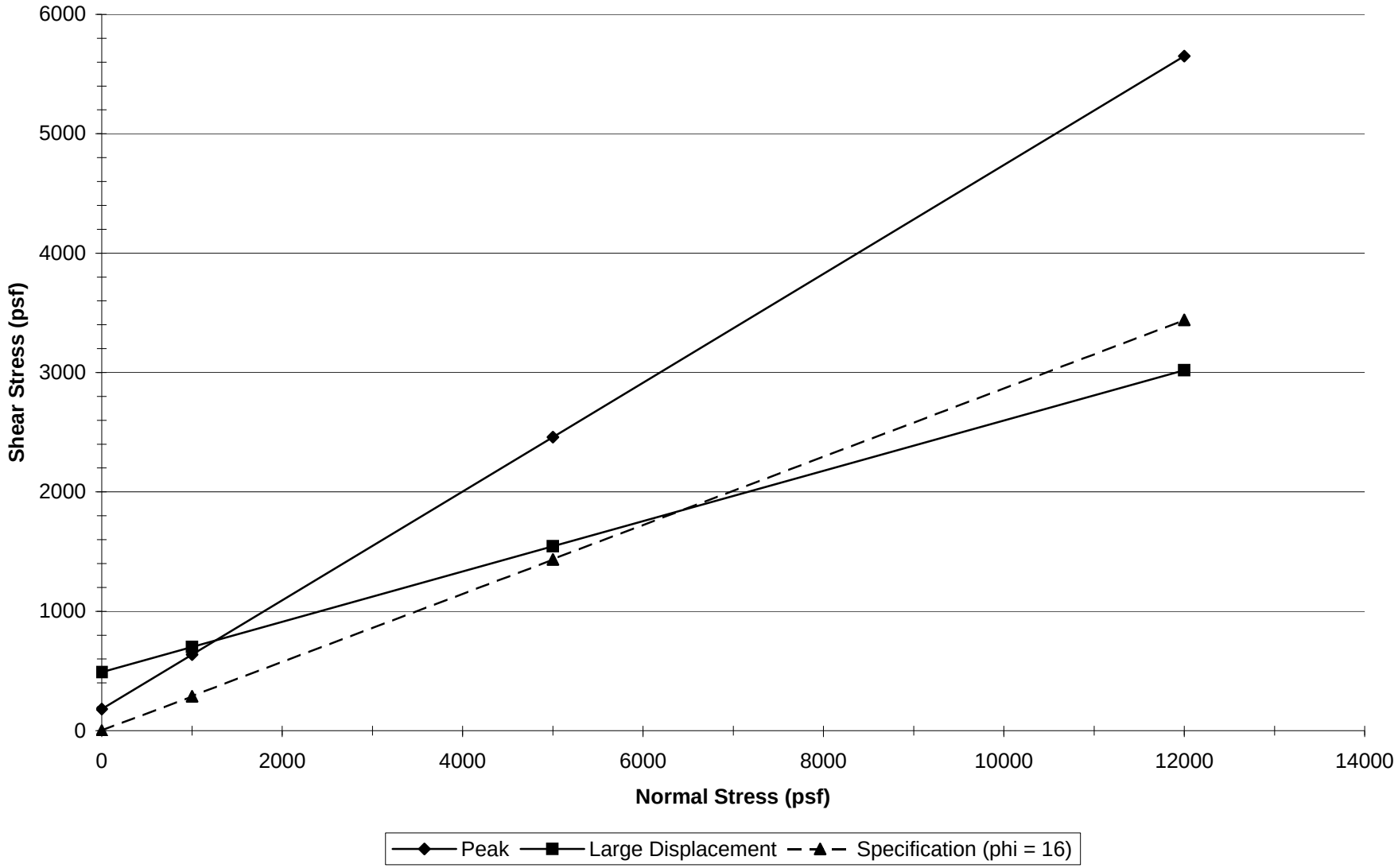


Figure 6: GCL - Nonwoven Geotextile (White Side) to HDPE Geomembrane (Long Spike Side)

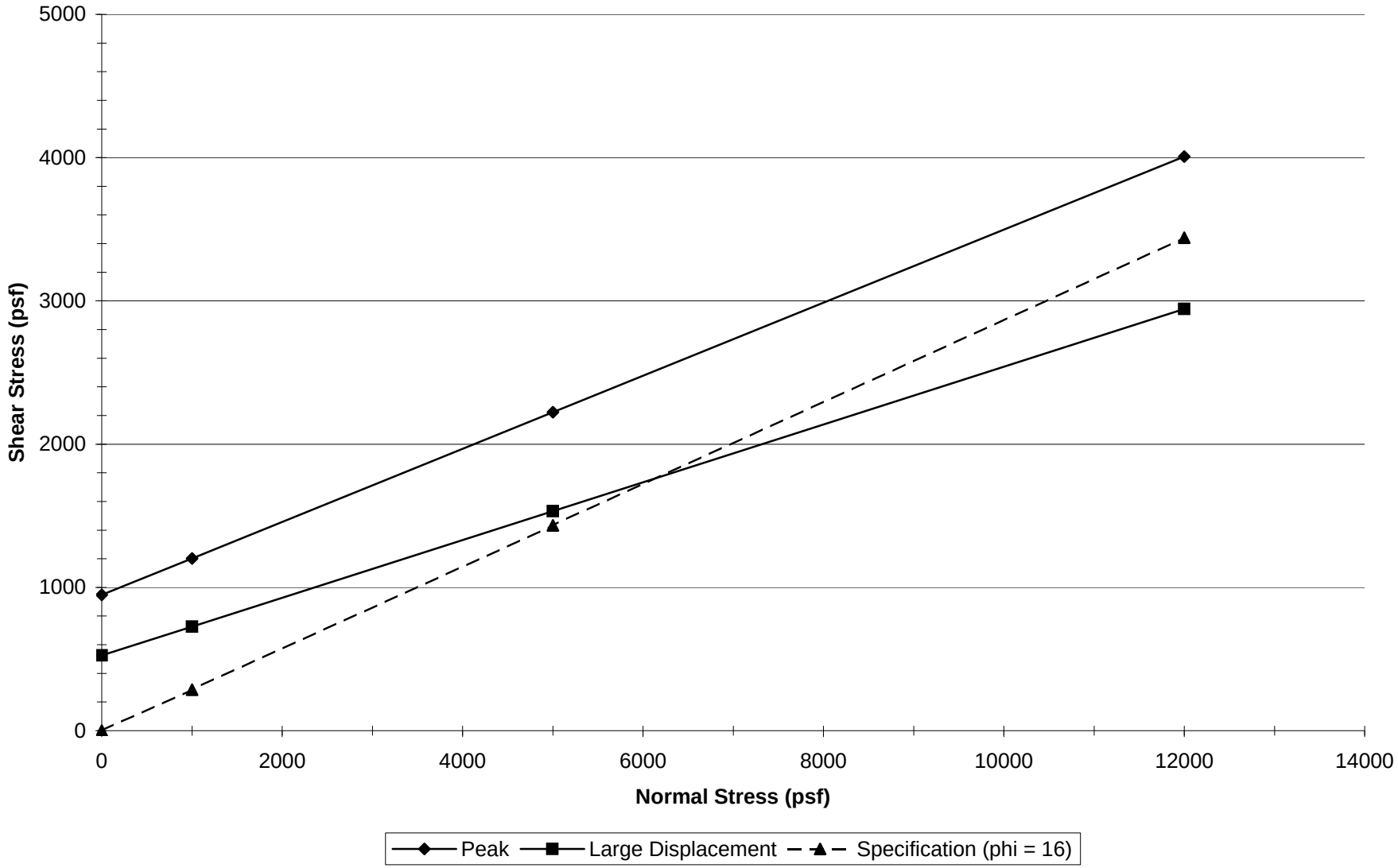


Figure 7: HDPE Geomembrane (Short Spike Side) to Geocomposite

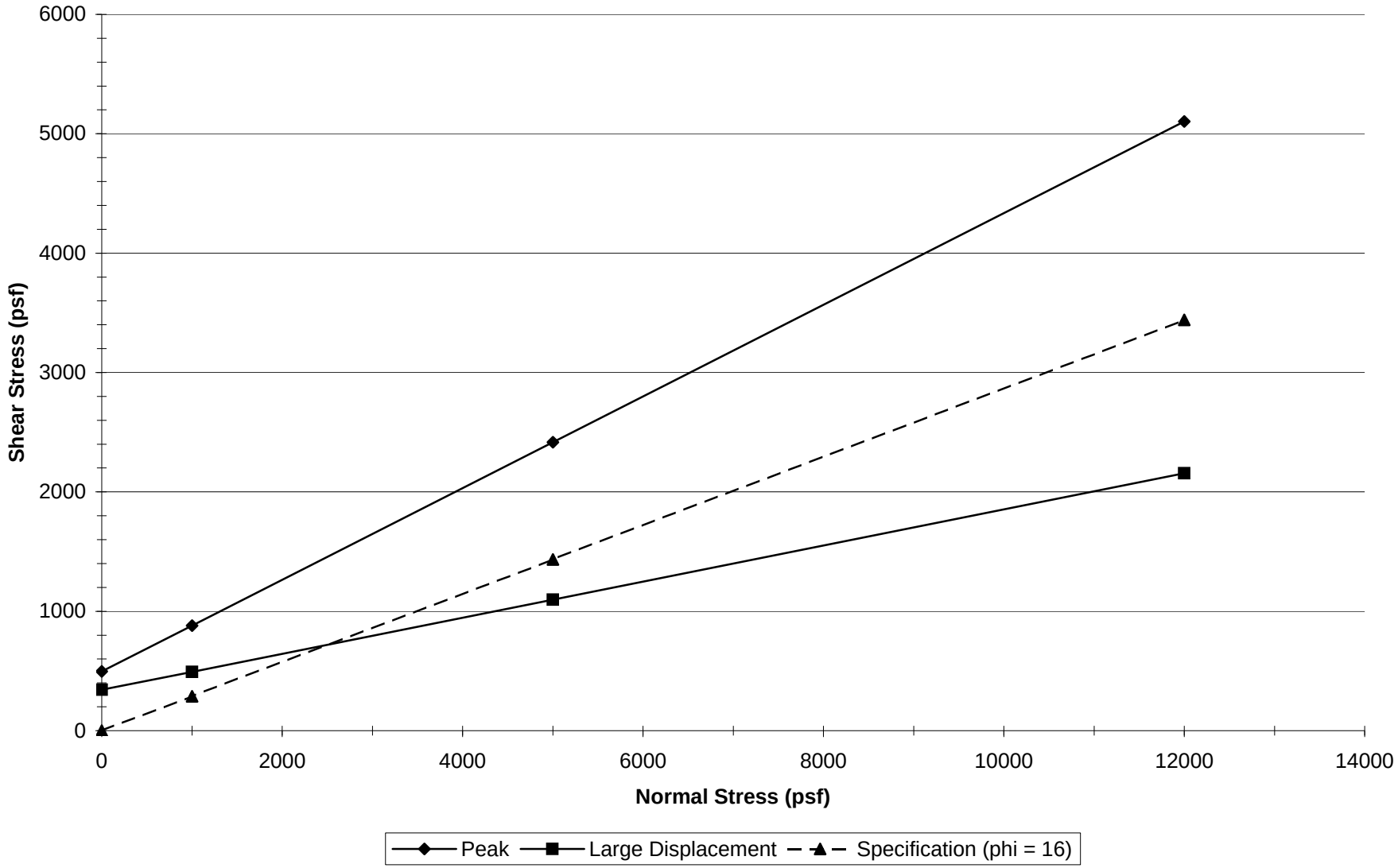
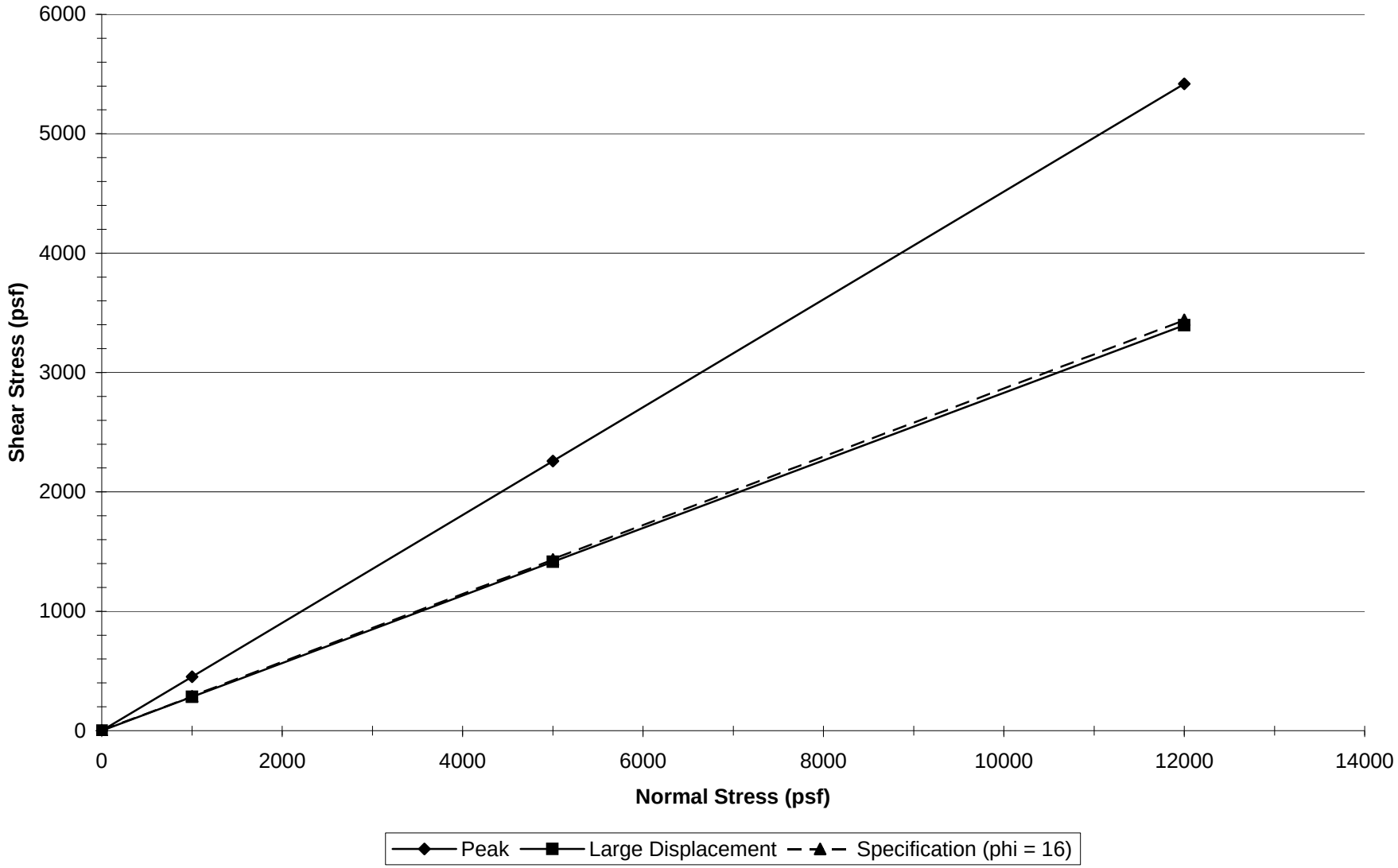


Figure 8: HDPE Geomembrane (Long Spike Side) to Geocomposite



APPENDIX II – GEOSYNTHETICS
Section 2 – Geosynthetic Clay Liner (GCL)

MQC Test Results
Conformance Test Results

Geosynthetic Clay Liner (GCL)
MQC Test Results

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

Date: 1/8/2009
Purchase Order: P12078
ORDER NUMBER: 024675901

Paul Elliott
Plastic Fusion

Huntsville, AL 35811
pelliott@plasticfusion.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Plastic Fusion.

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: Allen Steam Station LF
CUSTOMER P.O.: P12078
ORDER NUMBER: 024675901
PREPARED FOR: Plastic Fusion

CONTENTS:

- Daily production and needle detection certification
- GCL property specifications
- Order packing list
- GCL 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
Fax:
E-Mail: melanie.king@cetco.com

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

PRODUCTION CERTIFICATION

PROJECT NAME: Allen Steam Station LF
CUSTOMER P.O.: P12078
PREPARED FOR: Plastic Fusion

CETCO affirms that these products meet the physical and chemical criteria listed on the attached GCL property specification sheet.

NEEDLE REMOVAL AND DETECTION 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

Melanie King
Quality Assurance Coordinator
Colloid Environmental Technologies Co. (CETCO)

Ship Date: 01/07/2009
Order Number: 024675901
Prepared For: Plastic Fusion

The GCL raw materials and GCL finished product manufactured for the above-referenced order number(s) are hereby certified to achieve the properties 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 (3.6 kg/sq m) Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 4632	GCL Grab Strength	200,000 sq ft (20,000 sq m)	90 lbs (400 N) MARV
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 (48 kPa) typ @ 200 psf
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5 x 10^-9 cm/ sec Max
ASTM D 5887	GCL Index Flux	Weekly	1 x 10^-8 m^3/m^2/sec Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min
ASTM D 4632	GCL Peel Strength	40,000 sq ft (4000 sq m)	15 lbs (65 N) Min

SPECIALY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT ST

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D 4632	GCL Grab Strength	Standard	Standard	Standard
ASTM D 4632	GCL Peel Strength	Standard	Standard	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.

FABRIC SUPPLIER REQUIREMENTS FOR BENTOMAT ST

Raw Material	test method	mass per area	units
Nonwoven Cover Fabric	ASTM D 5261	6.0	oz/yd2
Bentomat ST Woven Base Fabric	ASTM D 5261	3.2	oz/yd2

Fabric certifications from our raw material suppliers are on file at our production facility.

CETCO's MQA laboratory is GAI-accredited (www.geosynthetic-institute.org/gai/lab.html).

Melanie King
Quality Assurance Coordinator
CETCO Cartersville Plant

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL ORDER PACKING LIST

GCL shipped for certification package number 024675901

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675901	CV-BENTOMAT ST	200902CV	00000207	150	15	2250	2808
024675901	CV-BENTOMAT ST	200902CV	00000237	150	15	2250	2860
024675901	CV-BENTOMAT ST	200902CV	00000281	150	15	2250	2688
024675901	CV-BENTOMAT ST	200902CV	00000282	150	15	2250	2667
024675901	CV-BENTOMAT ST	200902CV	00000283	150	15	2250	2694
024675901	CV-BENTOMAT ST	200902CV	00000284	150	15	2250	2756
024675901	CV-BENTOMAT ST	200902CV	00000288	150	15	2250	2674
024675901	CV-BENTOMAT ST	200902CV	00000289	150	15	2250	2680
024675901	CV-BENTOMAT ST	200902CV	00000292	150	15	2250	2700
024675901	CV-BENTOMAT ST	200902CV	00000295	150	15	2250	2712
024675901	CV-BENTOMAT ST	200902CV	00000296	150	15	2250	2686
024675901	CV-BENTOMAT ST	200902CV	00000297	150	15	2250	2708
024675901	CV-BENTOMAT ST	200902CV	00000298	150	15	2250	2716
024675901	CV-BENTOMAT ST	200902CV	00000301	150	15	2250	2736
024675901	CV-BENTOMAT ST	200902CV	00000304	150	15	2250	2716
024675901	CV-BENTOMAT ST	200902CV	00000306	150	15	2250	2722
			Totals:	**2400**	**240**	**36000**	**43523**
						Total Number of Rolls Certified: **16**	

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 024675901

GCL			Geotextiles				Clay
CV-BENTOMAT ST			CV-N/W-WHITE-ST			CV-WOVEN-ST	CV-CG 50-ST
GCL Lot #	**GCL Roll #**	**Roll # Tested**	**Cap Lot #**	**Cap Roll #**	**Roll # Tested**	**Base Roll #**	**Clay Lot #**
200902CV	00000207	00000195	2010965934			2010506736	899889B
200902CV	00000237	00000224	2010915228			2010654854	889280A
200902CV	00000281	00000268	2010965952			2010980797	889280B
200902CV	00000282	00000268	2010965952			2010980797	889280B
200902CV	00000283	00000268	2010965952			2010980797	889280B
200902CV	00000284	00000284	2010965952			2010980797	889280B
200902CV	00000288	00000284	2010965962			2010980797	889280B
200902CV	00000289	00000284	2010965962			2010980797	889280B
200902CV	00000292	00000284	2010965962			2010980797	889280B
200902CV	00000295	00000284	2010966022			2010980797	889280B
200902CV	00000296	00000284	2010966022			2010980797	889280B
200902CV	00000297	00000284	2010966022			2010980797	889280B
200902CV	00000298	00000284	2010966022			2010980797	889280B
200902CV	00000301	00000299	2010966036			2010910916	889280B
200902CV	00000304	00000299	2010966036			2010910916	889280B
200902CV	00000306	00000299	2010966036			2010910916	889280B

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 024675901 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength
		Standard Test Method:	ASTM D 5993	ASTM D 6768	ASTM D 6496
		Standard Specification:	0.75 lb/sq ft MARV	30lbs/in MARV	3.5lbs/in Min
Non-standard specifications were requested for this order as indicated on the attatched property sheet					
CV-BENTOMAT ST	200902CV	00000195	0.96	38.0	10.8
CV-BENTOMAT ST	200902CV	00000224	0.92	38.0	9.1
CV-BENTOMAT ST	200902CV	00000268	0.93	75.6	5.2
CV-BENTOMAT ST	200902CV	00000284	0.94	75.6	7
CV-BENTOMAT ST	200902CV	00000299	0.96	75.6	6.1

Product	Lot # Tested	Roll # Tested	PEEL 4632	GRAB 4632
CV-BENTOMAT ST	200902CV	00000195	52.1	151.9
CV-BENTOMAT ST	200902CV	00000224	44.9	151.9
CV-BENTOMAT ST	200902CV	00000268	26.7	302.5
CV-BENTOMAT ST	200902CV	00000284	37.7	302.5
CV-BENTOMAT ST	200902CV	00000299	29.3	302.5

ASTM test methods and property specifications per CETCO standard unless non-standard specifications were requested.
Any non-standard property specifications requested for this order are noted on the attached GCL property specifications sheet.

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 024675901 has been tested by American Colloid Company and yeilded the following test results.

Reference	Moist	Swell	Fluid Loss
Test Method:	ASTM D 2216	ASTM D 5890	ASTM D 5891
Specification:	12% Max	24 ml/2g Min	18 ml Max
889280A	8.9	27.0	16.0
889280B	9.7	26.0	15.8
899889B	8.9	27.0	15.8

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 024675901 was manufactured with geotextiles which were tested with the following results.

BASE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2010506736	3.5	155.2
PPX 82TEX	2010654854	3.4	162.5
PPX 82TEX	2010910916	3.2	169.8
PPX 82TEX	2010980797	3.5	190.9

CAP

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 650	2010915228	8.5	56.9
PPX 650	2010965934	7.1	50.9
PPX 650	2010965952	7.4	56.6
PPX 650	2010965962	7.8	63.6
PPX 650	2010966022	7.0	61.4
PPX 650	2010966036	8.0	82.5

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
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

Date: 1/9/2009
Purchase Order: P12078
ORDER NUMBERS: 024675902, 024675903, 024675904, 024675905

Paul Elliott
Plastic Fusion

Huntsville, AL 35811
pelliott@plasticfusion.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Plastic Fusion.

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: Allen Steam Station LF
CUSTOMER P.O.: P12078
ORDER NUMBERS: 024675902, 024675903, 024675904, 024675905
PREPARED FOR: Plastic Fusion

CONTENTS:

- Daily production and needle detection certification
- GCL property specifications
- Order packing list
- GCL 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
Fax:
E-Mail: melanie.king@cetco.com

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

PRODUCTION CERTIFICATION

PROJECT NAME: Allen Steam Station LF
CUSTOMER P.O.: P12078
PREPARED FOR: Plastic Fusion

CETCO affirms that these products meet the physical and chemical criteria listed on the attached GCL property specification sheet.

NEEDLE REMOVAL AND DETECTION 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

Melanie King
Quality Assurance Coordinator
Colloid Environmental Technologies Co. (CETCO)

Ship Date: 01/08/2009
Order Numbers: 024675902, 024675903, 024675904, 024675905
Prepared For: Plastic Fusion

The GCL raw materials and GCL finished product manufactured for the above-referenced order number(s) are hereby certified to achieve the properties 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 (3.6 kg/sq m) Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 4632	GCL Grab Strength	200,000 sq ft (20,000 sq m)	90 lbs (400 N) MARV
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 (48 kPa) typ @ 200 psf
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5 x 10^-9 cm/ sec Max
ASTM D 5887	GCL Index Flux	Weekly	1 x 10^-8 m^3/m^2/sec Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min
ASTM D 4632	GCL Peel Strength	40,000 sq ft (4000 sq m)	15 lbs (65 N) Min

SPECIALY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT ST

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D 4632	GCL Grab Strength	Standard	Standard	Standard
ASTM D 4632	GCL Peel Strength	Standard	Standard	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.

FABRIC SUPPLIER REQUIREMENTS FOR BENTOMAT ST

Raw Material	test method	mass per area	units
Nonwoven Cover Fabric	ASTM D 5261	6.0	oz/yd2
Bentomat ST Woven Base Fabric	ASTM D 5261	3.2	oz/yd2

Fabric certifications from our raw material suppliers are on file at our production facility.

CETCO's MQA laboratory is GAI-accredited (www.geosynthetic-institute.org/gai/lab.html).

Melanie King

Melanie King
Quality Assurance Coordinator
CETCO Cartersville Plant

GCL ORDER PACKING LIST

GCL shipped for certification package number 024675902

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675902	CV-BENTOMAT ST	200902CV	00000039	150	15	2250	2858
024675902	CV-BENTOMAT ST	200902CV	00000053	150	15	2250	2850
024675904	CV-BENTOMAT ST	200902CV	00000058	150	15	2250	2864
024675902	CV-BENTOMAT ST	200902CV	00000059	150	15	2250	2854
024675905	CV-BENTOMAT ST	200902CV	00000060	150	15	2250	2856
024675902	CV-BENTOMAT ST	200902CV	00000061	150	15	2250	2892
024675904	CV-BENTOMAT ST	200902CV	00000065	150	15	2250	2864
024675902	CV-BENTOMAT ST	200902CV	00000066	150	15	2250	2874
024675905	CV-BENTOMAT ST	200902CV	00000067	150	15	2250	2868
024675902	CV-BENTOMAT ST	200902CV	00000072	150	15	2250	2788
024675905	CV-BENTOMAT ST	200902CV	00000075	150	15	2250	2822
024675902	CV-BENTOMAT ST	200902CV	00000089	150	15	2250	2788
024675904	CV-BENTOMAT ST	200902CV	00000091	150	15	2250	2774
024675905	CV-BENTOMAT ST	200902CV	00000092	150	15	2250	2768
024675904	CV-BENTOMAT ST	200902CV	00000093	150	15	2250	2756
024675904	CV-BENTOMAT ST	200902CV	00000094	150	15	2250	2750
024675904	CV-BENTOMAT ST	200902CV	00000095	150	15	2250	2764
024675904	CV-BENTOMAT ST	200902CV	00000098	150	15	2250	2756
024675904	CV-BENTOMAT ST	200902CV	00000099	150	15	2250	2736
024675902	CV-BENTOMAT ST	200902CV	00000100	150	15	2250	2668
024675905	CV-BENTOMAT ST	200902CV	00000101	150	15	2250	2820
024675902	CV-BENTOMAT ST	200902CV	00000102	150	15	2250	2830
024675904	CV-BENTOMAT ST	200902CV	00000104	150	15	2250	2930
024675903	CV-BENTOMAT ST	200902CV	00000105	150	15	2250	2802
024675904	CV-BENTOMAT ST	200902CV	00000106	150	15	2250	2760
024675902	CV-BENTOMAT ST	200902CV	00000113	150	15	2250	2804
024675903	CV-BENTOMAT ST	200902CV	00000117	150	15	2250	2774

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675904	CV-BENTOMAT ST	200902CV	00000156	150	15	2250	2766
024675905	CV-BENTOMAT ST	200902CV	00000163	150	15	2250	2724
024675904	CV-BENTOMAT ST	200902CV	00000164	150	15	2250	2758
024675904	CV-BENTOMAT ST	200902CV	00000166	150	15	2250	2770
024675905	CV-BENTOMAT ST	200902CV	00000168	150	15	2250	2768
024675905	CV-BENTOMAT ST	200902CV	00000172	150	15	2250	2790
024675903	CV-BENTOMAT ST	200902CV	00000189	150	15	2250	2776
024675903	CV-BENTOMAT ST	200902CV	00000198	150	15	2250	2754
024675903	CV-BENTOMAT ST	200902CV	00000200	150	15	2250	2728
024675903	CV-BENTOMAT ST	200902CV	00000202	150	15	2250	2836
024675904	CV-BENTOMAT ST	200902CV	00000205	150	15	2250	2762
024675904	CV-BENTOMAT ST	200902CV	00000208	150	15	2250	2772
024675903	CV-BENTOMAT ST	200902CV	00000211	150	15	2250	2740
024675905	CV-BENTOMAT ST	200902CV	00000219	150	15	2250	2774
024675903	CV-BENTOMAT ST	200902CV	00000238	150	15	2250	2758
024675903	CV-BENTOMAT ST	200902CV	00000247	150	15	2250	2732
024675905	CV-BENTOMAT ST	200902CV	00000258	150	15	2250	2732
024675905	CV-BENTOMAT ST	200902CV	00000260	150	15	2250	2740
024675905	CV-BENTOMAT ST	200902CV	00000261	150	15	2250	2756
024675902	CV-BENTOMAT ST	200902CV	00000271	150	15	2250	2746
024675903	CV-BENTOMAT ST	200902CV	00000272	150	15	2250	2746
024675905	CV-BENTOMAT ST	200902CV	00000273	150	15	2250	2744
024675903	CV-BENTOMAT ST	200902CV	00000274	141	15	2115	2578
024675902	CV-BENTOMAT ST	200902CV	00000276	150	15	2250	2868
024675902	CV-BENTOMAT ST	200902CV	00000278	150	15	2250	2702
024675902	CV-BENTOMAT ST	200902CV	00000279	150	15	2250	2702
024675902	CV-BENTOMAT ST	200902CV	00000280	150	15	2250	2708
024675903	CV-BENTOMAT ST	200902CV	00000285	150	15	2250	2678
024675903	CV-BENTOMAT ST	200902CV	00000286	150	15	2250	2674
024675903	CV-BENTOMAT ST	200902CV	00000287	150	15	2250	2670
024675902	CV-BENTOMAT ST	200902CV	00000290	150	15	2250	2682
024675905	CV-BENTOMAT ST	200902CV	00000291	150	15	2250	2700

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675903	CV-BENTOMAT ST	200902CV	00000293	150	15	2250	2670
024675905	CV-BENTOMAT ST	200902CV	00000294	150	15	2250	2674
024675902	CV-BENTOMAT ST	200902CV	00000299	150	15	2250	2790
024675905	CV-BENTOMAT ST	200902CV	00000300	150	15	2250	2766
024675903	CV-BENTOMAT ST	200902CV	00000302	150	15	2250	2740
024675904	CV-BENTOMAT ST	200902CV	00000303	150	15	2250	2766
024675904	CV-BENTOMAT ST	200902CV	00000305	150	15	2250	2710
024675903	CV-BENTOMAT ST	200902CV	00000307	150	15	2250	2736
024675905	CV-BENTOMAT ST	200902CV	00000308	150	15	2250	2726
			Totals:	**10191**	**1020**	**152865**	**188082**
							Total Number of Rolls Certified: **68**

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 024675902

GCL			Geotextiles				Clay
CV-BENTOMAT ST			CV-N/W-WHITE-ST			CV-WOVEN-ST	CV-CG 50-ST
GCL Lot #	**GCL Roll #**	**Roll # Tested**	**Cap Lot #**	**Cap Roll #**	**Roll # Tested**	**Base Roll #**	**Clay Lot #**
200902CV	00000039	00000031	2010965929			2010971500	899885A
200902CV	00000053	00000045	2010965956			2010747344	899885A
200902CV	00000058	00000045	2010915238			2010747344	899885A
200902CV	00000059	00000045	2010915238			2010747344	899885A
200902CV	00000060	00000045	2010915238			2010747344	899885A
200902CV	00000061	00000061	2010915238			2010747344	899885A
200902CV	00000065	00000061	2010966054			2010747344	899885B
200902CV	00000066	00000061	2010966054			2010747344	899885B
200902CV	00000067	00000061	2010966054			2010747344	899885B
200902CV	00000072	00000061	2010915235			2010747344	899885B
200902CV	00000075	00000061	2010915235			2010725157	899885B
200902CV	00000089	00000076	2010915234			2010725157	899885B
200902CV	00000091	00000090	2010915234			2010725157	899885B
200902CV	00000092	00000090	2010915234			2010725157	899885B
200902CV	00000093	00000090	2010915230			2010725157	899885B
200902CV	00000094	00000090	2010915230			2010725157	899885B
200902CV	00000095	00000090	2010915230			2010725157	899885B
200902CV	00000098	00000090	2010915230			2010725157	899885B
200902CV	00000099	00000090	2010915230			2010725157	899885B
200902CV	00000100	00000090	2010915239			2010725157	899885B
200902CV	00000101	00000090	2010915239			2010725157	899885B
200902CV	00000102	00000090	2010915239			2010725157	899885B
200902CV	00000104	00000090	2010915239			2010725157	899885B
200902CV	00000105	00000105	2010915239			2010725157	899885B
200902CV	00000106	00000105	2010915239			2010725157	899885B
200902CV	00000113	00000105	2010915233			2010823577	899885B
200902CV	00000117	00000105	2010965954			2010823577	899889A
200902CV	00000156	00000149	2010905928			2010700157	899889A
200902CV	00000163	00000149	2010966024			2010700157	899889A

GCL Lot #	GCL Roll #	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
200902CV	00000164	00000149	2010966024			2010700157	899889A
200902CV	00000166	00000165	2010966024			2010910913	899889B
200902CV	00000168	00000165	2010905874			2010910913	899889B
200902CV	00000172	00000165	2010905874			2010910913	899889B
200902CV	00000189	00000180	2010946028			2010910913	899889B
200902CV	00000198	00000195	2010965953			2010506736	899889B
200902CV	00000200	00000195	2010965953			2010506736	899889B
200902CV	00000202	00000195	2010965934			2010506736	899889B
200902CV	00000205	00000195	2010965934			2010506736	899889B
200902CV	00000208	00000195	2010965951			2010506736	899889B
200902CV	00000211	00000210	2010965951			2010506736	899889B
200902CV	00000219	00000210	2010966023			2010506736	889280A
200902CV	00000238	00000224	2010915228			2010654854	889280A
200902CV	00000247	00000239	2010965933			2010637287	889280A
200902CV	00000258	00000254	2010966034			2010637287	889280A
200902CV	00000260	00000254	2010966034			2010637287	889280A
200902CV	00000261	00000254	2010966034			2010637287	889280A
200902CV	00000271	00000268	2010966032			2010637287	889280B
200902CV	00000272	00000268	2010966032			2010637287	889280B
200902CV	00000273	00000268	2010966032			2010637287	889280B
200902CV	00000274	00000268	2010966032			2010637287	889280B
200902CV	00000276	00000268	2010966032			2010980797	889280B
200902CV	00000278	00000268	2010966032			2010980797	889280B
200902CV	00000279	00000268	2010965952			2010980797	889280B
200902CV	00000280	00000268	2010965952			2010980797	889280B
200902CV	00000285	00000284	2010965952			2010980797	889280B
200902CV	00000286	00000284	2010965962			2010980797	889280B
200902CV	00000287	00000284	2010965962			2010980797	889280B
200902CV	00000290	00000284	2010965962			2010980797	889280B
200902CV	00000291	00000284	2010965962			2010980797	889280B
200902CV	00000293	00000284	2010966022			2010980797	889280B
200902CV	00000294	00000284	2010966022			2010980797	889280B
200902CV	00000299	00000299	2010966036			2010910916	889280B
200902CV	00000300	00000299	2010966036			2010910916	889280B
200902CV	00000302	00000299	2010966036			2010910916	889280B

GCL Lot #	GCL Roll #	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
200902CV	00000303	00000299	2010966036			2010910916	889280B
200902CV	00000305	00000299	2010966036			2010910916	889280B
200902CV	00000307	00000299	2010965930			2010910916	889280B
200902CV	00000308	00000299	2010965930			2010910916	889280B

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 024675902 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength
		Standard Test Method:	ASTM D 5993	ASTM D 6768	ASTM D 6496
		Standard Specification:	0.75 lb/sq ft MARV	30lbs/in MARV	3.5lbs/in Min
Non-standard specifications were requested for this order as indicated on the attatched property sheet					
CV-BENTOMAT ST	200902CV	00000031	0.95	48.5	9.8
CV-BENTOMAT ST	200902CV	00000045	0.96	48.5	8
CV-BENTOMAT ST	200902CV	00000061	0.98	48.5	8.7
CV-BENTOMAT ST	200902CV	00000076	0.94	48.5	7.4
CV-BENTOMAT ST	200902CV	00000090	0.84	74.6	7.2
CV-BENTOMAT ST	200902CV	00000105	0.93	74.6	6.1
CV-BENTOMAT ST	200902CV	00000149	0.94	74.6	11.1
CV-BENTOMAT ST	200902CV	00000165	0.97	74.6	9.6
CV-BENTOMAT ST	200902CV	00000180	0.96	38.0	13.6
CV-BENTOMAT ST	200902CV	00000195	0.96	38.0	10.8
CV-BENTOMAT ST	200902CV	00000210	0.98	74.6	8.9
CV-BENTOMAT ST	200902CV	00000224	0.92	38.0	9.1
CV-BENTOMAT ST	200902CV	00000239	0.86	38.0	7.7
CV-BENTOMAT ST	200902CV	00000254	0.96	38.0	6.6
CV-BENTOMAT ST	200902CV	00000268	0.93	75.6	5.2
CV-BENTOMAT ST	200902CV	00000284	0.94	75.6	7
CV-BENTOMAT ST	200902CV	00000299	0.96	75.6	6.1

Product	Lot # Tested	Roll # Tested	PEEL 4632	GRAB 4632
CV-BENTOMAT ST	200902CV	00000031	47.9	194.0
CV-BENTOMAT ST	200902CV	00000045	39.5	194.0
CV-BENTOMAT ST	200902CV	00000061	42.1	194.0
CV-BENTOMAT ST	200902CV	00000076	36.2	194.0
CV-BENTOMAT ST	200902CV	00000090	34.3	298.2
CV-BENTOMAT ST	200902CV	00000105	30.8	298.2
CV-BENTOMAT ST	200902CV	00000149	55.2	298.2
CV-BENTOMAT ST	200902CV	00000165	46.3	298.2
CV-BENTOMAT ST	200902CV	00000180	72.7	151.9

CV-BENTOMAT ST	200902CV	00000195	52.1	151.9
CV-BENTOMAT ST	200902CV	00000210	42.3	151.9
CV-BENTOMAT ST	200902CV	00000224	44.9	151.9
CV-BENTOMAT ST	200902CV	00000239	38.8	151.9
CV-BENTOMAT ST	200902CV	00000254	33.7	151.9
CV-BENTOMAT ST	200902CV	00000268	26.7	302.5
CV-BENTOMAT ST	200902CV	00000284	37.7	302.5
CV-BENTOMAT ST	200902CV	00000299	29.3	302.5

ASTM test methods and property specifications per CETCO standard unless non-standard specifications were requested.
Any non-standard property specifications requested for this order are noted on the attached GCL property specifications sheet.

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 024675902 has been tested by American Colloid Company and yeilded the following test results.

Reference	Moist	Swell	Fluid Loss
Test Method:	ASTM D 2216	ASTM D 5890	ASTM D 5891
Specification:	12% Max	24 ml/2g Min	18 ml Max
889280A	8.9	27.0	16.0
889280B	9.7	26.0	15.8
899885A	9.1	26.0	16.0
899885B	9.6	27.0	15.8
899889A	9.1	26.0	16.0
899889B	8.9	27.0	15.8

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 024675902 was manufactured with geotextiles which were tested with the following results.

BASE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2010506736	3.5	155.2
PPX 82TEX	2010637287	3.4	138.6
PPX 82TEX	2010654854	3.4	162.5
PPX 82TEX	2010700157	3.4	162.9
PPX 82TEX	2010725157	3.3	174.8
PPX 82TEX	2010747344	3.5	150.0
PPX 82TEX	2010823577	3.6	165.1
PPX 82TEX	2010910913	3.2	169.8
PPX 82TEX	2010910916	3.2	169.8
PPX 82TEX	2010971500	3.5	185.9
PPX 82TEX	2010980797	3.5	190.9

CAP

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 650	2010905874	8.4	71.9
PPX 650	2010905928	7.8	74.1
PPX 650	2010915228	8.5	56.9
PPX 650	2010915230	8.5	56.9
PPX 650	2010915233	8.0	51.8
PPX 650	2010915234	8.0	51.8
PPX 650	2010915235	7.3	46.7
PPX 650	2010915238	7.3	46.7
PPX 650	2010915239	7.9	54.8
PPX 650	2010946028	7.7	63.4
PPX 650	2010965929	7.7	63.4
PPX 650	2010965930	7.7	63.4
PPX 650	2010965933	7.7	63.4
PPX 650	2010965934	7.1	50.9
PPX 650	2010965951	7.4	56.6

PPX 650	2010965952	7.4	56.6
PPX 650	2010965953	7.4	56.6
PPX 650	2010965954	7.8	62.9
PPX 650	2010965956	7.8	62.9
PPX 650	2010965962	7.8	63.6
PPX 650	2010966022	7.0	61.4
PPX 650	2010966023	7.0	61.4
PPX 650	2010966024	7.5	64.0
PPX 650	2010966032	7.2	79.4
PPX 650	2010966034	7.2	79.4
PPX 650	2010966036	8.0	82.5
PPX 650	2010966054	8.2	95.4

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
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

Date: 1/12/2009
Purchase Order: P12078
ORDER NUMBERS: 024675906, 024675907, 024675908, 024675909, 024675910

Paul Elliott
Plastic Fusion

Huntsville, AL 35811
pelliott@plasticfusion.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Plastic Fusion.

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: Allen Steam Station LF
CUSTOMER P.O.: P12078
ORDER NUMBERS: 024675906, 024675907, 024675908, 024675909, 024675910
PREPARED FOR: Plastic Fusion

CONTENTS:

- Daily production and needle detection certification
- GCL property specifications
- Order packing list
- GCL 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
Fax:
E-Mail: melanie.king@cetco.com

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

PRODUCTION CERTIFICATION

PROJECT NAME: Allen Steam Station LF
CUSTOMER P.O.: P12078
PREPARED FOR: Plastic Fusion

CETCO affirms that these products meet the physical and chemical criteria listed on the attached GCL property specification sheet.

NEEDLE REMOVAL AND DETECTION 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

Melanie King
Quality Assurance Coordinator
Colloid Environmental Technologies Co. (CETCO)

Ship Date: 01/09/2009
Order Numbers: 024675906, 024675907, 024675908, 024675909, 024675910
Prepared For: Plastic Fusion

The GCL raw materials and GCL finished product manufactured for the above-referenced order number(s) are hereby certified to achieve the properties 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 (3.6 kg/sq m) Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 4632	GCL Grab Strength	200,000 sq ft (20,000 sq m)	90 lbs (400 N) MARV
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 (48 kPa) typ @ 200 psf
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5 x 10^-9 cm/ sec Max
ASTM D 5887	GCL Index Flux	Weekly	1 x 10^-8 m^3/m^2/sec Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min
ASTM D 4632	GCL Peel Strength	40,000 sq ft (4000 sq m)	15 lbs (65 N) Min

SPECIALY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT ST

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D 4632	GCL Grab Strength	Standard	Standard	Standard
ASTM D 4632	GCL Peel Strength	Standard	Standard	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.

FABRIC SUPPLIER REQUIREMENTS FOR BENTOMAT ST

Raw Material	test method	mass per area	units
Nonwoven Cover Fabric	ASTM D 5261	6.0	oz/yd2
Bentomat ST Woven Base Fabric	ASTM D 5261	3.2	oz/yd2

Fabric certifications from our raw material suppliers are on file at our production facility.

CETCO's MQA laboratory is GAI-accredited (www.geosynthetic-institute.org/gai/lab.html).

Melanie King

Melanie King
Quality Assurance Coordinator
CETCO Cartersville Plant

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL ORDER PACKING LIST

GCL shipped for certification package number 024675906

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675908	CV-BENTOMAT ST	200902CV	00000038	150	15	2250	2850
024675908	CV-BENTOMAT ST	200902CV	00000057	150	15	2250	2966
024675908	CV-BENTOMAT ST	200902CV	00000064	150	15	2250	2856
024675908	CV-BENTOMAT ST	200902CV	00000068	150	15	2250	2846
024675908	CV-BENTOMAT ST	200902CV	00000083	150	15	2250	2750
024675908	CV-BENTOMAT ST	200902CV	00000084	150	15	2250	2788
024675908	CV-BENTOMAT ST	200902CV	00000086	150	15	2250	2776
024675908	CV-BENTOMAT ST	200902CV	00000088	150	15	2250	2766
024675907	CV-BENTOMAT ST	200902CV	00000125	150	15	2250	2778
024675907	CV-BENTOMAT ST	200902CV	00000134	150	15	2250	2870
024675907	CV-BENTOMAT ST	200902CV	00000146	150	15	2250	2784
024675910	CV-BENTOMAT ST	200902CV	00000147	150	15	2250	2810
024675910	CV-BENTOMAT ST	200902CV	00000148	150	15	2250	2758
024675907	CV-BENTOMAT ST	200902CV	00000149	150	15	2250	2832
024675906	CV-BENTOMAT ST	200902CV	00000151	150	15	2250	2800
024675907	CV-BENTOMAT ST	200902CV	00000152	150	15	2250	2770
024675906	CV-BENTOMAT ST	200902CV	00000155	150	15	2250	2914
024675909	CV-BENTOMAT ST	200902CV	00000157	150	15	2250	2746
024675908	CV-BENTOMAT ST	200902CV	00000158	150	15	2250	2728
024675910	CV-BENTOMAT ST	200902CV	00000160	150	15	2250	2744
024675910	CV-BENTOMAT ST	200902CV	00000161	150	15	2250	2754
024675910	CV-BENTOMAT ST	200902CV	00000162	150	15	2250	2742
024675910	CV-BENTOMAT ST	200902CV	00000165	150	15	2250	2814
024675907	CV-BENTOMAT ST	200902CV	00000169	150	15	2250	2772
024675907	CV-BENTOMAT ST	200902CV	00000170	150	15	2250	2776
024675907	CV-BENTOMAT ST	200902CV	00000171	150	15	2250	2786
024675910	CV-BENTOMAT ST	200902CV	00000174	150	15	2250	2788

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675907	CV-BENTOMAT ST	200902CV	00000175	150	15	2250	2766
024675910	CV-BENTOMAT ST	200902CV	00000176	150	15	2250	2798
024675910	CV-BENTOMAT ST	200902CV	00000177	150	15	2250	2768
024675907	CV-BENTOMAT ST	200902CV	00000178	150	15	2250	2754
024675906	CV-BENTOMAT ST	200902CV	00000179	150	15	2250	2930
024675909	CV-BENTOMAT ST	200902CV	00000180	150	15	2250	2842
024675910	CV-BENTOMAT ST	200902CV	00000181	150	15	2250	2774
024675910	CV-BENTOMAT ST	200902CV	00000182	150	15	2250	2772
024675907	CV-BENTOMAT ST	200902CV	00000183	150	15	2250	2782
024675908	CV-BENTOMAT ST	200902CV	00000184	150	15	2250	2766
024675910	CV-BENTOMAT ST	200902CV	00000185	150	15	2250	2770
024675907	CV-BENTOMAT ST	200902CV	00000186	150	15	2250	2760
024675910	CV-BENTOMAT ST	200902CV	00000187	150	15	2250	2752
024675910	CV-BENTOMAT ST	200902CV	00000188	150	15	2250	2766
024675910	CV-BENTOMAT ST	200902CV	00000190	150	15	2250	2774
024675906	CV-BENTOMAT ST	200902CV	00000193	150	15	2250	2782
024675907	CV-BENTOMAT ST	200902CV	00000194	150	15	2250	2776
024675907	CV-BENTOMAT ST	200902CV	00000196	150	15	2250	2774
024675910	CV-BENTOMAT ST	200902CV	00000197	150	15	2250	2766
024675910	CV-BENTOMAT ST	200902CV	00000199	150	15	2250	2778
024675907	CV-BENTOMAT ST	200902CV	00000203	150	15	2250	2754
024675907	CV-BENTOMAT ST	200902CV	00000204	150	15	2250	2756
024675908	CV-BENTOMAT ST	200902CV	00000209	150	15	2250	2762
024675906	CV-BENTOMAT ST	200902CV	00000210	150	15	2250	2790
024675907	CV-BENTOMAT ST	200902CV	00000212	150	15	2250	2730
024675906	CV-BENTOMAT ST	200902CV	00000213	150	15	2250	2764
024675906	CV-BENTOMAT ST	200902CV	00000214	150	15	2250	2754
024675909	CV-BENTOMAT ST	200902CV	00000215	150	15	2250	2762
024675906	CV-BENTOMAT ST	200902CV	00000218	150	15	2250	2750
024675906	CV-BENTOMAT ST	200902CV	00000221	150	15	2250	2766
024675909	CV-BENTOMAT ST	200902CV	00000222	150	15	2250	2768
024675908	CV-BENTOMAT ST	200902CV	00000223	150	15	2250	2710

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675906	CV-BENTOMAT ST	200902CV	00000225	150	15	2250	2754
024675906	CV-BENTOMAT ST	200902CV	00000227	150	15	2250	2778
024675906	CV-BENTOMAT ST	200902CV	00000228	150	15	2250	2752
024675909	CV-BENTOMAT ST	200902CV	00000232	150	15	2250	2756
024675909	CV-BENTOMAT ST	200902CV	00000233	150	15	2250	2744
024675909	CV-BENTOMAT ST	200902CV	00000234	150	15	2250	2748
024675909	CV-BENTOMAT ST	200902CV	00000235	150	15	2250	2750
024675906	CV-BENTOMAT ST	200902CV	00000236	150	15	2250	2622
024675906	CV-BENTOMAT ST	200902CV	00000240	150	15	2250	2750
024675908	CV-BENTOMAT ST	200902CV	00000242	150	15	2250	2740
024675908	CV-BENTOMAT ST	200902CV	00000243	150	15	2250	2732
024675909	CV-BENTOMAT ST	200902CV	00000244	150	15	2250	2744
024675909	CV-BENTOMAT ST	200902CV	00000246	150	15	2250	2736
024675906	CV-BENTOMAT ST	200902CV	00000249	150	15	2250	2730
024675909	CV-BENTOMAT ST	200902CV	00000250	150	15	2250	2746
024675908	CV-BENTOMAT ST	200902CV	00000251	150	15	2250	2772
024675909	CV-BENTOMAT ST	200902CV	00000252	150	15	2250	2780
024675908	CV-BENTOMAT ST	200902CV	00000253	150	15	2250	2782
024675906	CV-BENTOMAT ST	200902CV	00000254	150	15	2250	2794
024675909	CV-BENTOMAT ST	200902CV	00000256	150	15	2250	2766
024675909	CV-BENTOMAT ST	200902CV	00000257	150	15	2250	2760
024675909	CV-BENTOMAT ST	200902CV	00000259	150	15	2250	2744
024675909	CV-BENTOMAT ST	200902CV	00000262	150	15	2250	2738
024675906	CV-BENTOMAT ST	200902CV	00000263	150	15	2250	2732
024675909	CV-BENTOMAT ST	200902CV	00000269	150	15	2250	2744
024675908	CV-BENTOMAT ST	200902CV	00000270	150	15	2250	2728
			Totals:	**12750**	**1275**	**191250**	**235702**
						Total Number of Rolls Certified: **85**	

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 024675906

GCL			Geotextiles				Clay
CV-BENTOMAT ST			CV-N/W-WHITE-ST			CV-WOVEN-ST	CV-CG 50-ST
GCL Lot #	**GCL Roll #**	**Roll # Tested**	**Cap Lot #**	**Cap Roll #**	**Roll # Tested**	**Base Roll #**	**Clay Lot #**
200902CV	00000038	00000031	2010965929			2010971500	899885A
200902CV	00000057	00000045	2010915238			2010747344	899885A
200902CV	00000064	00000061	2010966054			2010747344	899885A
200902CV	00000068	00000061	2010966054			2010747344	899885B
200902CV	00000083	00000076	2010915237			2010725157	899885B
200902CV	00000084	00000076	2010915237			2010725157	899885B
200902CV	00000086	00000076	2010915234			2010725157	899885B
200902CV	00000088	00000076	2010915234			2010725157	899885B
200902CV	00000125	00000120	2010905934			2010823577	899889A
200902CV	00000134	00000134	2010915236			2010823577	899889A
200902CV	00000146	00000134	2010966031			2010700157	899889A
200902CV	00000147	00000134	2010966031			2010700157	899889A
200902CV	00000148	00000134	2010966031			2010700157	899889A
200902CV	00000149	00000149	2010966031			2010700157	899889A
200902CV	00000151	00000149	2010905928			2010700157	899889A
200902CV	00000152	00000149	2010905928			2010700157	899889A
200902CV	00000155	00000149	2010905928			2010700157	899889A
200902CV	00000157	00000149	2010905928			2010700157	899889A
200902CV	00000158	00000149	2010905928			2010700157	899889A
200902CV	00000160	00000149	2010966024			2010700157	899889A
200902CV	00000161	00000149	2010966024			2010700157	899889A
200902CV	00000162	00000149	2010966024			2010700157	899889A
200902CV	00000165	00000165	2010966024			2010700157	899889A
200902CV	00000169	00000165	2010905874			2010910913	899889B
200902CV	00000170	00000165	2010905874			2010910913	899889B
200902CV	00000171	00000165	2010905874			2010910913	899889B
200902CV	00000174	00000165	2010905874			2010910913	899889B
200902CV	00000175	00000165	2010966028			2010910913	899889B
200902CV	00000176	00000165	2010966028			2010910913	899889B

GCL Lot #	GCL Roll #	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
200902CV	00000177	00000165	2010966028			2010910913	899889B
200902CV	00000178	00000165	2010966028			2010910913	899889B
200902CV	00000179	00000165	2010966028			2010910913	899889B
200902CV	00000180	00000180	2010966028			2010910913	899889B
200902CV	00000181	00000180	2010915229			2010910913	899889B
200902CV	00000182	00000180	2010915229			2010910913	899889B
200902CV	00000183	00000180	2010915229			2010910913	899889B
200902CV	00000184	00000180	2010915229			2010910913	899889B
200902CV	00000185	00000180	2010915229			2010910913	899889B
200902CV	00000186	00000180	2010915229			2010910913	899889B
200902CV	00000187	00000180	2010915229			2010910913	899889B
200902CV	00000188	00000180	2010915229			2010910913	899889B
200902CV	00000190	00000180	2010946028			2010910913	899889B
200902CV	00000193	00000180	2010946028			2010910913	899889B
200902CV	00000194	00000180	2010946028			2010910913	899889B
200902CV	00000196	00000195	2010965953			2010506736	899889B
200902CV	00000197	00000195	2010965953			2010506736	899889B
200902CV	00000199	00000195	2010965953			2010506736	899889B
200902CV	00000203	00000195	2010965934			2010506736	899889B
200902CV	00000204	00000195	2010965934			2010506736	899889B
200902CV	00000209	00000195	2010965951			2010506736	899889B
200902CV	00000210	00000210	2010965951			2010506736	899889B
200902CV	00000212	00000210	2010965951			2010506736	899889B
200902CV	00000213	00000210	2010965951			2010506736	899889B
200902CV	00000214	00000210	2010965951			2010506736	899889B
200902CV	00000215	00000210	2010966023			2010506736	899889B
200902CV	00000218	00000210	2010966023			2010506736	889280A
200902CV	00000221	00000210	2010915232			2010654854	889280A
200902CV	00000222	00000210	2010915232			2010654854	889280A
200902CV	00000223	00000210	2010915232			2010654854	889280A
200902CV	00000225	00000224	2010915232			2010654854	889280A
200902CV	00000227	00000224	2010915232			2010654854	889280A
200902CV	00000228	00000224	2010915232			2010654854	889280A
200902CV	00000232	00000224	2010965941			2010654854	889280A
200902CV	00000233	00000224	2010965941			2010654854	889280A

GCL Lot #	GCL Roll #	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
200902CV	00000234	00000224	2010965941			2010654854	889280A
200902CV	00000235	00000224	2010965941			2010654854	889280A
200902CV	00000236	00000224	2010915228			2010654854	889280A
200902CV	00000240	00000239	2010915228			2010654854	889280A
200902CV	00000242	00000239	2010915228			2010654854	889280A
200902CV	00000243	00000239	2010915228			2010654854	889280A
200902CV	00000244	00000239	2010965933			2010654854	889280A
200902CV	00000246	00000239	2010965933			2010637287	889280A
200902CV	00000249	00000239	2010965933			2010637287	889280A
200902CV	00000250	00000239	2010965933			2010637287	889280A
200902CV	00000251	00000239	2010965959			2010637287	889280A
200902CV	00000252	00000239	2010965959			2010637287	889280A
200902CV	00000253	00000239	2010965959			2010637287	889280A
200902CV	00000254	00000254	2010965959			2010637287	889280A
200902CV	00000256	00000254	2010965959			2010637287	889280A
200902CV	00000257	00000254	2010965959			2010637287	889280A
200902CV	00000259	00000254	2010966034			2010637287	889280A
200902CV	00000262	00000254	2010966034			2010637287	889280A
200902CV	00000263	00000254	2010966034			2010637287	889280A
200902CV	00000269	00000268	2010966039			2010637287	889280B
200902CV	00000270	00000268	2010966039			2010637287	889280B

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 024675906 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength
		Standard Test Method:	ASTM D 5993	ASTM D 6768	ASTM D 6496
		Standard Specification:	0.75 lb/sq ft MARV	30lbs/in MARV	3.5lbs/in Min
Non-standard specifications were requested for this order as indicated on the attatched property sheet					
CV-BENTOMAT ST	200902CV	00000031	0.95	48.5	9.8
CV-BENTOMAT ST	200902CV	00000045	0.96	48.5	8
CV-BENTOMAT ST	200902CV	00000061	0.98	48.5	8.7
CV-BENTOMAT ST	200902CV	00000076	0.94	48.5	7.4
CV-BENTOMAT ST	200902CV	00000120	0.98	74.6	7.2
CV-BENTOMAT ST	200902CV	00000134	0.97	74.6	10.2
CV-BENTOMAT ST	200902CV	00000149	0.94	74.6	11.1
CV-BENTOMAT ST	200902CV	00000165	0.97	74.6	9.6
CV-BENTOMAT ST	200902CV	00000180	0.96	38.0	13.6
CV-BENTOMAT ST	200902CV	00000195	0.96	38.0	10.8
CV-BENTOMAT ST	200902CV	00000210	0.98	74.6	8.9
CV-BENTOMAT ST	200902CV	00000224	0.92	38.0	9.1
CV-BENTOMAT ST	200902CV	00000239	0.86	38.0	7.7
CV-BENTOMAT ST	200902CV	00000254	0.96	38.0	6.6
CV-BENTOMAT ST	200902CV	00000268	0.93	75.6	5.2

Product	Lot # Tested	Roll # Tested	PEEL 4632	GRAB 4632
CV-BENTOMAT ST	200902CV	00000031	47.9	194.0
CV-BENTOMAT ST	200902CV	00000045	39.5	194.0
CV-BENTOMAT ST	200902CV	00000061	42.1	194.0
CV-BENTOMAT ST	200902CV	00000076	36.2	194.0
CV-BENTOMAT ST	200902CV	00000120	36.0	298.2
CV-BENTOMAT ST	200902CV	00000134	49.9	298.2
CV-BENTOMAT ST	200902CV	00000149	55.2	298.2
CV-BENTOMAT ST	200902CV	00000165	46.3	298.2
CV-BENTOMAT ST	200902CV	00000180	72.7	151.9
CV-BENTOMAT ST	200902CV	00000195	52.1	151.9
CV-BENTOMAT ST	200902CV	00000210	42.3	151.9

CV-BENTOMAT ST	200902CV	00000224	44.9	151.9
CV-BENTOMAT ST	200902CV	00000239	38.8	151.9
CV-BENTOMAT ST	200902CV	00000254	33.7	151.9
CV-BENTOMAT ST	200902CV	00000268	26.7	302.5

ASTM test methods and property specifications per CETCO standard unless non-standard specifications were requested.
Any non-standard property specifications requested for this order are noted on the attached GCL property specifications sheet.

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 024675906 has been tested by American Colloid Company and yeilded the following test results.

Reference	Moist	Swell	Fluid Loss
Test Method:	ASTM D 2216	ASTM D 5890	ASTM D 5891
Specification:	12% Max	24 ml/2g Min	18 ml Max
889280A	8.9	27.0	16.0
889280B	9.7	26.0	15.8
899885A	9.1	26.0	16.0
899885B	9.6	27.0	15.8
899889A	9.1	26.0	16.0
899889B	8.9	27.0	15.8

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 024675906 was manufactured with geotextiles which were tested with the following results.

BASE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2010506736	3.5	155.2
PPX 82TEX	2010637287	3.4	138.6
PPX 82TEX	2010654854	3.4	162.5
PPX 82TEX	2010700157	3.4	162.9
PPX 82TEX	2010725157	3.3	174.8
PPX 82TEX	2010747344	3.5	150.0
PPX 82TEX	2010823577	3.6	165.1
PPX 82TEX	2010910913	3.2	169.8
PPX 82TEX	2010971500	3.5	185.9

CAP

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 650	2010905874	8.4	71.9
PPX 650	2010905928	7.8	74.1
PPX 650	2010905934	7.3	51.8
PPX 650	2010915228	8.5	56.9
PPX 650	2010915229	8.5	56.9
PPX 650	2010915232	8.0	51.8
PPX 650	2010915234	8.0	51.8
PPX 650	2010915236	7.3	46.7
PPX 650	2010915237	7.3	46.7
PPX 650	2010915238	7.3	46.7
PPX 650	2010946028	7.7	63.4
PPX 650	2010965929	7.7	63.4
PPX 650	2010965933	7.7	63.4
PPX 650	2010965934	7.1	50.9
PPX 650	2010965941	6.8	50.1
PPX 650	2010965951	7.4	56.6
PPX 650	2010965953	7.4	56.6

PPX 650	2010965959	7.4	54.4
PPX 650	2010966023	7.0	61.4
PPX 650	2010966024	7.5	64.0
PPX 650	2010966028	8.0	65.6
PPX 650	2010966031	8.0	65.6
PPX 650	2010966034	7.2	79.4
PPX 650	2010966039	8.0	82.5
PPX 650	2010966054	8.2	95.4

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
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

Date: 1/12/2009
Purchase Order: P12078
ORDER NUMBERS: 024675911, 024675913

Paul Elliott
Plastic Fusion

Huntsville, AL 35811
pelliott@plasticfusion.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Plastic Fusion.

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: Allen Steam Station LF
CUSTOMER P.O.: P12078
ORDER NUMBERS: 024675911, 024675913
PREPARED FOR: Plastic Fusion

CONTENTS:

- Daily production and needle detection certification
- GCL property specifications
- Order packing list
- GCL 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
Fax:
E-Mail: melanie.king@cetco.com

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

PRODUCTION CERTIFICATION

PROJECT NAME: Allen Steam Station LF
CUSTOMER P.O.: P12078
PREPARED FOR: Plastic Fusion

CETCO affirms that these products meet the physical and chemical criteria listed on the attached GCL property specification sheet.

NEEDLE REMOVAL AND DETECTION 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

Melanie King
Quality Assurance Coordinator
Colloid Environmental Technologies Co. (CETCO)

Ship Date: 01/12/2009
Order Numbers: 024675911, 024675913
Prepared For: Plastic Fusion

The GCL raw materials and GCL finished product manufactured for the above-referenced order number(s) are hereby certified to achieve the properties 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 (3.6 kg/sq m) Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 4632	GCL Grab Strength	200,000 sq ft (20,000 sq m)	90 lbs (400 N) MARV
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 (48 kPa) typ @ 200 psf
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5 x 10^-9 cm/ sec Max
ASTM D 5887	GCL Index Flux	Weekly	1 x 10^-8 m^3/m^2/sec Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min
ASTM D 4632	GCL Peel Strength	40,000 sq ft (4000 sq m)	15 lbs (65 N) Min

SPECIALY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT ST

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D 4632	GCL Grab Strength	Standard	Standard	Standard
ASTM D 4632	GCL Peel Strength	Standard	Standard	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.

FABRIC SUPPLIER REQUIREMENTS FOR BENTOMAT ST

Raw Material	test method	mass per area	units
Nonwoven Cover Fabric	ASTM D 5261	6.0	oz/yd2
Bentomat ST Woven Base Fabric	ASTM D 5261	3.2	oz/yd2

Fabric certifications from our raw material suppliers are on file at our production facility.

CETCO's MQA laboratory is GAI-accredited (www.geosynthetic-institute.org/gai/lab.html).

Melanie King

Melanie King
Quality Assurance Coordinator
CETCO Cartersville Plant

GCL ORDER PACKING LIST

GCL shipped for certification package number 024675911

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675913	CV-BENTOMAT ST	200902CV	00000045	150	15	2250	2880
024675911	CV-BENTOMAT ST	200902CV	00000090	150	15	2250	2764
024675913	CV-BENTOMAT ST	200902CV	00000111	150	15	2250	2776
024675913	CV-BENTOMAT ST	200902CV	00000114	150	15	2250	2752
024675911	CV-BENTOMAT ST	200902CV	00000120	150	15	2250	2886
024675911	CV-BENTOMAT ST	200902CV	00000124	150	15	2250	2800
024675911	CV-BENTOMAT ST	200902CV	00000133	150	15	2250	2994
024675913	CV-BENTOMAT ST	200902CV	00000136	150	15	2250	2794
024675911	CV-BENTOMAT ST	200902CV	00000142	150	15	2250	2790
024675911	CV-BENTOMAT ST	200902CV	00000153	150	15	2250	2754
024675911	CV-BENTOMAT ST	200902CV	00000159	150	15	2250	2740
024675911	CV-BENTOMAT ST	200902CV	00000173	150	15	2250	2768
024675913	CV-BENTOMAT ST	200902CV	00000201	150	15	2250	2876
024675913	CV-BENTOMAT ST	200902CV	00000206	150	15	2250	2754
024675913	CV-BENTOMAT ST	200902CV	00000217	150	15	2250	2790
024675911	CV-BENTOMAT ST	200902CV	00000220	150	15	2250	2780
024675913	CV-BENTOMAT ST	200902CV	00000224	150	15	2250	2746
024675913	CV-BENTOMAT ST	200902CV	00000226	150	15	2250	2758
024675913	CV-BENTOMAT ST	200902CV	00000229	150	15	2250	2754
024675911	CV-BENTOMAT ST	200902CV	00000230	150	15	2250	2744
024675911	CV-BENTOMAT ST	200902CV	00000231	150	15	2250	2764
024675911	CV-BENTOMAT ST	200902CV	00000239	150	15	2250	2758
024675913	CV-BENTOMAT ST	200902CV	00000241	150	15	2250	2732
024675913	CV-BENTOMAT ST	200902CV	00000245	150	15	2250	2746
024675911	CV-BENTOMAT ST	200902CV	00000248	150	15	2250	2754
024675911	CV-BENTOMAT ST	200902CV	00000255	150	15	2250	2752
024675911	CV-BENTOMAT ST	200902CV	00000264	150	15	2250	2774

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675911	CV-BENTOMAT ST	200902CV	00000265	150	15	2250	2730
024675913	CV-BENTOMAT ST	200902CV	00000266	150	15	2250	2770
024675911	CV-BENTOMAT ST	200902CV	00000267	150	15	2250	2768
024675913	CV-BENTOMAT ST	200902CV	00000268	150	15	2250	2742
024675913	CV-BENTOMAT ST	200902CV	00000277	150	15	2250	2738
			Totals:	**4800**	**480**	**72000**	**88928**
							Total Number of Rolls Certified: **32**

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 024675911

GCL			Geotextiles				Clay
CV-BENTOMAT ST			CV-N/W-WHITE-ST			CV-WOVEN-ST	CV-CG 50-ST
GCL Lot #	**GCL Roll #**	**Roll # Tested**	**Cap Lot #**	**Cap Roll #**	**Roll # Tested**	**Base Roll #**	**Clay Lot #**
200902CV	00000045	00000045	2010905941			2010971500	899885A
200902CV	00000090	00000090	2010915234			2010725157	899885B
200902CV	00000111	00000105	2010915233			2010823577	899885B
200902CV	00000114	00000105	2010915233			2010823577	899885B
200902CV	00000120	00000120	2010965954			2010823577	899889A
200902CV	00000124	00000120	2010905934			2010823577	899889A
200902CV	00000133	00000120	2010915236			2010823577	899889A
200902CV	00000136	00000134	2010915236			2010700157	899889A
200902CV	00000142	00000134	2010915231			2010700157	899889A
200902CV	00000153	00000149	2010905928			2010700157	899889A
200902CV	00000159	00000149	2010905928			2010700157	899889A
200902CV	00000173	00000165	2010905874			2010910913	899889B
200902CV	00000201	00000195	2010965934			2010506736	899889B
200902CV	00000206	00000195	2010965934			2010506736	899889B
200902CV	00000217	00000210	2010966023			2010506736	889280A
200902CV	00000220	00000210	2010966023			2010506736	889280A
200902CV	00000224	00000224	2010915232			2010654854	889280A
200902CV	00000226	00000224	2010915232			2010654854	889280A
200902CV	00000229	00000224	2010915232			2010654854	889280A
200902CV	00000230	00000224	2010965941			2010654854	889280A
200902CV	00000231	00000224	2010965941			2010654854	889280A
200902CV	00000239	00000239	2010915228			2010654854	889280A
200902CV	00000241	00000239	2010915228			2010654854	889280A
200902CV	00000245	00000239	2010965933			2010637287	889280A
200902CV	00000248	00000239	2010965933			2010637287	889280A
200902CV	00000255	00000254	2010965959			2010637287	889280A
200902CV	00000264	00000254	2010966034			2010637287	889280A
200902CV	00000265	00000254	2010966039			2010637287	889280A
200902CV	00000266	00000254	2010966039			2010637287	889280A

GCL Lot #	GCL Roll #	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
200902CV	00000267	00000254	2010966039			2010637287	889280B
200902CV	00000268	00000268	2010966039			2010637287	889280B
200902CV	00000277	00000268	2010966032			2010980797	889280B

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 024675911 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength
		Standard Test Method:	ASTM D 5993	ASTM D 6768	ASTM D 6496
		Standard Specification:	0.75 lb/sq ft MARV	30lbs/in MARV	3.5lbs/in Min
Non-standard specifications were requested for this order as indicated on the attatched property sheet					
CV-BENTOMAT ST	200902CV	00000045	0.96	48.5	8
CV-BENTOMAT ST	200902CV	00000090	0.84	74.6	7.2
CV-BENTOMAT ST	200902CV	00000105	0.93	74.6	6.1
CV-BENTOMAT ST	200902CV	00000120	0.98	74.6	7.2
CV-BENTOMAT ST	200902CV	00000134	0.97	74.6	10.2
CV-BENTOMAT ST	200902CV	00000149	0.94	74.6	11.1
CV-BENTOMAT ST	200902CV	00000165	0.97	74.6	9.6
CV-BENTOMAT ST	200902CV	00000195	0.96	38.0	10.8
CV-BENTOMAT ST	200902CV	00000210	0.98	74.6	8.9
CV-BENTOMAT ST	200902CV	00000224	0.92	38.0	9.1
CV-BENTOMAT ST	200902CV	00000239	0.86	38.0	7.7
CV-BENTOMAT ST	200902CV	00000254	0.96	38.0	6.6
CV-BENTOMAT ST	200902CV	00000268	0.93	75.6	5.2

Product	Lot # Tested	Roll # Tested	PEEL 4632	GRAB 4632
CV-BENTOMAT ST	200902CV	00000045	39.5	194.0
CV-BENTOMAT ST	200902CV	00000090	34.3	298.2
CV-BENTOMAT ST	200902CV	00000105	30.8	298.2
CV-BENTOMAT ST	200902CV	00000120	36.0	298.2
CV-BENTOMAT ST	200902CV	00000134	49.9	298.2
CV-BENTOMAT ST	200902CV	00000149	55.2	298.2
CV-BENTOMAT ST	200902CV	00000165	46.3	298.2
CV-BENTOMAT ST	200902CV	00000195	52.1	151.9
CV-BENTOMAT ST	200902CV	00000210	42.3	151.9
CV-BENTOMAT ST	200902CV	00000224	44.9	151.9
CV-BENTOMAT ST	200902CV	00000239	38.8	151.9
CV-BENTOMAT ST	200902CV	00000254	33.7	151.9
CV-BENTOMAT ST	200902CV	00000268	26.7	302.5

ASTM test methods and property specifications per CETCO standard unless non-standard specifications were requested.
Any non-standard property specifications requested for this order are noted on the attached GCL property specifications sheet.

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 024675911 has been tested by American Colloid Company and yeilded the following test results.

Reference	Moist	Swell	Fluid Loss
Test Method:	ASTM D 2216	ASTM D 5890	ASTM D 5891
Specification:	12% Max	24 ml/2g Min	18 ml Max
889280A	8.9	27.0	16.0
889280B	9.7	26.0	15.8
899885A	9.1	26.0	16.0
899885B	9.6	27.0	15.8
899889A	9.1	26.0	16.0
899889B	8.9	27.0	15.8

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 024675911 was manufactured with geotextiles which were tested with the following results.

BASE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2010506736	3.5	155.2
PPX 82TEX	2010637287	3.4	138.6
PPX 82TEX	2010654854	3.4	162.5
PPX 82TEX	2010700157	3.4	162.9
PPX 82TEX	2010725157	3.3	174.8
PPX 82TEX	2010823577	3.6	165.1
PPX 82TEX	2010910913	3.2	169.8
PPX 82TEX	2010971500	3.5	185.9
PPX 82TEX	2010980797	3.5	190.9

CAP

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 650	2010905874	8.4	71.9
PPX 650	2010905928	7.8	74.1
PPX 650	2010905934	7.3	51.8
PPX 650	2010905941	7.7	52.6
PPX 650	2010915228	8.5	56.9
PPX 650	2010915231	8.0	51.8
PPX 650	2010915232	8.0	51.8
PPX 650	2010915233	8.0	51.8
PPX 650	2010915234	8.0	51.8
PPX 650	2010915236	7.3	46.7
PPX 650	2010965933	7.7	63.4
PPX 650	2010965934	7.1	50.9
PPX 650	2010965941	6.8	50.1
PPX 650	2010965954	7.8	62.9
PPX 650	2010965959	7.4	54.4
PPX 650	2010966023	7.0	61.4
PPX 650	2010966032	7.2	79.4

PPX 650	2010966034	7.2	79.4
PPX 650	2010966039	8.0	82.5

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
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

Date: 1/14/2009
Purchase Order: P12078
ORDER NUMBERS: 024675912, 024675914, 024675915

Paul Elliott
Plastic Fusion

Huntsville, AL 35811
pelliott@plasticfusion.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Plastic Fusion.

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: Allen Steam Station LF
CUSTOMER P.O.: P12078
ORDER NUMBERS: 024675912, 024675914, 024675915
PREPARED FOR: Plastic Fusion

CONTENTS:

- Daily production and needle detection certification
- GCL property specifications
- Order packing list
- GCL 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
Fax:
E-Mail: melanie.king@cetco.com

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

PRODUCTION CERTIFICATION

PROJECT NAME: Allen Steam Station LF
CUSTOMER P.O.: P12078
PREPARED FOR: Plastic Fusion

CETCO affirms that these products meet the physical and chemical criteria listed on the attached GCL property specification sheet.

NEEDLE REMOVAL AND DETECTION 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

Melanie King
Quality Assurance Coordinator
Colloid Environmental Technologies Co. (CETCO)

Ship Date: 01/13/2009
Order Numbers: 024675912, 024675914, 024675915
Prepared For: Plastic Fusion

The GCL raw materials and GCL finished product manufactured for the above-referenced order number(s) are hereby certified to achieve the properties 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 (3.6 kg/sq m) Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 4632	GCL Grab Strength	200,000 sq ft (20,000 sq m)	90 lbs (400 N) MARV
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 (48 kPa) typ @ 200 psf
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5 x 10^-9 cm/ sec Max
ASTM D 5887	GCL Index Flux	Weekly	1 x 10^-8 m^3/m^2/sec Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min
ASTM D 4632	GCL Peel Strength	40,000 sq ft (4000 sq m)	15 lbs (65 N) Min

SPECIALY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT ST

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D 4632	GCL Grab Strength	Standard	Standard	Standard
ASTM D 4632	GCL Peel Strength	Standard	Standard	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.

FABRIC SUPPLIER REQUIREMENTS FOR BENTOMAT ST

Raw Material	test method	mass per area	units
Nonwoven Cover Fabric	ASTM D 5261	6.0	oz/yd2
Bentomat ST Woven Base Fabric	ASTM D 5261	3.2	oz/yd2

Fabric certifications from our raw material suppliers are on file at our production facility.

CETCO's MQA laboratory is GAI-accredited (www.geosynthetic-institute.org/gai/lab.html).

Melanie King

Melanie King
Quality Assurance Coordinator
CETCO Cartersville Plant

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL ORDER PACKING LIST

GCL shipped for certification package number 024675912

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675915	CV-BENTOMAT ST	200902CV	00000001	150	15	2250	3158
024675912	CV-BENTOMAT ST	200902CV	00000009	150	15	2250	2802
024675915	CV-BENTOMAT ST	200902CV	00000016	150	15	2250	2884
024675914	CV-BENTOMAT ST	200902CV	00000020	150	15	2250	2850
024675912	CV-BENTOMAT ST	200902CV	00000025	150	15	2250	2876
024675915	CV-BENTOMAT ST	200902CV	00000031	150	15	2250	2878
024675914	CV-BENTOMAT ST	200902CV	00000032	150	15	2250	2846
024675915	CV-BENTOMAT ST	200902CV	00000043	150	15	2250	2828
024675914	CV-BENTOMAT ST	200902CV	00000044	150	15	2250	2846
024675914	CV-BENTOMAT ST	200902CV	00000046	150	15	2250	2872
024675914	CV-BENTOMAT ST	200902CV	00000047	150	15	2250	2844
024675912	CV-BENTOMAT ST	200902CV	00000048	150	15	2250	2856
024675915	CV-BENTOMAT ST	200902CV	00000049	150	15	2250	2882
024675915	CV-BENTOMAT ST	200902CV	00000054	100	15	1500	1914
024675912	CV-BENTOMAT ST	200902CV	00000063	150	15	2250	2844
024675915	CV-BENTOMAT ST	200902CV	00000069	150	15	2250	2808
024675915	CV-BENTOMAT ST	200902CV	00000070	150	15	2250	2796
024675912	CV-BENTOMAT ST	200902CV	00000071	150	15	2250	2780
024675912	CV-BENTOMAT ST	200902CV	00000073	150	15	2250	2820
024675912	CV-BENTOMAT ST	200902CV	00000074	150	15	2250	2790
024675914	CV-BENTOMAT ST	200902CV	00000076	150	15	2250	2852
024675912	CV-BENTOMAT ST	200902CV	00000077	150	15	2250	2794
024675912	CV-BENTOMAT ST	200902CV	00000078	150	15	2250	2760
024675912	CV-BENTOMAT ST	200902CV	00000079	150	15	2250	2740
024675914	CV-BENTOMAT ST	200902CV	00000081	150	15	2250	2774
024675912	CV-BENTOMAT ST	200902CV	00000082	150	15	2250	2782
024675914	CV-BENTOMAT ST	200902CV	00000087	150	15	2250	2758

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675915	CV-BENTOMAT ST	200902CV	00000096	150	15	2250	2780
024675915	CV-BENTOMAT ST	200902CV	00000110	150	15	2250	2778
024675915	CV-BENTOMAT ST	200902CV	00000112	150	15	2250	2776
024675914	CV-BENTOMAT ST	200902CV	00000115	150	15	2250	2772
024675914	CV-BENTOMAT ST	200902CV	00000116	150	15	2250	2774
024675914	CV-BENTOMAT ST	200902CV	00000118	150	15	2250	2784
024675914	CV-BENTOMAT ST	200902CV	00000122	150	15	2250	2794
024675915	CV-BENTOMAT ST	200902CV	00000123	150	15	2250	2792
024675912	CV-BENTOMAT ST	200902CV	00000127	150	15	2250	2792
024675912	CV-BENTOMAT ST	200902CV	00000128	150	15	2250	2810
024675912	CV-BENTOMAT ST	200902CV	00000129	150	15	2250	2764
024675912	CV-BENTOMAT ST	200902CV	00000131	150	15	2250	2794
024675912	CV-BENTOMAT ST	200902CV	00000132	150	15	2250	2776
024675915	CV-BENTOMAT ST	200902CV	00000135	150	15	2250	2832
024675915	CV-BENTOMAT ST	200902CV	00000137	150	15	2250	2798
024675914	CV-BENTOMAT ST	200902CV	00000138	150	15	2250	2786
024675914	CV-BENTOMAT ST	200902CV	00000139	150	15	2250	2790
024675914	CV-BENTOMAT ST	200902CV	00000140	150	15	2250	2784
024675914	CV-BENTOMAT ST	200902CV	00000141	150	15	2250	2784
024675915	CV-BENTOMAT ST	200902CV	00000191	150	15	2250	2804
024675912	CV-BENTOMAT ST	200902CV	00000192	150	15	2250	2804
			Totals:	**7150**	**720**	**107250**	**134202**
						Total Number of Rolls Certified: **48**	

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 024675912

GCL			Geotextiles				Clay
CV-BENTOMAT ST			CV-N/W-WHITE-ST			CV-WOVEN-ST	CV-CG 50-ST
GCL Lot #	**GCL Roll #**	**Roll # Tested**	**Cap Lot #**	**Cap Roll #**	**Roll # Tested**	**Base Roll #**	**Clay Lot #**
200902CV	00000001	00000001	2010905942			2010613380	891221B
200902CV	00000009	00000001	2010905852			2010613380	891221B
200902CV	00000016	00000016	2010905861			2010613380	899885A
200902CV	00000020	00000016	2010965957			2010971500	899885A
200902CV	00000025	00000016	2010965957			2010971500	899885A
200902CV	00000031	00000031	2010965936			2010971500	899885A
200902CV	00000032	00000031	2010965936			2010971500	899885A
200902CV	00000043	00000031	2010905941			2010971500	899885A
200902CV	00000044	00000031	2010905941			2010971500	899885A
200902CV	00000046	00000045	2010905941			2010747344	899885A
200902CV	00000047	00000045	2010965956			2010747344	899885A
200902CV	00000048	00000045	2010965956			2010747344	899885A
200902CV	00000049	00000045	2010965956			2010747344	899885A
200902CV	00000054	00000045	2010915238			2010747344	899885A
200902CV	00000063	00000061	2010966054			2010747344	899885A
200902CV	00000069	00000061	2010966054			2010747344	899885B
200902CV	00000070	00000061	2010915235			2010747344	899885B
200902CV	00000071	00000061	2010915235			2010747344	899885B
200902CV	00000073	00000061	2010915235			2010747344	899885B
200902CV	00000074	00000061	2010915235			2010725157	899885B
200902CV	00000076	00000076	2010915235			2010725157	899885B
200902CV	00000077	00000076	2010915237			2010725157	899885B
200902CV	00000078	00000076	2010915237			2010725157	899885B
200902CV	00000079	00000076	2010915237			2010725157	899885B
200902CV	00000081	00000076	2010915237			2010725157	899885B
200902CV	00000082	00000076	2010915237			2010725157	899885B
200902CV	00000087	00000076	2010915234			2010725157	899885B
200902CV	00000096	00000090	2010915230			2010725157	899885B
200902CV	00000110	00000105	2010915233			2010823577	899885B

GCL Lot #	GCL Roll #	Roll # Tested	Cap Lot #	Cap Roll #	Roll # Tested	Base Roll #	Clay Lot #
200902CV	00000112	00000105	2010915233			2010823577	899885B
200902CV	00000115	00000105	2010915233			2010823577	899889A
200902CV	00000116	00000105	2010965954			2010823577	899889A
200902CV	00000118	00000105	2010965954			2010823577	899889A
200902CV	00000122	00000120	2010965954			2010823577	899889A
200902CV	00000123	00000120	2010905934			2010823577	899889A
200902CV	00000127	00000120	2010905934			2010823577	899889A
200902CV	00000128	00000120	2010905934			2010823577	899889A
200902CV	00000129	00000120	2010905934			2010823577	899889A
200902CV	00000131	00000120	2010915236			2010823577	899889A
200902CV	00000132	00000120	2010915236			2010823577	899889A
200902CV	00000135	00000134	2010915236			2010823577	899889A
200902CV	00000137	00000134	2010915236			2010700157	899889A
200902CV	00000138	00000134	2010915231			2010700157	899889A
200902CV	00000139	00000134	2010915231			2010700157	899889A
200902CV	00000140	00000134	2010915231			2010700157	899889A
200902CV	00000141	00000134	2010915231			2010700157	899889A
200902CV	00000191	00000180	2010946028			2010910913	899889B
200902CV	00000192	00000180	2010946028			2010910913	899889B

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 024675912 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength
		Standard Test Method:	ASTM D 5993	ASTM D 6768	ASTM D 6496
		Standard Specification:	0.75 lb/sq ft MARV	30lbs/in MARV	3.5lbs/in Min
Non-standard specifications were requested for this order as indicated on the attatched property sheet					
CV-BENTOMAT ST	200902CV	00000001	1.08	48.5	11.1
CV-BENTOMAT ST	200902CV	00000016	0.93	48.5	10.4
CV-BENTOMAT ST	200902CV	00000031	0.95	48.5	9.8
CV-BENTOMAT ST	200902CV	00000045	0.96	48.5	8
CV-BENTOMAT ST	200902CV	00000061	0.98	48.5	8.7
CV-BENTOMAT ST	200902CV	00000076	0.94	48.5	7.4
CV-BENTOMAT ST	200902CV	00000090	0.84	74.6	7.2
CV-BENTOMAT ST	200902CV	00000105	0.93	74.6	6.1
CV-BENTOMAT ST	200902CV	00000120	0.98	74.6	7.2
CV-BENTOMAT ST	200902CV	00000134	0.97	74.6	10.2
CV-BENTOMAT ST	200902CV	00000180	0.96	38.0	13.6

Product	Lot # Tested	Roll # Tested	PEEL 4632	GRAB 4632
CV-BENTOMAT ST	200902CV	00000001	54.8	194.0
CV-BENTOMAT ST	200902CV	00000016	49.7	194.0
CV-BENTOMAT ST	200902CV	00000031	47.9	194.0
CV-BENTOMAT ST	200902CV	00000045	39.5	194.0
CV-BENTOMAT ST	200902CV	00000061	42.1	194.0
CV-BENTOMAT ST	200902CV	00000076	36.2	194.0
CV-BENTOMAT ST	200902CV	00000090	34.3	298.2
CV-BENTOMAT ST	200902CV	00000105	30.8	298.2
CV-BENTOMAT ST	200902CV	00000120	36.0	298.2
CV-BENTOMAT ST	200902CV	00000134	49.9	298.2
CV-BENTOMAT ST	200902CV	00000180	72.7	151.9

ASTM test methods and property specifications per CETCO standard unless non-standard specifications were requested.
Any non-standard property specifications requested for this order are noted on the attached GCL property specifications sheet.

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 024675912 has been tested by American Colloid Company and yeilded the following test results.

Reference	Moist	Swell	Fluid Loss
Test Method:	ASTM D 2216	ASTM D 5890	ASTM D 5891
Specification:	12% Max	24 ml/2g Min	18 ml Max
891221B	8.4	29.0	16.4
899885A	9.1	26.0	16.0
899885B	9.6	27.0	15.8
899889A	9.1	26.0	16.0
899889B	8.9	27.0	15.8

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 024675912 was manufactured with geotextiles which were tested with the following results.

BASE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2010613380	3.4	154.9
PPX 82TEX	2010700157	3.4	162.9
PPX 82TEX	2010725157	3.3	174.8
PPX 82TEX	2010747344	3.5	150.0
PPX 82TEX	2010823577	3.6	165.1
PPX 82TEX	2010910913	3.2	169.8
PPX 82TEX	2010971500	3.5	185.9

CAP

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 650	2010905852	7.6	59.7
PPX 650	2010905861	7.6	59.7
PPX 650	2010905934	7.3	51.8
PPX 650	2010905941	7.7	52.6
PPX 650	2010905942	7.7	52.6
PPX 650	2010915230	8.5	56.9
PPX 650	2010915231	8.0	51.8
PPX 650	2010915233	8.0	51.8
PPX 650	2010915234	8.0	51.8
PPX 650	2010915235	7.3	46.7
PPX 650	2010915236	7.3	46.7
PPX 650	2010915237	7.3	46.7
PPX 650	2010915238	7.3	46.7
PPX 650	2010946028	7.7	63.4
PPX 650	2010965936	7.1	50.9
PPX 650	2010965954	7.8	62.9
PPX 650	2010965956	7.8	62.9
PPX 650	2010965957	7.8	62.9
PPX 650	2010966054	8.2	95.4

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
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

Date: 1/15/2009
Purchase Order: P12078
ORDER NUMBER: 024675916

Paul Elliott
Plastic Fusion

Huntsville, AL 35811
pelliott@plasticfusion.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Plastic Fusion.

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: Allen Steam Station LF
CUSTOMER P.O.: P12078
ORDER NUMBER: 024675916
PREPARED FOR: Plastic Fusion

CONTENTS:

- Daily production and needle detection certification
- GCL property specifications
- Order packing list
- GCL 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
Fax:
E-Mail: melanie.king@cetco.com

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

PRODUCTION CERTIFICATION

PROJECT NAME: Allen Steam Station LF
CUSTOMER P.O.: P12078
PREPARED FOR: Plastic Fusion

CETCO affirms that these products meet the physical and chemical criteria listed on the attached GCL property specification sheet.

NEEDLE REMOVAL AND DETECTION 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

Melanie King
Quality Assurance Coordinator
Colloid Environmental Technologies Co. (CETCO)

Ship Date: 01/14/2009
Order Number: 024675916
Prepared For: Plastic Fusion

The GCL raw materials and GCL finished product manufactured for the above-referenced order number(s) are hereby certified to achieve the properties 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 (3.6 kg/sq m) Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 4632	GCL Grab Strength	200,000 sq ft (20,000 sq m)	90 lbs (400 N) MARV
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 (48 kPa) typ @ 200 psf
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5 x 10^-9 cm/ sec Max
ASTM D 5887	GCL Index Flux	Weekly	1 x 10^-8 m^3/m^2/sec Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min
ASTM D 4632	GCL Peel Strength	40,000 sq ft (4000 sq m)	15 lbs (65 N) Min

SPECIALY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT ST

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D 4632	GCL Grab Strength	Standard	Standard	Standard
ASTM D 4632	GCL Peel Strength	Standard	Standard	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.

FABRIC SUPPLIER REQUIREMENTS FOR BENTOMAT ST

Raw Material	test method	mass per area	units
Nonwoven Cover Fabric	ASTM D 5261	6.0	oz/yd2
Bentomat ST Woven Base Fabric	ASTM D 5261	3.2	oz/yd2

Fabric certifications from our raw material suppliers are on file at our production facility.

CETCO's MQA laboratory is GAI-accredited (www.geosynthetic-institute.org/gai/lab.html).

Melanie King

Melanie King
Quality Assurance Coordinator
CETCO Cartersville Plant

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL ORDER PACKING LIST

GCL shipped for certification package number 024675916

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675916	CV-BENTOMAT ST	200902CV	00000006	150	15	2250	2852
024675916	CV-BENTOMAT ST	200902CV	00000011	150	15	2250	2824
024675916	CV-BENTOMAT ST	200902CV	00000012	150	15	2250	2874
024675916	CV-BENTOMAT ST	200902CV	00000018	150	15	2250	2876
024675916	CV-BENTOMAT ST	200902CV	00000019	150	15	2250	2874
024675916	CV-BENTOMAT ST	200902CV	00000033	150	15	2250	2856
024675916	CV-BENTOMAT ST	200902CV	00000034	150	15	2250	2852
024675916	CV-BENTOMAT ST	200902CV	00000035	150	15	2250	2840
024675916	CV-BENTOMAT ST	200902CV	00000041	150	15	2250	2850
024675916	CV-BENTOMAT ST	200902CV	00000050	150	15	2250	2850
024675916	CV-BENTOMAT ST	200902CV	00000051	150	15	2250	2858
024675916	CV-BENTOMAT ST	200902CV	00000080	150	15	2250	2746
024675916	CV-BENTOMAT ST	200902CV	00000097	150	15	2250	2768
024675916	CV-BENTOMAT ST	200902CV	00000108	150	15	2250	2804
024675916	CV-BENTOMAT ST	200902CV	00000150	150	15	2250	2800
			Totals:	**2250**	**225**	**33750**	**42524**
						Total Number of Rolls Certified: **15**	

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 024675916

GCL			Geotextiles				Clay
CV-BENTOMAT ST			CV-N/W-WHITE-ST			CV-WOVEN-ST	CV-CG 50-ST
GCL Lot #	**GCL Roll #**	**Roll # Tested**	**Cap Lot #**	**Cap Roll #**	**Roll # Tested**	**Base Roll #**	**Clay Lot #**
200902CV	00000006	00000001	2010905852			2010613380	891221B
200902CV	00000011	00000001	2010905861			2010613380	891221B
200902CV	00000012	00000001	2010905861			2010613380	891221B
200902CV	00000018	00000016	2010965957			2010971500	899885A
200902CV	00000019	00000016	2010965957			2010971500	899885A
200902CV	00000033	00000031	2010965929			2010971500	899885A
200902CV	00000034	00000031	2010965929			2010971500	899885A
200902CV	00000035	00000031	2010965929			2010971500	899885A
200902CV	00000041	00000031	2010905941			2010971500	899885A
200902CV	00000050	00000045	2010965956			2010747344	899885A
200902CV	00000051	00000045	2010965956			2010747344	899885A
200902CV	00000080	00000076	2010915237			2010725157	899885B
200902CV	00000097	00000090	2010915230			2010725157	899885B
200902CV	00000108	00000105	2010915233			2010823577	899885B
200902CV	00000150	00000149	2010966031			2010700157	899889A

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 024675916 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength
		Standard Test Method:	ASTM D 5993	ASTM D 6768	ASTM D 6496
		Standard Specification:	0.75 lb/sq ft MARV	30lbs/in MARV	3.5lbs/in Min
Non-standard specifications were requested for this order as indicated on the attatched property sheet					
CV-BENTOMAT ST	200902CV	00000001	1.08	48.5	11.1
CV-BENTOMAT ST	200902CV	00000016	0.93	48.5	10.4
CV-BENTOMAT ST	200902CV	00000031	0.95	48.5	9.8
CV-BENTOMAT ST	200902CV	00000045	0.96	48.5	8
CV-BENTOMAT ST	200902CV	00000076	0.94	48.5	7.4
CV-BENTOMAT ST	200902CV	00000090	0.84	74.6	7.2
CV-BENTOMAT ST	200902CV	00000105	0.93	74.6	6.1
CV-BENTOMAT ST	200902CV	00000149	0.94	74.6	11.1

Product	Lot # Tested	Roll # Tested	PEEL 4632	GRAB 4632
CV-BENTOMAT ST	200902CV	00000001	54.8	194.0
CV-BENTOMAT ST	200902CV	00000016	49.7	194.0
CV-BENTOMAT ST	200902CV	00000031	47.9	194.0
CV-BENTOMAT ST	200902CV	00000045	39.5	194.0
CV-BENTOMAT ST	200902CV	00000076	36.2	194.0
CV-BENTOMAT ST	200902CV	00000090	34.3	298.2
CV-BENTOMAT ST	200902CV	00000105	30.8	298.2
CV-BENTOMAT ST	200902CV	00000149	55.2	298.2

ASTM test methods and property specifications per CETCO standard unless non-standard specifications were requested.
Any non-standard property specifications requested for this order are noted on the attached GCL property specifications sheet.

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 024675916 has been tested by American Colloid Company and yeilded the following test results.

Reference	Moist	Swell	Fluid Loss
Test Method:	ASTM D 2216	ASTM D 5890	ASTM D 5891
Specification:	12% Max	24 ml/2g Min	18 ml Max
891221B	8.4	29.0	16.4
899885A	9.1	26.0	16.0
899885B	9.6	27.0	15.8
899889A	9.1	26.0	16.0

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 024675916 was manufactured with geotextiles which were tested with the following results.

BASE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2010613380	3.4	154.9
PPX 82TEX	2010700157	3.4	162.9
PPX 82TEX	2010725157	3.3	174.8
PPX 82TEX	2010747344	3.5	150.0
PPX 82TEX	2010823577	3.6	165.1
PPX 82TEX	2010971500	3.5	185.9

CAP

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 650	2010905852	7.6	59.7
PPX 650	2010905861	7.6	59.7
PPX 650	2010905941	7.7	52.6
PPX 650	2010915230	8.5	56.9
PPX 650	2010915233	8.0	51.8
PPX 650	2010915237	7.3	46.7
PPX 650	2010965929	7.7	63.4
PPX 650	2010965956	7.8	62.9
PPX 650	2010965957	7.8	62.9
PPX 650	2010966031	8.0	65.6

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
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

Date: 1/19/2009
Purchase Order: P12078
ORDER NUMBER: 024675917

Paul Elliott
Plastic Fusion

Huntsville, AL 35811
pelliott@plasticfusion.com

To Whom it May Concern:

Please find enclosed the MQA/MQC test data package for Geosynthetic Clay Liner shipments to Plastic Fusion.

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: Allen Steam Station LF
CUSTOMER P.O.: P12078
ORDER NUMBER: 024675917
PREPARED FOR: Plastic Fusion

CONTENTS:

- Daily production and needle detection certification
- GCL property specifications
- Order packing list
- GCL 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
Fax:
E-Mail: melanie.king@cetco.com

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

PRODUCTION CERTIFICATION

PROJECT NAME: Allen Steam Station LF
CUSTOMER P.O.: P12078
PREPARED FOR: Plastic Fusion

CETCO affirms that these products meet the physical and chemical criteria listed on the attached GCL property specification sheet.

NEEDLE REMOVAL AND DETECTION 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

Melanie King
Quality Assurance Coordinator
Colloid Environmental Technologies Co. (CETCO)

Ship Date: 01/16/2009
Order Number: 024675917
Prepared For: Plastic Fusion

The GCL raw materials and GCL finished product manufactured for the above-referenced order number(s) are hereby certified to achieve the properties 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 (3.6 kg/sq m) Min
ASTM D 5890	Bentonite Swell Index	1 per 50 Tons	24 ml/2g Min
ASTM D 4632	GCL Grab Strength	200,000 sq ft (20,000 sq m)	90 lbs (400 N) MARV
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 (48 kPa) typ @ 200 psf
ASTM D 5887	GCL Hydraulic Conductivity	Weekly	5 x 10^-9 cm/ sec Max
ASTM D 5887	GCL Index Flux	Weekly	1 x 10^-8 m^3/m^2/sec Max
ASTM D 6496	GCL Peel Strength	40,000 sq ft (4000 sq m)	3.5 lbs/in Min
ASTM D 4632	GCL Peel Strength	40,000 sq ft (4000 sq m)	15 lbs (65 N) Min

SPECIALY REQUESTED CERTIFIED PROPERTIES FOR THIS ORDER OF BENTOMAT ST

Test Method	Test Method Property	Requested Frequency	Requested Value	Requested Conditions
ASTM D 4632	GCL Grab Strength	Standard	Standard	Standard
ASTM D 4632	GCL Peel Strength	Standard	Standard	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.

FABRIC SUPPLIER REQUIREMENTS FOR BENTOMAT ST

Raw Material	test method	mass per area	units
Nonwoven Cover Fabric	ASTM D 5261	6.0	oz/yd2
Bentomat ST Woven Base Fabric	ASTM D 5261	3.2	oz/yd2

Fabric certifications from our raw material suppliers are on file at our production facility.

CETCO's MQA laboratory is GAI-accredited (www.geosynthetic-institute.org/gai/lab.html).

Melanie King

Melanie King
Quality Assurance Coordinator
CETCO Cartersville Plant

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL ORDER PACKING LIST

GCL shipped for certification package number 024675917

Order #	Product	Lot Number	Roll Number	Length (ft)	Width (ft)	Square Ft	Weight (lbs)
024675917	CV-BENTOMAT ST	200902CV	00000010	150	15	2250	2828
024675917	CV-BENTOMAT ST	200902CV	00000022	150	15	2250	2830
024675917	CV-BENTOMAT ST	200902CV	00000023	150	15	2250	2842
024675917	CV-BENTOMAT ST	200902CV	00000024	150	15	2250	2852
024675917	CV-BENTOMAT ST	200902CV	00000040	150	15	2250	2862
024675917	CV-BENTOMAT ST	200902CV	00000056	150	15	2250	2966
024675917	CV-BENTOMAT ST	200902CV	00000085	150	15	2250	2774
024675917	CV-BENTOMAT ST	200902CV	00000103	150	15	2250	2726
024675917	CV-BENTOMAT ST	200902CV	00000107	150	15	2250	2780
			Totals:	**1350**	**135**	**20250**	**25460**
						Total Number of Rolls Certified: **9**	

CETCO LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MQA TRACKING FORM

Listing of finished and raw materials used to produce certification package number 024675917

GCL			Geotextiles				Clay
CV-BENTOMAT ST			CV-N/W-WHITE-ST			CV-WOVEN-ST	CV-CG 50-ST
GCL Lot #	**GCL Roll #**	**Roll # Tested**	**Cap Lot #**	**Cap Roll #**	**Roll # Tested**	**Base Roll #**	**Clay Lot #**
200902CV	00000010	00000001	2010905852			2010613380	891221B
200902CV	00000022	00000016	2010965957			2010971500	899885A
200902CV	00000023	00000016	2010965957			2010971500	899885A
200902CV	00000024	00000016	2010965957			2010971500	899885A
200902CV	00000040	00000031	2010965929			2010971500	899885A
200902CV	00000056	00000045	2010915238			2010747344	899885A
200902CV	00000085	00000076	2010915234			2010725157	899885B
200902CV	00000103	00000090	2010915239			2010725157	899885B
200902CV	00000107	00000105	2010915239			2010823577	899885B

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

GCL MANUFACTURING QUALITY CONTROL TEST DATA

The following rolls in GCL certification package number 024675917 have been tested in our production facility lab.

Product	Lot # Tested	Roll # Tested	Mass Area	Grab Strength	Peel Strength
		Standard Test Method:	ASTM D 5993	ASTM D 6768	ASTM D 6496
		Standard Specification:	0.75 lb/sq ft MARV	30lbs/in MARV	3.5lbs/in Min
Non-standard specifications were requested for this order as indicated on the attatched property sheet					
CV-BENTOMAT ST	200902CV	00000001	1.08	48.5	11.1
CV-BENTOMAT ST	200902CV	00000016	0.93	48.5	10.4
CV-BENTOMAT ST	200902CV	00000031	0.95	48.5	9.8
CV-BENTOMAT ST	200902CV	00000045	0.96	48.5	8
CV-BENTOMAT ST	200902CV	00000076	0.94	48.5	7.4
CV-BENTOMAT ST	200902CV	00000090	0.84	74.6	7.2
CV-BENTOMAT ST	200902CV	00000105	0.93	74.6	6.1

Product	Lot # Tested	Roll # Tested	PEEL 4632	GRAB 4632
CV-BENTOMAT ST	200902CV	00000001	54.8	194.0
CV-BENTOMAT ST	200902CV	00000016	49.7	194.0
CV-BENTOMAT ST	200902CV	00000031	47.9	194.0
CV-BENTOMAT ST	200902CV	00000045	39.5	194.0
CV-BENTOMAT ST	200902CV	00000076	36.2	194.0
CV-BENTOMAT ST	200902CV	00000090	34.3	298.2
CV-BENTOMAT ST	200902CV	00000105	30.8	298.2

ASTM test methods and property specifications per CETCO standard unless non-standard specifications were requested.
Any non-standard property specifications requested for this order are noted on the attached GCL property specifications sheet.

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

BENTONITE CLAY CERTIFICATION

The Bentonite Clay used to produce package 024675917 has been tested by American Colloid Company and yeilded the following test results.

Reference	Moist	Swell	Fluid Loss
Test Method:	ASTM D 2216	ASTM D 5890	ASTM D 5891
Specification:	12% Max	24 ml/2g Min	18 ml Max
891221B	8.4	29.0	16.4
899885A	9.1	26.0	16.0
899885B	9.6	27.0	15.8

GEOTEXTILE TEST RESULTS FROM MATERIAL SUPPLIERS

The GCL in certification package number 024675917 was manufactured with geotextiles which were tested with the following results.

BASE

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 82TEX	2010613380	3.4	154.9
PPX 82TEX	2010725157	3.3	174.8
PPX 82TEX	2010747344	3.5	150.0
PPX 82TEX	2010823577	3.6	165.1
PPX 82TEX	2010971500	3.5	185.9

CAP

Material	Roll Number	Mass Area oz/yd2	Grab Strength lbs
PPX 650	2010905852	7.6	59.7
PPX 650	2010915234	8.0	51.8
PPX 650	2010915238	7.3	46.7
PPX 650	2010915239	7.9	54.8
PPX 650	2010965929	7.7	63.4
PPX 650	2010965957	7.8	62.9

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.

