CLOSURE CERTIFICATION REPORT FOR FOUR SURFACE IMPOUNDMENTS AT THE DUPONT EDGE MOOR FACILITY

Submitted to:

State of Delaware
Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Solid and Hazardous Waste Management Branch
P.O. Box 1401, 89 Kings Highway
Dover, DE 19903

Re: EPA I.D. NO. DED000800284, Code 15
Submitted in compliance with Consent Order: C.A. No. 01C-10-288CHT

Date: May 25, 2004

CRG Project No.: 507382
URS Job No.: 18983858

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

CERTIFICATION OF
CONSTRUCTION QUALITY ASSURANCE
FOR
CLOSURE OF FOUR SURFACE IMPOUNDMENTS
DUPONT EDGE MOOR SITE
EDGEMOOR, DELAWARE

URS Corporation personnel have observed and documented the remedial action construction for the closure of four surface impoundments at the E. I. du Pont de Nemours and Company (DuPont) Edge Moor facility according to generally accepted practices. Based on field observations made by qualified onsite personnel and data provided by the Contractor and its subcontractors, the remedial action construction at the site is considered to have been performed in general compliance with the Delaware Department of Natural Resources and Environmental Control (DNREC) Consent Order (C.A. 01c-10-288CHT), the *Delaware Regulations Governing Hazardous Waste* (DRGHW) Part 264, and the DuPont Corporate Remediation Group (CRG) approved Contract Documents.

URS Corporation certifies that the remedy is operational and functional.

The work was observed and documented by competent persons under my direct supervision.

James E. Whitty, P.E.
Delaware License No. 9699

P.E. Stamp

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EXECUTIVE SUMMARY

This document presents the construction actions undertaken to complete the closure construction for the final cover of four surface impoundments at the E. I. du Pont de Nemours and Company (DuPont) Edge Moor White Pigment Facility in Edgemoor, Delaware.

The cap system construction was performed in general compliance with the Delaware Department of Natural Resources and Environmental Control (DNREC) Consent Order (C.A. 01c-10-288CHT), the *Delaware Regulations Governing Hazardous Waste* (DRGHW) Part 264, and the DuPont Corporate Remediation Group (CRG) approved contract documents. The closure certification is based on field observations made by qualified onsite personnel, quality control (QC) data provided by the Contractor, and quality assurance (QA) data obtained by DuPont.

The four surface impoundments were historically referred to as Surface Impoundments (or Ponds) A, B, C, and D. During the final cover construction the three separate cap systems were designated as Cell A, Cell B, and Cell C/D to correspond with the respective surface impoundment(s) that the cap system covered.

On January 31, 2002, DuPont submitted the "Closure Plan for Four Surface Impoundments at the DuPont Edge Moor Facility" (Closure Plan) to DNREC. The Closure Plan was mandated by the Consent Order lodged with the Superior Court of the State of Delaware on November 2, 2001. The Closure Plan was approved by DNREC on April 15, 2003.

The Closure Plan proposed an in-place closure of the surface impoundments consisting of neutralization and stabilization of the waste contained within the impoundments followed by construction of geosynthetic caps.

Neutralization and stabilization activities were completed on August 2, 2002. DuPont submitted the "Documentation of Neutralization and Stabilization Construction Activities for Four Surface Impoundments" to DNREC on November 4, 2002 as documentation demonstrating that the neutralized and stabilized material was in compliance with the project performance criteria.

On September 8, 2003, DuPont and the selected cap construction contractor, URS Remediation Operating Services (URS-ROS) initiated cap construction activities. The closure performance standards for the final cover were:

- Provide long-term minimization of migration of liquids through the closed impoundments.
- Function with minimum maintenance.
- Promote drainage and minimize erosion or abrasion of the cover.
- Accommodate settling and subsidence so that the cover's integrity is maintained.
- Have permeability less than or equal to the permeability of any bottom liner system or natural subsoil present.

Construction activities included:

- Installation of temporary site facilities and utilities, demolition of site structures, and stockpiling of debris.
- Construction of erosion and sediment controls.
- Excavation and grading of neutralized and stabilized material to the intermediate lines and grades of the cap subgrade.
- Installation of 12-ounce per square yard (oz/sy.) non-woven geotextile within the cap system.
- Installation of 40-mil LDPE geomembrane within the cap system.
- Installation of geosynthetic drainage layer for the cap system.
- Placement of 12-inches of cover soil and 6-inches of topsoil.
- Seeding and mulching of cap system surface to minimize erosion and function with minimum maintenance.

The CRG and URS-ROS implemented a construction quality program consisting of QC and QA activities necessary to manage, control, and document that the project complied with the requirements established by the Design Drawings and Technical Specifications. URS-ROS controlled the quality of the project through process control, inspection, verification, documentation, and testing. QA, which was separate from but coordinated with QC, was used to verify that the Contractor had achieved the level of quality required through submittal review, construction observation, review of QC reports, and confirmation testing.

Construction was completed on March 13, 2004 and demobilization was completed on March 26, 2004.

1.0 INTRODUCTION

1.1 Purpose

The purpose of this report is to document completion of closure activities mandated by the Delaware Department of Natural Resources and Environmental Control (DNREC) Consent Order (C.A. 01c-10-288CHT) lodged with the Superior Court of the State of Delaware on November 2, 2001. The closure activities are described in the "Closure Plan for Four Surface Impoundments at the DuPont Edge Moor Facility" (Closure Plan) submitted by E. I. du Pont de Nemours and Company (DuPont) on January 31, 2002 and approved by DNREC on April 15, 2003.

The Closure Certification Report presents the construction actions undertaken to complete the closure construction for the final cover of four surface impoundments at the DuPont Edge Moor White Pigment Facility (facility) in Edgemoor, Delaware. Figure 1 shows the location of the facility and Figure 2 shows the location of the four surface impoundments within the facility.

The four surface impoundments were historically referred to as Surface Impoundments (or Ponds) A, B, C, and D. During the final cover construction the three separate cap systems were designated as Cell A, Cell B, and Cell C/D to correspond with the respective surface impoundment(s) that the cap system covered.

1.2 Background

DuPont purchased the facility in 1935 from the Krebs Company. Krebs, the first owner to use the land for industrial purposes, operated a titanium dioxide (TiO_2) production facility on a portion of the site for about five years prior to selling the facility to DuPont. DuPont has used the site for titanium dioxide manufacturing since its purchase in 1935 to the present.

Titanium dioxide has been produced at the facility using two processes: the sulfate process and the chloride process. The sulfate process was used from the startup of the facility until 1974. The sulfate process line was dismantled in 1976.

DuPont developed the chloride process at the facility in 1948, and the first saleable product was made in 1950. In 1975, the chloride process was initiated in Line II, which now produces the entire quantity of the facility's pigment.

Both TiO_2 production processes generated two waste streams—a low pH aqueous material and low pH sludge. The sulfate process generated spent sulfuric acid and iron sulfate sludge, while the chloride process generates aqueous iron chloride and iron chloride sludge.

Historically, the waste streams from the sulfur and later the chloride processes were collected and separated in the "mud sulfate pond" located in the area occupied by Surface Impoundments C and D. In 1955 another surface impoundment, Surface Impoundment B, was constructed to perform the same function.

In 1958, the solids were dredged from the impoundments and disposed of at the DuPont Cherry Island Landfill, located about two miles south of the site. The impoundments were emptied approximately every four years.

On November 14, 1972, DNREC issued a "Certificate of Approval" for construction and operation of a fourth surface impoundment, Surface Impoundment A.

In 1977 the "mud sulfate" pond was completely removed and disposed of at Cherry Island Landfill and was replaced with the current Surface Impoundments C and D. Disposal of solids dredged from the various impoundments continued at different times until 1996; at which time, DuPont closed the landfill. After the landfill was closed, all solids were separated from liquid iron chloride (sold as ferric chloride) in facilities built in 1992.

Presently, liquids/solids separation inherent to mineral processing activities is accomplished entirely within the manufacturing process and accompanying tank-based waste management units, eliminating the need for the settling ponds.

1.3 Surface Impoundment Closure Design

The objectives of the Edge Moor Surface Impoundment Closure Design were to:

- Provide long-term minimization of migration of liquids through the closed impoundments.
- Function with minimum maintenance.
- Promote drainage and minimize erosion or abrasion of the cover.
- Accommodate settling and subsidence so that the cover's integrity is maintained.
- Have permeability less than or equal to the permeability of any bottom liner system or natural subsoil present.

The final cover generally consisted of the following cap components (from top to bottom):

- A 6-inch thick topsoil layer
- A 12-inch thick cover soil layer
- An 8-ounce per square yard (oz/sy.) geotextile
- A high-density polyethylene (HDPE) geonet
- A 40-mil low-density polyethylene (LDPE) geomembrane
- A 12-oz/sy. cushion geotextile
- Stabilized material (regraded as necessary)

Each cell includes controls that collect and transport surface water runoff into outlet structures that lead to the Delaware River.

1.4 Closure Activities

The Consent Order included closure of the surface impoundments in accordance with the closure standards in the *Delaware Regulations Governing Hazardous Waste* (DRGHW), Part 264 and additional treatment standards mandated in an October 12, 2001 letter from DNREC.

DuPont submitted the Closure Plan to DNREC in accordance with the requirements of the Consent Order. The Closure Plan proposed an in-place closure of the surface impoundments consisting of neutralization and stabilization of the waste contained within the impoundments followed by construction of geosynthetic caps. The Consent Order required that construction activities be completed within 12 months of DNREC final approval of the Closure Plan.

In anticipation of the closure of the surface impoundments, DuPont initiated several activities prior to entering into the Consent Order and submittal of the Closure Plan. These activities included:

- Aerial photography and mapping (May 6, 2000)
- Waste Characterization Sampling (February 27, 2001)
- Treatability Study for Obtaining Closure Performance Standards (May 2001)

DuPont commenced neutralization and stabilization construction activities on November 15, 2001 to:

- Obtain the universal treatment standards (UTSs) for compounds specified in the DNREC October 12, 2001 letter, including the alternate treatment standards for furans proposed in the Closure Plan.
- Stabilize wastes to a bearing capacity sufficient to support the final cover.

Construction activities included site preparation, neutralization and stabilization of waste using standard excavating equipment to mix Portland Type I cement and hydrated lime into the waste, grading of processed material to promote drainage and accommodate the future capping system, installation of storm water controls, and restoration of the site.

Neutralization and stabilization activities were completed on August 2, 2002. DuPont submitted the "Documentation of Neutralization and Stabilization Construction Activities for Four Surface Impoundments" to DNREC on November 4, 2002 as documentation demonstrating that the neutralized and stabilized material was in compliance with the project performance criteria.

On September 8, 2003, DuPont and the selected cap construction contractor, URS Remediation Operating Services (URS-ROS) initiated cap construction activities. This report presents the construction actions undertaken to complete the closure construction of the four surface impoundments.

2.0 SUMMARY OF CONSTRUCTION

2.1 Scope of Work

The definable features of the project were:

- Site preparation including installation of temporary site facilities and utilities, demolition of site structures, and stockpiling of debris.
- Construction of erosion and sediment (E & S) controls including silt fence and reinforced silt fence, stabilized construction entrance, sediment traps, stone outlets, and storm sewer inlet protection.
- Excavation and grading of neutralized and stabilized material to the intermediate lines and grades of the cap subgrade.
- Installation of 12-oz/sy. non-woven geotextile above the stabilized material.
- Installation of 40-mil LDPE geomembrane above the geotextile.
- Installation of geosynthetic drainage layer for the cap system above the LDPE geomembrane, including HDPE geonet and 8-oz/sy. non-woven geotextile components.
- Placement of 12-inches of cover soil and 6-inches of topsoil including construction of surface drainage features.
- Seeding and mulching of cap system surface to minimize erosion and function with minimum maintenance.

2.2 Project Participants

The following is a list of the significant participants in the Surface Impoundment Cap Construction project and a description of their roles in the project.

- **DuPont:** As the Owner, DuPont had overall responsibility for the Edge Moor Surface Impoundments closure. DuPont was responsible for reporting to the DNREC Case Manager.
- **DNREC:** State regulatory agency. Mr. Matthew D. Q. Higgins was the Case Manager in the Division of Air and Waste Management (DAWM), Solid and Hazardous Waste Management Branch (SHWMB). All DuPont reporting was addressed to Mr. Higgins.
- **Geosynthetics, Inc. (GSI):** Geosynthetic materials installer, subcontractor to the Construction Contractor. GSI was responsible for acceptance of the subgrade surface and installation of the geotextile, geomembrane, and geonet components of the cap systems.
- **URS Diamond (URSD):** Design Engineer and DuPont Site Representative. URSD was responsible for construction management and construction quality assurance (QA) oversight of the project, including providing site personnel and

other resources to manage the construction and accomplish the QA scope of work, maintaining budget and schedule control, and providing complete and timely reporting to DuPont.

- **URS-ROS:** Construction Contractor (Contractor). The Contractor had overall responsibility for construction and for quality control (QC) during construction in accordance with the Contract Documents and the Contractor's Work Plan.

2.3 Project Documents

2.3.1 Engineering Technical Specifications and Design Drawings

The surface impoundment cap systems were constructed according to the Technical Specifications and Design Drawings prepared by the DuPont Corporate Remediation Group and URS Corporation in September 2001. The Technical Specifications and Design Drawings were submitted to DNREC in the November 8, 2002 closure plan response to comments letter and are available from DuPont upon request.

2.3.2 Modifications to Project Documents

The Surface Impoundment Cap Construction was constructed in general conformance with the Design Drawings and Technical Specifications. Construction conditions and value engineering, however, necessitated modifications to these documents. A controlled system comprised of field change requests (FCRs), engineering change orders (ECOs) and contract alterations was utilized to identify, evaluate, approve, and implement the necessary changes.

FCRs were issued by the Contractor to document requests for clarification of and field changes to the Design Drawings and Technical Specifications. FCRs were also used to document the DuPont response to these requests. A log of submitted FCRs is included as Table 1. FCRs resulting in approved changes to the Design Drawings and Technical Specifications were accompanied by an ECO.

ECOs were issued by URSD to formally document changes to the Design Drawings and Technical Specifications resulting from approved FCRs and value engineering efforts. ECOs that required implementation by the Contractor or that effected the Contractor's construction methods were issued to the Contractor as an attachment to the corresponding FCR. A log of submitted ECOs is included as Table 2. ECOs that had a financial impact to the Contract were accompanied by a contract alteration.

Contract alterations were issued by DuPont to document approved changes to the Contract and to authorize the Contractor to implement changes in the Contract scope of work identified and approved through the FCR/ECO process.

Detailed explanations of the FCRs and ECOs processed during construction are presented in Appendix A.

2.4 Safety

2.4.1 Project Safety Analysis

DuPont conducted a Project Safety Analysis (PSA) at the site on September 8, 2003. Representatives from the CRG, URSD, the DuPont Edge Moor Plant, and URS-ROS were in attendance. The PSA identified potential physical and chemical hazards associated with the scope of work and outlined plans for eliminating or managing these hazards. A copy of the PSA is available from DuPont upon request.

2.4.2 Health and Safety Plan

A site-specific Health and Safety Plan (HASP) was developed in accordance with the DuPont safety and health standard operating procedures and in compliance with the requirements set forth in 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response. A site orientation and HASP review was conducted on September 8, 2003. Representatives from the CRG, URSD, and URS-ROS participated in the HASP review. Additional site orientations and HASP reviews were conducted as new personnel arrived on-site. A copy of the HASP is available from DuPont upon request.

2.5 Sequence of Construction

A final schedule showing start and completion dates is included as Figure 3. The construction activity summary of the Contractor's daily progress reports and the daily QA reports for the work are provided in Appendix B. In addition, the Contractor and URSD prepared photographic documentation records as part of the construction QC/QA requirements (Appendix C). Material QC/QA data is included in Appendix D and installation QC/QA data is presented in Appendix E.

2.5.1 Pre-construction Meeting

A pre-construction meeting was held at the site on September 3, 2004 to review the work plan and to address any health and safety and construction concerns. Representatives from the CRG, URSD, the DuPont Edge Moor Plant, and URS-ROS were in attendance.

2.5.2 Mobilization and Site Preparation

URS-ROS initiated mobilization of equipment and personnel to the site on September 8, 2003 and continued through September 10, 2003. A total of five personnel, one track excavator, one front end loader, one man lift, two construction trailers, and miscellaneous support equipment and supplies were mobilized during this time. Additional equipment mobilized throughout the project included one trencher, one three-inch pump, three bull dozers, two additional hydraulic excavators, one 5 cubic yard (cy.) dump truck, one smooth drum vibratory roller, one water truck, one off road dump truck, a fork lift, smooth drum and pad foot trench rollers, and a track loader.

The stabilized construction entrance, silt fence, and other site control structures were installed between September 16 and 23, 2003.

Demolition of the existing process piping and associated structures along the southern boundary of Cells B and C/D was completed in two phases. The existing cable tray and unused air scrubber were demolished on September 10 and 11, 2003. Prior to demolition of the process piping, Edge Moor Plant personnel removed residual material from the pipeline and completed the first line breaks. The residual material was recycled into the manufacturing waste treatment process. The piping demolition commenced on October 17 and continued through October 24, 2003.

Inlet protection for the existing storm drains was constructed on September 16, 2003.

Sediment traps for Cells A and B were constructed between September 22, 2003 and October 2, 2003. The stone outlets for Cells A and B were constructed between September 26 and 29, 2003.

2.5.3 Intermediate Grading and Surface Preparation

Intermediate grading and surface preparation construction activities consisted of:

- Excavation, regrading, and compaction of in situ subgrade materials to design grade elevations
- Drying of wet material
- Removal of rocks and other objects from the subgrade surface that would potentially damage the cap components

URS-ROS began grading operations in Cell C/D on October 1, 2003 and finished rough grading on November 2, 2003. URS-ROS periodically encountered saturated material during the grading of Cell C/D, primarily in deeper cut areas along the eastern berm. These areas were dried using a combination of passive air drying techniques and mixing the material with drying agents such as hydrated lime. In lieu of using heavy equipment to prepare the surface in the areas that were dried, a thin sand layer was deployed to fill ruts.

Grading and surface preparation operations were completed in Cell B between October 22, 2003 and November 11, 2003.

Cell A grading activities began on October 31, 2003. Construction of the perimeter drainage swales was suspended during the week of November 3, 2003 because seeps were evident along the interface between the clay lining and the stabilized material. URS-ROS implemented measures to contain seeping liquid within the excavated swales (refer to summary of FCR7382-015 and ECO7382-018 in Appendix A). The pH of the liquid was tested and soda ash was added within the impoundment to liquids that had low pH. The liquid that did not have a low pH was pumped to the facility wastewater treatment plant. The seep elevations were surveyed and a revised swale and cap termination design was developed for Cell A. Grading and surface preparation operations resumed on December 1 and continued through December 21, 2003.

URS-ROS maintained the subgrade surface until the geosynthetic material installer, GSI, accepted the surface condition for deployment of the subgrade geotextile.

2.5.4 Installation of Subgrade Geotextile

A total of 46 rolls of 12-oz/sy. non-woven polypropylene geotextile (TNS E120®) manufactured by Nevown, Inc. of Greer, South Carolina were delivered to the site. Geotextile rolls were stockpiled within the staging area on the site.

The geotextile was deployed directly on the subgrade as a cushion layer between the geomembrane and the subgrade surface. Geotextile rolls were overlapped a minimum of 6 inches on all sides for seams that were continuously sewn by GSI with a polymeric thread and an interlocking stitch. Where stitching the geotextile was not possible (e.g., due to freezing conditions), the geotextile was heat bonded using a manufacturer-approved hot air gun. The rolls were overlapped a minimum of 18-inches per the Technical Specifications when the seams were heat bonded. Wherever the thread broke or the seam was discontinuous during the geotextile installation, an additional seam was sewn to repair the defective area.

GSI began deployment of the 12-oz/sy. subgrade geotextile on Cell B on December 4 and continued through December 15, 2003. Deployment of the 12-oz/sy. geotextile progressed on Cell C/D from December 16 through 22, 2003. Subgrade geotextile deployment on Cell A was completed on January 3 and 4, 2004.

2.5.5 Installation of Geomembrane

A total of 25 rolls of 40-mil smooth, LDPE geomembrane (Solmax 840) manufactured by Solmax International of Varennes, Quebec, Canada were delivered to the site. Geomembrane rolls were stockpiled within the staging area on the site. Minor damage of the geomembrane was repaired in accordance with the Technical Specifications.

The geomembrane rolls were transported with a spreader bar attached to a forklift from the stockpile area to the deployment area. During deployment the forklift held the geomembrane while an all terrain vehicle (ATV) and laborers pulled the geomembrane off the roll and into position. Laborers using hand clamps positioned the geomembrane panels to ensure a minimum 3-inch overlap with adjacent panels. The deployed panels were labeled P-1 through P-85 and covered a plan area of approximately 298,906 square feet (6.9 acres). These panel identification numbers reference the sequential order in which the panels were deployed. The panel diagrams prepared by the QC representative are presented in Appendices E1, E2, and E3 for Cells A, B, and C/D, respectively.

The geomembrane panels were temporarily anchored with sandbags until the panels were seamed together. Damaged or blemished areas of the geomembrane were repaired in accordance with the Technical Specifications.

Trial seams were made by each welding apparatus and operator at the start of each day and after each break that resulted in an equipment shutdown. Trial seams were made with pieces of LDPE geomembrane welded together under the same ambient air conditions as the field seaming to be performed.

Seaming of the geomembrane panels proceeded concurrently with the panel deployment. The majority of the seams were made using a dual hot-wedge fusion welding apparatus. Repairs and short seam segments were made using an extrusion welding apparatus.

Installation of the LDPE geomembrane progressed concurrently with the deployment of the subgrade geotextile and included deploying, seaming, testing, and repairing the material. GSI installed the geomembrane on Cell B on December 13 and 15, 2003; on Cell C/D from December 16 through 22, 2003; and on Cell A on January 3, 2004. Patching and detail work was completed on Cell B on December 19, 2003; on Cell C/D on January 8, 2004; and on Cell A on January 9, 2004.

2.5.6 Installation of Drainage Layer

A total of 72 rolls of geonet (TN220) manufactured by SKAPS Industries of Commerce, Georgia and 39 rolls of 8-oz/sy. non-woven polypropylene geotextile (TNS E080®) manufactured by Nevown, Inc. of Greer, South Carolina were delivered to the site. Geotextile rolls were stockpiled within the staging area on the site.

Installation of the drainage layer consisting of separate geonet and geotextile components progressed following acceptance of the geomembrane installation. The geonet was deployed directly on the geomembrane. Adjacent rolls of geonet were overlapped a minimum of 4-inches on all sides and fastened as recommended by the manufacturer. The geotextile was placed directly on the geonet as a filter layer between the geonet and overlying cover soil. Geotextile rolls were overlapped a minimum of 6-inches on all sides and were continuously sewn by GSI with a polymeric thread and an interlocking stitch. Wherever the thread broke or the seam was discontinuous during the geotextile installation, an additional seam was sewn to repair the defective area.

GSI installed the drainage layer on Cell B between December 15 and 18, 2003; on Cell C/D from January 2 through 8, 2004; and on Cell A on January 9, 2004.

2.5.7 Placement of Cover Soil and Topsoil

Placement of the 12-inch cover soil and 6-inch topsoil layers over the geosynthetic liner systems was initiated on December 19, 2003 on Cell B and completed on March 4, 2004 (including the cap terminations) on Cell A. The cover soil layer was placed in a single 24-inch lift, creating temporary haul roads to protect the cap system during unloading of subsequent trucks. Once unloading of the trucks was complete, the lift was cut to the required 12-inch thickness with low ground pressure equipment and compacted in accordance with the Technical Specifications. The topsoil layer was placed using a similar method of constructing temporary haul roads to maintain a 24-inch protective cover over the cap system for vehicle traffic. The temporary topsoil haul road was then cut to the required 6-inch thickness.

The thickness of the cover soil and topsoil layers was monitored during placement through the use of grade stakes and spot surveys. The final soil layer thickness was confirmed with a topographic survey and a series of test pits.

2.5.8 Access Road Construction

The existing surface impoundment berms along the western side of Cell C/D and the entrance locations to Cells A and B were improved to provide access for Plant personnel to the existing outfall monitoring stations and to the cap surfaces for maintenance and

repair purposes. The existing berm surfaces were improved by installing a geotextile separation overlain with Type B graded aggregate (crusher run) meeting the requirements of The State of Delaware Department of Transportation's Standard Specifications. The graded aggregate was placed in compacted lifts not exceeding 6-inches in thickness to the specified grades. Construction of the access roads was completed on March 5, 2004.

2.5.9 Seeding and Mulching

Enviroscapes, Inc. of Woodbridge, New Jersey completed the installation of erosion control blanket in the Cell B ditches and seeding and mulching of all three Cells on March 11 and 12, 2004. Enviroscapes utilized a Finn T90 Hydroseeder to seed, fertilize, lime and tack the areas. Following seeding, straw mulch was applied with a REINCO straw blower and anchored using a polymer-based tackifying agent. A total of 6.5 acres was seeded with the following seed mixtures and soil amendments:

Seed Mixture: Permanent Seed Mix of 10.2 pounds/acre consisting of:

- 3.6 lbs. Indiangrass
- 3.6 lbs. Big Bluestem
- 2.4 lbs. Little Bluestem
- 0.6 lbs. Wildflower and Legume Mix
  - Black-eyed Susan (20%)
  - Lanceleaved Coreopsis (20%)
  - Purple Coneflower (20%)
  - Tickseed (20%)
  - Partridge Pea (20%)

Fertilizer: Liquid Fertilizer (16-32-16) at a rate of 100 lbs./acre.

Lime: Nutra Lime water-soluble lime at a rate of 100 lbs./acre.

Mulch: Straw Mulch at a rate of 1.5 tons/acre.

Binder: Earth Bond tackifying agent.

Copies of the material quality control certifications for the seed and soil amendments are presented in Appendix D8.

2.5.10 Contract Close-out and Demobilization

The Pre-final Inspection was conducted by Mr. James Whitty, P.E. (URSD), representatives of DuPont and URS-ROS on March 9, 2004. A list of incomplete and remaining work items was developed and submitted to URS-ROS immediately following the Pre-final Inspection. This list included deficiencies in the soil cover thickness in a few locations in Cell A, completion of erosion control blanket installation, seeding and mulching, and removal and restoration of the temporary sediment traps adjacent to Cells A and B.

The contractor began cleanup of the site and decontamination of equipment on March 13, 2004 and completed demobilization on March 26, 2004.

Mr. John Wolfe (URSD) and Mr. Eric Bryan (URSD) conducted the Final Acceptance Inspection on March 25, 2004. DuPont and URS-ROS agreed to defer removal and restoration of the sediment traps adjacent to Cells A and B until vegetation was established. All other items identified in the Pre-final Inspection had been satisfactorily addressed by URS-ROS at the time of the Final Inspection.

3.0 CONSTRUCTION QUALITY PROGRAM

3.1 Quality Control Activities

The Contractor was responsible for all QC activities necessary to manage, control, and document that the project complied with the requirements established by the Design Drawings and Technical Specifications. URS-ROS controlled the quality of the project through process control, inspection, verification, documentation, and testing.

3.1.1 Process Control

Process control was the first step employed in the construction quality control program. Process control measures were generally performed prior to or during construction activities and were implemented by the URS-ROS and GSI Site Superintendent, equipment operators, and construction personnel.

A key component to the process control strategy used by URS-ROS was the development and communication to all site personnel of project and task specific procedures in their Construction Operation Plan. This plan included the following elements:

- Task specific labor, equipment, and material requirements
- Identification of subcontractors necessary to complete each task
- Discussion of task specific coordination issues, construction methods, and contingency plans
- Task specific safety procedures
- Erosion and sediment control procedures
- Quality control plan
- Environmental protection plan
- Spill and discharge control plan
- Excavation plan
- Overhead and underground obstruction plan

Earthwork, including intermediate grading and placement of cover soil and topsoil, was controlled through construction layout surveying and placement of grade stakes.

3.1.2 Inspection

The second component of the URS-ROS construction quality control program was inspection of the work. QC inspections were generally conducted following completion of an individual work item or at significant intermediate milestones throughout the construction of a work item. Intermediate inspections were completed and any deficiencies addressed and accepted prior to continuation of subsequent work.

The URS-ROS QC Supervisor performed QC inspections of site preparation and earthwork items. URS-ROS subcontracted the QC Supervisor responsibilities for the installation of the geosynthetic components of the cap system to Mr. Vincent Troilo of URS Corporation. The geosynthetic materials installer, GSI, also provided an installation quality control supervisor to monitor and document the installation of the geosynthetic cap system. The URS QC Supervisor operated independently from the installer's QC personnel.

The following QC inspections were completed:

- Inspection of temporary site facilities to confirm that installation was in accordance with the Technical Specifications and the Edge Moor Site Conditions. This inspection was conducted after the project construction trailers were placed, anchored, and utility connections were complete.
- Inspection of the decontamination pad construction. Intermediate inspections included visual inspection of the liner subgrade and the HDPE liner integrity prior to and following placement on the subgrade. The completed decontamination pad was inspected for conformance with the Design Drawings and Technical Specifications.
- Inspection of erosion control measures including silt fence, protection of the existing storm sewer inlets, and maintenance of the construction entrances. Inspections were conducted at the completion of construction of each structure. Erosion control measures were also inspected weekly and following storm events to identify structures requiring maintenance.
- Inspection of the excavation of the subgrade, placement and compaction of fill materials, and clearing and grubbing to verify that the closure construction was performed in general conformance with the Design Drawings and Technical Specifications, or as approved by DuPont.
- Inspection of the subgrade surface for acceptance prior to geosynthetic material installation. These inspections were completed jointly with the URS-ROS Site Superintendent, URS QC Supervisor, GSI Site Superintendent, GSI QC Superintendent, and the DSR or other QA representative. All parties would reach consensus that the surface was in an acceptable condition to deploy the geosynthetic materials before geosynthetic installation was initiated. Approval of each surface was noted on the Certificate of Acceptance of Subgrade Surface Preparation for Geomembrane Installation and signed by the QC Supervisor and the Installer's QC Supervisor witnessing the inspection. The certificates are included in Appendices E1, E2, and E3 for Cells A, B, and C/D, respectively.
- Inspection of the geosynthetic material rolls for evidence of damage caused by shipping, storage, and handling. Damaged rolls were marked and portions of the damaged rolls were removed prior to or during installation, or repaired after installation. The Material Delivery/Inventory Record forms for the 12-oz/sy. geotextile, 40-mil LDPE geomembrane, geonet, and 8-oz/sy. geotextile are included in Appendices D1 through D4, respectively.

- Observation of geotextile deployment and seam preparation to ensure that the proper procedures were being followed. Inspections of the alignment, sheet surface quality, overlap with adjacent panels, and the completed seam continuity quality.
- Observation of geomembrane deployment and seam preparation to ensure that the proper procedures were being followed and all geomembrane seams were welded continuously to the end of the panels. The QC Supervisor inspected the alignment, sheet surface quality, overlap with adjacent panels, seaming apparatus temperatures, and the completed seam quality. Seaming imperfections were marked and subsequently repaired in general conformance with the Technical Specifications. The QC Supervisor inspected all repairs made to the geomembrane and seams. A final walk through of the entire geomembrane layer was completed and accepted by URSD before being covered with geonet.
- Inspection of the geonet alignment, overlap with adjacent panels, fastening, and repairs made.
- Observations of cover soil and topsoil placement to ensure that the geosynthetic components of the cap system were not damaged and that the geotextile seams remained intact during placement of the cover soil. The soil lift thickness was also inspected during placement to ensure that a minimum 24-inch cover was maintained in areas supporting vehicular traffic and following grading to ensure that the minimum 18-inch thickness was obtained above the uppermost geotextile layer.
- Inspection of site restoration activities. These inspections were conducted at the completion of restoration activities for each area disturbed during construction and again as part of the contract closeout inspections.

Deficiencies in work and work items not conforming with the Technical Specifications identified during QC inspections were noted in the daily QC report submitted to the DSR. QC deficiencies were addressed directly between the QC Supervisor and the Site Superintendent and the deficient work was corrected prior to continuation of work in the deficient areas.

3.1.3 Verification

The third component of the URS-ROS construction quality control program was verification of existing conditions, imported material properties, and work completed by outside parties (e.g., Plant contractors). QC verification also included review of process control items for accuracy. QC verification was generally performed by the URS-ROS QC Supervisor and included the following:

- Verification that utilities were properly located and cleared in accordance with the Technical Specifications during site preparation activities.
- Survey verification of site base maps and control points. The verification of existing conditions survey is shown on Figure 4.

- Verification that geosynthetic binders, geotextile fabrics, gravel, fill materials, and silt fence used for erosion control were in compliance with the Technical Specifications and were stored and handled properly.
- Verification that the imported geosynthetic, stone, and soil materials used in the cap system were in compliance with the Technical Specifications and were stored and handled properly. Copies of the quality control certificates for the 12-oz/sy. geotextile, 40-mil LDPE geomembrane, geonet, and 8-oz/sy. geotextile are included in Appendices D1 through D4, respectively.
- Survey verification that intermediate grades were within the tolerances shown on the Design Drawings. The intermediate grade survey is shown on Figure 5.
- Verification that measuring and metering equipment was in compliance with calibration and accuracy requirements specified. A copy of the tensiometer calibration certificate provided by Wegener North America, Inc. is presented in Appendix D9.
- Survey verification that the cap system extended to the limits shown on the Design Drawings. The limit of geosynthetic cap survey is shown on Figure 6.
- Survey and test pit verification that the minimum 18-inch soil cover over the geosynthetic cap system was obtained.

3.1.4 Documentation

The fourth component of the URS-ROS construction quality control program was documentation. QC documentation was generally performed by the URS-ROS QC Supervisor and Site Superintendent and included the following:

- Daily construction reports documenting construction, QC, and health and safety activities. A summary of the daily construction reports is provided in Appendix B.
- Photographic documentation of construction activities was conducted jointly by URS-ROS and CRG personnel. The photographic record of the project is included as Appendix C.
- Documentation of geomembrane panel identification, panel dimensions, panel layout, ambient and sheet temperatures, seam control data, and seam repair records. Geomembrane documentation is included in Appendices E1, E2, and E3 for Cells A, B, and C/D, respectively.
- Documentation of all test results as described in Section 3.1.5 and Section 4.0. Documentation of test results is Appendices E1, E2, and E3 for Cells A, B, and C/D, respectively.
- Documentation of as-built conditions through use of record drawings. The Record Plan Survey is shown in Figure 7.

3.1.5 QC Testing

The final component of the URS-ROS construction quality control program was QC testing. Field geosynthetic QC testing was generally performed by GSI's QC representatives under the direction and observation of the QC Supervisor in accordance with the Technical Specifications. QC testing included the following:

Geotextile Material Testing

One sample was collected every 50,000 square feet and tested for the following physical properties:

- Apparent Opening Size (ASTM D4751)
- Permittivity (ASTM D4491)
- Grab Strength (ASTM D4632)
- Puncture Strength (ASTM D4833)
- Trapezoidal Tear Strength (ASTM D4533)
- Burst Strength (ASTM D3786)

Samples submitted for testing were identified by brand name, type of fabric, location and date manufactured, lot identification, length and width.

The samples were tested at an approved GAI certified testing laboratory, TRI/Environmental, Inc. in Austin, Texas. The certified test results were submitted to DuPont prior to field placement. If the test results indicated values less than those specified, the roll from which the sample was obtained was rejected and the rolls before and after the rejected roll were also tested to determine the limit of material to be rejected. Rejected material was replaced with acceptable material documented by certified test results.

LDPE Geomembrane Material Testing

One QC sample, 36 inches in length, for the entire width of a roll, was collected at the following frequencies and tested for the following physical properties:

- Thickness (ASTM D5199) – 1 per 50,000 square feet (sf)
- Sheet Density (ASTM D1505) – 1 per 50,000 sf
- Tensile Strength and Elongation at Break (ASTM D638) – 1 per 50,000 sf
- Tear Resistance (ASTM D1004) – 3 tests
- Puncture Resistance (ASTM D4833) – 3 tests

Samples were not obtained from the first three feet of the roll. The samples were identified by manufacturer's name, product identification, and lot and roll number. The date, a unique sample number, and the machine direction were also noted. In addition, a 12-inch by 12-inch QA sample was collected, labeled, and submitted to the DSR each time a QC sample was collected.

The rolls that did not meet the specified requirements were rejected and the rolls produced immediately prior to and immediately after the failed roll were tested for the

same failed parameter. Testing continued until a minimum of three successive rolls on both sides of the original failing roll passed the failed parameter.

Geomembrane Trial Seam Testing

Trial seam testing established temperature and speed settings on the welding units conducive to formation of acceptable seams. One sample was obtained from each trial seam. This sample was at least 36 inches long by 14 inches wide with the seam centered lengthwise. Five random specimens 1 inch wide were cut from the sample.

Two seam specimens were field tested for shear strength and 3 seam specimens were field tested for peel adhesion using the approved quantitative tensiometer. This tensiometer was used to verify Film Tear Bond (FTB) as well as minimum shear and peel strength requirements of 53 and 44 pounds per inch width (ppi), respectively. Both tracks of double-wedge seams were tested for peel adhesion. Jaw separation speed for field tests was 20 inches per minute.

If a trial seam failed, the welding apparatus and welder associated with the failing trial seam were not permitted to weld additional geomembrane until a passing trial seam had been made. The QC Supervisor observed and documented the GSI trial seams and testing in the field. The trial seam logs for fusion and extrusion seams are presented in Appendices E1, E2, and E3 for Cells A, B, and C/D, respectively.

Geomembrane Non-Destructive Field Seam Continuity Testing

Field seams were non-destructively tested for continuity over their full length in accordance with the following methods:

- Double-wedge seams were tested using the pressurized air-channel test method in accordance with GRI GM-6. The ends of the seam to be pressure tested were sealed and a hollow needle with an attached pressure gauge was inserted in one end of the seam. The seam channel was filled with air using an electric pump and was initially pressurized to approximately 30 psi. Pressure loss of less than 3 psi over 5 minutes was considered passing. Following the 5-minute period, the seam end opposite to the needle was cut, and the pressure drop was observed in the pressure gauge. This method was performed to verify that the entire seam length was tested and that the air channel was not blocked by debris or sealed by overheating during seaming.
- For extrusion welds, seams were tested using the vacuum method and visually inspected in accordance with the procedures defined by ASTM D4437. A vacuum box is a rigid wall box with a clear Plexiglas top and a neoprene gasket around the bottom of the box (to serve as a seal between the box and the geomembrane). Vacuum box testing consisted of applying a soapy water solution to the seam and placing the vacuum box over the seam. A vacuum of at least 5 psig was drawn on the chamber for approximately 5 to 10 seconds to observe the welded area. Any area where soap bubbles appeared generally indicated a seam discontinuity or leak.

Seam testing was generally performed as the seaming work progressed, not at the completion of field seaming. Any seam that failed was documented and repaired in accordance with the Technical Specifications.

All non-destructive test results were recorded by the QC Contractor and are presented in Appendices E1, E2, and E3 for Cells A, B, and C/D, respectively.

Geomembrane Destructive Field Seam Testing

A minimum of one destructive test sample per 500 feet of field seam was obtained at the locations specified by the QC Contractor. These sample locations were not identified prior to seaming. Samples were a minimum of 14 inches wide by 42 inches long with the seam centered lengthwise. Each sample was cut into 3 equal pieces, with one piece retained by the installer, one piece given to the QC laboratory, and the remaining piece given to the DSR for QA testing and/or permanent record.

Each sample was numbered and cross referenced to a field log which identified:

- Project name
- Project number
- Panel numbers
- Seam number
- Date and time cut
- Ambient temperature within 6 inches above the geomembrane
- Seaming unit designation
- Name of seamer
- Seaming apparatus temperature and pressures

Ten 1-inch wide replicate specimens were cut from the installer's sample. Five specimens were tested for shear strength and 5 for peel adhesion using the approved field quantitative tensiometer. Both tracks of double-wedge seams were tested for peel adhesion. Jaw separation speed for the field tests were 20 inches per minute. To be acceptable, 4 out of 5 replicate test specimens had to meet the shear and peel strength requirements of 53 and 44 ppi, respectively.

Samples that passed the field tests were sent to the QC laboratory for shear strength (5 specimens) and peel adhesion (5 specimens) testing in accordance with the QC laboratory's approved procedures. Jaw separation speed for laboratory tests was 20 inches per minute. Laboratory tests were not performed if the field tests were not acceptable. Failed seam sections were tracked and repaired in accordance with the Technical Specifications.

Holes for destructive seam samples were generally repaired the same day they were cut. Certified test results on all field seams were submitted to and approved by the QC Supervisor and the DSR prior to acceptance of the seam.

The destructive sample locations are presented on the geomembrane panel diagrams included in Appendices E1, E2, and E3 for Cells A, B, and C/D, respectively. Testing results are further discussed in Section 4.0 and are also included in Appendices E1, E2, and E3 for Cells A, B, and C/D, respectively.

Geonet Material Testing

One sample was collected every 50,000 square feet and tested for the following physical properties:

- Transmissivity (ASTM D4716)
- Permittivity (ASTM D4491)

Samples submitted for testing were identified by brand name, type of fabric, location and date manufactured, lot identification, length and width. The rolls that did not meet the specified requirements were rejected and the rolls immediately before and immediately after the rejected roll were also tested to determine the limit of material to be rejected. Rejected material was replaced with acceptable material.

Cover Soil and Topsoil Advanced Testing

Advance testing was performed prior to excavation and delivery from the borrow source to establish that the borrow source contained materials meeting the Technical Specifications. Advance testing was done at a frequency of 1 test per 5,000 cubic yards.

Each material type or source of material was tested as follows:

- Soil classification in accordance with ASTM D2487
- Particle size distribution in accordance with ASTM D422 (sieve and hydrometer analyses)
- Atterberg limits in accordance with ASTM D4318
- Moisture content in accordance with ASTM D2216. One additional representative test shall be made when any change in material occurs that may affect the moisture content.

In addition to the above testing, topsoil was tested as follows:

- Organic content in accordance with ASTM D2974
- pH in accordance with ASTM D4972

Material that did not conform to the specified requirements was rejected and a different material or material source was selected, retested, and approved prior to delivery to the site.

Cover Soil and Topsoil Construction Testing

Construction testing was performed during fill placement to verify that the representative fill material met the specified requirements. Construction testing was done at the frequencies indicated.

- Lift Thickness Verification (1 per 200 ft centers per lift)
- Construction Classification Testing
  - Visual classification testing (ASTM D2488) – 1 per 400 ft centers per lift
  - Particle size distribution (ASTM D422) – 1 per 5,000 cy.
  - Atterberg limits (ASTM D4318) – 1 per 5,000 cy.
  - Organic content of topsoil (ASTM D2974) – 1 per 5,000 cy.

- pH of topsoil (ASTM D4972) – 5,000 cy.

Aggregate Testing

Advance testing of aggregate gradation was made in conformance with ASTM C117, ASTM C136, and ASTM D422 on one sample per source.

3.2 Quality Assurance Activities

The Contractor was responsible for all QC activities necessary to manage, control, and document that the project complied with the requirements established by the Design Drawings and Technical Specifications. QA, which was separate from but coordinated with QC, was used to verify that the Contractor had achieved the level of quality required by the Design Drawings and Technical Specifications.

This section describes the QA review, observation, and testing activities that occurred during construction of each definable feature of the project described in Section 2.1.

3.2.1 Submittal Review

QA personnel reviewed all Contractor submittals identified in the Technical Specifications, Requests for Information (RFIs), and Field Change Requests (FCRs) from the Contractor. QA personnel reviewed submittals for completeness and compliance with the Technical Specifications. Incomplete submittals were returned to the Contractor for completion and re-submittal. Any submittal, RFI, or FCR that requested a variance from the Design Drawings or Technical Specifications, or that required engineering review was forwarded to the Certifying Engineer for further review and determination of appropriate response action.

Based on the review, DuPont and URSD approved the submittal, approved the submittal with notation, returned the submittal for correction and re-submittal, or rejected the submittal. Before the work proceeded, DuPont, URSD, and the Contractor coordinated resolution of submittals that were returned for correction or rejected.

3.2.2 Observation of Construction

QA personnel observed construction and QC activities on a periodic basis rather than continuously to avoid duplication of effort with QC. In addition to periodic observation, QA personnel verified critical activities and components of the Work including:

- ❑ Decontamination pad liner subgrade was free of sharp or other objects that may compromise the integrity of the liner.
- ❑ Decontamination pad liner was free of holes, tears, penetrations, creases, folds, or other conditions that may cause failure of the liner.
- ❑ All areas that were impacted by excavation activities were cleared of utilities prior to excavation.
- ❑ Stockpiled materials were properly segregated.

- Surface water was directed away from the excavation and excavated surfaces were protected to prevent erosion or failure.
- Intermediate and final grades of the Cells were within the tolerances shown on the Design Drawings. This was primarily based on review of the survey data provided by the Contractor and verified by direct observation.
- The subgrade surface was acceptable prior to geosynthetic material installation. These inspections were completed jointly with the URS-ROS Site Superintendent, URS QC Supervisor, GSI Site Superintendent, GSI QC Superintendent, and the DSR.
- Inspection of the geosynthetic material rolls for evidence of damage caused by shipping, storage, and handling was completed and that damaged rolls were marked and portions of the damaged rolls were removed prior to or during installation, or repaired after installation.
- Observation of geotextile deployment and seam preparation to ensure that the proper procedures were being followed. QA personnel verified that inspection of the alignment, sheet surface quality, overlap with adjacent panels, and the completed seam quality were satisfactorily completed.
- Observation of geomembrane deployment and seam preparation to ensure that the proper procedures were being followed and all geomembrane seams were welded continuously to the end of the panels. QA personnel verified that inspection of the alignment, sheet surface quality, overlap with adjacent panels, seaming apparatus temperatures, and the completed seam quality were satisfactorily completed and that seaming imperfections were marked and subsequently repaired. The QA personnel completed a final walk through of the entire geomembrane layer and accepted it before being covered.
- Inspection of the geonet alignment, overlap with adjacent panels, fastening, and repairs made was satisfactorily completed.
- Observation of cover soil and topsoil placement to ensure that the geosynthetic components of the cap system were not damaged and that the geotextile seams remained intact during placement of the cover soil. The soil lift thickness was also inspected during placement to ensure that a minimum 24-inch cover was maintained in areas supporting vehicular traffic and following grading to ensure that the minimum 18-inch thickness was obtained.
- Site restoration work was completed to the satisfaction of DuPont.

QA personnel provided notification to the Certifying Engineer and Project Manager of any work that was not in conformance with the Design Drawings, Technical Specifications, or the Construction Operations Plan.

3.2.3 Review of QC Reports and Test Results

QA personnel reviewed the Contractor's daily QC reports, test methods, and results provided by the Contractor's independent QC laboratories. The reports, methods, and results were reviewed for completeness, accuracy, compliance with the Contractor's

Construction Quality Control Plan, and conformance with the project performance criteria.

3.2.4 QA Testing

QA testing was conducted on two cover soil samples, one topsoil sample, and each geomembrane destructive sample. The QA tests were the same as described in the QC testing section. In some instances, QC personnel, under the direction and observation of QA personnel, collected QA samples submitted for laboratory testing. QA personnel submitted the QA samples to an independent laboratory (Geotechnics in East Pittsburgh, Pennsylvania) contracted by DuPont. All QA results were reported directly to QA personnel. QA testing results are discussed in Section 4.0 and are included in Appendices E1, E2, and E3 for Cells A, B, and C/D, respectively.

4.0 LABORATORY AND FIELD TESTING RESULTS

The following discussion is presented in the order of placement of components within the cap system (from bottom to top).

4.1 Geotextile (12-oz/sy.)

A total of seven 12-oz/sy. geotextile material samples were tested for the properties listed below and compared to the following required values:

- Apparent Opening Size (AOS) – U.S. standard sieve No. 60 (min.) and No. 100 (max.)
- Permittivity – 0.60 sec^{-1} (minimum average)
- Grab Strength – 200 lbs. (minimum average)
- Puncture Strength – 126 lbs. (minimum average)
- Trapezoidal Tear Strength – 80 lbs. (minimum average)
- Burst Strength – 250 psi (minimum average)

All test results are presented in Appendix D1 and were in conformance with the specified values, with the exception of the AOS. URSD and DuPont allowed this non-conformance based on the use of the 12-oz/sy. geotextile as a cushion layer. AOS is an insignificant parameter if using the material as a cushion.

4.2 40-mil LDPE Geomembrane

4.2.1 Advance Testing

A total of seven 40-mil LDPE geomembrane material samples were tested for the properties listed below and compared to the following required values:

- Thickness – 40 mils ± 4 mils
- Sheet Density – 0.939 g/cc (maximum)
- Tensile Strength – 152 lb./in (minimum average)
- Elongation at Break – 800 percent (minimum average)
- Tear Resistance – 22 lb. (minimum average)
- Puncture Resistance – 56 lb. (minimum average)

All test results were in conformance with the specified values and are presented in Appendix D2.

4.2.2 Trial Seam Testing

The QC Supervisor witnessed a total of 40 trial seams during installation of the geomembrane. Trial seam testing was performed in the field, and all trial seams met project requirements with the following six exceptions:

- On December 15, 2003, machine #69 failed two consecutive trial seams (TS-3 and TS-3R). The wedge settings were adjusted and two consecutive passing seams were achieved (TS3-R1 and TS-3R2).
- On December 20, 2003, machine #69 initially failed the morning trial seam (TS-16) and was retested (TS-16R) with a passing result. Machine #42 failed three consecutive trial seams in the afternoon (TS-19, TS-19R, and TS-19R1) and was removed from service.
- On December 21, 2003, machine #69 failed the initial morning trial seam (TS-20) and was retested (TS-20R) with a passing result.
- On January 2, 2004, machine #59 failed the initial trial seam (TS-30) and was retested (TS-30R) with a passing result.
- On January 3, 2004, machine #69 failed the initial trial seam (TS-32) and was retested (TS-32R) with a passing result.
- On January 4, 2004, machine #610 failed the initial trial seam (TS-35) and was retested (TS-35R) with a passing result.

Trial seam test results are presented in Appendices E1, E2, and E3.

4.2.3 Non-Destructive Field Seam Continuity Testing

The QC Supervisor observed air pressure tests within Cell B for seams associated with geomembrane panels 1 through 16 representing approximately 2,741 feet of seam on December 15, 2003. Air pressure tests for Cell C/D seams along panels 17 through 76 representing approximately 8,836 feet of seam were observed between December 16 and 22, 2003. Cell A air pressure tests were witnessed on January 3, 2004 along panels 77 through 85 representing approximately 1,919 feet of seam. Failing seam sections were bounded and capped in compliance with Technical Specifications.

The QC Supervisor observed non-destructive testing of patches P-1 through P-28 on Cell B between December 15 and 19, 2003. Non-destructive testing on Cell C/D of patches P-29 through P-137 and P-165 through 171 was observed between December 19, 2003 and January 8, 2004. Cell A non-destructive tests for patches P-138 through P-164 and P-172 were observed on January 4 and 9, 2004. All tests were in compliance with the Technical Specifications and are presented in Appendices E1, E2, and E3.

4.2.4 Destructive Field Seam Testing

Destructive field seam test results are presented in Appendices E1, E2, and E3.

The QC Supervisor collected five destructive samples (DS-1 through DS-5) within Cell B on December 15, 2003. Samples were field tested for peel strength and shear strength.

All field tests were in compliance with the Technical Specifications. Duplicate samples were sent to both the QC lab and QA lab for laboratory testing. All laboratory test results were in compliance with the Technical Specifications.

Five destructive samples (DS-6 through DS-10) were collected from Cell C/D on December 19, 2003. All field tests were in compliance with the Technical Specifications and duplicate samples were sent to both the QC lab and QA lab for laboratory testing. All laboratory test results were in compliance with the Technical Specifications.

Thirteen destructive samples (DS-11 through DS-23) from Cell C/D were collected on January 2, 2004. All field tests were in compliance with the Technical Specifications except DS-17. The failing destructive test was tracked (DS-17B, DS-17B1 through DS-17B5) and passing field tests were achieved (DS-17B5). The failing portion of the seam was capped. Duplicates of samples that passed the field tests were sent to both the QC lab and QA lab for laboratory testing. The QC laboratory test results for samples DS-17B5, DS-18, and DS-20 and the QA laboratory test results for sample DS-18 were not in conformance with the Technical Specifications. The seam areas associated with these tests were tracked and additional testing was performed. All other laboratory test results were in compliance with the Technical Specifications.

The QC Supervisor collected one destructive sample (DS-24) from Cell C/D and 4 destructive samples (DS-25 through DS-28) from Cell A on January 4, 2004. All field tests were in compliance with the Technical Specifications and duplicate samples were sent to both the QC lab and QA lab for laboratory testing. All laboratory test results were in compliance with the Technical Specifications.

Seven destructive samples (DS-17B6, DS-B7, DS-18A, DS-A1, DS-18B, DS-20A, and DS-20B) were collected from Cell C/D on January 6, 2004. The January 6, 2004 samples were taken to track the test runs that were not in conformance with the Technical Specifications on January 2, 2004. With the exception of samples DS-17B7 and DS-18A1, the samples were field tested for peel strength and shear strength. All field tests were in compliance with the Technical Specifications. Duplicates of samples that passed the field tests were sent to both the QC lab and QA lab for laboratory testing. The QC laboratory test results for sample DS-18A had test runs that were not in conformance with the Technical Specifications. The seam areas associated with these tests were tracked and additional testing performed (DS-18A1) with passing results. All other laboratory test results were in compliance with the Technical Specifications.

4.3 Geonet

Seven geonet material samples were tested for the property listed below and compared to the following required value:

- Transmissivity – 0.0020 m^2/sec

All test results were in conformance with the specified values for transmissivity and are presented in Appendix D3. It should be noted that because the Contractor selected to deploy separate geonet and geotextile components for the drainage layer, permittivity test results were provided along with the 8-oz/sy. geotextile sample results.

4.4 Geotextile (8 oz/sy.)

Seven 8-oz/sy. geotextile material samples were tested for the properties listed below and compared to the following required values:

- AOS – U.S. standard sieve No. 60 (min.) and No. 100 (max.)
- Permittivity – 0.60 sec^{-1} (minimum average)
- Grab Strength – 200 lbs. (minimum average)
- Puncture Strength – 126 lbs. (minimum average)
- Trapezoidal Tear Strength – 80 lbs. (minimum average)
- Burst Strength – 250 psi (minimum average)

All test results are presented in Appendix D4 and were in conformance with the specified values with the exception of the AOS for rolls 200190462 and 200190470. These two rolls were retested for AOS. The retest result for roll 200190470 was in conformance with the required value. The retest result for roll 200190462 remained non-conformant. Per the Technical Specifications, the rolls produced before (roll 200190461) and after (200190463) the failing roll were tested for AOS. The test results for these two rolls were also not in conformance with the required AOS values and rolls 200190461 through 200190463 were rejected. As a result of these failing test results, URS-ROS elected to replace the entire lot that the failing rolls came from instead of continuing the testing to determine the extent of non-conforming rolls. Three additional samples were tested representing 13 replacement rolls. All three test results were in conformance with the specified values.

4.5 Cover Soil

4.5.1 Advance Testing

Cover soil material samples from two sources (Kent Sand and Gravel, and Contractor Materials) were tested for the properties listed below and compared to the following required values:

- Soil classification – SW, SP, SC, and SM
- Particle size distribution –
  - 100 percent of the material by weight passing the 3-inch sieve
  - Minimum of 90 percent passing the 1-inch sieve
  - Minimum of 70 percent passing the No. 10 sieve
  - Maximum of 40 percent by weight passing the No. 200 sieve

All test results were in conformance with the specified values and are presented in Appendix D5.

4.5.2 Construction Testing

Two QC and two QA cover soil construction samples were tested for the properties described in Section 3.1.5 and compared to the values listed in Section 4.5.1.

All test results are presented in Appendix D5 and were in conformance with the specified values with the exception of the percent passing the No. 200 sieve for the samples representing material from Kent Sand and Gravel (QC sample #CS-2 and QA sample #CS-1). Less than 100 cy. of material from this source was used to supplement material delivered from the Contractor Materials source. The non-conforming material was mixed with conforming material prior to placement on the cells.

4.6 Topsoil

4.6.1 Advance Testing

Topsoil material samples from two sources were tested for the properties described in Section 3.1.5 and compared to the values listed in Section 4.5.1 plus the following:

- Organic content – 2% to 20%
- pH – 5 to 7.5

All test results are presented in Appendix D6 and were in conformance with the specified values with the exception of pH for source A (4.6) and the percent passing the No. 200 sieve for both sources (source A = 84.9% and source B = 75.6%). DuPont did not object to the use of either source based on the conformance of the remaining material properties with the specified values and under the stipulation that the topsoil from source A be amended to raise the pH within the acceptable range.

4.6.2 Construction Testing

The Contractor only used material from source B during construction. One QA topsoil material sample was tested for the properties described in Section 3.1.5 and compared to the same values as the advance testing.

All test results are presented in Appendix D6 and were in conformance with the specified values with the exception of the percent passing the No. 200 sieve (84.7%). DuPont did not object to the use of the material based on the conformance of the remaining material properties with the specified values.

4.7 Roadway Aggregate

One roadway material sample was tested for the properties described in Section 3.1.5 and compared to the following required values:

- Particle size distribution –
  - 100 percent of the material by weight passing the 1 ½-inch sieve
  - 50-95 percent passing the ¾-inch sieve
  - 20-50 percent passing the No. 4 sieve

- 15-40 percent passing the No. 10 sieve
- 2-20 percent by weight passing the No. 100 sieve

All test results are presented in Appendix D7 and were in conformance with the specified values with the exception of the percent passing the No. 4 sieve (54.7%). DuPont did not object to the use of this material based on the conformance of the remaining material properties with the specified values and the use of the material on access roads that are infrequently traveled by passenger vehicles and light equipment.

5.0 SUMMARY

URS Diamond (URSD) provided construction management (CM) and construction quality assurance (CQA) oversight services during closure construction at four surface impoundments at the DuPont Edge Moor facility located in Edgemoor, Delaware. The CM and CQA oversight was performed by qualified URSD personnel on a full time basis. Based on observations of URSD personnel during closure construction and data provided by the remedial contractor, the closure of the four surface impoundments at the DuPont Edge Moor facility was completed in general conformance with the Project Documents and the approved modifications presented in Appendix A of this report.

6.0 REFERENCES

CRG. January 31, 2002. *Closure Plan for Four Surface Impoundments at the DuPont Edge Moor Facility, Edge Moor Delaware.* Project No. D6EM7384

CRG. November 4, 2002. *Documentation of Neutralization and Stabilization Construction Activities for Four Surface Impoundments at the DuPont Edge Moor Facility, Edge Moor Delaware.* Project No. 7384

DNREC, Division of Air and Waste Management, Hazardous and Solid Waste Branch (HSWB). May 20, 1991. *Closure Plan Guideline Document.*

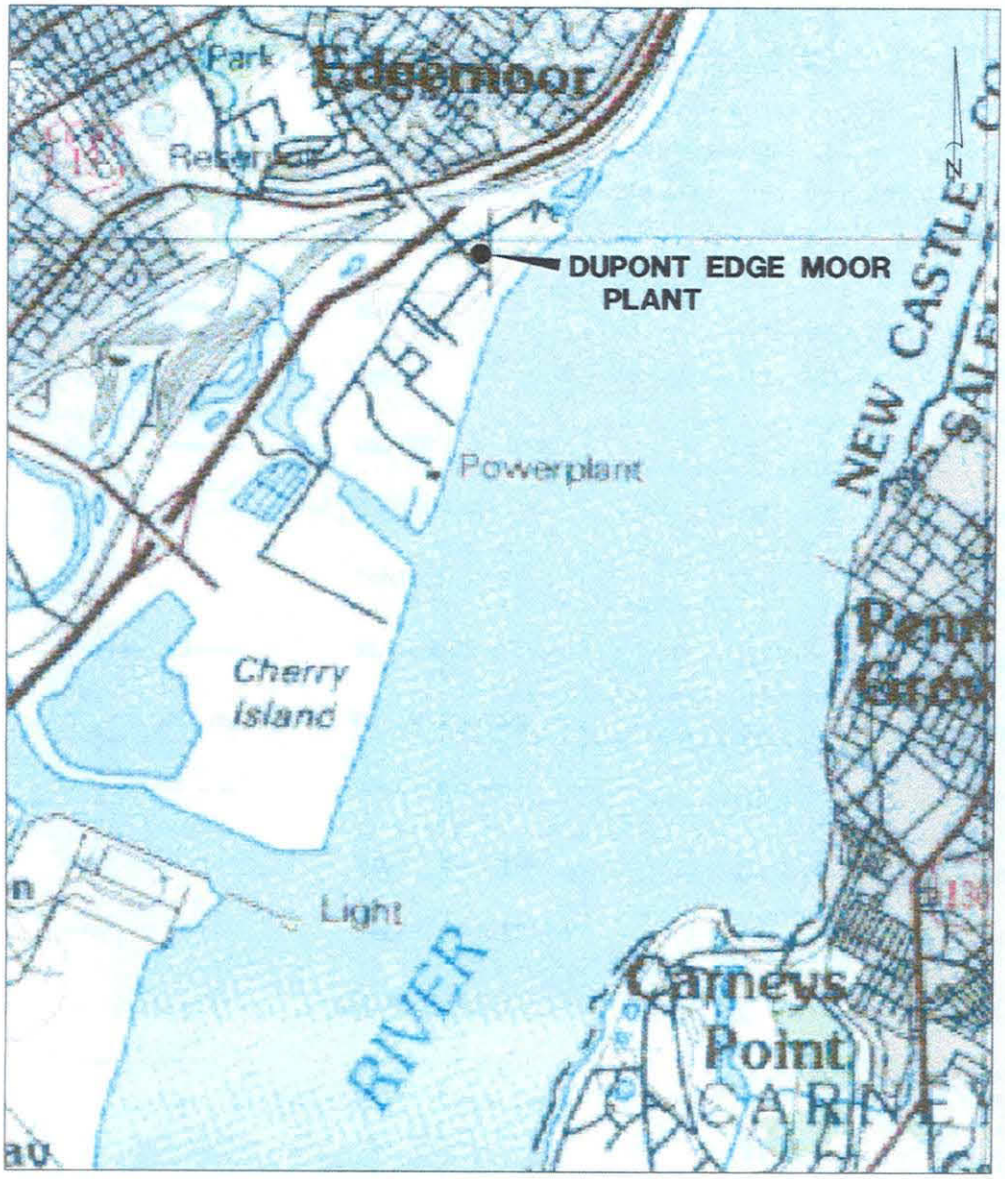
Table 1
Field Change Request Log

Document #	Description	Date Received	Final Disposition	Document Cross Reference
FC7382-001	Contract Change Request for trailer relocation	09/23/03	Approved	Contract Alteration #2
FC7382-002	Contract Change Request for excavation and demolition delays	09/23/03	Withdrawn	None
FC7382-003	Remove pipe between Surface Impoundments C and D	09/25/03	Approved	ECO7382-010
FC7382-004	Alternate pipe abandonment	09/24/03	Approved	ECO7382-010
FC7382-005	Geosynthetic conformance sampling at manufacturer's site	09/24/03	Approved	ECO7382-011
FC7382-006	Use of DuPont wash pad for decon	09/25/03	Approved	None
FC7382-007	Contract Change Request for demolition delays	10/01/03	Withdrawn	None
FC7382-007a	Revised Contract Change Request for demolition delays	10/22/03	Approved	Contract Alteration #2
FC7382-008	Contract Change Request for Godwin Pump	10/02/03	Withdrawn	None
FC7382-009	Alternate roadway material	10/02/03	Withdrawn	None
FC7382-010	Contract Change Request for drying of wet material	10/08/03	Withdrawn	None
FC7382-010a	Revised Contract Change Request for drying of wet material	10/22/03	Approved	Contract Alteration #2
FC7382-011	Contract Change Request for drying of wet material	11/12/03	Approved	Contract Alteration #2
FC7382-012	Contract Change Request for surface preparation of Cell C/D	10/03/03	Approved	Contract Alteration #2
FC7382-013	Contract Change Request for transporting and deploying 2 rolls of 60-mil HDPE geomembrane from the Chambers Works site to use as rub sheets	11/06/03	Approved	Contract Alteration #2
FC7382-014	Alternate seed specification	11/12/03	Withdrawn	ECO7382-014
FC7382-015	Contract Change Request for revised Cell A cap terminations and swale design	12/03/03	Approved	ECO7382-018, Contract Alteration #3
FC7382-016	Contract Change Request for to add additional rip rap to the eastern banks of Cell A and Cell C/D and to change ditch protection for Cells A and C/D to rip rap instead of grass-lined	01/22/04	Approved	Contract Alteration #3
FC7382-017	Contract Change Request for preparation of site for winter shut down	02/20/04	Approved	Contract Alteration #3

Table 2
Engineering Change Order Log

Document #	Description	Date Submitted	Final Disposition	Document Cross Reference
ECO7382-001	Section 02200, 3.8E - Smooth drum roller in place of padded-foot roller	10/10/03	Approved	None
ECO7382-002	Section 02274, 2.1B - Correct designation for mass/unit area to ASTM D5261	10/10/03	Approved	None
ECO7382-003	Section 02274, 2.1 Table 1 - Correct designation for AOS to ASTM D4751	10/10/03	Approved	None
ECO7382-004	Section 02277, 2.1B - Correct designation for ply adhesion to GSI GC-7	10/10/03	Approved	None
ECO7382-005	Section 02277, 2.3A - Change continuous filament to staple fiber	10/10/03	Approved	None
ECO7382-006	Section 02277, 3.4B Table 1 - Change ply Adhesion test value to 1.0 lbs/in.	10/29/03	Approved	None
ECO7382-007	Section 02278, 2.1B1 - Change manufacture location from U.S. to North America	10/29/03	Approved	None
ECO7382-008	Section 01110, 1.4A1 - Change H&S daily reporting requirement to allow for keeping log book available on site for review.	09/26/03	Approved	None
ECO7382-009	Section 01440 Table 1 - Change roadway aggregate acceptance criteria to match Section 02505	09/26/03	Approved	None
ECO7382-010	Drawing Detail 11 - Modify detail to allow alternate plug material in place of ADS N-12 Prolink WT end cap.	10/08/03	Approved	FCR7382-003, FCR7382-004
ECO7382-011	Sections 02274, 3.3B1; 02277, 3.4B1; 02278, 3.4A - change on-site geosynthetics testing to manufacturer's site.	10/09/03	Approved	FCR7382-005
ECO7382-012	Section 02505, 3.8F - remove wear and soundness testing requirement for aggregate	10/15/03	Approved	None
ECO7382-013	Section 01440 Table 1 - Change geomembrane and geonet acceptance criteria to match Sections 02278 and 02277, respecitvely	10/15/03	Approved	None
ECO7382-014	Section 02930, 2.1B - amend permanent seed mix to include winter rye for cold season planting	11/07/03	Withdrawn	FCR7382-014
ECO7382-015	Section 02278, 2.1B5 Table 2 - Change Note 2 to conform with GRI GM-19	11/07/03	Approved	None
ECO7382-016	Drawing Sheet 8 of 16 - Clarify cap termination detail for Cell C/D between Sta. 2+80 and 5+00	11/07/03	Approved	None
ECO7382-017	Drawing Sheet 8 of 16 - Clarify cap termination detail for Cell C/D between Sta. 14+00 and 15+50	11/07/03	Approved	None
ECO7382-018	Drawing Detail 2 - Modify detail to provide seep protection	11/07/03	Approved	FCR7382-015
ECO7382-019	Supplement to Section 02200, 3.10B - Soil analytical testing specification	01/12/04	Approved	None

FIGURE 1
EDGE MOOR SITE LOCATION MAP



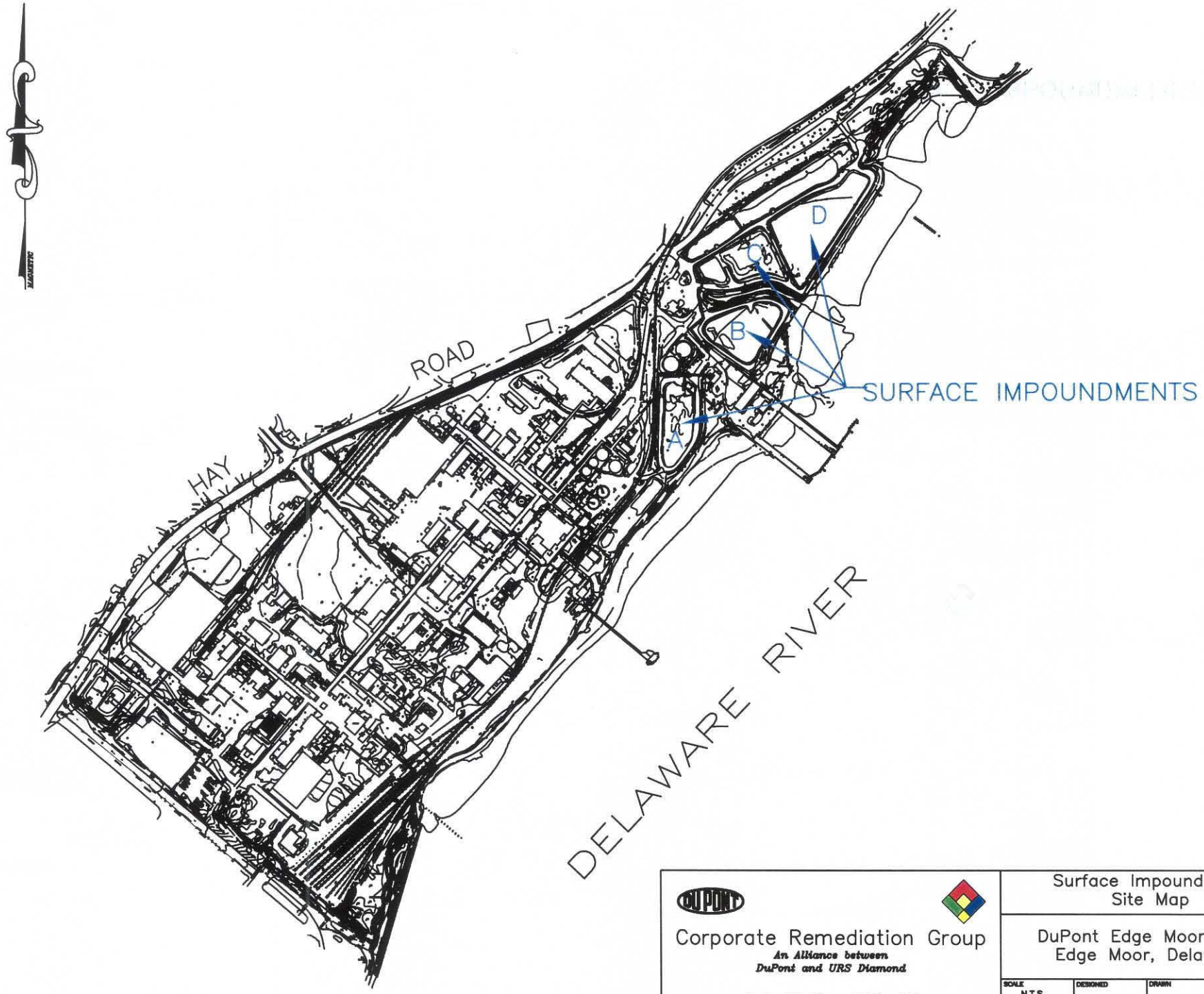
LOCATION MAP

SCALE

2500 0 2500'