Geosynthetic Clay Liner (GCL) Conformance Test Results

January 20, 2009

Mail To:	**Bill To:**
Mr. Cedric Ruhl **S & ME** 9751 Southern Pine Boulevard Charlotte, NC 28273	**<= Same**

email: cruhl@smeinc.com
cc email: kdaly@smeinc.com
cc email: kbaucom@smeinc.com

Dear Mr. Ruhl:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	**Allen Steam Station RAB Ash Landfill**
TRI Job Reference Number:	E2308-94-01
Material(s) Tested:	7 Bentomat ST GCL(s)
Test(s) Requested:	Mass/Unit Area (ASTM D 5993) Tensile Strength (ASTM D 6768) Peel Strength (ASTM D 6496) Index Flux (ASTM D 5887)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Richard S. Lacey, P.E.
Senior Engineer
Geosynthetic Services Division

www.GeosyntheticTesting.com

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GCL TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: GCL
Sample Identification: 1
TRI Log #: E2308-94-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)													
Bentonite mass/unit area (lbs/ft^2)	0.94	1.01	0.93	1.02	0.96						**0.97**	0.04	0.75 min
Moisture Content (%)	28.0	28.1	28.8	27.0	30.0						**28.4**	1.1	
Tensile Strength (ASTM D 6768)													
MD - Maximum Load (lbs)	207	201	208	202	191						**202**	7	90 min
MD - Tensile Strength (ppi)	51.8	50.2	51.9	50.6	47.7						**50.4**	1.7	
Peel Strength (ASTM D 6496)													
MD - Peak Peel Strength (lbs)	66.3	66.4	52.2	70.8	53.8						**61.9**	8.3	15 min
MD - Peel Strength (lbs/in)	14.5	14.0	10.9	14.6	11.3						**13.1**	1.8	
Index Flux (ASTM D 5887)													
Index Flux (m^3/m^2/sec)	2.6E-09										**2.6E-09**		1E-08 max
Hydraulic Conductivity (cm/sec)	2.4E-09										**2.4E-09**		5E-09 max

MD Machine Direction TD Transverse Direction NA Not Available

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GCL TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: GCL
Sample Identification: 45
TRI Log #: E2308-94-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)													
Bentonite mass/unit area (lbs/ft^2)	0.90	1.00	0.97	1.00	0.98						**0.97**	0.04	0.75 min
Moisture Content (%)	28.1	27.3	29.2	27.5	29.8						**28.4**	1.1	
Tensile Strength (ASTM D 6768)													
MD - Maximum Load (lbs)	287	314	303	332	323						**312**	18	90 min
MD - Tensile Strength (ppi)	71.8	78.4	75.8	83.1	80.8						**78.0**	4.4	
Peel Strength (ASTM D 6496)													
MD - Peak Peel Strength (lbs)	50.3	54.6	44.8	49.8	51.5						**50.2**	3.5	15 min
MD - Peel Strength (lbs/in)	10.8	11.5	8.4	10.9	10.8						**10.5**	1.2	
Index Flux (ASTM D 5887)													
Index Flux (m^3/m^2/sec)	2.6E-09										**2.6E-09**		1E-08 max
Hydraulic Conductivity (cm/sec)	2.3E-09										**2.3E-09**		5E-09 max

MD Machine Direction TD Transverse Direction NA Not Available

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GCL TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: GCL
Sample Identification: 90
TRI Log #: E2308-94-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)													
Bentonite mass/unit area (lbs/ft^2)	0.84	0.91	0.91	0.96	0.90						**0.90**	0.04	0.75 min
Moisture Content (%)	26.9	26.8	28.4	26.7	28.9						**27.5**	1.0	
Tensile Strength (ASTM D 6768)													
MD - Maximum Load (lbs)	287	296	316	322	300						**304**	15	90 min
MD - Tensile Strength (ppi)	71.8	73.9	79.1	80.6	75.1						**76.1**	3.7	
Peel Strength (ASTM D 6496)													
MD - Peak Peel Strength (lbs)	46.8	22.5	50.1	53.8	46.0						**43.8**	12.3	15 min
MD - Peel Strength (lbs/in)	10.3	4.4	11.3	5.2	10.6						**8.4**	3.3	
Index Flux (ASTM D 5887)													
Index Flux (m^3/m^2/sec)	3.1E-09										**3.1E-09**		1E-08 max
Hydraulic Conductivity (cm/sec)	2.8E-09										**2.8E-09**		5E-09 max

MD Machine Direction TD Transverse Direction NA Not Available

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GCL TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: GCL
Sample Identification: 134
TRI Log #: E2308-94-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)													
Bentonite mass/unit area (lbs/ft^2)	0.88	0.98	1.01	0.89	0.91						**0.93**	0.06	0.75 min
Moisture Content (%)	25.9	27.2	27.7	26.2	30.2						**27.4**	1.7	
Tensile Strength (ASTM D 6768)													
MD - Maximum Load (lbs)	306	342	303	328	337						**323**	18	90 min
MD - Tensile Strength (ppi)	76.6	85.5	75.7	82.0	84.3						**80.8**	4.5	
Peel Strength (ASTM D 6496)													
MD - Peak Peel Strength (lbs)	54.6	38.4	55.4	44.3	72.9						**53.1**	13.2	15 min
MD - Peel Strength (lbs/in)	12.6	7.8	12.3	9.8	15.1						**11.5**	2.8	
Index Flux (ASTM D 5887)													
Index Flux (m^3/m^2/sec)	3.5E-09										**3.5E-09**		1E-08 max
Hydraulic Conductivity (cm/sec)	3.5E-09										**3.5E-09**		5E-09 max

MD Machine Direction TD Transverse Direction NA Not Available

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GCL TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: GCL
Sample Identification: 180
TRI Log #: E2308-94-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)													
Bentonite mass/unit area (lbs/ft^2)	0.83	0.93	1.02	0.94	0.92						**0.93**	0.07	0.75 min
Moisture Content (%)	26.9	27.2	28.1	27.5	27.5						**27.4**	0.4	
Tensile Strength (ASTM D 6768)													
MD - Maximum Load (lbs)	155	162	150	148	168						**157**	8	90 min
MD - Tensile Strength (ppi)	38.8	40.5	37.5	37.0	42.1						**39.2**	2.1	
Peel Strength (ASTM D 6496)													
MD - Peak Peel Strength (lbs)	64.4	64.3	78.4	76.4	64.1						**69.5**	7.2	15 min
MD - Peel Strength (lbs/in)	12.7	13.8	17.0	15.6	13.7						**14.6**	1.7	
Index Flux (ASTM D 5887)													
Index Flux (m^3/m^2/sec)	2.0E-09										**2.0E-09**		1E-08 max
Hydraulic Conductivity (cm/sec)	1.5E-09										**1.5E-09**		5E-09 max

MD Machine Direction TD Transverse Direction NA Not Available

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GCL TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: GCL
Sample Identification: 224
TRI Log #: E2308-94-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)													
Bentonite mass/unit area (lbs/ft^2)	0.88	1.02	0.93	0.84	0.83						**0.90**	0.08	0.75 min
Moisture Content (%)	28.1	28.2	29.1	28.4	30.2						**28.8**	0.9	
Tensile Strength (ASTM D 6768)													
MD - Maximum Load (lbs)	264	268	247	246	298						**265**	21	90 min
MD - Tensile Strength (ppi)	65.9	67.1	61.8	61.4	74.5						**66.1**	5.3	
Peel Strength (ASTM D 6496)													
MD - Peak Peel Strength (lbs)	57.4	57.8	40.8	60.1	60.7						**55.4**	8.3	15 min
MD - Peel Strength (lbs/in)	12.5	12.0	8.9	12.4	12.7						**11.7**	1.6	
Index Flux (ASTM D 5887)													
Index Flux (m^3/m^2/sec)	2.3E-09										**2.3E-09**		1E-08 max
Hydraulic Conductivity (cm/sec)	1.7E-09										**1.7E-09**		5E-09 max

MD Machine Direction TD Transverse Direction NA Not Available

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GCL TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: GCL
Sample Identification: 268
TRI Log #: E2308-94-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Bentonite - Mass/Unit Area (ASTM D 5993, result @ 0% M.C.)													
Bentonite mass/unit area (lbs/ft^2)	0.88	0.98	0.86	0.94	0.95						**0.92**	0.05	0.75 min
Moisture Content (%)	25.9	26.6	27.6	26.9	26.6						**26.7**	0.6	
Tensile Strength (ASTM D 6768)													
MD - Maximum Load (lbs)	304	316	326	316	292						**311**	13	90 min
MD - Tensile Strength (ppi)	75.9	79.0	81.4	79.0	72.9						**77.6**	3.3	
Peel Strength (ASTM D 6496)													
MD - Peak Peel Strength (lbs)	30.6	42.1	34.5	33.9	27.0						**33.6**	5.6	15 min
MD - Peel Strength (lbs/in)	6.0	8.7	6.9	7.1	4.3						**6.6**	1.6	
Index Flux (ASTM D 5887)													
Index Flux (m^3/m^2/sec)	2.0E-09										**2.0E-09**		1E-08 max
Hydraulic Conductivity (cm/sec)	1.6E-09										**1.6E-09**		5E-09 max

MD Machine Direction TD Transverse Direction NA Not Available

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

APPENDIX II – GEOSYNTHETICS
Section 3 – HDPE Geomembrane

MQC Test Results
Conformance Test Results

HDPE Geomembrane
MQC Test Results

microspike liner

HDPE

60 mil

Plastic Fusion Allen Steam Sta. RAB Ash doc 11436

Belmont, NC

PO#	P12077

	METRIC DIMENSIONS			132 rolls 60 HD micro			132	left
roll #	width	length	area					
(K)246793 .08	7	125	875	PFF Belmont, NC	132tot	1	3158	7181255
(K)246794 .08	7	125	875	PFF Belmont, NC	132tot	2	3150	7181255
(K)246795 .08	7	125	875	PFF Belmont, NC	132tot	3	3154	7181255
(K)246796 .08	7	125	875	PFF Belmont, NC	132tot	4	3140	7181255
(K)246797 .08	7	125	875	PFF Belmont, NC	132tot	5	3152	7181255
(K)246798 .08	7	125	875	PFF Belmont, NC	132tot	6	3152	7181255
(K)246799 .08	7	125	875	PFF Belmont, NC	132tot	7	3141	7181255
(K)246700 .08	7	125	875	PFF Belmont, NC	132tot	8	3161	7181255
(K)246701 .08	7	125	875	PFF Belmont, NC	132tot	9	3143	7181255
(K)246702 .08	7	125	875	PFF Belmont, NC	132tot	10	3148	7181255
(K)246703 .08	7	125	875	PFF Belmont, NC	132tot	11	3136	7181255
(K)246704 .08	7	125	875	PFF Belmont, NC	132tot	12	3154	7181255
(K)246705 .08	7	125	875	PFF Belmont, NC	132tot	13	3136	7181255
(K)246706 .08	7	125	875	PFF Belmont, NC	132tot	14	3157	7181255
(K)246707 .08	7	125	875	PFF Belmont, NC	132tot	15	3124	7181255
(K)246708 .08	7	125	875	PFF Belmont, NC	132tot	16	3153	7181255
(K)246709 .08	7	125	875	PFF Belmont, NC	132tot	17	3140	7181255
(K)246710 .08	7	125	875	PFF Belmont, NC	132tot	18	3149	7181255
(K)246711 .08	7	125	875	PFF Belmont, NC	132tot	19	3137	7181255
(K)246712 .08	7	125	875	PFF Belmont, NC	132tot	20	3146	7181255
(K)247101 .08	7	125	875	PFF Belmont, NC	132tot	21	3141	7181255
(K)247102 .08	7	125	875	PFF Belmont, NC	132tot	22	3145	7181255
(K)247103 .08	7	125	875	PFF Belmont, NC	132tot	23	3137	7181255
(K)247104 .08	7	125	875	PFF Belmont, NC	132tot	24	3144	7181255
(K)247105 .08	7	125	875	PFF Belmont, NC	132tot	25	3145	7181255
(K)247106 .08	7	125	875	PFF Belmont, NC	132tot	26	3144	7181255
(K)247107 .08	7	125	875	PFF Belmont, NC	132tot	27	3134	7181250
(K)247108 .08	7	125	875	PFF Belmont, NC	132tot	28	3143	7181250
(K)247109 .08	7	125	875	PFF Belmont, NC	132tot	29	3136	7181250
(K)247110 .08	7	125	875	PFF Belmont, NC	132tot	30	3146	7181250
(K)247111 .08	7	125	875	PFF Belmont, NC	132tot	31	3139	7181250
(K)247112 .08	7	125	875	PFF Belmont, NC	132tot	32	3156	7181250
(K)247113 .08	7	125	875	PFF Belmont, NC	132tot	33	3140	7181250
(K)247114 .08	7	125	875	PFF Belmont, NC	132tot	34	3135	7181250
(K)247115 .08	7	125	875	PFF Belmont, NC	132tot	35	3161	7181250
(K)247116 .08	7	125	875	PFF Belmont, NC	132tot	36	3178	7181250
(K)247117 .08	7	125	875	PFF Belmont, NC	132tot	37	3160	7181250
(K)247118 .08	7	125	875	PFF Belmont, NC	132tot	38	3170	7181250
(K)247219 .08	7	125	875	PFF Belmont, NC	132tot	39	3160	7181250
(K)247220 .08	7	125	875	PFF Belmont, NC	132tot	40	3168	7181250
(K)247221 .08	7	125	875	PFF Belmont, NC	132tot	41	3163	7181250
(K)247222 .08	7	125	875	PFF Belmont, NC	132tot	42	3171	7181250
(K)247223 .08	7	125	875	PFF Belmont, NC	132tot	43	3160	7181250
(K)247224 .08	7	125	875	PFF Belmont, NC	132tot	44	3173	7181250

microspike liner

HDPE

60 mil

Plastic Fusion Allen Steam Sta. RAB Ash doc 11436

Belmont, NC

PO#	P12077

	METRIC DIMENSIONS			132 rolls 60 HD micro		132	left
roll #	width	length	area				
(K)247225 .08	7	125	875	PFF Belmont, NC 132tot	45	3156	7181250
(K)247226 .08	7	125	875	PFF Belmont, NC 132tot	46	3172	7181250
(K)247227 .08	7	125	875	PFF Belmont, NC 132tot	47	3157	7181250
(K)247228 .08	7	125	875	PFF Belmont, NC 132tot	48	3174	7181250
(K)247229 .08	7	125	875	PFF Belmont, NC 132tot	49	3157	7181250
(K)247230 .08	7	125	875	PFF Belmont, NC 132tot	50	3179	7181250
(K)247231 .08	7	125	875	PFF Belmont, NC 132tot	51	3157	7181250
(K)247232 .08	7	125	875	PFF Belmont, NC 132tot	52	3174	7181250
(K)247233 .08	7	125	875	PFF Belmont, NC 132tot	53	3153	7181250
(K)247234 .08	7	125	875	PFF Belmont, NC 132tot	54	3167	7181250
(K)247235 .08	7	125	875	PFF Belmont, NC 132tot	55	3150	7181250
(K)247236 .08	7	125	875	PFF Belmont, NC 132tot	56	3153	7181250
(K)247237 .08	7	125	875	PFF Belmont, NC 132tot	57	3158	7181250
(K)247238 .08	7	125	875	PFF Belmont, NC 132tot	58	3150	7181250
(K)247339 .08	7	125	875	PFF Belmont, NC 132tot	59	3150	7181250
(K)247340 .08	7	125	875	PFF Belmont, NC 132tot	60	3146	7181250
(K)247341 .08	7	125	875	PFF Belmont, NC 132tot	61	3147	7181250
(K)247342 .08	7	125	875	PFF Belmont, NC 132tot	62	3150	7181250
(K)247343 .08	7	125	875	PFF Belmont, NC 132tot	63	3147	7181250
(K)247344 .08	7	125	875	PFF Belmont, NC 132tot	64	3162	7181250
(K)247345 .08	7	125	875	PFF Belmont, NC 132tot	65	3143	7181250
(K)247346 .08	7	125	875	PFF Belmont, NC 132tot	66	3156	7181250
(K)247347 .08	7	125	875	PFF Belmont, NC 132tot	67	3142	7181250
(K)247348 .08	7	125	875	PFF Belmont, NC 132tot	68	3155	7181250
(K)247349 .08	7	125	875	PFF Belmont, NC 132tot	69	3139	7181250
(K)247350 .08	7	125	875	PFF Belmont, NC 132tot	70	3146	7181250
(K)247351 .08	7	125	875	PFF Belmont, NC 132tot	71	3152	7181250
(K)247352 .08	7	125	875	PFF Belmont, NC 132tot	72	3173	7181250
(K)247353 .08	7	125	875	PFF Belmont, NC 132tot	73	3166	7181250
(K)247354 .08	7	125	875	PFF Belmont, NC 132tot	74	3185	7181250
(K)247355 .08	7	125	875	PFF Belmont, NC 132tot	75	3180	7181250
(K)247456 .08	7	125	875	PFF Belmont, NC 132tot	76	3188	7181250
(K)247457 .08	7	125	875	PFF Belmont, NC 132tot	77	3175	7181250
(K)247458 .08	7	125	875	PFF Belmont, NC 132tot	78	3192	7181250
(K)247459 .08	7	125	875	PFF Belmont, NC 132tot	79	3182	7181250
(K)247460 .08	7	125	875	PFF Belmont, NC 132tot	80	3188	7181250
(K)247461 .08	7	125	875	PFF Belmont, NC 132tot	81	3173	7181250
(K)247462 .08	7	125	875	PFF Belmont, NC 132tot	82	3196	7181250
(K)247463 .08	7	125	875	PFF Belmont, NC 132tot	83	3173	7181250
(K)247464 .08	7	125	875	PFF Belmont, NC 132tot	84	3180	7181250
(K)247465 .08	7	125	875	PFF Belmont, NC 132tot	85	3180	7181250
(K)247466 .08	7	125	875	PFF Belmont, NC 132tot	86	3193	7181250
(K)247467 .08	7	125	875	PFF Belmont, NC 132tot	87	3182	7181250
(K)247568 .08	7	125	875	PFF Belmont, NC 132tot	88	3183	7181250

microspike liner

HDPE

60 mil

Plastic Fusion Allen Steam Sta. RAB Ash doc 11436

Belmont, NC

PO#	P12077

	METRIC DIMENSIONS			132 rolls 60 HD micro		132	left
roll #	width	length	area				
(K)247569 .08	7	125	875	PFF Belmont, NC 132tot	89	3173	7181250
(K)247570 .08	7	125	875	PFF Belmont, NC 132tot	90	3183	7181250
(K)247571 .08	7	125	875	PFF Belmont, NC 132tot	91	3173	7181254
(K)247572 .08	7	125	875	PFF Belmont, NC 132tot	92	3178	7181254
(K)247573 .08	7	125	875	PFF Belmont, NC 132tot	93	3172	7181254
(K)247574 .08	7	125	875	PFF Belmont, NC 132tot	94	3174	7181254
(K)247575 .08	7	125	875	PFF Belmont, NC 132tot	95	3170	7181254
(K)247576 .08	7	125	875	PFF Belmont, NC 132tot	96	3176	7181254
(K)247577 .08	7	125	875	PFF Belmont, NC 132tot	97	3162	7181254
(K)247578 .08	7	125	875	PFF Belmont, NC 132tot	98	3180	7181254
(K)247579 .08	7	125	875	PFF Belmont, NC 132tot	99	3164	7181254
(K)247580 .08	7	125	875	PFF Belmont, NC 132tot	100	3266	7181254
(K)247713 .08	7	125	875	PFF Belmont, NC 132tot	101	3317	7181254
(K)247714 .08	7	125	875	PFF Belmont, NC 132tot	102	3266	7181254
(K)247715 .08	7	125	875	PFF Belmont, NC 132tot	103	3233	7181254
(K)247716 .08	7	125	875	PFF Belmont, NC 132tot	104	3270	7181254
(K)247717 .08	7	125	875	PFF Belmont, NC 132tot	105	3216	7181254
(K)247718 .08	7	125	875	PFF Belmont, NC 132tot	106	3180	7181254
(K)247719 .08	7	125	875	PFF Belmont, NC 132tot	107	3183	7181254
(K)247720 .08	7	125	875	PFF Belmont, NC 132tot	108	3182	7181254
(K)247721 .08	7	125	875	PFF Belmont, NC 132tot	109	3185	7181254
(K)247722 .08	7	125	875	PFF Belmont, NC 132tot	110	3194	7181254
(K)248101 .08	7	125	875	PFF Belmont, NC 132tot	111	3194	7181254
(K)248103 .08	7	125	875	PFF Belmont, NC 132tot	112	3171	7181254
(K)248104 .08	7	125	875	PFF Belmont, NC 132tot	113	3168	7181254
(K)248105 .08	7	125	875	PFF Belmont, NC 132tot	114	3180	7181254
(K)248106 .08	7	125	875	PFF Belmont, NC 132tot	115	3178	7181254
(K)248107 .08	7	125	875	PFF Belmont, NC 132tot	116	3179	7181254
(K)248108 .08	7	125	875	PFF Belmont, NC 132tot	117	3178	7181254
(K)248109 .08	7	125	875	PFF Belmont, NC 132tot	118	3185	7181254
(K)248110 .08	7	125	875	PFF Belmont, NC 132tot	119	3194	7181254
(K)248111 .08	7	125	875	PFF Belmont, NC 132tot	120	3208	7181254
(K)248112 .08	7	125	875	PFF Belmont, NC 132tot	121	3186	7181254
(K)248113 .08	7	125	875	PFF Belmont, NC 132tot	122	3199	7181254
(K)248114 .08	7	125	875	PFF Belmont, NC 132tot	123	3186	7181254
(K)248115 .08	7	125	875	PFF Belmont, NC 132tot	124	3189	7181254
(K)248116 .08	7	125	875	PFF Belmont, NC 132tot	125	3184	7181254
(K)248117 .08	7	125	875	PFF Belmont, NC 132tot	126	3186	7181254
(K)248218 .08	7	125	875	PFF Belmont, NC 132tot	127	3189	7181254
(K)248219 .08	7	125	875	PFF Belmont, NC 132tot	128	3191	7181254
(K)248220 .08	7	125	875	PFF Belmont, NC 132tot	129	3194	7181254
(K)248221 .08	7	125	875	PFF Belmont, NC 132tot	130	3195	7181254
(K)248222 .08	7	125	875	PFF Belmont, NC 132tot	131	3180	7181254
(K)248223 .08	7	125	875	PFF Belmont, NC 132tot	132	3188	7181254

agru america quality control dept.

quality certificate

ROLL # **246793-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **26** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.26**	
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	**27**	N/mm	**156**	ppi		**2,506**	psi
	Average Strength @ Break	**33**	N/mm	**186**	ppi		**2,992**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.48**	
Lo = 2.0" Break	Average Elongation @ Break		%				**521.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**261.1**	N				**58.710**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.5**	N				**97.235**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**594.3**	N				**133.62**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246794-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.26**	
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	**28**	N/mm	**159**	ppi		**2,557**	psi
	Average Strength @ Break	**33**	N/mm	**188**	ppi		**3,030**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.57**	
Lo = 2.0" Break	Average Elongation @ Break		%				**525.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**275.4**	N				**61.921**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**420.4**	N				**94.520**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**583.6**	N				**131.19**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246795-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.50**	mm	**59**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity GRI GM12: **25** mil	AVE:	**1.54**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.26**	
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	**28**	N/mm	**162**	ppi		**2,675**	psi
	Average Strength @ Break	**35**	N/mm	**198**	ppi		**3,271**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**17.06**	
Lo = 2.0" Break	Average Elongation @ Break	%					**550.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**262.4**	N				**59.002**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**450.9**	N				**101.36**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**581.7**	N				**130.77**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246796-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.55**	mm	**61**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.949**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.26**	
Carbon Black Content ASTM D4218	Range		%				**2.52**	
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	**156**	ppi		**2,524**	psi
	Average Strength @ Break	**32**	N/mm	**182**	ppi		**2,951**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.22**	
Lo = 2.0" Break	Average Elongation @ Break		%				**516.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**261.6**	N				**58.812**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**455.2**	N				**102.33**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**579.8**	N				**130.34**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246797-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.949**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.26**	
Carbon Black Content ASTM D4218	Range		%				**2.52**	
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	**161**	ppi		**2,606**	psi
	Average Strength @ Break	**33**	N/mm	**190**	ppi		**3,081**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**21.93**	
Lo = 2.0" Break	Average Elongation @ Break		%				**504.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.6**	N				**57.463**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**460.2**	N				**103.45**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**611.6**	N				**137.50**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246798-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **33** mil	AVE:	**1.57**	mm	**62**	mil
ODD # : TOP EVEN #: BOTTOM					

Thickness.....	**1.5**	**mm**	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**182**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.949**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.26**	
Carbon Black Content ASTM D4218	Range			%				**2.52**	
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		**166**	ppi		**2,684**	psi
	Average Strength @ Break	**31**	N/mm		**179**	ppi		**2,894**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**17.37**	
Lo = 2.0" Break	Average Elongation @ Break			%				**469.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**260.2**	N					**58.493**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**474.9**	N					**106.76**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**608.4**	N					**136.77**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246799-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.949**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.26**	
Carbon Black Content ASTM D4218	Range		%					**2.52**	
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	**170**	ppi			**2,757**	psi
	Average Strength @ Break	**36**	N/mm	**205**	ppi			**3,310**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.03**	
Lo = 2.0" Break	Average Elongation @ Break		%					**541.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**256.4**	N					**57.644**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**447.9**	N					**100.69**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**643.9**	N					**144.75**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246700-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**182**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.949**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.26**	
Carbon Black Content ASTM D4218	Range		%					**2.52**	
Carbon Black Dispersion ASTM D5596	Category							**10 in Cat. 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**31**	N/mm	**178**	ppi			**2,902**	psi
	Average Strength @ Break	**39**	N/mm	**221**	ppi			**3,603**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.34**	
Lo = 2.0" Break	Average Elongation @ Break		%					**507.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**267.1**	N					**60.047**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**433.5**	N					**97.450**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.2**	N					**130.44**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246701-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.55**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.26**	
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	**163**	ppi		**2,676**	psi
	Average Strength @ Break	**37**	N/mm	**214**	ppi		**3,503**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.11**	
Lo = 2.0" Break	Average Elongation @ Break		%				**521.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**296.4**	N				**66.633**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.9**	N				**99.345**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**563.1**	N				**126.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246702-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.26**	
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	**31**	N/mm		**175**	ppi		**2,850**	psi
	Average Strength @ Break	**37**	N/mm		**211**	ppi		**3,432**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**23.17**	
Lo = 2.0" Break	Average Elongation @ Break			%				**487.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**283.2**	N					**63.676**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**453.0**	N					**101.83**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**563.1**	N					**126.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246703-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.26**	
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	**31**	N/mm	**175**	ppi			**2,852**	psi
	Average Strength @ Break	**35**	N/mm	**198**	ppi			**3,231**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**16.97**	
Lo = 2.0" Break	Average Elongation @ Break		%					**426.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**283.8**	N					**63.806**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**450.8**	N					**101.33**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**563.1**	N					**126.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246704-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.26**	
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	**31**	N/mm	**179**	ppi		**2,900**	psi
	Average Strength @ Break	**37**	N/mm	**209**	ppi		**3,381**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.18**	
Lo = 2.0" Break	Average Elongation @ Break		%				**454.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**299.4**	N				**67.319**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**457.2**	N				**102.78**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**563.1**	N				**126.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246705-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.50**	mm	**59**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.26**	
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	**31**	N/mm	**179**	ppi	**2,853**	psi		
	Average Strength @ Break	**41**	N/mm	**234**	ppi	**3,741**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.59**			
Lo = 2.0" Break	Average Elongation @ Break		%			**533.1**			
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.14**			
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**302.5**	N			**67.998**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**440.9**	N			**99.123**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**563.1**	N			**126.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246706-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							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				**.26**	
Carbon Black Content ASTM D4218	Range		%				**2.65**	
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	**173**	ppi		**2,802**	psi
	Average Strength @ Break	**36**	N/mm	**206**	ppi		**3,339**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.42**	
Lo = 2.0" Break	Average Elongation @ Break		%				**484.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**281.2**	N				**63.230**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**447.3**	N				**100.56**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**563.1**	N				**126.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246707-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.72**	mm	**68**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							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				**.26**	
Carbon Black Content ASTM D4218	Range		%				**2.65**	
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	**148**	ppi		**2,377**	psi
	Average Strength @ Break	**37**	N/mm	**212**	ppi		**3,401**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**19.27**	
Lo = 2.0" Break	Average Elongation @ Break		%				**502.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**251.9**	N				**56.628**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**450.7**	N				**101.33**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**648.2**	N				**145.71**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246708-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**182**	

								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					**.26**	
Carbon Black Content ASTM D4218	Range		%					**2.65**	
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	**150**	ppi			**2,417**	psi
	Average Strength @ Break	**38**	N/mm	**218**	ppi			**3,508**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**19.05**	
Lo = 2.0" Break	Average Elongation @ Break		%					**528.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**277.9**	N					**62.483**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**465.7**	N					**104.69**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**645.5**	N					**145.12**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246709-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							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				**.26**	
Carbon Black Content ASTM D4218	Range		%				**2.65**	
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	**162**	ppi		**2,593**	psi
	Average Strength @ Break	**31**	N/mm	**175**	ppi		**2,799**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.61**	
Lo = 2.0" Break	Average Elongation @ Break		%				**456.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**257.1**	N				**57.811**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**473.9**	N				**106.54**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**637.3**	N				**143.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246710-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.50**	mm	**59**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							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					**.26**	
Carbon Black Content ASTM D4218	Range	%					**2.65**	
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	**172**	ppi		**2,738**	psi
	Average Strength @ Break	**34**	N/mm	**195**	ppi		**3,096**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield	%					**16.63**	
	Average Elongation @ Break	%					**491.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**265.4**	N				**59.666**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**494.7**	N				**111.21**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**582.2**	N				**130.89**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246711-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**182**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.26**	
Carbon Black Content ASTM D4218	Range		%					**2.57**	
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	**146**	ppi			**2,378**	psi
	Average Strength @ Break	**35**	N/mm	**199**	ppi			**3,236**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**20.27**	
Lo = 2.0" Break	Average Elongation @ Break		%					**466.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**258.7**	N					**58.159**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**491.9**	N					**110.58**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**607.6**	N					**136.61**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **246712-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.26**	
Carbon Black Content ASTM D4218	Range		%				**2.57**	
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	**139**	ppi		**2,259**	psi
	Average Strength @ Break	**34**	N/mm	**197**	ppi		**3,204**	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		%				**546.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.1**	N				**53.744**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**478.2**	N				**107.51**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**578.2**	N				**129.98**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-16-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247101-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.26**	
Carbon Black Content ASTM D4218	Range			%				**2.57**	
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		**145**	ppi		**2,358**	psi
	Average Strength @ Break	**35**	N/mm		**200**	ppi		**3,261**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**18.98**	
Lo = 2.0" Break	Average Elongation @ Break			%				**472.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**257.6**	N					**57.924**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**469.0**	N					**105.44**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**566.0**	N					**127.23**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247102-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	**mm**	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.26**	
Carbon Black Content ASTM D4218	Range		%				**2.57**	
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	**148**	ppi		**2,407**	psi
	Average Strength @ Break	**35**	N/mm	**200**	ppi		**3,250**	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		%				**530.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**271.5**	N				**61.046**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**461.4**	N				**103.73**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**558.6**	N				**125.57**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247103-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**182**	

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.26**	
Carbon Black Content ASTM D4218	Range		%				**2.57**	
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	**153**	ppi		**2,492**	psi
	Average Strength @ Break	**39**	N/mm	**221**	ppi		**3,602**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**19.12**	
Lo = 2.0" Break	Average Elongation @ Break		%				**509.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**272.2**	N				**61.191**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**474.3**	N				**106.62**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**634.5**	N				**142.65**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247104-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.54**	mm	**61**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**182**	

								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				**.26**	
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	**25**	N/mm		**144**	ppi		**2,342**	psi
	Average Strength @ Break	**34**	N/mm		**196**	ppi		**3,188**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**18.26**	
Lo = 2.0" Break	Average Elongation @ Break			%				**541.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**273.9**	N					**61.586**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**427.1**	N					**96.025**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**632.4**	N					**142.17**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247105-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **182**

								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					**.26**	
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	**25**	N/mm	**144**	ppi			**2,341**	psi
	Average Strength @ Break	**34**	N/mm	**196**	ppi			**3,196**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**20.70**	
Lo = 2.0" Break	Average Elongation @ Break		%					**496.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**284.8**	N					**64.022**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**367.8**	N					**82.688**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**650.2**	N					**146.18**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247106-08** Lot #: **7181255** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**182**	

								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					**.26**	
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	**155**	ppi			**2,499**	psi
	Average Strength @ Break	**34**	N/mm	**191**	ppi			**3,078**	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		%					**510.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.14**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**311.9**	N					**70.111**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.4**	N					**92.933**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**550.4**	N					**123.73**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247107-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**28**	N/mm	**157**	ppi			**2,557**	psi
	Average Strength @ Break	**36**	N/mm	**207**	ppi			**3,370**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**18.84**	
Lo = 2.0" Break	Average Elongation @ Break		%					**510.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**239.5**	N					**53.848**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**452.6**	N					**101.75**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**552.2**	N					**124.14**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247108-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**28**	N/mm	**159**	ppi			**2,571**	psi
	Average Strength @ Break	**36**	N/mm	**204**	ppi			**3,296**	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		%					**504.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**249.5**	N					**56.093**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**467.0**	N					**104.98**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**606.1**	N					**136.27**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247109-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.55**	
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	**150**	ppi			**2,406**	psi
	Average Strength @ Break	**34**	N/mm	**194**	ppi			**3,114**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**19.11**	
Lo = 2.0" Break	Average Elongation @ Break		%					**479.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**260.5**	N					**58.569**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**479.8**	N					**107.87**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**647.7**	N					**145.60**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247110-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **31** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.55**	
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	**160**	ppi		**2,536**	psi
	Average Strength @ Break	**34**	N/mm	**197**	ppi		**3,122**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**21.92**	
Lo = 2.0" Break	Average Elongation @ Break		%				**529.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**226.4**	N				**50.898**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**429.8**	N				**96.637**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**647.7**	N				**145.60**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247111-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.55**	
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	**145**	ppi			**2,343**	psi
	Average Strength @ Break	**33**	N/mm	**191**	ppi			**3,094**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**18.80**	
Lo = 2.0" Break	Average Elongation @ Break		%					**518.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**262.4**	N					**58.983**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**463.3**	N					**104.16**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**647.7**	N					**145.60**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247112-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.55**	
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	**143**	ppi			**2,317**	psi
	Average Strength @ Break	**30**	N/mm	**171**	ppi			**2,761**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.53**	
Lo = 2.0" Break	Average Elongation @ Break		%					**477.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**241.8**	N					**54.361**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.9**	N					**97.334**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**647.7**	N					**145.60**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247113-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.55**	
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	**163**	ppi		**2,612**	psi
	Average Strength @ Break	**41**	N/mm	**233**	ppi		**3,721**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.69**	
Lo = 2.0" Break	Average Elongation @ Break		%				**538.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**274.0**	N				**61.595**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**431.3**	N				**96.965**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**647.7**	N				**145.60**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247114-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.72**	mm	**68**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
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	**157**	ppi		**2,511**	psi
	Average Strength @ Break	**38**	N/mm	**215**	ppi		**3,442**	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	%					**565.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**244.7**	N				**55.021**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**425.0**	N				**95.548**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**647.7**	N				**145.60**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247115-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.76**	mm	**69**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
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		**155**	ppi		**2,467**	psi
	Average Strength @ Break	**34**	N/mm		**193**	ppi		**3,065**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**19.01**	
Lo = 2.0" Break	Average Elongation @ Break			%				**498.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**281.0**	N					**63.173**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**463.9**	N					**104.29**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**619.6**	N					**139.29**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247116-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **25** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**163**	ppi			**2,651**	psi
	Average Strength @ Break	**38**	N/mm	**216**	ppi			**3,517**	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		%					**551.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**295.4**	N					**66.418**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**482.8**	N					**108.53**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**560.1**	N					**125.92**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247117-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity GRI GM12: **22** mil	AVE:	**1.55**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**152**	ppi		**2,496**	psi
	Average Strength @ Break	**34**	N/mm	**192**	ppi		**3,143**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.35**	
Lo = 2.0" Break	Average Elongation @ Break		%				**545.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**237.5**	N				**53.399**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**483.7**	N				**108.75**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**554.3**	N				**124.61**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247118-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **26** mil	AVE:	**1.55**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.943**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
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		**157**	ppi		**2,566**	psi
	Average Strength @ Break	**35**	N/mm		**197**	ppi		**3,232**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**17.13**	
Lo = 2.0" Break	Average Elongation @ Break			%				**539.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**294.9**	N					**66.290**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**485.8**	N					**109.21**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**632.8**	N					**142.27**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-17-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247219-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity GRI GM12: **20** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range	%					**2.72**	
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	**161**	ppi		**2,589**	psi
	Average Strength @ Break	**39**	N/mm	**220**	ppi		**3,535**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**17.44**	
Lo = 2.0" Break	Average Elongation @ Break	%					**564.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**279.7**	N				**62.873**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**493.7**	N				**110.99**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N				**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247220-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.75**	mm	**69**	mil
Asperity GRI GM12: **25** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.72**	
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	**156**	ppi			**2,492**	psi
	Average Strength @ Break	**35**	N/mm	**198**	ppi			**3,169**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**18.40**	
Lo = 2.0" Break	Average Elongation @ Break		%					**504.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**283.8**	N					**63.802**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**425.9**	N					**95.747**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N					**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247221-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **20** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.72**	
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	**157**	ppi	**2,537**	psi		
	Average Strength @ Break	**37**	N/mm	**209**	ppi	**3,389**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.79**	
Lo = 2.0" Break	Average Elongation @ Break		%					**568.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**271.4**	N			**61.013**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**468.8**	N			**105.39**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N			**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247222-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity GRI GM12: **26** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.72**	
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	**148**	ppi		**2,402**	psi
	Average Strength @ Break	**32**	N/mm	**183**	ppi		**2,980**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.40**	
Lo = 2.0" Break	Average Elongation @ Break		%				**473.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**265.5**	N				**59.699**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**451.5**	N				**101.51**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N				**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247223-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.41**	mm	**56**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **21** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.72**	
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		**156**	ppi		**2,533**	psi
	Average Strength @ Break	**38**	N/mm		**215**	ppi		**3,508**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**18.43**	
Lo = 2.0" Break	Average Elongation @ Break			%				**536.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**298.0**	N					**66.991**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**426.0**	N					**95.778**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N					**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247224-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.72**	mm	**68**	mil
Asperity GRI GM12: **23** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								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					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.65**	
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	**157**	ppi	**2,486**	psi		
	Average Strength @ Break	**35**	N/mm	**199**	ppi	**3,156**	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		%			**533.5**			
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.65**			
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**273.7**	N			**61.540**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**422.1**	N			**94.898**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N			**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247225-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **25** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.946**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range	%					**2.65**	
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	**152**	ppi		**2,477**	psi
	Average Strength @ Break	**36**	N/mm	**204**	ppi		**3,319**	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	%					**556.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**274.4**	N				**61.696**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**457.4**	N				**102.82**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**563.4**	N				**126.65**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247226-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.52**	mm	**60**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.946**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.65**	
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	**170**	ppi	**2,836**	psi	
	Average Strength @ Break	**38**	N/mm	**215**	ppi	**3,585**	psi	
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.38**	
Lo = 2.0" Break	Average Elongation @ Break		%				**545.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**282.5**	N			**63.523**	lbs	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.9**	N			**98.214**	lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	**572.3**	N			**128.66**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247227-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.74**	mm	**69**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								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					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.65**	
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	**156**	ppi	**2,486**	psi		
	Average Strength @ Break	**33**	N/mm	**189**	ppi	**3,018**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.12**	
Lo = 2.0" Break	Average Elongation @ Break		%					**508.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**262.8**	N			**59.076**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**399.4**	N			**89.784**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**538.3**	N			**121.01**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247228-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.50**	mm	**59**	mil
	MAX:	**1.72**	mm	**68**	mil
Asperity GRI GM12: **32** mil	AVE:	**1.61**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							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					**.22**	
Carbon Black Content ASTM D4218	Range	%					**2.65**	
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	**161**	ppi		**2,540**	psi
	Average Strength @ Break	**39**	N/mm	**223**	ppi		**3,511**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**17.94**	
Lo = 2.0" Break	Average Elongation @ Break	%					**567.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**261.7**	N				**58.829**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**380.2**	N				**85.487**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**529.4**	N				**119.01**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247229-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.950**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**157**	ppi	**2,553**	psi	
	Average Strength @ Break	**34**	N/mm	**192**	ppi	**3,133**	psi	
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.32**	
Lo = 2.0" Break	Average Elongation @ Break		%				**534.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**262.0**	N			**58.906**	lbs	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**403.3**	N			**90.674**	lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	**535.4**	N			**120.36**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11-18-08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247230-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.55**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.950**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
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	**26**	N/mm	**148**	ppi		**2,424**	psi
	Average Strength @ Break	**33**	N/mm	**186**	ppi		**3,047**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**17.93**	
Lo = 2.0" Break	Average Elongation @ Break	%					**455.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**261.8**	N				**58.857**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**365.9**	N				**82.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**535.4**	N				**120.36**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247231-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.950**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**153**	ppi		**2,448**	psi
	Average Strength @ Break	**33**	N/mm	**187**	ppi		**2,987**	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		%				**518.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**252.9**	N				**56.846**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**398.2**	N				**89.529**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**535.4**	N				**120.36**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247232-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.950**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**154**	ppi		**2,452**	psi
	Average Strength @ Break	**34**	N/mm	**195**	ppi		**3,088**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.78**	
Lo = 2.0" Break	Average Elongation @ Break		%				**545.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**249.6**	N				**56.105**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**375.6**	N				**84.451**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**535.4**	N				**120.36**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247233-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.950**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**157**	ppi		**2,555**	psi
	Average Strength @ Break	**32**	N/mm	**185**	ppi		**3,019**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**15.46**	
Lo = 2.0" Break	Average Elongation @ Break		%				**549.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**254.4**	N				**57.201**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**392.4**	N				**88.221**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**535.4**	N				**120.36**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247234-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **32** mil	AVE:	**1.55**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.56**	
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		**144**	ppi		**2,356**	psi
	Average Strength @ Break	**33**	N/mm		**189**	ppi		**3,090**	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			%				**540.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**267.0**	N					**60.038**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**400.7**	N					**90.089**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**535.4**	N					**120.36**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247235-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **26** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.56**	
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		**137**	ppi		**2,236**	psi
	Average Strength @ Break	**30**	N/mm		**171**	ppi		**2,782**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**17.23**	
Lo = 2.0" Break	Average Elongation @ Break			%				**496.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**245.6**	N					**55.208**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**445.8**	N					**100.23**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**636.3**	N					**143.05**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247236-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.56**	
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	**134**	ppi		**2,151**	psi
	Average Strength @ Break	**31**	N/mm	**175**	ppi		**2,815**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.63**	
Lo = 2.0" Break	Average Elongation @ Break		%				**464.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**275.5**	N				**61.949**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**458.2**	N				**103.01**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**625.6**	N				**140.63**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247237-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.40**	mm	**55**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity GRI GM12: **23** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.56**	
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		**142**	ppi		**2,307**	psi
	Average Strength @ Break	**34**	N/mm		**192**	ppi		**3,132**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**18.05**	
Lo = 2.0" Break	Average Elongation @ Break			%				**537.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**281.0**	N					**63.179**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**458.5**	N					**103.07**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**625.6**	N					**140.63**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247238-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.63**	mm	**64**	mil
Asperity GRI GM12: **23** mil	AVE:	**1.54**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.56**	
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		**135**	ppi		**2,233**	psi
	Average Strength @ Break	**36**	N/mm		**205**	ppi		**3,389**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**18.41**	
Lo = 2.0" Break	Average Elongation @ Break			%				**542.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**262.3**	N					**58.970**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**489.6**	N					**110.07**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**625.6**	N					**140.63**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247339-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.54**	mm	**61**	mil
	MAX:	**1.58**	mm	**62**	mil
Asperity GRI GM12: **22** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range	%					**2.14**	
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	**140**	ppi		**2,268**	psi
	Average Strength @ Break	**34**	N/mm	**196**	ppi		**3,165**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**18.68**	
Lo = 2.0" Break	Average Elongation @ Break	%					**560.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**250.7**	N				**56.373**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**451.9**	N				**101.60**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**625.6**	N				**140.63**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247340-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.57**	mm	**62**	mil
Asperity GRI GM12: **23** mil	AVE:	**1.55**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.14**	
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	**151**	ppi			**2,479**	psi
	Average Strength @ Break	**34**	N/mm	**194**	ppi			**3,183**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**18.79**	
Lo = 2.0" Break	Average Elongation @ Break		%					**521.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**274.5**	N					**61.708**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**483.4**	N					**108.67**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**625.6**	N					**140.63**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247341-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity GRI GM12: **22** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.14**	
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	**153**	ppi		**2,497**	psi
	Average Strength @ Break	**33**	N/mm	**191**	ppi		**3,109**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.80**	
Lo = 2.0" Break	Average Elongation @ Break		%				**533.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**250.5**	N				**56.311**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**476.3**	N				**107.08**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**625.6**	N				**140.63**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247342-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.14**	
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		**143**	ppi		**2,323**	psi
	Average Strength @ Break	**34**	N/mm		**194**	ppi		**3,158**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**18.36**	
Lo = 2.0" Break	Average Elongation @ Break			%				**521.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**274.2**	N					**61.651**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**471.9**	N					**106.09**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**625.6**	N					**140.63**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247343-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **21** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range	%					**2.14**	
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	**153**	ppi		**2,478**	psi
	Average Strength @ Break	**28**	N/mm	**162**	ppi		**2,628**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**17.80**	
Lo = 2.0" Break	Average Elongation @ Break	%					**357.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**249.4**	N				**56.067**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**468.8**	N				**105.39**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**625.6**	N				**140.63**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247344-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.54**	mm	**61**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **25** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**27**	N/mm	**154**	ppi			**2,491**	psi
	Average Strength @ Break	**32**	N/mm	**184**	ppi			**2,973**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**18.26**	
Lo = 2.0" Break	Average Elongation @ Break		%					**474.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**277.6**	N					**62.400**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**463.8**	N					**104.27**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**625.6**	N					**140.63**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247345-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity GRI GM12: **24** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**28**	N/mm	**160**	ppi			**2,587**	psi
	Average Strength @ Break	**31**	N/mm	**178**	ppi			**2,881**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**16.40**	
Lo = 2.0" Break	Average Elongation @ Break		%					**493.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**282.2**	N					**63.440**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**474.8**	N					**106.74**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N					**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247346-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**26**	N/mm	**150**	ppi	**2,389**	psi		
	Average Strength @ Break	**35**	N/mm	**199**	ppi	**3,175**	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		%			**474.6**			
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.65**			
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**272.6**	N			**61.290**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**456.2**	N			**102.56**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N			**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247347-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **25** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**28**	N/mm	**158**	ppi		**2,541**	psi
	Average Strength @ Break	**32**	N/mm	**184**	ppi		**2,962**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**15.54**	
Lo = 2.0" Break	Average Elongation @ Break		%				**519.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**284.8**	N				**64.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**440.0**	N				**98.923**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N				**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247348-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.944**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**27**	N/mm	**153**	ppi		**2,471**	psi
	Average Strength @ Break	**36**	N/mm	**208**	ppi		**3,366**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**19.26**	
Lo = 2.0" Break	Average Elongation @ Break		%				**507.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**280.4**	N				**63.047**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**434.2**	N				**97.623**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N				**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247349-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **26** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
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		**148**	ppi		**2,398**	psi
	Average Strength @ Break	**37**	N/mm		**214**	ppi		**3,455**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**18.26**	
Lo = 2.0" Break	Average Elongation @ Break			%				**588.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**256.0**	N					**57.547**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**446.2**	N					**100.31**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N					**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247350-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.50**	mm	**59**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**30**	N/mm	**173**	ppi			**2,783**	psi
	Average Strength @ Break	**38**	N/mm	**215**	ppi			**3,456**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.98**	
Lo = 2.0" Break	Average Elongation @ Break		%					**488.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**279.8**	N					**62.904**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**446.7**	N					**100.41**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N					**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247351-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**160**	ppi			**2,599**	psi
	Average Strength @ Break	**34**	N/mm	**193**	ppi			**3,139**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.21**	
Lo = 2.0" Break	Average Elongation @ Break		%					**489.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**278.6**	N					**62.626**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**448.4**	N					**100.81**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N					**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247352-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
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	**162**	ppi		**2,642**	psi
	Average Strength @ Break	**33**	N/mm	**186**	ppi		**3,035**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**17.20**	
Lo = 2.0" Break	Average Elongation @ Break	%					**494.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**283.3**	N				**63.698**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**404.4**	N				**90.919**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N				**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247353-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
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	**147**	ppi		**2,359**	psi
	Average Strength @ Break	**36**	N/mm	**208**	ppi		**3,350**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**21.13**	
Lo = 2.0" Break	Average Elongation @ Break	%					**498.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**274.2**	N				**61.637**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**411.1**	N				**92.433**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N				**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247354-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity GRI GM12: **32** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
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	**28**	N/mm	**158**	ppi		**2,524**	psi
	Average Strength @ Break	**36**	N/mm	**203**	ppi		**3,245**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**18.76**	
Lo = 2.0" Break	Average Elongation @ Break	%					**519.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**275.7**	N				**61.990**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.5**	N				**99.259**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.9**	N				**130.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247355-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
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	**29**	N/mm	**167**	ppi		**2,654**	psi
	Average Strength @ Break	**39**	N/mm	**220**	ppi		**3,490**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**19.08**	
Lo = 2.0" Break	Average Elongation @ Break	%					**484.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**289.8**	N				**65.153**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**439.1**	N				**98.712**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**574.6**	N				**129.18**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/19/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247456-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.59**	
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	**169**	ppi			**2,744**	psi
	Average Strength @ Break	**36**	N/mm	**206**	ppi			**3,359**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.26**	
Lo = 2.0" Break	Average Elongation @ Break		%					**539.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**263.1**	N					**59.148**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.8**	N					**92.128**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**571.0**	N					**128.37**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247457-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.59**	
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	**166**	ppi		**2,692**	psi
	Average Strength @ Break	**34**	N/mm	**195**	ppi		**3,150**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.88**	
Lo = 2.0" Break	Average Elongation @ Break		%				**500.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**285.7**	N				**64.235**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**425.8**	N				**95.721**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**627.9**	N				**141.17**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247458-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.76**	mm	**69**	mil
Asperity GRI GM12: **31** mil	AVE:	**1.64**	mm	**65**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.59**	
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	**156**	ppi		**2,419**	psi
	Average Strength @ Break	**34**	N/mm	**193**	ppi		**2,997**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.46**	
Lo = 2.0" Break	Average Elongation @ Break		%				**474.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**285.6**	N				**64.220**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**444.6**	N				**99.960**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**627.4**	N				**141.06**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247459-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							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				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.61**	
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	**174**	ppi		**2,775**	psi
	Average Strength @ Break	**37**	N/mm	**210**	ppi		**3,354**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.15**	
Lo = 2.0" Break	Average Elongation @ Break		%				**474.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**296.7**	N				**66.694**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**451.2**	N				**101.43**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**633.9**	N				**142.51**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247460-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.61**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								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					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.61**	
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	**173**	ppi			**2,730**	psi
	Average Strength @ Break	**41**	N/mm	**236**	ppi			**3,727**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**20.57**	
Lo = 2.0" Break	Average Elongation @ Break		%					**483.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**269.0**	N					**60.477**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**460.3**	N					**103.48**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**633.9**	N					**142.51**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247461-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								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					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.61**	
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	**170**	ppi			**2,719**	psi
	Average Strength @ Break	**34**	N/mm	**196**	ppi			**3,137**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**15.65**	
Lo = 2.0" Break	Average Elongation @ Break		%					**551.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**252.8**	N					**56.825**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**464.3**	N					**104.38**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**633.9**	N					**142.51**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247462-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								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					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.61**	
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	**156**	ppi			**2,477**	psi
	Average Strength @ Break	**30**	N/mm	**174**	ppi			**2,761**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**18.58**	
Lo = 2.0" Break	Average Elongation @ Break		%					**461.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**264.0**	N					**59.354**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**429.7**	N					**96.613**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**633.9**	N					**142.51**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247463-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.59**	mm	**63**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.946**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.61**	
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	**160**	ppi			**2,607**	psi
	Average Strength @ Break	**32**	N/mm	**180**	ppi			**2,937**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**16.83**	
Lo = 2.0" Break	Average Elongation @ Break		%					**482.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**276.6**	N					**62.187**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**426.3**	N					**95.848**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**633.9**	N					**142.51**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247464-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity GRI GM12: **31** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.946**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.67**	
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		**158**	ppi		**2,539**	psi
	Average Strength @ Break	**27**	N/mm		**151**	ppi		**2,434**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**17.22**	
Lo = 2.0" Break	Average Elongation @ Break			%				**437.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**285.4**	N					**64.170**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**483.2**	N					**108.64**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**633.9**	N					**142.51**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247465-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.79**	mm	**70**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.946**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.67**	
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	**161**	ppi			**2,581**	psi
	Average Strength @ Break	**33**	N/mm	**187**	ppi			**3,008**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.08**	
Lo = 2.0" Break	Average Elongation @ Break		%					**487.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.3**	N					**57.405**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.9**	N					**97.320**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**586.5**	N					**131.86**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247466-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.71**	mm	**67**	mil
Asperity GRI GM12: **31** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							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				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.67**	
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	**156**	ppi		**2,485**	psi
	Average Strength @ Break	**37**	N/mm	**211**	ppi		**3,375**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.80**	
Lo = 2.0" Break	Average Elongation @ Break		%				**502.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**253.3**	N				**56.953**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**430.1**	N				**96.687**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**586.6**	N				**131.86**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247467-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								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					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.67**	
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	**165**	ppi	**2,619**	psi		
	Average Strength @ Break	**33**	N/mm	**191**	ppi	**3,025**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.85**			
Lo = 2.0" Break	Average Elongation @ Break		%			**476.0**			
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.65**			
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**259.4**	N			**58.313**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**432.5**	N			**97.245**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**588.6**	N			**132.33**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/20/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247568-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.78**	mm	**70**	mil
Asperity GRI GM12: **33** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

							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				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.67**	
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	**158**	ppi		**2,524**	psi
	Average Strength @ Break	**35**	N/mm	**198**	ppi		**3,164**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.35**	
Lo = 2.0" Break	Average Elongation @ Break		%				**496.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**268.9**	N				**60.452**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.4**	N				**96.303**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**565.5**	N				**127.13**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247569-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity GRI GM12: **26** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**179**	

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.946**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.57**	
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	**153**	ppi		**2,492**	psi
	Average Strength @ Break	**37**	N/mm	**209**	ppi		**3,405**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**21.67**	
Lo = 2.0" Break	Average Elongation @ Break		%				**492.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**271.5**	N				**61.030**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**387.7**	N				**87.152**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**578.4**	N				**130.03**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247570-08** Lot #: **7181250** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity GRI GM12: **31** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **179**

								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					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.57**	
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	**166**	ppi			**2,635**	psi
	Average Strength @ Break	**37**	N/mm	**210**	ppi			**3,341**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**19.21**	
Lo = 2.0" Break	Average Elongation @ Break		%					**485.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.65**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**333.1**	N					**74.884**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**415.2**	N					**93.354**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**548.7**	N					**123.35**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247571-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.57**	
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	**148**	ppi		**2,376**	psi
	Average Strength @ Break	**31**	N/mm	**177**	ppi		**2,846**	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		%				**463.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**261.7**	N				**58.826**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**441.4**	N				**99.246**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**557.7**	N				**125.38**	lbs
ESCR ASTM D1693	Minimum Hrs w/o Failures	1500	hrs				**CERTIFIED**	
Notched Constant Tensile Load ASTM D5397	pass / fail @ 30%	300	hrs				**ONGOING**	

Customer: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247572-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.75**	mm	**69**	mil
Asperity GRI GM12: **33** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.57**	
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	**140**	ppi			**2,270**	psi
	Average Strength @ Break	**35**	N/mm	**198**	ppi			**3,203**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**19.19**	
Lo = 2.0" Break	Average Elongation @ Break		%					**506.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**287.2**	N					**64.571**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**417.0**	N					**93.756**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**545.0**	N					**122.52**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247573-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.63**	mm	**64**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.54**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.57**	
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		**137**	ppi		**2,256**	psi
	Average Strength @ Break	**30**	N/mm		**173**	ppi		**2,851**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**17.84**	
Lo = 2.0" Break	Average Elongation @ Break			%				**491.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**269.2**	N					**60.528**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**422.3**	N					**94.940**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**552.7**	N					**124.25**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247574-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **32** mil	AVE:	**1.61**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

							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				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.56**	
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	**142**	ppi		**2,244**	psi
	Average Strength @ Break	**30**	N/mm	**170**	ppi		**2,684**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.95**	
Lo = 2.0" Break	Average Elongation @ Break		%				**468.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**271.2**	N				**60.973**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**423.9**	N				**95.294**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**545.9**	N				**122.71**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247575-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.53**	mm	**60**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.61**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							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				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.56**	
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	**146**	ppi		**2,303**	psi
	Average Strength @ Break	**30**	N/mm	**173**	ppi		**2,734**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.12**	
Lo = 2.0" Break	Average Elongation @ Break		%				**467.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**257.7**	N				**57.933**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**482.2**	N				**108.40**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**675.7**	N				**151.91**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247576-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.76**	mm	**69**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.62**	mm	**64**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								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					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.56**	
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	**151**	ppi			**2,368**	psi
	Average Strength @ Break	**34**	N/mm	**195**	ppi			**3,064**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**19.64**	
Lo = 2.0" Break	Average Elongation @ Break		%					**481.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**264.5**	N					**59.467**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**492.8**	N					**110.78**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.1**	N					**132.44**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247577-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							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				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.56**	
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	**153**	ppi		**2,495**	psi
	Average Strength @ Break	**31**	N/mm	**179**	ppi		**2,916**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.32**	
Lo = 2.0" Break	Average Elongation @ Break		%				**499.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**272.2**	N				**61.197**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**457.9**	N				**102.94**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**577.9**	N				**129.91**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247578-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **31** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							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				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.56**	
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	**149**	ppi		**2,375**	psi
	Average Strength @ Break	**30**	N/mm	**169**	ppi		**2,693**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.98**	
Lo = 2.0" Break	Average Elongation @ Break		%				**384.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**265.2**	N				**59.627**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**464.8**	N				**104.50**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**650.1**	N				**146.15**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247579-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.66**	mm	**65**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**148**	ppi			**2,414**	psi
	Average Strength @ Break	**31**	N/mm	**178**	ppi			**2,896**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**16.81**	
Lo = 2.0" Break	Average Elongation @ Break		%					**410.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**295.3**	N					**66.385**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**488.9**	N					**109.90**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**552.6**	N					**124.22**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247580-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.71**	mm	**67**	mil
Asperity GRI GM12: **31** mil	AVE:	**1.62**	mm	**64**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
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	**30**	N/mm		**170**	ppi		**2,670**	psi
	Average Strength @ Break	**33**	N/mm		**189**	ppi		**2,961**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**18.28**	
Lo = 2.0" Break	Average Elongation @ Break			%				**445.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**292.2**	N					**65.694**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**459.3**	N					**103.27**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**552.6**	N					**124.22**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/21/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247713-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.54**	mm	**61**	mil
	MAX:	**1.78**	mm	**70**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.65**	mm	**65**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**30**	N/mm	**173**	ppi			**2,666**	psi
	Average Strength @ Break	**33**	N/mm	**190**	ppi			**2,927**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.52**	
Lo = 2.0" Break	Average Elongation @ Break		%					**488.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**305.0**	N					**68.572**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**467.9**	N					**105.18**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**552.6**	N					**124.22**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247714-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity GRI GM12: **32** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**30**	N/mm	**174**	ppi		**2,763**	psi
	Average Strength @ Break	**34**	N/mm	**196**	ppi		**3,118**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.29**	
Lo = 2.0" Break	Average Elongation @ Break		%				**517.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**290.8**	N				**65.379**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.8**	N				**99.552**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**552.6**	N				**124.22**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247715-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.50**	mm	**59**	mil
	MAX:	**1.77**	mm	**70**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.63**	mm	**64**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
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	**30**	N/mm		**171**	ppi		**2,660**	psi
	Average Strength @ Break	**32**	N/mm		**182**	ppi		**2,842**	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			%				**488.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**304.0**	N					**68.336**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**428.9**	N					**96.424**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**552.6**	N					**124.22**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247716-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.72**	mm	**68**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.63**	mm	**64**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.69**	
Carbon Black Dispersion ASTM D5596	Category							**10 in Cat. 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**31**	N/mm	**175**	ppi			**2,732**	psi
	Average Strength @ Break	**36**	N/mm	**205**	ppi			**3,197**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.05**	
Lo = 2.0" Break	Average Elongation @ Break		%					**533.6**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**289.6**	N					**65.104**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**443.7**	N					**99.742**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**552.6**	N					**124.22**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247717-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.71**	mm	**67**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.63**	mm	**64**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.69**	
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	**156**	ppi			**2,436**	psi
	Average Strength @ Break	**33**	N/mm	**187**	ppi			**2,911**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**19.92**	
Lo = 2.0" Break	Average Elongation @ Break		%					**522.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**290.3**	N					**65.266**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**440.9**	N					**99.122**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**593.8**	N					**133.49**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247718-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.72**	mm	**68**	mil
Asperity GRI GM12: **31** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.69**	
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	**171**	ppi	**2,735**	psi	
	Average Strength @ Break	**35**	N/mm	**198**	ppi	**3,159**	psi	
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**15.98**	
Lo = 2.0" Break	Average Elongation @ Break		%				**531.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**267.5**	N			**60.142**	lbs	
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**420.2**	N			**94.479**	lbs	
Puncture Resistance ASTM D4833 (Modified)	Load	**585.0**	N			**131.52**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247719-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.69**	
Carbon Black Dispersion ASTM D5596	Category							**10 in Cat. 1**	
Tensile Strength ASTM D6693 ASTM D638 (Modified) (2 inches / minute)	Average Strength @ Yield	**31**	N/mm	**176**	ppi	**2,788**	psi		
	Average Strength @ Break	**41**	N/mm	**234**	ppi	**3,715**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.96**			
Lo = 2.0" Break	Average Elongation @ Break		%			**528.0**			
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.25**			
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**290.4**	N			**65.294**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**445.9**	N			**100.23**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**660.9**	N			**148.58**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247720-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.43**	mm	**56**	mil
	MAX:	**1.72**	mm	**68**	mil
Asperity GRI GM12: **34** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.945**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.69**	
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	**157**	ppi		**2,524**	psi
	Average Strength @ Break	**37**	N/mm	**213**	ppi		**3,419**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.29**	
Lo = 2.0" Break	Average Elongation @ Break		%				**520.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**270.3**	N				**60.772**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**470.7**	N				**105.82**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**646.6**	N				**145.36**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247721-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.51**	mm	**59**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.69**	
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	**147**	ppi		**2,386**	psi
	Average Strength @ Break	**32**	N/mm	**182**	ppi		**2,945**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.10**	
Lo = 2.0" Break	Average Elongation @ Break		%				**519.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**288.3**	N				**64.806**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**426.6**	N				**95.902**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N				**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **247722-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.46**	mm	**57**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **34** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.69**	
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	**158**	ppi		**2,528**	psi
	Average Strength @ Break	**33**	N/mm	**186**	ppi		**2,968**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**22.67**	
Lo = 2.0" Break	Average Elongation @ Break		%				**514.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**279.0**	N				**62.730**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**413.9**	N				**93.054**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N				**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/23/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248101-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.69**	
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		**144**	ppi		**2,336**	psi
	Average Strength @ Break	**34**	N/mm		**197**	ppi		**3,186**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**19.63**	
Lo = 2.0" Break	Average Elongation @ Break			%				**513.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**262.3**	N					**58.974**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**401.1**	N					**90.169**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N					**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248103-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.60**	mm	**63**	mil
Asperity GRI GM12: **26** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.69**	
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	**142**	ppi		**2,318**	psi
	Average Strength @ Break	**27**	N/mm	**156**	ppi		**2,543**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield Lo = 2.0" Break	Average Elongation @ Yield		%				**17.10**	
	Average Elongation @ Break		%				**464.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**310.5**	N				**69.814**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**450.3**	N				**101.24**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N				**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248104-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.52**	mm	**60**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **33** mil	AVE:	**1.61**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.69**	
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	**161**	ppi			**2,544**	psi
	Average Strength @ Break	**35**	N/mm	**200**	ppi			**3,151**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.26**	
Lo = 2.0" Break	Average Elongation @ Break		%					**477.3**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**274.0**	N					**61.604**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**415.9**	N					**93.508**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N					**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248105-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.78**	mm	**70**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.62**	mm	**64**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								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					**.22**	
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	**28**	N/mm	**160**	ppi	**2,515**	psi		
	Average Strength @ Break	**35**	N/mm	**199**	ppi	**3,125**	psi		
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%			**17.76**			
Lo = 2.0" Break	Average Elongation @ Break		%			**532.2**			
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%			**-0.25**			
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**281.1**	N			**63.201**	lbs		
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**442.5**	N			**99.476**	lbs		
Puncture Resistance ASTM D4833 (Modified)	Load	**641.8**	N			**144.28**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248106-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							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				**.22**	
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	**27**	N/mm	**153**	ppi		**2,457**	psi
	Average Strength @ Break	**33**	N/mm	**186**	ppi		**2,984**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**19.07**	
Lo = 2.0" Break	Average Elongation @ Break		%				**489.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**249.9**	N				**56.182**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**493.6**	N				**110.96**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**552.2**	N				**124.13**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248107-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.74**	mm	**69**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.60**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							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				**.22**	
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	**29**	N/mm	**164**	ppi		**2,605**	psi
	Average Strength @ Break	**36**	N/mm	**208**	ppi		**3,303**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.47**	
Lo = 2.0" Break	Average Elongation @ Break		%				**522.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**303.2**	N				**68.156**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**482.3**	N				**108.42**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**629.0**	N				**141.41**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248108-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							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				**.22**	
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	**28**	N/mm	**161**	ppi		**2,566**	psi
	Average Strength @ Break	**37**	N/mm	**209**	ppi		**3,345**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.57**	
Lo = 2.0" Break	Average Elongation @ Break		%				**536.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**270.7**	N				**60.859**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**438.2**	N				**98.511**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**550.0**	N				**123.64**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248109-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.72**	mm	**68**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

							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				**.22**	
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	**27**	N/mm	**152**	ppi		**2,433**	psi
	Average Strength @ Break	**37**	N/mm	**209**	ppi		**3,346**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**20.16**	
Lo = 2.0" Break	Average Elongation @ Break		%				**474.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**303.7**	N				**68.272**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**439.7**	N				**98.861**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**607.6**	N				**136.59**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248110-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.70**	mm	**67**	mil
Asperity GRI GM12: **32** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**24**	N/mm	**138**	ppi		**2,212**	psi
	Average Strength @ Break	**31**	N/mm	**176**	ppi		**2,825**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**19.28**	
Lo = 2.0" Break	Average Elongation @ Break		%				**478.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**281.5**	N				**63.294**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**469.4**	N				**105.53**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.0**	N				**132.42**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248111-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.71**	mm	**67**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.57**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**27**	N/mm	**155**	ppi			**2,507**	psi
	Average Strength @ Break	**31**	N/mm	**175**	ppi			**2,832**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**23.32**	
Lo = 2.0" Break	Average Elongation @ Break		%					**499.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**282.7**	N					**63.556**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**416.5**	N					**93.630**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.0**	N					**132.42**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248112-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.71**	mm	**67**	mil
Asperity GRI GM12: **30** mil	AVE:	**1.62**	mm	**64**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
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	**28**	N/mm	**161**	ppi			**2,530**	psi
	Average Strength @ Break	**33**	N/mm	**189**	ppi			**2,958**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.79**	
Lo = 2.0" Break	Average Elongation @ Break		%					**441.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**253.8**	N					**57.069**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**387.3**	N					**87.077**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.0**	N					**132.42**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248113-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.48**	mm	**58**	mil
	MAX:	**1.73**	mm	**68**	mil
Asperity GRI GM12: **27** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**27**	N/mm	**153**	ppi		**2,485**	psi
	Average Strength @ Break	**32**	N/mm	**183**	ppi		**2,987**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.84**	
Lo = 2.0" Break	Average Elongation @ Break		%				**528.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**255.9**	N				**57.521**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**377.9**	N				**84.967**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.0**	N				**132.42**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248114-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.69**	mm	**67**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
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	**27**	N/mm	**153**	ppi		**2,489**	psi
	Average Strength @ Break	**31**	N/mm	**179**	ppi		**2,912**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.94**	
Lo = 2.0" Break	Average Elongation @ Break		%				**508.9**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**256.4**	N				**57.650**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**390.7**	N				**87.839**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.0**	N				**132.42**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248115-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.49**	mm	**59**	mil
	MAX:	**1.67**	mm	**66**	mil
Asperity GRI GM12: **26** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.67**	
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	**152**	ppi			**2,475**	psi
	Average Strength @ Break	**32**	N/mm	**183**	ppi			**2,986**	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		%					**508.5**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**254.5**	N					**57.213**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**409.0**	N					**91.960**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**589.0**	N					**132.42**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248116-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.42**	mm	**56**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **31** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.67**	
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	**151**	ppi			**2,434**	psi
	Average Strength @ Break	**36**	N/mm	**207**	ppi			**3,336**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**27.34**	
Lo = 2.0" Break	Average Elongation @ Break		%					**460.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**268.0**	N					**60.251**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**362.7**	N					**81.543**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**567.7**	N					**127.62**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248117-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.47**	mm	**58**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **26** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density	g/cc					**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g	g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range	%					**2.67**	
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	**161**	ppi		**2,570**	psi
	Average Strength @ Break	**33**	N/mm	**188**	ppi		**3,009**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield	%					**17.44**	
Lo = 2.0" Break	Average Elongation @ Break	%					**497.8**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change	%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**267.2**	N				**60.066**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.5**	N				**98.132**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**640.2**	N				**143.94**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/24/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248218-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.67**	
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	**153**	ppi		**2,495**	psi
	Average Strength @ Break	**28**	N/mm	**161**	ppi		**2,627**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**16.88**	
Lo = 2.0" Break	Average Elongation @ Break		%				**441.2**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**278.9**	N				**62.702**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**433.6**	N				**97.476**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**580.2**	N				**130.44**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/25/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248219-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.54**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.947**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.67**	
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	**158**	ppi		**2,608**	psi
	Average Strength @ Break	**36**	N/mm	**205**	ppi		**3,373**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**18.48**	
Lo = 2.0" Break	Average Elongation @ Break		%				**468.4**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**294.5**	N				**66.218**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**445.1**	N				**100.06**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**573.8**	N				**129.00**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/25/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248220-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.65**	mm	**65**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.56**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet
OIT(Standard) ASTM D3895	minutes	**176**	

								TEST RESULTS	
Specific Gravity ASTM D792	Density			g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g			g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range			%				**2.65**	
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		**142**	ppi		**2,308**	psi
	Average Strength @ Break	**34**	N/mm		**195**	ppi		**3,173**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield			%				**21.65**	
Lo = 2.0" Break	Average Elongation @ Break			%				**540.7**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change			%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**274.3**	N					**61.673**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**445.4**	N					**100.14**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**635.9**	N					**142.97**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/25/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248221-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.78**	mm	**70**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.59**	mm	**63**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60** mil
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.65**	
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	**164**	ppi			**2,620**	psi
	Average Strength @ Break	**33**	N/mm	**190**	ppi			**3,029**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.46**	
Lo = 2.0" Break	Average Elongation @ Break		%					**502.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**288.7**	N					**64.906**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**433.1**	N					**97.363**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**635.9**	N					**142.97**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/25/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248222-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.45**	mm	**57**	mil
	MAX:	**1.64**	mm	**65**	mil
Asperity GRI GM12: **29** mil	AVE:	**1.58**	mm	**62**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

							TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc				**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min				**.22**	
Carbon Black Content ASTM D4218	Range		%				**2.65**	
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	**166**	ppi		**2,663**	psi
	Average Strength @ Break	**34**	N/mm	**195**	ppi		**3,143**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%				**17.68**	
Lo = 2.0" Break	Average Elongation @ Break		%				**516.1**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%				**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**299.6**	N				**67.349**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**433.6**	N				**97.480**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**635.9**	N				**142.97**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/25/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

agru america quality control dept.

quality certificate

ROLL # **248223-08** Lot #: **7181254** **Liner Type: MICROSPIKE™ HDPE**

Measurement ASTM D5994 (Modified)		METRIC		ENGLISH	
	MIN:	**1.44**	mm	**57**	mil
	MAX:	**1.68**	mm	**66**	mil
Asperity GRI GM12: **28** mil	AVE:	**1.54**	mm	**61**	mil

ODD # : TOP EVEN #: BOTTOM

Thickness.....	**1.5**	mm	**60 mil**
Length.....	**125**	m	**410.1** feet
Width.....	**7.00**	m;	**23.0** feet

OIT(Standard) ASTM D3895 minutes **176**

								TEST RESULTS	
Specific Gravity ASTM D792	Density		g/cc					**.948**	
MFI ASTM D1238 COND. E GRADE: **K307**	Melt Flow Index 190ºC /2160 g		g/10 min					**.22**	
Carbon Black Content ASTM D4218	Range		%					**2.65**	
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	**158**	ppi			**2,607**	psi
	Average Strength @ Break	**33**	N/mm	**191**	ppi			**3,151**	psi
Elongation ASTM D6693 ASTM D638 (Modified) (2 inches / minute) Lo = 1.3" Yield	Average Elongation @ Yield		%					**17.66**	
Lo = 2.0" Break	Average Elongation @ Break		%					**533.0**	
Dimensional Stability ASTM D1204 (Modified)	Average Dimensional change		%					**-0.25**	
Tear Resistance ASTM D-1004 (Modified)	Average Tear Resistance	**294.5**	N					**66.216**	lbs
Puncture Resistance FTMS 101 Method 2065 (Modified)	Load	**436.9**	N					**98.220**	lbs
Puncture Resistance ASTM D4833 (Modified)	Load	**635.9**	N					**142.97**	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: **Plastic Fusion**
PO: **P12077 Allen Steam RAB Ash LF**
Destination **Belmont, NC**

Date:..... **11/25/08**

Signature.....
Quality Control Department

60HDmic.FRM
REV 03
12/23/05

CoA Date: 10/22/2008

Certificate of Analysis

Shipped To: AGRU AMERICA INC
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

CPC Delivery #: 87757301
PO #: 004792
Weight: 195600 LB
Ship Date: 10/22/2008
Package: BULK
Mode: Hopper Car
Car #: CHVX898110
Seal No: 271224

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 7181255

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.260	g/10mi
HLMI Flow Rate	ASTM D1238	21.00	g/10mi
Density	ASTM D1505	0.9360	g/cm3
Pellet Count	P02.08.03	37.000	pel/g
Production Date		10/12/2008	

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 800-231-1212

CoA Date: 10/23/2008

Certificate of Analysis

Shipped To: AGRU AMERICA INC
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

CPC Delivery #: 87758570
PO #: 004792
Weight: 191700 LB
Ship Date: 10/23/2008
Package: BULK
Mode: Hopper Car
Car #: PSPX006046
Seal No: 267649

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 7181250

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.220	g/10mi
HLMI Flow Rate	ASTM D1238	22.00	g/10mi
Density	ASTM D1505	0.9360	g/cm3
Pellet Count	P02.08.03	30.000	pel/g
Production Date		10/09/2008	

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 800-231-1212

CoA Date: 10/23/2008

Certificate of Analysis

Shipped To: AGRU AMERICA INC
500 GARRISON RD
GEORGETOWN SC 29440
USA

Recipient: PALMER
Fax:

CPC Delivery #: 87758573
PO #: 004815
Weight: 193900 LB
Ship Date: 10/23/2008
Package: BULK
Mode: Hopper Car
Car #: CHVX889027
Seal No: 267708

Product:
MARLEX POLYETHYLENE K307 BULK

Lot Number: 7181254

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.220	g/10mi
HLMI Flow Rate	ASTM D1238	19.00	g/10mi
Density	ASTM D1505	0.9370	g/cm3
Pellet Count	P02.08.03	31.000	pel/g
Production Date		10/10/2008	

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 800-231-1212

HDPE Geomembrane
Conformance Test Results

December 16, 2008

Mail To:

Mr. Cedric Ruhl
S & ME
9751 Southern Pine Boulevard
Charlotte, NC 28273

email: cruhl@smeinc.com
cc email: kdaly@smeinc.com

Bill To:

<= Same

Dear Mr. Ruhl:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	**Allen Steam Station RAB Ash Landfill**
TRI Job Reference Number:	E2324-09-03
Material(s) Tested:	13 Agru 60 mil Microspike HDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5994) Density (ASTM D 1505) Carbon Content (ASTM D 1603, mod.) Tensile (ASTM D 6693) Tear Resistance (ASTM D 1004)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

MPatel

Dr. Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 246703.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	64	65	62	65	62	65	65	62	64	65	**64**	1	57 min avg 8 of 10, 54 min
											62	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.943	0.943	0.943								**0.943**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.68	2.64									**2.66**	0.03	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	157	176	172	148	172						**165**	12	126 min
TD Yield Strength (ppi)	185	154	191	165	193						**178**	17	126 min
MD Break Strength (ppi)	185	241	242	192	257						**223**	33	90 min
TD Break Strength (ppi)	187	156	151	168	195						**171**	19	90 min
MD Yield Elongation (%)	19	19	19	19	19						**19**	0	12 min
TD Yield Elongation (%)	17	17	15	17	15						**16**	1	12 min
MD Break Elongation (%)	485	475	469	495	441						**473**	20	100 min
TD Break Elongation (%)	543	490	415	518	544						**502**	53	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	69	64	63	58	59	67	67	55	67	55	**62**	5	42 min
TD Tear Strength (lbs)	51	55	53	58	60	62	52	58	49	58	**56**	4	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 246793.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	65	60	64	65	60	65	60	65	65	61	**63**	2	57 min avg 8 of 10, 54 min
											60	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.944	0.944	0.944								**0.944**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.61	2.60									**2.61**	0.01	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	161	157	168	145	155						**157**	8	126 min
TD Yield Strength (ppi)	181	180	150	157	179						**169**	15	126 min
MD Break Strength (ppi)	268	243	224	199	199						**227**	30	90 min
TD Break Strength (ppi)	177	137	170	171	181						**167**	17	90 min
MD Yield Elongation (%)	21	21	21	21	21						**21**	0	12 min
TD Yield Elongation (%)	15	15	17	17	15						**16**	1	12 min
MD Break Elongation (%)	484	465	419	504	523						**479**	40	100 min
TD Break Elongation (%)	466	209	530	510	500						**443**	133	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	57	66	67	54	69	57	67	56	65	68	**63**	6	42 min
TD Tear Strength (lbs)	57	58	49	58	49	53	55	57	53	58	**55**	4	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 247102.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	66	66	59	62	66	66	66	66	62	65	**64**	3	57 min avg 8 of 10, 54 min
											59	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.943	0.943	0.943								**0.943**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.67	2.70									**2.69**	0.02	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	161	145	162	170	161						**160**	9	126 min
TD Yield Strength (ppi)	150	163	182	181	181						**171**	14	126 min
MD Break Strength (ppi)	246	217	250	231	165						**222**	34	90 min
TD Break Strength (ppi)	169	179	131	194	189						**172**	25	90 min
MD Yield Elongation (%)	18	18	18	18	18						**18**	0	12 min
TD Yield Elongation (%)	17	17	17	17	17						**17**	0	12 min
MD Break Elongation (%)	464	489	475	446	363						**447**	50	100 min
TD Break Elongation (%)	504	496	320	530	508						**472**	86	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	65	61	56	57	61	60	63	62	62	57	**60**	3	42 min
TD Tear Strength (lbs)	50	54	54	49	59	54	54	52	58	54	**54**	3	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 247112.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	59	65	65	65	60	59	65	64	65	60	**63**	3	57 min avg 8 of 10, 54 min
											59	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.943	0.943	0.944								**0.943**	0.001	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.78	2.79									**2.79**	0.01	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	180	179	172	180	159						**174**	9	126 min
TD Yield Strength (ppi)	176	199	163	192	192						**184**	15	126 min
MD Break Strength (ppi)	221	273	212	248	187						**228**	33	90 min
TD Break Strength (ppi)	180	206	157	149	174						**173**	22	90 min
MD Yield Elongation (%)	17	17	17	17	17						**17**	0	12 min
TD Yield Elongation (%)	14	14	15	14	14						**14**	0	12 min
MD Break Elongation (%)	440	461	506	451	486						**469**	27	100 min
TD Break Elongation (%)	520	559	453	398	460						**478**	63	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	66	54	63	65	58	55	62	61	64	56	**60**	4	42 min
TD Tear Strength (lbs)	54	52	51	55	56	55	53	54	52	52	**53**	2	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 247223.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	55	61	60	62	66	65	67	67	68	66	**64**	4	57 min avg 8 of 10, 54 min
											55	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.943	0.943	0.943								**0.943**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.65	2.64									**2.65**	0.01	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	154	150	165	171	164						**161**	9	126 min
TD Yield Strength (ppi)	153	162	187	188	184						**175**	16	126 min
MD Break Strength (ppi)	171	191	248	263	247						**224**	40	90 min
TD Break Strength (ppi)	149	178	183	182	172						**173**	14	90 min
MD Yield Elongation (%)	19	19	19	19	19						**19**	0	12 min
TD Yield Elongation (%)	17	17	17	17	17						**17**	0	12 min
MD Break Elongation (%)	438	510	454	511	480						**479**	33	100 min
TD Break Elongation (%)	423	529	508	468	466						**479**	41	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	53	54	63	64	66	63	53	53	63	64	**60**	6	42 min
TD Tear Strength (lbs)	58	50	51	53	59	55	51	53	50	57	**54**	3	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 247234.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	64	66	63	61	64	64	59	57	65	64	**63**	3	57 min avg 8 of 10, 54 min
											57	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.944	0.944	0.944								**0.944**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.80	2.82									**2.81**	0.01	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	181	161	168	169	157						**167**	9	126 min
TD Yield Strength (ppi)	176	192	186	188	159						**180**	13	126 min
MD Break Strength (ppi)	283	207	224	235	180						**226**	38	90 min
TD Break Strength (ppi)	215	201	187	203	163						**194**	20	90 min
MD Yield Elongation (%)	17	17	17	17	17						**17**	0	12 min
TD Yield Elongation (%)	17	15	17	15	17						**16**	1	12 min
MD Break Elongation (%)	484	503	436	441	461						**465**	28	100 min
TD Break Elongation (%)	614	544	510	559	463						**538**	56	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	64	62	62	56	55	64	61	61	54	54	**59**	4	42 min
TD Tear Strength (lbs)	51	53	56	52	52	52	53	52	52	52	**53**	1	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 247344.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	60	66	62	63	64	60	60	62	63	64	**62**	2	57 min avg 8 of 10, 54 min
											60	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.943	0.943	0.943								**0.943**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.59	2.57									**2.58**	0.01	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	156	166	160	167	163						**162**	5	126 min
TD Yield Strength (ppi)	174	160	181	186	167						**174**	10	126 min
MD Break Strength (ppi)	169	193	183	242	219						**201**	29	90 min
TD Break Strength (ppi)	195	164	178	180	177						**179**	11	90 min
MD Yield Elongation (%)	19	19	19	19	19						**19**	0	12 min
TD Yield Elongation (%)	17	17	17	17	17						**17**	0	12 min
MD Break Elongation (%)	434	421	486	460	494						**459**	32	100 min
TD Break Elongation (%)	568	485	476	491	525						**509**	38	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	55	59	54	63	57	55	65	59	59	59	**59**	4	42 min
TD Tear Strength (lbs)	58	53	54	52	55	56	55	52	50	55	**54**	2	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 247355.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
													57 min avg
Thickness (mils)	71	63	64	63	61	70	63	65	64	61	**65**	3	8 of 10, 54 min
											61	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.941	0.942	0.942								**0.942**	0.001	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.66	2.66									**2.66**	0.00	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	155	173	160	144	152						**157**	11	126 min
TD Yield Strength (ppi)	163	154	191	139	176						**165**	20	126 min
MD Break Strength (ppi)	214	287	217	174	187						**216**	44	90 min
TD Break Strength (ppi)	160	166	155	158	193						**166**	15	90 min
MD Yield Elongation (%)	18	18	18	18	18						**18**	0	12 min
TD Yield Elongation (%)	17	17	17	17	17						**17**	0	12 min
MD Break Elongation (%)	486	483	434	506	509						**484**	30	100 min
TD Break Elongation (%)	424	485	236	503	541						**438**	120	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	57	63	57	65	74	74	53	58	58	53	**61**	8	42 min
TD Tear Strength (lbs)	61	57	56	48	64	53	56	49	53	57	**55**	5	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 247465.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	65	62	62	62	61	65	62	65	65	61	**63**	2	57 min avg 8 of 10, 54 min
											61	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.944	0.944	0.944								**0.944**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.74	2.78									**2.76**	0.03	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	159	151	150	169	171						**160**	10	126 min
TD Yield Strength (ppi)	154	180	148	174	177						**167**	15	126 min
MD Break Strength (ppi)	222	192	170	233	253						**214**	33	90 min
TD Break Strength (ppi)	169	134	162	133	203						**160**	29	90 min
MD Yield Elongation (%)	18	18	18	18	18						**18**	0	12 min
TD Yield Elongation (%)	17	15	17	17	15						**16**	1	12 min
MD Break Elongation (%)	466	494	484	505	446						**479**	23	100 min
TD Break Elongation (%)	485	351	491	366	561						**451**	90	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	53	58	52	61	62	63	50	59	62	50	**57**	5	42 min
TD Tear Strength (lbs)	54	55	47	54	54	53	52	52	52	54	**53**	2	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 247576.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	67	64	65	65	63	66	61	65	65	63	**64**	2	57 min avg 8 of 10, 54 min
											61	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.943	0.943	0.943								**0.943**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.75	2.78									**2.77**	0.02	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	151	145	157	155	137						**149**	8	126 min
TD Yield Strength (ppi)	145	167	163	140	172						**157**	14	126 min
MD Break Strength (ppi)	240	201	221	238	155						**211**	35	90 min
TD Break Strength (ppi)	189	132	123	161	166						**154**	27	90 min
MD Yield Elongation (%)	17	17	17	17	17						**17**	0	12 min
TD Yield Elongation (%)	16	16	16	16	16						**16**	0	12 min
MD Break Elongation (%)	455	478	443	449	410						**447**	24	100 min
TD Break Elongation (%)	578	291	150	488	426						**387**	168	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	66	66	52	65	54	58	65	64	64	58	**61**	5	42 min
TD Tear Strength (lbs)	56	52	57	47	58	54	58	54	57	56	**55**	3	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 247719.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	66	66	58	66	62	66	66	60	65	61	**64**	3	57 min avg 8 of 10, 54 min
											58	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.943	0.944	0.944								**0.944**	0.001	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.73	2.73									**2.73**	0.00	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	167	165	155	169	160						**163**	6	126 min
TD Yield Strength (ppi)	179	158	183	183	156						**172**	14	126 min
MD Break Strength (ppi)	214	236	133	253	169						**201**	49	90 min
TD Break Strength (ppi)	205	169	125	171	133						**161**	32	90 min
MD Yield Elongation (%)	20	20	20	20	20						**20**	0	12 min
TD Yield Elongation (%)	15	17	15	15	17						**16**	1	12 min
MD Break Elongation (%)	445	453	336	471	429						**427**	53	100 min
TD Break Elongation (%)	574	489	105	451	390						**402**	179	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	50	63	58	51	62	58	58	51	59	52	**56**	5	42 min
TD Tear Strength (lbs)	49	54	49	53	53	49	55	48	55	54	**52**	3	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 248108.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	66	62	63	62	66	65	64	63	62	64	**64**	2	57 min avg 8 of 10, 54 min
											62	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.942	0.942	0.942								**0.942**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.64	2.65									**2.65**	0.01	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	158	156	143	151	154						**152**	6	126 min
TD Yield Strength (ppi)	184	176	159	200	184						**181**	15	126 min
MD Break Strength (ppi)	283	208	174	183	245						**219**	45	90 min
TD Break Strength (ppi)	217	200	173	194	213						**199**	17	90 min
MD Yield Elongation (%)	19	19	19	19	19						**19**	0	12 min
TD Yield Elongation (%)	15	15	15	15	17						**15**	1	12 min
MD Break Elongation (%)	486	494	469	465	505						**484**	17	100 min
TD Break Elongation (%)	578	558	501	476	588						**540**	49	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	58	54	63	64	69	60	63	54	60	54	**60**	5	42 min
TD Tear Strength (lbs)	57	54	58	51	54	59	57	54	55	59	**56**	3	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOMEMBRANE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: Agru 60 mil Microspike HDPE Geomembrane
Sample Identification: 248219.08
TRI Log #: E2324-09-03

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5994)													
Thickness (mils)	60	57	66	63	65	60	57	65	64	63	**62**	3	57 min avg 8 of 10, 54 min
											57	<< min	51 min
Density (ASTM D 1505)													
Density (g/cm3)	0.943	0.943	0.943								**0.943**	0.000	0.940 min
Carbon Black Content (ASTM D 1603, mod.)													
% Carbon Black	2.82	2.80									**2.81**	0.01	2 - 3%
Tensile Properties (ASTM D 6693, 2 ipm strain rate)													
MD Yield Strength (ppi)	183	170	159	189	171						**174**	12	126 min
TD Yield Strength (ppi)	170	162	157	156	185						**166**	12	126 min
MD Break Strength (ppi)	272	253	175	172	195						**213**	46	90 min
TD Break Strength (ppi)	187	226	201	160	189						**193**	24	90 min
MD Yield Elongation (%)	15	15	15	15	15						**15**	0	12 min
TD Yield Elongation (%)	15	21	17	19	15						**17**	3	12 min
MD Break Elongation (%)	466	478	475	463	469						**470**	6	100 min
TD Break Elongation (%)	524	479	601	466	518						**518**	53	100 min
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	51	50	57	53	52	59	63	62	49	52	**55**	5	42 min
TD Tear Strength (lbs)	51	52	48	48	57	57	46	52	51	51	**51**	4	42 min

MD Machine Direction TD Transverse Direction

The testing is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

APPENDIX II – GEOSYNTHETICS
Section 4 – Geocomposite Drainage Layer

LDS (350-mil) MQC Test Results
LDS (350-mil) Conformance Test Results
LCS (300-mil) MQC Test Results
LCS (300-mil) Conformance Test Results

LDS Geocomposite Drainage Layer MQC Test Results

SKAPS Industries

Engineered Synthetic Products, Inc.

December 26, 2008
Plastic Fusion Fabricators, Inc.
3455 Stanwood Blvd
Huntsville, AL 35811

Ref. : Duke Energy Allen Steam, NC
Customer P.O. # P12079
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[3]				
Mass per Unit Area	ASTM D 5261	lbs/ft^2	0.300	Minimum
Thickness	ASTM D 5199	mil	350	Minimum
Carbon Black	ASTM D 4218	%	2.0	Minimum
Tensile Strength	ASTM D 5035	lbs/in	75	Minimum
Melt Flow	ASTM D 1238[2]	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm^3	0.94	Minimum
Composite				
Ply Adhesion	GRI GC7	lb/in	1.0	MARV[5]
Transmissivity[1]	ASTM D 4716	m^2/sec	3.44×10^{-3}	MARV
Geotextile[3 & 4]				
Fabric Weight	ASTM D 5261	oz/yd^2	8.0	MARV
Grab Strength	ASTM D 4632	lbs	200	MARV
Puncture Resistance	ASTM D 4833	lbs	80	MARV
Permeability	ASTM D 4491	cm/sec	5.0×10^{-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 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

2 Condition 190/2.16

3 Geotextile and Geonet properties are prior to lamination.

4 Geotextile data is provided by the supplier.

5 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 : **TN350-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304720001	304720001 - N	3047.206	3047.225	1.23	3.02	3.59×10^{-3}
2	304720002	304720002 - N	3047.206	3047.225			
3	304720003	304720003 - N	3047.206	3047.225			
4	304720004	304720004 - N	3047.206	3047.225			
5	304720005	304720005 - N	3047.206	3047.225			
6	304720006	304720006 - N	3047.206	3047.225			
7	304720007	304720007 - N	3047.206	3047.225			
8	304720008	304720008 - N	3047.222	3047.210			
9	304720009	304720009 - N	3047.222	3047.210			
10	304720010	304720010 - N	3047.222	3047.210			
11	304720011	304720011 - N	3047.222	3047.210			
12	304720012	304720012 - N	3047.222	3047.210			
13	304720013	304720013 - N	3047.222	3047.210			
14	304720014	304720014 - N	3047.222	3047.210			
15	304720015	304720015 - N	3047.203	3047.218			
16	304720016	304720016 - N	3047.203	3047.218			
17	304720017	304720017 - N	3047.203	3047.218			
18	304720018	304720018 - N	3047.203	3047.218			
19	304720019	304720019 - N	3047.203	3047.218			
20	304720020	304720020 - N	3047.203	3047.218	1.87	3.87	
21	304720021	304720021 - N	3047.203	3047.218			
22	304720022	304720022 - N	3047.219	3047.201			
23	304720023	304720023 - N	3047.219	3047.201			
24	304720024	304720024 - N	3047.219	3047.201			
25	304720025	304720025 - N	3047.219	3047.201			
26	304720026	304720026 - N	3047.219	3047.201			
27	304720027	304720027 - N	3047.219	3047.201			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720001 - N	CEFX54562	0.9548	0.436	356	2.32	119	
304720002 - N	CEFX54562	0.9548					
304720003 - N	CEFX54562	0.9548					
304720004 - N	CEFX54562	0.9548					
304720005 - N	CEFX54562	0.9548					
304720006 - N	CEFX54562	0.9548					
304720007 - N	CEFX54562	0.9548					
304720008 - N	CEFX54562	0.9548					
304720009 - N	CEFX54562	0.9548					
304720010 - N	CEFX54562	0.9548					
304720011 - N	CEFX54562	0.9548					
304720012 - N	CEFX54562	0.9548					
304720013 - N	CEFX54562	0.9548					
304720014 - N	CEFX54562	0.9548					
304720015 - N	CEFX54562	0.9548					
304720016 - N	CEFX54562	0.9548					
304720017 - N	CEFX54562	0.9548					
304720018 - N	CEFX54562	0.9548					
304720019 - N	CEFX54562	0.9548					
304720020 - N	CEFX54562	0.9554	0.450	365	2.60	126	
304720021 - N	CEFX54562	0.9554					
304720022 - N	CEFX54562	0.9554					
304720023 - N	CEFX54562	0.9554					
304720024 - N	CEFX54562	0.9554					
304720025 - N	CEFX54562	0.9554					
304720026 - N	CEFX54562	0.9554					
304720027 - N	CEFX54562	0.9554					

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 Allen Steam, NC**

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	304720028	304720028 - N	3047.219	3047.201			
2	304720029	304720029 - N	3047.208	3047.215			
3	304720030	304720030 - N	3047.208	3047.215			
4	304720031	304720031 - N	3047.208	3047.215			
5	304720032	304720032 - N	3047.208	3047.215			
6	304720033	304720033 - N	3047.208	3047.215			
7	304720034	304720034 - N	3047.208	3047.215			
8	304720035	304720035 - N	3047.208	3047.215			
9	304720036	304720036 - N	3047.226	3047.204			
10	304720037	304720037 - N	3047.226	3047.204			
11	304720038	304720038 - N	3047.226	3047.204			
12	304720039	304720039 - N	3047.226	3047.204			
13	304720040	304720040 - N	3047.226	3047.204	1.28	3.05	
14	304720041	304720041 - N	3047.226	3047.204			
15	304720042	304720042 - N	3047.226	3047.204			
16	304720043	304720043 - N	3047.211	3047.227			
17	304720044	304720044 - N	3047.211	3047.227			
18	304720045	304720045 - N	3047.211	3047.227			
19	304720046	304720046 - N	3047.211	3047.227			
20	304720047	304720047 - N	3047.211	3047.227			
21	304720048	304720048 - N	3047.211	3047.227			
22	304720049	304720049 - N	3047.211	3047.227			
23	304720050	304720050 - N	3047.216	3047.207			
24	304720051	304720051 - N	3047.216	3047.207			
25	304720052	304720052 - N	3047.216	3047.207			
26	304720053	304720053 - N	3047.216	3047.207			
27	304720054	304720054 - N	3047.216	3047.207			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720028 - N	CEFX54562	0.9554					
304720029 - N	CEFX54562	0.9554					
304720030 - N	CEFX54562	0.9554					
304720031 - N	CEFX54562	0.9554					
304720032 - N	CEFX54562	0.9554					
304720033 - N	CEFX54562	0.9554					
304720034 - N	CEFX54562	0.9554					
304720035 - N	CEFX54562	0.9554					
304720036 - N	CEFX54562	0.9554					
304720037 - N	CEFX54562	0.9554					
304720038 - N	CEFX54562	0.9554					
304720039 - N	CEFX54562	0.9554					
304720040 - N	CEFX54562	0.9550	0.438	358	2.35	121	
304720041 - N	CEFX54562	0.9550					
304720042 - N	CEFX54562	0.9550					
304720043 - N	CEFX54562	0.9550					
304720044 - N	CEFX54562	0.9550					
304720045 - N	CEFX54562	0.9550					
304720046 - N	CEFX54562	0.9550					
304720047 - N	CEFX54562	0.9550					
304720048 - N	CEFX54562	0.9550					
304720049 - N	CEFX54562	0.9550					
304720050 - N	CEFX54562	0.9550					
304720051 - N	CEFX54562	0.9550					
304720052 - N	CEFX54562	0.9550					
304720053 - N	CEFX54562	0.9550					
304720054 - N	CEFX54562	0.9550					

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 Allen Steam, NC**

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	304720055	304720055 - N	3047.216	3047.207			
2	304720056	304720056 - N	3047.216	3047.207			
3	304720057	304720057 - N	3047.202	3047.223			
4	304720058	304720058 - N	3047.202	3047.223			
5	304720059	304720059 - N	3047.202	3047.223			
6	304720060	304720060 - N	3047.202	3047.223	1.83	3.84	
7	304720061	304720061 - N	3047.202	3047.223			
8	304720062	304720062 - N	3047.202	3047.223			
9	304720063	304720063 - N	3047.202	3047.223			
10	304720064	304720064 - N	3047.224	3047.212			
11	304720065	304720065 - N	3047.224	3047.212			
12	304720066	304720066 - N	3047.224	3047.212			
13	304720067	304720067 - N	3047.224	3047.212			
14	304720068	304720068 - N	3047.224	3047.212			
15	304720069	304720069 - N	3047.224	3047.212			
16	304720070	304720070 - N	3047.224	3047.212			
17	304720071	304720071 - N	3047.213	3047.220			
18	304720072	304720072 - N	3047.213	3047.220			
19	304720073	304720073 - N	3047.213	3047.220			
20	304720074	304720074 - N	3047.213	3047.220			
21	304720075	304720075 - N	3047.213	3047.220			
22	304720076	304720076 - N	3047.213	3047.220			
23	304720077	304720077 - N	3047.213	3047.220			
24	304720078	304720078 - N	3047.217	3047.205			
25	304720079	304720079 - N	3047.217	3047.205			
26	304720080	304720080 - N	3047.217	3047.205	1.35	3.11	
27	304720081	304720081 - N	3047.217	3047.205			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720055 - N	CEFX54562	0.9550					
304720056 - N	CEFX54562	0.9550					
304720057 - N	CEFX54562	0.9550					
304720058 - N	CEFX54562	0.9550					
304720059 - N	CEFX54562	0.9550					
304720060 - N	CEFX54562	0.9557	0.448	363	2.66	124	
304720061 - N	CEFX54562	0.9557					
304720062 - N	CEFX54562	0.9557					
304720063 - N	CEFX54562	0.9557					
304720064 - N	CEFX54562	0.9557					
304720065 - N	CEFX54562	0.9557					
304720066 - N	CEFX54562	0.9557					
304720067 - N	CEFX54562	0.9557					
304720068 - N	CEFX54562	0.9557					
304720069 - N	CEFX54562	0.9557					
304720070 - N	CEFX54562	0.9557					
304720071 - N	CEFX54562	0.9557					
304720072 - N	CEFX54562	0.9557					
304720073 - N	CEFX54562	0.9557					
304720074 - N	CEFX54562	0.9557					
304720075 - N	CEFX54562	0.9557					
304720076 - N	CEFX54562	0.9557					
304720077 - N	CEFX54562	0.9557					
304720078 - N	CEFX54562	0.9557					
304720079 - N	CEFX54562	0.9557					
304720080 - N	CEFX54562	0.9547	0.435	355	2.42	118	
304720081 - N	CEFX54562	0.9547					

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 Allen Steam, NC**

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	304720082	304720082 - N	3047.217	3047.205			
2	304720083	304720083 - N	3047.217	3047.205			
3	304720084	304720084 - N	3047.217	3047.205			
4	304720085	304720085 - N	3047.209	3047.245			
5	304720086	304720086 - N	3047.209	3047.245			
6	304720087	304720087 - N	3047.209	3047.245			
7	304720088	304720088 - N	3047.209	3047.245			
8	304720089	304720089 - N	3047.209	3047.245			
9	304720090	304720090 - N	3047.209	3047.245			
10	304720091	304720091 - N	3047.209	3047.245			
11	304720092	304720092 - N	3047.228	3047.221			
12	304720093	304720093 - N	3047.228	3047.221			
13	304720094	304720094 - N	3047.228	3047.221			
14	304720095	304720095 - N	3047.228	3047.221			
15	304720096	304720096 - N	3047.228	3047.221			
16	304720097	304720097 - N	3047.228	3047.221			
17	304720098	304720098 - N	3047.228	3047.221			
18	304720099	304720099 - N	3047.214	3047.250			
19	304720100	304720100 - N	3047.214	3047.250	1.78	3.79	
20	304720101	304720101 - N	3047.214	3047.250			
21	304720102	304720102 - N	3047.214	3047.250			
22	304720103	304720103 - N	3047.214	3047.250			
23	304720104	304720104 - N	3047.214	3047.250			
24	304720105	304720105 - N	3047.214	3047.250			
25	304720106	304720106 - N	3047.248	3047.233			
26	304720107	304720107 - N	3047.248	3047.233			
27	304720108	304720108 - N	3047.248	3047.233			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720082 - N	CEFX54562	0.9547					
304720083 - N	CEFX54562	0.9547					
304720084 - N	CEFX54562	0.9547					
304720085 - N	CEFX54562	0.9547					
304720086 - N	CEFX54562	0.9547					
304720087 - N	CEFX54562	0.9547					
304720088 - N	CEFX54562	0.9547					
304720089 - N	CEFX54562	0.9547					
304720090 - N	CEFX54562	0.9547					
304720091 - N	CEFX54562	0.9547					
304720092 - N	CEFX54562	0.9547					
304720093 - N	CEFX54562	0.9547					
304720094 - N	CEFX54562	0.9547					
304720095 - N	CEFX54562	0.9547					
304720096 - N	CEFX54562	0.9547					
304720097 - N	CEFX54562	0.9547					
304720098 - N	CEFX54562	0.9547					
304720099 - N	CEFX54562	0.9547					
304720100 - N	CEFX54562	0.9555	0.446	361	2.61	122	
304720101 - N	CEFX54562	0.9555					
304720102 - N	CEFX54562	0.9555					
304720103 - N	CEFX54562	0.9555					
304720104 - N	CEFX54562	0.9555					
304720105 - N	CEFX54562	0.9555					
304720106 - N	CEFX54562	0.9555					
304720107 - N	CEFX54562	0.9555					
304720108 - N	CEFX54562	0.9555					

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 Allen Steam, NC**

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	304720109	304720109 - N	3047.248	3047.233			
2	304720110	304720110 - N	3047.248	3047.233			
3	304720111	304720111 - N	3047.248	3047.233			
4	304720112	304720112 - N	3047.248	3047.233			
5	304720113	304720113 - N	3047.235	3047.253			
6	304720114	304720114 - N	3047.235	3047.253			
7	304720115	304720115 - N	3047.235	3047.253			
8	304720116	304720116 - N	3047.235	3047.253			
9	304720117	304720117 - N	3047.235	3047.253			
10	304720118	304720118 - N	3047.235	3047.253			
11	304720119	304720119 - N	3047.235	3047.253			
12	304720120	304720120 - N	3047.252	3047.229	1.42	3.17	
13	304720121	304720121 - N	3047.252	3047.229			
14	304720122	304720122 - N	3047.252	3047.229			
15	304720123	304720123 - N	3047.252	3047.229			
16	304720124	304720124 - N	3047.252	3047.229			
17	304720125	304720125 - N	3047.252	3047.229			
18	304720126	304720126 - N	3047.252	3047.229			
19	304720127	304720127 - N	3047.230	3047.243			
20	304720128	304720128 - N	3047.230	3047.243			
21	304720129	304720129 - N	3047.230	3047.243			
22	304720130	304720130 - N	3047.230	3047.243			
23	304720131	304720131 - N	3047.230	3047.243			
24	304720132	304720132 - N	3047.230	3047.243			
25	304720133	304720133 - N	3047.230	3047.243			
26	304720134	304720134 - N	3047.246	3047.237			
27	304720135	304720135 - N	3047.246	3047.237			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720109 - N	CEFX54562	0.9555					
304720110 - N	CEFX54562	0.9555					
304720111 - N	CEFX54562	0.9555					
304720112 - N	CEFX54562	0.9555					
304720113 - N	CEFX54562	0.9555					
304720114 - N	CEFX54562	0.9555					
304720115 - N	CEFX54562	0.9555					
304720116 - N	CEFX54562	0.9555					
304720117 - N	CEFX54562	0.9555					
304720118 - N	CEFX54562	0.9555					
304720119 - N	CEFX54562	0.9555					
304720120 - N	CEFX54562	0.9549	0.437	357	2.46	120	
304720121 - N	CEFX54562	0.9549					
304720122 - N	CEFX54562	0.9549					
304720123 - N	CEFX54562	0.9549					
304720124 - N	CEFX54562	0.9549					
304720125 - N	CEFX54562	0.9549					
304720126 - N	CEFX54562	0.9549					
304720127 - N	CEFX54562	0.9549					
304720128 - N	CEFX54562	0.9549					
304720129 - N	CEFX54562	0.9549					
304720130 - N	CEFX54562	0.9549					
304720131 - N	CEFX54562	0.9549					
304720132 - N	CEFX54562	0.9549					
304720133 - N	CEFX54562	0.9549					
304720134 - N	CEFX54562	0.9549					
304720135 - N	CEFX54562	0.9549					

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 Allen Steam, NC**

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	304720136	304720136 - N	3047.246	3047.237			
2	304720137	304720137 - N	3047.246	3047.237			
3	304720138	304720138 - N	3047.246	3047.237			
4	304720139	304720139 - N	3047.246	3047.237			
5	304720140	304720140 - N	3047.246	3047.237	1.71	3.74	
6	304720141	304720141 - N	3047.238	3047.251			
7	304720142	304720142 - N	3047.238	3047.251			
8	304720143	304720143 - N	3047.238	3047.251			
9	304720144	304720144 - N	3047.238	3047.251			
10	304720145	304720145 - N	3047.238	3047.251			
11	304720146	304720146 - N	3047.238	3047.251			
12	304720147	304720147 - N	3047.238	3047.251			
13	304720148	304720148 - N	3047.254	3047.232			
14	304720149	304720149 - N	3047.254	3047.232			
15	304720150	304720150 - N	3047.254	3047.232			
16	304720151	304720151 - N	3047.254	3047.232			
17	304720152	304720152 - N	3047.254	3047.232			
18	304720153	304720153 - N	3047.254	3047.232			
19	304720154	304720154 - N	3047.254	3047.232			
20	304720155	304720155 - N	3047.231	3047.247			
21	304720156	304720156 - N	3047.231	3047.247			
22	304720157	304720157 - N	3047.231	3047.247			
23	304720158	304720158 - N	3047.231	3047.247			
24	304720159	304720159 - N	3047.231	3047.247			
25	304720160	304720160 - N	3047.231	3047.247	1.49	3.29	
26	304720161	304720161 - N	3047.231	3047.247			
27	304720162	304720162 - N	3047.244	3047.239			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720136 - N	CEFX54562	0.9549					
304720137 - N	CEFX54562	0.9549					
304720138 - N	CEFX54562	0.9549					
304720139 - N	CEFX54562	0.9549					
304720140 - N	GPLX76777	0.9558	0.451	364	2.57	125	
304720141 - N	GPLX76777	0.9558					
304720142 - N	GPLX76777	0.9558					
304720143 - N	GPLX76777	0.9558					
304720144 - N	GPLX76777	0.9558					
304720145 - N	GPLX76777	0.9558					
304720146 - N	GPLX76777	0.9558					
304720147 - N	GPLX76777	0.9558					
304720148 - N	GPLX76777	0.9558					
304720149 - N	GPLX76777	0.9558					
304720150 - N	GPLX76777	0.9558					
304720151 - N	GPLX76777	0.9558					
304720152 - N	GPLX76777	0.9558					
304720153 - N	GPLX76777	0.9558					
304720154 - N	GPLX76777	0.9558					
304720155 - N	GPLX76777	0.9558					
304720156 - N	GPLX76777	0.9558					
304720157 - N	GPLX76777	0.9558					
304720158 - N	GPLX76777	0.9558					
304720159 - N	GPLX76777	0.9558					
304720160 - N	GPLX76777	0.9552	0.439	359	2.49	123	
304720161 - N	GPLX76777	0.9552					
304720162 - N	GPLX76777	0.9552					

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 Allen Steam, NC**

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	304720163	304720163 - N	3047.244	3047.239			
2	304720164	304720164 - N	3047.244	3047.239			
3	304720165	304720165 - N	3047.244	3047.239			
4	304720166	304720166 - N	3047.244	3047.239			
5	304720167	304720167 - N	3047.244	3047.239			
6	304720168	304720168 - N	3047.244	3047.239			
7	304720169	304720169 - N	3047.240	3047.242			
8	304720170	304720170 - N	3047.240	3047.242			
9	304720171	304720171 - N	3047.240	3047.242			
10	304720172	304720172 - N	3047.240	3047.242			
11	304720173	304720173 - N	3047.240	3047.242			
12	304720174	304720174 - N	3047.240	3047.242			
13	304720175	304720175 - N	3047.240	3047.242			
14	304720176	304720176 - N	3047.249	3047.236			
15	304720177	304720177 - N	3047.249	3047.236			
16	304720178	304720178 - N	3047.249	3047.236			
17	304720179	304720179 - N	3047.249	3047.236			
18	304720180	304720180 - N	3047.249	3047.236	1.66	3.67	
19	304720181	304720181 - N	3047.249	3047.236			
20	304720182	304720182 - N	3047.249	3047.236			
21	304720183	304720183 - N	3047.234	3047.272			
22	304720184	304720184 - N	3047.234	3047.272			
23	304720185	304720185 - N	3047.234	3047.272			
24	304720186	304720186 - N	3047.234	3047.272			
25	304720187	304720187 - N	3047.234	3047.272			
26	304720188	304720188 - N	3047.234	3047.272			
27	304720189	304720189 - N	3047.234	3047.272			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720163 - N	GPLX76777	0.9552					
304720164 - N	GPLX76777	0.9552					
304720165 - N	GPLX76777	0.9552					
304720166 - N	GPLX76777	0.9552					
304720167 - N	GPLX76777	0.9552					
304720168 - N	GPLX76777	0.9552					
304720169 - N	GPLX76777	0.9552					
304720170 - N	GPLX76777	0.9552					
304720171 - N	GPLX76777	0.9552					
304720172 - N	GPLX76777	0.9552					
304720173 - N	GPLX76777	0.9552					
304720174 - N	GPLX76777	0.9552					
304720175 - N	GPLX76777	0.9552					
304720176 - N	GPLX76777	0.9552					
304720177 - N	GPLX76777	0.9552					
304720178 - N	GPLX76777	0.9552					
304720179 - N	GPLX76777	0.9552					
304720180 - N	GPLX76777	0.9556	0.445	362	2.55	126	
304720181 - N	GPLX76777	0.9556					
304720182 - N	GPLX76777	0.9556					
304720183 - N	GPLX76777	0.9556					
304720184 - N	GPLX76777	0.9556					
304720185 - N	GPLX76777	0.9556					
304720186 - N	GPLX76777	0.9556					
304720187 - N	GPLX76777	0.9556					
304720188 - N	GPLX76777	0.9556					
304720189 - N	GPLX76777	0.9556					

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 Allen Steam, NC**

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	304720190	304720190 - N	3047.270	3047.255			
2	304720191	304720191 - N	3047.270	3047.255			
3	304720192	304720192 - N	3047.270	3047.255			
4	304720193	304720193 - N	3047.270	3047.255			
5	304720194	304720194 - N	3047.270	3047.255			
6	304720195	304720195 - N	3047.270	3047.255			
7	304720196	304720196 - N	3047.270	3047.255			
8	304720197	304720197 - N	3047.241	3047.278			
9	304720198	304720198 - N	3047.241	3047.278			
10	304720199	304720199 - N	3047.241	3047.278			
11	304720200	304720200 - N	3047.241	3047.278	1.53	3.35	
12	304720201	304720201 - N	3047.241	3047.278			
13	304720202	304720202 - N	3047.241	3047.278			
14	304720203	304720203 - N	3047.241	3047.278			
15	304720204	304720204 - N	3047.275	3047.260			
16	304720205	304720205 - N	3047.275	3047.260			
17	304720206	304720206 - N	3047.275	3047.260			
18	304720207	304720207 - N	3047.275	3047.260			
19	304720208	304720208 - N	3047.275	3047.260			
20	304720209	304720209 - N	3047.275	3047.260			
21	304720210	304720210 - N	3047.275	3047.260			
22	304720211	304720211 - N	3047.257	3047.269			
23	304720212	304720212 - N	3047.257	3047.269			
24	304720213	304720213 - N	3047.257	3047.269			
25	304720214	304720214 - N	3047.257	3047.269			
26	304720215	304720215 - N	3047.257	3047.269			
27	304720216	304720216 - N	3047.257	3047.269			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720190 - N	GPLX76777	0.9556					
304720191 - N	GPLX76777	0.9556					
304720192 - N	GPLX76777	0.9556					
304720193 - N	GPLX76777	0.9556					
304720194 - N	GPLX76777	0.9556					
304720195 - N	GPLX76777	0.9556					
304720196 - N	GPLX76777	0.9556					
304720197 - N	GPLX76777	0.9556					
304720198 - N	GPLX76777	0.9556					
304720199 - N	GPLX76777	0.9556					
304720200 - N	GPLX76777	0.9548	0.442	356	2.43	118	
304720201 - N	GPLX76777	0.9548					
304720202 - N	GPLX76777	0.9548					
304720203 - N	GPLX76777	0.9548					
304720204 - N	GPLX76777	0.9548					
304720205 - N	GPLX76777	0.9548					
304720206 - N	GPLX76777	0.9548					
304720207 - N	GPLX76777	0.9548					
304720208 - N	GPLX76777	0.9548					
304720209 - N	GPLX76777	0.9548					
304720210 - N	GPLX76777	0.9548					
304720211 - N	GPLX76777	0.9548					
304720212 - N	GPLX76777	0.9548					
304720213 - N	GPLX76777	0.9548					
304720214 - N	GPLX76777	0.9548					
304720215 - N	GPLX76777	0.9548					
304720216 - N	GPLX76777	0.9548					

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 Allen Steam, NC**

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	304720217	304720217 - N	3047.257	3047.269			
2	304720218	304720218 - N	3047.266	3047.258			
3	304720219	304720219 - N	3047.266	3047.258			
4	304720220	304720220 - N	3047.266	3047.258	1.62	3.53	3.62×10^{-3}
5	304720221	304720221 - N	3047.266	3047.258			
6	304720222	304720222 - N	3047.266	3047.258			
7	304720223	304720223 - N	3047.266	3047.258			
8	304720224	304720224 - N	3047.266	3047.258			
9	304720225	304720225 - N	3047.263	3047.276			
10	304720226	304720226 - N	3047.263	3047.276			
11	304720227	304720227 - N	3047.263	3047.276			
12	304720228	304720228 - N	3047.263	3047.276			
13	304720229	304720229 - N	3047.263	3047.276			
14	304720230	304720230 - N	3047.263	3047.276			
15	304720231	304720231 - N	3047.263	3047.276			
16	304720232	304720232 - N	3047.277	3047.265			
17	304720233	304720233 - N	3047.277	3047.265			
18	304720234	304720234 - N	3047.277	3047.265			
19	304720235	304720235 - N	3047.277	3047.265			
20	304720236	304720236 - N	3047.277	3047.265			
21	304720237	304720237 - N	3047.277	3047.265			
22	304720238	304720238 - N	3047.277	3047.265			
23	304720239	304720239 - N	3047.259	3047.271			
24	304720240	304720240 - N	3047.259	3047.271	1.32	3.44	
25	304720241	304720241 - N	3047.259	3047.271			
26	304720242	304720242 - N	3047.259	3047.271			
27	304720243	304720243 - N	3047.259	3047.271			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720217 - N	GPLX76777	0.9548					
304720218 - N	GPLX76777	0.9548					
304720219 - N	GPLX76777	0.9548					
304720220 - N	GPLX76777	0.9559	0.447	360	2.64	124	
304720221 - N	GPLX76777	0.9559					
304720222 - N	GPLX76777	0.9559					
304720223 - N	GPLX76777	0.9559					
304720224 - N	GPLX76777	0.9559					
304720225 - N	GPLX76777	0.9559					
304720226 - N	GPLX76777	0.9559					
304720227 - N	GPLX76777	0.9559					
304720228 - N	GPLX76777	0.9559					
304720229 - N	GPLX76777	0.9559					
304720230 - N	GPLX76777	0.9559					
304720231 - N	GPLX76777	0.9559					
304720232 - N	GPLX76777	0.9559					
304720233 - N	GPLX76777	0.9559					
304720234 - N	GPLX76777	0.9559					
304720235 - N	GPLX76777	0.9559					
304720236 - N	GPLX76777	0.9559					
304720237 - N	GPLX76777	0.9559					
304720238 - N	GPLX76777	0.9559					
304720239 - N	GPLX76777	0.9559					
304720240 - N	GPLX76777	0.9551	0.440	358	2.34	120	
304720241 - N	GPLX76777	0.9551					
304720242 - N	GPLX76777	0.9551					
304720243 - N	GPLX76777	0.9551					

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 Allen Steam, NC**

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	304720244	304720244 - N	3047.259	3047.271			
2	304720245	304720245 - N	3047.259	3047.271			
3	304720246	304720246 - N	3047.268	3047.256			
4	304720247	304720247 - N	3047.268	3047.256			
5	304720248	304720248 - N	3047.268	3047.256			
6	304720249	304720249 - N	3047.268	3047.256			
7	304720250	304720250 - N	3047.268	3047.256			
8	304720251	304720251 - N	3047.268	3047.256			
9	304720252	304720252 - N	3047.268	3047.256			
10	304720253	304720253 - N	3047.264	3047.267			
11	304720254	304720254 - N	3047.264	3047.267			
12	304720255	304720255 - N	3047.264	3047.267			
13	304720256	304720256 - N	3047.264	3047.267			
14	304720257	304720257 - N	3047.264	3047.267			
15	304720258	304720258 - N	3047.264	3047.267			
16	304720259	304720259 - N	3047.264	3047.267			
17	304720260	304720260 - N	3047.274	3047.262	1.81	3.62	
18	304720261	304720261 - N	3047.274	3047.262			
19	304720262	304720262 - N	3047.274	3047.262			
20	304720263	304720263 - N	3047.274	3047.262			
21	304720264	304720264 - N	3047.274	3047.262			
22	304720265	304720265 - N	3047.274	3047.262			
23	304720266	304720266 - N	3047.274	3047.262			
24	304720267	304720267 - N	3047.261	3047.273			
25	304720268	304720268 - N	3047.261	3047.273			
26	304720269	304720269 - N	3047.261	3047.273			
27	304720270	304720270 - N	3047.261	3047.273			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between textured liners after 100 hours.