REFERENCE:

USGS QUADRANGLE: MARCUS HOOK, PA–NJ–DE (1993)
USGS QUADRANGLE: PENNS GROVE, NJ–DE (1993)



Corporate Remediation Group
An Alliance between DuPont and URS Diamond

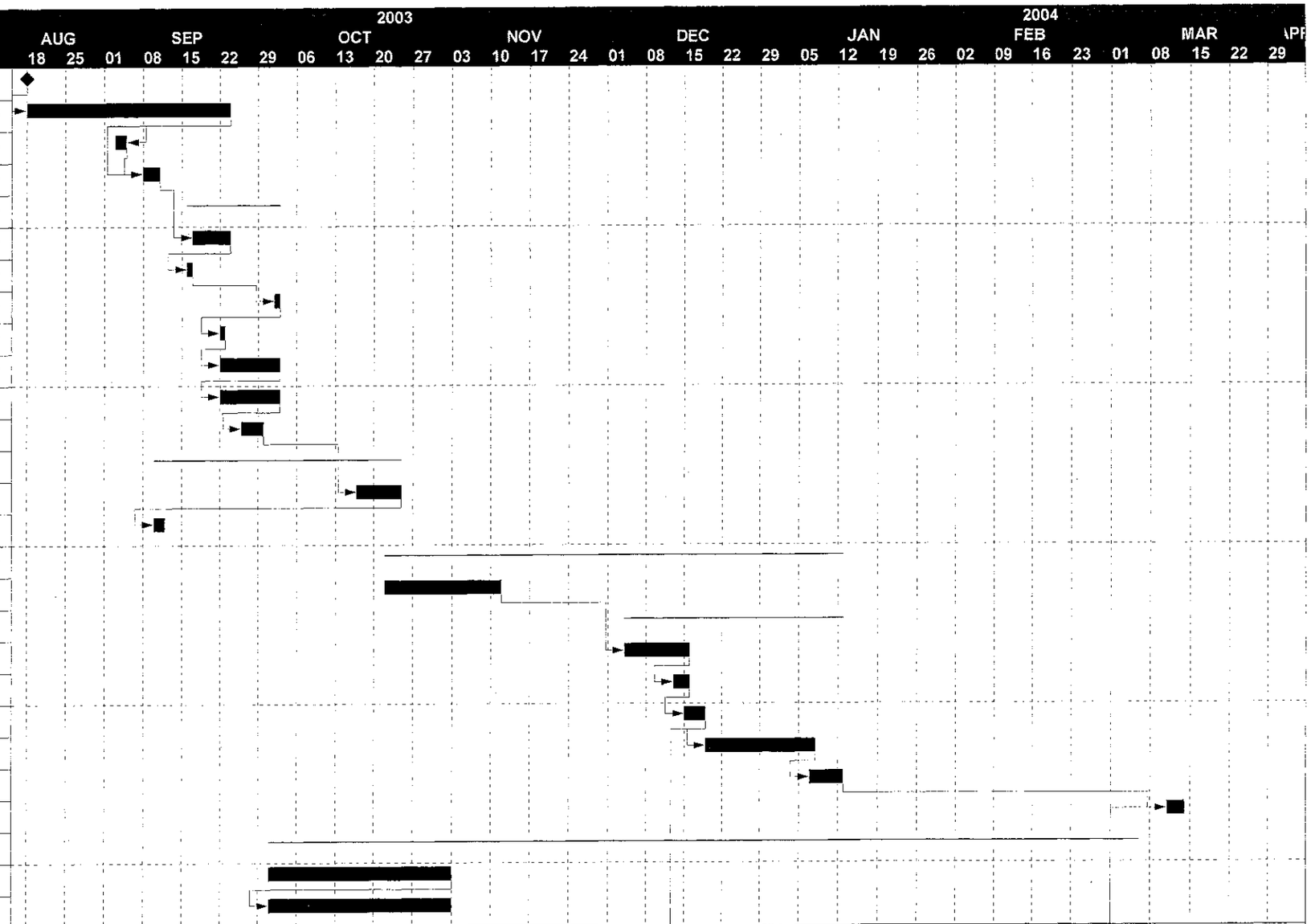
Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

Surface Impoundment Site Map

DuPont Edge Moor Plant
Edge Moor, Delaware

SCALE	DESIGNED	DRAWN	CAD FILE NO.
N.T.S.			
DATE 09/30/02	CHECKED	APPROVED	FIGURE Figure 2

Activity ID	Description	Actual Start	Actual Finish
1000	**Notice to Proceed**	**08/18/03**	
1100	**Submittals, Vendor Selection, Procurement**	**08/18/03**	**09/23/03**
1300	**Pre-Construction Meetings**	**09/03/03**	**09/04/03**
2000	**Mobilization**	**09/08/03**	**09/10/03**
2100	**Site Preparation**	**09/16/03**	**10/02/03**
2110	Perimeter Erosion Control	09/17/03	09/23/03
2120	Stabilized Construction Entrance & Storm Inlets	09/16/03	09/16/03
2130	Decontamination Pad - C/D Cell	10/02/03	10/02/03
2140	Clearing Vegetation	09/22/03	09/22/03
2150	Sediment Trap Pond "A" & Plug Pipe	09/22/03	10/02/03
2160	Sediment Trap Pond "B" & Plug Pipe	09/22/03	10/02/03
2170	Cell "D" Rip Rap Outlet	09/26/03	09/29/03
2200	**Demolition**	**09/10/03**	**10/24/03**
2210	Pipe Rack & Piping	10/17/03	10/24/03
2220	Air Scrubber & Cable Tray	09/10/03	09/11/03
2400	**Impoundment B**	**10/22/03**	**01/12/04**
2420	Regrade (B) and Ditches	10/22/03	11/11/03
2430	Geosynthetic/Soil Cap	12/04/03	01/12/04
2431	Geotextile Installation (B)	12/04/03	12/15/03
2432	Geomembrane Installation (B)	12/13/03	12/15/03
2433	Geocomposite Drainage Layer Installation (B)	12/15/03	12/18/03
2434	Cover Soil (B)	12/19/03	01/07/04
2435	Topsoil (B)	01/07/04	01/12/04
2450	**Seeding (B)**	**03/11/04**	**03/13/04**
2300	**Impoundment C/D**	**10/01/03**	**03/05/04**
2310	Regrade (D)	10/01/03	11/02/03
2320	Regrade (C)	10/01/03	11/02/03



Start date	08/18/03
Finish date	05/03/04
Data date	05/03/04
Run date	05/06/04
Page number	1A

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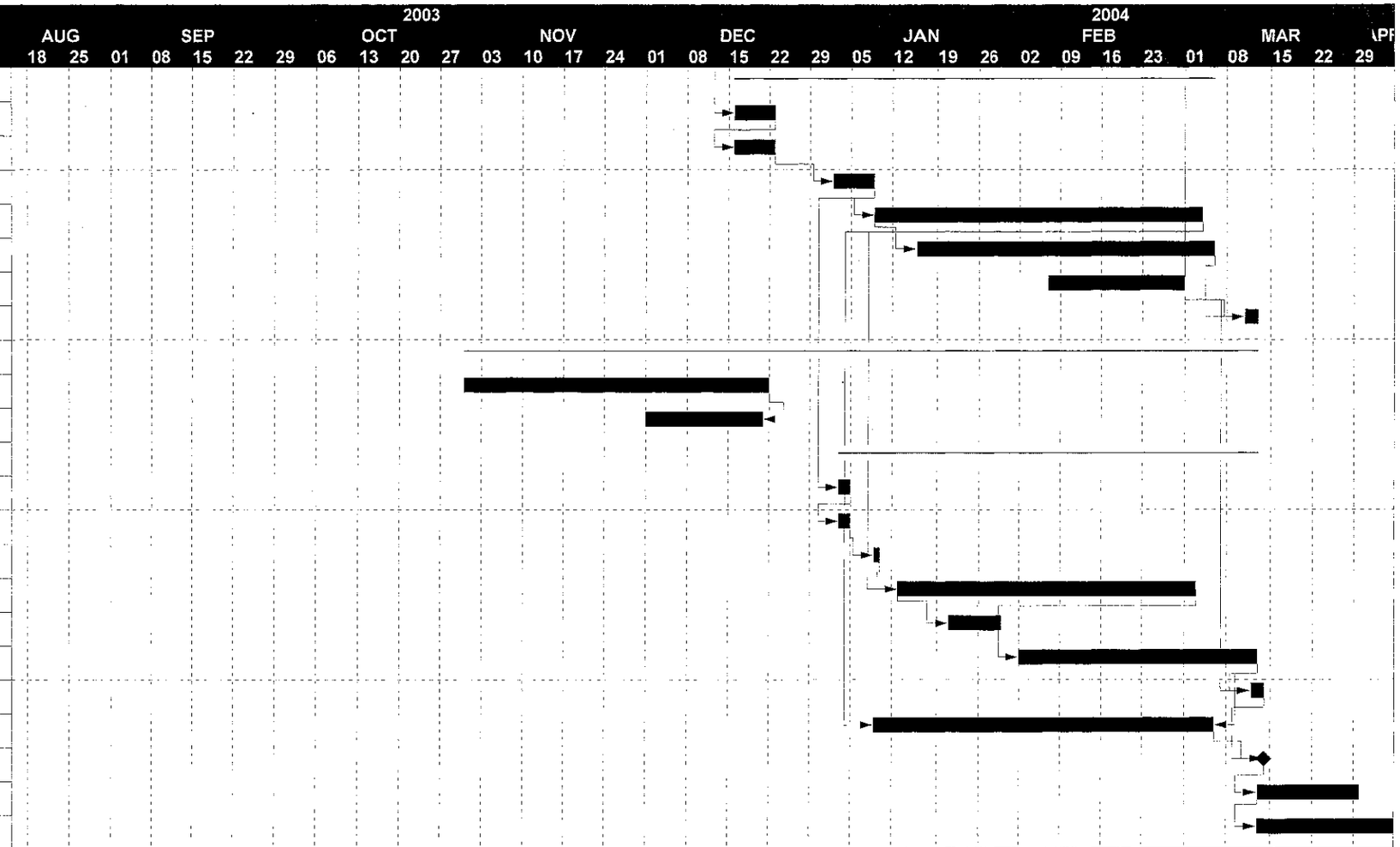
Figure 3

Early bar
Progress bar
Critical bar
Summary bar
Progress point
Critical point
Summary point
Start milestone point
Finish milestone point

Activity ID	Description	Actual Start	Actual Finish
2330	Geosynthetic/Soil Cap	12/16/03	03/05/04
2331	Geotextile Installation (C/D)	12/16/03	12/22/03
2332	Geomembrane Installation (C/D)	12/16/03	12/22/03
2333	Geocomposite Drainage Layer Installation (C/D)	01/02/04	01/08/04
2334	Cover Soil (C/D) (Inclu. Winter Shutdown)	01/09/04	03/03/04
2335	Topsoil (C/D) (Inclu. Winter Shutdown)	01/16/04	03/05/04
2340	Winter Shutdown	02/07/04	02/29/04
2350	**Seeding (C/D)**	**03/11/04**	**03/12/04**
2500	**Impoundment A**	**10/31/03**	**03/12/04**
2520	Regrade (A) and Ditches	10/31/03	12/21/03
2521	Construct Revised Ditch-New	12/01/03	12/20/03
2530	Geosynthetic/Soil Cap	01/03/04	03/12/04
2531	Geotextile Installation (A)	01/03/04	01/04/04
2532	Geomembrane Installation (A)	01/03/04	01/04/04
2533	Geocomposite Drainage Layer Installation (A)	01/09/04	01/09/04
2535	Cover soil (A) (Inclu. Winter Shutdown)	01/13/04	03/02/04
2534	Terminate Cap, Re-designed	01/21/04	01/30/04
2536	Topsoil (A) (Inclu. Winter Shutdown)	02/02/04	03/12/04
2550	**Seeding (A)**	**03/12/04**	**03/13/04**
2600	**Construct Access Roads (Inclu. Shutdown)**	**01/09/04**	**03/05/04**
2700	**Construction Complete Milestone**		**03/13/04**
2800	**Demobilization**	**03/13/04**	**03/29/04**
3000	**Project Close Out**	**03/13/04**	**04/23/04**



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Finish date	05/03/04
Data date	05/03/04
Run date	05/06/04
Page number	2A

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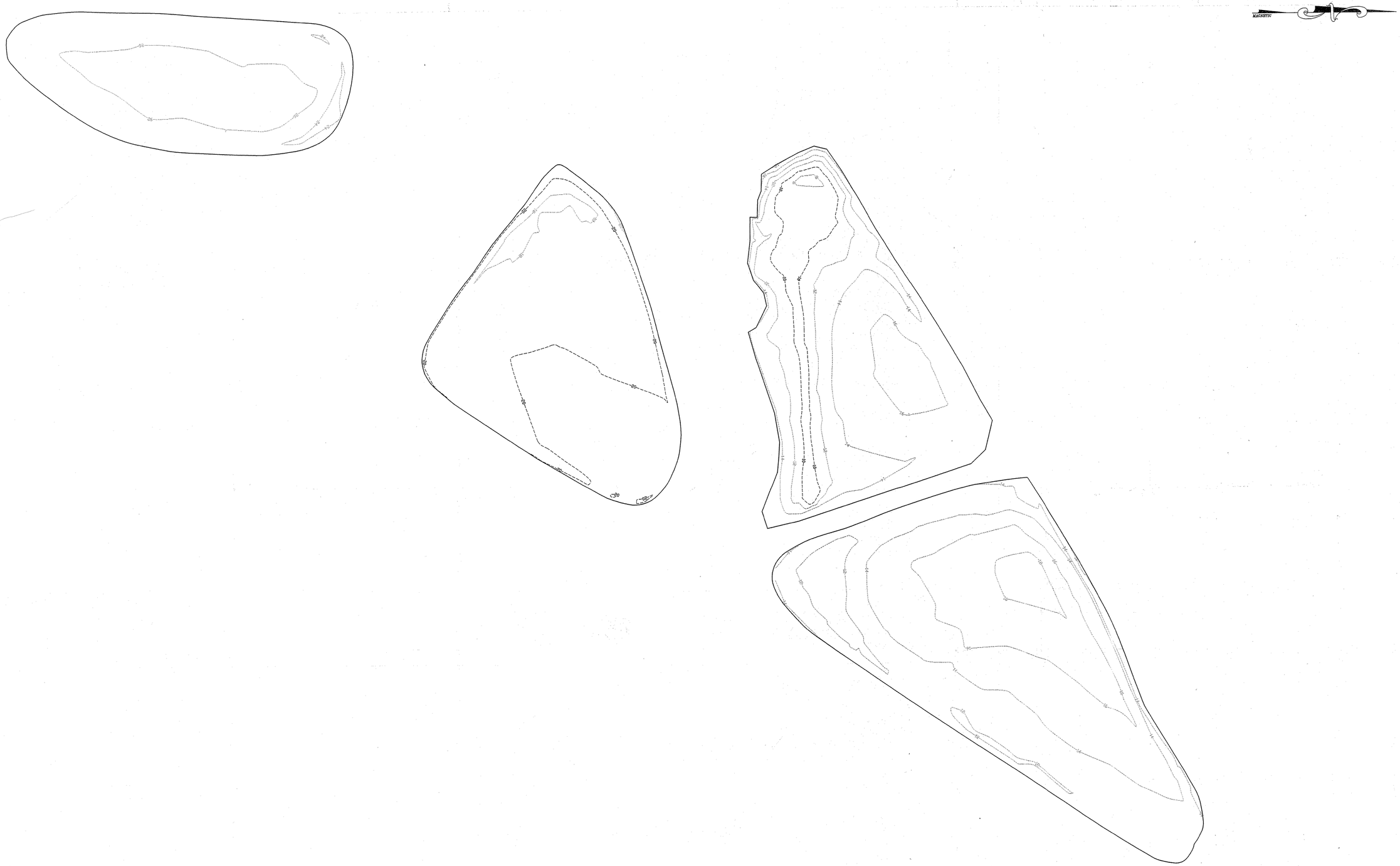
Early bar	Critical point
Progress bar	Summary point
Critical bar	Start milestone point
Summary bar	Finish milestone point
Progress point	



LEGEND

EDGE OF DIRT ROAD

MAJOR CONTOUR

MINOR CONTOUR

MAPPING NOTES

1. EXISTING CONDITIONS SHOWN REPRESENT THE SITE PRIOR TO ANY CONSTRUCTION ACTIVITIES BEING UNDERTAKEN. CONDITIONS SURVEYED 09/15/03
2. SITE GPS COORDINATE CONTROL ESTABLISHED BY LAURENCE R. McBRIDE, INC. GLOBAL POSITIONING SYSTEM SURVEYOR.
3. HORIZONTAL DATUM: DELAWARE STATE PLAIN COORDINATES 1983
   VERTICAL DATUM: DELAWARE STATE PLAIN COORDINATES 1988

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EXISTING CONDITIONS TOPOGRAPHIC PLAN

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CLOSURE DESIGN FOR
FOUR SURFACE IMPOUNDMENTS

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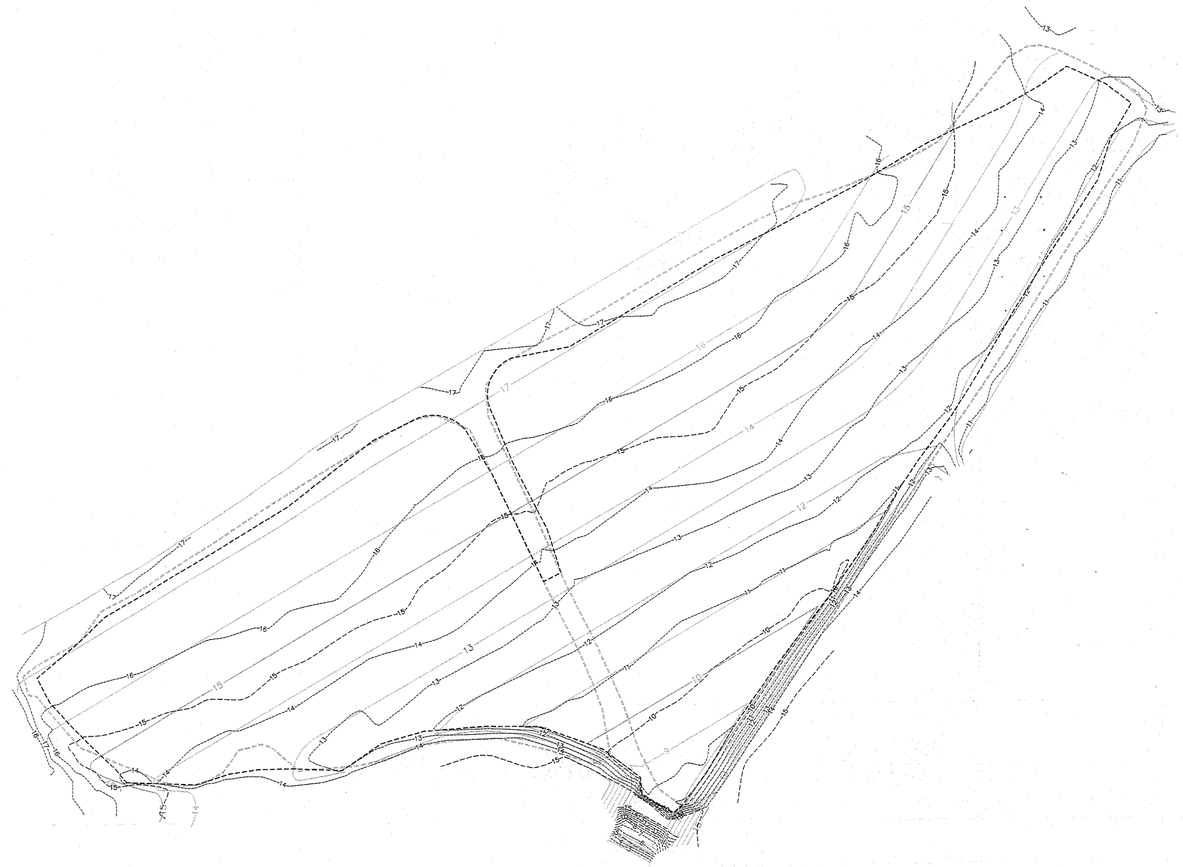
DRAWING Figure 4



PONDS C & D

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- APPROXIMATE LIMITS OF STABILIZED MATERIAL
- DESIGN LIMITS OF STABILIZED MATERIAL
- DESIGN MAJOR CONTOUR
- DESIGN MINOR CONTOUR

MAPPING NOTES

1. INTERMEDIATE CONDITIONS SHOWN REPRESENT THE SITE PRIOR TO THE INSTALLATION OF THE GEOSYNTHETHIC LINER BEING UNDERTAKEN. CONDITIONS SURVEYED 10/28/03
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INTERMEDIATE CONDITIONS TOPOGRAPHIC PLAN

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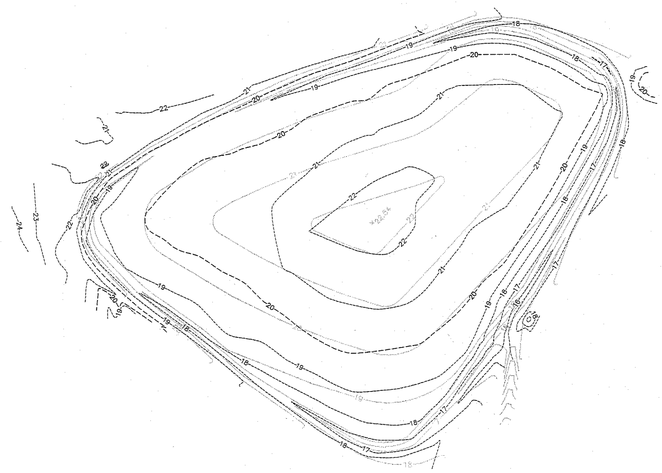

POND B

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- DESIGN MAJOR CONTOUR
- DESIGN MINOR CONTOUR

MAPPING NOTES

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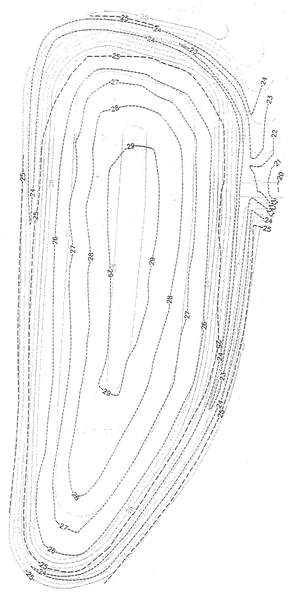

POND A

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- DESIGN MAJOR CONTOUR
- DESIGN MINOR CONTOUR

MAPPING NOTES

1. INTERMEDIATE CONDITIONS SHOWN REPRESENT THE SITE PRIOR TO THE INSTALLATION OF THE GEOSYNTHETHIC LINER BEING UNDERTAKEN. CONDITIONS SURVEYED 12/31/03
2. SITE GPS COORDINATE CONTROL ESTABLISHED BY LAURENCE R. McBRIDE, INC. GLOBAL POSITIONING SYSTEM SURVEYOR.
3. HORIZONTAL DATUM: DELAWARE STATE PLAIN COORDINATES 1983
   VERTICAL DATUM: DELAWARE STATE PLAIN COORDINATES 1988

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INTERMEDIATE CONDITIONS TOPOGRAPHIC PLAN

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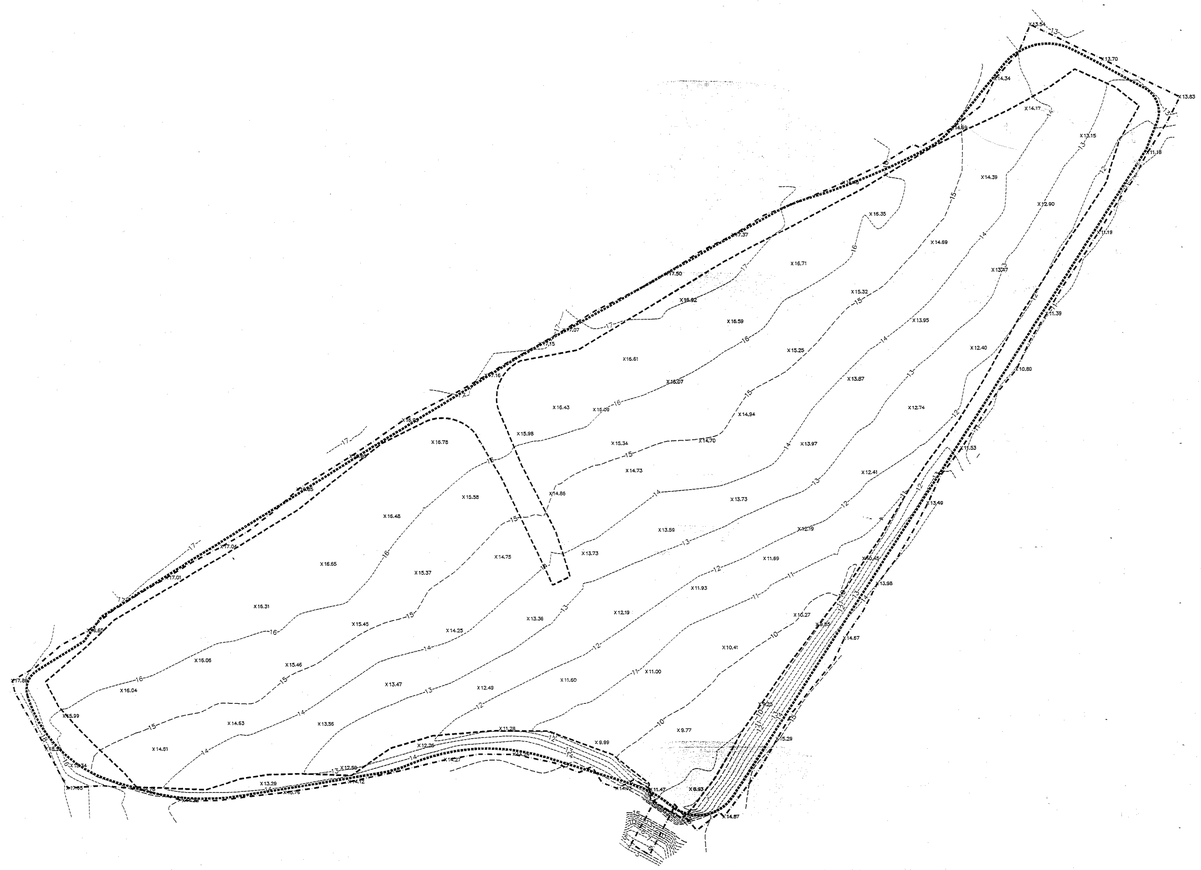

PONDS C & D

LEGEND

----41----	INTERMEDIATE MAJOR CONTOUR
----42----	INTERMEDIATE MINOR CONTOUR
- - - - - -	LIMITS OF STABILIZED MATERIAL
.....	DESIGN LIMITS OF LINER
- - - - - -	ASBUILT LIMITS OF LINER
X 21.38	SPOT ELEVATION ON LINER

MAPPING NOTES

1. INTERMEDIATE CONDITIONS SHOWN REPRESENT THE SITE PRIOR TO THE INSTALLATION OF THE GEOSYNTHETHIC LINER BEING UNDERTAKEN. CONDITIONS SURVEYED 10/28/03
2. ASBUILT LIMITS OF LINER AND THE ASSOCIATED SPOT ELEVATIONS REPRESENT THE SITE FOLLOWING THE INSTALLATION OF THE GEOSYNTHETIC LINER. CONDITIONS SURVEYED 12/23/03.
3. SITE GPS COORDINATE CONTROL ESTABLISHED BY LAURENCE R. McBRIDE, INC. GLOBAL POSITIONING SYSTEM SURVEYOR.
4. HORIZONTAL DATUM: DELAWARE STATE PLAIN COORDINATES 1983
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POST GEOSYNTHETIC LINER CONDITIONS

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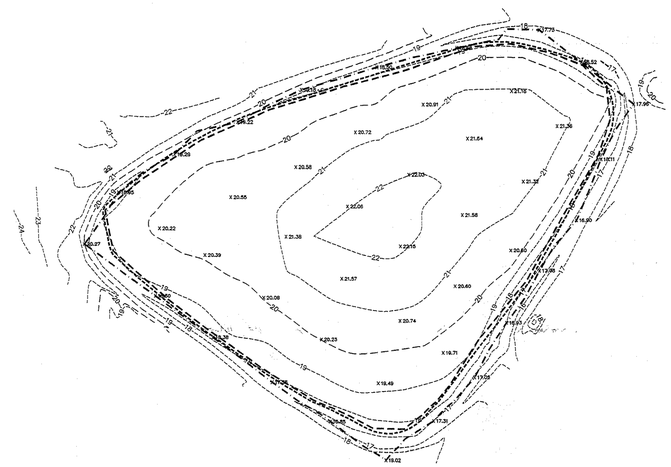
DRAWING Figure 6



POND B

LEGEND

----41----	INTERMEDIATE MAJOR CONTOUR
--------42--------	INTERMEDIATE MINOR CONTOUR
- - - - - - - -	LIMITS OF STABILIZED MATERIAL
- - - - - - - - - - - - - - - -	DESIGN LIMITS OF LINER
-·-·-·-·-·-·-	ASBUILT LIMITS OF LINER
X21.38	SPOT ELEVATION ON LINER

MAPPING NOTES

1. INTERMEDIATE CONDITIONS SHOWN REPRESENT THE SITE PRIOR TO THE INSTALLATION OF THE GEOSYNTHETHIC LINER BEING UNDERTAKEN. CONDITIONS SURVEYED 11/12/03
2. ASBUILT LIMITS OF LINER AND THE ASSOCIATED SPOT ELEVATIONS REPRESENT THE SITE FOLLOWING THE INSTALLATION OF THE GEOSYNTHETIC LINER. CONDITIONS SURVEYED 12/18/03.
3. SITE GPS COORDINATE CONTROL ESTABLISHED BY LAURENCE R. McBRIDE, INC. GLOBAL POSITIONING SYSTEM SURVEYOR.
4. HORIZONTAL DATUM: DELAWARE STATE PLAIN COORDINATES 1983
   VERTICAL DATUM: DELAWARE STATE PLAIN COORDINATES 1988

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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

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Wilmington, DE 19809
Tel: 302.791.0700
Fax: 302.791.0708

APPROVED BY:

SCALE	1" = 50'
SURVEYED	SJM/DRP
DRAWN	SJM
CHECKED	
PEER REVIEWED	
DATE	12/19/03

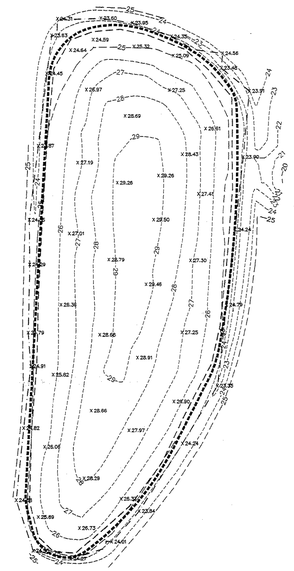
POST GEOSYNTHETIC LINER CONDITIONS

DuPONT EDGEMOOR PLANT
CLOSURE DESIGN FOR
FOUR SURFACE IMPOUNDMENTS

REVISION 1

PROJECT 20619101.00001

DRAWING Figure 6



POND A

LEGEND

- 41 — INTERMEDIATE MAJOR CONTOUR
- 42 — INTERMEDIATE MINOR CONTOUR
- LIMITS OF STABILIZED MATERIAL
- DESIGN LIMITS OF LINER
- ASBUILT LIMITS OF LINER
- X 25.38 — SPOT ELEVATION ON LINER

MAPPING NOTES

1. INTERMEDIATE CONDITIONS SHOWN REPRESENT THE SITE PRIOR TO THE INSTALLATION OF THE GEOSYNTHETHIC LINER BEING UNDERTAKEN. CONDITIONS SURVEYED 11/12/03
2. ASBUILT LIMITS OF LINER AND THE ASSOCIATED SPOT ELEVATIONS REPRESENT THE SITE FOLLOWING THE INSTALLATION OF THE GEOSYNTHETIC LINER. CONDITIONS SURVEYED 12/18/03.
3. SITE GPS COORDINATE CONTROL ESTABLISHED BY LAURENCE R. McBRIDE, INC. GLOBAL POSITIONING SYSTEM SURVEYOR.
4. HORIZONTAL DATUM: DELAWARE STATE PLAIN COORDINATES 1983
   VERTICAL DATUM: DELAWARE STATE PLAIN COORDINATES 1988

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SCALE	1" = 50'
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PEER REVIEWED	
DATE	01/09/04

POST GEOSYNTHETIC LINER CONDITIONS

DuPONT EDGEMOOR PLANT
CLOSURE DESIGN FOR
FOUR SURFACE IMPOUNDMENTS

REVISION 0

PROJECT 20619101.00001

DRAWING Figure 6

Last edited:

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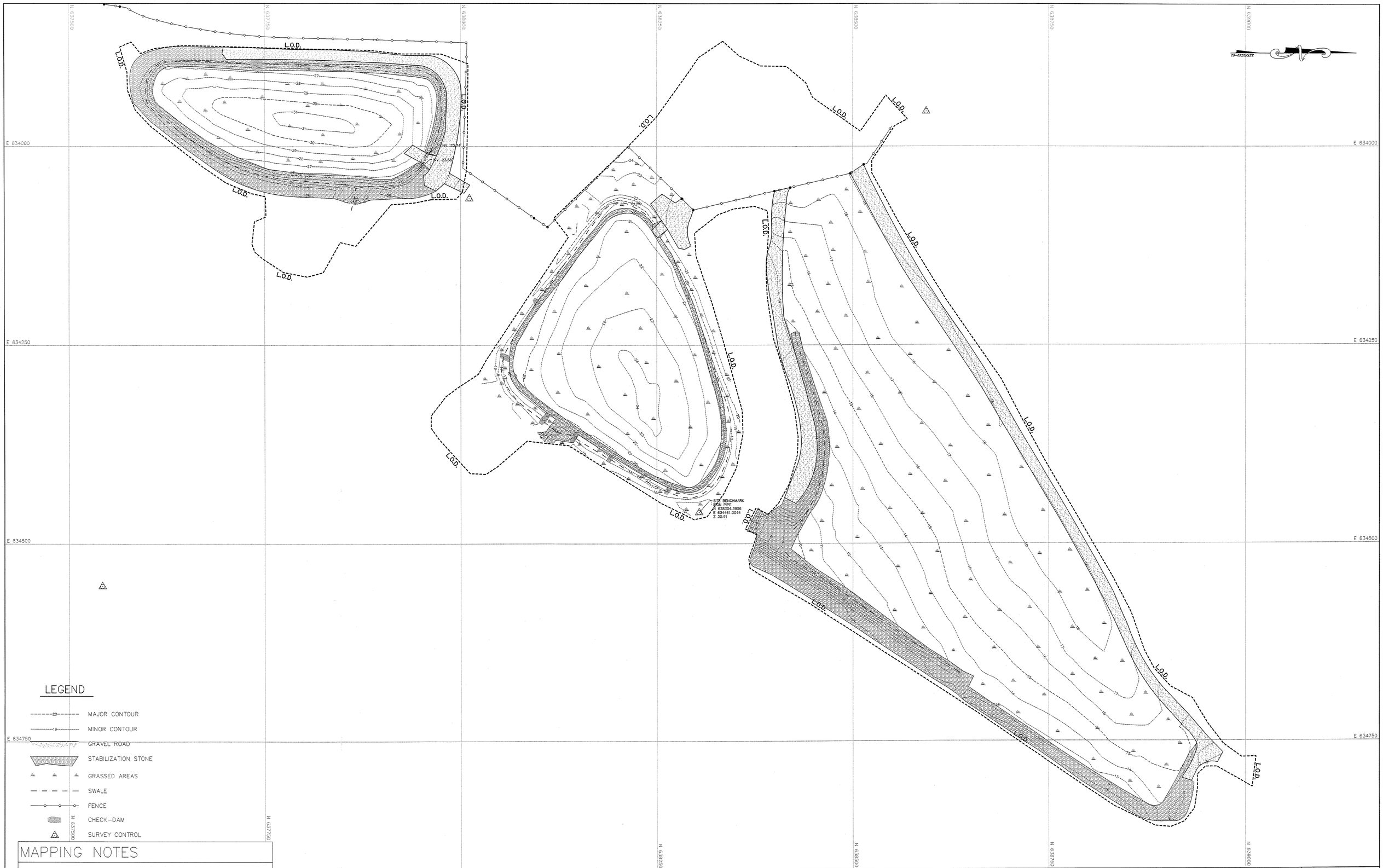

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- GRAVEL ROAD
- STABILIZATION STONE
- GRASSED AREAS
- SWALE
- FENCE
- CHECK-DAM
- SURVEY CONTROL

MAPPING NOTES

1. AS-BUILT CONDITIONS SHOWN REPRESENT THE SITE AFTER COMPLETION OF ALL CONSTRUCTION ACTIVITIES AND FINAL SEEDING. CONDITIONS SURVEYED 04/15/04
2. SITE GPS COORDINATE CONTROL ESTABLISHED BY LAURENCE R. McBRIDE, INC. GLOBAL POSITIONING SYSTEM SURVEYOR.
3. HORIZONTAL DATUM: DELAWARE STATE PLAIN COORDINATES 1983
   VERTICAL DATUM: DELAWARE STATE PLAIN COORDINATES 1988

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WARNING
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SCALE	1" = 50'
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SURVEYED DATE	04/15/04
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AS-BUILT CONDITIONS TOPOGRAPHIC PLAN

DuPONT EDGEMOOR PLANT
CLOSURE DESIGN FOR
FOUR SURFACE IMPOUNDMENTS

REVISION	0
PROJECT	20619101.00001
DRAWING	Figure 7

APPENDIX A
FIELD CHANGE REQUESTS AND ENGINEERING CHANGE ORDERS

Field Change Requests

- FCR7382-001: Contract Change Request for compensation for trailer relocation made necessary by the Plant's installation of an automatic railroad gate adjacent to the trailer's position on the site.
- FCR7382-002: Contract Change Request for compensation for excavation and demolition delays due to an extended time for the Plant clearing of the pipelines for initial break and additional time in obtaining work permits.
- FCR7382-003: URS-ROS requested to remove the drainpipe between Surface Impoundments C and D in lieu of capping and grouting. DuPont approved of the pipe removal provided that the pipe be cut and placed within Cell C/D in a manner that prevented localized subsidence or damage to the geosynthetic cap system. ECO7382-010 was issued to modify Drawing Sheet 6 of 16 to reflect the alternate abandonment method.
- FCR7382-004: URS-ROS requested to abandon the storm water pipes between Surface Impoundments A, B, and C by forming and pouring a 2-foot long concrete plug within the pipes in lieu of installing mechanical caps and filling the pipes with grout. DuPont approved the alternate provided that a complete watertight seal was obtained on each end of the pipe. ECO7382-010 was issued to modify Drawing Sheet 6 of 16 to reflect the alternate abandonment method.
- FCR7382-005: URS-ROS requested to conduct the on-site geosynthetic advance conformance testing specified in Sections 02274.3.3B1, 02277.3.4B1, and 02278.3.4A at the manufacturer's site to prevent non-conforming materials from being shipped to the site. DuPont approved the alternate provided that the testing was in addition to the specified manufacturer's testing. ECO7382-011 was issued modifying the appropriate specification sections.
- FCR7382-006: URS-ROS requested to utilize the existing wash pad located adjacent to Surface Impoundment A instead of constructing a separate decontamination pad for use during closure of Surface Impoundment A. The Plant agreed to the availability and use of this wash pad. The use of the existing Plant wash pad eliminated the need to construct and restore one of the decontamination pads.
- FCR7382-007a: Revised Contract Change Request for compensation for delays due to extended time for the Plant clearing of the pipelines for initial break required prior to demolition of the pipes.
- FCR7382-008: Contract Change Request for compensation for rental of a 3-inch pump in preparation for Hurricane Isabel. The pump was not used and the request was withdrawn by URS-ROS.

APPENDIX A
FIELD CHANGE REQUESTS AND ENGINEERING CHANGE ORDERS

- FCR7382-009: URS-ROS requested that the western access road along Cell C/D be built up with crusher run aggregate instead of on-site borrow material due to the extended periods of rain and deteriorating road condition. URS-ROS was able to work with the existing material and subsequently withdrew the request.
- FCR7382-010a: Revised Contract Change Request for compensation for drying of wet material in Cell C/D using a combination of mixing quick lime into the wet material and spreading the material to facilitate air drying.
- FCR7382-011: Contract Change Request for additional compensation for drying of wet material in Cell C/D using a combination of mixing quick lime into the wet material and spreading the material to facilitate air drying.
- FCR7382-012: Contract Change Request for compensation for preparation of Cell C/D surface within the ditch line using geotextile and sand.
- FCR7382-013: Contract Change Request for compensation for transporting and deploying two rolls of 60-mil HDPE geomembrane for use as rub sheets to protect the installation of the 40-mil LDPE geomembrane component of the cap system.
- FCR7382-014: DuPont requested to amend specified permanent seed mixture to accommodate planting between November and April. The amended seed mixture was based on recommendations from the USDA. Engineering Change Order ECO7382-014 was issued to modify Specification Section 02930, Article 2.1B to reflect the amended seed mixture for the winter planting season. Seeding occurred in mid-March using the original seed mixture specification and this FCR was withdrawn.
- FCR7382-015: Contract Change Request for compensation for additional work to construct the revised Cell A cap terminations and swale design. During the excavation of the swales in Cell A, a small volume of liquid began seeping out of the side of the excavation along the top of the existing clay liner. ECO7382-018 was issued to modify the cap termination to backfill the current excavation with compacted clay, raise the intermediate grade invert elevations and reduce ditch fall in accordance with the Summary of Minor Design Modification for Surface Impoundment A Drainage Swale letter submitted to DNREC on November 21, 2003. The modification effectively sealed the seeps while maintaining adequate storm water drainage off of the cell cap.
- FCR7382-016: Contract Change Request for compensation to add additional rip rap to the eastern banks of Cell A and Cell C/D and to change ditch protection for Cells A and C/D to rip rap instead of the grass-lined ditch shown on the drawings.
- FCR7382-017: Contract Change Request for compensation to prepare the site for winter shut down.

APPENDIX A
FIELD CHANGE REQUESTS AND ENGINEERING CHANGE ORDERS

Engineering Change Orders

- ECO7382-001: Modify Specification Section 02200, Article 3.8E to specify the use of a smooth drum roller in place of a padded-foot roller to protect the underlying geosynthetic components of the cap system.
- ECO7382-002: Modify Specification Section 02274, Article 2.1B to correct the ASTM test designation for geotextile mass/unit area from ASTM D3776 to ASTM D5261.
- ECO7382-003: Modify Specification Section 02274, Article 2.1, Table 1 to correct the test designation for geotextile apparent opening size (AOS) from CW02215 to ASTM D4751.
- ECO7382-004: Modify Specification Section 02277, Article 2.1B to correct the test designation for geocomposite ply adhesion characteristics from ASTM F904 to GSI GC-7.
- ECO7382-005: Modify Specification Section 02277, Article 2.3A to change the geotextile description to match the current industry designation for needle-punched, non-woven geotextile from continuous filament fabric to staple fiber.
- ECO7382-006: Modify Specification Section 02277, Article 3.4B, Table 1 to change the required ply adhesion test (ASTM D413) value from 2.0 lbs./in. to 1.0 lbs./in. to reflect properties of current commercially available material.
- ECO7382-007: Modify Specification Section 02278, Article 2.1B1 to change the required geomembrane manufacturing location from U.S. to North America in order to accept material produced wholly or in part in Canada.
- ECO7382-008: Modify Specification Section 01110, Article 1.4A1 to change the health and safety daily reporting requirement to allow for keeping a log book available on site for review.
- ECO7382-009: Modify Specification Section 01440, Table 1 to clarify the discrepancy in the specified roadway aggregate acceptance criteria for gradation to match Section 02505. The gradation specified in Section 02505 and the revised Section 01440 are in conformance with the Delaware Department of Transportation specification for graded aggregate Type B (crusher run) as specified in their Standard Specifications, Section 821.03(c) – Graded Aggregates.
- ECO7382-010: Modify Drawing Detail 11 to allow alternate drainage pipe plug material in place of ADS N-12 Prolink WT end cap in response to FCR7382-003 and to remove the pipe between Surface Impoundments C and D in response to FCR7382-004.
- ECO7382-011: Modify Specification Section 02274, Article 3.3B1; Section 02277, Article 3.4B1; and Section 02278, Article 3.4A to change the specified

geosynthetics testing location from on-site to the manufacturer's site. This modification was made to avoid the potential cost and delays associated with returning and replacing non-conforming geosynthetic materials after they have been delivered to the site.

- ECO7382-012: Modify Specification Section 02505, Article 3.8F to remove the wear and soundness testing requirements for aggregate materials based on their intended use.
- ECO7382-013: Modify Specification Section 01440, Table 1 to clarify the discrepancy in the geomembrane and geonet acceptance criteria to match Sections 02278 and 02277, respectively.
- ECO7382-014: Modify Specification Section 02930, Article 2.1B to amend permanent seed mix to include winter rye for cold season planting in response to FCR7382-014. This ECO was withdrawn based on the actual seeding date.
- ECO7382-015: Modify Specification Section 02278, Article 2.1B5, Table 2 to change Note 2 to conform to GRI GM-19.
- ECO7382-016: Provided Contractor with additional cross section to clarify the cap termination detail for Cell C/D between Sta. 2+80 and 5+00 as shown on Drawing Sheet 8 of 16.
- ECO7382-017: Provided Contractor with additional cross section to clarify the cap termination detail for Cell C/D between Sta. 14+00 and 15+50 as shown on Drawing Sheet 8 of 16.
- ECO7382-018: Modify Drawing Detail 2 to provide seep protection by backfilling the current excavation with compacted clay, raising the intermediate grade invert elevations and reducing the ditch fall in Ditch A1 and A2 on Cell A.
- ECO7382-019: Provided Contractor with a supplement to Specification Section 02200, Article 3.10B to include soil analytical testing for non-commercial borrow sources.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

Activities for the week ending September 12, 2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - Plant orientation, Pre-construction conference and Project Safety Analysis (PSA) for mobilization and site preparation activities conducted on 09/08/03.
  - PSA for grading activities conducted on 09/12/03.
  - Mobilization of office trailers, excavator, loader, and manlift.
  - Debris disposal roll-offs delivered to the site.
- ❑ Site Preparation
  - Relocate former surface impoundment pumping equipment and miscellaneous debris from work area to debris stockpile area.
  - Set up work zone barricades.
  - Demolition of existing cable tray and decommissioned air stripper.
  - Temporarily remove sections of the site security fence to provide access to the work zone.
  - Received material deliveries of silt fence and sediment control filter bags.
- ❑ Intermediate Grading and Surface Preparation
  - Received Plant excavation permit on 09/11/03.

Activities for the week ending September 19, 2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - Mobilization of trencher for silt fence installation and pump for storm water by-pass system.
- ❑ Site Preparation
  - Plant contractor, Eisco, started removal of residual material from pipes in preparation for demolition work.
  - Received material deliveries of 40-mil HDPE geomembrane and geotextile (one roll each) for use in decontamination pads and other temporary site structures on 09/15/03.
  - Inlet protection for the existing storm drains was constructed on 09/16/03.
  - Installed silt fence along eastern side of Cell C/D on 09/17/03 and along Cell B perimeter on 09/18/03.
  - Set up storm water by-pass system in Cell C/D.
  - Prepared site for approach of Hurricane Isabel. Site work limited on 09/18/03 and 09/19/03 due to effects of the storm.
- ❑ Meetings
  - First progress meeting held on 09/17/03.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

Activities for the week ending September 26, 2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - Mobilization and inspection of D-6 dozer, second excavator, dump truck, and roller.
  - Demobilization of the trencher.
- ❑ Site Preparation
  - Installed silt fence along western side of Cell C/D and along site construction entrance on 09/22/03 and 09/23/03.
  - Cleared location and constructed sediment control structure at the base of Cell B on 09/22/03. Outlet constructed on 09/25/03.
  - Sediment control structure at the base of Cell A constructed between 09/22/03 and 09/25/03.
  - Received material deliveries of R-3 (120 tons) and R-4 (48 tons) rip rap and AASHTO #2 stone (25 tons) on 09/24/03.
  - Eisco and BE&K continued removal of residual material from pipes in preparation for demolition work.
  - Temporary seeding of areas disturbed for construction of sediment control structures completed on 09/26/03.
- ❑ Intermediate Grading and Surface Preparation
  - Pre-construction topographic survey for Cell C/D started on 09/22/03.
  - Grading activities began in Cell C/D on 09/25/03.
- ❑ Installation of Geosynthetic Cap System
  - Delivery of 1 roll of 12-oz./sy. geotextile.
  - Delivery of 14 rolls of 8-oz./sy. geotextile.
- ❑ Meetings
  - Coordination meeting held with Plant personnel on 09/23/03 regarding demolition of pipes and pipe rack.
  - Progress meeting held on 09/24/03.

Activities for the week ending October 3,2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - Mobilization and inspection of water truck.
- ❑ Site Preparation
  - Abandoned the existing storm water drainage pipes between Cells A, B, and C/D.
  - Decontamination pad constructed at Cell C/D on 10/02/03.
- ❑ Intermediate Grading and Surface Preparation
  - Started construction of Cell C/D outlet.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

- Construction layout survey of Cells B and C/D.
- Started intermediate grading of Cell C/D on 10/01/03. Encountered wet material in area of Cell C/D outlet. Approximately 20 tons of quick lime was mixed with the wet material to dry it.

❑ Meetings

- Progress meeting held on 10/01/03.

Activities for the week ending October 10, 2003:

❑ Mobilization/Demobilization of Personnel and Equipment

- Mobilization and inspection of low-ground pressure dozer.

❑ Site Preparation

- Eisco and BE&K continued removal of residual material from pipes in preparation for demolition work.
- Construction access road along the western side of Cell C/D constructed.

❑ Intermediate Grading and Surface Preparation

- Continued intermediate grading of Cell C/D.
- Continued mixing quick lime in areas of wet material near Cell C/D outlet and where the previous storm water retention basin in Surface Impoundment C was located. An additional 46 tons of quick lime were delivered to the site.
- Started spreading operation to dry wet material in conjunction with lime addition on 10/09/03.
- Prepared sump area for storm water control near Cell C/D outlet.

❑ Meetings

- Progress meeting held on 10/08/03.

Activities for the week ending October 17, 2003:

❑ Mobilization/Demobilization of Personnel and Equipment

- Mobilization and inspection of off road dump truck.

❑ Site Preparation

- Installed reinforced silt fence along northeastern outlet of Cell C/D.
- Started pumping storm water from Cell C/D through filter bag on 10/15/03.
- Started demolition of pipes and pipe rack on 10/17/03.

❑ Intermediate Grading and Surface Preparation

- Continued intermediate grading of Cell C/D and drying of wet material.

❑ Meetings

- Progress meeting held on 10/15/03.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

Activities for the week ending October 24, 2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - Demobilization of the off road dump truck.
- ❑ Site Preparation
  - Continued demolition of pipes and pipe rack.
- ❑ Intermediate Grading and Surface Preparation
  - Continued intermediate grading of Cell C/D and drying of wet material. An additional 23 tons of quick lime were delivered to the site and mixed with wet material.
  - Started intermediate grading of Cell B on 10/22/03.
- ❑ Meetings
  - Progress meeting held on 10/22/03.

Activities for the week ending October 31, 2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - No work performed on 10/27/03 through 10/30/03 due to heavy rain.
- ❑ Site Preparation
  - Continued demolition of pipes and pipe rack.
- ❑ Intermediate Grading and Surface Preparation
  - Continued intermediate grading of Cell C/D and drying of wet material.
  - Started fine grading and subgrade surface preparation on Cell C/D on 10/31/03. Surface rocks greater than 3-inches in diameter or that could damage the geosynthetic components of the cap were removed. Approximately 89 tons of sand was used to fill ruts and prepare the subgrade surface in areas where equipment could not operate on.
  - Started intermediate grading of Cell A on 10/31/03. Encountered low pH liquid seeping from the interface of the clay liner and rip rap protective layer while excavating perimeter drainage ditches around Cell A. Liquid was contained in the ditches.
- ❑ Meetings
  - Progress meeting held on 10/29/03.

Activities for the week ending November 7, 2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - Excavator decontaminated on 11/04/03 and 11/05/03. Excavator was visually inspected and released for demobilization on 11/05/03.
  - Mobilization and inspection of forklift and Cat 318 excavator.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

- GSI mobilization, Plant orientation, PSA and HASP review conducted on 11/07/03. GSI personnel were temporarily removed from site due to non-compliance with DuPont background check requirements.

- Site Preparation
  - Constructed second construction entrance at north end of Cell C/D to facilitate truck traffic during soil hauling operations.
- Intermediate Grading and Surface Preparation
  - Continued fine grading and subgrade surface preparation on Cell C/D.
  - Continued excavation of perimeter ditches in Cell A. The seeps were still present and all liquid was contained in the ditches. Eisco used vacuum truck to evacuate the liquid in the ditches and return the liquid to the head of the on-site water treatment plant.
  - A test pit was excavated in the northwest corner of Cell A to verify the limit of waste on 11/01/03. Additional test trenches were excavated on 11/04/03 to evaluate the extent of the seeps.
  - Grading of Cell A ditches was discontinued on 11/03/03 to re-evaluate the design of the ditches.
  - Continued grading on Cell B.
  - Earthwork was suspended between 11/05/03 and 11/06/03 due to rain.
  - Concrete debris was removed from the Cell B berm and buried within Cell B.
- Installation of Geosynthetic Cap System
  - Delivery of 46 rolls of 12-oz./sy. geotextile.
  - Delivery of 7 rolls of 40-mil LDPE geomembrane.
  - Delivery of 5 rolls of 8-oz./sy. geotextile.
  - Delivery of 72 rolls of geonet.
- Quality Control/Quality Assurance
  - QC representative reviewed shipping information and inspected 27 rolls of 12-oz./sy. geotextile on 11/07/03.
  - QC representative reviewed shipping information and inspected 19 rolls of 40-mil LDPE geomembrane on 11/05/03.
  - QC representative witnessed unloading of, reviewed shipping information and inspected 18 rolls of geonet on 11/05/03.
  - QC representative reviewed shipping information and inspected 64 rolls of geonet on 11/07/03.
- Meetings
  - Progress meeting held on 11/05/03.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

Activities for the week ending November 14, 2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - No work performed from the afternoon of 11/11/03 through 11/14/03 due to rain, GSI background checks, and Cell A ditch redesign.
- ❑ Intermediate Grading and Surface Preparation
  - Completed intermediate grading and subgrade surface preparation of Cell B on 11/11/03.
  - Low pH liquid from Cell A ditches was neutralized with soda ash and returned to the head of the on-site wastewater treatment process.
- ❑ Installation of Geosynthetic Cap System
  - Delivery of 7 rolls of geonet.
  - Delivery of 27 rolls of 8-oz./sy. geotextile.
- ❑ Quality Control/Quality Assurance
  - Collected quality control samples for proposed clay sources and sent them for laboratory geotechnical testing on 11/13/03 and 11/14/03.
- ❑ Meetings
  - Progress meeting held on 11/12/03.

Activities for the week ending November 21, 2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - Reduced crew on site and limited work performed between 11/17/03 and 11/21/03 due GSI background checks and Cell A ditch redesign.
  - No work performed on 11/19/03 due to rain. Water pumped from Cell C/D on 11/20/03 and 11/21/03.
  - Roller and two dozers decontaminated, visually inspected and released for demobilization on 11/18/03.
- ❑ Site Preparation
  - Conducted general site cleanup.
- ❑ Quality Control/Quality Assurance
  - Collected quality control samples for additional proposed clay source and sent them for laboratory geotechnical testing on 11/18/03.
- ❑ Meetings
  - Progress meeting held on 11/19/03.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

Activities for the week ending November 28, 2003:

- Mobilization/Demobilization of Personnel and Equipment
  - Reduced crew on site and limited work performed between 11/24/03 and 11/26/03 due GSI background checks and Cell A ditch redesign.
  - No work performed on 11/27/03 or 11/28/03 due to Holiday.
- Site Preparation
  - Plant contractor, Breslin Construction, installed asphalt apron on entrance road to Cell A to accommodate truck traffic.
- Installation of Geosynthetic Cap System
  - Construction layout survey of cap system on Cell B.
- Meetings
  - No progress meeting held this week due to Holiday.

Activities for the week ending December 5, 2003:

- Mobilization/Demobilization of Personnel and Equipment
  - GSI remobilization, Plant orientation, and PSA and HASP review on 12/03/05.
  - Mobilization and inspection of two dozers, roller, and trench roller.
  - No work performed on 12/05/03 due to snowstorm.
- Intermediate Grading and Surface Preparation
  - Received material delivery of 1,197 tons of clay for use in Cell A ditches between 12/01/03 and 12/02/03.
  - Clay placed and compacted in perimeter ditch A1 from Station 0+00 to 3+50 and ditch A2 from Station 0+00 to 3+00.
- Installation of Geosynthetic Cap System
  - GSI placed approximately 13,930 sf. of 12-oz./sy. geotextile on Cell B working south to north and east to west. All seams were sewn.
- Quality Control/Quality Assurance
  - QC representative completed initial inspection of Cell B subgrade surface on 12/03/04 and found the surface to be in satisfactory condition for deployment of geosynthetic components of the cap system.
  - QC representative collected two clay samples (120301-1 and 120301-2) and tested them on site for moisture content on 12/01/03.
  - QC representative performed 33 in-place moisture and density tests of clay lifts placed in the Cell A ditches on 12/02/03 through 12/04/03. All tests were in conformance with the specifications for compaction. Test performed at Ditch A2, Station 1+25, of lift 2 was not within the specified permeability window. Location was retested and was within the permeability window.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

- ❑ Meetings
  - Progress meeting held on 12/03/03.

Activities for the week ending December 12, 2003:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - No work performed on 12/06/03 due to snowstorm.
  - GSI demobilized on 12/09/03.
  - No work performed on 12/11/03 due to rain.
- ❑ Site Preparation
  - Received material delivery of crusher run stone (70 tons).
  - Constructed Cell B access road.
- ❑ Intermediate Grading and Surface Preparation
  - Continued construction of drainage ditches in Cell A.
- ❑ Installation of Geosynthetic Cap System
  - No geosynthetic installation performed on 12/08/03 and 12/09/03 due to snow conditions on cells.
- ❑ Meetings
  - Progress meeting held on 12/10/03.

Activities for the week ending December 19, 2003:

- ❑ Mobilization of Personnel and Equipment
  - Additional GSI crew mobilized on 12/13/03 and completed Plant orientation and PSA and HASP review.
  - No work performed on 12/17/03 due to rain.
- ❑ Intermediate Grading and Surface Preparation
  - Received material delivery of 50 additional loads of clay.
  - Clay placed and compacted in perimeter ditch A1 from Station 3+50 to 4+50 and ditch A2 from Station 3+00 to 4+50.
  - Clay placement completed on 12/13/03.
- ❑ Installation of Geosynthetic Cap System
  - Installed approximately 64,902 sf. of 12-oz./sy. geotextile on Cell B, working west to east and south to north. Installation completed on 12/13/03.
  - Installed approximately 201,236 sf. of 12-oz./sy. geotextile on Cell C/D starting on 12/16/03.
  - Installed 40-mil LDPE geomembrane panels 1 through 16 (approximately 64,463 sf) on Cell B on 12/13/03 and 12/15/03.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

- Installed geomembrane panels 17 through 41 (approximately 80,608 sf.) on Cell C/D on 12/16/03 and 12/19/03.
- Approximately 2,741 ft. of seaming was completed on Cell B geomembrane.
- Approximately 3,343 ft. of seaming was completed on Cell C/D geomembrane.
- Patch numbers P-1 through P-28 and detail work on Cell B geomembrane completed on 12/19/03.
- Completed patch numbers P-29 through P-42 on Cell C/D geomembrane.
- Installed approximately 65,406 sf. of geonet on Cell B.
- Installed approximately 65,397 sf. of 8-oz./sy. geotextile on Cell B.

❑ Placement of Cover Soil and Topsoil

- Received material delivery of 48 tons of #3 stone for cap terminations and 915 tons cover soil on 12/19/03.
- Started placement of cover soil on 12/19/03.

❑ Quality Control/Quality Assurance

- One geonet QA sample from roll #1124030 and one 8-oz./sy. geotextile QA sample from roll #300120108 was collected on 12/18/03.
- QC representative performed 12 in-place moisture and density tests of clay lifts placed in the Cell A ditches on 12/13/03. All tests were in conformance with the specifications for compaction and were within the permeability window.
- QC Supervisor witnessed the following trial seams:

Date	Sample #	Cell
12/13/03	TS-1 through TS-2	B
12/15/03	TS-3, TS-3R, TS-3R1, TS-3R2, TS-4, TS-5, and TS-6	B
12/16/03	TS-7	B
12/16/03	TS-8 through TS-11	C/D
12/19/03	TS-12 through TS-15	C/D

Machine #69 failed two consecutive trial seams (TS-3 and TS-3R). The wedge was adjusted and two consecutive passing seams were achieved (TS3-R1 and TS-3R2). All other trial seams were in compliance with the specifications.

- QC Supervisor witnessed air pressure tests for seams associated with panels 1 through 16 (approximately 2,741 ft.) on 12/15/03 and for seams associated with panels 17 through 34 (approximately 2,572 ft.) on 12/16/03. Failing seam sections were bounded and capped in compliance with specifications.
- QC Supervisor collected five destructive samples (DS-1 through DS-5) on 12/15/03 and five destructive samples (DS-6 through DS-10) on 12/19/03. Samples were field tested for peel strength and shear strength. All field tests

were in compliance with the specifications. Duplicate samples were sent to both the QC lab and QA lab for laboratory testing. All laboratory test results were in compliance with the specifications.

- QC Supervisor witnessed non-destructive testing of patches P-1 through P-18 on 12/15/03, P-19 through P-24 on 12/16/03, and P-25 through P-28 on 12/19/03. All tests were in compliance with the specifications.
- Completed quality control survey of limit of geosynthetic cap on Cell B on 12/18/03. Two areas needed to be extended and were brought into compliance on 12/19/03.

❑ Meetings

- Progress meeting held on 12/17/03.

Activities for the week ending December 26, 2003:

❑ Mobilization/Demobilization of Personnel and Equipment

- Dozer decontaminated, visually inspected and released for demobilization on 12/20/03.
- Demobilization of storm water pump and bag filter.
- Holiday break from 12/24/03 through 12/26/03.

❑ Site Preparation

- General site cleanup in preparation for holiday break.
- Repaired silt fence along west access road.

❑ Intermediate Grading and Surface Preparation

- Completed construction of drainage ditches in Cell A.
- Completed excavation of Cell C/D outlet.

❑ Installation of Geosynthetic Cap System

- Installed geomembrane panels 42 through 76 (approximately 109,032 sf) on Cell C/D on 12/20/03 and 12/21/03.
- Approximately 5,493 ft. of seaming was completed on Cell C/D geomembrane.
- Patch numbers P-43 through P-112 and detail work on Cell C/D geomembrane completed on 12/22/03.

❑ Placement of Cover Soil and Topsoil

- Continued placement of cover soil on Cell B.
- Received material delivery of 143 tons of #57 stone for cap terminations and 1,567 tons cover soil on 12/22/03 and 12/23/03.

❑ Quality Control/Quality Assurance

- Two geomembrane QA conformance samples were collected on 12/20/03 from rolls #39105 and roll #39087.
- QC Supervisor witnessed the following trial seams:

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

Date	Sample #	Cell
12/20/03	TS-16, TS-16R, TS-17, TS-18, TS-19, TS-19R, and TS-19R1	C/D
12/21/03	TS-20, TS-20R, and TS-21 through TS-25	C/D
12/22/03	TS-26 through TS-29	C/D

Machine #69 initially failed the morning trial seam (TS-16) on 12/20/03 and was retested (TS-16R) with a passing result. Machine #42 failed three consecutive trial seams in the afternoon (TS-19, TS-19R, and TS-19R1) on 12/20/03 and was removed from service. Machine #69 initially failed the morning trial seam (TS-20) on 12/21/03 and was retested (TS-20R) with a passing result. All other trial seams were in compliance with the specifications.

- QC Supervisor and QA representative witnessed air pressure tests for seams associated with panels 35 through 76 (approximately 6,264 ft.) on 12/20/03 through 12/22/04. Failing seam sections were bounded and capped in compliance with specifications.
- QC Supervisor witnessed non-destructive testing of patches P-43 through P-59 on 12/21/03, P-29 through P-42 and P-60 through P-112 on 12/22/03. All tests were in compliance with the specifications.

❑ Meetings

- Progress meeting held on 12/30/03.

<u>Activities for the week ending January 2, 2004:</u>

❑ Mobilization/Demobilization of Personnel and Equipment

- Holiday break from 12/27/03 through 12/28/03.

❑ Installation of Geosynthetic Cap System

- Completed patch numbers P-113 through P-120 on Cell C/D geomembrane.
- Installed approximately 66,279 sf. of geonet on Cell C/D, working from west to east and north to south.
- Installed approximately 66,279 sf. of 8-oz./sy. geotextile on Cell C/D working from west to east and north to south.

❑ Placement of Cover Soil and Topsoil

- Continued placement of cover soil on Cell B.
- Received material delivery of 120 tons of #57 stone for cap terminations and 1,840 tons cover soil on 12/29/03 and 12/30/03.

APPENDIX B
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- Quality Control/Quality Assurance
  - QC Supervisor witnessed trial seams TS-30 and TS-30R on 01/02/04 for Cell C/D. Machine #59 initially failed the trial seam (TS-30) and was retested (TS-30R) with a passing result.
  - QC Supervisor collected 13 destructive samples (DS-11 through DS-23) on 01/02/04. Samples were field tested for peel strength and shear strength. All field tests were in compliance with the specifications except DS-17. The failing destructive test was tracked (DS-17B, DS-17B1 through DS-17B5) and a passing field test was achieved (DS-17B5). The failing portion of the seam was capped. Duplicates of samples that passed the field tests were sent to both the QC lab and QA lab for laboratory testing. The QC laboratory test results for samples DS-17B5, DS-18, and DS-20 and the QA laboratory test results for sample DS-18 had test runs that were not in conformance with the specifications. The seam areas associated with these tests were tracked and additional testing performed. All other laboratory test results were in compliance with the specifications.
- Meetings
  - No progress meeting was held this week due to holiday and limited work activity.

<u>Activities for the week ending January 9, 2004:</u>

- Mobilization/Demobilization of Personnel and Equipment
  - Mobilization and inspection of track loader.
- Intermediate Grading and Surface Preparation
  - Received material delivery of 24 tons of R-3 rip rap for placement on Cell B outlet.
- Installation of Geosynthetic Cap System
  - Installed approximately 47,398 sf. of 12-oz./sy. geotextile on Cell A. Installation completed on 01/03/04.
  - Installed geomembrane panels 77 through 85 (approximately 44,803 sf.) on Cell A on 01/03/04.
  - Approximately 1,919 ft. of seaming was completed on Cell A geomembrane.
  - Completed patch numbers P-121 through P-137 and P-165 through P-171 on Cell C/D geomembrane.
  - Patch numbers P-138 through P-164 and detail work on Cell A geomembrane completed on 01/04/04. Patch number P-172 completed on Cell A geomembrane on 01/09/04.
  - Installation of geonet on Cell C/D completed on 01/06/04.
  - Installation of geonet on Cell A completed on 01/08/04.
  - Installation of 8-oz./sy. geotextile on Cell C/D completed on 01/08/04.

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- Installation of 8 oz./sy. geotextile on Cell A completed on 01/09/04.
- No geosynthetic materials installed on 01/05/04 due to rain.
- Installation of 12-oz./sy. geotextile, geonet, and 8-oz./sy. geotextile on the west access road completed on 01/08/04. An additional layer of 8-oz./sy. geotextile was placed over the drainage layer on the road on 01/08/04 and 01/09/04.

❑ Placement of Cover Soil and Topsoil

- Continued grading of cover soil on Cell B.
- Started construction of cap termination in Cell B on 01/03/04.
- Received material delivery of 192 tons of #57 stone and 195 tons of #2 stone for cap terminations on 01/05/04 and 01/07/04.
- Received material delivery of 231 tons cover soil on 01/07/04 and 2,244 tons of topsoil between 01/07/04 and 01/09/04.
- Started topsoil placement on Cell B on 01/07/04.
- Received material delivery of 504 tons of crusher run stone for access road surfaces.
- Started placement and compaction of crusher run stone on west access road on 01/09/04.

❑ Quality Control/Quality Assurance

- QC Supervisor witnessed the following trial seams:

Date	Sample #	Cell
01/03/04	TS-31, and TS-34	C/D
01/03/04	TS-32, TS-32R, and TS-33	A
01/04/04	TS-35, TS-35R, and TS-36	A
01/06/04	TS-37 and TS-38	C/D
01/08/04	TS-39	C/D
01/09/04	TS-40	A

- Machine #69 initially failed the trial seam (TS-32) and was retested (TS-32R) with a passing result. Machine #610 initially failed the trial seam (TS-35) and was retested (TS-35R) with a passing result. All other trial seams were in compliance with the specifications.
- QC Supervisor witnessed air pressure tests for seams associated with panels 77 through 85 (approximately 1,919 ft.) on 01/03/04. Failing seam sections were bounded and capped in compliance with specifications.
- QC Supervisor collected 5 destructive samples (DS-24 through DS-28) on 01/04/04 and 7 destructive samples (DS-17B6, DS-B7, DS-18A, DS-A1, DS-18B, DS-20A, and DS-20B) on 01/06/04. The 01/06/04 samples were taken to track the test runs that were not in conformance with the specifications on 01/02/04. With the exception of samples DS-17B7 and DS-18A1, the samples were field tested for peel strength and shear strength. All field tests were in

compliance with the specifications. Duplicates of samples that passed the field tests were sent to both the QC lab and QA lab for laboratory testing. The QC laboratory test results for sample DS-18A had test runs that were not in conformance with the specifications. The seam areas associated with these tests were tracked and additional testing performed (DS-18A1) with passing results. All other laboratory test results were in compliance with the specifications.