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 Allen Steam, NC**

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)
304720244 - N	GPLX76777	0.9551					
304720245 - N	GPLX76777	0.9551					
304720246 - N	GPLX76777	0.9551					
304720247 - N	GPLX76777	0.9551					
304720248 - N	GPLX76777	0.9551					
304720249 - N	GPLX76777	0.9551					
304720250 - N	GPLX76777	0.9551					
304720251 - N	GPLX76777	0.9551					
304720252 - N	GPLX76777	0.9551					
304720253 - N	GPLX76777	0.9551					
304720254 - N	GPLX76777	0.9551					
304720255 - N	GPLX76777	0.9551					
304720256 - N	GPLX76777	0.9551					
304720257 - N	GPLX76777	0.9551					
304720258 - N	GPLX76777	0.9551					
304720259 - N	GPLX76777	0.9551					
304720260 - N	GPLX76777	0.9553	0.443	365	2.52	122	
304720261 - N	GPLX76777	0.9553					
304720262 - N	GPLX76777	0.9553					
304720263 - N	GPLX76777	0.9553					
304720264 - N	GPLX76777	0.9553					
304720265 - N	GPLX76777	0.9553					
304720266 - N	GPLX76777	0.9553					
304720267 - N	GPLX76777	0.9553					
304720268 - N	GPLX76777	0.9553					
304720269 - N	GPLX76777	0.9553					
304720270 - N	GPLX76777	0.9553					

APPROVED 5 QA

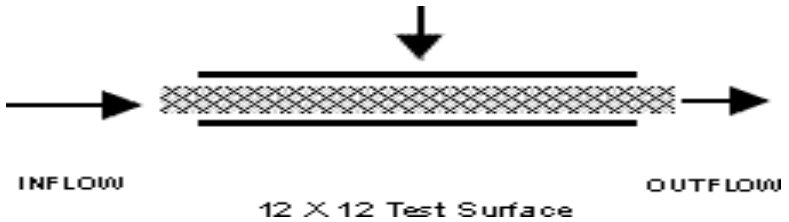
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 Fax: 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	Plastic Fusion Fabricators, Inc.	**Job #**	3047
Project:	Duke Energy Allen Steam, NC		
Product:	TN350-2-8		

Test Configuration:



Test Information:

Boundary Conditions:	Textured Liner Geocomposite Textured 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
304720001	7200	0.03	3.59×10^{-3}
304720220			3.62×10^{-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 : Plastic Fusion Fabricators, Inc.
Project Name : Duke Energy Allen Steam, NC
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*
Matrix Polymers	Chevron, TX	HDPE	CEFX54562	Density	ASTM D 1505	gm/cc	0.950	0.950
				Melt Flow Index	ASTM D 1238[(a)]	gm/10 min	0.05	0.10
			GPLX76777	Density	ASTM D 1505	gm/cc	0.951	0.950
				Melt Flow Index	ASTM D 1238[(a)]	gm/10 min	0.21	0.24

(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 Allen Steam, 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.	XMD TENSILE lbs.	PUNCTURE lbs.	AOS us sieve	PERM-ABL cm/sec
304720001	3047.206	8.22	227	237	137	80	0.43
	3047.225	8.26	229	233	139	80	0.43
304720040	3047.226	8.26	229	233	139	80	0.43
	3047.204	8.47	232	241	137	80	0.43
304720080	3047.217	8.30	225	230	132	80	0.43
	3047.205	8.22	227	237	137	80	0.43
304720120	3047.252	8.58	235	240	134	80	0.42
	3047.229	8.26	229	233	139	80	0.43
304720160	3047.231	8.52	231	242	130	80	0.43
	3047.247	8.33	226	231	136	80	0.43
304720200	3047.241	8.45	233	245	136	80	0.43
	3047.278	8.16	225	230	131	80	0.42
304720240	3047.259	8.14	229	234	134	80	0.42
	3047.271	8.54	230	238	131	80	0.42

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

LDS Geocomposite Drainage Layer Conformance Test Results

December 30, 2008

Mail To:	**Bill To:**
Mr. Cedric Ruhl **S & ME** 9751 Southern Pine Boulevard Charlotte, NC 28273	**<= Same**

email: cruhl@smeinc.com
cc email: kdaly@smeinc.com
cc email: kbaucom@smeinc.com

Dear Mr. Ruhl:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	**Allen Steam Station RAB Ash Landfill**
TRI Job Reference Number:	E2324-18-07
Material(s) Tested:	7 SKAPS TN350-2-8 Double Sided Geocomposite(s)
Test(s) Requested:	Transmissivity (ASTM D 4716) - GC Peel Strength (D7005) - GC Thickness (ASTM D 5199) - GN Density (ASTM D 1505) - GN

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Dr. Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

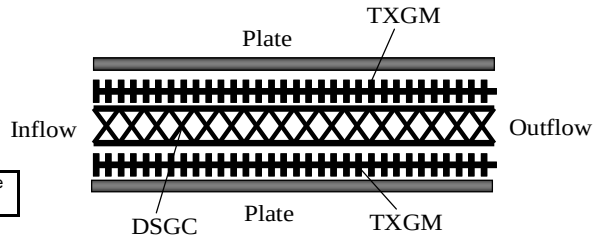
cc: Sam R. Allen, Vice President and Division Manager

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN350-2-8 Double Sided Geocomposite
Sample Identification: 304720003
TRI Log #: E2324-18-07

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / 60 mil HDPE MSGM/ Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		611	616	608									
Time (s)		10.00	10.04	9.96									
100 Flow Rate (GPM/ft width)		0.97	0.97	0.97							0.97	0.00	
100 Transmissivity (m^2/s)		6.68E-03	6.71E-03	6.68E-03							6.69E-03	1.81E-05	3.44E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	5.7	2.5	1.9	5.6	4.5						4.0	1.8	1.0 min
A - MD Average Peel Strength (g/in)	2588	1135	863	2542	2043						1834	798	
B - MD Average Peel Strength (ppi)	3.9	1.6	1.2	4.2	3.4						2.9	1.4	1.0 min
B - MD Average Peel Strength (g/in)	1771	726	545	1907	1544						1298	622	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	387	392	373	403	376	380	360	391	353	394	381	16	270 min
											353	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.946	0.947	0.946								0.946	0.001	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

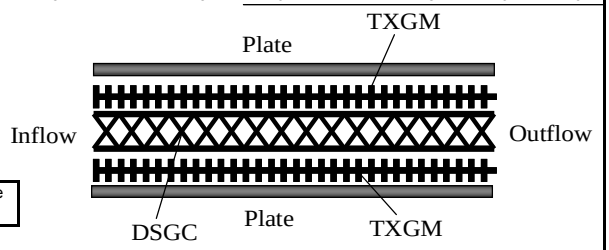
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN350-2-8 Double Sided Geocomposite
Sample Identification: 304720053
TRI Log #: E2324-18-07

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / 60 mil HDPE MSGM/ Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		615	614	613									
Time (s)		10.06	10.06	10.04									
100 Flow Rate (GPM/ft width)		0.97	0.97	0.97							0.97	0.00	
100 Transmissivity (m^2/s)		6.69E-03	6.67E-03	6.68E-03							6.68E-03	5.71E-06	3.44E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	8.1	4.9	6.0	5.1	5.1						5.8	1.3	1.0 min
A - MD Average Peel Strength (g/in)	3677	2225	2724	2315	2315						2651	605	
B - MD Average Peel Strength (ppi)	6.3	3.5	3.3	4.6	2.8						4.1	1.4	1.0 min
B - MD Average Peel Strength (g/in)	2860	1589	1498	2088	1271						1861	633	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	377	382	373	364	372	382	369	380	380	371	375	6	270 min
											364	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.946	0.946	0.946								0.946	0.000	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

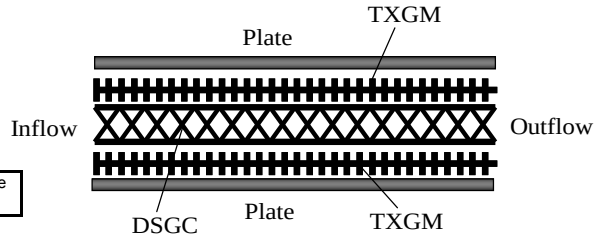
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN350-2-8 Double Sided Geocomposite
Sample Identification: 304720095
TRI Log #: E2324-18-07

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / 60 mil HDPE MSGM/ Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		541	541	544									
Time (s)		8.04	8.00	8.06									
100 Flow Rate (GPM/ft width)		1.07	1.07	1.07							1.07	0.00	
100 Transmissivity (m^2/s)		7.36E-03	7.40E-03	7.38E-03							7.38E-03	1.85E-05	3.44E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	4.6	6.6	4.3	2.2	7.5						5.0	2.1	1.0 min
A - MD Average Peel Strength (g/in)	2088	2996	1952	999	3405						2288	944	
B - MD Average Peel Strength (ppi)	3.0	3.6	1.9	1.1	1.0						2.1	1.2	1.0 min
B - MD Average Peel Strength (g/in)	1362	1634	863	499	454						962	523	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				Geonet Component									
Thickness (mils)	392	383	379	375	376	365	367	370	377	375	376	8	270 min
											365	<< min	
Density (ASTM D 1505)				Geonet Component									
Density (g/cm3)	0.945	0.945	0.945								0.945	0.000	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

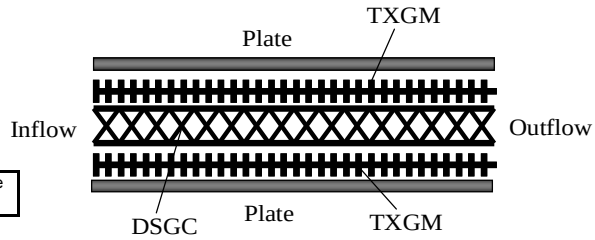
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN350-2-8 Double Sided Geocomposite
Sample Identification: 304720148
TRI Log #: E2324-18-07

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / 60 mil HDPE MSGM/ Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		688	680	678									
Time (s)		10.09	10.00	9.96									
100 Flow Rate (GPM/ft width)		1.08	1.08	1.08							1.08	0.00	
100 Transmissivity (m^2/s)		7.46E-03	7.44E-03	7.44E-03							7.45E-03	1.03E-05	3.44E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	8.0	4.0	6.5	3.7	3.4						5.1	2.0	1.0 min
A - MD Average Peel Strength (g/in)	3632	1816	2951	1680	1544						2324	920	
B - MD Average Peel Strength (ppi)	4.0	2.6	4.6	3.8	2.1						3.4	1.0	1.0 min
B - MD Average Peel Strength (g/in)	1816	1180	2088	1725	953						1553	470	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	355	360	370	398	377	400	371	387	358	362	374	16	270 min
											355	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.946	0.947	0.947								0.947	0.001	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

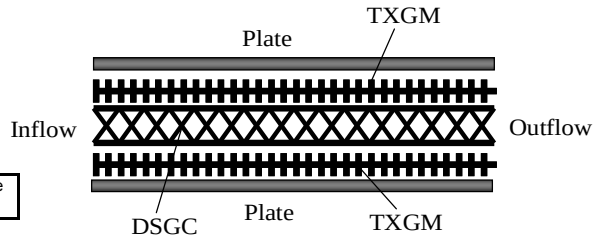
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN350-2-8 Double Sided Geocomposite
Sample Identification: 304720182
TRI Log #: E2324-18-07

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / 60 mil HDPE MSGM/ Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		516	516	512									
Time (s)		8.01	8.03	7.96									
100 Flow Rate (GPM/ft width)		1.02	1.02	1.02							1.02	0.00	
100 Transmissivity (m^2/s)		7.04E-03	7.03E-03	7.03E-03							7.04E-03	8.84E-06	3.44E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	5.1	6.8	4.0	6.2	5.6						5.5	1.1	1.0 min
A - MD Average Peel Strength (g/in)	2315	3087	1816	2815	2542						2515	486	
B - MD Average Peel Strength (ppi)	3.0	2.4	2.0	3.0	2.4						2.6	0.4	1.0 min
B - MD Average Peel Strength (g/in)	1362	1090	908	1362	1090						1162	197	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	378	366	379	378	382	378	384	377	403	393	382	10	270 min
											366	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.946	0.946	0.946								0.946	0.000	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

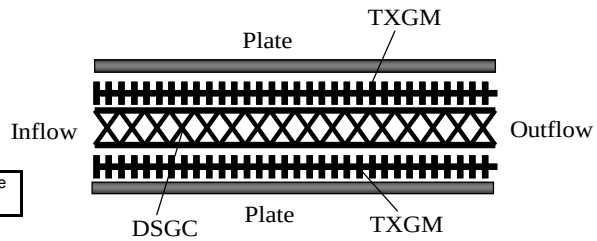
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN350-2-8 Double Sided Geocomposite
Sample Identification: 304720228
TRI Log #: E2324-18-07

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / 60 mil HDPE MSGM/ Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		601	598	595									
Time (s)		10.04	10.00	9.96									
100 Flow Rate (GPM/ft width)		0.95	0.95	0.95							0.95	0.00	
100 Transmissivity (m^2/s)		6.55E-03	6.54E-03	6.53E-03							6.54E-03	6.65E-06	3.44E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	9.6	7.9	3.7	3.8	5.3						6.1	2.6	1.0 min
A - MD Average Peel Strength (g/in)	4358	3587	1680	1725	2406						2751	1183	
B - MD Average Peel Strength (ppi)	3.0	5.0	2.6	4.0	2.8						3.5	1.0	1.0 min
B - MD Average Peel Strength (g/in)	1362	2270	1180	1816	1271						1580	457	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	361	361	357	357	378	354	382	352	358	382	364	12	270 min
											352	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.946	0.946	0.947								0.946	0.001	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

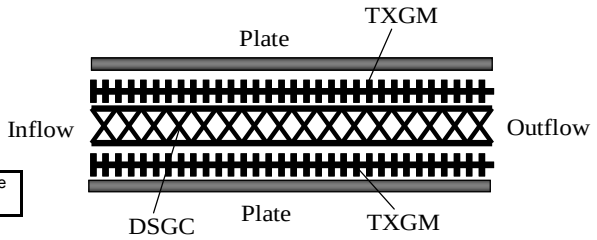
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN350-2-8 Double Sided Geocomposite
Sample Identification: 304720245
TRI Log #: E2324-18-07

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / 60 mil HDPE MSGM/ Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		648	645	640									
Time (s)		10.09	10.06	10.00									
100 Flow Rate (GPM/ft width)		1.02	1.02	1.01							1.02	0.00	
100 Transmissivity (m^2/s)		7.02E-03	7.01E-03	7.00E-03							7.01E-03	1.21E-05	3.44E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	2.8	4.7	7.3	5.1	3.0						4.6	1.8	1.0 min
A - MD Average Peel Strength (g/in)	1271	2134	3314	2315	1362						2079	829	
B - MD Average Peel Strength (ppi)	1.6	3.3	4.5	3.9	2.4						3.1	1.2	1.0 min
B - MD Average Peel Strength (g/in)	726	1498	2043	1771	1090						1426	526	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	355	374	387	366	372	365	374	395	360	377	373	12	270 min
											355	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.944	0.945	0.945								0.945	0.001	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

LCS Geocomposite Drainage Layer MQC Test Results

SKAPS Industries

Engineered Synthetic Products, Inc.

December 26, 2008
Plastic Fusion Fabricators, Inc.
3455 Stanwood Blvd
Huntsville, AL 35811

Ref. : Duke Energy Allen Steam, NC
Customer P.O. # P12079
Transnet 300-2-8

We certify that the Transnet 300-2-8 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[3]				
Mass per Unit Area	ASTM D 5261	lbs/ft^2	0.194	Minimum
Thickness	ASTM D 5199	mil	270	Minimum
Carbon Black	ASTM D 4218	%	2 - 3	Range
Tensile Strength	ASTM D 5035	lbs/in	75	Minimum
Melt Flow	ASTM D 1238[2]	g/10 min	1.0	Maximum
Density	ASTM D 1505	g/cm^3	0.94	Minimum
Composite				
Ply Adhesion	GRI GC7	lb/in	1.0	MARV[5]
Transmissivity[1]	ASTM D 4716	m^2/sec	1.0×10^{-3}	MARV
Geotextile[3 & 4]				
Fabric Weight	ASTM D 5261	oz/yd^2	8.0	MARV
Grab Strength	ASTM D 4632	lbs	200	MARV
Puncture Resistance	ASTM D 4833	lbs	80	MARV
Permeability	ASTM D 4491	cm/sec	5.0×10^{-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 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

2 Condition 190/2.16

3 Geotextile and Geonet properties are prior to lamination.

4 Geotextile data is provided by the supplier.

5 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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304710001	304710001 - N	3047.09	3047.24	1.24	2.63	1.26×10^{-3}
2	304710002	304710002 - N	3047.09	3047.24			
3	304710003	304710003 - N	3047.09	3047.24			
4	304710004	304710004 - N	3047.09	3047.24			
5	304710005	304710005 - N	3047.09	3047.24			
6	304710006	304710006 - N	3047.09	3047.24			
7	304710007	304710007 - N	3047.21	3047.03			
8	304710008	304710008 - N	3047.21	3047.03			
9	304710009	304710009 - N	3047.21	3047.03			
10	304710010	304710010 - N	3047.21	3047.03	1.49	3.03	
11	304710011	304710011 - N	3047.21	3047.03			
12	304710012	304710012 - N	3047.21	3047.03			
13	304710013	304710013 - N	3047.05	3047.18			
14	304710014	304710014 - N	3047.05	3047.18			
15	304710015	304710015 - N	3047.05	3047.18			
16	304710016	304710016 - N	3047.05	3047.18			
17	304710017	304710017 - N	3047.05	3047.18			
18	304710018	304710018 - N	3047.05	3047.18			
19	304710019	304710019 - N	3047.17	3047.10			
20	304710020	304710020 - N	3047.17	3047.10	1.27	2.69	
21	304710021	304710021 - N	3047.17	3047.10			
22	304710022	304710022 - N	3047.17	3047.10			
23	304710023	304710023 - N	3047.17	3047.10			
24	304710024	304710024 - N	3047.17	3047.10			
25	304710025	304710025 - N	3047.11	3047.22			
26	304710026	304710026 - N	3047.11	3047.22			
27	304710027	304710027 - N	3047.11	3047.22			

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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)
304710001 - N	UTCX54535	0.9544	0.326	302	2.27	102	
304710002 - N	UTCX54535	0.9544					
304710003 - N	UTCX54535	0.9544					
304710004 - N	UTCX54535	0.9544					
304710005 - N	UTCX54535	0.9544					
304710006 - N	UTCX54535	0.9544					
304710007 - N	UTCX54535	0.9544					
304710008 - N	UTCX54535	0.9544					
304710009 - N	UTCX54535	0.9544					
304710010 - N	UTCX54535	0.9544					
304710011 - N	UTCX54535	0.9544					
304710012 - N	UTCX54535	0.9544					
304710013 - N	UTCX54535	0.9544					
304710014 - N	UTCX54535	0.9544					
304710015 - N	UTCX54535	0.9551	0.334	310	2.66	107	
304710016 - N	UTCX54535	0.9551					
304710017 - N	UTCX54535	0.9551					
304710018 - N	UTCX54535	0.9551					
304710019 - N	UTCX54535	0.9551					
304710020 - N	UTCX54535	0.9551					
304710021 - N	UTCX54535	0.9551					
304710022 - N	UTCX54535	0.9551					
304710023 - N	UTCX54535	0.9551					
304710024 - N	UTCX54535	0.9551					
304710025 - N	UTCX54535	0.9551					
304710026 - N	UTCX54535	0.9551					
304710027 - N	UTCX54535	0.9551					

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304710028	304710028 - N	3047.11	3047.22			
2	304710029	304710029 - N	3047.11	3047.22			
3	304710030	304710030 - N	3047.11	3047.22	1.45	3.00	
4	304710031	304710031 - N	3047.25	3047.06			
5	304710032	304710032 - N	3047.25	3047.06			
6	304710033	304710033 - N	3047.25	3047.06			
7	304710034	304710034 - N	3047.25	3047.06			
8	304710035	304710035 - N	3047.25	3047.06			
9	304710036	304710036 - N	3047.25	3047.06			
10	304710037	304710037 - N	3047.02	3047.16			
11	304710038	304710038 - N	3047.02	3047.16			
12	304710039	304710039 - N	3047.02	3047.16			
13	304710040	304710040 - N	3047.02	3047.16	1.31	2.72	
14	304710041	304710041 - N	3047.02	3047.16			
15	304710042	304710042 - N	3047.02	3047.16			
16	304710043	304710043 - N	3047.19	3047.12			
17	304710044	304710044 - N	3047.19	3047.12			
18	304710045	304710045 - N	3047.19	3047.12			
19	304710046	304710046 - N	3047.19	3047.12			
20	304710047	304710047 - N	3047.19	3047.12			
21	304710048	304710048 - N	3047.19	3047.12			
22	304710049	304710049 - N	3047.13	3047.26			
23	304710050	304710050 - N	3047.13	3047.26	1.42	2.97	
24	304710051	304710051 - N	3047.13	3047.26			
25	304710052	304710052 - N	3047.13	3047.26			
26	304710053	304710053 - N	3047.13	3047.26			
27	304710054	304710054 - N	3047.13	3047.26			

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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)
304710028 - N	UTCX54535	0.9551					
304710029 - N	UTCX54535	0.9551					
304710030 - N	UTCX54535	0.9546	0.324	304	2.32	104	
304710031 - N	UTCX54535	0.9546					
304710032 - N	UTCX54535	0.9546					
304710033 - N	UTCX54535	0.9546					
304710034 - N	UTCX54535	0.9546					
304710035 - N	UTCX54535	0.9546					
304710036 - N	UTCX54535	0.9546					
304710037 - N	UTCX54535	0.9546					
304710038 - N	UTCX54535	0.9546					
304710039 - N	UTCX54535	0.9546					
304710040 - N	UTCX54535	0.9546					
304710041 - N	UTCX54535	0.9546					
304710042 - N	UTCX54535	0.9546					
304710043 - N	UTCX54535	0.9546					
304710044 - N	UTCX54535	0.9546					
304710045 - N	UTCX54535	0.9548	0.332	308	2.61	106	
304710046 - N	UTCX54535	0.9548					
304710047 - N	UTCX54535	0.9548					
304710048 - N	UTCX54535	0.9548					
304710049 - N	UTCX54535	0.9548					
304710050 - N	UTCX54535	0.9548					
304710051 - N	UTCX54535	0.9548					
304710052 - N	UTCX54535	0.9548					
304710053 - N	UTCX54535	0.9548					
304710054 - N	UTCX54535	0.9548					

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304710055	304710055 - N	3047.15	3047.01			
2	304710056	304710056 - N	3047.15	3047.01			
3	304710057	304710057 - N	3047.15	3047.01			
4	304710058	304710058 - N	3047.15	3047.01			
5	304710059	304710059 - N	3047.15	3047.01			
6	304710060	304710060 - N	3047.15	3047.01	1.34	2.75	
7	304710061	304710061 - N	3047.07	3047.20			
8	304710062	304710062 - N	3047.07	3047.20			
9	304710063	304710063 - N	3047.07	3047.20			
10	304710064	304710064 - N	3047.07	3047.20			
11	304710065	304710065 - N	3047.07	3047.20			
12	304710066	304710066 - N	3047.07	3047.20			
13	304710067	304710067 - N	3047.27	3047.08			
14	304710068	304710068 - N	3047.27	3047.08			
15	304710069	304710069 - N	3047.27	3047.08			
16	304710070	304710070 - N	3047.27	3047.08	1.39	2.94	
17	304710071	304710071 - N	3047.27	3047.08			
18	304710072	304710072 - N	3047.27	3047.08			
19	304710073	304710073 - N	3047.04	3047.46			
20	304710074	304710074 - N	3047.04	3047.46			
21	304710075	304710075 - N	3047.04	3047.46			
22	304710076	304710076 - N	3047.04	3047.46			
23	304710077	304710077 - N	3047.04	3047.46			
24	304710078	304710078 - N	3047.04	3047.46			
25	304710079	304710079 - N	3047.42	3047.14			
26	304710080	304710080 - N	3047.42	3047.14	1.37	2.79	
27	304710081	304710081 - N	3047.42	3047.14			

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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)
304710055 - N	UTCX54535	0.9548					
304710056 - N	UTCX54535	0.9548					
304710057 - N	UTCX54535	0.9548					
304710058 - N	UTCX54535	0.9548					
304710059 - N	UTCX54535	0.9548					
304710060 - N	UTCX54535	0.9543	0.321	301	2.36	101	
304710061 - N	UTCX54535	0.9543					
304710062 - N	UTCX54535	0.9543					
304710063 - N	UTCX54535	0.9543					
304710064 - N	UTCX54535	0.9543					
304710065 - N	UTCX54535	0.9543					
304710066 - N	UTCX54535	0.9543					
304710067 - N	UTCX54535	0.9543					
304710068 - N	UTCX54535	0.9543					
304710069 - N	UTCX54535	0.9543					
304710070 - N	UTCX54535	0.9543					
304710071 - N	UTCX54535	0.9543					
304710072 - N	UTCX54535	0.9543					
304710073 - N	UTCX54535	0.9543					
304710074 - N	UTCX54535	0.9543					
304710075 - N	UTCX54535	0.9552	0.329	306	2.54	105	
304710076 - N	UTCX54535	0.9552					
304710077 - N	UTCX54535	0.9552					
304710078 - N	UTCX54535	0.9552					
304710079 - N	UTCX54535	0.9552					
304710080 - N	UTCX54535	0.9552					
304710081 - N	UTCX54535	0.9552					

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304710082	304710082 - N	3047.42	3047.14			
2	304710083	304710083 - N	3047.42	3047.14			
3	304710084	304710084 - N	3047.42	3047.14			
4	304710085	304710085 - N	3047.23	3047.43			
5	304710086	304710086 - N	3047.23	3047.43			
6	304710087	304710087 - N	3047.23	3047.43			
7	304710088	304710088 - N	3047.23	3047.43			
8	304710089	304710089 - N	3047.23	3047.43			
9	304710090	304710090 - N	3047.23	3047.43	1.51	3.06	
10	304710091	304710091 - N	3047.49	3047.36			
11	304710092	304710092 - N	3047.49	3047.36			
12	304710093	304710093 - N	3047.49	3047.36			
13	304710094	304710094 - N	3047.49	3047.36			
14	304710095	304710095 - N	3047.49	3047.36			
15	304710096	304710096 - N	3047.49	3047.36			
16	304710097	304710097 - N	3047.29	3047.50			
17	304710098	304710098 - N	3047.29	3047.50			
18	304710099	304710099 - N	3047.29	3047.50			
19	304710100	304710100 - N	3047.29	3047.50	1.22	2.84	
20	304710101	304710101 - N	3047.29	3047.50			
21	304710102	304710102 - N	3047.29	3047.50			
22	304710103	304710103 - N	3047.52	3047.31			
23	304710104	304710104 - N	3047.52	3047.31			
24	304710105	304710105 - N	3047.52	3047.31			
25	304710106	304710106 - N	3047.52	3047.31			
26	304710107	304710107 - N	3047.52	3047.31			
27	304710108	304710108 - N	3047.52	3047.31			

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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)
304710082 - N	UTCX54535	0.9552					
304710083 - N	UTCX54535	0.9552					
304710084 - N	UTCX54535	0.9552					
304710085 - N	UTCX54535	0.9552					
304710086 - N	UTCX54535	0.9552					
304710087 - N	UTCX54535	0.9552					
304710088 - N	UTCX54535	0.9552					
304710089 - N	UTCX54535	0.9552					
304710090 - N	UTCX54535	0.9545	0.323	303	2.42	103	
304710091 - N	UTCX54535	0.9545					
304710092 - N	UTCX54535	0.9545					
304710093 - N	UTCX54535	0.9545					
304710094 - N	UTCX54535	0.9545					
304710095 - N	UTCX54535	0.9545					
304710096 - N	UTCX54535	0.9545					
304710097 - N	UTCX54535	0.9545					
304710098 - N	UTCX54535	0.9545					
304710099 - N	UTCX54535	0.9545					
304710100 - N	UTCX54535	0.9545					
304710101 - N	UTCX54535	0.9545					
304710102 - N	UTCX54535	0.9545					
304710103 - N	UTCX54535	0.9545					
304710104 - N	UTCX54535	0.9545					
304710105 - N	UTCX54535	0.9550	0.333	309	2.50	107	
304710106 - N	UTCX54535	0.9550					
304710107 - N	UTCX54535	0.9550					
304710108 - N	UTCX54535	0.9550					

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304710109	304710109 - N	3047.35	3047.54			
2	304710110	304710110 - N	3047.35	3047.54	1.48	3.01	
3	304710111	304710111 - N	3047.35	3047.54			
4	304710112	304710112 - N	3047.35	3047.54			
5	304710113	304710113 - N	3047.35	3047.54			
6	304710114	304710114 - N	3047.35	3047.54			
7	304710115	304710115 - N	3047.45	3047.28			
8	304710116	304710116 - N	3047.45	3047.28			
9	304710117	304710117 - N	3047.45	3047.28			
10	304710118	304710118 - N	3047.45	3047.28			
11	304710119	304710119 - N	3047.45	3047.28			
12	304710120	304710120 - N	3047.45	3047.28	1.26	2.87	
13	304710121	304710121 - N	3047.30	3047.47			
14	304710122	304710122 - N	3047.30	3047.47			
15	304710123	304710123 - N	3047.30	3047.47			
16	304710124	304710124 - N	3047.30	3047.47			
17	304710125	304710125 - N	3047.30	3047.47			
18	304710126	304710126 - N	3047.30	3047.47			
19	304710127	304710127 - N	3047.51	3047.39			
20	304710128	304710128 - N	3047.51	3047.39			
21	304710129	304710129 - N	3047.51	3047.39			
22	304710130	304710130 - N	3047.51	3047.39	1.41	2.96	
23	304710131	304710131 - N	3047.51	3047.39			
24	304710132	304710132 - N	3047.51	3047.39			
25	304710133	304710133 - N	3047.32	3047.53			
26	304710134	304710134 - N	3047.32	3047.53			
27	304710135	304710135 - N	3047.32	3047.53			

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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)
304710109 - N	UTCX54535	0.9550					
304710110 - N	UTCX54535	0.9550					
304710111 - N	UTCX54535	0.9550					
304710112 - N	UTCX54535	0.9550					
304710113 - N	UTCX54535	0.9550					
304710114 - N	UTCX54535	0.9550					
304710115 - N	UTCX54535	0.9550					
304710116 - N	UTCX54535	0.9550					
304710117 - N	UTCX54535	0.9550					
304710118 - N	UTCX54535	0.9550					
304710119 - N	UTCX54535	0.9550					
304710120 - N	UTCX54535	0.9542	0.320	300	2.47	102	
304710121 - N	UTCX54535	0.9542					
304710122 - N	UTCX54535	0.9542					
304710123 - N	UTCX54535	0.9542					
304710124 - N	UTCX54535	0.9542					
304710125 - N	UTCX54535	0.9542					
304710126 - N	UTCX54535	0.9542					
304710127 - N	UTCX54535	0.9542					
304710128 - N	UTCX54535	0.9542					
304710129 - N	UTCX54535	0.9542					
304710130 - N	UTCX54535	0.9542					
304710131 - N	UTCX54535	0.9542					
304710132 - N	UTCX54535	0.9542					
304710133 - N	UTCX54535	0.9542					
304710134 - N	UTCX54535	0.9542					
304710135 - N	UTCX54535	0.9549	0.328	307	2.68	106	

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304710136	304710136 - N	3047.32	3047.53			
2	304710137	304710137 - N	3047.32	3047.53			
3	304710138	304710138 - N	3047.32	3047.53			
4	304710139	304710139 - N	3047.44	3047.34			
5	304710140	304710140 - N	3047.44	3047.34	1.29	2.62	
6	304710141	304710141 - N	3047.44	3047.34			
7	304710142	304710142 - N	3047.44	3047.34			
8	304710143	304710143 - N	3047.44	3047.34			
9	304710144	304710144 - N	3047.44	3047.34			
10	304710145	304710145 - N	3047.37	3047.41			
11	304710146	304710146 - N	3047.37	3047.41			
12	304710147	304710147 - N	3047.37	3047.41			
13	304710148	304710148 - N	3047.37	3047.41			
14	304710149	304710149 - N	3047.37	3047.41			
15	304710150	304710150 - N	3047.37	3047.41	1.38	2.91	
16	304710151	304710151 - N	3047.48	3047.38			
17	304710152	304710152 - N	3047.48	3047.38			
18	304710153	304710153 - N	3047.48	3047.38			
19	304710154	304710154 - N	3047.48	3047.38			
20	304710155	304710155 - N	3047.48	3047.38			
21	304710156	304710156 - N	3047.48	3047.38			
22	304710157	304710157 - N	3047.40	3047.66			
23	304710158	304710158 - N	3047.40	3047.66			
24	304710159	304710159 - N	3047.40	3047.66			
25	304710160	304710160 - N	3047.40	3047.66	1.33	2.66	
26	304710161	304710161 - N	3047.40	3047.66			
27	304710162	304710162 - N	3047.40	3047.66			

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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)
304710136 - N	UTCX54535	0.9549					
304710137 - N	UTCX54535	0.9549					
304710138 - N	UTCX54535	0.9549					
304710139 - N	UTCX54535	0.9549					
304710140 - N	UTCX54535	0.9549					
304710141 - N	UTCX54535	0.9549					
304710142 - N	UTCX54535	0.9549					
304710143 - N	UTCX54535	0.9549					
304710144 - N	UTCX54535	0.9549					
304710145 - N	UTCX54535	0.9549					
304710146 - N	UTCX54535	0.9549					
304710147 - N	UTCX54535	0.9549					
304710148 - N	UTCX54535	0.9549					
304710149 - N	UTCX54535	0.9549					
304710150 - N	UTCX54535	0.9547	0.325	305	2.25	104	
304710151 - N	UTCX54535	0.9547					
304710152 - N	UTCX54535	0.9547					
304710153 - N	UTCX54535	0.9547					
304710154 - N	UTCX54535	0.9547					
304710155 - N	UTCX54535	0.9547					
304710156 - N	UTCX54535	0.9547					
304710157 - N	UTCX54535	0.9547					
304710158 - N	UTCX54535	0.9547					
304710159 - N	UTCX54535	0.9547					
304710160 - N	UTCX54535	0.9547					
304710161 - N	UTCX54535	0.9547					
304710162 - N	UTCX54535	0.9547					

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304710163	304710163 - N	3047.65	3047.57			
2	304710164	304710164 - N	3047.65	3047.57			
3	304710165	304710165 - N	3047.65	3047.57			
4	304710166	304710166 - N	3047.65	3047.57			
5	304710167	304710167 - N	3047.65	3047.57			
6	304710168	304710168 - N	3047.65	3047.57			
7	304710169	304710169 - N	3047.33	3047.68			
8	304710170	304710170 - N	3047.33	3047.68	1.36	2.85	
9	304710171	304710171 - N	3047.33	3047.68			
10	304710172	304710172 - N	3047.33	3047.68			
11	304710173	304710173 - N	3047.33	3047.68			
12	304710174	304710174 - N	3047.33	3047.68			
13	304710175	304710175 - N	3047.63	3047.55			
14	304710176	304710176 - N	3047.63	3047.55			
15	304710177	304710177 - N	3047.63	3047.55			
16	304710178	304710178 - N	3047.63	3047.55			
17	304710179	304710179 - N	3047.63	3047.55			
18	304710180	304710180 - N	3047.63	3047.55	1.21	2.73	
19	304710181	304710181 - N	3047.58	3047.61			
20	304710182	304710182 - N	3047.58	3047.61			
21	304710183	304710183 - N	3047.58	3047.61			
22	304710184	304710184 - N	3047.58	3047.61			
23	304710185	304710185 - N	3047.58	3047.61			
24	304710186	304710186 - N	3047.58	3047.61			
25	304710187	304710187 - N	3047.67	3047.59			
26	304710188	304710188 - N	3047.67	3047.59			
27	304710189	304710189 - N	3047.67	3047.59			

* Transmissivity measured using water at 21 $\pm$ 2 ^{o}C (70 $\pm$ 4 ^{o}F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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)
304710163 - N	UTCX54535	0.9547					
304710164 - N	UTCX54535	0.9547					
304710165 - N	GPLX76646	0.9553	0.331	310	2.56	107	
304710166 - N	GPLX76646	0.9553					
304710167 - N	GPLX76646	0.9553					
304710168 - N	GPLX76646	0.9553					
304710169 - N	GPLX76646	0.9553					
304710170 - N	GPLX76646	0.9553					
304710171 - N	GPLX76646	0.9553					
304710172 - N	GPLX76646	0.9553					
304710173 - N	GPLX76646	0.9553					
304710174 - N	GPLX76646	0.9553					
304710175 - N	GPLX76646	0.9553					
304710176 - N	GPLX76646	0.9553					
304710177 - N	GPLX76646	0.9553					
304710178 - N	GPLX76646	0.9553					
304710179 - N	GPLX76646	0.9553					
304710180 - N	GPLX76646	0.9556	0.322	302	2.33	101	
304710181 - N	GPLX76646	0.9556					
304710182 - N	GPLX76646	0.9556					
304710183 - N	GPLX76646	0.9556					
304710184 - N	GPLX76646	0.9556					
304710185 - N	GPLX76646	0.9556					
304710186 - N	GPLX76646	0.9556					
304710187 - N	GPLX76646	0.9556					
304710188 - N	GPLX76646	0.9556					
304710189 - N	GPLX76646	0.9556					

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304710190	304710190 - N	3047.67	3047.59	1.47	2.82	1.38×10^{-3}
2	304710191	304710191 - N	3047.67	3047.59			
3	304710192	304710192 - N	3047.67	3047.59			
4	304710193	304710193 - N	3047.60	3047.62			
5	304710194	304710194 - N	3047.60	3047.62			
6	304710195	304710195 - N	3047.60	3047.62			
7	304710196	304710196 - N	3047.60	3047.62			
8	304710197	304710197 - N	3047.60	3047.62			
9	304710198	304710198 - N	3047.60	3047.62			
10	304710199	304710199 - N	3047.64	3047.56			
11	304710200	304710200 - N	3047.64	3047.56	1.25	2.78	
12	304710201	304710201 - N	3047.64	3047.56			
13	304710202	304710202 - N	3047.64	3047.56			
14	304710203	304710203 - N	3047.64	3047.56			
15	304710204	304710204 - N	3047.64	3047.56			
16	304710205	304710205 - N	3047.73	3047.70			
17	304710206	304710206 - N	3047.73	3047.70			
18	304710207	304710207 - N	3047.73	3047.70			
19	304710208	304710208 - N	3047.73	3047.70			
20	304710209	304710209 - N	3047.73	3047.70			
21	304710210	304710210 - N	3047.73	3047.70	1.42	2.93	1.28×10^{-3}
22	304710211	304710211 - N	3047.69	3047.76			
23	304710212	304710212 - N	3047.69	3047.76			
24	304710213	304710213 - N	3047.69	3047.76			
25	304710214	304710214 - N	3047.69	3047.76			
26	304710215	304710215 - N	3047.69	3047.76			
27	304710216	304710216 - N	3047.69	3047.76			

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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)
304710190 - N	GPLX76646	0.9556					
304710191 - N	GPLX76646	0.9556					
304710192 - N	GPLX76646	0.9556					
304710193 - N	GPLX76646	0.9556					
304710194 - N	GPLX76646	0.9556					
304710195 - N	GPLX76646	0.9551	0.327	306	2.64	105	
304710196 - N	GPLX76646	0.9551					
304710197 - N	GPLX76646	0.9551					
304710198 - N	GPLX76646	0.9551					
304710199 - N	GPLX76646	0.9551					
304710200 - N	GPLX76646	0.9551					
304710201 - N	GPLX76646	0.9551					
304710202 - N	GPLX76646	0.9551					
304710203 - N	GPLX76646	0.9551					
304710204 - N	GPLX76646	0.9551					
304710205 - N	GPLX76646	0.9551					
304710206 - N	GPLX76646	0.9551					
304710207 - N	GPLX76646	0.9551					
304710208 - N	GPLX76646	0.9551					
304710209 - N	GPLX76646	0.9551					
304710210 - N	GPLX76646	0.9555	0.335	301	2.41	102	
304710211 - N	GPLX76646	0.9555					
304710212 - N	GPLX76646	0.9555					
304710213 - N	GPLX76646	0.9555					
304710214 - N	GPLX76646	0.9555					
304710215 - N	GPLX76646	0.9555					
304710216 - N	GPLX76646	0.9555					

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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	304710217	304710217 - N	3047.75	3047.72			
2	304710218	304710218 - N	3047.75	3047.72			
3	304710219	304710219 - N	3047.75	3047.72			
4	304710220	304710220 - N	3047.75	3047.72	1.23	2.71	
5	304710221	304710221 - N	3047.75	3047.72			
6	304710222	304710222 - N	3047.75	3047.72			
7	304710223	304710223 - N	3047.71	3047.78			
8	304710224	304710224 - N	3047.71	3047.78			
9	304710225	304710225 - N	3047.71	3047.78			
10	304710226	304710226 - N	3047.71	3047.78			
11	304710227	304710227 - N	3047.71	3047.78			
12	304710228	304710228 - N	3047.71	3047.78			
13	304710229	304710229 - N	3047.77	3047.74			
14	304710230	304710230 - N	3047.77	3047.74	1.50	2.99	
15	304710231	304710231 - N	3047.77	3047.74			

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.03 and a confining pressure of 7200 psf between ottawa sand & liner after 100 hours.

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 : **TN300-2-8**
Project : **Duke Energy Allen Steam, NC**

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)
304710217 - N	GPLX76646	0.9555					
304710218 - N	GPLX76646	0.9555					
304710219 - N	GPLX76646	0.9555					
304710220 - N	GPLX76646	0.9555					
304710221 - N	GPLX76646	0.9555					
304710222 - N	GPLX76646	0.9555					
304710223 - N	GPLX76646	0.9555					
304710224 - N	GPLX76646	0.9555					
304710225 - N	GPLX76646	0.9552	0.330	309	2.59	106	
304710226 - N	GPLX76646	0.9552					
304710227 - N	GPLX76646	0.9552					
304710228 - N	GPLX76646	0.9552					
304710229 - N	GPLX76646	0.9552					
304710230 - N	GPLX76646	0.9552					
304710231 - N	GPLX76646	0.9552					

APPROVED 5 QA

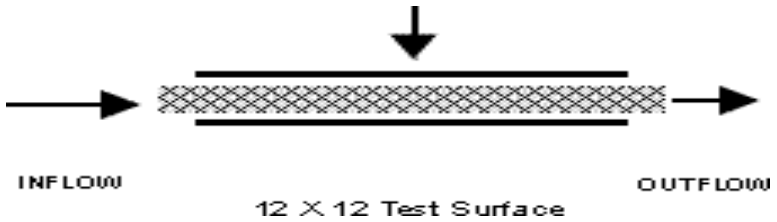
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 Fax: 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	Plastic Fusion Fabricators, Inc.	**Job #**	3047
Project:	Duke Energy Allen Steam, NC		
Product:	TN300-2-8		

Test Configuration:



Test Information:

Boundary Conditions:	Ottawa Sand Geocomposite Liner	**Normal Load:** **Gradient:** **Seating Time:** **Flow Direction:**	7200 psf 0.03 ft 100 hours MD

Test Results:

Roll No.	Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec
			100 hours
304710001	7200	0.03	1.26×10^{-3}
304710190			1.38×10^{-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 : Plastic Fusion Fabricators, Inc.
Project Name : Duke Energy Allen Steam, NC
Geocomposite Manufacturer : SKAPS Industries
Geocomposite Production Plant : Commerce, GA
Geocomposite Brand Name : TN300-2-8

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*
Matrix Polymers	Formosa, TX	HDPE	UTCX54535	Density	ASTM D 1505	gm/cc	0.951	0.950
				Melt Flow Index	ASTM D 1238[(a)]	gm/10 min	0.12	0.14
			GPLX76646	Density	ASTM D 1505	gm/cc	0.953	0.951
				Melt Flow Index	ASTM D 1238[(a)]	gm/10 min	0.07	0.10

(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 : TN300-2-8
Project : Duke Energy Allen Steam, 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.	XMD TENSILE lbs.	PUNCTURE lbs.	AOS us sieve	PERM-ABL cm/sec
304710001	3047.09	8.19	230	233	130	80	0.44
	3047.24	8.58	226	236	139	80	0.44
304710035	3047.25	8.31	231	234	139	80	0.44
	3047.06	8.19	230	233	130	80	0.44
304710070	3047.27	8.31	231	234	139	80	0.44
	3047.08	8.19	230	233	130	80	0.44
304710105	3047.52	8.53	235	244	135	80	0.43
	3047.31	8.44	233	241	131	80	0.44
304710140	3047.44	8.50	227	235	137	80	0.44
	3047.34	8.44	233	241	131	80	0.44
304710175	3047.63	8.60	230	238	140	80	0.43
	3047.55	8.24	225	233	135	80	0.43
304710210	3047.73	8.57	228	230	138	80	0.43
	3047.70	8.57	228	230	138	80	0.43

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

LCS Geocomposite Drainage Layer Conformance Test Results

January 7, 2009

Mail To:	**Bill To:**
Mr. Cedric Ruhl **S & ME** 9751 Southern Pine Boulevard Charlotte, NC 28273	**<= Same**

email: cruhl@smeinc.com
cc email: kdaly@smeinc.com
cc email: kbaucom@smeinc.com

Dear Mr. Ruhl:

Thank you for consulting TRI/Environmental, Inc. (TRI) for your geosynthetics testing needs. TRI is pleased to submit this final report for laboratory testing.

Project:	**Allen Steam Station RAB Ash Landfill**
TRI Job Reference Number:	E2324-16-01
Material(s) Tested:	7 SKAPS TN300-2-8 Double Sided Geocomposite(s)
Test(s) Requested:	Transmissivity (ASTM D 4716) - GC Peel Strength (D7005) - GC Thickness (ASTM D 5199) - GN Density (ASTM D 1505) - GN

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

MPatel

Dr. Mansukh Patel
Sr. Laboratory Coordinator
Geosynthetic Services Division
www.GeosyntheticTesting.com

cc: Sam R. Allen, Vice President and Division Manager

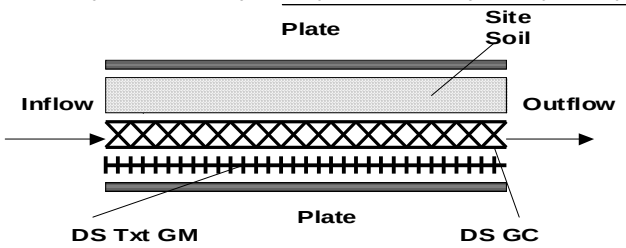
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN300-2-8 Double Sided Geocomposite
Sample Identification: 304710004
TRI Log #: E2324-16-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / Site Soil / Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		561	558	587									
Time (s)		35.09	35.00	36.04									
100 Flow Rate (GPM/ft width)		0.25	0.25	0.26							0.25	0.00	
100 Transmissivity (m^2/s)		1.75E-03	1.74E-03	1.78E-03							1.76E-03	2.05E-05	1.0E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	6.3	8.7	8.1	11.9	11.2						9.2	2.3	1.0 min
A - MD Average Peel Strength (g/in)	2860	3950	3677	5403	5085						4195	1044	
B - MD Average Peel Strength (ppi)	5.0	6.4	3.8	5.2	7.2						5.5	1.3	1.0 min
B - MD Average Peel Strength (g/in)	2270	2906	1725	2361	3269						2506	597	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	313	313	322	337	333	339	325	349	304	300	324	16	270 min
											300	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.949	0.949	0.949								0.949	0.000	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

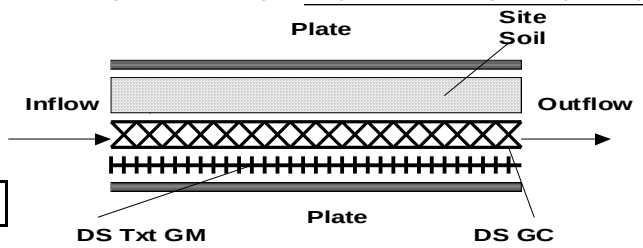
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN300-2-8 Double Sided Geocomposite
Sample Identification: 304710043
TRI Log #: E2324-16-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / Site Soil / Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		682	686	684									
Time (s)		29.95	30.01	30.00									
100 Flow Rate (GPM/ft width)		0.36	0.36	0.36							0.36	0.00	
100 Transmissivity (m^2/s)		2.49E-03	2.50E-03	2.49E-03							2.49E-03	4.89E-06	1.0E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	10.6	4.2	10.5	6.4	4.9						7.3	3.1	1.0 min
A - MD Average Peel Strength (g/in)	4812	1907	4767	2906	2225						3323	1387	
B - MD Average Peel Strength (ppi)	7.0	4.6	5.6	6.5	4.4						5.6	1.1	1.0 min
B - MD Average Peel Strength (g/in)	3178	2088	2542	2951	1998						2551	518	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	319	308	343	331	336	340	322	323	321	329	327	11	270 min
											308	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.949	0.949	0.950								0.949	0.001	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

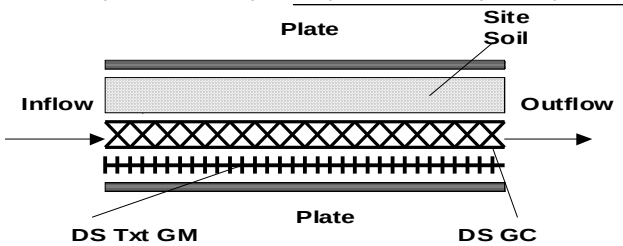
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN300-2-8 Double Sided Geocomposite
Sample Identification: 304710084
TRI Log #: E2324-16-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / Site Soil / Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		629	631	631									
Time (s)		30.09	30.13	30.09									
100 Flow Rate (GPM/ft width)		0.33	0.33	0.33							0.33	0.00	
100 Transmissivity (m^2/s)		2.29E-03	2.29E-03	2.29E-03							2.29E-03	3.65E-06	1.0E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	3.5	6.4	11.3	7.6	5.1						6.8	3.0	1.0 min
A - MD Average Peel Strength (g/in)	1589	2906	5130	3450	2315						3078	1340	
B - MD Average Peel Strength (ppi)	2.5	4.1	5.9	6.0	4.0						4.5	1.5	1.0 min
B - MD Average Peel Strength (g/in)	1135	1861	2679	2724	1816						2043	666	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	332	337	333	341	330	311	311	304	316	339	325	14	270 min
											304	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.950	0.950	0.950								0.950	0.000	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

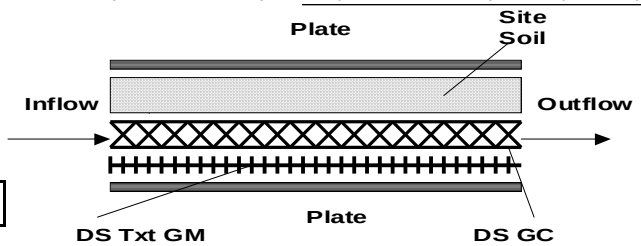
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN300-2-8 Double Sided Geocomposite
Sample Identification: 304710119
TRI Log #: E2324-16-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / Site Soil / Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		799	809	801									
Time (s)		24.07	24.26	24.09									
100 Flow Rate (GPM/ft width)		0.53	0.53	0.53							0.53	0.00	
100 Transmissivity (m^2/s)		3.63E-03	3.65E-03	3.64E-03							3.64E-03	8.43E-06	1.0E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	5.8	6.9	8.4	7.3	7.4						7.2	0.9	1.0 min
A - MD Average Peel Strength (g/in)	2633	3133	3814	3314	3360						3251	427	
B - MD Average Peel Strength (ppi)	4.2	4.0	5.6	4.6	7.0						5.1	1.2	1.0 min
B - MD Average Peel Strength (g/in)	1907	1816	2542	2088	3178						2306	562	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	312	350	334	335	326	334	337	336	336	326	333	10	270 min
											312	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.951	0.951	0.951								0.951	0.000	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

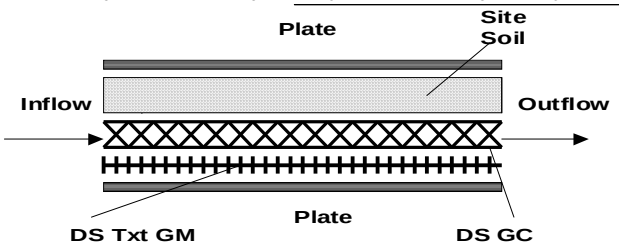
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN300-2-8 Double Sided Geocomposite
Sample Identification: 304710151
TRI Log #: E2324-16-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / Site Soil / Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		675	675	672									
Time (s)		30.10	30.09	30.00									
100 Flow Rate (GPM/ft width)		0.36	0.36	0.36							0.36	0.00	
100 Transmissivity (m^2/s)		2.45E-03	2.45E-03	2.45E-03							2.45E-03	1.87E-06	1.0E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	5.1	7.0	8.0	6.3	3.7						6.0	1.7	1.0 min
A - MD Average Peel Strength (g/in)	2315	3178	3632	2860	1680						2733	759	
B - MD Average Peel Strength (ppi)	3.2	3.7	6.0	3.3	7.5						4.7	1.9	1.0 min
B - MD Average Peel Strength (g/in)	1453	1680	2724	1498	3405						2152	871	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				**Geonet Component**									
Thickness (mils)	329	338	334	333	333	326	301	305	334	340	327	13	270 min
											301	<< min	
Density (ASTM D 1505)				**Geonet Component**									
Density (g/cm3)	0.951	0.951	0.951								0.951	0.000	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

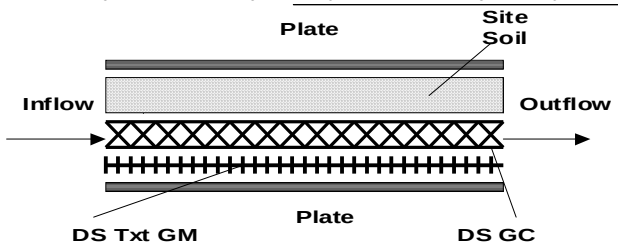
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN300-2-8 Double Sided Geocomposite
Sample Identification: 304710192
TRI Log #: E2324-16-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / Site Soil / Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		701	699	702									
Time (s)		30.06	30.03	30.06									
100 Flow Rate (GPM/ft width)		0.37	0.37	0.37							0.37	0.00	
100 Transmissivity (m^2/s)		2.55E-03	2.55E-03	2.55E-03							2.55E-03	4.20E-06	1.0E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	5.7	8.3	4.0	6.4	6.8						6.2	1.6	1.0 min
A - MD Average Peel Strength (g/in)	2588	3768	1816	2906	3087						2833	714	
B - MD Average Peel Strength (ppi)	3.8	8.3	6.6	2.9	4.7						5.3	2.2	1.0 min
B - MD Average Peel Strength (g/in)	1725	3768	2996	1317	2134						2388	991	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)				Geonet Component									
Thickness (mils)	311	301	313	322	316	318	340	332	343	324	322	13	270 min
											301	<< min	
Density (ASTM D 1505)				Geonet Component									
Density (g/cm3)	0.951	0.951	0.951								0.951	0.000	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

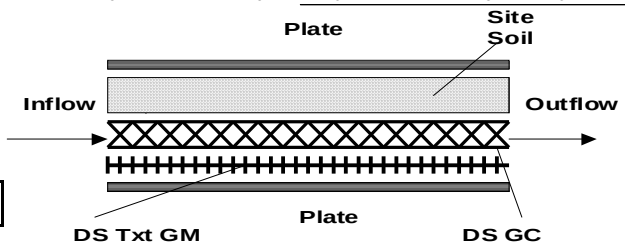
GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

GEOCOMPOSITE TEST RESULTS

TRI Client: S & ME
Project: Allen Steam Station RAB Ash Landfill

Material: SKAPS TN300-2-8 Double Sided Geocomposite
Sample Identification: 304710225
TRI Log #: E2324-16-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Direction Tested: Machine Direction													
Normal Load (psf): 7,200													
Hydraulic Gradient: 0.03													
Test Length (in) 12													
Test Width (in) 12													
Plate / Site Soil / Sample / 60 mil MS HDPE GM / Plate													
Seat Time (hours)	Specimen		1										
Volume (cc)		599	907	598									
Time (s)		30.06	45.51	30.09									
100 Flow Rate (GPM/ft width)		0.32	0.32	0.32							0.32	0.00	
100 Transmissivity (m^2/s)		2.18E-03	2.18E-03	2.17E-03							2.18E-03	3.45E-06	1.0E-03 min
Test Temp (C)			20.0										
Temp. Corr. Factor			1.000										
Peel Strength (D7005)													
A - MD Average Peel Strength (ppi)	7.0	6.5	8.2	6.0	10.0						7.5	1.6	1.0 min
A - MD Average Peel Strength (g/in)	3178	2951	3723	2724	4540						3423	726	
B - MD Average Peel Strength (ppi)	5.7	6.4	6.4	4.1	8.8						6.3	1.7	1.0 min
B - MD Average Peel Strength (g/in)	2588	2906	2906	1861	3995						2851	769	
Note: A and B represent a randomly assigned top and bottom of the sample													
Thickness (ASTM D 5199)					Geonet Component								
Thickness (mils)	312	302	336	314	304	301	312	303	312	321	312	11	270 min
											301	<< min	
Density (ASTM D 1505)					Geonet Component								
Density (g/cm3)	0.949	0.949	0.949								0.949	0.000	0.94 min



MD Machine Direction TD Transverse Direction

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction: of this report, except in full, without prior approval of TRI.

GeosyntheticTesting.com
9063 Bee Caves Road / Austin, TX 78733 / 512 263 2101 / fax: 512 263 2558

APPENDIX III – PROJECT DOCUMENTATION

Construction Photographs

Allen Steam Station RAB Ash Landfill
Cell 1 Liner System Earthworks Construction
Project #: 1356-06-825 Ph. 9

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273

Photo 1

Date: 7-21-08

Photographer: Jim McCutcheon

Location / Orientation	Top of dike facing northwest towards Test Fill study
Remarks	Test Fill study consisted of approximately 20 feet of fill at 3H:1V slopes

Photo 2

Date: 7-30-08

Photographer: Jim McCutcheon

Location / Orientation	Top of structural fill facing southeast towards Cell 1
Remarks	Cell 1 subgrade construction; wet ash comes from ash ponds south of Cell 1

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273

Photo 3

Date: 9-8-08

Photographer: Jim McCutcheon

Location / Orientation	Top of structural fill facing southeast towards Cell 1
Remarks	Cell 1 subgrade construction; fill height increasing

Photo 4

Date: 9-25-08

Photographer: Jim McCutcheon

Location / Orientation	Top of structural fill facing southeast towards Cell 1
Remarks	Ash placement prior to lift construction in northern part of Cell 1; compaction just south of loose lifts

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273

Photo 5

Date: 10-22-08

Photographer: Jim McCutcheon

Location / Orientation	Sediment basin south and extending east of Cell 1 facing west
Remarks	During construction; structural fill placed over retired ash basin

Photo 6

Date: 11-10-08

Photographer: Jim McCutcheon

Location / Orientation	Top of structural fill facing east towards Cell 1
Remarks	Cell 1 subgrade construction; fill height increasing (almost height of test fill)

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273

Photo 7

Date: 1-2-09

Photographer: Jim McCutcheon

Location / Orientation	Top of structural fill facing southeast towards Cell 1
Remarks	Cell 1 subgrade construction; fill height increasing (nearly completed)

Photo 8

Date: 2-16-09

Photographer: Jim McCutcheon

Location / Orientation	Top of structural fill facing east towards Cell 1
Remarks	Western structural fill berm and fine grading of ash subgrade

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273

Photo 9

Date: 2-26-09

Photographer: Kyle Baucom

Location / Orientation	From the south of the retired ash basin facing northwest towards Cell 1
Remarks	Southern structural fill berm and fine grading of ash subgrade in leachate collection/detection corridor

Photo 10

Date: 3-21-09

Photographer: Ken Daly

Location / Orientation	Southeast quadrant of Cell 1 facing southeast
Remarks	Hauling and unloading first lift of compacted soil liner placed upon ash subgrade prior to moisture conditioning and compaction

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273

Photo 11

Date: 3-21-09

Photographer: Ken Daly

Location / Orientation	Southeast quadrant of Cell 1 facing southeast
Remarks	Spreading first lift of compacted soil liner placed upon ash subgrade prior to moisture conditioning and compaction

Photo 12

Date: 3-21-09

Photographer: Ken Daly

Location / Orientation	Northeast quadrant of Cell 1 facing southwest
Remarks	Kneading compaction of soil liner by sheep's foot roller

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273

Photo 13

Date: 3-21-09

Photographer: Ken Daly

Location / Orientation	Northeast quadrant of Cell 1 facing east
Remarks	Moisture conditioning of compacted soil liner by water truck

Photo 14

Date: 3-21-09

Photographer: Ken Daly

Location / Orientation	Northeast quadrant of Cell 1 facing southeast
Remarks	Compaction of soil liner by smooth drum roller following behind sheep's foot roller and conditioning operations

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273

Photo 15

Date: 3-24-09

Photographer: Kyle Baucom

Location / Orientation	East of center corridor facing west
Remarks	Compacted soil liner in place to western slope of center leachate collection/detection corridor with western lateral graded in

Photo 16

Date: 4-8-09

Photographer: Cedric Ruhl

Location / Orientation	Northeast quadrant of Cell 1 facing west
Remarks	Compacted soil liner in place and smooth drum rolled in eastern side of Cell 1 and grading and moisture conditioning of compacted soil liner in western side

Allen Steam Station RAB Ash Landfill
Cell 1 Liner System Earthworks Construction
Project #: 1356-06-825 Ph. 9

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273

Photo 17	
	Date: 4-9-09 **Photographer:** Cedric Ruhl
Location / Orientation	Northeast quadrant of Cell 1 facing southwest
Remarks	Compacted soil liner being smooth drum rolled in eastern side of Cell 1 and grading and moisture conditioning of compacted soil liner in western side

Field Reports

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
7-18-08	1353-06-825-200

Project/Location: ALLEN RAB ASH LANDFILL

Contractor	Weather/Temp
ABC Crowder	Clear 85 T

Present at Site
Jim - S+ME
Dalton - ABC.
Ken/Will - S+ME
Ted - Duke

Time	Mileage
6. ✓	40

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) Erosion Control. TRK Count / Silt Fence / Rain Fall ect.

Observations/Remarks:

At job site Monitor Truck count of loads delivered in 1 hr period 5 Load per TRK 7 TRKs. 1 broke 1/2 way through. JUST Dumping Today Still to wet to start compaction or testing.

Ken Daley + Will on site of S+ME LANDFILL, I checked silt Fence and Noted deficiencies in log book provided Briefed By Ken on what to check Ref. Erosion control. RAINFALL + Location of Gauge.

_____ On-Site Representative/Company

JEM Cuthbertson. S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
7-21-08	135606-825-2010

Project/Location: Allen RAB Ash Landfill

Contractor	Weather/Temp
ABC Duke Power	Clear 98↑

Present at Site: Dalton - ABC; Ted - Duke; Jim - S+ME

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): Monitor Placement

Time	Mileage
9.5	40

Observations/Remarks:

Density tests conducted in NW corner of fill area 1 test pass 2 tests fail
2 moisture test fail optimum moisture 7 to 10% high. let sit and dry for today
conduct moisture check in afternoon still to high. (Elev. 623 approx)
ABC placing fill and letting set and drain and dry out for today

On site Equipment:		Using:
Dozers	3	3
Trackhoe	4	3
Roller	1	1
Trucks.	10	7
W/TRK	1	1

Pull from Pond 1 AM, 7 TRK

(PM) Ash Pulled from both Ponds 1+3 Trucks average 5 loads per hour after lunch, 8 TRKs.

_____ On-Site Representative/Company

J E M Critchon
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

JUL 24 2008

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.
7-22-08	1356-06-825-200

Project/Location: ALLEN RAB ASH LANDFILL

Contractor: ABC/Duke Power

Weather/Temp: Clear 95+ F

Present at Site: TED - Duke Power; Dalton - ABC; Jim - S&ME

Time: 8.0

Mileage: 40

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): Monitor Cleanup / Fill placement

Observations/Remarks:

S&ME on site for Density Testing and fill placement. Trk & Equipment Count, of loads, Truck count with Trucks pulling from Ash Lake #1 & 3 Averaging 5 loads per hour per Truck. AM, 8 Trucks running: 4 in Pond #1 4 in Pond #3. PM 6 trucks running Mostly in Pond #3 Average 7 loads per hour.

Conducted density test on section 1 1st lift (Bridge) Test moisture (±3) within tolerance. Compaction 100%, fill being loaded in and placed on first lift that was placed and compacted to be spread & placed on remainder of area still being cleaned up (Stumped, Trash loop ect).

ONSITE Equipment	USE
DOZER - 3	3
TRK Hoe - 4	4
TRUCKS - 10	8
WaterTRK - 1	1
Roller - 1	1

On-Site Representative/Company

J E McCutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

JUL 24 2008

S&ME Form FRLFO3

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
7-31-08	1356-06-825-200

Project/Location: Allen RAB Ash Land Fill

Contractor: ABC / Duke Power

Weather/Temp: Clear 90↑

Present at Site: Dalton/Kalvin - ABC; Jim - S&ME

Time: 8. ✓

Mileage: ✓40

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): Monitor Fill / Equipment.

Observations/Remarks:

Truck count today 10 on site 7 hauling 4 tak hoe 3 operating 4 dozer open. 1 Roller 1 watertruck, Average per TAK per hour. 7 loads. Hauling from ponds 1 & 3. Mid morning Pond 1 shut down no more hauling from there ash + water was transferred to that area.

Conducted density test on North end. Both tests pass compaction and moisture ABC started dumping load's in this area for next lift.

Showed Kalvin (ABC) where rock check dam needed to go he said his people would get on it soon.

AUG 1 2008

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 8-7-08	Job No.: 1356-06-825-200
Project/Location: Allen-RAB Ash Landfill	
Contractor: Duke Power ABC	Weather/Temp: P/Cloudy 95°
Present at Site: Dalton - ABC; Jim - S+ME	
Time: 10.	Mileage: 40

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): Monitor Fill / Equipment

Observations/Remarks:

On site Monitor fill placement hauling out of Pond #3
Trucks operating 9 average 5 load per hour 2 truck hour loading
During operation 1 truck gave way on haul road over pond and
rolled over on its side into pond. All haul operation stopped
for the rest of day. No more hauling until haul road is safed up
South of overhanging power lines (Monday-Tues)
The rest of the day Dozer pushing of fill that had been place and
prep area for testing.
Surveyors on site to set for stake around entire cell
and offsets and check some grade's where I will know where
we are for grades previously push out material.

_____ On-Site Representative/Company

J E M Eckhoe S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-8-08	1356-06-525-200

Project/Location: Allen - RAB Ash Landfill

Contractor	Weather/Temp
Duke Power/ABC	Clear 85

Present at Site: Dalton - ABC; Jim - S+ME.

Time: 6.

Mileage: 40

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): Monitor Fill

Observations/Remarks:

Survey on site to complete Survey's (2) Dozer pushing out fill. No Trucks Running 3 Track hoe working 1 Roller.
Staked off grid area's to place fill to start back monday?
Checked Erosion control - No rain recorded for week. Fence all repaired and check dam mound and placed correctly - Roller Sealing off everything that has been push out.

_____ On-Site Representative/Company

J E M Cutchin S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-11-08	1356-06-825-200

Project/Location: Allen RAB ASH LANDFILL.

Contractor: ABC / Dura Power

Weather/Temp: Clear

Present at Site: KALUM - ABC; Jim - S&ME

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): Monitor work

Time: 7.

Mileage: 40

Observations/Remarks:

No Hauling still working on haul road for pond 3 to stabilize and get past power lines. Also building road across pond # 2. 4 TRK haul 3 dozers. 1 dozer in fill area cell 1 still pushing out. Conducted 3 density tests North side on cell 1 All tests met density and moisture.

_____ On-Site Representative/Company

Jim Critchlow S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-12-08	1356-06-825-202

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC/Duke Power	PCloudy

Present at Site: Kalvin - ABC; Jim - S&ME

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): Monitor work

Time	Mileage
8	60

Observations/Remarks:

Work on haul Road Pond 3 & Pond 2 - Blade down fill area to get to correct grade still high. Some area's drying out adding water to keep dust down. No hauling as of yet.
4 grd hoes working 4 dozers working. Brief Ken Daley, S&ME PM.

_____ On-Site Representative/Company

Jim Cochran
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-13-08	1356-06-825-200

Project/Location: Allen LAB Ash Landfill

Contractor	Weather/Temp
ABC/Duke Power	Cloudy Rain

Present at Site: Tony - ABC; Jim - S&ME

Time	Mileage
4.	40

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:

Working on haul Road Pond 3. Weather going to stop around 10. ✓ Rain overnight into AM. still Raining - decided to stop for day. Check silt fence. erosion control. 3 tenths of inch Rain. No wash out noted.

On-Site Representative/Company

J E M Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-14-08	1356-06-825-2020

Project/Location: Allen RAB Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: PCloudy.

Present at Site: KALVIN - ABC; JIM - SAME

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): Monitor fill.

Time: 8.5 ✓

Mileage: 40

Observations/Remarks:

Seven truck average. 6 dozed per hour hauling from Bond 3 into Cell 1 4 TRK Hoe, 3 dozers. 1 water Tank 1 Roller. working. Not pushing anything out at present. Checking moisture of material still high on South left area (1A) NW corner, Dumping in different location.

_____ On-Site Representative/Company

_____ S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-15-08	1356-06-825-200

Project/Location: Allen RAB ADH Landfill

Contractor: ABC/ Duke Power

Weather/Temp: P Cloudy

Present at Site: Kalvin - ABC; Jim - S&ME.

Time: 8.0

Mileage: 40

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): Monitor fill TRKS.

Observations/Remarks:

(9) Nine trucks hauling aver. 5 loads per hour. Still working on haul road over pond 3 getting away from power lines, 4 TRK hoe working 3 dozers. Water TRK Roller. Cell 1 Hauling to 3 sections to spread out fill. Having to water due to drying. Conducted 4 density tests all pass compaction and moisture. On lift 1 flooring in. Still need to start hauling to South end East side for lift 1 Erosion control no problems with silt fence. 3 tenths of Rain for week. Recorded. No other problems noted.

_____ On-Site Representative/Company

J E M Cutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-16-08	1356-06-825

Project/Location: Allied RAB ASH Landfill.

Contractor	Weather/Temp
ABC Duke Power	Cloudy.

Present at Site: DANNY ABC, Jim. S&ME.

Time	Mileage
8. ✓	40

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): Monitor fill

Observations/Remarks:

Monitor placement of fill from Pond #3 to Cell #1. 6 trucks hauling today. 4 TRK hoes working, 3 dozer. 1 Roller. 1 water TRK. Only hauling today. Start to spread in 1 section Cell 1 to prep for density. No Rain Recorded.

_____ On-Site Representative/Company

J E M Cutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-18-08	1356-06-825-202

Project/Location: Allen RAB Ash Landfill

Contractor: ABC / Duke Power

Weather/Temp: P/Cloudy 85°F

Present at Site: Ted - Duke Power; Dalton - ABC; Jim - S&ME

Time: 8.5 ✓

Mileage: 40

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): Monitor fill/work.

Observations/Remarks:

On site today 8 trucks hauling approx 6 load each per hour 1 Track hoe working on Pond #3, 3 dozers on cell / pushing out fill 1 dozer on Pond #3, Talked with Ted Manus this AM (Duke Power PM) about what is going on as far as work et. Erosion Control, silt fence drain out let no problems - in place Rain over weekend 8-16-8-17. .3" tenths of in no erosion problems -

No problems noted in Pond #3 at present getting haul road ready in Pond # 2 to start hauling from later.

Density test not conducted today moisture high on material being pushed out mostly for 2nd lift.

J E M Cutchen

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-19-08	1356-08-825-0202

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Clear 90°

Present at Site: Dalton - ABC; Jim - S&ME.

Time: 8.

Mileage: 40

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) Load Count Monitor Placement

Observations/Remarks:

S&ME on site for density testing when needed, Load Counts & Equipment count. Monitor Fill.

8 Truck hauling ash from Pond #3 placing in 3 different sections of Cell #1, Some previously placed fill being pushed out to prep for compaction & density test. Checked moisture still high 34.35%

4 Truck now working at present 3 dozer 1 water truck 1 Roller.

Still working on haul road for pond #2. And Having to haul Red dirt into Pond 3 on East side to help stabilize haul road on that end.

J E M Cutchen

On-Site Representative/Company — **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-20-08	1356-06-825-200

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC/Duke Power	Clear

Present at Site: Dalton - ABC; Jim - S&ME

Time	Mileage
11.	40

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) TRK count; Monitor fill as loads

Observations/Remarks:

Hauling from Pond #3 till road started cracking. Switch over to pond #2. Some ~~trucks~~ trucks moved to hauling dirt to stabilize haul road on pond #3 west end. Conducted 4 Density test in fill area of Cell #1 all within specification compaction and moisture. fill being pushed out and compacted. 8 trk on hand today to haul 3 dozer 4 trk haul. 1 roller 1 water truck

_____
On-Site Representative/Company

JEM Eutchison
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-21-08	1356-06-825-200

Project/Location: Allen Ash Landfill.

Contractor: ABC/Duke Power

Weather/Temp: Clear.

Present at Site: Dalton - ABC; Jim - S&ME

Time: 6.

Mileage: 40

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): Monitor fill/TRR Count etc.

Observations/Remarks:

Conduct load count & truck. 7 load per hour 4 TRR hour 3 dozer 1 water TRR 1 Roller. hauling Pond 2+3 start today on 2 Compacting area's previously pushed out. Conducted 4 density test in area's needed to clean next lift.

_____ On-Site Representative/Company

JM Crutchfield S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-22-08	1356-06-825

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC/Duke Power	P/Cloudy.

Present at Site: Dalton - ABC; Jim - S+ME

Time: 8.

Mileage: 40

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): Monitor Placement / TRK Counter

Observations/Remarks:

Today 10 trucks hauling from Ponds 3 + 2, 5 each pond average 5 load per hr, each Truck 4 TRK Hour 3 Dozer 1 water TRK 1 Roller working on fill area. Dozer pushing out previously placed piles of Ash. and cutting down to 18" lift + letting Dry out before testing. conducted 2 Density tests which pass compaction and moisture.

_____ On-Site Representative/Company

J E M Carter S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-23-08	1356-06-825-200

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: P/Cloudy

Present at Site: Dalton - ABC; Jim - S+ME; Ted - Duke Power

Time: 5.

Mileage: 40

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): Monitor Placement / Load Count est.

Observations/Remarks:

Conduct load count of truck. only 4 hauling today. 2. Eller + 2 ABC TRCKS, ABC Working on Haul road for pond #3 to stabilize Hauling from pond #2. average 6 load per hr. placing fill in Cell #1 Dozer pushing out load previously placed. to help dry out for testing Check erosion Control. Silt fence est. No rain.

On-Site Representative/Company

J E M Eutchison
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-25-08	1356-06-825-200

Project/Location: ALLEN ASH LANDFILL

Contractor: ABC/ Duke Power

Weather/Temp: Cloudy Pr33te

Present at Site: DAVION ABC, Ted Duke Power, Jim - S+ME.

Time: 10.

Mileage: 40

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): Monitor Fill / Load count.

Observations/Remarks:

ABC hauling from Ponds 2+3, 8 trucks + dozer working 4 Trash haul. 1 Roller 1 water truck. .01" rain this morn. Rain Dryer off + on. ABC Pushing out all piles of fill for Sunny + quantify. as much as possible. Only hauling into one area. No density test done to amount of moisture. Erosion control fine no problem. Dash Truck approx. 6 load per hr.

_____ On-Site Representative/Company

J E McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-26-08	1356-06-825-200

Project/Location: Allen Ash Landfill.

Contractor: ABC/Duke Power

Weather/Temp: RAIN

Present at Site: DAYTON - ABC; Jim - S+ME.

Time: 20

Mileage: 40

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 Visit Erosion Control

Observations/Remarks:

On site Raining hard. 1" of Rain over night ABC Getting Pumps operational to pump all day. All work washout for today. A lot of erosion starting

_____ On-Site Representative/Company

JEMcAuliffe S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreen client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The i presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
8-27-08	1356-06-825-200

Project/Location: Allen Ash Landfill

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 visit / Erosion Control est.

Contractor	Weather/Temp
ABC / Duke Power	Cloudy.

Present at Site: Daffan - ABC; Jim - S&ME

Time	Mileage
2.1	40

Observations/Remarks:

On site after Rain Storm overnight. TOTAL Rain since 8-25-08 PM. 7.7 of Rain. Guage had over flowed. ABC cleaning up Roadway and trying to Stabilize haul Road over Pond 2. and Repair haul road on Pond 3. from wash outs.

Wash outs all over in fill area to include silt fence and Rock check dam on SE corner. Completely washed out. ABC to repair silt fence and check dam as soon as they can get into area. Took photo's of everything and had down loaded.

Briefed Ted Maner of Duke Power who will go and look for himself.

On-Site Representative/Company

J E M Etchison
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 8-29-08	Job No.: 1356-06-825-200
Project/Location: Allen Ash Landfill	
Contractor: ABC/Duke Power	Weather/Temp: Cloudy
Present at Site: Dalton - ABC; Jim - S&ME	
Time: 4.	Mileage: 40

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): Erosion Control / Misc.

Observations/Remarks:

AM. S&ME on site to check Erosion Control and Site work. Dalton Not on site at present to confirm work to be done PM, Met with Dalton (ABC consp) went over problem's from Erosion Control and what needed to be done & when Repairs to be made He stated he would work on them over the weekend and get pad area straightened out for Fill.

On-Site Representative/Company

J. M. Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-2-08	1356-06-825-200

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: P/Cloudy - 85°F

Present at Site: Dalton - ABC; Jim - S&ME.

Time: 6.

Mileage: 40

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): Erosion Control / Monitor Fill

Observations/Remarks:

ABC hauling from Ponds 2+3 6 trucks avg 6 loads per hour at time. Clean up in fill area slopes wash out at during worked on. Silt fence at Rock check dam cleaned out some need to replace section of silt fence fill area very wet still in some places.

On-Site Representative/Company

J E M Cutchin
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 9-3-08	Job No.: 1356-06-825-200
Project/Location: Allen Ash Landfill	
Contractor: ABC/Duke Power	Weather/Temp: Clear
Present at Site: Dalton ABC, Jim S&ME	
Time: 6.	Mileage: 40

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): Monitor Cleanup/Fill placement

Observations/Remarks:

Trucks hauling Ponds 2+3 placing fill around perimeter of Cell 1 to attempt to hold water and keep slopes from washing Average 6 loads per truck 9 trucks hauling. Conducted Moisture checks - still wet 37% moisture

On-Site Representative/Company

Jim Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 9-4-08	Job No.: 1356-06-825-200
Project/Location: Allen - Ash Landfill	
Contractor: ABC / Duke Power	Weather/Temp: Clear 85 F
Present at Site: Dalton ABC, Jim - S&ME	
Time: 9. ✓	Mileage: 40

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:

Fill placement in Cell 1 from Ponds 2+3 10 trucks hauling - 1 Truck hauling Soil for work on capped area on West side of Road to fill washouts. 9 Trucks on Cell 1 6 loads per hour per truck - 3 dozers working 4 Trackhoes. Conduct density tests on fill moisture 35% to 37% 4% out of optimum. Compaction 100%.

ABC cleaning up silt fence and making check ponds to slow water off Rain occurs - Shoring up slopes.

On-Site Representative/Company

J E M Crutchfield
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-5-08	1356-06-825-200

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Cloudy

Present at Site: Dalton - ABC; Jim - S&ME

Time: 6.

Mileage: 40

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): Monitor fill / Erosion control

Observations/Remarks:

On site to monitor fill placement and Erosion Control repairs. ABC pulling Ash from ponds 2 + 3. Have 11 Trucks today. average 5 loads per hr. per TRK. 3 TRK haul. 3 dozers. Repairs completed on silt fence (temp). Contractor dug in trench to slow water flow around fill area. All fill placed on top of slopes around perimeter to help hold out washouts. Across from Cell 1 Repairs made in large washouts on pipes and roadway washout.

Ash Samples brought in to lab for oven moisture.

J E M Clarkson

On-Site Representative/Company _____

S&ME Personnel _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-8-08	1356-06-825-200

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Clear

Present at Site: Dalton - ABC; Jim - S&ME

Time: 9.✓

Mileage: 40

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): Monitor Fill

Observations/Remarks:

S&ME on site to Monitor Fill placement operation And Density testing Also Erosion Control.
At present 11 trucks running hauling from Ponds 2+3 Not pushing out at present. testing for Density today 8 density test some of which Moisture Content was a little higher than ±+3% but density was within requirements of 95%. Moisture Samples taken in to lab for over lab Controlled tests. See drawing for plotted location in and elevations

J E M Cutchin

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
September 8, 2008	1336-08-8257 100

Project/Location: Allen Steam Station

Contractor:

Weather/Temp:

Present at Site:

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): Drug Testing

Time: 1:12

Mileage:

Observations/Remarks:

For drug screening as required by client.

J. Jackson

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 9-9-08	Job No.: 1356-06-825-200
Project/Location: Allen Ash Landfill	
Contractor: ABC / Duke Power	Weather/Temp: Cloudy -
Present at Site: DALTON ABC, Jim - S&ME	
Time: 7.5	Mileage: 40

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): Fill Placement Erosion Control etc

Observations/Remarks:

ABC hauling from Ponds 2+3 12 trucks running 4 TRKhoes 3 dozers Roller w/TRK. placing fill around perimeter and pushing out to maxify drying. Also Keeping berm on top of slopes to attempt to minimize washouts. Material very wet at present. Measured truck beds average 16'x7'x4' Two larger at 18'x7'x4 and 2 smaller 14' length.
Erosion Control in working order at present.

On-Site Representative/Company

J E M Cutchen SEP 11 2008
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-10-08	1356-06-825-200

Project/Location: Allen Ash Landfill

Contractor: ABC / Duke Power

Weather/Temp: Cloudy ~~Rain~~

Present at Site: Dalton - ABC; Jim SME

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): Monitor Fill / Erosion Control.

Time: 8.5 ✓

Mileage: 140

Observations/Remarks:

On site haul from Pond 2-3. pond 2 Down due to Road build up. part of day 11 Trucks hauling Ash. Pushing out most of placed material on Stone area. Moisture very high. puddling wet spots. No density tests today.

_____ On-Site Representative/Company

_____ S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-11-08	1356-06-825-200

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Rainy -

Present at Site: Dalton - ABC; Jim - S&ME

Time: 4. ✓

Mileage: 40

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 visit Erosion Control.

Observations/Remarks:

3/4" Rain overnight some present drizzle
Contractor cleaning up. Work on Haul Road.
pulling up from ponds. 2+3. Erosion Control
Silt fence in good shape. No problem.
pump out Sediment pond.

_____ On-Site Representative/Company

J E McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-12-08	1356-06-825-200

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC / Duke Power	Cloudy.

Present at Site: Dalton, ABC; Jim - S&ME

Time	Mileage
3.5	40

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:

Only pumping out. 2 tenths of Rain from 9-11-08 Am To present. Pond #2 down at present till haul Road Repaired due to failure. Erosion Control in good shape - walked. silt fence.

On-Site Representative/Company

J E M Eubanks
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-15-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC / Duke Power

Weather/Temp: Cloudy · 85

Present at Site: DALTON - ABC; JIM - S&ME

Time: 6.5 ✓

Mileage: 40 ✓

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): Monitor Placement.

Observations/Remarks:

Hauling out of Ponds 2+3 11 Trucks at present 3 dozers attempting to push out material placed previously in Cell #1 to next grade lift in each area. One density test in NE corner of Cell 1 No problems noted within Requirements

On-Site Representative/Company

J E M Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-16-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Rain Cloudy 70

Present at Site: Dalton - ABC; Jim - S&ME

Time: 3.5

Mileage: 40

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): Monitorfill.

Observations/Remarks:

S&ME on site for fill placement - light Rain early am. 9 trucks hauling ponds 2 + 3 untill Rain got more intense and Contractor cut off trucks. 3 dozers pushing out previously placed fill to required lift.

Jim Eubanks

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-18-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC / Duke Power

Weather/Temp: Clear.

Present at Site: Dalton - ABC; Jim - S&ME

Time: 7.

Mileage: 40

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): Monitor Fill

Observations/Remarks:

AM. Today 12 truck hauling ash from ponds 2+3, ABC still pushing out fill placed before the Rain to get to grade. Planning fill in NW+SW sections of fill area with trucks -

PM. Still pushing fill and compacting - Density tests conducted. Talk with Cedric S+ME 1356 who informed me of the 1.8% Variation in moisture from field to lab. Comparison Moisture Sample comparison taken for lab moisture.

J E M Cuthbertson

On-Site Representative/Company _____ **S&ME Personnel** _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRIF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
9-19-08	13506825-09

Project/Location: Allen Ash Landfill.

Contractor: ABC/Duke Power

Weather/Temp: P/Cloudy.

Present at Site: Dalton - ABC; Jim - S&ME

Time: 5.5

Mileage: 40

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): Erosion Control.

Observations/Remarks:

Monitor fill placement with 12 trucks hauling from Pond 2+3; 3 dozer pushing out fill and cutting down to grade for drying and compaction.
Density tests conducted compaction with in specification of 95% +. Moisture a little high but within verisance of 1.8%

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-20-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Clear

Present at Site: Donney—ABC; Jim - Same

Time: 7.

Mileage: 40

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): Monitor Fill.

Observations/Remarks:

Contractor hauling today 6 trucks pond 2B - still cutting down material from early in week and drying some area's very wet, Get everything pushed out and Rolled in for weekend

On-Site Representative/Company

Jim Crutchfield
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-22-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/ Duke Power

Weather/Temp: Clear

Present at Site: Dalton – ABC; Jim – S&ME

Time: 5

Mileage: 40

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): Monitor Fill.

Observations/Remarks:

S&ME up on site to monitor fill placement trucks and Erosion control. No density testing today due to wet material being pushed out. 12 trucks hauling from Ponds 2+3. fill placement in 2 areas or Cell #1 Contracted Surveyor on site (Mead) to Survey fill for Volume. No problems w/ erosion control

On-Site Representative/Company

Jim Cirkhron
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 9-22-08	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill	
Contractor: ABC / Duke Power	Weather/Temp: Clear -
Present at Site: Dalton - ABC; Jim - S&ME	
Time: 10. ✓	Mileage: 40 ✓

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): Fill Placement.

Observations/Remarks:

S&ME on site to monitor fill placement density tests Erosion control touch coat. Today 12 trucks hauling from Ponds 2 & 3 Pond #2 2 cuts hauling from each. average. 6-7 load per Truck per hr. Pushing out fill to dry conduct density tests as needed. Alot of wet material out present coming out of Ponds need more time to dry out. Had to participate in 100% Site Drug Testing after lunch. which took till 4:30 pm to get everyone tested. Not much production for p.m.

Survey completed quantity survey today.

On-Site Representative/Company

J E McCrohon
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-24-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Cloudy Windy 7[illegible]

Present at Site: Dalton - ABC; Jim - S+ME

Time: 9

Mileage: 40

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 on site for Density test. Monitor fill placement. est. fill that had been pushed out was compacted and density test conducted. Samples of each test taken to lab for lab moisture tests. 13 trucks running Ponds 2+3, 2 cuts in Pond 2 to haul from until longreach Truck Broke Material hauled very wet. Pushing out everything to help dry faster since its so windy 20-30 mph. at times. 6 density tests today. Brief Ken Daley PM. 1356 S+ME.

On-Site Representative/Company

J E McCutchen

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 9-25-08	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill	
Contractor: ABC/Duke Power	Weather/Temp: Cloudy windy 60's
Present at Site: Dalton - ABC, Jim - S&ME	
Time: 8.	Mileage: 40

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): Monitor placement ops

Observations/Remarks:

S&ME on site for Ash placement operations hauling from ponds 2+3. Trucks hauling today. Pushing out fills and compacting area's to prep for testing. Windy today help's dry area's faster. At present elev's not positive as to fill elevation until survey has been turned over then clean at grades at proper elevations. All material today is wet to test.

_____ On-Site Representative/Company

J E McCutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-26-08	1356-06-825-09

Project/Location: Allen Ashlandfill

Contractor: ABC Construction

Weather/Temp: RAIN

Present at Site: DAlton

Time: 2.

Mileage: 40

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:

Rain All work washed out for today 8AM 9/10"
ABC to Scrape Muck off road only

On-Site Representative/Company

J E McArthur
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
9-29-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: P/Cloudy

Present at Site: Dalton - ABC; Jim - S&ME

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): Monitor fill. Erosion Control.

Time: 8:5 ✓

Mileage: 40 ✓

Observations/Remarks:

S&ME on site for density tests of placed fill once moisture is down to reasonable %. Rain over weekend 1.3" of Rain Erosion Control in good shape for Cell #1 no washouts. temp sediment holds holding up flow of water. Conducted 4 density tests of fill that had been pushed out and compacted.

Jim Kirkham

On-Site Representative/Company _____

S&ME Personnel _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 9-30-08	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill	
Contractor: ABC/Dickerson	Weather/Temp: Cloudy
Present at Site: Kalvin - ABC; Jim - S&ME	
Time: 9 ✓	Mileage: 40 ✓

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): Erosion Control; Money To Fill

Observations/Remarks:

S&ME on site for fill placement + density testing. Today No density test's due to high amount of moisture in material being pushed out. Placed on Monday Once dried to be compacted and tested. Brief Review Daily S&ME 1356 on daily operations at present. Lawrence Surveyors checked Sediment plotted in test fill. Earnhardt Grading bring in equipment Also shipping across Road. North W corner of site post gate Cutting wood out for Borrow site.

J E M Dickson

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-1-08	1356-06-825-09

Project/Location: Allen Ash Landfill.

Contractor: ABC / Duke Power

Weather/Temp: Clear

Present at Site: Dalton - ABC; Jim - S&ME

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): Monitor Fill

Time: 9.5

Mileage: 40

Observations/Remarks:

S&ME on site to conduct density tests Monitor fill placement - cut Wet fill placement in Cell 1 Pond Hauling pond 2+3 placement being pushed out after couple hrs set time to assist in drying Conducted 2 density tests - which were very wet and did not pass Need to dry some more - Contractor will start placing in another area today after area dries -

J. M. Chilton

On-Site Representative/Company _____

S&ME Personnel _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-2-08	1358-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Clear

Present at Site: Dalton – ABC; Jim – S&ME

Time: 6.5

Mileage: 40

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): Monitor fill. Erosion control

Observations/Remarks:

S&ME on site for fill placement and density testing. Moisture checks on material periodically at present still too high. Hauling w/ 10 trucks ponds 2 & 3 #2 split 2 dozer on Cell #1 pushing out. Brought in sample for Proctor

_____ On-Site Representative/Company

J E M Cuthron S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-3-08	1356-06-825-09

Project/Location: Allen Ash Landfill.

Contractor: ABC/Duke Power

Weather/Temp: Clear

Present at Site: Dalton ABC, Jim - S&ME

Time: 8.

Mileage: 40

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): Monitor fill.

Observations/Remarks:

S&ME on site for fielddensity tests Monitor fill. Erosion Control. ABC hauling from Pond 2 only. Haul Road on 3 callapsed on East end. Hauling with 9 trucks. Fill placement being pushed out for testing Moisture still to high for density tests to pass. Attempting to dry. Brought in sample for proctor. Will continue to push out & dry for weekend.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-6-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC / Duke Power

Weather/Temp: Cloudy Partly

Present at Site: DALTON - ABC; Jim - S&ME

Time: 6.

Mileage: 40

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 on site for FDT And Monitor fill placement Today contractor hauling from Ponds 2+3 #2 Split 11 truck hauling into Cell #1. Pushing out all fill placed to attempt to speed up drying Check moisture which was still 37 to 45% but coming down pretty fast due to Sun + wind..
Left early due to illness.

_____ On-Site Representative/Company

JEM Cutchin S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-7-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Cloudy

Present at Site: Dalton - ABC; Jim - S&ME; Carl Rodgers, Kyle Beaucom } S&ME

Time: 9.5

Mileage: 40

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): Erosion Control / Fill Placement.

Observations/Remarks:

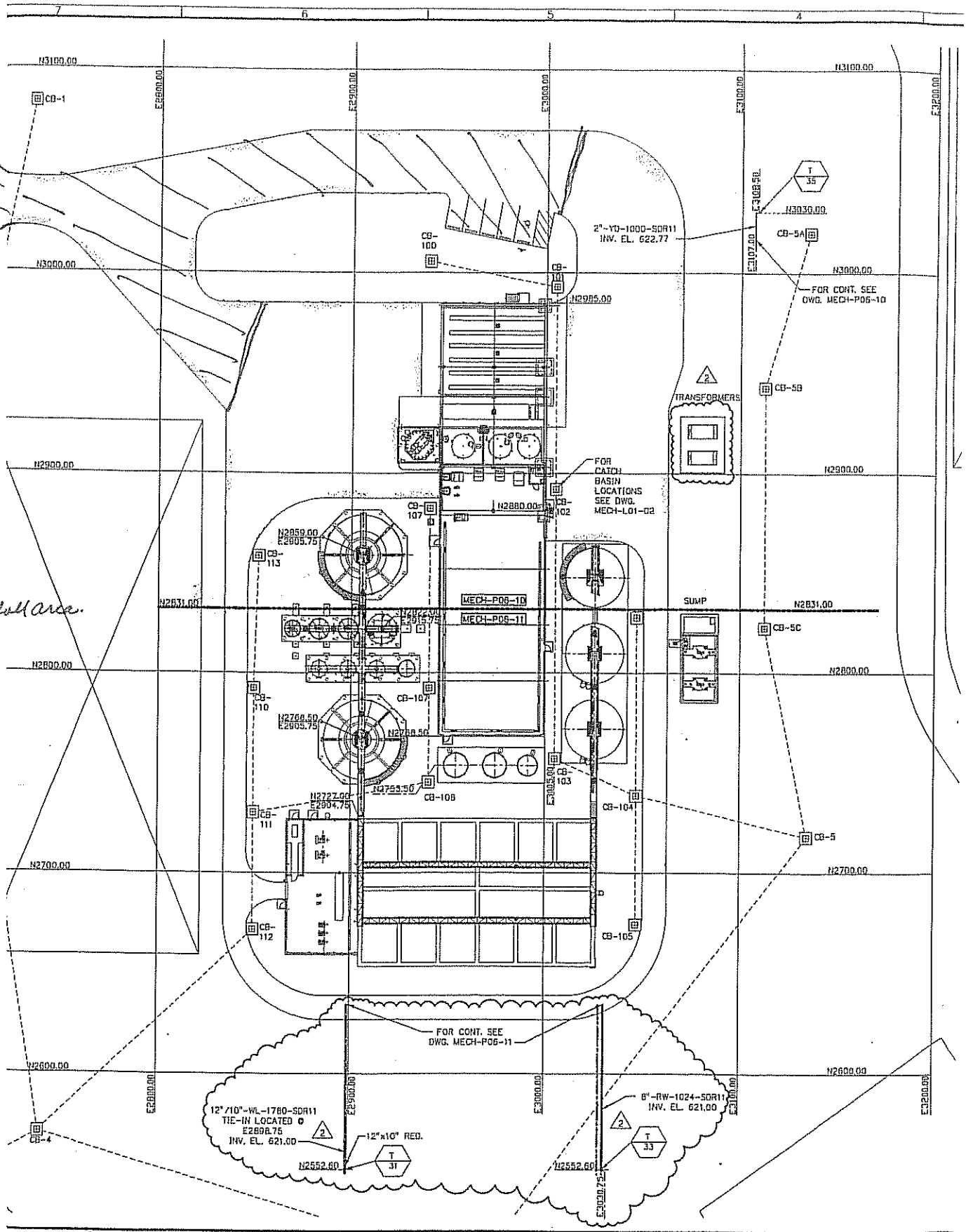
S&ME on site for fill placement and density testing. Met with Carl Rogers and Kyle Beaucom S&ME Erosion Control and went over the erosion control on site. Checked silt fence, check dam and flower outlet. Deficient area's noted and photos taken. Memorandum sent from above listed to Ken Daly S&ME PM, to myself Ted Moore & Ralph Bryant along with Drawing of area. ABC started addressing these areas immediately by started to uncover silt fence and remove area's. Ordered Rip Rap and 57 stone for 10-8-08 placement. Earth Scapes called in to do repair Start AM - 10-8-08. I had conversation with Ken Daly and was given copy of everything, to include Email sent out. I will document repairs as they are completed. photograph same and include with Report.

Jim Critchon

On-Site Representative/Company — **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03



1111 - proof roll area.

Allen WWTP
1353-06-1027
Proof Roll

Jim McCutchen

NORTH CAROLINA PROFESSIONAL SEAL 0041 ENGINEER DENNIS L. LEWIS
3/22/07

BAR = 1" AT PLOT SCALE

REV	DESCRIPTION	DATE	DWN	CH
2	REVISED TIE-IN LOCATIONS AND LOCATIONS OF TRANSFORMERS	03/22/07	LLJ	DK
1	ISSUED FOR CONSTRUCTION	3/02/07	LLJ	DK
0	FINAL - NOT RELEASED FOR CONSTRUCTION	8/31/06	GDK	DK

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
10-8-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Cloudy-Rain

Present at Site: Dalton - ABC; Jim - S&ME.

Time: 11.5

Mileage: 40

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): Erosion Control.

Observations/Remarks:

S&ME Technician on site today Monitor fill placement Push out material for placement, Compaction very wet. Rain in before lunch Monitored Erosion Control repair on Tower, Rip Rap placed on top of fabric after area cleaned of debris photo's taken Silt fence Repair & Replacement on East side cell / North to South photo's taken. Rock check drainage area Rebuilt made a little longer. More rock (Class 57) placed photos taken and on west side at Concrete pipe coming through roadway into cell #1 riprap place around outlet. photo's taken.

_____ On-Site Representative/Company

J E McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-9-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Cloudy - Drizzle

Present at Site: DAVON - ABC, JIM - S&ME

Time: 5.5

Mileage: 40

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): Erosion Control.

Observations/Remarks:

S&ME On site after overnight rain, (1.1" inch of Rain) to check erosion Control in place. After the previous days repairs the silt fence held up and the Rock check drain area are in good shape. ABC not doing any work today.

Also checked the erosion Control for phase 2. in the Borrow area that area still under construction at present approx 1150' of silt fence placed and 2 rock sed area's in place the rest of the area still being cleared.

Took camera in download photos.

J E McCutchen

On-Site Representative/Company _____

S&ME Personnel _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-10-08	1356-06-825-09

Project/Location: Allen Ash landfill

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): Erosion Control/Site Visit

Contractor	Weather/Temp
ABC/Duke Power	Cloudy -

Present at Site: Dalton - ABC; Jim - S&ME.

Time	Mileage
5.	40

Observations/Remarks:

S&ME on site to determine work for today - ABC only cleaning up roadways moving equipment etc. Do not to do any other work on site. No more Rain recorded.

_____ On-Site Representative/Company

J E McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-13-08	1356-06-825-09

Project/Location: Allen Ash landfill

Contractor: ABC/Duke Power

Weather/Temp: Clear

Present at Site: Dalton - ABC; Ted-Duke Power; Jim-S&ME

Time: 8.5

Mileage: 40

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): Monitor fill

Observations/Remarks:

S&ME Technician on site to monitor fill placement and Density testing. Density test taken today all good - Placing fill with 11 trucks. on South end. and west side of Ash piles and NW side mid way down across middle. Other material being pushed out drying for testing. Talked with Ted Kaina Duke Power who requested that I arrange a place in the fill area for Earnhardt Const to place ash as needed while they are digging out the sediment pond. that area is the SW Corner of Cell #1 which I flagged off for them and briefed Earnhardt Rep. as to the placement and compaction procedures. I also briefed Ken Daley 1356 S&ME. Manager ref what is going on update and requested that Surveyors stake out pipe area and top of first step in for ahead and off set for second. Joe he called Mike Gunnel.

_____ On-Site Representative/Company

J E M Arthur S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-14-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Clear

Present at Site: Dalton - ABC; Jim - S&ME

Time: 5. ✓

Mileage: 40 ✓

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): Monitor fill.

Observations/Remarks:

S&ME on site for fill placement + Density testing is material is dry enough. Surveyors Meade Cantrell (Jeff) around and set up for grade stakes on pipe and Bench (Shelf) and shoulder toe of top slope.
11 Truckers hauling Pond 2 & 3.
Earnhardt digging out Sediment Pond.

On-Site Representative/Company

JEM Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-15-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC/Duke Power	Clear

Present at Site: Dalton - ABC; Jim - S&ME

Time	Mileage
8. ✓	40 ✓

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): Fill Placement / Erosion Control

Observations/Remarks:

S&ME Technician on site for Fill Placement of Ash hauled from Ponds #2 + 3 into Cell #1. Today 11 Trucks hauling loading from 3 trackhoes. Fill placed and pushed out for drying. So far still very wet moisture checks 39-40%. Area blocked off for Earthwork Grading nothing placed as yet.

J E M Eichson

On-Site Representative/Company _____

S&ME Personnel _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-16-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Duke Power

Weather/Temp: Clear.

Present at Site: Dalton - ABC; Jim - S&ME

Time: 10.5

Mileage: 40

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): Monitor Fill / Erosion Control.

Observations/Remarks:

S&ME on site for Fill Placement, Checked Moisture in 2 place's needing testing still very wet rolling some more to attempt to dry more Took photo's of Fill area and Seed pond area Earnhardt is working on presently. Also painted well heads so they are easier to find. Put up PVC pipe at stakes so they are easier for Drivers to see.....!? and have grades once fill has come up. Talk with Ted Maine today who mentioned the berm Earnhardt is putting in to keep wash out out from Power area. Bring Ken Daley on progress.

_____ On-Site Representative/Company

J E M Cutchin _____ S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-17-08	1356-06-825-09

Project/Location: Allen Ash Landfill.

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): Monitor fill.

Contractor	Weather/Temp
ABC/ Duke Power	Cloudy -

Present at Site: Dalton - ABC; Jim - SOME

Time	Mileage
8 ✓	40 ✓

Observations/Remarks:

S&ME on site for fill placement and density testing - due to some scattered Rain. No density tests conducted. fill placement with 9 trucks hauling 2 section of Pond # 2. # 3 shut down because of haul Road. Extended grade stakes to grade levels and painted. Checked all erosion control all in effect. Also include a beam Earnhardt const. placed at the tower drain area - Progress photo's taken.

_____ On-Site Representative/Company

J E McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-20-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt ABC/Duke Power

Weather/Temp: Clear

Present at Site:
ABC - Dalton
Earnhardt - Dennis
S&ME - Jim
Duke Power - Ted

Time: 7.

Mileage: 40

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): Monitor fill / Erosion control.

Observations/Remarks:

S&ME Technician on site for density test, fill placement, monitor fill + sediment pond.
All fill placement placed one area and knocked down due to surveyors. Conducted moisture checks and density tests of material. Checked Erosion control and logged in.
Earnhardt construction working on sediment pond area trash fill going to stock pile area good fill used for berm and roadway. Talked with Ken Dalton S&ME Rep. Ref mixture of ash and soil. He stated clean soil only in the fill they use for roadway/berm and lining the Sediment Pond area and I am to monitor work in that area. Talked with Dennis of Earnhardt and informed same to use only clean soil for the berm and roadway he had no problem with doing so. Earnhardt started hauling some nasty clean ash up into designated fill area and push out same at end of day. That area will need water and compaction one more is placed.

J E McCutchen

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-21-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC/Duke Power	Clear

Present at Site: Dalton - ABC; Jim - S&ME; Dennis Earnhardt

Time	Mileage
8. ✓	40 ✓

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): Monitor Soil Erosion Control

Observations/Remarks:

S&ME on site for fill placement and density testing. 4 Density test taken on clean fill after days of drying. ABC Hauling pond 2, 104 trucks. Surveys on site finishing topo. for quantity's. Earnhardt Const. has placed approx 12-15 loads in section designated for them.

Monitored removal of material and clean soil placement for berm and flening in of sediment pond area with Earnhardt Const. and the Dam area for pipe placement.

_____ **On-Site Representative/Company**

J E M Cutshaw **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-22-08	1356-06-825 09

Project/Location: ALLEN LF

Contractor:

Weather/Temp: SUN 60

Present at Site: KEVIN DEMBINE

Time: 3 ✓

Mileage: 40 ✓

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:

SME TECH ON SITE FOR DENSITY TESTING OF PREVIOUSLY PLACED + COMPACTED ASH FILL. PERFORMED TWO DENSITY TESTS. UNKNOWN ELEVATIONS, SEE JIM McCUTCHON REPORT FROM PREVIOUS DAY FOR APPROXIMATE/ESTIMATED ELEVATIONS. DUKE RIVERBEND ASH PROCTOR, A-1 USED TO OBTAIN RESULTS. BOTH TESTS RESULTED IN 100% COMPACTION.

TEN TRUCKS ON SITE MOVING ASH FROM POND #2.

On-Site Representative/Company

KEVIN DEMBINE
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-23-08	1356-06-825-09

Project/Location: Allen Ash Landfill

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): Monitor Fill Placement ect

Contractor	Weather/Temp
Earnhardt ABC/ Dillepont	Clear

Present at Site: DALTON - ABC; DENNIS - Earnhardt; JIM - STME

Time	Mileage
9.	40

Observations/Remarks:

S&ME on site to monitor fill placement and push out placed fill as placed. 10 Trucks hauling from ponds 2 ~~3~~ density tests conducted - Working on Slopes and place on top of slope to prevent washout.

Earnhardt cont. working on sediment pond. placing fill around pipes. Lucas informed by Ken today that he wanted density tests taken on dam. will get Grade Contractor to prepare area for testing. Outlet pipe's good. Scrimmer pipes placed today

_____ On-Site Representative/Company

J E McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-24-08	1356-08-825-09

Project/Location: Allen Ash Landfill -

Contractor: Duke power

Weather/Temp: Cloudy Rain

Present at Site: Dalton - ABC
Denver - Earnhardt
Jim - S&ME
Ken Daley, Ted M - (DOT)

Time: 9.

Mileage: 48

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:

On site monitor fill placement. Was to conduct density tests on Dam area when Rolled in, but Rain. Ken Daley on site. Ted Mann. Duke. and NCDOT Reps. Looking at site, Some issues looked at and. Corrected. fabric from Rip-Rap. Small amount of ash mixed w/soil. taken care of.

Got 3 sample. 2 ash 1 soil brought in today

Meeting with Ken Daley at the office. Ref. Earnhardt Const and Earthwork going on. # of proctor, Tests ect.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-27-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Duke Power

Weather/Temp: P/Cloudy Windy 40's

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME

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): Monitor Fill

Time: 10.

Mileage: 40

Observations/Remarks:

S&ME on site to monitor fill placement for Ash landfill and Sediment Pond. Attempted to add moisture chunks to windy Ash blow out of pan's, stove flame blow out. ABC hauling with 11 trucks, Ponds 2 & 3 avg. 4-Coach per hr each - Earnhardt digging Sed pond and hauling fill for berm and bed in roadway 2' of Clean dirt placed to bridge over wet ash area.

Met with Ken Dorley few minutes brief as to what he wants done. Talked about trying to use Nuke Density Gauge on the ash and do comparison on Ash moisture in lab.

On-Site Representative/Company

J E M Eutchison
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date 28 10-28-08	Job No. 1356-06-825-09
Project/Location Allen Ash Landfill	
Contractor ABC/Duke Power	Weather/Temp Clear
Present at Site Dalton - ABC Jim - S&ME	
Time 5.5 ✓	Mileage 40 ✓

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) Monitor fill Placement

Observations/Remarks:

S&ME on site to monitor fill and Density testing. After talking with Ken Daley Project Manager / PE. 1356 - Mentioned and we discussed using Nuclear Guage for density's along with bringing in moisture samples for each test as comparison. Conducted 6 tests today in Ash and gathered samples for oven moisture. Tests conducted with Proctor appeared to be within requirements with 99-100% density.

J. M. Christian

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date 28 10-28-08	Job No. 1356-06-825-09
Project/Location Allen Ash Landfill - Sed Basin	
Contractor Duke Power/Earnhardt	Weather/Temp Clear
Present at Site Dennis - Earnhardt. Jim - S+ME	
Time 5.	Mileage 40

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 on site Monitor fill and Compaction when available (PT) on structural fill for ~~the~~ Sediment Basin and Berm/Roadway/Dam/ Conducted 4 density tests w/ drive tube. Tests conducted on Roadway - Dam. After placement of structural fill. Test's conducted within Requirement by Spec. All area's firm and stable at this time.

7 TRKS 16X7'4"X4
3 TRKS 15X7'4"X4
1 TRK 18X7'4"X3

once + awhile 1 more TRK 18X7'4"X4 comes in

Ash Land Fill -
TRK measurements
RR'D 10/31 KB

On-Site Representative/Company

Jim Crutchfield
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-29-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt ABC/Duke Power

Weather/Temp: Clear

Present at Site: Dalton ABC, Jim - S&ME

Time: 8.

Mileage: 40

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): Monitor fill.

Observations/Remarks:

S&ME on-site for fill placement and density test. 11 trucks hauling from pond 2+3, checked moisture's and found that moisture was still 35-37% no density tests conducted. Several moisture tested.

Also on Sed Basin for Earnhardt conducted density tests of placed fill on top of Berm (Roadway) and Dam. Monitor fill placement and compaction part time and removal of old Berm and fill in bottom of Sed pond area.

In Afternoon noticed that water and ash coming up out of bottom of newly filled area. Contractor had seen same and got equipment off same. I called Ken Daley + Cedric at 1356. Brief Cedric to Brief Ken on same. Will discuss 10-30-08

On-Site Representative/Company

J. E. McCracken
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-30-08	6356-06-825-09

Project/Location: Allen Ash Landfill / Sed Pond

Contractor: ABC DukePower

Weather/Temp: Clear

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME

Time: 4. ✓

Mileage: 40 ✓

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): Monitor fill.

Observations/Remarks:

S&ME on site for density testing / fill placement.
ABC - 11 trucks hauling from Ponds 2 + 3 #3 about finished. Had Phone Call Ken Daley Rep. progress on job etc. and what needed to be done. Checked moisture next sections still to wet for density's.
Earnhardt - Still digging out some good dry ash down to 2 very wet. hauling clean material with some soil mix into ash landfill all trash haul off. Area where water seepage getting firmer Ken to come out + look at same maybe. Probably will firm up. but as the dig more will come up
Still Bridging in for Berm + Roadway -

Had Eye appt - left at 1230.

_____ On-Site Representative/Company

Jim Cutshaw S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-31-06	1356-06-825-09

Project/Location: Allen Ash Landfill / Sed Basin

Contractor	Weather/Temp
ABC/Earnhardt	Clear

Present at Site: DAYTON - ABC; Dennis - Earnhardt; Jim & S&ME; Kyle & Ken Dabey.

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): HA/DCP/ Nuclear Density.

Time	Mileage
11 ✓	40 ✓

Observations/Remarks:

ABC, S&ME on site for density testing Monitor fill.
12 TRKS hauling Pond 2&3, Kyle B S&ME on site
assisted with Setting Settling Plates & Stand Pipes had to have
pipe welded to plates by Earnhardt Mechanic.
Conducted Nuclear Density on Ash. (4)
Assisted Kyle B. with HADCP for Bridge down to
-10' need to continue Monday.
Earnhardt - By the time I got to them they were done for the day.
Ken Dabey out site to look at Sed Basin Ref. Seepage
which seems to be settling down.

_____ On-Site Representative/Company

_____ S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-1-08	1356-06-825

Project/Location: Allen Ash Landfill/Bed. Basin

Contractor: ABC/Earnhardt.

Weather/Temp: Clear

Present at Site: ~~Danny~~ - ABC
Dennis - Earnhardt
Jim - S&ME

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): Sed plate stabilize

Time	Mileage
6 ✓	40 ✓

Observations/Remarks:

S&ME Onsite today for density testing & monitor fill.
ABC - Place fill around Sediment plates to stabilize and put flags on same for visuals. ABC just cleaning upslopes and haul road's today. A couple of truck (4) running mostly dry material.
Earnhardt - cleaned of basin area. 3 more small area's bleeding in. Bridge lift over wet area complete in Roadway and Berm this area extended to slope of Ash with ditch area left inbetween - 4 density conducted.

_____ On-Site Representative/Company

Jim Eutsler
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-3-08	135606-825-09

Project/Location: Allen Ashlandfill / Sed Basin

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): Monitor fill / Sed fence

Contractor	Weather/Temp
ABC / Earthcut.	Cloudy -

Present at Site: Dalton - ABC; Dennis - Earthcut; Jim - S&ME

Time	Mileage
8	40

Observations/Remarks:

ABC S&ME on site for fill placement & Density testing. ABC Hauling w/11 Trucks today. Trying to finish up Pond 3 fill not coming in Condlot density test as needed. and Moisture in oven to Compare with Nuclear gauge and Dime tube.

Earthcut - Removing material for Sed Pond and Berm Roadway. Most material removed not able to use as fill due to trash. U/C 2' and back fill the area they are working in very wet and spongy but seem's to tighten up with time.

On-Site Representative/Company

J. M. Cutchin
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 11-4-08	Job No.: 135606-825-09
Project/Location: Allen Ash Landfill/Sed basin	
Contractor: ABC/Earnhart	Weather/Temp: Cloudy/Rain
Present at Site: Dalton ABC, Dennis - Earnhart, Jim & Brett SEME	
Time: 8	Mileage: 48

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): Monitor fill - Testing.

Observations/Remarks:

- ABC hauling with 10 trucks today. Pond # 2 Conduct Density test in fill area drive tube - Due to Rain off & on. No more testing today

Earnhart - Working on sed basin stated area at slip up in Bottom of Pond Bank fill area has 4' fill Bridge still some movement still work on more tomorrow to tighten up. All material removed (trash) hauled to back stock pile area

Brett Hixson on site to work when needed and learn job/site as back up.

On-Site Representative/Company

Jim Cribbon
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
11-4-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt

Weather/Temp: ~~60's~~ 50's/rain

Present at Site: Brett Hixson, Jim Mc. } S&ME

Time: 7 hr. ✓

Mileage: 40

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:

S&ME tech on site for Drive tube density tests. Conducted 2 FDT's for earnhardt on sediment Basin Berm and 1 FDT for ABC on Ash ~~Landfill~~ Landfill. Paper work turned in to Jim Mc.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-5-08	1356-06-825-09

Project/Location: Allen Ash Landfill

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
ABC/Earnhardt	clear/60's

Present at Site: Brett Hixson, Jim McCutcheon } S&ME

Time	Mileage
5.5 hr. ✓	40

Observations/Remarks:

S&ME tech on site for nuclear + Drive tube density tests. Two nuclear density tests were performed for ABC on the ash landfill with compaction results of 99.1% and 99.9% (95% required). One moisture sample was taken for each nuclear density test and placed in oven to cook overnight. Also, one drive tube density test was performed to coincide with nuclear density test No. 2. Results were 102.2% compaction and 32.7% moisture, both passing.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date 11-5-08	Job No. 1356-06-825-09
Project/Location Allen Ash Landfill	
Contractor ABC Cornhart	Weather/Temp Clear.
Present at Site Dalton - ABC, Jim - S+ME, Brett - S+ME	
Time 4.	Mileage 40

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:

ABC hauling 10 Trucks. pond # 2 - Coordinate fill placement and area to be tested before leaving for Landfill in Rockhill for Al Quarles.