- QC Supervisor witnessed non-destructive testing of patches P-113 through P-164 on 01/04/04, P-165 through P-169 on 01/06/04, P-170 and P-171 on 01/08/04, and P-172 on 01/09/04. All tests were in compliance with the specifications.

❑ Meetings

- Progress meeting held on 01/07/04.

Activities for the week ending January 16, 2004:

❑ Mobilization/Demobilization of Personnel and Equipment

- GSI demobilization completed on 01/10/04.
- Demobilization of track loader on 01/13/04.

❑ Placement of Cover Soil and Topsoil

- Received material delivery of 13,956 tons cover soil and 2,535 tons of topsoil.
- Completed placement of topsoil on Cell B on 01/12/04.
- Started placement of cover soil on Cell C/D on 01/10/04.
- Started placement of cover soil on Cell A on 01/12/04.
- Completed cap terminations on Cell B on 01/13/04.
- Started placement of topsoil on Cell C/D on 01/16/04.
- Installed cap termination on Cell C/D between Station 5+00 and 8+10 on 01/16/04.
- Received material delivery of 307 tons of crusher run stone for access road surfaces.
- Continued placement and compaction of crusher run stone on west access road.
- Received material delivery of 244 tons of R-3 rip rap for ditch lining and slope protection on Cell C/D.

❑ Quality Control/Quality Assurance

- Quality control survey of limit of geosynthetic cap on Cell A completed on 01/13/04.

❑ Meetings

- Progress meeting held on 01/14/04.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

Activities for the week ending January 23, 2004:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - Demobilization of water truck and one dozer.
- ❑ Installation of Geosynthetic Cap System
  - Excavated anchor trench and placed the installed geosynthetics into trench, and backfilled trench on Cell A between 01/21/04 and 01/23/04.
- ❑ Placement of Cover Soil and Topsoil
  - Received material delivery of 988 tons cover soil and 3,472 tons of topsoil.
  - Received material delivery of 98 tons of #57 stone and 143 tons of #2 stone for cap terminations.
  - Received material delivery of 515 tons of R-3 rip rap for ditch lining and slope protection on Cell C/D.
  - Continued placement of cover soil and topsoil on Cell C/D.
  - Completed installation of cap termination along Ditch D in Cell C/D on 01/18/04.
  - Completed installation of cap termination along Ditch C in Cell C/D on 01/19/04.
  - Remaining cap terminations on Cell C/D completed on 01/22/04.
  - Continued Cell C/D outlet construction between 01/20/04 and 01/22/04.
  - Continued placement of cover soil on Cell A.
  - Started construction of cap termination on Cell A on 01/23/04.
- ❑ Meetings
  - Progress meeting held on 01/21/04.

Activities for the week ending January 30, 2004:

- ❑ Mobilization/Demobilization of Personnel and Equipment
  - No work performed between 01/24/04 and 01/27/04 due to snow and ice storm.
- ❑ Site Preparation
  - Snow removal activities performed between 01/28/04 and 01/30/04.
- ❑ Placement of Cover Soil and Topsoil
  - Completed Cell C/D outlet construction on 01/28/04.
  - Received material delivery of 143 tons of #2 stone for cap terminations.
  - Received material delivery of 353 tons of R-3 rip rap for ditch lining and slope protection on Cell A.
  - Continued cap termination construction on Cell A.
  - Started installation of geotextile and rip rap in Cell A ditches on 01/30/04.

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- Meetings
  - Progress meeting held on 01/28/04.

Activities for the week ending February 6, 2004:

- Mobilization/Demobilization of Personnel and Equipment
  - Mobilization and inspection of dump truck (1 day of use).
  - Demobilization of roller on 02/01/04.
  - Started decontamination of remaining equipment on 02/04/04.
  - Temporary demobilization on 02/06/04 due to continued poor weather and deteriorating site conditions.
- Site Preparation
  - Completed general site cleanup in preparation for temporary demobilization.
- Placement of Cover Soil and Topsoil
  - Placed rip rap slope protection along eastern berm of Cell C/D.
  - Completed installation of geotextile and rip rap in Cell A ditches on 02/03/04.
  - Received material delivery of 526 tons cover soil and 1,380 tons of topsoil.
  - Continued placement of cover soil and topsoil on Cell A.
- Meetings
  - No progress meeting held this week

Activities for the week ending February 13, 2004:

- Mobilization/Demobilization of Personnel and Equipment
  - No work due to poor site conditions.
- Meetings
  - No progress meeting held this week

Activities for the week ending February 20, 2004:

- Mobilization/Demobilization of Personnel and Equipment
  - No work due to poor site conditions.
- Meetings
  - No progress meeting held this week

Activities for the week ending February 27, 2004:

- Mobilization/Demobilization of Personnel and Equipment
  - No work due to poor site conditions.

APPENDIX B
CONSTRUCTION ACTIVITY REPORT

- Meetings
  - No progress meeting held this week

Activities for the week ending March 5, 2004:

- Mobilization/Demobilization of Personnel and Equipment
  - Re-mobilization of crew, dozer, excavator, roller, and loader.
- Site Preparation
  - Received material delivery of 95 tons of R-4 rip rap to repair Cell A outlet.
  - Cleaned and repaired outlet and sediment control structures.
  - Removed silt fence along west access road and along the river in Cell C/D.
  - Started final site cleanup on 03/05/04.
- Placement of Cover Soil and Topsoil
  - Received material delivery of 224 tons cover soil and 221 tons of topsoil.
  - Received material delivery of 47 tons of R-3 rip rap for repair of ditch lining and outlet structures.
  - Repaired areas of Cell B topsoil layer damaged by erosion during break.
  - Continued placing and grading of cover soil and topsoil on Cell A.
  - Received material delivery of 2 rolls of 8 oz./sy. geotextile for use under access roads.
  - Constructed access road to Cell C/D outlet on 03/02/04.
  - Completed placement and grading of cover soil and topsoil on Cell C/D on 03/05/04.
  - Received material delivery of 861 tons of crusher run stone for access road surfaces.
  - Constructed Cell A access road on 03/04/04.
  - Completed top course of west access road on 03/05/04.
- Quality Control/Quality Assurance
  - Quality control survey of Cell A cover soil and topsoil thickness completed on 03/05/04.
- Meetings
  - No progress meeting held this week

Activities for the week ending March 12, 2004:

- Placement of Cover Soil and Topsoil
  - Received material delivery of 433 tons of topsoil.
  - Received material delivery of 25 tons of #2 stone for cap terminations.
  - Received material delivery of 24 tons of crusher run stone for access road surfaces.

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CONSTRUCTION ACTIVITY REPORT

- Installed 12-inch diameter culvert pipe in Cell A ditch for truck crossing.
- Corrected Cell A topsoil thickness deficiencies identified during the Pre-final inspection.
- Installed erosion control blanket in Cell B ditches and seeded all cells on 03/11/04 and 03/12/04.

❑ Quality Control/Quality Assurance

- Pre-final inspection completed by DuPont on 03/09/04.
- Quality assurance verification of cover soil and topsoil thickness in Cells B and C/D completed on 03/11/04.
- Quality assurance verification of cover soil and topsoil thickness in Cell A completed on 03/12/04

❑ Meetings

- No progress meeting held this week

Activities for the week ending March 19,2004:

❑ Mobilization/Demobilization of Personnel and Equipment

- Completed final cleanup of site and started demobilization on 03/13/04.

❑ Placement of Cover Soil and Topsoil

- Completed installation of erosion control blanket in Cell B ditches and seeding and mulching of all cells on 03/13/04.

❑ Meetings

- No progress meeting held this week

Activities for the week ending March 26, 2004:

❑ Mobilization/Demobilization of Personnel and Equipment

- Completed final demobilization on 03/26/04.

❑ Quality Control/Quality Assurance

- Completed final inspection on 03/25/04.

❑ Meetings

- No progress meeting held this week

Cell B outfall and sediment trap

Plugging storm water pipe between Cell B and Cell C/D

Cell C/D - backfilling and grading in south end

Cell C/D - demolition of pipe rack over eastern access road

Cell A - placing clay in Ditch A1 along northern berm

Cell A - Ditch A2 original ditch profile (foreground) and revised ditch profile (background)

Cell B - sewing subgrade geotextile

Geotextile cushion layer deployed on Cell A

Cell B - preparing to deploy first geomembrane panel

Extrusion welding destructive sample location patch

QC Supervisor witnessing non-destructive (vacuum box) testing of patch

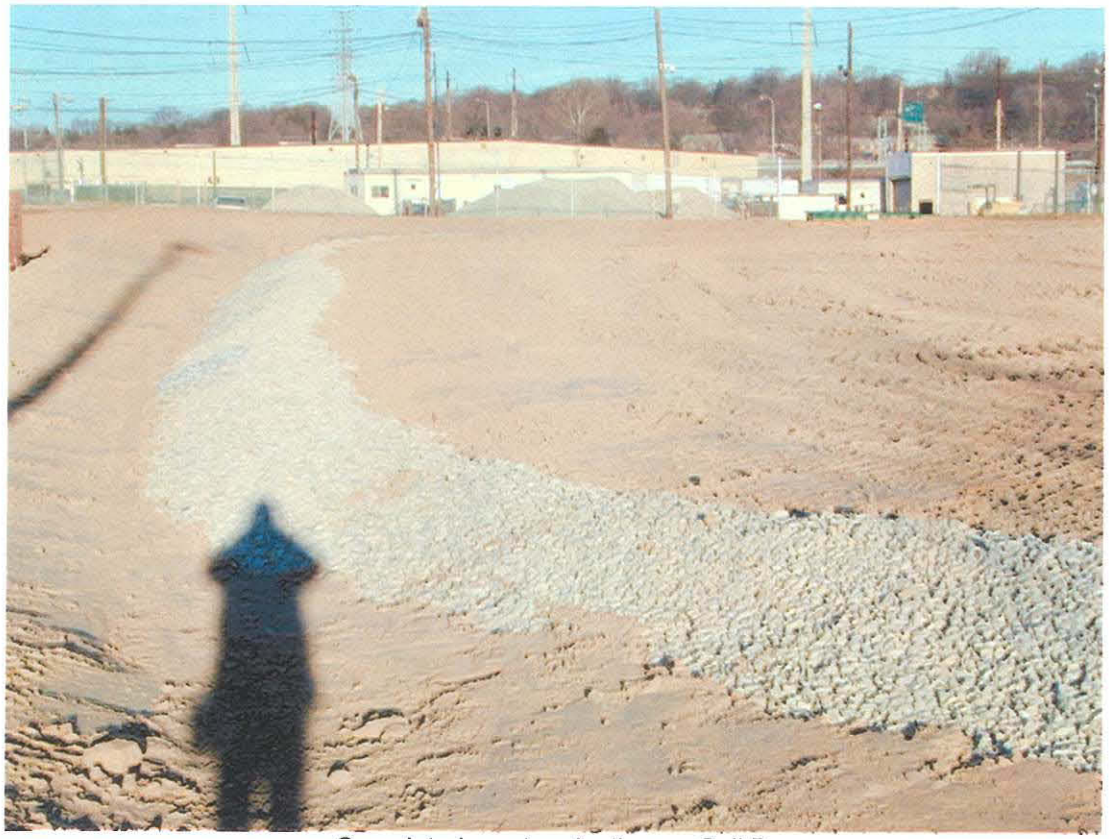
Deploying geonet and top geotextile on Cell C/D

Placing cover soil on Cell C/D

Spreading cover soil on Cell C/D

Constructing cap termination on Cell B

Completing cap termination on Cell C/D



Completed cap termination on Cell B

Constructing drainage swale on Cell C/D

Completed drainage swale on Cell A

Cell B completed (south looking north)

APPENDIX D
MATERIAL QUALITY CONTROL/QUALITY ASSURANCE DATA

APPENDIX D1
12-OZ/SY GEOTEXTILE (TNS E120®)

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

October 30, 2003

Mail To:

Mr. Gordon Chin
URS Construction Services
2325 Maryland Road, 2nd Floor
Willow Grove, PA 19090

email: gordon_chin@urscorp.com

Bill To:

<= Same

Dear Mr. Chin:

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:	Dupont Edgemoor
TRI Job Reference Number:	E2193-10-05
Material(s) Tested:	7 TNS 12 oz Nonwoven Geotextile(s)
Test(s) Requested:	Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Puncture Strength (D4833) Trapezoidal Tear (ASTM D 4533) Mullen Burst Strength (ASTM D 3786, mod.) AOS (ASTM D 4751) Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Sam R. Allen

Sam R. Allen
Vice President and Division Manager
Geosynthetic Services Division

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190839
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	5.61	5.93	5.85	6.31	5.65	5.94	5.42	5.64	5.52	5.28			
Mass/Unit Area (oz/sq.yd)	13.05	13.79	13.61	14.68	13.14	13.82	12.61	13.12	12.84	12.28	13.29	0.66	NA
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	457	576	582	490	465	454	521	659	455	465	512	67	200 min
TD - Tensile Strength (lbs)	509	499	576	499	447	457	504	520	451	427	489	42	200 min
MD - Elong. @ Max. Load (%)	81	89	78	87	88	82	89	79	79	83	84	4	NA
TD - Elong. @ Max. Load (%)	103	107	102	100	101	93	102	102	102	101	101	3	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	233	223	244	222	215	232	217	249	232	215	228	16	126 min
	233	250	226	188	248								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	155	188	262	191	187	195	207	245	147	173	195	34	80 min
TD - Tear Strength (lbs)	159	210	239	215	217	183	194	176	174	234	200	26	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 25 psi >													
Burst Strength (psi)	670	730	720	885	710	755	680	700	780	640	727	65	250 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190839
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.090	0.090	0.090	0.106	0.090						0.093	0.006	
US Sieve No.	170	170	170	140	170						140		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>:	1					2				
Thickness (mils)	156	156	156	156	156	156	156	156	156	156
Time (s)	27	27	27	27	27	34	34	34	34	34
Flow (L)	2.52	2.52	2.48	2.48	2.52	2.12	2.12	2.12	2.12	2.12
Permittivity (s-1)	0.91	0.91	0.89	0.89	0.91	0.61	0.61	0.61	0.61	0.61
Flow rate (GPM/ft2)	68	68	67	67	68	45	45	45	45	45
Permeability (cm/s)	0.36	0.36	0.35	0.35	0.36	0.24	0.24	0.24	0.24	0.24

Trial =>:	3					4					MEAN	STD. DEV.
Thickness (mils)	156	156	156	156	156	155	155	155	155	155		
Time (s)	38	38	38	38	38	30	30	30	30	30		
Flow (L)	2.16	2.16	2.12	2.16	2.12	2.48	2.44	2.44	2.44	2.44		
Permittivity (s-1)	0.55	0.55	0.54	0.55	0.54	0.80	0.79	0.79	0.79	0.79	0.71	0.14
Flow rate (GPM/ft2)	41	41	41	41	41	60	59	59	59	59	53	11
Permeability (cm/s)	0.22	0.22	0.21	0.22	0.21	0.32	0.31	0.31	0.31	0.31	0.28	0.06

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	0.71	0.60 min
	Flow rate (GPM/ft2)	53	
	Permeability (cm/s)	0.28	

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190845
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	5.24	5.73	6.90	5.44	5.26	5.18	5.41	5.67	6.22	5.48			
Mass/Unit Area (oz/sq.yd)	12.19	13.33	16.05	12.65	12.23	12.05	12.58	13.19	14.47	12.75	13.15	1.18	NA
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	380	415	580	403	393	379	412	427	541	406	434	66	200 min
TD - Tensile Strength (lbs)	487	519	526	654	581	618	504	565	566	591	561	50	200 min
MD - Elong. @ Max. Load (%)	87	78	77	87	95	91	87	81	81	90	85	6	NA
TD - Elong. @ Max. Load (%)	107	102	105	147	116	121	94	99	99	107	110	15	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	203	226	229	222	223	217	206	225	203	225	211	16	126 min
	223	200	181	196	181								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	153	135	125	150	139	141	124	127	114	135	134	11	80 min
TD - Tear Strength (lbs)	309	235	208	254	203	224	225	247	212	229	235	29	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 25 psi >													
Burst Strength (psi)	590	700	785	675	670	640	645	695	750	660	681	53	250 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.

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190845
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.090	0.090	0.090	0.090	0.090						0.090	0.000	
US Sieve No.	170	170	170	170	170						170		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>:	1					2				
Thickness (mils)	160	160	160	160	160	155	155	155	155	155
Time (s)	35	35	35	35	35	35	35	35	35	35
Flow (L)	2.24	2.24	2.24	2.24	2.24	2.24	2.24	2.20	2.20	2.24
Permittivity (s-1)	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.61	0.61	0.62
Flow rate (GPM/ft2)	46	46	46	46	46	46	46	46	46	46
Permeability (cm/s)	0.25	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24

Trial =>:	3					4							
Thickness (mils)	171	171	171	171	171	151	151	151	151	151			
Time (s)	39	39	39	39	39	35	35	35	35	35			
Flow (L)	2.04	2.04	2.00	2.00	2.04	2.64	2.64	2.64	2.64	2.64			
Permittivity (s-1)	0.51	0.51	0.50	0.50	0.51	0.73	0.73	0.73	0.73	0.73	0.62	0.08	
Flow rate (GPM/ft2)	38	38	37	37	38	55	55	55	55	55	46	6	
Permeability (cm/s)	0.22	0.22	0.22	0.22	0.22	0.28	0.28	0.28	0.28	0.28	0.25	0.02	
TEMPERATURE CORRECTED VALUES								Permittivity (s-1)			0.62		0.60 min
								Flow rate (GPM/ft2)			46		
								Permeability (cm/s)			0.25		

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190849
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	5.47	5.61	5.70	5.46	5.23	5.30	5.58	5.84	5.55	5.72			
Mass/Unit Area (oz/sq.yd)	12.72	13.05	13.26	12.70	12.16	12.33	12.98	13.58	12.91	13.30	12.90	0.42	NA
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	398	390	479	387	396	394	428	482	349	399	410	40	200 min
TD - Tensile Strength (lbs)	544	505	456	530	485	467	471	466	505	446	488	31	200 min
MD - Elong. @ Max. Load (%)	89	84	70	85	86	88	82	73	78	89	82	6	NA
TD - Elong. @ Max. Load (%)	109	104	93	102	98	97	97	98	97	97	99	4	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	222	247	256	263	249	232	198	208	251	246	235	18	126 min
	224	222	233	217	252								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	144	158	195	133	144	137	169	233	123	149	159	31	80 min
TD - Tear Strength (lbs)	214	169	200	187	239	209	202	148	196	194	196	23	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	720	705	785	650	670	725	700	785	675	750	717	44	250 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.

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190849
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.090	0.090	0.090	0.090	0.075						0.087	0.006	
US Sieve No.	170	170	170	170	200						170		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 19
Correction Factor: 1.025

Trial =>:	1					2				
Thickness (mils)	155	155	155	155	155	158	158	158	158	158
Time (s)	31	31	31	31	31	31	31	31	31	31
Flow (L)	2.50	2.52	2.60	2.52	2.52	2.32	2.36	2.34	2.32	2.32
Permittivity (s-1)	0.78	0.79	0.81	0.79	0.79	0.73	0.74	0.73	0.73	0.73
Flow rate (GPM/ft2)	59	59	61	59	59	54	55	55	54	54
Permeability (cm/s)	0.31	0.31	0.32	0.31	0.31	0.29	0.30	0.29	0.29	0.29

Trial =>:	3					4							
Thickness (mils)	150	150	150	150	150	161	161	161	161	161			
Time (s)	31	31	31	31	31	31	31	31	31	31			
Flow (L)	2.52	2.52	2.48	2.44	2.44	2.76	2.76	2.76	2.76	2.76			
Permittivity (s-1)	0.79	0.79	0.78	0.76	0.76	0.86	0.86	0.86	0.86	0.86	0.79	0.05	
Flow rate (GPM/ft2)	59	59	58	57	57	65	65	65	65	65	59	4	
Permeability (cm/s)	0.30	0.30	0.30	0.29	0.29	0.35	0.35	0.35	0.35	0.35	0.31	0.02	

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	0.81	0.60 min
	Flow rate (GPM/ft2)	61	
	Permeability (cm/s)	0.32	

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190855
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	5.83	6.82	5.80	6.00	5.97	6.08	7.00	6.17	6.94	5.82			
Mass/Unit Area (oz/sq.yd)	13.56	15.86	13.49	13.96	13.89	14.14	16.28	14.35	16.14	13.54	14.52	1.07	NA
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	413	383	553	376	380	405	448	513	399	380	425	58	200 min
TD - Tensile Strength (lbs)	511	473	465	481	486	490	457	509	485	495	485	16	200 min
MD - Elong. @ Max. Load (%)	91	81	83	83	83	91	85	82	88	85	85	3	NA
TD - Elong. @ Max. Load (%)	96	97	89	102	95	105	102	97	94	98	98	4	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	238	231	284	237	240	236	245	259	256	252	247	15	126 min
	264	246	222	260	231								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	150	148	175	224	158	153	165	146	201	152	167	25	80 min
TD - Tear Strength (lbs)	217	259	235	270	194	227	271	237	230	263	240	24	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 25 psi >													
Burst Strength (psi)	720	875	700	740	795	770	825	805	940	695	787	75	250 min

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190855
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.090	0.090	0.090	0.090	0.075						0.087	0.006	
US Sieve No.	170	170	170	170	200						170		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>:	1					2				
Thickness (mils)	181	181	181	181	181	165	165	165	165	165
Time (s)	30	30	30	30	30	33	33	33	33	33
Flow (L)	2.44	2.44	2.46	2.46	2.44	2.24	2.24	2.24	2.24	2.24
Permittivity (s-1)	0.79	0.79	0.80	0.80	0.79	0.66	0.66	0.66	0.66	0.66
Flow rate (GPM/ft2)	59	59	60	60	59	49	49	49	49	49
Permeability (cm/s)	0.36	0.36	0.37	0.37	0.36	0.28	0.28	0.28	0.28	0.28

Trial =>:	3					4					MEAN	STD. DEV.
Thickness (mils)	166	166	166	166	166	179	179	179	179	179		
Time (s)	33	33	33	33	33	33	33	33	33	33		
Flow (L)	2.52	2.52	2.52	2.52	2.52	2.92	2.92	2.92	2.96	2.92		
Permittivity (s-1)	0.74	0.74	0.74	0.74	0.74	0.86	0.86	0.86	0.87	0.86	0.76	0.07
Flow rate (GPM/ft2)	55	55	55	55	55	64	64	64	65	64	57	6
Permeability (cm/s)	0.31	0.31	0.31	0.31	0.31	0.39	0.39	0.39	0.40	0.39	0.34	0.04

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	0.76	0.60 min
	Flow rate (GPM/ft2)	57	
	Permeability (cm/s)	0.34	

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190858
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	5.37	5.03	5.21	4.83	5.22	5.16	5.19	4.78	5.32	5.07			
Mass/Unit Area (oz/sq.yd)	12.49	11.70	12.12	11.23	12.14	12.00	12.07	11.12	12.37	11.79	11.90	0.43	NA
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	387	425	507	395	347	387	406	575	360	353	414	69	200 min
TD - Tensile Strength (lbs)	500	436	459	431	474	458	473	439	478	449	460	21	200 min
MD - Elong. @ Max. Load (%)	88	82	75	83	85	89	78	75	75	88	82	5	NA
TD - Elong. @ Max. Load (%)	102	95	93	87	97	94	94	83	89	91	93	5	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	218	212	230	181	190	203	208	252	177	228	208	21	126 min
	221	218	200	176	207								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	129	143	208	150	152	125	174	190	135	128	153	27	80 min
TD - Tear Strength (lbs)	234	196	173	204	203	171	188	211	219	234	203	21	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 25 psi >													
Burst Strength (psi)	640	640	655	610	590	605	660	590	615	620	623	24	250 min

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 200190858
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.090	0.075	0.075	0.090	0.075						0.081	0.007	
US Sieve No.	170	200	200	170	200						170		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>:	1					2				
Thickness (mils)	135	135	135	135	135	140	140	140	140	140
Time (s)	35	35	35	35	35	32	32	32	32	32
Flow (L)	2.20	2.16	2.16	2.20	2.16	2.40	2.40	2.32	2.40	2.40
Permittivity (s-1)	0.61	0.60	0.60	0.61	0.60	0.73	0.73	0.70	0.73	0.73
Flow rate (GPM/ft2)	46	45	45	46	45	54	54	53	54	54
Permeability (cm/s)	0.21	0.21	0.21	0.21	0.21	0.26	0.26	0.25	0.26	0.26

Trial =>:	3					4					MEAN	STD. DEV.
Thickness (mils)	132	132	132	132	132	140	140	140	140	140		
Time (s)	35	35	35	35	35	31	31	31	31	31		
Flow (L)	2.20	2.24	2.24	2.24	2.12	2.16	2.08	2.16	2.20	2.28		
Permittivity (s-1)	0.61	0.62	0.62	0.62	0.59	0.68	0.65	0.68	0.69	0.71	0.66	0.05
Flow rate (GPM/ft2)	46	46	46	46	44	51	49	51	52	53	49	4
Permeability (cm/s)	0.20	0.21	0.21	0.21	0.20	0.24	0.23	0.24	0.25	0.25	0.23	0.02

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	0.66	0.60 min
	Flow rate (GPM/ft2)	49	
	Permeability (cm/s)	0.23	

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 300119548
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	5.74	5.88	6.29	6.00	5.87	5.87	6.20	5.80	5.91	6.20			
Mass/Unit Area (oz/sq.yd)	13.35	13.68	14.63	13.96	13.65	13.65	14.42	13.49	13.75	14.42	13.90	0.42	NA
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	380	412	524	400	384	430	373	432	398	424	416	41	200 min
TD - Tensile Strength (lbs)	455	530	527	535	451	505	503	511	477	571	507	35	200 min
MD - Elong. @ Max. Load (%)	94	88	92	87	99	95	89	93	91	105	93	5	NA
TD - Elong. @ Max. Load (%)	84	98	89	93	97	101	89	93	91	115	95	8	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	209	208	316	207	178	199	204	227	333	224	228	46	126 min
	216	166	233	286	214								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	149	153	153	124	196	142	138	158	247	130	159	35	80 min
TD - Tear Strength (lbs)	244	249	223	231	223	278	228	267	230	224	240	19	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 25 psi >													
Burst Strength (psi)	690	680	705	690	675	670	730	600	640	660	674	34	250 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.

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 300119548
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.090	0.125	0.090	0.075	0.075						0.091	0.018	
US Sieve No.	170	120	170	200	200						140		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 19
Correction Factor: 1.025

Trial =>	1					2				
Thickness (mils)	172	172	172	172	172	175	175	175	175	175
Time (s)	23	23	23	23	23	23	23	23	23	23
Flow (L)	2.44	2.40	2.44	2.40	2.40	2.12	2.12	2.12	2.08	2.08
Permittivity (s-1)	1.03	1.01	1.03	1.01	1.01	0.90	0.90	0.90	0.88	0.88
Flow rate (GPM/ft2)	77	76	77	76	76	67	67	67	66	66
Permeability (cm/s)	0.45	0.44	0.45	0.44	0.44	0.40	0.40	0.40	0.39	0.39

Trial =>	3					4					MEAN	STD. DEV.
Thickness (mils)	165	165	165	165	165	168	168	168	168	168		
Time (s)	23	23	23	23	23	23	23	23	23	23		
Flow (L)	2.72	2.84	2.80	2.84	2.84	2.24	2.20	2.20	2.24	2.20		
Permittivity (s-1)	1.15	1.20	1.18	1.20	1.20	0.95	0.93	0.93	0.95	0.93	1.01	0.11
Flow rate (GPM/ft2)	86	90	88	90	90	71	69	69	71	69	75	9
Permeability (cm/s)	0.48	0.50	0.50	0.50	0.50	0.40	0.40	0.40	0.40	0.40	0.43	0.04

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.03	0.60 min
	Flow rate (GPM/ft2)	77	
	Permeability (cm/s)	0.44	

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.

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 300119551
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Mass/Unit Area (ASTM D 5261)													
5" diameter circle (grams)	6.24	5.89	5.85	5.58	5.69	5.44	5.86	5.79	5.41	5.49			
Mass/Unit Area (oz/sq.yd)	14.51	13.70	13.61	12.98	13.23	12.65	13.63	13.47	12.58	12.77	13.31	0.56	NA
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	420	452	412	372	416	540	570	417	469	353	442	65	200 min
TD - Tensile Strength (lbs)	501	521	432	465	448	441	425	419	398	461	451	36	200 min
MD - Elong. @ Max. Load (%)	82	86	85	73	89	103	81	79	90	81	85	8	NA
TD - Elong. @ Max. Load (%)	104	110	92	95	109	100	101	97	94	105	101	6	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	228	199	262	273	210	209	178	233	269	296	230	34	126 min
	244	183	245	217	201								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	185	223	270	155	163	181	164	266	147	191	195	42	80 min
TD - Tear Strength (lbs)	274	257	172	202	231	298	310	336	340	318	274	55	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 25 psi >													
Burst Strength (psi)	800	700	670	625	685	595	760	660	650	715	686	58	250 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 12 oz Nonwoven Geotextile
Sample Identification: 300119551
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.090	0.090	0.090	0.075	0.090						0.087	0.006	
US Sieve No.	170	170	170	200	170						170		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 19
Correction Factor: 1.025

Trial =>:	1					2							
Thickness (mils)	189	189	189	189	189	189	189	189	189	189			
Time (s)	23	23	23	23	23	23	23	23	23	23			
Flow (L)	2.24	2.24	2.24	2.24	2.24	2.20	2.16	2.16	2.16	2.16			
Permittivity (s-1)	0.95	0.95	0.95	0.95	0.95	0.93	0.91	0.91	0.91	0.91			
Flow rate (GPM/ft2)	71	71	71	71	71	69	68	68	68	68			
Permeability (cm/s)	0.45	0.45	0.45	0.45	0.45	0.45	0.44	0.44	0.44	0.44			
Trial =>:	3					4							
Thickness (mils)	174	174	174	174	174	183	183	183	183	183			
Time (s)	23	23	23	23	23	27	27	27	27	27			
Flow (L)	2.60	2.64	2.60	2.60	2.64	2.32	2.36	2.32	2.32	2.32			
Permittivity (s-1)	1.10	1.11	1.10	1.10	1.11	0.83	0.85	0.83	0.83	0.83	0.95	0.10	
Flow rate (GPM/ft2)	82	83	82	82	83	62	64	62	62	62	71	7	
Permeability (cm/s)	0.49	0.49	0.49	0.49	0.49	0.39	0.39	0.39	0.39	0.39	0.44	0.04	

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	0.97	0.60 min
	Flow rate (GPM/ft2)	73	
	Permeability (cm/s)	0.45	

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.

URS

November 26, 2003

Edge Moor Surface Impoundment Capping
DuPont Edge Moor Plant
Edgemoor, Delaware

Re: Geosynthetic Inventory List

Gentlemen:

Attached please find the inventory lists of the geosynthetic materials imported for use on the Edge Moor Surface Impoundment Capping project. For ease of review, this submittal was divided into three attachments. Each attachment includes: the hand written inventory record created as the materials were unloaded, the bill of lading or shipping papers, and the pre-shipment roll lists, and the Manufacturers Quality Control test results for cross referencing purposes.

Attachment 1 contains the information regarding the 12-ounce per square yard cushion geotextile imported from Skaps Industries. In attachment 2 you will find the information for the 40-mil LLDPE geomembrane imported from Solmax. Attachment 3 contains the information for the drainage layer including both the 8-ounce per square yard geotextile and the geonet components imported from Skaps Industries.

If you have any questions or if we may be of further assistance please contact me.

Sincerely,

Vince Troilo
Quality Control Supervisor

URS Corporation
1400 Union Meeting Road, Suite 202
Blue Bell, PA 19422-1972
Tel: 215.542.3800
Fax: 215.542.3888

Attachment 1

12-Ounce Geotextile

46 X 7200 = 331,200 12 oz
TOTAL

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE:	12-6-03	MANUFACTURER:	NEVOWN, INC. / SKAPS
PROJECT NAME:	DUPONT EDGE MOOR CAP	MAT. TYPE:	12 OZ GEOTEXTILE
PROJECT NUMBER:	811752	TRUCK #:	(27 ROLLS) LANDSTAR
INSPECTOR:	G. CHIN	BILL OF LADING #:	000808823 (ATTACHED)

	PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
1	200190836	15' X 480'	7,200	* NO APPARENT DAMAGE
2	" 38			N.A.D.
3	" 40			SL CORE N.A.D.
4	" 42			N.A.D
5	" 44			N.A.D
6	" 47			N.A.D
7	" 49			N.A.D
8	" 51			N.A.D
9	" 53			N.A.D
10	" 55			SL CORE N.A.D
11	" 57			N.A.D
12	" 59			N.A.D
13	" 61			SL. CORE N.A.D
14	" 63			N.A.D
15	200190837			N.A.D
16	" 39			N.A.D
17	" 41			SL CORE N.A.D
18	" 43			SL CORE N.A.D
19	" 45			N.A.D
20	" 48			N.A.D.

* SOME TEARS IN WRAPPER, SLIGHT CORE DAMAGE

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE:	12-6-03	MANUFACTURER:	NEXGUN, INC. / SKAPS
PROJECT NAME:	DUPONT EDGEMOOR	MAT. TYPE:	12 OZ GEOTEXTILE
PROJECT NUMBER:	811752	TRUCK #:	
INSPECTOR:	G. CHIN	BILL OF LADING #:	

	PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
21)	200190850	18X480	8640	NO APPARENT DAMAGE
22)	" 52	↓	↓	N.A.D
23)	" 54			N.A.D
24)	" 56			N.A.D.
25)	" 58			N.A.D.
26)	" 60			N.A.D.
27)	" 62			N.A.D.

STRAIGHT BILL OF LADING – SHORT FORM – ORIGINAL – NOT NEGOTIABLE

RECEIVED subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Original Bill of Lading.
The property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back hereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

vown Inc. (Warehouse)
.1 DEYOUNG RD.
GREER, SC 29651

PH. 864-848-1054
FAX 864-848-1499

Shipping Bill Number 000808823

Sold to:
Customer #: 170303
GEO-SYNTHETICS INC.
W 239 - N. 428 PEWAUKEE ROAD
WAUKESHA
WI 53188

Ship to:
008538
DUPONT EDGEMOOR CLOSURE
104 HAY ROAD NORTH GATE
WILMINGTON
DE 19809

Page: 0001
Date: 10/31/03
Salesman: N09
Division: 05
Warehouse: 27
Ship Via: QUALITY LOG.

Line#	Item #	# Elem.	Net	Line #	Item #	# Elem.	Net

Purchase Order: 9191 Order Number: 805217

Description: 180X480 ENVIR LOT: 132 Line: 001

5 E120 180 480 PP BLK.30

001	200190836	00/00	800.00	002	200190837	00/00	800.00
003	200190838	00/00	800.00	004	200190839	00/00	800.00
005	200190840	00/00	800.00	006	200190841	00/00	800.00
007	200190842	00/00	800.00	008	200190843	00/00	800.00
009	200190844	00/00	800.00	010	200190845	00/00	800.00
011	200190847	00/00	800.00	012	200190848	00/00	800.00
013	200190849	00/00	800.00	014	200190850	00/00	800.00
[illegible]	200190851	00/00	800.00	016	200190852	00/00	800.00
	200190853	00/00	800.00	018	200190854	00/00	800.00
019	200190855	00/00	800.00	020	200190856	00/00	800.00
021	200190857	00/00	800.00	022	200190858	00/00	800.00
023	200190859	00/00	800.00	024	200190860	00/00	800.00
025	200190861	00/00	800.00	026	200190862	00/00	800.00
027	200190863	00/00	800.00				

Items per article: 27 Qty per article: 21600.00

Items per order: 27 Qty per order: 21600.00

CONTACT:
856-498-2196

Comments:
Items Shipped: 27 Gross Wt. Ship: 18359.00
Net Wt. Shipped: 21600.00

GEOTEXTILES
NMFC 49160 FAK 65

12 OZ

rec'd 11/6/03.
JR.

NEVOWN INC.

PREPAID

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of consignor.)

This is to certify that the above materials are properly described by name and are packed and marked and are in proper condition for transportation according to regulations by the Interstate Commerce Commission.
If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."
Shipper's imprints in lieu of stamp; not a part of Bill of Lading approved by the Interstate Commerce Commission.
NOTE – Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding.

IIPMENT IS CORRECTLY DESCRIBED
CORRECT WEIGHT IS _____ LBS.

The fibre boxes used for this shipment conforms to the specifications set forth in the box marker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classifications.

Per _____ Shipper

NEVOWN INC.

Shipper, Per _____ Agent, Per _____

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE: 11-7-03	MANUFACTURER: SKAPS, IND
PROJECT NAME: DUPONT EDGEMOOR	MAT. TYPE: GEOTEXTILE E120 12OZ
PROJECT NUMBER: 811752	TRUCK #: ATTACHED (19 rolls)
INSPECTOR: G CHIN	BILL OF LADING #: 000808825

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
200[illegible]90864	15'X480'	7,200	*NO APPARENT DAMAGE
30011 9548			NAD
" 9550			NAD
" 9552			NAD
" 9554			SOME ROLL EDGE DAM
" 9556			NAD
" 9558			NAD
" 9560			NAD
" 9562			NAD
" 9547			NAD
" 9546			NAD
" 9549			NAD
" 9551			NAD
" 9553			NAD
" 9555			NAD
" 9557			NAD
" 9559			NAD
" 9561			NAD
" 9563			NAD

* SL. CORE, SOME TEARS IN PLASTIC COVER

STRAIGHT BILL OF LADING – SHORT FORM – ORIGINAL – NOT NEGOTIABLE

RECEIVED subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Original Bill of Lading.
The property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back hereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Nevown Inc. (Warehouse)
DEYOUNG RD.
, SC 29651
PH. 864-848-1054
FAX 864-848-1499

Shipping Bill Number 000808825

MIXED LOAD

Sold to:
Customer #: 170303
GEO-SYNTHETICS INC.
W 239 - N. 428 PEWAUKEE ROAD
WAUKESHA
WI 53188

QLI# 55095

Ship to: 008538
DUPONT EDGEMOOR CLOSURE
104 HAY ROAD NORTH GATE
WILMINGTON
DE 19809

Page: 0001
Date: 10/31/03
Salesman: N09
Division: 05
Warehouse: 27
Ship Via: QUALITY LOG.

Line#	Item #	# Elem.	Net	Line #	Item #	# Elem.	Net

Purchase Order: 9191 Order Number: 805219

80Z

Description: 180X690 ENVIR LOT: 132 Line: 001
5 E080 180 690 PP BLK.30

001	300119000	00/00	1150.00	002	300118982	00/00	1150.00
003	300118986	00/00	1150.00	004	300118991	00/00	1150.00
005	300118996	00/00	1150.00				

Items per article: 5 Qty per article: 5750.00

Description: 180X480 ENVIR LOT: 132 Line: 002
5 E120 180 480 PP BLK.30

12OZ

001	200190864	00/00	800.00	002	300119546	00/00	800.00
003	300119548	00/00	800.00	004	300119549	00/00	800.00
005	300119550	00/00	800.00	006	300119551	00/00	800.00
007	300119552	00/00	800.00	008	300119553	00/00	800.00
009	300119554	00/00	800.00	010	300119555	00/00	800.00
011	300119556	00/00	800.00	012	300119557	00/00	800.00
013	300119558	00/00	800.00	014	300119559	00/00	800.00
015	300119560	00/00	800.00	016	300119561	00/00	800.00
017	300119562	00/00	800.00	018	300119563	00/00	800.00
019	300119547	00/00	800.00				

Items per article: 19 Qty per article: 15200.00

Items per order: 24 Qty per order: 20950.00

CONTACT:
856-498-2196

Comments:
Items Shipped: 24 Gross Wt. Ship: 16290.00
Net Wt. Shipped: 20950.00

Trl # 1036
GDCHIN
Some Minor roll, core damage
NEVOWN INC.
11/7/03
PREPAID

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of consignor.)

GEOTEXTILES
NMFC 49160 FAK 65

This is to certify that the above materials are properly described by name and are packed and marked and are in proper condition for transportation according to regulations by the Interstate Commerce Commission.
If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."
Shipper's imprints in lieu of stamp; not a part of Bill of Lading approved by the Interstate Commerce Commission.
NOTE – Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding.

THIS SHIPMENT IS CORRECTLY DESCRIBED.
C(WEIGHT IS _____ LBS.

The fibre boxes used for this shipment conforms to the specifications set forth in the box marker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classifications.

Per [signature] Shipper
NEVOWN

NEVOWN INC.
Shipper, Per _____ Agent, Per _____
Permanent post office address of shipper Quality Logistics SLC Derrick Gaul Trl 1036 10/14/03

"This is to certify that the above named materials are properly classified, described, packages marked and labeled and ...

Nevown Inc.
681 Deyoung Rd.
Greer, SC 29651
PH: 864-968-0592

10/27/2003
REF: TNS E120

Geo-Synthetics Inc.
Dupont Edgemoor Closure

Dear Sir/Madam:

This is to certify that TNS E120 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E120 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E120 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	12.0
Thickness	ASTM D 5199	mils	120
Grab Tensile	ASTM D 4632	lbs	350
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	125
Puncture	ASTM D 4833	lbs	190
Permittivity	ASTM D 4491	1/sec	0.90
Mullen Burst	ASTM D 3786*	psi	625
A.O.S.	ASTM D 4751	US Sieve	100
Permeability	ASTM D 4491	cm/sec	.30
Water Flow	ASTM D 4491	gpm/sqft	70
UV Resistance After 500 hrs.	ASTM D 4355	% Strength Retained	70

*modified

Marshall O. Gaddy

Marshall O. Gaddy
Quality Control Manager

Nevown Inc.

Nonwoven Quality Data

GSI Dupont Edgemoor Closure

Date 10/27

11/6 1st load today.

Roll #'s	Style	Weight	Thick-ness	Grab Tensile MD	Grab Tensile XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm-eability	Perm-ttivity	AOS
200190836	E120	15.0	171	439	435	74	93	153	195	262	769	83	0.59	1.31	100
200190837	E120	15.0	171	439	435	74	93	153	195	262	769	83	0.59	1.31	100
200190838	E120	13.9	171	353	447	89	102	167	209	220	684	109	0.72	1.71	100
200190839	E120	13.6	165	397	402	71	92	162	214	251	708	77	0.57	1.21	100
200190840	E120	13.6	165	397	402	71	92	162	214	251	708	77	0.57	1.21	100
200190841	E120	13.6	165	397	402	71	92	162	214	251	708	77	0.57	1.21	100
200190842	E120	13.8	182	426	350	70	96	162	214	260	713	77	0.59	1.21	100
200190843	E120	13.8	182	426	350	70	96	162	214	260	713	77	0.59	1.21	100
200190844	E120	13.8	182	426	350	70	96	162	214	260	713	77	0.59	1.21	100
200190845	E120	13.9	173	392	460	80	94	162	214	245	683	77	0.59	1.21	100
200190847	E120	13.9	173	392	460	80	94	162	214	245	683	77	0.59	1.21	100
200190848	E120	13.9	173	392	460	80	94	162	214	245	683	77	0.59	1.21	100
200190849	E120	13.4	173	370	426	76	95	151	234	244	683	77	0.59	1.21	100
200190850	E120	13.4	173	370	426	76	95	151	234	244	683	77	0.59	1.21	100
200190851	E120	13.4	173	370	426	76	95	151	234	244	683	77	0.59	1.21	100
200190852	E120	12.7	171	351	404	81	92	151	234	232	673	77	0.57	1.21	100
200190853	E120	12.7	171	351	404	81	92	151	234	232	673	77	0.57	1.21	100
200190854	E120	12.7	171	351	404	81	92	151	234	232	673	77	0.57	1.21	100
200190855	E120	14.1	186	378	452	83	100	141	229	272	773	116	0.88	1.81	100
200190856	E120	14.1	186	378	452	83	100	141	229	272	773	116	0.88	1.81	100
200190857	E120	14.1	186	378	452	83	100	141	229	272	773	116	0.88	1.81	100
200190858	E120	13.4	161	389	445	80	97	141	229	243	703	116	0.88	1.81	100
200190859	E120	13.4	161	389	445	80	97	141	229	243	703	116	0.88	1.81	100
200190860	E120	13.4	161	389	445	80	97	141	229	243	703	116	0.88	1.81	100
200190861	E120	12.2	159	351	357	81	102	129	148	194	651	116	0.88	1.81	100
200190862	E120	12.2	159	351	357	81	102	129	148	194	651	116	0.88	1.81	100
200190863	E120	12.2	159	351	357	81	102	129	148	194	651	116	0.88	1.81	100
200190864	E120	12.2	159	351	357	81	102	129	148	194	651	116	0.88	1.81	100

11/7

Nevown Inc.
681 Deyoung Rd.
Greer, SC 29651
PH: 864-968-0592

10/29/2003
REF: TNS E120

Geo-Synthetics Inc.
Dupont Edgemoor Closure

Dear Sir/Madam:

This is to certify that TNS E120 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E120 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E120 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	12.0
Thickness	ASTM D 5199	mils	120
Grab Tensile	ASTM D 4632	lbs	350
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	125
Puncture	ASTM D 4833	lbs	190
Permittivity	ASTM D 4491	1/sec	0.90
Mullen Burst	ASTM D 3786*	psi	625
A.O.S.	ASTM D 4751	US Sieve	100
Permeability	ASTM D 4491	cm/sec	.30
Water Flow	ASTM D 4491	gpm/sqft	70
UV Resistance After 500 hrs.	ASTM D 4355	% Strength Retained	70

*modified

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

Nevown Inc.

Nonwoven Quality Data

GSI Dupont Edgemoor Closure

Date 10/29

Roll #'s	Style	Weight	Thick-ness	Grab Tensile MD	Grab Tensile XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm-eability	Perm-ttivity	AOS
300119546	E120	13.9	190	394	427	84	87	152	220	224	665	116	0.88	1.81	100
300119547	E120	13.9	190	394	427	84	87	152	220	224	665	116	0.88	1.81	100
300119548	E120	13.9	190	394	427	84	87	152	220	224	665	116	0.88	1.81	100
300119549	E120	13.9	190	394	427	84	87	152	220	224	665	116	0.88	1.81	100
300119550	E120	13.9	190	394	427	84	87	152	220	224	665	116	0.88	1.81	100
300119551	E120	14.0	204	442	415	85	105	185	233	261	730	110	0.88	1.81	100
300119552	E120	14.0	204	442	415	85	105	185	233	261	730	110	0.88	1.81	100
300119553	E120	14.0	204	442	415	85	105	185	233	261	730	110	0.88	1.81	100
300119554	E120	14.0	204	442	415	85	105	185	233	261	730	110	0.88	1.81	100
300119555	E120	14.0	204	442	415	85	105	185	233	261	730	110	0.88	1.81	100
300119556	E120	14.0	204	442	415	85	105	185	233	261	730	110	0.88	1.81	100
300119557	E120	13.6	203	366	410	96	107	185	233	226	667	110	0.88	1.81	100
300119558	E120	13.6	203	366	410	96	107	185	233	226	667	110	0.88	1.81	100
300119559	E120	13.6	203	366	410	96	107	185	233	226	667	110	0.88	1.81	100
300119560	E120	13.6	203	366	410	96	107	185	233	226	667	110	0.88	1.81	100
300119561	E120	13.6	203	366	410	96	107	185	233	226	667	110	0.88	1.81	100
300119562	E120	13.6	203	366	410	96	107	185	233	226	667	110	0.88	1.81	100
300119563	E120	13.6	203	366	410	96	107	185	233	226	667	110	0.88	1.81	100

11/7

APPENDIX D2
40-MIL LDPE GEOMEMBRANE (SOLMAX 840)

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

October 29, 2003

Mail To:

Mr. Gordon Chin
URS Construction Services
2325 Maryland Road, 2nd Floor
Willow Grove, PA 19090
email: gordon_chin@urscorp.com

Bill To:

<= Same

email: vincent_troilo@urscorp.com - Vince Troilo - URS

Dear Mr. Chin:

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:	Dupont Edgemoor
TRI Job Reference Number:	E2193-11-01
Material(s) Tested:	3 Solmax 40 mil Smooth LLDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5199) Density (ASTM D 1505) Tensile (ASTM D 638/GRI GM13) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Sam R. Allen

Sam R. Allen
Vice President and Division Manager
Geosynthetic Services Division

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Solmax 40 mil Smooth LLDPE Geomembrane
Sample Identification: 39090-1
TRI Log #: E2193-11-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5199)													
Thickness (mils)	41	42	41	43	40	42	40	42	40	41	41	1	40 avg
											40	<< min.	36 min
Density (ASTM D 1505)													
Density (g/cm3)	0.936	0.936	0.936								0.936	0.000	0.939 max
Tensile Properties (ASTM D 638/GRI GM 13, 2 ipm strain rate, Type IV specimen)													
MD Yield Strength (ppi)	82	80	79	78	79						80	1	
TD Yield Strength (ppi)	84	84	82	81	79						82	2	
MD Break Strength (ppi)	190	185	192	191	189						189	2	152 min
TD Break Strength (ppi)	206	182	202	184	200						195	10	152 min
MD Yield Elongation (%)	22	23	23	21	23						22	1	
TD Yield Elongation (%)	21	21	21	21	23						21	1	
MD Break Elongation (%)	786	776	816	831	795						801	20	800 min
TD Break Elongation (%)	943	806	923	829	926						885	56	800 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	80	79	80	80	79	79	71	72	74	76	78	3	56 min
	79	78	80	81	81								
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	30	30	30	30	29	31	30	30	32	30	30	1	22 min
TD Tear Strength (lbs)	29	29	28	27	27	28	29	29	29	29	28	1	22 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Solmax 40 mil Smooth LLDPE Geomembrane
Sample Identification: 39095-1
TRI Log #: E2193-11-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5199)													
Thickness (mils)	42	44	42	42	43	42	42	40	45	41	42	1	40 avg
											40	<< min.	36 min
Density (ASTM D 1505)													
Density (g/cm3)	0.937	0.937	0.937								0.937	0.000	0.939 max
Tensile Properties (ASTM D 638/GRI GM 13, 2 ipm strain rate, Type IV specimen)													
MD Yield Strength (ppi)	77	73	77	80	80						77	3	
TD Yield Strength (ppi)	83	78	80	82	82						81	2	
MD Break Strength (ppi)	184	196	166	203	197						189	13	152 min
TD Break Strength (ppi)	190	168	188	195	181						184	9	152 min
MD Yield Elongation (%)	22	22	22	23	23						22	0	
TD Yield Elongation (%)	18	18	18	18	18						18	0	
MD Break Elongation (%)	780	855	721	835	820						802	47	800 min
TD Break Elongation (%)	831	779	855	878	806						830	35	800 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	84	86	86	86	85	84	83	83	84	83	83	2	56 min
	83	82	81	82	80								
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	31	30	31	31	31	31	30	30	31	29	31	1	22 min
TD Tear Strength (lbs)	29	28	28	29	28	29	29	28	28	29	29	1	22 min

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Solmax 40 mil Smooth LLDPE Geomembrane
Sample Identification: 39101-1
TRI Log #: E2193-11-01

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5199)													
Thickness (mils)	42	42	42	41	40	42	40	40	42	42	41	1	40 avg
											40	<< min.	36 min
Density (ASTM D 1505)													
Density (g/cm3)	0.936	0.935	0.936								0.936	0.0005	0.939 max
Tensile Properties (ASTM D 638/GRI GM 13, 2 ipm strain rate, Type IV specimen)													
MD Yield Strength (ppi)	80	82	81	81	81						81	1	
TD Yield Strength (ppi)	85	84	83	84	84						84	1	
MD Break Strength (ppi)	194	206	200	204	202						201	4	152 min
TD Break Strength (ppi)	191	181	179	203	190						189	9	152 min
MD Yield Elongation (%)	24	24	24	24	24						24	0	
TD Yield Elongation (%)	23	23	21	21	23						22	1	
MD Break Elongation (%)	795	855	831	839	839						832	20	800 min
TD Break Elongation (%)	840	809	799	916	836						840	41	800 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	84	84	84	84	83	82	79	74	80	80	81	3	56 min
	81	81	82	81	82								
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	33	30	30	30	30	30	30	31	31	30	31	1	22 min
TD Tear Strength (lbs)	29	29	28	29	28	2	28	28	29	28	26	8	22 min

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

October 22, 2003

Mail To:

Mr. Gordon Chin
URS Construction Services
2325 Maryland Road, 2nd Floor
Willow Grove, PA 19090

email: gordon_chin@urscorp.com

Bill To:

<= Same

Dear Mr. Chin:

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:	Dupont Edgemoor
TRI Job Reference Number:	E2193-01-10
Material(s) Tested:	4 Solmax 40 mil Smooth LLDPE Geomembrane(s)
Test(s) Requested:	Thickness (ASTM D 5199) Density (ASTM D 1505) Tensile (ASTM D 638/GRI GM13) Puncture Strength (ASTM D 4833) Tear Resistance (ASTM D 1004)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Sam R. Allen

Sam R. Allen
Vice President and Division Manager
Geosynthetic Services Division

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Solmax 40 mil Smooth LLDPE Geomembrane
Sample Identification: 39087-1
TRI Log #: E2193-01-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5199)													
Thickness (mils)	41	43	42	40	42	41	42	41	43	41	42	1	40 avg
											40	<< min.	36 min
Density (ASTM D 1505)													
Density (g/cm3)	0.937	0.937	0.937								0.937	0.000	0.939 max
Tensile Properties (ASTM D 638/GRI GM 13, 2 ipm strain rate, Type IV specimen)													
MD Yield Strength (ppi)	79	76	78	78	79						78	1	
TD Yield Strength (ppi)	84	78	79	79	82						80	2	
MD Break Strength (ppi)	209	191	204	192	205						200	7	152 min
TD Break Strength (ppi)	197	187	202	180	198						193	8	152 min
MD Yield Elongation (%)	28	27	27	30	28						28	1	
TD Yield Elongation (%)	18	21	18	18	18						19	1	
MD Break Elongation (%)	846	810	833	805	845						828	17	800 min
TD Break Elongation (%)	858	866	903	823	869						864	26	800 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	85	84	85	85	86	85	84	84	84	84	85	1	56 min
	85	85	85	84	85								
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	33	32	30	31	32	33	33	30	31	34	32	1	22 min
TD Tear Strength (lbs)	30	31	28	29	28	30	32	28	28	30	29	1	22 min

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Solmax 40 mil Smooth LLDPE Geomembrane
Sample Identification: 39092-1
TRI Log #: E2193-01-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5199)													
Thickness (mils)	43	41	43	41	42	42	41	43	41	43	42	1	40 avg
											41	<< min.	36 min
Density (ASTM D 1505)													
Density (g/cm3)	0.937	0.937	0.937								0.937	0.000	0.939 max
Tensile Properties (ASTM D 638/GRI GM 13, 2 ipm strain rate, Type IV specimen)													
MD Yield Strength (ppi)	78	75	82	78	80						79	2	
TD Yield Strength (ppi)	82	82	80	85	79						82	2	
MD Break Strength (ppi)	203	163	197	204	192						192	15	152 min
TD Break Strength (ppi)	204	196	190	201	189						196	6	152 min
MD Yield Elongation (%)	26	24	24	26	23						25	1	
TD Yield Elongation (%)	21	21	20	22	22						21	1	
MD Break Elongation (%)	874	703	811	885	799						814	65	800 min
TD Break Elongation (%)	909	893	881	894	876						891	11	800 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	85	85	85	85	85	83	83	82	82	82	84	1	56 min
	84	83	83	84	83								
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	31	31	31	30	30	32	33	31	32	33	31	1	22 min
TD Tear Strength (lbs)	30	30	28	30	30	31	32	29	27	29	30	1	22 min

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.

A Texas Research International Company

GEOMEMBRANE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Solmax 40 mil Smooth LLDPE Geomembrane
Sample Identification: 39098-1
TRI Log #: E2193-01-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5199)													
Thickness (mils)	42	42	42	42	42	43	43	42	42	42	42	0	40 avg
											42	<< min.	36 min
Density (ASTM D 1505)													
Density (g/cm3)	0.936	0.936	0.936								0.936	0.000	0.939 max
Tensile Properties (ASTM D 638/GRI GM 13, 2 ipm strain rate, Type IV specimen)													
MD Yield Strength (ppi)	82	84	81	82	80						82	1	
TD Yield Strength (ppi)	83	81	84	82	80						82	1	
MD Break Strength (ppi)	203	193	201	200	181						196	8	152 min
TD Break Strength (ppi)	195	200	170	201	198						193	12	152 min
MD Yield Elongation (%)	24	22	22	24	22						23	1	
TD Yield Elongation (%)	21	19	21	21	19						20	1	
MD Break Elongation (%)	858	796	859	855	773						828	36	800 min
TD Break Elongation (%)	851	899	761	915	903						866	57	800 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	85	85	84	84	84	85	86	85	85	86	84	1	56 min
	83	83	83	83	83								
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	33	30	30	31	30	33	34	30	33	31	32	2	22 min
TD Tear Strength (lbs)	31	30	30	31	29	31	29	33	28	31	30	1	22 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOMEMBRANE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Solmax 40 mil Smooth LLDPE Geomembrane
Sample Identification: 39104-1
TRI Log #: E2193-01-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Thickness (ASTM D 5199)													
Thickness (mils)	42	43	42	42	42	43	43	42	43	42	42	0	40 avg
											42	<< min.	36 min
Density (ASTM D 1505)													
Density (g/cm3)	0.937	0.937	0.937								0.937	0.000	0.939 max
Tensile Properties (ASTM D 638/GRI GM 13, 2 ipm strain rate, Type IV specimen)													
MD Yield Strength (ppi)	78	76	77	76	75						76	1	
TD Yield Strength (ppi)	83	79	79	79	78						80	2	
MD Break Strength (ppi)	188	204	203	215	195						201	9	152 min
TD Break Strength (ppi)	196	184	189	194	192						191	4	152 min
MD Yield Elongation (%)	25	24	24	24	23						24	1	
TD Yield Elongation (%)	19	18	17	18	18						18	1	
MD Break Elongation (%)	794	883	846	918	841						856	42	800 min
TD Break Elongation (%)	858	834	840	866	869						853	14	800 min
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	85	89	89	88	87	84	84	84	83	82	85	2	56 min
	84	83	83	83	83								
Tear Resistance (ASTM D 1004)													
MD Tear Strength (lbs)	35	31	31	36	31	33	33	31	34	30	33	2	22 min
TD Tear Strength (lbs)	32	31	28	31	28	30	29	30	31	29	30	1	22 min

MD Machine Direction
TD Transverse Direction

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Attachment 2

40-Mil Geomembrane

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE:	11/4/03 0900 – 1000	MANUFACTURER:	SOLMAX
PROJECT NAME:	EDGE MOOR CAP	MAT. TYPE:	40 MIL LLDPE + ROD
PROJECT NUMBER:	811752	TRUCK #:	
INSPECTOR:	GORDON CHIN	BILL OF LADING #:	SEE ATTACHED

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
39096-1	780 X 22.4	17,472	OK
39104-1	"	"	SL. CORE DAMAGE
39095-1	"	"	SOME DAMAGE, EDGE SMALL HOLES
39101-1	"	"	OK
39094-1	"	"	OK
39097-1	"	"	SL. CORE CRUSH
* MISSING 39106-1	"	"	OK
39100-1	"	"	OK
39105-1	"	"	EDGE DAMAGE, SL CORE OK
39099-1	"	"	SL. CORE DAMAGE
39098-1	"	"	SM TEAR, CORE OK
39102-1	"	"	OK
2640B	SPOOL	2370'	OK
2641A	"	2385'	OK
2641B	"	2385'	OK
2642A	"	2400'	OK
2642B	"	2400'	OK
2643B	"	2400'	OK

* ALL ROLLS RECEIVED WERE CROSS REFERENCED TO AND MATCH PRE SHIPMENT CERTIFICATIONS.

CONNAISSEMENT **NON NEGOCIABLE** **No DE CONNAISSEMENT** MF-LOG-06

BILL OF LADING **NOT NEGOCIABLE** **B/L No.** Rev:00/03-01-02

1-Expéditeur ou Agent (Nom & Adresse)/Consignor or Agent (Name & Address) **SOLMAX INTERNATIONAL INC.** **2801 BOUL. MARIE VICTORIN** **VARENNES QUE J3X 1P7 CANADA** **TÉL : (450) 929-1234 FAX : (450) 929-2548**	2-No Compte Expéditeur Consignor's Account No. 3-Date **10/31/03** 5-Nom du transporteur Name of Carrier A. Giroux
7-Destinataire (Nom & Adresse)/Consignée (Name & Adress) DUPONT EDGE MOORE CLOSURE 104 HAY ROAD- NORTH GATE Tel: Gordon (302) 293-5487 WILMINGTON DE 19809 9-Partie à Notifier - Courtier en douanes*/Notify Party - Customs Broker UPS SCS 10- POINT D'ORIGINE POINT OF ORIGIN	8-Reçu au point d'origine, à la date de l'expéditeur mentionné aux présentes les marchandises ci-après décrites en bon état apparent (le contenu des colis et sa condition étant inconnus) marquées, contresignées et destinées tel que ci-après mentionné, que le transporteur consent à transporter et à délivrer à leur consignataire au point de destination si ce point se trouve sur la route qu'il est autorisé à desservir, sinon à faire transporter et délivrer par un autre transporteur autorisé à ce faire et ce, aux taux et à la classification en vigueur à la date de l'expédition. Il est mutuellement convenu que chaque transporteur transportant les dites marchandises en tout ou en partie sur le parcours entier ou une portion quelconque de celui jusqu'à destination et que tout intéressé à la dite expédition pour tout service à effectuer en vertu des présentes est sujet à toutes les conditions imprimées ou écrites non prohibées par la loi, incluant les conditions contenues au verso des présentes qui sont acceptées par l'expéditeur pou lui-meme et ses ayants-droit. Received at the point of origin on the date specified, from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and conditions of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consignee at the said destination, if on its own authorized route or otherwise to cause to be carried by another carrier on the route to said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, including conditions on back hereof, which are hereby agreed by the consignor and accepted for himself and his assigns.
11-El. Route/Routing	**Valeur déclarée / Declared valuation** Responsabilité maximum de 4,41$ le kilogramme (2.00$ la livre) à moins d'indication contraire par la valeur déclarée (Conditions 9 et 10 au verso) Maximum liability of 4.41$ per kilogramme ($2.00 per pound) unless declared valuation states otherwise (Conditions 9 and 10 on back)

Marques et numéros*/ Marks & numbers*	14-Nombre total de colis*/ Total no. of packages*	15-Description générale de l'expédition*/ General description of shipment*	16-No du véhicule*/ Vehicle No.*	17-Poids brut et cubage*/ Total weight & cubage*

18-Nombre et type de colis/ Number and type of pieces	19-Description des marchandises, marques et particularités/ Particulars of goods, marks and exceptions	20-Poids/ Weight	21-Tarif/ Rate	22-Montant/ Amount	23-FRAIS DE TRANSPORT
12 Rolls	22" x 30" ⌀ + 24 nylons Slings				A percevoir/collect ☐ Port payé/Prepaid ☒ Les frais seront à percevoir à moins d'avis contraire/Freight charges will be collect unless marked prepaid
+					
~~1 SKID~~	~~3 1/2 x 3 1/2 x 1'~~				24-Si au risque de l'expéditeur, indiquez ici/If at consignor's risk, write or stamp here
6 SPOOLS					25-Envoi contre remboursement/C.O.D. shipment Frais de recouvrement/ Collection charges À percevoir/Collect ☐ Port payé/Prepaid ☐
	TOTAL	43514 LBS			

26-Entente spéciale entre l'expéditeur et le transporteur, y faire référence/ ⇨ C MONTANT/AMOUNT $

27-avis de réclamation

a-Le transporteur n'est responsible de pertes, de dommage ou de retards aux marchandises transportées qui sont décrites au connaissement, qu'à condition qu'un avis écrit précisant l'origine des marchandises, leur destination, leur date d'expédition et le montant approximatif réclamé en réparation de la perte, des dommages ou du retard ne soit signifié au transporteur initial ou au transporteur de destination, dans les soixante (60) jours suivant la date de la livraison des marchandises ou dans les cas de non livraison, dans un délai de neuf (9) mois suivant la date d'expédition.

b-La présentation de la réclamation finale accompagnée d'une preuve du paiement des frais de transport doit etre soumise au transporteur dans un délai de neuf (9) mois suivant la date d'expédition.

O Frais de recouvrement/Collection charges $
D TOTAL $
28-À l'arrivée*/Inbound $
29-Au-delà*/Beyond $
31-Autres (précisez)*/Others (specify)* $
$
36-Total des frais*/Total charges* $

32-EXPÉDITEUR/CONSIGNOR	33-TRANSPORTEUR/CARRIER	34-DESTINATAIRE/CONSIGNEE
D.	DATE	DATE 11/4

H:\ISO\Formulaire\Logistique\MF-LOG-06(Bill of lading).doc

CONNAISSEMENT **NON NEGOCIABLE** **No DE CONNAISSEMENT**
BILL OF LADING **NOT. NEGOCIABLE** **B/L No.**

MF-LOG-06
Rev:00/03-01-02

1-Expéditeur ou Agent (Nom & Adresse)/Consignor or Agent (Name & Address)

SOLMAX INTERNATIONAL INC.
2801 BOUL. MARIE VICTORIN
ARENNES QUE J3X 1P7 CANADA
TÉL : (450) 929-1234 FAX : (450) 929-2548

2-No Compte Expéditeur
Consignor's Account No.

3-Date
10/31/03

5-Nom du transporteur
Name of Carrier A. Giroux

7-Destinataire (Nom & Adresse)/Consignée (Name & Adress)

DUPONT EDGE MOORE CLOSURE
104 HAY ROAD- NORTH GATE
Tel: Gordon (302) 293-5487
WILMINGTON DE 19809

9-Partie à Notifier - Courtier en douanes*/Notify Party - Customs Broker
UPS SCS

10- POINT D'ORIGINE
POINT OF ORIGIN

8-Reçu au point d'origine, à la date de l'expéditeur mentionné aux présentes les marchandises ci-après décrites en bon état apparent (le contenu des colis et sa condition étant inconnus) marquées, contresignées et destinées tel que ci-après mentionné, que le transporteur consent à transporter et à délivrer à leur consignataire au point de destination si ce point se trouve sur la route qu'il est autorisé à desservir, sinon à faire transporter et délivrer par un autre transporteur autorisé à ce faire et ce, aux taux et à la classification en vigueur à la date de l'expédition.
Il est mutuellement convenu que chaque transporteur transportant les dites marchandises en tout ou en partie sur le parcours entier ou une portion quelconque de celui jusqu'à destination et que tout intéressé à la dite expédition pour tout service à effectuer en vertu des présentes est sujet à toutes les conditions imprimées ou écrites non prohibées par la loi, incluant les conditions contenues au verso des présentes qui sont acceptées par l'expéditeur pou lui-meme et ses ayants-droit.
Received at the point of origin on the date specified, from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and conditions of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consignee at the said destination, if on its own authorized route or otherwise to cause to be carried by another carrier on the route to said destination, subject to the rates and classification in effect on the date of shipment.
It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, including conditions on back hereof, which are hereby agreed by the consignor and accepted for himself and his assigns.

11-Et Route/Routing

Valeur déclarée / Declared valuation
Responsabilité maximum de 4,41$ le kilogramme (2.00$ la livre) à moins d'indication contraire par la valeur déclarée (Conditions 9 et 10 au verso)
Maximum liability of 4.41$ per kilogramme ($2.00 per pound) unless declared valuation states otherwise (Conditions 9 and 10 on back)

13-Marques et numéros*/ Marks & numbers*	14-Nombre total de colis*/ Total no. of packages*	15-Description générale de l'expédition*/ General description of shipment*	16-No du véhicule*/ Vehicle No.*	17-Poids brut et cubage*/ Total weight & cubage*

18-Nombre et type de colis/ Number and type of pieces	19-Description des marchandises, marques et particularités/ Particulars of goods, marks and exceptions	20-Poids/ Weight	21-Tarif/ Rate	22-Montant/ Amount
12 Rolls	22" x 30"D + 24 nylons Slings			
+				
~~1 Skid~~	~~3 1/2 x 3 1/2 x 1'A~~			
6 Spools				
	TOTAL	435	14	2 BS

23-FRAIS DE TRANSPORT
A percevoir/collect ☐
Port payé/Prepaid ☒
Les frais seront à percevoir à moins d'avis contraire/Freight charges will be collect unless marked prepaid

24-Si au risque de l'expéditeur, indiquez le ici/If at consignor's risk, write or stamp here

25-Envoi contre remboursement/C.O.D. shipment
*Frais de recouvrement/ Collection charges
À percevoir/Collect ☐
Port payé/Prepaid ☐

26-Entente spéciale entre l'expéditeur et le transporteur, y faire référence/

C. MONTANT/AMOUNT $

27-avis de réclamation
a-Le transporteur n'est responsible de pertes, de dommage ou de retards aux marchandises transportées qui sont décrites au connaissement, qu'à condition qu'un avis écrit précisant l'origine des marchandises, leur destination, leur date d'expédition et le montant approximatif réclamé en réparation de la perte, des dommages ou du retard ne soit signifié au transporteur initial ou au transporteur de destination, dans les soixante (60) jours suivant la date de la livraison des marchandises ou dans les cas de non livraison, dans un délai de neuf (9) mois suivant la date d'expédition.
b-La présentation de la réclamation finale accompagnée d'une preuve du paiement des frais de transport doit etre soumise au transporteur dans un délai de neuf (9) mois suivant la date d'expédition.