On-Site Representative/Company

J. M. Cutchin
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-6-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC	clear / 70's

Present at Site: Brett Hixson - S&ME

Time	Mileage
7 hr.	40

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:

S&ME tech on site for Nuclear and Drive Tube density tests. ~~Five~~ Six nuclear density tests were performed on Ash landfill w/ compaction results of 104, 97, 101, 100, 100, and 106. One moisture and ~~and~~ one drive tube were run to coincide w/ nuclear test #4. The Drive tube test passed compaction @ 97% (95% required)

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-6-08-	1356-06-825-09

Project/Location: Allen Ash Landfill Sed Basin

Contractor: ABC/Earthcut

Weather/Temp: Clear

Present at Site: Dalton - ABC; Tim - S&ME; Butt - S&ME

Time: 6.5

Mileage: 46

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:

ABC S&ME on site for density testing and fill placement. ABC Hauling with 10 trucks from pond # 2 at present. finishing upon #3. Rolling area to be tested in fill area.

Earthcut - Digging out West section. Discussed placing material in Cell # 2 with Ted Manes - I call Ken Dalby Reg Mgr who stated he could do that but he did not want any trash placed there. They will start hauling in on Saturday

J E McCutchen

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-7-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt / ABC

Weather/Temp: clear / 70's

Present at Site: Brett Hixson - S&ME

Time: 5.5 hr.

Mileage: 40

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:

S&ME tech on site for in place density tests.

Two drive tube density tests were performed for Earnhardt Grading @ 89.9% and 86.1 %

Six nuclear density tests were performed for ABC all passing @ 104.5, 97.5, 101.4, 100.4, 100.5, and 106.7
↳ one drive tube density test was performed w/ 91.6 % compaction.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-8-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC	clear / 60's

Present at Site: Brett Hixson

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)

Time	Mileage
3.5 hr.	40

Observations/Remarks:

S&ME tech on site to perfor nuclear density tests.
six tests were performed with 104.1, 95.93, 97.44, 103.2, 98.8, and 99.4 percent compaction
(~~100~~ to 95% required)

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
11-10-08	135606-825-09

Project/Location: Allen Ash landfill

Contractor: ABC/Earnhardt

Weather/Temp: Clear

Present at Site: DAYTON - ABC; Kevin - Earnhardt; Jim - S&ME

Time: 9.5

Mileage: 40

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:

ABC - 10 Trucks hauling today from pond # 2 and Cut some fill out of # 3 at very end. Fill placement on North E side of fill area Cell #1 and being push out but very wet.
Earnhardt - Digging today on Basin haul material (All) into Cell #2 and spread out thin to find trash material to be removed to trash area. Brought in sample. Talk with Ken Daley Rep getting posters completed faster.

On-Site Representative/Company

J. M. Crutchfield
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-11-08	1356-06-82509

Project/Location: Allen Creek Landfill/Sed Basin

Contractor: ABC/Earnhardt

Weather/Temp: Clear

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME

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): Monitor fill

Time: 9.5 ✓

Mileage: 40 ✓

Observations/Remarks:

ABC S&ME on site for density testing Monitor fill placement ABC Hauling with 11 trucks into Cell #1. Fill sample brought in for Proctors. Conducted Moisture tests of fill and Nuclear density tests to check same. Moisture high for now

Earnhardt - digging out for bridge lift of 4' for Sediment Basin and Berm. Conduct density test on fill for Berm. Not yet compacted enough as told by Clyde W/Earnhardt they will compact more and advise me. All material taken out placed in Cell #2 area and spread out to dry.

_____ On-Site Representative/Company

J E Critchon S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-12-08	135606-82509

Project/Location: Allen Ashlandfill/Sediment Basin

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): Monitor Fill.

Contractor	Weather/Temp
ABC/Earnhardt	P/Cloudy Cool.

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME

Time	Mileage
9. ✓	40 ✓

Observations/Remarks:

ABC Fill placement in Cell #1. Density tests conducted all for new area to place fill - Moisture Samples and Shelby tube. Hauling from Ponds #2 + 3 11 truck hauling.
Earnhardt - Clean out more in Basin area and haul in fill to bridge in bottom of Pond area. Approx 4' bottom of Basin. Sample of fill from Borrow area brought in for Proctor. Monitor placement for now.

Jim Cathey

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-13-08	1356-06-825-09

Project/Location: Allen Ash Landfill / Sediment Basin

Contractor: ABC/Earnhardt

Weather/Temp: Cloudy Rain off on

Present at Site: Dalton - ABC; Dennis - Kinney - Earnhardt; Jim - S&ME

Time: 6.5

Mileage: 40

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): Monitor Fill

Observations/Remarks:

ABC - 13 trucks hauling from Pond #2. #3 completed. Conduct Density test Shelby tube before Rain get heavy and take out moisture samples & record. Stop hauling at lunch wait to see if Rain stop

Earnhardt - Placing fill in U/C area of Sediment Basin 3/4 finish move Pump to remove water leaching in. Bridge lift still 4' 4½" thick. Going to stop since Rain Coming in

_____ On-Site Representative/Company

J E M Crutchfield
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-14-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC / Earnhardt

Weather/Temp: rain / 50's

Present at Site: Brett Hixson - S&ME; Dalton - ABC

Time: 2

Mileage: 40

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:

S&ME tech on site for nuclear density tests. After talking w/ Dalton of ABC work was cancelled for the day due to rain. Earnhardt was not working & was not on site.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME INC. *ENVIRONMENTAL * ENGINEERING TESTING
CHARLOTTE, NORTH CAROLINA

TECHNICIANS DAILY FIELD REPORT

GENERAL FIELD TESTING SERVICES

Job Name: Allen Ash Landfill	Technician: Brett Hixson
Contractor: ABC	Job Number: 1356-06-825-09
Weather: clear	Job Date: 11-18-08
Travel Time: – (hrs.)	Total Job Time: 1 ✓ (hrs.)
On-Site Time: 1 (hrs.)	Total Miles: – (miles)

Start Time: (Circle one) am / pm Stop Time: (Circle one) am / pm

CONSTRUCTION ACTIVITIES:

TEST CONDUCTED AND THE RESULTS: S&ME tech on site to discuss results of previous days work w/ Jim Mc.

THE FOLLOWING TEST(s) PERFORMED TODAY WILL REQUIRE SUBSEQUENT RETESTING:

Non-compliance Test Results, Name of Contractors/Owners Representative Informed:

S&ME's Staff Representative Notified:

Other Discussions with Contractor

Technician Initials BWH

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
11-17-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC / Earnhardt

Weather/Temp: clear / 40's-50's

Present at Site: Brett Hixson - S&ME

Time: 9.5 ✓

Mileage: 40 ✓

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:

ABC - S&ME tech on site for drive tube and nuclear density tests. Eight nuclear density tests were performed along with one drive tube and three moisture tests. Also monitored Ash placement and removal.

Earnhardt - No fill was being placed ~~so~~ tech monitored removal of material from basin.

* All results turned in to Jim McCutchen

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
11-18-08	1356-06-825-09

Project/Location: Allen Ash Landfill / Sed Basin

Contractor: ABC / Earnhardt

Weather/Temp: Clear Windy Cold

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME

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): Monitor Fill / Undercut

Time	Mileage
9.5 ✓	40 ✓

Observations/Remarks:

1.25" of Rain (11-14-08)

ABC - Hauling from Pond #2 only 15 trucks today. Per Ted Maness Duke Power PM. ABC is to only haul into the North Portion of Cell #1 as of today and leave the South portion for Earnhardt. I had went to talk to him about giving all of Cell 1 back to ABC to have more area for them to place fill since Earnhardt was hauling out into Cell 2 and not placed anything in Cell #1 portion for 3± wks. But he wants the material from the New Const. Bridge on the hill to go in there when they start. This leaves less time to work the material placed by ABC and drying time + testing but it doesn't seem to have any affect. To wait for testing.

Earnhardt Still dugging Sediment basin; Alot of water coming in to the E/C area faster than being pumped out. The Rain on 11-14-08 no help. Still placing excavated material in Cell 2 area. Still fresh in material.

Went to office to have photo's downloaded.

Check Sediment fence at Borrow site and between cell 1+2 all in place and working properly -

_____ On-Site Representative/Company

_____ S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-19-08	1356-06-825-09

Project/Location: Allen Ash Landfill/Sed Basin

Contractor: ABC/Earnhardt

Weather/Temp: 30° Clear - Cold.

Present at Site: Dalton - ABC, Dennis - Earnhardt, Jim - S&ME

Time: 10. ✓

Mileage: 40 ✓

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): Monitor fill

Observations/Remarks:

ABC Hauling with 15 Trucks today pushing out material as being placed to try and dry faster but due to cold and frozen material this is causing moisture to draw to surface and when the trucks run over it get stick, Dozer pushing off frozen and tracking up. Up to grade on SE side to Bench and starting to slope up. Surveyor on site checking grade/Fill ect. Proctor Samples brought in

Earnhardt - Digging out in same area using long reach due to ash pushing out on lower area and large amount of water coming into the area. Process to take a couple of more weeks as told by Dennis.

_____ On-Site Representative/Company

JM Pitchford S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-20-08	135606-825-09

Project/Location: Allen Ash Landfill/Ed Brown

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): Monitor Fill

Contractor	Weather/Temp
ABC/Earnhardt	Clear Cool

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME

Time	Mileage
6. ✓	40 ✓

Observations/Remarks:

ABC Started of Day with 11 trucks hauling into Cell #1 from Pond #2. After lunch Cut off 4 trucks due to Truck wait time to be loaded. On 2 track hoes to load at North End of Pond. Under Powerlines. Still pushing Across Pond #2 for Second Cut which could start next week. Material Wet still and having to place fill in Areas not tested but spreading placement out at present.

Earnhardt. Working on Sediment basin. Still hauling a lot of trash out as they dig water table must be up at this end (SW corner) due to amount of water standing. Also placing bridge lift in bottom haul road area and Berm of Ash fill in Cell #1 leaving a small low area for water drainage. on SW corner where water stands muck out and Bridge over will test when compacted.

_____ **On-Site Representative/Company**

J E M Eutchison **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-21-08	1356-06-825-09

Project/Location: Allen Ash Landfill/Sediment Basin

Contractor	Weather/Temp
ABC/Earnhardt	Clear - 34 windy

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME

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): Monitor Fill.

Time	Mileage
8. ✓	40 ✓

Observations/Remarks:

ABC - Started with 10 Trucks drop back to 6 due to slowness of loading trucks. Having to back in on N end of pond #2 because the split the road. Fill placement around slopes and roadway to build up pond also to help drying process. Conduct density test today and moisture samples.

Earnhardt - Finish bridging in adj to roadway need more compacting. still digging out in Sed Basin. A lot of trash coming out. Try to fill in Bridge left as they go.

JM Critchlow

On-Site Representative/Company _____ **S&ME Personnel** _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-22-08	1356-06-825-09

Project/Location: Allen Ash Landfill / Sed Basin

Contractor	Weather/Temp
ABC / Earnhardt	Clear / Cold

Present at Site
Danny - ABC
Dennis - Earnhardt
Jim - S&ME

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): Monitor fill / Sed control

Time	Mileage
5. ✓	40 ✓

Observations/Remarks:

ABC - Not hauling today. Pond Maintence on Pond #2.
Pushing out placed fill from 11-21-08. and Compacting
previously placed fill.
Earnhardt - Just doing maint digging out Sed basin pumping water
no fill.
Check Sed fence all in operating order

_____ On-Site Representative/Company

J. M. Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
10-24-08	135606-825-09

Project/Location: Allen Ash Landfill/Sed Basin

Contractor: ABC/Earnhardt

Weather/Temp: Cloudy-Rain

Present at Site: Dalton-ABC, Dennis-Earnhardt, Jim-S&ME

Time: 11o ✓

Mileage: 40 ✓

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): Fill Placement/Excavation

Observations/Remarks:

ABC - Hauling from Pond #2 on North end with 8 trucks on split out Road. due to Equip problem's over weekend Talked with Ted Manes of Duke Power and was informed that ABC could start working in Pond #1 to prep for Removal. ABC that they could also haul in to the area in Cell #1 that was given to Earnhardt. which gave more room to spread material Due to Misting Rain All day No density tests taken.

Earnhardt digging out on sediment basin and hauling in fill from Borrow site. All material being hauled out very trashy (Tire liner stamps etc) Trying to floor in bottom of Sed basin a lot of water also coming in to excavated area from under roadway and area where fill placed as much as pump can pump and push.

Rain stopped work for today 430 pm.

_____ On-Site Representative/Company

J. M. Cutchin S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
11-25-08	1356-06-825-09

Project/Location: Allen Ash Landfill/Sed Basin

Contractor: ABC/Crowder

Weather/Temp: P/Cloudy

Present at Site: Dalton - ABC
Dennis - Earnhardt
Jim - S+ME.

Time: 2. ✓

Mileage: 40 ✓

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): Monitor fill/Sedcontrol.

Observations/Remarks:

ABC - Not Hauling today Clean up on pond only. Draining Pond #1 to prep. Clean on #2.

Earnhardt - Hauling out from Sediment Basin, and placing fill in to Bridge bottom. Alot of Water Coming in to area from side through ash.

On-Site Representative/Company

J E McArthur
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 11-26-08	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill/Sed Basin	
Contractor: ABC/Earnhardt	Weather/Temp: Clear
Present at Site: Dalton - ABC Dennis - Earnhardt Jim - S&ME	
Time: 6. ✓	Mileage: 40 ✓

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): Monitorfill/Cleanup.

Observations/Remarks:

ABC Not hauling today Fill area still to wet to test Clean up in Pond #2 + Set up on #1 only today.

Earnhardt - This Am. a Large amount of water flowing in from Ash onto excavated area Probably 30-40 gal/min +. Notified Ken Dalton took Pictures, Earnhardt pushed in fill to the area and over filled going to leave fill Monday and let drain

On-Site Representative/Company

Jim Critchlow
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 12-1-08	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill/Sed basin	
Contractor: ABC/Earnhardt	Weather/Temp: P/Cloudy
Present at Site: Dalton - ABC; Jim - S&ME	
Time: 2.5	Mileage: 4

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:

ABC on site pumping water, cleaning up roads set prep work on haul roads. Freq and dry out 1.6" of rain since Friday
Earnhardt - No work today all flooded.

On-Site Representative/Company

J E M Crotchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-2-08	1356-06-825-09

Project/Location: Allen Ash landfill/Sed Basin

Contractor: ABC/Earnhardt

Weather/Temp: P Cloudy -

Present at Site:
D Alton - ABC
Dennis Earnhardt
Jim - S+ME

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 Visit

Time	Mileage
3.5	40

Observations/Remarks:

S+ME on site ABC still not to haul attempted
But cut trucks off due to wet condition decided
to only work on ponds.
Earnhardt only pumping water today and clean up.
Transfer Muden gauge to Kevin, for use Mt Holly Rd

_____ **On-Site Representative/Company**

JEMcCutchen **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-4-08	1356-086-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC / Earnhardt

Weather/Temp: clear / 40's-50's

Present at Site: Brett Hixson - S&ME; Dalton - ABC; Kevin - Earnhardt

Time: 11 hr.

Mileage: 40

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:

S&ME tech on site for density tests for ABC and Earnhardt.

ABC - Seven nuclear density tests were performed, all passing w/ compactions of
① 97% ② ~~93.7%~~ 98% ③ 98.24% ④ 100% ⑤ 95.2% ⑥ ~~[illegible]~~ 105.6 ⑦ 98.8% (95% required)

Earnhardt - Tests were taken ~~[illegible]~~ on either side of pipe
test ①: Failed @ 89.5%; talked to Kevin and area was recompacted w/ jumping jack
↳ retest: Failed @ 93% "
↳ retest #2: Passed @ 95%
test ②: Failed @ 93%: talked to Kevin; area was recompacted w/ jumping jack
↳ retest: Passed @ 98%.
test ③: Failed @ ~~94~~%
test ④: Failed @ 92%
> ~~Earnhardt left for the day; Kevin will be told of failing tests~~ on 12/5/08 + area will be recompacted

* 95% required compaction

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-5-08	1356-086-825-09

Project/Location: Allen Ash Landfill

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
Earnhardt	clear/40's-50's

Present at Site: Brett Hixson - S&ME; Kevin - Earnhardt

Time	Mileage
9.5 hr.	80 (2 trips)

Observations/Remarks:

S&ME tech on site for drive tube density tests.

- Retest of test 3 and 4 from 12/4/08 passed with ~~45%~~ 96% and 96% compactions.
  (Area was recompacted in morn w/ jumping jack)

test (5): passed w/ 95% compaction
test (6): passed w/ 97% compaction
test (7): passed w/ 98% compaction
test (8): failed w/ 90% compaction; Earnhardt had left for the day but Kevin was contacted via nextel and informed of failure so that area can be compacted mon. morn.

* trip was made back to office to pick up updated proctors

* package was dropped off @ duke energy office from Ken Daly

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 12-8-08	Job No.: ~~1356-085-825-04~~ 1356-086-825(09)
Project/Location: Allen Ash Landfill	
Contractor: ABC/Earnhardt	Weather/Temp: clear/40's
Present at Site: Brett Hirsen & S&ME, Jim Mc.	
Time: 5 hr.	Mileage: 40

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:

S&ME tech on site for Drive tube density tests.

- Roller for Earnhardt broke down delaying rolling of failed area from friday until approx 10 am. Once rolled test was taken and failed @ 92% compaction. (95% required). Jim McCutcheon took over testing and results were turned in to him.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-8-08	13560-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt

Weather/Temp: P Cloudy

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME

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): Monitor fill.

Time: 9.

Mileage: 40

Observations/Remarks:

ABC Hauling from Pond #2 10 trucks into Cell #1 Material very wet being pushed out to attempt drying. Still Prep work on Pond #1 and #2 for second cut.

Earnhardt placing fill at Box + pipe on SE corner of Cell #2 inlet Box and pipe into Sediment Pond - Density tests conducted - Retesting failing test and finish testing to SG. Soil. all test within specification required. Also digging out sed pond on SW. end of Cell #1 At end of day large area stuffed off and work had to discontinue for today - at 4:45 pm

J E McCutchen

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-9-06	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC / Earnhardt

Weather/Temp: Cloudy

Present at Site: Dalton - ABC; Dennis - Earnhardt.

Time: 10.

Mileage: 40

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): Monitor fill.

Observations/Remarks:

ABC hauling from pond #2 to trucks and started hauling pond #1 on NE corner. Also hauling soil fill for Berm and Roadway on East side of Pond #3 to build up Roadway to help prevent washout across Road if Heavy Rain (predicted). Ash fill hauling into Cell #1 Very wet at present. Prep area's for testing.

Earnhardt Placing bridge lift On NW side of Cell #1 Between Roadway and slope to prep for cap.

Ken Daley S&ME P.M. arrived to check slope area which Broke off on Sed Basin/Roadway Berm. and give recommendations as to correcting problems and assure safe working conditions for repair. Photo's taken of same. work to continue

_____ On-Site Representative/Company

Jem Cirthen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-10-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC Earnhardt

Weather/Temp: Cloudy Rain

Present at Site: Dalton - ABC
Dennis - Earnhardt
Jim - S&ME

Time: 7.

Mileage: 40

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): Monitor-file

Observations/Remarks:

ABC Hauling from Pond #2 + #1 9 trucks hauling
2 hauling Soil for Roadway on East Side
of Pond #3. to Build up + Haul fill Rain Started
Mud day
Earnhardt - doing repair of Blow out in Sed Basin to try
and - stabilize - Ken Daley came out + looked at
same - and made recommendation on repair on
accutual bldg., WORK to Rain Started

J E McCutchen

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRIF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
12-15-08	1356-06-825-09

Project/Location: Allen Ash Landfill

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): Monitor fill Erosion control

Contractor	Weather/Temp
ABC/Eernhardt	Cloudy

Present at Site: Dalton - ABC; Jim - S&ME

Time	Mileage
8.5 ✓	40 ✓

Observations/Remarks:

ABC hauling from Pond's 1 & 2 8 trucks today - placing fill on NE side of Phase 1 Cell 1 Material to wet to work with after Rain from last Thur, Fri 3.3 inches through picture int downloaded Eernhardt Not working today, Sed Basin full of water and water on N side of Berm in Cell #2.

_____ On-Site Representative/Company

Jim McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-16-08	1356-06-825-09

Project/Location: Allen Ash Landfill.

Contractor: ABC-Earnhardt

Weather/Temp: Cloudy (Fog)

Present at Site: Danny - ABC; Dennis - Earnhardt; Jim - State

Time: 7. ✓

Mileage: 40 ✓

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): Fill Excavation / Erosion Control

Observations/Remarks:

ABC only cleaning up Due to fog Sent Truck home for today no hauling. working on ponds
Earnhardt - Pumping water from Sediment Basin. also preparing test pad cutting to grade for cap test pad to be placed.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-17-06	1356 06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC/Earnhardt	Cloudy Rain

Present at Site: Dennis Earnhardt, Danny - ABC, Jim - S&ME.

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): Erosion Control.

Time	Mileage
3.5 ✓	40 ✓

Observations/Remarks:

ABC not hauling today work on ponds & haul roads only. due to weather.
Earnhardt prep work for test pad area on Cap.
Not hauling any fill cut down of Test area ash.

Surveyor on Site

_____ On-Site Representative/Company

Jim Eutsler S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-18-08	1356-06-825-09

Project/Location: Allen Ashland fill.

Contractor: ABC Earnhardt

Weather/Temp: Cloudy Rain

Present at Site: Dalton - ABC
Dennis - Earnhardt
Jim - S&ME

Time: 3. ✓

Mileage: ✓40

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:

ABC, Sent everyone home decided to not to work.
Earnhardt - working on test Pad and - prep work for Test Cap.

Surveyor on site

On-Site Representative/Company

J. M. Eutsler
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-22-08	1356-06-82509

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC Earnhardt	P/Cloudy

Present at Site: Dalton - ABC, Dennis - Earnhardt, Jim - S&ME, Kyle -

Time	Mileage
5.	40

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): Fill Placement.

Observations/Remarks:

ABC Hauling 5 trucks. Roadbed clean. Mostly clean up from Rain. 3" 0
Earnhardt Not working today. Unload Liner.
Kyle came out to inventory.

_____ On-Site Representative/Company

J. M. Eutchison S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-23-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt

Weather/Temp: 8/Cloudy

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME; Kyle

Time: 5.

Mileage: 40

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): Monitor fill (Ash)

Observations/Remarks:

ABC Hauling with 4 trucks not pushing out material very wet. Haul Road and fill area frozen. Advised not to place wet material on frozen ash approx 3/4 to 1" frozen. Dalton elected to haul anyway. As road thawed everything was very slick & wet.

Kyle inventoried liner which came in Monday/Tuesday

Earnhardt not doing any work till next week

J E M Cutchen

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-24-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC/Earnhardt	Cloudy

Present at Site: ABC Dalton Dennis - Earnhardt.

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): Fill Placement.

Time	Mileage
5r	40

Observations/Remarks:

ABC Hauling with 9 trucks. Stockpile fill to push out next week. Fill area still frozen But they still need to haul. Their decision. All fill to stay till next week to push out. Earnhardt - pumping out Sed basin today only. Some clean up.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-29-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC / Earnhardt.

Weather/Temp: clear / 60's

Present at Site: Brett Hixson, Jim M. } S&ME; Dalton - ABC

Time: 10.5 hr.

Mileage: 40

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:

ABC - Two tests were performed
- both test met compaction requirements but failed moisture on the wet side
- Dalton w/ ABC was informed of moisture.
- results turned in to Jim Mc.

Earnhardt. - Six tests were performed on test pad, Two tests per lift
- All tests met compaction and moisture requirements
- 1 perm tube was driven adjacent to each drive tube by Jim Mc.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

JAN - 2 2009

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
12-29-08	1356-06-825-09

Project/Location: Allen Ash Landfill (Test Pad)

Contractor: Earnhardt. | **Weather/Temp**: Clear 60

Present at Site: Dennis - Earnhardt; Jim - S&ME; Britt

Time: 11.5 | **Mileage**: 40

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): Perms./Samples.

Observations/Remarks:

S&ME Technician on site for Test Pad placement by Earnhardt Const. Test pad area proofrolled. and 1st lift of 1' soil placed. and compacted with 815 compactor. Test area's cut down and density (2) tests conducted and 2 perm tubes. Next 2 lifts 2 density tests and 2 perm tubes per lift to 18" approx and Smooth Drum Roller on last lift.
Also a Composite Bucket Sample from each lift taken and all brought into the lab.
Advised Cedric of 1356 of material being in office lab.

J E McPherson

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 12-31-08	Job No.: 1356-06-825-09
Project/Location: Allen Ash landfill	
Contractor: ABC / Earnhardt.	Weather/Temp: clear
Present at Site: Brett Hixson - S&ME	
Time: 1.5 hr. ✓	Mileage: 40

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:

S&ME tech on site for density tests. Neither ABC ~~and~~ or Earnhardt needed tests run

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
12-30-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt

Weather/Temp: clear/60's

Present at Site: Brett Hixson - S&ME; Dalton - ABC

Time: 6 hr. ✓

Mileage: 40

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:

S&ME tech on site for compaction tests.

Earnhardt: did not need tests run. Tech monitored removal of material from sed. pond.

ABC: Four tests were performed all meeting compaction requirements.
- results turned in to Jim Mc.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
01-02-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt ASC

Weather/Temp: Cloudy Rainy

Present at Site: Dennis Earnhardt, Jim - S&ME

Time: 5 ✓

Mileage: 40

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 Visit / Erosion Control -

Observations/Remarks:

S&ME on site check Erosion Control of Ash Site and - Borrow site for Earnhardt - Site Fence & check dam areas in good shape - Earnhardt cleaned up after last rain new gravel set - Only work today strip for road way and clean up of silt pond - remove some silt rash in pond area - ABC not working today

J E McCutchon

On-Site Representative/Company _____

S&ME Personnel _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 01-05-09	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill	
Contractor: ABC Earthwork	Weather/Temp: Cloudy
Present at Site: Dalton - ABC; Dennis - Earthwork; Jim - S&ME	
Time: 4.5	Mileage: 40

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:

Went to job site. Earthwork not to work today due to overnight Rain. 4" overnight. ABC Cleaning up - Roads Haul Road - on Pond - set not to place fill today. Checked Erosion control sediment fence. Rock check dams set. No problem noted today.

On-Site Representative/Company

Jim Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
01-06-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt.

Weather/Temp: Rain

Present at Site: Dalton - ABC; Jim SMe.

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 Visit

Time: 3. ✓

Mileage: 40

Observations/Remarks:

Went to job site. Earnhardt Const. not on site today - ABC on site pushing out piling ash that had been placed last week. No other work to be done. Since last night 1" of rain had fallen. Sed pond not draining properly. Talk with Kyle about fencing. Also talked to Ron R & Jason R about fech on test pads

_____ On-Site Representative/Company

_____ S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
01-07-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt

Weather/Temp: Rain

Present at Site: Dalton - ABC; Jim - Stone

Time: 2, ✓

Mileage: 40 ✓

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 Visit

Observations/Remarks:

Went to job site check Erosion Controls (Raining)
ABC working on Haul Roads only.
Check Sed fence at Borrow site, in good shape.

On-Site Representative/Company

J E McCutchon
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
01-08-09	1356-06-825-09

Project/Location: Allen Ash Landfill.

Contractor: ABC Earnhardt

Weather/Temp: P/Cloudy

Present at Site: Dalton - ABC; Jim - S&ME

Time: 3

Mileage: 40

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 Visit Erosion Control

Observations/Remarks:

On Site Earnhardt not working. ABC still doing clean up. Total Rain fall 1.8 inches. Silt fence in good shape. no washouts. Some to clean up sediment.

On-Site Representative/Company

J. M. Cutshaw
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
01-09-09	1356-06-825-09

Project/Location: Allen - Ash Landfill.

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 Visit

Contractor	Weather/Temp
ABC/Earnhardt.	Clear

Present at Site: Dalton - ABC; Ted - Duke; Jimmy A / Stone; Jim M

Time	Mileage
4.5	40

Observations/Remarks:

With Jimmy Addis after talking with Ken D. about job site. Took some equip to Conex for office use. Went around job site talk with Contractor ABC. Dalton. Talk with Ted Mann. Duke Power.

_____ On-Site Representative/Company

J E M Eutchison S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
01-02-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt

Weather/Temp: P Cloudy

Present at Site: Dalton - ABC; Dennis - Earnhardt; Timmy A & S&ME; Tim M

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): Sitework.

Time: 3. ✓

Mileage: 40 ✓

Observations/Remarks:

S&ME on site for fill placement and if needed Density testing. Work w/ Timmy Addis #356 to get oriented with Job Site. Fill being pushed out but still to wet to test. Left job site early for appointment

J E M Critchon

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-13-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
ABC/Earnhardt	P/Cloudy

Present at Site:
Dalton - ABC
Dennis - Earnhardt
Jimmy A - S&ME
Jim M -

Time	Mileage
7. ✓	40 ✓

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 Work

Observations/Remarks:

ABC - On site with Jimmy A of 1356. Monitor fill placement and area is being cut down to promote drying. Also after some grades were shot on the South west area it was determined that the area was approx 4-5' high and needed to be cut down. ABC started doing so.

Earnhardt - Unloading materials for the cap - and placing pipe and loop into the sediment area. Pipe bedded in rock and backfill with select fill.

See Jimmy A Report for more details.

J E M Cutchin

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 13, 2009	1356-06-825 PHI
Project/Location	
Plant Allen RAB Ash LF/Belmont NC	
Contractor	**Weather/Temp**
ABC/Earnhardt	PC/30-47°
Present at Site	
Dalton Lambert Dennis Foltz	
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:

ABC hauling flyash out of pond #1, w/ ten tandem-axle dump trucks, piling in cell #1 NW & SE areas. Started to spread out piles of flyash on the NE area of cell #1, ash is still pretty wet. Got onto contractor about spreading flyash too thick, will thin when it dries more. Two more ud tubes (30") were pushed in the compacted soil liner test pad, these were to retest lift #1. Measured and removed three settlement plate extensions.
#1 (W) 106.5" ~ 638.685 (above existing subgrade ~ elevation of top extension left in place).
#2 (S) 105" ~ 637.452
#3 (N) 54.5" ~ 642.544
EG laid 24" double barrel ADS-N12 pipe out of DI-7, bedded and backfilled up to spring line w/ #57 washstone. Each run ~ 4 joints / 80 lf ~ 160 lf total. DI-7 ~ 6'x4'x3.5'. Still continue to receive construction materials ~ 8 mil plastic - sand bags - GCL and geocomposite 350-2-8, delivered today. I requested copies of bill of lading from Dennis.

On-Site Representative/Company

Jimmy H. Addip
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-14-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt

Weather/Temp: Clear

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jimmy A; Jim M (Some)

Time: 10.5

Mileage: 40

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): Paperwork

Observations/Remarks:

On site w/Jimmy A site orientation - Conduct density test's of placed fill (Ash) in Cell #1 9 tests conducted today ABC Hauling with 9 trucks from Ponds 1 + 2.
Work on paperwork to assure locations and Proctors used.
Earthards placing pipe at sediment pond - and unloading Materials at Lay down area -

Jim Cutchen

On-Site Representative/Company _____

S&ME Personnel _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 14, 2009	13560-06-825 Ph.9

Project/Location: Plant Allen RABAsh LF / Belmont NC.

Contractor	Weather/Temp
ABC/Earnhardt	Sunny/29° - 45°

Present at Site: Dennis Foltz, Dalton Lambert - Cavin Bryant

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:

ABC hauling flyash out of ponds 1 and 2, stacking in piles along East side of cell #1. Flyash being spread on the NW area of cell #1. Today nine field density test were performed on flyash placement. All test met projection specifications for moisture and compaction, refer to attached data sheets. Informed Dalton (ABC) of test results. ABC had Earnhardt set stakes on the SW side, they were way high on this area 3 to 6 feet. Started pushing overbuild area to the North, and piled.

Earnhardt backfilled double 24 inch storm drain line out of DI-7, used material excavated out of future access/entrance roadway. Sealed up DI-7 w/ brick and mortar. Continue to receive const. materials ie: geocomposite & GCL.

On-Site Representative/Company

Jimmy H Addis
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-15-09	1356-06-825-09

Project/Location: Allen Ash Landfill.

Contractor: KBE/Earnhardt

Weather/Temp: clear cold.

Present at Site: Dalton KBE, Danny Earnhardt, Jimmy A. } S&ME, Jim M

Time: 2.5

Mileage: 40

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 Visit

Observations/Remarks:

Went to job site got with Jimmy A. Rev paperwork to complete paperwork and work on needed paperwork Show jimmy A. Borrow Area + Erosion control methods

_____ On-Site Representative/Company

Jim Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 15, 2009	1356-06-825

Project/Location: Plant Allen RAB Ash 2F / Belmont NC

Contractor	Weather/Temp
ABC / Earnhardt	Sunny / 32-43°

Present at Site: Dalton Lambert, Dennis Foltz

Time	Mileage
11.0	50.0

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:

ABC hauling flyash out of ponds 1 and 2 with 10 tandem-axle dump trucks. Flyash being dumped in piles along east side of cell #1. I ran 3 field density test (drive tube method) on flyash placement today, all met project specifications. Informed Dalton of test results.

Observed Earnhardt as they started excavation of the 36 inch culvert at the sediment basin. Subgrade at 6 inches below pipe invert was wet and seeping water for the 1st & 2nd joints of pipe. EG bedded w/ #57 washstone. Backfilling w/ ABC stone to 6 inches above pipe, placed in approximately 12 inch lifts and compacted w/ hand tamp and ramx. 80LF of 36" ADS-N12 pipe (smooth walled) laid today. Excavation secured up at end of day. EG received more geocomposite today.

Could not get nuclear guage, unable to test ABC, scheduled for 1-16-09 am, thru Ron Harris.

On-Site Representative/Company

Jimmy Addie
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-16-09	1356-06-825 9

Project/Location: ALLEN RAB ASH LANDFILL

Contractor:

Weather/Temp:

Present at Site: KEVIN DEMBIK, JIMMY ADDIS

Time: 3 1/2 V

Mileage: 20

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:

SME TECH ON SITE FOR NDT. 36" CULVERT 80'-90' FROM S END.
UPON ARRIVAL, NO ABC PLACED. OFF SITE TO ALLEN SILOS FOR DENSITY TESTING.
UPON RETURNING, ABC PLACED + COMPACTED. NO NDT OF ABC DUE TO TWO LIFTS OF ASH PLACED + COMPACTED.

On-Site Representative/Company

KEVIN DEMBIK
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 16, 2009	13560-06-825

Project/Location: Plant Allen RAB Ash LF / Belmont NC.

Contractor	Weather/Temp
ABC/Earnhardt	Sunny Cold/15-30°

Present at Site: Dalton L., Dennis F., Kevin D.

Time	Mileage
10.0	50.0

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:

ABC hauling flyash out of ponds 1 and 2 placing in piles on the North side of cell #1. Still cutting down SW area, that was overbuilt, pushing over slope and N towards ramp into cell #1. I ran 6 field density test today, all passed. Informed Dalton of test results. Earnhardt backfilled w/ soil above 36 inch culvert. I ran 3 field's on pipe backfill, all exceeded 95% compaction. Informed contractor of test results. Kevin onsite at 2:15 w/ nuke guage, EG not ready to test, told him to return around 3:30 and check on them. Refer to his report for data. Six loads of geocomposite delivered today, EG unloaded.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-19-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt

Weather/Temp: Cloudy/Drizzle/Cold

Present at Site:
Dalton - ABC
Denner - Earnhardt
Jim - S&ME

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): Monitor Pipe Work

Time	Mileage
10.5	40

Observations/Remarks:

ABC hauling to NE corner of fill area Cell 1 Trench area pushed out over weekend and rolled - Still very wet. not able to test.
Earnhardt - Placing pipe along side and across Haul Road. Pipe being bedded in 57 stone? and compacted as much as possible around sides of pipe with atleast 6" surrounding pipe and on top. Back fill with material excavated.
Nuclear density conducted 92% compaction req. 98%

On-Site Representative/Company

Jim Eitkhen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

JAN 20 2009

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
Jan. 19, 2009	1356-06-825

Project/Location: Plant Allen RAB Ash LF / Belmont NC

Contractor: ABC / Earnhardt

Weather/Temp: PC / 27°

Present at Site: Dalton Lambert, Dennis Foltz

Time: 5.0

Mileage: 50.0

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:

ABC hauling flyash out of ponds 1 and 2 with 10 tandem-axle dump trucks. Ash being piled on North end of cell #1.

Earnhardt resumed excavation and placement for the 36 inch culvert, along Ash blvd.. Area I saw today was dry, contractor bedding w/ ABC stone. I left jobsite at 10:30, and went into office. Jim McCutheon to take over site, until I return.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-20-09	1356-06-825-09

Project/Location: Allen Ash landfill

Contractor: ABC/Earnhardt

Weather/Temp: am Cloudy/Snow pm Clear 20°F

Present at Site: Dennis - Earnhardt; Jim - S&ME

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): Monitor Pipe

Time: 8½ .5 ✓

Mileage: 40 ✓

Observations/Remarks:

ABC Not Working Today.
Earnhardt Const placing 36" Pipe across the Ash Blvd to East side of Road at field pipes. Pipe Bedded in 6" of ABC stone and wrapped with stone to include 6" of ABC on top of pipe. Due to the slow delivery of stone to the site this took all day to complete. Also fill placed over pipe for back fill not tested yet Contractor wanted to Run trucks over the area for a few days to compact.

On-Site Representative/Company

J E M Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-21-09	1356-06-825-09

Project/Location: Allen Ash Landfill / Sed Basin

Contractor: Earnhardt ~~Grove~~

Weather/Temp: P/Cloudy

Present at Site: ✓

Time: 110

Mileage: 40

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) Rock / Soil UC Monitor Geotextile

Observations/Remarks:

On Site today working with Earnhardt Const. Today they are Undercutting Roadway on Top of Berm adj to Sed Basin. After Conferring with Ken Daley ref UC & placement of Geotextile STO and depth of Stone it was decided to place Geo Textile Running N+S across the Ditch to the South Side of Roadway overlap. 3' and place 1½' of Stone on top. Area UC 4' to allow for 1½' of Clean Soil fill and then another 1' of Stone. The Area Cut out 300'X40' approx. For today only stone placed on partial roadway.

Also Proofroll Roadway on top of Berm for East end at Rocked Roadway Tower and to edge of fill area approx 875' long. 12' wide. This area proofrolled firm and stable and Rock can be placed.

_____ **On-Site Representative/Company**

J E McCutchen **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 22, 2009	1356-06-825 PH9

Project/Location
Plant Allen RAB Ash LF / Belmont NC.

Contractor	Weather/Temp
ABC / Earnhardt	Sunny / 29-50°

Present at Site
Dalton Lambert
Dennis Foltz

Time	Mileage
12.0	50.0

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 ABC hauling very wet flyash out of pond #1 w/ 8 to 10 tandem-axle dump trucks, ash being piled midway along West side of cell #1. I performed six field Density test on the North side of cell #1 today. All test passed required project specifications, informed Dalton of test results. ABC cut dump trucks off at 3:30 today.

Earnhardt covering Mirafi HP570, that was deployed yesterday with a 18 inch bridge lift of ABC stone, on future South roadway beyond cell #1. I looked at South rdwy. from between cells 1 & 2 to tie in w/ existing rdwy. on East side of cell #2. for Earnhardt. Jim McCutcheon proofrolled yesterday, I called him to verify. Road subgrade was still frozen, when I looked at around 10am. I recommended to allow rdwy. to thaw out, then dip off a tenth or so. Looked at rdwy. "pm" after it was dipped looked O.K., EG put down Mirafi 600X, and started ABC placement.

Jimmy A Iodio

On-Site Representative/Company — **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-23-09	1356-06-825-09

Project/Location: Allen Dry Ash Landfill.

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): Paperwork on Densitys

Contractor	Weather/Temp
Earnhardt/ABC	Clear

Present at Site: Dalton - ABC; Dennis - Earnh.; Jimmy A } S&ME; Jim M -

Time	Mileage
3.	40

Observations/Remarks:

Went to job site worked on density location! Paperwork for job. No other work to be done

_____ On-Site Representative/Company

_____ S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 23, 2009	13560-06-825 Ph9

Project/Location: Plant Allen RAB Ash LF/Belmont 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
ABC/Earnhardt	Sunny/32°-57°

Present at Site: Dalton Lambert, Dennis Foltz

Time	Mileage
12.0	50.0

Observations/Remarks:

ABC did not haul any flyash today. They had all four dozers in cell #1 spreading & thinning, along w/ the smooth drum roller compacting. I ran six field density test in cell #1 today on the flyash. All test exceeded required compaction of 95%. Informed contractor of test results. D.L. Lawrence surveyors staked East half of cell #1 today.

Observed Earnhardt as they started access road/entrance facility grading. All ABC stone taken up was stockpiled for reuse. Graded ABC on access road East of cell #1.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-23-09	1353-08144-200

Project/Location: Allen Dry Ash handling

Contractor	Weather/Temp
Crowder	Clear

Present at Site: Steve - Crowder; Jim - Stress

Time: 3.

Mileage: 40

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:

I Went to job site found there was no work this AM. But needed Density in PM. I on want to location and determined that tests needed were load bearing tests and needed Equipment to preform. Went to office to find equipment. None available did find some pipe + pieces to put together a DCP Hammer. Talk with Steve going to put off testing till AM. Monday

J E McCutchen

On-Site Representative/Company _____

S&ME Personnel _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 24, 2009	1356-06-825

Project/Location: Plant Allen RAB Ash LF / Belmont NC.

Contractor	Weather/Temp
ABC / Earnhardt	Cloudy / 44-55°

Present at Site: Dalton Lambert, Dennis Foltz

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:

Observed ABC spreading and compacting flyash in cell #1 today, on the north side. Trucks not hauling today. I ran ten field density test in cell #1 today, all test passed project specifications. Informed Dalton of test results. Took in 5 ash proctor samples for testing.

Earnhardt continued entrance/access roadway cut, material hauled to South access road and placed over ABC stone. One felt run on soil backfill, exceed 95% compaction. Informed Dennis of test results. South rdwy. sealed down w/ smooth drum.

On-Site Representative/Company

Jimmy Addo
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 26, 2009	1356-06-825

Project/Location
Plant Allen RAB Ash LF / Belmont NC.

Contractor	Weather/Temp
ABC/Earnhardt	Cloudy / 36°

Present at Site
Dalton Lambert
Dennis Foltz

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:

ABC spreading / thinning flyash in cell #1, all four dozers working in cell #1, smooth drum rolling. Informed Dalton that surveyors would be onsite this Wednesday to do final rough subgrade shots.

Earnhardt excavating in ash now at facility area, this material is being hauled to cell #1 East embankment. This area will be undercut 2 feet below subgrade, and capped w/ 2 feet of soil, where need be, 1 foot soil & 1 foot ABC to be placed where AR is finish grade. I left site at 11am, Jim McCutcheon took over monitoring of jobsite, see his report.

Jimmy Addis

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
1-26-09	1356-06-825-09

Project/Location: Allen Ash Landfill

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): Relative Jimmy A.

Contractor	Weather/Temp
ABC-Earnhardt	Cloudy -

Present at Site: Dalton - ABC; Dennis - Earnhardt; Jim - S&ME

Time	Mileage
4.	40

Observations/Remarks:

Went to job site ABC not hauling today. Surveyor's shooting grade. And found that most of N end of fill area to high and needed cut down. ABC attempting to cut down. at the time not ready for tests till later in PM.
Later still not ready - Will test in AM.
Earnhardt placing fill around bottom slope of fill area on SE and South end. between white stake and berm slope not at present prepd for testing.

_____ On-Site Representative/Company

Jim Gibbon S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 27, 2009	13556-06-825 Ph.9

Project/Location: Plant Allen RAB Ash LF / Belmont 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
ABC / Earnhardt	Cloudy / 40°-50°

Present at Site: Dalton Lambert, Dennis Foltz

Time	Mileage
11.0	50.0

Observations/Remarks:

Observed ABC fine grading and placing ash where needed. Overbuilt areas of ash are being pushed to the West & Southwest slopes and piled up for Earnhardt to doing something with. Ted Manes questioned me on 1-24-09, about all the loose ash along the western edge of cell #1. I informed him that when Earnhardt resumed embankment fill placement, I would recommended benching into the loose ash and spread it out so it could be compacted. I ran four field density test (fdt's) on ash placed and compacted in cell #1 today. All test passed, informed Dalton of test results.

Earnhardt continued to cut facility area to grade, material (ash) being hauled to the West & South embankments. Dozer operator is benching into existing slope / loose ash. Four fdt's run on materials placed, all passed. Informed Dennis of test results. Sides seeding onsite, hydroseeded sediment pond and one slope on West side of facility entrance (old ash structural fill).

On-Site Representative/Company

Jimmy H. Addis
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 28, 2009	1356-06-825 PH9
Project/Location	
Plant Allen RAB Ash LF/Belmont NC	
Contractor	**Weather/Temp**
ABC/Earnhardt	Cloudy / 42-60°
Present at Site	
Dalton Lambert Dennis Foltz	
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:

Earnhardt completed facility area excavation to minus two feet below subgrade, due to flyash. I proofrolled the area w/a loaded Cat 740 articulate dump truck. Majority of area appeared stable, did have one area that I observed pumping and rutting. I recommended to undercut to stable conditions. Area measured 40'x40'x1.75', ten Volvo 730 loads taken out and hauled to cell #1. I observed fill placement (ash) on the West emlankment, and the undercut area was filled in w/ soils out of the borrow area. Three fdt's run today, all exceeded 95% compaction. Informed contractor of test results.

ABC continues to fine grade cell #1 floor. Meade Gunnell doing final rough subgrade shots. Site rained out around 3pm.

On-Site Representative/Company

Jimmy Addis
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 29, 2009	1356-06-825 Ph9

Project/Location
Plant Allen RAB Ash LF / Belmont 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
ABC / Earnhardt	Sunny / 40-52°

Present at Site
Dalton Lambert
Dennis Foltz
Ted Manes
Jeff

Time	Mileage

Observations/Remarks:

Site had 3/10's of an inch of rainfall on the 28th. Earnhardt did not work today.

ABC continues to fine grade the cell #1 floor. Meade Grunnell finished up rough subgrade shots, this afternoon. I spoke w/ Kyle B. about rough subgrade tolerance +/- 3" ≈ .25. I plotted foll's that I have run since 1-14-09. Wrote field reports for the week. I took four flyash samples into lab for proctor testing.

On-Site Representative/Company

Jimmy Adkins
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
12-19-08	13506-825-09

Project/Location: Allen Ash Landfill

Contractor: ABC/Earnhardt

Weather/Temp: Cloudy

Present at Site: Dalton [illegible] Dennis Earnhardt [illegible] - SMC

Time: 8.

Mileage: 40

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): Jig Placement

Observations/Remarks:

ABC hauling from Ponds #1 & 2 into Cell #1 using 8 trucks - placing fill in NW section of Cell 1 and pushing out to let dry before testing.

Earnhardt - Cutting down to grade in Cell #1 for test cap placement and also prep pad for cap. Surveyor staked out entire pad for grade to include slope and bench - no work to be done today

J E McCutchen

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
Jan. 12, 2009	13560-06-825 Ph9

Project/Location: Plant Allen RAB Ash LF

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
ABC/Earnhardt	Sunny/32-50°

Present at Site: Dalton Lambert, Dennis Folks

Time	Mileage
11.0	50.0

Observations/Remarks:

Observed ABC excavating and hauling flyash out of pond #2, w/ 5 trackhoes and 10 tandem-axle dump trucks. Flyash being piled in cell #1 NE & SE areas, ash is very wet. ABC's smooth drum roller is down, got another onsite around 5pm, no compactive effort today. I sat in on construction progress meeting (10-1) today. Toured jobsite w/ Ken & Kyle.

Earnhardt Grading receiving materials today: 6 loads of GCL delivered, have not inventoried yet. Observed excavation for double-barrel 24 inch storm line out of sediment basin, towards DI-7, some water seepage observed, bottom of excavation bedded w/ 8 to 10 inches of #57 washstone.

On-Site Representative/Company

Jimmy H. Addis
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 1-30-09	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill -	
Contractor: ABC/Earnhardt	Weather/Temp: Clear
Present at Site: Dalton - ABC Dennis - Earnhardt Jim - S&ME	
Time: 7.5	Mileage: 40

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): Sitework

Observations/Remarks:

S&ME on site to monitor site work and conduct density tests as needed. ABC still cutting high area's and pup slopes to grade.

Earnhardt placing fill in Scale area 1½' and compacting same night at 4 pm before completely rolled in for testing. Also hauling fill to place on South end of Slope of Ash fill area. Dirt being push out as they go and Rolled with 815 compactor none prepd for compaction as of yet - it appears as though the material may need some water to achieve compaction as it is very dry and dusty coming from the borrow site. A proctor sample taken to bring into the lab.

On-Site Representative/Company

J. M. Cutchin
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 2-3-09	Job No. 1356-06-825-09 ~~1358-06-785-09~~
Project/Location: Allen Ash Landfill	
Contractor: Earnhardt	Weather/Temp: Clear
Present at Site: Dennis - Earnhardt; Jim - S&ME	
Time: 2.	Mileage: 40

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:

Went to job site Earnhardt had everything on West and South side of fill area. Scarified drying due to .3" of rain overnight. Talked with Dennis of Earnhardt he stated they had a change of plans for today and were not going to haul today and needed to dry out the area.

On-Site Representative/Company

Jim Gitchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 2-4-09	Job No.: 1356-06-825-09
Project/Location: ALLAN Ash Landfill	
Contractor: Earnhardt	Weather/Temp: clear
Present at Site: Dennis - Earnhardt; Jim - S&ME	
Time: 9.5	Mileage: 40

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 on site to monitor fill placement and conduct density tests. Most areas wet and frozen. Contractor scarified West side of fill between fill & Road & density test conducted in this area. Must reprocess.

On-Site Representative/Company

J E McCutchen
S&ME Personnel

FEB 5 2009

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
2-5-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor:

Weather/Temp: clear / 20's

Present at Site: Brett Hixson, Kevin Dembik } S&ME

Time: 6 hr. ✓

Mileage: 40

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:

S&ME tech on site to assist K. Dembik w/ HA/DCP tests. Five tests were performed to a depth of 5' each. See field report of K. Dembik for test results.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 2-5-09	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill	
Contractor: Earnhardt	Weather/Temp: Clear
Present at Site: Dennis - Earnhardt; Jim M - S&ME	
Time: 9.5	Mileage: 40

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 On site today for density testing of structural fill being placed on the West side of Cell 1 between slope and Roadway. All density test conducted were 95% or better as per requirements. Also Earnhardt cont placing bore and pipe for mud roadway. No backfill placed as of yet. Ready for inspection testing. Assisted Nevin & Britt at footing on S side of pipe for Bridge Adj to New Soon to be Stair for Dry Ash handling.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

FEB 6 2009

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
2-6-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt

Weather/Temp: clear/20's-50's

Present at Site: Brett Hixson - S&ME

Time: 10 hr. ✓

Mileage: 40

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:

S&ME tech on site to perform FDT's @ W base of Ash Landfill + @ pipe @ intersection of existing road + new road.

- One test was taken @ fill placed over pipe which met requirements w/ 99.4% compaction and 26.3% moisture. 2nd lift was not placed.

- Six tests were performed @ equal distances along West base of Ash landfill from N to S. results were as follows.

  Test 1 - met req. w/ 100% comp & 18.1% moisture
  * test 2 - did not meet comp req. w/ 94.7% comp & did not meet moisture w/ 21.2%
  * Test 3 - did not meet comp or moisture req. w/ 93.4% comp and 17.6% moisture.
  Test 4 - met req. w/ 97.9% comp & 18.9% moisture
  Test 5 - met req. w/ 101.1% comp & 26.6% moisture
  * Test 6 - met req. w/ 99% comp & did not meet moisture w/ 26.2%

- Supervisor w/ Earhardt grading was informed of failing areas w/ test 2 & 3 being Dry and test 6 being wet.
- 95% compaction req.

FEB 9 2009

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 2-9-09	Job No.: 1356-06-825-0
Project/Location: Allen Ash Landfill	
Contractor: Earnhardt	Weather/Temp: Clear
Present at Site: Dennis - Earnhardt; Jim - S&ME	
Time: 10.✓	Mileage: 40

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 on site for Density Testing of structural fill placed on Phase 1 West and south side. Monitor fill placement / compaction. All tests + 95%

Also monitor work on new Roadway adj to Allen Plant Rd up to New Scale location. 2 catch basin pipes and junction Box on N end of Road. Fabric and Rip Rap placed. W ~~pond~~ inlet.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 2-10-09	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill (Struct. Fill)	
Contractor: Earnhardt	Weather/Temp: P/Cloudy
Present at Site: Dennis - Earnhardt; Jim - S&ME	
Time: 10. ✓	Mileage: 42 ✓

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 on site for Density Testing and Monitor Fill Earnhardt placing structural fill on west side of Ash fill and east side of existing roadways. I talked with Ken Daley ref. frequency of testing which was every 5000 SF. Now it is 1 test per Acre. Fill being placed approx. 8" to 1' thick. and compacted with 815 Roller. Density test today (3) all within spec - 100% compaction

_____ On-Site Representative/Company

J E McCutchen FEB 11 2009
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
2-11-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt

Weather/Temp: Cloudy

Present at Site: ✓

Time: 10.5 ✓

Mileage: 40 ✓

To: _____

Services Performed

- [x] Concrete Testing
- [ ] Cylinder Pickup
- [ ] Asphalt Testing
- [ ] Steel Testing
- [ ] Asphalt Coring
- [ ] Concrete Coring
- [ ] Undercut Evaluation
- [ ] Foundation Evaluation
- [x] Proofrolling
- [x] In-Place Density
- [x] Other (Explain): Rebar inspection

Observations/Remarks:

S&ME Technician on site and Conducted Rebar inspection for South side of Bridge footing. Footing formed on top of 2'x5' of lean concrete fill. Rebar as per attached drawing with adequate overlap of bars and clearance.

While going over Concrete Specification I have noted that the required Slump was 3" only. I talked with Ken Daley about this because the Contractor did not think this could happen and Ken later advised me that the slump could be 4" with deviation of +-1". Concrete placed at 1030 hrs. 1 set of 5 cylinders made by myself and Brett H. I monitored the rest of the concrete being placed until its finish.

Earnhardt placing structural fill on west slope of phase 1 adj to Roadway. Density tests conducted all pass 95%+.

Also ABC Placing ash in Phase 2 berm on east side of Phase cell. At this time they are only stock piling.

Proofroll new roadway from existing asphalt up to existing gravel road to Ash landfill Roadway firm and stable used loaded 30ton off Road TRK. No problems noted. Roadway then Rocked.

On-Site Representative/Company

J. M. Cuthbertson
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date 2-11-09	Job No. 1356-06-825-09 300
Project/Location Allen Ash Landfill (Bridge)	
Contractor Crowder	Weather/Temp Cloudy
Present at Site Site Worker Brett/Jim - S&ME	
Time 1 hr.	Mileage 40

To: _____

- [x] Concrete sampling and testing — SCM, 4000 psi, Air Entrained
- [ ] Grout sampling and testing
- [ ] Mortar sampling and testing
- [ ] Sample locations attached
- [ ] Picked up _____ sets, logged

Cast 1 sets of 5 cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Mix design 40625 Design compressive strength 4000
Addition of water authorized by: _____

Set Number	Truck Number	Ticket #	Time Batched	Time Truck Arrived	Time Sampled	Time Truck Completed	Water Added (gal)	Slump (in)	% Air	Unit Weight of Concrete (pcf)	Temp. of Air (°F)	Temp. of Concrete (°F)	# Cylinders Cast	Location
1	9503	63443	9:52	N/A	10:30	N/A	0	4½	4%	149.48	59	62	5	Plant 30 - SCM

Comments/Location: Formed Footing for Bridge South Side of Flow Pipes.

_____ On-Site Representative/Company

_____ S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services an has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods o other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRCR03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
2-12-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor:

Weather/Temp: clear/60's

Present at Site: Brett Hixson, Jim Mc., Kyle B. } S+ME

Time: 3 hr.

Mileage: 40

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:

S+ME tech on site to assist staff proff. w/ HA/DCP tests. See field report of Kyle B. for test data/results.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-12-09	1356-06-825-09

Project/Location: Allen Ash Landfill (Structural Fill)

Contractor	Weather/Temp
Earnhardt	Clear Buggy

Present at Site: Dennis - Earnhardt; Dalton - ABC; Jim - S&ME; Site Work Personnel

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): Monitor Fill

Time	Mileage
10.	40

Observations/Remarks:

AM - Went to Office to gather HA/DCP Equipment for job.
At Allen - Assisted Kyle of 1356 with Hand Auger DCP on Footing for Bridge on North side of Ash Piper Scale Side until the Arrival of Britt who then assisted him. See Kyles Report for test information.
Conducted density tests on Structural fill being placed on West side of Ash fill East side of Ash Road. 95% required 95% + Compaction achieved, 98 to 100%
Also monetor placement of Ash in place to Berm east side adj Roadway.

FEB 16 2009

J E McCutchen

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2/12/09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt

Weather/Temp: 60s / sunny

Present at Site: Kyle, Jim, Brett - S&ME
Site Works

Time: 9:30 - 4:15

Mileage: 40

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:

Performed four hand auger /DCPs. HA-1 went to depth of 1 foot (refusal); offset twice and still hit refusal at 1 foot depth. HA-1 through HA-3 had greater than 12 bpi at bottom of excavation (2 foot embedment depth). HA-4 had less than 12 bpi above three feet below bottom of excavation. Ash was also encountered during this hand auger. After talking to Jason Reeves, I advised Site Works to overexcavate another three feet. Excavation continued to the south end of the footing at three feet overexcavation. Stratigraphy looked similar to that of HA-4 so three feet overexcavation continued to the south end of the footing. Length of three feet overexcavation was approximately 35 feet by 5 feet wide.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
5-13-09	1356-06-825-09

Project/Location: Allen Ash Landfill.

Contractor: Earnhardt. **Weather/Temp**: Clear

Present at Site: Dennis - Earnhardt; Jim - S&ME

Time: 9. ✓ **Mileage**: 40 ✓

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 on site for density test of structural fill placed on west side of Phase 1 fill and East side of Roadway. Tests conducted today were 97% compaction.

Earnhardt started the fine grade of ash for clay liner

J. M. Gretchen

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-16-08	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt/ABC

Weather/Temp: Clear

Present at Site: Dennis Earnhardt, Dalton - ABC, Jim - S+ME

Time: 10. ✓

Mileage: 40

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): Monitor fill

Observations/Remarks:

On site today for fill monitoring + Density testing. Today West side of Phase I fill and east side of haul road. Density tests today 9520+; Earnhardt finishing grading Ash fill and placing 3' berm on top around fill. As much as 1 ft. of Ash having to be removed to get to grade. (After Survey.)

ABC Hauling Ash into phase II for Berms. Starting to push out to dry for testing.

Talk with Kyle (S+ME 1356). Brief on what is going on today.

_____ On-Site Representative/Company

Jim Cutchen. S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-17-09	1356-06-825-09

Project/Location: Allen Ash Landfill (SF)

Contractor: Earnhardt/ABC

Weather/Temp: Clear

Present at Site: Dalton - ABC; Dennis - Earnhardt; Sidewalks; Jim - S&ME

Time: 10.

Mileage: 40

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 on site today for fill placement and density testing. Fill being placed between roadway and west side of Ash. Berm for structural fill. Due to material being dry 16% water added throughout the day. Also grading on Ash fill continuing to prep for clay liner. And berm placement on top of Ash at top of slope.

ABC still placing fill in Phase II for Berm and trying to dry out. and placing ash for ramp on NW corner of Ash fill.

Checked Erosion Control as requested by Jed Mann and found that ash was washing from Borrow site down on to Lower Canal roadway. Walk the perimeter on top and found that from Previous hard rain ashute back at haul spilled over the rock check dam - and flowed to low area. Earnhardt had done some repair and today worked on the check dam area. Jed Mann (DP) Requested that Ken Daley (1356) come up with a fix for this problem. i.e.. Sed pond ect. I notified him on this

J. M. Crutchfield

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-18-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt | **Weather/Temp**: Rain

Present at Site: Dennis - Earnhardt; Jim - S&ME

Time: 2. ✓ | **Mileage**: 40. ✓

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:

Site visit due to Rain no work to be done today except for some clean up. Also in office talk with Kyle B. (PM)

On-Site Representative/Company

J E McCutchon
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-19-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt ABC

Weather/Temp: Clear.

Present at Site: Dennis - Earnhardt; Dalton - ABC; Jim - S&ME

Time: 10.

Mileage: 40

To: _____

Services Performed

- [x] Concrete Testing
- [ ] Cylinder Pickup
- [ ] Asphalt Testing
- [ ] Steel Testing
- [ ] Asphalt Coring
- [ ] Concrete Coring
- [ ] Undercut Evaluation
- [ ] Foundation Evaluation
- [ ] Proofrolling
- [x] In-Place Density
- [ ] Other (Explain)

Observations/Remarks:

On site for - FDT. Ash/Structural Fill and Concrete.
ABC only cleanup today. Roadways ect.
Earnhardt prep area to place fill. And placed fill for structural fill on west side of Ash. Also stockpile clay. Pick up paperwork prepared by Kyle B. (pm). Density tests taken - 9520+
Site work. had canceled concrete for today but later ~~Contact~~ change and placed concrete at 1:30 pm using pumptruck. 35cy placed no problems noted.

On-Site Representative/Company

Jim Critchlow
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
3201 Spring Forest Road
Raleigh, NC 27616
(919) 872-2660
(919) 876-3958 fax

Field Report

Date: 2-19-09	Job No.: 1356-06-825-09 200
Project/Location: ALLEN ASHLAND FILL BRIDGE FOOTING	
Contractor: SITEWORK CONCRETE	Weather/Temp: SUNNY-WINDY 40s
Present at Site: JIM McC ACE / S&ME	
Time: 3.5	Mileage: 40 RT

To: _____

- [x] Concrete sampling and testing — Cast 1 sets of 5 cylinders/prisms/cubes/beams
- [ ] Grout sampling and testing — Cast ____ sets of ____ cylinders/prisms/cubes/beams
- [ ] Mortar sampling and testing — Cast ____ sets of ____ cylinders/prisms/cubes/beams
- [ ] Sample locations attached — Mix design 4000 25 AE — Design compressive strength 4000
- [ ] Picked up ____ sets, logged — Addition of water authorized by: ____

Set Number	Truck Number	Ticket #	Time Batched	Time Truck Arrived	Time Sampled	Time Truck Completed	Water Added (gal)	Slump (in)	% Air	Unit Weight of Concrete (pcf)	Temp. of Air (°F)	Temp. of Concrete (°F)	# Cylinders Cast	Location
	3505	22049	12:14		12:50			3.5"	3.8	150.8	50	60	4	

Comments/Location: S&ME REP. ON SITE AS REQUESTED TO SAMPLE & TEST CONCRETE BEING PLACED VIA PUMP INTO NORTH SIDE FOOTING FOR FUTURE BRIDGE.

_____ On-Site Representative/Company

John A. Jinkins (ACE) S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRCR03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
2-20-09	1356-06-82509

Project/Location: Allen Ash Landfill

Contractor: Earnhardt/ABC

Weather/Temp: Clear

Present at Site: Dennis - Earnhardt; Dalton - ABC; Jim - S&ME

Time: 10.5 ✓

Mileage: ✓40 x2

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:

On site for field density testing - Monitor fill placement of structural fill and Ash in PHASE II.
Conducted density test of placed fill Cell 1 West side adj to Roadway. All tests 95%+ as required. Monitor fill placement - and added moisture (Water Trk)
ABC placing fill for ramp on NW corner of Cell I
Non tested - all wet.

Pick up Cyl. from pour bridge footing. Log in strip.

On-Site Representative/Company

S&ME Personnel

FEB 23 2009

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-23-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt/ABC

Weather/Temp: Clear Cold wind

Present at Site: Dennis - Earnhardt; Dalton - ABC; Jim - S&ME

Time: 9.

Mileage: 80.

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:

Earnhardt placing fill east side of Road to West Ash for structural fill. only on NW end as the other is at grade. Density test taken as placed. All tests 95% or +.
Also still cutting Ash to grade for Clay liner which should start this week once Berms are completed around top of Cell.
ABC placing ash for Ramp on NE end of Ash landfill for Roadway, Pushing out material placed for berm on east side of Phase II to dry for testing. Still needs to dry.
Site Work strip forms for bridge footing.
Crowder Starting to dig on W side of Ash Blvd to place electrical conduit.

J E McCutchen

On-Site Representative/Company _____ **S&ME Personnel** _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-24-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
Earnhardt ABC	Clear cool

Present at Site: Dennis Earnhardt, Dalton - ABC, Jim - S&ME

Time	Mileage
4. ✓	40 x 2

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:

Structural fill being completed on west side of Ash fill except for placement of top layer. Density tests taken 95% or better. Phase II

ABC placing fill for Ram on NE corner of Ash fill Phase I

Went home early due to illness

On-Site Representative/Company

Jim Crotchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-25-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt / ABC

Weather/Temp: Cloudy

Present at Site: Dennis Earnhardt, Dalton - ABC, Jim - S&ME

Time: 9.

Mileage: 40 x 2

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): Monitor Fill

Observations/Remarks:

S&ME on site for density tests and Monitor Fill.
Earnhardt placing fill for Structural fill on South End of fill area and Complete Berm on west side. Fill being placed to grade. Density tests 95% +.
ABC placing ash on East side of Phase I and for Berms on East + South Side of phase II now ready for testing

_____ On-Site Representative/Company

_____ S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-26-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
Earnhardt/ABC	P/Cloudy

Present at Site: Dennis - Earnhardt
Dalton - ABC
Jim - S&ME
Kyle

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): Meeting

Time	Mileage
9	40

Observations/Remarks:

Earnhardt placing fill on S Duct end of Phase I and grading cell for pipe placement - preparing for clay liner.

ABC still placing fill for ramp on East side of Phase I and placing wet ash in Berm area.

With Kyle B. (1356) p.m. for meeting and demonstration of Ash Dust Deterrant information to be down loaded by Kyle. The polymer based material sprayed on dry dusty ash and did appear to hold up well using a blower to demonstrate. NCDOT Rep. Ted Mauer Ted Newell on hand.

See Kyle report for info.

J E McCutchen

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
2-27-09	1356-06-82509

Project/Location: Allen Ash landfill (Structural Fill)

Contractor: Earnhardt/ABC

Weather/Temp: Cloudy - Rain Late

Present at Site: Dennis - Earnhardt; Dalton - ABC; Jim - S&ME

Time: 10. ✓

Mileage: 40

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:

AM. early. Monitor fill placement structural fill
Contractor grading for pipe placement in Cell 1, Pond #3
flow switched to pond #2 ABC to move from pond #1 to #3
Rain started 1030am -
At office Calibrated equipment Sand Cone + plate - proctor
mold + Hammer -, Slump cone, plate, Tamping Rod -

J E M Cutchen

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
3-6-08	1356-06-82509

Project/Location: Allen Ash Landfill

Contractor: Earnhardt/ABC

Weather/Temp: Clear

Present at Site: Dalton - ABC; Jim - S&ME

Time: 3 ✓

Mileage: 40 ✓

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 Visit

Observations/Remarks:

On job site to see contractors. Check work progress. Earnhardt not to return to site till 3-9-09. There are a couple of washouts to be repaired and the sediment pond does not appear to be draining properly.
ABC attempting to dry material placed and build the Ramp on NE corner of Phase I for material placement. No other work to be conducted.
Took photo's.

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
3-9-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt/ABC

Weather/Temp: Clear

Present at Site: Dennis - Earnhardt; Dalton - ABC; Jim - S&ME

Time: 9 ✓

Mileage: 40 ✓

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:

On site for fill placement. ABC trying to Dry out Ash for Berms not ready for testing. But still placing Ash?

Earnhardt finishing Berm on South East end of Cell #1 Start Clay liner fill on N.W. Bench to last side check moisture on material. Still low 29s

Talk with Kyle about project and testing procedures for the Clay liner and use of Nuclear Gauge to help minimize time in the Moisture

On-Site Representative/Company

J E McCutchen

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-10-09	Job No. 200 1356-06-825-09
Project/Location: Allen Ash Landfill	
Contractor:	Weather/Temp: clear/70's
Present at Site: Brett Hixson, Mike Curfman } S&ME	
Time: 10.5 ✓	Mileage: 40 ✓

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:

S&ME tech on site for field density tests. 9 tests were performed along the South and East Berm caps. Test results were turned in to J. McCutcheon

On-Site Representative/Company

S&ME Personnel

sclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the oject site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our ent. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information esented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-10-2009	Job No. 200 1356-06-825(09)
Project/Location: Allen Steam Station	
Contractor:	Weather/Temp:
Present at Site: M. Curtman, B. Hixson > S&ME, Jim Mc	
Time: 9.0 ✓	Mileage: 40 ✓

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:

S&ME Tech arrived on site as requested to run FDTs. Todays test were taken on an old landfill, they are capping one of the landfills. Unable to run 4 test, the ~~first~~ first test failed compaction. The next 3 test all passed compaction and moisture. To find exact location ask Jim Mc for them.

Michael Curtman

On-Site Representative/Company Michael Curtman | S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
3-11-09	135606825-09

Project/Location: Allen Ash Landfill -

Contractor: Earnhardt/ABC

Weather/Temp: P/Cloudy.

Present at Site: Dennis - Earnhardt
Dalton - ABC
Jim M - S&ME
M Curtin -

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): Moisture / Density

Time: 10.5 ✓

Mileage: 40 ✓

Observations/Remarks:

S&ME on site today, Density tests conducted on ash placed Phase II. on East side Berm for Ash Basins Co. Most of which is still to wet.

Check moisture for clay line placement. and bring in Samples for perm tests on 1st lift. 1 from pad 2 from Stockpile. Check. Sed pond for out let flow. which is clear & running good. In office talking with Ken Dalton + Kyle Bancom - Mfg. testing and procedures. Clay placement ect.

J M Curtin
On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-11-2009	Job No. 200 1356-06-8256
Project/Location: Allen Ash Land fill	
Contractor:	Weather/Temp: Sunny (82)
Present at Site: M. Curtman, Jim Mc > S&ME	
Time: 12.0 ✓	Mileage: 40 ✓

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:

S&ME Tech arrived on site as requested to run FDTs today & was able to run 8 test in all. 5 out of the 8 test was soil test for berm capping on Ash land fill. & also was able to take 3 test on Ash that APC Company has been placing down. 7 test pass both Moisture requirement and Compaction. 5 out of the 5 soil test were retest from 3-10-2009. One of the Ash test pass Compaction but did not pass moisture requirements (Jim Mc is aware of the test results. To find out location ask Jim Mc

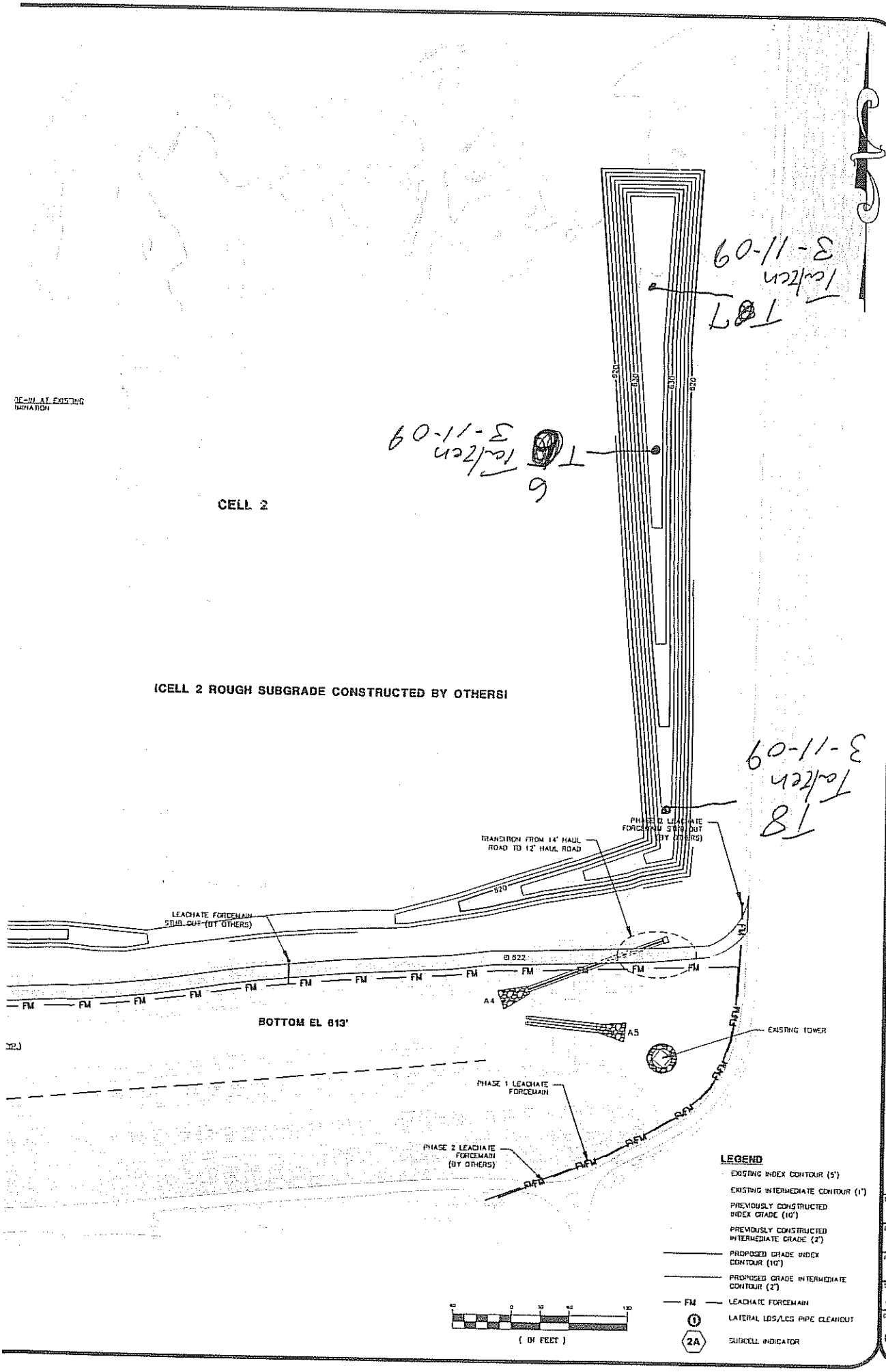
Michael Curtman

On-Site Representative/Company Michael Curtman **S&ME Personnel**

MAR 12 2009

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03


CELL 2
(CELL 2 ROUGH SUBGRADE CONSTRUCTED BY OTHERS)
BOTTOM EL 613'
TRANSITION FROM 14' HAUL ROAD TO 12' HAUL ROAD
PHASE 2 LEACHATE FORCEMAIN STUB OUT (BY OTHERS)
LEACHATE FORCEMAIN STUB OUT (BY OTHERS)
PHASE 1 LEACHATE FORCEMAIN
PHASE 2 LEACHATE FORCEMAIN (BY OTHERS)
EXISTING TOWER
A4
A5
FM
LEGEND
EXISTING INDEX CONTOUR (5')
EXISTING INTERMEDIATE CONTOUR (1')
PREVIOUSLY CONSTRUCTED INDEX GRADE (10')
PREVIOUSLY CONSTRUCTED INTERMEDIATE GRADE (2')
PROPOSED GRADE INDEX CONTOUR (10')
PROPOSED GRADE INTERMEDIATE CONTOUR (2')
LEACHATE FORCEMAIN
LATERAL LDS/LCS PIPE CLEANOUT
SUBCELL INDICATOR
(IN FEET)
DRAFT
Duke Energy
S&ME
WWW.SMEINC.COM
CELL 2 ROUGH SUBGRADE & EROSION & SEDIMENT CONTROL PLAN
PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA
DRAWN BY: CLD
CHECKED BY: KRD
DESIGNED BY: CHR
APPROVED BY: KRD
PROJECT NUMBER: 1356-06-825
SCALE: AS SHOWN
DATE: 07-31-08
DRAWING: C8A
OF: 28

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
3-12-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Eismhardt - KBC

Weather/Temp: Cloudy

Present at Site: Dennis - Eismhardt, Jim, Mike - S&ME

Time: 10. ✓

Mileage: 40 ✓

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): Nuclear density/moisture

Observations/Remarks:

Conducted nuclear density tests along with Shelby tube to correlate tests + moisture's 4 each.
Helped Mike run density test's (Shelby tube). No other tests done today due to water truck breakdown. Will continue tomorrow. 1st lift line A 1-8 (2,4,6,8) on Bench area + slope.
Left early due to truck problems and not being able to conduct any more tests today.
Talk to Ken D. + Kyle B at office brief same on testing and how thing were going.

On-Site Representative/Company

Jim Cutchin MAR 13 2009

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date 5-12-09	Job No. 200 1358-06825(0
Project/Location Allen Ash Fill	
Contractor	Weather/Temp
Present at Site M. Curtman / S&ME	
Time 9.0 ✓	Mileage 40 ✓

To: file

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

☑ Drive Tubes

☐ Sand Cone

☐ Test results and locations attached

All tests met specifications ☐ Yes ☐ No

Collected Bulk Sample(s) ☐ Yes ☐ No

General locations:

Foundation bearing materials evaluation

☐ Deficiencies Noted ☐ Yes (see comments) ☐ No

Design allowable bearing capacity: _____ psf

Location:

Comments: S&ME Tech arrived on site as requested to run FDR tests. Tech ran test along side Tim MC who was using Nuke Gage to compare test results we were able to run 4 FDR for test results each Tim MC

On-Site Representative/Company Michael Curtman

Michael Curtman S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
3-13-09	1356-06-825-09

Project/Location: Allen Ash Landfill Clay Liner

Contractor: Earnhardt/ABC

Weather/Temp: Cloudy Rain

Present at Site: Dennis – Earnhardt; Dalton – ABC; Mike C; Jim M 2 S&ME.

Time: 4.5 ✓

Mileage: ✓40

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:

On site this AM for Density testing of Clay liner. Most of area sealed off still placing some clay to finish sections off. Compacting Benchaxa Next 2nd lift. Rain started heavy had to seal off everything.

On-Site Representative/Company

Jim Critcher MAR 16 2009

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-13-2009	Job No. 1350-06-825 (109)
Project/Location: Allen Park Fill	
Contractor:	Weather/Temp:
Present at Site: M. Curtman, Jim Mc — S&ME	
Time: 2.5 ✓	Mileage: 40 ✓

To: file

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

Using: ☐ Nuclear Density Gauge ☐ Soil ☐ Stone ☐ Asphalt

☐ Drive Tubes ☐ Test results and locations attached

☐ Sand Cone All tests met specifications ☐ Yes ☐ No

General locations: _____ Collected Bulk Sample(s) ☐ Yes ☐ No

Foundation bearing materials evaluation

☐ Deficiencies Noted ☐ Yes (see comments) ☐ No Design allowable bearing capacity: _____ psf

Location: _____

Comments: S&ME Tech arrived on site as requested but when I got to site the rain was coming down. I stay with Jim Mc to see if they were correct to buy and unload although the rain forced it cancel equipment that day and slowing for the day we decided to load cardwell & called drop off paper work to Jim Mc

On-Site Representative/Company Michael Curtman

Michael Curtman S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
3-16-09	1356-06-825-09

Project/Location: Allen Cash Landfill

Contractor: Earnhardt/ATC

Weather/Temp: Cloudy Rain

Present at Site: Donnie - Earnhardt
Jim - S&ME

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 Visit

Time: 2. ✓

Mileage: 40 ✓

Observations/Remarks:

On site this AM. to check w/ contractor about work today. It was decided not to work due to being to muddy and a little drizzle. Sediment pond appeared to be in good shape.

_____ **On-Site Representative/Company**

_____ **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
3-16-2009	1356-06-825-(09)

Project/Location Allen Ash fill

Contractor

Weather/Temp Rain

Present at Site M. Curtman > S&ME, Jim MC

Time 1.5

Mileage 40

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:

S&ME Tech arrived on site as requested but was told that due to bad weather from the weekend there would be no work needed.

Michael Curtman

On-Site Representative/Company Michael Curtman

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-17-09	Job No.: 1356 06 825-09
Project/Location: Allen Ash Landfill	
Contractor: Earnhardt/ABC	Weather/Temp: Cloudy
Present at Site: Dennis - Earnhardt; Dalton - ABC; Jim - S&ME	
Time: 2, ✓	Mileage: 40 ✓

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 visit

Observations/Remarks:

Job site still to wet to work. Check erosion on fill area. No big washouts. Sediment pond drained down - no problem noted. Very Muddy. Bridge sections arrived being unloaded - Borrow site Very Wet muddy.

On-Site Representative/Company

J E McCutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-18-2009	Job No. 200 1356-06-825(09)
Project/Location: Allen Ash fill	
Contractor:	Weather/Temp: Sunny
Present at Site: M. Curtman, Jim Mc > S&ME	
Time: 10.0 ✓	Mileage: 40 ✓

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:

S&ME Tech arrived on site as requested to run FDTs today test were taken on the clay top which is being placed to cover Ash fill today tests were at the 2nd lift (for location look at Jim Mc field report.) Today was able to run 8 test, a few of the test been having problems with moisture tests have passed compaction, but moisture has been a problem to control.

Michael Curtman

On-Site Representative/Company Michael Curtman **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
3-18-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt

Weather/Temp: Clear

Present at Site: Dennis - Earnhardt; Jim M. - S&ME; Mike C - S&ME

Time: 10 ✓

Mileage: 40 ✓

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): Nuclear Density

Observations/Remarks:

On site today conduct density tests on fill placed for clay liner. Today tests were meeting compaction but moisture levels not working out to the 2+05 % but mostly closer to the Proctor. Of a couple of tests worked out, Nuclear test's were closer to the 2+05 % over optimum. Also took in samples for pers 2+3. Talk with Kyle and Renaldo

_____ On-Site Representative/Company

J E McCutchen
S&ME Personnel

MAR 23 2009

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-19-2009	Job No. 200 1358-06-8251-09)
Project/Location: Allen Ash Fill	
Contractor:	Weather/Temp: Sunny
Present at Site: M. Curtman > S&ME; Jim Mc	
Time: 11.75 ✓	Mileage: 40 ✓

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:

S&ME Tech arrived on site as requested to run FDTs on fill placement of Ash fill, today was the clay capping of Ash fill. I was able to run 6 tests, again we were having trouble with moisture compaction was sufficient, having a hard time finding that balance of the moisture we need and compaction, with that said today was alot better than on 3-18-2009. However at end of day I was able to grab a sample to see where we where at and that test was on the dry side and look like it would not meet moisture and compaction, will take full test on 3-20-09, was not able to due to bad weather coming in.

Michael Curtman

On-Site Representative/Company Michael Curtman

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-19-09	Job No.: 1356-06-825
Project/Location: Allen Ash Landfill	
Contractor: Earnhardt	Weather/Temp: Clear
Present at Site: Dennis - Earnhardt; Jim & S&ME; Mike	
Time: 9. ✓	Mileage: 40 ✓

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): Nuclear Density

Observations/Remarks:

Conduct density test of North Bench and East Bench area - 2nd lift N 1st lift E. Also Tests on NE corner of fill area for Clay liner. Still having some trouble with some test's but trying to work them out experimenting with moisture. Went into office to talk with Ken D. about same, but he was busy at the time.

On-Site Representative/Company

J. M. Pitchen
S&ME Personnel

MAR 23 2009

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
3-20-09	1356-06-825-09

Project/Location: Allen Ash landfill (clay liner)

Contractor: Earnhardt

Weather/Temp: Clear

Present at Site: Dennis – Earnhardt; Jim – Mike – Ken D. } S&ME

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 work / Meeting

Time	Mileage
10.5 ✓	40 ✓

Observations/Remarks:

On site today conduct density tests on fill placed for clay liner. Material wet ontop from overnight Rain Contractor scarified with Tractor & Disc, Compacted with 815 Sheepfoot Roller overlapping to get 2X compaction then Sealing off to Retain Moisture with Smooth drum Rubber tire Placing Material with off Road trucks and 2 Dozers 1 rough placement and the other with GPS placement to get correct lift placement. North Bench received 3rd lift today E bench 2nd lift and both tested. All test's but 1 pass compaction and moisture.

Ken Daley on site today to look at clay being placed. took Samples talked about Moisture vs Density etc. and the problems we were having when moisture to high or to low. and also mixture of more silty material mixed with clay.

J. M. Crutchson

On-Site Representative/Company _____

S&ME Personnel _____

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

MAR 23 2009

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-20-2009	Job No. 200 1356-06828(0
Project/Location: Allen Ash Fill	
Contractor:	Weather/Temp: Sunny
Present at Site: M. Curtman > S&ME, Jim Mc	
Time: 10.5 ✓	Mileage: 40 ✓

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:

S&ME Tech arrived on site as requested to run FDR today. I was able to run 8 tests all tests passed both Moisture requirement and Compaction, Jim Mc also used Nuke test to compare test results.

Michael Curtman

On-Site Representative/Company

Michael Curtman

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-23-2009	Job No. 2006-06-825(09)
Project/Location: Allen Ash fill	
Contractor:	Weather/Temp: Sunny
Present at Site: M. Curtman, Jim Mc > S&ME	
Time: 10.0	Mileage: 40

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:

S&ME Tech arrived on site as requested to run F-DTs on Ash land fill cap. Tech was able to run 8 tests, all test passed both compaction and moisture requirements. The last 4 test moisture was starting to get on the wet side, but all test still were passing both moisture and compaction.

(last 4 test have no location on Green sheet if you need them ask Jim Mc for them)

MAR 24 2009

On-Site Representative/Company: Michael Curtman

S&ME Personnel: Michael Curtman

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
3-23-09	1356-06-825-09

Project/Location: Allen Ash landfill (Clayliner)

Contractor	Weather/Temp
Earnhardt/ABC	Clear

Present at Site: Dennis Earnhardt, Dalton - ABC, Jimm-, Mike C - S&ME.

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): Nuclear Density / Perm samples.

Time	Mileage
10.5 ✓	40 ✓

Observations/Remarks:

S&ME on site today conducted IN Place Density's of Clay for liner of Cell I. All tests today. 95+% Compaction and Moisture + 2 to 5% over optimum. Brought in 3 sample for Remold perms and proctors.

Also conducted density tests on Ash for ABC on Berm placed in Cell II East berm. at approx. N 10' - 6' - 4' S. from N to S end. All tests pass Compaction + Moisture

Had to move Jimmy A. office materials to another office

_____ On-Site Representative/Company

J E McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-24-2009	Job No. 200 1356-06-825 (09)
Project/Location: Allen Ash Fill	
Contractor:	Weather/Temp: Overcast
Present at Site: M. Curtman > S&ME; Jim Mc	
Time: 12.25 ✓	Mileage: 40

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:

S&ME Tech arrived on site as requested to continue with fill placement on Ash land fill. Today I was able to run 8 test all test passed compaction and moisture requirement. Test ~~[illegible]~~ 34 and 35 were for 1st Lift on Southeast side of site. Rest of test 36 37 38 39 40 and 41 were for Lift #3. Test 36 37 38 39 were for East Slope. Jim also took 3 test on the Ash that is being placed on a different area.

Michael Curtman

On-Site Representative/Company Michael Curtman / **S&ME Personnel**

MAR 25 2009

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
3-24-09	1356 06 82509

Project/Location: Allen Ash Landfill

Contractor: Earnhardt/ABC

Weather/Temp: P/Cloudy

Present at Site: Dennis - Earnhardt; Dalton ABC; Jim M & Mike C SHME; Kyle B. SHME

Time: 11. ✓

Mileage: 40

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): Sample P/U/ Test Pits

Observations/Remarks:

S&ME on site Conduct density tests of Clay liner being placed. 8 tests Conducted and all pass compaction and Moisture 95% + 2 to 5%

With Kyle B. to dig test pits in Phase II Berm area locating more clay. Bucket samples taken. Also took sample of placed material at present stockpiled from stockpile material

Conducted density tests of Ash on Phase II on East Berm. All test Pass 95%.

_____ On-Site Representative/Company

J M Crabtree MAR 26 2009 S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
3-25-09	1356-06-825-09

Project/Location: Allen Ash Landfill (clay liner)

Contractor: Earnhardt/ABC

Weather/Temp: Cloudy/Rain

Present at Site:
Dennis - Earnhardt
Dalton - ABC
Jim - S&ME

Time: 5.✓

Mileage: 40

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 Visit

Observations/Remarks:

At job site. Earnhardt placing fill on SouthEast section of Cell I to cover ash. And seal off. 2 dozer 1,815 Roller, 2 water trucks, 1 smooth drum Roller. 1 backhoe. 4 off road trucks.

Due to Rain not going to work area today. Brought in sample placed from F 7 section of fill area

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-25-2009	Job No. 20 1356-06-825 (-0
Project/Location: Allen Ash Fill	
Contractor:	Weather/Temp:
Present at Site: M. Curtman / S&ME; Jim Mc	
Time: 2.50	Mileage: 40

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:

S&ME Tech arrived on site to run FDT but due to the weather they decided to not do any Fill placement

Michael Curtman

On-Site Representative/Company Michael Curtman

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
3-26-09	1356-06-825-09

Project/Location: Allen Ash Landfill (Lina)

Contractor: Earnhardt

Weather/Temp: Rain

Present at Site: Dennis - Earnhardt
Jim - S&ME

Time: 2.

Mileage: 40

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 Visit

Observations/Remarks:

On site to confirm work or no work. Earnhardt decided to not work today the whole site to wait to work. try on Friday.

On-Site Representative/Company

J. M. Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
3-27-09	1356-06-825-09

Project/Location: Allen ash Landfill

Contractor	Weather/Temp
Earnhardt	Cloudy/Showers

Present at Site: Dennis Earnhardt, Jim - S+ME

Time: 2.

Mileage: 40

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 Visit

Observations/Remarks:

Again today it was decided not to work due to being wet and impending showers. try on Monday

_____ On-Site Representative/Company

J. McCutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
3-30-09	1356-06-825-09

Project/Location: Allen Steam Sta. (clay liner)

Contractor	Weather/Temp
Earnhardt	Partly Cloudy

Present at Site: Dennis - Earnhardt; Jim - S&ME; Mike - S&ME

Time: 5 ✓ **Mileage**: 40 ✓

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): Samples

Observations/Remarks:

On-site for density testing of Clay liner Earnhardt Const. Has 2 Dozers (D7) 1,815 Compactor 1 Smooth drum Roller 1 Backhoe 1 motorgrader off Road and Highway Watertruck + 4 off-Road Dump Trucks working site. Density test taken: 95% + achieved. 1 sample of ML material brought in from Borrow site.

_____ On-Site Representative/Company

J E McArthur S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 3-30-2009	Job No. 206 1356-06-825(-09)
Project/Location: Allen Ash Fill	
Contractor:	Weather/Temp: Sunny
Present at Site: M. Curtman S&ME	
Time: 8.50	Mileage: 40

To: file

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 Tech arrived on site as requested by our FOR on Ash fill placement today. I was able to run 5 tests all test pass both Moisture and Compaction. I ~~was able to show~~ wasn't able to grab the last few tests due to my compressor tank was out, had to go back to shop, by the time I would have return it would have been after 5 pm

Michael Curtman

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRSF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 8-31-2009	Job No. 2100 1356-06-825(-09
Project/Location: Allen Ash Fill	
Contractor:	Weather/Temp: Sunny
Present at Site: M. Curtman > S&ME	
Time: 12.25	Mileage: 40

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:

S&ME Tech arrived on site as requested to run FOTs. today I was able to take 10 test all test passed both moisture and compaction There is still one area of the south west corner that has not had any fill being place

On-Site Representative/Company Michael Curtman

Michael Curtman S&ME Personnel

laimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the ct site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our . In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information ented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 4-1-2009	Job No.: 1356-06-825C-09
Project/Location: Allen Ash Fill	
Contractor:	Weather/Temp: Overcast
Present at Site: M. Curtman > S&ME, J. Mc	
Time: 11:00	Mileage: 140

To: file

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 Tech arrived on site as requested to run FDTs, tiedown test were taken at North west corner while I was able to run 2 more test in area, I also took 2 test in East Section of Landfill and another 2 test in Northeast section, All test passed both Compaction and Moisture.

On-Site Representative/Company

Michael Curtman
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 4-1-09	Job No.: 1356-06-82509
Project/Location: Allen ABL Landfill (Clay Liner)	
Contractor: Earnhardt	Weather/Temp: Cloudy
Present at Site: Dennis	
Time: 5.	Mileage: 40

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): Sample (perm)

Observations/Remarks:

PM. Went to job site after NCDOT Class. I Helped Mike C. Conclude his density testing for the day on SE section of Cell I. on second lift of clayliner. Contractor has started placing 3rd lift in that area but they are only placing and Rolling with smooth drum and sealing off due to looming bad weather.

It was found by contractor on the N end of Cell I a large wash which probably happened over the weekend approx 8' to 10' deep on the slope area 10-12' across. washed down to the sump - (This was on the lowest part of the Bench) Notified Ken Daley who will come out to the site tomorrow to look at same.

Jim Cutchen

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

APR 6 2009

S&ME
9751 Southern Pine Blvd.
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 4-2-2009	Job No. 200 1356-06-825 (09)
Project/Location: Allen Ash Fill	
Contractor: ABC	Weather/Temp: Sunny
Present at Site: M. Curtman > S&ME; Jim Mc	
Time: 3.00	Mileage: 40

To: file

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: Today I arrived on site as requested to run FDTs on Ash Landfill with Clay Cap. Some tests due to the weather was not able to perform those tests. Assisted Jim Mc with Proper work for test area.

On-Site Representative/Company: Michael Curtman

S&ME Personnel: Michael Curtman

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRSF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-2-09	1356-06-825-09

Project/Location: Allen Steam Sta. Ashlandfill

Contractor	Weather/Temp
Earnhardt	Rain/Cloudy.

Present at Site
Dennis - Earnhardt
Jim - S&ME.
Ken D. "
Kyle B. "

Time: 5. ✓

Mileage: 40 ✓

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 Visit

Observations/Remarks:

On site this am. No work due to Rain. With Ken D & Kyle B. S&ME 1356. Ref wash out on slope, Ken D to decide how to go about repairs, See his report for details. Made copy of grid. (Kyle) Talk with Ben as to how things are to continue at job site

_____ On-Site Representative/Company

Jim Eckhardt
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-3-09	1356-06-82509

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
Earnhardt	P. Cloudy.

Present at Site: Dennis, Earnhardt
Jim - S&ME

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 Visit

Time	Mileage
2.5. ✓	40 ✓

Observations/Remarks:

Went to job site due to overnight Rain No work to be done today. Roads very wet messy. Will work on Saturday AM. Check erosion control.

_____ **On-Site Representative/Company**

JEM Critchen **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-4-09	1356-06-825-09

Project/Location: Allen Ash Landfill.

Contractor	Weather/Temp
Earnhardt.	Clear

Present at Site: Dennis - Earnhardt; Jim - S&ME

Time: 4.5 ✓ **Mileage**: 40 ✓

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:

On site, contractor backfilling wash out on N end of Cell I-with soil from borrow site placed in lifts and rolled in with smooth drum. Also placed soil on slope and placed slope drain.

Equip. used. Backhoe, 1 dozer. 1 smooth drum. off road trucks -

On-Site Representative/Company

J E McCutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-6-09	1356-06-825-09

Project/Location: Allen Ash Landfill Liner

Contractor	Weather/Temp
Earnhardt	P Cloudy

Present at Site: Dennis Earnhardt, Jim, Kyle } S&ME

Time: 10 ✓ **Mileage**: 40 ✓

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 on site today with Earnhardt Const SE Section of Cell #1 with 3rd & final lift placed and density tested. Contractor Equipment on site prepping pad area for liner: 2 motograders, 2 smooth drum rollers, 2 D7 dozers, 1 815 roller, 1 water truck. 3 off road dump trucks hauling into SW side of cell placing 1st lift. 1 large tractor with disk plow. 1 bobcat skidsteer. Earnhardt grading final grade on NE section cell #1 down to 1st lateral and rolling. SE section completed density tests all test meet requirements for moisture and 95% + on density today.

Steve from Crowder on site and had questions about the scale area, concrete to be placed and to inform me about the footing to be excavated, I pass information on to Kyle B. S&ME staff.

APR 8 2009

J E McCutchen

On-Site Representative/Company — **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 4-7-09	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill (Scale)	
Contractor: Crowder	Weather/Temp: P/Cloudy
Present at Site: Steve H. - Crowder; Jim, Kyle } S&ME	
Time: 2.5	Mileage: 40

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): HA DCP

Observations/Remarks:

Conducted Hand Auger DCP in footings for Scale. Footings only excavated 7" to 10" into subgrade. Hand auger Results on Kyle B. Report. Started from South End. #1 Number good #2 undercut 2'. Recommended Fabric Stone (57) in lower portion up to Bottom of Footing. #3 numbers good. #4 undercut to top of ash (-1') place stone to BOF. Contractor Undercut and made repairs as requested. Ready for forming & Concrete.

See Kyle B report for numbers.

_____ On-Site Representative/Company

J E McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

book Murphy

Field Report

Date: 4-7-09	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill	
Contractor: Earnhardt	Weather/Temp: P/Cloudy
Present at Site: Dennis - Earnhardt; Jim - S&ME.	
Time: 8 ~~7:15~~	Mileage: 40 x 2

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 work

Observations/Remarks:

On site today for density's and sitework, placing 1st lift on SW section of Cell I, fill placed and smoothdrum only. ~~Early~~ later in Am Rolled w/ 815, placement 30 off road Dumps, 2 dozers, 2 Motograder cutting E side of Cell prep for liner. Walk area clerk for roots, Rocks ect. make sure debris cleaned up nothing to puncture liner. Will test 1st lift of SW section in Am

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 4-8-09	Job No.: 1356-06-825-09
Project/Location: Allen Ash Landfill	
Contractor: Earnhardt	Weather/Temp: P/Cloudy
Present at Site: Dennis - Earnhardt; Jim - S&ME; Cedric - S&ME	
Time: 10. ✓	Mileage: 80 ✓

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:

On site today, liner personnel started placing geotextile and liner on North East corner of cell #1 as Earnhardt fine grades South E. section. Cedric on site to monitor liner placement.

Conducted density tests on W side of Cell I as fill is placed with 3 off Road dumps. 2 dozers 1,815 1 smooth drum roller Tractor with plow. and 1 water truck. density tests pass 95% + and moisture % +2+05% 1 sample taken in for perm + proctor

On-Site Representative/Company

Jim Cutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

APR 10 2009

S&ME Form FR1502

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-9-09	1356-06-825-09

Project/Location: Allen Ashcandfile

Contractor	Weather/Temp
Earnhardt	Clear

Present at Site: Earnhardt - Dennis, Somez, Jim, C — Andrew

Time: 9. ✓ **Mileage**: 40 ✓

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:

On site today liner crew placing liner Cedric monitoring same Earnhardt prepping area for liner and digging trench. also placing fill for 3rd 2nd + 1st lifts on West side of Cell. Conducted density tests of fill placed after compaction. All tests today pass compaction and moisture % Tests conducted on 3rd lift above 1st lateral ready for fine grade and liner placement. Density tests attached

On-Site Representative/Company

J M Cathron
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

APR 10 2009

S&ME Form FR1F02

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date 4-10-09	Job No. 1356-06-825-09
Project/Location Allen Ash Landfill (Scales)	
Contractor Crowder	Weather/Temp P/Cloudy
Present at Site Steve - Crowder Jim - S&ME	
Time 1.5	Mileage 40

To: _____

- [x] Concrete sampling and testing
- [ ] Grout sampling and testing
- [ ] Mortar sampling and testing
- [ ] Sample locations attached
- [ ] Picked up _____ sets, logged

Plant #5
Thomas Conc
6 cy.
TOTAL 12 cy.

Cast 1 sets of 5 cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Mix design 409P Design compressive strength 4000 AE
Addition of water authorized by: _____

Set Number	Truck Number	Ticket #	Time Batched	Time Truck Arrived	Time Sampled	Time Truck Completed	Water Added (gal)	Slump (in)	% Air	Unit Weight of Concrete (pcf)	Temp. of Air (°F)	Temp.of Concrete (°F)	# Cylinders Cast	Location
1	M245	4732	931	955	1000			4 3/4	5.8	143.56	64	73	5	Scale footings

Comments/Location: 4 Scale footings

_____
On-Site Representative/Company

J E McCutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRCR03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 4-10-09	Job No.: 1356-06-82509
Project/Location: Allen Ash Landfill - Clay Liner	
Contractor: Earnhardt	Weather/Temp: Cloudy - Rain
Present at Site: Dennis - Earnhardt - Jim - S&ME Cedric - S&ME.	
Time: 4.5 ✓	Mileage: 40 ✓

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 work

Observations/Remarks:

On site for density testing Earnhardt moving fill for clay liner but due to coming Rain decided to seal off fill as soon as placed and pushed out with dozer. Rain started approx 12:30 everyone left job site.

Cedric on site with liner personnel.

On-Site Representative/Company

J E Hutchison

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
4-11-09	1356-06-825-09

Project/Location: Allen Ash Landfill.

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 Visit

Contractor	Weather/Temp
Earnhardt / Crowder	Clear

Present at Site: Dennis - Earnhardt. Jim, Cedric / Stonco

Time	Mileage
4. ✓	40 ✓

Observations/Remarks:

Earnhardt On site this am after overnight Rain of 1 3/4" of Rain
Earnhardt pumping out water at sumpcna.
and trying to dry out placed fill from overnight.
Liner daily repairs & destructs.
Crowder Pick up cyl from job site transport to lab
log in strip.

_____ **On-Site Representative/Company**

J. M. Aiken **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FR1503

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-13-09	1356-06-825-09

Project/Location: Allen Ash Landfill (Lines)

Contractor: Earnhardt

Weather/Temp: Cloudy/Drizzle

Present at Site: Dennis - Earnhardt; Jim - S&ME

Time: 10. ✓

Mileage: 40 ✓

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): Monitor fill

Observations/Remarks:

S&ME on site to monitor placed fill for W side S end 3rd lift and second lift of clay liner, Placement with 3 approad trucks 2 dozers. 1 motograder 1 backhoe 1 skid steer 1 water truck. 2 tankhoes

Density tests taken on 3rd lift all test pass requirement of 95% + moisture

Earnhardt prepping area on E side of cell for plastic liner + clay mix

liner personnel not working today.

_____ On-Site Representative/Company

J E M Cutchin S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

APR 14 2009

S&ME INC. *ENVIRONMENTAL * ENGINEERING TESTING
CHARLOTTE, NORTH CAROLINA

TECHNICIANS DAILY FIELD REPORT

GENERAL FIELD TESTING SERVICES

Job Name: Apphenwash Landfill	Technician: Jim McCutcheon
Contractor: Earnhardt	Job Number: 1356-06 825-09
Weather: Rain	Job Date: 4-20-09
Travel Time: _____ (hrs.)	Total Job Time: 1.5. (hrs.)
On-Site Time: _____ (hrs.)	Total Miles: 40 (miles)

Start Time: _____ (Circle one) am / pm Stop Time: _____ (Circle one) am / pm

CONSTRUCTION ACTIVITIES: _____

TEST CONDUCTED AND THE RESULTS: Site Visit Job Rained Out -

THE FOLLOWING TEST(s) PERFORMED TODAY WILL REQUIRE SUBSEQUENT RETESTING: _____

Non-compliance Test Results, Name of Contractors/Owners Representative Informed: _____

S&ME's Staff Representative Notified: _____

Other Discussions with Contractor _____

Technician Initials JEM.

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-15-09	1356-06-825-09

Project/Location: Allen Ash landfill (Lime)

Contractor: Earnhardt

Weather/Temp: Clear

Present at Site: Dennis - Earnhardt; Jim - Cedric - S&ME

Time: 90

Mileage: 40

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): Monitoring

Observations/Remarks:

S&ME on site today for Clay liner placement and Density testing. Area prepd for section of 3rd lift and - Completion of 2nd lift in Cell I SW Corner - fill placement with 3 offroad Dump - 2 dozers water truck 815 roller Smooth drum roller. 1 Moto grader 1 Track hoe. 1 water truck - and tractor with Plow - Density tests today 95% + Compaction on 2nd + 3rd lifts. + 2 to 5% on moisture should finish on 3rd lift 4-16-09.

APR 17 2009

_____ **On-Site Representative/Company**

J E M Cutchen **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 4-16-09	Job No.: 135606-825-09
Project/Location: Allen Ash Landfill (Liner)	
Contractor: Earnhardt	Weather/Temp: Clear
Present at Site: Dennis - Earnhardt; Jim - S&ME	
Time: 8, ✓	Mileage: 40 ✓

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:

On site today to complete fill placement on clay liner for Cell I. SW end. As of today all clay for liner in place. for Geo textile liner placement all test for density completed and samples for perm's extracted. Tests today 95+% in compaction. Earnhardt reworking the sump area as it had gotten wet this area to be recut out once ready for liner placement. 2 perm samples brought in today

_____ On-Site Representative/Company

Jim Cushion S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

APR 17 2009

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.
4-21-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt / ABC

Weather/Temp: Clear

Present at Site: Donnie - Earnhardt; Dalton - ABC; Jim - Cedric; Ken Kyle - S&ME

Time: 9.5 ✓

Mileage: 40

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:

ABC started hauling ash into Cell place II from pond # 3. 9 trucks hauling. 2 track hoes loading. 2 dozer 1 roller. 1 water truck.

Earnhardt to water & roll cell 1 work on sump - Also Started digging out Approach Roadway for Asphalt at Scale area. Met with Ken Daley & Kyle Bowman Ref grade set.

Walked Cell I with Ken Daley to inspect. He requested that I walk cell and mark damage areas for repair which I did: Also noted area at Center pipe drain where SG needed repair in trench -

_____ On-Site Representative/Company

JEM Eustis S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRLF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date: 4-22-09	Job No.: 1356-06-825-09
Project/Location: Allen Ash landfill	
Contractor: Earnhardt/ABC	Weather/Temp: Clear Windy
Present at Site: Denver - Earnhardt; Dalton - ABC; Jim & Celie 2 S+ME	
Time: 8.5	Mileage: 40 x 2

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 work

Observations/Remarks:

ABC hauling Ash into Cell 2 Berms and pushing out to dry. Digging from Pond 3 wont be ready for a couple days. Earnhardt undercut roadway entance to Scale area and proofrolled for stone placement - area firm and stable set up for testing - AM. 4-23-09 Also Crowder has stone set up for concrete paving.

Walked Geo composit and marked damaged areas for repairs.

_____ **On-Site Representative/Company**

J E McCutchen **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
4-23-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor	Weather/Temp
Crowder	Clear

Present at Site: Steve - Crowder; Jim & Steve.

Time	Mileage
2.5 ✓	40

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): Nuclear density

Observations/Remarks:

With Mooresville Technician Conduct Nuclear Density tests of Stone placed for Concrete paving, 11" Slap Section Density tests 100% compaction from Quarry Value of 151.1 g Area formed and ready for concrete. Dowels to be placed 4-24-09 pads 15'x15'x11"

Check Density on roadway (Stone) 5 tests Conducted Req 100% Quarry Value of 151.1 achieved 100% & 97% Area reworked by contractor water added & scarified it was today 2-2% moisture.

Jim McCutchen

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

APR 27 2009

S&ME Form FR1503

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-23-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt

Weather/Temp: Clear -

Present at Site: Dennis - Earnhardt
Jim } SHME
Cedric

Time: 8

Mileage: 40

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 work -

Observations/Remarks:

On site today for site work. Density tests ect. Conducted density tests of fill placed back in berm for trench at sump area. All tests pass compaction of 95% or better. Monitor subgrade. have contractor place water + roll before lines placed due to high heat conditions. Went into office and talked with (Kyle B) on testing req ect. Brought out old test samples + dispos of them. Monitor repair on berm seal on sump.

Jim Eutsler APR 27 2009

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
4-24-09	1356-06-825-09

Project/Location: Allen Ash landfill.

Contractor: Earthcraft/ABC

Weather/Temp: Clear

Present at Site: Dalton - ABC; Jim - SEPA

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 work.

Time: 7.5

Mileage: 40

Observations/Remarks:

Monitor placement of ash on Berm area and floor area of Cell 2. Conduct density tests of ash placed on berm. ABC hauling with 8 trucks. SEPA also hauling into Cell 2 dumping on E side of Cell. but not pushing out to dry or fill.

2 track hoes loading on pond #3, dozer working area. 1 water truck on roadway 1 doze and roller on fill area Cell 2.

Jim Clarkson APR 27 2009

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date 4-24-09	Job No. 1356-06-825-09
Project/Location Allen ~~Roby~~ Ash Landfill (Scalcara)	
Contractor Crowder	Weather/Temp Clear
Present at Site Steve - Crowder, Jim - S&ME	
Time 2.5	Mileage 40

To: _____

- ☐ Concrete sampling and testing
- ☐ Grout sampling and testing
- ☐ Mortar sampling and testing
- ☐ Sample locations attached
- ☐ Picked up _____ sets, logged

Thomas

Cast 1 sets of 5 cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Mix design 409 Design compressive strength 4000 AVR
Addition of water authorized by: _____

Set Number	Truck Number	Ticket #	Time Batched	Time Truck Arrived	Time Sampled	Time Truck Completed	Water Added (gal)	Slump (in)	% Air	Unit Weight of Concrete (pcf)	Temp. of Air (°F)	Temp. of Concrete (°F)	# Cylinders Cast	Location
1	2698	5987	8:18	920	925		0	3 3/4	4.8	142.6	67	75	5	11" Slab See below

Comments/Location: 2 sections of 11" Slab at Scales Tire wash sections, Check dowell placement. all placed in accordance with plan's. Prior to concrete placement.

_____ On-Site Representative/Company

J E McCutchen S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRCR03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-24-09	1356-06-825-09

Project/Location: ALLEN ASH LANDFILL SCALE ROADWAY

Contractor	Weather/Temp
FERGEE	Sunny / 80's

Present at Site: Earl - S&ME; Jim - S&ME; Randy - Fergee

Time	Mileage
7.5	80.0 (2 Trips)

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 personnel on site to perform NDT's on Asphalt placed and compacted on Allen Landfill Scale Roadway. 20 NDT's were performed on asphalt placed. All NDT's met the 92% compaction requirement

Earl T. Alexander

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

F Form FRIF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-25-09	1356-06-825-09

Project/Location: Allen Asph Land of Ft Scale Rdway

Contractor	Weather/Temp
Ferebee	Sunny/80's

Present at Site: David - Ferebee; Evan - S&ME

To: Evan

Services Performed

- ☐ Concrete Testing
- ☐ Cylinder Pickup
- ☑ Asphalt Testing
- ☐ Steel Testing
- ☐ Asphalt Coring
- ☐ Concrete Coring
- ☐ Undercut Evaluation
- ☐ Foundation Evaluation
- ☐ Proofrolling
- ☐ In-Place Density
- ☑ Other (Explain): cyl Pickup

Time	Mileage
9.0	40'

Observations/Remarks:

S&ME personnel on site to perform NDT's on asphalt placed and compacted on roadway. 3" of surface was placed. 20 NDT's were performed on asphalt placed. All NDT's met the 92% requirement. 1 set of 5 concrete test cyls were picked up and logged in @ Lab.

APR 27 2009

On-Site Representative/Company

S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

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.
4-27-09	1356-06-825-09

Project/Location: Allen Ash Landfill

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 Work.

Contractor	Weather/Temp
Earnhardt/ABC	Clear

Present at Site: Dennis - Earnhardt; Dalton - ABC; Jim - S&ME; Earl - S&ME

Time	Mileage
9.5	40

Observations/Remarks:

Working on Bridge and roadway area. conduct density testing w/Earl. and Monitor fill placement.
Backfill stone 3' wide in lifts. and structural fill for Bridge check spec & dennis recomendation for backfill and compaction which was Ref AASHTO T190 req. 90% compaction and not have heavy equipment adj to structure also roadway outside slope work started on Ash
Ash in cell 2 not set up yet for testing due to high moisture. ABC Hauling out of Pond 3, 9 trucks - 2 excavators 3 dozers 1 roller - 1 water truck.

J E McCutchen APR 29 2009

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form 681502

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-27-09	1356-06-825-01

Project/Location: ALLEN ASH LANDF. // SEALE ROADWAY

Contractor	Weather/Temp
EARNHARDT	Sunny/80's

Present at Site: Jim - S&ME; Earl; Kevin - EARNHARDT

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)

Time	Mileage
11.0 ✓	40.0 ✓

Observations/Remarks:

S&ME personnel on site to perform NDT's and FDT's on stone and soil placed @ bridge pipe on East + West Ends. 6 - FDT's were performed on soil and 9 - NDT's were performed on ABC Stone. All NDT's and FDT's met compaction requirements of > 90%.