O Frais de recouvrement/Collection charges $
D TOTAL $
28-À l'arrivée*/Inbound $
29-Au-delà*/Beyond $
31-Autres (précisez)*/Others (specify)* $
$
35-Total des frais*/Toyal charges* $

EXPÉDITEUR/CONSIGNOR	33-TRANSPORTEUR/CARRIER	34-DESTINATAIRE/CONSIGNÉE
DATE	DATE	DATE 11/4

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE:	MANUFACTURER: SOLMAX
PROJECT NAME: EDGE MOOR CAP	MAT. TYPE: 40 mil LLDPE & ROD
PROJECT NUMBER: 811752	TRUCK #:
INSPECTOR:	BILL OF LADING #: SEE ATTACHED

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
39090-1	780 x 22.4	17,472	OK
39091	"	"	OK
39092	"	"	OK
39087	"	"	OK
39088	"	"	OK
39093	"	"	SL. CORE CRUSH
39089	"	"	OK

SOLMAX

Solmax International Inc.
2801 MARIE VICTORIN

VARENNES
QC J3X 1P7
Tel. : (450) 929-1234
Fax : (450) 929-2548

PACKING SLIP

DATE 03/11/03
REFERENCE 10,181

MF-LOG-02
Rev : 01/03-07-03

SHIP TO DUPONT EDGE MOORE CLOSURE
104 HAY ROAD- NORTH GATE

INVOICE INV018151

WILMINGTON DE 19809
(302) 293-5487 Ext. 0000 FAX (000) 000-0000

CONTACT GORDON CHIN

P.O. No	CUSTOMER No	SALESPERSON	PROJECT No	SHIP VIA
9190-00	GEOSYNTH	PAUL PAYEUR	WILLMINGTON, DE	PREPAID

ITEM No	LOT No.	DIMENSIONS (Feet/Pieds)		SURFACE (SF/PC)	WEIGHT (Lbs)
		WIDTH	LENGTH		
ROD SOLMAX LLDPE		0.00	0.00	0.00	0.00
SUB TOTAL				0.00	
SOLMAX 840	39087	22.40	780.00	17,472.01	3,622.00
SOLMAX 840	39088	22.40	780.00	17,472.01	3,616.00
SOLMAX 840	39089	22.40	780.00	17,472.01	3,618.00
SOLMAX 840	39090	22.40	780.00	17,472.01	3,610.00
SOLMAX 840	39091	22.40	780.00	17,472.01	3,614.00
SOLMAX 840	39092	22.40	779.52	17,461.24	3,624.00
SOLMAX 840	39093	22.40	780.00	17,472.01	3,620.00
				122,293.32	

Note : Dimensions May Vary +/- 1%
Note : Les Dimensions Peuvent Variees de +/- 1%

QUANTITY	WEIGHT (Lbs)
7.00	25,324.00

CONNAISSEMENT **NON NEGOCIABLE** **No DE CONNAISSEMENT** 6670 MF-LOG-06
BILL OF LADING **NOT NEGOCIABLE** **B/L No.** Rev:00/03-01-02

1-Expéditeur ou Agent (Nom & Adresse)/Consignor or Agent (Name & Address) **SOLMAX INTERNATIONAL INC.** **1801 BOUL. MARIE VICTORIN** **VARENNES QUE J3X 1P7 CANADA** **TÉL : (450) 929-1234 FAX : (450) 929-2548**	2-No Compte Expéditeur Consignor's Account No. 3-Date **03/11/03** 5-Nom du transporteur Name of Carrier TRANSRIVE
7-Destinataire (Nom & Adresse)/Consignée (Name & Adress) DUPONT EDGE MOORE CLOSURE 104 HAY ROAD- NORTH GATE Tel: Gordon (302) 293-5487 WILMINGTON DE 19809 9-Partie à Notifier - Courtier en douanes*/Notify Party - Customs Broker UPS-SCS 10- POINT D'ORIGINE POINT OF ORIGIN	8-Reçu au point d'origine, à la date de l'expéditeur mentionné aux présentes les marchandises ci-après décrites en bon état apparent (le contenu des colis et sa condition étant inconnus) marquées, contresignées et destinées tel que ci-après mentionné, que le transporteur consent à transporter et à délivrer à leur consignataire au point de destination si ce point se trouve sur la route qu'il est autorisé à desservir, sinon à faire transporter et délivrer par un autre transporteur autorisé à ce faire et ce, aux taux et à la classification en vigueur à la date de l'expédition. Il est mutuellement convenu que chaque transporteur transportant les dites marchandises en tout ou en partie sur le parcours entier ou une portion quelconque de celui jusqu'à destination et que tout intéressé à la dite expédition pour tout service à effectuer en vertu des présentes est sujet à toutes les conditions imprimées ou écrites non prohibées par la loi, incluant les conditions contenues au verso des présentes qui sont acceptées par l'expéditeur pou lui-meme et ses ayants-droit. Received at the point of origin on the date specified, from the consignor mentioned herein, the property herein described, in apparent good order, except as noted (contents and conditions of contents of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consignee at the said destination, if on its own authorized route or otherwise to cause to be carried by another carrier on the route to said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed hereunder shall be subject to all the conditions not prohibited by law, whether printed or written, including conditions on back hereof, which are hereby agreed by the consignor and accepted for himself and his assigns.
11-Et Route/Routing	**Valeur déclarée / Declared valuation** Responsabilité maximum de 4,41$ le kilogramme (2,00$ la livre) à moins d'indication contraire par la valeur déclarée (Conditions 9 et 10 au verso) Maximum liability of 4.41$ per kilogramme ($2.00 per pound) unless declared valuation states otherwise (Conditions 9 and 10 on back)

13-Marques et numéros*/ Marks & numbers*	14-Nombre total de colis*/ Total no. of packages*	15-Description générale de l'expédition*/ General description of shipment*	16-No du véhicule*/ Vehicle No.*	17-Poids brut et cubage*/ Total weight & cubage*

18-Nombre et type de colis/ Number and type of pieces	19-Description des marchandises,marques et particularités/ Particulars of goods marks and exceptions	20-Poids/ Weight	21-Tarif/ Rate	22-Montant/ Amount	23-FRAIS DE TRANSPORT
7 Rolls	22" x 30" Ø + 14 nylons Slings				A percevoir/collect ☐ Port payé/Prepaid ☑ Les frais seront à percevoir à moins d'avis contraire/Freight charges will be collect unless marked prepaid.
					24-Si au risque de l'expéditeur, indiquez le ici./If et consignor's risk, write or stamp here
					25-Envoi contre remboursement/C.O.D. shipment Frais de recouvrement/ Collection charges À percevoir/Collect ☐ Port payé/Prepaid ☐
	TOTAL	25324 LBS			

26-Entente spéciale entre l'expéditeur et le transporteur, y faire référence/ ⇨ C MONTANT/AMOUNT $

27-avis de réclamation
a-Le transporteur n'est responsible de pertes, de dommage ou de retards aux marchandises transportées qui sont décrites au connaissement,qu'à condition qu'un avis écrit précisant l'origine des marchandises, leur destination, leur date d'expédition et le montant approximatif réclamé en réparation de la perte, des dommages ou du retard ne soit signifié au transporteur initial ou au transporteur de destination,dans les soixante (60) jours suivant la date de la livraison des marchandises ou dans les cas de non livraison,dans un délai de neuf (9) mois suivant la date d'expédition.
b-La présentation de la réclamation finale accompagnée d'une preuve du paiement des frais de transport doit etre soumise au transporteur dans un délai de neuf (9) mois suivant la date d'expédition.

O Frais de recouvrement/Collection charges $
O TOTAL $
28-À l'arrivée*/Inbound $
29-Au-delà*/Beyond $
31-Autres (précisez)*/Others (specify)* $
$
35-Total des frais*/Toyal charges* $

EXPÉDITEUR/CONSIGNOR	33-TRANSPORTEUR/CARRIER	34-DESTINATAIRE/CONSIGNEE
DATE	DATE	DATE

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Edge Moor Surface Impoundment Closure Project – Phase II Cap Construction
Submittal Review Form

THIS SECTION TO BE COMPLETED BY CONTRACTOR

Submittal Identification: 40 **Specification Paragraph:** 02278 1.5.C

Description of Submittal: Manufacturer Certificate of Compliance

Submittal Type: ☐ Drawing ☐ Sample ☐ Guarantee ☐ Mfr's Data ☒ Certificate
☒ Test Report ☐ Other

Submitted For: ☐ Review ☒ Information ☐ Closeout ☐ Available On Site

Approval Needed By: 10/22 **Material Needed By:** 10/23

Manufacturer: SOLMAX **Product:** Solmax 440

Contractor Comments: 40-mil LLDPE Maufacturer Cert's and QC Results

Submitted By: Gordon D. Chin **Signature:** [signature] **Date:** 10/20/03

---

17 rolls x 17,472 = 314,496 SF
TOTAL

COPY

[liner - wed.] (262) 366-0027 White
Mike Beeman

Jim Smith
700 AM.

GEO-SYNTHETICS, INC.
W239 N428 Pewaukee Road
Waukesha, WI 53188
262-524-7979 800-444-5523 FAX (262) 524-7961
www.geo-synthetics.com

LETTER OF TRANSMITTAL

TO: URS c/o DuPont Edge Moor Field Office
ATTENTION: c/o Tom Adams for Gordon Chin
ADDRESS: 104 Hay Road
CITY/STATE/ZIP: Wilmington, DE 19809
FROM: Jon Fuhrman
with COPIES TO:

DATE: 10/17/03 JOB NO: 23069
RE: Edge Moor Closure
PHONE: 302.765.2315
FAX: 302.765.2317

☒ Submitted via Fax – 8 pages (includes this page)

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

☒ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☒ Product Specifications
☐ Copy of letter ☐ Proposal ☐ Submittals ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1	10/17/03	4	Section 02278 – Geomembrane - Roll Certs and Weld Rod Certs

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☒ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____, 20_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS:

Please note that shipping release awaits your review and approval of the attached. Please communicate any issues as soon as possible to avoid potential delays.

SIGNED: _____
Jon Fuhrman – GSI Project Manager

If enclosures are not as noted, kindly notify us at once.

SOLMAX INTERNATIONAL

List of Geomembrane Rolls

MF-CQ-01
Rev.: 01 / 16-07-03

2801 Marie-Victorin, Quebec, Canada, J3X 1P7

17-Oct-03

Project Name: Willmington, DE
Customer P.O.: 9190-00
Reference No: 10181

Roll No.	Product Code	Lot Number	Length * ft	Width * ft	Date Manufactured
39087	Solmax 840	8130967	780	22.4	10/16/03
39088	Solmax 840	8130967	780	22.4	10/16/03
39089	Solmax 840	8130967	780	22.4	10/16/03
39090	Solmax 840	8130967	780	22.4	10/16/03
39091	Solmax 840	8130967	780	22.4	10/16/03
39092	Solmax 840	8130967	780	22.4	10/16/03
39093	Solmax 840	8130967	780	22.4	10/16/03
39094	Solmax 840	8130967	780	22.4	10/16/03
39095	Solmax 840	8130967	780	22.4	10/16/03
39096	Solmax 840	8130967	780	22.4	10/16/03
39097	Solmax 840	8130967	780	22.4	10/16/03
39098	Solmax 840	8130967	780	22.4	10/16/03
39099	Solmax 840	8130967	780	22.4	10/16/03
39100	Solmax 840	8130967	780	22.4	10/16/03
39101	Solmax 840	8130967	780	22.4	10/16/03
39102	Solmax 840	8130967	780	22.4	10/16/03
39104	Solmax 840	8130967	780	22.4	10/16/03
39105	Solmax 840	8130967	780	22.4	10/17/03
39106	Solmax 840	8130967	780	22.4	10/17/03

19 rolls
22.4 X 780

* Roll dimensions may vary ± 1%

SOLMAX INTERNATIONAL

Manufacturing Quality Control Test Results - Resin

MF-CQ-11
Rev.: 00 / 10-10-00

2801 Marie-Victorin, Quebec, Canada, J3X 1P7

17-Oct-03

Project Name: Willmington, DE
Project No: 9190-00
Reference No: 10181

Lot No.	Melt Index	Density	SP-NCTL	Roll Tested
Specification	< 1.0 g/10 minutes	< 0.926 g/cc	> 200 hrs	
Test Method	ASTM D1238	ASTM D1505	ASTM D5397	
8130967	0.180	0.923	In-Progress	38881

CoA Date: 09/10/2003

Certificate of Analysis

Shipped To: SOLMAX
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Bob DesJardins
Fax: 1-450-929-2548

CPC Delivery #: 88452442
PO #: 31370
Weight: 180500 LB
Ship Date: 09/09/2003
Package: BULK
Mode: Hopper Car
Car #: PSPX006117

Product:
MARLEX POLYETHYLENE K203 BULK

Lot Number: 8130987

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.180	g/10ml
HLMI Flow Rate	ASTM D1238	15.70	g/10ml
Density	ASTM D1505	0.9230	g/cm3
Production Date		0	

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.

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Sandra Seymour at 832-813-4636

Solmax
ACCEPTED
Chantal Gagnon
Quality Department

SOLMAX INTERNATIONAL

Manufacturing Quality Control Test Results - Rolls

MF-CQ-03
Rev.: 00 / 10-10-00

2801 Marie-Victorin, Varennes, Québec, J3X 1P7

17-Oct-03

Project Name: Wilmington, DE
Project No: 9190-00
Reference No: 1018

Product: Solmax 840

Property		Thickness ave. / min.	Sheet Density	Car. blk. Content	Car. blk. Dispersion	Yield Strength	Yield Elongation	Break Strength	Break Elongation	Tear Resistance	Puncture Resistance	Dimensional Stability
Units		mil	g/cc	%		ppi	%	ppi	%	lbs	lbs	%
Test method		D5199	D1505	D4218	D5596	D638 2.0 in Gage Length, Type IV; 2 ipm				D1004	D4833	D1204
Specification		> 40 / > 36	< 0.939	2 to 3	1 or 2	N/A	N/A	152	800	22	56	± 2
Roll No.												
39087	MD	41.8 / 36	0.934	2.4	Cat. 1 10 Views	73	47	215	1000	26	90	-0.06
	XD				Cat. 2 0 Views	73	20	210	1057	24		-0.80
39088	MD	41.4 / 37	0.934	2.5	Cat. 1 10 Views	75	19	208	1015	26	90	-0.06
	XD				Cat. 2 0 Views	73	57	214	942	24		-0.80
39089	MD	41.1 / 37	0.934	2.5	Cat. 1 10 Views	75	19	208	1015	27	90	-0.06
	XD				Cat. 2 0 Views	73	57	214	942	25		-0.80
39090	MD	41 / 37	0.934	2.41	Cat. 1 10 Views	75	23	214	975	27	90	-0.06
	XD				Cat. 2 0 Views	76	19	208	1038	25		-0.80
39091	MD	41.2 / 37	0.934	2.41	Cat. 1 10 Views	75	23	214	975	27	90	-0.06
	XD				Cat. 2 0 Views	76	19	208	1038	25		-0.80
39092	MD	41.7 / 37	0.934	2.56	Cat. 1 10 Views	75	22	215	962	28	92	-0.77
	XD				Cat. 2 0 Views	79	18	210	1018	26		-0.03
39093	MD	42 / 37	0.934	2.56	Cat. 1 10 Views	75	22	215	962	28	92	-0.77
	XD				Cat. 2 0 Views	79	18	210	1018	26		-0.03
39094	MD	41.7 / 37	0.934	2.51	Cat. 1 10 Views	73	24	217	994	28	92	-0.77
	XD				Cat. 2 0 Views	76	19	207	1027	26		-0.03
39095	MD	41.7 / 37	0.934	2.51	Cat. 1 10 Views	73	24	217	994	28	92	-0.77
	XD				Cat. 2 0 Views	76	19	207	1027	26		-0.03

Solmax Quality Department
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Chantal Gagnon

Property		Thickness ave. / min.	Sheet Density	Car. blk. Content	Car. blk. Dispersion	Yield Strength	Yield Elongation	Break Strength	Break Elongation	Tear Resistance	Puncture Resistance	Dimensional Stability
Units		mil	g/cc	%		ppi	%	ppi	%	lbs	lbs	%
Test method		D5199	D1505	D4218	D5596	D638 2.0 in Gage Length, Type IV; 2 ipm				D1004	D4833	D1204
Specification		> 40 / > 36	< 0.939	2 to 3	1 or 2	N/A	N/A	152	800	22	56	± 2
Roll No.												
39096	MD	41.7 / 37	0.934	2.56	Cat. 1 10 Views	73	24	210	955	28	92	-0.77
	XD				Cat. 2 0 Views	77	19	210	1032	26		-0.03
39097	MD	41.5 / 37	0.934	2.56	Cat. 1 10 Views	73	24	210	955	28	92	-0.77
	XD				Cat. 2 0 Views	77	19	210	1032	26		-0.03
39098	MD	42.1 / 37	0.937	2.54	Cat. 1 10 Views	77	22	219	958	28	89	-0.69
	XD				Cat. 2 0 Views	72	19	193	949	26		-0.06
39099	MD	41.9 / 37	0.937	2.54	Cat. 1 10 Views	77	22	219	958	28	89	-0.69
	XD				Cat. 2 0 Views	72	19	193	949	26		-0.06
39100	MD	41.4 / 37	0.936	2.46	Cat. 1 10 Views	73	23	214	945	28	89	-0.69
	XD				Cat. 2 0 Views	76	18	200	945	26		-0.06
39101	MD	41.3 / 36	0.936	2.46	Cat. 1 10 Views	73	23	214	945	27	89	-0.69
	XD				Cat. 2 0 Views	76	18	200	945	24		-0.06
39102	MD	41.1 / 37	0.936	2.39	Cat. 1 10 Views	75	23	212	929	27	89	-0.69
	XD				Cat. 2 0 Views	78	19	200	939	24		-0.06
39104	MD	41.5 / 37	0.935	2.43	Cat. 1 10 Views	72	75	210	936	26	88	-0.07
	XD				Cat. 2 0 Views	73	19	199	944	25		-0.65
39105	MD	41.7 / 37	0.935	2.43	Cat. 1 10 Views	72	75	210	936	26	88	-0.07
	XD				Cat. 2 0 Views	73	19	199	944	25		-0.65
39106	MD	41.5 / 36	0.935	2.56	Cat. 1 10 Views	66	69	202	934	26	88	-0.07
	XD				Cat. 2 0 Views	67	19	193	943	25		-0.65

Solmax
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Chantal Gagnon
Quality Department

SOLMAX INTERNATIONAL

Manufacturing Quality Control Test Results - ROD

MP-CQ-16
Rev.: 00 / 10-10-00

2801 Marie-Victorin, Quebec, Canada, J3X 1P7

17-Oct-03

Project Name: Willmington, DE
Project No: 9190-00
Reference No: 10181

	Spool No.	Type	Size (mm)	Resin Lot No.	Density. (g/cc)	Carbon Black Content. (%)
	2639 A	LLDPE	5	8130877	0.935	2.79
	2639 B	LLDPE	5	8130877	0.935	2.79
	2640 A	LLDPE	5	8130877	0.935	2.42
2370'	2640 B ✓	LLDPE	5	8130877	0.935	2.42
2385'	2641 A ✓	LLDPE	5	8130877	0.935	2.09
2385'	2641 B ✓	LLDPE	5	8130877	0.935	2.09
2400'	2642 A ✓	LLDPE	5	8130877	0.935	2.11
2400	2642 B ✓	LLDPE	5	8130877	0.935	2.11
	2643 A	LLDPE	5	8130877	0.934	2.52
2400'	2643 B ✓	LLDPE	5	8130877	0.934	2.52
	2644 A	LLDPE	5	8130877	0.934	2.21
	2645 A	LLDPE	5	8130877	0.935	2.39

Solmax
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Chantal Gagnon
Quality Department

Chevron Phillips

CoA Date: 08/18/2003

ROD

Certificate of Analysis

Shipped To: SOLMAX
2801 BOUL MARIE-VICTORIN
VARENNES QC J3X 1P7
CANADA

Recipient: Bob DesJardins
Fax: 1-450-929-2548

CPC Delivery #: 86436209
PO #: 31265
Weight: 181700 LB
Ship Date: 08/17/2003
Package: BULK
Mode: Hopper Car
Car #: [redacted]

Product:
MARLEX POLYETHYLENE K203 BULK

Lot Number: 8130877

Property	Test Method	Value	Unit
Melt Index	ASTM D1238	0.160	g/10ml
HLMI Flow Rate	ASTM D1238	15.10	g/10ml
Density	ASTM D1505	0.9230	g/cm3
Production Date		0	

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.**

Paul S. Newbold

Paul S. Newbold
Sr. Certification Systems Specialist

For CoA questions contact Melody Chenevert at 832-813-4244

Solmax
ACCEPTE / ACCEPTED
Chantal Gagnon
Quality Department

APPENDIX D3
GEONET (TN220)

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

October 22, 2003

Mail To:

Mr. Gordon Chin
URS Construction Services
2325 Maryland Road, 2nd Floor
Willow Grove, PA 19090

email: gordon_chin@urscorp.com

Bill To:

<= Same

Dear Mr. Chin:

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:	Dupont Edgemoor
TRI Job Reference Number:	E2193-01-08
Material(s) Tested:	7 Skaps Geonet(s)
Test(s) Requested:	Transmissivity (ASTM D 4716) - GC

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Sam R. Allen

Sam R. Allen
Vice President and Division Manager
Geosynthetic Services Division

GEONET TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Skaps Geonet
Sample Identification: 1124006
TRI Log #: E2193-01-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Compressive Load (psf):	200												
Hydraulic Gradient:	0.1												
Seat Time (hours):	0.25												
Test Temperature (C)	21												
Direction Tested: machine direction													
Profile (Top to Bottom): Plate/GN Sample/Plate													
Permeant: Water													
Flow Rate/Unit Width (GPM/ft width)	3.36	3.37	3.43	3.34	3.37	3.37					3.37	0.03	
Hydraulic Transmissivity (m2/s)	6.8E-03	6.8E-03	6.9E-03	6.7E-03	6.8E-03	6.8E-03					6.8E-03	5.7E-05	2E-3 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEONET TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Skaps Geonet
Sample Identification: 1124017
TRI Log #: E2193-01-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Compressive Load (psf):	200												
Hydraulic Gradient:	0.1												
Seat Time (hours):	0.25												
Test Temperature (C)	22												
Direction Tested: machine direction													
Profile (Top to Bottom): Plate/GN Sample/Plate													
Permeant: Water													
Flow Rate/Unit Width (GPM/ft width)	3.37	3.36	3.38	3.40	3.38	3.37					3.38	0.01	
Hydraulic Transmissivity (m2/s)	6.6E-03	6.6E-03	6.7E-03	6.7E-03	6.7E-03	6.6E-03					6.7E-03	2.4E-05	2E-3 min

MD Machine Direction
TD Transverse Direction

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GEONET TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Skaps Geonet
Sample Identification: 1124027
TRI Log #: E2193-01-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Compressive Load (psf):	200												
Hydraulic Gradient:	0.1												
Seat Time (hours):	0.25												
Test Temperature (C)	21												
Direction Tested: machine direction													
Profile (Top to Bottom): Plate/GN Sample/Plate													
Permeant: Water													
Flow Rate/Unit Width (GPM/ft width)		3.45	3.49	3.50	3.46	3.51	3.47				3.48	0.02	
Hydraulic Transmissivity (m2/s)		7.0E-03	7.0E-03	7.1E-03	7.0E-03	7.1E-03	7.0E-03				7.0E-03	3.7E-05	2E-3 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.

GEONET TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Skaps Geonet
Sample Identification: 1124038
TRI Log #: E2193-01-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Compressive Load (psf):	200												
Hydraulic Gradient:	0.1												
Seat Time (hours):	0.25												
Test Temperature (C)	22												
Direction Tested: machine direction													
Profile (Top to Bottom): Plate/GN Sample/Plate													
Permeant: Water													
Flow Rate/Unit Width (GPM/ft width)		3.39	3.37	3.39	3.34	3.35	3.37				3.37	0.02	
Hydraulic Transmissivity (m2/s)		6.7E-03	6.7E-03	6.7E-03	6.6E-03	6.6E-03	6.6E-03				6.6E-03	3.9E-05	2E-3 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.

GEONET TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Skaps Geonet
Sample Identification: 1124050
TRI Log #: E2193-01-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Compressive Load (psf):	200												
Hydraulic Gradient:	0.1												
Seat Time (hours):	0.25												
Test Temperature (C)	21.5												
Direction Tested: machine direction													
Profile (Top to Bottom): Plate/GN Sample/Plate													
Permeant: Water													
Flow Rate/Unit Width (GPM/ft width)		3.29	3.35	3.32	3.65	3.66	3.52				3.46	0.15	
Hydraulic Transmissivity (m2/s)		6.6E-03	6.7E-03	6.6E-03	7.3E-03	7.3E-03	7.0E-03				6.9E-03	3.0E-04	2E-3 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.

GEONET TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Skaps Geonet
Sample Identification: 1124061
TRI Log #: E2193-01-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Compressive Load (psf):	200												
Hydraulic Gradient:	0.1												
Seat Time (hours):	0.25												
Test Temperature (C)	21.5												
Direction Tested: machine direction													
Profile (Top to Bottom): Plate/GN Sample/Plate													
Permeant: Water													
Flow Rate/Unit Width (GPM/ft width)		3.30	3.26	3.30	3.41	3.38	3.39				3.34	0.06	
Hydraulic Transmissivity (m2/s)		6.6E-03	6.5E-03	6.6E-03	6.8E-03	6.7E-03	6.8E-03				6.7E-03	1.1E-04	2E-3 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.

GEONET TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: Skaps Geonet
Sample Identification: 1124072
TRI Log #: E2193-01-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Hydraulic Transmissivity (ASTM D 4716)													
Compressive Load (psf):	200												
Hydraulic Gradient:	0.1												
Seat Time (hours):	0.25												
Test Temperature (C)	21.5												
Direction Tested: machine direction													
Profile (Top to Bottom): Plate/GN Sample/Plate													
Permeant: Water													
Flow Rate/Unit Width (GPM/ft width)		3.20	3.21	3.22	3.39	3.37	3.36				3.29	0.08	
Hydraulic Transmissivity (m2/s)		6.4E-03	6.4E-03	6.4E-03	6.8E-03	6.7E-03	6.7E-03				6.6E-03	1.6E-04	2E-3 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.

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE: 11-11-03	MANUFACTURER: SKAPS
PROJECT NAME: DUPONT EDGE MOOR CAP	MAT. TYPE: TN220 GEONET
PROJECT NUMBER: 811752	TRUCK #: (7 ROLLS)
INSPECTOR: G CHIN	BILL OF LADING #: ATTACHED

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
1124073	14.5' X 350'	4,350	NO APPARENT DAMAGE
" 74	↓	↓	" "
" 75			" "
" 76			" "
" 77			" "
" 78			" "
" 79			" "

SHIPPING ORDER - PACKING LIST – ORIGINAL – NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
C[illegible]merce, GA 30529
[illegible]6-336-7000 Fax: 706-336-7007
[illegible].skaps.com e-mail: info@skaps.com

Shipper's # 4622

Job Name: Dupont Edgemoor Closure
Address: 104 Hwy Road-North Gate
City, State, Zip : **Wilmington, DE 19809**
Contact: **Gordan Chin**
Phone: **302 293 5487**

Date Shipped: 11/11/2003
Cust. P.O. # 9191
Job # 1124

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY
Product Code:TN22000

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	1124073	4350			
2	1124074	4350			
3	1124075	4350			
4	1124076	4350			
5	1124077	4350			
6	1124078	4350			
7	1124079	4350			

Received by:
Sign:
BOL#: 5724

Total Rolls: 7
Total Sq. feet 30,450
Total Weight: 5,740

Deliver by:
Driver's Name: Roger Hancock
Driver's Sign: Roger Hancock
Driver's Cell Phone #: 706-986-9080
Trucking Co.: McRae Transport
Trucking Co.'s Phone #: 706-597-1502
Broker

DATE: 11/11/2003

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from Skaps Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is Skaps Industries as indicated by the designation of the "Shipper" to be Skaps Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation between the parties or (b) if the Shipper noted herein is not Skaps Industries then Skaps Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the [illegible] be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, Skaps Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by Skaps Industries.

Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE: 11-06-03	MANUFACTURER: SKAPS, IND
PROJECT NAME: DUPONT EDGE MOOR	MAT. TYPE: GEONET-TN220
PROJECT NUMBER: 811752	TRUCK #: ~~TN220~~ LOAD # 3 (27 rolls)
INSPECTOR: G. CHIN	BILL OF LADING #: SEE ATTACHED

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
1124019	14.5 X 300	4,350	NO APPARENT DAMAGE
20			N.A.D.
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE:	11-06-03	MANUFACTURER:	SKAPS, IND
PROJECT NAME:	DUPONT EDGE MOOR	MAT. TYPE:	GEONET TN220
PROJECT NUMBER:	811752	TRUCK #:	LOAD # 3 (Cont.)
INSPECTOR:	G. CHIN	BILL OF LADING #:	SEE ATTACHED

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
1124039	14.5x300	4,350	N.A.D.
40	↓	↓	↓
41	↓	↓	↓
42	↓	↓	↓
43	↓	↓	↓
44	↓	↓	↓
45	↓	↓	↓

SHIPPING ORDER - PACKING LIST – ORIGINAL – NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
706-336-7000 Fax: 706-336-7007
skaps.com e-mail: info@skaps.com

GEONET #3 LOAD.

Shipper's # 4591

Job Name: Dupont Edgemoor Closure
Address: 104 Hwy Road-North Gate
City, State, Zip : **Wilmington, DE 19809**
Contact: **Gordan Chin**
Phone: **302 293 5487**

Date Shipped: 11/5/2003
Cust. P.O. # 21200801
Job # 1124

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY
Product Code:TN22000

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	1124019	4350	16	1124034	4350
2	1124020	3625	17	1124035	4350
3	1124021	4350	18	1124036	4350
4	1124022	4350	19	1124037	3625
5	1124023	4350	20	1124038	4350
6	1124024	4350	21	1124039	4350
7	1124025	4350	22	1124040	4350
8	1124026	4350	23	1124041	4350
9	1124027	4350	24	1124042	4350
10	1124028	4350	25	1124043	4350
11	1124029	3625	26	1124044	4350
12	1124030	4350	27	1124045	4350
13	1124031	4350			
14	1124032	4350			
15	1124033	4350			

Please Collect 2 - Bags of Ties From the Driver
Driver Sign Here If you received 2 bags

Received by:
Sign:
BOL#:

Total Rolls: 27
Total Sq. feet 115,275
Total Weight: 22,140

Deliver by: 11/5/2003
Driver's Name:
Driver's Sign:
Driver's Cell Phone #:
Trucking Co.:
Trucking Co.'s Phone #:
Broker

DATE: 11/5/2003

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from Skaps Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is Skaps Industries as indicated by the designation of the "Shipper" to be Skaps Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not Skaps Industries then Skaps Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official orn, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, Skaps Industries accepts no liability for loss of cargo, damage to containers or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by Skaps Industries

Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

SKAPS Industries

571 Industrial Pkwy., Commerce, GA 30529
Ph. 706-336-7000 Fax 706-336-7007
www.skaps.com

Customer P.O.: 9191

Order: 330,600 sq. ft

Balance to ship: 30,450 sq. ft

Ship to: Dupont Edgemoor Closure
Wilmington, DE
Product: TN22000

To: Gordon Chin
Phone: (302) 293-5487
Fax: (262) 524-7961

SR #	SHIPPER #	TRUCK	SHIP DATE	ROLLS	SQ. FT	TIE BAGS	COMMENTS
1	4585	McNair	11/04/03	18	78,300	0	
2	4590	TEI	11/05/03	27	106,575	2	
3	4591	Landstar	11/05/03	27	115,275	2	
	Total			**72**	**300,150**	**4**	

11/6/2003

SHIPPING ORDER - PACKING LIST – ORIGINAL – NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
merce, GA 30529
706-336-7000 Fax: 706-336-7007
www.skaps.com e-mail: info@skaps.com

Shipper's # 4585

Job Name: Dupont Edgemoor Closure
Address: 104 Hwy Road-North Gate
City, State, Zip : **Wilmington, DE 19809**
Contact: **Gordan Chin**
Phone: **302 293 5487**

Date Shipped: 11/4/2003
Cust. P.O. # 21200801
Job # 1124

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY
Product Code:TN22000

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	1124001	4350	16	1124016	4350
2	1124002	4350	17	1124017	4350
3	1124003	4350	18	1124018	4350
4	1124004	4350			
5	1124005	4350			
6	1124006	4350			
7	1124007	4350			
8	1124008	4350			
9	1124009	4350			
10	1124010	4350			
11	1124011	4350			
12	1124012	4350			
13	1124013	4350			
14	1124014	4350			
15	1124015	4350			

Received by:
Sign:
BOL#: 4585.

Total Rolls: 18
Total Sq. feet 78,300
Total Weight: 14,760

Deliver by: 11/5/2003
Driver's Name: Reggi C Norman
Driver's Sign: Reggie Norman
Driver's Cell Phone #:
Trucking Co.:
Trucking Co.'s Phone #: Mcnair
Broker

DATE: 11/4/2003

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

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Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE:	11-06-03	MANUFACTURER:	SKAPS IND.
PROJECT NAME:	DUPONT EDGE MOOR	MAT. TYPE:	GEONET TN220
PROJECT NUMBER:	811752	TRUCK #:	LOAD #2 (27 ROLLS)
INSPECTOR:	G.CHIN	BILL OF LADING #:	SEE ATTACHED

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
(19) 1124046	14.5 X 300	4,350	NO APPARENT DAMAGE
(20) " 47			N.A.D
(21) " 48			N.A.D
(22) " 49			N.A.D
(23) " 50			N.A.D
(24) " 51			N.A.D
(25) " 52			N.A.D
(26) " 53			N.A.D
(27) " 54			N.A.D
(28) " 55			NAD
(29) " 56			N.AD
(30) " 57			NAD
(31) " 58			NAD
(32) " 59			NAD
(33) " 60			NAD
(34) " 61			NAD
(35) " 62			NAD
(36) " 63			NAD
(37) " 64			NAD
(38) " 65			NAD

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE:	11-06-03	MANUFACTURER:	SKAPS IND
PROJECT NAME:	DUPONT EDGE MOOR	MAT. TYPE:	GEONET TN220
PROJECT NUMBER:	811752	TRUCK #:	LOAD #2 CONT
INSPECTOR:	G. CHIN	BILL OF LADING #:	SEE ATTACHED

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
(39) 1124066	14.5 x 300	4,350	N.A.D.
(40) " 67	↓	↓	N.A.D.
(41) " 68			N.A.D.
(42) " 69			N.A.D.
(43) " 70			NAD
(44) " 71			NAD
(45) " 72	↓	↓	NAD

SHIPPING ORDER - PACKING LIST – ORIGINAL – NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
'06-336-7000 Fax: 706-336-7007
.skaps.com e-mail: info@skaps.com

GEONET #2 LOAD

Shipper's # 4590

Job Name: Dupont Edgemoor Closure
Address: 104 Hwy Road-North Gate
City, State, Zip : **Wilmington, DE 19809**
Contact: **Gordan Chin**
Phone: **302 293 5487**

Date Shipped: 11/5/03
Cust. P.O. # 21200801
Job # 1124

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY
Product Code:TN22000

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	1124046	4350	16	1124061	3625
2	1124047	4350	17	1124062	3625
3	1124048	4350	18	1124063	3625
4	1124049	4350	19	1124064	3625
5	1124050	4350	20	1124065	3625
6	1124051	4350	21	1124066	3625
7	1124052	4350	22	1124067	3625
8	1124053	4350	23	1124068	3625
9	1124054	4350	24	1124069	3625
10	1124055	3625	25	1124070	4350
11	1124056	3625	26	1124071	4350
12	1124057	3625	27	1124072	4350
13	1124058	3625			
14	1124059	3625			
15	1124060	3625			

Please Collect 2 - Bags of Ties From the Driver
Driver Sign Here If you received 2 bags

Received by:
Sign:
BOL#:

Total Rolls: 27
Total Sq. feet 106,575
Total Weight: 20,640

Deliver by: RONSON NEALEN
Driver's Name: Ron Nealen
Driver's Sign:
Driver's Cell Phone #: M&C
Trucking Co.: 800 522-2372
Trucking Co.'s Phone #: TI/M&C
Broker

DATE: 11/5/03

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

Received at Commerce, GA from Skaps Industries the property described above, in apparent good order except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated above, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the shipper noted herein is Skaps Industries as indicated by the designation of the "Shipper" to be Skaps Industries, then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties or (b) if the Shipper noted herein is not Skaps Industries then Skaps Industries is acting solely as the agent for the denoted Shipper, and thus every aspect of the [illegible] be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official [illegible], Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, Skaps Industries accepts no liability for loss of cargo, damage to containers, or any other consequences occurring during transportation. Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by Skaps Industries.

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SHIPPING ORDER - PACKING LIST – ORIGINAL – NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
706-336-7000 Fax: 706-336-7007
skaps.com e-mail: info@skaps.com

Shipper's # 4590

Job Name: Dupont Edgemoor Closure
Address: 104 Hwy Road-North Gate
City, State, Zip : **Wilmington, DE 19809**
Contact: **Gordan Chin**
Phone: **302 293 5487**

Date Shipped: 11/5/03
Cust. P.O. # 21200801
Job # 1124

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY
Product Code:TN22000

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	1124046	4350	16	1124061	3625
2	1124047	4350	17	1124062	3625
3	1124048	4350	18	1124063	3625
4	1124049	4350	19	1124064	3625
5	1124050	4350	20	1124065	3625
6	1124051	4350	21	1124066	3625
7	1124052	4350	22	1124067	3625
8	1124053	4350	23	1124068	3625
9	1124054	4350	24	1124069	3625
10	1124055	3625	25	1124070	4350
11	1124056	3625	26	1124071	4350
12	1124057	3625	27	1124072	4350
13	1124058	3625			
14	1124059	3625			
15	1124060	3625			

Please Collect 2 - Bags of Ties From the Driver
Driver Sign Here If you received 2 bags

Received by:
Sign:
BOL#:

Total Rolls: 27
Total Sq. feet 106,575
Total Weight: 20,640

Deliver by: 11/5/03
Driver's Name: Ron Deaton
Driver's Sign:
Driver's Cell Phone #:
Trucking Co.: MSC
Trucking Co.'s Phone #: 500 322 2372
Broker TI/MSC

DATE: 11/5/03

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

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Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE: 5 NOVEMBER 03	MANUFACTURER: SKAPS INDUSTRIES
PROJECT NAME: DUPONT - EDGEMOOR CAP	MAT. TYPE: GEONET (220 MIL) TT
PROJECT NUMBER: 811752	TRUCK #: 1ST LOAD (18 ROLLS) #5682
INSPECTOR: V. TADLO	BILL OF LADING #: SEE ATTACHED

~~PANEL~~/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
(1) 1124007	14.5' x 300'	4,350	NO APPARENT DAMAGE
(2) 1124003			N.A.D.
(3) 1124004			N.A.D.
(4) 1124016			N.A.D.
(5) 1124018			N.A.D.
(6) 1124012			N.A.D.
(7) 1124001			N.A.D.
(8) 1124005			N.A.D.
(9) 1124006			N.A.D.
(10) 1124002			N.A.D.
(11) 1124009			N.A.D.
(12) 1124008			N.A.D.
(13) 1124014			N.A.D.
(14) 1124010			N.A.D.
(15) 1124011			N.A.D.
(16) 1124015			N.A.D.
(17) 1124017			N.A.D.
(18) 1124013			N.A.D.

* - ROLLS RECEIVED WERE CROSS REFERENCED WITH AND MATCH PRE-SHIPMENT CERTIFICATIONS.

STRAIGHT BILL OF LADING
ORIGINAL – NOT NEGOTIABLE

This is to certify that the herein-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

SKAPS INDUSTRIES

571 Industrial Parkway
Commerce, GA 30529
706/336-7000 phone
706/336-7007 fax

5682

Shipper No. 4585

P.O. No.

Date 11/4/07

MC NAIR TR- (Name of Carrier) (SCAC)

TO:	FROM:
Consignee DUPONT. Ed Semoor. Closure	Shipper **SKAPS Industries**
On Collect on Delivery shipments, the letters "COD" must appear before consignee's name – or as otherwise provided in item 430, Section 1.	
Street 104 HWY. ROAD. NORTH-GATE	Street 571 Industrial Parkway
	Origin Commerce, GA Zip Code 30529
Destination WILMINSTON-DE Zip Code 19809	
Carrier No. Seal No.	Vessel Number

No. Shipping Units	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Sq. Ft.	Weight (Subject to Correction)
		78-300	14.760
18	Roll TN 220 mill NET	ONLY.	
	SHIPMENT #1		

Broker:

Contact:

Name: Reggie N

Phone:

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination. If on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER SKAPS Industries • Commerce, GA 30529	CARRIER
	PER
EMERGENCY RESPONSE TELEPHONE NUMBER: 706-336-7000	DATE

The Athens Printing Company

SHIPPING ORDER - PACKING LIST – ORIGINAL – NOT NEGOTIABLE

SKAPS Industries

571 Industrial Parkway
Commerce, GA 30529
706-336-7000 Fax: 706-336-7007
..skaps.com e-mail: info@skaps.com

Shipper's # 4585

Job Name: Dupont Edgemoor Closure
Address: 104 Hwy Road-North Gate
City, State, Zip : **Wilmington, DE 19809**
Contact: **Gordan Chin**
Phone: **302 293 5487**

Date Shipped: 11/4/2003
Cust. P.O. # 21200801
Job # 1124

DRIVER MUST CALL 24 HOURS PRIOR TO DELIVERY
Product Code:TN22000

No	Roll#	Sq. Ft.	No	Roll#	Sq. Ft.
1	1124001	4350	16	1124016	4350
2	1124002	4350	17	1124017	4350
3	1124003	4350	18	1124018	4350
4	1124004	4350			
5	1124005	4350			
6	1124006	4350			
7	1124007	4350			
8	1124008	4350			
9	1124009	4350			
10	1124010	4350			
11	1124011	4350			
12	1124012	4350			
13	1124013	4350			
14	1124014	4350			
15	1124015	4350			

Received by:
Sign: 11/5/03
BOL#:

Total Rolls: 18
Total Sq. feet 78,300
Total Weight: 14,760

Deliver by: 11/5/2003
Driver's Name: Reggi
Driver's Sign:
Driver's Cell Phone #:
Trucking Co.:
Trucking Co.'s Phone #: Mcnair
Broker

DATE: 11/4/2003

SIGN HERE FOR SHIPPER
SHIPPER ADDRESS: 571 INDUSTRIAL PKWY.
COMMERCE, GA 30529

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JOB# 1124 **PRODUCT: TN22000** **ESTIMATED LENGTH: 300**

JOB NAME: Dupont Edgemoor Closure Wilmington, DE **NO OF ROLLS: 76** **TOTAL SQ FT.: 330,600**

ROLL ID	SHIP	CERT	PRD.		ROLL ID	SHIP	CERT	PRD.		ROLL ID	SHIP	CERT	PRD.
1					2					3			
1124001	✓				1124028	✓				1124055	✓		
1124002	✓				1124029	✓				1124056	✓		
1124003	✓				1124030	✓				1124057	✓		
1124004	✓				1124031	✓				1124058	✓		
1124005	✓				1124032	✓				1124059	✓		
1124006	✓		#3		1124033	✓				1124060	✓		
1124007	✓				1124034	✓				1124061	✓		
1124008	✓				1124035	✓		#2		1124062	✓		
1124009	✓		11/6		1124036	✓				1124063	✓		
1124010	✓				1124037	✓				1124064	✓		
1124011	✓				1124038	✓				1124065	✓		
1124012	✓				1124039	✓		11/6		1124066	✓		
1124013	✓				1124040	✓				1124067	✓		
1124014	✓				1124041	✓				1124068	✓		
1124015	✓				1124042	✓				1124069	✓		
1124016	✓				1124043	✓				1124070	✓		
1124017	✓				1124044	✓				1124071	✓		
1124018	✓				1124045	✓				1124072	✓		
1124019	✓				1124046	✓			✓	1124073	✓		
1124020	✓				1124047	✓			✓	1124074	✓		
1124021	✓				1124048	✓		11-11	✓	1124075	✓		
1124022	✓				1124049	✓			✓	1124076	✓		
1124023	✓		#2		1124050	✓		#3	✓	1124077	✓		
1124024	✓				1124051	✓			✓	1124078	✓		
1124025	✓				1124052	✓			✓	1124079	✓		
1124026	✓		11/6		1124053	✓				~~1124080~~			
1124027	✓				1124054	✓				~~1124081~~			

11/5 #1 #3 11-6

~~81 rolls X 4350 = 352,350 SQ FT~~

79 rolls X 4350 = 343,650 SF

SKAPS Industries

Engineered Synthetic Products, Inc.

October 20, 2003
Geo-Synthetics, Inc.
W239 N428 Pewaukee Road
Waukesha, WI 53188

Ref. : DuPont Edgemoor Closure, Wilmington, DE
Customer P.O. # 9191-00
Transnet TN22000

We certify that the Transnet TN22000 drainage net, meets the project requirements as stated in the specifications. The properties listed in this section are:

Property	Test Method	Unit	Required Value	Qualifier
Geonet				
Mass per Unit Area	ASTM D 5261	lb/ft^2	0.162	Minimum
Thickness	ASTM D 5199	mil	220 ± 20	Range
Carbon Black	ASTM D 4218	%	2.0	Minimum
Tensile Strength	ASTM D 5035	lb/in	50	Minimum
Melt Flow	ASTM D 1238[2]	g/10 min	1.0	Maximum
Density	ASTM D 1505	gm/cc	0.94	Minimum
Transmissivity[1]	ASTM D 4716	m^2/sec	2.0×10^{-3}	MARV[3]

Notes:

1 Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.1 and a confining pressure of 200 psf between steel plates after 15 minutes.

2 Condition 190/2.16

3 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 : **TN22000**
Project : **DuPont Edgemoor Closure, Wilmington, DE**

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)
1124001	64442	0.9586	0.179	215	2.21	70	5.48×10^{-3}
1124002	64442	0.9586					
1124003	64442	0.9586					
1124004	64442	0.9586					
1124005	64442	0.9586	0.189	222	2.27	66	
1124006	64442	0.9586					
1124007	64442	0.9586					
1124008	64442	0.9586					
1124009	64442	0.9586					
1124010	64442	0.9586	0.181	218	2.31	69	
1124011	64442	0.9586					
1124012	64442	0.9586					
1124013	64442	0.9586					
1124014	64442	0.9586					
1124015	64442	0.9586	0.180	223	2.82	67	
1124016	64442	0.9586					
1124017	64442	0.9586					
1124018	64442	0.9586					
1124019	64442	0.9586					
1124020	64442	0.9586	0.187	222	2.68	69	5.63×10^{-3}
1124021	64442	0.9586					
1124022	64442	0.9586					
1124023	64442	0.9586					
1124024	64442	0.9586					
1124025	64442	0.9586	0.186	210	2.74	73	
1124026	64442	0.9586					
1124027	64442	0.9586					

* Transmissivity measured using water at 21 $\pm$ 2 °C (70 $\pm$ 4 °F) with a gradient of 0.1 and a confining pressure of 200 psf between steel plates after 15 minutes.

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571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 Fax: 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN22000**
Project : **DuPont Edgemoor Closure, Wilmington, DE**

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)
1124028	64442	0.9586					
1124029	64442	0.9586					
1124030	64442	0.9586	0.175	216	2.64	70	
1124031	64442	0.9586					
1124032	64442	0.9586					
1124033	64442	0.9586					
1124034	64442	0.9586					
1124035	64442	0.9586	0.178	209	2.64	69	
1124036	64442	0.9586					
1124037	64442	0.9586					
1124038	64442	0.9586					
1124039	64442	0.9586					
1124040	64442	0.9586	0.188	213	2.76	69	5.50×10^{-3}
1124041	64442	0.9586					
1124042	64442	0.9586					
1124043	64442	0.9586					
1124044	64442	0.9586					
1124045	64442	0.9586	0.182	206	2.33	72	
1124046	64442	0.9586					
1124047	64442	0.9586					
1124048	64442	0.9586					
1124049	64442	0.9586					
1124050	64442	0.9586	0.186	221	2.41	74	
1124051	64442	0.9586					
1124052	64442	0.9586					
1124053	64442	0.9586					
1124054	64442	0.9586					

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.1 and a confining pressure of 200 psf between steel plates after 15 minutes.

APPROVED 5 QA

571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 Fax: 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

Engineered Synthetic Products, Inc.

Product : **TN22000**
Project : **DuPont Edgemoor Closure, Wilmington, DE**

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)
1124055	64442	0.9586	0.178	217	2.62	71	
1124056	64442	0.9586					
1124057	64442	0.9586					
1124058	64442	0.9586					
1124059	64442	0.9586					
1124060	64442	0.9586	0.172	210	2.79	68	5.41×10^{-3}
1124061	64442	0.9586					
1124062	64442	0.9586					
1124063	64442	0.9586					
1124064	64442	0.9586					
1124065	64442	0.9586	0.183	225	2.73	69	
1124066	64442	0.9586					
1124067	64442	0.9586					
1124068	64442	0.9586					
1124069	64442	0.9586					
1124070	64442	0.9586	0.186	215	2.51	72	
1124071	64442	0.9586					
1124072	64442	0.9586					
1124073	64442	0.9586					
1124074	64442	0.9586					
1124075	64442	0.9586	0.184	212	2.57	69	
1124076	64442	0.9586					
1124077	64442	0.9586					
1124078	64442	0.9586					
1124079	64442	0.9586					
1124080	64442	0.9586	0.188	209	2.71	66	5.77×10^{-3}
1124081	64442	0.9586					

* Transmissivity measured using water at 21 ± 2 °C (70 ± 4 °F) with a gradient of 0.1 and a confining pressure of 200 psf between steel plates after 15 minutes.

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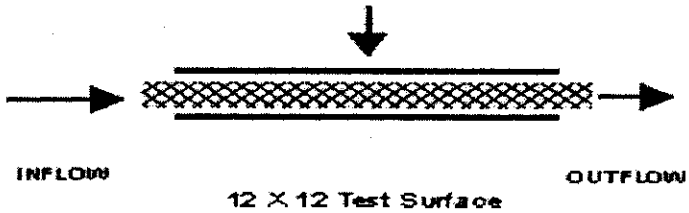
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 Fax: 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	Geo-Synthetics, Inc.	**Job #**	1124
Project:	DuPont Edgemoor Closure, Wilmington, DE		
Product:	TN22000		
Roll #	1124001		

Test Configuration:



Test Information:

Boundary Conditions:	Steel Plate Geonet Steel Plate	**Normal Load:**	200 psf
		Gradient:	0.1 ft
		Seating Time:	15 minutes
		Flow Direction:	MD

Test Results:

Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec	Flow rate, gpm/ft
		15 minutes	15 minutes
200	0.1	5.48×10^{-3}	2.642

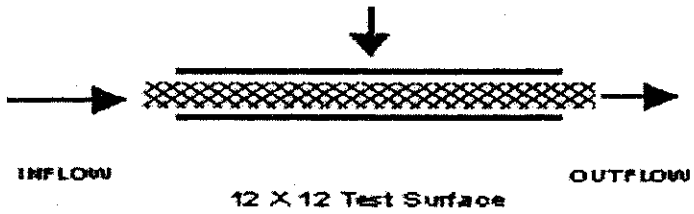
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	Geo-Synthetics, Inc.	**Job #**	1124
Project:	DuPont Edgemoor Closure, Wilmington, DE		
Product:	TN22000		
Roll #	1124020		

Test Configuration:



Test Information:

Boundary Conditions:	Steel Plate Geonet Steel Plate	**Normal Load:**	200 psf
		Gradient:	0.1 ft
		Seating Time:	15 minutes
		Flow Direction:	MD

Test Results:

Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec	Flow rate, gpm/ft
		15 minutes	15 minutes
200	0.1	5.63×10^{-3}	2.713

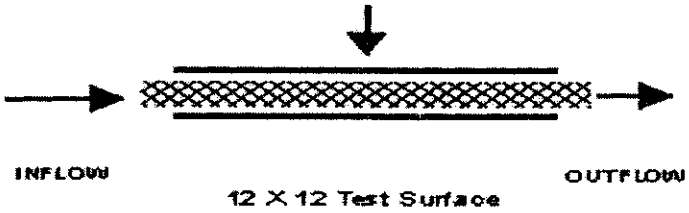
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	Geo-Synthetics, Inc.	**Job #**	1124
Project:	DuPont Edgemoor Closure, Wilmington, DE		
Product:	TN22000		
Roll #	1124040		

Test Configuration:



Test Information:

Boundary Conditions:	Steel Plate Geonet Steel Plate	**Normal Load:**	200 psf
		Gradient:	0.1 ft
		Seating Time:	15 minutes
		Flow Direction:	MD

Test Results:

Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec	Flow rate, gpm/ft
		15 minutes	15 minutes
200	0.1	5.50×10^{-3}	2.651

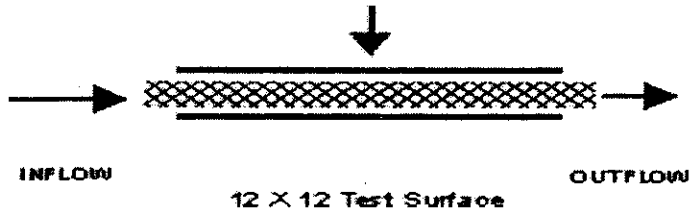
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	Geo-Synthetics, Inc.	**Job #**	1124
Project:	DuPont Edgemoor Closure, Wilmington, DE		
Product:	TN22000		
Roll #	1124060		

Test Configuration:



Test Information:

Boundary Conditions:	Steel Plate Geonet Steel Plate	**Normal Load:**	200 psf
		Gradient:	0.1 ft
		Seating Time:	15 minutes
		Flow Direction:	MD

Test Results:

Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec	Flow rate, gpm/ft
		15 minutes	15 minutes
200	0.1	5.41×10^{-3}	2.605

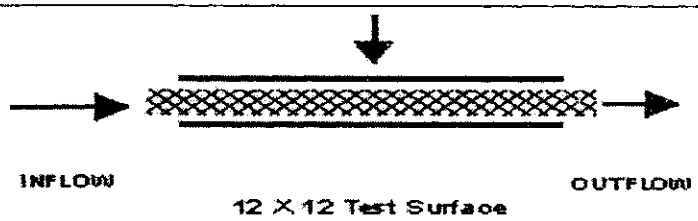
571 Industrial Parkway, Commerce, GA 30529 **Phone:** 706-336-7000 **Fax:** 706-336-7007 **Email:** skaps@skaps.com

SKAPS Industries

ASTM D 4716

Client:	Geo-Synthetics, Inc.	**Job #**	1124
Project:	DuPont Edgemoor Closure, Wilmington, DE		
Product:	TN22000		
Roll #	1124080		

Test Configuration:



Test Information:

Boundary Conditions:	Steel Plate Geonet Steel Plate	**Normal Load:**	200 psf
		Gradient:	0.1 ft
		Seating Time:	15 minutes
		Flow Direction:	MD

Test Results:

Pressure (psf)	Gradient, ft	Transmissivity, m^2/sec	Flow rate, gpm/ft
		15 minutes	15 minutes
200	0.1	5.77×10^{-3}	2.778

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 : Geo-Synthetics, Inc.
Project Name : DuPont Edgemoor Closure, Wilmington, DE
Geonet Manufacturer : SKAPS Industries
Geonet Production Plant : Commerce, GA
Geonet Brand Name : TN22000

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*
BP Solvay Polyethylene	BP Solvay, Houston, TX	HDPE	64442	Density	ASTM D 1505	gm/cc	0.9537	0.9537
				Melt Flow Index	ASTM D 1238[a]	gm/10 min	0.28	0.28

(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

APPENDIX D4
8-OZ/SY GEOTEXTILE (TNS E080®)

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

October 23, 2003

Mail To:

Mr. Gordon Chin
URS Construction Services
2325 Maryland Road, 2nd Floor
Willow Grove, PA 19090

email: gordon_chin@urscorp.com

Bill To:

<= Same

Dear Mr. Chin:

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:	Dupont Edgemoor
TRI Job Reference Number:	E2189-97-10
Material(s) Tested:	7 TNS Nonwoven Geotextile(s)
Test(s) Requested:	Grab Tensile (ASTM D 4632) Puncture Strength (D4833) Trapezoidal Tear (ASTM D 4533) Mullen Burst Strength (ASTM D 3786, mod.) AOS (ASTM D 4751) Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Sam R. Allen

Sam R. Allen
Vice President and Division Manager
Geosynthetic Services Division

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190462
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	311	297	347	314	265	281	362	409	329	283	320	41	200 min
TD - Tensile Strength (lbs)	351	325	342	332	350	340	358	301	333	357	339	16	200 min
MD - Elong. @ Max. Load (%)	77	71	65	73	69	75	80	61	71	75	72	5	NA
TD - Elong. @ Max. Load (%)	94	93	113	95	95	94	97	106	97	97	98	6	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	172	202	164	170	190	155	160	161	153	171	178	23	126 min
	177	216	171	237	167								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	86	71	99	74	115	88	111	95	91	90	92	13	80 min
TD - Tear Strength (lbs)	124	116	144	144	124	105	151	119	170	162	136	20	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	540	730	610	560	560	500	600	670	550	550	587	65	250 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190462
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.125	0.090	0.075	0.090	0.106						0.097	0.017	
US Sieve No.	120	170	200	170	140						140		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>:	1					2				
Thickness (mils)	115	115	115	115	115	120	120	120	120	120
Time (s)	20	20	20	20	20	20	20	20	20	20
Flow (L)	2.16	2.16	2.16	2.20	2.20	2.12	2.08	2.12	2.12	2.12
Permittivity (s-1)	1.05	1.05	1.05	1.07	1.07	1.03	1.01	1.03	1.03	1.03
Flow rate (GPM/ft2)	78	78	78	80	80	77	76	77	77	77
Permeability (cm/s)	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31

Trial =>:	3					4					MEAN	STD. DEV.
Thickness (mils)	112	112	112	112	112	121	121	121	121	121		
Time (s)	20	20	20	20	20	20	20	20	20	20		
Flow (L)	2.24	2.24	2.24	2.24	2.24	2.08	2.08	2.12	2.08	2.08		
Permittivity (s-1)	1.09	1.09	1.09	1.09	1.09	1.01	1.01	1.03	1.01	1.01	1.05	0.03
Flow rate (GPM/ft2)	81	81	81	81	81	76	76	77	76	76	78	2
Permeability (cm/s)	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.32	0.31	0.31	0.31	0.00

		MEAN	PROJ. SPEC.
TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.05	0.60 min
	Flow rate (GPM/ft2)	78	
	Permeability (cm/s)	0.31	

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.

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190467
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	176	228	290	167	208	171	205	295	212	231	218	43	200 min
TD - Tensile Strength (lbs)	246	226	280	211	259	242	212	243	231	248	240	20	200 min
MD - Elong. @ Max. Load (%)	69	79	72	71	72	73	67	77	69	78	73	4	NA
TD - Elong. @ Max. Load (%)	94	110	108	103	95	99	101	113	93	95	101	7	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	144	119	157	119	116	144	138	156	120	140	135	14	126 min
	140	124	125	133	155								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	104	128	113	97	84	88	96	96	103	85	99	13	80 min
TD - Tear Strength (lbs)	104	91	94	81	108	117	105	111	101	99	101	10	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	410	410	380	510	630	420	540	390	440	520	465	77	250 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.

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190467
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.125	0.150	0.106	0.150	0.106						0.127	0.020	
US Sieve No.	120	100	140	100	140						100		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>:	1					2				
Thickness (mils)	132	132	132	132	132	109	109	109	109	109
Time (s)	20	20	20	20	20	20	20	20	20	20
Flow (L)	2.12	2.12	2.10	2.08	2.10	2.76	2.76	2.76	2.80	2.80
Permittivity (s-1)	1.03	1.03	1.02	1.01	1.02	1.34	1.34	1.34	1.36	1.36
Flow rate (GPM/ft2)	77	77	76	76	76	100	100	100	102	102
Permeability (cm/s)	0.35	0.35	0.34	0.34	0.34	0.37	0.37	0.37	0.38	0.38

Trial =>:	3					4					MEAN	STD. DEV.
Thickness (mils)	122	122	122	122	122	109	109	109	109	109		
Time (s)	20	20	20	20	20	20	20	20	20	20		
Flow (L)	2.28	2.28	2.28	2.28	2.32	2.68	2.68	2.64	2.64	2.68		
Permittivity (s-1)	1.11	1.11	1.11	1.11	1.13	1.30	1.30	1.28	1.28	1.30	1.19	0.13
Flow rate (GPM/ft2)	83	83	83	83	84	97	97	96	96	97	89	10
Permeability (cm/s)	0.34	0.34	0.34	0.34	0.35	0.36	0.36	0.35	0.35	0.36	0.35	0.01

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.19	0.60 min
	Flow rate (GPM/ft2)	89	
	Permeability (cm/s)	0.35	

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.

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190470
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	218	241	367	239	230	232	282	304	226	200	254	47	200 min
TD - Tensile Strength (lbs)	315	280	245	258	318	345	305	283	272	293	291	29	200 min
MD - Elong. @ Max. Load (%)	82	83	71	80	86	85	87	74	81	81	81	5	NA
TD - Elong. @ Max. Load (%)	93	90	108	85	90	99	97	118	96	95	97	9	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	147	154	140	143	131	145	142	133	155	125	143	9	126 min
	147	160	148	137	145								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	94	99	119	93	89	86	88	101	94	75	94	11	80 min
TD - Tear Strength (lbs)	105	101	107	107	123	120	97	109	117	113	110	8	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	370	400	400	380	440	500	440	470	450	500	435	44	250 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190470
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.125	0.090	0.090	0.125	0.125						0.111	0.017	
US Sieve No.	120	170	170	120	120						80		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C):	20												
Correction Factor:	1												
Trial =>:	1					2							
Thickness (mils)	122	122	122	122	122	110	110	110	110	110			
Time (s)	20	20	20	20	20	20	20	20	20	20			
Flow (L)	2.32	2.32	2.32	2.32	2.32	2.76	2.76	2.72	2.76	2.80			
Permittivity (s-1)	1.13	1.13	1.13	1.13	1.13	1.34	1.34	1.32	1.34	1.36			
Flow rate (GPM/ft2)	84	84	84	84	84	100	100	99	100	102			
Permeability (cm/s)	0.35	0.35	0.35	0.35	0.35	0.37	0.37	0.37	0.37	0.38			
Trial =>:	3					4							
Thickness (mils)	117	117	117	117	117	114	114	114	114	114			
Time (s)	20	20	20	20	20	20	20	20	20	20			
Flow (L)	2.28	2.32	2.32	2.28	2.28	2.30	2.36	2.36	2.40	2.36			
Permittivity (s-1)	1.11	1.13	1.13	1.11	1.11	1.12	1.15	1.15	1.17	1.15	1.18	0.09	
Flow rate (GPM/ft2)	83	84	84	83	83	84	86	86	87	86	88	7	
Permeability (cm/s)	0.33	0.33	0.33	0.33	0.33	0.32	0.33	0.33	0.34	0.33	0.35	0.02	
	TEMPERATURE CORRECTED VALUES					Permittivity (s-1)					1.18		0.60 min
						Flow rate (GPM/ft2)					88		
						Permeability (cm/s)					0.35		

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118982
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	278	224	307	298	267	288	241	423	261	257	284	52	200 min
TD - Tensile Strength (lbs)	386	385	355	379	368	329	372	339	347	344	360	19	200 min
MD - Elong. @ Max. Load (%)	99	97	84	96	103	105	99	96	93	101	97	6	NA
TD - Elong. @ Max. Load (%)	107	99	118	113	98	119	108	93	94	99	105	9	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	159	153	148	152	176	142	136	135	107	174	151	18	126 min
	151	143	177	143	170								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	97	88	95	102	99	117	98	87	97	113	99	9	80 min
TD - Tear Strength (lbs)	150	145	168	150	140	145	146	154	175	142	152	11	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	440	440	510	420	490	600	580	550	520	420	497	63	250 min

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118982
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.150	0.180	0.106	0.125	0.150						0.142	0.025	
US Sieve No.	100	80	140	120	100						100		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>:	1					2				
Thickness (mils)	131	131	131	131	131	132	132	132	132	132
Time (s)	20	20	20	20	20	20	20	20	20	20
Flow (L)	2.68	2.72	2.68	2.68	2.64	2.36	2.36	2.36	2.36	2.36
Permittivity (s-1)	1.30	1.32	1.30	1.30	1.28	1.15	1.15	1.15	1.15	1.15
Flow rate (GPM/ft2)	97	99	97	97	96	86	86	86	86	86
Permeability (cm/s)	0.43	0.44	0.43	0.43	0.43	0.38	0.38	0.38	0.38	0.38

Trial =>:	3					4					MEAN	STD. DEV.
Thickness (mils)	126	126	126	126	126	131	131	131	131	131		
Time (s)	20	20	20	20	20	20	20	20	20	20		
Flow (L)	2.76	2.76	2.76	2.72	2.80	2.80	2.80	2.76	2.80	2.80		
Permittivity (s-1)	1.34	1.34	1.34	1.32	1.36	1.36	1.36	1.34	1.36	1.36	1.29	0.08
Flow rate (GPM/ft2)	100	100	100	99	102	102	102	100	102	102	96	6
Permeability (cm/s)	0.43	0.43	0.43	0.42	0.44	0.45	0.45	0.45	0.45	0.45	0.42	0.02

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.29	0.60 min
	Flow rate (GPM/ft2)	96	
	Permeability (cm/s)	0.42	

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118987
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	226	297	382	257	235	273	285	279	260	262	276	41	200 min
TD - Tensile Strength (lbs)	326	306	415	330	314	413	328	294	312	271	331	45	200 min
MD - Elong. @ Max. Load (%)	93	96	99	95	97	114	101	105	101	101	100	6	NA
TD - Elong. @ Max. Load (%)	114	116	127	114	114	133	107	106	106	99	114	10	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	165	216	160	134	150	137	153	142	142	168	149	22	126 min
	142	134	113	142	135								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	94	86	79	82	91	89	69	111	99	81	88	11	80 min
TD - Tear Strength (lbs)	141	166	148	124	104	131	130	152	139	119	135	17	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	400	430	430	400	460	480	450	470	470	450	444	27	250 min

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118987
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.150	0.125	0.180	0.180	0.150						0.157	0.021	
US Sieve No.	100	120	80	80	100						80		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>	1					2				
Thickness (mils)	128	128	128	128	128	128	128	128	128	128
Time (s)	16	16	16	16	16	16	16	16	16	16
Flow (L)	2.88	2.92	2.88	2.92	2.92	2.96	2.92	2.92	2.96	2.96
Permittivity (s-1)	1.75	1.77	1.75	1.77	1.77	1.80	1.77	1.77	1.80	1.80
Flow rate (GPM/ft2)	131	133	131	133	133	134	133	133	134	134
Permeability (cm/s)	0.57	0.58	0.57	0.58	0.58	0.58	0.58	0.58	0.58	0.58

Trial =>	3					4					MEAN	STD. DEV.
Thickness (mils)	152	152	152	152	152	121	121	121	121	121		
Time (s)	17	17	17	17	17	13	13	13	13	13		
Flow (L)	2.12	2.12	2.16	2.16	2.16	2.68	2.68	2.68	2.68	2.68		
Permittivity (s-1)	1.21	1.21	1.23	1.23	1.23	2.00	2.00	2.00	2.00	2.00	1.69	0.29
Flow rate (GPM/ft2)	91	91	92	92	92	150	150	150	150	150	127	21
Permeability (cm/s)	0.47	0.47	0.48	0.48	0.48	0.62	0.62	0.62	0.62	0.62	0.56	0.05

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.69	0.60 min
	Flow rate (GPM/ft2)	127	
	Permeability (cm/s)	0.56	

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118992
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	212	263	309	249	227	234	268	377	244	247	263	45	200 min
TD - Tensile Strength (lbs)	358	315	270	353	349	374	317	320	333	365	335	29	200 min
MD - Elong. @ Max. Load (%)	108	105	117	105	111	107	97	113	98	107	107	6	NA
TD - Elong. @ Max. Load (%)	113	119	135	118	108	114	118	135	121	109	119	9	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	174	131	140	137	164	120	145	144	172	171	147	18	126 min
	139	156	119	132	164								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	86	80	95	100	75	88	72	85	109	91	88	11	80 min
TD - Tear Strength (lbs)	171	165	194	173	167	136	149	172	136	161	162	17	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	430	480	510	440	500	450	450	450	430	490	463	28	250 min

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118992
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.212	0.212	0.180	0.150	0.150						0.181	0.028	
US Sieve No.	70	70	80	100	100						70		60 - 100
Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)													
Water Temp. (C):	19												
Correction Factor:	1.025												
Trial =>:	1					2							
Thickness (mils)	151	151	151	151	151	131	131	131	131	131			
Time (s)	13	13	13	13	13	17	17	17	17	17			
Flow (L)	2.08	2.10	2.10	2.08	2.04	2.64	2.60	2.58	2.60	2.60			
Permittivity (s-1)	1.55	1.57	1.57	1.55	1.52	1.51	1.49	1.47	1.49	1.49			
Flow rate (GPM/ft2)	116	117	117	116	114	113	111	110	111	111			
Permeability (cm/s)	0.60	0.60	0.60	0.60	0.58	0.50	0.49	0.49	0.49	0.49			
Trial =>:	3					4							
Thickness (mils)	135	135	135	135	135	153	153	153	153	153			
Time (s)	17	17	17	17	17	17	17	17	17	17			
Flow (L)	2.84	2.84	2.92	2.88	2.92	2.24	2.24	2.20	2.20	2.20			
Permittivity (s-1)	1.62	1.62	1.67	1.64	1.67	1.28	1.28	1.26	1.26	1.26	1.49	0.14	
Flow rate (GPM/ft2)	121	121	125	123	125	96	96	94	94	94	111	11	
Permeability (cm/s)	0.56	0.56	0.57	0.56	0.57	0.50	0.50	0.49	0.49	0.49	0.54	0.05	
TEMPERATURE CORRECTED VALUES							Permittivity (s-1)				1.53		0.60 min
							Flow rate (GPM/ft2)				114		
							Permeability (cm/s)				0.55		

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118999
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	231	287	444	242	271	270	330	316	267	279	294	57	200 min
TD - Tensile Strength (lbs)	375	351	333	336	328	319	307	346	339	348	338	18	200 min
MD - Elong. @ Max. Load (%)	105	107	93	107	107	114	100	93	111	111	105	7	NA
TD - Elong. @ Max. Load (%)	111	103	95	102	103	105	101	110	103	103	104	4	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	138	172	158	159	139	163	188	160	130	157	160	15	126 min
	164	176	148	173	171								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	97	96	123	112	108	102	106	131	199	126	120	29	80 min
TD - Tear Strength (lbs)	162	166	156	140	164	133	165	161	158	171	158	11	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	530	480	490	450	450	420	460	510	420	500	471	35	250 min

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118999
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.212	0.150	0.150	0.180	0.180						0.174	0.023	
US Sieve No.	70	100	100	80	80						80		60 - 100
Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)													
Water Temp. (C):	20												
Correction Factor:	1												
Trial =>:	1					2							
Thickness (mils)	146	146	146	146	146	142	142	142	142	142			
Time (s)	18	18	18	18	18	18	18	18	18	18			
Flow (L)	2.28	2.32	2.32	2.36	2.32	2.64	2.64	2.68	2.68	2.64			
Permittivity (s-1)	1.23	1.25	1.25	1.27	1.25	1.42	1.42	1.45	1.45	1.42			
Flow rate (GPM/ft2)	92	94	94	95	94	107	107	108	108	107			
Permeability (cm/s)	0.46	0.46	0.46	0.47	0.46	0.51	0.51	0.52	0.52	0.51			
Trial =>:	3					4							
Thickness (mils)	141	141	141	141	141	135	135	135	135	135			
Time (s)	18	18	18	18	18	16	16	16	16	16			
Flow (L)	2.84	2.80	2.80	0.28	2.76	2.76	2.80	2.80	2.84	2.84			
Permittivity (s-1)	1.53	1.51	1.51	0.15	1.49	1.67	1.70	1.70	1.72	1.72	1.41	0.33	
Flow rate (GPM/ft2)	115	113	113	11	111	125	127	127	129	129	105	25	
Permeability (cm/s)	0.55	0.54	0.54	0.05	0.53	0.57	0.58	0.58	0.59	0.59	0.50	0.11	
TEMPERATURE CORRECTED VALUES	Permittivity (s-1)										1.41		0.60 min
	Flow rate (GPM/ft2)										105		
	Permeability (cm/s)										0.50		

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

October 28, 2003

Mail To:

Mr. Gordon Chin
URS Construction Services
2325 Maryland Road, 2nd Floor
Willow Grove, PA 19090

email: gordon_chin@urscorp.com

Bill To:

<= Same

Dear Mr. Chin:

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:	Dupont Edgemoor
TRI Job Reference Number:	E2189-97-10
Material(s) Tested:	7 TNS Nonwoven Geotextile(s)
Test(s) Requested:	Grab Tensile (ASTM D 4632) Puncture Strength (D4833) Trapezoidal Tear (ASTM D 4533) Mullen Burst Strength (ASTM D 3786, mod.) AOS (ASTM D 4751) Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Jarrett A. Nelson

Jarrett A. Nelson
Special Projects Manager
Geosynthetic Services Division

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190462
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	311	297	347	314	265	281	362	409	329	283	320	41	200 min
TD - Tensile Strength (lbs)	351	325	342	332	350	340	358	301	333	357	339	16	200 min
MD - Elong. @ Max. Load (%)	77	71	65	73	69	75	80	61	71	75	72	5	NA
TD - Elong. @ Max. Load (%)	94	93	113	95	95	94	97	106	97	97	98	6	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	172	202	164	170	190	155	160	161	153	171	178	23	126 min
	177	216	171	237	167								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	86	71	99	74	115	88	111	95	91	90	92	13	80 min
TD - Tear Strength (lbs)	124	116	144	144	124	105	151	119	170	162	136	20	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	540	730	610	560	560	500	600	670	550	550	587	65	250 min

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190462
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.125	0.090	0.075	0.090	0.106						0.097	0.017	
US Sieve No.	120	170	200	170	140						140		60 - 100
Apparent Opening Size (ASTM D 4751) Retest													
Opening Size Diameter (mm)	0.106	0.106	0.090	0.090	0.106						0.100	0.008	
US Sieve No.	140	140	170	170	140						140		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>	1					2				
Thickness (mils)	115	115	115	115	115	120	120	120	120	120
Time (s)	20	20	20	20	20	20	20	20	20	20
Flow (L)	2.16	2.16	2.16	2.20	2.20	2.12	2.08	2.12	2.12	2.12
Permittivity (s-1)	1.05	1.05	1.05	1.07	1.07	1.03	1.01	1.03	1.03	1.03
Flow rate (GPM/ft2)	78	78	78	80	80	77	76	77	77	77
Permeability (cm/s)	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31

Trial =>	3					4					MEAN	STD. DEV.
Thickness (mils)	112	112	112	112	112	121	121	121	121	121		
Time (s)	20	20	20	20	20	20	20	20	20	20		
Flow (L)	2.24	2.24	2.24	2.24	2.24	2.08	2.08	2.12	2.08	2.08		
Permittivity (s-1)	1.09	1.09	1.09	1.09	1.09	1.01	1.01	1.03	1.01	1.01	1.05	0.03
Flow rate (GPM/ft2)	81	81	81	81	81	76	76	77	76	76	78	2
Permeability (cm/s)	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.32	0.31	0.31	0.31	0.00

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.05	0.60 min
	Flow rate (GPM/ft2)	78	
	Permeability (cm/s)	0.31	

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190467
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	176	228	290	167	208	171	205	295	212	231	218	43	200 min
TD - Tensile Strength (lbs)	246	226	280	211	259	242	212	243	231	248	240	20	200 min
MD - Elong. @ Max. Load (%)	69	79	72	71	72	73	67	77	69	78	73	4	NA
TD - Elong. @ Max. Load (%)	94	110	108	103	95	99	101	113	93	95	101	7	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	144	119	157	119	116	144	138	156	120	140	135	14	126 min
	140	124	125	133	155								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	104	128	113	97	84	88	96	96	103	85	99	13	80 min
TD - Tear Strength (lbs)	104	91	94	81	108	117	105	111	101	99	101	10	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	410	410	380	510	630	420	540	390	440	520	465	77	250 min

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190467
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.125	0.150	0.106	0.150	0.106						0.127	0.020	
US Sieve No.	120	100	140	100	140						100		60 - 100
Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)													
Water Temp. (C):	20												
Correction Factor:	1												
Trial =>:	1					2							
Thickness (mils)	132	132	132	132	132	109	109	109	109	109			
Time (s)	20	20	20	20	20	20	20	20	20	20			
Flow (L)	2.12	2.12	2.10	2.08	2.10	2.76	2.76	2.76	2.80	2.80			
Permittivity (s-1)	1.03	1.03	1.02	1.01	1.02	1.34	1.34	1.34	1.36	1.36			
Flow rate (GPM/ft2)	77	77	76	76	76	100	100	100	102	102			
Permeability (cm/s)	0.35	0.35	0.34	0.34	0.34	0.37	0.37	0.37	0.38	0.38			
Trial =>:	3					4							
Thickness (mils)	122	122	122	122	122	109	109	109	109	109			
Time (s)	20	20	20	20	20	20	20	20	20	20			
Flow (L)	2.28	2.28	2.28	2.28	2.32	2.68	2.68	2.64	2.64	2.68			
Permittivity (s-1)	1.11	1.11	1.11	1.11	1.13	1.30	1.30	1.28	1.28	1.30	1.19	0.13	
Flow rate (GPM/ft2)	83	83	83	83	84	97	97	96	96	97	89	10	
Permeability (cm/s)	0.34	0.34	0.34	0.34	0.35	0.36	0.36	0.35	0.35	0.36	0.35	0.01	
TEMPERATURE CORRECTED VALUES	Permittivity (s-1)										1.19		0.60 min
	Flow rate (GPM/ft2)										89		
	Permeability (cm/s)										0.35		

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190470
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	218	241	367	239	230	232	282	304	226	200	254	47	200 min
TD - Tensile Strength (lbs)	315	280	245	258	318	345	305	283	272	293	291	29	200 min
MD - Elong. @ Max. Load (%)	82	83	71	80	86	85	87	74	81	81	81	5	NA
TD - Elong. @ Max. Load (%)	93	90	108	85	90	99	97	118	96	95	97	9	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	147	154	140	143	131	145	142	133	155	125	143	9	126 min
	147	160	148	137	145								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	94	99	119	93	89	86	88	101	94	75	94	11	80 min
TD - Tear Strength (lbs)	105	101	107	107	123	120	97	109	117	113	110	8	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	370	400	400	380	440	500	440	470	450	500	435	44	250 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.

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 200190470
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.125	0.090	0.090	0.125	0.125						0.111	0.017	
US Sieve No.	120	170	170	120	120						120		60 - 100
Apparent Opening Size (ASTM D 4751) Retest													
Opening Size Diameter (mm)	0.125	0.150	0.125	0.125	0.125						0.130	0.010	
US Sieve No.	120	100	120	120	120						100		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>	1					2				
Thickness (mils)	122	122	122	122	122	110	110	110	110	110
Time (s)	20	20	20	20	20	20	20	20	20	20
Flow (L)	2.32	2.32	2.32	2.32	2.32	2.76	2.76	2.72	2.76	2.80
Permittivity (s-1)	1.13	1.13	1.13	1.13	1.13	1.34	1.34	1.32	1.34	1.36
Flow rate (GPM/ft2)	84	84	84	84	84	100	100	99	100	102
Permeability (cm/s)	0.35	0.35	0.35	0.35	0.35	0.37	0.37	0.37	0.37	0.38

Trial =>	3					4					MEAN	STD. DEV.
Thickness (mils)	117	117	117	117	117	114	114	114	114	114		
Time (s)	20	20	20	20	20	20	20	20	20	20		
Flow (L)	2.28	2.32	2.32	2.28	2.28	2.30	2.36	2.36	2.40	2.36		
Permittivity (s-1)	1.11	1.13	1.13	1.11	1.11	1.12	1.15	1.15	1.17	1.15	1.18	0.09
Flow rate (GPM/ft2)	83	84	84	83	83	84	86	86	87	86	88	7
Permeability (cm/s)	0.33	0.33	0.33	0.33	0.33	0.32	0.33	0.33	0.34	0.33	0.35	0.02

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.18	0.60 min
	Flow rate (GPM/ft2)	88	
	Permeability (cm/s)	0.35	

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118982
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	278	224	307	298	267	288	241	423	261	257	284	52	200 min
TD - Tensile Strength (lbs)	386	385	355	379	368	329	372	339	347	344	360	19	200 min
MD - Elong. @ Max. Load (%)	99	97	84	96	103	105	99	96	93	101	97	6	NA
TD - Elong. @ Max. Load (%)	107	99	118	113	98	119	108	93	94	99	105	9	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	159	153	148	152	176	142	136	135	107	174	151	18	126 min
	151	143	177	143	170								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	97	88	95	102	99	117	98	87	97	113	99	9	80 min
TD - Tear Strength (lbs)	150	145	168	150	140	145	146	154	175	142	152	11	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	440	440	510	420	490	600	580	550	520	420	497	63	250 min

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118982
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.150	0.180	0.106	0.125	0.150						0.142	0.025	
US Sieve No.	100	80	140	120	100						100		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>	1					2				
Thickness (mils)	131	131	131	131	131	132	132	132	132	132
Time (s)	20	20	20	20	20	20	20	20	20	20
Flow (L)	2.68	2.72	2.68	2.68	2.64	2.36	2.36	2.36	2.36	2.36
Permittivity (s-1)	1.30	1.32	1.30	1.30	1.28	1.15	1.15	1.15	1.15	1.15
Flow rate (GPM/ft2)	97	99	97	97	96	86	86	86	86	86
Permeability (cm/s)	0.43	0.44	0.43	0.43	0.43	0.38	0.38	0.38	0.38	0.38

Trial =>	3					4				
Thickness (mils)	126	126	126	126	126	131	131	131	131	131
Time (s)	20	20	20	20	20	20	20	20	20	20
Flow (L)	2.76	2.76	2.76	2.72	2.80	2.80	2.80	2.76	2.80	2.80
Permittivity (s-1)	1.34	1.34	1.34	1.32	1.36	1.36	1.36	1.34	1.36	1.36
Flow rate (GPM/ft2)	100	100	100	99	102	102	102	100	102	102
Permeability (cm/s)	0.43	0.43	0.43	0.42	0.44	0.45	0.45	0.45	0.45	0.45

		MEAN	STD. DEV.	PROJ. SPEC.
Permittivity (s-1)		1.29	0.08	
Flow rate (GPM/ft2)		96	6	
Permeability (cm/s)		0.42	0.02	
TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.29		0.60 min
	Flow rate (GPM/ft2)	96		
	Permeability (cm/s)	0.42		

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118987
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	226	297	382	257	235	273	285	279	260	262	276	41	200 min
TD - Tensile Strength (lbs)	326	306	415	330	314	413	328	294	312	271	331	45	200 min
MD - Elong. @ Max. Load (%)	93	96	99	95	97	114	101	105	101	101	100	6	NA
TD - Elong. @ Max. Load (%)	114	116	127	114	114	133	107	106	106	99	114	10	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	165	216	160	134	150	137	153	142	142	168	149	22	126 min
	142	134	113	142	135								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	94	86	79	82	91	89	69	111	99	81	88	11	80 min
TD - Tear Strength (lbs)	141	166	148	124	104	131	130	152	139	119	135	17	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	400	430	430	400	460	480	450	470	470	450	444	27	250 min

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118987
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.150	0.125	0.180	0.180	0.150						0.157	0.021	
US Sieve No.	100	120	80	80	100						80		60 - 100
Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)													
Water Temp. (C):	20												
Correction Factor:	1												
Trial =>:	1					2							
Thickness (mils)	128	128	128	128	128	128	128	128	128	128			
Time (s)	16	16	16	16	16	16	16	16	16	16			
Flow (L)	2.88	2.92	2.88	2.92	2.92	2.96	2.92	2.92	2.96	2.96			
Permittivity (s-1)	1.75	1.77	1.75	1.77	1.77	1.80	1.77	1.77	1.80	1.80			
Flow rate (GPM/ft2)	131	133	131	133	133	134	133	133	134	134			
Permeability (cm/s)	0.57	0.58	0.57	0.58	0.58	0.58	0.58	0.58	0.58	0.58			
Trial =>:	3					4							
Thickness (mils)	152	152	152	152	152	121	121	121	121	121			
Time (s)	17	17	17	17	17	13	13	13	13	13			
Flow (L)	2.12	2.12	2.16	2.16	2.16	2.68	2.68	2.68	2.68	2.68			
Permittivity (s-1)	1.21	1.21	1.23	1.23	1.23	2.00	2.00	2.00	2.00	2.00	1.69	0.29	
Flow rate (GPM/ft2)	91	91	92	92	92	150	150	150	150	150	127	21	
Permeability (cm/s)	0.47	0.47	0.48	0.48	0.48	0.62	0.62	0.62	0.62	0.62	0.56	0.05	
	TEMPERATURE CORRECTED VALUES					Permittivity (s-1)					1.69		0.60 min
						Flow rate (GPM/ft2)					127		
						Permeability (cm/s)					0.56		

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118992
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	212	263	309	249	227	234	268	377	244	247	263	45	200 min
TD - Tensile Strength (lbs)	358	315	270	353	349	374	317	320	333	365	335	29	200 min
MD - Elong. @ Max. Load (%)	108	105	117	105	111	107	97	113	98	107	107	6	NA
TD - Elong. @ Max. Load (%)	113	119	135	118	108	114	118	135	121	109	119	9	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	174	131	140	137	164	120	145	144	172	171	147	18	126 min
	139	156	119	132	164								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	86	80	95	100	75	88	72	85	109	91	88	11	80 min
TD - Tear Strength (lbs)	171	165	194	173	167	136	149	172	136	161	162	17	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	430	480	510	440	500	450	450	450	430	490	463	28	250 min

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118992
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.212	0.212	0.180	0.150	0.150						0.181	0.028	
US Sieve No.	70	70	80	100	100						70		60 - 100
Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)													
Water Temp. (C):	19												
Correction Factor:	1.025												
Trial =>:	1					2							
Thickness (mils)	151	151	151	151	151	131	131	131	131	131			
Time (s)	13	13	13	13	13	17	17	17	17	17			
Flow (L)	2.08	2.10	2.10	2.08	2.04	2.64	2.60	2.58	2.60	2.60			
Permittivity (s-1)	1.55	1.57	1.57	1.55	1.52	1.51	1.49	1.47	1.49	1.49			
Flow rate (GPM/ft2)	116	117	117	116	114	113	111	110	111	111			
Permeability (cm/s)	0.60	0.60	0.60	0.60	0.58	0.50	0.49	0.49	0.49	0.49			
Trial =>:	3					4							
Thickness (mils)	135	135	135	135	135	153	153	153	153	153			
Time (s)	17	17	17	17	17	17	17	17	17	17			
Flow (L)	2.84	2.84	2.92	2.88	2.92	2.24	2.24	2.20	2.20	2.20			
Permittivity (s-1)	1.62	1.62	1.67	1.64	1.67	1.28	1.28	1.26	1.26	1.26	1.49	0.14	
Flow rate (GPM/ft2)	121	121	125	123	125	96	96	94	94	94	111	11	
Permeability (cm/s)	0.56	0.56	0.57	0.56	0.57	0.50	0.50	0.49	0.49	0.49	0.54	0.05	
TEMPERATURE CORRECTED VALUES							Permittivity (s-1)				1.53		0.60 min
							Flow rate (GPM/ft2)				114		
							Permeability (cm/s)				0.55		

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.

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118999
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	231	287	444	242	271	270	330	316	267	279	294	57	200 min
TD - Tensile Strength (lbs)	375	351	333	336	328	319	307	346	339	348	338	18	200 min
MD - Elong. @ Max. Load (%)	105	107	93	107	107	114	100	93	111	111	105	7	NA
TD - Elong. @ Max. Load (%)	111	103	95	102	103	105	101	110	103	103	104	4	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	138	172	158	159	139	163	188	160	130	157	160	15	126 min
	164	176	148	173	171								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	97	96	123	112	108	102	106	131	199	126	120	29	80 min
TD - Tear Strength (lbs)	162	166	156	140	164	133	165	161	158	171	158	11	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	530	480	490	450	450	420	460	510	420	500	471	35	250 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS Nonwoven Geotextile
Sample Identification: 300118999
TRI Log #: E2189-97-10

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.212	0.150	0.150	0.180	0.180						0.174	0.023	
US Sieve No.	70	100	100	80	80						80		60 - 100
Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)													
Water Temp. (C):	20												
Correction Factor:	1												
Trial =>:	1					2							
Thickness (mils)	146	146	146	146	146	142	142	142	142	142			
Time (s)	18	18	18	18	18	18	18	18	18	18			
Flow (L)	2.28	2.32	2.32	2.36	2.32	2.64	2.64	2.68	2.68	2.64			
Permittivity (s-1)	1.23	1.25	1.25	1.27	1.25	1.42	1.42	1.45	1.45	1.42			
Flow rate (GPM/ft2)	92	94	94	95	94	107	107	108	108	107			
Permeability (cm/s)	0.46	0.46	0.46	0.47	0.46	0.51	0.51	0.52	0.52	0.51			
Trial =>:	3					4							
Thickness (mils)	141	141	141	141	141	135	135	135	135	135			
Time (s)	18	18	18	18	18	16	16	16	16	16			
Flow (L)	2.84	2.80	2.80	0.28	2.76	2.76	2.80	2.80	2.84	2.84			
Permittivity (s-1)	1.53	1.51	1.51	0.15	1.49	1.67	1.70	1.70	1.72	1.72	1.41	0.33	
Flow rate (GPM/ft2)	115	113	113	11	111	125	127	127	129	129	105	25	
Permeability (cm/s)	0.55	0.54	0.54	0.05	0.53	0.57	0.58	0.58	0.59	0.59	0.50	0.11	
TEMPERATURE CORRECTED VALUES							Permittivity (s-1)				1.41		0.60 min
							Flow rate (GPM/ft2)				105		
							Permeability (cm/s)				0.50		

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

October 31, 2003

Mail To:

Mr. Gordon Chin
URS Construction Services
2325 Maryland Road, 2nd Floor
Willow Grove, PA 19090

email: gordon_chin@urscorp.com

Bill To:

<= Same

Dear Mr. Chin:

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:	Dupont Edgemoor
TRI Job Reference Number:	E2193-12-10
Material(s) Tested:	2 TNS 8 oz Nonwoven Geotextile(s)
Test(s) Requested:	AOS (ASTM D 4751)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Sam R. Allen

Sam R. Allen
Vice President and Division Manager
Geosynthetic Services Division

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: TNS 8 oz Nonwoven Geotextile
Apparent Opening Size (ASTM D 4751)
TRI Log #: E2193-10-05

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Sample Identification: 200190461													
Opening Size Diameter (mm)	0.106	0.075	0.090	0.090	0.106						0.093	0.012	
US Sieve No.	140	200	170	170	140						140	X	60 - 100
Sample Identification: 200190463													
Opening Size Diameter (mm)	0.090	0.125	0.090	0.090	0.090						0.097	0.014	
US Sieve No.	170	120	170	170	170						140	X	60 - 100

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both failed AOS

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

November 13, 2003

Mail To:

Mr. Gordon Chin
URS Construction Services
2325 Maryland Road, 2nd Floor
Willow Grove, PA 19090

email: gordon_chin@urscorp.com

Bill To:

<= Same

Dear Mr. Chin:

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:	Dupont Edgemoor
TRI Job Reference Number:	E2193-26-08
Material(s) Tested:	3 GSE 8 oz Nonwoven Geotextile(s)
Test(s) Requested:	Mass/Unit Area (ASTM D 5261) Grab Tensile (ASTM D 4632) Puncture Strength (D4833) Trapezoidal Tear (ASTM D 4533) Mullen Burst Strength (ASTM D 3786, mod.) AOS (ASTM D 4751) Permittivity (ASTM D 4491)

If you have any questions or require any additional information, please call us at 1-800-880-8378.

Sincerely,

Sam R. Allen

Sam R. Allen
Vice President and Division Manager
Geosynthetic Services Division

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: GSE 8 oz Nonwoven Geotextile
Sample Identification: 300120108
TRI Log #: E2193-26-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	216	229	243	239	247	177	203	188	201	231	217	23	200 min
TD - Tensile Strength (lbs)	387	319	294	341	313	351	298	334	321	326	328	26	200 min
MD - Elong. @ Max. Load (%)	97	95	82	127	93	131	101	105	97	105	103	14	NA
TD - Elong. @ Max. Load (%)	123	107	103	115	103	119	99	111	111	109	110	7	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	161	160	131	162	147	133	156	159	161	165	150	12	126 min
	143	143	155	128	147								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	102	81	57	114	95	74	69	78	90	90	85	16	80 min
TD - Tear Strength (lbs)	122	126	118	155	147	168	122	123	176	127	138	20	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	420	510	520	460	440	410	450	440	450	440	454	34	250 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: GSE 8 oz Nonwoven Geotextile
Sample Identification: 300120108
TRI Log #: E2193-26-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.180	0.125	0.125	0.180	0.180						0.158	0.027	
US Sieve No.	80	120	120	80	80						80	?	60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 21
Correction Factor: 0.9759

Trial =>:	1					2							
Thickness (mils)	161	161	161	161	161	156	156	156	156	156			
Time (s)	12	12	12	12	12	12	12	12	12	12			
Flow (L)	2.32	2.32	2.32	2.32	2.32	2.48	2.44	2.44	2.40	2.44			
Permittivity (s-1)	1.88	1.88	1.88	1.88	1.88	2.01	1.97	1.97	1.94	1.97			
Flow rate (GPM/ft2)	140	140	140	140	140	150	148	148	145	148			
Permeability (cm/s)	0.77	0.77	0.77	0.77	0.77	0.80	0.78	0.78	0.77	0.78			
Trial =>:	3					4							
Thickness (mils)	154	154	154	154	154	152	152	152	152	152			
Time (s)	12	12	12	12	12	12	12	12	12	12			
Flow (L)	2.80	2.76	2.80	2.80	2.80	2.56	2.56	2.56	2.56	2.52			
Permittivity (s-1)	2.27	2.23	2.27	2.27	2.27	2.07	2.07	2.07	2.07	2.04	2.04	0.14	
Flow rate (GPM/ft2)	170	167	170	170	170	155	155	155	155	153	153	11	
Permeability (cm/s)	0.89	0.87	0.89	0.89	0.89	0.80	0.80	0.80	0.80	0.79	0.81	0.05	
TEMPERATURE CORRECTED VALUES						Permittivity (s-1)					1.99		0.60 min
						Flow rate (GPM/ft2)					149		
						Permeability (cm/s)					0.79		

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: GSE 8 oz Nonwoven Geotextile
Sample Identification: 300120112
TRI Log #: E2193-26-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	249	241	259	225	236	221	278	238	325	227	250	30	200 min
TD - Tensile Strength (lbs)	334	326	291	318	323	360	334	327	366	324	330	20	200 min
MD - Elong. @ Max. Load (%)	108	125	90	86	98	135	97	113	99	105	106	15	NA
TD - Elong. @ Max. Load (%)	120	109	109	105	105	127	105	110	121	112	112	7	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	157	163	173	142	124	164	150	153	155	140	151	14	126 min
	149	141	174	148	132								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	96	78	89	111	78	78	83	106	94	132	95	17	80 min
TD - Tear Strength (lbs)	124	116	118	128	131	158	114	126	159	144	132	16	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	560	540	530	500	450	500	490	500	520	440	503	36	250 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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: GSE 8 oz Nonwoven Geotextile
Sample Identification: 300120112
TRI Log #: E2193-26-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.250	0.125	0.125	0.125	0.125						0.150	0.050	
US Sieve No.	60	120	120	120	120						100		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>	1					2				
Thickness (mils)	155	155	155	155	155	150	150	150	150	150
Time (s)	18	18	18	18	18	12	12	12	12	12
Flow (L)	2.16	2.20	2.16	2.12	2.16	2.04	2.00	2.04	2.04	2.00
Permittivity (s-1)	1.17	1.19	1.17	1.14	1.17	1.65	1.62	1.65	1.65	1.62
Flow rate (GPM/ft2)	87	89	87	86	87	124	121	124	124	121
Permeability (cm/s)	0.46	0.47	0.46	0.45	0.46	0.63	0.62	0.63	0.63	0.62

Trial =>	3					4					MEAN	STD. DEV.
Thickness (mils)	148	148	148	148	148	147	147	147	147	147		
Time (s)	12	12	12	12	12	12	12	12	12	12		
Flow (L)	2.16	2.20	2.16	2.20	2.20	2.16	2.16	2.12	2.16	2.16		
Permittivity (s-1)	1.75	1.78	1.75	1.78	1.78	1.75	1.75	1.72	1.75	1.75	1.58	0.24
Flow rate (GPM/ft2)	131	133	131	133	133	131	131	128	131	131	118	18
Permeability (cm/s)	0.66	0.67	0.66	0.67	0.67	0.65	0.65	0.64	0.65	0.65	0.60	0.08

TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.58	0.60 min
	Flow rate (GPM/ft2)	118	
	Permeability (cm/s)	0.60	

MD Machine Direction
TD Transverse Direction

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GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: GSE 8 oz Nonwoven Geotextile
Sample Identification: 300120116
TRI Log #: E2193-26-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Grab Tensile Properties (ASTM D 4632)													
MD - Tensile Strength (lbs)	245	305	353	211	289	276	255	328	247	252	276	41	200 min
TD - Tensile Strength (lbs)	387	348	362	375	331	329	313	327	330	319	342	24	200 min
MD - Elong. @ Max. Load (%)	102	87	95	85	101	98	97	82	93	81	92	7	NA
TD - Elong. @ Max. Load (%)	119	107	107	115	106	108	101	101	107	100	107	6	NA
Puncture Resistance (ASTM D 4833)													
Puncture Strength (lbs)	178	136	175	140	144	179	197	178	174	175	165	18	126 min
	184	146	165	159	144								
Trapezoidal Tear Resistance (ASTM D 4533)													
MD - Tear Strength (lbs)	92	105	94	101	121	96	103	131	114	104	106	12	80 min
TD - Tear Strength (lbs)	106	153	131	146	171	142	150	139	146	140	142	16	80 min
Mullen Burst Strength (ASTM D 3786, modified)													
Tare (psi): < 20 psi >													
Burst Strength (psi)	440	560	540	490	440	540	530	440	500	510	499	43	250 min

MD Machine Direction
TD Transverse Direction

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

GEOTEXTILE TEST RESULTS

TRI Client: URS Construction Services
Project: Dupont Edgemoor

Material: GSE 8 oz Nonwoven Geotextile
Sample Identification: 300120116
TRI Log #: E2193-26-08

PARAMETER	TEST REPLICATE NUMBER 1	2	3	4	5	6	7	8	9	10	MEAN	STD. DEV.	PROJ. SPEC.
Apparent Opening Size (ASTM D 4751)													
Opening Size Diameter (mm)	0.212	0.212	0.125	0.125	0.150						0.165	0.040	
US Sieve No.	70	70	120	120	100						80		60 - 100

Constant Head Permittivity (ASTM D 4491, 2 in Constant Head)

Water Temp. (C): 20
Correction Factor: 1

Trial =>	1					2				
Thickness (mils)	170	170	170	170	170	168	168	168	168	168
Time (s)	15	15	15	15	15	15	15	15	15	15
Flow (L)	2.40	2.36	2.40	2.32	2.36	2.40	2.36	2.32	2.32	2.32
Permittivity (s-1)	1.55	1.53	1.55	1.50	1.53	1.55	1.53	1.50	1.50	1.50
Flow rate (GPM/ft2)	116	114	116	112	114	116	114	112	112	112
Permeability (cm/s)	0.67	0.66	0.67	0.65	0.66	0.66	0.65	0.64	0.64	0.64

Trial =>	3					4					MEAN	STD. DEV.
Thickness (mils)	163	163	163	163	163	164	164	164	164	164		
Time (s)	15	15	15	15	15	15	15	15	15	15		
Flow (L)	2.64	2.64	2.64	2.64	2.64	2.72	2.72	2.64	2.64	2.64		
Permittivity (s-1)	1.71	1.71	1.71	1.71	1.71	1.76	1.76	1.71	1.71	1.71	1.62	0.10
Flow rate (GPM/ft2)	128	128	128	128	128	132	132	128	128	128	121	7
Permeability (cm/s)	0.71	0.71	0.71	0.71	0.71	0.73	0.73	0.71	0.71	0.71	0.68	0.03

		MEAN	PROJ. SPEC.
TEMPERATURE CORRECTED VALUES	Permittivity (s-1)	1.62	0.60 min
	Flow rate (GPM/ft2)	121	
	Permeability (cm/s)	0.68	

MD Machine Direction
TD Transverse Direction

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Attachment 3

Drainage Layer
(8-ounce geotextile and geonet)

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE:	11-12-03	MANUFACTURER:	NEVOWN (SKAPS)
PROJECT NAME:	DUPONT EDGE MOOR CAP	MAT. TYPE:	E080 - 8 oz GEOTEXTILE
PROJECT NUMBER:	811752	TRUCK #:	27 ROLLS - (ATTACHED)
INSPECTOR:	G. CHIN	BILL OF LADING #:	00808890

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
3000118983	15'X690'	10,350	NO APPARENT DAMAGE *
" 84			
" 85			
" 87			
" 88			
" 89			
" 90			
" 92			
" 94			
" 97			
" 98			
" 99			
" 93			
" 95			

* TEARS IN PLASTIC COVERING

NOTE: THESE ARE APPROVED ROLLS

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE: 11-12-03	MANUFACTURER: NEYCOWN (SKAPS)
PROJECT NAME: DUPONT EDGE MOOR CAP	MAT. TYPE: E080 - 8 OZ GEOTEXTILE
PROJECT NUMBER: 811752	TRUCK #: (ATTACHED)
INSPECTOR: G CHIN	BILL OF LADING #: 00808890

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
300120114	15'X690'	10,350	NO APPARENT DAMAGE *
" 16			
" 12			
" 10			
" 06			
" 08			
" 17			
" 15			
" 13			
" 71			
" 05			
" 07			
" 09			

* TEARS IN PLASTIC

NOTE: THESE ARE NOT APPROVED YET!

STRAIGHT BILL OF LADING – SHORT FORM – ORIGINAL – NOT NEGOTIABLE

RECEIVED subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Original Bill of Lading.
The property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back hereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Nevown Inc. (Warehouse)
681 DEYOUNG RD.
G SC 29651
PH. 864-848-1054
FAX 864-848-1499

Shipping Bill Number 000808890

Sold to:
Customer #: 170303
GEO-SYNTHETICS INC.
W 239 - N. 428 PEWAUKEE ROAD
WAUKESHA
WI 53188

Ship to: 008538
DUPONT EDGEMOOR CLOSURE
104 HAY ROAD NORTH GATE
WILMINGTON
DE 19809

Page: 0001
Date: 11/10/03
Salesman: N09
Division: 05
Warehouse: 27
Ship Via: Service Trans

Line#	Item #	# Elem.	Net	Line #	Item #	# Elem.	Net
urchase Order:	9191			Order Number:	805254		
escription:	180X690 ENVIR			LOT: 132		Line: 001	
E080	180	690	PP	BLK.30			
01	300118998 ✓	00/00	1150.00	002	300118997 ✓	00/00	1150.00
03	300118989 ✓	00/00	1150.00	004	300118988 ✓	00/00	1150.00
05	300118999 ✓	00/00	1150.00	006	300118992 ✓	00/00	1150.00
07	300118983 ✓	00/00	1150.00	008	300118994 ✓	00/00	1150.00
09	300118990 ✓	00/00	1150.00	010	300118984 ✓	00/00	1150.00
11	300118993 ✓	00/00	1150.00	012	300118987 ✓	00/00	1150.00
13	300118995 ✓	00/00	1150.00	014	300120117	00/00	1150.00
15	300120114	00/00	1150.00	016	300120115	00/00	1150.00
17	300120116	00/00	1150.00	018	300120113	00/00	1150.00
19	300120112	00/00	1150.00	020	300120111	00/00	1150.00
21	00120110 N.A.	00/00	1150.00	022	300120105	00/00	1150.00
23	300120106	00/00	1150.00	024	300120107	00/00	1150.00
25	300120108	00/00	1150.00	026	300120109	00/00	1150.00
27	300118985 ✓	00/00	1150.00				

M. GADDY
864) 968-0592
(864) 848-1054
Robin.

NEVOWN INC.

PREPAID

tems per article: 27 Qty per article: 31050.00 16100.00 BONUS

N.A.

tems per order: 27 Qty per order: 31050.00

✓ = TESTED & APP'D

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of consignor.)

omments:
tems Shipped: 27 Gross Wt. Ship: 15232.00
et Wt. Shipped: 31050.00

GEOTEXTILES
NMFC 49160 FAK 65

This is to certify that the above materials are properly described by name and are packed and marked and are in proper condition for transportation according to regulations by the Interstate Commerce Commission.
If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."
Shipper's imprints in lieu of stamp; not a part of Bill of Lading approved by the Interstate Commerce Commission.
NOTE – Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding.

T-1094

THIS SHIPMENT IS CORRECTLY DESCRIBED.
CORRECT WEIGHT IS _____ LBS.

The fibre boxes used for this shipment conforms to the specifications set forth in the box marker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classifications.

Per [signature] Shipper

NEVOWN

NEVOWN INC.

Shipper, Per _____ Agent, Per STI - K. Ma

Permanent post office address of shipper

(Sec) 11-10-03

"This is to certify that the above named materials are properly classified, described, packages, marked and labeled, and are in proper condition for transportation, according to

STRAIGHT BILL OF LADING – SHORT FORM – ORIGINAL – NOT NEGOTIABLE

RECEIVED subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Original Bill of Lading.
The property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back hereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Nevown Inc. (Warehouse)
[illegible] DEYOUNG RD.
[illegible], SC 29651

PH. 864-848-1054
FAX 864-848-1499

Shipping Bill Number 000808890

Sold to:
Customer #: 170303
GEO-SYNTHETICS INC.
W 239 - N. 428 PEWAUKEE ROAD
WAUKESHA
WI 53188

Ship to: 008538
DUPONT EDGEMOOR CLOSURE
104 HAY ROAD NORTH GATE
WILMINGTON
DE 19809

Page: 0001
Date: 11/10/03
Salesman: N09
Division: 05
Warehouse: 27
Ship Via: Service Trans

Line#	Item #	# Elem.	Net	Line #	Item #	# Elem.	Net

Purchase Order: 9191 Order Number: 805254

Description: 180X690 ENVIR LOT: 132 Line: 001

5 E080 180 690 PP BLK.30

001	300118998	00/00	1150.00	002	300118997	00/00	1150.00
003	300118989	00/00	1150.00	004	300118988	00/00	1150.00
005	300118999	00/00	1150.00	006	300118992	00/00	1150.00
007	300118983	00/00	1150.00	008	300118994	00/00	1150.00
009	300118990	00/00	1150.00	010	300118984	00/00	1150.00
011	300118993	00/00	1150.00	012	300118987	00/00	1150.00
013	300118995	00/00	1150.00	014	300120117	00/00	1150.00
015	300120114	00/00	1150.00	016	300120115	00/00	1150.00
017	300120116	00/00	1150.00	018	300120113	00/00	1150.00
01[illegible]	300120112	00/00	1150.00	020	300120111	00/00	1150.00
0[illegible]	300120110	00/00	1150.00	022	300120105	00/00	1150.00
023	300120106	00/00	1150.00	024	300120107	00/00	1150.00
025	300120108	00/00	1150.00	026	300120109	00/00	1150.00
027	300118985	00/00	1150.00				

NEVOWN INC.

PREPAID

Items per article: 27 Qty per article: 31050.00 16100.00 BONUS

Items per order: 27 Qty per order: 31050.00

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of consignor.)

Comments:
Items Shipped: 27 Gross Wt. Ship: 15232.00
Net Wt. Shipped: 31050.00

GEOTEXTILES
NMEC 49160 FAK 65

This is to certify that the above materials are properly described by name and are packed and marked and are in proper condition for transportation according to regulations by the Interstate Commerce Commission.
If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."
Shipper's imprints in lieu of stamp; not a part of Bill of Lading approved by the Interstate Commerce Commission.
NOTE – Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding.

T-1094

THIS SHIPMENT IS CORRECTLY DESCRIBED. [illegible]CT WEIGHT IS _____ LBS.	The fibre boxes used for this shipment conforms to the specifications set forth in the box maker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classifications.	Per [illegible] Shipper

NEVOWN

Shipper, Per _____ Agent, Per STI - K. Mu

NEVOWN INC.

Permanent post office address of shipper

11-10-03

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation, according to

Form 1
MATERIAL DELIVERY / INVENTORY RECORD

DATE: 11-7-03	MANUFACTURER: (N BROWN) SKAPS
PROJECT NAME: DUPONT EDGE MOOR	MAT. TYPE: GEOTEXTILE - EO50 8oz
PROJECT NUMBER: 811752	TRUCK #: ATTACHED (5 rolls)
INSPECTOR: G. CHIN	BILL OF LADING #: 000808825

PANEL/ROLL NUMBER	PANEL/ROLL SIZE	SQUARE FOOT	COMMENTS
300119000	15' x 690	10,350	*NO APPARENT DAMAGE
" 8986	↓	↓	NAD
" 8996			NAD
" 8982			NAD
" 8991			NAD

* SLIGHT CORE, SMALL TEARS IN PLASTIC COVER

STRAIGHT BILL OF LADING – SHORT FORM – ORIGINAL – NOT NEGOTIABLE

RECEIVED subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Original Bill of Lading.
The property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back hereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

Nevown Inc. (Warehouse)
DEYOUNG RD.
ER, SC 29651
PH. 864-848-1054
FAX 864-848-1499

Shipping Bill Number 000808825
MIXED LOAD

Sold to:
Customer #: 170303
GEO-SYNTHETICS INC.
W 239 - N. 428 PEWAUKEE ROAD
WAUKESHA
WI 53188

Ship to: 008538
DUPONT EDGEMOOR CLOSURE
104 HAY ROAD NORTH GATE
WILMINGTON
DE 19809

Page: 0001
Date: 10/31/03
Salesman: N09
Division: 05
Warehouse: 27
Ship Via: QUALITY LOG.

Line#	Item #	# Elem.	Net	Line #	Item #	# Elem.	Net

Purchase Order: 9191 Order Number: 805219

Description: 180X690 ENVIR LOT: 132 Line: 001
5 E080 180 690 PP BLK.30

001	300119000	00/00	1150.00	002	300118982	00/00	1150.00
003	300118986	00/00	1150.00	004	300118991	00/00	1150.00
005	300118996	00/00	1150.00				

8OZ

Items per article: 5 Qty per article: 5750.00

Description: 180X480 ENVIR LOT: 132 Line: 002
5 E120 180 480 PP BLK.30

001	200190864	00/00	800.00	002	300119546	00/00	800.00
003	300119548	00/00	800.00	004	300119549	00/00	800.00
[illegible]	300119550	00/00	800.00	006	300119551	00/00	800.00
[illegible]	300119552	00/00	800.00	008	300119553	00/00	800.00
009	300119554	00/00	800.00	010	300119555	00/00	800.00
011	300119556	00/00	800.00	012	300119557	00/00	800.00
013	300119558	00/00	800.00	014	300119559	00/00	800.00
015	300119560	00/00	800.00	016	300119561	00/00	800.00
017	300119562	00/00	800.00	018	300119563	00/00	800.00
019	300119547	00/00	800.00				

NEVOWN INC.

PREPAID

Items per article: 19 Qty per article: 15200.00

Items per order: 24 Qty per order: 20950.00

CONTACT:
856-498-2196

Comments:
Items Shipped: 24 Gross Wt. Ship: 16290.00
Net Wt. Shipped: 20950.00

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of consignor.)

GEOTEXTILES
NMFC 49160 FAK 65

This is to certify that the above materials are properly described by name and are packed and marked and are in proper condition for transportation according to regulations by the Interstate Commerce Commission.
If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."
Shipper's imprints in lieu of stamp; not a part of Bill of Lading approved by the Interstate Commerce Commission.
NOTE – Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding.

THIS SHIPMENT IS CORRECTLY DESCRIBED.
NET WEIGHT IS _____ LBS.

The fibre boxes used for this shipment conforms to the specifications set forth in the box marker's certificate thereon, and all other requirements of Rule 41, of the Consolidated Freight Classifications.

Per [signature] Shipper

NEVOWN

NEVOWN INC.

Shipper, Per _____ Agent, Per _____

Permanent post office address of shipper Quality Logistics SLC Derrick Gaul 1036 10/4/03

"This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation

Nevown Inc.
681 Deyoung Rd.
Greer, SC 29651
PH: 864-968-0592

10/20/03
REF: TNS E080

Geo-Synthetics
Dupont Edgemoor Closure

Dear Sir/Madam:

This is to certify that TNS E080 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS E080 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS E080 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	8.0
Thickness	ASTM D 5199	mils	100
Grab Tensile	ASTM D 4632	lbs	225
Grab Elongation	ASTM D 4632	%	50
Trap Tear	ASTM D 4533	lbs	90
Puncture	ASTM D 4833	lbs	130
Mullen Burst	ASTM D 3786*	psi	450
A.O.S.	ASTM D 4751	U.S. Sieve	70
Permittivity	ASTM D 4491	1/sec	1.26
Permeability	ASTM D 4491	cm/sec	.30
Water Flow	ASTM D 4491	gpm/sqft	100
U.V. Resistance	ASTM D 4355	% strength retained at 500 hrs.	70 %

*modified

Marshall O. Gaddy

Marshall O. Gaddy
Quality Control Manager

Nevown Inc.

Nonwoven Quality Data

GSI Dupont Edgemoor Closure

Date 10/20

X = REJECTED = SUSPECT

	Roll #'s	Style	Weight	Thick-ness	Grab Tensile MD	Grab Tensile XMD	Elng MD	Elng XMD	Trap MD	Trap XMD	Punc Rest	Brst Strg	Flow Rate	Perm-eability	Perm-ttivity	AOS
	200190460	E080	10.6	143	272	323	78	88	104	135	187	574	171	1.06	2.68	80
X	200190461	E080	10.6	143	272	323	78	88	104	135	187	574	171	1.06	2.68	80
X	200190462	E080	10.6	143	272	323	78	88	104	135	187	574	171	1.06	2.68	80
X	200190463	E080	10.6	143	272	323	78	88	104	135	187	574	171	1.06	2.68	80
	200190464	E080	10.6	143	272	323	78	88	104	135	187	574	171	1.06	2.68	80
	200190465	E080	8.0	116	226	245	74	104	104	135	136	462	171	1.06	2.68	80
	200190466	E080	8.0	116	226	245	74	104	104	135	136	462	171	1.06	2.68	80
	200190467	E080	8.0	116	226	245	74	104	104	135	136	462	171	1.06	2.68	80
	200190468	E080	8.0	116	226	245	74	104	104	135	136	462	171	1.06	2.68	80
	200190469	E080	8.0	116	226	245	74	104	104	135	136	462	171	1.06	2.68	80
X	200190470	E080	8.6	125	228	268	90	102	104	135	142	458	171	1.06	2.68	80
	200190471	E080	8.6	125	228	268	90	102	104	135	142	458	171	1.06	2.68	80
	200190472	E080	8.6	125	228	268	90	102	104	135	142	458	171	1.06	2.68	80
✓	300118982	E080	9.3	153	265	325	106	108	106	143	153	473	140	0.85	2.19	80
	300118983	E080	9.3	153	265	325	106	108	106	143	153	473	140	0.85	2.19	80
	300118984	E080	9.3	153	265	325	106	108	106	143	153	473	140	0.85	2.19	80
	300118985	E080	9.3	153	265	325	106	108	106	143	153	473	140	0.85	2.19	80
✓	300118986	E080	9.3	153	265	325	106	108	106	143	153	473	140	0.85	2.19	80
	300118987	E080	9.2	158	245	299	105	111	106	143	143	473	140	0.85	2.19	80
	300118988	E080	9.2	158	245	299	105	111	106	143	143	473	140	0.85	2.19	80
	300118989	E080	9.2	158	245	299	105	111	106	143	143	473	140	0.85	2.19	80
	300118990	E080	9.2	158	245	299	105	111	106	143	143	473	140	0.85	2.19	80
✓	300118991	E080	9.2	158	245	299	105	111	106	143	143	473	140	0.85	2.19	80
	300118992	E080	10.3	176	255	331	119	110	106	143	167	503	140	0.85	2.19	80
	300118993	E080	10.3	176	255	331	119	110	106	143	167	503	140	0.85	2.19	80
	300118994	E080	10.3	176	255	331	119	110	106	143	167	503	140	0.85	2.19	80
	300118995	E080	10.3	176	255	331	119	110	106	143	167	503	140	0.85	2.19	80
✓	300118996	E080	10.3	176	255	331	119	110	106	143	167	503	140	0.85	2.19	80
	300118997	E080	9.1	166.0	233	280	108	101	106	143	144	455	140	0.85	2.19	80
	300118998	E080	9.1	166.0	233	280	108	101	106	143	144	455	140	0.85	2.19	80
	300118999	E080	9.1	166.0	233	280	108	101	106	143	144	455	140	0.85	2.19	80
✓	300119000	E080	9.1	166.0	233	280	108	101	106	143	144	455	140	0.85	2.19	80

✓ = 11/7 shipment

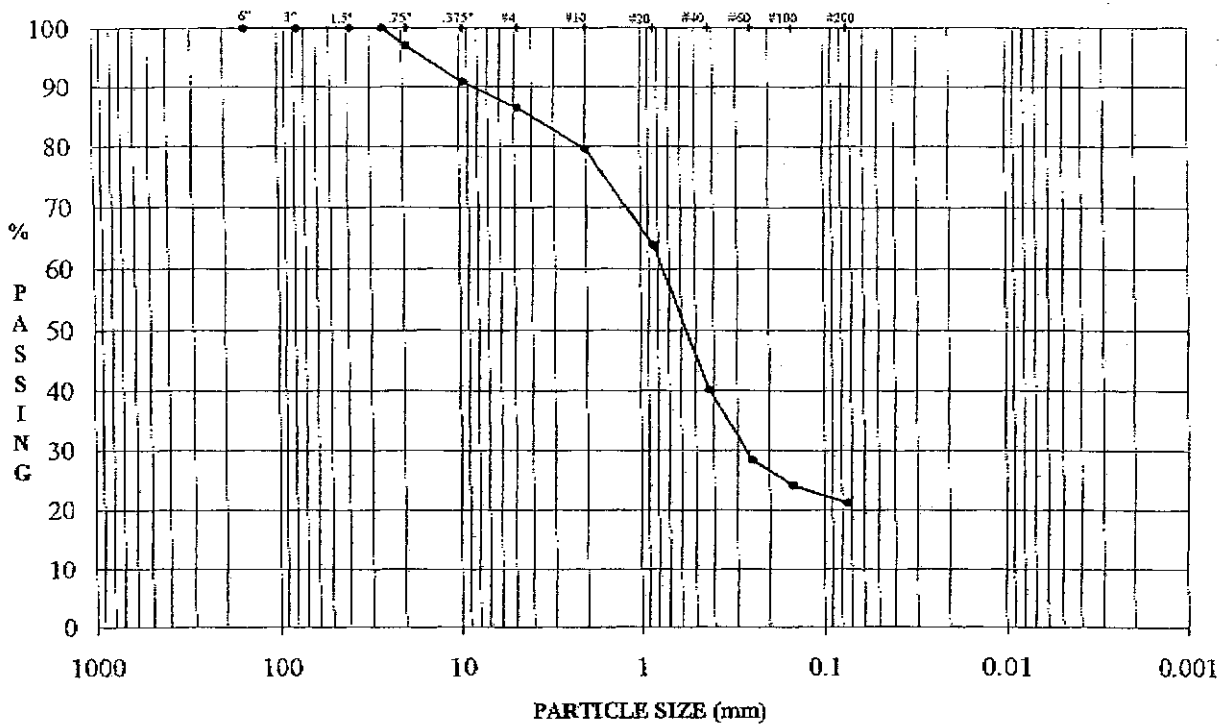
32 rolls X 10,350 = 331,200

APPENDIX D5
COVER SOIL

07.00 3.10 COVER SOIL

PARTICLE-SIZE DISTRIBUTION ASTM D 422

US STANDARD SIEVE OPENING SIZES



COBBLE	GRAVEL Coarse	GRAVEL Fine	SAND Cor	SAND Med	SAND Fine	FINES Silt or Clay

Sample Data		
% Gravel	13.6	
% Sand	65.3	
% Fines	21.1	
C_C	N/A	
C_U	N/A	
LL	33	INFO
PL	22	INFO
PI	11	INFO
USCS	SC	SC
w (%)	4.7	INFO
Percent Finer		
3"	100.0%	100
1 1/2"	100.0%	
1"	100.0%	90 MIN
3/4"	97.0%	
3/8"	90.8%	
#4	86.4%	
#10	79.6%	70 MIN
#20	63.8%	
#40	40.2%	
#60	28.4%	
#100	24.1%	
#200	21.1%	40 MAX

COMMENTS:

DESCRIPTION

Sample: COVER SOIL

Depth: -

Wet Color: Yellowish brown

Description: Clayey sand

Date: 09/22/03

Technician: WWC

Reviewer: RMW

URS/EDGEMOOR/DE

GOLDER ASSOCIATES INC.
CHERRY HILL, NEW JERSEY

geotechnics
INTEGRITY IN TESTING

LABORATORY TEST REPORT

February 4, 2004

Project No. 2004-023-01

Mr. Eric Bryan
URS Corporation
Barley Mill Plaza, Bldg. 27-2215
4417 Lancaster Pike
Wilmington, DE 19805

RE: Soils Testing – DuPont Edgemoor Closure Cap

Transmitted herein are the results of the soils testing performed for Engineering Mechanics, Inc. verified on the Project Verification Form, submitted January 20, 2004. The testing was performed in general accordance with the ASTM methods listed on the enclosed data sheets. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

Disclaimer

The test results are believed to be representative of the samples submitted but are indicative only of the specimens which were evaluated. Geotechnics has no direct knowledge of the origin of the samples, implies no position with regard to the disposition of the test results, i.e., pass/fail, and makes no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization of the Client and Geotechnics. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please do not hesitate to contact our office.

Respectively submitted,

David R. Backstrom
Laboratory Director

544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • Fax (412) 823-8999

geotechnics
INTEGRITY IN TESTING

MOISTURE CONTENT

ASTM D 2216 (SOP-S1)

Client	URS CORPORATION
Client Reference	DUPONT EDGEMOOR CLOSURE CAP
Project No.	2004-023-01

Lab ID	01	02	03
Boring No.	COVER	COVER	TOP SOIL
Depth (ft)	NA	0-1	NA
Sample No.	CS-1	CS-2	TS-1
Tare Number	1710	581	1695
Wt. of Tare & WS (gm)	387.99	412	501.9
Wt. of Tare & DS (gm)	347.18	386.55	433.7
Wt. of Tare (gm)	82.53	83.7	81.29
Wt. of Water (gm)	40.81	25.45	68.2
Wt. of DS (gm)	264.65	302.85	352.41
Water Content (%)	**15.4**	**8.4**	**19.4**

Notes : *NA*

Tested By *DDA* *Date* *01/23/04* *Checked By* *Jem* *Date* 1-26-04

DCN: CT-S1 DATE 6-30-98 REVISION: 2

C:\MSOFFICE\EXCEL\PrintQ\W139.xls]Sheet1

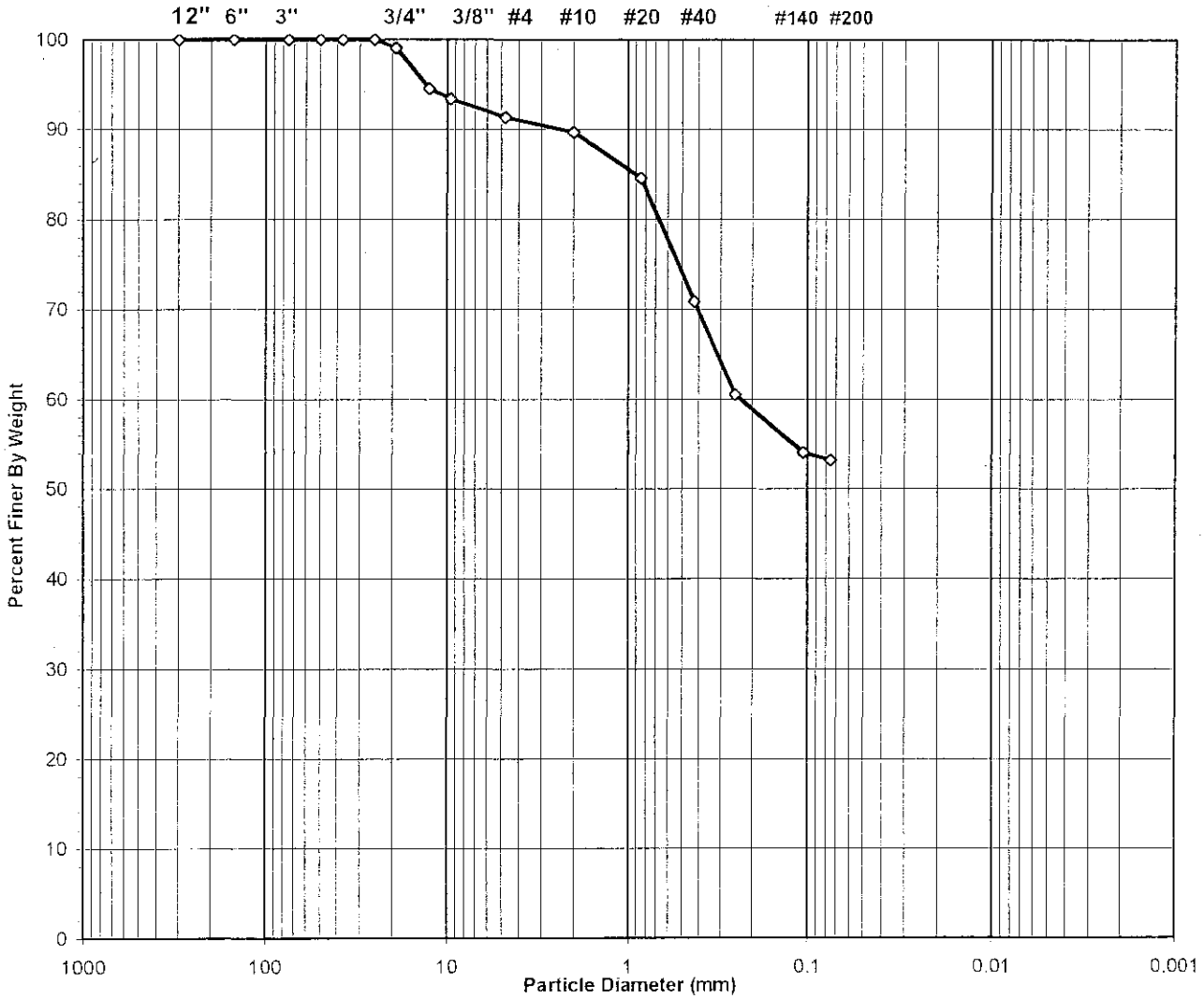
544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • Fax (412) 823-8999

geotechnics
INTEGRITY IN TESTING

SIEVE ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	URS CORPORATION	Boring No.	COVER
Client Reference	DUPONT EDGEMOOR CLOSURE CAP	Depth (ft)	NA
Project No.	2004-023-01	Sample No.	CS-1
Lab ID	2004-023-01-01	Soil Color	**REDDISH BROWN**

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol ***CL, TESTED***

USCS Classification ***SANDY LEAN CLAY***

Tested By JP Date 01/27/04 Checked By Com Date 2-3-04

 DCN: CT-S3A DATE 6-25-98 REVISION 2 *C:\MSOFFICE\EXCEL\PrintQ\W259.xls]Sheet1*

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geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	URS CORPORATION	Boring No.	COVER
Client Reference	DUPONT EDGEMOOR CLOSURE CAP	Depth (ft)	NA
Project No.	2004-023-01	Sample No.	CS-1
Lab ID	2004-023-01-01	Soil Color	**REDDISH BROWN**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	523	Tare No.	684
Wgt.Tare + Wet Specimen (gm)	1372.00	Wgt.Tare + Wet Specimen (gm)	350.80
Wgt.Tare + Dry Specimen (gm)	1213.00	Wgt.Tare + Dry Specimen (gm)	346.25
Weight of Tare (gm)	99.16	Weight of Tare (gm)	100.80
Weight of Water (gm)	159.00	Weight of Water (gm)	4.55
Weight of Dry Soil (gm)	1113.84	Weight of Dry Soil (gm)	245.45
Moisture Content (%)	**14.3**	**Moisture Content (%)**	**1.9**

Wet Weight -3/4" Sample (gm)	29066	Weight of the Dry Specimen (gm)	1113.84
Dry Weight - 3/4" Sample (gm)	25435.1	Weight of minus #200 material (gm)	598.10
Wet Weight +3/4" Sample (gm)	250.00	Weight of plus #200 material (gm)	515.74
Dry Weight + 3/4" Sample (gm)	245.45		
Total Dry Weight Sample (gm)	25680.6	**J - Factor (Percent Finer than 3/4")**	**0.9904**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100.00**
6"	150	0.00		0.00	0.00	100.00	**100.00**
3"	75	0.00		0.00	0.00	100.00	**100.00**
2"	50	0.00	(*)	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00		0.00	0.00	100.00	**100.00**
1"	25	0.00		0.00	0.00	100.00	**100.00**
3/4"	19	250.00		0.96	0.96	99.04	**99.04**
1/2"	12.5	50.54		4.54	4.54	95.46	**94.55**
3/8"	9.5	12.96		1.16	5.70	94.30	**93.40**
#4	4.75	23.02		2.07	7.77	92.23	**91.35**
#10	2	18.98		1.70	9.47	90.53	**89.66**
#20	0.85	57.10	(**)	5.13	14.60	85.40	**84.59**
#40	0.425	154.39		13.86	28.46	71.54	**70.86**
#60	0.25	116.36		10.45	38.91	61.09	**60.51**
#140	0.106	72.78		6.53	45.44	54.56	**54.04**
#200	0.075	9.61		0.86	46.30	53.70	**53.18**
Pan	-	598.10		53.70	100.00	-	-

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" sieve analysis is based on the Weight of the Dry Specimen*

Tested By JP Date 01/27/04 Checked By Jm Date 2-3-04

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ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	URS CORPORATION	Boring No.	COVER
Client Reference	DuPont Edgemoor Closure Cap	Depth (ft)	NA
Project No.	2004-023-01	Sample No.	CS-1
Lab ID	2004-023-01-01	Soil Description	**REDDISH BROWN LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

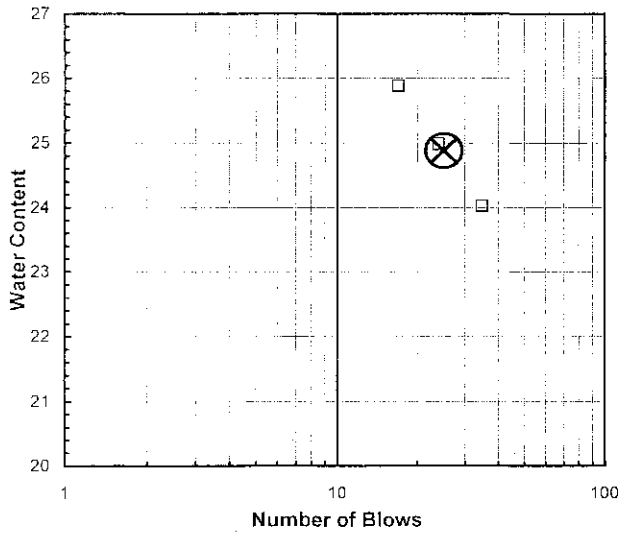
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	95	221	65	U
Wt. of Tare & WS (gm)	43.50	46.07	43.71	L
Wt. of Tare & DS (gm)	38.22	40.90	38.34	T
Wt. of Tare (gm)	16.24	20.20	17.59	I
Wt. of Water (gm)	5.3	5.2	5.4	P
Wt. of DS (gm)	22.0	20.7	20.8	O
				I
Moisture Content (%)	**24.0**	**25.0**	**25.9**	N
Number of Blows	**35**	**24**	**17**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	174	165	
Wt. of Tare & WS (gm)	22.22	19.84	
Wt. of Tare & DS (gm)	21.27	18.94	
Wt. of Tare (gm)	15.64	13.62	
Wt. of Water (gm)	0.9	0.9	
Wt. of DS (gm)	5.6	5.3	
Moisture Content (%)	**16.9**	**16.9**	**0.0**

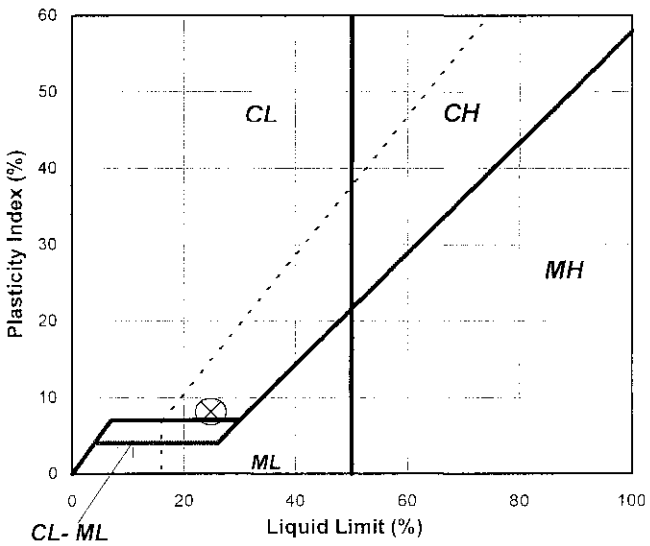
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**25**
Plastic Limit (%)	**17**
Plasticity Index (%)	**8**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By *DDA* *Date* *02/02/04* *Checked By* *Cm* *Date* *2-3-04*

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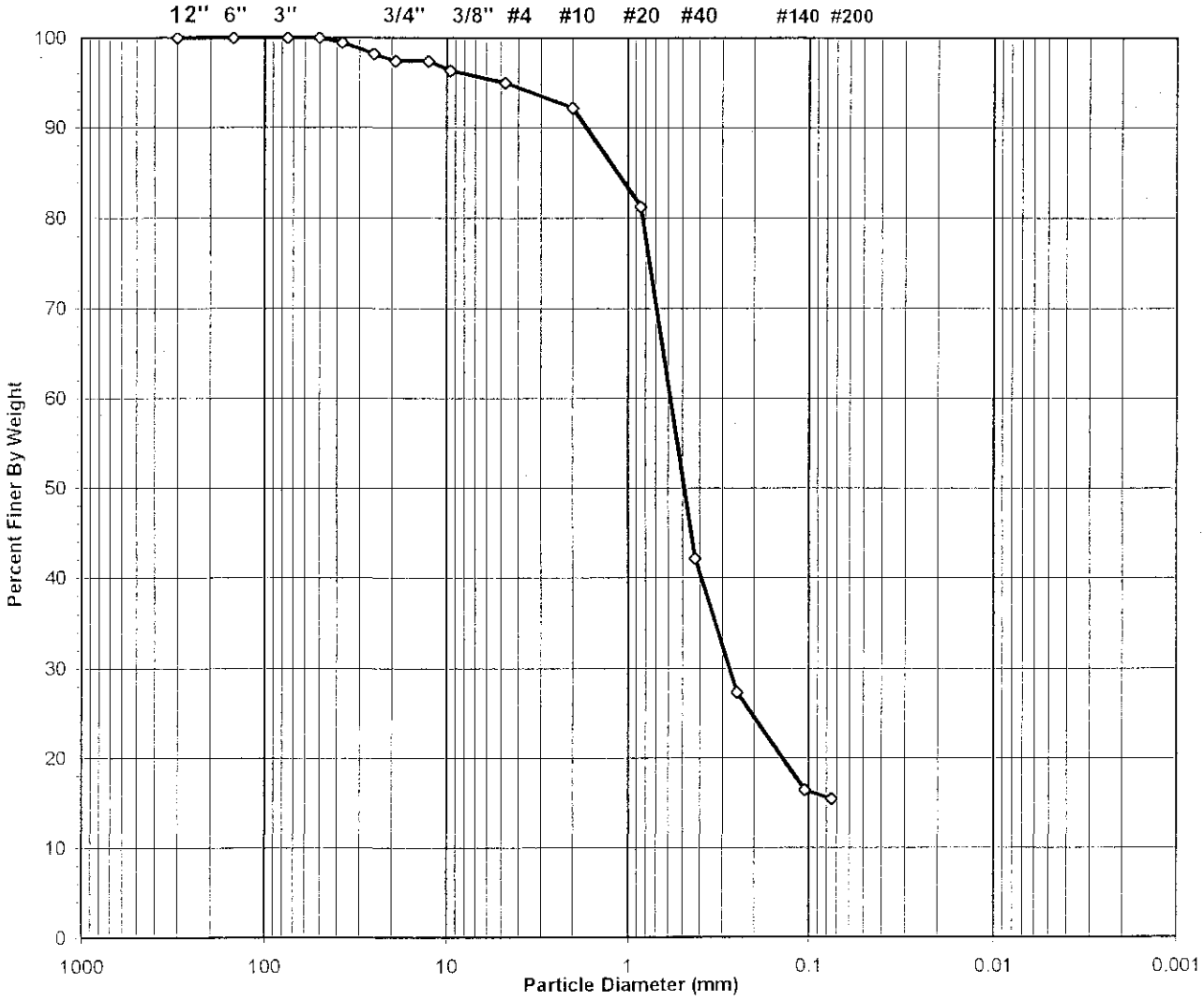
SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	URS CORPORATION	Boring No.	COVER
Client Reference	DuPont Edgemoor Closure Cap	Depth (ft)	NA
Project No.	2004-023-01	Sample No.	CS-2
Lab ID	2004-023-01-02	Soil Color	**REDDISH BROWN**

	SIEVE ANALYSIS		*HYDROMETER*
USCS	gravel	sand	silt and clay



USCS Symbol ***SM, TESTED***

USCS Classification ***SILTY SAND (NON-PLASTIC FINES)***

Tested By JP Date 01/27/04 Checked By [illegible] Date 1-30-04

 DCN: CT-S3A DATE 6-25-98 REVISION 2 C:\MSOFFICE\Excel\Printq\[W216.xls]Sheet1

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	URS CORPORATION	Boring No.	COVER
Client Reference	DuPont Edgemoor Closure Cap	Depth (ft)	NA
Project No.	2004-023-01	Sample No.	CS-2
Lab ID	2004-023-01-02	Soil Color	**REDDISH BROWN**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	668	Tare No.	1621
Wgt.Tare + Wet Specimen (gm)	1200.60	Wgt.Tare + Wet Specimen (gm)	736.57
Wgt.Tare + Dry Specimen (gm)	1112.80	Wgt.Tare + Dry Specimen (gm)	714.40
Weight of Tare (gm)	97.69	Weight of Tare (gm)	98.20
Weight of Water (gm)	87.80	Weight of Water (gm)	22.17
Weight of Dry Soil (gm)	1015.11	Weight of Dry Soil (gm)	616.20
Moisture Content (%)	**8.6**	**Moisture Content (%)**	**3.6**

Wet Weight -3/4" Sample (gm)	25233	Weight of the Dry Specimen (gm)	1015.11
Dry Weight - 3/4" Sample (gm)	23224.3	Weight of minus #200 material (gm)	161.02
Wet Weight +3/4" Sample (gm)	638.37	Weight of plus #200 material (gm)	854.09
Dry Weight + 3/4" Sample (gm)	616.20		
Total Dry Weight Sample (gm)	23840.5	**J - Factor (Percent Finer than 3/4")**	**0.9742**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)		Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00		0.00	0.00	100.00	**100.00**
6"	150	0.00		0.00	0.00	100.00	**100.00**
3"	75	0.00		0.00	0.00	100.00	**100.00**
2"	50	0.00	(*)	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	131.80		0.53	0.53	99.47	**99.47**
1"	25	310.20		1.26	1.79	98.21	**98.21**
3/4"	19	196.37		0.80	2.58	97.42	**97.42**
1/2"	12.5	0.00		0.00	0.00	100.00	**97.42**
3/8"	9.5	11.36		1.12	1.12	98.88	**96.33**
#4	4.75	13.73		1.35	2.47	97.53	**95.01**
#10	2	29.17		2.87	5.35	94.65	**92.21**
#20	0.85	114.31	(**)	11.26	16.61	83.39	**81.24**
#40	0.425	407.40		40.13	56.74	43.26	**42.14**
#60	0.25	154.70		15.24	71.98	28.02	**27.30**
#140	0.106	113.63		11.19	83.17	16.83	**16.39**
#200	0.075	9.79		0.96	84.14	15.86	**15.45**
Pan	-	161.02		15.86	100.00	-	-

Notes : *(*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample*
*(**) The - 3/4" sieve analysis is based on the Weight of the Dry Specimen*

Tested By JP Date 01/27/04 Checked By [illegible] Date 1-30-04

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INTEGRITY IN TESTING

ATTERBERG LIMIT

ASTM D 4318-00/AASHTO T89-96, T90-00 (SOP - S4)

Client	URS CORPORATION	Boring No.	COVER
Client Reference	Dupont Edgemoor Closure Cap	Depth (ft)	NA
Project No.	2004-023-01	Sample No.	CS-2
Lab ID	2004-023-01-02	Visual Description	**BROWN SILT**
			(MInus No. 40 sieve material, Airdried)

NON - PLASTIC MATERIAL

Tested By JP *Date* 01/27/04 *Checked By* Jem *Date* 1-29-04

page 1 of 1 DCN: CT-S4C DATE: 7-11-97 REVISION : 2 C:\MSOFFICE\EXCEL\PrintQ\[W172.xls]Sheet1