Earl J. Alexander

On-Site Representative/Company — **S&ME Personnel**

APR 23 2009

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FR1503

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-27-09	1356-06-825-09

Project/Location: Allen Ash Landfill, Scale area

Contractor	Weather/Temp
Crowder	Clear

Present at Site: Steve - Crowder; Jim - S+ME

Time: 1.5 **Mileage**: 40

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:

Conduct Hand Auger DCP in 48"x16' footing for 12" slab for fine wash placement; Area met specifications for 3000 psf Area firm and stable. See HA-DCP report for numbers.

J E M Cutchen APR 29 2009

On-Site Representative/Company **S&ME Personnel**

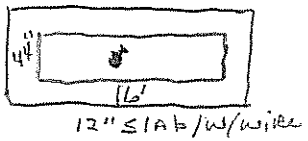
Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

SUMMARY OF HAND AUGER BORING

S&ME
ENVIRONMENTAL SERVICES
ENGINEERING • TESTING

Project Name Allen Ash Land Fill (Scale Area)

Job No. 1356-06-825-09



STRATIFICATION

Dynamic Cone Penetrometer Resistance

DATE	TEST LOCATION	DEPTH FEET	SOIL DESCRIPTION	DEPTH (FEET)	HAMMER BLOWS INCREMENT 1st	2nd	3rd	AVERAGE
3-27-09	Tire Wash Footing HA-1	BOF to-	Gray-Silty Ash.	BOF	25+	—	—	
				-1	21	25+	—	
				-2	18	16	15	
				-3	17	25+	—	

APR 29 2009

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date Apr 28-09	**Job No.** 1356-06-825-09
Project/Location Allen Ash Landfill	
Contractor Barnhardt	**Weather/Temp** Sunny/80's
Present at Site Jim, Steve, Gene, Kevin - Barnhardt	
Time 11:00	**Mileage** 40

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:

S&ME personnel on site to perform RDT's on soil and NDT's on stone placed @ bridge @ roadway scale area. 3 RDT's and 5 NDT's were performed. All tests met the compaction requirements.

Ed T. Clyburn

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-28-09	1356-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt/ABC

Weather/Temp: Clear

Present at Site: Dennis - Earnhardt; Jim - S&ME; Earl - S&ME

Time: 9. ✓

Mileage: 40 ✓

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:

Earnhardt: On site today at bridge + Roadway, Scale area. conducted density tests of Placed fill in Roadway and Ramp area for Scale entrance structural fill. Density tests 95% +. at permit. Equipment used: 815 Roller, Dozer. Backhoe. Bobcat. Smooth Drum Roller. Ramx + Plate compactor, 2 off Road trucks hauling.

Also testing Concrete on Scale area see concrete Report. and Earl conducting tests on Stone w/ Nuclear Gauge.

Ken Daly out for Meeting and Site visit. No problems noted.

J E McCutchen

On-Site Representative/Company | **S&ME Personnel**

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date 4-28-09	Job No. 1356-06-825-09
Project/Location Allen Ash Landfill (Stockpile area)	
Contractor Crowder	Weather/Temp Clear
Present at Site Steve - Crowder; Jim, Earl - S&ME	
Time 1.5 ✓	Mileage 40 ✓

To: _____

- ☐ Concrete sampling and testing
- ☐ Grout sampling and testing
- ☐ Mortar sampling and testing
- ☐ Sample locations attached
- ☐ Picked up _____ sets, logged

Cast 1 sets of 5 cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Mix design 409 Design compressive strength 4000 AE.
Addition of water authorized by: _____

Set Number	Truck Number	Ticket #	Time Batched	Time Truck Arrived	Time Sampled	Time Truck Completed	Water Added (gal)	Slump (in)	% Air	Unit Weight of Concrete (pcf)	Temp. of Air (°F)	Temp. of Concrete (°F)	# Cylinders Cast	Location
1	2697	6441	12:35		1:25		0	3	3.5	144.2	80	82	5	

Comments/Location: _____

_____
On-Site Representative/Company

J E McCutchen
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRCR03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-29-09	B56-06-825-09

Project/Location: Allen Ash Landfill

Contractor: Earnhardt/ABC

Weather/Temp: Clear

Present at Site: Dennis - Earnhardt; Dalton - ABC; Tim; Earl 2 S&ME

Time: 8.5 ✓

Mileage: 40 ✓

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:

On site at Bridge conducted Density tests in roadway placing Clay on top 18" of fill. and stone ady to Standard tests 95% +

Tested Concrete placed 11" slab. #1 to Asphalt see Report

Conducted Density tests in Ash. Cell 2, tests 95% +.
No other ash tests till it drys.

Had Meeting with SEPA + Ted Manns Ref. Ash placement in 1/2 of Cell 2 Discussed procedure and lift thickness, watering, Roller.

_____ On-Site Representative/Company

Jim Crawford
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRIF03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date 4-29-09	Job No. 1356-06-825-09
Project/Location Allen Ash Landfill (Scale area)	
Contractor Crowder	Weather/Temp Clear
Present at Site Steve Crowder, Jim Earl - S&ME	
Time 1.5	Mileage 40

To: _____

- [x] Concrete sampling and testing — Thomas 514
- [ ] Grout sampling and testing
- [ ] Mortar sampling and testing
- [ ] Sample locations attached
- [ ] Picked up _____ sets, logged

Cast 1 sets of 5 cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Cast _____ sets of _____ cylinders/prisms/cubes/beams
Mix design 409 Design compressive strength 4000 PSI
Addition of water authorized by: _____

Set Number	Truck Number	Ticket #	Time Batched	Time Truck Arrived	Time Sampled	Time Truck Completed	Water Added (gal)	Slump (in)	% Air	Unit Weight of Concrete (pcf)	Temp. of Air (°F)	Temp. of Concrete (°F)	# Cylinders Cast	Location
1	M214	6530	805	831	840	853	0	4½	3.4	146.9	74	76	5	Sc4

Comments/Location: 1ST slab (11") adj to Asphalt paving Scale area.
Density test at Ramp area for scale 1st section 95%+

_____ On-Site Representative/Company

Jason Cutshaw S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FRCR03

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-29-09	1356-06-825-09

Project/Location: ALLEN ASH LANDFILL (Bridge)

Contractor	Weather/Temp
EARNHARDT	Sunny/80's

Present at Site: STEVE - CROWDER, KEVIN - EARNHARDT, EARL, Jim - S&ME

Time	Mileage
12.0	40.0

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:

S&ME personnel on site to perform KDT's + NDT's on soil and stone (ABC) placed @ Bridge. 4 KDT's and 9 NDT's were performed on soil and stone placed @ the bridge and @ the scale approach. All tests met compaction requirements. 1 - Set of 5 concrete test cylis picked up to be logged in @ lab.

On-Site Representative/Company

Earl T. Alexander
S&ME Personnel

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME Form FR1502

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

Field Report

Date	Job No.
4-30-09	1356-06-825-05

Project/Location: ARCEN ASH Landfill Scale Roadway

Contractor	Weather/Temp
GRAHAM HARDT	Sunny / 80's

Present at Site: Gene - S&ME; Dennis / Kevin - GRAHAM HARDT

Time: 8 ✓

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:

S&ME personnel on site to perform FDT's on soil and NDT's on stone placed and compacted @ Bridge Pipe area. 3 FDT's and 6 NDT's were performed on fill placed. All tests met the compaction requirement. S&ME personnel also performed a proofroll on the ~~West~~ East side of the bridge area. Area was found to be stable.

Earl T. Alexander

On-Site Representative/Company — **S&ME Personnel**

MAY 1 2009

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and has certain responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of other parties at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

S&ME
9751 Southern Pine Blvd
Charlotte, NC 28273
(704) 523-4726
(704) 525-3953 fax

3260

To: File

Field Report

Date 4-30-09	Job No. 1356-06-825-09
Project/Location ALLEN ASH LANDFILL SCALE ROADWAY (Bridge)	
Contractor CROWDER	Weather/Temp Sunny/80's
Present at Site ERIC - S&ME STEVE - CROWDER	
Time 4.0	Mileage 40.0

- [x] Concrete sampling and testing
- [ ] Grout sampling and testing
- [ ] Mortar sampling and testing
- [ ] Sample locations attached
- [x] Picked up 1 sets, logged

Cast 2 sets of 5 cylinders/prisms/cubes/beams
Cast ____ sets of ____ cylinders/prisms/cubes/beams
Cast ____ sets of ____ cylinders/prisms/cubes/beams
Mix design 4009 Design compressive strength 4000
Addition of water authorized by: STEVE - CROWDER

Set Number	Truck Number	Ticket #	Time Batched	Time Truck Arrived	Time Sampled	Time Truck Completed	Water Added (gal)	Slump (in)	% Air	Unit Weight of Concrete (pcf)	Temp. of Air (°F)	Temp. of Concrete (°F)	# Cylinders Cast	Location
1	2693	000549	0727	0820	0825	0850	0	5.25	3.3	143.24	65°	75°	5	See Below
2	2707	001560	1218	1300	1310	1400	0	9.0	1.2	146.4	86°	80°	5	"

Comments/Location: (1) SCALE APPROACH RAMP
(2) Wheel WASH STATION / RTG
TIRE WASH STATION RTG

On-Site Representative/Company

Ed J. Alexander
S&ME Personnel

MAY 1 2009

Disclaimer: The presence of S&ME at the project site shall not be construed as an acceptance or approval of activities at the site. S&ME is at the project site to perform specific services and responsibilities which are limited to those specifically authorized in our agreement with our client. In no event shall S&ME be responsible for the safety or the means and methods of at the project site. **The information presented in this field report has not been reviewed by an engineer and is to be considered preliminary.**

PROOFROLLING/UNDERCUTTING OBSERVATIONS

Page 2 of 3

S&ME

PROJECT NAME: Allen Ash Landfill Scale Roadway 1356-06-825-09

DATE: 4-30-09

PROJECT NUMBER: 1356-06-825-09

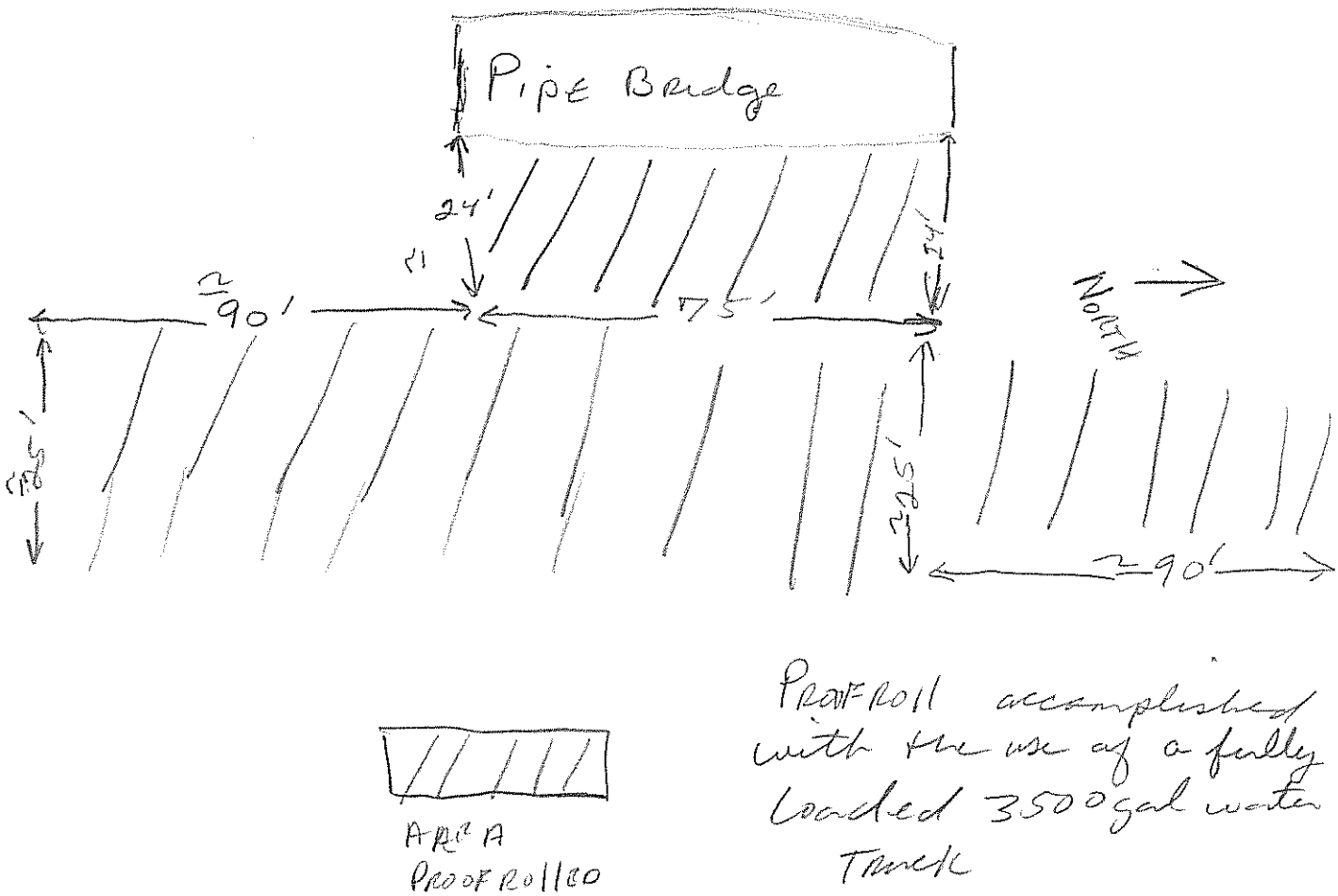
ENGINEER/TECH:

LOCATION: Belmont, NC

PROOFROLLING VEHICLE: Fully Loaded 3500 gal water Truck

WEATHER: Sunny/80's

SOIL SUBGRADE / AGGREGATE BASE COURSE (circle one)



Proof roll accomplished with the use of a fully loaded 3500 gal water truck

SITE DIAGRAM

COMMENTS / RECOMMENDATIONS: S&ME personnel on site to perform a proofroll of the above pictured roadway area. S&ME personnel observed no rutting, pumping or deflection of any significance. Proofrolled area concluded to be stable by S&ME personnel.

Signature

Meeting Minutes

Plant Allen RAB Ash Landfill – Cell 1 Construction
Pre-Construction Meeting - Agenda

Date of Meeting: Friday October 23, 2008
Time of Meeting: 9 AM

---

1. **Level I Safety Assessment and Sign-in**

2. **Introduction/Designation of Responsible Personnel**

   - Owner and Designee
   - Contractor
   - Design Engineer/Construction Quality Assurance
   - Regulators/Inspectors

3. **Health and Safety, Environmental**

   - Safe Work Practices
   - Procedures / Incident Reporting
   - Safety Meeting
   - First Aid
   - Site Assembly / Excavation
   - Spill Reporting
   - Preparation of Job Hazard Analysis

4. **Schedule**

   - General Phase I Schedule: Cell 1 & Cell 2
   - Cell 1 Critical Work Sequences
   - Progress Meetings/Reporting
   - Permit to Operate application process and schedule

5. **CQA**

   - Earthworks
     i. Structural fill
     ii. Compacted soil liner

- Geosynthetics
    i. Interface shear strength testing
    ii. Conformance testing
- Certification report

6. Record Drawings

- Review Section 014000 Part 1.4 C

7. Erosion and Sediment Control

- E&SC Permit in place
- Observation responsibility
- Land Quality Section site visits

8. Other Items

- Future NCDENR SWS meetings/visits
- .1700 Rule clarification for subgrade fill
- Test fill report

***A discussion item summary was not prepared for this meeting.**

MEMORANDUM

TO: Meeting Attendees
CC: None
FROM: Kyle Baucom, Ken Daly
DATE: January 21, 2009
SUBJECT: **January 12, 2009 Meeting Summary**
Plant Allen Retired Ash Basin (RAB) Ash Landfill – Phase I Construction
Belmont, North Carolina

PRINCIPAL ATTENDEES

Duke Energy:	Ted Manes
Earnhardt Grading:	Mark LeGrand
Ash Basics Company (ABC):	Cavin Bryant
Crowder Construction:	Sandy Brown Brad Hughey
S&ME, Inc.:	Ken Daly Kyle Baucom Jimmy Addis

This discussion item summary is intended to provide a general summary of the subject meeting and to document decisions and action items. 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 1 Safety/ Introduction:**
   The meeting began at approximately 10:00 A.M.

   Ted Manes began the meeting by discussing the topic of safety and pointing out that the main safety concern is heavy construction traffic throughout the site. He explained that this issue will become more of a concern towards the end of the month when Allen Steam Station will undergo an outage. He cautioned meeting attendees of increased traffic (primarily in the morning and evening) as a result of this outage.

Another traffic issue discussed was the cross traffic between Earnhardt Grading and Ash Basics Company. Ted explained that everyone must be critically aware of this cross traffic when storm drain line excavation occurs (per Notice of Change No. 2 at the southwest corer of the retired ash basin). The resulting open trenches must be clearly marked to distinguish their locations, especially for excavations left open after work hours.

1.1 Ken Daly stated that he would like S&ME on-site personnel to sign-in, attend tailgate safety meetings, and review the job safety analyses (JSAs) for Earnhardt Grading.

1.2 Ted Manes emphasized the need to staying in close proximity of your vehicle when exiting the vehicle in the active construction area. He also distinguished where hard hats are necessary. Hard hats are not required around the construction trailers. However, they are required in the landfill construction area.

2. Entrance Facility/Access Road Construction:

2.1 Mark LeGrand stated that construction at the entrance facility should start at the end of this week.

2.2 The group discussed earthwork/grading at the access road to the existing structural fill. It was identified that earthwork/grading in the structural fill area would likely encounter ash at proposed grades. Ted Manes and Ken Daly agreed that over excavation of the ash of 2 feet and backfill of with engineer fill will be required.

2.3 Cavin Bryant explained that ABC could access the rear entrance off of Wildlife Road while this construction at the entrance facility was taking place.

2.4 Meeting attendees then discussed the drainage issues at the access road. Ted Manes asked if the junction box needed to be installed. He asked if the pipe could be extended from Drop Inlet 2. Ken Daly agreed that this could be done, and Mark LeGrand stated that fabrication of this junction box could be halted. Meeting attendees also agreed that the Drop Inlet 1 location would be field verified to fit with the existing concrete ditch.

2.5 Aggregate base course and geotextile for the slope access road construction was discussed. Ken Daly questioned who is responsible for constructing the aggregate base course. It was agreed upon that Earnhardt would build this, and Ken explained that S&ME would verify if the aggregate base course included a geotextile beneath it.

2.6 Meeting attendees agreed on a target date of end of construction at the entrance facility/access road to be the end of February, so that seed could be planted by March.

2.7 Mark LeGrand asked about the subgrade in the scale pad area. Ken Daly explained that the intent was to grade up to subgrade elevations. Ted Manes explained that it may be beneficial to add a few inches to the subgrade and scrape off the additional soil later. Mark agreed that the subgrade could be finished 0.2-0.3 feet high (above design grades).

2.8 It was agreed that the existing guardrails along Plant Allen Road (base of the access road) will be removed prior to construction, and flared sections will be added on either side of the entrance.

3. Cell 1 Subgrade Construction:

3.1 Cavin Bryant estimated that ABC is placing approximately 2,000-3,000 cubic yards a day with about 9 to 11 cubic yards per truck. With approximately 24,000 cubic yards left to haul, he stated that January 20th is the target date for completion of the rough subgrade, weather permitting.

3.2 Meeting attendees agreed that Earnhardt will take over the final subgrade around this date with survey verification of the rough subgrade before the final subgrade construction begins. Ted Manes requested that subgrade as-built be scheduled for this time.

3.3 Ted Manes requested that Earnhardt grading provide ABC assistance with grade staking considering they have GPS surveying capabilities. Mark LeGrand agreed that Earnhardt can provide this support.

3.4 Meeting attendees from Crowder Construction exited at this point in the meeting.

4. Pipe Abandonment/Cell 1 Construction Access:

4.1 Cavin Bryant brought up the issue of abandoning the existing 24 inch pipe underlying the existing road and how this will affect the access to haul to Cell 1.

4.2 The group discussed and it was agreed that access would be coordinated between ABC and Earnhardt.

4.3 The issue of access to Cell 1 during construction in this area was raised. Ted Manes raised the concern to address Cell 1 access for landfill operations. Meeting attendees discussed and generally agreed to access Cell 1 from the northeast corner by building up an access from the existing road (Ash Boulevard) to Cell 1 with 3H:1V side slopes Ted Manes requested that S&ME prepare a grading plan for the Cell 1 access road.

5. E&SC and Stormwater Management:

5.1 Mark LeGrand explained that the sediment basin filled up with stormwater because of a defective skimmer. However, a new skimmer was installed and the sediment basin drained down over the weekend.

5.2 Ted Manes addressed drainage issues during construction from the top of Cell 1. Meeting attendees agreed that from the drawings the southwest corner will act as the sump for drainage. Ted asked if temporary pumps should be installed during construction to remove stormwater. Jimmy Addis suggested that a stretch of the berm on the south side of Cell 1 could be left open to allow for drainage straight to the sediment basin during construction.

5.3 Ken Daly addressed a few E&SC issues. He explained that there are some locations where wattles will need to be installed on perimeter berm slopes. He also identified that there is exposed geotextile on the western end of the sediment basin explaining that new rip rap should be placed to supplement the existing

conditions. Mr. Daly also believed that E&SC plan requires baffles in the sediment basin. He stated that S&ME would verify the most up to date E&SC plan to confirm these E&SC measures should be in place.

5.4 Temporary vs. permanent vegetation and the timeframe for vegetation was discussed. Ted Manes agreed that seeding should progress consistent with the E&SC plan.

5.5 Ken Daly asked to clarify who is responsible for completing the weekly E&SC inspections. Parties agreed that Earnhardt will take the lead for inspections with audits by S&ME.

6. Compacted Soil Liner Test Pad:

6.1 Ken Daly presented and explained test results for the compacted soil liner test pad. He explained that test results for a sample of the first lift (of three) had a permeability of 1.80×10^{-4} cm/sec and did not pass permeability requirements (of 1×10^{-5} cm/sec) He noted that a retest had a permeability of 1.87×10^{-5} cm/sec, which was close but did not pass the permeability requirements. He explained that test results indicated the moisture content was below the project requirement of 2 to 5 % wet of optimum moisture content. In addition, he noted that the lab reported the first lift sample tested exhibited signs of sample disturbance and it was believed this contributed to the failing test results. The second and third lifts met permeability requirements with permeabilities on the order of 5.35×10^{-6} cm/sec, but were also on the dry side of the compaction moisture criteria. He explained that samples were collected as the lifts were constructed and that construction of overlying lifts may have improved the condition of the first lift. Ken noted that one option was to collect an 18" long Shelby tube sample and retest the first lift. If this retest passed permeability requirements, then the test pad could be accepted and remain in place.

6.2 Mark LeGrand requested that the first lift be retested for permeability.

6.3 Ken Daly also noted that two permeability test results on samples remolded to the project requirements (95 percent of the standard proctor maximum dry density and 2 percent wet of the optimum moisture content) indicated permeabilities of about 3.51×10^{-6} cm/sec. He mentioned that he felt that based upon these laboratory test results, with the proper compaction and moisture conditioning, permeability requirements would be met for the compacted soil liner.

6.4 Mark LeGrand explained that in the compacted soil liner construction, the entire first lift would be constructed, followed by the entire second lift, followed by the entire third lift.

6.5 Ken Daly emphasized the importance of reaching the specified moisture and compaction criteria to reach target permeabilities. Jimmy Addis stated he believed that moisture conditioning (adding water) and discing would be required to achieve this. The group discussed the potential to mingle subgrade ash with the soil liner first lift. It was agreed that the rough subgrade would be

constructed a couple inches short of the proposed rough subgrade elevations to allow for discing without mixing in ash.

6.6 Ted Manes noted that NCDENR representatives had requested a site visit before liner system construction started. Ken Daly will touch base with Andy Tinsley (of Duke Energy) to make confirm this with NCDENR.

7. Settlement Plate Abandonment:

7.1 Ted Manes explained that the three existing settlement plates in Cell 1 should be abandoned. He explained that the extension from each settlement plate rod should be removed to below liner system elevations to prevent puncture.

7.2 Ken Daly agreed to abandonment so far as a final survey was performed on the settlement plates.

8. Cell 2 Construction:

8.1 Ted Manes explained that he would like to begin placing dry ash for subgrade fill in Cell 2 as well as placing structural fill on the southern and eastern perimeters of Cell 2.

8.2 Ted requested that S&ME develop a grading plan for a sliver fill placement of an ash subgrade fill with a 12-foot wide top width. The intent being that Earnhard construction could continue soil structural fill for the Cell 2 perimeter berms. Ken Daly agreed that S&ME would develop this grading plan.

9. Arch Bridge Construction:

9.1 Ken Daly summarized the expectations of S&ME during bridge construction. These included performing DCP tests after foundation excavation to verify bearing capacity as well as monitoring concrete placement.

9.2 Ken Daly noted that the design loading was a gross vehicle weight of 68,000 pounds based on information provided by operators and Duke's Marshall Steam Station. Ted asked that S&ME provide the design traffic load capacity of the arch bridge for placing signs indicating the maximum operating vehicle weight. He also asked if S&ME provide this information on the project drawings.

9.3 Ted requested that either side of the bridge be barricaded during construction to prevent an overloaded vehicle from crossing.

10. Geosynthetics:

10.1 Ken Daly addressed that the geosynthetics need to be properly protected and covered. This primarily applies to the GCL so as to prevent hydration of the bentonite.

10.2 Jimmy Addis asked Mark LeGrand if S&ME could get copies of geosynthetics shipments Bills of Lading. Mark LeGrand agreed.

11. Schedule:

11.1 Schedule items were discussed throughout the meeting and are summarized in general as follows.

11.2 Calvin Bryant explained that the rough subgrade should be completed by January 20th.
11.3 With rough subgrade completed by January 20th, placement of the compacted soil liner should begin at the end of January.
11.4 Following compacted soil liner placement, geosynthetics installation should take place during March and April.
11.5 Based on discussion with Earnhardt Grading, Ted Manes established the end of February as a target date for completing entrance facility/access road construction.
11.6 Ted Manes established March as a target date for planting seed.

The meeting adjourned by consensus at approximately 12:05 P.M. A meeting date was scheduled for January 26, 2009 at 10:00 A.M. at the Duke Office Trailer at Allen Steam Station.

Following the progress meeting, Ted and S&ME meeting attendees reviewed existing conditions in the area of the access road.

MEMORANDUM

TO: Meeting Attendees
CC: None
FROM: Kyle Baucom, Ken Daly
DATE: January 29, 2009
SUBJECT: **January 22, 2009 Meeting Summary**
Plant Allen Retired Ash Basin (RAB) Ash Landfill – Phase I Construction
Belmont, North Carolina

PRINCIPAL ATTENDEES

Duke Energy:	Ted Manes Chris Ussery
Earnhardt Grading:	Dennis Fultz Mark LeGrand Nick Linderman
Ash Basics Company (ABC):	Cavin Bryant Dean Johnston
S&ME, Inc.:	Ken Daly Kyle Baucom

This discussion item summary is intended to provide a general summary of the subject meeting and to document decisions and action items. 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:

- The progress meeting began at approximately 10:00 A.M.
- Dennis Fultz and Mark LeGrand raised the question of grading in the compacted soil liner in the areas around the laterals and corridors. All parties agreed that as long as the 18" thickness of the compacted soil liner could be verified, these areas could be bowled in rather than using a 2H:1V slope as specified in Detail 22 on Sheet D6.
- Dennis Fultz and Mark LeGrand also raised the question about stone placement in the corridors. Ken Daly explained that from the Pine Hall Road Landfill closure

they were able to run small equipment on the geomembrane and geocomposite. He also suggested that it may be beneficial to lay a strip of sacrificial geosynthetic down the length of the corridor to help cushion the equipment and prevent damage to any of the geosynthetics.

- All parties agreed that Donnie Lawrence and Associates will be responsible for the necessary as-built surveys. Ken Daly also addressed that the contractor is responsible for day to day repair locations on the geomembrane.
- All parties also agreed that since Earnhardt would construct a thicker (8 – 12") first lift on the compacted soil liner, and ABC would now bring the final rough subgrade up to the specified elevations instead of 2" short as specified from the previous meeting. Ken Daly also informed the present parties that he would like to perform an additional undisturbed permeability test on the first lift of the second 18" long Shelby tube sample from the compacted soil liner test pad to reconfirm that the specified permeability was met.
- Mark LeGrand asked if both the primary and secondary liner systems could be trenched in the same anchor trench instead of separate trenches as specified in Detail 3 on Sheet D1.
- Ted Manes asked if the existing 18" CMP could be field fit into Drop Inlet 2.
- Mark LeGrand and Ted Manes asked if they could proofroll in areas where 95% of standard proctor maximum dry density needed to be achieved. Ken Daly stated that this issue will be evaluated, and he restated that there still needs to be a 2-foot cover over areas with ash.
- Ted Manes and Ken Daly discussed that subgrade fill is to be used within the limit of waste, while structural fill is to be used outside the limit of waste, per Detail 1 on Sheet D1.
- All parties agreed on a target date of Wednesday, January 28, 2009, weather permitting, for the final survey on the rough subgrade with tolerances to be determined. Ted Manes also requested a survey on the south and east perimeters of Cell 2 to a quantity estimate.
- Construction on the entrance facility was scheduled to begin towards the end of the week. All parties agreed that the centerline of the proposed access road would be field fit to maintain an adequate 4-foot thick cover over the existing HDPE pipe.
- The meeting adjourned by consensus at approximately 11:50 A.M.

MEMORANDUM

TO: Meeting Attendees
CC: None
FROM: Kyle Baucom, Ken Daly
DATE: March 6, 2009
SUBJECT: **February 4, 2009 Meeting Summary**
Plant Allen Retired Ash Basin (RAB) Ash Landfill – Phase I Construction
Belmont, North Carolina

PRINCIPAL ATTENDEES

Crowder Construction:	Alan Baynard Sandy Brown Brad Hughey
Duke Energy:	Dennis Hiott Ted Manes Jeff Newell
Earnhardt Grading:	Dennis Foltz Mark LeGrand Nick Linderman
S&ME, Inc.:	Ken Daly Kyle Baucom

This discussion item summary is intended to provide a general summary of the subject meeting and to document decisions and action items. 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:

The progress meeting began at approximately 9:00 A.M. The main subject of this progress meeting was scheduling of Cell 1, electrical-mechanical, and Cell 2 construction. Ted Manes reviewed the schedule for these three construction activities.

Cell 1 Construction Schedule

- Entrance Facility – finish rough grade with subgrade and aggregate base course (ABC) in place by February 13th.
- Entrance Facility – to be seeded by February 20th.
- Structural Fill – Earnhardt Grading to finish by March 2nd.
- Final Subgrade – Earnhardt Grading to complete between March 2nd and March 9th.
- Compacted Soil Liner – Earnhardt Grading to construct between March 9th and March 23rd.
- Geosynthetics Pre-Installation Meeting – to meet around March 9th.
- Geosynthetic Liners – Plastic Fusion to install between March 23rd and May 23rd.
- Protective Cover – Earnhardt Grading to construct between May 23rd and June 12th.
- CQA Paperwork - S&ME to complete Part 1 (through geosynthetic installation) between May 23rd and June 5th.
- CQA Paperwork – S&ME to complete Part 2 (protective cover CQA) between June 12th and June 19th.
- Review – NCDENR to review between June 5th and July 19th.

Electrical-Mechanical Construction Schedule

- The following schedule is the general process of construction. Crowder Construction to develop more detailed schedule later.
- Access Road – Crowder Construction to pave the access road between March 1st and March 15th. Crowder Construction to pave intersection of access road and existing haul road between March 23rd and April 1st so that dry ash hauling from silos can begin on April 1st.
- Entrance Facility – Crowder Construction to pour concrete slabs.
- Entrance Facility – Crowder Construction to install truck scale to be provided by Duke Energy and wheel wash system provided by Crowder Construction.
- Electrical – Crowder Construction to work in duct bank and transformer area.
- Electrical – Crowder Construction to work in landfill area from March 23rd to May 23rd.
- Mechanical – Crowder Construction to install force main.
- Mechanical – Crowder Construction to install pipe pumps.
- Mechanical – Crowder Construction to work in entrance facility from March 23rd to May 1st.
- Mechanical – Crowder Construction to set pumps and have pumps working between April 17th and May 1st.
- Civil – Crowder Construction to install scale pad basin.
- Civil – Crowder Construction to install pump retaining walls.

Other items discussed included:

- Access ramp to be constructed from existing Ash Boulevard connecting to the northern slope of Cell 1 to provide construction access.
- Crowder Construction will work around haul roads intersections during periods of no haul (ie. inclement weather, such as cold temperatures or rain).
- Ted Manes emphasized erosion and sediment control (E&SC) as a major concern. E&SC measures and inspections need to be kept up. Minimizing dust was another issue with E&SC.
- S&ME will update electrical-mechanical drawings for Crowder Construction to include control points in the scale pad and control panel areas and to parallel water line to electrical line in the scale pad area.

Meeting attendees took a break from 11:05 to 11:15 A.M. The progress meeting continued at 11:15 A.M. without attendees from Crowder Construction. Ted Manes reviewed the schedule for Cell 2 construction activities.

Cell 2 Construction Schedule

- Subgrade – to be completed as early as August 1st and as late as September 1st depending on amount of ash that can be used for Cell 2 subgrade. Assuming an August 1st subgrade completion date, the subsequent schedule is as follows.
- Compacted Soil Liner – to be constructed between August 1st and August 22nd.
- Geosynthetic Liners – to be installed between August 23rd and October 23rd.
- Protective Cover – to be constructed between October 24th and November 14th.
- E&SC Measures – half of Cell 2 to be seeded and other half of Cell 2 to be covered with sacrificial geomembrane.

Other items discussed included:

- S&ME will estimate quantity of subgrade to be placed in Cells 3 and 4. Ken Daly to talk Chris Hallman and Andy Tinsley with NCDENR about their opinion on structural fill for Cells 3 and 4.
- S&ME will evaluate the load capacity of the arch bridge with rigid pavement for future construction use.

MEMORANDUM

TO: Meeting Attendees
CC: None
FROM: Kyle Baucom, Ken Daly
DATE: April 14, 2009
SUBJECT: **April 6, 2009 Meeting Summary**
Plant Allen Retired Ash Basin (RAB) Ash Landfill – Phase I
Geosynthetics Pre-Construction
Belmont, North Carolina

PRINCIPAL ATTENDEES

Crowder Construction:	Brad Hughey
Duke Energy:	Ted Manes Don Scruggs Andy Tinsley
Earnhardt Grading:	Dennis Foltz Mark LeGrand Nick Linderman
NCDENR:	Larry Frost
Plastic Fusion:	Albert Corbitt
S&ME, Inc.:	Ken Daly Kyle Baucom Cedric Ruhl

This discussion item summary is intended to provide a general summary of the subject meeting and to document decisions and action items. 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

The Phase I geosynthetics pre-construction meeting began at approximately 10:00 A.M. with a Level I safety assessment from Ted Manes. He informed meeting attendees of construction activity taking place on site.

2. Sign-In and Introduction/Designation of Responsible Personnel

Following the safety assessment, meeting attendees introduced themselves and their respective company (see attached sign-in sheet for details).

3. Environment, Health, and Safety

3.1 Ted Manes explained the MICCS program and made all parties aware that any workers on site should go through the MICCS program as well as site specific safety training for Allen Steam Station.
3.2 Ted Manes also explained that parking passes can be attained for those coming on site regularly. He explained that company vehicles are permitted throughout the site, while personal vehicles are not. Personal vehicles should be parked in designated areas.
3.3 Meeting attendees discussed job hazard analyses (JHAs). Ted Manes discussed that wet ash hauling from Pond 3 should begin shortly as well as dry ash hauling from the silos, which will result in cross traffic.
3.4 Ted Manes explained that Crowder will be doing some work around the entrance facility and at some point will need to cross the roads to put the conduits in place.
3.5 Ted Manes suggested weekly coordination meetings to review work activities for the week for each party.
3.6 Mark LeGrand explained that Earnhardt Grading will still have heavy equipment running to continue with fine grading on the compacted soil liner.
3.7 Albert Corbitt explained that Plastic Fusion will be running ATVs, but warned that their most significant hazard is wind getting underneath any geosynthetics.
3.8 Ken Daly expressed interest for S&ME on site personnel to attend any safety meetings and sign daily JHAs for Earnhardt and Plastic Fusion.

4. Schedule

4.1 Mark LeGrand explained that Earnhardt Grading is in the process of fine grading the compacted soil liner, and that the plan is for Plastic Fusion to deploy geosynthetics as Earnhardt Grading is finishing fine grading with a start date as early as later in the week.
4.2 Albert Corbitt explained that Plastic Fusion still needs to get their equipment and more people on site before they can begin deployment. He also explained that

Plastic Fusion will plan on working six days a week at 9 to 10 hours a day (weather permitting) with one crew with a target of six weeks to complete geosynthetics installation.

4.3 Dennis Foltz explained that Earnhardt Grading's plan was to fine grade the eastern side of the main center corridor working their way south from the northeast corner and then fine grade with a similar plan on the western side.

4.4 Albert Corbitt explained that Plastic Fusion can install approximately four acres of geosynthetics per day.

5. Specification and CQA Plan Overview

5.1 Ken Daly explained that Plastic Fusion should keep parallel documentation during geosynthetics installation with daily coordination between S&ME and Plastic Fusion on geosynthetics paperwork.

5.2 Ken Daly explained that field density and moisture testing and laboratory permeability testing has met specification requirements and that testing frequencies are up to date for the quantity of material in place.

5.3 Mark LeGrand explained that final topography for the compacted soil liner will be performed in sections as Earnhardt Grading is completing fine grading.

5.4 Ken Daly explained that compacted soil liner thickness will be based on the elevation difference between subgrade and compacted soil liner survey points at corresponding northing/easting locations.

5.5 Ken Daly summarized the expectations for the finished grade on the compacted soil liner explaining that it should be smoothly rolled with no significant ruts, cracks, or protrusions (ie. roots, rocks).

5.6 Ken Daly explained that there is still some missing submittal information that S&ME would discuss with Earnhardt Grading at another time.

5.7 Albert Corbitt explained that Plastic Fusion would perform two trial seams a day.

5.8 Ken Daly reviewed CQA testing protocol and CQA form details. Albert Corbitt and Ken Daly compared CQA field forms. It was agreed that the field forms were similar and each company could use their individual field forms.

5.9 Parties agreed that destructive testing would be performed at a frequency of 1 per 500 feet of seam length on 4.5 feet long by 12-inch wide samples. Destructive testing will be performed independently by Plastic Fusion and S&ME with one additional sample as an archive.

5.10 Ken Daly reviewed the expectations for panel marking, which includes a panel identification number, seaming technician initials, date/time welded, machine number, testing technician initials, date/time of test, type of test (air or vacuum), and pass/fail result.

5.11 Ken Daly explained that Earnhardt Grading is responsible for the as-built geomembrane record drawing, which includes: panel numbers, panel intersections, and destructive test locations.

5.12 Ken Daly reviewed the different geocomposites for the LDS and LCS systems, and explained that the geocomposite must be installed in the same direction as

the slope direction for both geocomposite layers (ie. diagonal instead of north-south or east-west directions).

5.13 Ken Daly reviewed seaming and ballast loading of the sacrificial geomembrane. It was explained that seaming should follow manufacturer recommendations. Albert Corbitt suggested constructing an anchor trench for the sacrificial geomembrane to help prevent wind uplift.

5.14 Ken Daly explained that all geosynthetics documentation must be complete before protective cover can be placed. He also explained that this must be monitored during placement of protective cover to ensure no significant wrinkles of underlying geosynthetics.

5.15 Ken Daly explained that all geosynthetics have met manufacturer's quality control and conformance tests results and frequencies.

5.16 Ken Daly reviewed drawing details to confirm that geosynthetic installation details were understood.

5.17 Ken Daly explained that the leachate detection system sump consists of two hydraulically isolated sumps. Albert Corbitt explained that this could be done by extrusion welding the primary geomembrane to the secondary geomembrane.

5.18 Ken Daly explained that prior to placing waste in the cells, the sacrificial geomembrane (over leachate collection corridor, laterals, and sump) should be removed or pulled back to allow contact between the waste and the geotextile (wrapping the drainage aggregate).

6. Roundtable

6.1 Albert Corbitt raised the question of whether or not they can back roll geomembrane over the geosynthetic clay liner (GCL) with a rubber tire loader. Ken Daly expressed that this can be done if they can demonstrate that this can be done without rutting the GCL. S&ME will observe GCL condition during deployment to confirm.

6.2 Albert Corbitt also raised the question of whether or not they can heat bond adjacent geocomposite panels instead of sewing the adjacent panels. He explained that this would be done by heating the geocomposite with a torch, and it would lay much flatter with this approach. Ken Daly expressed that he is fine with this heat bond on the leak detection system (LDS), and this can also be done on the leachate collection system (LCS) if they can demonstrate that the heat bond does not burn the geocomposite creating holes and subsequent soil infiltration.

6.3 Albert Corbitt explained that Plastic Fusion will also be installing the LDS and LCS pipes.

6.4 Albert Corbitt explained that Plastic Fusion construction equipment will consist of ATVs and a four-wheeler. Ted Manes explained that the four-wheeler must remain on in the Cell 1 work area since it has no roll bar or seat belts.

6.5 Parties discussed storm water management in the Cell 1 sump area during construction. Brad Hughey explained that the pumps will not be working until

the middle of May. Storm water management suggestions including notching the existing berm and covering with geomembrane through this area and down the slope to prevent erosion or installing a down drain.

The meeting adjourned by consensus at approximately 12:30 P.M. Following the meeting, several meeting attendees performed a site walk in the area of Cell 1 compacted soil liner construction.

PLANT ALLEN RAB ASH LANDFILL – CELL 1 GEOSYNTHETICS CONSTRUCTION

PRE-CONSTRUCTION MEETING

SIGN-IN SHEET FOR 4/6/09

Name (Print)	Signature	Company
Kyle Baucom	kbaucom@smeinc.com	S&ME
Ken Daly	kdaly@smeinc.com	S&ME
Cedric Ruhl	cruhl@smeinc.com	S&ME
Mark LeGrand	mark@earnhardtgrading.com	Earnhardt Grading
Larry Frost	larry.frost@ncmail.net	NCDENR
Nick Linderman	nick@earnhardtgrading.com	Earnhardt Grading
Dennis Foltz		Earnhardt Grading
Don Scruggs	dlscruggs@duke-energy.com	Duke Energy
Albert Corbitt		Plastic Fusion
Ted Manes	tamanes@duke-energy.com	Duke Energy
Andy Tinsley	aftinsley@duke-energy.com	Duke Energy

Notices of Change

TABLE OF CONTENTS

NOTICE OF CHANGE LOG

CELL 1 CONSTRUCTION CERTIFICATION REPORT (SUBMITTAL 1 OF 2)

Retired Ash Basin (RAB) – Ash Landfill
S&ME Project No. 1356-06-825, Ph. 9

Change No. 1	GCL Index Flux
Change No. 2	Culvert Relocation
Change No. 3	Drop Inlet & Bridge Modifications
Change No. 4	LDS minimum Design Transmissivity
Change No. 5A	Sump Grade
Change No. 6	Aggregate and Subgrade Compaction
Change No. 7	Cast-In-Place Concrete Slump Specification
Change No. 8	Subgrade Density Testing Frequency
Change No. 9	Signage
Change No. 10	Borrow Area Sediment Basin
Change No. 10A	Borrow Area Sediment Basin (Revision)
Change No. 11	Access Ramp
Change No. 12	Concrete Slab Elevations

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date: 11/17/08**	**Job No.: 1356.06.825-09**
DESCRIPTION:	GCL Index Flux	Duke Energy – Allen Steam Station	
		Ash Landfill	
NOTICE OF CHANGE NO.	1		
CHANGE ORDER NOS:	N/A		

Description of design change:

Table 02677-A in Specification 02677 – Geosynthetic Clay Liner (GCL) states the following:

a. GCL index flux shall be less than 1×10^{-9} $m^3/m^2/sec$;
b. GCL tensile strength shall be greater than 90 lbs; and
c. GCL peel strength shall be greater than 15 lbs.

This Notice of Change makes the following modifications:

a. GCL index flux shall be less than 1×10^{-8} $m^3/m^2/sec$;
b. GCL tensile strength shall be greater than 22.5 lbs/in; and
c. GCL peel strength shall be greater than 2.5 lbs/in.

Reason for design change:

Correction to original specification consistent with geotextile-backed GCL products.

Effective date of design change:

Immediately.

Financial and schedule considerations:

None anticipated.

Attachment:

None.

11/17/08		11.17.08	
Engineer of Record Name	**Date**	**Prepared By** Name	**Date**

Copies to:

- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☐
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐
- ☐

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date: 1/2/08**	**Job No.: 1356.06.825-09**
DESCRIPTION:	Culvert	Duke Energy – Allen Steam Station	
	Relocation	Ash Landfill	
NOTICE OF CHANGE NO.	2		
CHANGE ORDER NOS:			

Description of design change:

Abandon existing culvert underneath ash sluice pipes, install culvert drainage system discharging to the sediment basin south of the proposed landfill. Class III backfill is to be used for the culvert as shown in Reference 1 ADS, Inc. Drainage Handbook.

Reason for design change:

To provide drainage for post-construction conditions.

Effective date of design change:

Immediately.

Financial and schedule considerations:

T.B.D.

Attachments:

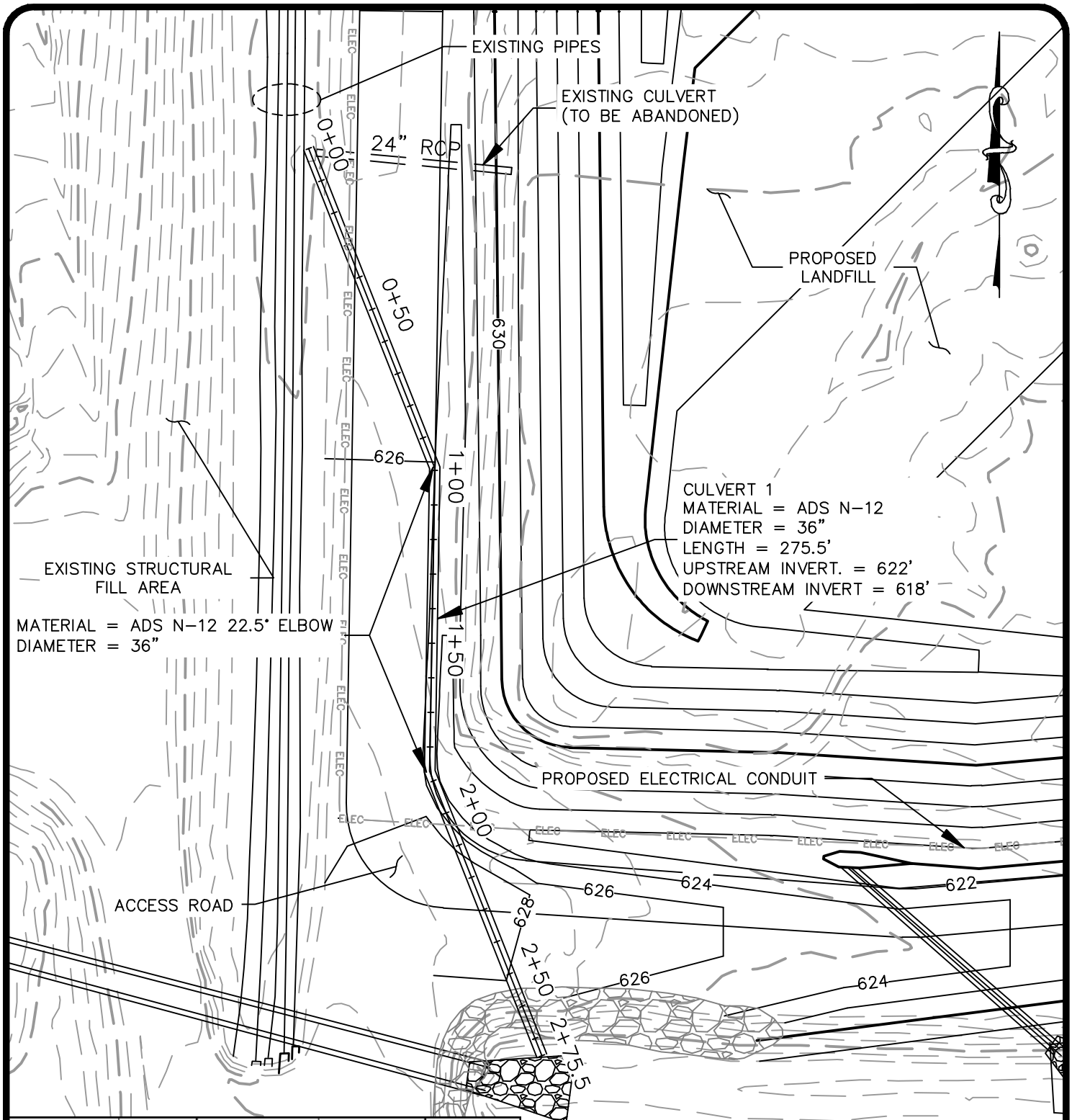
Figure 1: Proposed Culvert Relocation

Reference 1: ADS, Inc. Drainage Handbook, pages 5-10 to 5-14.

1/2/08	1/2/08
Engineer of Record **Date**	**Prepared By** **Date**
Kenneth Daly, P.E.	Erik Hartwick

Copies to:

- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☐
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐
- ☐



Description	Station	Northing	Easting	Invert Elevation
Beginning	0+00.00	527316.07	1398767.18	622.00
Elbow	0+99.29	527223.72	1398803.64	620.56
Elbow	1+87.01	527136.01	1398802.19	619.28
End	2+75.00	527053.76	1398834.66	618.00

SCALE: 1" = 40'

DATE: 12/31/08

DRAWN BY: ELH

PROJECT NO: 1356-06-825 PH. 9

S&ME

WWW.SMEINC.COM

PROPOSED CULVERT RELOCATION

ALLEN STEAM STATION RAB ASH LF
BELMONT, NORTH CAROLINA

FIGURE NO.

1

Table 5-2
Classes of Embedment and Backfill Materials

ASTM D2321[1] Class	ASTM D2321[1] Description	ASTM D2487 Notation	ASTM D2487 Description	AASHTO M43 Notation	Min. Compaction Required (Std. Proctor Density %)[3]	ASTM D2321 [1] Percentage Passing Sieve Sizes: 1 ½ in. (40mm)	No. 4 (4.75mm)	No. 200 (0.075mm)	Atterberg Limits: LL	PI	Coefficients: Uniformity Cu	Curvature Cc
IA[4]	Open-graded, clean manufactured aggregates	N/A	Angular crushed stone or rock, crushed gravel, crushed slag; large voids with little or no fines	5 56	Dumped to Slight	100%	≤10%	<5%	Non Plastic		N/A	
IB	Dense-graded, clean manufactured, processed aggregates	N/A	Angular crushed stone or other Class IA material and stone/sand mixtures with gradations selected to minimize migration of adjacent soils; little or no fines			100%	≤50%	<5%	Non Plastic			
II	Clean, coarse-grained soils	GW	Well-graded gravel, gravel-sand mixtures; little or no fines	57 6 67	Moderate (85%)	100%	<50% of "Coarse Fraction"	<5%	Non Plastic		>4	1 to 3
		GP	Poorly-graded gravels, gravel-sand mixtures; little or no fines								<4	<1 or >3
		SW	Well-graded sands, gravelly sands; little or no fines				>50% of "Coarse Fraction"				>6	1 to 3
		SP	Poorly-graded sands, gravelly sands; little or no fines								<6	<1 or >3
	Coarse-Grained Soils, borderline clean to w/fines	GW-GC, SP-SM	Sands and gravels which are borderline between clean and with fines	N/A		100%	Varies	5% to 12%	Non Plastic		Same as for GW, GP, SW and SP	
III	Coarse-grained soils with fines	GM	Silty gravels, gravel-sand-silt mixtures	Gravel & sand with <10% fines	Moderate to High (90%)	100%	<50% of "Coarse Fraction"	12% to 50%	N/A	<4 or <"A" Line	N/A	
		GC	Clayey gravels, gravel-sand-clay mixtures							<7 & >"A" Line		
		SM	Silty sands, sand-silt mixtures				>50% of "Coarse Fraction"			>4 or <"A" Line		
		SC	Clayey sands, sand-clay mixtures							>7 & >"A" Line		
IVA[2]	Inorganic fine-grained soils	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, silts with slight plasticity	N/A	N/R	100%	100%	>50%	<50	<4 or <"A" Line	N/A	
		CL	Inorganic clays of low to medium plasticity; gravelly, sandy, or silty clays; lean clays	N/A						>7 & >"A" Line		
IVB	Inorganic fine-grained soils	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	N/A	N/R	100%	100%	>50%	>50	<"A" Line	N/A	
		CH	Inorganic clays of high plasticity, fat clays	N/A						>"A" Line		
V	Organic soils or Highly organic soils	OL	Organic silts and organic silty clays of low plasticity	N/A	N/R	100%	100%	>50%	<50	<4 or <"A" Line	N/A	
		OH	Organic clays of medium to high plasticity, organic silts	N/A					>50	<"A" Line		
		PT	Peat and other high organic soils	N/A								

Notes:
1) Refer to ASTM D2321 for more complete soil descriptions.
2) Class IVA material has limited applications and can be difficult to place and compact; use ONLY with the approval of a soil expert. Contact ADS for additional information regarding suitability of this backfill material.
3) N/R indicates that use of this material and/or compaction level is not recommended by ASTM D2321 for the backfill envelope.
4) When using open-graded material, additional precaution must be taken to reduce or eliminate the risk of migration of fines from adjacent material. Refer to ASTM D2321 for more complete information.

© ADS, Inc., August 2008

BACKFILL PLACEMENT

Storm sewers are sometimes placed on foundations that settle and shift in a non-uniform manner. Fortunately, flexible pipe can accommodate many of these changes without detrimental effects. The best construction practices, however, involve placing the pipe on a firm foundation for maximum performance and structural integrity throughout the design life.

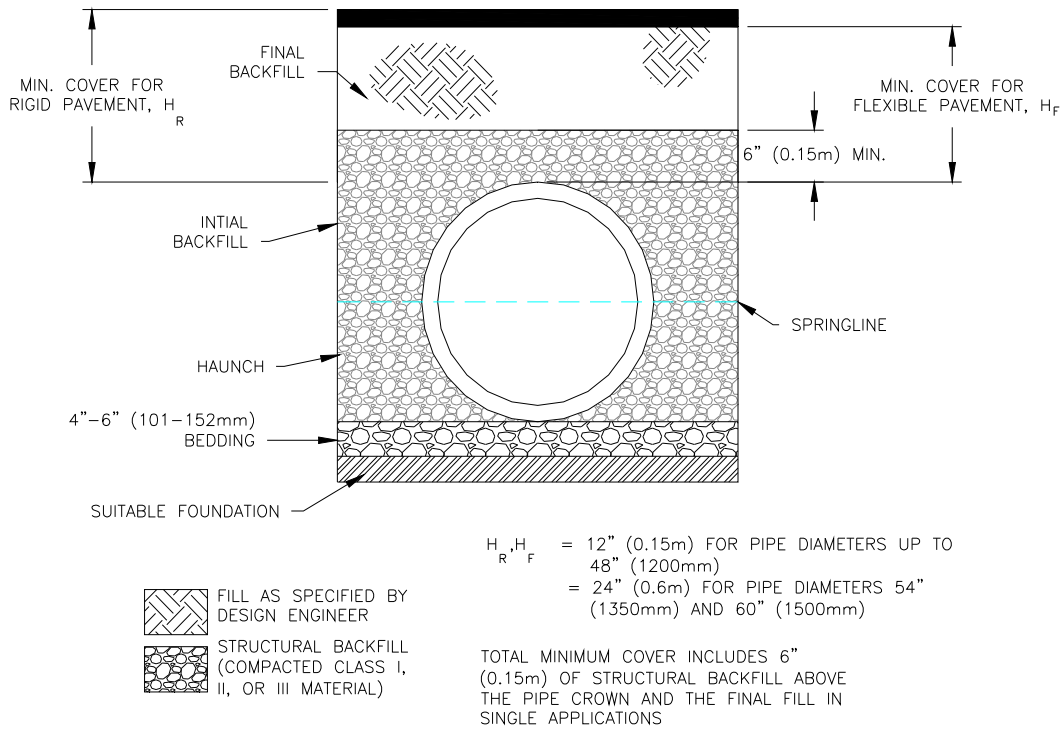
In some cases it may be necessary to perform subsurface evaluations of the soil conditions where muck, rock, or other unsuitable conditions are suspected. Zones of soft material, such as muck, allow the pipe to settle, potentially affecting the structural integrity and hydraulic characteristics of the system. Rock and rock protrusions apply point loads where they contact the pipe that can affect the hydraulics or structural integrity of the system. It is recommended that unsuitable foundation material be excavated before installation of the pipe proceeds. Where a rock or unyielding or soft foundation is present, the design engineer or a geotechnical engineer shall be consulted to determine the extent to which the undesirable material is to be excavated.

If no undesirable foundation material is found, a minimum of 4- to 6-inches (0.1 - 0.15m) of bedding shall be placed and compacted on the foundation to equalize load distributions along the invert of the pipe. (Refer to Figure 5-2 for a pictorial description of backfill terminology.)

A stable and uniform bedding shall be provided for the pipe and any protruding features of its joints and/or fittings. The middle of the bedding equal to 1/3 of the pipe O.D. should be loosely placed, with the remainder compacted to a minimum of 90% standard proctor density. Class I, II, and III materials are suitable for use as bedding. Note: Where using open-graded material (IA for example) in any fill zone, additional precaution must be taken to reduce or eliminate the risk of migration of fines form adjacent material. Precautionary steps could include the use of geotextile between the varying fill materials, gradation selection to prevent the migration of fines, or other precautionary measures. Refer to ASTM D2321 for more complete information.

© ADS, Inc., August 2008

Figure 5-2
Typical Backfill Structure



The next layer of backfill, the haunching, is the most important since it is this layer that provides the pipe with support against the soil and traffic loadings. Class I, II, and III materials are suitable for use in the haunches. Haunching shall be placed in lifts of 4- to 6-inches (0.10 - 0.15m) and compacted in accordance with Table 5-3, or as otherwise stated in fill height Technical Notes 2.01 and 2.02 to achieve required depth of fill. Tamp to achieve the specified compaction, or shovel into the area, eliminating voids, if the material doesn't require compaction. Construction of each lift should be repeated up to the spring line.

Initial backfill extends from the spring line to a minimum of six inches (0.15m) above the crown of the pipe. This area of the backfill anchors the pipe and ensures that loads are distributed as evenly as possible into the haunching. The same material used in the haunching should be used for the initial backfill. Where differing materials are used, backfill material size should be selected as to prevent migration of fines or a geosynthetic shall be used to separate the backfill zones. Additionally, it is crucial to obtain similar backfill strength between fill zones if differing materials are used. Where varying soil strengths exist, structural performance of the overall system may be compromised; therefore using the same material as was used in the haunch area for the initial backfill is recommended. When using a material that requires compaction it is important not to use mechanical compaction equipment directly on the pipe itself. Class I, II, and III materials are suitable for use as initial backfill. Initial backfill shall be placed in lifts of 4- to 6-inches (0.10 - 0.15m) and compacted in accordance with Table 5-3, or as otherwise stated in fill height Technical

© ADS, Inc., August 2008

Notes 2.01 and 2.02 to achieve required depth of fill. Tamp to achieve the specified compaction, or shovel into the area, eliminating voids, if the material doesn't require compaction. Construction of each lift should be repeated up to a minimum of six inches (0.15m) above the crown of the pipe.

Flowable fill can be used as an alternative to compacted granular material, however special precautions are necessary for a successful installation. Flowable fill may cause the pipe to float or misalign. Therefore the pipe will need to be weighted with sandbags or held with some type of anchoring system. The flowable fill may also be poured in layers that are allowed to cure before the next layer is poured to help reduce the tendency for the pipe to float. As with any backfill material, proper installation of the flowable fill around the pipe is critical to the structural performance of the pipe. For additional information on the use of flowable fill, refer to Technical Note 5.02: *Use of CLSM as Backfill Material for HDPE Pipe*.

Final backfill, which extends from the initial backfill layer to the ground surface, does not directly support the pipe. For 4- to 48-inch (100mm-1200mm) diameters the final backfill shall be a minimum of six inches (0.15m) and shall be a minimum of eighteen inches (0.5m) for 54-inch and 60-inch (1350mm and 1500mm) diameters for a total of twelve and twenty-four inches of minimum cover, respectively, for single run applications (see Figure 5-2). For applications where flexible pavement is installed over the pipe zone, height of cover is measured from the crown of the pipe to the bottom of the flexible pavement. Where rigid pavement is installed over the pipe zone, height of cover is measured from the top of the pipe to the top of the rigid pavement. When no pavement will be installed, but vehicle traffic is expected (e.g. gravel driveway), a minimum cover of 18" (0.5m) for 4- to 48-inch (100-1200mm) diameters and 30" (0.8m) for 54- and 60-inch (1350mm and 1500mm) diameters is recommended to minimize rutting. Proper compaction in this area is not nearly so critical for the pipe as in the other layers. However, if roads or drives will be crossing the pipe, a relatively high degree of compaction is needed to prevent pavement settlement. Excavated materials may be of adequate quality for final backfill, depending on the intended use at the surface. Selection, placement and compaction of final backfill shall be as directed by the design engineer.

© ADS, Inc., August 2008

Table 5-3
Recommendations for Installation and Use of Soils and Aggregates

Backfill Zone	Class 1A	Class 1B	Class 2	Class 3
General Restrictions	Do not use where conditions may cause migration of fines from adjacent soil and loss of pipe support.	Process material as required to obtain gradation which will minimize migration of adjacent materials.	Where hydraulics gradient exists check gradation to minimize migration.	Do not use where water condition in trench may cause instability.
Foundation	√	√	√	√ *- Do not use in thicknesses greater than 12-in. total.*
Bedding	√ *- 4" for 12"-24" pipe 6" for 30" to 60" pipe* *- Loosely place middle 1/3*OD with remainder compacted to min. 90% SPD*	√ *- 4" for 12"-24" pipe 6" for 30" to 60" pipe* *- Loosely place middle 1/3*OD with remainder compacted to min. 90% SPD*	√ *- 4" for 12"-24" pipe 6" for 30" to 60" pipe* *- Loosely place middle 1/3*OD with remainder compacted to min. 90% SPD*	√ *- 4" for 12"-24" pipe 6" for 30" to 60" pipe* *- Loosely place middle 1/3*OD with remainder compacted to min. 90% SPD*
Haunch	√ *- Work in around pipe by hand to provide uniform support* *- knife in to remove any voids*	√ *- Work in around pipe by hand to provide uniform support* *- Compact to min. 85% SPD*	√ *- Work in around pipe by hand to provide uniform support* *- Compact to min. 85% SPD*	√ *- Work in around pipe by hand to provide uniform support* *- Compact to min. 90% SPD*
Initial Backfill	√ *- Install to a minimum of 6" above pipe crown* *- knife in to remove any voids*	√ *- Install to a minimum of 6" above pipe crown* *- Compact to min. 85% SPD*	√ *- Install to a minimum of 6" above pipe crown* *- Compact to min. 85% SPD*	√ *- Install to a minimum of 6" above pipe crown* *- Compact to min. 90% SPD*
Final Backfill	√ *- Place and compact as required by the engineer*	√ *- Place and compact as required by the engineer*	√ *- Place and compact as required by the engineer*	√ *- Place and compact as required by the engineer*

1) √ = Material may be suitable. Ultimately, the design engineer must determine the acceptable backfill material based on specific project conditions and structural requirements for the product.

2) Refer to ASTM D2321 for more complete soil requirements.

© ADS, Inc., August 2008

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date: 1/21/09**	**Job No.: 1356.06.825-09**
DESCRIPTION:	Drop Inlet and Bridge Modifications	Duke Energy – Allen Steam Station RAB Ash Landfill	
NOTICE OF CHANGE NO.	3		
CHANGE ORDER NOS:			

Description of design changes:

Referencing Drawings C16 and D11: Drop inlet 1 and Drop inlet 2 invert elevations were modified. Drop inlet dimensions have been clarified. Junction box (JB-1) location and elevations are to be field fit to tie into the existing 18-in. diameter CMP culvert location.

The single radius arch bridge width was enlarged from 17 feet to 20 feet, and the length was expanded from 75 feet to 90 feet. Grading around the bridge was modified accordingly. Channel D7 and riprap apron A6 were added along the groin of the southwest bridge embankments. Vendor provided bridge foundation design is also incorporated with this change.

Reason for design change:

To clarify stormwater management design at the access road and to integrate the bridge foundation design and bridge changes with the grading plans.

Effective date of design change:

Immediately.

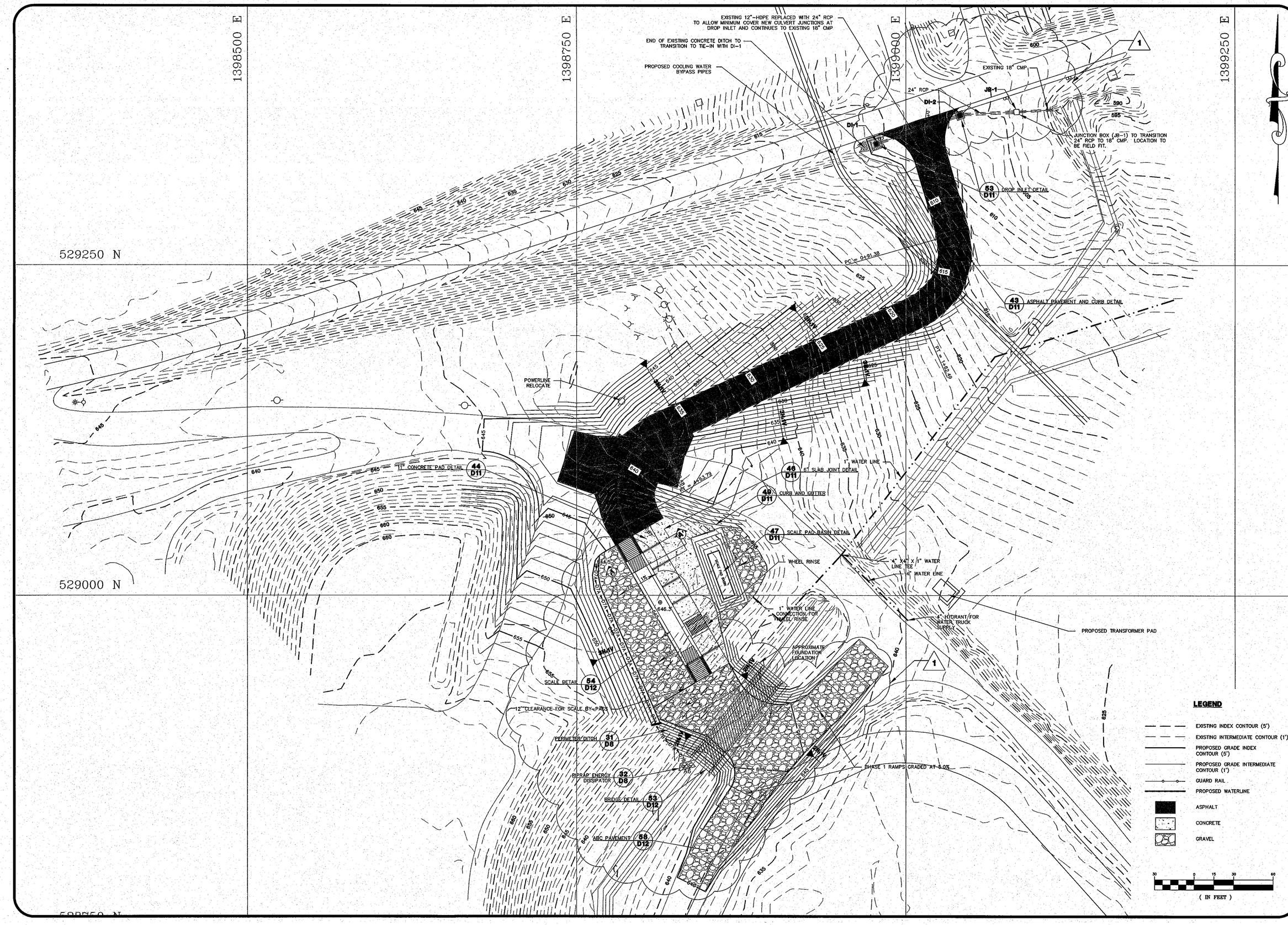
Financial and schedule considerations: To be determined.

Attachments:

Revision 1 of Drawings C16, D8, D11, and D12
"Aluminum Arch Foundation Design", Peritus Civil, Inc., January 12, 2009.
"Arch Bridge Foundation Design Recommendations", S&ME, Inc., December 12, 2008.

Kenneth R. Daly 1/21/09		Kyle Baucom 1/21/09	
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:
- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☒ Mark LeGrand, Earnhardt Grading, Inc.



Duke Energy ©

S&ME
WWW.SMEINC.COM

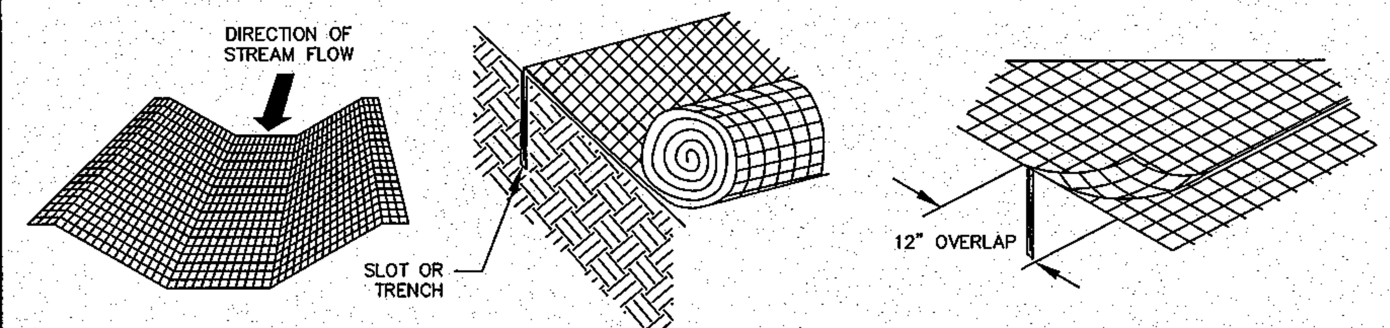
NO.	DATE	DESCRIPTION	BY
1	1-21-09	NOTICE OF CHANGE 3: DROP INLET AND BRIDGE MODIFICATIONS	
0	10-16-08	ISSUED FOR CONSTRUCTION	

ACCESS ROAD / ENTRANCE PLAN

ELECTRICAL\MECHANICAL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: WMH	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: C16	OF: 28

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\ACCESS ROAD @ CHANGE\CONSTRUCTION\C16 ACCESS ROAD\BELDWG



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:

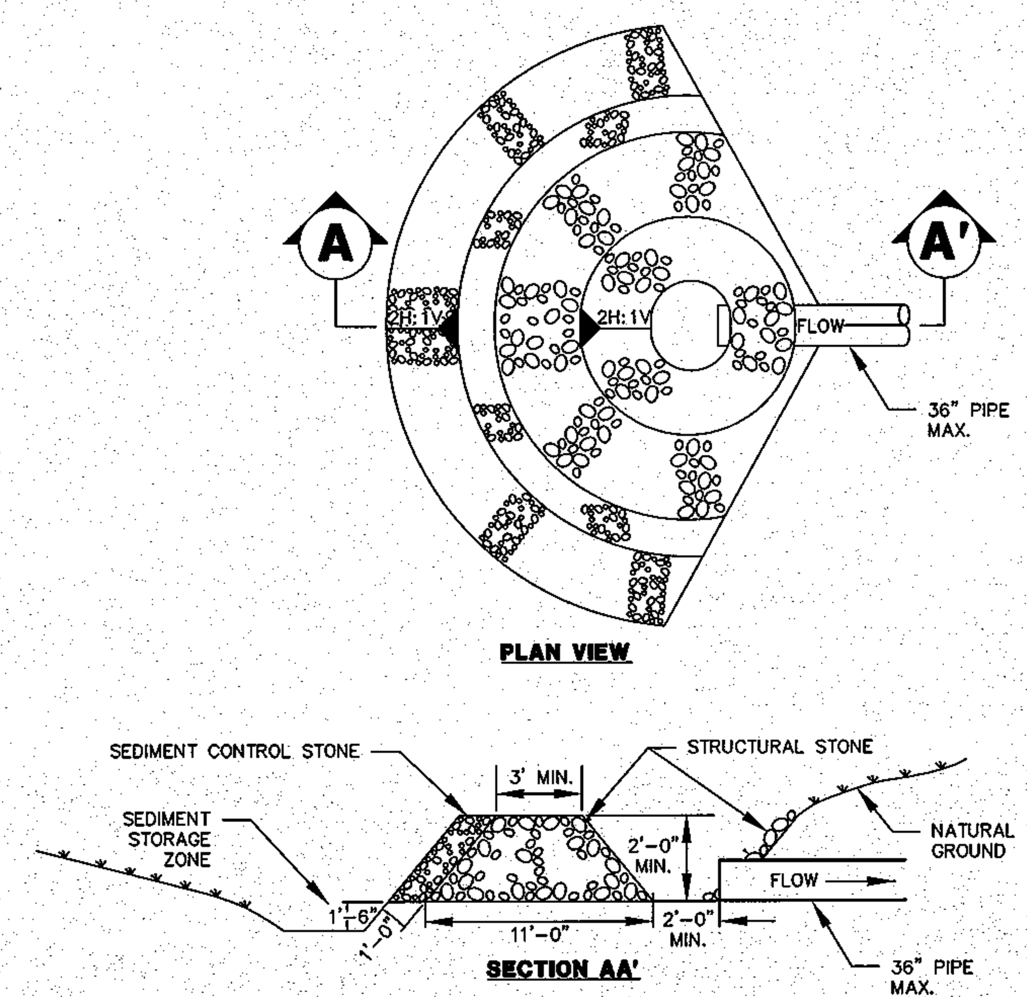
1. DITCH LINES OVER 3 PERCENT MUST BE MATTED WITH NORTH AMERICAN GREEN DS-75 MATTING OR EQUIVALENT.
2. APPLY SEED BEFORE LAYING THE NET OR MAT. IF OPEN-WEAVE NETTING IS USED, LIME MAY BE INCORPORATED BEFORE INSTALLING THE NET AND FERTILIZER AND SEED MAY BE SPRAYED ON AFTERWARD.
3. START LAYING THE NET 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. WHERE 2 STRIPS OF NET ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHOULD BE OVERLAPPED 3 INCHES AND STAPLED TOGETHER. EACH STRIP OF MATTING SHOULD ALSO BE STAPLED DOWN THE CENTER, EVERY 3 FEET.

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.
5. MONITOR AND REPAIR THE RECP AS NECESSARY UNTIL GROUND COVER IS ESTABLISHED.

*REF: 6.17.12 NC Erosion and Sediment Control Planning and Design Manual, 2006

28/D8 TYPICAL TEMPORARY MATTING DETAIL
NTS



GENERAL NOTES:

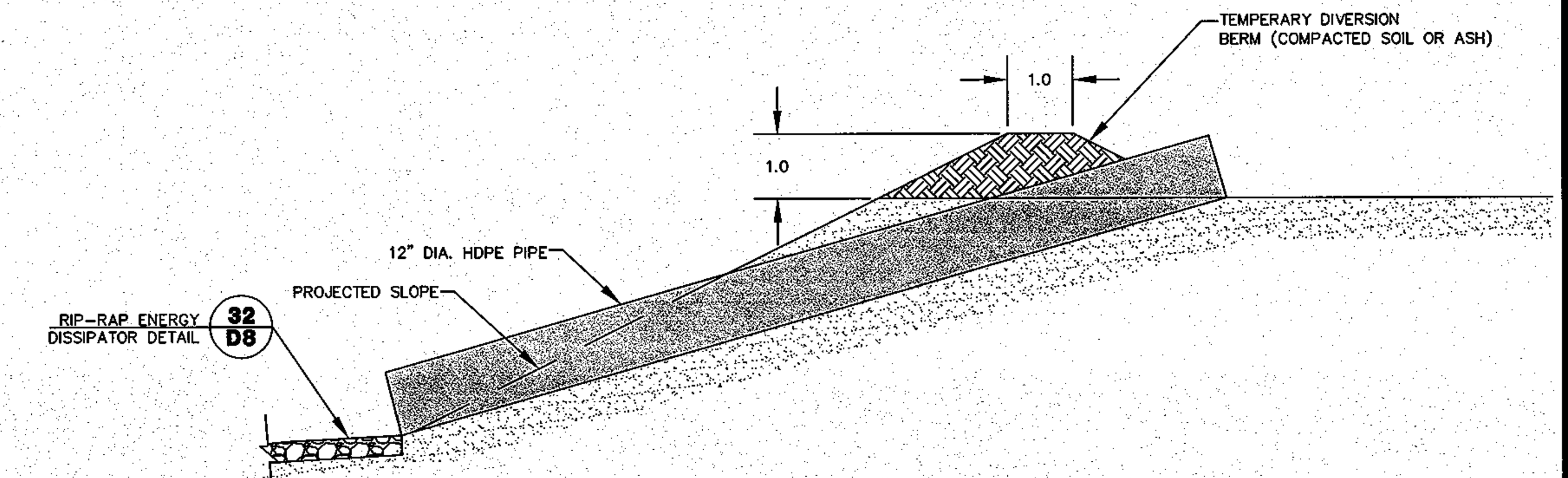
1. INSTALL ROCK PIPE INLET PROTECTION AT ANY CULVERT RECEIVING FLOW ACROSS DISTURBED DITCHLINE.
2. STRUCTURAL STONE SHALL BE CLASS B RIPRAP.
3. SEDIMENT CONTROL STONE SHALL BE NO. 5 OR NO. 57 STONE.
4. DIMENSIONS ARE MINIMUM ACCEPTABLE UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.

MAINTENANCE NOTES:

1. INSPECT ROCK PIPE INLET PROTECTION AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (0.5" OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY. REMOVE SEDIMENT AND RESTORE THE SEDIMENT STORAGE AREA TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-HALF THE DESIGN DEPTH OF THE TRAP. PLACE THE SEDIMENT THAT IS REMOVED IN THE DESIGNED DISPOSAL AREA AND REPLACE THE CONTAMINATED PART OF THE GRAVEL FACING.
2. CHECK THE STRUCTURE FOR DAMAGE. ANY RIPRAP DISPLACED FROM THE STONE HORSESHOE MUST BE REPLACED IMMEDIATELY.
3. AFTER ALL THE SEDIMENT-PRODUCING AREAS HAVE BEEN PERMANENTLY STABILIZED, REMOVE THE STRUCTURE AND ALL THE UNSTABLE SEDIMENT. SMOOTH THE AREA TO BLEND WITH THE ADJOINING AREAS AND PROVIDE PERMANENT GROUND COVER (SURFACE STABILIZATION).

*REF: 6.55.3 NC Erosion and Sediment Control Planning and Design Manual, 2006

29/D8 STANDARD ROCK PIPE INLET PROTECTION DETAIL
NTS



30/D8 SLOPE DRAIN DETAIL
NTS

1

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 PLANS 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 SPECIES. PROTECT THE CHANNEL WITH MULCH OR A TEMPORARY LINER SUFFICIENT TO WITHSTAND ANTICIPATED VELOCITIES DURING THE ESTABLISHMENT PERIOD (SEE SEEDING SPECIFICATIONS).
5. APPLY LIME, FERTILIZER AND SEED BEFORE LAYING THE NET (WITHOUT MULCH) OR MAT (WITH MULCH OR SYNTHETIC). IF OPEN-WEAVE NETTING IS USED, LIME MAY BE INCORPORATED BEFORE INSTALLING THE NET AND THE FERTILIZER AND SEED CAN BE SPRAYED ON AFTERWARD, OTHERWISE APPLY SEED AND FERTILIZER BEFORE INSTALLATION.
6. START LAYING THE NET OR MAT 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.
7. TO SECURE THE NET, BURY THE UPSLOPE END IN A SLOT OR TRENCH NO LESS THAN 6 INCHES DEEP, COVER WITH SOIL, AND TAMP FIRMLY. STAPLE THE NET EVERY 12 INCHES ACROSS THE TOP END AND EVERY 3 FT AROUND THE EDGES AND BOTTOM. WHERE 2 STRIPS OF NET ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHOULD BE OVERLAPPED 3 INCHES AND STAPLED TOGETHER. EACH STRIP OF NETTING OR MATTING SHOULD ALSO BE STAPLED DOWN THE CENTER OR EVERY 3 FT IF THE STRIP IS NOT WIDER THAN 8 FEET. DO NOT STRETCH THE NET/MAT WHEN APPLYING STAPLES.
8. STAPLES SHOULD BE THE "U"-SHAPED TYPE AND 4" TO 6" LONG (DEPENDING ON SOIL CONDITIONS).
9. TO JOIN ENDS OF TWO STRIPS OF NETTING, CUT A TRENCH TO ANCHOR THE END OF THE DOWN GRADIENT NET. OVERLAP THE END OF THE PREVIOUS ROLL 18 INCHES AND STAPLE EVERY 12 INCHES JUST BELOW THE ANCHOR SLOT.
10. TO JOIN ENDS OF TWO STRIPS OF MATTING, OVERLAP THE UPGRADIENT STRIP OVER THE DOWNGRADIENT ONE AT LEAST 4 INCHES. STAPLE THE OVERLAP AT THE ENDS AND EVERY 12 INCHES ALONG THE CENTER OF THE OVERLAP.

MAINTENANCE

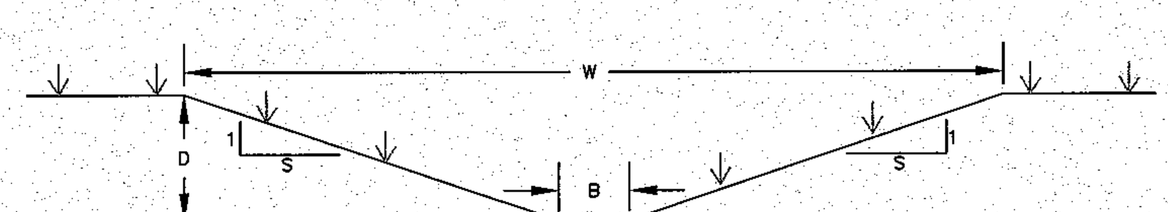
DURING THE ESTABLISHMENT PERIOD, CHECK GRASS-LINED CHANNELS AFTER EVERY RAINFALL. AFTER GRASS IS ESTABLISHED, PERIODICALLY CHECK THE CHANNEL; CHECK IT AFTER EVERY HEAVY RAINFALL EVENT. IMMEDIATELY MAKE REPAIRS. IT IS PARTICULARLY IMPORTANT TO CHECK THE CHANNEL OUTLET AND ALL ROAD CROSSINGS FOR BANK STABILITY 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.
2. NETTING AND MATTING PRODUCTS SHOULD BE INSTALLED ACCORDING TO MANUFACTURER'S GUIDELINES. IF THE MANUFACTURER DOES NOT PROVIDE GUIDELINES, THE ABOVE GUIDELINES FOR NETTING AND MATTING MAY BE USED.



GRASS – LINED DITCH TYPE	E&S MATTING	W (ft)	D (ft)	B (ft)	S (ft/ft)
D1	DS75	9	1.5	3	2
D2	DS75	6	1.0	2	2
D3	DS75	9	1.5	3	2
D4	DS75	15	1.5	9	2
D5	DS75	4	1.0	0	3
D6	DS75	15	2.0	3	3
D7A*	DS75	VARIES	VARIES	0	3
D7B**	GROUTED RIPRAP	8	2.0	0	2

*D7A SHALL BE CONSTRUCTED WITH AN UPSTREAM CHANNEL DEPTH OF 0.5 FEET AND A CHANNEL SLOPE OF 0.5 PERCENT.
**D7B SHALL BE CONSTRUCTED OF GROUTED NCDOT CLASS B RIPRAP WITH A LINING THICKNESS OF 18 INCHES, UNDERLAIN BY AN 8 OZ/SY NON-WOVEN GEOTEXTILE.

31/D8 PERIMETER DITCH DETAIL
NTS

DEFINITION:

A STRUCTURE DESIGNED TO CONTROL EROSION AT THE INLET OR 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:

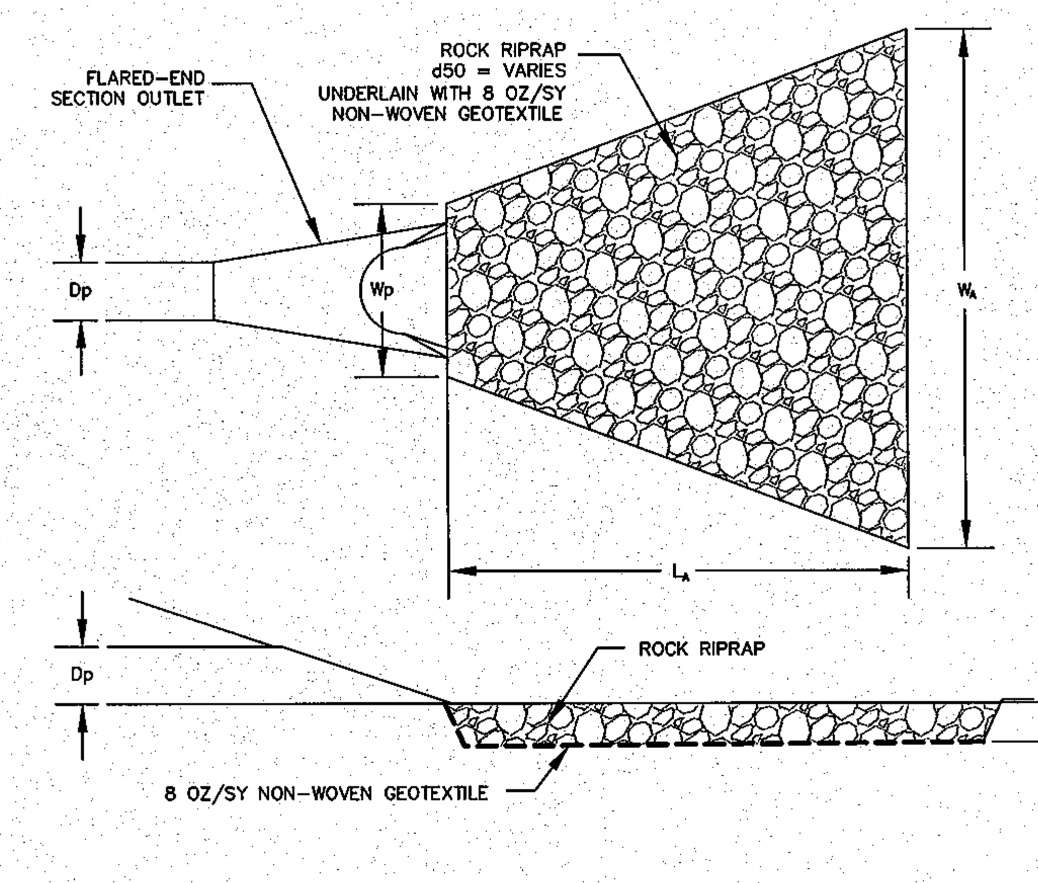
1. ENSURE THAT THE SUBGRADE FOR THE FILTER AND RIPRAP FOLLOWS THE REQUIRED LINES AND GRADES SHOWN IN THE PLAN. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO THE DENSITY OF THE SURROUNDING DISTURBED MATERIAL. LOW AREAS IN THE SUBGRADE ON UNDISTURBED SOIL MAY ALSO BE FILLED BY INCREASING THE RIPRAP THICKNESS.
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 MAY BE FIELD STONE OR ROUGH QUARRY STONE. 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 (½ 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



SUMMARY OF PROTECTION APRONS								
APRON LABEL	DISCHARGE PIPE LOCATION	Dp (FT)	LA (FT)	Wp (FT)	WA (FT)	T (IN)	D50 (IN)	DMAX. (IN)
A1	SEDIMENT BASIN	(2)3	22	15	28	18	8	12
A3	SEDIMENT BASIN	(2)2	30	10	32	32	14	21
A4	SEDIMENT BASIN	(2)2	28	10.5	30	27	12	18
A5	SEDIMENT BASIN OUTLET	(2)3	22	6	28	19	8	13
A6	BRIDGE ABUTMENT	N/A	5	8	13	18	8	12

32/D8 RIP-RAP ENERGY DISSIPATOR
SCALE: 1"=4'

Duke Energy ©

S&ME
WWW.SMEINC.COM

NORTH CAROLINA PROFESSIONAL SEAL 032183 ENGINEER KENNETH R. DAILY 1/21/09

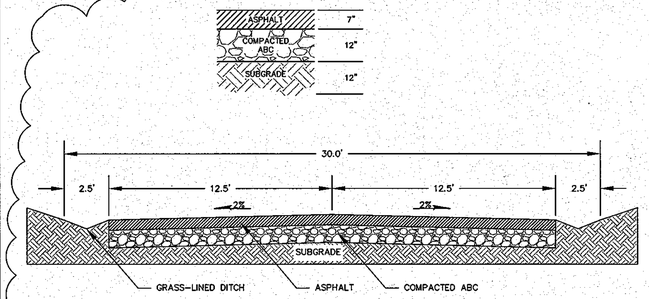
NO.	DATE	DESCRIPTION	BY
1	1-21-09	NOTICE OF CHANGE 3: DROP INLET AND BRIDGE MODIFICATIONS	
0	10-20-08	ISSUED FOR CONSTRUCTION	

E&SC DETAILS I
RETIRED ASH BASIN (RAB) - ASH LANDFILL

PHASE I RAB LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: ELH	CHECKED BY: KRD
DESIGNED BY: JMB	APPROVED BY: KRD
PROJECT NUMBER 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: D8	OF: 28

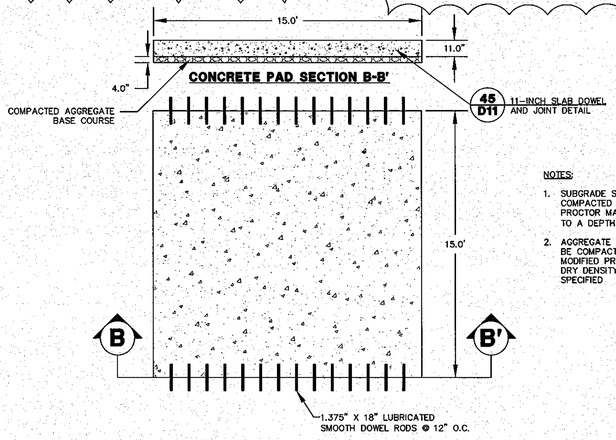
DRAWING PATH: G:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\ACCESS ROAD DI CHANGE\CONSTRUCTION\DETAILS 7-9.DWG



43/D11 ASPHALT PAVEMENT DETAIL
SCALE: 1"=4'

NOTES:

1. SUBGRADE SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".
2. AGGREGATE BASE COURSE SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".

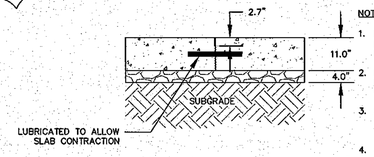


CONCRETE PAD SECTION B-B'

44/D11 11" CONCRETE PAD DETAIL
SCALE: 1"=4'

NOTES:

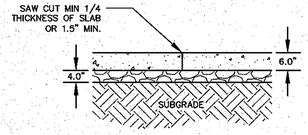
1. SUBGRADE SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".
2. AGGREGATE BASE COURSE SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO THICKNESS SPECIFIED



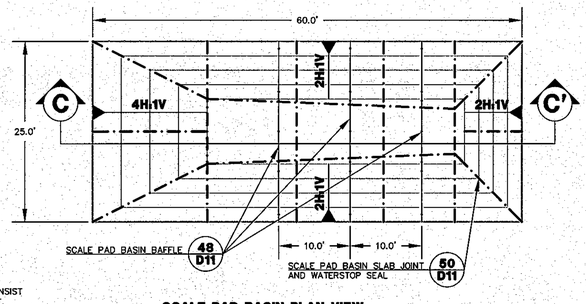
NOTES:

1. DOWELS SHALL MEASURE 1-3/8" IN DIAMETER AND SHALL MEASURE 18" IN LENGTH
2. DOWELS SHALL BE SMOOTH AND LUBRICATED TO ALLOW SLAB CONTRACTION AND EXPANSION
3. SAWED OR CAST JOINTS SHALL EXTEND TO A DEPTH EQUAL TO 1/4 THE THICKNESS OF THE SLAB
4. JOINTS SHALL BE SEALED WITH A WATERTIGHT SEALANT

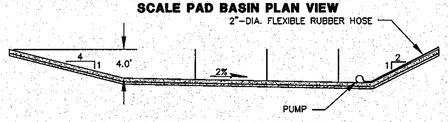
45/D11 11-INCH SLAB DOWEL AND JOINT DETAIL
SCALE: 1"=2'



46/D11 6-INCH SLAB JOINT DETAIL
SCALE: 1"=2'



SCALE PAD BASIN PLAN VIEW

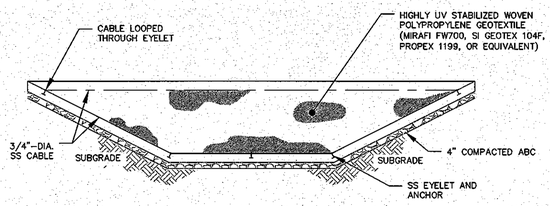


SCALE PAD BASIN SECTION C-C'

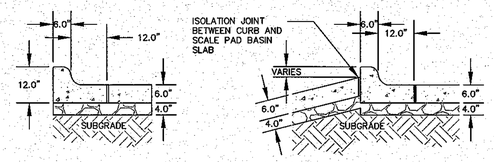
47/D11 SCALE PAD BASIN DETAILS
SCALE: 1"=10'

NOTES:

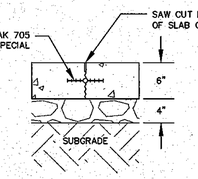
1. SCALE PAD BASIN SHALL CONSIST OF 4" COMPACTED ABC BASE, POURED CONCRETE SLABS OF 6" THICKNESS WITH WATERSTOPPED JOINTS
2. CONCRETE PADS SHALL BE PLANAR WITHIN JOINTED BOUNDARIES
3. SCALE PAD BASIN SHALL BE CLEARED OUT MONTHLY OR WHEN SEDIMENTATION EXCEEDS 6" THICKNESS
4. BAFFLES WILL BE SECURED TO BASIN SLABS WITH CORROSION RESISTANT WIRES STRUNG THROUGH ANCHORED BOLTS



48/D11 SCALE PAD BASIN BAFFLE DETAILS
SCALE: 1"=4'

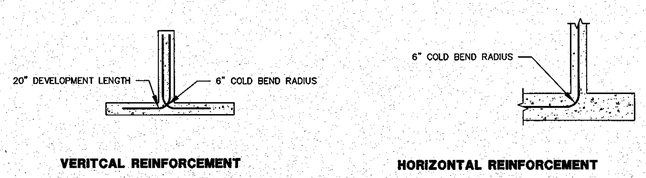


49/D11 CURB AND CURB ALONG BASIN DETAILS
SCALE: 1"=2'

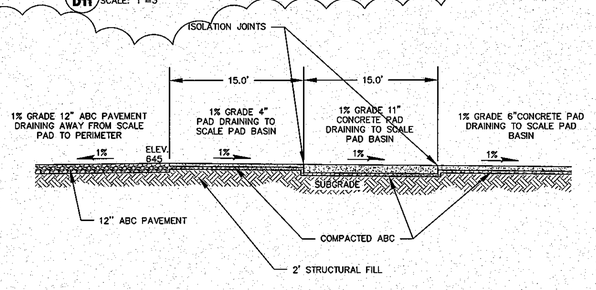


50/D11 SCALE PAD BASIN SLAB JOINT AND WATERSTOP SEAL
SCALE: 1"=1'

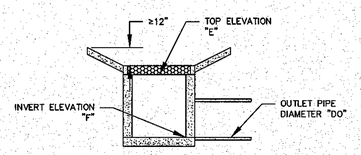
WORK BY OTHERS



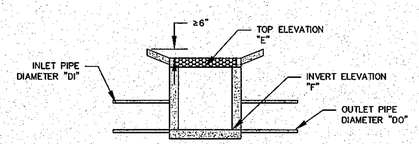
51/D11 SCALE PAD BASIN REINFORCEMENT DETAILS
SCALE: 1"=3'



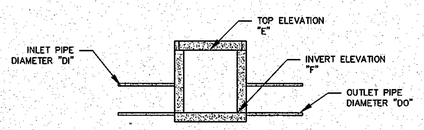
52/D11 PAD DRAINAGE SLOPES SECTION A-A'
SCALE: 1"= 8'



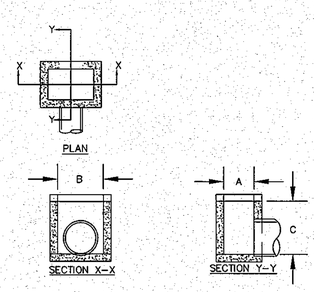
DROP INLET - 1



DROP INLET - 2



JUNCTION BOX - 1



STORM WATER STRUCTURES SCHEDULE								
	DIMENSIONS			INLET GRATE OPEN AREA	INLET PIPE DIAMETER	OUTLET PIPE DIAMETER	ELEVATIONS	
STRUCTURE NO.	SPAN	WIDTH	DEPTH				TOP	INVERT
	A	B	C	OA	DI	DO	E	F
DI-1	4'	4'	4'	470 SQ. IN.	NONE	1-24" RCP	608.0'	604.0'
DI-2	4'	4'	4'	270 SQ. IN.	1-24" RCP	1-24" RCP	605.5'	601.5'
JB-1	4'	4'	TBD	NONE	1-24" RCP	1-18" CMP	TBD	TBD

NOTES:

1. GRATE AND BASIN STRUCTURE SHALL BE SUPPORTED TO ALLOW HS-20 LOADING

53/D11 CATCH BASIN INLET DETAIL
N.T.S.

1

Duke Energy ©

S&ME
WWW.SMEINC.COM

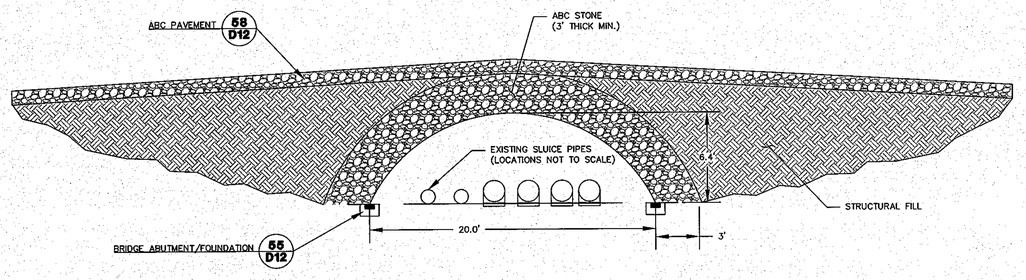
NO.	DATE	DESCRIPTION	BY
1	1-21-09	NOTICE OF CHANGE 3: DROP INLET AND BRIDGE MODIFICATIONS	
0	10-20-08	ISSUED FOR CONSTRUCTION	

ACCESS ROAD / ENTRANCE DETAILS

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: WMH	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: D11	OF: 28

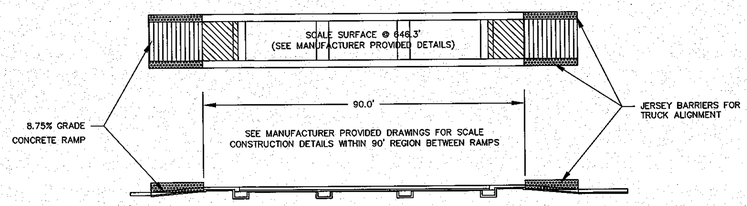
DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\ACCESS ROAD IS CHANGE\CONSTRUCTION\DETAIL 10-12.DWG



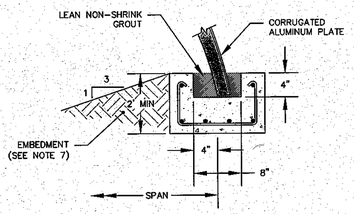
53 D12 BRIDGE DETAILS
SCALE: 1"=5'

NOTES:

1. STRUCTURAL FILL SHALL CONSIST OF BORROW SOILS CONSISTENT WITH SPECIFICATION SECTION 02320.
2. MANUFACTURER PROVIDED DETAILS ARE PROVIDED ON SHEET D12



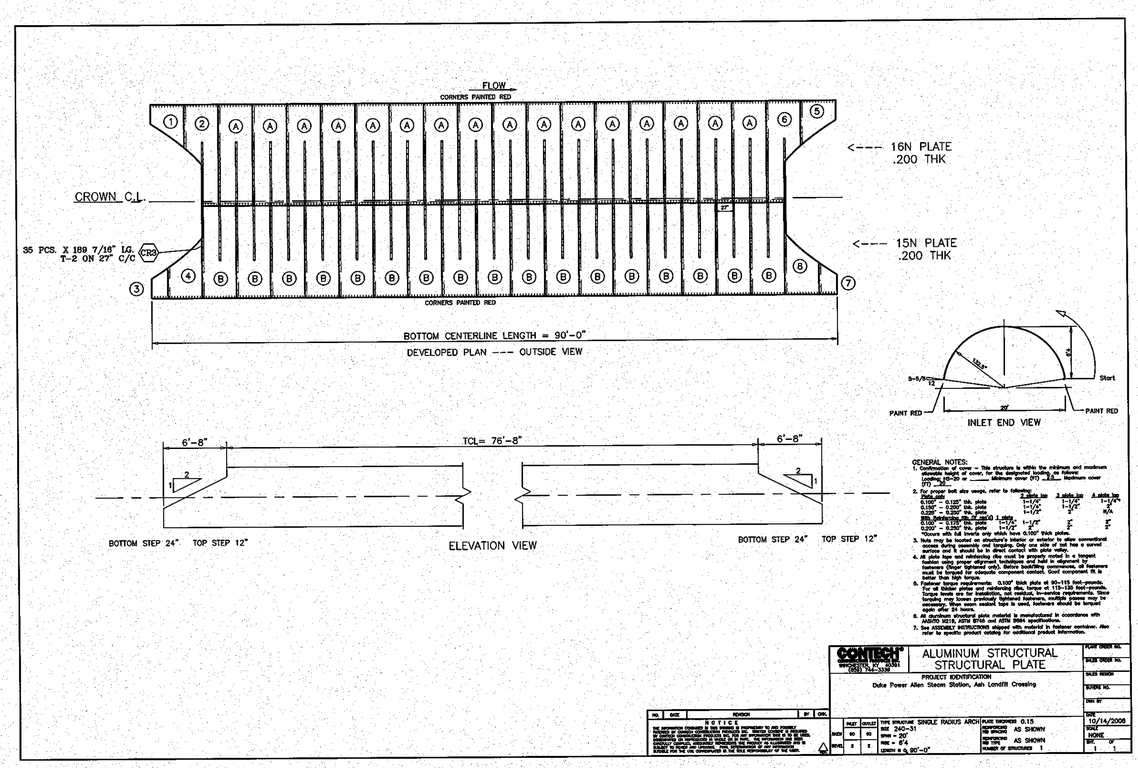
54 D12 SCALE DETAIL
SCALE: 1"=20'



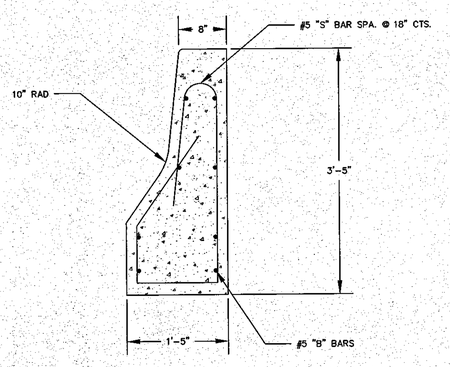
55 D12 BRIDGE ABUTMENT/FOUNDATION DETAIL
SCALE: NTS

NOTES:

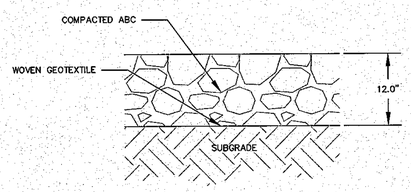
1. MAINTAIN ENOUGH CLEARANCE BETWEEN THE REBAR AND ALUMINUM TO AVOID GALVANIC CORROSION.
2. 4,500 PSF FOOTING SUBGRADE SOILS.
3. FOOTING SIZE BY OTHERS.
4. FOUNDATION DESIGN BY OTHERS.
5. AN S&ME ENGINEER OR REPRESENTATIVE SHOULD EVALUATE THE FOUNDATION BEARING MATERIALS AND UNDERCUT DEPTHS REQUIRED AT THE TIME OF CONSTRUCTION.
6. UNDERCUTTING AND BACKFILL MAY BE REQUIRED TO ACHIEVE AN ALLOWABLE BEARING PRESSURE OF 4,500 PSF. BACKFILL OPTIONS CONSIST OF THE FOLLOWING:
   6.1. 2,000 PSI COMPRESSIVE STRENGTH LEAN CONCRETE
   6.2. LINE EXCAVATION WITH 6-OZ NONWOVEN GEOTEXTILE. BACKFILL WITH #57 OR #67 NCDOT WASHED STONE PLACED IN MAXIMUM 12-INCH LIFTS AND COMPACTED.
7. BOTTOM OF FOUNDATION SHALL HAVE A MINIMUM OF 2 FEET EMBEDMENT EITHER INTO EXISTING GRADE OR COMPACTED FILL.



57 D12 BRIDGE DETAIL
SCALE: NTS



56 D12 JERSEY BARRIER (TYP.) DETAIL
SCALE: 1"=1'



58 D12 ABC PAVEMENT
SCALE: 1"=1'

Duke Energy®

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
1	1-21-09	NOTICE OF CHANGE 3: DROP INLET AND BRIDGE MODIFICATIONS	
0	10-20-08	ISSUED FOR CONSTRUCTION	

ACCESS ROAD / ENTRANCE DETAILS

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: WMH	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER: 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: D12	OF: 28

DRAWING PATH: G:\1356 DUKE ENERGY\CP-825 PLANT ALLEN\DWG\CONSTRUCTION\ACCESS ROAD CH CHANGE\CONSTRUCTION\DETAIL 10-13.DWG

ALUMINUM ARCH FOUNDATION DESIGN

FOR ARCH:
20.0 FT. SPAN - 6.33 FT. RISE - 3.5 FT. COVER

DUKE ENERGY

ASH LANDFILL - ALLEN STEAM STATION
MOUNT HOLLY, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 5832 ENGINEER HOWARD R. LEONARD

12 JAN 09

DESIGN BY:

PERITUS CIVIL, INC.
GREENVILLE, SOUTH CAROLINA 29607
864-288-5312

S&ME

Celebrating 35 Years
1973 • 2008

December 12, 2008

Duke Energy
EC10c/ PO Box 1006
Charlotte, NC 28201-1006
United States of America

Attention: Mr. Ted Manes

Reference: **Arch Bridge Foundation Design Recommendations**
RAB Ash Landfill
Duke Energy – Allen Steam Station
Belmont, North Carolina
S&ME Project No. 1356-06-825

Dear Mr. Manes:

S&ME, Inc. (S&ME) performed a limited foundation bearing material evaluation at the above referenced project. This letter summarizes our field testing and observations on October 31, 2008 and November 3, 2008 at Allen Steam Station in Belmont, North Carolina. This report also summarizes our conclusions and recommendations regarding the design and construction of the proposed single-radius arch bridge foundations.

PROJECT INFORMATION

A single-radius aluminum arch bridge is proposed to span several ash sluice pipes located between an existing structural fill and an existing access road. The bridge span is a part of a proposed access road as shown on the attached Figure 1.

S&ME personnel performed a series of hand auger borings at the site near each end of the proposed bridge foundations. Preliminary foundation bearing options and settlement estimates were provided to Rick Leonardi of Pomona Pipe Supply Company (the bridge manufacturer), and Howard Leonard (the bridge manufacturer's foundation design subcontractor).

S&ME obtained foundation design information through correspondence with Rick Leonardi and Howard Leonard. Based on telephone conversations, emails, and faxes between S&ME, the bridge manufacturer, and the foundation designer, S&ME understands that the proposed bridge will be supported by a continuous spread foundation approximately 5.5 feet wide and two feet in thickness. We understand that the

foundations vertical loading will be on the order of 16.1 kips per linear foot with horizontal loads of 7.64 kips per linear foot. The foundations are currently designed based on an allowable bearing pressure of 4,500 psf. Additionally, the proposed aluminum arch bridge is capable of withstanding differential settlement of up to 7.5 inches based on an email from the bridge manufacturer.

HAND AUGER BORINGS

S&ME representatives visited the proposed arch bridge site on October 31, 2008 and November 3, 2008 to perform hand auger borings and Dynamic Cone Penetrometer (DCP) testing in the vicinity of the arch bridge foundations, as shown on the attached Figure 1. These hand auger borings and DCP tests were performed to evaluate the near-surface subsurface conditions in the proposed foundation areas and to evaluate those conditions with regard to the design and construction of the foundations.

The Dynamic Cone Penetrometer test procedure is as follows: The cone point of the penetrometer is first seated two inches into the bearing materials to assure that the point is completely embedded. The cone point is driven 1-¾ inches using a 15-pound weight falling 20 inches. The penetrometer reading is the number of blows required to drive the cone point 1-¾ inches. Typically, the cone point may be driven an additional second and third increment of 1-¾ inches each and the penetrometer readings are recorded. The penetrometer reading is similar to the Standard Penetration Resistance (N-value), as defined by ASTM D 1586. When properly evaluated, the penetrometer test results provide an index for estimating soil strength.

A total of four (4) hand auger borings and DCP tests with several offset hand auger boring offsets were conducted to depths ranging from 2.5 feet to 10 feet. The results of the hand auger borings and DCP tests are included on the attached Summary of Hand Auger Borings.

FINDINGS

Based on the hand auger borings, fill soils were encountered in hand auger borings HA-1, HA-3, and HA-4 at depths ranging from the ground surface to depths of 10 feet. Residual soils were encountered at a depth of 4.75 feet in hand auger boring HA-1. Possible residual soils were encountered in hand auger boring HA-2 at a depth of 4 inches. DCP readings obtained in the fill, residuum, and possible residuum ranged from 3 to greater than 25 blows per 1-¾ inch increment. The hand auger borings were terminated at depths from 2.5 feet to 10 feet.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the hand auger borings and DCP tests, it is our opinion that the arch bridge foundations can be designed based on an allowable bearing capacity of 4,500 psf, provided the structure can tolerate the anticipated total and differential settlements. Some undercutting will be required to achieve the allowable bearing pressure. We

estimate that a safety factor against ultimate bearing capacity failure on the order of 2.5 will be available based on a footing width of 5.5 feet and a minimum 2-foot foundation embedment depth. Based on the subsurface conditions encountered in the hand auger borings, we estimate that total settlements of the foundations may be on the order of 1.5 to 2 inches. Differential settlements are anticipated to be on the order of one-half of the total settlement.

We recommend that the foundations be embedded a minimum of two feet or greater as measured from the top of proposed grade to the bottom of the foundation. In areas where an embedment of two feet can not be obtained from existing grades, embedment may be achieved by placing compacted structural fill at the foundation location and excavating two feet to construct the foundation, thickening the foundation, providing a short stem wall, or or by using one of the undercut methods described below. All structural fill should be placed in accordance with the project specifications or to a minimum of 95 percent standard Proctor compaction, whichever is greater.

Lower consistency fill soils (DCP readings of less than 8 bpi) were encountered in Hand Auger Borings HA-1 through HA-4 to depths of approximately 1 to 4.5 feet. **Due to the depth of the lower consistency soils, we recommend undercutting the existing near surface foundation bearing materials in the vicinity of Hand Auger Borings HA-1 and HA-2 to depths of 4.5 feet and Hand Auger Borings HA-3 and HA-4 to depths of 1.5 feet, respectively, below the existing ground surface. An S&ME engineer or his representative should evaluate the foundation bearing materials and undercut depths required at the time of construction. This evaluation may consist of performing additional hand auger borings with DCP testing, test pit observations, probing with a steel rod, and/or visual observations.**

The undercut materials can be replaced with minimum 2,000 psi compressive strength lean concrete to the design foundation level. Alternatively, undercutting and stone replacement could be utilized. The excavation bottom and sides should be lined with a 6-ounce non-woven geotextile fabric such as Mirafi 160N or equivalent. Washed No. 57 or No. 67 stone should then be placed in maximum 12-inch compacted lifts and compacted to the foundation bearing level. Typically, the stone can be compacted using a walk-behind type vibratory sled compactor. Alternatively, the foundations could be thickened or extended to bear at a minimum depth of 4.5 feet below the existing ground surface.

We recommend that external stability of the footings also be considered including sliding stability analyses. A sliding coefficient of 0.38 can be utilized in conjunction with the weight of the footings to resist sliding.