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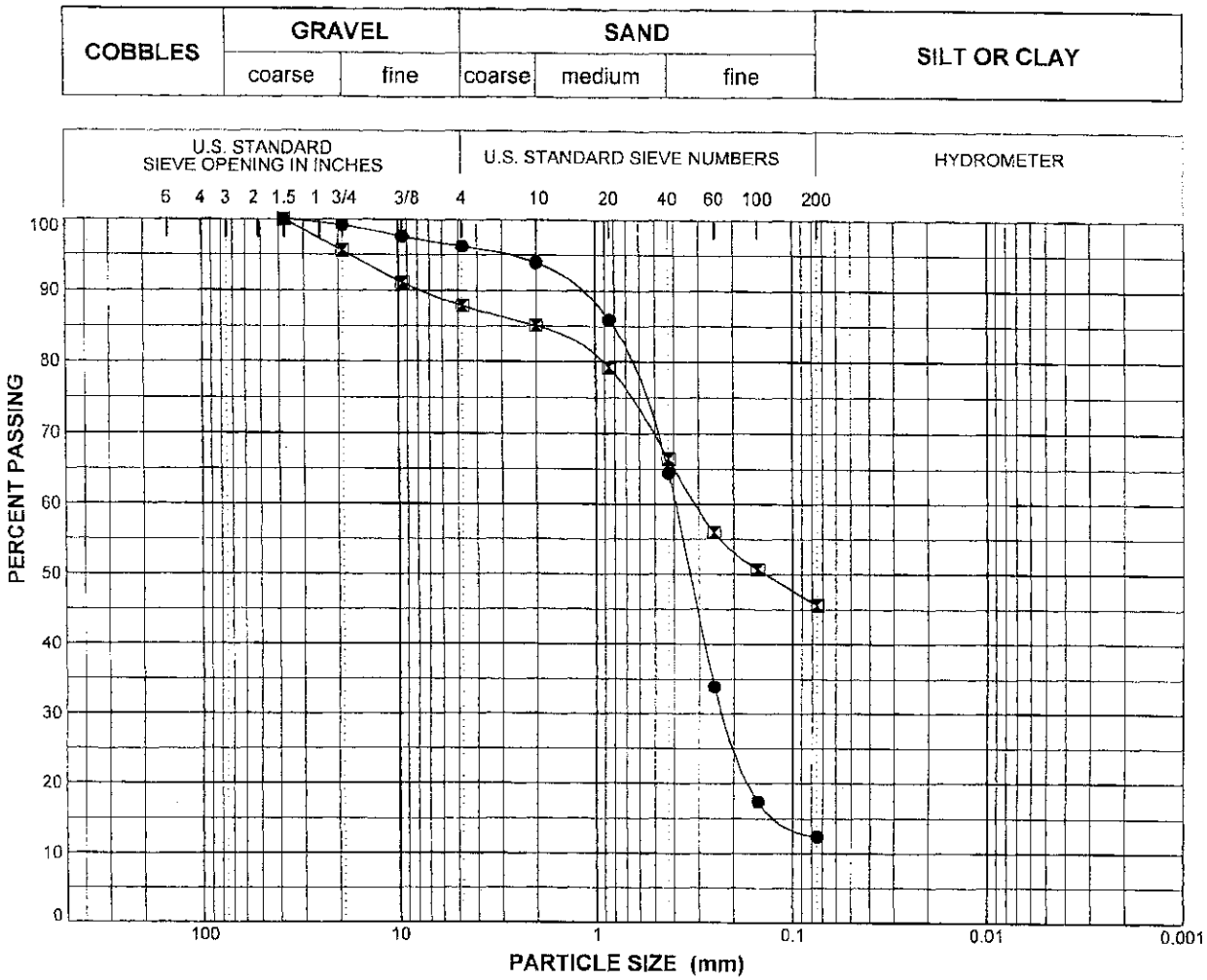
172

CS2 - CONTRACTOR MAT'LS

CS3 - BANK ONE

ALTERNATE COVER SOILS



SYMBOL	●	⊠
Boring	BULK-CS2	BULK-CS3
Sample		
Spec		
Depth (ft)	--	--
% +3"	0.0	0.0
% Gravel	3.8	12.2
% Sand	83.8	42.3
% Fines	12.4	45.6
% -2μ		
Cc	2.32	
Cu	7.30	
LL		
PL		
PI		
USCS	SC	SC
w (%)		

Particle Size (Sieve #)	PERCENT FINER ●	PERCENT FINER ⊠
4"		
3"		
1-1/2"	100.0	100.0
3/4"	99.2	95.6
3/8"	97.6	91.1
4	96.2	87.8
10	94.0	85.1
20	85.9	79.2
40	64.5	66.5
60	33.9	56.0
100	17.4	50.7
200	12.4	45.6

SYMBOL	DESCRIPTION AND REMARKS
●	BROWN CLAYEY SAND (SC)
⊠	BROWN CLAYEY SAND (SC)

PARTICLE SIZE DISTRIBUTION

DuPont

Project Number 19992311	January 2004	Figure 1

URS

SIEVE_BLUEBELL 19992311-DUPONT 11-21-2003.GPJ URS_BLUE.GDT 1/8/04

1- 8-04;12:37PM;URS Corporation ;215 543 3888 # 3/ 8

17.2

Project: DuPont
Project No.: 19992311

URS

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2μ (%)			Stress (psi)	Strain (%)	UU	CIU		
BULK-CS2	--	BROWN CLAYEY SAND	SC							12									
BULK-CS3	--	BROWN CLAYEY SAND	SC							46									

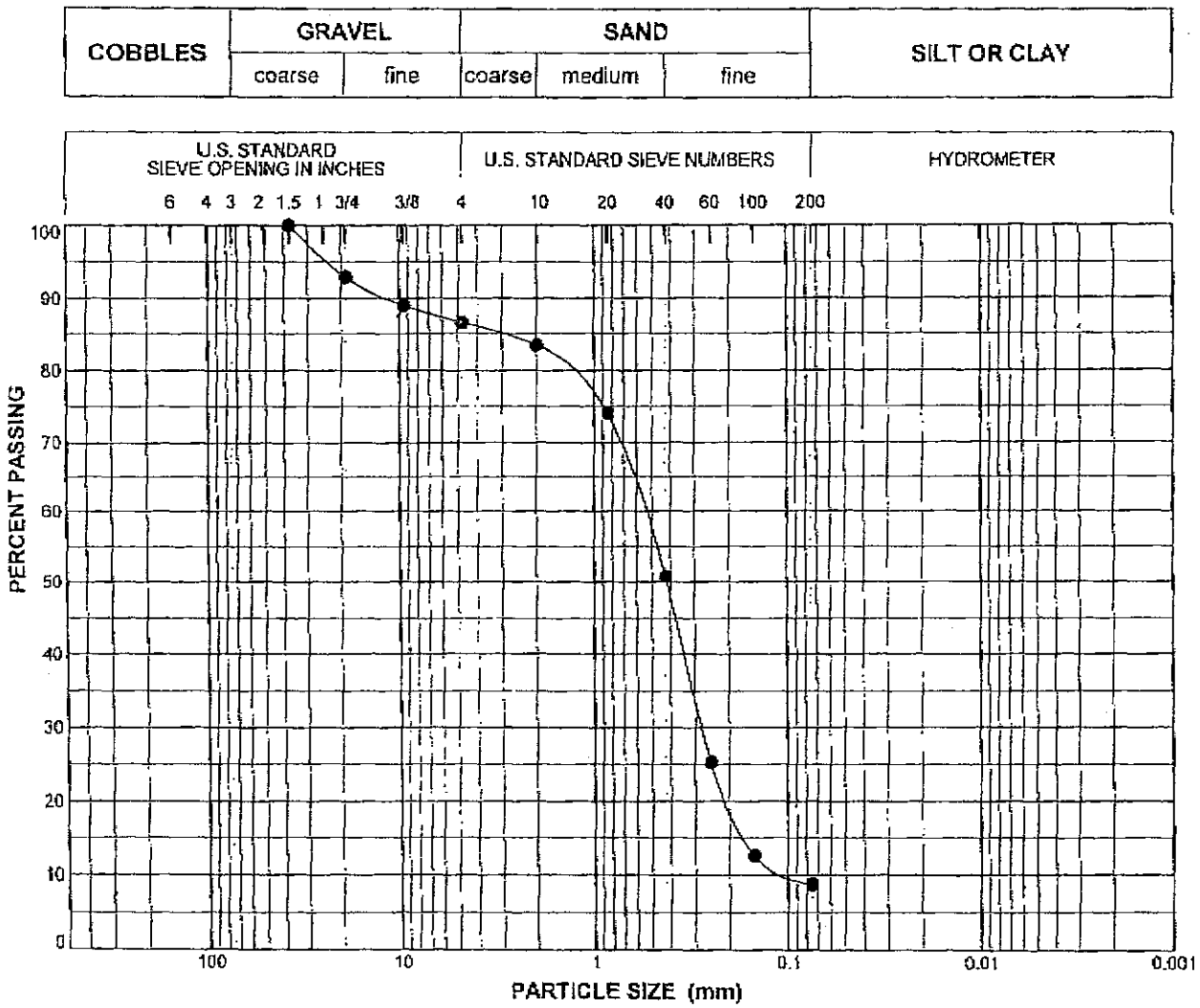
Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves

1- 8-04; 12:37PM;URS Corporation ;215 543 3888 # 2/ 3

CONTRACTOR'S MATERIAL - COVER SOIL

CS2



SYMBOL	●		
Boring	BULK-CM2		
Sample			
Spec			
Depth (ft)	–		
% +3"	0.0		
% Gravel	13.4		
% Sand	77.8		
% Fines	8.7		
% -2μ			
Cc	1.44		
Cu	5.93		
LL	NP		
PL	NP		
PI	NP		
USCS	SP-SM		
w (%)	4.1		

Particle Size (Sieve #)	PERCENT FINER ●		
4"			
3"			
1-1/2"	100.0		
3/4"	92.9		
3/8"	89.0		
4	86.6		
10	83.4		
20	74.1		
40	50.8		
60	25.3		
100	12.6		
200	8.7		

SYMBOL	DESCRIPTION AND REMARKS
●	BROWN POORLY GRADED SAND with SILT (SP-SM)

PARTICLE SIZE DISTRIBUTION

DuPont

Project Number	January 2004	Figure 1
19992311		

URS

Jan-30-2004 03:37pm From-URS CORPORATION T-280 P.003/003 F-052 2165423888
SIEVE_BLUEBELL 19992311-DUPONT-11-21-2003.GPJ URS_BLUE.GDT 1/27/04

Jan-30-2004 03:37pm From-URS CORPORATION 2155423888 T-290 P.002/003 F-052

Project: DuPont
Project No.: 19992311

URS

SUMMARY OF LABORATORY TEST RESULTS

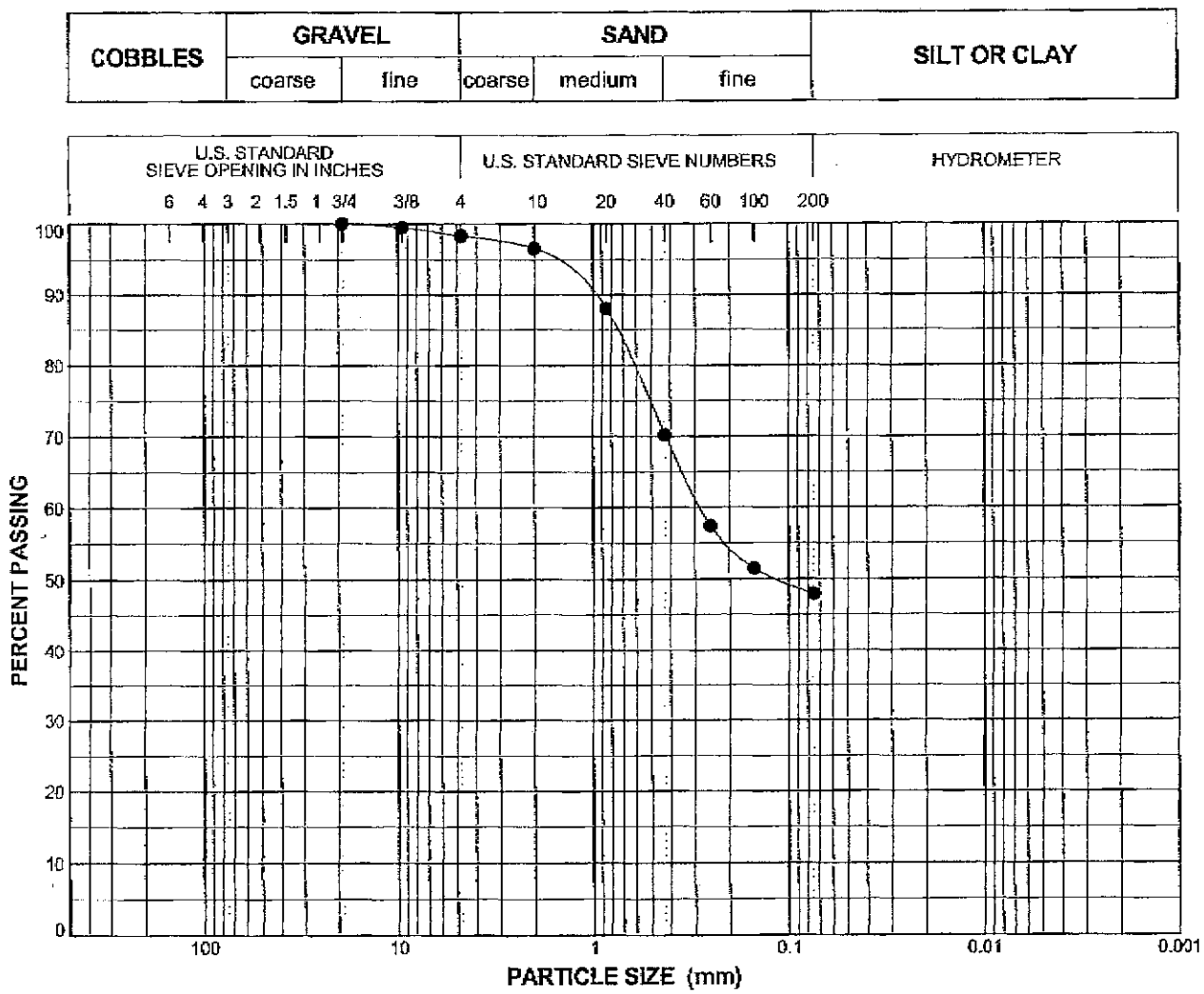
Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2μ (%)			Stress (psi)	Strain (%)	UU	CIU		
BULK-C&D2	--	BROWN POORLY GRADED SAND with SILT	SP-SM	4.1		NP	NP			9									

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves

20.1 32200 3.10.C KENT SAND & GRAVEL

COVER SOIL



SYMBOL	●		
Boring	COVER SOIL		
Sample			
Spec			
Depth (ft)	–		
% +3"	0.0		
% Gravel	1.7		
% Sand	50.4		
% Fines	47.9		
% -2μ			
Cc			
Cu			
LL	28		
PL	19		
PI	9		
USCS	SC		
w (%)	8.2		

Particle Size (Sieve #)	PERCENT FINER ●		
4"			
3"			
1-1/2"			
3/4"	100.0		
3/8"	99.5		
4	98.3		
10	96.6		
20	88.1		
40	70.2		
60	57.4		
100	51.5		
200	47.9		

SYMBOL	DESCRIPTION AND REMARKS
●	GRAY BROWN CLAYEY SAND (SC)

PARTICLE SIZE DISTRIBUTION

DuPont

Project Number 19992311	March 2004	Figure 1

URS

SIEVE_BLUEBELL 19992311-DUPONT-11-21-2003.GPJ URS_BLUE.GDT 3/10/04

Project: DuPont
Project No.: 19992311

URS

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Analytical Results (ppm)			Triaxial Compression		Resistivity (Ohm-cm)	pH
						Liquid Limit	Plastic Limit			<#200 (%)	<2μ (%)			Chloride	Sulfate	Sulfide	UU	CIU		
COVER SOIL	--	GRAY BROWN CLAYEY SAND	SC	8.2		28	19			48										

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves

APPENDIX D6
TOPSOIL

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INTEGRITY IN TESTING

LOSS ON IGNITION

ASTM D 2974-87 (SOP - S8)

Client	URS CORPORATION
Client Reference	DUPONT EDGEMOOR CLOSURE CAP
Project No.	2004-023-01

Lab ID	03
Boring No.	TOPSOIL
Depth(ft).	NA
Sample No.	**TS-1**
Tare Number	O+M
Wt. Tare & WS (gm)	124.16
Wt. Tare & DS (gm)	110.06
Wt. Tare (gm)	37.31
Wt. Water (gm)	14.1
Wt. DS (gm)	72.75
Moisture Content	**19.4%**

Ash Content

Wt. Tare & Ash (gm)	107.92
Wt. Volatiles (gm)	2.14
Wt. Ash (gm)	70.61
Percent Solids	**83.8%**
Ash Content	**97.1%**
Loss On Ignition	**2.9%**

Tested By JP *Date* 01/27/04 *Checked By* DDA *Date* 1/30/04

DCN: CT-S8 DATE 11-15-96 REVISION 1

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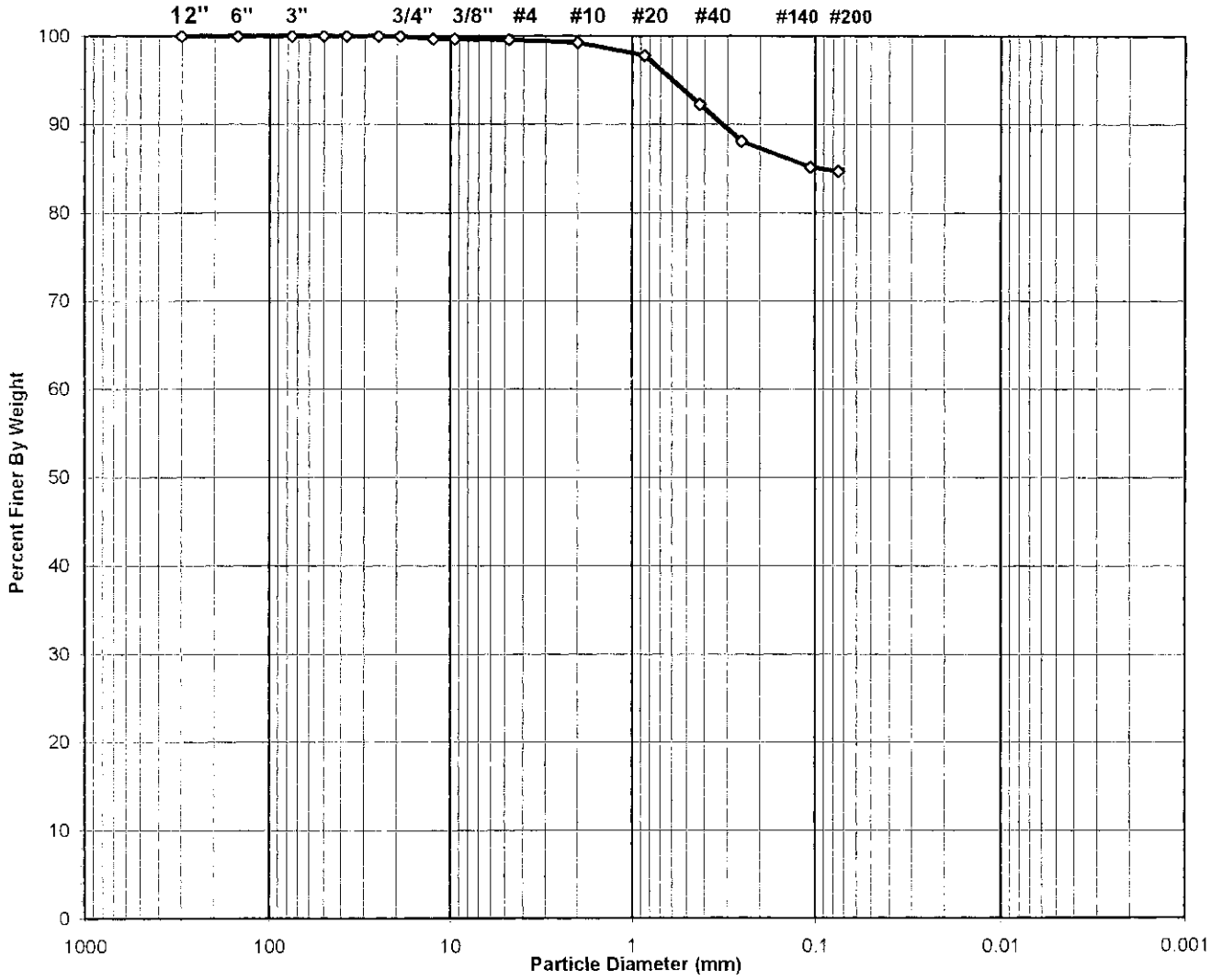
INTEGRITY IN TESTING

SIEVE ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	URS CORPORATION	Boring No.	TOPSOIL
Client Reference	DUPONT EDGEMOOR CLOSURE CAP	Depth (ft)	NA
Project No.	2004-023-01	Sample No.	TS-1
Lab ID	2004-023-01-03	Soil Color	**BROWN**

	SIEVE ANALYSIS		*HYDROMETER*
USCS	**gravel**	**sand**	**silt and clay**



USCS Symbol ***CL-ML, TESTED***

USCS Classification ***SILTY CLAY WITH SAND***

Tested By JP Date 01/27/04 Checked By Jam Date 2-3-04

 DCN: CT-S3C DATE 6-25-98 REVISION: 2 C:\MSOFFICE\EXCEL\PrintQ\W260.xls]Sheet1

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WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	URS CORPORATION	Boring No.	TOPSOIL
Client Reference	DUPONT EDGEMOOR CLOSURE CAP	Depth (ft)	NA
Project No.	2004-023-01	Sample No.	TS-1
Lab ID	2004-023-01-03	Soil Color	**BROWN**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	681	Tare No.	NA
Wgt.Tare + Wet Specimen (gm)	1065.70	Wgt.Tare + Wet Specimen (gm)	NA
Wgt.Tare + Dry Specimen (gm)	907.50	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	98.07	Weight of Tare (gm)	NA
Weight of Water (gm)	158.20	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	809.43	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**19.5**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	809.43
Dry Weight - 3/4" Sample (gm)	123.9	Weight of minus #200 material (gm)	685.57
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	123.86
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.50	2.56	0.32	0.32	99.68	**99.68**
3/8"	9.50	0.00	0.00	0.32	99.68	**99.68**
#4	4.75	0.82	0.10	0.42	99.58	**99.58**
#10	2.00	2.49	0.31	0.73	99.27	**99.27**
#20	0.850	12.09	1.49	2.22	97.78	**97.78**
#40	0.425	44.64	5.51	7.73	92.27	**92.27**
#60	0.250	33.62	4.15	11.89	88.11	**88.11**
#140	0.106	23.78	2.94	14.83	85.17	**85.17**
#200	0.075	3.86	0.48	15.30	84.70	**84.70**
Pan	-	685.57	84.70	100.00	-	-

Tested By JP Date 01/27/04 Checked By CM Date 2-3-04

DCN: CT-S3C DATE 6-25-98 REVISION: 2

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544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • Fax (412) 823-8999

geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	URS CORPORATION	Boring No.	TOPSOIL
Client Reference	DuPont Edgemoor Closure Cap	Depth (ft)	NA
Project No.	2004-023-01	Sample No.	TS-1
Lab ID	2004-023-01-03	Soil Description	**BROWN SILTY CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

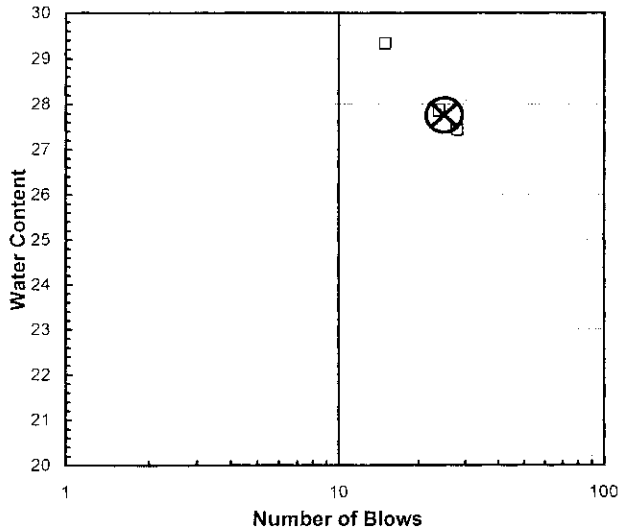
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	227	252	260	U
Wt. of Tare & WS (gm)	47.95	53.57	54.32	L
Wt. of Tare & DS (gm)	41.49	45.97	46.67	T
Wt. of Tare (gm)	17.94	18.69	20.58	I
Wt. of Water (gm)	6.5	7.6	7.7	P
Wt. of DS (gm)	23.6	27.3	26.1	O
				I
Moisture Content (%)	**27.4**	**27.9**	**29.3**	N
Number of Blows	**28**	**24**	**15**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	194	157	
Wt. of Tare & WS (gm)	23.29	22.61	
Wt. of Tare & DS (gm)	22.12	21.50	
Wt. of Tare (gm)	16.67	16.24	
Wt. of Water (gm)	1.2	1.1	
Wt. of DS (gm)	5.5	5.3	
Moisture Content (%)	**21.5**	**21.1**	**0.4**

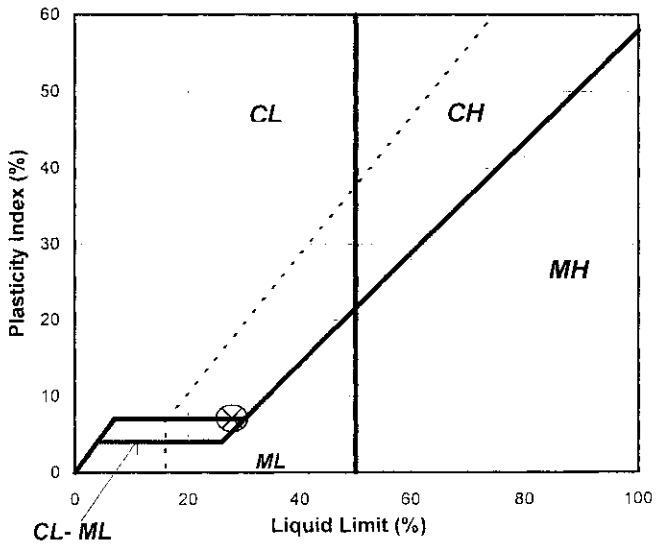
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**28**
Plastic Limit (%)	**21**
Plasticity Index (%)	**7**
USCS Symbol	**CL-ML**

Flow Curve



Plasticity Chart



Tested By TO *Date* 02/02/04 *Checked By* [illegible] *Date* 2-3-04

page 1 of 1 **DCN:** CT-S4B **DATE:** 10/08/01 **REVISION:** 2

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544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • Fax (412) 823-8999

geotechnics
INTEGRITY IN TESTING

pH OF SOILS

ASTM D 4972-01 / AASHTO T 289-91
(SOP- S36)

Client	URS CORPORATION
Client Reference	DuPont Edgemoor Closure Cap
Project No.	2004-023-01

Lab ID		03
Boring No.		TOPSOIL
Depth (ft)		NA
Sample No.		TS-1
Drying Tare No.		669
Testing Tare No.		A
Temperature (° C)		21
pH of Sample	***Test 1***	**5.7**
	Test 2	**5.7**
Agreement (+/- 0.2 units)		**0.0**

Meter Calibration

Buffer pH	Meter Reading	Meter Model
4.00	4.02	ORION 720A
7.00	7.04	
10.0	10.03	

pH of Deionized Water (Acceptable range 6.5-7.5)	6.9

Tested By KBL Date 01/27/04 Checked By [illegible] Date 1-29-04

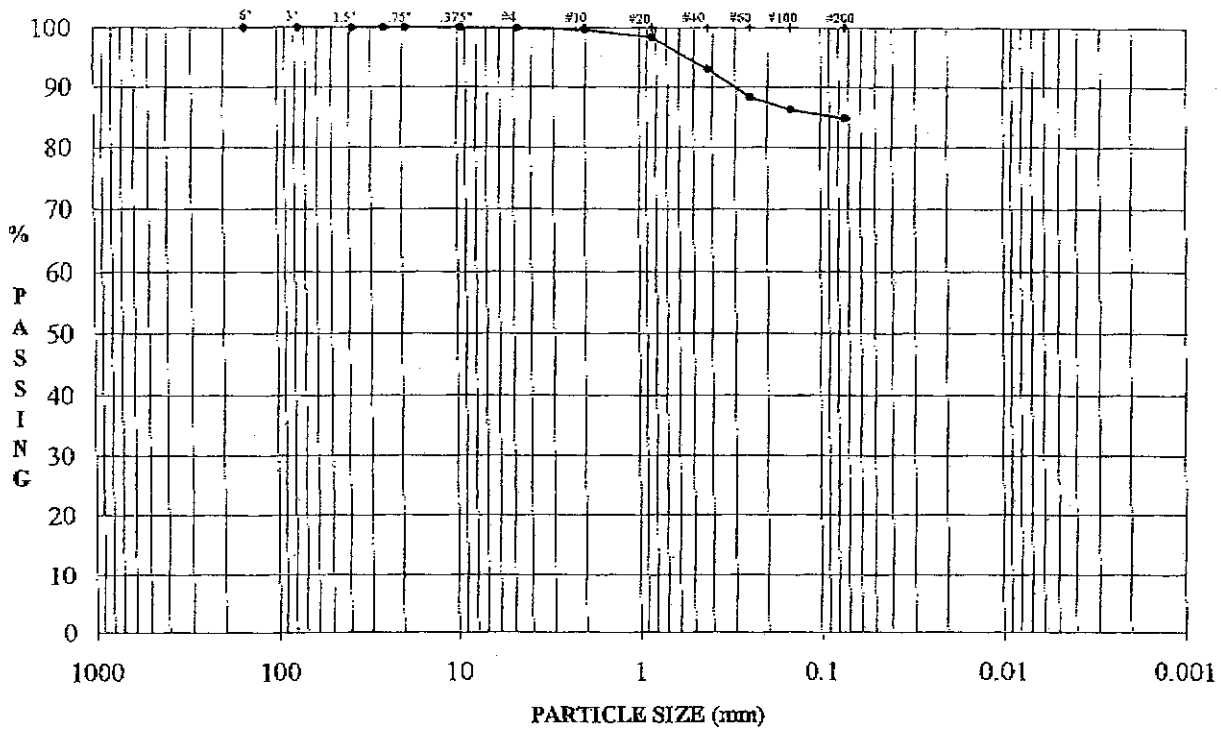
DCN: CT-S36 DATE 2/16/01 REVISION: 3 *\\GEOSERVER\Data Drive\Soil Data\2004\[2004-023-01-03pH XLS]Sheet1*

544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • Fax (412) 823-8999

02200 310.B TOPSOIL

PARTICLE-SIZE DISTRIBUTION ASTM D 422

US STANDARD SIEVE OPENING SIZES



COBBLE	Coarse	Fine	Cor	Med	Fine	Silt or Clay
	GRAVEL		SAND			FINES

Sample Data		
% Gravel	0.1	
% Sand	15.0	
% Fines	84.9	
C_C	N/A	
C_U	N/A	
LL	28	INFO
PL	22	
PI	6	
USCS	CL-ML	
w (%)	9.0	INFO

Percent Finer		
3"	100.0%	100
1 1/2"	100.0%	
1"	100.0%	90 MIN
3/4"	100.0%	
3/8"	100.0%	
#4	99.9%	
#10	99.6%	70 MIN
#20	98.4%	
#40	93.1%	
#60	88.4%	
#100	86.2%	
#200	84.9%	40 MAX

COMMENTS:

DESCRIPTION

Sample: TOP SOIL

Depth: -

Wet Color: Pale brown

Description: Silty clay

Date: 09/22/03

Technician: WWC

Reviewer: RMW

URS/EDGEMOOR/DE

GOLDER ASSOCIATES INC.
CHERRY HILL, NEW JERSEY

02200 3.10 B TOPSOIL

ORGANIC CONTENT

ASTM D 2974, METHOD C

URS/EDGEMOOR/DE				DATE	09/23/03
				TECH	WWC
				REVIEW	RMW
sample #	TOPSOIL			pH:	4.6
depth					
tare #	1	2	3		
wt soil&tare,dry (g)	113.95	98.99	108.11		
wt soil&tare,burnt (g)	112.95	98.16	107.23		
wt tare (g)	74.33	67.20	74.37		
ash (g)	38.62	30.96	32.86		
wt soil,dry (g)	39.62	31.79	33.74		
% ash	97.48%	97.39%	97.39%	AVERAGE	
% organics	2.52%	2.61%	2.61%		2.58%

5.0 - 7.5

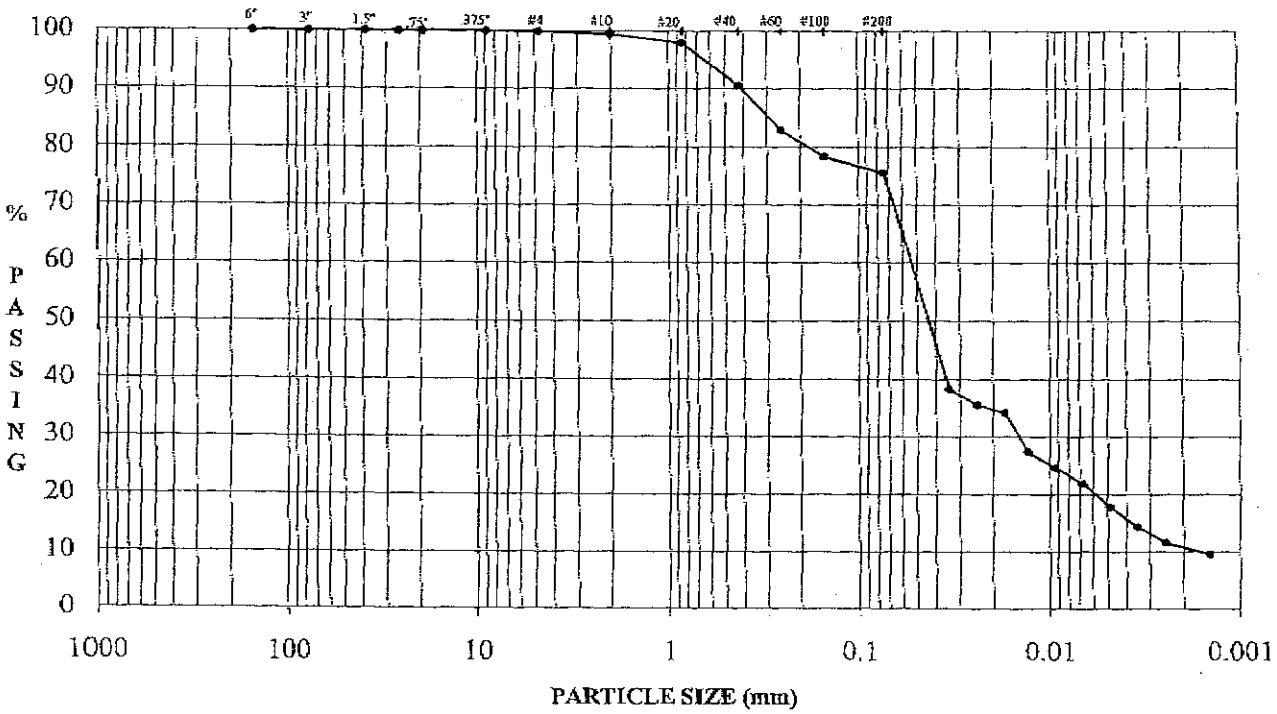
2% < , < 20%

GOLDER ASSOCIATES INC.
CHERRY HILL, NEW JERSEY

TOPSOIL - BORROW SOUT E "B"

PARTICLE-SIZE DISTRIBUTION ASTM D 422

US STANDARD SIEVE OPENING SIZES



COBBLE	Coarse	Fine	Cor	Med	Fine	Silt or Clay
	GRAVEL		SAND			FINES

Sieve Data

Particle Diameter	% Finer
3"	100.0%
1 1/2"	100.0%
1"	100.0%
3/4"	100.0%
3/8"	100.0%
#4	99.8%
#10	99.5%
#20	97.9%
#40	90.5%
#60	82.9%
#100	78.4%
#200	75.6%

Hydrometer Data

Particle Diameter	% Finer
0.034	38.2%
0.024	35.5%
0.017	34.1%
0.013	27.3%
0.009	24.6%
0.007	21.9%
0.005	17.8%
0.003	14.3%
0.002	11.6%
0.001	9.6%

DESCRIPTION

Sample:	TOPSOIL	Depth:	-
		USCS:	CL-ML
Wet Color:	Yellowish brown		
Description:	Silty clay with sand		
Comments:			

SAMPLE DATA

W_C (%):	16.6	(ASSUMED)	C_C	N/A
G_S:	2.65		C_U	N/A
% Gravel	0.2		LL	28
% Sand	24.3		PL	21
% Fines	75.6		PI	7

Date:	12/05/03
Technician:	WWC
Reviewer:	RMW

URS/EDGEMOOR/DE

GOLDER ASSOCIATES INC.
CHERRY HILL, NEW JERSEY

ORGANIC CONTENT

ASTM D 2974, METHOD C

URS/EDGEMOOR/DE			DATE	12/08/03
			TECH	RDD
			REVIEW	RMW
sample #	**TOPSOIL**		pH:	**5.6**
depth				
tare #	1	2		
wt soil&tare,dry (g)	135.65	127.83		
wt soil&tare,burnt (g)	133.86	125.99		
wt tare (g)	74.36	67.21		
ash (g)	59.50	58.78		
wt soil,dry (g)	61.29	60.62		
% ash	**97.08%**	**96.96%**		**AVERAGE**
% organics	**2.92%**	**3.04%**		**2.98%**

GOLDER ASSOCIATES INC.
CHERRY HILL, NEW JERSEY

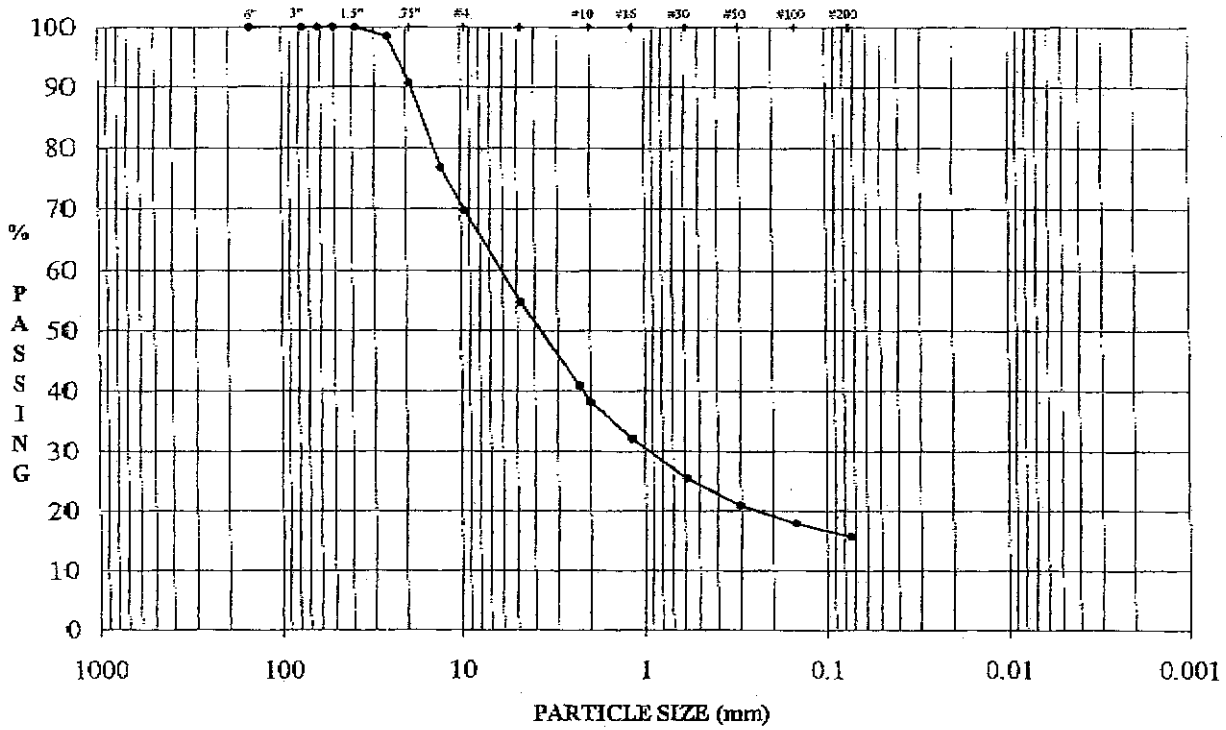
TOPSOIL - "B"

APPENDIX D7
GRADED AGGREGATE

02505 3.8F ADV. TEST GRADATION ROAD AGGREGATE.

PARTICLE-SIZE DISTRIBUTION ASTM C 136

US STANDARD SIEVE OPENING SIZES



COBBLE	GRAVEL Coarse	GRAVEL Fine	SAND Cor	SAND Med	SAND Fine	FINES Silt or Clay

Sample Data		
C_C	N/A	
C_U	N/A	
USCS	-	
w (%)	2.9	
Percent Finer		
3"	100.0%	
2 1/2"	100.0%	
2"	100.0%	
1 1/2"	100.0%	
1"	98.4%	100
3/4"	90.6%	50-90
1/2"	76.7%	
3/8"	69.7%	
#4	54.7%	20-50
#8	40.9%	
#10	38.2%	15-40
#20	31.9%	
#40	25.4%	
#60	20.9%	
#100	17.8%	2-20
#200	15.6%	

COMMENTS:

DESCRIPTION

Sample: ROADWAY AGGREGATE

Depth: -

Wet Color: Pale brown

Description: Gravel and Sand, some fines

Date: 09/22/03

Technician: WWC

Reviewer: RMW

URS/EDGEMOOR/DE

GOLDER ASSOCIATES INC.
CHERRY HILL, NEW JERSEY

APPENDIX D8
SEED AND SOIL AMENDMENTS

Enviroscapes, Inc.
Environmental Restoration Services

April 13, 2004

Via Facsimile (302.429.0812)/USPS

Mr. Gordon Chin
Senior Project Manager
URS Remediation and Operating Services
2325 Maryland Road, 2nd Floor
Willow Grove, Pennsylvania 19090

RE: CERTIFICATION LETTER- SEEDING
EDGE MOOR SURFACE IMPOUNDMENT CLOSURE
DUPONT EDGE MOOR FACILITY, DELAWARE

Dear Mr. Chin:

This letter will serve as a formal certification letter for Enviroscapes Inc. (Enviroscapes) for the seeding services at the subject site. This work was performed by Enviroscapes personnel in conformance with the following materials and procedures as stated.

Permanent Seeding

Enviroscapes utilized a Finn T90 Hydroseeder to seed, fertilizer. lime and tack the area. Following seeding, straw mulch was applied with a REINCO Straw Blower and anchored using polymer-based tackifying agent. Enviroscapes seeded 6.5 acres (283,140 square feet) of area in accordance with the following seed mixtures and soil amendments:

Seed Mixture: Permanent Seed Mix at a rate of 10.2 per acre:

- 3.6 lbs. Indiangrass
- 3.6 lbs. Big Bluestem
- 2.4 lbs. Little Bluestem
- 0.6 lb. Wildflower and Legume Mix
  - Black-Eyed Susan (20%)
  - Lanceleaved Coreopsis (20%)
  - Purple Coneflower (20%)
  - Tickseed (20%)
  - Partridge Pea (20%)

Fertilizer Liquid Fertilizer (16-32-16) at a rate of 100 lbs. per acre.

Lime: Nutra Lime water soluble lime at a rate of 100 lbs. per acre.

Mulch: Straw Mulch at a rate of 1.5 tons per acre.

Binder: Earth Bond tackifying agent.

P.O. Box 1262, 521-L Amboy Ave., Woodbridge, NJ 07095 telephone # (732) 636-6407 - fax # (732) 634-8255
visit us at: www.enviroscapesinc.com

Enviroscapes appreciates the opportunity to provide seeding services to URS. If you have any questions, please call me at (732) 636-6407.

Very truly yours,

Edward W. Blanar

Edward W. Blanar
Vice President.

ANNUAL RYEGRASS
99.88% PURE SEED
0.04% OTHER CROP
0.08% INERT MATTER
0.00% WEED SEED
ORIGIN: OREGON

LOT:L108-3-7
NET WT: 50 LBS
GERMINATION: 90.00%
TEST DATE: 08/03
SELL BY 00/00

NATIONAL SEED COMPANY
188 JULES LANE
NEW BRUNSWICK, NJ 08901
NOXIOUS WEEDS:
NONE FOUND

AMS-643

ERNST *Conservation Seeds*

9006 Mercer Pike, Meadville, PA 16335 (814) 336-2404 fax: (814) 336-5191
e-mail: ernst@ernstseed.com (800) 873-3321 web:www.ernstseed.com

Conservation Seed Mix

ITEM	PURITY	GERM	HARD	DORM	ORIGIN
Niagara Big Bluestem	31.48%	92%			PA
Rumsey Yellow Indian Grass	31.48%	67%		25%	MO
Camper Little Bluestem	20.53%	50%		44%	NE
Partridge Pea	1.37%	30%	41%		PA
Purple Coneflower	1.15%	84%			OR
Lance Leaved Coreopsis	1.08%	82%		9%	NC
Black Eyed Susan	1.08%	87%		3%	NC
Showy Tickseed Sunflower (Bur	1.03%	94%			NC

OTHER CROP: 0.14%
INERT MATTER: 10.49%
WEED SEED: 0.17%

NET WEIGHT: 50 LB
LOT NUMBER: ENVI00430
DATE TESTED: March 2003

Pea/Vetch inoculant mixed in - exp 12/04.

Seeds for Conservation Use.

ENVIROBLEND®
HYDRAULIC MULCH

WOOD FIBER / PAPER FIBER

Now with ProPlus™ Hydro Mulching Solutions SLIKSHOT™

APPLICATION RATE GUIDELINES

RECOMMENDED MAXIMUM SLOPE LENGTH: 30 FEET

Maximum Slope	Lbs./Acre	Machine Loading

Organic Matter	87% +/- 3%
Moisture	12% +/- 3%
SlikShot™	1%

NET WEIGHT 50 LBS (22.7 Kg)
NET DRY WEIGHT 44 LBS (20.0 Kg)

MADE IN U.S.A.

CONWED FIBERS

PROFILE PRODUCTS LLC
750 LAKE COOK ROAD • SUITE 440 • BUFFALO GROVE, IL 60089
CUSTOMER SERVICE: 1-800-366-1180 • WWW.CONWEDFIBERS.COM
MANUFACTURED BY PROFILE PRODUCTS LLC • CONOVER, NC

10,000 sq/ft

15,000 sq/ft

20,000 sq/ft

25,000 sq/ft

30,000 sq/ft

35,000 sq/ft

Empty entire bottle to treat one acre.

Earth Bond

Recommended Uses:

Wood and Paper Mulch Tackifier
Straw/Hay Tackifier
Slurry Thickener and Lubricant
Dust Abatement
Soil Stabilization Agent
Water Retaining Agent

Application Rate:

One 3 lb. bottle treats one acre, regardless of desired application. When tacking straw or hay, we recommend adding 200 lbs. of fiber mulch per acre.

Recommended Mixing Procedure

Fill tank with water and all other slurry ingredients. Set agitation to 1/2 speed and slowly sift tackifier into the slurry. Once added, begin full speed agitation for 3-5 minutes.

Caution: Very slippery when wet.
Clean wet spill with absorbent material.
Clean dry spill with vacuum.

NONPLANT FOOD INGREDIENT

NET WT 3 LBS

National Seed of NJ
18 B Jules Lane
New Brunswick, NJ 08901

1-800-828-5856

ProPlus™
Hydro Mulching Solutions

NeutraLime™

Dry

- QUICKLY INCREASES pH SUSPENSION
- EASY TO MIX AND USE
- IMPROVES FERTILIZER UPTAKE

DIRECTIONS FOR USE

Refer to equipment manufacturer's loading instructions.

TYPICAL APPLICATION RATES

Soil Test pH Range ≥ 5.6	40 Lbs. Per Acre
Soil Test pH Range ≥ 5.2	80 Lbs. Per Acre
Soil Test pH Range ≥ 4.9	120 Lbs. Per Acre
Soil Test pH Range ≥ 4.6	160 Lbs. Per Acre

GUARANTEED ANALYSIS

Solids	99%	Effective Neutralizing Power	1900 Lbs. Per Ton
Calcium Carbonate ($CaCO_3$)	Minimum 97.8%	Non Corrosive	pH 9.5
Magnesium	.5%	Percent passing 500 microns,	
Related Neutralizing Value	97%	35 mesh sieve	100%

Profile warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes referred to in the directions. Profile makes no other expressed or implied warranty. In no case shall Profile or seller be liable for consequential, special or indirect damages resulting from the use or handling of this product, and no claim of any kind shall be greater in amount than the purchase price of the product.

CAUTION: Avoid breathing dust. May cause respiratory irritation. Use in a ventilated area. Avoid contact with eyes and skin. If product comes in contact with eyes or skin, wash thoroughly with water. If taken internally, contact a physician. If irritation develops from skin or eye contact, consult a physician.

Profile Products LLC
750 Lake Cook Road ▪ Suite 440 ▪ Buffalo Grove, IL 60089 ▪ 800-366-1180
www.profileproducts.com

NET WEIGHT 40 POUNDS (18.16 KG)

16-32-16
JACK'S CLASSIC

HYDRO SEED FORMULA
WATER SOLUBLE FERTILIZER

GUARANTEED ANALYSIS

Total nitrogen (N) 16%
6.2% ammoniacal nitrogen
9.8% urea nitrogen
Available Phosphate (P_2O_5) 32%
Soluble potash (K_2O) 16%

Primary Nutrients Sources: urea, ammonium phosphate, muriate of potash.
Potential Acidity: 725 lbs. calcium carbonate equivalent per ton.

Directions

Hydroseeding/Lawn Care:

Mix in hydroseeder with seed and mulch and apply when seeding combinations are favorable for seed germination. One 25 lb. bag should be dissolved in enough water to cover 16,666 square ft. This rate will provide .25# (N), .50 (P), and .25# (K) per 1,000 sq. ft. of covered area. Time of application may be varied to meet local needs. Check mix calculations carefully before changing rates. Apply immediately and use the entire tankful at one time. Prolonged standing of mix may cause clogging of equipment.

Tree and Shrub Care:

Dissolve 4 1/2 lbs. of the product per 7 1/2 gallons of water and apply to 1,000 sq. ft. either by root injection on 2 1/2 ft. centers under tree drip line with injections of 6 oz. liquid per site, 6" to 10" deep or by drench application to bed areas. (Note: Keep liquid off of foliage and use drench method in mulched beds.)

MFG BY: J.R. Peters, Inc.
Allentown, PA 18106

NET WT. 25 lbs.

APPENDIX D9
FIELD TENSIOMETER CALIBRATION CERTIFICATE

SMO
11/27/04

FIELD TENSIOMETER CALIBRATION

SMITH

WEGENER

Proud Members of:

IAPD INTERNATIONAL ASSOCIATION OF PLASTICS DISTRIBUTORS PGI

D-L-F-A

IAGI IFA Proud member

LOAD CELL CALIBRATION CERTIFICATE
WEGENER ULTITEST 500/B
SERIAL # 90001

Display Instrument:	ATC 5204A J01134-00	Serial #	015156
Load Cell:	Interface SM-500 0-500 lbs	Serial #	B85044

WEGENER NORTH AMERICA INC. verifies the calibration of field testing equipment with an Omegadyne TC-S 0-500 lb Load Cell serial #088910 and a T-Hydronics Transducer Indicator serial #594 manufactured by Omegadyne Inc. (formerly T-Hydronics, Inc.) of Sunbury, Ohio. The transducer was compared to standards certified traceable to the National Institute of Standards and Technology, Washington, D.C. This certification is in reference to NIST test report #38130 B. The system calibration of the calibration load cell/indicator was completed on 06/04/96 (certificate available on request).

The calibration of WEGENER ULTITEST 500/B Tensiometer Serial # 90001 was verified on 04/07/03 using the calibration load cell/indicator described above. The readings of the calibration set are recorded as "True Load." The readings of the instrument in question are recorded below as "Display Load."

True Load (lbs)	Display Load Run #1	Display Load Run #2	Display Load Run #3	Display Load Average
0.0	0.0	0.0	0.0	0.0
50.0	50.2	50.3	50.1	50.2
100.0	100.4	100.3	100.4	100.4
150.0	150.2	150.3	150.4	150.3
200.0	200.2	200.3	200.2	200.2
250.0	250.2	250.4	250.3	250.3
300.0	300.3	300.2	300.3	300.3
350.0	350.2	350.2	350.3	350.2
400.0	400.2	400.2	400.2	400.2
450.0	450.4	450.2	450.3	450.3
500.0	500.1	500.2	500.2	500.2

WEGENER NORTH AMERICA, INC.

Vicky McKeown
Service Department

For all your thermoplastic welding and testing needs, contact:

WEGENER North America, Inc.
231 S. Frontage Road, Unit #12 • Burr Ridge, IL 60521 • ☎(630) 789-0990 • Fax: (630) 789-1380 • sales@wegener-na.com

URS

Page ____ of ____

Job DuPont Edge Moor | Project No. 14992311-00001 | Sheet ____ of ____

Description GSI Name vs. Initials | Computed by ____ | Date ____

Cross Reference | Checked by ____ | Date ____

Reference

QC Technicians:

P.P. = Paul Phachanh
S.P. = Souphachanh Phomphaksksavanh
C.L. = Cheng Lo

Welding Technicians:

P.P. = Phoulamnao Phouthaiong
S.L. = Sengthong Liamsavay
N.P. = Nousin Phommaskha
K.M. = Kali McDade

APPENDIX E
INSTALLATION QUALITY CONTROL/QUALITY ASSURANCE DATA

APPENDIX E1
CELL A DATA

IMPOUNDMENT A

SEW

11/27/04

URS

November 26, 2003

Edge Moor Surface Impoundment Capping
DuPont Edge Moor Plant
Edgemoor, Delaware

Re: Clay Compaction Equipment and
Borrow Source Assessment

Gentlemen:

Attached please find the information regarding the proposed compaction equipment and clay borrow source to be used for the clay backfill at Impoundment Cell A.

Attachment one contains the pertinent literature for the compaction equipment proposed for use during backfill operations. For compaction operations we propose to use the Ingersoll Rand SD-70DA PRO-PAC segmented pad roller (sheeps foot). For areas where standard compaction equipment cannot be operated, a "jumping jack" impact type tamper (Ingersol Rand MT-75HS) will be utilized. For final smooth rolling the Ingersoll Rand SD-100D smooth drum roller will be used.

The clay source proposed is owned by Delaware Recyclable Products, A Waste Management Company (DRPI). The clay consists of site soils excavated for the construction of the landfill. Attachment 2 contains the initial borrow source evaluation testing initially performed at the site in January 1995. Additionally, we have provided some recent testing data on the materials indicating the consistency of the source.

Additional testing of the source was completed as advance testing for this site specifically. Laboratory testing included physical property testing (USCS classification, Atterberg Limit, Specific Gravity, Grain size analysis including hydrometer) and standard proctor. These test results area presented as attachment 3. Based upon review of the recent testing is it is our opinion that the DRPI stockpiled material is consistent with the original borrow source testing performed.

If you have any questions or if we may be of further assistance please contact me.

Sincerely,

Vince Troilo
Quality Control Supervisor

Attachment 1

Compaction Equipment

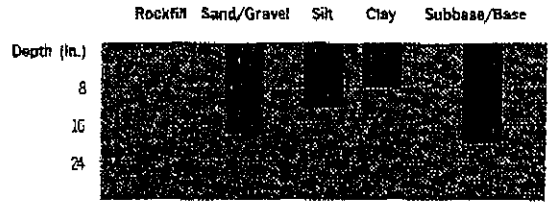
TRENCH COMPACTORS

LP 852

Primarily for sand, gravel and cohesive material. The roller is available both in manual control and manual/Infra Red control.

Read more about the LP 852 in our leaflet.

Maximum recommended thickness of layer (in.)



TECHNICAL DATA	Std. U.S. Version LP 852 (manual)	Std. U.S. Version LP 852 (dual)
Net weight, lbs (wide drums, high pads)	3,521	3,521
Operating weight, lbs	3,557	3,557
Frequency, vpm	1,800	1,800
Amplitude, in.	0.7	0.7
Centrifugal force, lbs	16,500	16,500
Speed, mph	0-2.5	0-2.5
Dimensions		
Drum diameter, in.	21	21
Drum width, in.	24/33	24/33
LxWxH, in.	76x33x47	76x33x49
Engine		
Manufacturer	Hatz	Hatz
Type	2G40	2G40
hp/rpm	18/2500	18/2500
Options		
Wide drums, high pads	Yes	Yes
Narrow drums, high pads	Yes, red. weight 198 lbs	Yes, red. weight 198lbs
Wide drums, low pads	Yes, red. weight 265 lbs	Yes, red. weight 265 lbs
Narrow drums, low pads	Yes, red. weight 397 lbs	Yes, red. weight 397 lbs
Cable remote control	-	Yes

FEATURES

LP 852

- Exclusive Dynapac designed high performance pad rollers are the result of extensive testing and years of compaction experience.
- Low profile pads as an optional for non cohesive soil compaction.
- The operator can control the rotation of the eccentric element to maximise traction.
- The LP 852 features operating noise levels as low as 78 dB(A), measured within 23 foot radius.
- Easy access to all check points so that routine maintenance can be performed quickly and safely.
- Excellent stability and climbing ability.

Pad Foot

SD-70DA PRO-PAC Specifications

Machine Weights		
Operating Weight	15,015 lb.	(6809 kg)
Static Weight at Drum	9,675 lb.	(4388 kg)
Static Weight at Tires	5,340 lb.	(2,422 kg)
Shipping Weight	14,261 lb.	(6,467 kg)
Machine Dimensions		
Overall Length	196 in.	(4985 mm)
Overall Width	74 in.	(1,875 mm)
Overall Ht. (top of ROPS)	113 in.	(2,870 mm)
Wheel/Drum Base	115 in.	(2,910 mm)
Curb Clearance	15 in.	(385 mm)
Side Clearance	4 in.	(100 mm)
Drum		
Drum Width	66 in.	(1,675 mm)
Drum Diameter	48 in.	(1,220 mm)
Shell Thickness (Nominal)	0.75 in.	(19 mm)
Vibration		
Frequency	1500-2500 VPM	(25-42.5 Hz)
Centrifugal Force-		
minimum	10,668 lb.	(47 kN)
maximum	26,000 lb.	(116 kN)
Nominal Amplitude-		
minimum	.016 in.	(0.41 mm)
maximum	.040 in.	(1.01 mm)
Water System		
Type/Pump	Pressurized, Electric Diaphram	
Tank Capacity	125 gal.	(473 L)

Engine		
Make & Model	Cummins 4B13.9	
Rated Power @2100rpm	92 HP	(69 kw)
Electrical System	12-Volt DC, Negative Ground	
Propulsion		
Type System	Hydrostatic, two-speed gearbox on planetary axle with No-Spin® differential	
Tire Size	13.0 x 24 – 10 PR-smooth	
Speeds - Low	0-4.5 mph	(0-7 km/hr)
High	0-7.8 mph	(0-12.5 km/hr)
Gradeability (theoretical)	55%	
Brakes		
Service	Dynamic hydrostatic through propulsion system	
Parking/Secondary	Spring-Applied, Hydraulically Released	
Steering		
Design	Centerpoint articulation	
Type System	Hydrostatic	
Articulation Angle	±40°	
Outside Turning Radius	200 in.	(5120 mm)
Miscellaneous Specifications		
Fuel Capacity	45 gal.	(170 L)
Hydraulic Oil Capacity	32 gal.	(121 L)
Oscillation Angle	±10°	

Controls/Instruments: Hourmeter, engine tachometer, engine oil pressure and water temperature gauge, fuel guage, battery voltmeter, parking brake knob, brake "on" light, horn, water spray switch and keyed ignition switch.

- Approximate 7 metric ton static weight
- Automatic vibration control activates system above 0.5 mph (0.8 km/hr). Manual override
- Automatically reversing eccentric weights (in auto vibration mode) result in a smoother mat
- Machined drum and chamfered edges ensure a smooth surface when compacting H.M.A. (Hot Mix Asphalt)
- Maneuverability promoted by drum and axle drive, ±40° frame articulation, a short turning radius, high curb clearance and narrow side clearance
- Maintenance: grouped lubrication points; color-coded lube chart; hydraulic pressure test ports; ground level service access
- Single piece tilt-back hood enclosure for exceptional serviceability and quiet operation
- Ergonomically designed, shock mounted, isolated operation's station
- Adjustable scraper bar with wiper blade
- Safe operation: low operator platform, double-bar guard rails; back-up alarm; and excellent visibility
- Fully adjustable bucket seat with fold-down arm rests, spring suspension, and shock absorber
- ROPS/FOPS and seat belt control (North America only)
- Variable frequency 1,500-2,500 vpm
- Fuel gauge

Flood lights (2 front, 2 rear) and diamond tread dirt tires

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CONSTRUCTION & MINING

Road Machinery Division
Ingersoll-Rand Company
312 Ingersoll Drive
Shippensburg, PA 17257

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Specifications

We Have
Jumping Jack

	Oil-injected				Four-cycle			Diesel	
Model	**MTR-40HS**	**MT-62HS**	**MT-75HS**	**MT-85HS**	**MT-55F**	**MT-65H**	**MT-74F**	**MT-76D**	**MT-86D**
Operating Weight lbs. (kg)	97 (44)	123 (56)	146 (66)	172 (78)	126 (57)	146 (66)	161 (73)	176 (80)	202 (92)
Overall Length in. (mm)	24.5 (623)	27.6 (700)	29.9 (760)	29.9 (760)	26.8 (680)	29.1 (740)	28.3 (720)	28.3 (720)	28.3 (720)
Overall Width in. (mm)	13.8 (350)	13.8 (350)	16.1 (410)	16.1 (410)	13.8 (350)	14.6 (370)	16.2 (412)	16.1 (410)	16.1 (410)
Overall Height in. (mm)	43.7 (1,109)	40.6 (1,030)	39.4 (1,000)	41.1 (1,045)	40.6 (1,030)	41.9 (1,065)	41.3 (1,050)	39.4 (1,000)	41.7 (1,060)
Shoe Size WxL in. (mm)	5.9 x 10.6 (150 x 270)	10.8 x 13.4 (274 x 340)	11.2 x 13.4 (285 x 340)	13.0 x 13.4 (330 x 340)	10.4 x 13.4 (265 x 340)	11.2 x 13.4 (285 x 340)	11.2 x 13.4 (285 x 340)	11.2 x 13.4 (285 x 340)	11.8 x 13.4 (300 x 340)
Shoe Jump Height in. (mm)	2.75 (70)	2.75 (70)	3.3 (85)	3.7 (95)	2.75 (70)	3.0 (80)	3.3 (85)	3.3 (85)	3.7 (95)
Impact Force lbs. (kg)	1,225 (550)	2,250 (1,000)	3,200 (1,451)	4,410 (2,000)	2,250 (1,000)	2,900 (1,300)	3,100 (1,400)	3,600 (1,623)	4,500 (2,041)
Blows per Minute	600-690	600-690	660	670	600-695	590-695	680	700	700
Fuel Tank Capacity qt. (lt)	2.1 (2.0)	2.1 (2.0)	2.6 (2.5)	2.6 (2.5)	2.1 (2.0)	2.1 (2.0)	2.6 (2.5)	3.2 (3.0)	3.2 (3.0)
Oil Tank Capacity qt. (lt)	0.58 (.55)	0.58 (.55)	0.58 (.55)	0.58 (.55)	n/a	n/a	n/a	n/a	n/a
Engine Make/Model	Robin EC-08HS	Robin EC-08HS	Robin EC-12HS	Robin EC-12HS	Robin EH-09	Honda GX-100	Robin EH-12D	Yanmar L48EE	Yanmar L48EE
Engine Power hp (kw)	3.3 (2.5)	3.3 (2.5)	4.0 (3.0)	4.0 (3.0)	2.6 (1.8)	3.0 (2.3)	3.5 (2.6)	4.8 (3.6)	4.8 (3.6)
Fuel	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Gasoline	Diesel	Diesel
Displacement cu. in. (cc)	5.1 (78.5)	5.1 (78.5)	7.4 (114)	7.4 (114)	5.2 (86)	6.0 (98)	7.9 (121)	12.1 (199)	12.1 (199)
Engine rpm	3,850	3,850	3,950	3,950	3,600	3,600	3,600	3,600	3,600
Starting Method	Recoil	Recoil	Recoil	Recoil	Recoil	Recoil	Recoil	Recoil	Recoil
Travel Speed ft. (m) per min.	30 (9)	36 (11)	40 (12)	49 (15)	36 (11)	40 (12)	40 (12)	40 (12)	46 (14)
Max. Area Capacity sq. ft. (sq. m) per min.	1,453 (135)	1,873 (174)	2,240 (208)	3,185 (296)	1,872 (174)	2,183 (203)	2,183 (203)	2,183 (203)	2,714 (252)

Specifications are in accordance with CIMA-LEMB Standard No. 1.
Features and specifications are subject to change without notice.