EXCAVATIONS

Since the excavations will be performed adjacent to the active ash handling lines, care should be taken not to undermine the bearing materials for the ash lines or supports. If excavations extend within a 1:1 plane projected from below the lines, we recommend that

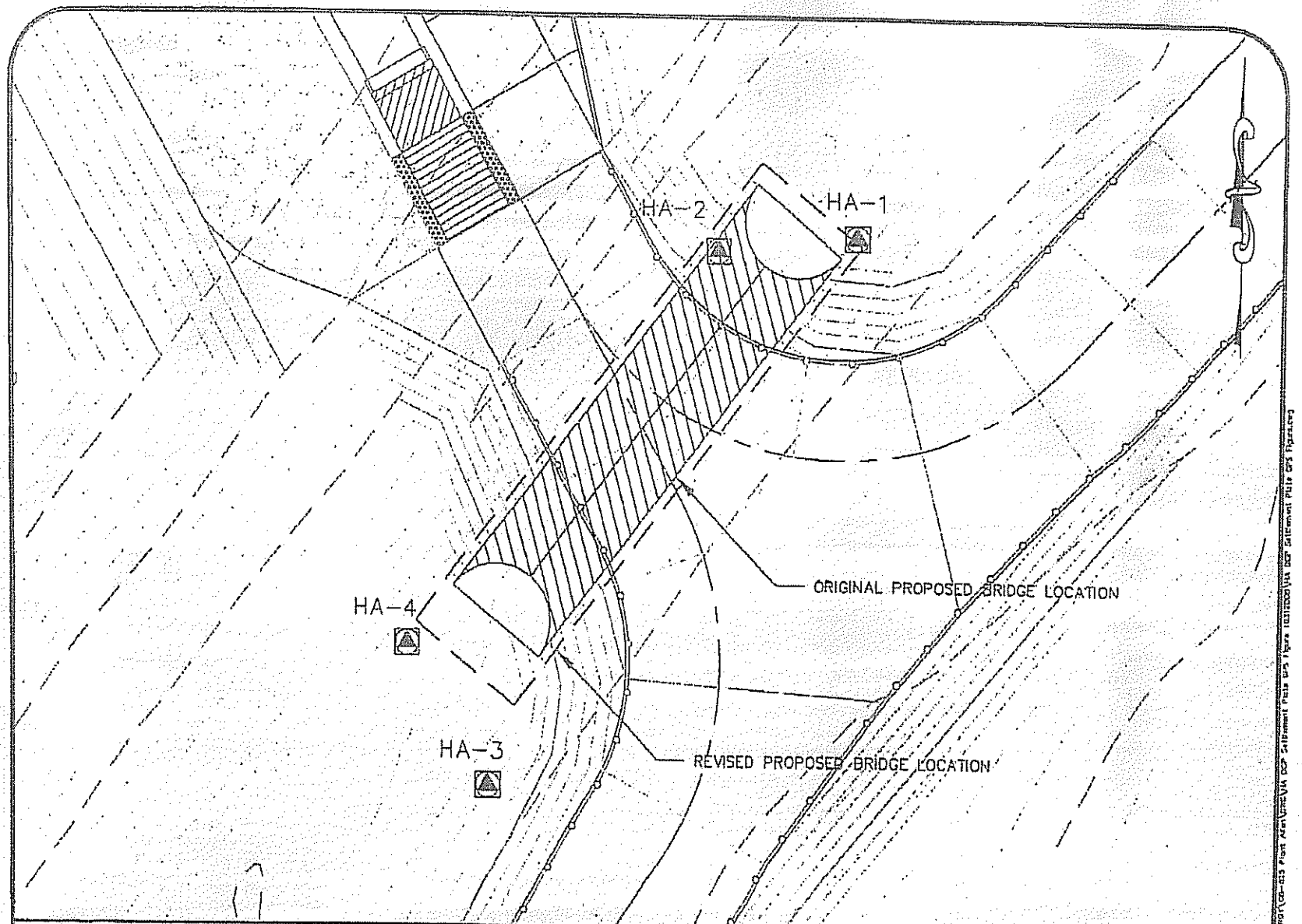
the excavations be performed in short sections on the order of 10 feet and backfilled to the foundation bearing level in a timely manner. Excavations should not be left exposed to inclement weather, as softening and instability of the excavations sides may results. Depending on the excavation depths and geometry, excavation shoring or bracing may be required.

Should excavations extend below final grades, shoring and bracing or flattening (laying back) of the slopes may be required to obtain a safe working environment. Excavations should be sloped or shored in accordance with local, state and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME or its subconsultants be assumed responsible for construction site safety.

LIMITATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made.

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the hand auger borings will not become evident until construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the building (structure, etc.) are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing.



SCALE: 1" = 20'	DATE: 12/9/08	S&ME WWW.SMEINC.COM	APPROXIMATE HAND AUGER BORING LOCATIONS PLANT ALLEN RAB ASH LANDFILL BELMONT, NC
PROJECT NO. 1356-06-825	DRAWN BY: KB		FIGURE NO. 1
	CHECKED BY:		

CLOSURE

S&ME, Inc. appreciates the opportunity to be of service to you during this phase of the project. If you should have any questions concerning this letter, or we may be of further assistance, please contact us.

Sincerely,

S&ME, Inc.

Cedric Ruhl, E.I.
Staff Professional

Jason S. Reeves, P.E.
Senior Reviewer
N.C. Registration No. 29486

NORTH CAROLINA PROFESSIONAL SEAL 29486 12-12-08 ENGINEER JASON S. REEVES

CR/JSR

Cc: Rick Leonardi (Pomona Supply Company),
Mark LeGrand (Earnhardt Grading, Inc.)

Enclosures: Figure No. 1 – Hang Auger Locations
Hand Auger Boring/Dynamic Cone Penetrometer Records (HA-1 – HA-4)

Summary of Hand Auger Borings
Plant Allen RAB Ash Landfill
Belmont, North Carolina
S&ME Project No. 1356-06-825

Date	Test Location	Depth (Feet)	Soil Description	Depth (Feet)	Hammer Blows Increment 1st	2nd	3rd
10/31/08	HA-1 (NE)	0 – 4"	Topsoil	0	4	3	3
		4" – 2'	Fill: Brown, Tan Fine Sandy Silt with Coal and Gravel Fragments	1	6	6	8
		2' – 3'	Fill: Gray Sandy Silt with Coal and Gravel Fragments	2	24	13	25+
		3' – 4.75'	Possible Residuum: Red, Brown Clayey Silt	3	9	11	14
		4.75' – 8.5'	Residuum: Red, Orange Fine Sandy, Clayey Silt	4	14	20	19
			*encountered hand auger refusal at 5' on first auger; offset 4" north and continued	5	25+	-	-
				6	25+	-	-
				7	25+	-	-
				8	20	20	22
		8.5' – 9.5'	Red, Pink, White Fine Sandy Clay	9	19	23	25+
		9.5'	Hand Auger Refusal	9.5	25+	-	-
10/31/08	HA-2 (NW)	0 – 4"	Topsoil	0	4	3	7
		4" – 2.5'	Possible Residuum: Red, Brown, Tan Clayey Silt	1	21	25+	-
				2	18	22	23
		2.5'	Hand Auger Refusal	2.5	25+	-	-
			*initial hand auger by stake; offset 2' and 4' north of stake; offset 2', 4', and 10' south of stake; offset 1' west of furthest south hand auger; encountered refusal at 2.5'				

Summary of Hand Auger Borings
Plant Allen RAB Ash Landfill
Belmont, North Carolina
S&ME Project No. 1356-06-825

Date	Test Location	Depth (Feet)	Soil Description	Depth (Feet)	Hammer Blows Increment 1st	2nd	3rd
11/3/08	HA-3 (SE)	0 – 4"	Topsoil	0	6	5	6
		4" – 9"	Fill: Tan, Brown Fine Sandy Silt with Rock Fragments				
		9" – 1'	Fill: Fly Ash				
		1' – 3'	Fill: Red, Orange, Brown Sandy Silt	1	8	8	10
			*encountered hand auger refusal at 1.5' on first hand auger; offset 1' south and encountered hand auger refusal at 1.5'; offset 4' south and continued	2	5	5	5
		3' – 5'	Fill: Red, Orange, Brown Fine Sandy Clayey Silt	3	4	4	6
				4	4	3	3
		5' – 6.5'	Fill: Gray, Tan Silty Sand with Coal Fragments	5	7	10	12
				6	10	8	11
		6.5' – 7'	Fill: Fly Ash	-	-	-	-
		7' – 8'	Fill: Gray Silty Fine to Medium Sand	7	7	13	18
		8' – 9'	Fill: Fly Ash	8	10	8	8
		9' – 10'	Fill: Gray, Tan Silty Sand	9	7	7	7
				10	8	8	10
11/3/08	HA-4 (SW)	0 – 1.5'	Fill: Fly Ash	0	7	10	16
				1	17	23	25+
		1.5' – 2.5'	Fill: Red, Brown, Gray Clayey Fine Sandy Silt with Gravel	2	16	18	20
		2.5' – 3.5'	Fill: Brown, Tan Silty Fine to Coarse Sand with Coal Fragments	3	10	8	10
		3.5'	Hand Auger Refusal *offset 5' south and encountered hand auger refusal at 2.5'	3.5	25+	-	-

YAHOO! MAIL

Print - Close Window

From: "Tysl, Steve" <tysls@contechbridge.com>

To: "rick leonardi" <rickleonardi@yahoo.com>, "Cedric Ruhl" <CRuhl@smeinc.com>

Date: Thu, 8 Jan 2009 14:53:37 -0500

Subject: Ash Haul Road Arch footing reactions

DUKE ENERGY
MT. HOLLY, NC

Rick and Cedric,

After digging around a bit and using the info that Cedric and Ken called with, here's is what I came up with. I used 68 kip operating vehicle weight and used Sterling trucks data to distribute the load 12 kips front axle and 56 kips rear axle, then computed reactions @ 3.5 ft cover with one very heavy axle at the crown of the arch.

Long story short, by switching to the lighter truck, the cover can be minimized and the existing foundation design should be OK. The new calculated reactions (attached) are a bit lower than what the foundation engineer used.

Stephan (Steve) Tysl, P.E.

Engineer – Corrugated Products

CONTECH Construction Products Inc.

9025 Centre Pointe Drive, Suite 400 | West Chester, OH 45069

Off: 513-645-7600 | Mob: 330-730-6083 | Fax: 513-645-7395

tysls@contech-cpi.com

The information contained in this message may be confidential and/or proprietary, and legally protected from disclosure. If the reader of this message is not the intended recipient, or an employee or agent responsible for delivering this message to the intended recipient, you are hereby notified that any retention, dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by replying to the message and permanently deleting it from your computer. Thank you, CONTECH Construction Products Inc.

Attachments

Files:

SRA_Footing_Reactions.pdf (5k)

9

1/9/2009 3:39 PM

STRUCTURAL PLATE ARCH FOOTING REACTIONS

Special Live Load

Span (S) =	20.00	ft.
Rise (R) =	8.33	ft.
Top Rise (Rt) =	20.00	ft.
Bottom Span =	8.33	ft.
Height of cover (H) =	3.50	ft.
Axle Load =	56,000	lbs.
Number of Lanes =	2	
Live Load (LL) =	112,000	lbs.
Area (A) =	21	sq. ft.
Area of Top Rise (At) =	271	sq. ft.
Soil Density =	120	lbs./cu. ft.
Footing contact angle (fca) =	25.36	deg.

Calculate footing contact angle:		
arc length =	93	pi
radius =	133	in
fca =	25.36	deg

DUKE ENERGY
MT. HOLLY, NC

LOAD ON STRUCTURE

Total Load = Live Load + Dead Load

Live Load = LL/(8 + 2(H + R))
Live Load = 4,049 lbs./ft./footing

Dead Load = Soil weight

Soil weight = (S x (H + Rt) - At) x soil density
Soil weight = 23,860

Dead Load = 11,930 lbs./ft./footing

Total Load = R = 15,979 lbs./ft./footing

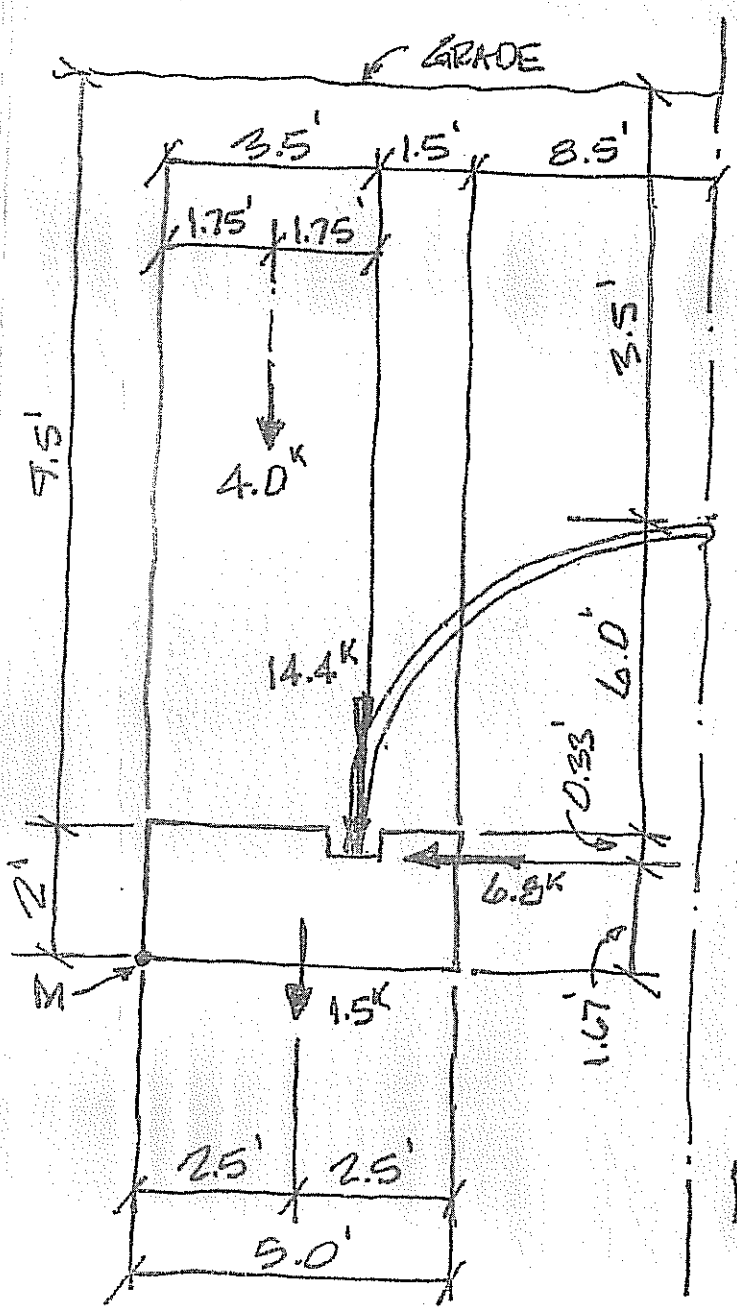
FOOTING REACTIONS

Rv = R x cos(fca)
Rv = 14,439 lbs./ft./footing

Rh = R x sin(fca)
Rh = 6,844 lbs./ft./footing outward

10

STABILITY:



LOADS:

EARTH: 3.5' x 9.5' x .120 K/CF = 4.0K

ARCH: H ——— = 6.8K

V ——— = 14.4K

FDN: 5.0K x 2' x .150 K/CF = 1.5K

MOMENT:

M = 4.0K(1.75') + 14.4K(3.5') + 1.5K(2.5') − 6.8K(1.67')

= 49.8'K

EVL:

4.0K
14.4K
1.5K
19.9K

R:

$R = \frac{49.8'K}{19.9K} = 2.5'$

OK

S.B.

$\frac{19.9K}{5.0'} = 4.0 K/\square'$

OR 4000 #/SF OK

STABILITY
DUKE ENERGY
ASH LANDFILL - ALLEN STEAM STA.
MOUNT HOLLY, N.C

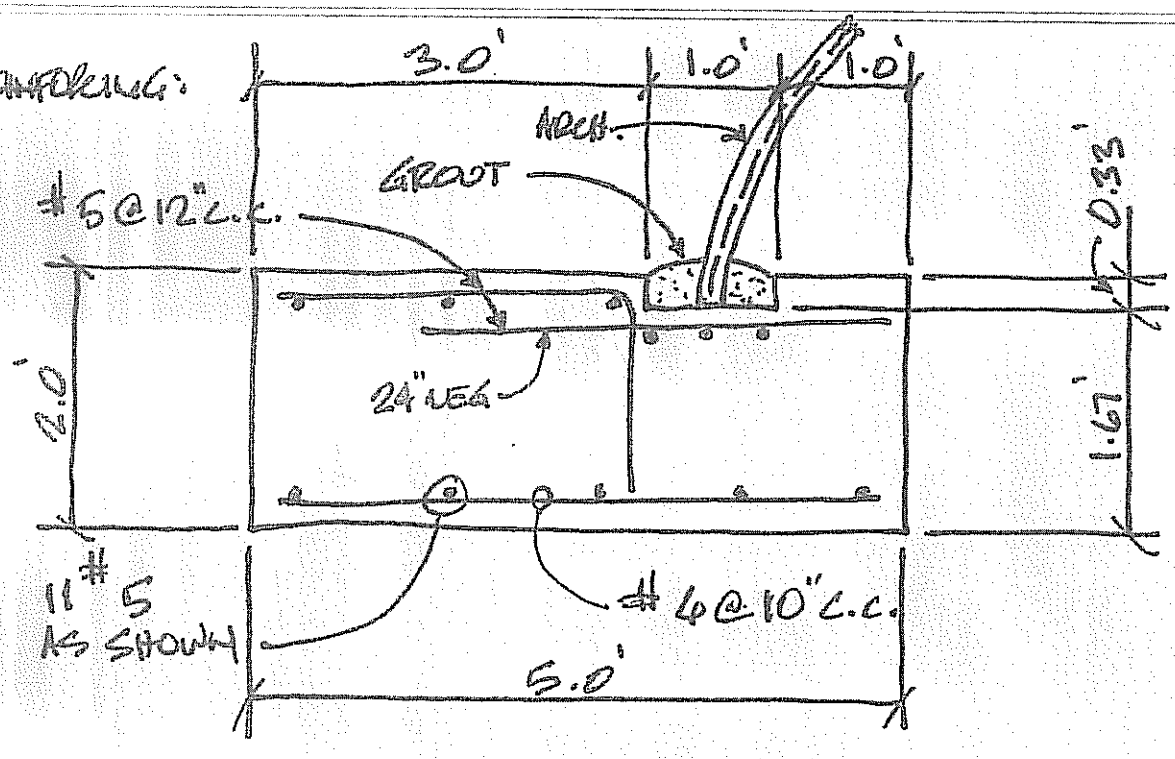
7

DATE: 12 JAN 09

12

PERITUS CIVIL INC P.O. BOX 1546 GREENVILLE SC 29602 864-234-2867 Jan 12 09 04:23p p.12

REINFORCING:



NOTE: LOCATE ARCH IN CENTER OF NOTCH. BLOCK IN PLACE AND GROUT.

MOMENT

$M = 4^K(2.5)(1.25')$
$= 12.5^{'K}$

REINFORCING

$A_s = \frac{12.5^{'K}}{1.76(17)}$
$= \frac{12.5^{'K}}{29.9}$
$= .42 \square''$

USE #4 @ 10"

DISTRIBUTION

#5 BARS SPACED AS SHOWN

PC

REINFORCING
DUKE ENERGY
ASH LANDFILL - ALLEN STE. STA.,
MOUNT HOLLY, N.C.

BY: 7

DATE: 12/14/09

SHEET 13 OF

Jan 12 09 04:25p PERITUS CIVIL INC 864-234-2857 p.13

S&ME

Celebrating 35 Years
1973 • 2008

December 12, 2008

Duke Energy
EC10c/ PO Box 1006
Charlotte, NC 28201-1006
United States of America

Attention: Mr. Ted Manes

Reference: Arch Bridge Foundation Design Recommendations
RAB Ash Landfill
Duke Energy – Allen Steam Station
Belmont, North Carolina
S&ME Project No. 1356-06-825

Dear Mr. Manes:

S&ME, Inc. (S&ME) performed a limited foundation bearing material evaluation at the above referenced project. This letter summarizes our field testing and observations on October 31, 2008 and November 3, 2008 at Allen Steam Station in Belmont, North Carolina. This report also summarizes our conclusions and recommendations regarding the design and construction of the proposed single-radius arch bridge foundations.

PROJECT INFORMATION

A single-radius aluminum arch bridge is proposed to span several ash sluice pipes located between an existing structural fill and an existing access road. The bridge span is a part of a proposed access road as shown on the attached Figure 1.

S&ME personnel performed a series of hand auger borings at the site near each end of the proposed bridge foundations. Preliminary foundation bearing options and settlement estimates were provided to Rick Leonardi of Pomona Pipe Supply Company (the bridge manufacturer), and Howard Leonard (the bridge manufacturer's foundation design subcontractor).

S&ME obtained foundation design information through correspondence with Rick Leonardi and Howard Leonard. Based on telephone conversations, emails, and faxes between S&ME, the bridge manufacturer, and the foundation designer, S&ME understands that the proposed bridge will be supported by a continuous spread foundation approximately 5.5 feet wide and two feet in thickness. We understand that the

foundations vertical loading will be on the order of 16.1 kips per linear foot with horizontal loads of 7.64 kips per linear foot. The foundations are currently designed based on an allowable bearing pressure of 4,500 psf. Additionally, the proposed aluminum arch bridge is capable of withstanding differential settlement of up to 7.5 inches based on an email from the bridge manufacturer.

HAND AUGER BORINGS

S&ME representatives visited the proposed arch bridge site on October 31, 2008 and November 3, 2008 to perform hand auger borings and Dynamic Cone Penetrometer (DCP) testing in the vicinity of the arch bridge foundations, as shown on the attached Figure 1. These hand auger borings and DCP tests were performed to evaluate the near-surface subsurface conditions in the proposed foundation areas and to evaluate those conditions with regard to the design and construction of the foundations.

The Dynamic Cone Penetrometer test procedure is as follows: The cone point of the penetrometer is first seated two inches into the bearing materials to assure that the point is completely embedded. The cone point is driven 1-¾ inches using a 15-pound weight falling 20 inches. The penetrometer reading is the number of blows required to drive the cone point 1-¾ inches. Typically, the cone point may be driven an additional second and third increment of 1-¾ inches each and the penetrometer readings are recorded. The penetrometer reading is similar to the Standard Penetration Resistance (N-value), as defined by ASTM D 1586. When properly evaluated, the penetrometer test results provide an index for estimating soil strength.

A total of four (4) hand auger borings and DCP tests with several offset hand auger boring offsets were conducted to depths ranging from 2.5 feet to 10 feet. The results of the hand auger borings and DCP tests are included on the attached Summary of Hand Auger Borings.

FINDINGS

Based on the hand auger borings, fill soils were encountered in hand auger borings HA-1, HA-3, and HA-4 at depths ranging from the ground surface to depths of 10 feet. Residual soils were encountered at a depth of 4.75 feet in hand auger boring HA-1. Possible residual soils were encountered in hand auger boring HA-2 at a depth of 4 inches. DCP readings obtained in the fill, residuum, and possible residuum ranged from 3 to greater than 25 blows per 1-¾ inch increment. The hand auger borings were terminated at depths from 2.5 feet to 10 feet.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the hand auger borings and DCP tests, it is our opinion that the arch bridge foundations can be designed based on an allowable bearing capacity of 4,500 psf, provided the structure can tolerate the anticipated total and differential settlements. Some undercutting will be required to achieve the allowable bearing pressure. We

estimate that a safety factor against ultimate bearing capacity failure on the order of 2.5 will be available based on a footing width of 5.5 feet and a minimum 2-foot foundation embedment depth. Based on the subsurface conditions encountered in the hand auger borings, we estimate that total settlements of the foundations may be on the order of 1.5 to 2 inches. Differential settlements are anticipated to be on the order of one-half of the total settlement.

We recommend that the foundations be embedded a minimum of two feet or greater as measured from the top of proposed grade to the bottom of the foundation. In areas where an embedment of two feet can not be obtained from existing grades, embedment may be achieved by placing compacted structural fill at the foundation location and excavating two feet to construct the foundation, thickening the foundation, providing a short stem wall, or or by using one of the undercut methods described below. All structural fill should be placed in accordance with the project specifications or to a minimum of 95 percent standard Proctor compaction, whichever is greater.

Lower consistency fill soils (DCP readings of less than 8 bpi) were encountered in Hand Auger Borings HA-1 through HA-4 to depths of approximately 1 to 4.5 feet. **Due to the depth of the lower consistency soils, we recommend undercutting the existing near surface foundation bearing materials in the vicinity of Hand Auger Borings HA-1 and HA-2 to depths of 4.5 feet and Hand Auger Borings HA-3 and HA-4 to depths of 1.5 feet, respectively, below the existing ground surface. An S&ME engineer or his representative should evaluate the foundation bearing materials and undercut depths required at the time of construction. This evaluation may consist of performing additional hand auger borings with DCP testing, test pit observations, probing with a steel rod, and/or visual observations.**

The undercut materials can be replaced with minimum 2,000 psi compressive strength lean concrete to the design foundation level. Alternatively, undercutting and stone replacement could be utilized. The excavation bottom and sides should be lined with a 6-ounce non-woven geotextile fabric such as Mirafi 160N or equivalent. Washed No. 57 or No. 67 stone should then be placed in maximum 12-inch compacted lifts and compacted to the foundation bearing level. Typically, the stone can be compacted using a walk-behind type vibratory sled compactor. Alternatively, the foundations could be thickened or extended to bear at a minimum depth of 4.5 feet below the existing ground surface.

We recommend that external stability of the footings also be considered including sliding stability analyses. A sliding coefficient of 0.38 can be utilized in conjunction with the weight of the footings to resist sliding.

EXCAVATIONS

Since the excavations will be performed adjacent to the active ash handling lines, care should be taken not to undermine the bearing materials for the ash lines or supports. If excavations extend within a 1:1 plane projected from below the lines, we recommend that

the excavations be performed in short sections on the order of 10 feet and backfilled to the foundation bearing level in a timely manner. Excavations should not be left exposed to inclement weather, as softening and instability of the excavations sides may results. Depending on the excavation depths and geometry, excavation shoring or bracing may be required.

Should excavations extend below final grades, shoring and bracing or flattening (laying back) of the slopes may be required to obtain a safe working environment. Excavations should be sloped or shored in accordance with local, state and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME or its subconsultants be assumed responsible for construction site safety.

LIMITATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made.

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the hand auger borings will not become evident until construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the building (structure, etc.) are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing.

CLOSURE

S&ME, Inc. appreciates the opportunity to be of service to you during this phase of the project. If you should have any questions concerning this letter, or we may be of further assistance, please contact us.

Sincerely,

S&ME, Inc.

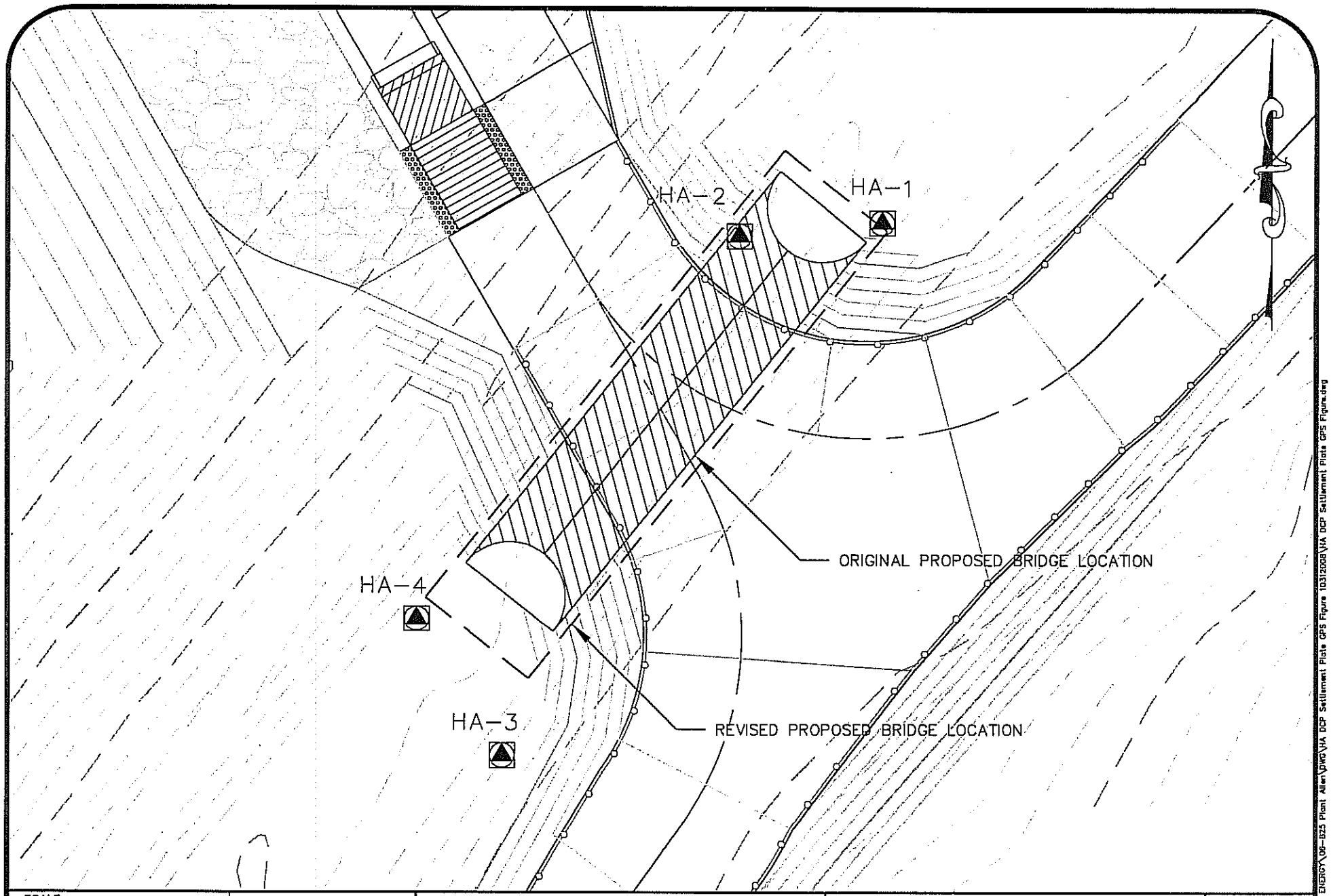
Cedric Ruhl, E.I.
Staff Professional

Jason S. Reeves, P.E.
Senior Reviewer
N.C. Registration No. 24486

CR/JSR

Cc: Rick Leonardi (Pomona Supply Company),
Mark LeGrand (Earnhardt Grading, Inc.)

Enclosures: Figure No. 1 – Hang Auger Locations
Hand Auger Boring/Dynamic Cone Penetrometer Records (HA-1 – HA-4)



SCALE: 1" = 20'	DATE: 12/9/08	S&ME WWW.SMEINC.COM	**APPROXIMATE HAND AUGER BORING LOCATIONS** PLANT ALLEN RAB ASH LANDFILL BELMONT, NC
PROJECT NO. 1356-06-825	DRAWN BY: KB		FIGURE NO. 1
	CHECKED BY:		

G:\1356\DUKE ENERGY\06-825 Plant Allen\DWG\HA DCP Settlement Plate GPS Figure 10312008\HA DCP Settlement Plate GPS Figure.dwg

Summary of Hand Auger Borings
Plant Allen RAB Ash Landfill
Belmont, North Carolina
S&ME Project No. 1356-06-825

Date	Test Location	Depth (Feet)	Soil Description	Depth (Feet)	Hammer Blows Increment		
					1st	2nd	3rd
10/31/08	HA-1 (NE)	0 – 4"	Topsoil	0	4	3	3
		4" – 2'	Fill: Brown, Tan Fine Sandy Silt with Coal and Gravel Fragments	1	6	6	8
		2' – 3'	Fill: Gray Sandy Silt with Coal and Gravel Fragments	2	24	13	25+
		3' – 4.75'	Possible Residuum: Red, Brown Clayey Silt	3	9	11	14
		4.75' – 8.5'	Residuum: Red, Orange Fine Sandy, Clayey Silt	4	14	20	19
				5	25+	-	-
			*encountered hand auger refusal at 5' on first auger; offset 4" north and continued	6	25+	-	-
				7	25+	-	-
				8	20	20	22
		8.5' – 9.5'	Red, Pink, White Fine Sandy Clay	9	19	23	25+
		9.5'	Hand Auger Refusal	9.5	25+	-	-
10/31/08	HA-2 (NW)	0 – 4"	Topsoil	0	4	3	7
		4" – 2.5'	Possible Residuum: Red, Brown, Tan Clayey Silt	1	21	25+	-
				2	18	22	23
		2.5'	Hand Auger Refusal *initial hand auger by stake; offset 2' and 4' north of stake; offset 2', 4', and 10' south of stake; offset 1' west of furthest south hand auger; encountered refusal at 2.5'	2.5	25+	-	-

Summary of Hand Auger Borings
Plant Allen RAB Ash Landfill
Belmont, North Carolina
S&ME Project No. 1356-06-825

Date	Test Location	Depth (Feet)	Soil Description	Depth (Feet)	Hammer Blows Increment		
					1st	2nd	3rd
11/3/08	HA-3 (SE)	0 – 4"	Topsoil	0	6	5	6
		4" – 9"	Fill: Tan, Brown Fine Sandy Silt with Rock Fragments				
		9" – 1'	Fill: Fly Ash				
		1' – 3'	Fill: Red, Orange, Brown Sandy Silt	1	8	8	10
			*encountered hand auger refusal at 1.5' on first hand auger; offset 1' south and encountered hand auger refusal at 1.5'; offset 4' south and continued	2	5	5	5
		3' – 5'	Fill: Red, Orange, Brown Fine Sandy Clayey Silt	3	4	4	6
				4	4	3	3
		5' – 6.5'	Fill: Gray, Tan Silty Sand with Coal Fragments	5	7	10	12
				6	10	8	11
		6.5' – 7'	Fill: Fly Ash	-	-	-	-
		7' – 8'	Fill: Gray Silty Fine to Medium Sand	7	7	13	18
		8' – 9'	Fill: Fly Ash	8	10	8	8
		9' – 10'	Fill: Gray, Tan Silty Sand	9	7	7	7
				10	8	8	10
11/3/08	HA-4 (SW)	0 – 1.5'	Fill: Fly Ash	0	7	10	16
				1	17	23	25+
		1.5' – 2.5'	Fill: Red, Brown, Gray Clayey Fine Sandy Silt with Gravel	2	16	18	20
		2.5' – 3.5'	Fill: Brown, Tan Silty Fine to Coarse Sand with Coal Fragments	3	10	8	10
		3.5'	Hand Auger Refusal *offset 5' south and encountered hand auger refusal at 2.5'	3.5	25+	-	-

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date: 2/5/09**	**Job No.: 1356.06.825-09**
DESCRIPTION:	Bridge Foundation Modification	Duke Energy – Allen Steam Station RAB Ash Landfill	
NOTICE OF CHANGE NO.	3A		
CHANGE ORDER NOS:			

Description of design changes:

Notice of Change 3 stated that the foundations for the single-radius arch bridge shall be embedded at least two feet into compacted soil to achieve an adequate allowable bearing capacity, as measured from the bottom of the foundation. Notice of Change 3 recommended that, in areas where existing grades will not provide two feet of embedment, compacted fill be placed against the foundation to achieve the full embedment depth of two feet.

Notice of Change 3A modifies this recommendation to include the possibility of achieving two feet of embedment by over-excavating the foundation and backfilling with lean concrete. During a telephone conversation on 2/3/09, Rick Leonardi (Pomona Pipe Supply) stated that the foundation recommendation presented herein will not impact the foundation design provided that the lean concrete backfill is not constructed to form a monolithic structure with the bridge foundation.

Reason for design change:

Ease of construction.

Effective date of design change:

Immediately.

Financial and schedule considerations: To be determined.

Attachments:

None.

3/11/09		3.11.09	
Engineer of Record Kenneth Daly, P.E.	**Date**	**Prepared By** Cedric Ruhl, E.I.	**Date**

Copies to:

- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☐
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐
- ☐

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date:** 1/27/09	**Job No.:** 1356-06-825-09
DESCRIPTION:	LDS Minimum Design	Duke Energy – Allen Steam Station	
	Transmissivity	Ash Landfill	
NOTICE OF CHANGE NO.	4		
CHANGE ORDER NOS:			

Description of design change:

Table 02675-B in Specification 02675 – Geocomposite Drainage Layer states that the transmissivity of the geocomposite drainage layer must be greater than the minimum average value of 1.0×10^{-3} $m^3/m/sec$. This Notice of Change modifies the leak detection system (LDS) minimum design transmissivity to be 3.45×10^{-3} $m^3/m/sec$.

The minimum design transmissivity for the leachate collection system (LCS) will remain at the previously specified value of 1.0×10^{-3} $m^3/m/sec$.

Reason for design change:

To maintain an LDS action leakage rate (ALR) of 500 gpad based on product specific transmissivities and thicknesses.

Effective date of design change:

Immediately.

Financial and schedule considerations:

None anticipated.

Attachment:

1. S&ME Calculation – Minimum Transmissivity

1/27/09		1/27/09	
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:	☒ Ted Manes, Duke Energy	☒ Mark LeGrand, Earnhardt Grading, Inc.
	☒ S&ME File No. 1356-06-825	☐
	☐	☐

ATTACHMENT 1

S&ME Calculation – Minimum Transmissivity

S&ME

PROJECT NO. 1356-06-825

SHEET NO. 1 / 3

DATE 12/19/08

JOB NAME Duke Energy –Allen Steam Station Ash Landfill

COMPUTED BY WMH

SUBJECT Minimum Transmissivity

CHECKED BY KB

COMPUTATIONS BY: Signature [signature] Date 1/27/09

Name William Harrison, E.I.

Title Staff Professional

ASSUMPTIONS AND PROCEDURES CHECKED BY: Signature [signature] Date 1/27/09

Name Kenneth Daly, P.E.

Title Sr. Project Engineer

COMPUTATIONS CHECKED BY: Signature [signature] Date 1/27/09

Name Kyle Baucom, E.I.

Title Staff Professional

REVIEWED BY: Signature [signature] Date 1/27/09

Name Kenneth Daly, P.E.

Title Sr. Project Engineer

REVIEW NOTES / COMMENTS:

OBJECTIVE:

The objective of this analysis is to establish the minimum transmissivity required to maintain an LDS action leakage rate (ALR) of 500 gpad [Reference 1] for the proposed ash landfill constructed over the retired ash basin (RAB) at the Allen Steam Station.

BACKGROUND:

Within the Permit to Construct (PTC) application, the ALR was evaluated by considering flows within the leak detection system (LDS) resulting from unconfined flow where leachate thickness is limited to the thickness of the LDS drainage layer.

Unconfined Flow Condition

According to Giroud et al. (1997) [Reference 2], the unconfined capacity of the LDS was evaluated with the following equation:

$$Q_{full} = kt^2 = Q_{ALR} \qquad \text{(Equation 1)}$$

Where:
Q_{full} = flow rate in the LDS when the leachate thickness is the same as the drainage layer thickness;
Q_{ALR} = corresponding action leakage rate;
k = hydraulic conductivity of the LDS drainage material (m/s); and,
t = thickness of the LDS drainage material (m).

Additionally, as established within the PTC [Reference 3], the reduction factor for measured transmissivity to long-term, in-service transmissivity within the LDS is 1.4.

CALCULATIONS:

With this information, a minimum measured transmissivity can be established based on laboratory measured transmissivity and material thickness. This relationship is developed beginning with the argument that to meet the established ALR, the product of a materials permeability and thickness, squared, must be greater than 500 gpad. This argument is presented in Equation 2.

$$kt^2 \geq Q_{ALR} \qquad \text{(Equation 2)}$$

Permeability is equivalent to long-term, in-service transmissivity (Θ_{LTIS}) divided by thickness:

$$k * t = \Theta_{LTIS} \qquad \text{(Equation 3)}$$

Where long-term, in-service transmissivity is equivalent to the laboratory measured transmissivity ($\Theta_{measured}$) divided by the product of the reduction factors (ΠR.F.=1.4)

$\Theta_{LTIS} = \Theta_{measured} / (\Pi R.F.)$ (Equation 4)

Substituting Equation 4 into Equation 3 yields:

$k * t = \Theta_{measured} / (\Pi R.F.)$ (Equation 5)

Solving Equation 5 for k yields $k = [\Theta_{measured} / [(\Pi R.F.)*t]$ and substituting this into Equation 2 yields:

$[\Theta_{measured} /(\Pi R.F.)] * t \geq Q_{ALR}$ (Equation 6)

Solving for $\Theta_{measured}$ with respect to thickness (t) yields:

$\Theta_{measured} \geq (Q_{ALR}) * (\Pi R.F.) / (t)$ (Equation 7)

Q_{ALR}=500 gallons/day/(264.17 gallons/cubic meter)/(24 hours/day)/(3600 seconds/hour), or $Q_{ALR} = 2.191 * 10^{-5}$ m^3/s, and ΠR.F.= 1.4. Substituting these values into Equation 7 yields:

$\Theta_{measured} \geq (3.07 * 10^{-5}\ m^3/s) / (t)$ (Equation 8)

CONCLUSIONS:

For the SKAPS Industries TN-350-2-8, the thickness is 350 mils or 0.00889 meters. With this thickness, the minimum measured transmissivity required to maintain an ALR of 500 gpad is $3.45 * 10^{-3}\ m^2/s$.

REFERENCES

1. "S&ME Calculation – Action Leakage Rate" in Duke Energy: Permit to Construct Application, Retired Ash Basin (RAB) – Ash Landfill Ash Landfill, Allen Steam Station, Belmont, North Carolina. S&ME Project No. 1356-06-825.

2. J.P. Giroud et al. (1997) "Liquid Migration through Defects in a Geomembrane Overlain and Underlain by Permeable Media" Geosynthetics International, Vol. 4, Nos. 3-4.

3. "S&ME Calculation – Design Transmissivity" in Duke Energy: Permit to Construct Application, Retired Ash Basin (RAB) – Ash Landfill Ash Landfill, Allen Steam Station, Belmont, North Carolina. S&ME Project No. 1356-06-825.

REFERENCE 1

"S&ME Calculation – Action Leakage Rate" in Duke Energy: Permit to Construct Application, Retired Ash Basin (RAB) – Ash Landfill Ash Landfill, Allen Steam Station, Belmont, North Carolina. S&ME Project No. 1356-06-825.

OBJECTIVE:

The objective of this analysis is to establish the action leakage rate (ALR) for the proposed ash landfill constructed over the retired ash basin (RAB) at the Allen Steam Station.

METHOD:

An ALR was evaluated by considering flows within the leak detection system (LDS) resulting from the following two conditions: a leachate head of 1-ft driving flow through a defect in the primary liner and into the leak detection system (EPA's ALR Definition); and unconfined flow where leachate thickness is limited to the thickness of the LDS drainage layer. Giroud et al. (1997) developed flow estimation equations for both these cases (presented in Attachment 1).

The proposed ash landfill liner system consists of, from top-to-bottom: a geocomposite drainage layer (leachate collection system, LCS); a primary 60-mil HDPE geomembrane; a secondary geocomposite drainage layer (LDS drainage layer); a secondary 60-mil HDPE geomembrane; a geosynthetic clay liner (GCL); and finally an 18-in thick, low permeability soil layer ($k<1*10^{-5}$cm/s).

EPA Definition

The ALR of the LDS is, according to the definition provided by CFR 40 § 264.302, the maximum design flow rate that the LDS can remove without the fluid head on the bottom liner exceeding 1 foot.

Flow through the LDS may be estimated for a single primary liner defect based on the following equation developed by Giroud et al. (1997):

$$Q = kt_1(2t_o - t_1) \qquad \text{(Equation 1)}$$

Where:
Q = flow rate in the LDS (drainage layer);
k = hydraulic conductivity of the LDS drainage material;
t_1 = thickness of the LDS drainage material; and
t_o = thickness or head of leachate on the secondary liner.

If evaluated using the EPA definition, the ALR may be established from the flow rate of Equation 1 by considering the anticipated defect frequency and factor of safety.

Unconfined Flow Condition

The method of ALR evaluation relying upon the EPA definition allows for a head buildup of 1-ft on the primary liner causing a region of confined flow in the LDS. Alternatively, the unconfined capacity of the LDS can be evaluated. According to Giroud et al. (1997) this capacity can be evaluated with the following equation:

$$Q_{full} = kt_1^2 \qquad \text{(Equation 2)}$$

Where:
Q_{full} = flow rate in the LDS when the leachate thickness is the same as the drainage layer thickness;
k = hydraulic conductivity of the LDS drainage material (m/s); and,
t_1 = thickness of the LDS drainage material (m).

CALCULATIONS:

Material Parameters

k = 46 cm/s from Table 1 (most conservative value was chosen considering the decreasing flow capacity of the system over time measured for GSE Permanet TRx) [estimated for GSE Permanet TRx]
t_o = 0.3 m (1.0 ft) [assumed]
t_1 = 6.9 mm [property of GSE Permanet TRx]
Defect Frequency = 1 hole/acre [Qian et al. 2002]

Table 1 presents hydraulic conductivity design values for the three cases considered within the companion calculation package titled "Leachate Generation Rates": Case 1, open without waste; Case 2, open with (10 and 80 ft) waste; Case 3, closed landfill waste. Hydraulic conductivity design values are based on laboratory test results of representative materials and boundary conditions accounting for appropriate flow reduction factors as outlined in the companion calculation package "Design Transmissivity".

Table 1: Drainage Layer Hydraulic Conductivity Design Values for LDS

Operation Conditions	$\Theta_{measured}$ (m^2/s)	Θ_{LTIS} (m^2/s)	FS	Θ_{design} (m^2/s)	k_{design} (cm/s)
Case 1 (No Waste)	5.77E-03	4.12E-03	1.0	4.12E-03	60
Case 2 (10'-80' Waste)	4.45E-03	3.18E-03	1.0	3.18E-03	46
Case 3 (Closed Landfill)	4.45E-03	3.18E-03	1.0	3.18E-03	46

EPA Definition (1-ft Head, Maximum LDS Flow)

$Q = k * t_1 * (2t_o - t_1)$ = 0.46 m/s * 0.0069 m *[(2*0.3 m)-0.0069m] =
Q = 1.88 x 10^{-3} m^3/s = 43000 gal/day/defect
Q = 43000 gal/day/defect * 1 defect/acre = 43000 gal/acre/day
Q * (1/ FS) 43000 gal/acre/day * ½ = 21,500 gal/acre/day, or for measurement,
Q_{EPA} = **21,500 gpad**

Unconfined Flow Condition (Head within LDS, Maximum LDS Flow)

Q = $k*t_1^2$ = $0.46*0.0069^2$ = 2.19E-05 m^3/s = 500 gal/acre/day
$Q_{Unconfined}$ = **500 gpad**

RESULTS:

Table 2 presents the estimated flow rates in the LDS by the two methods considered. For comparison purposes, the peak and average daily LDS flows estimated using the HELP model are summarized in Table 3, originally presented in the companion calculation package titled "Leachate Generation Rates". Estimated peak daily and average daily flows for Cases 1-3 are less than the LDS flow rates.

Table 2. Estimated LDS Flow Rates by Various Methods

LDS Flow Condition	Q (gpad)
EPA Definition (1-ft Head on Primary Liner)	21,500
Unconfined Flow (Head Restricted to LDS Thickness)	500

Table 3. HELP-Predicted LDS Flow Rates

Operation Conditions	Peak Daily Q_{LDS} (gpad)	Average Daily Q_{LDS} (gpad)
Case 1	175.0	23.2
Case 2a	99.0	37.1
Case 2b	71.3	25.2
Case 3	7.7	0.3

DISCUSSION:

The function of the LDS drainage layer is to quickly remove liquids that may migrate through the primary geomembrane liner and convey the liquid to the sumps. The liquids are then pumped out of the landfill. The average daily pump rates are to be monitored as required by regulations, and if LDS flow rates exceed the established ALR, appropriate response actions will be implemented.

Based on the analysis herein it is believed reasonable to evaluate the ALR considering unconfined flow within the LDS originating from a defect in the primary liner. According to this method and assuming 1 defect per acre, the ALR is 500 gpad.

To evaluate LDS flows, the owner or operator must convert the weekly or monthly flow rate from recorded monitoring data, to an average daily flow rate (gallons per acre per day) for each sump. The average daily flow rate for each sump must be calculated weekly during the active life and monthly during the post-closure care period.

It is important to note that Equation 2 is based on LDS drainage material thickness and permeability, k. The value of k used herein was developed from project specific testing replicating anticipated landfill conditions as presented in the companion calculation package titled "Design Transmissivity". We emphasize that in the context of typical flow characteristics for a range of commonly available geocomposite drainage layer materials a relatively high-flow geocomposite drainage material was selected. The specific product is a GSE Permanet

TRx. This product was selected on the basis of maximizing leachate collection and leak detection system performance.

REFERENCES

United States Environmental Protection Agency (USEPA) (1992) "Liners and Leak detection Systems for Hazardous Waste Land Disposal Units" 57, 19, 3462.

X. Qian et al. (2002) "Geotechnical Aspects of Landfill Design and Construction" Prentice Hall, NJ.

J.P. Giroud et al. (1997) "Liquid Migration Through Defects in a Geomembrane Overlain and Underlain by Permeable Media" Geosynthetics International, Vol. 4, Nos. 3-4.

United States Environmental Protection Agency (USEPA) (1992) "Action Leakage Rates for Leak Detection Systems" EPA-530-R-92-004

Bonaparte and Gross (1993) "LDCRS Flow from Double-Lined Landfills and Surface Impoundments" Supplement to EPA-600-R-93-070

REFERENCE 2

J.P. Giroud et al. (1997) “Liquid Migration through Defects in a Geomembrane Overlain and Underlain by Permeable Media” Geosynthetics International, Vol. 4, Nos. 3-4.

ALR: Attachment 1

approximately the same in all directions. Since the hydraulic gradient is closely related to the slope of the phreatic surface, it may then be assumed that the slope of the cone generatrices is the same in all directions. The slope of the phreatic surface (i.e. the slope of the cone generatrix) in the direction of the slope of the leakage collection layer is approximately known: it is close to the slope angle, β, since the flow thickness is small compared to the length of the leakage collection layer. Therefore, it is assumed that the angle between all generatrices of the cone that form the phreatic surface of leachate and a horizontal plane is β (Figure 4).

From the foregoing discussion, it appears that the wetted zone (Figure 1b) is parabolic since the intersection of a cone and a plane parallel to a generatrix of the cone is a parabola. However, the actual wetted zone is only approximately parabolic because several simplifying assumptions were made, as indicated in Section 2.1 and, above, in Section 2.2.

2.3 Assumptions Specific to the Case Where the Leakage Collection Layer is Full

The case where "the leakage collection layer is full" is the case where the flow rate through the considered defect in the primary liner is large enough that the thickness of leachate in the leakage collection layer is equal to the thickness of the leakage collection layer in an area greater than zero around the defect in the primary liner. At the periphery of this area, the leachate phreatic surface is in contact with the primary liner.

As indicated in Section 2.2, the case where the leakage collection layer is not full is the lead case. Accordingly, assumptions regarding the hydraulic gradient and the shape of the phreatic surface (described in Section 2.2 for the case where the leakage collection layer is not full) will be adapted to the case where the leakage collection layer is full, as shown in Section 3.2.

3 RATE OF LEACHATE FLOW

3.1 Rate of Leachate Flow When the Leakage Collection Layer is not Full

The leakage collection layer is not full if the following condition is met:

$$t_o \leq t_{LCL} \tag{1}$$

where: t_o = maximum thickness of leachate in the leakage collection layer, which occurs at the defect of the primary liner, i.e. at the apex of the phreatic surface (Figure 4a); and t_{LCL} = thickness of the leakage collection layer (Figures 3 and 4a).

In the case where the leakage collection layer is not full, the vertical cross section of the flow in a plane passing through the defect and containing the horizontal contour lines of the liners (Figure 4b) is a triangle whose surface area is:

$$S = D_o^2 / \tan\beta \tag{2}$$

where: D_o = depth
(i.e. at the apex of
tion layer, which i
The leachate dep
perpendicularly to
between the leach
thickness, t:

Therefore, at the
tween the leachate
the leachate depth,

The flow cross s
S_F, is the projectio

Combining Equa

Flow in the leak

where: Q = steady-
sults from a defect
chate migration thr
layer.
As discussed in S
collection layer is
gradient is virtually
lel to a slope, whic

Combining Equa

hence:

1/4

ALR: Attachment 1

where: D_o = depth of leachate in the leakage collection layer at the primary liner defect (i.e. at the apex of the phreatic surface); and β = angle of the slope of the leakage collection layer, which is also the angle of the cone that forms the assumed phreatic surface.

The leachate depth is measured vertically, whereas the leachate thickness is measured perpendicularly to the liners. The following general (and classical) relationship exists between the leachate head on top of a liner, h, the leachate depth, D, and the leachate thickness, t:

$$h = t \cos\beta = D \cos^2\beta \tag{3}$$

Therefore, at the apex of the phreatic surface, the following relationship exists between the leachate head on top of the secondary liner, h_o, the leachate thickness, t_o, and the leachate depth, D_o:

$$h_o = t_o \cos\beta = D_o \cos^2\beta \tag{4}$$

The flow cross section area perpendicular to the flow in the leakage collection layer, S_F, is the projection of S, hence:

$$S_F = S \cos\beta \tag{5}$$

Combining Equations 2, 4 and 5 gives:

$$S_F = t_o^2 / \sin\beta \tag{6}$$

Flow in the leakage collection layer is governed by Darcy's equation:

$$Q = k\, i\, S_F \tag{7}$$

where: Q = steady-state rate of leachate flow in the leakage collection layer, which results from a defect in the primary liner and which is, therefore, equal to the rate of leachate migration through the defect; and i = hydraulic gradient in the leakage collection layer.

As discussed in Section 2.2, the slope of the leachate phreatic surface in the leakage collection layer is extremely close to the liner slope angle β. Therefore, the hydraulic gradient is virtually equal to the classical value of the hydraulic gradient for flow parallel to a slope, which is:

$$i = \sin\beta \tag{8}$$

Combining Equations 6, 7 and 8 gives:

$$Q = k\, t_o^2 \tag{9}$$

hence:

$$t_o = \sqrt{\frac{Q}{k}} \tag{10}$$

2/4

ALR:
Attachment 1

It appears that, when the leakage collection layer is not full, there is an extremely simple relationship between the rate of leachate migration through the primary liner defect, Q, and the thickness of leachate in the leakage collection layer beneath the defect, t_o. It is interesting to note that this relationship does not depend on the size of the defect in the primary liner or on the slope of the leakage collection layer.

An approximation that was made to establish Equations 9 and 10 was to assume that the downslope flow line from A (i.e. AB in Figure 4a) is parallel to the liner. This assumption is close to reality as discussed in Section 2.2. However, the actual flow line from A is below Line AB as the flow thickness decreases in the downslope direction, as discussed at the end of Section 5.1.2. Therefore, t_o should only be regarded as the flow thickness at a primary liner defect, and it is the maximum flow thickness.

Since the simple relationship expressed by Equations 9 and 10 was demonstrated for the case when the leakage collection layer is not full, the condition expressed by Equation 1 must be met for Equations 9 and 10 to be valid. Combining Equations 1 and 10 gives the following equation, which is another way to express the condition that should be met to ensure that the leakage collection layer is not full:

$$t_{LCL} \geq t_{LCLfull} = \sqrt{\frac{Q}{k}} \tag{11}$$

where $t_{LCLfull}$ is the *minimum* thickness that a leakage collection layer with a hydraulic conductivity k should have to contain, without being full at any location, the leachate flow which results from a defect in the primary liner.

The following equation, derived from Equation 11, is another way to express the condition that should be met to ensure that the leakage collection layer is not full:

$$Q \leq Q_{full} = k\, t_{LCL}^2 \tag{12}$$

where Q_{full} is the *maximum* steady-state rate of leachate migration through a defect in the primary liner that a leakage collection layer, with a thickness t_{LCL} and a hydraulic conductivity k, can accommodate without being filled with leachate.

It is important to remember that the subscript *full* corresponds to a *minimum* thickness of the leakage collection layer and to a *maximum* rate of leachate migration (which is also the *maximum* flow rate in the leakage collection layer). It is noteworthy that the minimum thickness of the leakage collection layer, $t_{LCLfull}$, and the maximum flow rate, Q_{full}, which are required to ensure that the leakage collection layer can contain, without being full, the flow that results from a defect in the primary liner, do not depend on the slope of the leakage collection layer.

It is not impossible to design a leakage collection layer with a thickness less than the value $t_{LCLfull}$ given by Equation 11, i.e. where the flow rate is greater than Q_{full} defined by Equation 12. In this case, the leakage collection layer is filled with leachate in a certain area around the defect of the primary liner (i.e. "the leachate collection layer is full"). This case is discussed in Section 3.2.

3.2 Rate of l

If the thicknes
tion 11 (or if the
Q_{full} expressed b
filled with leach
scribed in Sectio
leakage collectic
cone, A′, is abo
the upper bound
the virtual leach
Equation 4, and
chate collection

The surface are
(Figure 5) is exp

where D_{LCL} is the
The depth is m
to the slope, hen

Using the dem
8, 14 and 15, giv

Primary liner –

Figure 5. Vertica layer in the case w around the primar

3/4

re is an extremely sim-
ne primary liner defect,
beneath the defect, t_o.
n the size of the defect
yer.
10 was to assume that
l to the liner. This as-
r, the actual flow line
downslope direction,
e regarded as the flow
thickness.
was demonstrated for
n expressed by Equa-
g Equations 1 and 10
condition that should

(11)

ayer with a hydraulic
ocation, the leachate

y to express the con-
er is not full:

(12)

n through a defect in
t_{LCL} and a hydraulic
ate.
minimum thickness
migration (which is
noteworthy that the
maximum flow rate,
can contain, without
o not depend on the

ckness less than the
er than Q_{full} defined
th leachate in a cer-
collection layer is

3.2 Rate of Leachate Flow When the Leachate Collection Layer is Full

If the thickness of the leakage collection layer is less than $t_{LCLfull}$ expressed by Equation 11 (or if the rate of leachate migration through a primary liner defect is greater than Q_{full} expressed by Equation 12, which is equivalent), the leakage collection layer is filled with leachate in a certain area around the defect. Following the approach described in Section 2.2, it may then be assumed that the leachate phreatic surface in the leakage collection layer is a truncated cone (Figure 5). The virtual apex of the truncated cone, A′, is above the leakage collection layer (i.e. above the primary liner, which is the upper boundary of the leakage collection layer). The virtual leachate depth, D_o, and the virtual leachate thickness, t_o, are related to the actual leachate head, h_o, through Equation 4, and the virtual leachate thickness t_o is greater than the thickness of the leachate collection layer:

$$t_o > t_{LCL} \tag{13}$$

The surface area of the vertical cross section of the flow in the leakage collection layer (Figure 5) is expressed by:

$$S = \frac{D_o^2}{\tan\beta} - \frac{(D_o - D_{LCL})^2}{\tan\beta} = \frac{D_{LCL}(2D_o - D_{LCL})}{\tan\beta} \tag{14}$$

where D_{LCL} is the depth of the leakage collection layer.

The depth is measured vertically whereas the thickness is measured perpendicularly to the slope, hence, in accordance with Equation 3:

$$t_{LCL} = D_{LCL}\cos\beta \tag{15}$$

Using the demonstration presented in Section 2.2, i.e. combining Equations 4, 5, 7, 8, 14 and 15, gives:

$$Q = k\, t_{LCL}(2t_o - t_{LCL}) \tag{16}$$

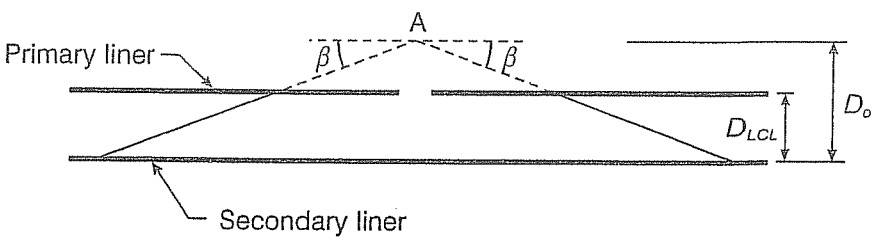


Figure 5. Vertical cross section of the assumed phreatic surface in the leakage collection layer in the case where the leakage collection layer is filled with leachate in a certain area around the primary liner defect.

4/4

REFERENCE 3

"S&ME Calculation – Design Transmissivity" in Duke Energy: Permit to Construct Application, Retired Ash Basin (RAB) – Ash Landfill Ash Landfill, Allen Steam Station, Belmont, North Carolina. S&ME Project No. 1356-06-825.

OBJECTIVE:

Evaluate the design transmissivity of the geocomposite drainage layer used for the leachate collection system (LCS) and leak detection system (LDS) of the liner system for the proposed retired ash basin (RAB) ash landfill.

METHOD:

Develop a geocomposite drainage layer design transmissivity as described by Giroud et al. (2000) to account for in service reductions in flow capacity. Design transmissivity values were calculated for three operational conditions: Case 1, liner system with 2' operational cover; Case 2, liner system with 2' operational cover, 10'-80' compacted waste and 6" daily cover; and Case 3, closed landfill.

CALCULATIONS:

Drainage Layer Transmissivity Design Values

Transmissivity is calculated using the following equation:

$$\theta = kt \qquad \text{(Equation 1)}$$

Where:

Θ=hydraulic transmissivity (cm^2/sec);

k=hydraulic conductivity (cm/sec); and

t=drainage layer thickness (0.69cm).

Use the following equations to estimate the appropriate geocomposite drainage layer design transmissivity value:

$$\theta_{LTIS} = \frac{\theta_{measured}}{\prod(RF)} = \frac{\theta_{measured}}{RF_{IMCO} * RF_{IMIN} * RF_{CR} * RF_{IN} * RF_{CD} * RF_{PC} * RF_{CC} * RF_{BC}} \qquad \text{(Equation 2)}$$

$$\theta_{Design} = \frac{\theta_{LTIS}}{FS} \qquad \text{(Equation 3)}$$

Where

Θ_{LTIS}=long term in-situ soil hydraulic transmissivity of the geocomposite;

$\Theta_{measured}$=value of hydraulic transmissivity obtained after laboratory testing;

Π (RF) = product of all reduction factors;

RF_{IMCO}=reduction factor for immediate compression;

RF_{IMIN}=reduction factor for immediate intrusion;

RF_{cr}=creep reduction factor;

RF_{in}=intrusion reduction factor;

RF_{cd}=chemical clogging/degradation reduction factor;

RF_{PC}= particulate clogging reduction factor;

RF_{cc}=chemical clogging reduction factor;

RF_{bc}=biological clogging reduction factor;

Θ_{design}=geocomposite transmissivity appropriate for use in design;

FS= factor of safety.

Evaluation of $\theta_{measured}$

- For Cases 1, 2 and 3 laboratory transmissivity tests were performed in accordance with ASTM D 4716. Test parameters replicating operational conditions of the LCS and LDS, including seating times of 100 hrs under normal stresses of 250 and 7,200 psf were used. Furthermore, sample profiles were arranged to replicate geocomposite contact conditions for LCS and LDS. These profiles consisted of a sand/geocomposite/HDPE geomembrane profile for the LCS and a HDPE geomembrane/geocomposite/ HDPE geomembrane profile for the LDS. Laboratory testing was performed by TRI/Environmental, Inc. of Austin, Texas. Lab test results are reported in Attachment 1.
- GSE Permanet TRx, a triaxial drainage net, was selected due to the products sustained flow capacity under high normal load.

LCS Reduction Factors

Reduction factors used to evaluate LCS geocomposite drainage layer design transmissivity values are presented in Table 1. As discussed in the preceding section, site specific operational conditions of the LCS geocomposite drainage layer were replicated during laboratory transmissivity testing. This allowed for minimization of several of the reduction factors.

Table 1: LCS Reduction Factors

		Range of Values		Operating Conditions			
		LINER	**COVER**	**Case 1 (No Waste)**	**Case 2 (10'-80' Waste)**	**Case 3 (Closed Landfill Liner)**	**Case 3 (Closed Landfill Cover)**
RF_{IMCO}	Reduction factor for immediate compression	1.0	1.0	1.0	1.0	1.0	1.0
RF_{IMIN}	Reduction factor for immediate intrusion	1.5	1.0	1.0	1.0	1.0	1.0
RF_{CR}	Reduction factor for creep	1.4-2.0[(1)]	1.1-1.4[(1)]	1.4	1.4	1.4	1.1
RF_{IN}	Reduction factor for delayed intrusion	1.0-1.2[(1)]	1.0-1.2[(1)]	1.1	1.0	1.0	1.0
RF_{CD}	Reduction factor for chemical degradation	1.5	1.2	1.0	1.0	1.0	1.0
RF_{PC}	Reduction factor for particulate clogging	1.2	1.2	1.0	1.2	1.2	1.2
RF_{CC}	Reduction factor for chemical clogging	1.5-2.0[(1)]	1.0-1.2[(1)]	1.0	1.0	1.0	1.0
RF_{BC}	Reduction factor for biological clogging	1.5-2.0[(1)]	1.2-1.5[(1)]	1.0	1.0	1.5	1.2
	Overrall Reduction Factors =	RF		**1.54**	**1.68**	**2.52**	**1.58**

[(1)] Published Values from Giroud et al. (2000) and Qian et al. (2002)

LDS Reduction Factors

Reduction factors used to evaluate the LDS geocomposite drainage layer design transmissivity values are presented in Table 2. Again, the replication of site specific operational conditions of the LDS geocomposite drainage layer during laboratory transmissivity testing allowed for minimization of several of the reduction factors.

Table 2: LDS Reduction Factors

		Operating Conditions			
		Range of Values	Case 1 (No Waste)	Case 2 (10'-80' Waste)	Case 3 (Closed Landfill Liner)
		LINER			
RF_{IMCO}	Reduction factor for immediate compression	1.0	1.0	1.0	1.0
RF_{IMIN}	Reduction factor for immediate intrusion	1.5	1.0	1.0	1.0
RF_{CR}	Reduction factor for creep	1.4-2.0[(1)]	1.4	1.4	1.4
RF_{IN}	Reduction factor for delayed intrusion	1.0-1.2[(1)]	1.0	1.0	1.0
RF_{CD}	Reduction factor for chemical degradation	1.5	1.0	1.0	1.0
RF_{PC}	Reduction factor for particulate clogging	1.2	1.0	1.0	1.0
RF_{CC}	Reduction factor for chemical clogging	1.5-2.0[(1)]	1.0	1.0	1.0
RF_{BC}	Reduction factor for biological clogging	1.5-2.0[(1)]	1.0	1.0	1.0
	Overall Reduction Factor =	RF	**1.4**	**1.4**	**1.4**

[(1)] Published Values from Giroud et al. (2000) and Qian et al. (2002)

RESULTS:

Design transmissivity values were calculated for three operational conditions: Case 1, liner system with 2' operational cover; Case 2, liner system with 2' operational cover, 10'-80' compacted waste and 6" daily cover; and Case 3, closed landfill.

LCS Design Transmissivity and Hydraulic Conductivity

The estimated LCS geocomposite drainage layer design transmissivity values for operational conditions are presented in Table 3.

Table 3: LCS Design Transmissivity and Hydraulic Conductivity

Operation Conditions	$\Theta_{measured}$ (m^2/s)	Θ_{LTIS}	k_{design} (cm/s)
Case 1	5.53E-03	3.59E-03	52
Case 2	3.36E-03	2.00E-03	29
Case 3	3.36E-03	1.33E-03	19

Please note that a hand calculation verifying the k_{design} is provided in Attachment 2.

LDS Design Transmissivity and Hydraulic Conductivity

The estimated LDS geocomposite drainage layer design transmissivity values for operational conditions are presented in Table 4. These values will be used to evaluate the LDS performance and action leakage rate (ALR).

Table 4: LDS Design Transmissivity and Hydraulic Conductivity

Operation Conditions	$\Theta_{measured}$ (m^2/s)	Θ_{LTIS}	k_{design} (cm/s)
Case 1	5.77E-03	4.12E-03	60
Case 2	4.45E-03	3.18E-03	46
Case 3	4.45E-03	3.18E-03	46

S&ME

JOB NO. 1356-06-825
SHEET NO. 6 / 6
DATE 2/12/08

JOB NAME Duke Energy – Allen Steam Station Ash Landfill
SUBJECT Design Transmissivity

COMPUTED BY WMH
CHECKED BY IKB/KRD

REFERENCE:

1. J. P. Giroud, J. G. Zornberg and A. Zhao (2000) "Hydraulic Design of Geosynthetic and Granular Liquid Collection Layers". *Geosynthetics International*, Vol. 7, Nos 4-5.
2. X. Qian, R. M. Koerner and D. H. Gray (2002) "Geotechnical Aspects of Landfill Design and Construction" Prentice Hall, Inc. Upper Saddle River , New Jersey 07458
3. Geosynthetics Specifiers Guide 2008. Vol. 25, Number 6

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date:** 3/11/09	**Job No.:** 1356-06-825-09
DESCRIPTION:	Sump Grades	Duke Energy – Allen Steam Station	
		Ash Landfill	
NOTICE OF CHANGE NO.	5A		
CHANGE ORDER NOS:			

Description of design change:

- Referencing Drawings C4 and D3, the Cell 1 leachate sump location was moved 5 feet north.
- Referencing Drawings C9 and D3, the Cell 2 leachate sump location was moved approximately 9 feet north and sump elevations were lowered 2 feet.
- Referencing Drawing D3, the secondary and primary liner control point locations and elevations were modified for the revised sump locations and elevations.
- Intermediate contours were added to clarify grading around the sump location.
- Referencing Drawings D1 (Details 1, 3, 5, and 6) and D5 (Details 17 and 18) on the final subgrade surface (ie. structural fill or subgrade fill), the perimeter berm anchor trench detail is modified to drop 3 feet over a 1H:1V slope from the crest of the structural fill to a 7 foot wide flat ledge.
- Referencing Drawing D1 (Details 1 and 6), the minimum depth from crest to toe of 3H:1V slope inside the limit of waste is modified from 3 feet to 2.62 feet.

Related grading plans (C5, C6, C7, C10, C11, and C12) will be revised and included in Notice of Change 5B.

Reason for design change:

To reconcile inconsistencies between grading plan drawings and detail drawings.

Effective date of design change:

Immediately.

Financial and schedule considerations:

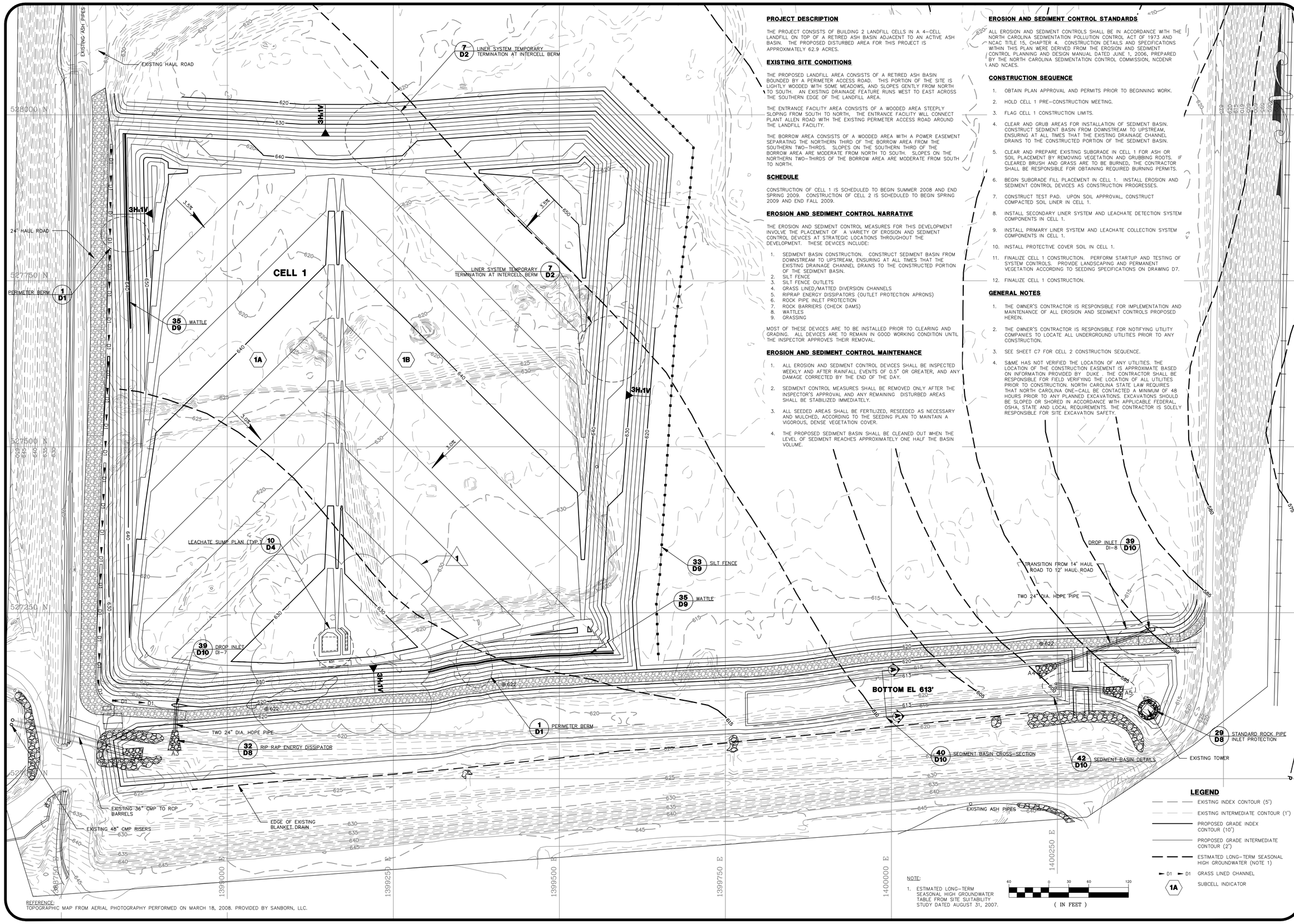
None anticipated.

Attachment:

Revision 1 of Drawings C4, C9, D1, D3, and D5

Engineer of Record Kenneth Daly, P.E.	3/12/09 **Date**	**Prepared By** Kyle Baucom, E.I.	3/12/09 **Date**

Copies to:
- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐



NOTE:

1. ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER TABLE FROM SITE SUITABILITY STUDY DATED AUGUST 31, 2007.

REFERENCE:
TOPOGRAPHIC MAP FROM AERIAL PHOTOGRAPHY PERFORMED ON MARCH 18, 2008. PROVIDED BY SANBORN, LLC.

PROJECT DESCRIPTION

THE PROJECT CONSISTS OF BUILDING 2 LANDFILL CELLS IN A 4-CELL LANDFILL ON TOP OF A RETIRED ASH BASIN ADJACENT TO AN ACTIVE ASH BASIN. THE PROPOSED DISTURBED AREA FOR THIS PROJECT IS APPROXIMATELY 62.9 ACRES.

EXISTING SITE CONDITIONS

THE PROPOSED LANDFILL AREA CONSISTS OF A RETIRED ASH BASIN BOUNDED BY A PERIMETER ACCESS ROAD. THIS PORTION OF THE SITE IS LIGHTLY WOODED WITH SOME MEADOWS, AND SLOPES GENTLY FROM NORTH TO SOUTH. AN EXISTING DRAINAGE FEATURE RUNS WEST TO EAST ACROSS THE SOUTHERN EDGE OF THE LANDFILL AREA.

THE ENTRANCE FACILITY AREA CONSISTS OF A WOODED AREA STEEPLY SLOPING FROM SOUTH TO NORTH. THE ENTRANCE FACILITY WILL CONNECT PLANT ALLEN ROAD WITH THE EXISTING PERIMETER ACCESS ROAD AROUND THE LANDFILL FACILITY.

THE BORROW AREA CONSISTS OF A WOODED AREA WITH A POWER EASEMENT SEPARATING THE NORTHERN THIRD OF THE BORROW AREA FROM THE SOUTHERN TWO-THIRDS. SLOPES ON THE SOUTHERN THIRD OF THE BORROW AREA ARE MODERATE FROM NORTH TO SOUTH. SLOPES ON THE NORTHERN TWO-THIRDS OF THE BORROW AREA ARE MODERATE FROM SOUTH TO NORTH.

SCHEDULE

CONSTRUCTION OF CELL 1 IS SCHEDULED TO BEGIN SUMMER 2008 AND END SPRING 2009. CONSTRUCTION OF CELL 2 IS SCHEDULED TO BEGIN SPRING 2009 AND END FALL 2009.

EROSION AND SEDIMENT CONTROL NARRATIVE

THE EROSION AND SEDIMENT CONTROL MEASURES FOR THIS DEVELOPMENT INVOLVE THE PLACEMENT OF A VARIETY OF EROSION AND SEDIMENT CONTROL DEVICES AT STRATEGIC LOCATIONS THROUGHOUT THE DEVELOPMENT. THESE DEVICES INCLUDE:

1. SEDIMENT BASIN CONSTRUCTION. CONSTRUCT SEDIMENT BASIN FROM DOWNSTREAM TO UPSTREAM, ENSURING AT ALL TIMES THAT THE EXISTING DRAINAGE CHANNEL DRAINS TO THE CONSTRUCTED PORTION OF THE SEDIMENT BASIN.
2. SILT FENCE
3. SILT FENCE OUTLETS
4. GRASS LINED/MATTED DIVERSION CHANNELS
5. RIPRAP ENERGY DISSIPATORS (OUTLET PROTECTION APRONS)
6. ROCK PIPE INLET PROTECTION
7. ROCK BARRIERS (CHECK DAMS)
8. WATTLES
9. GRASSING

MOST OF THESE DEVICES ARE TO BE INSTALLED PRIOR TO CLEARING AND GRADING. ALL DEVICES ARE TO REMAIN IN GOOD WORKING CONDITION UNTIL THE INSPECTOR APPROVES THEIR REMOVAL.

EROSION AND SEDIMENT CONTROL MAINTENANCE

1. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSPECTED WEEKLY AND AFTER RAINFALL EVENTS OF 0.5" OR GREATER, AND ANY DAMAGE CORRECTED BY THE END OF THE DAY.
2. SEDIMENT CONTROL MEASURES SHALL BE REMOVED ONLY AFTER THE INSPECTOR'S APPROVAL AND ANY REMAINING DISTURBED AREAS SHALL BE STABILIZED IMMEDIATELY.
3. ALL SEEDED AREAS SHALL BE FERTILIZED, RESEEDED AS NECESSARY AND MULCHED, ACCORDING TO THE SEEDING PLAN TO MAINTAIN A VIGOROUS, DENSE VEGETATION COVER.
4. THE PROPOSED SEDIMENT BASIN SHALL BE CLEANED OUT WHEN THE LEVEL OF SEDIMENT REACHES APPROXIMATELY ONE HALF THE BASIN VOLUME.

EROSION AND SEDIMENT CONTROL STANDARDS

ALL EROSION AND SEDIMENT CONTROLS SHALL BE IN ACCORDANCE WITH THE NORTH CAROLINA SEDIMENTATION POLLUTION CONTROL ACT OF 1973 AND NCAC TITLE 15, CHAPTER 4. CONSTRUCTION DETAILS AND SPECIFICATIONS WITHIN THIS PLAN WERE DERIVED FROM THE EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL DATED JUNE 1, 2006, PREPARED BY THE NORTH CAROLINA SEDIMENTATION CONTROL COMMISSION, NCDENR AND NCAES.

CONSTRUCTION SEQUENCE

1. OBTAIN PLAN APPROVAL AND PERMITS PRIOR TO BEGINNING WORK.
2. HOLD CELL 1 PRE-CONSTRUCTION MEETING.
3. FLAG CELL 1 CONSTRUCTION LIMITS.
4. CLEAR AND GRUB AREAS FOR INSTALLATION OF SEDIMENT BASIN. CONSTRUCT SEDIMENT BASIN FROM DOWNSTREAM TO UPSTREAM, ENSURING AT ALL TIMES THAT THE EXISTING DRAINAGE CHANNEL DRAINS TO THE CONSTRUCTED PORTION OF THE SEDIMENT BASIN.
5. CLEAR AND PREPARE EXISTING SUBGRADE IN CELL 1 FOR ASH OR SOIL PLACEMENT BY REMOVING VEGETATION AND GRUBBING ROOTS. IF CLEARED BRUSH AND GRASS ARE TO BE BURNED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING REQUIRED BURNING PERMITS.
6. BEGIN SUBGRADE FILL PLACEMENT IN CELL 1. INSTALL EROSION AND SEDIMENT CONTROL DEVICES AS CONSTRUCTION PROGRESSES.
7. CONSTRUCT TEST PAD. UPON SOIL APPROVAL, CONSTRUCT COMPACTED SOIL LINER IN CELL 1.
8. INSTALL SECONDARY LINER SYSTEM AND LEACHATE DETECTION SYSTEM COMPONENTS IN CELL 1.
9. INSTALL PRIMARY LINER SYSTEM AND LEACHATE COLLECTION SYSTEM COMPONENTS IN CELL 1.
10. INSTALL PROTECTIVE COVER SOIL IN CELL 1.
11. FINALIZE CELL 1 CONSTRUCTION. PERFORM STARTUP AND TESTING OF SYSTEM CONTROLS. PROVIDE LANDSCAPING AND PERMANENT VEGETATION ACCORDING TO SEEDING SPECIFICATIONS ON DRAWING D7.
12. FINALIZE CELL 1 CONSTRUCTION.

GENERAL NOTES

1. THE OWNER'S CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROLS PROPOSED HEREIN.
2. THE OWNER'S CONTRACTOR IS RESPONSIBLE FOR NOTIFYING UTILITY COMPANIES TO LOCATE ALL UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION.
3. SEE SHEET C7 FOR CELL 2 CONSTRUCTION SEQUENCE.
4. S&ME HAS NOT VERIFIED THE LOCATION OF ANY UTILITIES. THE LOCATION OF THE CONSTRUCTION EASEMENT IS APPROXIMATE BASED ON INFORMATION PROVIDED BY DUKE . THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION. NORTH CAROLINA STATE LAW REQUIRES THAT NORTH CAROLINA ONE-CALL BE CONTACTED A MINIMUM OF 48 HOURS PRIOR TO ANY PLANNED EXCAVATIONS. EXCAVATIONS SHOULD BE SLOPED OR SHORED IN ACCORDANCE WITH APPLICABLE FEDERAL, OSHA, STATE AND LOCAL REQUIREMENTS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR SITE EXCAVATION SAFETY.

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
1	3-12-09	NOTICE OF CHANGE 5A: SUMP GRADES	
0	10-20-08	ISSUED FOR CONSTRUCTION	

CELL 1 FINAL SUBGRADE AND EROSION AND SEDIMENT CONTROL PLAN

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: CHR	APPROVED BY: KRD
PROJECT NUMBER 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: C4	OF: 28

DRAWING PATH: G:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NOC 5 - SUMP GRADES\C4 CELL 1 FINAL SUBGRADE.DWG

PROJECT DESCRIPTION

THE PROJECT CONSISTS OF BUILDING 2 LANDFILL CELLS IN A 4–CELL LANDFILL ON TOP OF A RETIRED ASH BASIN ADJACENT TO AN ACTIVE ASH BASIN. THE PROPOSED DISTURBED AREA FOR THIS PROJECT IS APPROXIMATELY 62.9 ACRES.

EXISTING SITE CONDITIONS

THE PROPOSED LANDFILL AREA CONSISTS OF A RETIRED ASH BASIN BOUNDED BY A PERIMETER ACCESS ROAD. THIS PORTION OF THE SITE IS LIGHTLY WOODED WITH SOME MEADOWS, AND SLOPES GENTLY FROM NORTH TO SOUTH. AN EXISTING DRAINAGE FEATURE RUNS WEST TO EAST ACROSS THE SOUTHERN EDGE OF THE LANDFILL AREA.

THE ENTRANCE FACILITY AREA CONSISTS OF A WOODED AREA STEEPLY SLOPING FROM SOUTH TO NORTH. THE ENTRANCE FACILITY WILL CONNECT PLANT ALLEN ROAD WITH THE EXISTING PERIMETER ACCESS ROAD AROUND THE LANDFILL FACILITY.

THE BORROW AREA CONSISTS OF A WOODED AREA WITH A POWER EASEMENT SEPARATING THE NORTHERN THIRD OF THE BORROW AREA FROM THE SOUTHERN TWO–THIRDS. SLOPES ON THE SOUTHERN THIRD OF THE BORROW AREA ARE MODERATE FROM NORTH TO SOUTH. SLOPES ON THE NORTHERN TWO–THIRDS OF THE BORROW AREA ARE MODERATE FROM SOUTH TO NORTH.

SCHEDULE

CONSTRUCTION OF CELL 1 IS SCHEDULED TO BEGIN SUMMER 2008 AND END SPRING 2009. CONSTRUCTION OF CELL 2 IS SCHEDULED TO BEGIN SPRING 2009 AND END FALL 2009.

EROSION AND SEDIMENT CONTROL NARRATIVE

THE EROSION AND SEDIMENT CONTROL MEASURES FOR THIS DEVELOPMENT INVOLVE THE PLACEMENT OF A VARIETY OF EROSION AND SEDIMENT CONTROL DEVICES AT STRATEGIC LOCATIONS THROUGHOUT THE DEVELOPMENT. THESE DEVICES INCLUDE:

1. SEDIMENT BASIN MAINTENANCE
2. SILT FENCE
3. SILT FENCE OUTLETS
4. GRASS LINED/MATTED DIVERSION CHANNELS
5. RIPRAP ENERGY DISSIPATORS (OUTLET PROTECTION APRONS)
6. ROCK PIPE INLET PROTECTION
7. ROCK BARRIERS (CHECK DAMS)
8. WATTLES
9. GRASSING

MOST OF THESE DEVICES ARE TO BE INSTALLED PRIOR TO CLEARING AND GRADING. ALL DEVICES ARE TO REMAIN IN GOOD WORKING CONDITION UNTIL THE INSPECTOR APPROVES THEIR REMOVAL.

EROSION AND SEDIMENT CONTROL MAINTENANCE

1. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSPECTED WEEKLY AND AFTER RAINFALL EVENTS OF 0.5" OR GREATER, AND ANY DAMAGE CORRECTED BY THE END OF THE DAY.
2. SEDIMENT CONTROL MEASURES SHALL BE REMOVED ONLY AFTER THE INSPECTOR'S APPROVAL AND ANY REMAINING DISTURBED AREAS SHALL BE STABILIZED IMMEDIATELY.
3. ALL SEEDED AREAS SHALL BE FERTILIZED, RESEEDED AS NECESSARY AND MULCHED, ACCORDING TO THE SEEDING PLAN TO MAINTAIN A VIGOROUS, DENSE VEGETATION COVER.
4. THE PROPOSED SEDIMENT BASIN SHALL BE CLEANED OUT WHEN THE LEVEL OF SEDIMENT REACHES APPROXIMATELY ONE HALF THE BASIN VOLUME.

EROSION AND SEDIMENT CONTROL STANDARDS

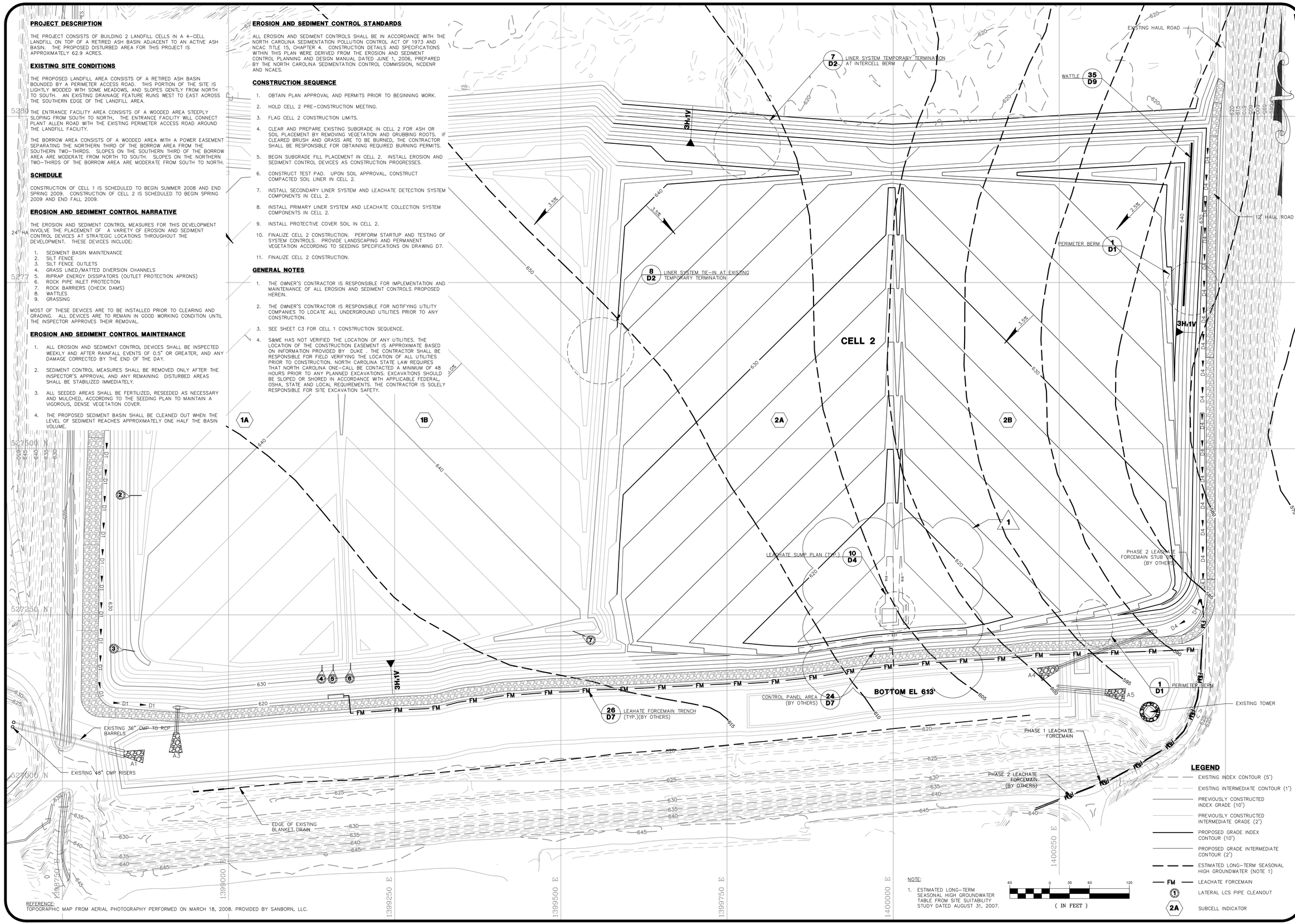
ALL EROSION AND SEDIMENT CONTROLS SHALL BE IN ACCORDANCE WITH THE NORTH CAROLINA SEDIMENTATION POLLUTION CONTROL ACT OF 1973 AND NCAC TITLE 15, CHAPTER 4. CONSTRUCTION DETAILS AND SPECIFICATIONS WITHIN THIS PLAN WERE DERIVED FROM THE EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL DATED JUNE 1, 2006, PREPARED BY THE NORTH CAROLINA SEDIMENTATION CONTROL COMMISSION, NCDENR AND NCAES.

CONSTRUCTION SEQUENCE

1. OBTAIN PLAN APPROVAL AND PERMITS PRIOR TO BEGINNING WORK.
2. HOLD CELL 2 PRE–CONSTRUCTION MEETING.
3. FLAG CELL 2 CONSTRUCTION LIMITS.
4. CLEAR AND PREPARE EXISTING SUBGRADE IN CELL 2 FOR ASH OR SOIL PLACEMENT BY REMOVING VEGETATION AND GRUBBING ROOTS. IF CLEARED BRUSH AND GRASS ARE TO BE BURNED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING REQUIRED BURNING PERMITS.
5. BEGIN SUBGRADE FILL PLACEMENT IN CELL 2. INSTALL EROSION AND SEDIMENT CONTROL DEVICES AS CONSTRUCTION PROGRESSES.
6. CONSTRUCT TEST PAD. UPON SOIL APPROVAL, CONSTRUCT COMPACTED SOIL LINER IN CELL 2.
7. INSTALL SECONDARY LINER SYSTEM AND LEACHATE DETECTION SYSTEM COMPONENTS IN CELL 2.
8. INSTALL PRIMARY LINER SYSTEM AND LEACHATE COLLECTION SYSTEM COMPONENTS IN CELL 2.
9. INSTALL PROTECTIVE COVER SOIL IN CELL 2.
10. FINALIZE CELL 2 CONSTRUCTION. PERFORM STARTUP AND TESTING OF SYSTEM CONTROLS. PROVIDE LANDSCAPING AND PERMANENT VEGETATION ACCORDING TO SEEDING SPECIFICATIONS ON DRAWING D7.
11. FINALIZE CELL 2 CONSTRUCTION.

GENERAL NOTES

1. THE OWNER'S CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROLS PROPOSED HEREIN.
2. THE OWNER'S CONTRACTOR IS RESPONSIBLE FOR NOTIFYING UTILITY COMPANIES TO LOCATE ALL UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION.
3. SEE SHEET C3 FOR CELL 1 CONSTRUCTION SEQUENCE.
4. S&ME HAS NOT VERIFIED THE LOCATION OF ANY UTILITIES. THE LOCATION OF THE CONSTRUCTION EASEMENT IS APPROXIMATE BASED ON INFORMATION PROVIDED BY DUKE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION. NORTH CAROLINA STATE LAW REQUIRES THAT NORTH CAROLINA ONE–CALL BE CONTACTED A MINIMUM OF 48 HOURS PRIOR TO ANY PLANNED EXCAVATIONS. EXCAVATIONS SHOULD BE SLOPED OR SHORED IN ACCORDANCE WITH APPLICABLE FEDERAL, OSHA, STATE AND LOCAL REQUIREMENTS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR SITE EXCAVATION SAFETY.



REFERENCE:
TOPOGRAPHIC MAP FROM AERIAL PHOTOGRAPHY PERFORMED ON MARCH 18, 2008. PROVIDED BY SANBORN, LLC.

NOTE:
1. ESTIMATED LONG–TERM SEASONAL HIGH GROUNDWATER TABLE FROM SITE SUITABILITY STUDY DATED AUGUST 31, 2007.

60 0 30 60 120
(IN FEET)

LEGEND

- EXISTING INDEX CONTOUR (5')
- EXISTING INTERMEDIATE CONTOUR (1')
- PREVIOUSLY CONSTRUCTED INDEX GRADE (10')
- PREVIOUSLY CONSTRUCTED INTERMEDIATE GRADE (2')
- PROPOSED GRADE INDEX CONTOUR (10')
- PROPOSED GRADE INTERMEDIATE CONTOUR (2')
- ESTIMATED LONG–TERM SEASONAL HIGH GROUNDWATER (NOTE 1)
- FM — LEACHATE FORCEMAIN
- 1 — LATERAL LCS PIPE CLEANOUT
- 2A — SUBCELL INDICATOR

Duke Energy ©

S&ME
WWW.SMEINC.COM

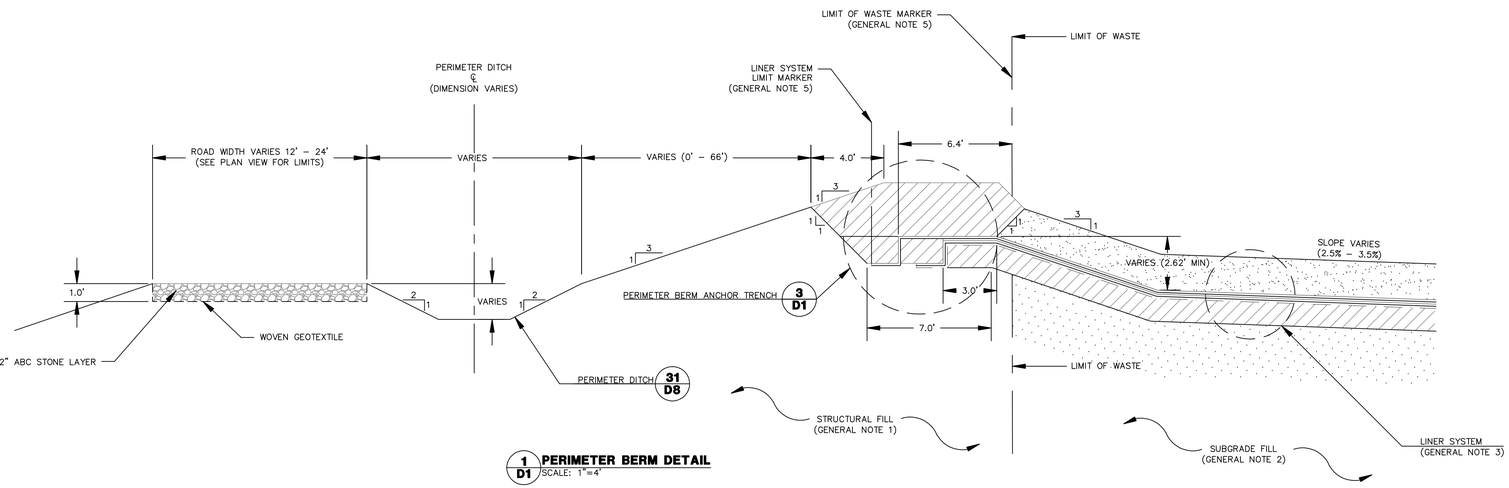
NO.	DATE	DESCRIPTION	BY
1	3–12–09	NOTICE OF CHANGE 5A: SUMP GRADES	
0	10–20–08	ISSUED FOR CONSTRUCTION	

CELL 2 FINAL SUBGRADE & EROSION & SEDIMENT CONTROL PLAN

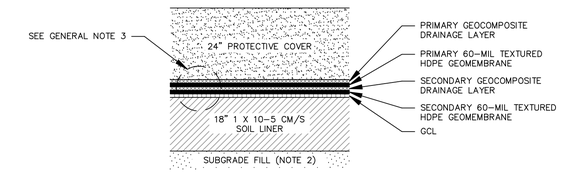
PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: CHR	APPROVED BY: KRD
PROJECT NUMBER: 1356–06–825	
SCALE: AS SHOWN	DATE: 7–31–08
DRAWING: C9	OF: 28

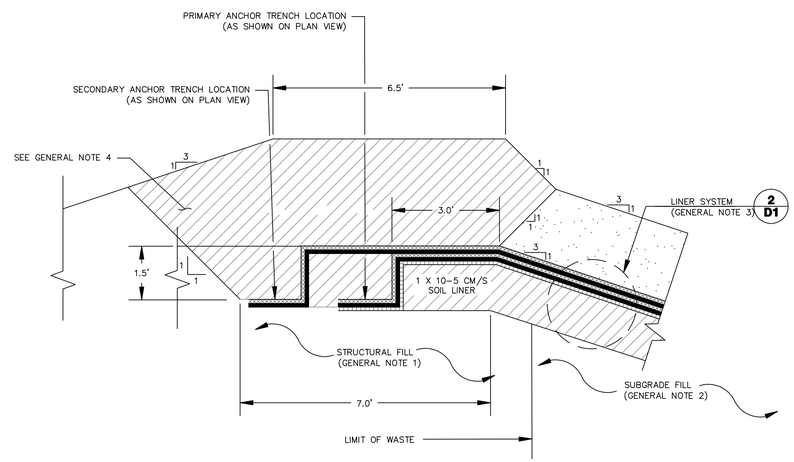
DRAWING PATH: G:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NOD 5 – SUMP GRADES\C9 CELL 2 FINAL SUBGRADE.DWG



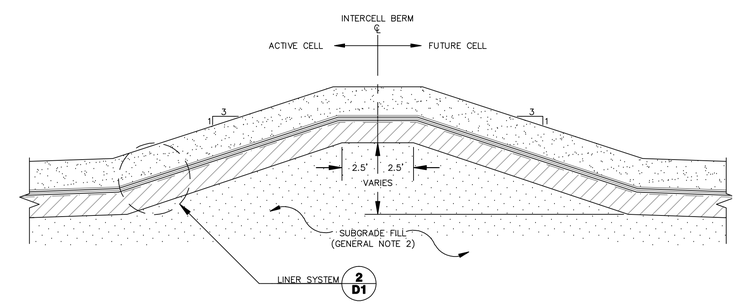
1 D1 PERIMETER BERM DETAIL
SCALE: 1"=4'



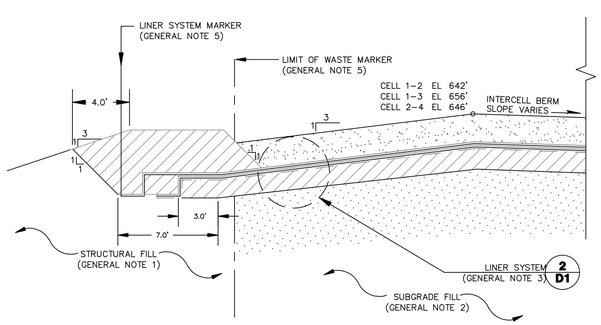
2 D1 LINER SYSTEM DETAIL
SCALE: 1"=2'



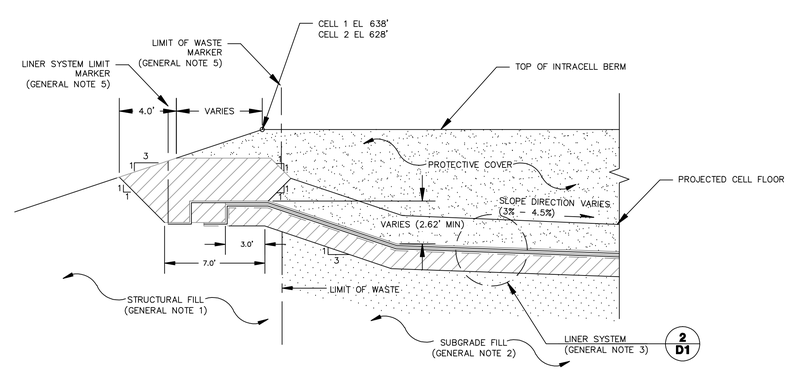
3 D1 PERIMETER BERM ANCHOR TRENCH (TYP.)
SCALE: 1"=2'



4 D1 INTERCELL BERM DETAIL
SCALE: 1"=5'



5 D1 PERIMETER BERM AT INTERCELL BERM DETAIL
SCALE: 1"=5'



6 D1 PERIMETER BERM AT INTRACELL BERM DETAIL
SCALE: 1"=5'

GENERAL 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. DETAIL IS DRAWN TO SCALE WITH THE EXCEPTION OF THE GEOSYNTHETIC COMPONENTS WHICH ARE EXAGGERATED FOR CLARITY.
4. ANCHOR TRENCH BACKFILL AND PERIMETER BERM SHALL CONSIST OF SAME MATERIAL USED TO CONSTRUCT SOIL LINER CONSISTENT WITH SPECIFICATION SECTIONS 02321 AND 02324.
5. THIN, FLEXIBLE HIGHWAY–TYPE MARKER TO BE PROVIDED AT CHANGES IN ALIGNMENT, SPACED 100' O.C. (MAX.) AND 25' O.C. ON CURVES.

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
1	3–12–09	NOTICE OF CHANGE 5A: SUMP GRADES	
0	10–20–08	ISSUED FOR CONSTRUCTION	

LINER SYSTEM DETAILS I

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: ELH	CHECKED BY: KRD
DESIGNED BY: CHR	APPROVED BY: KRD
PROJECT NUMBER: 1356–06–825	
SCALE: AS SHOWN	DATE: 7–31–08
DRAWING: D1	OF: 28

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NOC 5 - SUMP GRADES\DETAILS 1,3,5.DWG

CELL 1 SUMP			
Point Number	Northing	Easting	Point Elevation
1	527191.76	1399143.44	625.50
2	527213.39	1399143.44	625.50
3	527213.39	1399165.44	625.50
4	527193.39	1399165.44	625.50
5	527186.26	1399170.44	628.00
6	527186.48	1399173.44	628.00
7	527194.38	1399178.44	625.50
8	527194.54	1399180.44	625.50
9	527187.39	1399185.44	628.00
10	527221.68	1399185.44	628.00
11	527230.68	1399176.44	628.00
12	527227.60	1399172.44	626.00
13	527219.60	1399180.44	625.50
14	527218.78	1399178.44	625.50
15	527226.78	1399170.44	626.00
16	527223.71	1399166.44	628.00
17	527216.71	1399173.44	628.00
18	527215.46	1399170.44	628.00
19	527222.46	1399163.44	628.00
20	527219.39	1399159.44	626.00
21	527220.39	1399150.44	626.00
22	527223.46	1399146.44	628.00
23	527215.46	1399138.44	628.00
24	527183.86	1399138.44	628.00

CELL 2 SUMP			
POINT	NORTHING	EASTING	ELEVATION
1	527237.15	1399983.20	614.50
2	527259.16	1399983.20	614.50
3	527259.16	1400005.20	614.50
4	527239.16	1400005.20	614.50
5	527232.08	1400010.20	617.00
6	527232.36	1400013.20	617.00
7	527240.35	1400018.20	614.50
8	527240.53	1400020.20	614.50
9	527233.47	1400025.20	617.00
10	527267.44	1400025.20	617.00
11	527276.44	1400016.20	617.00
12	527273.37	1400012.20	615.00
13	527265.37	1400020.20	614.50
14	527264.54	1400018.20	614.50
15	527272.54	1400010.20	615.00
16	527269.47	1400006.20	617.00
17	527262.47	1400013.20	617.00
18	527261.23	1400010.20	617.00
19	527268.23	1400003.20	617.00
20	527265.16	1399999.20	615.00
21	527266.16	1399990.20	615.00
22	527269.23	1399986.20	617.00
23	527261.23	1399978.20	617.00
24	527229.15	1399978.20	617.00

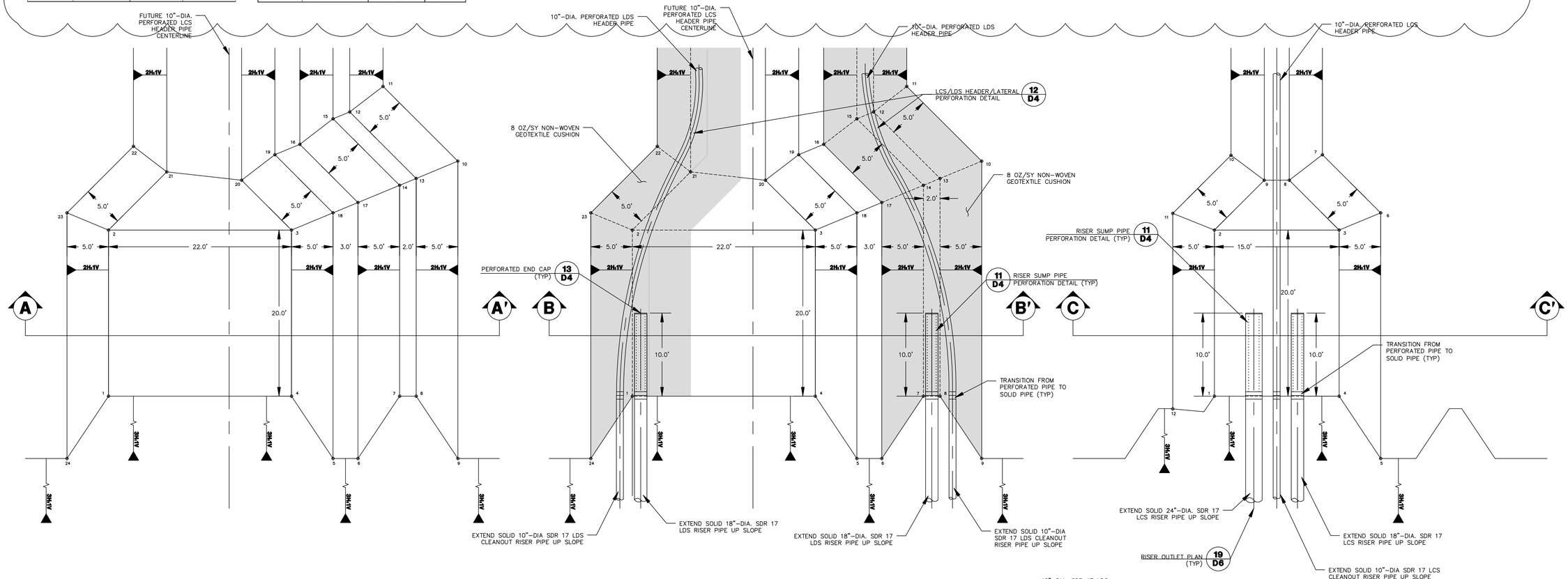
CELL 1 SUMP			
Point Number	Northing	Easting	Point Elevation
1	527191.76	1399143.44	627.00
2	527213.39	1399143.44	627.00
3	527213.39	1399165.44	627.00
4	527193.39	1399165.44	627.00
5	527186.26	1399170.44	629.50
6	527186.48	1399173.44	629.50
7	527194.38	1399178.44	627.00
8	527194.54	1399180.44	627.00
9	527187.39	1399185.44	629.50
10	527221.68	1399185.44	629.50
11	527230.68	1399176.44	629.50
12	527227.60	1399172.44	627.50
13	527219.60	1399180.44	627.00
14	527218.78	1399178.44	627.00
15	527226.78	1399170.44	627.50
16	527223.71	1399166.44	629.50
17	527216.71	1399173.44	629.50
18	527215.46	1399170.44	629.50
19	527222.46	1399163.44	629.50
20	527219.39	1399159.44	627.50
21	527220.39	1399150.44	627.50
22	527223.46	1399146.44	629.50
23	527215.46	1399138.44	629.50
24	527183.86	1399138.44	629.50

CELL 2 SUMP			
POINT	NORTHING	EASTING	ELEVATION
1	527237.15	1399983.20	616.00
2	527259.16	1399983.20	616.00
3	527259.16	1400005.20	616.00
4	527239.16	1400005.20	616.00
5	527232.08	1400010.20	618.50
6	527232.36	1400013.20	618.50
7	527240.35	1400018.20	616.00
8	527240.53	1400020.20	616.00
9	527233.47	1400025.20	618.50
10	527267.44	1400025.20	618.50
11	527276.44	1400016.20	618.50
12	527273.37	1400012.20	616.50
13	527265.37	1400020.20	616.00
14	527264.54	1400018.20	616.00
15	527272.54	1400010.20	616.50
16	527269.47	1400006.20	618.50
17	527262.47	1400013.20	618.50
18	527261.23	1400010.20	618.50
19	527268.23	1400003.20	618.50
20	527265.16	1399999.20	616.50
21	527266.16	1399990.20	616.50
22	527269.23	1399986.20	618.50
23	527261.23	1399978.20	618.50
24	527229.15	1399978.20	618.50

CELL 1 SUMP			
Point Number	Northing	Easting	Point Elevation
1	527192.27	1399150.44	627.00
2	527213.39	1399150.44	627.00
3	527213.39	1399165.44	627.00
4	527193.39	1399165.44	627.00
5	527186.26	1399170.44	629.50
6	527215.46	1399170.44	629.50
7	527222.46	1399163.44	629.50
8	527219.39	1399159.44	627.50
9	527219.39	1399156.44	627.50
10	527222.39	1399152.44	629.50
11	527215.39	1399145.44	629.50
12	527190.39	1399145.44	629.50

CELL 2 SUMP			
POINT	NORTHING	EASTING	ELEVATION
1	527237.77	1399990.20	617.00
2	527259.16	1399990.20	617.00
3	527259.16	1400005.20	617.00
4	527239.16	1400005.20	617.00
5	527232.08	1400010.20	619.50
6	527261.23	1400010.20	619.50
7	527268.23	1400003.20	619.50
8	527265.16	1399999.20	618.00
9	527265.16	1399996.20	618.00
10	527268.16	1399992.20	619.50
11	527261.16	1399985.20	619.50
12	527237.32	1399985.20	619.50

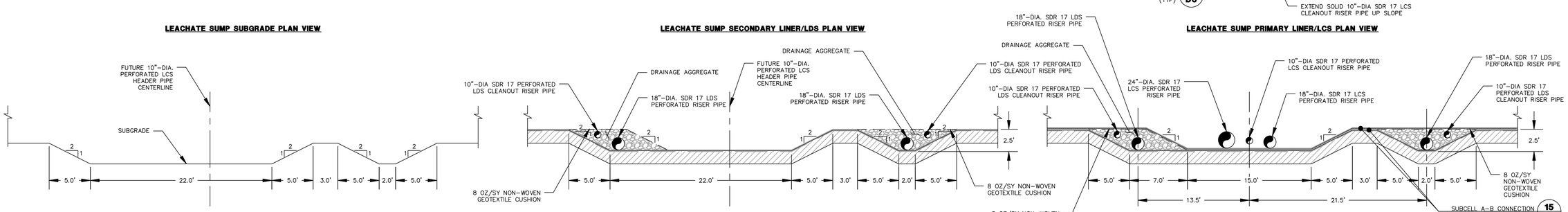
2



LEACHATE SUMP SUBGRADE PLAN VIEW

LEACHATE SUMP SECONDARY LINER/LDS PLAN VIEW

LEACHATE SUMP PRIMARY LINER/LCS PLAN VIEW



LEACHATE SUMP SUBGRADE SECTION A-A' VIEW

LEACHATE SUMP SECONDARY LINER/LDS SECTION B-B' VIEW

LEACHATE SUMP PRIMARY LINER/LCS SECTION C-C' VIEW

9 D3 LEACHATE SUMP SEQUENCE PLAN
SCALE: 1"=6'

GENERAL 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. DETAIL IS DRAWN TO SCALE WITH THE EXCEPTION OF THE GEOSYNTHETIC COMPONENTS WHICH ARE EXAGGERATED FOR CLARITY.
4. CONTROL POINT ELEVATIONS IN LEACHATE SUMP SECONDARY LINER/LDS PLAN VIEW REPRESENT TOP OF 18" THICK COMPACTED SOIL LINER LAYER.

Duke Energy ©

S&ME
WWW.SMEINC.COM

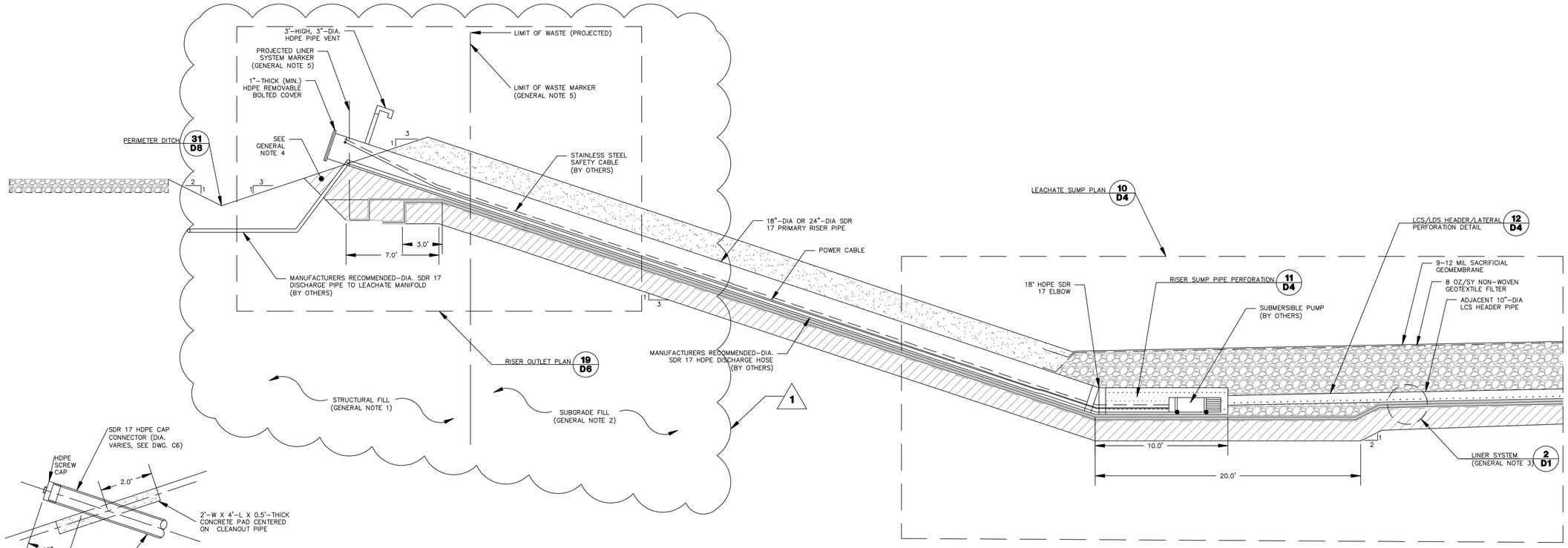
NO.	DATE	DESCRIPTION	BY
1	3-12-09	NOTICE OF CHANGE 5A: SUMP GRADES	
0	10-20-08	ISSUED FOR CONSTRUCTION	

LCS/LDS DETAILS I

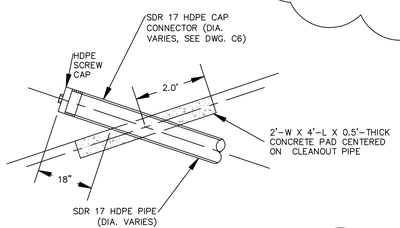
PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: ELH	CHECKED BY: KRD
DESIGNED BY: CHR	APPROVED BY: KRD
PROJECT NUMBER: 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: D3	OF: 28

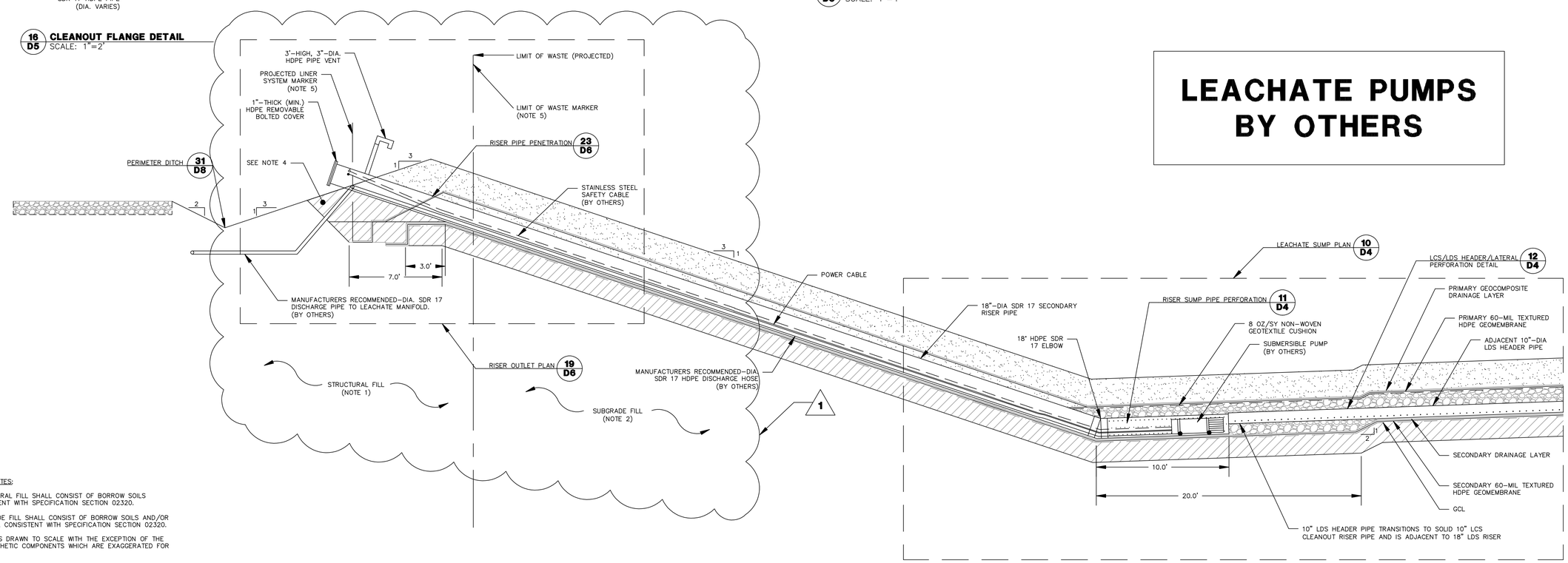
DRAWING PATH: G:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\WBS 9 - SUMP GRADES\DETAILS 9.3.5.DWG



17 D5 **LCS SUMP AND RISER SIDE VIEW**
SCALE: 1"=4'



16 D5 **CLEANOUT FLANGE DETAIL**
SCALE: 1"=2'



18 D5 **LDS SUMP AND RISER SIDE VIEW**
SCALE: 1"=4'

LEACHATE PUMPS BY OTHERS

GENERAL 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. DETAIL IS DRAWN TO SCALE WITH THE EXCEPTION OF THE GEOSYNTHETIC COMPONENTS WHICH ARE EXAGGERATED FOR CLARITY.
4. ANCHOR TRENCH BACKFILL AND PERIMETER BERM SHALL CONSIST OF SAME MATERIAL USED TO CONSTRUCT SOIL LINER CONSISTENT WITH SPECIFICATION SECTIONS 02321 AND 02324.
5. THIN, FLEXIBLE HIGHWAY-TYPE MARKER TO BE PROVIDED AT CHANGES IN ALIGNMENT, SPACED 100' O.C. (MAX.) AND 25' O.C. ON CURVES.

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
1	3-12-09	NOTICE OF CHANGE 5A: SUMP GRADES	
0	10-20-08	ISSUED FOR CONSTRUCTION	

LCS/LDS DETAILS III

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: ELH	CHECKED BY: KRD
DESIGNED BY: CHR	APPROVED BY: KRD
PROJECT NUMBER: 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: D5	OF: 28

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NOC 5 - SUMP GRADES\DETAILS 1,3,5.DWG

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date: 3/16/09**	**Job No.: 1356-06-825-09**
DESCRIPTION:	Aggregate and	Duke Energy – Allen Steam Station	
	Subgrade Compaction	Ash Landfill	
NOTICE OF CHANGE NO.	6		
CHANGE ORDER NOS:			

Description of design change:

In both the original and electrical-mechanical drawings and technical specifications:

- The minimum compaction criteria for aggregate base course (ABC) stone is revised to 100 percent of the modified Proctor maximum dry density.
- The minimum compaction criteria for subgrade is revised to 95 percent of the standard Proctor maximum dry density. This excludes areas of cut within the paved access road, which may be proofrolled as described in the electrical-mechanical Asphalt Pavement Specification Section 03001, part 3.2.

This changes:

- Original Aggregate Specification Section 02060, part 3.7.B
- Original Drawing D11, Detail 43 & 44
- Electrical-mechanical Drawing D3, Detail 10 & 12

Reason for design change:

To clarify the compaction criteria for aggregate and subgrade and eliminate inconsistencies between the original and electrical-mechanical technical specifications and drawings.

Effective date of design change:

Immediately.

Financial and schedule considerations:

None anticipated.

Attachment:

Revised original Aggregate Specification Section 02060
Revision 2 of original Drawing D11
Revision 2 of electrical-mechanical Drawing D3

3/16/09		3/16/09	
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:
- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐

SECTION 02060
AGGREGATE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Aggregate Type A1 – ABC stone for roadways.
2. Aggregate Type A2 – No. 57 stone for drainage aggregate and erosion and sediment control structures.
3. Aggregate Type A3 – Class B riprap for erosion and sediment control structures.
4. Aggregate Type A4 – Class 2 riprap for erosion and sediment control structures.

B. Related Sections:
1. Section 02320 – Backfill – Structural.
2. Section 02374 – Erosion Control Devices
3. Section 02500 – High Density Polyethylene (HDPE) Piping and Miscellaneous Items.
4. Section 02610 – Pipe Culverts.
5. Section 02673 – Woven Geotextile.
6. Section 02674 – Nonwoven Geotextile.
7. Section 02675 – Geonet Composite Drainage Layer.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Coarse Aggregate:
1. Basis of Measurement: A1, A2, A3 & A4 by the **in place cubic yard** or as otherwise indicated in other Sections of these Specifications. Installation quantities shall not include quantities placed beyond the lines and grades shown on the Drawings.
2. Basis of Payment: By the cubic yard placed times the unit price for each aggregate type, or as otherwise indicated in these Specifications.
   a. Includes supplying aggregate materials, hauling, stockpiling, and placement.
   b. Requested payment quantities will be submitted by the Contractor with final approval by the Engineer. If a dispute exists relative to payment quantities, the Contractor at his expense will uncover any buried or covered material for re-evaluation.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:
1. AASHTO T11 – Standard Method of Test for Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing.
2. AASHTO T27 – Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates.
3. AASHTO T180 – Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:
1. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregate.
2. ASTM D421 – Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants.
3. ASTM D422 – Standard Test Method for Particle Size Analysis of Soils.
4. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 (600 kN-m/m^3)).

5. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
6. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10 lb Rammer and 18 inch Drop.
7. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
8. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
10. ASTM D4253 – Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
11. ASTM D4254 – Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

C. North Carolina Department of Transportation (NCDOT) Standard specifications for Roads and Structures.

1.4 SUBMITTALS

A. Section 01300 – Administrative Requirements: Submittal procedures.

B. Materials Source: Submit name of imported materials suppliers and description of material.

C. Manufacturer's/Supplier's Certificate: Certify materials meet or exceed specified requirements.

D. Requested payment quantities will be submitted by the Contractor with final approval by the Engineer.

1.5 QUALITY ASSURANCE

A. Furnish each aggregate material type from single source throughout the Work.

B. Perform Work in accordance with North Carolina Department of Transportation Standard Specifications for Roads and Structures or as otherwise specified.

PART 2 PRODUCTS

2.1. COARSE AGGREGATE MATERIALS

A. Coarse Aggregate Type A1 - Roadways: Conforming to ABC Stone NCDOT standards. Coarse Aggregate Type A1 shall be used for roadway subgrades and where shown on the Drawings.

B. Coarse Aggregate Type A2 – Drainage Aggregate: Subangular, subrounded, rounded, or well rounded particle shaped conforming to No. 57 Stone NCDOT Standards. Coarse Aggregate Type A2 shall be used in the LCS and LDS corridors, sumps, and other drainage applications, for construction of erosion and sediment control structures, and where shown on the Drawings.

C. Coarse Aggregate Type A3: Conforming to Class B Riprap NCDOT standards. Coarse Aggregate Type A3 shall be used for drainage feature inlet and outlet protection, for construction of erosion and sediment control structures, and where shown on the Drawings.

D. Coarse Aggregate Type A4: Conforming to Class 2 Riprap NCDOT standards. Coarse aggregate Type A4 shall be used for drainage feature outlet protection, for erosion and sediment control structures, and where shown on the Drawings.

2.2 SOURCE QUALITY CONTROL

A. Section 01400 - Quality Requirements: Testing and observation services.

B. Aggregate Material - Testing and Analysis: Perform in accordance with ASTM C136, ASTM D421, ASTM D422, ASTM D4253, ASTM D4254, AASHTO T11, and/or AASHTO T27.

C. When tests indicate materials do not meet specified requirements, change material or material source and retest.

D. Furnish materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1. STOCKPILING

A. Stockpile materials on site at locations agreed upon by Engineer and Owner.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

3.2. STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water and restore to original site conditions.

3.3. EXAMINATION

A. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.4. PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place fill on soft, muddy, or frozen surfaces.

3.5. AGGREGATE PLACEMENT

A. Spread aggregate over prepared substrate to a total compacted thickness as specified on Drawings.

B. Place aggregate in a maximum layer and compact to specified density.

C. Level and contour surfaces to elevations and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.6. TOLERANCES

A. Section 01400 - Quality Requirements: Tolerances.

B. Scheduled Compacted Thickness: Within ¼ inch.

C. Variation From Design Elevation: Within ½ inch.

3.7. FIELD QUALITY CONTROL

A. Section 01400 - Quality Requirements: Testing and observation requirements.

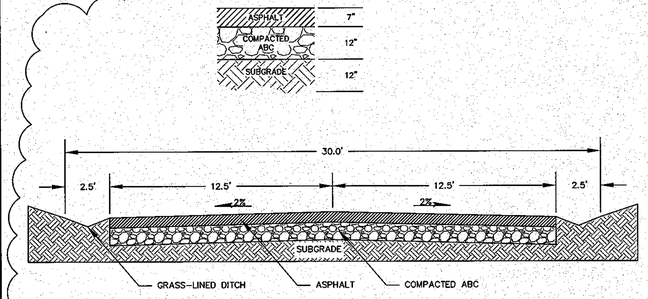
B. Coarse aggregate Type A1, where used for road surfacing applications, shall be compacted to a density of 100 percent **of its modified Proctor maximum dry density** and in accordance with these Specifications.

C. Compaction testing will be performed in accordance with ASTM D1556, ASTM D1557, ASTM D698, AASHTO T180, ASTM D2167, ASTM D2922, and/or ASTM D3017.

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

E. Frequency of Tests: Minimum of one test per 2,500 square feet per compacted lift.

END OF SECTION

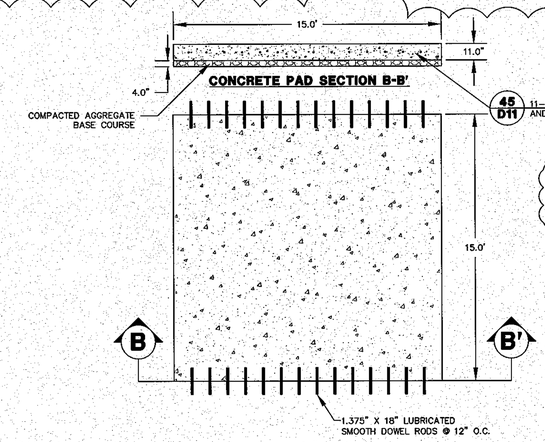


43/D11 ASPHALT PAVEMENT DETAIL
SCALE: 1"=4'

2

NOTES:

1. SUBGRADE SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12". IN AREAS OF CUT, SUBGRADE COMPACTION MAY BE TESTED AT THE SUBGRADE SURFACE BY THE METHOD OF PROOFROLLING.
2. AGGREGATE BASE COURSE SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".



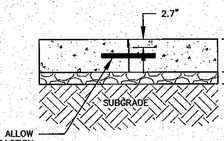
CONCRETE PAD SECTION B-B'

44/D11 11" CONCRETE PAD DETAIL
SCALE: 1"=4'

2

NOTES:

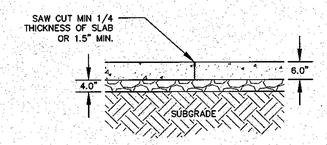
1. SUBGRADE SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".
2. AGGREGATE BASE COURSE SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO THICKNESS SPECIFIED



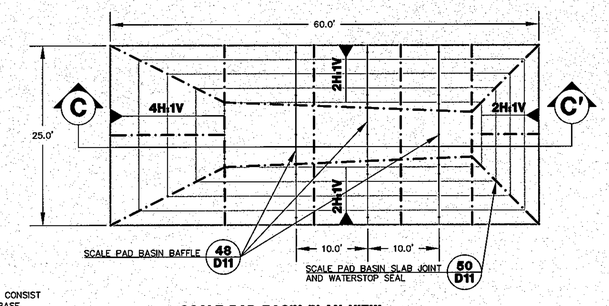
NOTES:

1. DOWELS SHALL MEASURE 1-3/8" IN DIAMETER AND SHALL MEASURE 18" IN LENGTH
2. DOWELS SHALL BE SMOOTH AND LUBRICATED TO ALLOW SLAB CONTRACTION AND EXPANSION
3. SAWED OR CAST JOINTS SHALL EXTEND TO A DEPTH EQUAL TO 1/4 THE THICKNESS OF THE SLAB
4. JOINTS SHALL BE SEALED WITH A WATERTIGHT SEALANT

45/D11 11-INCH SLAB DOWEL AND JOINT DETAIL
SCALE: 1"=2'



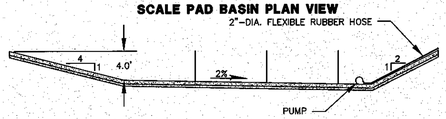
46/D11 6-INCH SLAB JOINT DETAIL
SCALE: 1"=2'



SCALE PAD BASIN PLAN VIEW

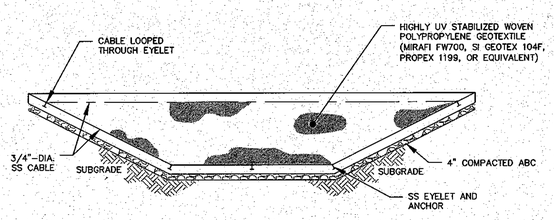
NOTES:

1. SCALE PAD BASIN SHALL CONSIST OF 4" COMPACTED ABC BASE, POURED CONCRETE SLABS OF 6" THICKNESS WITH WATERSTOPPED JOINTS
2. CONCRETE PADS SHALL BE PLANAR WITHIN JOINTED BOUNDARIES
3. SCALE PAD BASIN SHALL BE CLEARED OUT MONTHLY OR WHEN SEDIMENTATION EXCEEDS 6" THICKNESS
4. BAFFLES WILL BE SECURED TO BASIN SLABS WITH CORROSION RESISTANT WIRES STRUNG THROUGH ANCHORED BOLTS

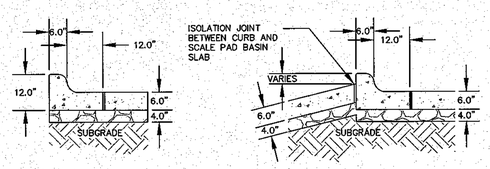


SCALE PAD BASIN SECTION C-C'

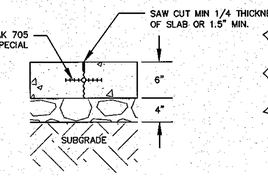
47/D11 SCALE PAD BASIN DETAILS
SCALE: 1"=10'



48/D11 SCALE PAD BASIN BAFFLE DETAILS
SCALE: 1"=4'

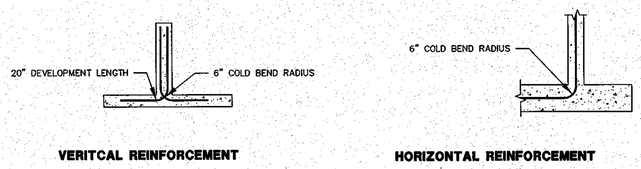


49/D11 CURB AND CURB ALONG BASIN DETAILS
SCALE: 1"=2'

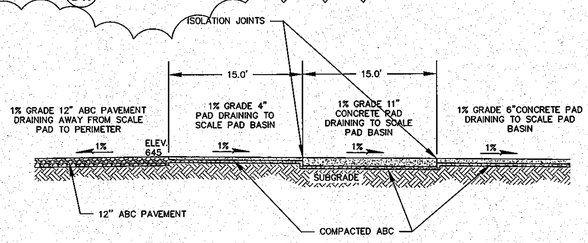


50/D11 SCALE PAD BASIN SLAB JOINT AND WATERSTOP SEAL
SCALE: 1"=1'

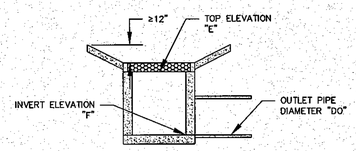
WORK BY OTHERS



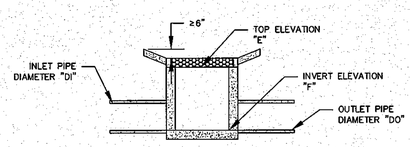
51/D11 SCALE PAD BASIN REINFORCEMENT DETAILS
SCALE: 1"=3'



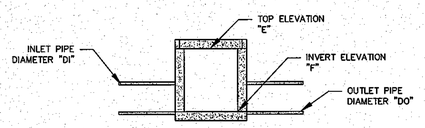
52/D11 PAD DRAINAGE SLOPES SECTION A-A'
SCALE: 1"= 8'



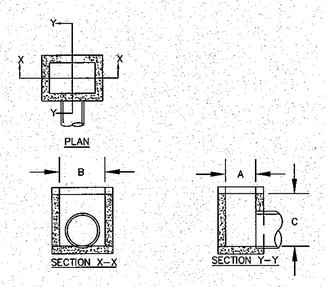
DROP INLET - 1



DROP INLET - 2



JUNCTION BOX - 1



STORM WATER STRUCTURES SCHEDULE								
	DIMENSIONS			INLET GRATE OPEN AREA	INLET PIPE DIAMETER	OUTLET PIPE DIAMETER	ELEVATIONS	
STRUCTURE NO.	SPAN A	WIDTH B	DEPTH C	OA	DI	DO	TOP E	INVERT F
DI-1	4'	4'	4'	470 SQ. IN.	NONE	1-24" RCP	608.0'	604.0'
DI-2	4'	4'	4'	270 SQ. IN.	1-24" RCP	1-24" RCP	605.5'	601.5'
JB-1	4'	4'	TBD	NONE	1-24" RCP	1-18" CMP	TBD	TBD

NOTES:

1. GRATE AND BASIN STRUCTURE SHALL BE SUPPORTED TO ALLOW HS-20 LOADING

53/D11 CATCH BASIN INLET DETAIL
N.T.S.

1

Duke Energy ©

S&ME
WWW.SMEINC.COM

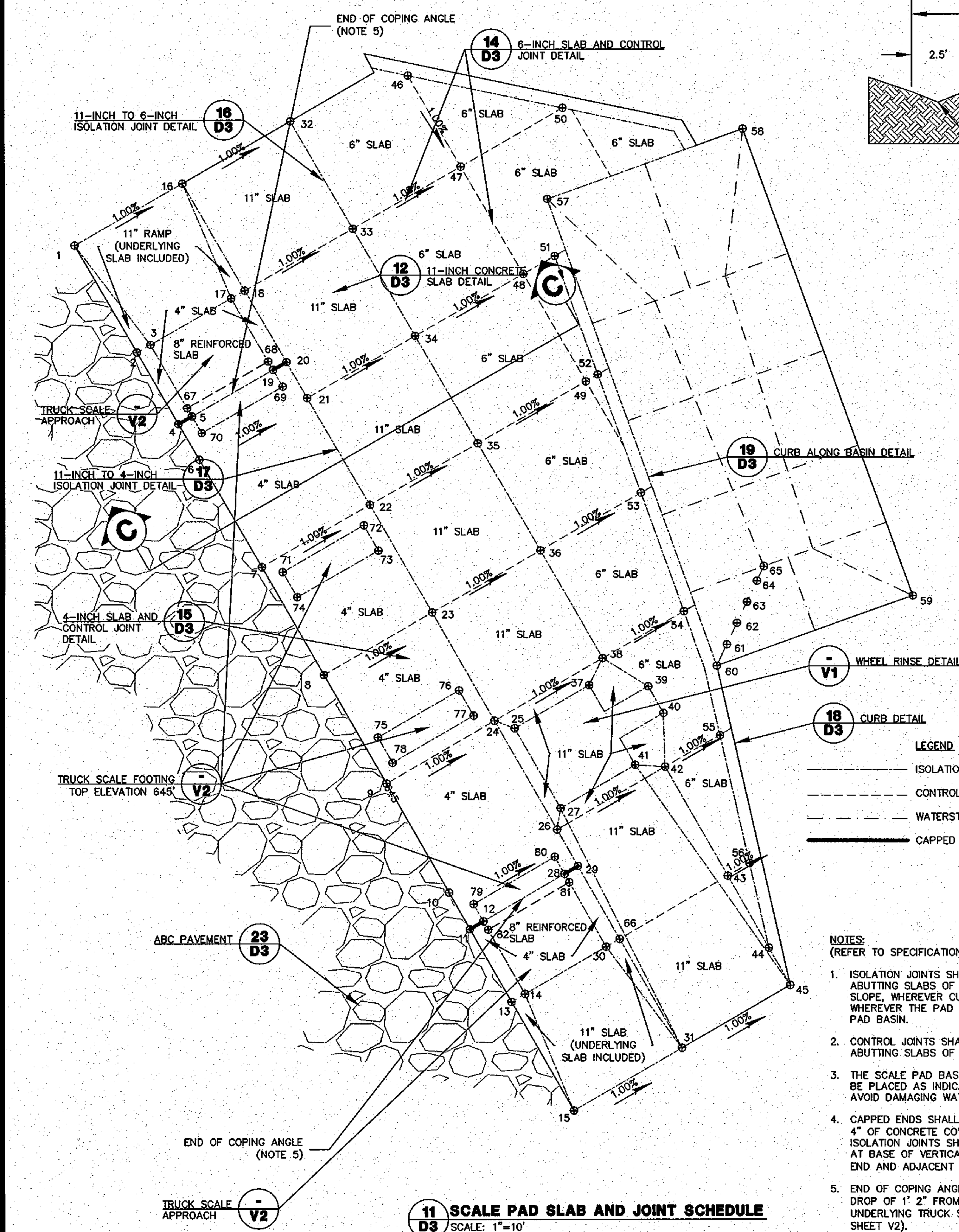
NO.	DATE	DESCRIPTION
2	3-16-09	NOTICE OF CHANGE 6: AGGREGATE & SUBGRADE COMPACTION
1	1-21-09	NOTICE OF CHANGE 3: DROP INLET AND BRIDGE MODIFICATIONS
0	10-20-08	ISSUED FOR CONSTRUCTION

ACCESS ROAD / ENTRANCE DETAILS

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: WMH	CHECKED BY: KRD
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: D11	OF: 28

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NCCG - ABC AND SUBGRADE COMPACTION\NCCG 6 - DETAIL 10-12.DWG



LEGEND
- ISOLATION JOINTS (NOTE 1)
- CONTROL JOINTS (NOTE 2)
- WATERSTOP SEALED JOINTS (NOTE 3)
- CAPPED ENDS (NOTE 4)

11/D3 SCALE PAD SLAB AND JOINT SCHEDULE
SCALE: 1"=10'

NOTES:
(REFER TO SPECIFICATIONS FOR JOINT INFORMATION)

1. ISOLATION JOINTS SHALL BE PLACED BETWEEN ABUTTING SLABS OF VARYING THICKNESS OR SLOPE, WHEREVER CURBS ABUT SLABS, AND WHEREVER THE PAD SLABS ABUT THE SCALE PAD BASIN.
2. CONTROL JOINTS SHALL BE PLACED BETWEEN ABUTTING SLABS OF EQUAL THICKNESS
3. THE SCALE PAD BASIN CONTROL JOINTS SHALL BE PLACED AS INDICATED WITH CARE TAKEN TO AVOID DAMAGING WATERSTOP JOINT SEALS
4. CAPPED ENDS SHALL BE FORMED TO PROVIDE 4" OF CONCRETE COVER ON VERTICAL FACES. ISOLATION JOINTS SHOULD ALSO BE INCLUDED AT BASE OF VERTICAL FACE BETWEEN CAPPED END AND ADJACENT 4" SLAB.
5. END OF COPING ANGLE RESULTS IN VERTICAL DROP OF 1' 2" FROM SCALE APPROACH TO UNDERLYING TRUCK SCALE FOOTING (SEE DETAIL SHEET V2).
6. ALL SLABS SHALL BE 15-FT X 15-FT WHEREVER POSSIBLE

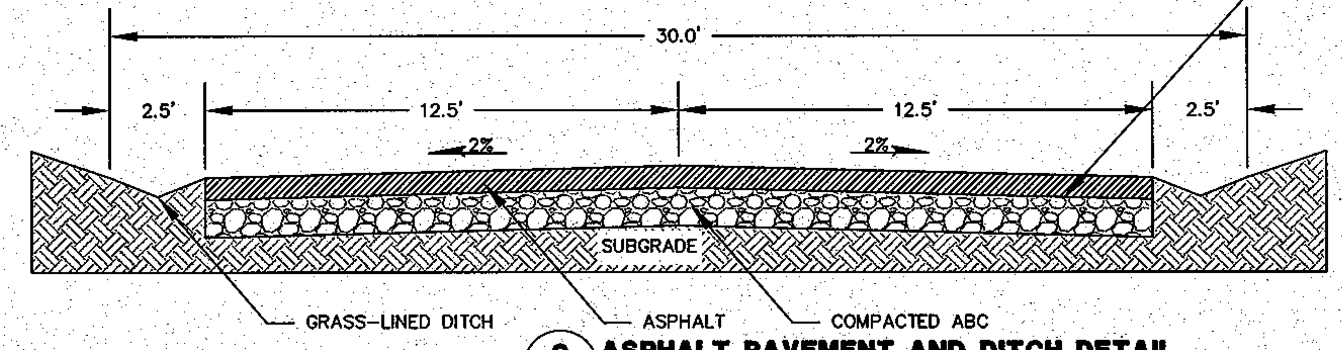
TOP OF CONCRETE SLAB POINTS

POINT	NORTHING	EASTING	ELEVATION	POINT	NORTHING	EASTING	ELEVATION
1	529037.65	1398779.52	645.00	34	529026.66	1398820.50	644.70
2	529024.66	1398787.02	645.00	35	529013.67	1398828.00	644.70
3	529025.59	1398788.64	646.17	36	529000.67	1398835.49	644.70
4	529015.99	1398792.02	645.00	37	528984.45	1398841.37	644.44
5	529016.93	1398793.64	646.17	38	528987.68	1398842.99	644.70
6	529011.66	1398794.52	645.00	39	528984.30	1398848.45	644.44
7	528998.67	1398802.01	645.00	40	528981.11	1398850.30	644.44
8	528985.68	1398809.51	645.00	41	528974.90	1398846.88	644.44
9	528972.69	1398817.01	645.00	42	528974.69	1398850.49	644.70
10	528959.69	1398824.50	645.00	43	528961.70	1398857.98	645.36
11	528955.36	1398827.00	645.00	44	528953.15	1398862.92	645.69
12	528956.30	1398828.63	646.17	45	528948.70	1398865.48	645.87
13	528946.70	1398832.00	645.00	46	529058.11	1398819.67	644.68
14	528947.64	1398833.62	646.17	47	529047.15	1398826.00	644.55
15	528933.71	1398839.50	646.17	48	529034.15	1398833.49	644.55
16	529045.15	1398792.52	645.85	49	529021.16	1398840.99	644.55
17	529031.22	1398798.39	646.17	50	529054.21	1398838.24	644.55
18	529032.15	1398800.01	645.85	51	529036.33	1398837.26	644.51
19	529022.55	1398803.39	646.17	52	529021.99	1398842.43	644.53
20	529023.49	1398805.01	645.85	53	529007.65	1398847.59	644.56
21	529019.16	1398807.51	645.85	54	528993.31	1398852.75	644.59
22	529006.17	1398815.01	645.85	55	528978.45	1398857.08	644.62
23	528993.18	1398822.50	645.85	56	528963.32	1398861.03	645.33
24	528980.18	1398830.00	645.85	57	529043.67	1398836.37	644.50
25	528979.28	1398832.41	644.44	58	529051.70	1398859.89	644.50
26	528967.19	1398837.50	645.85	59	528995.25	1398880.22	644.50
27	528969.73	1398837.92	644.44	60	528986.78	1398856.70	644.50
28	528961.92	1398838.37	646.17	61	528989.34	1398857.91	643.50
29	528962.86	1398839.99	645.85	62	528991.89	1398859.11	642.50
30	528953.26	1398843.37	646.17	63	528994.45	1398860.32	641.50
31	528941.21	1398852.49	646.02	64	528997.01	1398861.52	640.50
32	529052.64	1398805.51	644.70	65	528998.79	1398862.35	639.81
33	529039.65	1398813.00	644.70	66	528954.20	1398844.99	645.32

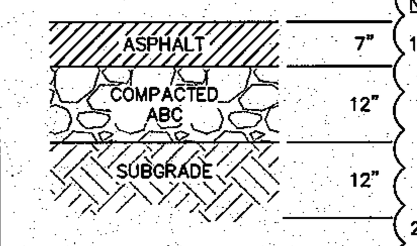
TRUCK SCALE FOOTING POINTS

POINT	NORTHING	EASTING
67	529017.93	1398793.06
68	529023.56	1398802.81
69	529020.52	1398804.56
70	529014.90	1398794.81
71	528998.07	1398804.53
72	529003.69	1398814.27
73	529000.66	1398816.02
74	528995.03	1398806.28
75	528978.20	1398815.99
76	528983.82	1398825.74
77	528980.79	1398827.48
78	528975.17	1398817.74
79	528958.33	1398827.46
80	528963.95	1398837.20
81	528960.92	1398838.95
82	528955.30	1398829.20

*ALL TRUCK SCALE FOOTINGS SHALL HAVE TOP ELEVATIONS OF 645'



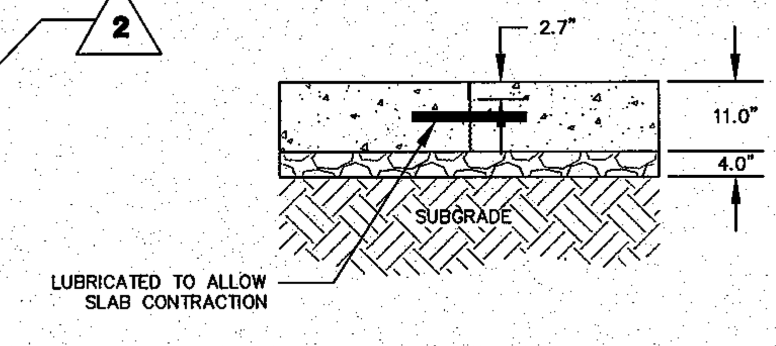
9/D3 ASPHALT PAVEMENT AND DITCH DETAIL
SCALE: 1"=4'



NOTES:
1. SUBGRADE SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12". IN AREAS OF CUT, SUBGRADE COMPACTION MAY BE TESTED AT THE SUBGRADE SURFACE BY THE METHOD OF PROOFROLLING.
2. AGGREGATE BASE COURSE SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".

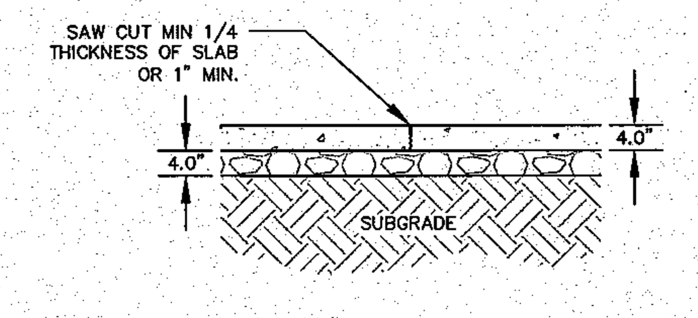
2

10/D3 ASPHALT PAVEMENT SECTION
SCALE: 1"=2'

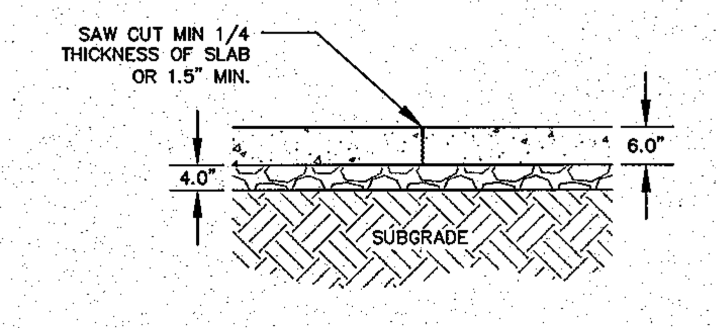


NOTES:
1. DOWELS SHALL MEASURE 1-3/8" IN DIAMETER AND SHALL MEASURE 18" IN LENGTH
2. DOWELS SHALL BE SMOOTH AND LUBRICATED TO ALLOW SLAB CONTRACTION AND EXPANSION
3. SAWED OR CAST JOINTS SHALL EXTEND TO A DEPTH EQUAL TO 1/4 THE THICKNESS OF THE SLAB
4. JOINTS SHALL BE SEALED AS INDICATED IN THE SPECIFICATIONS

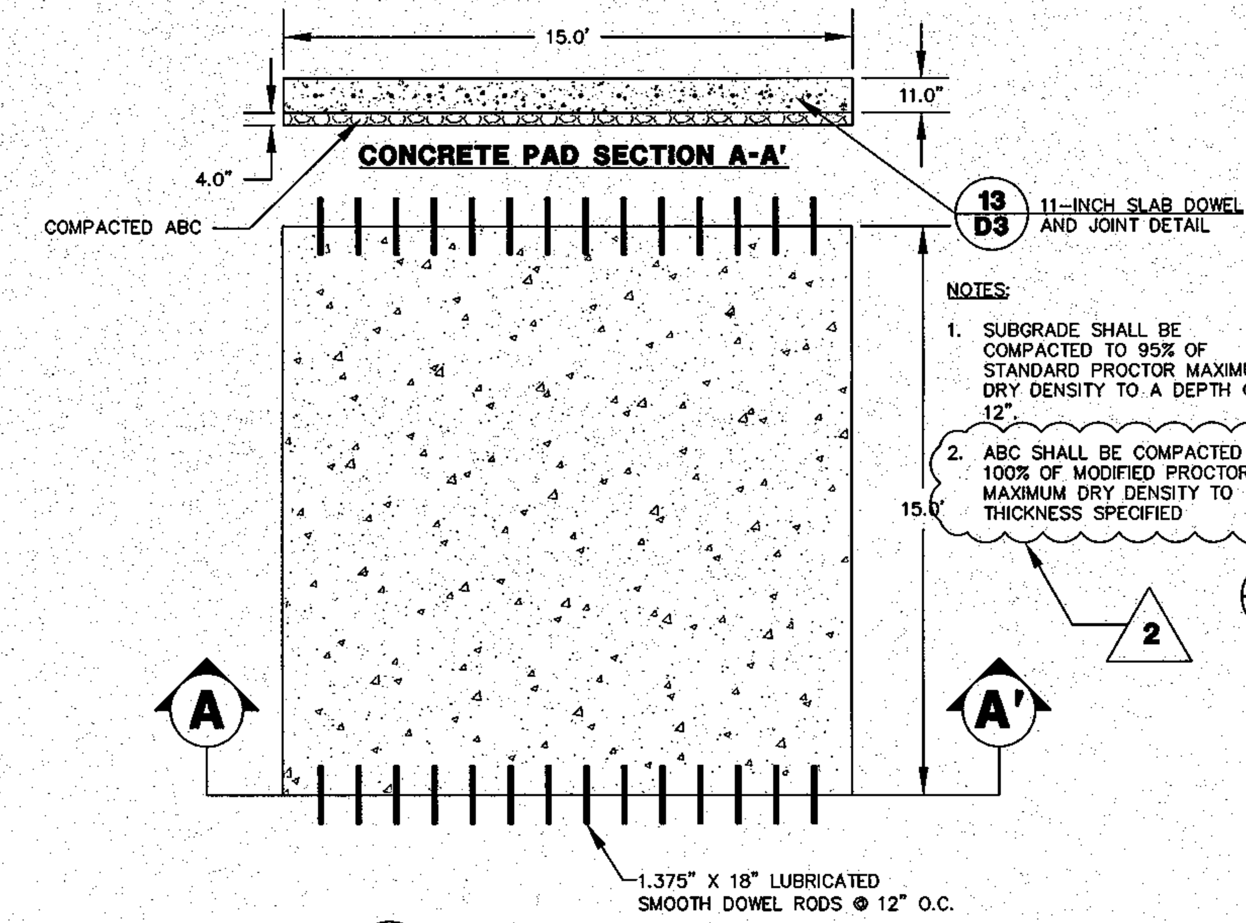
13/D3 11-INCH SLAB DOWEL AND JOINT DETAIL
SCALE: 1"=2'



15/D3 4-INCH SLAB AND CONTROL JOINT DETAIL
SCALE: 1"=2'



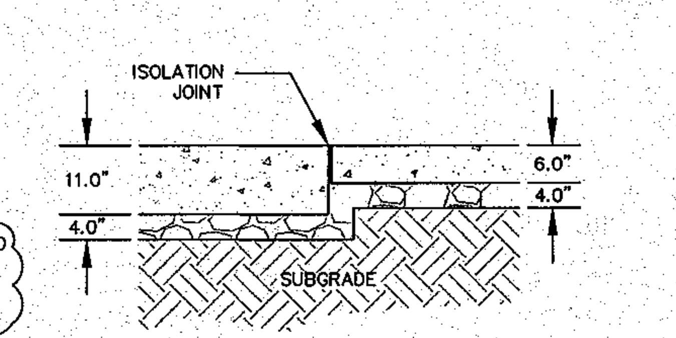
14/D3 6-INCH SLAB AND CONTROL JOINT DETAIL
SCALE: 1"=2'



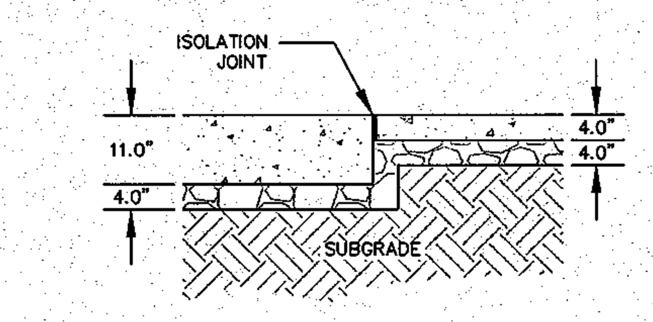
NOTES:
1. SUBGRADE SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".
2. ABC SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO THICKNESS SPECIFIED

2

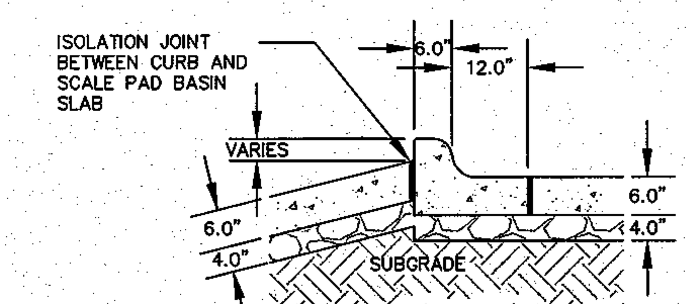
12/D3 11" CONCRETE SLAB DETAIL
SCALE: 1"=4'



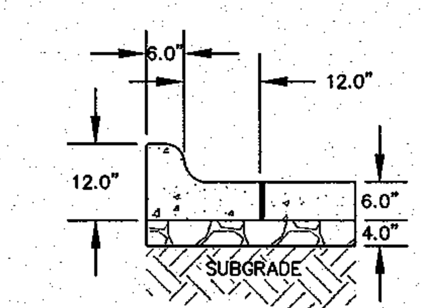
16/D3 11-INCH TO 6-INCH ISOLATION JOINT DETAIL
SCALE: 1"=2'



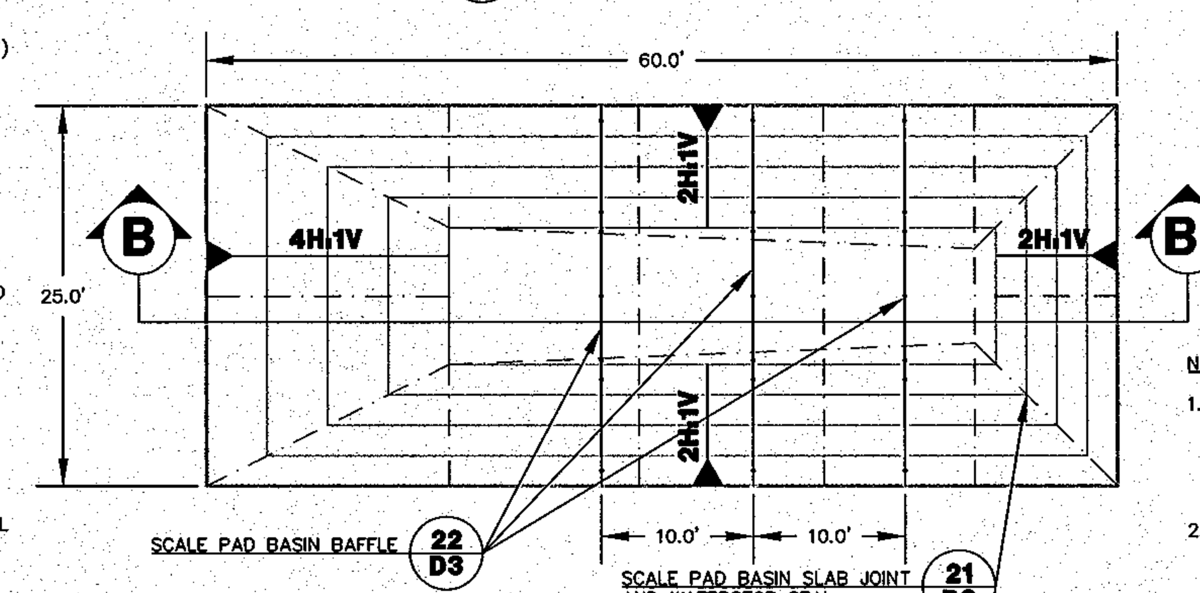
17/D3 11-INCH TO 4-INCH ISOLATION JOINT DETAIL
SCALE: 1"=2'



19/D3 CURB ALONG BASIN DETAIL
SCALE: 1" = 2'

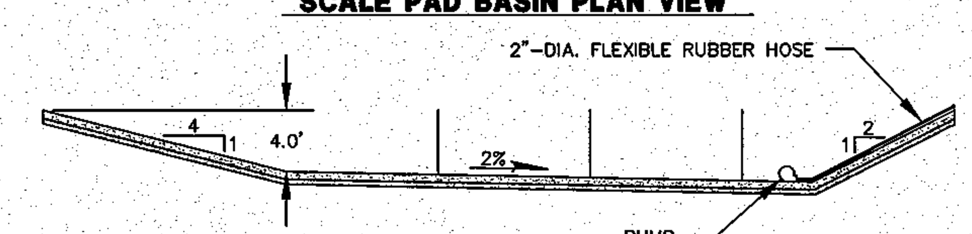


18/D3 CURB DETAIL
SCALE: 1" = 2'



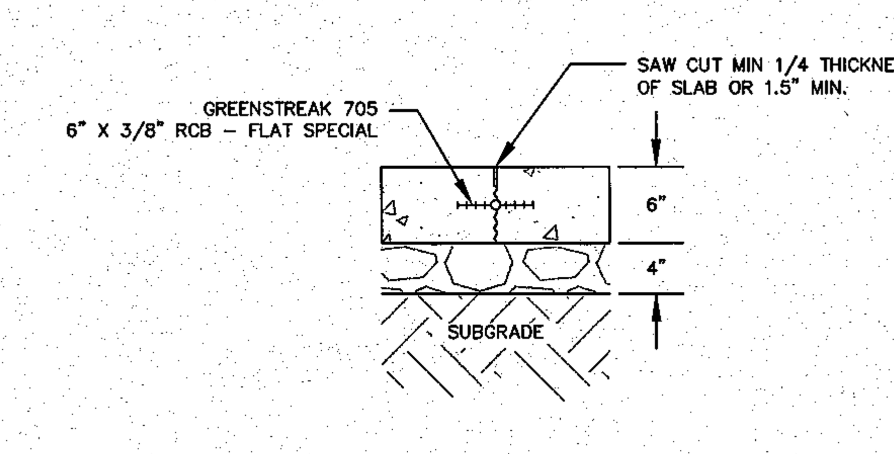
SCALE PAD BASIN PLAN VIEW

NOTES:
1. SCALE PAD BASIN SHALL CONSIST OF 4" COMPACTED ABC BASE, POURED CONCRETE SLABS OF 6" THICKNESS WITH WATERSTOPPED JOINTS
2. CONCRETE PADS SHALL BE PLANAR WITHIN JOINTED BOUNDARIES
3. SCALE PAD BASIN SHALL BE CLEARED OUT MONTHLY OR WHEN SEDIMENTATION EXCEEDS 6" THICKNESS
4. BAFFLES WILL BE SECURED TO BASIN SLABS WITH CORROSION RESISTANT WIRES STRUNG THROUGH ANCHORED BOLTS

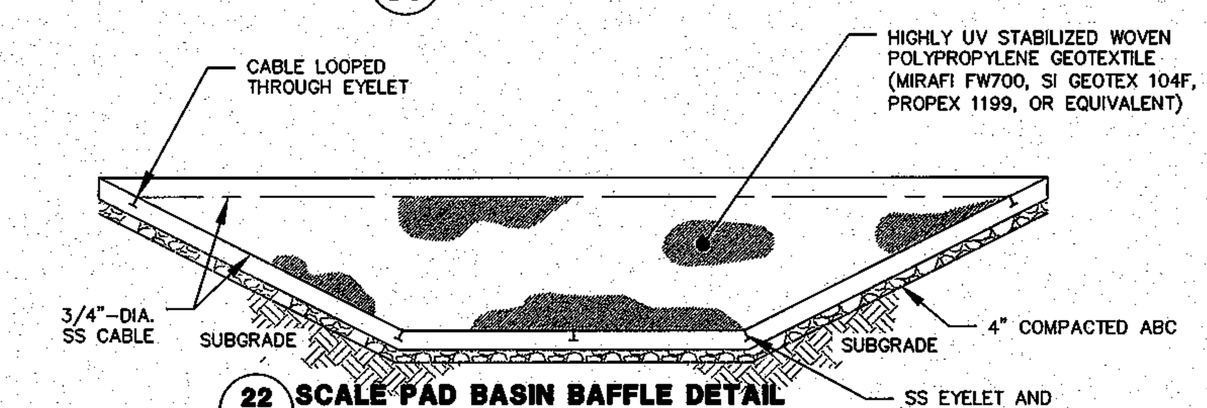


SCALE PAD BASIN SECTION B-B'

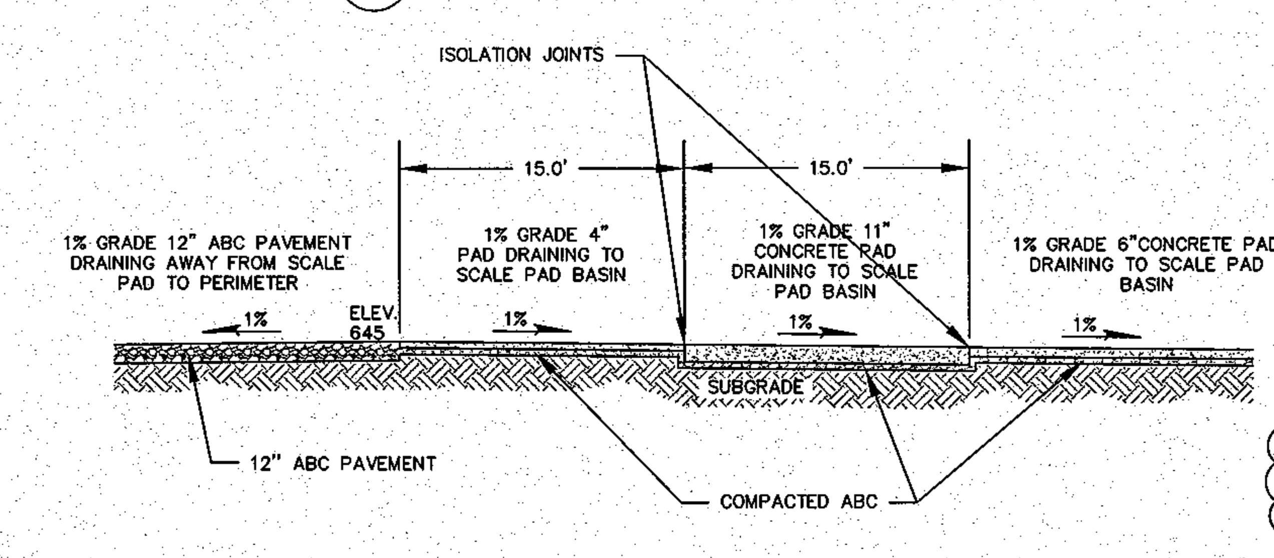
20/D3 SCALE PAD BASIN DETAILS
SCALE: 1"=10'



21/D3 SCALE PAD BASIN SLAB JOINT AND WATERSTOP SEAL
SCALE: 1"=1'



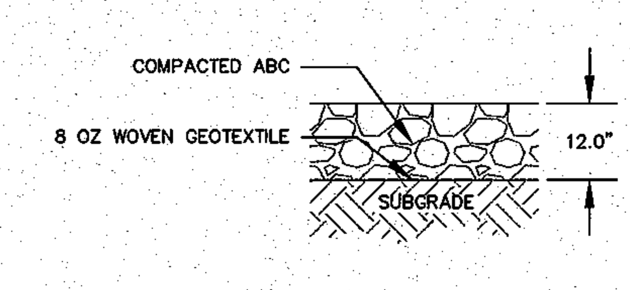
22/D3 SCALE PAD BASIN BAFFLE DETAIL
SCALE: 1"=4'



NOTES:
1. SUBGRADE SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".
2. ABC SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO THICKNESS SPECIFIED

2

SCALE PAD SECTION C-C'
SCALE: 1"= 8'



23/D3 ABC PAVEMENT
1"=2'

Duke Energy ©

S&ME
WWW.SMEINC.COM

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 032153 KENNETH R. D... 3/16/09

NO.	DATE	DESCRIPTION	BY
2	3-16-09	NOTICE OF CHANGE 6: AGGREGATE & SUBGRADE COMPACATION	
1	2-18-09	ISSUED FOR CONSTRUCTION	

ACCESS ROAD / ENTRANCE DETAILS I

ELECTRICAL/MECHANICAL
PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION

DRAWN BY: WMH	CHECKED BY: IKB
DESIGNED BY: WMH	APPROVED BY: KRD
PROJECT NUMBER 1356-06-825	
SCALE: AS SHOWN	DATE: 2-18-09
DRAWING: D3	OF: 19

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NOC6 - ABC AND SUBGRADE COMPACTION\E-M DETAIL 3.DWG

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date:** 3/5/09	**Job No.:** 1356-06-825-09
DESCRIPTION:	Cast-In-Place Concrete	Duke Energy – Allen Steam Station	
	Slump Specification	Ash Landfill	
NOTICE OF CHANGE NO.	7		
CHANGE ORDER NOS:			

Description of design change:

As specified in the "Cast-In-Place Concrete" Specification 03300, part 2.4.D, the slump required for cast-in-place concrete is 3 inches.

The specified slump for cast-in-place concrete is revised to 3 to 5 inches.

Reason for design change:

To allow for a wider range in the slump to allow for more workable concrete.

Effective date of design change:

February 11, 2009.

Financial and schedule considerations:

None anticipated.

Attachment:

None.

3/11/09		3/11/09	
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:
- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☐
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐
- ☐

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date:** 3/5/09	**Job No.:** 1356-06-825-09
DESCRIPTION:	Subgrade Density	Duke Energy – Allen Steam Station	
	Testing Frequency	Ash Landfill	
NOTICE OF CHANGE NO.	8		
CHANGE ORDER NOS:			

Description of design change:

The maximum lift thicknesses for Fill Type S1 (structural fill) and Fill Type S2 (subgrade fill) are described in "Backfill – Structural" Specification 02320, part 3.3C as follows:

"Fill Type S1 and S2: Place and compact material in loose lifts not exceeding 8 inches in thickness and not exceeding 6 inches compacted thickness. Manually compacted fill near pipes and other structures will be placed in loose lifts not exceeding 4 to 6 inches in thickness."

The maximum lift thickness for Fill Type S2 (subgrade fill) is revised to 18 inches. The field density testing requirement for Fill Type S2 will remain one test per acre per lift, as described in Specification 02320, part 3.5.C.3.a.

Reason for design change:

Based on demonstrated compaction efforts and construction monitoring, it is our opinion that the compaction requirements can be met for S2 material for an 18-inch lift.

Effective date of design change:

July 22, 2008.

Financial and schedule considerations:

None anticipated.

Attachment:

None.

3/11/09		3/11/09	
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:
- [x] Ted Manes, Duke Energy
- [x] S&ME File No. 1356-06-825
- [ ]
- [x] Mark LeGrand, Earnhardt Grading, Inc.
- [ ]
- [ ]

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date:** 3/5/09	**Job No.:** 1356-06-825-09
DESCRIPTION:	Signage	Duke Energy – Allen Steam Station	
		Ash Landfill	
NOTICE OF CHANGE NO.	9		
CHANGE ORDER NOS:			

Description of design change:

The maximum total weight limit for the single-radius aluminum arch bridge shall be displayed on signage to be installed in accordance with NCDOT standard details and the Owner's choice of location.

The bridge was designed two-way traffic with two rear axle loads from a 68 kip (34 ton) operating vehicle with a load distribution of 12 kips (6 tons) in the front axle and 56 kips (28 tons) in the rear axle. Therefore, a total live load of 56 tons. It is recommended to display a weight limit of 34 tons per attached FHWA sign detail

Reason for design change:

To prevent overloading of bridge.

Effective date of design change:

Immediately.

Financial and schedule considerations:

None anticipated.

Attachments:

Aluminum Arch Foundation Design, Peritus Civil, Inc.
NCDOT Standard Detail Nos. 903.20
FHWA Sign Detail R12-1

3/11/09		3/11/09	
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:
- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☐
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐
- ☐

ALUMINUM ARCH FOUNDATION DESIGN

FOR ARCH:
20.0 FT. SPAN - 6.33 FT. RISE - 3.5 FT. COVER

DUKE ENERGY

ASH LANDFILL - ALLEN STEAM STATION
MOUNT HOLLY, NORTH CAROLINA

NORTH CAROLINA PROFESSIONAL SEAL 5002 ENGINEER HOWARD R. LEONARD

12 JAN 09

DESIGN BY:

PERITUS CIVIL, INC.
GREENVILLE, SOUTH CAROLINA 29607
864-288-5312

S&ME

Celebrating 35 Years
1973 • 2008

December 12, 2008

Duke Energy
EC10c/ PO Box 1006
Charlotte, NC 28201-1006
United States of America

Attention: Mr. Ted Manes

Reference: **Arch Bridge Foundation Design Recommendations**
RAB Ash Landfill
Duke Energy – Allen Steam Station
Belmont, North Carolina
S&ME Project No. 1356-06-825

Dear Mr. Manes:

S&ME, Inc. (S&ME) performed a limited foundation bearing material evaluation at the above referenced project. This letter summarizes our field testing and observations on October 31, 2008 and November 3, 2008 at Allen Steam Station in Belmont, North Carolina. This report also summarizes our conclusions and recommendations regarding the design and construction of the proposed single-radius arch bridge foundations.

PROJECT INFORMATION

A single-radius aluminum arch bridge is proposed to span several ash sluice pipes located between an existing structural fill and an existing access road. The bridge span is a part of a proposed access road as shown on the attached Figure 1.

S&ME personnel performed a series of hand auger borings at the site near each end of the proposed bridge foundations. Preliminary foundation bearing options and settlement estimates were provided to Rick Leonardi of Pomona Pipe Supply Company (the bridge manufacturer), and Howard Leonard (the bridge manufacturer's foundation design subcontractor).

S&ME obtained foundation design information through correspondence with Rick Leonardi and Howard Leonard. Based on telephone conversations, emails, and faxes between S&ME, the bridge manufacturer, and the foundation designer, S&ME understands that the proposed bridge will be supported by a continuous spread foundation approximately 5.5 feet wide and two feet in thickness. We understand that the

foundations vertical loading will be on the order of 16.1 kips per linear foot with horizontal loads of 7.64 kips per linear foot. The foundations are currently designed based on an allowable bearing pressure of 4,500 psf. Additionally, the proposed aluminum arch bridge is capable of withstanding differential settlement of up to 7.5 inches based on an email from the bridge manufacturer.

HAND AUGER BORINGS

S&ME representatives visited the proposed arch bridge site on October 31, 2008 and November 3, 2008 to perform hand auger borings and Dynamic Cone Penetrometer (DCP) testing in the vicinity of the arch bridge foundations, as shown on the attached Figure 1. These hand auger borings and DCP tests were performed to evaluate the near-surface subsurface conditions in the proposed foundation areas and to evaluate those conditions with regard to the design and construction of the foundations.

The Dynamic Cone Penetrometer test procedure is as follows: The cone point of the penetrometer is first seated two inches into the bearing materials to assure that the point is completely embedded. The cone point is driven 1-¾ inches using a 15-pound weight falling 20 inches. The penetrometer reading is the number of blows required to drive the cone point 1-¾ inches. Typically, the cone point may be driven an additional second and third increment of 1-¾ inches each and the penetrometer readings are recorded. The penetrometer reading is similar to the Standard Penetration Resistance (N-value), as defined by ASTM D 1586. When properly evaluated, the penetrometer test results provide an index for estimating soil strength.

A total of four (4) hand auger borings and DCP tests with several offset hand auger boring offsets were conducted to depths ranging from 2.5 feet to 10 feet. The results of the hand auger borings and DCP tests are included on the attached Summary of Hand Auger Borings.

FINDINGS

Based on the hand auger borings, fill soils were encountered in hand auger borings HA-1, HA-3, and HA-4 at depths ranging from the ground surface to depths of 10 feet. Residual soils were encountered at a depth of 4.75 feet in hand auger boring HA-1. Possible residual soils were encountered in hand auger boring HA-2 at a depth of 4 inches. DCP readings obtained in the fill, residuum, and possible residuum ranged from 3 to greater than 25 blows per 1-¾ inch increment. The hand auger borings were terminated at depths from 2.5 feet to 10 feet.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the hand auger borings and DCP tests, it is our opinion that the arch bridge foundations can be designed based on an allowable bearing capacity of 4,500 psf, provided the structure can tolerate the anticipated total and differential settlements. Some undercutting will be required to achieve the allowable bearing pressure. We

estimate that a safety factor against ultimate bearing capacity failure on the order of 2.5 will be available based on a footing width of 5.5 feet and a minimum 2-foot foundation embedment depth. Based on the subsurface conditions encountered in the hand auger borings, we estimate that total settlements of the foundations may be on the order of 1.5 to 2 inches. Differential settlements are anticipated to be on the order of one-half of the total settlement.

We recommend that the foundations be embedded a minimum of two feet or greater as measured from the top of proposed grade to the bottom of the foundation. In areas where an embedment of two feet can not be obtained from existing grades, embedment may be achieved by placing compacted structural fill at the foundation location and excavating two feet to construct the foundation, thickening the foundation, providing a short stem wall, or or by using one of the undercut methods described below. All structural fill should be placed in accordance with the project specifications or to a minimum of 95 percent standard Proctor compaction, whichever is greater.

Lower consistency fill soils (DCP readings of less than 8 bpi) were encountered in Hand Auger Borings HA-1 through HA-4 to depths of approximately 1 to 4.5 feet. **Due to the depth of the lower consistency soils, we recommend undercutting the existing near surface foundation bearing materials in the vicinity of Hand Auger Borings HA-1 and HA-2 to depths of 4.5 feet and Hand Auger Borings HA-3 and HA-4 to depths of 1.5 feet, respectively, below the existing ground surface. An S&ME engineer or his representative should evaluate the foundation bearing materials and undercut depths required at the time of construction. This evaluation may consist of performing additional hand auger borings with DCP testing, test pit observations, probing with a steel rod, and/or visual observations.**

The undercut materials can be replaced with minimum 2,000 psi compressive strength lean concrete to the design foundation level. Alternatively, undercutting and stone replacement could be utilized. The excavation bottom and sides should be lined with a 6-ounce non-woven geotextile fabric such as Mirafi 160N or equivalent. Washed No. 57 or No. 67 stone should then be placed in maximum 12-inch compacted lifts and compacted to the foundation bearing level. Typically, the stone can be compacted using a walk-behind type vibratory sled compactor. Alternatively, the foundations could be thickened or extended to bear at a minimum depth of 4.5 feet below the existing ground surface.

We recommend that external stability of the footings also be considered including sliding stability analyses. A sliding coefficient of 0.38 can be utilized in conjunction with the weight of the footings to resist sliding.

EXCAVATIONS

Since the excavations will be performed adjacent to the active ash handling lines, care should be taken not to undermine the bearing materials for the ash lines or supports. If excavations extend within a 1:1 plane projected from below the lines, we recommend that

the excavations be performed in short sections on the order of 10 feet and backfilled to the foundation bearing level in a timely manner. Excavations should not be left exposed to inclement weather, as softening and instability of the excavations sides may results. Depending on the excavation depths and geometry, excavation shoring or bracing may be required.

Should excavations extend below final grades, shoring and bracing or flattening (laying back) of the slopes may be required to obtain a safe working environment. Excavations should be sloped or shored in accordance with local, state and federal regulations, including OSHA (29 CFR Part 1926) excavation trench safety standards. The contractor is usually solely responsible for site safety. This information is provided only as a service and under no circumstances should S&ME or its subconsultants be assumed responsible for construction site safety.

LIMITATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made.

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the subsurface exploration. The nature and extent of variations between the hand auger borings will not become evident until construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the building (structure, etc.) are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing.

CLOSURE

S&ME, Inc. appreciates the opportunity to be of service to you during this phase of the project. If you should have any questions concerning this letter, or we may be of further assistance, please contact us.

Sincerely,

S&ME, Inc.

Cedric Ruhl

Cedric Ruhl, E.I.
Staff Professional

NORTH CAROLINA PROFESSIONAL SEAL 24486 ENGINEER JASON S. REEVES

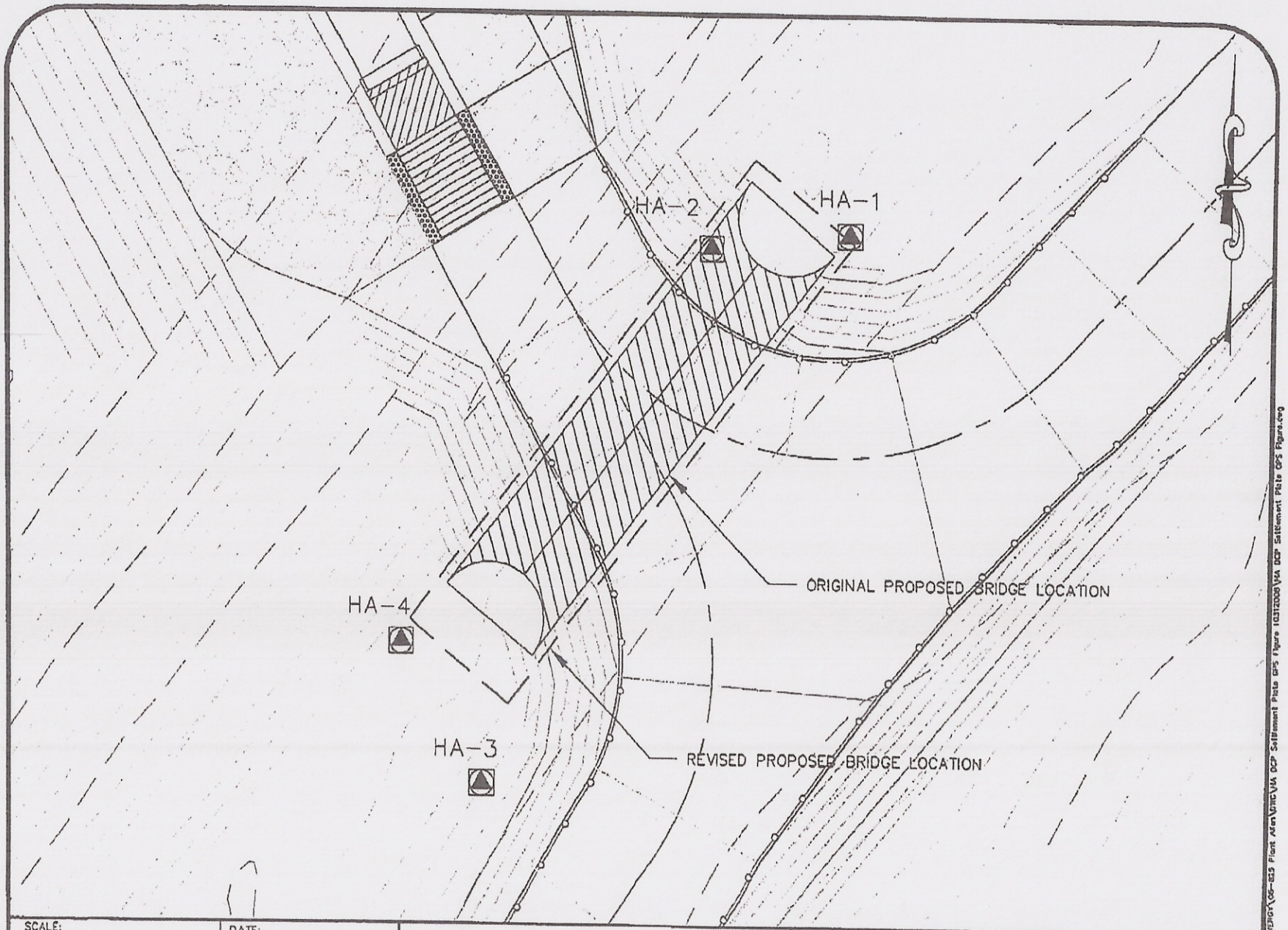
Jason S. Reeves, P.E.
Senior Reviewer
N.C. Registration No. 24486

12-12-08

CR/JSR

Cc: Rick Leonardi (Pomona Supply Company),
Mark LeGrand (Earnhardt Grading, Inc.)

Enclosures: Figure No. 1 – Hang Auger Locations
Hand Auger Boring/Dynamic Cone Penetrometer Records (HA-1 – HA-4)



SCALE: 1" = 20'	DATE: 12/9/08	S&ME WWW.SMEINC.COM	APPROXIMATE HAND AUGER BORING LOCATIONS PLANT ALLEN RAB ASH LANDFILL BELMONT, NC
PROJECT NO. 1356-06-825	DRAWN BY: KB		FIGURE NO. 1
	CHECKED BY:		

G:\1356\DUKE ENERGY\06-825 Plant Allen\SMEINC\VA DCP Settlement Plate GPS Figure 10312008\VA DCP Settlement Plate GPS Figure.dwg

Summary of Hand Auger Borings
Plant Allen RAB Ash Landfill
Belmont, North Carolina
S&ME Project No. 1356-06-825

Date	Test Location	Depth (Feet)	Soil Description	Depth (Feet)	Hammer Blows Increment 1st	2nd	3rd
10/31/08	HA-1 (NE)	0 – 4"	Topsoil	0	4	3	3
		4" – 2'	Fill: Brown, Tan Fine Sandy Silt with Coal and Gravel Fragments	1	6	6	8
		2' – 3'	Fill: Gray Sandy Silt with Coal and Gravel Fragments	2	24	13	25+
		3' – 4.75'	Possible Residuum: Red, Brown Clayey Silt	3	9	11	14
		4.75' – 8.5'	Residuum: Red, Orange Fine Sandy, Clayey Silt	4	14	20	19
			*encountered hand auger refusal at 5' on first auger; offset 4" north and continued	5	25+	-	-
				6	25+	-	-
				7	25+	-	-
				8	20	20	22
		8.5' – 9.5'	Red, Pink, White Fine Sandy Clay	9	19	23	25+
		9.5'	Hand Auger Refusal	9.5	25+	-	-
10/31/08	HA-2 (NW)	0 – 4"	Topsoil	0	4	3	7
		4" – 2.5'	Possible Residuum: Red, Brown, Tan Clayey Silt	1	21	25+	-
				2	18	22	23
		2.5'	Hand Auger Refusal	2.5	25+	-	-
			*initial hand auger by stake; offset 2' and 4' north of stake; offset 2', 4', and 10' south of stake; offset 1' west of furthest south hand auger; encountered refusal at 2.5'				

8

Summary of Hand Auger Borings
Plant Allen RAB Ash Landfill
Belmont, North Carolina
S&ME Project No. 1356-06-825

Date	Test Location	Depth (Feet)	Soil Description	Depth (Feet)	Hammer Blows Increment 1st	2nd	3rd
11/3/08	HA-3 (SE)	0 – 4"	Topsoil	0	6	5	6
		4" – 9"	Fill: Tan, Brown Fine Sandy Silt with Rock Fragments				
		9" – 1'	Fill: Fly Ash				
		1' – 3'	Fill: Red, Orange, Brown Sandy Silt *encountered hand auger refusal at 1.5' on first hand auger; offset 1' south and encountered hand auger refusal at 1.5'; offset 4' south and continued	1	8	8	10
				2	5	5	5
		3' – 5'	Fill: Red, Orange, Brown Fine Sandy Clayey Silt	3	4	4	6
				4	4	3	3
		5' – 6.5'	Fill: Gray, Tan Silty Sand with Coal Fragments	5	7	10	12
				6	10	8	11
		6.5' – 7'	Fill: Fly Ash	-	-	-	-
		7' – 8'	Fill: Gray Silty Fine to Medium Sand	7	7	13	18
		8' – 9'	Fill: Fly Ash	8	10	8	8
		9' – 10'	Fill: Gray, Tan Silty Sand	9	7	7	7
				10	8	8	10
11/3/08	HA-4 (SW)	0 – 1.5'	Fill: Fly Ash	0	7	10	16
				1	17	23	25+
		1.5' – 2.5'	Fill: Red, Brown, Gray Clayey Fine Sandy Silt with Gravel	2	16	18	20
		2.5' – 3.5'	Fill: Brown, Tan Silty Fine to Coarse Sand with Coal Fragments	3	10	8	10
		3.5'	Hand Auger Refusal *offset 5' south and encountered hand auger refusal at 2.5'	3.5	25+	-	-

YAHOO! MAIL

Print - Close Window

From: "Tysl, Steve" <tysls@contechbridge.com>

To: "rick leonardi" <rickleonardi@yahoo.com>, "Cedric Ruhl" <CRuhl@smeinc.com>

Date: Thu, 8 Jan 2009 14:53:37 -0500

Subject: Ash Haul Road Arch footing reactions

DUKE ENERGY
MT. HOLLY, NC

Rick and Cedric,

After digging around a bit and using the info that Cedric and Ken called with, here's is what I came up with. I used 68 kip operating vehicle weight and used Sterling trucks data to distribute the load 12 kips front axle and 56 kips rear axle, then computed reactions @ 3.5 ft cover with one very heavy axle at the crown of the arch.

Long story short, by switching to the lighter truck, the cover can be minimized and the existing foundation design should be OK. The new calculated reactions (attached) are a bit lower than what the foundation engineer used.

Stephan (Steve) Tysl, P.E.

Engineer – Corrugated Products

CONTECH Construction Products Inc.

9025 Centre Pointe Drive, Suite 400 | West Chester, OH 45069

Off: 513-645-7600 | Mob: 330-730-6083 | Fax 513-645-7399

tysls@contech-cpi.com

The information contained in this message may be confidential and/or proprietary, and legally protected from disclosure. If the reader of this message is not the intended recipient, or an employee or agent responsible for delivering this message to the intended recipient, you are hereby notified that any retention, dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by replying to the message and permanently deleting it from your computer. Thank you, CONTECH Construction Products Inc.

Attachments

Files:

SRA_Footing_Reactions.pdf (5k)

STRUCTURAL PLATE ARCH FOOTING REACTIONS

Special Live Load

Span (S) =	20.00	ft.
Rise (R) =	6.33	ft.
Top Rise (Rt) =	20.00	ft.
Bottom Span =	6.33	ft.
Height of cover (H) =	3.50	ft.
Axle Load =	56,000	lbs.
Number of Lanes =	2	
Live Load (LL) =	112,000	lbs.
Area (A) =	91	sq. ft.
Area of Top Rise (At) =	271	sq. ft.
Soil Density =	120	lbs./cu. ft.
Footing contact angle (fca) =	25.36	deg.

Calculate footing contact angle:		
arc length =	93	pi
radius =	188	in
fca =	25.36	deg.

DUKE ENERGY
MT. HOLLY, NC

LOAD ON STRUCTURE

Total Load = Live Load + Dead Load

Live Load = LL/(8 + 2(H + R))
Live Load = 4,049 lbs./ft./footing

Dead Load = Soil weight

Soil weight = (S x (H + Rt) - At) x soil density
Soil weight = 23,860

Dead Load = 11,930 lbs./ft./footing

Total Load = R = 15,979 lbs./ft./footing

FOOTING REACTIONS

Rv = R x cos(fca)
Rv = 14,439 lbs./ft./footing

Rh = R x sin(fca)
Rh = 6,844 lbs./ft./footing outward

10

DUKE ENERGY
ASH LANDFILL
ALLEN STEAM STATION
MOUNT HOLLY, N.C.

FOUNDATION DESIGN INFORMATION FOR ARCH WITH 20FT. SPAN, 6'-4" RISE & 3'-6" COVER.

SPAN	20 FT.
RISE	6'-4"
COVER	3'-6"
VERTICAL ARCH LOAD	14.4 K/FT.
HORIZONTAL ARCH LOAD	6.8 K/FT.
CONCRETE	4000 PSI
REINFORCING	A-615-GR. 60
SOIL BEARING	4,000 PSF
SCOUR DESIGN	NO SCOUR DESIGN

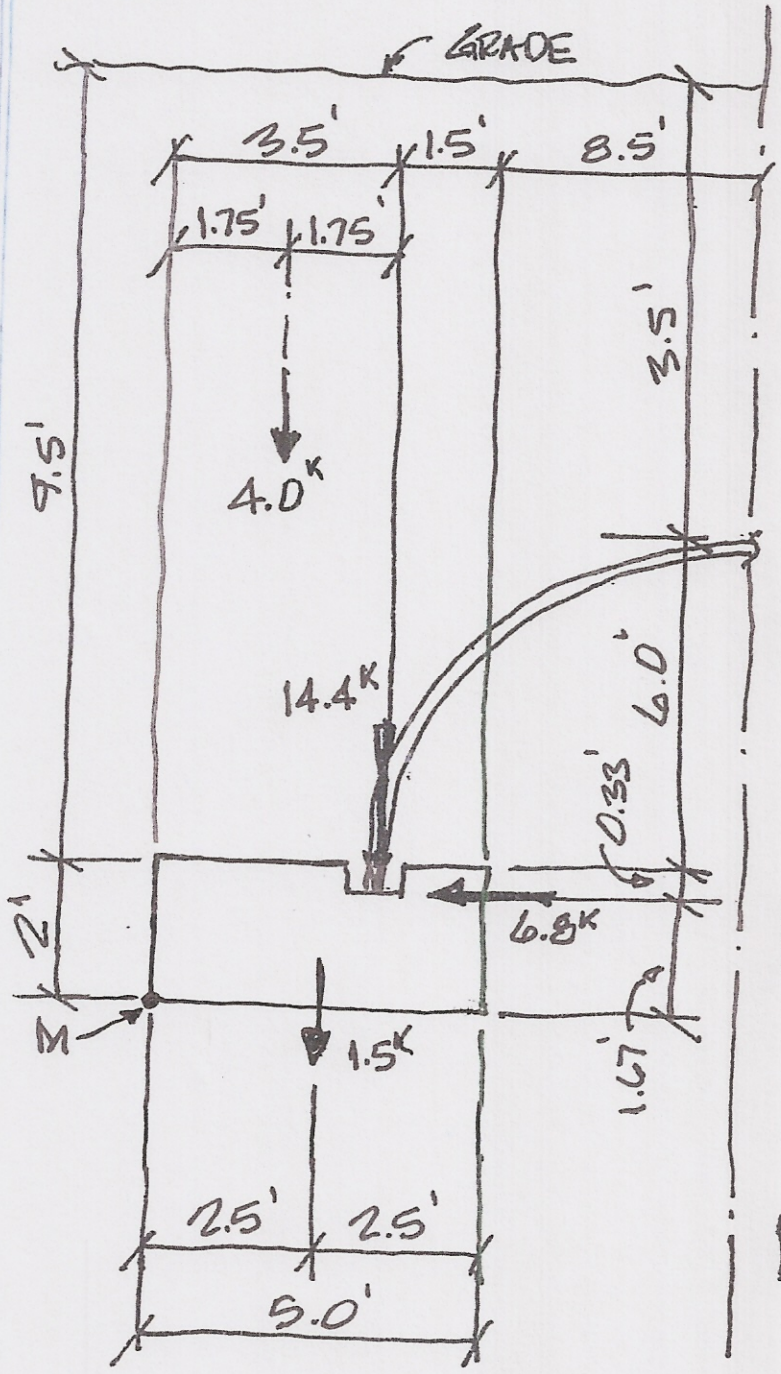
PC

DESIGN INFORMATION
20' SPAN, 6'-4" RISE
ASH LANDFILL-ALLEN STEAM STA.
MOUNT HOLLY, N.C.

BY: 7
REV. 1-12-09
DATE: 29 NOV. 08

SHEET 11 OF

STABILITY:



LOADS:

EARTH: $3.5' \times 9.5' \times .120^{K/CF} = 4.0^K$

ARCH: H ——— $= 6.8^K$

V ——— $= 14.4^K$

FDN: $5.0^K \times 2' \times .150^{K/CF} = 1.5^K$

MOMENT:

$M = 4.0^K(1.75') + 14.4^K(3.5') + 1.5^K(2.5') - 6.8^K(1.67')$

$= 49.8'^K$

EVL:

4.0^K
14.4^K
1.5^K
19.9^K

R:

$R = \frac{49.8'^K}{19.9^K} = 2.5'$

OK

S.B.

$\frac{19.9^K}{5.0'} = 4.0^{K/LF}$

OR $4000^{\#/SF}$ OK

PC

STABILITY
DUKE ENERGY
ASH LANDFILL - ALLEN STEAM STA.
MOUNT HOLLY, N.C

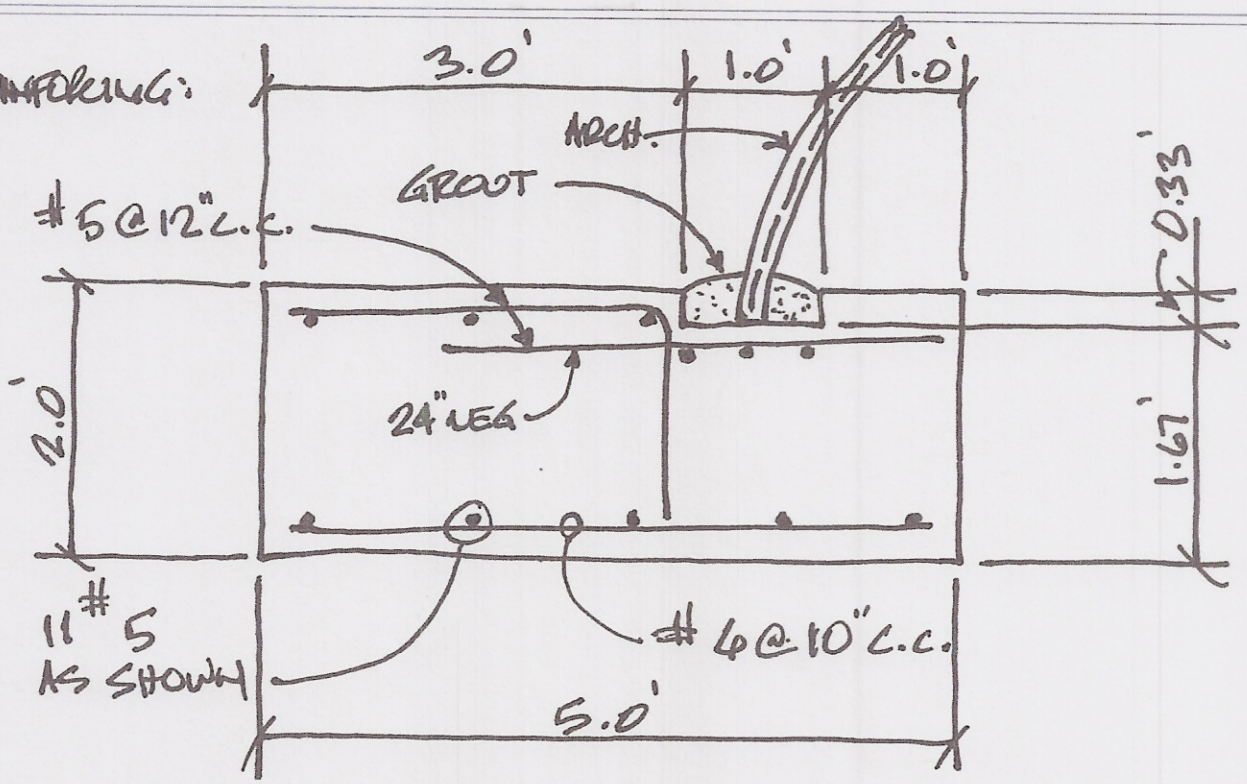
BY: 7(

DATE: 12/14/09

SHEET 12 OF

PERITUS CIVIL, INC. • P.O. BOX 16146 • GREENVILLE, SC 29606

REINFORCING:



NOTE: LOCATE ARCH IN CENTER OF NOTCH. BLOCK IN PLACE AND GROUT.

MOMENT	REINFORCING	DISTRIBUTION
$M = 4^K(2.5')(1.25')$	$A_s = \frac{12.5^{IK}}{1.76(17)}$	#5 BARS SPACED AS SHOWN
$= 12.5^{IK}$	$= \frac{12.5^{IK}}{29.9}$	
	$= .42 \square''$	
	USE #6@10"	

PC

REINFORCING
DUKE ENERGY
ASH LANDFILL - ALLEN STE. STA.
MOUNT HOLLY, N.C.

BY:

DATE: 12 JAN 09

SHEET: 13 OF

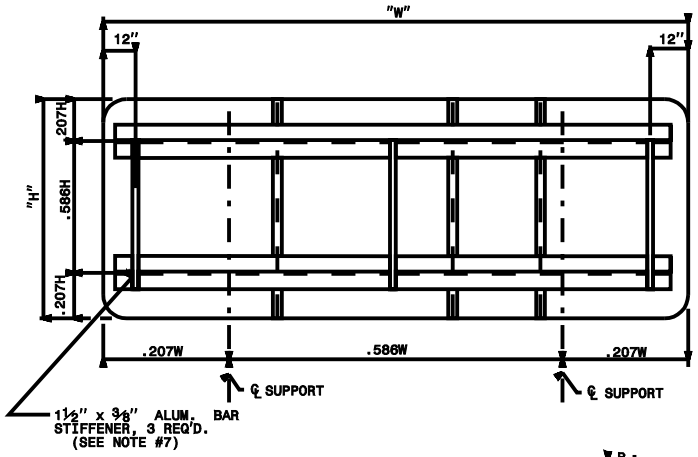
PERITUS CIVIL, INC. · P.O. BOX 16146 · GREENVILLE, S.C. 29606

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

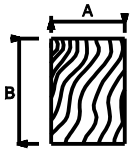
7-07

ENGLISH STANDARD DRAWING FOR

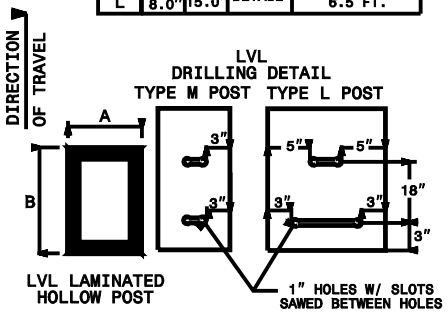
WOOD SIGN POST

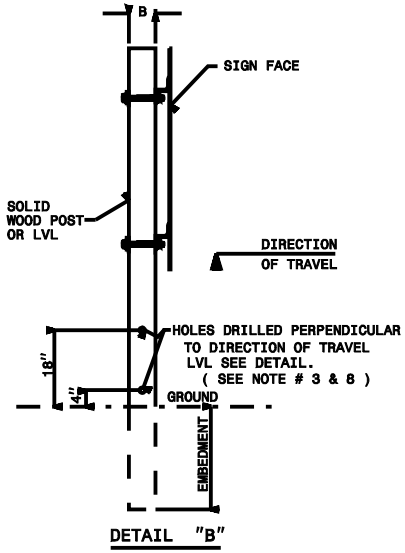


POST SIZE AND DRILLED HOLE SIZE

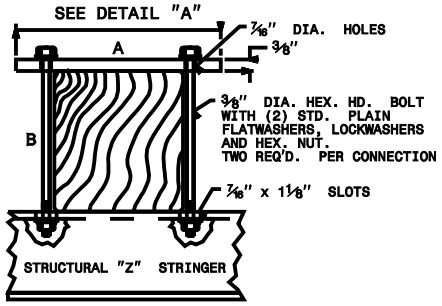


	A	B	HOLE SIZE	EMBEDMENT
	4.0"	4.0"	N/A	3.5 FT.
	4.0"	6.0"	1.5"	4.5 FT.
	6.0"	6.0"	2.0"	5.25 FT.
	6.0"	8.0"	3.0"	6.0 FT.
	8.0"	8.0"	N/A	6.5 FT.
M	8.0"	8.0"	SEE DETAIL	6.5 FT.
L	8.0"	15.0"		6.5 FT.

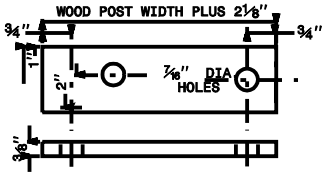




DETAIL "B"



WOOD SUPPORT MOUNTING DETAIL



DETAIL "A"

NOTES:

1. USE THE SIZE, NUMBER, LENGTH AND TYPE OF SUPPORTS SHOWN IN THE PLANS. USE WOOD POSTS THAT CONFORM TO SECTIONS 1082-2 AND 1082-3 OF THE 2002 NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.
2. MOUNT ALL WOOD POSTS THAT DO NOT HAVE DRILLED HOLES BEHIND GUARDRAIL, EXCEPT THE 4" X 4" WOOD POSTS.
3. FOR WOOD POSTS, DRILL THE BOTTOM HOLE 4" ABOVE THE GROUND AND THE TOP HOLE 18" ABOVE THE GROUND. SEE CHART FOR POST SIZES AND DRILLED HOLE SIZES. DRILL HOLES PERPENDICULAR TO THE DIRECTION OF TRAVEL. DUAL SUPPORTS MUST BE AT LEAST 7 FEET APART. (SEE DETAIL "B")
4. LOCATE ALL WOOD POSTS THAT ARE 8" X 8" EITHER BEHIND GUARDRAIL OR LOCATED SO THAT THE POSTS COULD NOT BE HIT BY TRAFFIC.
5. FURNISH ALL MOUNTING HARDWARE.
6. USE GALVANIZED STEEL BACKING PLATES AND MOUNTING BOLTS.
7. ADJUST STIFFENERS TO AVOID CONFLICTS WITH SUPPORTS.
8. FOR LVL POSTS, DRILL THE BOTTOM HOLE 3" ABOVE THE GROUND AND THE TOP HOLE 18" ABOVE THE GROUND. SEE CHART FOR POST SIZES AND DRILLED HOLE SIZES. DRILL HOLES PERPENDICULAR TO THE DIRECTION OF TRAVEL. DUAL SUPPORTS MUST BE AT LEAST 7" APART. (SEE DETAIL "B")
9. DRILL HOLES IN THE CENTER OF THE SUPPORTS

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-07

ENGLISH STANDARD DRAWING FOR

WOOD SIGN POST

SHEET 1 OF 2
903.20

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-07

ENGLISH STANDARD DRAWING FOR

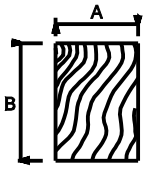
MOUNTING OF TYPE 'D', 'E', AND 'F' SIGNS ON WOOD POSTS

SHEET 2 OF 2

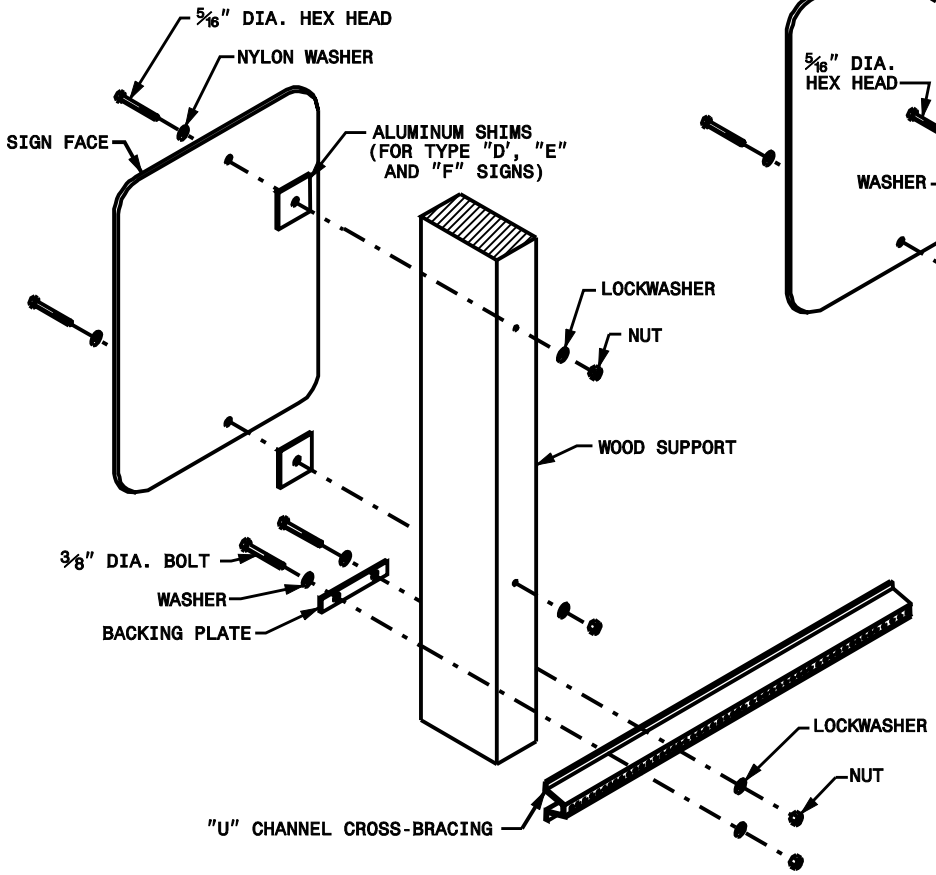
903.20

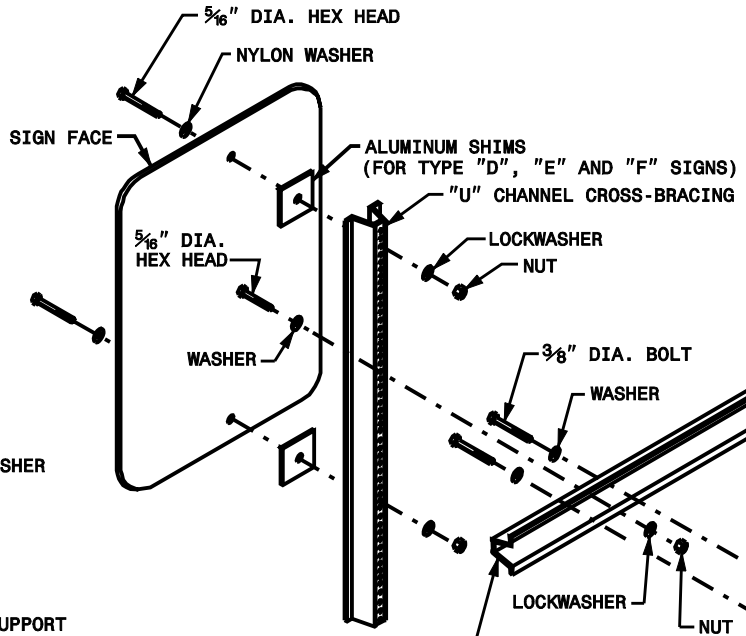
ATTACHMENT METHODS

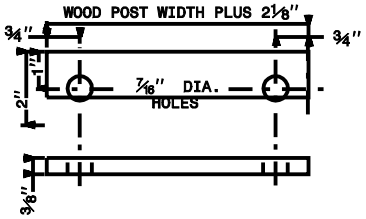
POST SIZE AND DRILLED HOLE SIZE

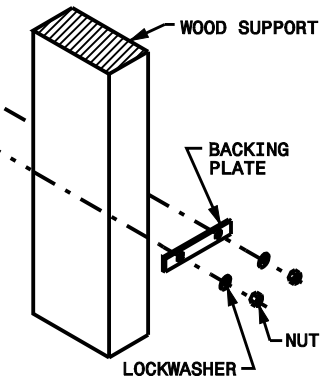


A	B	HOLE SIZE	EMBEDMENT
4.0"	4.0"	N/A	3.5 FT.
4.0"	6.0"	1.5"	4.5 FT.









NOTES

1. 4" X 4" WOOD POSTS ARE ACCEPTABLE UNDRILLED, AND CAN BE USED AT ANY LOCATION WITHOUT GUARDRAIL PROTECTION.
2. 4" X 6" WOOD POSTS MUST BE USED WITH GUARDRAIL PROTECTION OR DRILLED TO MAKE THEM BREAKAWAY.(DRILLED WITH 1½" HOLES, PERPENDICULAR TO THE DIRECTION OF TRAVEL, LOCATED 4" AND 18" ABOVE THE GROUND)
3. USE "U" CHANNEL POSTS FOR CROSS-BRACING SIGNS SUPPORTED BY DUAL WOOD POSTS.

STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

7-07

ENGLISH STANDARD DRAWING FOR

MOUNTING OF TYPE 'D', 'E', AND 'F' SIGNS ON WOOD POSTS

SHEET 2 OF 2

903.20

R12-1

WEIGHT LIMIT

*Optically space numerals about centerline.

	A	B	C	D	E	F	G	H	J	K	L
C	24	30	.375	.625	3	4 D	1.75	2.125	5 E	5D	9
	36	48	.625	.875	4.75	6 D	3	3.75	8 E	8 D	13.5

M	N	P	Q
9.5	6.313	8.25	1.5
14.25	9.438	13.25	2.25

COLORS: LEGEND — BLACK
BACKGROUND— WHITE (RETROREFLECTIVE)

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date:** 3/11/09	**Job No.:** 1356-06-825-09
DESCRIPTION:	Borrow Area Sediment Basin	Duke Energy – Allen Steam Station	
		Ash Landfill	
NOTICE OF CHANGE NO.	10		
CHANGE ORDER NOS:			

Description of design change:

A sediment basin was designed according to the North Carolina Erosion and Sediment Control manual assuming an approximate drainage area of 14.3 acres for Phase I (Cells 1 and 2) disturbance limits excluding the topsoil stockpile area which should be conveyed to the existing silt fence outlet on the downstream side of the proposed sediment basin. The proposed sediment basin contains a principal spillway consisting of a riser and barrel, an emergency spillway, and outlet protection. Details are defined in the attached revised drawings.

Reason for design change:

To improve erosion and sediment control in response to observed performance and actual clearing limits.

Effective date of design change:

Immediately.

Financial and schedule considerations:

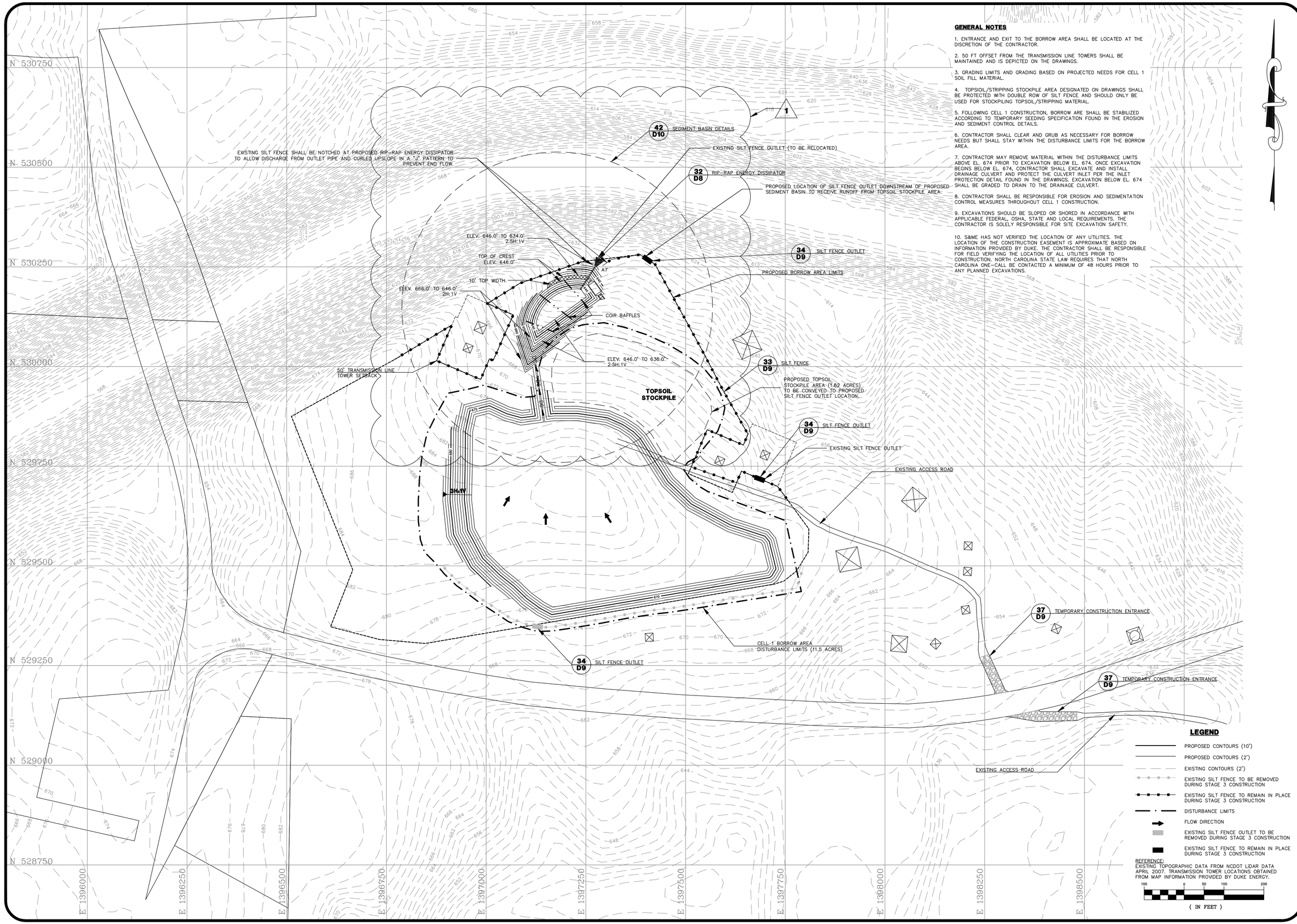
To be determined.

Attachments:

Revision 1 of Original IFC Drawing C14
Revision 2 of Original IFC Drawing D8
Revision 1 of Original IFC Drawing D10

Kenneth R. Daly	3/11/09	Kyle Baucom	3/11/09
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:
- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐



GENERAL NOTES

1. ENTRANCE AND EXIT TO THE BORROW AREA SHALL BE LOCATED AT THE DISCRETION OF THE CONTRACTOR.

2. 50 FT OFFSET FROM THE TRANSMISSION LINE TOWERS SHALL BE MAINTAINED AND IS DEPICTED ON THE DRAWINGS.

3. GRADING LIMITS AND GRADING BASED ON PROJECTED NEEDS FOR CELL 1 SOIL FILL MATERIAL.

4. TOPSOIL/STRIPPING STOCKPILE AREA DESIGNATED ON DRAWINGS SHALL BE PROTECTED WITH DOUBLE ROW OF SILT FENCE AND SHOULD ONLY BE USED FOR STOCKPILING TOPSOIL/STRIPPING MATERIAL.

5. FOLLOWING CELL 1 CONSTRUCTION, BORROW ARE SHALL BE STABILIZED ACCORDING TO TEMPORARY SEEDING SPECIFICATION FOUND IN THE EROSION AND SEDIMENT CONTROL DETAILS.

6. CONTRACTOR SHALL CLEAR AND GRUB AS NECESSARY FOR BORROW NEEDS BUT SHALL STAY WITHIN THE DISTURBANCE LIMITS FOR THE BORROW AREA.

7. CONTRACTOR MAY REMOVE MATERIAL WITHIN THE DISTURBANCE LIMITS ABOVE EL. 674 PRIOR TO EXCAVATION BELOW EL. 674. ONCE EXCAVATION BEGINS BELOW EL. 674, CONTRACTOR SHALL EXCAVATE AND INSTALL DRAINAGE CULVERT AND PROTECT THE CULVERT INLET PER THE INLET PROTECTION DETAIL FOUND IN THE DRAWINGS. EXCAVATION BELOW EL. 674 SHALL BE GRADED TO DRAIN TO THE DRAINAGE CULVERT.

8. CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION AND SEDIMENTATION CONTROL MEASURES THROUGHOUT CELL 1 CONSTRUCTION.

9. EXCAVATIONS SHOULD BE SLOPED OR SHORED IN ACCORDANCE WITH APPLICABLE FEDERAL, OSHA, STATE AND LOCAL REQUIREMENTS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR SITE EXCAVATION SAFETY.

10. S&ME HAS NOT VERIFIED THE LOCATION OF ANY UTILITIES. THE LOCATION OF THE CONSTRUCTION EASEMENT IS APPROXIMATE BASED ON INFORMATION PROVIDED BY DUKE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION. NORTH CAROLINA STATE LAW REQUIRES THAT NORTH CAROLINA ONE-CALL BE CONTACTED A MINIMUM OF 48 HOURS PRIOR TO ANY PLANNED EXCAVATIONS.

LEGEND

- PROPOSED CONTOURS (10')
- PROPOSED CONTOURS (2')
- EXISTING CONTOURS (2')
- EXISTING SILT FENCE TO BE REMOVED DURING STAGE 3 CONSTRUCTION
- EXISTING SILT FENCE TO REMAIN IN PLACE DURING STAGE 3 CONSTRUCTION
- DISTURBANCE LIMITS
- FLOW DIRECTION
- EXISTING SILT FENCE OUTLET TO BE REMOVED DURING STAGE 3 CONSTRUCTION
- EXISTING SILT FENCE TO REMAIN IN PLACE DURING STAGE 3 CONSTRUCTION

REFERENCE:
EXISTING TOPOGRAPHIC DATA FROM NCDOT LIDAR DATA APRIL 2007. TRANSMISSION TOWER LOCATIONS OBTAINED FROM MAP INFORMATION PROVIDED BY DUKE ENERGY.

100 0 50 100 200
(IN FEET)

Duke Energy

S&ME
WWW.SMEINC.COM

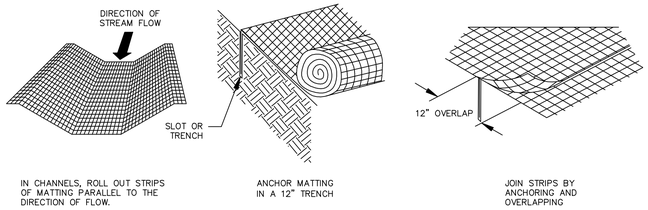
NO.	DATE	DESCRIPTION	BY
1	3-11-09	NOTICE OF CHANGE 10: BORROW AREA SEDIMENT BASIN	
0	10-16-08	ISSUED FOR CONSTRUCTION	

BORROW AREA GRADING PLAN - CELL 1
EROSION AND SEDIMENT CONTROL PLAN

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: JMB	CHECKED BY: KRD
DESIGNED BY: JMB	APPROVED BY: KRD
PROJECT NUMBER 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: C14	OF: 28

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NOC 10 BORROW AREA - SEDIMENT BASIN\NOC 10 - SED BASIN (TO CONTRACTOR).DWG



GENERAL NOTES:

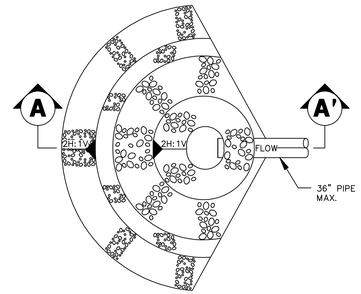
1. DITCH LINES OVER 3 PERCENT MUST BE MATTED WITH NORTH AMERICAN GREEN DS-75 MATTING OR EQUIVALENT.
2. APPLY SEED BEFORE LAYING THE NET OR MAT. IF OPEN-WEAVE NETTING IS USED, LIME MAY BE INCORPORATED BEFORE INSTALLING THE NET AND FERTILIZER AND SEED MAY BE SPRAYED ON AFTERWARD.
3. START LAYING THE NET 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. WHERE 2 STRIPS OF NET ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHOULD BE OVERLAPPED 3 INCHES AND STAPLED TOGETHER. EACH STRIP OF MATTING SHOULD ALSO BE STAPLED DOWN THE CENTER, EVERY 3 FEET.

MAINTENANCE NOTES:

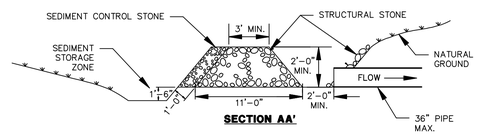
1. INSPECT ROLLED EROSION CONTROL PRODUCTS (RECP) AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (0.5" OR GREATER) RAIN FALL EVENT.
2. GOOD CONTACT WITH THE GROUND MUST BE MAINTAINED, AND EROSION MUST NOT OCCUR BENEATH THE RECP.
3. ANY AREAS OF THE RECP THAT ARE DAMAGED OR NOT IN CLOSE CONTACT WITH THE GROUND SHALL BE REPAIRED AND STAPLED.
4. IF EROSION OCCURS DUE TO POORLY CONTROLLED DRAINAGE, THE PROBLEM SHALL BE FIXED AND THE ERODED AREA PROTECTED.
5. MONITOR AND REPAIR THE RECP AS NECESSARY UNTIL GROUND COVER IS ESTABLISHED,

*REF: 6.17.12 NC Erosion and Sediment Control Planning and Design Manual, 2006

28 / D8 TYPICAL TEMPORARY MATTING DETAIL
NTS



PLAN VIEW



SECTION AA'

GENERAL NOTES:

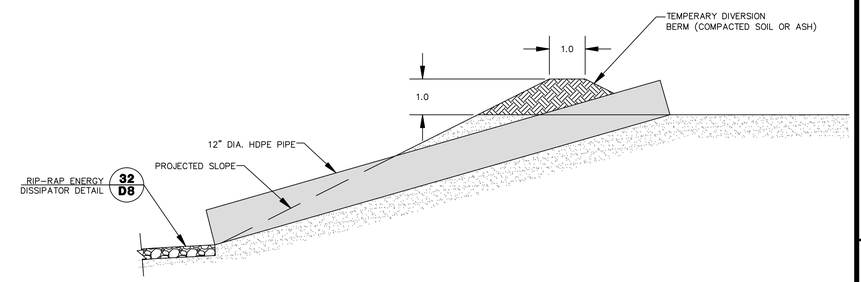
1. INSTALL ROCK PIPE INLET PROTECTION AT ANY CULVERT RECEIVING FLOW ACROSS DISTURBED DITCHLINE.
2. STRUCTURAL STONE SHALL BE CLASS B RIPRAP.
3. SEDIMENT CONTROL STONE SHALL BE NO. 5 OR NO. 57 STONE.
4. DIMENSIONS ARE MINIMUM ACCEPTABLE UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.

MAINTENANCE NOTES:

1. INSPECT ROCK PIPE INLET PROTECTION AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (0.5" OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY. REMOVE SEDIMENT AND RESTORE THE SEDIMENT STORAGE AREA TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-HALF THE DESIGN DEPTH OF THE TRAP. PLACE THE SEDIMENT THAT IS REMOVED IN THE DESIGNED DISPOSAL AREA AND REPLACE THE CONTAMINATED PART OF THE GRAVEL FACING.
2. CHECK THE STRUCTURE FOR DAMAGE. ANY RIPRAP DISPLACED FROM THE STONE HORSESHOE MUST BE REPLACED IMMEDIATELY.
3. AFTER ALL THE SEDIMENT-PRODUCING AREAS HAVE BEEN PERMANENTLY STABILIZED, REMOVE THE STRUCTURE AND ALL THE UNSTABLE SEDIMENT. SMOOTH THE AREA TO BLEND WITH THE ADJOINING AREAS AND PROVIDE PERMANENT GROUND COVER (SURFACE STABILIZATION).

*REF: 6.55.3 NC Erosion and Sediment Control Planning and Design Manual, 2006

29 / D8 STANDARD ROCK PIPE INLET PROTECTION DETAIL
NTS



30 / D8 SLOPE DRAIN DETAIL
NTS

1

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 PLANS 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 SPECIES. PROTECT THE CHANNEL WITH MULCH OR A TEMPORARY LINER SUFFICIENT TO WITHSTAND ANTICIPATED VELOCITIES DURING THE ESTABLISHMENT PERIOD (SEE SEEDING SPECIFICATIONS).
5. APPLY LIME, FERTILIZER AND SEED BEFORE LAYING THE NET (WITHOUT MULCH) OR MAT (WITH MULCH OR SYNTHETIC). IF OPEN-WEAVE NETTING IS USED, LIME MAY BE INCORPORATED BEFORE INSTALLING THE NET AND THE FERTILIZER AND SEED CAN BE SPRAYED ON AFTERWARD, OTHERWISE APPLY SEED AND FERTILIZER BEFORE INSTALLATION.
6. START LAYING THE NET OR MAT 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.
7. TO SECURE THE NET, BURY THE UPSLOPE END IN A SLOT OR TRENCH NO LESS THAN 6 INCHES DEEP, COVER WITH SOIL, AND TAMP FIRMLY. STAPLE THE NET EVERY 12 INCHES ACROSS THE TOP END AND EVERY 3 FT AROUND THE EDGES AND BOTTOM. WHERE 2 STRIPS OF NET ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHOULD BE OVERLAPPED 3 INCHES AND STAPLED TOGETHER. EACH STRIP OF NETTING OR MATTING SHOULD ALSO BE STAPLED DOWN THE CENTER OR EVERY 3 FT IF THE STRIP IS NOT WIDER THAN 8 FEET. DO NOT STRETCH THE NET/MAT WHEN APPLYING STAPLES.
8. STAPLES SHOULD BE THE "U"-SHAPED TYPE AND 4" TO 6" LONG (DEPENDING ON SOIL CONDITIONS).
9. TO JOIN ENDS OF TWO STRIPS OF NETTING, CUT A TRENCH TO ANCHOR THE END OF THE DOWN GRADIENT NET. OVERLAP THE END OF THE PREVIOUS ROLL 18 INCHES AND STAPLE EVERY 12 INCHES JUST BELOW THE ANCHOR SLOT.
10. TO JOIN ENDS OF TWO STRIPS OF MATTING, OVERLAP THE UPGRADIENT STRIP OVER THE DOWNGRADIENT ONE AT LEAST 4 INCHES. STAPLE THE OVERLAP AT THE ENDS AND EVERY 12 INCHES ALONG THE CENTER OF THE OVERLAP.

MAINTENANCE

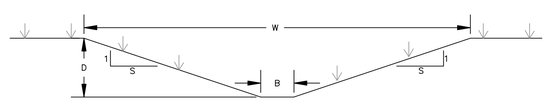
DURING THE ESTABLISHMENT PERIOD, CHECK GRASS-LINED CHANNELS AFTER EVERY RAINFALL. AFTER GRASS IS ESTABLISHED, PERIODICALLY CHECK THE CHANNEL; CHECK IT AFTER EVERY HEAVY RAINFALL EVENT. IMMEDIATELY MAKE REPAIRS. IT IS PARTICULARLY IMPORTANT TO CHECK THE CHANNEL OUTLET AND ALL ROAD CROSSINGS FOR BANK STABILITY 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.
2. NETTING AND MATTING PRODUCTS SHOULD BE INSTALLED ACCORDING TO MANUFACTURER'S GUIDELINES. IF THE MANUFACTURER DOES NOT PROVIDE GUIDELINES, THE ABOVE GUIDELINES FOR NETTING AND MATTING MAY BE USED.



GRASS - LINED DITCH TYPE	E&S MATTING	W (ft)	D (ft)	B (ft)	S (ft/ft)
D1	DS75	9	1.5	3	2
D2	DS75	6	1.0	2	2
D3	DS75	9	1.5	3	2
D4	DS75	15	1.5	9	2
D5	DS75	4	1.0	0	3
D6	DS75	15	2.0	3	3
D7A*	DS75	VARIES	VARIES	0	3
D7B**	GROUTED RIPRAP	8	2.0	0	2

*D7A SHALL BE CONSTRUCTED WITH AN UPSTREAM CHANNEL DEPTH OF 0.5 FEET AND A CHANNEL SLOPE OF 0.5 PERCENT.
**D7B SHALL BE CONSTRUCTED OF GROUTED NCDOT CLASS B RIPRAP WITH A LINING THICKNESS OF 18 INCHES, UNDERLAIN BY AN 8 OZ/SY NON-WOVEN GEOTEXTILE.

31 / D8 PERIMETER DITCH DETAIL
NTS

DEFINITION:

A STRUCTURE DESIGNED TO CONTROL EROSION AT THE INLET OR 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:

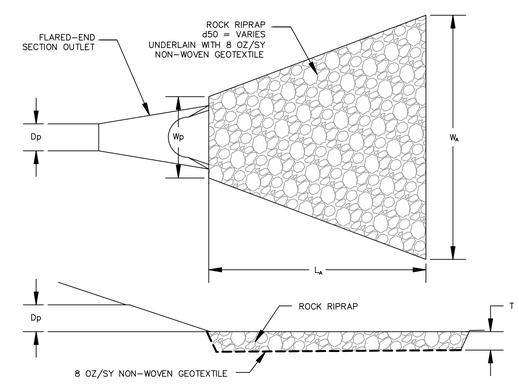
1. ENSURE THAT THE SUBGRADE FOR THE FILTER AND RIPRAP FOLLOWS THE REQUIRED LINES AND GRADES SHOWN IN THE PLAN. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO THE DENSITY OF THE SURROUNDING DISTURBED MATERIAL. LOW AREAS IN THE SUBGRADE ON UNDISTURBED SOIL MAY ALSO BE FILLED BY INCREASING THE RIPRAP THICKNESS.
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 MAY BE FIELD STONE OR ROUGH QUARRY STONE. 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 (½ 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



SUMMARY OF PROTECTION APRONS

APRON LABEL	DISCHARGE PIPE LOCATION	Dp (FT)	LA (FT)	Wp (FT)	WA (FT)	T (IN)	D50 (IN)	DMAX. (IN)
A1	SEDIMENT BASIN	(2)3	22	15	28	18	8	12
A3	SEDIMENT BASIN	(2)2	30	10	32	32	14	21
A4	SEDIMENT BASIN	(2)2	28	10.5	30	27	12	18
A5	SEDIMENT BASIN OUTLET	(2)3	22	6	28	19	8	13
A6	BRIDGE ABUTMENT	N/A	5	8	13	18	8	12
A7	BORROW AREA SEDIMENT BASIN OUTLET	2	19	6	21	18	8	12

32 / D8 RIP-RAP ENERGY DISSIPATOR
SCALE: 1"=4'

2

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
2	3-11-09	NOTICE OF CHANGE 10: BORROW AREA SEDIMENT BASIN	
1	1-21-09	NOTICE OF CHANGE 3: DROP INLET AND BRIDGE MODIFICATIONS	
0	10-20-08	ISSUED FOR CONSTRUCTION	

E&SC DETAILS I
RETIRED ASH BASIN (RAB) - ASH LANDFILL

PHASE I RAB LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: ELH	CHECKED BY: KRD
DESIGNED BY: JMB	APPROVED BY: KRD
PROJECT NUMBER: 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: D8	OF: 28

DRAWING PATH: S:\DEQ\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\D02-10 BORROW AREA - SEDIMENT BASIN\E-FILS B3.DWG

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 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 changes 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)	120

Seeding Mixture (late winter early spring)

Species*	Rate (lb/acre)
Rye (grain)	120
Annual Lespedeza	50

Omit Annual Lespedeza when duration of temporary cover is not to extend beyond July.

Seeding mixture (summer)

Species*	Rate (lb/acre)
German Millet	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 lb/acre straw. Anchor mulch by tacking with asphalt, roving or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring. tool.

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 (Grass lined Channels)	200
Tall fescue (Other Areas)	100

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

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 and late winter for lespedezas. Over seeding of Kobe lespedeza 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.

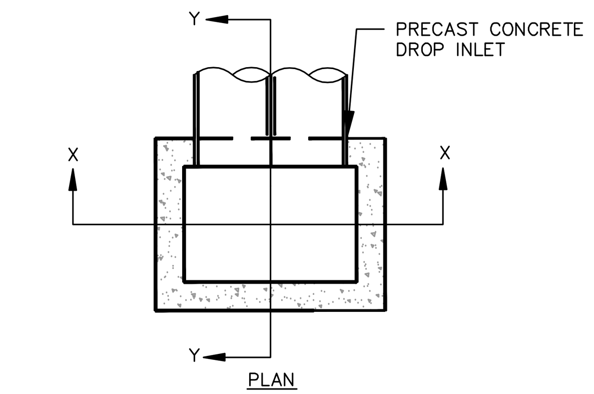
Mulch
Apply 4,000–5,000 lb/acre grain straw or equivalent cover of another suitable mulching material. Anchor mulch by tacking with asphalt, roving, or netting. Netting is the preferred anchoring method on steep slopes.

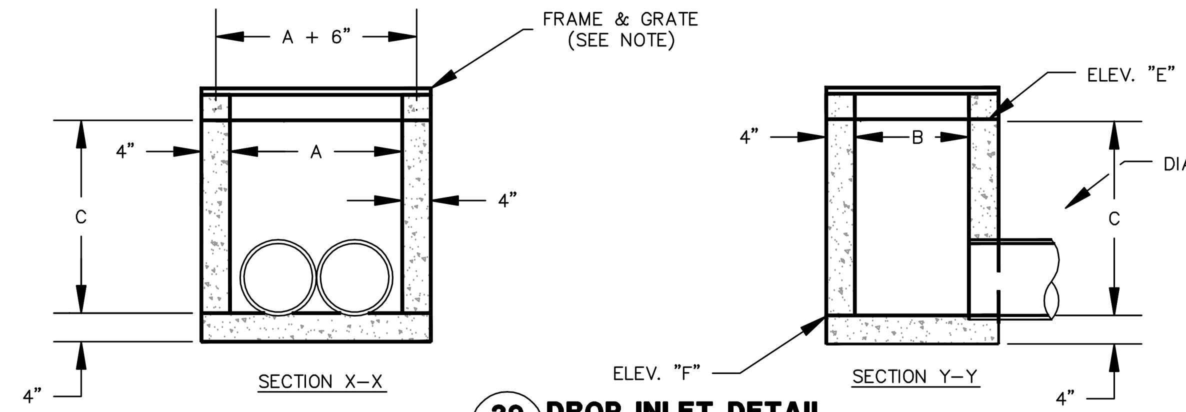
Maintenance
Re–fertilize in the second year unless growth is fully adequate. May be mowed once or twice a year, but mowing is not necessary. Reseed, fertilize, and mulch damaged areas immediately.

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

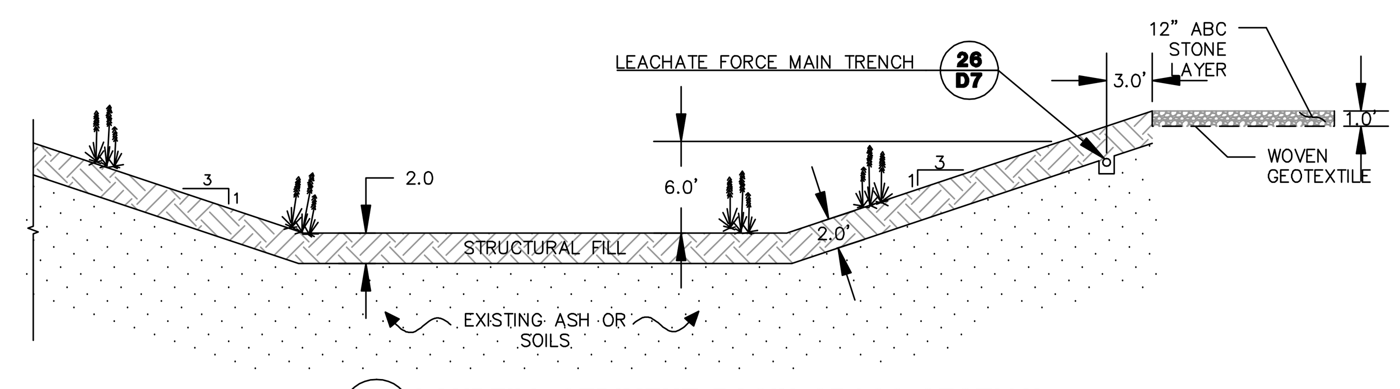




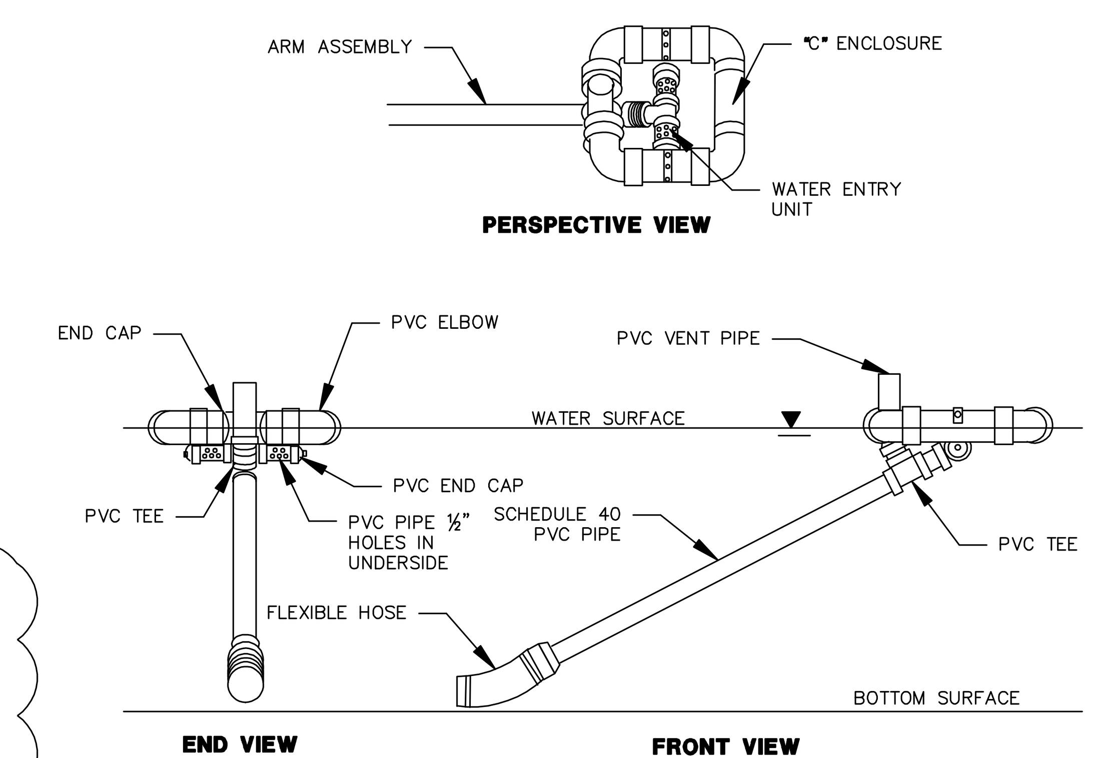
DROP INLET SCHEDULE						
DROP INLET NO.	DIMENSIONS			PIPE DIAMETER	ELEVATIONS	
	SPAN	WIDTH	DEPTH		TOP	INVERT
	A	B	C	D	E	F
7	6'	4'	3.5'	2–24"	620'	616.5'
8	6'	4'	6'	2–24"	620'	614'

NOTE:
STORM GRATE SHALL CONSIST OF AN ELEVATED LID PROVIDING 6" (MIN.) CLEAR SPACE ABOVE DROP INLET

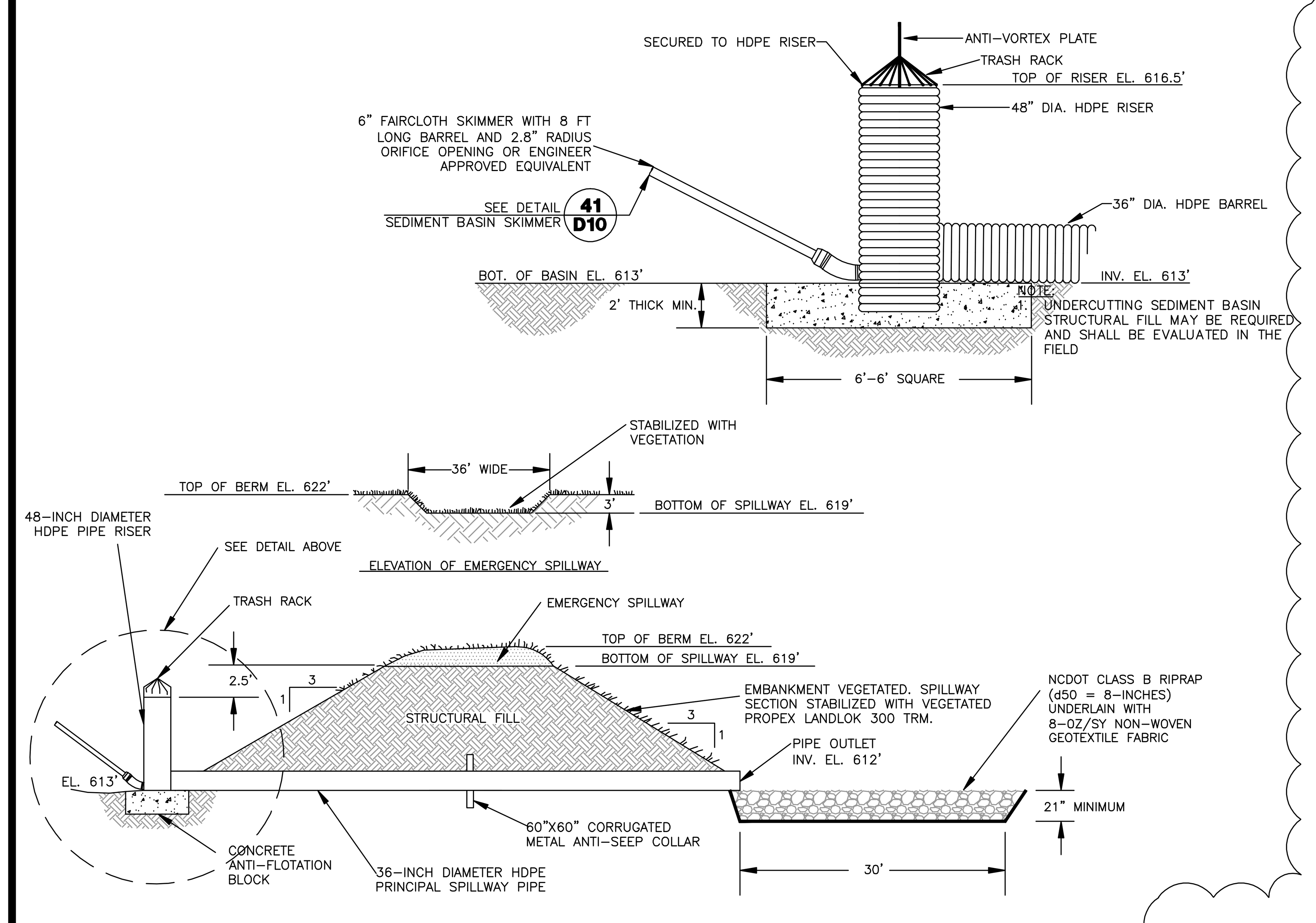
39 / D10 DROP INLET DETAIL
SCALE: 1"=2'



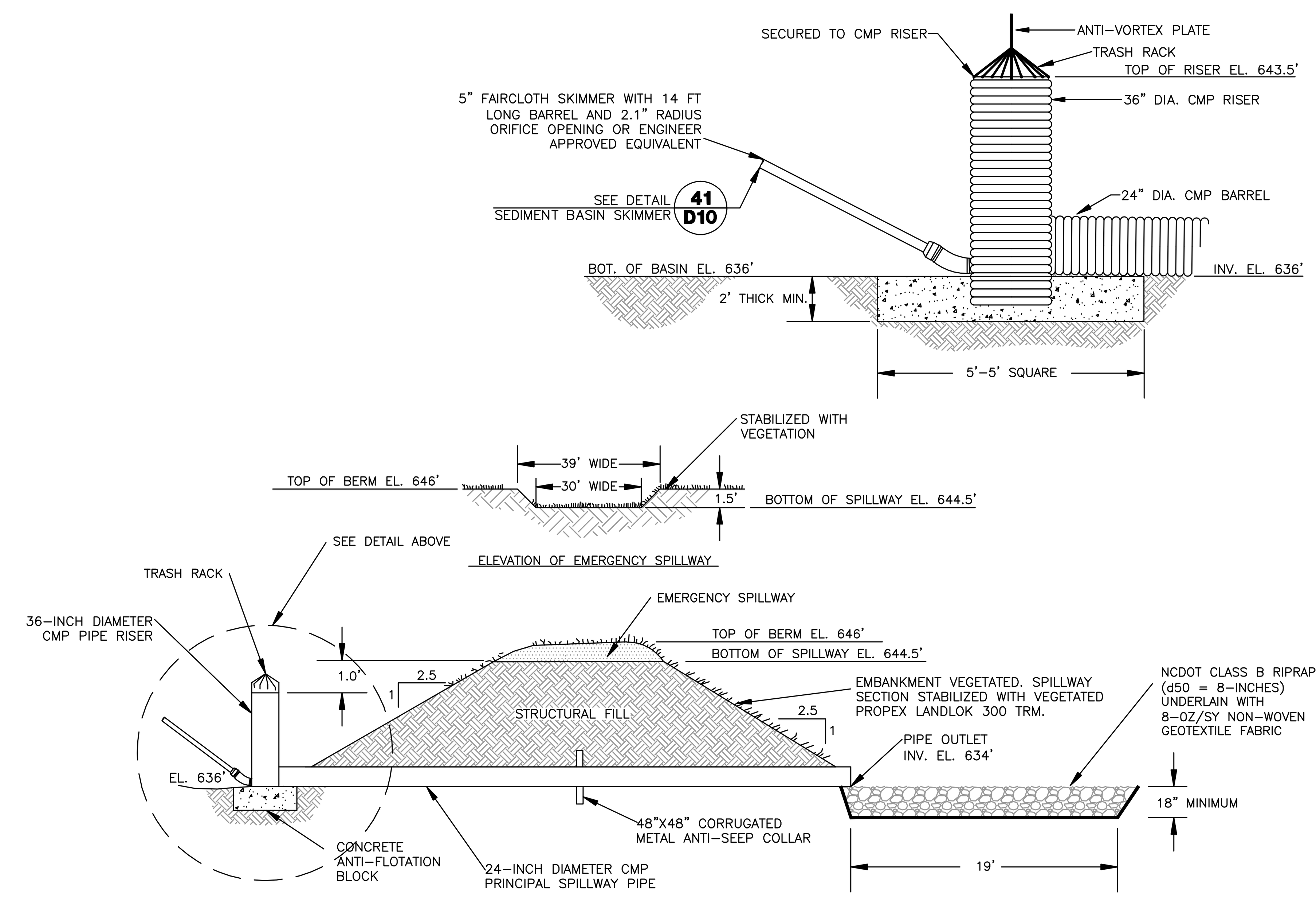
40 / D10 LANDFILL SEDIMENT BASIN CROSS-SECTION
SCALE: 1"=10'



41 / D10 SEDIMENT BASIN SKIMMER
NTS



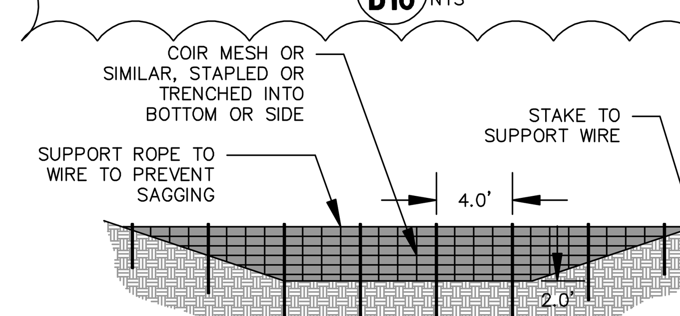
LANDFILL SEDIMENT BASIN



BORROW AREA SEDIMENT BASIN

1

42 / D10 SEDIMENT BASIN DETAILS
NTS



MAINTENANCE:

INSPECT BAFFLES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.

BE SURE TO MAINTAIN ACCESS TO THE BAFFLES. SHOULD THE FABRIC OF A BAFFLE COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.

REMOVE SEDIMENT DEPOSITS WHEN IT REACHES HALF FULL TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE BAFFLES. TAKE CARE TO AVOID DAMAGING THE BAFFLES DURING CLEANOUT. SEDIMENT DEPTH SHOULD NEVER EXCEED HALF THE DESIGNED STORAGE DEPTH.

AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED, REMOVE ALL BAFFLE MATERIALS AND UNSTABLE SEDIMENT DEPOSITS, BRING THE AREA TO GRADE, AND STABILIZE IT.

CONSTRUCTION SPECIFICATION:

1. SECURELY ATTACH THE RISER TO THE BARREL OR BARREL STUB TO MAKE A WATERTIGHT STRUCTURAL CONNECTION. SECURE ALL CONNECTIONS BETWEEN BARREL SECTIONS BY APPROVED WATERTIGHT ASSEMBLIES. PLACE THE BARREL AND RISER ON A FIRM, SMOOTH FOUNDATION OR IMPERVIOUS SOIL. DO NOT USE PERVIOUS MATERIAL SUCH AS SAND, GRAVEL, OR CRUSHED STONE AS BACKFILL AROUND THE PIPE OR ANTI–SEEP COLLARS. PLACE THE FILL MATERIAL AROUND THE PIPE SPILLWAY IN 4–INCH LAYERS AND COMPACT IT UNDER AND AROUND THE PIPE TO AT LEAST THE SAME DENSITY AS THE ADJACENT EMBANKMENT. CARE MUST BE TAKEN NOT TO RAISE THE PIPE FROM FIRM CONTACT WITH ITS FOUNDATION WHEN COMPACTING UNDER THE PIPE HAUNCHES.

   PLACE A MINIMUM DEPTH OF 2 FT. OF HAND–COMPACTED BACKFILL OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT. ANCHOR THE RISER IN PLACE BY CONCRETE OR OTHER SATISFACTORY MEANS TO PREVENT FLOTATION. IN NO CASE SHOULD THE PIPE CONDUIT BE INSTALLED BY CUTTING A TRENCH THROUGH THE DAM AFTER THE EMBANKMENT IS COMPLETE.
2. GRADE THE BASIN SO THAT THE BOTTOM IS LEVEL FRONT TO BACK AND SIDE TO SIDE.
3. INSTALL POSTS OR SAW HORSES ACROSS THE WIDTH OF THE SEDIMENT TRAP (PRACTICE 6.62, SEDIMENT FENCE).
4. STEEL POSTS SHOULD BE DRIVEN TO A DEPTH OF 24 INCHES, SPACED A MAXIMUM OF 4 FEET APART, AND INSTALLED UP THE SIDES OF THE BASIN AS WELL. THE TOP OF THE FABRIC SHOULD BE 6 INCHES HIGHER THAN THE INVERT OF THE SPILLWAY. TOPS OF BAFFLES SHOULD BE 2 INCHES LOWER THAN THE TOP OF THE BERMS.
5. INSTALL AT LEAST THREE ROWS OF BAFFLES BETWEEN THE INLET AND OUTLET DISCHARGE POINT. BASINS LESS THAN 20 FEET IN LENGTH MAY USE 2 BAFFLES.
6. WHEN USING POSTS, ADD A SUPPORT WIRE OR ROPE ACROSS THE TOP OF THE MEASURE TO PREVENT SAGGING.
7. WRAP POROUS MATERIAL, LIKE JUTE BACKED BY COIR MATERIAL, OVER A SAWHORSE OR THE TOP WIRE. HAMMER REBAR INTO THE SAWHORSE LEGS FOR ANCHORING. THE FABRIC SHOULD HAVE FIVE TO TEN PERCENT OPENINGS IN THE WEAVE. ATTACH FABRIC TO A ROPE AND A SUPPORT STRUCTURE WITH ZIP TIES, WIRE, OR STAPLES.
8. THE BOTTOM AND SIDES OF THE FABRIC SHOULD BE ANCHORED IN A TRENCH OR PINNED WITH 8–INCH EROSION CONTROL MATTING STAPLES.
9. DO NOT SPLICE THE FABRIC, BUT USE A CONTINUOUS PIECE ACROSS THE BASIN.

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
1	3–11–09	NOTICE OF CHANGE 10: BORROW AREA SEDIMENT BASIN	
0	10–20–08	ISSUED FOR CONSTRUCTION	

STORMWATER DETAILS

PHASE I RAB LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: ELH	CHECKED BY: KRD
DESIGNED BY: JMB	APPROVED BY: KRD
PROJECT NUMBER 1356–06–825	
SCALE: AS SHOWN	DATE: 7–31–08
DRAWING: D10	OF: 28

DRAWING PATH: Q:\1356\DUKE ENERGY\06–825 PLANT ALLEN\DWG\CONSTRUCTION\NOC 10 BORROW AREA – SEDIMENT BASIN\DETAIL 10.DWG

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date:** 4/3/09	**Job No.:** 1356-06-825-09
DESCRIPTION:	Borrow Area Sediment Basin	Duke Energy – Allen Steam Station	
		Ash Landfill	
NOTICE OF CHANGE NO.	10A		
CHANGE ORDER NOS:			

Description of design change:

The sediment basin design from Notice of Change 10 was revised to assume a drainage area of 17.0 acres, which now includes the topsoil stockpile area. The area is conveyed to the proposed sediment basin with the addition of two proposed grass-lined ditches. Other changes from the previous sediment basin design include sediment basin location and size, elevations, and skimmer size. All details are defined in drawing details.

Reason for design change:

To improve erosion and sediment control in response to observed performance and actual clearing limits.

Effective date of design change:

Immediately.

Financial and schedule considerations:

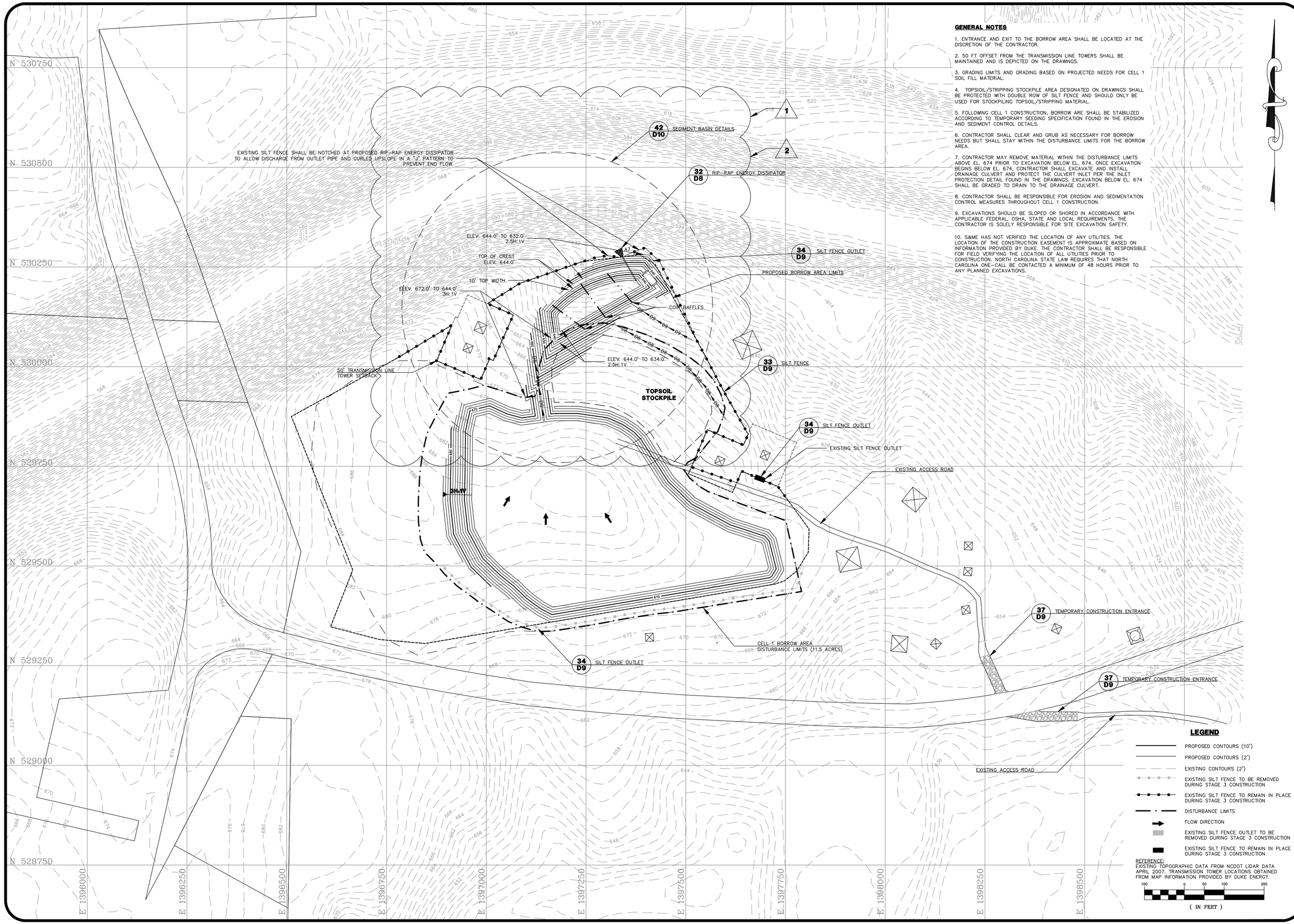
To be determined.

Attachments:

Revision 2 of Drawing C14
Revision 3 of Drawing D8
Revision 2 of Drawing D10

4/3/09		4/7/09	
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:
- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐



GENERAL NOTES

1. ENTRANCE AND EXIT TO THE BORROW AREA SHALL BE LOCATED AT THE DISCRETION OF THE CONTRACTOR.

2. 50 FT OFFSET FROM THE TRANSMISSION LINE TOWERS SHALL BE MAINTAINED AND IS DEPICTED ON THE DRAWINGS.

3. GRADING LIMITS AND GRADING BASED ON PROJECTED NEEDS FOR CELL 1 SOIL FILL MATERIAL.

4. TOPSOIL/STRIPPING STOCKPILE AREA DESIGNATED ON DRAWINGS SHALL BE PROTECTED WITH DOUBLE ROW OF SILT FENCE AND SHOULD ONLY BE USED FOR STOCKPILING TOPSOIL/STRIPPING MATERIAL.

5. FOLLOWING CELL 1 CONSTRUCTION, BORROW ARE SHALL BE STABILIZED ACCORDING TO TEMPORARY SEEDING SPECIFICATION FOUND IN THE EROSION AND SEDIMENT CONTROL DETAILS.

6. CONTRACTOR SHALL CLEAR AND GRUB AS NECESSARY FOR BORROW NEEDS BUT SHALL STAY WITHIN THE DISTURBANCE LIMITS FOR THE BORROW AREA.

7. CONTRACTOR MAY REMOVE MATERIAL WITHIN THE DISTURBANCE LIMITS ABOVE EL. 674 PRIOR TO EXCAVATION BELOW EL. 674. ONCE EXCAVATION BEGINS BELOW EL. 674, CONTRACTOR SHALL EXCAVATE AND INSTALL DRAINAGE CULVERT AND PROTECT THE CULVERT INLET PER THE INLET PROTECTION DETAIL FOUND IN THE DRAWINGS. EXCAVATION BELOW EL. 674 SHALL BE GRADED TO DRAIN TO THE DRAINAGE CULVERT.

8. CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION AND SEDIMENTATION CONTROL MEASURES THROUGHOUT CELL 1 CONSTRUCTION.

9. EXCAVATIONS SHOULD BE SLOPED OR SHORED IN ACCORDANCE WITH APPLICABLE FEDERAL, OSHA, STATE AND LOCAL REQUIREMENTS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR SITE EXCAVATION SAFETY.

10. S&ME HAS NOT VERIFIED THE LOCATION OF ANY UTILITIES. THE LOCATION OF THE CONSTRUCTION EASEMENT IS APPROXIMATE BASED ON INFORMATION PROVIDED BY DUKE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION. NORTH CAROLINA STATE LAW REQUIRES THAT NORTH CAROLINA ONE-CALL BE CONTACTED A MINIMUM OF 48 HOURS PRIOR TO ANY PLANNED EXCAVATIONS.

LEGEND

- PROPOSED CONTOURS (10')
- PROPOSED CONTOURS (2')
- EXISTING CONTOURS (2')
- EXISTING SILT FENCE TO BE REMOVED DURING STAGE 3 CONSTRUCTION
- EXISTING SILT FENCE TO REMAIN IN PLACE DURING STAGE 3 CONSTRUCTION
- DISTURBANCE LIMITS
- FLOW DIRECTION
- EXISTING SILT FENCE OUTLET TO BE REMOVED DURING STAGE 3 CONSTRUCTION
- EXISTING SILT FENCE TO REMAIN IN PLACE DURING STAGE 3 CONSTRUCTION

REFERENCE:
EXISTING TOPOGRAPHIC DATA FROM NCDOT LIDAR DATA APRIL 2007. TRANSMISSION TOWER LOCATIONS OBTAINED FROM MAP INFORMATION PROVIDED BY DUKE ENERGY.

100 0 50 100 200
(IN FEET)

Duke Energy

S&ME
WWW.SMEINC.COM

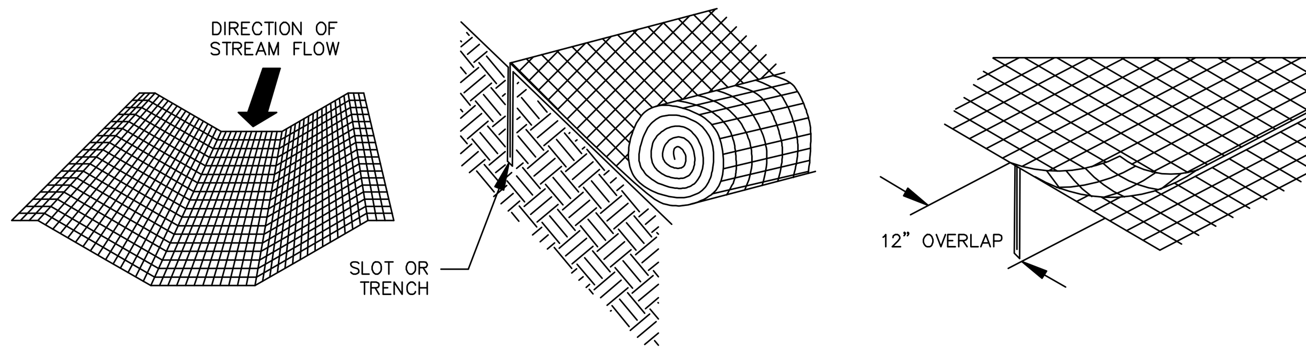
NO.	DATE	DESCRIPTION	BY
2	4-3-09	NOTICE OF CHANGE 10A: BORROW AREA SEDIMENT BASIN	
1	3-11-09	NOTICE OF CHANGE 10: BORROW AREA SEDIMENT BASIN	
0	10-16-08	ISSUED FOR CONSTRUCTION	

BORROW AREA GRADING PLAN - CELL 1
EROSION AND SEDIMENT CONTROL PLAN

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: JMB	CHECKED BY: KRD
DESIGNED BY: JMB	APPROVED BY: KRD
PROJECT NUMBER 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: C14	OF: 28

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NOC 10 BORROW AREA - SEDIMENT BASIN\NOC 10 - SED BASIN (TO CONTRACTOR).DWG



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:

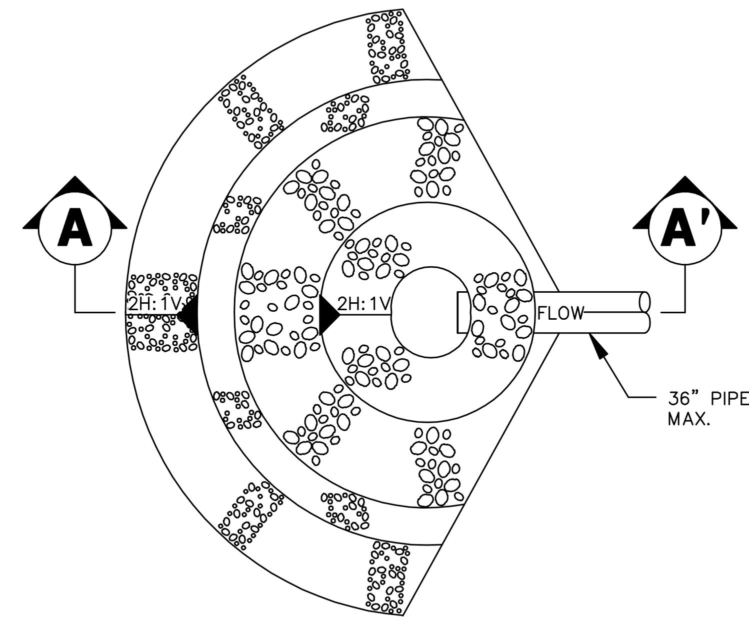
1. DITCH LINES OVER 3 PERCENT MUST BE MATTED WITH NORTH AMERICAN GREEN DS-75 MATTING OR EQUIVALENT.
2. APPLY SEED BEFORE LAYING THE NET OR MAT. IF OPEN-WEAVE NETTING IS USED, LIME MAY BE INCORPORATED BEFORE INSTALLING THE NET AND FERTILIZER AND SEED MAY BE SPRAYED ON AFTERWARD.
3. START LAYING THE NET 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. WHERE 2 STRIPS OF NET ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHOULD BE OVERLAPPED 3 INCHES AND STAPLED TOGETHER. EACH STRIP OF MATTING SHOULD ALSO BE STAPLED DOWN THE CENTER, EVERY 3 FEET.

MAINTENANCE NOTES:

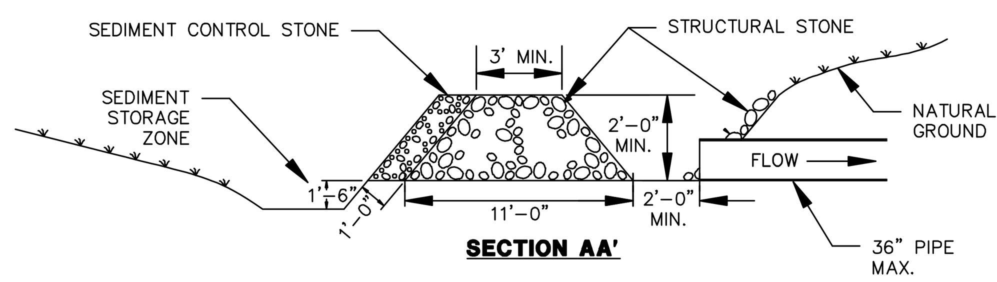
1. INSPECT ROLLED EROSION CONTROL PRODUCTS (RECP) AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (0.5" OR GREATER) RAIN FALL EVENT.
2. GOOD CONTACT WITH THE GROUND MUST BE MAINTAINED, AND EROSION MUST NOT OCCUR BENEATH THE RECP.
3. ANY AREAS OF THE RECP THAT ARE DAMAGED OR NOT IN CLOSE CONTACT WITH THE GROUND SHALL BE REPAIRED AND STAPLED.
4. IF EROSION OCCURS DUE TO POORLY CONTROLLED DRAINAGE, THE PROBLEM SHALL BE FIXED AND THE ERODED AREA PROTECTED.
5. MONITOR AND REPAIR THE RECP AS NECESSARY UNTIL GROUND COVER IS ESTABLISHED,

*REF: 6.17.12 NC Erosion and Sediment Control Planning and Design Manual, 2006

28/D8 TYPICAL TEMPORARY MATTING DETAIL
NTS



PLAN VIEW



SECTION AA'

GENERAL NOTES:

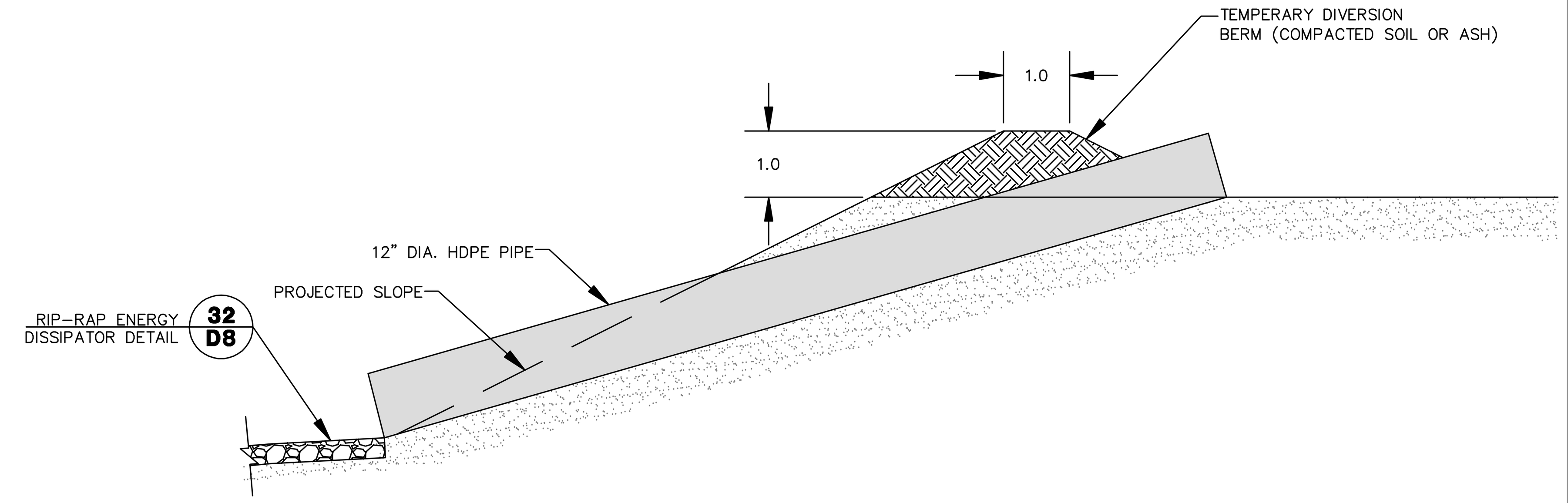
1. INSTALL ROCK PIPE INLET PROTECTION AT ANY CULVERT RECEIVING FLOW ACROSS DISTURBED DITCHLINE.
2. STRUCTURAL STONE SHALL BE CLASS B RIPRAP.
3. SEDIMENT CONTROL STONE SHALL BE NO. 5 OR NO. 57 STONE.
4. DIMENSIONS ARE MINIMUM ACCEPTABLE UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.

MAINTENANCE NOTES:

1. INSPECT ROCK PIPE INLET PROTECTION AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (0.5" OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY. REMOVE SEDIMENT AND RESTORE THE SEDIMENT STORAGE AREA TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-HALF THE DESIGN DEPTH OF THE TRAP. PLACE THE SEDIMENT THAT IS REMOVED IN THE DESIGNED DISPOSAL AREA AND REPLACE THE CONTAMINATED PART OF THE GRAVEL FACING.
2. CHECK THE STRUCTURE FOR DAMAGE. ANY RIPRAP DISPLACED FROM THE STONE HORSESHOE MUST BE REPLACED IMMEDIATELY.
3. AFTER ALL THE SEDIMENT-PRODUCING AREAS HAVE BEEN PERMANENTLY STABILIZED, REMOVE THE STRUCTURE AND ALL THE UNSTABLE SEDIMENT. SMOOTH THE AREA TO BLEND WITH THE ADJOINING AREAS AND PROVIDE PERMANENT GROUND COVER (SURFACE STABILIZATION).

*REF: 6.55.3 NC Erosion and Sediment Control Planning and Design Manual, 2006

29/D8 STANDARD ROCK PIPE INLET PROTECTION DETAIL
NTS



30/D8 SLOPE DRAIN DETAIL
NTS

1

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 PLANS 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 SPECIES. PROTECT THE CHANNEL WITH MULCH OR A TEMPORARY LINER SUFFICIENT TO WITHSTAND ANTICIPATED VELOCITIES DURING THE ESTABLISHMENT PERIOD (SEE SEEDING SPECIFICATIONS).
5. APPLY LIME, FERTILIZER AND SEED BEFORE LAYING THE NET (WITHOUT MULCH) OR MAT (WITH MULCH OR SYNTHETIC). IF OPEN-WEAVE NETTING IS USED, LIME MAY BE INCORPORATED BEFORE INSTALLING THE NET AND THE FERTILIZER AND SEED CAN BE SPRAYED ON AFTERWARD, OTHERWISE APPLY SEED AND FERTILIZER BEFORE INSTALLATION.
6. START LAYING THE NET OR MAT 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.
7. TO SECURE THE NET, BURY THE UPSLOPE END IN A SLOT OR TRENCH NO LESS THAN 6 INCHES DEEP, COVER WITH SOIL, AND TAMP FIRMLY. STAPLE THE NET EVERY 12 INCHES ACROSS THE TOP END AND EVERY 3 FT AROUND THE EDGES AND BOTTOM. WHERE 2 STRIPS OF NET ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHOULD BE OVERLAPPED 3 INCHES AND STAPLED TOGETHER. EACH STRIP OF NETTING OR MATTING SHOULD ALSO BE STAPLED DOWN THE CENTER OR EVERY 3 FT IF THE STRIP IS NOT WIDER THAN 8 FEET. DO NOT STRETCH THE NET/MAT WHEN APPLYING STAPLES.
8. STAPLES SHOULD BE THE "U"-SHAPED TYPE AND 4" TO 6" LONG (DEPENDING ON SOIL CONDITIONS).
9. TO JOIN ENDS OF TWO STRIPS OF NETTING, CUT A TRENCH TO ANCHOR THE END OF THE DOWN GRADIENT NET. OVERLAP THE END OF THE PREVIOUS ROLL 18 INCHES AND STAPLE EVERY 12 INCHES JUST BELOW THE ANCHOR SLOT.
10. TO JOIN ENDS OF TWO STRIPS OF MATTING, OVERLAP THE UPGRADIENT STRIP OVER THE DOWNGRADIENT ONE AT LEAST 4 INCHES. STAPLE THE OVERLAP AT THE ENDS AND EVERY 12 INCHES ALONG THE CENTER OF THE OVERLAP.

MAINTENANCE

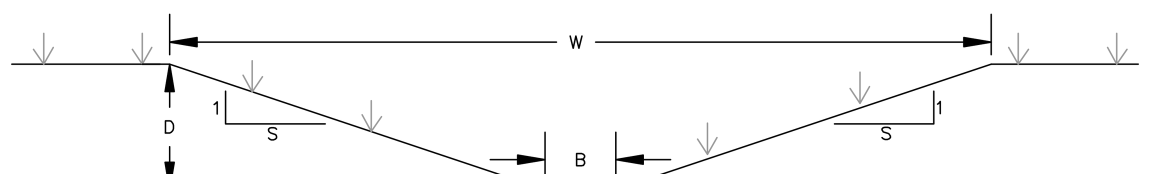
DURING THE ESTABLISHMENT PERIOD, CHECK GRASS-LINED CHANNELS AFTER EVERY RAINFALL. AFTER GRASS IS ESTABLISHED, PERIODICALLY CHECK THE CHANNEL; CHECK IT AFTER EVERY HEAVY RAINFALL EVENT. IMMEDIATELY MAKE REPAIRS. IT IS PARTICULARLY IMPORTANT TO CHECK THE CHANNEL OUTLET AND ALL ROAD CROSSINGS FOR BANK STABILITY 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.
2. NETTING AND MATTING PRODUCTS SHOULD BE INSTALLED ACCORDING TO MANUFACTURER'S GUIDELINES. IF THE MANUFACTURER DOES NOT PROVIDE GUIDELINES, THE ABOVE GUIDELINES FOR NETTING AND MATTING MAY BE USED.



GRASS - LINED DITCH TYPE	E&S MATTING	W (ft)	D (ft)	B (ft)	S (ft/ft)
D1	DS75	9	1.5	3	2
D2	DS75	6	1.0	2	2
D3	DS75	9	1.5	3	2
D4	DS75	15	1.5	9	2
D5	DS75	4	1.0	0	3
D6	DS75	15	2.0	3	3
D7A*	DS75	VARIES	VARIES	0	3
D7B**	GROUTED RIPRAP	8	2.0	0	2
D8	DS75	6	1.0	0	2
D9	DS75	6	1.0	0	2

*D7A SHALL BE CONSTRUCTED WITH AN UPSTREAM CHANNEL DEPTH OF 0.5 FEET AND A CHANNEL SLOPE OF 0.5 PERCENT.
**D7B SHALL BE CONSTRUCTED OF GROUTED NCDOT CLASS B RIPRAP WITH A LINING THICKNESS OF 18 INCHES, UNDERLAIN BY AN 8 OZ/SY NON-WOVEN GEOTEXTILE.

31/D8 PERIMETER DITCH DETAIL
NTS

3

DEFINITION:

A STRUCTURE DESIGNED TO CONTROL EROSION AT THE INLET OR 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:

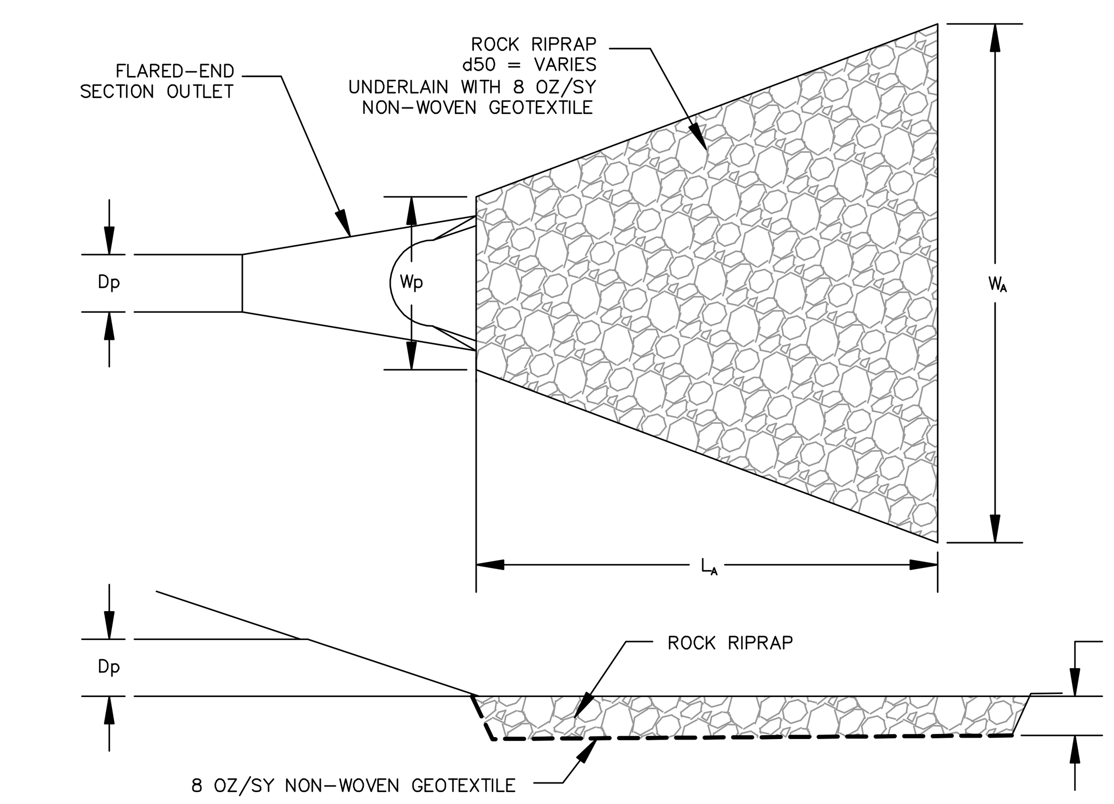
1. ENSURE THAT THE SUBGRADE FOR THE FILTER AND RIPRAP FOLLOWS THE REQUIRED LINES AND GRADES SHOWN IN THE PLAN. COMPACT ANY FILL REQUIRED IN THE SUBGRADE TO THE DENSITY OF THE SURROUNDING DISTURBED MATERIAL. LOW AREAS IN THE SUBGRADE ON UNDISTURBED SOIL MAY ALSO BE FILLED BY INCREASING THE RIPRAP THICKNESS.
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 MAY BE FIELD STONE OR ROUGH QUARRY STONE. 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 (½ 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



SUMMARY OF PROTECTION APRONS								
APRON LABEL	DISCHARGE PIPE LOCATION	Dp (FT)	LA (FT)	Wp (FT)	WA (FT)	T (IN)	D50 (IN)	DMAX. (IN)
A1	SEDIMENT BASIN	(2)3	22	15	28	18	8	12
A3	SEDIMENT BASIN	(2)2	30	10	32	32	14	21
A4	SEDIMENT BASIN	(2)2	28	10.5	30	27	12	18
A5	SEDIMENT BASIN OUTLET	(2)3	22	6	28	19	8	13
A6	BRIDGE ABUTMENT	N/A	5	8	13	18	8	12
A7	BORROW AREA SEDIMENT BASIN OUTLET	2	19	6	21	18	8	12

32/D8 RIP-RAP ENERGY DISSIPATOR
SCALE: 1"=4'

3

2

Duke Energy ©

S&ME
WWW.SMEINC.COM

SEAL 032153

NO.	DATE	DESCRIPTION	BY
3	4-3-09	NOTICE OF CHANGE 10A: BORROW AREA SEDIMENT	
2	3-11-09	NOTICE OF CHANGE 10: BORROW AREA SEDIMENT BASIN	
1	1-21-09	NOTICE OF CHANGE 3: DROP INLET AND BRIDGE MODIFICATIONS	
0	10-20-08	ISSUED FOR CONSTRUCTION	

E&SC DETAILS I
RETIRED ASH BASIN (RAB) - ASH LANDFILL

PHASE I RAB LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: ELH	CHECKED BY: KRD
DESIGNED BY: JMB	APPROVED BY: KRD
PROJECT NUMBER 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: D8	OF: 28

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NOC 10 BORROW AREA - SEDIMENT BASIN\DETAILS 8.DWG

GENERAL SEEDING SPECIFICATIONS

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 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 changes 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)	120

Seeding Mixture (late winter early spring)

Species*	Rate (lb/acre)
Rye (grain)	120
Annual Lespedeza	50

Omit Annual Lespedeza when duration of temporary cover is not to extend beyond July.

Seeding mixture (summer)

Species*	Rate (lb/acre)
German Millet	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 lb/acre straw. Anchor mulch by tacking with asphalt, roving or a mulch anchoring tool. A disk with blades set nearly straight can be used as a mulch anchoring. tool.

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 (Grass lined Channels)	200
Tall fescue (Other Areas)	100

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

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 and late winter for lespedezas. Over seeding of Kobe lespedeza over fall–seeded tall fescue is very effective.

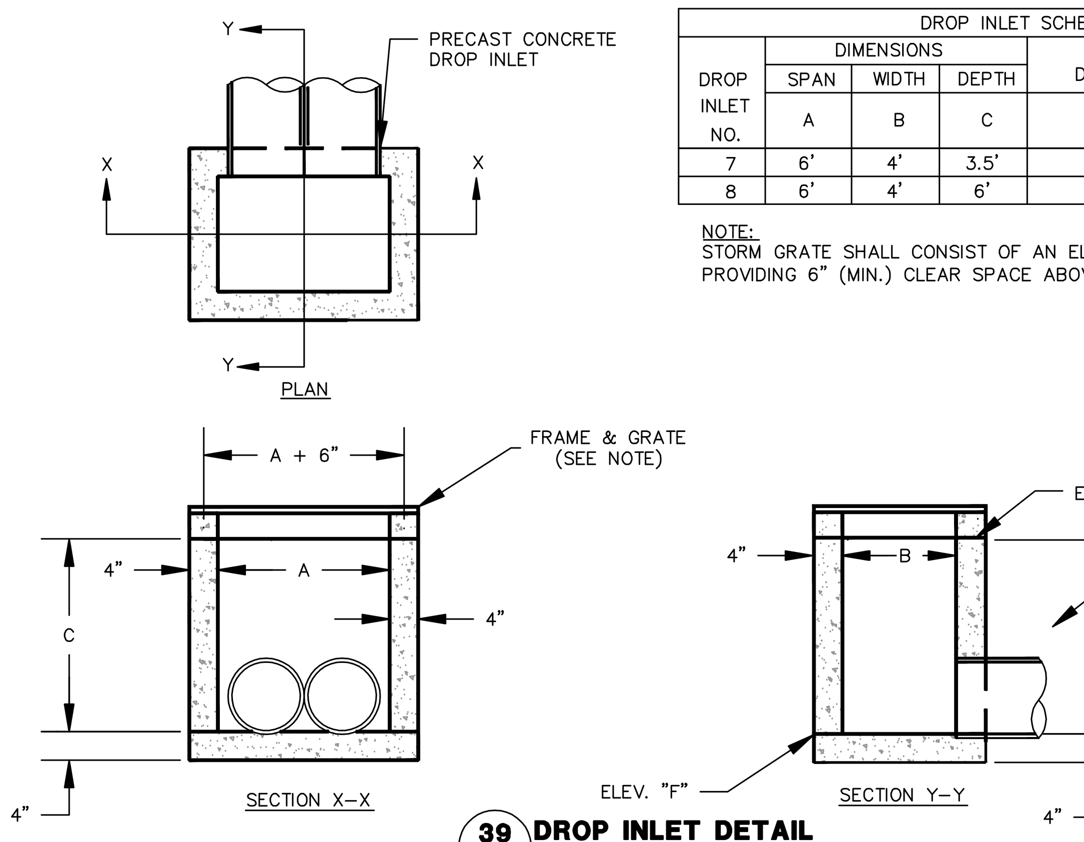
Soil amendments
Apply lime and fertilizer according to soil tests, or apply 4,000 lb/acre ground agricultural limestone and 1,000 lb/acre 10–10–10 fertilizer.

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. 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

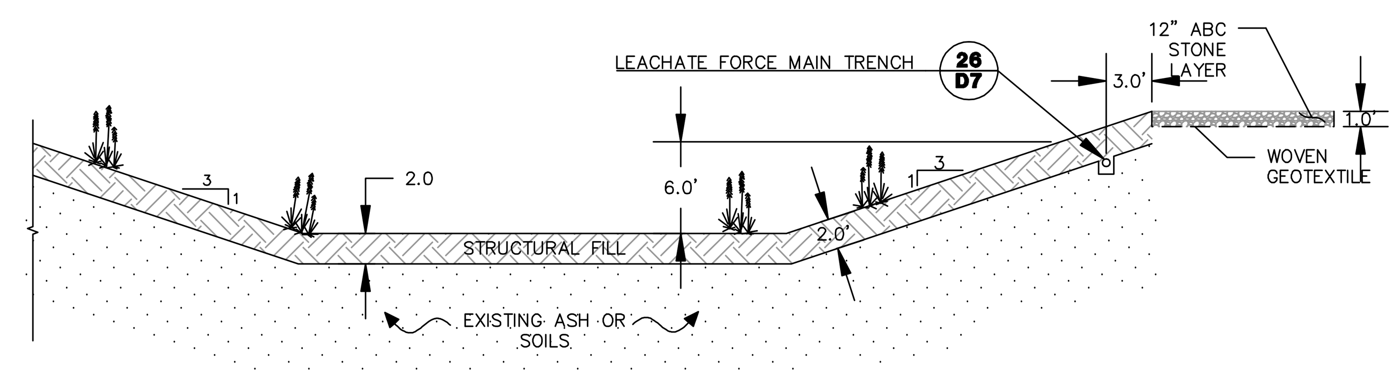


DROP INLET SCHEDULE

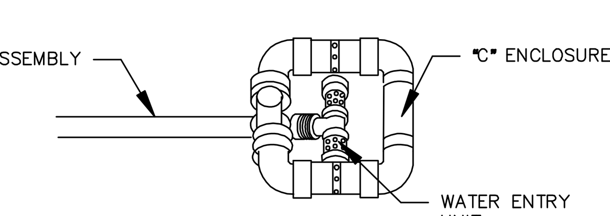
DROP INLET NO.	DIMENSIONS SPAN A	WIDTH B	DEPTH C	PIPE DIAMETER D	ELEVATIONS TOP E	INVERT F
7	6'	4'	3.5'	2–24"	620'	616.5'
8	6'	4'	6'	2–24"	620'	614'

NOTE:
STORM GRATE SHALL CONSIST OF AN ELEVATED LID PROVIDING 6" (MIN.) CLEAR SPACE ABOVE DROP INLET

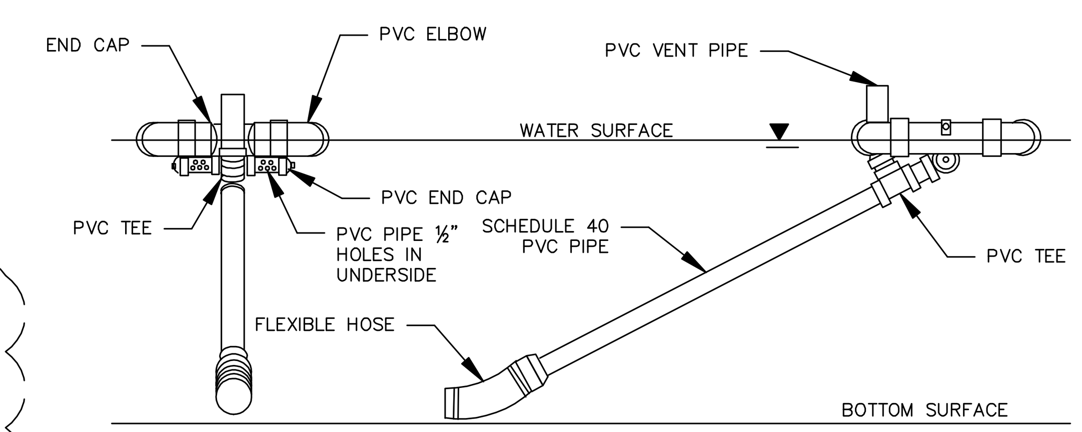
39 / D10 **DROP INLET DETAIL**
SCALE: 1"=2'



40 / D10 **LANDFILL SEDIMENT BASIN CROSS-SECTION**
SCALE: 1"=10'

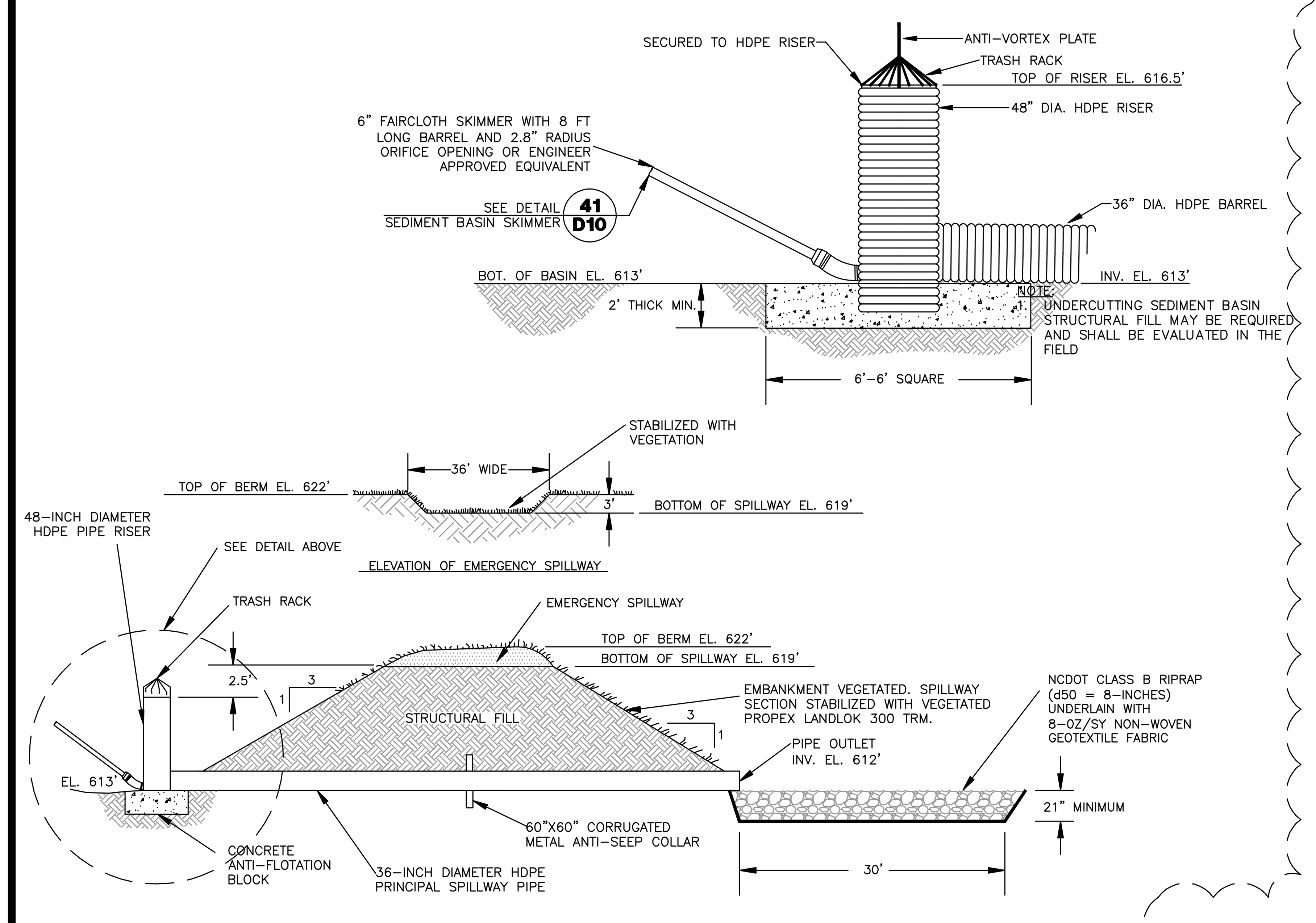


PERSPECTIVE VIEW



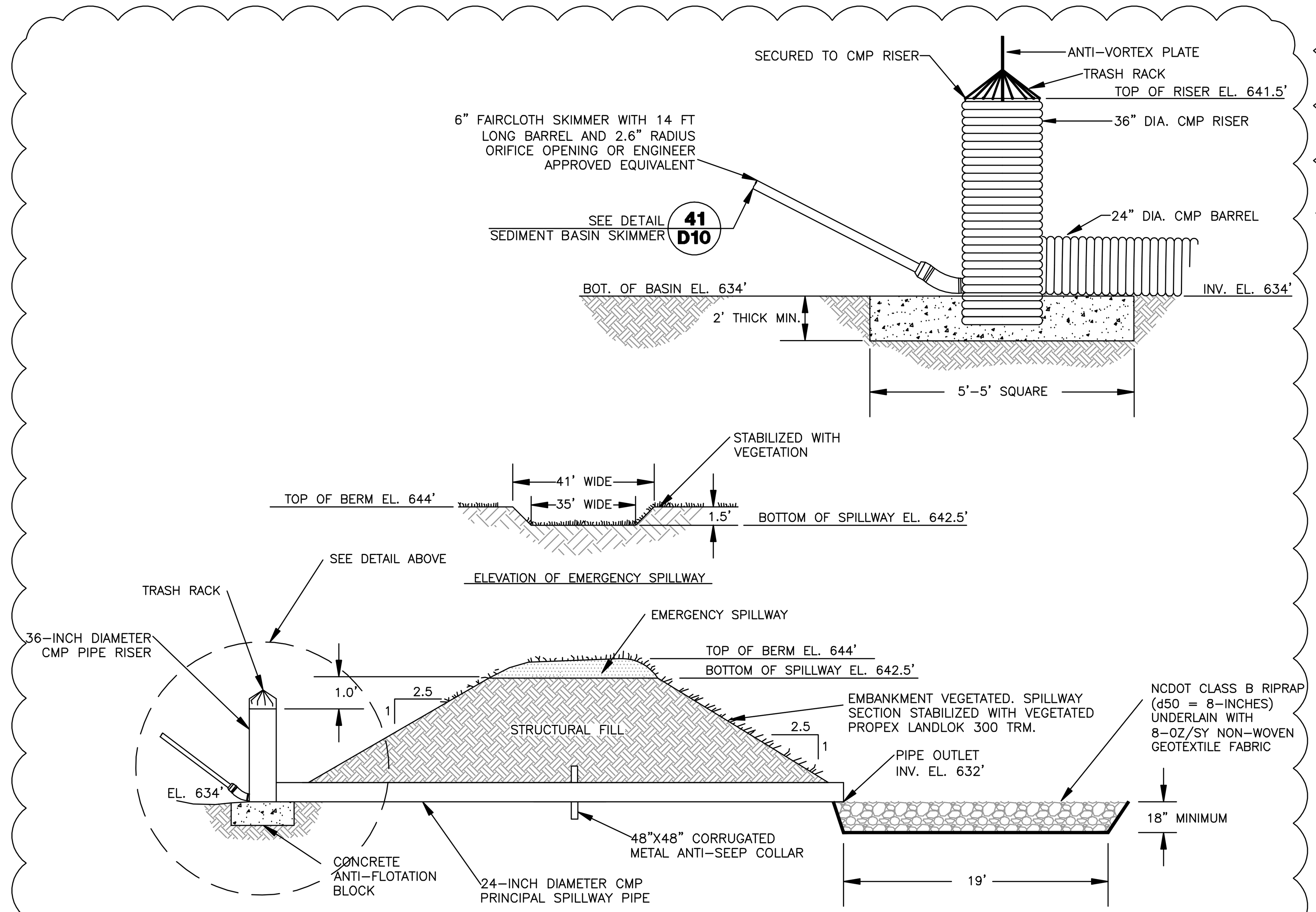
END VIEW **FRONT VIEW**

41 / D10 **SEDIMENT BASIN SKIMMER**
NTS



LANDFILL SEDIMENT BASIN

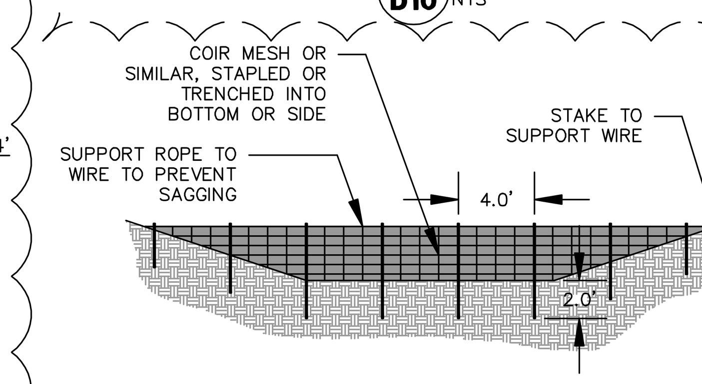
1



BORROW AREA SEDIMENT BASIN

42 / D10 **SEDIMENT BASIN DETAILS**
NTS

2



MAINTENANCE:

INSPECT BAFFLES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.

BE SURE TO MAINTAIN ACCESS TO THE BAFFLES. SHOULD THE FABRIC OF A BAFFLE COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.

REMOVE SEDIMENT DEPOSITS WHEN IT REACHES HALF FULL TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE BAFFLES. TAKE CARE TO AVOID DAMAGING THE BAFFLES DURING CLEANOUT. SEDIMENT DEPTH SHOULD NEVER EXCEED HALF THE DESIGNED STORAGE DEPTH.

AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED, REMOVE ALL BAFFLE MATERIALS AND UNSTABLE SEDIMENT DEPOSITS, BRING THE AREA TO GRADE, AND STABILIZE IT.

CONSTRUCTION SPECIFICATION:

1. SECURELY ATTACH THE RISER TO THE BARREL OR BARREL STUB TO MAKE A WATERTIGHT STRUCTURAL CONNECTION. SECURE ALL CONNECTIONS BETWEEN BARREL SECTIONS BY APPROVED WATERTIGHT ASSEMBLIES. PLACE THE BARREL AND RISER ON A FIRM, SMOOTH FOUNDATION OR IMPERVIOUS SOIL. DO NOT USE PERVIOUS MATERIAL SUCH AS SAND, GRAVEL, OR CRUSHED STONE AS BACKFILL AROUND THE PIPE OR ANTI–SEEP COLLARS. PLACE THE FILL MATERIAL AROUND THE PIPE SPILLWAY IN 4–INCH LAYERS AND COMPACT IT UNDER AND AROUND THE PIPE TO AT LEAST THE SAME DENSITY AS THE ADJACENT EMBANKMENT. CARE MUST BE TAKEN NOT TO RAISE THE PIPE FROM FIRM CONTACT WITH ITS FOUNDATION WHEN COMPACTING UNDER THE PIPE HAUNCHES.

   PLACE A MINIMUM DEPTH OF 2 FT. OF HAND–COMPACTED BACKFILL OVER THE PIPE SPILLWAY BEFORE CROSSING IT WITH CONSTRUCTION EQUIPMENT. ANCHOR THE RISER IN PLACE BY CONCRETE OR OTHER SATISFACTORY MEANS TO PREVENT FLOTATION. IN NO CASE SHOULD THE PIPE CONDUIT BE INSTALLED BY CUTTING A TRENCH THROUGH THE DAM AFTER THE EMBANKMENT IS COMPLETE.
2. GRADE THE BASIN SO THAT THE BOTTOM IS LEVEL FRONT TO BACK AND SIDE TO SIDE.
3. INSTALL POSTS OR SAW HORSES ACROSS THE WIDTH OF THE SEDIMENT TRAP (PRACTICE 6.62, SEDIMENT FENCE).
4. STEEL POSTS SHOULD BE DRIVEN TO A DEPTH OF 24 INCHES, SPACED A MAXIMUM OF 4 FEET APART, AND INSTALLED UP THE SIDES OF THE BASIN AS WELL. THE TOP OF THE FABRIC SHOULD BE 6 INCHES HIGHER THAN THE INVERT OF THE SPILLWAY. TOPS OF BAFFLES SHOULD BE 2 INCHES LOWER THAN THE TOP OF THE BERMS.
5. INSTALL AT LEAST THREE ROWS OF BAFFLES BETWEEN THE INLET AND OUTLET DISCHARGE POINT. BASINS LESS THAN 20 FEET IN LENGTH MAY USE 2 BAFFLES.
6. WHEN USING POSTS, ADD A SUPPORT WIRE OR ROPE ACROSS THE TOP OF THE MEASURE TO PREVENT SAGGING.
7. WRAP POROUS MATERIAL, LIKE JUTE BACKED BY COIR MATERIAL, OVER A SAWHORSE OR THE TOP WIRE. HAMMER REBAR INTO THE SAWHORSE LEGS FOR ANCHORING. THE FABRIC SHOULD HAVE FIVE TO TEN PERCENT OPENINGS IN THE WEAVE. ATTACH FABRIC TO A ROPE AND A SUPPORT STRUCTURE WITH ZIP TIES, WIRE, OR STAPLES.
8. THE BOTTOM AND SIDES OF THE FABRIC SHOULD BE ANCHORED IN A TRENCH OR PINNED WITH 8–INCH EROSION CONTROL MATTING STAPLES.
9. DO NOT SPLICE THE FABRIC, BUT USE A CONTINUOUS PIECE ACROSS THE BASIN.

Duke Energy ©

S&ME
WWW.SMEINC.COM

NO.	DATE	DESCRIPTION	BY
2	4–3–09	NOTICE OF CHANGE 10A: BORROW AREA SEDIMENT	
1	3–11–09	NOTICE OF CHANGE 10: BORROW AREA SEDIMENT BASIN	
0	10–20–08	ISSUED FOR CONSTRUCTION	

STORMWATER DETAILS

PHASE I RAB LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: ELH	CHECKED BY: KRD
DESIGNED BY: JMB	APPROVED BY: KRD
PROJECT NUMBER 1356–06–825	
SCALE: AS SHOWN	DATE: 7–31–08
DRAWING: D10	OF: 28

DRAWING PATH: Q:\1356\DUKE ENERGY\06–825 PLANT ALLEN\DWG\CONSTRUCTION\NOC 10 BORROW AREA – SEDIMENT BASIN\DETAIL 10.DWG

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date:** 3/18/09	**Job No.:** 1356-06-825-09
DESCRIPTION:	Access Ramp	Duke Energy – Allen Steam Station	
		Ash Landfill	
NOTICE OF CHANGE NO.	11		
CHANGE ORDER NOS:			

Description of design change:

An access ramp grading plan was designed to connect the existing haul road (Ash Boulevard) to the northern slope of Cell 1. The access ramp begins at a base elevation of 634 feet and rises to a top elevation of 640 feet at an approximate 3% slope. The access ramp is 24 feet wide with 3H:1V side slopes. The access ramp is to be constructed of ash.

Reason for design change:

To provide Cell 1 access during and after construction activities.

Effective date of design change:

Immediately.

Financial and schedule considerations:

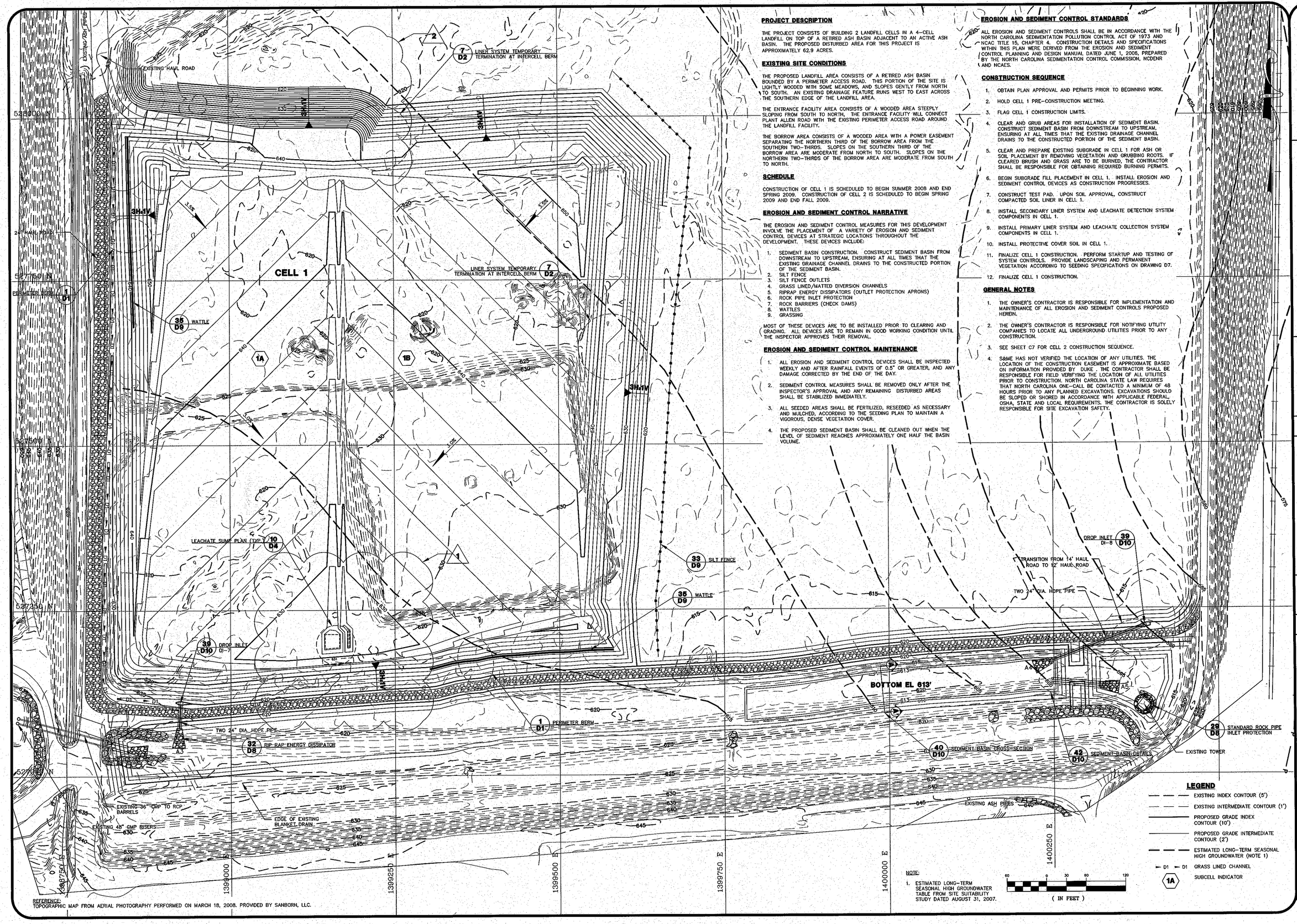
To be determined.

Attachments:

Revision 2 of Original IFC Drawing C4

Kenneth R. Daly 3/18/09		3/18/09	
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:
- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☐
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☐
- ☐



REFERENCE:
TOPOGRAPHIC MAP FROM AERIAL PHOTOGRAPHY PERFORMED ON MARCH 18, 2008. PROVIDED BY SANBORN, LLC.

PROJECT DESCRIPTION

THE PROJECT CONSISTS OF BUILDING 2 LANDFILL CELLS IN A 4-CELL LANDFILL ON TOP OF A RETIRED ASH BASIN ADJACENT TO AN ACTIVE ASH BASIN. THE PROPOSED DISTURBED AREA FOR THIS PROJECT IS APPROXIMATELY 62.9 ACRES.

EXISTING SITE CONDITIONS

THE PROPOSED LANDFILL AREA CONSISTS OF A RETIRED ASH BASIN BOUNDED BY A PERIMETER ACCESS ROAD. THIS PORTION OF THE SITE IS LIGHTLY WOODED WITH SOME MEADOWS, AND SLOPES GENTLY FROM NORTH TO SOUTH. AN EXISTING DRAINAGE FEATURE RUNS WEST TO EAST ACROSS THE SOUTHERN EDGE OF THE LANDFILL AREA.

THE ENTRANCE FACILITY AREA CONSISTS OF A WOODED AREA STEEPLY SLOPING FROM SOUTH TO NORTH. THE ENTRANCE FACILITY WILL CONNECT PLANT ALLEN ROAD WITH THE EXISTING PERIMETER ACCESS ROAD AROUND THE LANDFILL FACILITY.

THE BORROW AREA CONSISTS OF A WOODED AREA WITH A POWER EASEMENT SEPARATING THE NORTHERN THIRD OF THE BORROW AREA FROM THE SOUTHERN TWO-THIRDS. SLOPES ON THE SOUTHERN THIRD OF THE BORROW AREA ARE MODERATE FROM NORTH TO SOUTH. SLOPES ON THE NORTHERN TWO-THIRDS OF THE BORROW AREA ARE MODERATE FROM SOUTH TO NORTH.

SCHEDULE

CONSTRUCTION OF CELL 1 IS SCHEDULED TO BEGIN SUMMER 2008 AND END SPRING 2009. CONSTRUCTION OF CELL 2 IS SCHEDULED TO BEGIN SPRING 2009 AND END FALL 2009.

EROSION AND SEDIMENT CONTROL NARRATIVE

THE EROSION AND SEDIMENT CONTROL MEASURES FOR THIS DEVELOPMENT INVOLVE THE PLACEMENT OF A VARIETY OF EROSION AND SEDIMENT CONTROL DEVICES AT STRATEGIC LOCATIONS THROUGHOUT THE DEVELOPMENT. THESE DEVICES INCLUDE:

1. SEDIMENT BASIN CONSTRUCTION. CONSTRUCT SEDIMENT BASIN FROM DOWNSTREAM TO UPSTREAM, ENSURING AT ALL TIMES THAT THE EXISTING DRAINAGE CHANNEL DRAINS TO THE CONSTRUCTED PORTION OF THE SEDIMENT BASIN.
2. SILT FENCE
3. SILT FENCE OUTLETS
4. GRASS LINED/MATTED DIVERSION CHANNELS
5. RIPRAP ENERGY DISSIPATORS (OUTLET PROTECTION APRONS)
6. ROCK PIPE INLET PROTECTION
7. ROCK BARRIERS (CHECK DAMS)
8. WATTLES
9. GRASSING

MOST OF THESE DEVICES ARE TO BE INSTALLED PRIOR TO CLEARING AND GRADING. ALL DEVICES ARE TO REMAIN IN GOOD WORKING CONDITION UNTIL THE INSPECTOR APPROVES THEIR REMOVAL.

EROSION AND SEDIMENT CONTROL MAINTENANCE

1. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSPECTED WEEKLY AND AFTER RAINFALL EVENTS OF 0.5" OR GREATER, AND ANY DAMAGE CORRECTED BY THE END OF THE DAY.
2. SEDIMENT CONTROL MEASURES SHALL BE REMOVED ONLY AFTER THE INSPECTOR'S APPROVAL AND ANY REMAINING DISTURBED AREAS SHALL BE STABILIZED IMMEDIATELY.
3. ALL SEEDED AREAS SHALL BE FERTILIZED, RESEEDED AS NECESSARY AND MULCHED, ACCORDING TO THE SEEDING PLAN TO MAINTAIN A VIGOROUS, DENSE VEGETATION COVER.
4. THE PROPOSED SEDIMENT BASIN SHALL BE CLEANED OUT WHEN THE LEVEL OF SEDIMENT REACHES APPROXIMATELY ONE HALF THE BASIN VOLUME.

EROSION AND SEDIMENT CONTROL STANDARDS

ALL EROSION AND SEDIMENT CONTROLS SHALL BE IN ACCORDANCE WITH THE NORTH CAROLINA SEDIMENTATION POLLUTION CONTROL ACT OF 1973 AND NCAC TITLE 15, CHAPTER 4. CONSTRUCTION DETAILS AND SPECIFICATIONS WITHIN THIS PLAN WERE DERIVED FROM THE EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL DATED JUNE 1, 2006, PREPARED BY THE NORTH CAROLINA SEDIMENTATION CONTROL COMMISSION, NCDENR AND NCAES.

CONSTRUCTION SEQUENCE

1. OBTAIN PLAN APPROVAL AND PERMITS PRIOR TO BEGINNING WORK.
2. HOLD CELL 1 PRE-CONSTRUCTION MEETING.
3. FLAG CELL 1 CONSTRUCTION LIMITS.
4. CLEAR AND GRUB AREAS FOR INSTALLATION OF SEDIMENT BASIN. CONSTRUCT SEDIMENT BASIN FROM DOWNSTREAM TO UPSTREAM, ENSURING AT ALL TIMES THAT THE EXISTING DRAINAGE CHANNEL DRAINS TO THE CONSTRUCTED PORTION OF THE SEDIMENT BASIN.
5. CLEAR AND PREPARE EXISTING SUBGRADE IN CELL 1 FOR ASH OR SOIL PLACEMENT BY REMOVING VEGETATION AND GRUBBING ROOTS. IF CLEARED BRUSH AND GRASS ARE TO BE BURNED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING REQUIRED BURNING PERMITS.
6. BEGIN SUBGRADE FILL PLACEMENT IN CELL 1. INSTALL EROSION AND SEDIMENT CONTROL DEVICES AS CONSTRUCTION PROGRESSES.
7. CONSTRUCT TEST PAD. UPON SOIL APPROVAL, CONSTRUCT COMPACTED SOIL LINER IN CELL 1.
8. INSTALL SECONDARY LINER SYSTEM AND LEACHATE DETECTION SYSTEM COMPONENTS IN CELL 1.
9. INSTALL PRIMARY LINER SYSTEM AND LEACHATE COLLECTION SYSTEM COMPONENTS IN CELL 1.
10. INSTALL PROTECTIVE COVER SOIL IN CELL 1.
11. FINALIZE CELL 1 CONSTRUCTION. PERFORM STARTUP AND TESTING OF SYSTEM CONTROLS. PROVIDE LANDSCAPING AND PERMANENT VEGETATION ACCORDING TO SEEDING SPECIFICATIONS ON DRAWING D7.
12. FINALIZE CELL 1 CONSTRUCTION.

GENERAL NOTES

1. THE OWNER'S CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTATION AND MAINTENANCE OF ALL EROSION AND SEDIMENT CONTROLS PROPOSED HEREIN.
2. THE OWNER'S CONTRACTOR IS RESPONSIBLE FOR NOTIFYING UTILITY COMPANIES TO LOCATE ALL UNDERGROUND UTILITIES PRIOR TO ANY CONSTRUCTION.
3. SEE SHEET C7 FOR CELL 2 CONSTRUCTION SEQUENCE.
4. S&ME HAS NOT VERIFIED THE LOCATION OF ANY UTILITIES. THE LOCATION OF THE CONSTRUCTION EASEMENT IS APPROXIMATE BASED ON INFORMATION PROVIDED BY DUKE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION. NORTH CAROLINA STATE LAW REQUIRES THAT NORTH CAROLINA ONE-CALL BE CONTACTED A MINIMUM OF 48 HOURS PRIOR TO ANY PLANNED EXCAVATIONS. EXCAVATIONS SHOULD BE SLOPED OR SHORED IN ACCORDANCE WITH APPLICABLE FEDERAL, OSHA, STATE AND LOCAL REQUIREMENTS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR SITE EXCAVATION SAFETY.

NOTE:
1. ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER TABLE FROM SITE SUITABILITY STUDY DATED AUGUST 31, 2007.

60 0 30 60 120
(IN FEET)

LEGEND

- EXISTING INDEX CONTOUR (5')
- EXISTING INTERMEDIATE CONTOUR (1')
- PROPOSED GRADE INDEX CONTOUR (10')
- PROPOSED GRADE INTERMEDIATE CONTOUR (2')
- ESTIMATED LONG-TERM SEASONAL HIGH GROUNDWATER (NOTE 1)
- D1 GRASS LINED CHANNEL
- 1A SUBCELL INDICATOR

Duke Energy®

S&ME
WWW.SMEINC.COM

NORTH CAROLINA PROFESSIONAL SEAL ENGINEER

NO.	DATE	DESCRIPTION	BY
2	3-18-09	NOTICE OF CHANGE 11: ACCESS RAMP	
1	3-12-09	NOTICE OF CHANGE 5A: SUMP GRADES	
0	10-20-08	ISSUED FOR CONSTRUCTION	

CELL 1 FINAL SUBGRADE AND EROSION AND SEDIMENT CONTROL PLAN

PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION
BELMONT, NORTH CAROLINA

DRAWN BY: CLD	CHECKED BY: KRD
DESIGNED BY: CHR	APPROVED BY: KRD
PROJECT NUMBER 1356-06-825	
SCALE: AS SHOWN	DATE: 7-31-08
DRAWING: C4	OF: 28

DRAWING PATH: G:\1356\DUKE ENERGY\DE-825 PLANT ALLEN\DWG\CONSTRUCTION\WCC 11 ACCESS RAMP\C4 CELL 1 FINAL SUBGRADE.DWG

S&ME

NOTICE OF CHANGE

OWNER:	Duke Energy	**Date:** 4/22/09	**Job No.:** 1356-06-825-09
DESCRIPTION:	Concrete Slab Elevations	Duke Energy – Allen Steam Station	
		Ash Landfill	
NOTICE OF CHANGE NO.	12		
CHANGE ORDER NOS:			

Description of design change:

Northings, eastings, and elevations were adjusted in Detail 11 on Electrical-Mechanical Drawing D3.

Based on discussions with Earnhardt Grading and Duke Energy personnel on Tuesday, April 21, 2009, the asphalt pavement tie-in to the north of the scale pad area shall be adjusted in the field and documented by as-built drawings. Similarly, the ABC pavement tie-in to the south of the scale pad area shall also be adjusted in the field and documented by as-built drawings.

Reason for design change:

Accommodate as-built scale footing locations.

Effective date of design change:

Immediately.

Financial and schedule considerations:

None anticipated.

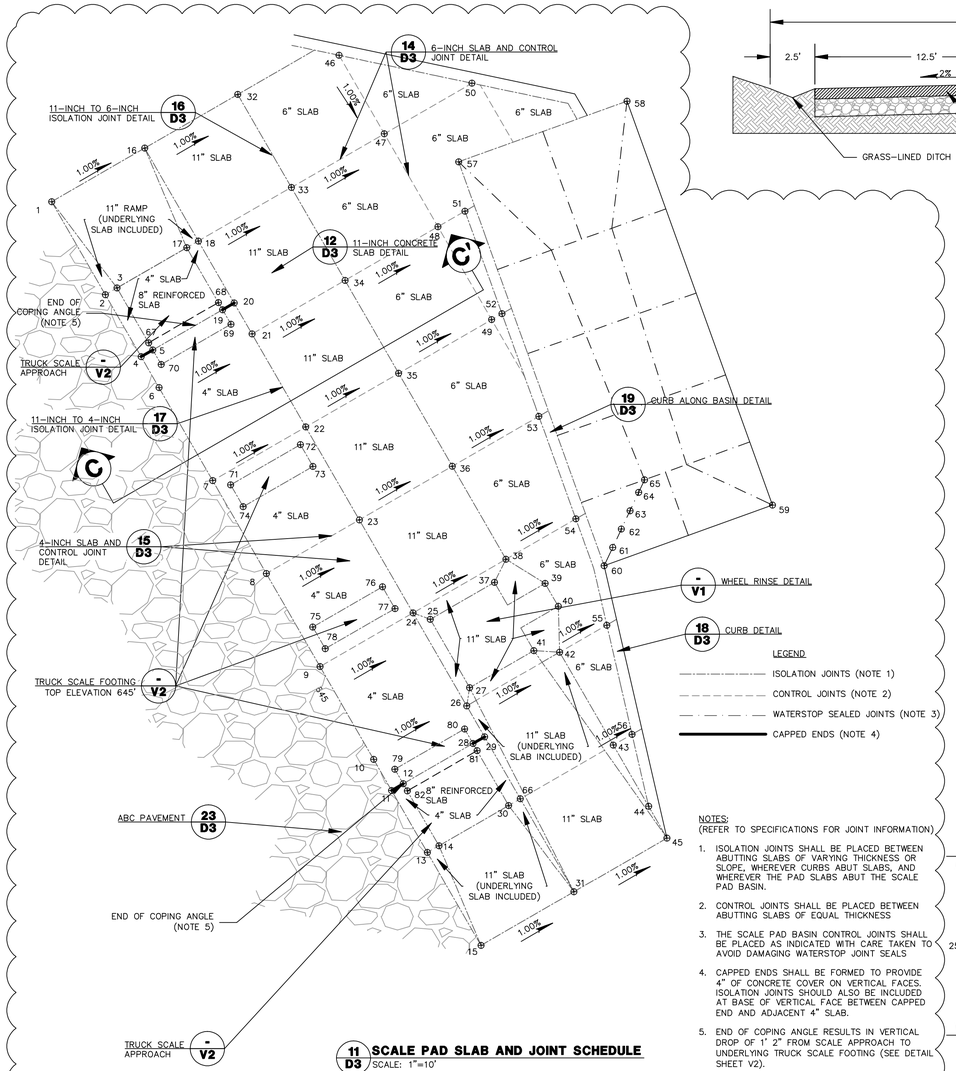
Attachments:

Revision 3 of Electrical-Mechanical Drawings D3

4/22/09		4/22/09	
Engineer of Record	**Date**	**Prepared By**	**Date**
Kenneth Daly, P.E.		Kyle Baucom, E.I.	

Copies to:

- ☒ Ted Manes, Duke Energy
- ☒ S&ME File No. 1356-06-825
- ☐
- ☒ Mark LeGrand, Earnhardt Grading, Inc.
- ☒ Brad Hughey, Crowder Construction Co.
- ☐



11 D3 SCALE PAD SLAB AND JOINT SCHEDULE
SCALE: 1"=10'

NOTES:
(REFER TO SPECIFICATIONS FOR JOINT INFORMATION)

1. ISOLATION JOINTS SHALL BE PLACED BETWEEN ABUTTING SLABS OF VARYING THICKNESS OR SLOPE, WHEREVER CURBS ABUT SLABS, AND WHEREVER THE PAD SLABS ABUT THE SCALE PAD BASIN.
2. CONTROL JOINTS SHALL BE PLACED BETWEEN ABUTTING SLABS OF EQUAL THICKNESS
3. THE SCALE PAD BASIN CONTROL JOINTS SHALL BE PLACED AS INDICATED WITH CARE TAKEN TO AVOID DAMAGING WATERSTOP JOINT SEALS
4. CAPPED ENDS SHALL BE FORMED TO PROVIDE 4" OF CONCRETE COVER ON VERTICAL FACES. ISOLATION JOINTS SHOULD ALSO BE INCLUDED AT BASE OF VERTICAL FACE BETWEEN CAPPED END AND ADJACENT 4" SLAB.
5. END OF COPING ANGLE RESULTS IN VERTICAL DROP OF 1' 2" FROM SCALE APPROACH TO UNDERLYING TRUCK SCALE FOOTING (SEE DETAIL SHEET V2).
6. ALL SLABS SHALL BE 15-FT X 15-FT WHEREVER POSSIBLE

3

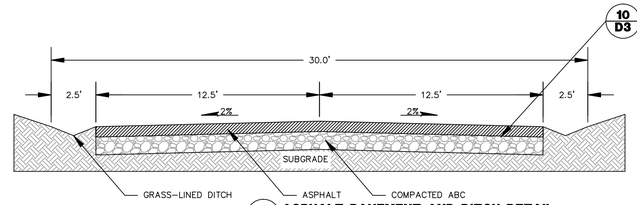
TOP OF CONCRETE SLAB POINTS

POINT	NORTHING	EASTING	ELEVATION	POINT	NORTHING	EASTING	ELEVATION
1	529040.34	1398779.85	645.57	34	529029.35	1398820.83	645.27
2	529027.35	1398787.35	645.57	35	529016.36	1398828.33	645.27
3	529028.28	1398788.97	646.74	36	529003.36	1398835.82	645.27
4	529018.68	1398792.35	645.57	37	528987.14	1398841.70	645.01
5	529019.62	1398793.97	646.74	38	528990.37	1398843.32	645.27
6	529014.35	1398794.85	645.57	39	528986.99	1398848.78	645.01
7	529001.36	1398802.34	645.57	40	528983.80	1398850.63	645.01
8	528988.37	1398809.84	645.57	41	528977.59	1398847.21	645.01
9	528975.38	1398817.34	645.57	42	528977.38	1398850.82	645.27
10	528962.38	1398824.83	645.57	43	528964.39	1398858.31	645.93
11	528958.05	1398827.33	645.57	44	528955.84	1398863.25	646.26
12	528958.99	1398828.96	646.74	45	528951.39	1398865.81	646.44
13	528949.39	1398832.33	645.57	46	529060.80	1398820.00	645.25
14	528950.33	1398833.95	646.74	47	529049.84	1398826.33	645.12
15	528936.40	1398839.83	646.74	48	529036.84	1398833.82	645.12
16	529047.84	1398792.85	645.42	49	529023.85	1398841.32	645.12
17	529033.91	1398798.72	646.74	50	529056.90	1398838.57	645.12
18	529034.84	1398800.34	645.42	51	529039.02	1398837.59	645.08
19	529025.24	1398803.72	646.74	52	529024.68	1398842.76	645.10
20	529026.18	1398805.34	645.42	53	529010.34	1398847.92	645.13
21	529021.85	1398807.84	645.42	54	528996.00	1398853.08	645.16
22	529008.86	1398815.34	645.42	55	528981.14	1398857.41	645.19
23	528995.87	1398822.83	645.42	56	528966.01	1398861.36	645.90
24	528982.87	1398830.33	645.42	57	529046.36	1398836.70	645.07
25	528981.97	1398832.74	645.01	58	529054.39	1398860.22	645.07
26	528969.88	1398837.83	645.42	59	528997.94	1398880.55	645.07
27	528972.42	1398838.25	645.01	60	528989.47	1398857.03	645.07
28	528964.61	1398838.70	646.74	61	528992.03	1398858.24	644.07
29	528965.55	1398840.32	645.42	62	528994.58	1398859.44	643.07
30	528955.95	1398843.70	646.74	63	528997.14	1398860.65	642.07
31	528943.90	1398852.82	646.59	64	528999.70	1398861.85	641.07
32	529055.33	1398805.84	645.27	65	529001.48	1398862.68	640.38
33	529042.34	1398813.33	645.27	66	528956.89	1398845.32	645.89

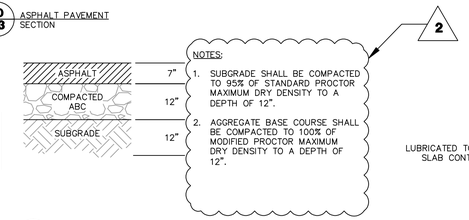
TRUCK SCALE FOOTING POINTS

POINT	NORTHING	EASTING
67	529020.61	1398793.43
68	529026.23	1398803.17
69	529023.20	1398804.89
70	529017.58	1398795.16
71	529000.77	1398804.86
72	529006.37	1398814.59
73	529003.34	1398816.34
74	528997.74	1398806.61
75	528980.87	1398816.33
76	528986.46	1398826.08
77	528983.42	1398827.83
78	528977.85	1398818.08
79	528961.07	1398827.77
80	528966.66	1398837.49
81	528963.63	1398839.25
82	528958.05	1398829.52

*ALL TRUCK SCALE FOOTINGS HAVE TOP ELEVATIONS OF APPROXIMATELY 645.57' (BASED ON FOOTING AS-BUILT SURVEY BY DONNIE LAWRENCE & ASSOC. ON 4/21/09



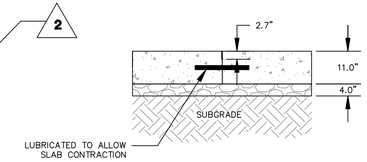
9 D3 ASPHALT PAVEMENT AND DITCH DETAIL
SCALE: 1"=4'



NOTES:

1. SUBGRADE SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".
2. AGGREGATE BASE COURSE SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".

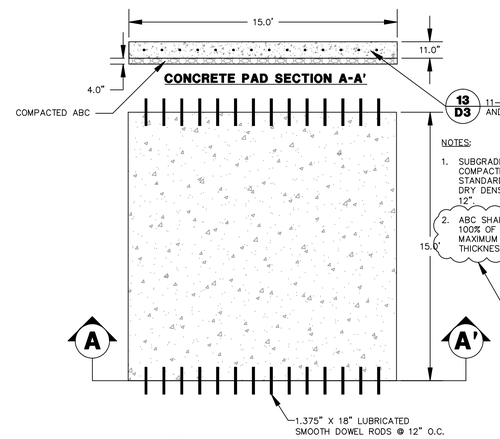
10 D3 ASPHALT PAVEMENT SECTION
SCALE: 1"=2'



NOTES:

1. DOWELS SHALL MEASURE 1-3/8" IN DIAMETER AND SHALL MEASURE 18" IN LENGTH
2. DOWELS SHALL BE SMOOTH AND LUBRICATED TO ALLOW SLAB CONTRACTION AND EXPANSION
3. SAWED OR CAST JOINTS SHALL EXTEND TO A DEPTH EQUAL TO 1/4 THE THICKNESS OF THE SLAB
4. JOINTS SHALL BE SEALED AS INDICATED IN THE SPECIFICATIONS

13 D3 11-INCH SLAB DOWEL AND JOINT DETAIL
SCALE: 1"=2'

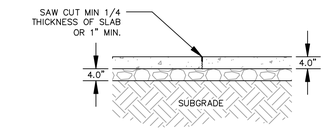


NOTES:

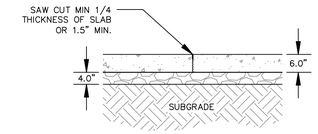
1. SUBGRADE SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".
2. ABC SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO THICKNESS SPECIFIED

2

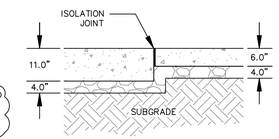
12 D3 11" CONCRETE SLAB DETAIL
SCALE: 1"=4'



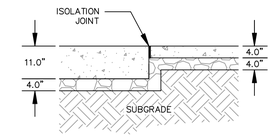
15 D3 4-INCH SLAB AND CONTROL JOINT DETAIL
SCALE: 1"=2'



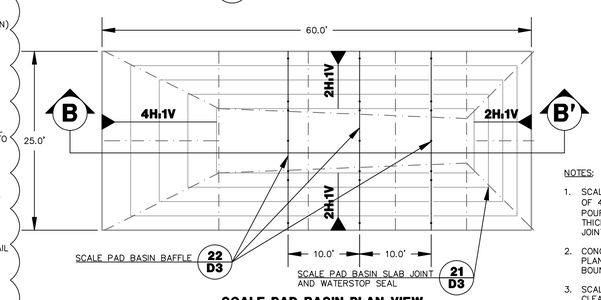
14 D3 6-INCH SLAB AND CONTROL JOINT DETAIL
SCALE: 1"=2'



16 D3 11-INCH TO 6-INCH ISOLATION JOINT DETAIL
SCALE: 1"=2'



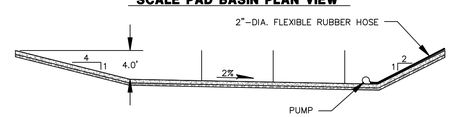
17 D3 11-INCH TO 4-INCH ISOLATION JOINT DETAIL
SCALE: 1"=2'



SCALE PAD BASIN PLAN VIEW

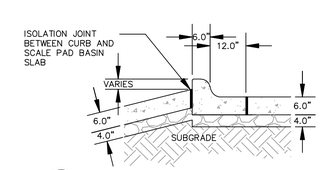
NOTES:

1. SCALE PAD BASIN SHALL CONSIST OF 4" COMPACTED ABC BASE, POURED CONCRETE SLABS OF 6" THICKNESS WITH WATERSTOPPED JOINTS
2. CONCRETE PADS SHALL BE PLANAR WITHIN JOINTED BOUNDARIES
3. SCALE PAD BASIN SHALL BE CLEARED OUT MONTHLY OR WHEN SEDIMENTATION EXCEEDS 6" THICKNESS
4. BAFFLES WILL BE SECURED TO BASIN SLABS WITH CORROSION RESISTANT WIRES STRUNG THROUGH ANCHORED BOLTS

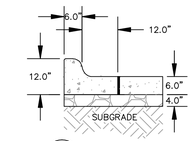


SCALE PAD BASIN SECTION B-B'

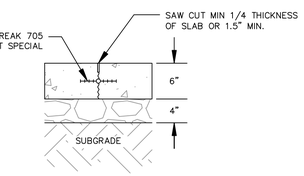
20 D3 SCALE PAD BASIN DETAILS
SCALE: 1"=10'



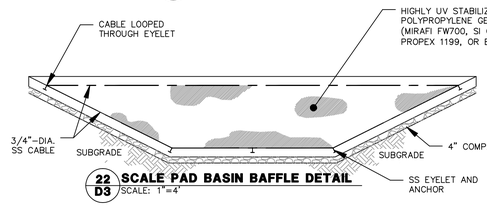
19 D3 CURB ALONG BASIN DETAIL
SCALE: 1" = 2'



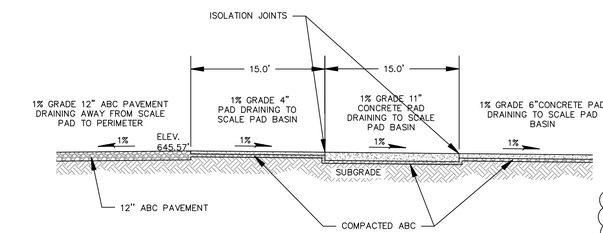
18 D3 CURB DETAIL
SCALE: 1" = 2'



21 D3 SCALE PAD BASIN SLAB JOINT AND WATERSTOP SEAL
SCALE: 1"=1'



22 D3 SCALE PAD BASIN BAFFLE DETAIL
SCALE: 1"=4'

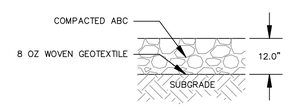


SCALE PAD SECTION C-C'
SCALE: 1"= 8'

NOTES:

1. SUBGRADE SHALL BE COMPACTED TO 95% OF STANDARD PROCTOR MAXIMUM DRY DENSITY TO A DEPTH OF 12".
2. ABC SHALL BE COMPACTED TO 100% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY TO THICKNESS SPECIFIED

2



23 D3 ABC PAVEMENT
SCALE: 1"=2'

Duke Energy ©

S&ME
WWW.SMEINC.COM

NORTH CAROLINA PROFESSIONAL SEAL 022134 ENGINEER

NO.	DATE	DESCRIPTION	BY
3	4-22-09	NOC 12: CONCRETE SLAB ELEVATIONS	
2	3-16-09	NOTICE OF CHANGE 6: AGGREGATE & SUBGRADE COMPACATION	
1	2-18-09	ISSUED FOR CONSTRUCTION	

ACCESS ROAD / ENTRANCE DETAILS I

ELECTRICAL/MECHANICAL
PHASE I RAB ASH LANDFILL
DUKE ENERGY - ALLEN STEAM STATION

DRAWN BY: WMH	CHECKED BY: IKB
DESIGNED BY: WMH	APPROVED BY: KZ
PROJECT NUMBER: 1356-06-825	
SCALE: AS SHOWN	DATE: 2-18-09
DRAWING: D3	OF: 19

DRAWING PATH: Q:\1356\DUKE ENERGY\06-825 PLANT ALLEN\DWG\CONSTRUCTION\NOC 12 - CONCRETE SLAB ELEVS\V-W DETAILS 3-4.DWG