We Have

Smooth Drum

Specifications	SD-100 B Series		SD-100D B Series		SD-100F B Series	
Weights (without ROPS)						
Operating weight	22,000 lb.	(9980 kg)	22,200 lb.	(10 070 kg)	24,200 lb.	(10 975 kg)
Static weight at drum	13,445 lb.	(6100 kg)	13,645 lb.	(6190 kg)	15,645 lb.	(7095 kg)
Static weight at tires	8,555 lb.	(3880 kg)	8,555 lb.	(3880 kg)	8,555 lb.	(3880 kg)
Shipping weight	21,400 lb.	(9705 kg)	21,600 lb.	(9800 kg)	23,600 lb.	(10 705 kg)
Dimensions						
Overall length	17 ft. 9 in.	(5410 mm)	17 ft. 9 in.	(5410 mm)	17 ft. 9 in.	(5410 mm)
Overall width	7 ft. 8 in.	(2335 mm)	7 ft. 8 in.	(2335 mm)	7 ft. 8 in.	(2335 mm)
Overall height, top of steering wheel	7 ft. 8 in.	(2335 mm)	7 ft. 8 in.	(2335 mm)	7 ft. 10 in.	(2388 mm)
Wheelbase	10 ft. 9 in.	(3275 mm)	10 ft. 9 in.	(3275 mm)	10 ft. 9 in.	(3275 mm)
Curb clearance	20 in.	(510 mm)	20 in.	(510 mm)	20 in.	(510 mm)
Outside turning radius (to drum edge)	223 in.	(5665 mm)	223 in.	(5665 mm)	223 in.	(5665 mm)
Drum diameter	59 in.	(1500 mm)	59 in.	(1500 mm)	59 in.	(1500 mm)
Drum diameter over pads	–	–	–	–	67 in.	(1700 mm)
Drum width	84 in.	(2135 mm)	84 in.	(2135 mm)	84 in.	(2135 mm)
Drum shell thickness	1 in.	(25 mm)	1 in.	(25 mm)	1 in.	(25 mm)
Pad tip area	–	–	–	–	21 in.^{2}	(135 cm^2)
Pad height	–	–	–	–	4 in.	(100 mm)
Number of pads	–		–		120	
Vibration						
Frequency	0-1,800 VPM	(0-30 Hz)	0-1,800 VPM	(0-30 Hz)	0-1,800 VPM	(0-30 Hz)
Centrifugal force - high	50,000 lb.	(222.4 kN)	50,000 lb.	(222.4 kN)	50,000 lb.	(222.4 kN)
- low	25,000 lb.	(111.2 kN)	25,000 lb.	(111.2 kN)	25,000 lb.	(111.2 kN)
Nominal amplitude - high	.067 in.	(1.70 mm)	.067 in.	(1.70 mm)	.055 in.	(1.41 mm)
- low	.033 in.	(0.85 mm)	.033 in.	(0.85 mm)	.028 in.	(0.70 mm)
Engine						
Engine make and model	Cummins 4BT 3.9		Cummins 4BTA 3.9		Cummins 4BTA 3.9	
Rated horsepower	96 hp @ 2300 rpm	(71.6 kW)	125 hp @ 2200 rpm	(93.2 kW)	125 hp @ 2200 rpm	(93.2 kW)
Optional engine	Deutz F6L 912D		Deutz F6L 912D		Deutz F6L 912D	
Rated horsepower	111 hp @ 2300 rpm	(82.8 kW)	111 hp @ 2300 rpm	(82.8 kW)	111 hp @ 2300 rpm	(82.8 kW)
Electrical system	12-volt DC, negative ground 1000 CCA		12-volt DC, negative ground 1000 CCA		12-volt DC, negative ground 1000 CCA	
Propulsion						
Type system	2-speed hydrostatic		2-speed hydrostatic		2-speed hydrostatic	
Tire size	18.4 x 26 - 6 PR		18.4 x 26 - 6 PR		18.4 x 26 - 6 PR	
Drum drive	–		planetary gear reduction		planetary gear reduction	
Speed - low gear	4.3 mph	(7 km/hr)	4.8 mph	(7.7 km/hr)	4.4 mph	(7 km/hr)
- high gear	9.5 mph	(15.3 km/hr)	9.0 mph	(14.5 km/hr)	7.8 mph	(12.5 km/hr)
Brakes						
Service brake	Dynamic Hydrostatic through Propulsion System					
Parking/secondary brake	Spring-Applied, Hydraulically Released					
Miscellaneous						
Articulation angle	±40°		±40°		±40°	
Oscillation angle	±17°		±17°		±17°	
Fuel capacity	68 gal.	(257 L)	68 gal.	(257 L)	68 gal.	(257 L)
Hydraulic oil capacity	56 gal.	(212 L)	56 gal.	(212 L)	56 gal.	(212 L)
Gradeability (Theoretical)	29%		62%		63%	

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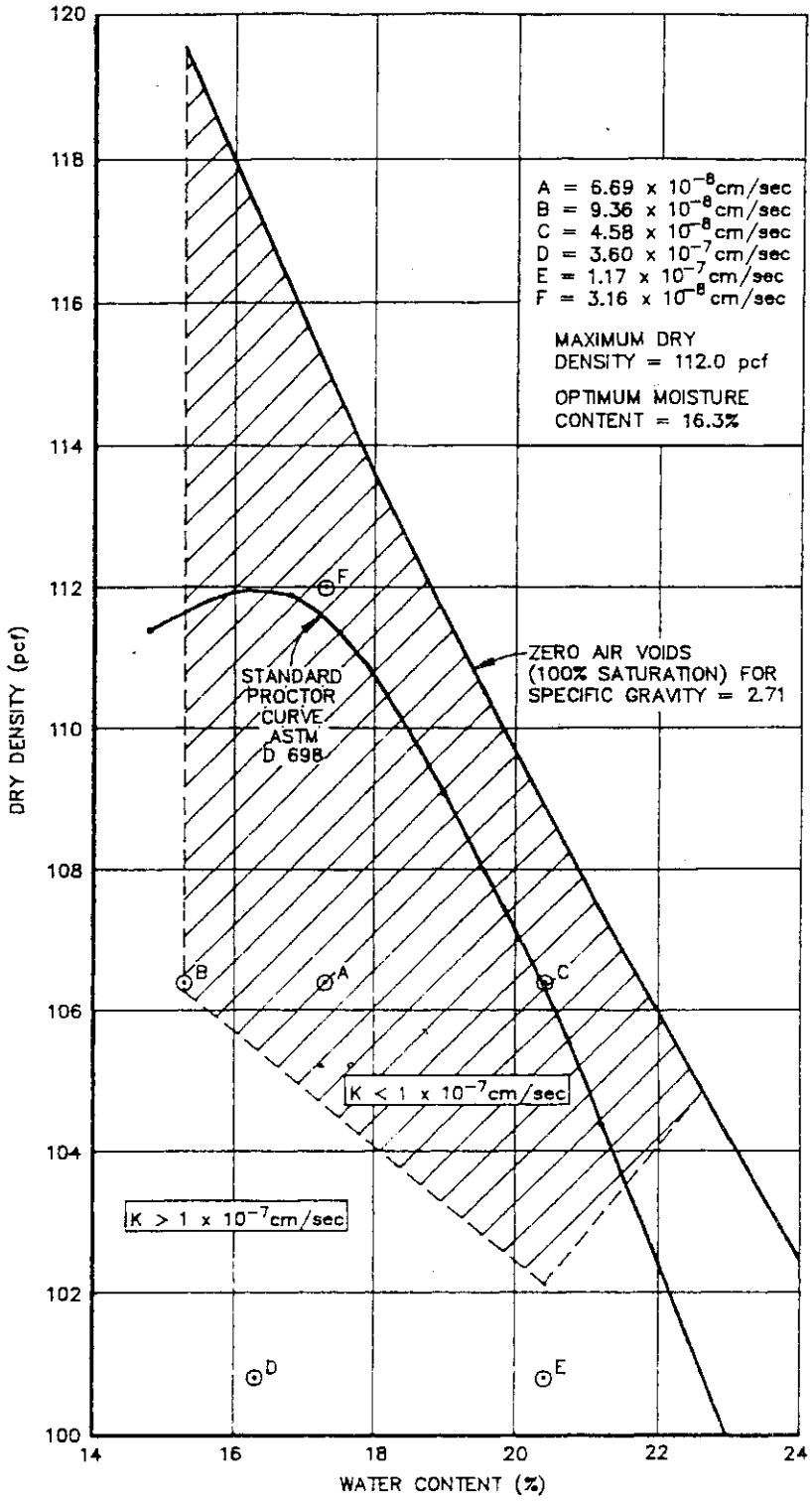
Attachment 2

Initial Laboratory Test Data



LEGEND:

⊙ PERMEABILITY TEST ON LAB-COMPACTED SAMPLE

▨ ZONE OF PERMEABILITY $\leq 1 \times 10^{-7}$ cm/sec

PERMEABILITY TEST RESULTS
ONSITE CLAY BORROW SOURCE – [redacted]

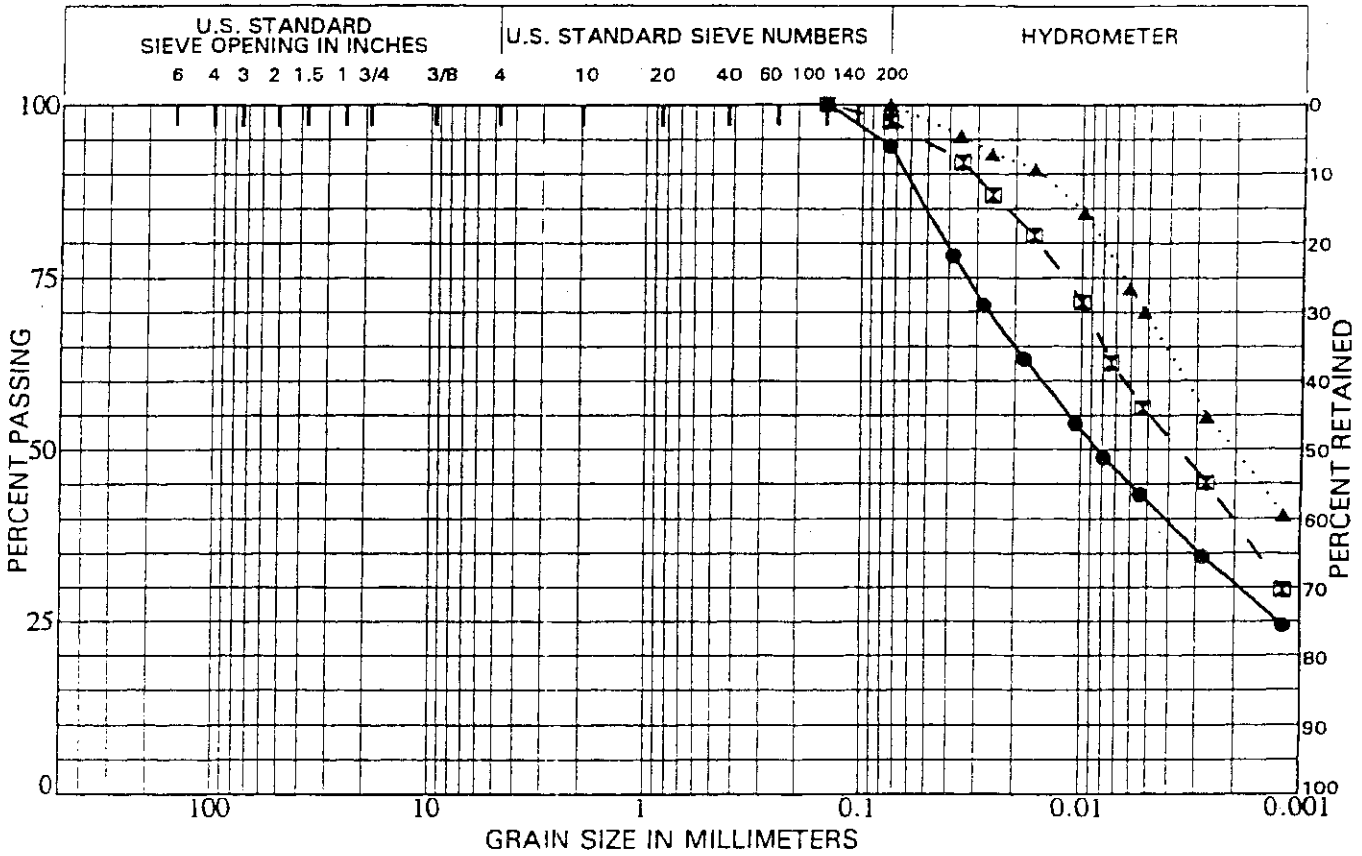
10:34

Rev. No.	Date	Type of Revision	Checked by:

Woodward-Clyde Consultants
Consulting Engineers, Geologists and Environmental Scientists

Job No.: [redacted]	Drawing No. 42720040	Date: 01/04/1995
Drawn by: JWC	Checked by:	
Scale: AS NOTED		PLATE 1

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	



Boring Number	Sample Number	Sample Depth	Symbol	Water Content (%)	Classification
TP-1			●	16.5	Gray Red Brown Lean Clay (CL)
TP-2			⊠	20.1	Gray Red Brown Lean Clay (CL)
TP-3			▲	22.2	Gray Lean Clay (CL)

Project: [redacted]
Project Number: [redacted]

GRAIN SIZE DISTRIBUTION CURVES

11/07/94 STV17 42272

Woodward-Clyde Consultants

[redacted]

Project: DRPI - [redacted]
Project No.: [redacted]

URS

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2μ (%)			Stress (psi)	Strain (%)	UU	CIU		
GWT-1	--	LIGHT BROWN WHITE POORLY GRADED GRAVEL	GP	0.0	105.1					0								5E+01	
SF-1 Lift-1	--	GRAY and RED BROWN LEAN CLAY with SAND	CL							77									
SF-2 Lift-1	--	GRAY and RED BROWN LEAN CLAY with SAND	CL							78									
SF-3 Lift-1	--	GRAY and RED BROWN LEAN CLAY with SAND	CL							72									
SF-4 Lift-1	--	GRAY and RED BROWN LEAN CLAY with SAND	CL							70									
SF-5 Lift-2	--	GRAY and RED BROWN LEAN CLAY with SAND	CL							71									
SF-6 Lift-2	--	GRAY and RED BROWN LEAN CLAY with SAND	CL							78									
SF-1 & 2	--	GRAY and RED BROWN LEAN CLAY with SAND (CL)						2.73				★							
SF-7 Lift-3	--	GRAY, BROWN and RED BROWN LEAN CLAY with SAND	CL							79									
SF-8 [redacted]	--	GRAY, BROWN and RED BROWN [redacted]	[redacted]							80									
ST-1 Lifts-4/5	0.36	GRAY, BROWN and RED BROWN LEAN CLAY	CL	20.9	106.5			2.74		87								1E-07	
ST-2 Lifts-4/5	0.35	GRAY, BROWN and RED BROWN LEAN CLAY	CL	17.4	113.3					93								1E-08	
ST-3 Lifts-4/5	0.35	GRAY, BROWN and RED BROWN LEAN CLAY with SAND	CL	18.9	111.5					85								2E-08	
ST-4 Lifts-4/5	0.65	GRAY, BROWN and RED BROWN LEAN CLAY with SAND	CL	18.5	110.4					82								4E-08	
ST-5 Lifts-4/5	0.65	GRAY, BROWN and RED BROWN LEAN CLAY with SAND	CL	19.2	109.5					84								2E-08	
ST-6 Lifts-5/6	0.60	GRAY, BROWN and RED BROWN LEAN CLAY with SAND	CL	17.5	114.6					82								2E-08	
ST-7 Lifts-5/6	0.70	GRAY, BROWN and RED BROWN LEAN CLAY	CL	24.0	102.5					97								2E-08	
ST-8 Lifts-5/6	1.0	GRAY, BROWN and RED BROWN LEAN CLAY with SAND	CL	16.3	113.7					83								3E-08	
ST-9 Lifts-5/6	1.0	GRAY, BROWN and RED BROWN LEAN CLAY with SAND	CL	18.3	111.1					77								2E-08	

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

★ Refer to Laboratory Test Curves

[redacted]

Project: [redacted]
Project No.: [redacted]

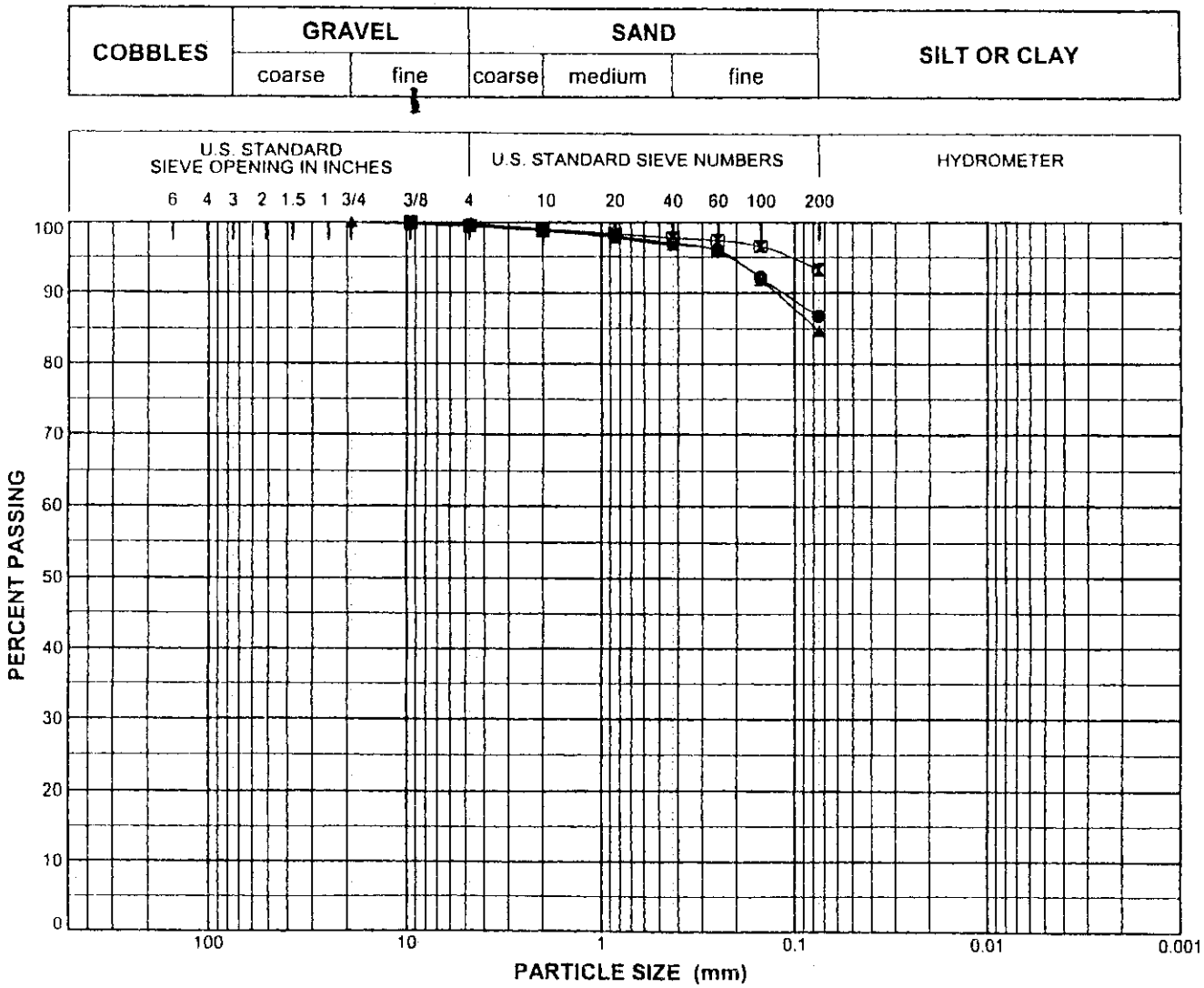
URS

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2μ (%)			Stress (psi)	Strain (%)	UU	CIU		
ST-10 Lifts-5/6	0.70	GRAY, BROWN and RED BROWN LEAN CLAY with SAND	CL	16.3	114.0					78								7E-08	
UDL-1	--	WELL-GRADED SAND	SW	0.0	114.4					1								2.66E-01	
UDL-2	--	LIGHT YELLOW BROWN POORLY GRADED SAND	SP							1									
UDL-3	--	LIGHT YELLOW BROWN POORLY GRADED SAND with GRAVEL	SP							1									

Note: The soil classification is based partially on visual classification unless both grain size and Atterberg limits are performed.

* Refer to Laboratory Test Curves



SYMBOL	●	⊠	▲
Boring	ST- 1	ST- 2	ST- 3
Sample	Lifts-4/5	Lifts-4/5	Lifts-4/5
Spec			
Depth (ft)	0.36	0.35	0.35
% +3"	0.0	0.0	0.0
% Gravel	0.3	0.5	0.7
% Sand	13.0	6.3	14.6
% Fines	86.8	93.2	84.7
% -2μ			
Cc			
Cu			
LL			
PL			
PI			
USCS	CL	CL	CL
w (%)	20.9	17.4	18.9

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
4"			
3"			
1-1/2"			
3/4"			100.0
3/8"	100.0	100.0	99.7
4	99.7	99.5	99.3
10	99.0	99.0	98.7
20	98.1	98.4	97.8
40	97.0	97.8	96.8
60	95.8	97.4	96.0
100	92.1	96.5	91.9
200	86.8	93.2	84.7

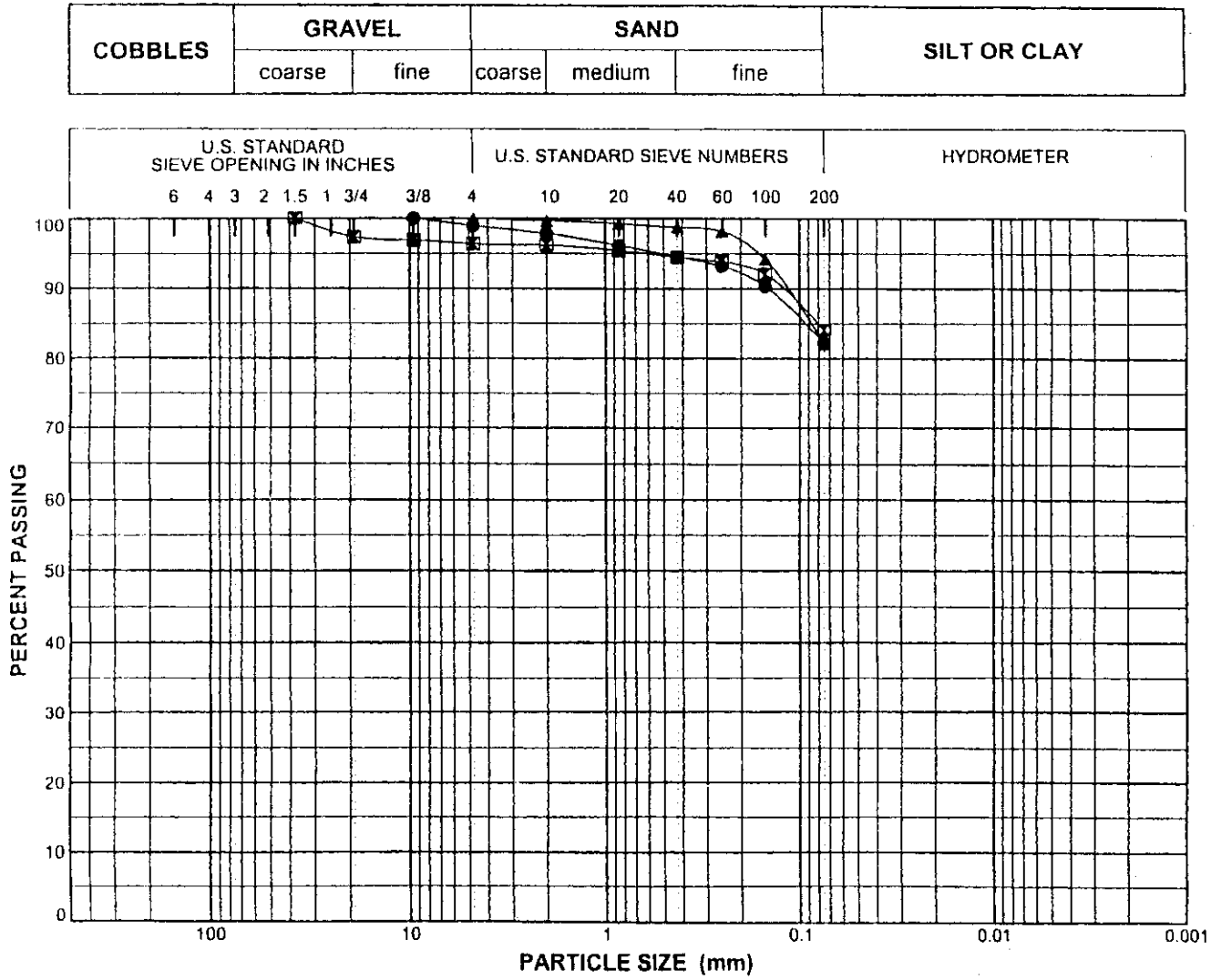
SYMBOL	DESCRIPTION AND REMARKS
●	GRAY, BROWN and RED BROWN LEAN CLAY (CL)
⊠	GRAY, BROWN and RED BROWN LEAN CLAY (CL)
▲	GRAY, BROWN and RED BROWN LEAN CLAY with SAND (CL)

PARTICLE SIZE DISTRIBUTION

[redacted]

Project Number	September 2003	Figure 4
[redacted]		

URS



SYMBOL	●	⊠	▲
Boring	ST- 4	ST- 5	ST- 6
Sample	Lifts-4/5	Lifts-4/5	Lifts-5/6
Spec			
Depth (ft)	0.65	0.65	0.60
% +3"	0.0	0.0	0.0
% Gravel	1.0	3.6	0.0
% Sand	16.8	12.3	17.9
% Fines	82.1	84.1	82.1
% -2μ			
Cc			
Cu			
LL			
PL			
PI			
USCS	CL	CL	CL
w (%)	18.5	19.2	17.5

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
4"			
3"			
1-1/2"		100.0	
3/4"		97.3	
3/8"	100.0	96.9	
4	99.0	96.4	100.0
10	97.8	96.2	99.7
20	96.1	95.4	99.3
40	94.6	94.5	98.7
60	93.1	93.8	98.1
100	90.3	92.1	94.2
200	82.1	84.1	82.1

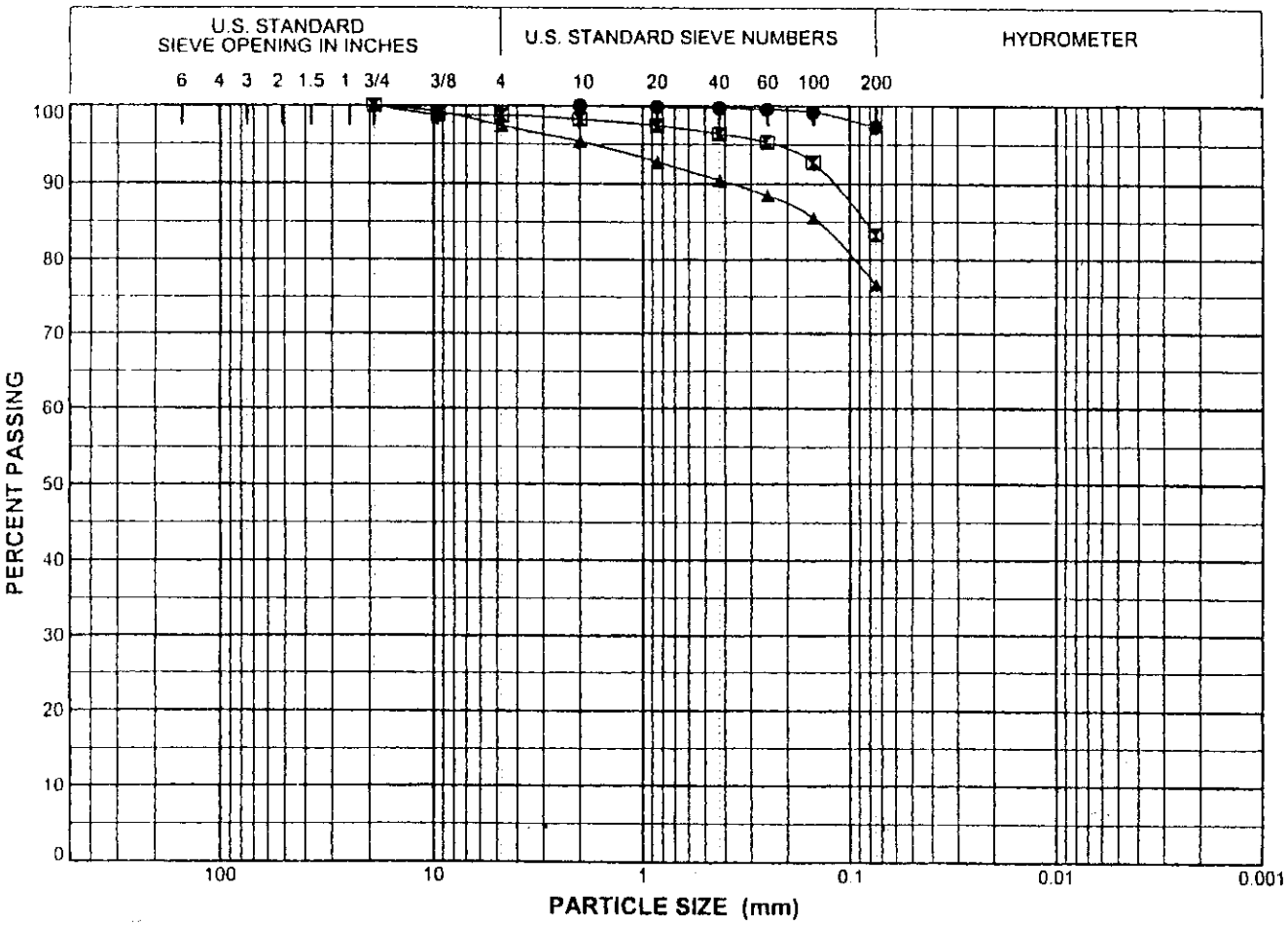
SYMBOL	DESCRIPTION AND REMARKS
●	GRAY, BROWN and RED BROWN LEAN CLAY with SAND (CL)
⊠	GRAY, BROWN and RED BROWN LEAN CLAY with SAND (CL)
▲	GRAY, BROWN and RED BROWN LEAN CLAY with SAND (CL)

PARTICLE SIZE DISTRIBUTION

[redacted]

Project Number	September 2003	Figure 5
[redacted]		

URS



SYMBOL	●	⊠	▲
Boring	ST- 7	ST- 8	ST- 9
Sample	Lifts-5/6	Lifts-5/6	Lifts-5/6
Spec			
Depth (ft)	0.70	1.0	1.0
% +3"	0.0	0.0	0.0
% Gravel	0.0	1.3	2.6
% Sand	2.7	15.5	20.7
% Fines	97.3	83.2	76.7
% -2μ			
Cc			
Cu			
LL			
PL			
PI			
USCS	CL	CL	CL
w (%)	24.0	16.3	18.3

Particle Size (Sieve #)	PERCENT FINER ●	⊠	▲
4"			
3"			
1-1/2"			
3/4"		100.0	100.0
3/8"		98.8	99.2
4		98.7	97.4
10	100.0	98.2	95.3
20	99.8	97.4	92.7
40	99.7	96.4	90.4
60	99.5	95.3	88.5
100	99.2	92.7	85.5
200	97.3	83.2	76.7

SYMBOL	DESCRIPTION AND REMARKS
●	GRAY, BROWN and RED BROWN LEAN CLAY (CL)
⊠	GRAY, BROWN and RED BROWN LEAN CLAY with SAND (CL)
▲	GRAY, BROWN and RED BROWN LEAN CLAY with SAND (CL)

PARTICLE SIZE DISTRIBUTION

[redacted]

Project Number	September 2003	Figure 6
[redacted]		

URS

Attachment 3

Advance Laboratory Test Data

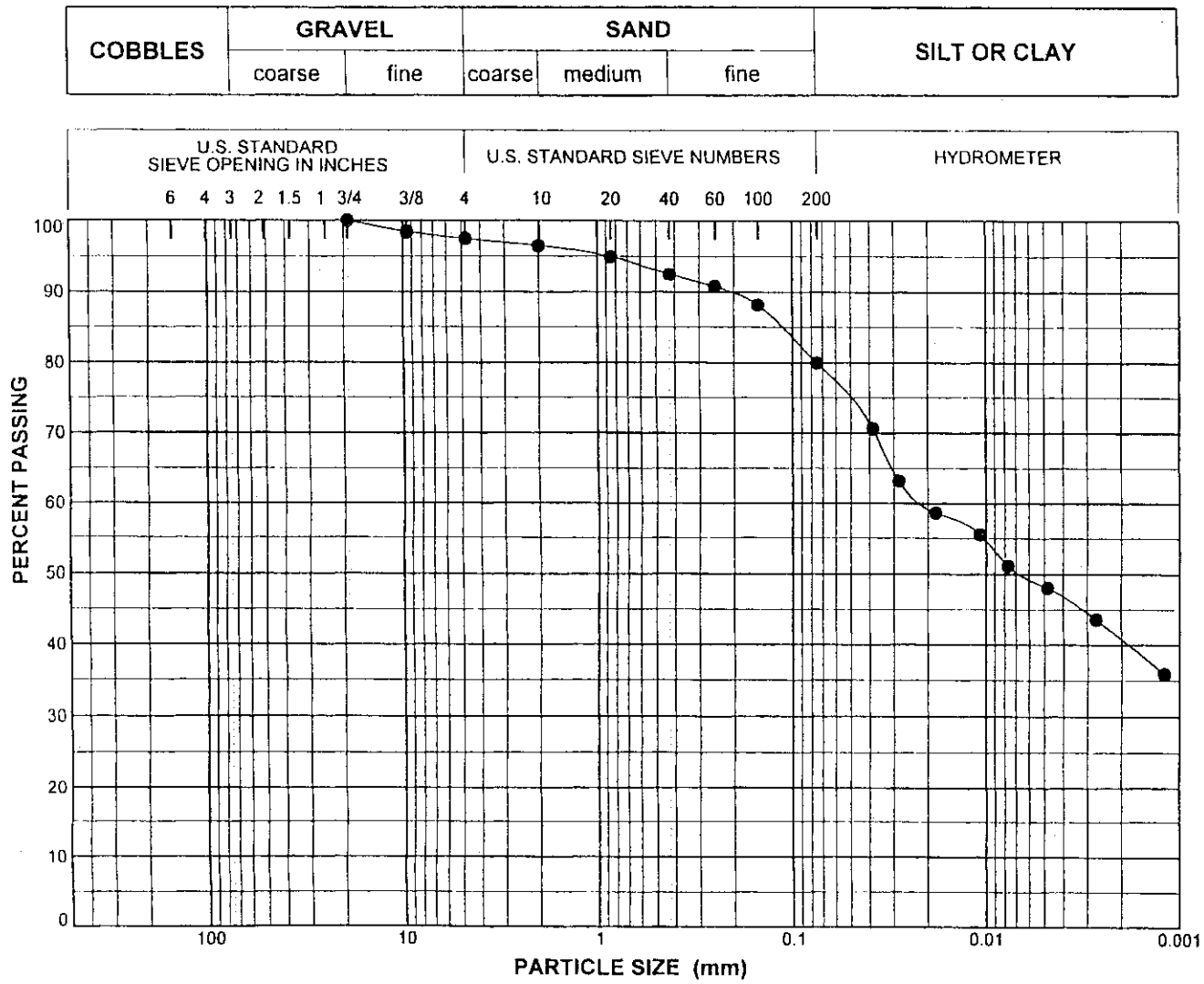
Project: DuPont
Project No.: 19992311

URS

SUMMARY OF LABORATORY TEST RESULTS

Boring and Sample Number	Depth (feet)	Classification	USCS Symbol	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits		Specific Gravity	Organic Content (%)	Grain Size		Compaction	Consolidation	Unconfined Compression		Triaxial Compression		Permeability (cm/sec)	Special Tests
						Liquid Limit	Plastic Limit			<#200 (%)	<2μ (%)			Stress (psi)	Strain (%)	UU	CIU		
BULK-WM	--	RED BROWN LEAN CLAY with SAND	CL	20.6		41	19	2.78		80	41	*							

* Refer to Laboratory Test Curves



SYMBOL	DESCRIPTION AND REMARKS
●	RED BROWN LEAN CLAY with SAND (CL)

SYMBOL	●		
Boring	BULK-WMI		
Sample			
Spec			
Depth (ft)	--		
% +3"	0.0		
% Gravel	2.5		
% Sand	17.5		
% Fines	80.0		
% -2μ	40.8		
Cc			
Cu			
LL	41		
PL	19		
PI	22		
USCS	CL		
w (%)	20.6		

Particle Size (Sieve #)	PERCENT FINER ●
4"	
3"	
1-1/2"	
3/4"	100.0
3/8"	98.5
4	97.5
10	96.5
20	95.0
40	92.5
60	90.8
100	88.2
200	80.0

PARTICLE SIZE DISTRIBUTION

DuPont

Project Number 19992311	November 2003	Figure 1

URS

SIEVE BLUEBELL 19992311 DUPONT 11-21-2003 GPJ URS_BLUE.GDT 11/21/03

Project Name: DuPont		Figure 2
Sample Identification: BULK-WMI		Project No.: 19992311
Material Description: RED BROWN LEAN CLAY with SAND (CL)		
Optimum Moisture Content(%): 17.5	Specific Gravity: 2.78 (measured)	Liquid Limit(%): 41
Maximum Dry Unit Weight(pcf): 111.5	Method of Compaction: ASTM D 698 Method A	Plastic Limit(%): 19

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GEO-SYNTHETICS, INC.

CERTIFICATE OF ACCEPTANCE OF SUBGRADE SURFACE PREPARATION FOR GEOMEMBRANE INSTALLATION

PROJECT NAME: Dupont Edge Moor Closure

LOCATION: Wilmington, DE. 19809

JOB #: 23069 OWNER: Dupont

AREA ACCEPTED: Surface under 12 oz textile in cell A
47,398 SF Deployed 1-3-04.

INSTALLER: The undersigned authorized representative of GSI certifies that he or she has visually inspected the subgrade surface of the area described above and has found the surface to be acceptable for installation of the Geomembrane materials.

GSI shall be responsible for the integrity of finished GCL and Geomembrane material until completion of the installation or demobilization from site.

This certification is based on observations of the subgrade surface conditions only. GSI has made no sub-terrain inspections or tests and makes no representations or warranties as to the conditions that may exist below the surface of the subgrade.

INSPECTOR: Vicky L. Beeman 1-4-04 QC. GSI

CERTIFICATE APPROVED AND ACCEPTED BY:

Signature 1/4/04 Date

QC SUPERVISOR
Title

URS CORP.
Company

URS

geomembrane panel record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

	40-mil geomembrane				Temperature	
Panel #	**Mat'l Type**	**Roll #**	**Time**	**Length**	**Sheet**	**Ambient**
77	40 MIL LL	39095	13:00	162'	53°	50°
78	↓	↓	13:18	320'	↓	↓
79			13:25	187'		
80		39104	13:35	170'		
81		↓	13:40	357'		
82		↓	14:05	208'	↓	↓
83		39096	14:37	166'	56°	50°
84		↓	14:48	372'	↓	↓
85	↓	↓	14:58	189' x 11' WIDE		
		P77 →	84	1942 LF	= 42,724 FT²	
			P85		2079 FT²	
					+44,803 FT²	

Inspected By: V. TROILO **Date:** 1/3/01

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seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Cloudy → Pty Sunny **Welding Inspector** V. Troilo **Testing Inspector** V. Troilo

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine: Mach No.	Machine: Temp / Speed	Temp: Sheet / Amb
1-3-04	13:50	77/78	262'	P.P.	69	860°/5.0	53°/50°
	13:50	79/80	22'	S.L.	41	860°/6.0	
	14:00	78/80	164'	S.L.	41	860°/6.0/7.5	
	14:18	78/79	157'	S.L	41	860°/7.5	
	14:25	80/81	170'	P.P.	69	860°/6.0	56°/50°
	14:45	79/81	187'	P.P.	69	860°/6.0	
	14:50	82/83	22	S.L	41	860/7.5	
	15:00	81/83	166'	S.L	41	860°/7.5	
	15:10	81/82	208'	S.L	41	860°/7.5	
	15:10	82/84	204'	P.P	69	840°/6.0	
	15:35	83/84	168'	P.P.	69	860°/6.0	

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time: In	Time: Out	PSI: In	PSI: Out	Pass / Fail	Notes
1-3-04	AIR TEST	ENTIRE	P.P.	14:37	14:42	35	33	P	
		ENTIRE		14:45	14:50	31	29	P	
		150'-EOS		14:38	14:43	31	30	P	☆
		118'-132'		14:39	14:44	31	29	P	
		69'-114'		14:37	14:44	31	24	P	DS-25
		0'-69'		1446	1451	32	30	P	@ 65'
		118'-EOS		1447	1452	31	29	P	
		88'-118'		1453	1458	31	30	P	
		12'-88'		1516	1521	32	31	P	
		BOS-12'		1515	1520	30	29	P	
		0'-60'-EOS		1612	1617	32	32	P	DS-26
		0'-60'-0'-60'		1611	1616	30	30	P	@ 55'
		ENTIRE		1543	1548	32	32	P	
		ENTIRE		1554	1559	30	30	P	
		ENTIRE		1553	1558	30	29	P	
		0'-60'		1554	1559	31	31	P	*
		135-EOS		1625	1630	31	30	P	DS-27 @ 20'
		ENTIRE		1617	1622	31	31	P	
		ENTIRE		1617	1622	30	29	P	DS-28 @ 24'

Notes/Comments: MACHINE 41 "BUMPED" SPEED TO 7.5 AT MIDDLE SEAM 78/80

☆ 78/80 CAP 132'–150' NO AIR TEST - BURNOUTS
78/80 CAP 114'-118' " " " "

* 81/82 CAP 60'-135' - NO OVERLAP/AIR CHANNEL

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seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Partly Sunny **Welding Inspector** V. Troilo **Testing Inspector**

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine: Mach No.	Machine: Temp / Speed	Temp: Sheet / Amb
13.04	15:40	84 / 85	189'	S. L.	41	860° / 7.5	56° / 50°

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time: In	Time: Out	PSI: In	PSI: Out	Pass / Fail	Notes
1.3.04	Air Test	Entire	P.P.	1619	1624	30	29	P	

Notes/Comments: 1919 LF TODAY
11'569.5
13,488.5 27 DESTRUCTS NEEDED FOR JOB

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 1/3/04

SEAM INFORMATION					FIELD TESTING INFORMATION[2]											
	Seam ID	Mat'l[1]	Time / Date	Seamer's Name				Seam Adhesion Strength - Peel 44 lb/in					Seam Strength - Shear 53 lb/in				
Sample No.	Mach No.	Mach Temp / Speed	Temp Sheet / Amb	Weather	Tester's Name	Weather / Temp		1	2	3	4	5	1	2	3	4	5
TS-33	TRIAL	40 mil LL	13:15 / 1.3.04	S. L	P.P.	Cloudy 50°	Strength at Break	77 / 81	98 / 100	88 / 89			104	106			
	#41	860° / 6.0	53° / 50°	Cloudy Overcast			Break Desc	FTB	FTB	FTB			FTB	FTB			
							Pass / Fail	P	P	P			P	P			
							Strength at Break										
							Break Desc										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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URS

geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 1/3/04

SEAM INFORMATION					FIELD TESTING INFORMATION[2]											
								Seam Adhesion Strength - Peel 44 lb/in					Seam Strength - Shear 53 lb/in				
Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather	Tester's Name	Weather / Temp		1	2	3	4	5	1	2	3	4	5
TS-32	TRIAL	40 MIL LL	13:10 / 1.3.04	P.P.	P.P.	CLOUDY 50°F	Strength at Break	88 / 95	91								
	#69	860° / 6.0	53° / 50°	CLOUDY OVERCAST			Break Desc	FTB	ADSOL								
							Pass / Fail	P	F	50% PEEL INCLUSION							
TS-32R	TRIAL	40 MIL LL	13:35 / 1.3.04	P.P.	P.P.	CLOUDY 50°F	Strength at Break	86 / 76	82 / 76	84 / 79			104	104			
	#69	860° / 5.0	53° / 50°	CLOUDY OVERCAST			Break Desc	FTB	FTB	FTB			FTB	FTB			
							Pass / Fail	P	P	P			P	P			
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 1·4·04

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-35 (EXT.)	TRIAL / #610	40 MIL LL / 215° / 215° PH	07:30 / 1-4-04 / 52° / 50°	K.M / Cloudy
TS-36 (EXT.)	TRIAL / #59	40 MIL LL / 420° / 300°	07:40 / 1-4-04 / 52° / 50°	N.P. / CLOUDY
TS-35R (EXT.)	TRIAL / #610	40 MIL LL / 215° / 215°	07:55 / 1-4-04 / 52° / 50°	K.M. / CLOUDY

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Cloudy 50°	Strength at Break	88									
		Break Desc.	– NFTB									
		Pass / Fail	F	100% PEEL INCURSION								
P.P.	Cloudy 50°	Strength at Break	96	96	96			100	100			
		Break Desc.	– FTB	– FTB	– FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P.	Cloudy 50°	Strength at Break	86	86	88			88	102			
		Break Desc.	– FTB	– FTB	– FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. Troilo Testing Date: 1/9/04

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-40 (Ext.)	TRIAL #59	40 mil LL / 400° / 300°	07:30 / 1-9-04 / 26° / 25°	N.P. / Sunny

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Sunny 26°	Strength at Break	79 / –	85 / –	83 / –			110	101			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
78/80 132'-150'	Numerous Burnouts	138	1.4.04 / AM	610	K.M	4'x18'	1.4.04	VBox	C.L	P	
78/80 113'-118'N	"	139	/ AM			9'x5'				P	
78/80 @ 69'N	Burnout	140	/ AM			2'x2'				P	
78/80 @ 65N	DS-25	141	/ AM			2'x6'				P	
78/79/80	T SEAM	142	/ AM			2'x6'				P	
79/80/81	T SEAM	143	1.4.04 / AM	59	N.P.	2'x3'				P	
78/79 113'-118'N	Burnout	144	/ AM	610	K.M	2'x5'				P	
78/79 @ 88'N	Burnout	145	/ AM			2'x3'				P	
78/79 @ 72'N	"	146	/ AM			2'x3'				P	
78/79 EOS	"	147	/ AM			2'x8'				P	
79/81 130'S	"	148	/ AM			2'x3				P	
82/84 @ 6'N	"	149	/ AM			2'x3'				P	
82/84 BOS	"	150	/ AM			2'x4'				P	
81/82 125'-137'N	No Lap/A.S.	151	1.4.04 / 11:45	59	N.P	2'x12'				P	
81/82 101'-125'	"	152	/ 11:00			2'x18'				P	
81/82 92'-107'	"	153	/ 10:45			2'x15'				P	

Inspected By: V TRUILO **Date:** 1.4.04

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URS

repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
81/82 75'-92'S	OVERLAP/ NO NDE TEST	154	1.4.04 10:30	#59	N.P.	2'x 17'	1.4.04	V.Box	C.L.	P	
81/82 60'-75'S	"	155	10:15			2'x 15'				P	
81/82 @ 20'S	DS-27	156	09:30			2'x6'				P	
81/82/83	T SEAM	157	09:15			2'x2'				P	
P&S 3'N 82/83 6'W 81/83	HOLE	158	09:10			1.5'x1.5'				P	
82/83/84	T SEAM	159	09:20			1.5'x2'				P	
83/84 @ 24'N	DS-28	160	09:00			2'x6'				P	
80/81 @ 58'S	BLOWOUT	161	1.4.04 AM	610	K.M	2'x2'				P	
80/81 @ 55'S	DS-26	162	AM			2'x6'				P	
80/81 BOS	BLOWOUT	163	AM			2'x2'				P	
84/85 No end P85	EXTEND TO LINER LIMITS	164	1.4.04 11:20	59	N.P.	4'x8'				P	
84/85 Se END P85	"	172	1.9.04 08:00	59	N.P	4x22'	1.9.04	VBox	P.P.	P	

Inspected By: V. Troilo **Date:** 1.4.04

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. Troilo Testing Date: 1-4-04

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
DS-25	78/80	40 mil LL	14:00 / 1-3-04	S.L.
	41	860° / 7.5°	53° / 50°	Cloudy
DS-26	80/81	40 mil LL	14:25 / 1-3-04	P.P.
	69	860° / 6.0	56° / 50°	Cloudy
DS-27	81/82	40 mil LL	15:10 / 1-3-04	S.L.
	41	860° / 7.5	56° / 50°	Cloudy
DS-28	83/84	40 mil LL	15:35 / 1-3-04	P.P.
	69	860° / 6.0	56° / 50°	Cloudy

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Cloudy 50°	Strength at Break	87/85	84/84	82/81	88/85	80/83	93	89	95	95	83
		Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P
P.P.	Cloudy 50°	Strength at Break	83/77	71/78	83/74	62/83	73/78	92	91	92	82	91
		Break Desc.	FTB	FTB	NOBREAK	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	>50% P	P	P	P	P	P	P	P
P.P.	Cloudy 50°	Strength at Break	91/91	91/85	86/86	86/86	86/87	92	91	91	89	91
		Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P
P.P.	Cloudy 50°	Strength at Break	74/73	88/81	80/80	82/84	87/87	60	92	93	91	92
		Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-60-03

ASTM D 6392/4437
ANALYST: MPP

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	76	<10	SE	FTB	44	79	> 50	FTB	53
	2A	70	<10	SE	FTB					
	3A	74	<10	SE	FTB		80	> 50	FTB	
	4A	76	<10	SE	FTB					
	5A	75	<10	SE	FTB		78	> 50	FTB	
DS-25	**MEAN:**	**74**								
	1B	69	<10	SE	FTB		79	> 50	FTB	
	2B	74	<10	SE	FTB					
	3B	69	<10	SE	FTB		83	> 50	FTB	
	4B	74	<10	SE	FTB					
	5B	74	<10	SE	FTB					
	MEAN:	**72**				**MEAN:**	**80**			
	1A	75	<10	SE	FTB	44	79	> 50	FTB	53
	2A	71	<10	SE	FTB					
	3A	75	<10	SE	FTB		77	> 50	FTB	
	4A	65	<10	SE	FTB					
	5A	71	<10	SE	FTB		78	> 50	FTB	
DS-26	**MEAN:**	**71**								
	1B	78	<10	SE	FTB		70	> 50	FTB	
	2B	74	<10	SE	FTB					
	3B	73	<10	SE	FTB		72	> 50	FTB	
	4B	75	<10	SE	FTB					
	5B	76	<10	SE	FTB					
	MEAN:	**75**				**MEAN:**	**75**			

NR: Not Requested

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.

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-60-03

ASTM D 6392/4437
ANALYST: MPP

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	79	<10	SE	FTB	44	83	> 50	FTB	53
	2A	76	<10	SE	FTB					
	3A	74	<10	SE	FTB		77	> 50	FTB	
	4A	77	<10	SE	FTB					
	5A	75	<10	SE	FTB		78	> 50	FTB	
DS-27	**MEAN:**	**76**								
	1B	76	<10	SE	FTB		79	> 50	FTB	
	2B	75	<10	SE	FTB					
	3B	74	<10	SE	FTB		80	> 50	FTB	
	4B	75	<10	SE	FTB					
	5B	75	<10	SE	FTB					
	MEAN:	**75**				**MEAN:**	**79**			
	1A	72	<10	SE	FTB	44	79	> 50	FTB	53
	2A	63	<10	SE	FTB					
	3A	63	<10	SE	FTB		79	> 50	FTB	
	4A	70	<10	SE	FTB					
	5A	66	<10	SE	FTB		79	> 50	FTB	
DS-28	**MEAN:**	**67**								
	1B	77	<10	SE	FTB		79	> 50	FTB	
	2B	73	<10	SE	FTB					
	3B	76	<10	SE	FTB		77	> 50	FTB	
	4B	73	<10	SE	FTB					
	5B	71	<10	SE	FTB					
	MEAN:	**74**				**MEAN:**	**79**			

NR: Not Requested

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.

PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-05
LAB ID NO.: L03156-05-02
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-25

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	66.8	FTB-SE1	<10
2	67.1	FTB-SE1	<10
3	66.0	FTB-SE1	<10
4	64.6	FTB-SE1	<10
5	66.7	FTB-SE1	<10
AVERAGE	**66.2**		
STD. DEV.	1.00		
INSIDE TRACK (WELD "B")			
1	66.3	FTB-SE1	<10
2	65.7	FTB-SE1	<10
3	65.5	FTB-SE1	<10
4	65.7	FTB-SE1	<10
5	49.5	FTB-SE1	<10
AVERAGE	**62.5**		
STD. DEV.	7.30		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	70.3	FTB-SE1
2	69.2	FTB-SE1
3	69.7	FTB-SE1
4	70.1	FTB-SE1
5	70.1	FTB-SE1
AVERAGE	**69.9**	
STD. DEV.	0.44	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-05
LAB ID NO.: L03156-05-03
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-26

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	63.7	FTB-SE1	<10
2	64.4	FTB-SE1	<10
3	65.2	FTB-SE1	<10
4	65.1	FTB-SE1	<10
5	65.0	FTB-SE1	<10
AVERAGE	**64.7**		
STD. DEV.	0.63		
INSIDE TRACK (WELD "B")			
1	65.7	FTB-SE1	<10
2	56.1	FTB-SE1	<10
3	49.4	FTB-SE1	<10
4	63.4	FTB-SE1	<10
5	64.2	FTB-SE1	<10
AVERAGE	**59.8**		
STD. DEV.	6.87		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	69.7	FTB-SE1
2	68.3	FTB-SE1
3	69.6	FTB-SE1
4	72.1	FTB-SE1
5	71.2	FTB-SE1
AVERAGE	**70.2**	
STD. DEV.	1.49	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-05
LAB ID NO.: L03156-05-04
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-27

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	64.9	FTB-SE1	<10
2	65.6	FTB-SE1	<10
3	64.1	FTB-SE1	<10
4	66.6	FTB-SE1	<10
5	63.9	FTB-SE1	<10
AVERAGE	**65.0**		
STD. DEV.	1.11		
INSIDE TRACK (WELD "B")			
1	66.2	FTB-SE1	<10
2	66.7	FTB-SE1	<10
3	66.0	FTB-SE1	<10
4	66.7	FTB-SE1	<10
5	65.2	FTB-SE1	<10
AVERAGE	**66.2**		
STD. DEV.	0.62		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	69.4	FTB-SE1
2	67.4	FTB-SE1
3	68.6	FTB-SE1
4	69.6	FTB-SE1
5	70.2	FTB-SE1
AVERAGE	**69.0**	
STD. DEV.	1.08	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-05
LAB ID NO.: L03156-05-05
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-28

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	65.7	FTB-SE1	<10
2	67.7	FTB-SE1	<10
3	59.3	FTB-SE1	<10
4	56.3	FTB-SE1	<10
5	63.4	FTB-SE1	<10
AVERAGE	**62.5**		
STD. DEV.	4.66		
INSIDE TRACK (WELD "B")			
1	63.3	FTB-SE1	<10
2	56.3	FTB-SE1	<10
3	65.0	FTB-SE1	<10
4	49.6	FTB-SE1	<10
5	66.9	FTB-SE1	<10
AVERAGE	**60.2**		
STD. DEV.	7.16		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	72.8	FTB-SE1
2	71.8	FTB-SE1
3	68.9	FTB-SE1
4	71.2	FTB-SE1
5	70.9	FTB-SE1
AVERAGE	**71.1**	
STD. DEV.	1.44	

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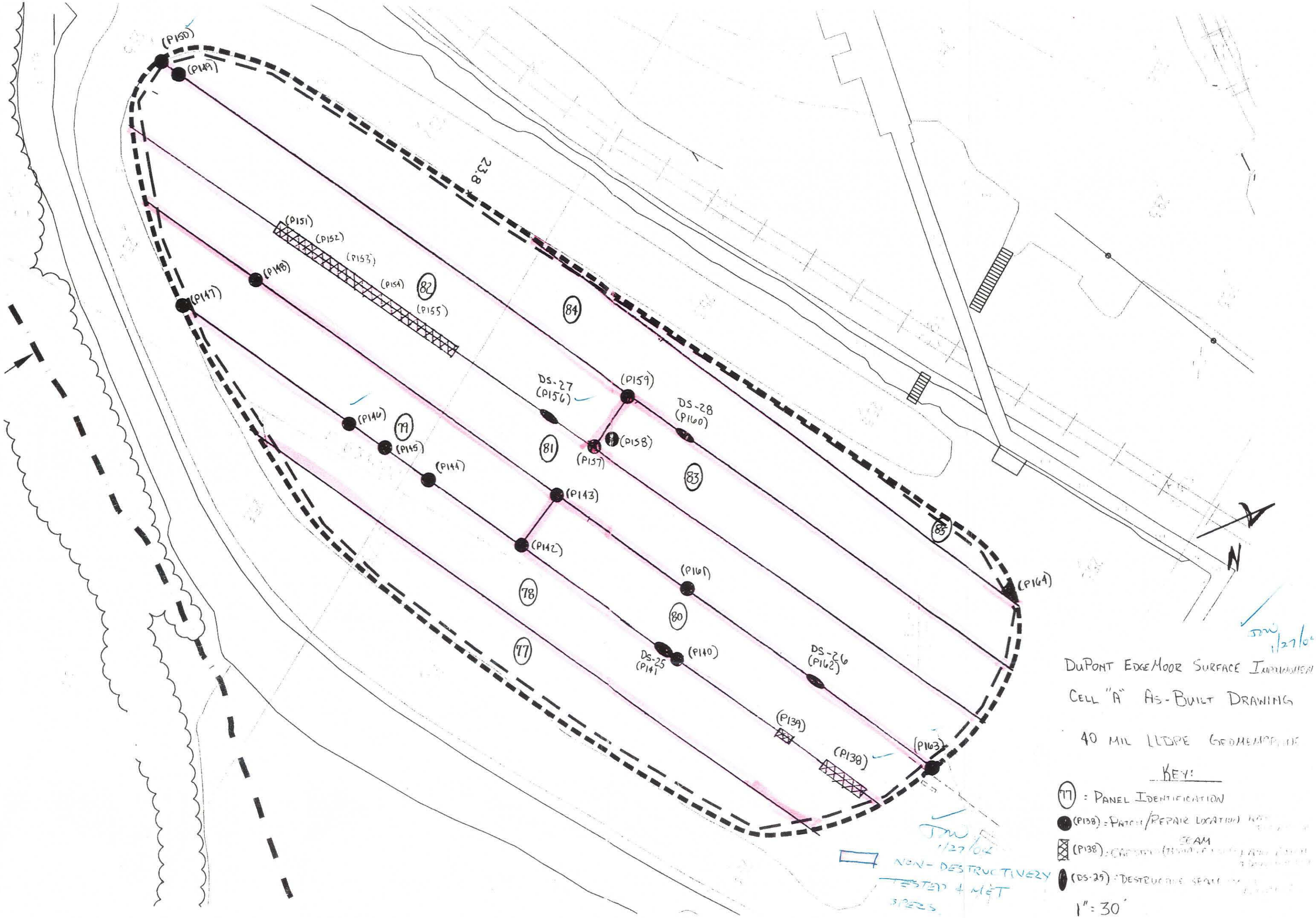

(P150)
(P149)
23.8
(P151)
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82
84
(P148)
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DS-27
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DS-25
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DS-26
(P162)
(P139)
(P138)
(P163)
N
JDW 1/27/04
NON-DESTRUCTIVELY TESTED & MET SPECS
JDW 1/27/04
DuPont EdgeMoor Surface Impoundment
Cell "A" As-Built Drawing
40 mil LLDPE Geomembrane
Key:
77 : Panel Identification
(P138) = Patch/Repair Location
(P138) = Seam
(DS-25) = Destructive Seam
1" = 30'

APPENDIX E2
CELL B DATA

IMPOUNDMENT B

GEO-SYNTHETICS, INC.

CERTIFICATE OF ACCEPTANCE OF SUBGRADE SURFACE PREPARATION FOR GEOMEMBRANE INSTALLATION

PROJECT NAME: Dupont Edge Moor Closure

LOCATION: Wilmington, DE 19809

JOB #: 23069 OWNER: Dupont

AREA ACCEPTED: Area under 12 oz. textile Panels 1-3. 13,920 SF. Total. in cell B 12-4-03

INSTALLER: The undersigned authorized representative of GSI certifies that he or she has visually inspected the subgrade surface of the area described above and has found the surface to be acceptable for installation of the Geomembrane materials.

GSI shall be responsible for the integrity of finished GCL and Geomembrane material until completion of the installation or demobilization from site.

This certification is based on observations of the subgrade surface conditions only. GSI has made no sub-terrain inspections or tests and makes no representations or warranties as to the conditions that may exist below the surface of the subgrade.

INSPECTOR:

CERTIFICATE APPROVED AND ACCEPTED BY:

Signature

12-5-03
Date

Vicky L. Beeman 12-5-03
GSI QC.

QUALITY CONTROL SUPERVISOR
Title

URS Corp.
Company

W239 N428 PEWAUKEE ROAD • WAUKESHA, WI 53188 • 262-524-7979 • Fax: 262-524-7961 • 800-444-5523 • www.geo-synthetics.com

GEO-SYNTHETICS, INC.

CERTIFICATE OF ACCEPTANCE OF SUBGRADE SURFACE PREPARATION FOR GEOMEMBRANE INSTALLATION

PROJECT NAME: Dupont Edge Moor Closure

LOCATION: Wilmington, DE 19809

JOB #: 23069 OWNER: Dupont

AREA ACCEPTED: Area under 12 oz. textile to complete cell B 66,120 SF
Deployed 12·13·03.

INSTALLER: The undersigned authorized representative of GSI certifies that he or she has visually inspected the subgrade surface of the area described above and has found the surface to be acceptable for installation of the Geomembrane materials.

GSI shall be responsible for the integrity of finished GCL and Geomembrane material until completion of the installation or demobilization from site.

This certification is based on observations of the subgrade surface conditions only. GSI has made no sub-terrain inspections or tests and makes no representations or warranties as to the conditions that may exist below the surface of the subgrade.

INSPECTOR:

CERTIFICATE APPROVED AND ACCEPTED BY:

Vicky L Bunn 12.5.03
G.S.I. QC.

[signature]
Signature

12.15.03
Date

QC SUPERVISOR
Title

URS
Company

URS

CELL "B"

geomembrane panel record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

40-mil geomembrane					Temperature	
Panel #	**Mat'l Type**	**Roll #**	**Time**	**Length**	**Sheet**	**Ambient**
1	40 MIL LL	39092	14:23	259'	39°	35°
2	↓	39092	14:47	275'	↓	↓
3	↓	39092	15:00	225'	↓	↓
4	↓	39088	15:15	50'	↓	↓
5	↓	39088	15:23	225'	37°	35°
6	↓	39088	15:35	258	↓	↓
				(7,29,070 ft²)		
				DAILY TOTAL		

Inspected By: V TROILO **Date:** 12-13-03

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geomembrane panel record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

40-mil geomembrane					Temperature	
Panel #	**Mat'l Type**	**Roll #**	**Time**	**Length**	**Sheet**	**Ambient**
7	40 mil LLL	39088	07:06	178'	33°	35°
8		39093	07:20	64'	↓	↓
9		39093	07:40	218'	↓	↓
10		39093	08:00	205'	↓	↓
11		39093	09:00	188'	38°	38°
12		39089	09:20	173'	↓	↓
13		↓	09:55	158'	↓	↓
14		↓	10:20	158'	41°	41°
15		↓	10:30	125'	↓	↓
16		↓	10:40	106'	↓	↓
				(~35,393 ft²) DAILY TOTAL		

Inspected By: V. TROILO **Date:** 12-15-03

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seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Cloudy, cold **Welding Inspector** V. Troilo **Testing Inspector** V. Troilo

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine: Mach No.	Machine: Temp / Speed	Temp: Sheet / Amb
12.13.03	15:00	1 / 2	259'	S.L.	42	860° / 5.0	39° / 35°
12.13.03	15:15	2 / 3	225'	P.P. (B)	69	860° / 5.0	39° / 35°
	15:30	3 / 4	22.5	S.L.	42	860° / 5.0	39° / 35
	15:35	3 / 5	225'	S.L.	42	860° / 5.0	39° / 35°
	14:42	4 / 5	43'	S.L	42	860 / 5.0	39° / 35°
	15:35	2 / 4	50	P.P. (B)	69	860 / 5.0	39° / 35°
	15:48	5 / 6	257'	P.P. (B)	69	860° / 5.0	39° / 35°
12.15.03	08:20	7 / 8	22.5	P.P. (B)	69	860° / 4.00	33° / 30°
	08:25	6 / 8	65	P.P. (B)	69	860° / 4.00	33° / 35°
	08:35	6 / 7	118	P.P. (B)	69	860° / 4.0	33° / 35°
	07:55	8 / 9	58'	S.L	42	860° / 6.0	33° / 35°

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time: In	Time: Out	PSI: In	PSI: Out	Pass / Fail	Notes
12.15.03	APT	ENTIRE	P.P. (A)	08:20	08:55	31	31	P	E→W
	AIR TEST	ENTIRE		08:26	08:31	31	30	P	E→W
	A.P.T	ENTIRE		08:25	08:30	32	31	P	W→E N→S
		ENTIRE		08:41	08:46	31	29	P	W→E DS-1 210'
		ENTIRE		08:42	08:47	33	31	P	W→E
		DIUC - EDS : DIUC 6408		08:40	08:45	33	31	P F	W→E *
		ENTIRE		09:02	09:07	31	30	P	W→E DS-2 1400'
		ENTIRE		10:43	10:48	30	30	P	
		ENTIRE		10:45	10:50	32	30	P	
		ENTIRE		10:41	10:46	30	29	P	
		ENTIRE		11:00	11:05	31	30	P	

Notes/Comments: 1,082 LINEAL FEET (12.13.03) + 323.5 (12.15.03) = 1405.50 LF TO DATE * . CAP 3/4 0 - 0.102" ATF

1.2. = E→W DIRECTION PANEL DEPLOYED - ALL SEAMS WELDED W→E ON 12.15.03

UR

seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Pety sunny **Welding Inspector** **Testing Inspector** V. Troilo

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine Mach No.	Machine Temp / Speed	Temp Sheet / Amb
12-15-03	08:05	7 / 9	174'	S.L.	42	860° / 6.0	33° / 35°
	08:25	9 / 10	218'	S.L.	42	860° / 6.0	33° / 35
	09:15	10 / 11	205'	S.L	42	860° / 6.0	38° / 38°
	09:27	11 / 12	187'	P.P.(B)	69	860° / 4.0	38° / 38
	10:05	12 / 13	171'	S.L	42	860° / 6.0	38° / 38°
	10:10	13 / 14	150'	P.P.(B)	69	860° / 4.0	38° / 38°
	10:35	14 / 15	124'	S.L	42	860° / 6.0	41° / 41°
	10:45	15 / 16	100'	P.P.(B)	69	860° / 4.0	41° / 41°

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time In	Time Out	PSI In	PSI Out	Pass / Fail	Notes
12-15-03	AIR TEST	68'-95' 25'-55' 16'-25' 1+05'-EOS	P.P. (A)	11:22 11:30 11:38 11:45	11:27 11:35 11:43 11:50	31 31 33 30	31 30 31 29	P P P P	* ☆
		ENTIRE		13:40	13:45	29	29	P	
		28'-EOS 0+15-0+20' 0+05'-0+15'		13:41 14:20 14:21	13:46 14:25 14:26	30 30 31	30 30 30	P P P	DS-3 35' CAP 20'-28' ☆
		ENTIRE		13:50	13:55	30	30	P	
		ENTIRE		13:51	13:56	31	31	P	
		ENTIRE		13:52	13:57	32	29	P	DS-4 13/14 33'
		ENTIRE		14:05	14:10	30	30	P	
		ENTIRE		14:06	14:11	32	30	P	DS-5 46'

Notes/Comments: * - SEAM 7/9 CAPPED FROM 0+55'-0+68' - FAILING AIR TEST ✓
7/9 CAPPED 0+00' 0+16' - FAILED AIR TEST ✓
☆ 7/9 AIR TEST 95'-1+05' 30 - 29 PASS ✓

1,335 LF
+ 1,405.5 LF (PREVIOUS)
2,740.5 - 5 DS CARRY OVER 240'
CAP 10/11 20'-28' - ATF

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 12-13-03

SEAM INFORMATION / **FIELD TESTING INFORMATION**[2]

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp / Sheet / Amb	Seamer's Name / Weather	Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
TS-1	TRIAL	40 MIL LL	14:45 / 12-13-03	S.L.	PAUL P.	CLOUDY COLD 35°	Strength at Break	101 / 103	106 / 99	109 / 102			115	119			
	#42	860° / 5.0	39° / 35°	CLOUDY COLD			Break Desc	FTB	FTB	FTB			FTB	FTB			
							Pass / Fail	P	P	P			P	P			
							Strength at Break										
							Break Desc										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. Troilo Testing Date: 12-13-03

SEAM INFORMATION					FIELD TESTING INFORMATION[2]											
								Seam Adhesion Strength - Peel 44 lb/in					Seam Strength - Shear 53 lb/in				
Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather	Tester's Name	Weather / Temp		1	2	3	4	5	1	2	3	4	5
TS-2	TRIAL	40 mil LL	14:45 / 12-13-03	P. P. (B)	P.	Cloudy,	Strength at Break	104 / 101	98 / 109	94 / 101			120	117			
	#69	260° / 5.0	39° / 35°	Cloudy Cold	P. (A)	Cold	Break Desc	FTB	FTB	FTB			FTB	FTB			
							Pass / Fail	P	P	P			P	P			
							Strength at Break										
							Break Desc										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 12-15-03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp / Sheet / Amb	Seamer's Name / Weather
TS-3	TRIAL	40 MIL LL	07:15 / 12-15-03	P.P.(B)
	#69	860° / 6.0	33° / 33°	PARTLY SUNNY, WINDY
TS-3(R) (RETEST)	TRIAL	40 MIL LL	07:40 / 12-15-03	P.P.(B)
	#69	860° / 5.0	33° / 33°	PARTLY SUNNY, WINDY
TS-3(R1)	TRIAL	40 MIL LL	08:00 / 12-15-03	P.P.(B)
	#69	860° / 4.0	33° / 33°	PARTY, SUNNY, WINDY
TS-3(R2)	TRIAL	40 MIL LL	08:00 / 12-15-03	P.P.(B)
	69	860° / 4.0	33° / 33°	PARTY SUNNY, WINDY

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.(A)	PARTLY SUNNY, WINDY	Strength at Break	105 / 105	97 / 87								
		Break Desc.	FTB	NFTB								
		Pass / Fail	P	F - 100% PEEL INCLUSION								
P.P.(A)	PARTY SUNNY, WINDY	Strength at Break	101 / 96	101 / 100				120				
		Break Desc.	FTB	NFTB - 80% INCLUSION				FTB				
		Pass / Fail	P	F				P				
P.P.(A)	PARTY, SUNNY, WINDY	Strength at Break	90 / 85	92 / 93	96 / 92			113	114			
		Break Desc.	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P.(A)	PARTY SUNNY, WINDY	Strength at Break	98 / 83	99 / 96	107 / 101			115	113			
		Break Desc.	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

MACHINE #69 FAILED 2 CONSECUTIVE TRIAL WELDS. REPAIRS WERE MADE TO MACHINE (ADJUST WEDGE) AND 2 CONSECUTIVE PASSING TESTS WERE ACHIEVED.

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. Troilo Testing Date: 12.15.03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-4	TRIAL	40 mil LL	07:20 12.15.03	S.L.
	42	860° 4.0	33° 35°	Pretty Sunny windy

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P(A)	Pretty Sunny, windy	Strength at Break	92/95	107/92	105/94			124	120			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TADILO Testing Date: 12-15-03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp / Sheet / Amb	Seamer's Name / Weather
TS-5 (EXT.)	EXT. TRIAL / #59	40 MIL LL / 400 @ 450 (EXT.)	08:00 / 12-15-03 / 33° / 35°	N.P. / PARTY SUNNY WINDY
TS-6	TRIAL / #59	40 MIL LL / 400 @ 450 (EXT.)	13:15 / 12-15-03 / 42° / 42°	N.P. / PARTY SUNNY WINDY

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
V. BERMAN	PARTY SUNNY WINDY	Strength at Break	112	129	99			99	113			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P. (A)	PARTY, SUNNY WINDY	Strength at Break	107	100	106			111	111			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

URS

geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILL Testing Date: 12-16-03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-7 EXT	TRIAL #59	40 MIL LLDPE 300' @ 60' EXT.	10:35 12-16-03 55° 44°	P.P. Sunny Clear

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Sunny Clear	Strength at Break	83 / –	90 / –	89 /	/	/	104	106			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break	/	/	/	/	/					
		Break Desc										
		Pass / Fail										
		Strength at Break	/	/	/	/	/					
		Break Desc.										
		Pass / Fail										
		Strength at Break	/	/	/	/	/					
		Break Desc.										
		Pass / Fail										
		Strength at Break	/	/	/	/	/					
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
2/3/4	T-SEAM	P-1	12-15-03/09:05	#59	N.P.	3'x4'	12-15-03	Vac Box	P.P.	PASS	
P-4 2' west of seam 3/4	HOLE	P-2	/09:10			2'x2'				P	
3/4/5	T-SEAM	P-3	/09:15			2'x2'				P	
3/5 210 E	DS-1	P-4	/13:35			2'x5'				P	
5/6 1100' E	DS-2	P-5	/09:50			2'x3'				P	
6/7/8	T-SEAM	P-6	/11:15			2'x2'				P	
7/8/9	T-SEAM/ A.T.F	P-7	/11:35			2'x10'				P	
Panel end 1/2 panel - 1/2 panel 1/2	HOLE	P-8	/13:40			1.5'x1.5'				P	
2/4 [illegible]	A.T.F	P-9	/14:00			2'x8'				P	
6/8 B.O.S.	AIR TEST SEAM	P-10	/14:40			2'x3'				P	
8/9 B.O.S.	AIR TEST SEAM	P-11	/15:00			2'x4'				P	
7/9 0+28 E	AIR TEST	P-12	/15:15			2'x3'				P	
10/11 15 East	AIR TEST	P-13	/15:30			1.5'x2'				P	
10/11 20'-28' E	AIR TEST PANEL	P-14	/15:45			2'x9'				P	
10/11 35' E	DS-3	P-15	/15:55			2'x6'				P	
7/9 50'-70' E	AIR TEST PANEL	P-16	/16:25			2'x14'				P	

Inspected By: V. TROILO **Date:** 12-15-03

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
7/9 95' E	AIR TEST SEAL	P-17	12-15-03 / 16:31	#59	N.P	1.5'x2'	12-15-03	Vac Box	P.P.	P	
7/9 1105' E	"	P-18	↓ / 16:35	"	"	1.5'x2'	↓	↓	↓	P	
13/14 33' E	DS-4	P-19	12-16-03 / 11:15	#59	P.P.	3'x6'	12-16-03	Vac Box	P.P.	P	
15/16 46' E	DS-5	P-20	/ 11:20			2'x6'				P	
P12 5' W ℄	DEED INDEMNITION	P-21	/ 11:22			1.5'x1.5'				P	
P12 10' W ℄		P-22	/ 11:25			1.5'x1.5'				P	
P12 15' W ℄		P-23	/ 11:28			1.5'x1.5'				P	
P12 20' W ℄		P-24	/ 11:30			1.5'x1.5'				P	

Inspected By: V. TAOILO **Date:** 12-15-03
12-16-03

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

	WELDING DATA							TEST DATA				
					ID			Non-Destructive Testing				
	Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
WELL B	BEG. PANEL 1	EXTEND LINER TO LIMIT	P-25	12-19-03 / 01:59	#59	N.P	3'x16'	12-19-03	V BOX	D.P.	PASS	
"	BEG. PANEL 2	EXTEND LINER TO LIMIT	P-26	/ 08:20			5'x22'				P	
C/D	NORTH SIDE P-16 30'-52'		P-27	/ 10:30			3'x22'				P	
	NORTH SIDE P-16 57'-62'		P-28	/ 10:45			3'x10				P	
	19/20 @ 12'	DS-6	P-29	/ 14:35	#59	N.P	2'x6'	12-22-03	V BOX	S.P.	P	
	22/24 @ 100'	DS-7	P-30	/ 16:20			2'x6'				P	
	22/23/24	T SEAM	P-31	/ 16:25			2'x3'				P	
	P28 12' EAST 3' SO 26/28	HOLE	P-32	/ 15:20			2'x2'				P	
	P28 18' EAST 3' SO 26/28	HOLE	P-33	/ 15:15			2'x2'				P	
	P28 18' EAST 3' SO 26/28	HOLE	P-34	/ 15:10			2'x2'				P	
	P28 25' EAST	NUMEROUS HOLES / DAMAGE	P-35	/ 14:40			2'x20				P	
	26/27/28	T SEAM	P-36	/ 15:05			2'x3'				P	
	27/28/29	T SEAM	P-37	/ 15:00			2'x3'				P	
	26/27 @ 50'	DS-8	P-38	/ 15:35			2'x6'				P	
	26/27 @ 54'	AIR TEST "SEAL"	P-39	/ 15:40			2'x3'				P	
	29/30 @ 167'	DS-9	P-40	/ 15:50			2'x6'				P	

Inspected By: Vincent Troile **Date:** 12-19-03

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CELL "B"

geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TADILO Testing Date: 12-15-03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
DS-1	3/5	40 UIL LL	15:35 / 12-13-03	S.L.
	#42	860° / 5.0	39° / 35°	Sunny, clear
DS-2	5/6	40 UIL LL	15:48 / 12-13-03	P.P. (B)
	#69	860° / 5.0	39° / 35°	Sunny clear
DS-3	10/11	40 UIL LL	09:15 / 12-15-03	S.L.
	#42	860° / 6.0	38° / 38°	Perly sunny windy
DS-4	13/14	40 UIL LL	10:10 / 12-15-03	P.P. (B)
	#69	860° / 4.0	38° / 38°	Perly sunny, windy
DS-5	15/16	40 UIL LL	10:45 / 12-15-03	P.P. (B)
	#69	860° / 4.0	41° / 41°	Perly sunny windy

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P (A)	Perly sunny windy	Strength at Break	85/88	92/89	85/78	92/88	88*/86	102	103	101	103	102
		Break Desc	FTB	FTB	FTB	FTB	ADSER	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P
P.P. (A)	Perly sunny, windy	Strength at Break	77/85	96/77	92/84	95/82	93/75	103	106	105	103	103
		Break Desc	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P
P.P (A)	Perly sunny, windy	Strength at Break	69/78	91/76	87/75	76/79	91/71	99	81	101	85	97
		Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P
P.P (A)	↓	Strength at Break	90/65	91/64	83/83	62/88	88/83	92	100	102	95	96
		Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P
P.P (A)	↓	Strength at Break	75/85	70/85	91/69	93/78	75/86	102	100	98	100	99
		Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

* - ADBRK - < 25% PEEL INCURSION

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-52-02

ASTM D 6392/4437
ANALYST: KM/KKA

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	71	<10	SE	FTB	44	81	> 50	FTB	53
	2A	65	<10	SE	FTB					
	3A	78	<10	SE	FTB		84	> 50	FTB	
	4A	62	<10	SE	FTB					
	5A	72	<10	SE	FTB		77	> 50	FTB	
DS-1	**MEAN:**	**70**								
	1B	69	<10	SE	FTB		79	> 50	FTB	
	2B	68	<10	SE	FTB					
	3B	68	<10	SE	FTB		83	> 50	FTB	
	4B	69	<10	SE	FTB					
	5B	70	<10	SE	FTB					
	MEAN:	**69**				**MEAN:**	**81**			
	1A	73	<10	SE	FTB	44	78	> 50	FTB	53
	2A	66	<10	SE	FTB					
	3A	68	<10	SE	FTB		79	> 50	FTB	
	4A	61	<10	SE	FTB					
	5A	73	<10	SE	FTB		78	> 50	FTB	
DS-2	**MEAN:**	**68**								
	1B	70	<10	SE	FTB		77	> 50	FTB	
	2B	73	<10	SE	FTB					
	3B	73	<10	SE	FTB		81	> 50	FTB	
	4B	71	<10	SE	FTB					
	5B	74	<10	SE	FTB					
	MEAN:	**72**				**MEAN:**	**79**			

NR: Not Requested

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.

TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-52-02

ASTM D 6392/4437
ANALYST: KM/KKA

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	73	<10	SE	FTB	44	78	> 50	FTB	53
	2A	78	<10	SE	FTB					
	3A	75	<10	SE	FTB		72	> 50	FTB	
	4A	77	<10	SE	FTB					
	5A	82	<10	SE	FTB		76	> 50	FTB	
DS-3	**MEAN:**	**77**								
	1B	57	<10	SE	FTB		78	> 50	FTB	
	2B	62	<10	SE	FTB					
	3B	55	<10	SE	FTB		83	> 50	FTB	
	4B	55	<10	SE	FTB					
	5B	57	<10	SE	FTB					
	MEAN:	**57**				**MEAN:**	**77**			
	1A	57	<10	SE	FTB	44	79	> 50	FTB	53
	2A	64	<10	SE	FTB					
	3A	72	<10	SE	FTB		77	> 50	FTB	
	4A	59	<10	SE	FTB					
	5A	75	<10	SE	FTB		79	> 50	FTB	
DS-4	**MEAN:**	**65**								
	1B	68	<10	SE	FTB		76	> 50	FTB	
	2B	76	<10	SE	FTB					
	3B	72	<10	SE	FTB		77	> 50	FTB	
	4B	73	<10	SE	FTB					
	5B	65	<10	SE	FTB					
	MEAN:	**71**				**MEAN:**	**78**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-52-02

ASTM D 6392/4437
ANALYST: KM/KKA

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	54	<10	SE	FTB	44	78	> 50	FTB	53
	2A	66	<10	SE	FTB					
	3A	66	<10	SE	FTB		79	> 50	FTB	
	4A	66	<10	SE	FTB					
	5A	61	<10	SE	FTB		79	> 50	FTB	
DS-5	**MEAN:**	**63**								
	1B	75	<10	SE	FTB		77	> 50	FTB	
	2B	69	<10	SE	FTB					
	3B	73	<10	SE	FTB		80	> 50	FTB	
	4B	73	<10	SE	FTB					
	5B	70	<10	SE	FTB					
	MEAN:	**72**				**MEAN:**	**79**			

NR: Not Requested

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.

geotechnics

..... GEOTECHNICAL, GEOENVIRONMENTAL, AND GEOSYNTHETIC LABORATORIES

LABORATORY TEST REPORT

December 31, 2003

Mr. James Whitty
URS Diamond Group / DuPont CRG
Barley Mill Plaza, Bldg 27-2306
4417 Lancaster Pike
Wilmington, DE 19805

Project No.: L03156-02, 03

GAI-LAP
Initials: [illegible] #: [illegible]
Date: 12-31-03

RE: DESTRUCTIVE SEAM TEST RESULTS
40-MIL LLDPE GEOMEMBRANE
DuPONT EDGE MOOR SURFACE IMPOUNDMENT CAP
PROJECT NO.: 1898358

Transmitted herein are the results of the peel and shear tests performed for URS Corporation as directed by Mr. Eric Bryan on the following seam samples submitted:

Submitted	Project No.	Material	Samples	Sample No.s
12-18-03	L03156-02	Seams	5	DS-1....5
12-22-03	L03156-03	Seams	5	DS-6...10

We are pleased to be of service and trust that our efforts have contributed to the success of your project. Should you have any questions, please do not hesitate to call.

Respectfully submitted,

Richard S. Lacey

Richard S. Lacey, P.E.
Laboratory Director

attachments: 10 Data Pages

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INTEGRITY IN TESTING

CAVEAT

The tests were performed in general accordance with the procedures referenced on the data tables as well as industry practice on test specimens believed to be representative of the samples submitted. The test results are indicative only of the specimens that were actually evaluated. There were no seam sample remnants.

Geotechnics has no direct knowledge of the origin of the samples submitted, implies no position with regard to the disposition of the test results, i.e. pass/fail, and makes no claims as to the suitability of the material for its intended end use.

The test data and all associated project information provided shall be held in confidence and disclosed to other parties not directly involved with the project only with the authorization of the Client and Geotechnics.

The test data transmitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics.

PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-02
LAB ID NO.: L03156-02-01
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-1

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	74.5	FTB-SE1	<10
2	65.6	FTB-SE1	<10
3	64.5	FTB-SE1	<10
4	63.0	FTB-SE1	<10
5	68.4	FTB-SE1	<10
AVERAGE	**67.2**		
STD. DEV.	4.53		
INSIDE TRACK (WELD "B")			
1	68.1	FTB-SE1	<10
2	68.6	FTB-SE1	<10
3	67.4	FTB-SE1	<10
4	68.5	FTB-SE1	<10
5	65.7	FTB-SE1	<10
AVERAGE	**67.7**		
STD. DEV.	1.19		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	72.3	FTB-SE1
2	71.2	FTB-SE1
3	73.1	FTB-SE1
4	69.7	FTB-SE1
5	72.5	FTB-SE1
AVERAGE	**71.8**	
STD. DEV.	1.34	

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T:\Synthetics\2003 Synthetics\[L03156-02DS1.xls]Sheet1 L03156-02-01 12/18/03

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-02
LAB ID NO.: L03156-02-02
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-2

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	70.0	FTB-SE1	<10
2	68.5	FTB-SE1	<10
3	68.7	FTB-SE1	<10
4	68.4	FTB-SE1	<10
5	68.0	FTB-SE1	<10
AVERAGE	**68.7**		
STD. DEV.	0.76		
INSIDE TRACK (WELD "B")			
1	61.4	FTB-SE1	<10
2	65.6	FTB-SE1	<10
3	61.0	FTB-SE1	<10
4	59.7	FTB-SE1	<10
5	62.0	FTB-SE1	<10
AVERAGE	**61.9**		
STD. DEV.	2.21		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	76.7	FTB-SE1
2	74.0	FTB-SE1
3	74.5	FTB-SE1
4	72.3	FTB-SE1
5	71.4	FTB-SE1
AVERAGE	**73.8**	
STD. DEV.	2.06	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-02
LAB ID NO.: L03156-02-05
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-5

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	69.5	FTB-SE1	<10
2	67.5	FTB-SE1	<10
3	68.2	FTB-SE1	<10
4	68.2	FTB-SE1	<10
5	69.3	FTB-SE1	<10
AVERAGE	**68.5**		
STD. DEV.	0.84		
INSIDE TRACK (WELD "B")			
1	69.2	FTB-SE1	<10
2	63.2	FTB-SE1	<10
3	64.2	FTB-SE1	<10
4	60.5	FTB-SE1	<10
5	64.3	FTB-SE1	<10
AVERAGE	**64.3**		
STD. DEV.	3.15		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	77.7	FTB-SE1
2	76.2	FTB-SE1
3	74.3	FTB-SE1
4	72.4	FTB-SE1
5	73.6	FTB-SE1
AVERAGE	**74.8**	
STD. DEV.	2.11	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-02
LAB ID NO.: L03156-02-04
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-4

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	68.5	FTB-SE1	<10
2	66.1	FTB-SE1	<10
3	68.1	FTB-SE1	<10
4	68.3	FTB-SE1	<10
5	66.9	FTB-SE1	<10
AVERAGE	**67.6**		
STD. DEV.	1.04		
INSIDE TRACK (WELD "B")			
1	69.0	FTB-SE1	<10
2	68.1	FTB-SE1	<10
3	60.0	FTB-SE1	<10
4	59.8	FTB-SE1	<10
5	61.7	FTB-SE1	<10
AVERAGE	**63.7**		
STD. DEV.	4.48		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	69.0	FTB-SE1
2	69.4	FTB-SE1
3	70.2	FTB-SE1
4	71.4	FTB-SE1
5	70.6	FTB-SE1
AVERAGE	**70.1**	
STD. DEV.	0.95	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-02
LAB ID NO.: L03156-02-03
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-3

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	56.2	FTB-SE1	<10
2	57.9	FTB-SE1	<10
3	56.0	FTB-SE1	<10
4	61.5	FTB-SE1	<10
5	60.1	FTB-SE1	<10
AVERAGE	**58.3**		
STD. DEV.	2.42		
INSIDE TRACK (WELD "B")			
1	69.0	FTB-SE1	<10
2	64.1	FTB-SE1	<10
3	68.7	FTB-SE1	<10
4	68.3	FTB-SE1	<10
5	68.1	FTB-SE1	<10
AVERAGE	**67.6**		
STD. DEV.	2.01		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	64.2	FTB-SE1
2	63.9	FTB-SE1
3	67.0	FTB-SE1
4	63.3	FTB-SE1
5	71.4	FTB-SE1
AVERAGE	**66.0**	
STD. DEV.	3.36	

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DuPont Edge Moor Surface Impoundment

Cell "B" Cap As-Built Drawing

Key:

(1) = Panel Identification

(P-1) = Patch/Repair Location and Identification

(P-9) = Cap Strip (Testing Seam Failure) and Patch Identification

DS-1 = Destructive Seam Sample Location

Scale: 1" = 30'

APPENDIX E3
CELL C/D DATA

IMPOUNDMENTS C/D

GEO-SYNTHETICS, INC.

CERTIFICATE OF ACCEPTANCE OF SUBGRADE SURFACE PREPARATION FOR GEOMEMBRANE INSTALLATION

PROJECT NAME: Dupont Edge Moor Clousre

LOCATION: Wilmington, DE. 19809

JOB #: 23069 OWNER: Dupont

AREA ACCEPTED: Surface under 12 oz. textile in cell C-D 76,560 SF
Deployed 12.16.03.

INSTALLER: The undersigned authorized representative of GSI certifies that he or she has visually inspected the subgrade surface of the area described above and has found the surface to be acceptable for installation of the Geomembrane materials.

GSI shall be responsible for the integrity of finished GCL and Geomembrane material until completion of the installation or demobilization from site.

This certification is based on observations of the subgrade surface conditions only. GSI has made no sub-terrain inspections or tests and makes no representations or warranties as to the conditions that may exist below the surface of the subgrade.

INSPECTOR:

CERTIFICATE APPROVED AND ACCEPTED BY:

Vicky L. Beeman GSI.
QC. 12.17.03

[signature]
Signature

12/17/03
Date

QC Supervisor
Title

URS
Company

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GEO-SYNTHETICS, INC.

CERTIFICATE OF ACCEPTANCE OF SUBGRADE SURFACE PREPARATION FOR GEOMEMBRANE INSTALLATION

PROJECT NAME: Dupont Edge Moor Closure

LOCATION: Wilmington DE 19809

JOB #: 23069 OWNER: Dupont

AREA ACCEPTED: Surface under 12oz textile in cell C-D 125,580

INSTALLER: The undersigned authorized representative of GSI certifies that he or she has visually inspected the subgrade surface of the area described above and has found the surface to be acceptable for installation of the Geomembrane materials.

GSI shall be responsible for the integrity of finished GCL and Geomembrane material until completion of the installation or demobilization from site.

This certification is based on observations of the subgrade surface conditions only. GSI has made no sub-terrain inspections or tests and makes no representations or warranties as to the conditions that may exist below the surface of the subgrade.

INSPECTOR: GSI 12-22-03

CERTIFICATE APPROVED AND ACCEPTED BY:

Signature — Date: 12-22-03

QA SUPERVISER
Title

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Company

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"C/D"

geomembrane panel record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

40-mil geomembrane					Temperature	
Panel #	Mat'l Type	Roll #	Time	Length	Sheet	Ambient
17	40 mil LL	39091	11:05	112'	55°	41°
18	↓	↓	11:10	116'	↓	↓
19			11:15	116'		
20			11:20	123'		
21		↓	11:30	130'	↓	↓
22		39091	13:05	138'	54°	46°
23		39090	13:12	11'	↓	↓
24		↓	13:20	168'		
25			13:25	187'		
26			13:30	186'		
27		↓	13:35	174'		
28		39102	13:45	36'		
29		39102	13:50	230'		
30		39102	14:00	238'		
31		39102	14:02	240'	↓	↓
32		39102	14:15	8'	52	48°
33		39098	14:20	260'	↓	↓
34	↓	39098	14:25	265	↓	↓
				(+/- 60,236 SQ FT)		

Inspected By: V. TROICO **Date:** 12-16-03

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URS

geomembrane panel record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

40-mil geomembrane					Temperature	
Panel #	**Mat'l Type**	**Roll #**	**Time**	**Length**	**Sheet**	**Ambient**
P-35	40 mil LL	39098	15:35	92'	36°	36°
P-36	↓	↓	15 40	112'	↓	↓
37	↓	39087	15:45	133'	↓	↓
38	↓	↓	15:48	150'	↓	↓
39	↓	↓	15:50	152'	↓	↓
40	↓	↓	16:00	152'	↓	↓
41	↓	↓	16.05	135'	35°	35°
				+/- 20,372 FT²		

Inspected By: V. TROILO **Date:** 12.19.03

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geomembrane panel record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

40-mil geomembrane					Temperature	
Panel #	Mat'l Type	Roll #	Time	Length	Sheet	Ambient
42	40 MILLL	39105	07:20	39'	27°	30°
43			07:30	190'		
44			07:38	192'		
45			07:42	192'		
46			07:45	137'		
47		39099	08:00	73'	34°	33°
48			08:05	225'		
49			08:25	225'		
50			08:40	210'	39°	36°
51		39100	08:50	26'		
52			09:51	271'	46°	37°
53			09:55	290'		
54			10:10	145'		
55		39097	10:20	160'		
56			11:01	315'		
57			13:05	38'	48°	40°
58			13:10	40'		
59			13:25	38'		
60			13:30	40'		
61			13:40	40'		
				(4,63,492 FT²)		

Inspected By: V. Troilo **Date:** 12-20-03

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geomembrane panel record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

	40-mil geomembrane				Temperature	
Panel #	**Mat'l Type**	**Roll #**	**Time**	**Length**	**Sheet**	**Ambient**
62	40 mil LL	39097		37'	35°	35°
63		39097	07:10	33'	"	"
64		39100	07:32	303'	30°	30°
65		" "	07:40	292'	30°	28°
66		" "	07:50	173'	30°	28°
67		39094	08:10	112'	30°	28°
68		39094	08:25	256'	32°	31°
69		39094	08:45	218'	32°	31°
70		39094	09:00	135'	35°	33°
71		39101	09:15	53'	38°	33°
72		39101	09:30	155'	46°	35°
73		39101	09:55	123'	46°	35°
74		39101	10:15	89'	46°	35°
75		39101	10:40	~~77~~ 55'	50°	35°
76		39101	10:45	36' x 12' wide	50°	35°
				10,540 FT²		

12/21

Inspected By: J. Shannon Date: 12-21-03

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CELLS "C"

URS

seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather SUNNY, CLEAR **Welding Inspector** V. TROICO **Testing Inspector** V. TROICO

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine Mach No.	Machine Temp / Speed	Temp Sheet / Amb
12.16.03	11:25	17/18	112'	S.L.	#42	860°/6.0	55°/44°
	11:30	18/19	116'	P.P.	#69	860°/6.0	
	11:40	19/20	116'	S.L.	42	860°/6.0	
	11:45	20/21	123'	P.P.	69	860°/6.0	
	13:10	21/22	136'	S.L.	42	860/6.0	54°/46°
	13:20	22/23	22.5	P.P.	69	860°/6.0	
	13:25	23/24	16'	P.P.	69	860°/6.0	
	13:28	23/24	137'	P.P.	69	860°/6.0	
	13:30	24/25	167'	S.L.	42	860°/6.0	
	13:50	25/26	186	P.P.	69	860°/6.0	
	13:50	27/28	22.5	S.L.	42	860°/6.0	

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time In	Time Out	PSI In	PSI Out	Pass / Fail	Notes
12.16.03	AIR TEST	ENTIRE	P.P.	13:34	13:39	30	29	P	
		ENTIRE		13:34	13:39	30	28	P	
		ENTIRE		13:35	13:40	31	29	P	DS-6 0+12'
		ENTIRE		14:00	14:05	31	30	P	
		ENTIRE		13:52	13:57	30	29	P	
		ENTIRE		13:53	13:58	30	29	P	
		ENTIRE		14:14	14:19	34	34	P	
		ENTIRE		14:05	14:10	29	29	P	DS-7 1+00'
		ENTIRE		14:20	14:25	30	27	P	
		ENTIRE		14:40	14:45	33	31	P	
		ENTIRE		14:56	15:01	32	30	P	

Notes/Comments:

1,154 LF
3,740.5 LF PREVIOUS
3,894.5 LF TO DATE

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URS

seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Sunny → Partly sunny **Welding Inspector** V. TAOILO **Testing Inspector** V TAOILO

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine Mach No.	Machine Temp / Speed	Temp Sheet / Amb
12.16.03	14:00	26 / 28	29'	S.L.	42	860° / 6.0	54° / 46°
	14:05	26 / 27	174'	S.L.	42	860° / 6.0	52° / 48°
	14:20	28 / 29	42'	P.P.	69	860° / 6.0	
	14:28	27 / 29	174'	P.P.	69	860° / 6.0	
	14:30	29 / 30	227'	S.L.	42	860° / 6.0	
	14:57	30 / 31	238'	P.P.	69	860° / 6.0	
	15:05	31 / 32	16'	S.L.	42	860° / 6.0	48° / 48°
	15:10	32 / 33	12'	S.L.	42	860° / 6.0	
	15:15	31 / 33	241'	S.L.	42	860° / 6.0	
	15:35	33 / 34	265'	P.P.	69	860° / 6.0	

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time In	Time Out	PSI In	PSI Out	Pass / Fail	Notes
12.16.03	AIR TEST	ENTIRE	P.P.	14:45	14:50	30	29	P	
		0+00 - 0+54'		14:46	14:51	32	30	P	DS-8
		0+54' → END		15:05	15:10	31	30	P	0+50'
		ENTIRE		14:55	15:00	31	30	P	
		ENTIRE		14:54	14:59	33	31	P	
		ENTIRE		15:25	15:30	32	32	P	DS-9 1+67'
		ENTIRE		15:26	15:31	29	27	P	
		ENTIRE		15:27	15:32	33	31	P	
		ENTIRE		15:41	15:46	30	28	P	
		ENTIRE		15:40	15:45	30	29	P	DS-10 1+75'
		ENTIRE		16:00	16:05	29	29	P	

Notes/Comments:

1418 LF
3894.5 PREVIOUS
5,312.5 LF TO DATE = 10.5 TOTAL DEST. 5 MORE NEEDED NEXT DEST 188' INTO SEAMING

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URS

seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Cloudy 36° 12/19/03 Sunny Clear 12/20/03 **Welding Inspector** V Tagilo **Testing Inspector** V. Tagilo

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine Mach No.	Machine Temp / Speed	Temp Sheet / Amb
12-19-03	15:45	35 / 36	92'	S.L.	42	860 / 6.0	36° / 36°
12-19-03	15:50	36 / 37	112'	PP	69	860 / 6.0	
	16:05	37 / 38	132'	S L	42	860 / 6.0	
	16:11	38 / 39	149'	P.P.	69	860 / 6.0	
	16:25	39 / 40	151'	S L	42	860 / 6.0	35° / 35°
	16:30	40 / 41	135'	P.P	69	860 / 6.0	
12/20/03	01:50	43 / 44	185'	S.L	42	860 / 6.0	27° / 30°
	07:55	44 / 45	191'	P.P.	69	860 / 6.0	34° / 33°
	08:25	46 / 47	22.5'	S.L.	42	860 / 6.0	34° / 33°
	08:30	45 / 46	131'	S L	42	860 / 6.0	34° / 33°
	08:45	45 / 47	70'	S.L	42	860 / 6.0	39° / 36°

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time In	Time Out	PSI In	PSI Out	Pass / Fail	Notes
12-20-03	AIR TEST	ENTIRE	P.D	09:10	09:15	30	29	P	
		ENTIRE		09:11	09:16	30	29	P	DS-12 0+96'
		ENTIRE		09:21	09:26	30	28	P	
		ENTIRE		09:22	09:27	30	29	P	
		ENTIRE		09:30	09:35	31	29	P	
		ENTIRE		09:31	09:36	30	29	P	DS-12 0+52
		ENTIRE		10:20	10:25	30	28	P	
		0+30' - EOS		10:21	10:26	31	29	P	*
		ENTIRE		10:44	10:49	32	30	P	
		0+00' - 0+72 0+72' - EOS		10:35 10:45	10:40 10:50	31 30	29 29	P P	DS-13 102'
		ENTIRE		10:36	10:41	30	28	P	

Notes/Comments: * - CAP SEAM 44/45 BOS → 0+30' FAILING TRIAL WELD BEGAN PRODUCTION SEAMING W/O RESULTS OF TESTING

1370.5
+ 5312.5
6683

(DS NEEDED 4 - 188' INTO SEAMING)

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seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Sunny, cold **Welding Inspector** V. Tadeo **Testing Inspector** V. Tadeo

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine: Mach No.	Machine: Temp / Speed	Temp: Sheet / Amb
12-20-03	08:30	41 / 48	75'	P.P.	69	860° / 6.0	39° / 36°
	09:00	48 / 49	221	S.L	42	860 / 6.0	
	09:02	46 / 48	138'	P.P.	69	860 / 6.0	
	09:15	41 / 43	143'	P.P.	69	860 / 6.0	
	09:16	42 / 43	34'	P.P	69	860 / 6.0	
	09:35	41 / 42	22.5'	P.P.	69	860 / 6.0	
	09:41	40 / 42	33'	P.P.	69	860 / 6.0	
	09:30	50 / 51	22.5	S.L	42	860 / 6.0	
	09:40	49 / 51	25'	S.L.	42	860 / 6.0	
	09:50	49 / 50	209'	S.L.	42	860 / 6.0	
	10:00	51 / 52	27'	P.P	69	860 / 6.0	47° / 36°

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time: In	Time: Out	PSI: In	PSI: Out	Pass / Fail	Notes
12-21-03	AIR	10 - EOS	PP	0851	0856	31	31	P	Cap 0-10'
		108 - 211'	PP	0950	0955	32	31	P	
		0 - 108		0955	1000	30	27	P	
		211' - EOS		0925	0930	30	27	P	
		73' - EOS	PP	~~0914~~	~~0919~~ 905	30	30	P	DS-14 1405'
		0 - 73'	PP	0850	0855	29	29	P	
12-20-03	AIR TEST	0100 - 16'	P.P.	0951	0956	30	30	P	
		16' - 135'		0950	0955	30	29	P	
		135' - EOS		10:00	10:05	31	28	P	
		ENTIRE		10:01	10:06	30	30	P	
		ENTIRE		10:15	10:20	30	30	P	
		ENTIRE		10:15	10:20	30	28	P	
12-21-03	AIR	Entire	P.P	1006	1011	30	28	P	
		Entire		1005	1010	32	31	P	
		Entire		1005	1010	30	28	P	DS-12 177'
		Entire		1015	1020	31	29	P	

Notes/Comments:

950 L.F.
1,683 previous
7633 LF

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seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Sunny, clear w/ winds 5-10mph **Welding Inspector** V. Trujillo **Testing Inspector** V. Trujillo

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine Mach No.	Machine Temp / Speed	Temp Sheet / Amb
12/20/03	10:10	50 / 52	226'	P.P.	69	860 / 6.0	46° / 37
	10:20	52 / 53	271	S.L.	42	860 / 6.0	
	10:56	54 / 55	22.5	P.P.	69	860 / 6.0	
	11:00	53 / 55	161'	P.P.	69	860 / 6.0	
	11:25	53 / 54	134'	P.P.	69	860 / 6.0	
	11:15	55 / 56	160	S.L.	42	860 / 6.0	
	11:32	54 / 56	156'	S.L.	42	860 / 6.0	47° / 38°
	14:08	57 / 58	35'	P.P.	69	860 / 6.0	48° / 40°
	13:45	58 / 59	37	P.P.	69	860 / 6.0	
	13:55	59 / 60	39'	P.P.	69	860 / 6.0	
	14:00	60 / 61	38'	P.P.	69	860 / 6.0	

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time In	Time Out	PSI In	PSI Out	Pass / Fail	Notes
12/21/03	AIR	Entire	PP	10:20	10:25	32	29	P	
12/21/03		0'-75' 75-235' 235-EOS	PP PP PP	1044 1112 1125	1049 1117 1130	30 30 30	29 29 30	P P P	DS-16 100'
12/21/03		Entire	PP	1055	1100	30	29	P	
12/21/03		Entire	PP	1045	1050	30	29	P	
12/22/03	AIR TEST	117-EOS 40'-117 0'-40	P.P.	0835 0750 0748	0840 0755 0753	30 30 30	29 29 29	P P P	
12/21/03	AIR	Entire	PP	1046	1051	31	29	P	DS-1785 DS-1786 DS-1787
12-22-03	AIR	0175-EOS 0100-0175	P.P	0755 0750	0800 0755	30 31	30 30	P P	DS-17 EOS
12-22-03	AIR	ENTIRE	PP	0842	0847	31	30	P	
		ENTIRE		0850	0855	30	27	P	DS-18 EOS
		0100-0121 0121-EOS		0920 0920	0925 0925	30 32	30 32	P P	DS-18A
		ENTIRE		0925	0930	32	30	P	

Notes/Comments: 1279.5

NOTE: DS-17 LOCATED AT END OF SEAM

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seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Sunny, CLEAR **Welding Inspector** J. SHANNON **Testing Inspector** J. Shannon / V. TROILO

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine Mach No.	Machine Temp / Speed	Temp Sheet / Amb
12.20.03	14:15	56 / 57	7'	P.P	69	860° / 6.0	48° / 40°
12.20.03	1420	56 / 58	17'	P.P	69	860° / 6.0	48° / 40°
12/21/03	8:10	62 / 63	33'	PP	69	860 / 5.5	30° / 28°
12/21/03	815	64 / 65	288'	PP	69	860 / 5.5	30° / 28°
	0900	65 / 67	108'	SL	41	860 / 5.0	38° / 33°
	0915	65 / 66	173'	SL	41	860 / 5.0	38° / 33°
	850	66 / 67	22'	SL	41	860 / 5.0	38° / 33
	0900	66 / 68	164'	PP	69	860 / 5.5	38° / 33°
	850	67 / 68	107'	PP	69	860 / 5.5	38 / 33
	1115	63 / 76	34'	PP	69	860 / 5.5	50 / 38
	1110	75 / 76	39'	SL	41	860 / 5.0	50 / 38

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time In	Time Out	PSI In	PSI Out	Pass / Fail	Notes
12.22.03	AIR	ENTIRE	P.P	08:30	–	–	–	F	CAP ENTIRE 7'
↓	AIR	ENTIRE	P.P.	0842	08:47	30	30	P	
↓	AIR	ENTIRE	P.P.	10:00	10:05	30	29	P	
12/21/03	AIR	ENTIRE	PP	1453	1458	32	32	P	
12/21/03	AIR	ENTIRE	PP	1454	1459	30	29	P	DS-19 0+50'
12/21/03	AIR	85'-115' 30'-85' 115-135'	PP PP	1540 1547	1545 1552	34 32	33 31	P P	
12/21/03	AIR	ENTIRE	PP	1505	1510	~~1510~~ 32	31	P	
12/21/03	AIR	ENTIRE	PP	1522	1527	30	29	P	DS-20A
12/21/03	AIR	ENTIRE	PP	1523	1528	30	29	P	DS-20 86'
12/22/03	AIR	ENTIRE	P.P	10:22	10:27	32	30	P	
↓	↓	ENTIRE	P.P.	10:25	10:30	33	31	P	

Notes/Comments:

992
8912.56
9904.5 LF TO DATE

0754 65/66 12/22/03
65/66 12/21/03
↓ ↓

0700 - 0+30'
165' - EOS
150' - 165'
135' - 150'

0928 0933 33 32 A
1555 1600 32 30 P
1600 1605 31 30 P
CAP

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seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Sunny, CLEAR **Welding Inspector** J. SHANNON **Testing Inspector** V. TROILO

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine Mach No.	Machine Temp / Speed	Temp Sheet / Amb
12/21/03	0930	68 / 69	234'	PP	69	860 / 5.5	46° / 35°
	1120	69 / 71	37'	SL	41	860 / 5.0	50° / 38°
	1125	69 / 72	31'	SL	41	860 / 5.0	50° / 38°
	1130	69 / 73	31'	SL	41	860 / 5.0	50° / 38°
	1135	69 / 74	31'	SL	41	860 / 5.0	50° / 38°
	1137	69 / 75	38'	SL	41	860 / 5.0	50° / 38°
	1140	69 / 76	12'	SL	41	860 / 5.0	50° / 38°
	11:42	69 / 63	22'	SL	41	860 / 5.0	50° / 38°
	11:50	68 / 63	5'	SL	41	860 / 5.0	50° / 38°
	11:52	68 / 62	17	SL	41	860 / 5.0	50° / 38°
	1104	75 / 74	73'	PP	69	860 / 5.5	50° / 38°

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time In	Time Out	PSI In	PSI Out	Pass / Fail	Notes
12-22-03	AIR TEST	0+00-102'	P.P.	10:15	10:20	30	29	P	CAP 102'-108'
		1+08' EOS		13:23	13:28	31	30	P	FAIL AIR TEST
		ENTIRE		13:11	13:16	31	29	P	
		0+24-EOS		10:50	10:55	30	29	P	
		0+00-24'		13:10	13:15	35	35	P	
		ENTIRE		10:44	10:49	32	31	P	
		0+0-0+15'		10:34	10:39	30	30	P	
		0+15-EOS		10:37	10:42	31	30	P	
		ENTIRE		10:30	10:35	30	28	P	DS-21 24'
		ENTIRE		10:20	10:25	30	30	P	
		ENTIRE		10:17	10:22	32	32	P	
		ENTIRE		10:14	10:19	30	28	P	
		0+00-0+09'	P.P.	10:07	10:12	33	32	P	
		0+09-EOS	- CAP - NO OVERLAP						
		ENTIRE	P.P.	10:30	10:35	30	29	P	

Notes/Comments: 549 -
9904.5
10,453.50 LF TO DATE

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seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Sunny, CLEAR **Welding Inspector** J. SHANNON **Testing Inspector** V. TROILO

WELDING DATA								TEST DATA									
					Machine		Temp					Time		PSI			
Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Mach No.	Temp / Speed	Sheet / Amb	Test Date	Test Type	Interval	Tester's Name	In	Out	In	Out	Pass / Fail	Notes
12-21-03	1050	74 / 73	103'	SL	41	860 / 5.0	50° / 38°	12/24/03	AIR TEST	ENTIRE	P.P.	10:33	10:38	30	29	P	
	1030	72 / 73	139'	SL	41	860 / 5.0	50° / 38°			ENTIRE		10:45	10:50	30	30	P	
	1010	70 / 72	132	SL	41	860 / 5.0	46° / 35°			0+00 - 25'		11:38	11:43	30	30	P	DS-22
										25' - EDS		11:35	11:40	31	30	P	1+15'
	950	70 / 71	22'	SL	41	860 / 5.0	46° / 35°			ENTIRE		10:50	10:55	34	32	P	
	10:02	71 / 72	38'	SL	41	860 / 5.0	46° / 35°			ENTIRE		11:45	11:50	34	33	P	
	1140	34 / 71	68'	PP	69	860 / 5.5	50° / 38°			ENTIRE		13:14	13:19	30	29	P	
	1130	34 / 69	39'	PP	69	860 / 5.5	50° / 38°			ENTIRE		13:16	13:21	32	32	P	
	11:25	34 / 68	38'	PP	69	860 / 5.5				ENTIRE		13:17	13:22	33	30	P	
	1400	34 / 70	133'	PP	69	860 / 6.0	52° / 40°			0'-17'		11:30	11:35	32	31	P	
										17' - EDS		11:30	11:35	70	30	P	
	1350	66 / 62	4'	SL	41	860 / 5.0	52° / 40°			ENTIRE		FAIL - CAP ENTIRE				F	
	1350	66 / 61	19'	SL	41	860 / 5.0	52° / 40°			0+00'-0+16'		0946	0951	32	32	P	CAP 16' → EDS

Notes/Comments:

733
10,453.50
11,186.5

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URS

seam control

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Welding Weather Sunny, CLEAR **Welding Inspector** J. SHANNON **Testing Inspector** V. TROILO

WELDING DATA

Weld Date	Time	Seam ID	Seam Length	Seamer's Name	Machine Mach No.	Machine Temp / Speed	Temp Sheet / Amb
12/21/03	13:53	65 / 61	2'	SL	41	860 / 5.0	52° / 40°
↓	13:56	65 / 60	22'	SL	41	860 / 5.0	52° / 40°
↓	1400	64 / 59	22'	SL	41	860 / 5.0	52° / 40°
↓	1010	56 / 64	300	PP	69	860 / 5.5	46° / 35°
12/21/03	10:56	61 / 62	37' ~~69~~	P.P	69	860° / 5.5	50 / 38°
12/22/03	09:00	54 / 57	7'	K.M	#610	215° / 215° P.H.	38° / 37°

TEST DATA

Test Date	Test Type	Interval	Tester's Name	Time In	Time Out	PSI In	PSI Out	Pass / Fail	Notes
12.22.03	AIR TEST	ENTIRE	P.P.	ELECTED TO CAP - 2 SEAM					CAP ENTRY SEAM
↓	↓	ENTIRE	↓	10:03	10:03	32	32	P	
↓	↓	ENTIRE	↓	0940	0941	31	31	P	
12/21/03	AIR	Entire	PP	1502 ~~BS~~	1507	31	30	P	DS-23 0+80'
12/22/03	AIR	0+00-0+19 0+19-EOS	P.P	0950 0955	0955	30	27	P F	CAP 0+19' TO EOS PM. C A.T.
12/22/03	Vacuum Box	ENTIRE	S.P.	→				P	

Notes/Comments:

383
11,186.5
11,569.5 23 DESTRUCTS needed (need destruct 440 LF into next seaming DAY

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 12-16-03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-8	TRIAL	40 MIL LL	11:15 / 12-16-03	S.L.
	#42	860° / 6.0	55° / 44°	SUNNY, CLEAR
TS-10	TRIAL	40 MIL LL	15:45 / 12-16-03	S.L.
	#42	860° / 6.0	48° / 48°	SUNNY, CLEAR

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
V. BEAUDOIN	SUNNY CLEAR	Strength at Break	90 / 107	101 / 105	105 / 102				112	111		
		Break Desc	FTB	FTB	FTB				FTB	FTB		
		Pass / Fail	P	P	P				P	P		
P.P.	SUNNY, CLEAR	Strength at Break	89 / 79	84 / 90	80 / 88				94	96		
		Break Desc	FTB	FTB	FTB				FTB	FTB		
		Pass / Fail	P	P	P				P	P		
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. Taoilo Testing Date: 12.16.03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp / Sheet / Amb	Seamer's Name / Weather
TS-9	TRIAL	40 mil LL	11:10 / 12.16.03	P.P (B)
	#69	860° / 6.0	55° / 44°	Sunny clear
TS-11	TRIAL	40 MIL LL	16:05 / 12.16.03	P.P.
	#69	860° / 6.0	48° / 48°	Sunny clear

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
V. Beum	Sunny clear	Strength at Break	98 / 77	90 / 94	97 / 92			107	108			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P.	clear	Strength at Break	103 / 68	94 / 88	92 / 86			106	111			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 12-19-03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-12	TRIAL	40 MIL LL	07:46 / 12-19-03	N.P.
	59	430° @ 300 / EXT.	30° / 30°	PARTY SUNNY
TS-13	TRIAL	40 MIL LL	13:15 / 12-19-03	N.P.
	59	435° / 300° EXT	42° / 49°	PARTY SUNNY

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	PARTY SUNNY 30°	Strength at Break	71 / –	88	87			122	123			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P	PARTY SUNNY 42°	Strength at Break	62 / –	84 / –	77 / –			98	98			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. Tacilo Testing Date: 12-19-03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-14	TRIAL	10 MIL LL	15:42 / 12-19-03	S.L.
	A2	260° / 6.0	36° / 36	Cloudy
TS-15	TRIAL	10 MIL LL	15:36 / 12-19-03	P.P.
	G9	260° / 6.0	36° / 36°	Cloudy

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Cloudy 36°	Strength at Break	108 / 108	99 / 110	101 / 102			113	113			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P.	Cloudy 36°	Strength at Break	98 / 102	88 / 92	96 / 106			107	119			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 12·20·03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp / Sheet / Amb	Seamer's Name / Weather
TS-16	TRIAL / 69	40 MIL LL / 860° / 6.0	07:13 / 12.20.03 / 27° / 30°	P.P. / SUNNY CLEAR
TS-16R	TRIAL / 69	40 MIL LL / 860° / 6.0	08:00 / 12.20.03 / 27° / 30°	P.P. / SUNNY CLEAR
TS-1C	TRIAL / 69	40 MIL LL / 860° / 6.0	13:20 / 12.20.03 / 48° / 10	P.P. / PARTY CLOUDY

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P	SUNNY 30°	Strength at Break	93 / 78									
		Break Desc	NOCK	70% PEEL		INCURSION						
		Pass / Fail	F									
P.P.	SUNNY 30°	Strength at Break	84 / 65	66 / 85	86 / 89			104	98			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P.	PARTY CLOUDY 40°	Strength at Break	99 / 96	98 / 87	98 / 90			110	109			
		Break Desc.	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROLLO Testing Date: 12.20.03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-17	TRIAL	40 MIL LL	07:30 12.20.03	S.L
	AC	860° 6.0	27° 30	SUNNY CLOUDY
TS-19	TRIAL	40 MIL LL	13:20 12.20.03	S.L
	A2	860° 6.0	48° 40°	PARTLY CLOUDY
TS-19R	TRIAL	40 MIL LL	13:30 12.20.03	S.L
	A2	860° 6.0	48° 40°	PARTLY CLOUDY
TS-19R	TRIAL	40 MIL LL	14:00 12.20.03	S.L
	A2	860° 6.0	48° 40°	PARTLY CLOUDY

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	SUNNY 30°	Strength at Break	115 / 101	115 / 114	112 / 112			122	122			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P.	PARTLY ~~SUNNY~~ CLOUDY 40°	Strength at Break	103									
		Break Desc	ADEQ	50% PEEL INCURSION								
		Pass / Fail	F									
P.P	PARTLY CLOUDY 40°	Strength at Break	103									
		Break Desc.	NFTB - 100% PEEL INCURSION									
		Pass / Fail	F									
P.P.	PARTLY CLOUDY 40°	Strength at Break	99 / 81	93 / 99								
		Break Desc.		NFB - 100% PEEL INCURSION								
		Pass / Fail		F								
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: J. Shannon Testing Date: 12.21.03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-20	TRIAL	40 mil LL	01-13 / 12-21-03	P.P.
	#69	860 / 6.0	25° / 25°	Sunny, clear
TS-20R	TRIAL	40 mil LL	7:40 / 12-21-03	P.P.
	#69	860 / 5.5	25° / 25°	Sunny, clear
TS-21	Trial	40 mil LL	0840 / 12-21-03	SL
	#41	860 / 5.0	32° / 31°	Sunny Clear
TS-22	Trial	40 mil LL	1330 / 12-21-03	SL
	#41	860 / 5.0	52° / 40°	P. Cloudy
TS-22	Trial	40 mil LL	1320 / 12-21-03	PP
	69	860 / 6.00	52° / 40°	P. Cloudy

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P. (A)	Sunny	Strength at Break	116 / 101	105 / 105	107 / 60							
		Break Desc.	FTB	FTB	ADHEX							
		Pass / Fail	P	P	F	50%		INCURSION				
P.P.	Sunny Clear 25°	Strength at Break	76 / 90	80 / 90	87 / 73			104	105			
		Break Desc.	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
PP	Sunny Clear 31°	Strength at Break	110 / 99	71 / 89	95 / 67			119	118			
		Break Desc.	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
PP	P. Cloudy 40°	Strength at Break	99 / 64	65 / 91	76 / 66			110	110			
		Break Desc.	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
PP	P. Cloudy 40°	Strength at Break	88 / 83	92 / 86	83 / 90			100	96			
		Break Desc.	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: J. Shannon Testing Date: 12/21/03

Extrusion

SEAM INFORMATION					FIELD TESTING INFORMATION[2]											
Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp / Sheet / Amb	Seamer's Name / Weather	Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
TS-24	Trial	40 mil LL	1335 / 12-21-03	KM	PP	P.Cloudy 40°F	Strength at Break	105	104	104			111	109			
	610	215 / 215	52° / 40°	P.Cloudy			Break Desc.	FTB	FTB	FTB			FTB	FTB			
							Pass / Fail	P	P	P			P	P			
TS-25	Trial	40 mil LL	12-21-03	NP	PP	P.Cloudy 40°F	Strength at Break	105	92	85			108	110			
	59	450 / 300	52° / 40°	P.Cloudy			Break Desc.	FTB	FTB	FTB			FTB	FTB			
							Pass / Fail	P	P	P			P	P			
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										
							Strength at Break										
							Break Desc.										
							Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TAOILO Testing Date: V. TAOILO

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-26	TRIAL	40 mil LL	08:05 12-22-03	K.M
	#610	215 @ 215 RPM EXT.	38° 37°	Sunny clear
TS-28	TRIAL	40 mil LL	13:15 12-22-03	K.M
	#610	215 @ 215 RPM EXT.	60 @ 49°	Sunny clear

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Sunny 37°	Strength at Break	96	98	98			115	115			
		Break Desc.	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
M.B.	Sunny 48°	Strength at Break	92	85	91			95	95			
		Break Desc.	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V TROILO Testing Date: 12-22-03

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-27	TRIAL / 59	40 MIL LL / 450°@300PH / EXT	08:00 / 12-22-03 / 38° / 37	NP / Sunny clear
TS-29	TRIAL / 59	40 mil LL / 450°@300PH / EXT	13:25 / 12-22-03 / 60° / 60°	NP / Sunny clear

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Sunny 37°	Strength at Break	90 / –	89 / –	99 / –			115	114			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
M.B.	Sunny 48°	Strength at Break	79 / –	91 / –	77 /			95	97			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TFOILO Testing Date: 1.2.04

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-30 EXT.	TRIAL	40 MIL LL	13:45 / 1.2.04	N.P.
	#59	430°@300° P.H. / EXT.	51° / 44°	Cloudy
TS-30R EXT.	TRIAL	40 MIL LL	14:10 / 1.2.04	N.P.
	#59	430°@300° / EXT.	51° / 44°	Cloudy

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Cloudy +/46°	Strength at Break	88 / 1	88								
		Break Desc	FTB	NFTB								
		Pass / Fail	P	F	100% PEEL INCLUSION							
P.P.	Cloudy 46°	Strength at Break	75 / –	84 / –	73 / –			102	102			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 1·3·04

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp / Sheet / Amb	Seamer's Name / Weather
T3-31 (EXT.)	TRIAL / #59	40 mil LL / 430° @ 300 PM	01:40 / 1·3·04 / 47° / 47°	N.P. / PARTLY SUNNY
T3-34 (EXT)	TRIAL / #59	40 MIL LL / 430° 300 PM	13:20 / 1·3·04 / 53° / 50°	N.P. / CLOUDY OVERCAST

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
J. SMITH	PARTLY SUNNY 47°	Strength at Break	87 / –	82 / –	72 / –			100	101			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P.	Cloudy 50°	Strength at Break	86 / –	77 / –	96 / –			100	100			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: J. Troilo Testing Date: 1.6.04

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
TS-37 (Ext)	TRIAL / 610	40 MIL LL / 215° / 215° PH	13:30 / 1.6.04 / 40° / 36°	K.M / PARRY SUNNY
TS-38 (Ext)	TRIAL / 59	40 mil LL / 430° / 360° PH	13:55 / 1.6.04 / 40° / 36°	N.P. / PARRY SUNNY

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.D.	Pet / Sunny 38°	Strength at Break	90 / –	103 / –	77 / –			110	109			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
P.P.	↓	Strength at Break	80 / –	79 / –	80 /			110	110			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. Troilo Testing Date: 1/8/04

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp / Sheet / Amb	Seamer's Name / Weather
TS39 (EXT)	TRIAL / 59	40 mil LL / 450° / 300° PH	08:30 / 1-8-04 / 27° / 28°	N.P. / Sunny clade

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Sunny 28°F	Strength at Break	82 / –	84 / –	76 / –			126	134			
		Break Desc	FTB	FTB	FTB			FTB	FTB			
		Pass / Fail	P	P	P			P	P			
		Strength at Break										
		Break Desc										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										
		Strength at Break										
		Break Desc.										
		Pass / Fail										

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
BEG. PANEL 1	EXTEND LINER TO LIMIT	P-25	12-19-03 / 01:39	#59	N.P	3'x16'	12-19-03	V BOX	P.P.	PASS	
BEG. PANEL 2	EXTEND LINER TO LIMIT	P-26	/ 08:20			3'x22'				P	
NORTH SIDE P-16 30'-52'		P-27	/ 10:30			3'x22'				P	
NORTH SIDE P-16 52'-62'		P-28	/ 10:45			3'x10				P	
19/20 @ 12'	DS-6	P-29	/ 14:35	#59	N.P	2'x6'	12-22-03	V. BOX	S.P.	P	
22/24 @ 100'	DS-7	P-30	/ 16:20			2'x6'				P	
22/23/24	T SEAM	P-31	/ 16:25			2'x3'				P	
P28 12' EAST 3 30 26/28	HOLE	P-32	/ 15:20			2'x2'				P	
P28 18' EAST 3 30 26/28	HOLE	P-33	/ 15:15			2'x2'				P	
P28 24' EAST 3 30 26/28	HOLE	P-34	/ 15:10			2'x2'				P	
P28 25' EAST	NUMEROUS HOLES / DAMAGE	P-35	/ 14:40			2'x20				P	
26/27/28	T SEAM	P-36	/ 15:05			2'x3'				P	
27/28/29	T SEAM	P-37	/ 15:00			2'x3'				P	
26/27 @ 50'	DS-8	P-38	/ 15:35			2'x6'				P	
26/27 @ 54'	AIR TEST "SEAL"	P-39	/ 15:40			2'x3'				P	
29/30 @ 167'	DS-9	P-40	/ 15:50			2'x6'				P	

Inspected By: VINCENT TROILO **Date:** 12-19-03

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
31/32/33	T SEAM	P-41	12-19-03/16:45	# 59	U.P.	2'x3'	12-22-03	VBOX	J.P.	P	
31/33 @ 175'	DS-10	P-42	↓ /16:00	↓	↓	2'x6'	↓	↓	↓	P	
40/42/41	T-Seam	P-43	12/21/03 1355	59	NP	2'x3'	12/21/03	VBOX	SP	OK	
41/42/43	" "	P-44	1402			2x3'		" "	SP	OK	
43/41 @ 135'	Burn out	P-45	1400			1x2'		" "	SP	OK	
43/41 @ 16'	" "	P-46	1415	610	KM	2x3'		" "	SP	OK	
43/41 @ 50'		P-47	1425			1x1'		" "	SP	OK	
44/45 @ 0'-30'	Trial Weld Fails	P48	1445	59	NP	30x1.5'		" "	SP	OK	
45/46 @ 70-73'	Burn out	P-49	1500	610	KM	3x2'		" "	SP	OK	
46/48 @ 73	Air test	P-50	1515	610	KM	3x2		" "	SP	OK	
45/46/47	T Seam	P-51	1514	59	NP	2x2'		" "	SP	OK	
46/47/48	" "	P-52	1518	59	NP	3x2'		" "	SP	OK	
47/48 @ 0'-10'	Burn/Air test fail	P-53	1502	59	NP	2'x10'		" "	SP	OK	
P48/49 @ 211'	Burn/Air test	P-54	1520	59	NP	2x4'		" "	SP	OK	
49/50/51	T-Seam	P-55	1535	59	NP	2x2'		" "	SP	LEAK	REPAIRED/RETEST PASS 12/22/03
50/51/52	" "	P-56	1540	59	NP	2x3'		" "	SP	OK	

Inspected By: V. Thoilo / J. Shannon **Date:** 12-20-03 to 12/21/03

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
52/53 @ 75'	Bubble/Air Test	P-57	12/21/03	610	KM	2x4'	12/21/03	V-box	SP	OK	
48/49 @ 107'	Bubble/Air Test	P-58	↓	610	KM	2x3'	↓	↓	↓	↓	
50/52 @ 0-12'	Bubble/Air Test	P-59	↓	610	KM	1x12'	↓	↓	↓	↓	
53/54/55	T Seam	P-60	12/21/03	610	KM	2'x3'	12-22-03	V-Box	S.P.	P	
Pipe 55, 3 N 54/55, 5' so 55/56	Hole	P-61	12/22/03	610	KM	1.5x1.5	↓	↓	↓	P	
54/55/56	T Seam	P-62	12/22/03	↓	↓	2'x2'	↓	↓	↓	P	
Pipe 55, 3 N 54/55, 5' so 55/56	Hole	P-63	12/21/03	↓	↓	1.5x1.5	↓	↓	↓	P	
53/54 @ 40'	Bubble/Air Test	P-64	12/21/03 13:45	↓	↓	2'x3'	↓	↓	↓	P	
52/53 @ 238'	"	P-65	12/21/03 14:45	↓	↓	2'x3	↓	↓	↓	P	
54/55 @ 79'	"	P-66	12/22/03 09:45	59	N.P	2'x2'	↓	↓	↓	P	
54/55 @ 105'	"	P-67	12/21/03 13:30	610	K.M	1.5x1.5	↓	↓	↓	P	
53/54 @ 117'	Crack	P-68	12/22/03 (AM)	610	K.M	3'x4	↓	↓	↓	P	
Pipe @ 117 @ 0 Grid	Crack	P-69	12-22-03 (AM)	610	KM	2'x4'	↓	↓	↓	P	
54/56/57	T Seam	P-70	12-21-03 16:30	610	KM	3'x3	↓	↓	↓	P	
56/57 Entire	Cap - Air Test Fail	P-71	12-22-03 (AM)	610	KM	2'x6'	↓	↓	↓	P	
56/57/58	T Seam	P-72	12-22-03 AM	610	KM	2'x2'	↓	↓	↓	P	

Inspected By: J. Shannon / V. Tadlo **Date:** 12/21/03 12/22/03

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
56/64/58/55	T SEAM/TEAR	P-73	12-22-03 / AM	#610	K.M.	5'x11'	12-22-03	V. Boy	S.P.	P	
264 0+12' W CL OF PANEL	HOLE	P-74				2'x3'				P	
59/60/64/65	T SEAM/NO CAP	P-75				4'x9'				P	
59/60 @ 21'	HOLE/AIR TEST	P-76				2'x2				P	
65/66/60/61	T SEAMS/AIR TEST FAIL	P-77				2'x8'				P	
65/66 @ 30'	BURN/AIR TEST	P-78	12/22-03 / 10:20	#59	N.P	2'x3				P	
65/66 @ 85'	"	P-79	/ 09:05			2'x4'				P	
65/66 @ 115'	"	P-80	/ 08:55			2'x5'				P	
PANEL 65 134' W 3' SO 65/66	HOLE	P-81	/ 08:35			2'x2'				P	
65/66 1+35-1+50	AIR TEST FAIL - CAP	P-82	/ 08:45			2'x12				P	
65/66 1+65	AIR TEST SEAL	P-83	/ 08:25	#59	N.P.	1.5'x2'				P	
65/66/67	T SEAM	P-84	/ 08:20			2'x2'				P	
66/67/68	T SEAM	P-85	/ 09:05			2'x2'				P	
68/69 @ 100'	BURN	P-86	/ (P.M)	610	K.M.	2'x5'				P	
68/69 102'-108'	AIR TEST FAIL CAP	P-87	/ P.M	610	K.M	2'x6				P	
62/68 7' → EDS	"	P-88	/ 10:35	59	N.P	3'x10'				P	

Inspected By: V. Troilo **Date:** 12-22-03

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
62/66 ENTIRE	CAP - AIR TEST FAIL	P-89	12-22-03 / 11:00	#59	N. P.	2×5	12-22-03	V Box	S. P.	P	
61/62 17'-EOS	"	P-90	/ 10:20			2×20'				P	
62/63/68	T SEAM	P-91	/ 11:00			2'×2'				P	
63/68/69	T SEAM	P-92	/ 11:05			2×2				P	
63/69/76	T SEAM	P-93	/ 11:15			2×2'				P	
63/76 @ 15'	BLOW/HEAT OUTSIDE WELD	P-94	/ 11:25			2×6'				P	
69/75/76	T SEAM	P-95	/ 11:35			2×2'				P	
69/75 15'	BLOW/HEAT OUTSIDE WELD	P-96	/ 11:30	610	KM	2×6'				P	
69/74/75	T SEAM	P-97	/ AM			2×2'				P	
69/74 @ 15'	BLOW/HEAT OUTSIDE WELD	P-98	/ AM			2×2'				P	
69/73/74	T SEAM	P-99	/ AM			2×2'				P	
69/72/73	"	P-100	/ AM			2×3				P	
70/71/72	T SEAM	P-101	/ PM			2×3				P	
34/71/72	T SEAM	P-102	/ PM			2'×3'				P	
P-71, 5' @ EOS 2'50' 34/71	HOLE	P-103	/ PM			2'×2				P	
34/70 @ 17'	AIR TEST SEAL	P-104	/ PM			2'×4				P	

Inspected By: V. Troilo **Date:** 12-22-03

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
34/70@92'	BUTT - OUTSIDE AIR CHANNEL	P-105	12-22-03/13:45	59	N.P	2'x2'	12-22-03	VBox	S.P.	P	
34/70@133'	"	P-106	/14:07	59	N/P	2'x3'				P	
70/72 25'	AIR TEST SEAL	P-107	/13:35	59	N.P	2'x4'				P	
69/72 24'	BUTT - OUTSIDE AIR CHANNEL	P-108	/(P.M)	610	K.M	2'x2'				P	
69/71/72	T SEAL	P-109	/(P.M)			2'x2'				P	
34/69/71	"	P-110	/(P.M)			2'x3'				P	
34/68/69	"	P-111	/(P.M)			2'x3'				P	
34/67/68	"	P-112	/(P.M)			2'x4'				P	

Inspected By: V. TAOICO **Date:** 12-22-03

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
67/68 @ 86'	DS-20	P-113	1-2-04/14:20	#59	N.P.	2'x6'	1-4-04	V. Box	C.L.	P	
65/67 @ 50'	DS-19	P-114	/14:35			2'x6'				P	
70/72 @ 115'	DS-22	P-115	/14:50			2'x6'				P	
69/75 @ 24'	DS-21	P-116	/15:10			2'x5'				P	
56/64 @ 80'	DS-23	P-117	/15:21			2'x6'				P	
52/53 @ 100'	DS-16	P-118	/15:55			2'x6'				P	
49/50 @ 177	DS-15	P-119	/16:15			2'x5'				P	
46/48 @ 105'	DS-14	P-120	/16:45			2'x5'				P	
45/46 @ 102'	DS-13	P-121	1-3-04/08:15	#59	N.P.	2'x6'				P	
PAT 50' WEST @ ℄	REMOVED "ROCK"	P-122	/08:30			2'x2'				P	
41/43 @ 32'W	BURN OUTSIDE AIR CHANNEL	P-123	/08:40			2'x2'				P	
40/41 @ 52'W	DS-12	P-124	/09:05			2'x6'				P	
36/37 @ 96'W	DS-11	P-125	/09:20			2'x6'				P	
58/59 BOS	DS-18	P-126	/13:50			2'x6				P	
54/56 134'-156'	DS-17 CAP	P-127	/10:55			2'x22'				P	
54/56 112'-134'	"	P128	/14:00			2'x22'				P	

Inspected By: V. TAGLO **Date:** 1-3-04

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repair record

Project No. 19992311 **Project Name** Dupont - Edge Moor

Project location Edgemoor, Delaware Surface Impoundment Capping

WELDING DATA							TEST DATA				
				ID			Non-Destructive Testing				
Location	Problem	Patch No.	Repair Date/Time	Apparatus	Seamer	Patch Size	Date	Method	Tester	Result	Comments
54/56 95'-112'	DS-17 CAP	P129	1-3-04 / 14:40	#59	N.P.	2'x17'	1-4-04	V.Box	C.L.	P	
54/56 79'-95'	↓	P130	↓ / 15:10	↓	↓	2'x16'	↓	↓	↓	P	DS-25 on No weld @ 80'
54/56 57'-79'		P131	/ 15:40			2'x22'				P	
54/56 35'-57'		P132	/ 16:00			2'x22'				P	
154/56 13'-35'		P133	/ 16:47			2'x22'				P	
54/56 0'-13'	DS-17CAP	P134	1-3-04 / 17:10	59	NP	2'x13'				P	
55/56 0'-22'	DS-17CAP	P-135	1-3-04 / 17:30	59	NP	2'x22'				P	
DS-17 CAP 54/56 @ 80' No.	DS-24	P-136	1-4-04 / 08:10	#59	N.P	2'x6'				P	
45/46 @ 50'	BURNOUT	P-137	1-4-04 / 08:00	#59	N.P	2'x3'				P	
58/59 DS-18B - DS-18	DS-18 FAIL. CAP STRIP	P-165	1-6-04 / 14:20	#59	N.P	2'x10'	1-6-04	VBox	C.L.	P	
59/60 (DS-18 DS-18A) 0-10'	DS-18 FAILURE CAP STRIP	P-166	/ 15:00	"	"	2'x10'				P	
55/56 22'-32' DS-17B5-17B6	DS-17 CONT'D FAILURE	P-167	/ 14:10	#610	K.M.	2'x10'				P	
67/68 0'-10'	DS-20 FAIL	P-168	/ 14:25			2'x10'				P	
66/68 0'-10'	DS-20 FAIL	P-169	/ 15:00			2'x10'				P	
55/56 32'-42'	DS-17B6 FAIL	P-170	1-8-04 / 08:45	#59	N.P.	2'x10'	1-8-04	VBox	P.P	P	
59/60 10'-20'	DS-18A FAIL	P-171	↓ / 09:20	↓	↓	2'x10'	↓	↓	↓	P	

Inspected By: V. Taoilo **Date:** 1/3/04 1/6/04

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 12-19-03

SEAM INFORMATION					FIELD TESTING INFORMATION[2]												
Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather	Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
DS-6	19/20	40 MIL LL	11:40 / 12-16-03	S.L	P.P.	PARTLY SUNNY / 42°F	Strength at Break	98/81	77/96	78/96	89/98	98/81	101	99	103	101	100
	42	860° / 6.0	55° / 44°	Sunny Clear			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-7	22/24	40 MIL LL	13:28 / 12-16-03	P.P.			Strength at Break	86/75	84/75	90/84	93/72	95/95	101	101	102	101	105
	69	860° / 6.0	54° / 46°	Sunny Clear			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS 8	26/27	40 MIL LL	14:05 / 12-16-03	S.L			Strength at Break	95/90	95/90	92/82	74/91	93/89	101	101	102	100	103
	42	860° / 6.0	52° / 48°	Sunny Clear			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS 9	29/30	40 MIL LL	14:30 / 12-16-03	S.L.			Strength at Break	90/87	93/82	93/89	83/84	90/79	100	97	100	100	101
	42	860° / 6.0	52° / 48	Sunny Clear			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-10	31/33	40 MIL LL	15:15 / 12-16-03	S.L			Strength at Break	85/86	93/94	92/96	81/95	85/86	97	101	99	101	101
	42	860° / 6.0	48° / 48°	Sunny Clear			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TRAILO Testing Date: 1/2/04

SEAM INFORMATION					FIELD TESTING INFORMATION[2]											
Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather	Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
DS-11	36/37	40 MIL LLDPE	15:50 12-19-03	P.P.	P.P	CLOUDY OVERCAST 40°F	Strength at Break	87/75	83/77	79/78	79/78	90/69	103	103	101	103	107
	#69	860° 6.0	36° 36°	Cloudy			Break Desc	FTB	DPORT	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-12	40/41	40 MIL LL	16:30 12-19-03	P.P.			Strength at Break	107/97	78/77	94/63	89/78	67/91	102	101	104	102	99
	#69	860° 6.0	36° 36°	Cloudy			Break Desc	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-13	45/46	40 MIL LL	08:30 12-20-03	S.L			Strength at Break	82/87	78/82	85/93	77/93	82/94	98	98	96	96	99
	#42	860° 6.0	34° 33°	Sunny			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-14	46/48	40 MIL LL	09:02 12-20-03	P.P.			Strength at Break	76/93	80/91	90/73	93/90	94/84	97	97	97	101	99
	#69	860° 6.0	39° 36°	Sunny windy			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-15	49/50	40 MIL LL	09:50 12-20-03	S.L			Strength at Break	69/91	81/82	77/83	79/84	78/85	97	97	99	98	96
	#42	860° 6.0	47° 36°	Sunny, windy			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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* DS-11 - ONE SPECIMEN >25% PEEL INCURSION

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 1/2/04

SEAM INFORMATION					FIELD TESTING INFORMATION[2]										
Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather	Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
DS-16	52/53	40 MIL LL	10:20 12-20-03	S.L.	P.P.	CLOUDY 40°F	Strength at Break	86/77	88/81	83/77	86/67	89/89	98	98	97	98	91
	#42	860° 6.0	46° 37°	Sunny, windy			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-17	54/56	40 MIL LL	11:32 12-20-03	S.L.			Strength at Break	75/90	72								
	#42	860° 6.0	49° 38°	Sunny, windy			Break Desc.	NFB									
							Pass / Fail	*F	80% PEEL INCURSION								
DS-18	58/59	40 MIL LL	13:45 12-20-03	P.P.			Strength at Break	85/79	94/62	84/84	85/57	84/67	100	97	85	100	88
	#69	860° 6.0	48° 40°	Sunny windy			Break Desc.	FTB	ADHESIVE	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	72%	P	P	P	P	P	P	P	P
DS-19	65/67	40 MIL LL	09:00 12-21-03	S.L.			Strength at Break	88/74	63/87	84/91	88/60	87/84	94	96	95	94	93
	#41	860° 5.0	38° 33°	Sunny, windy			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-20	67/68	40 MIL LL	08:50 12-21-03	P.P.			Strength at Break	67/82	82/85	75/75	83/73	87/87	92	90	91	92	93
	#69	860° 5.5	38° 33°	Sunny, windy			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

* - 80% PEEL INCURSION

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 1·2·04

SEAM INFORMATION					FIELD TESTING INFORMATION[2]										
Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather	Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
DS 21	69/75	40 mil LL	11:37 / 12.21.03	S.L.	P.P.	Cloudy 46°	Strength at Break	93/73	94/85	83/80	86/89	88/82	95	97	93	97	97
	#41	860° / 5.0	50° / 38°	Sunny, windy			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-22	70/72	40 mil LL	10:10 / 12.21.03	S.L.			Strength at Break	79/86	86/86	87/87	88/88	87/87	95	97	97	92	94
	#41	860° / 5.0	46° / 35°	Sunny Windy			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS 23	56/64	40 mil LL	10:10 / 12.21.03	P.P.			Strength at Break	82/82	88/74	78/78	65/75	80/68	88	93	93	91	90
	#69	860° / 5.5	46° / 35°	Sunny Windy			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-17B 10' of DS 17	54/56	40 mil L.L	11:32 / 12-20-03	S.L.			Strength at Break	79/80	67/86								
	#42	860° / 6.0	41° / 38	Sunny windy			Break Desc.	ADSEL	NFTB								
							Pass / Fail	72% P	100% PEEL								
DS-17B1 11.50 of DS 17	54/56	40 mil LL	11:32 / 12.20.03	S.L.			Strength at Break	91/79	85/65								
	#42	860° / 6.0	41° / 38°	Sunny windy			Break Desc.	FTB	NFTB								
							Pass / Fail	P	F 100% PEEL INCUSION								

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TAOILO

Testing Date: 1/2/04 1/4/04

SEAM INFORMATION

Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather
DS-17B2 +/- 70' West	54/56 / #42	40 MIL LL / 860° / 6.0	11:32 / 12-20-03 / 47° / 38°	S.L. / Sunny windy
DS-17B3 +/- 100' W	54/56 / #42	40 MIL LL / 860° / 6.0	11:32 / 12-20-03 / 47° / 38°	S.L / Sunny windy
DS-17B4 EOS prior to 54/56	55/56 / #42	40 MIL LL / 860° / 6.0	11:15 / 12-20-03 / 46° / 37°	S.L. / Sunny, windy
DS-17B5 10' West of 17B4	55/56 / #42	40 MIL LL / 860° / 6.0	11:15 / 12-20-03 / 46° / 37°	S.L / Sunny windy
DS-24 (EXT.)	DS-17 CAP 54/56 @ 80' NO WELD OF P130 / #59	40 MIL LL / 430° / 300° PM	15:10 / 1-3-03 / 56° / 50°	N.P. / Cloudy to Partly Sunny

FIELD TESTING INFORMATION[2]

Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
P.P.	Cloudy 46°	Strength at Break	85/91	85/91	84/91	80/	/					
		Break Desc	FTB	ADBK	FTB	NFTB						
		Pass / Fail	P	20%	P	100%	- FAIL					
P.P.	Cloudy 46°	Strength at Break	85/75	77/75	75/	/	/					
		Break Desc	FTB	FTB	NFTB							
		Pass / Fail	P	P	FAIL - 100% INCLUSION							
P.P.	Cloudy 46°	Strength at Break	74/82	77/77	82/84	/	/					
		Break Desc.	FTB	ADBK	FAIL							
		Pass / Fail	P	50%								
P.P.	Cloudy 46°	Strength at Break	80/90	78/91	90/90	81/91	91/91	96	94	95	97	97
		Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P
1.4.04 P.P.	CLOUDY 50°	Strength at Break	90/-	99/-	81/-	80/-	85/-	103	103	105	104	104
		Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
		Pass / Fail	P	P	P	P	P	P	P	P	P	P

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

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geomembrane field seam strength test sheet

Project No. 19992311 **Project Name** Dupont - Edge Moor **Project location** Edgemoor, Delaware

Testing Inspector: V. TROILO Testing Date: 1-6-04

SEAM INFORMATION					FIELD TESTING INFORMATION[2]												
Sample No.	Seam ID / Mach No.	Mat'l[1] / Mach Temp / Speed	Time / Date / Temp Sheet / Amb	Seamer's Name / Weather	Tester's Name	Weather / Temp		Seam Adhesion Strength - Peel 44 lb/in 1	2	3	4	5	Seam Strength - Shear 53 lb/in 1	2	3	4	5
DS-17B 6	55/56	40 mil LL	11:45 12-20-03	S.L.	P.P.	Rainy Sunny 38°	Strength at Break	109/111	111/86	72*/102	106/99	110/95	113	116	112	110	109
	#42	860° 6.0	47° 38°	Sunny clear			Break Desc.	FTB	FTB	ADBOL	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-18B	58/59	40 mil LL	13:45 12-20-03	P.P.			Strength at Break	111/70	74/99	70/86	75/97	75/90	107	114	115	111	116
	69	860° 6.0	48° 40°	Sunny CLEAR			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-18A	59/60	40 mil LL	13:55 12-20-03	P.P.			Strength at Break	110/110	101/106	99/91	108/108	108/107	120	113	113	110	112
	69	860° 6.0	48° 40°	Sunny CLEAR			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-20B	67/68	40 mil LL	08:30 12-21-03	P.P.			Strength at Break	91/82	97/74	94/83	96/80	77/100	117	117	116	118	110
	69	860° 5.5	38° 33°	Sunny CLEAR			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P
DS-20A	66/68	40 mil LL	09:00 12-21-03	P.P.			Strength at Break	118/71	96/96	97/74	74/97	100/77	116	115	117	116	118
	69	860° 5.5	38° 33°	Sunny CLEAR			Break Desc.	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB	FTB
							Pass / Fail	P	P	P	P	P	P	P	P	P	P

Notes/Comments: [1]T = Textured, S = Smooth (i.e. T-T, S-S, T-S) [2]Sample Width = 1 inch; Grip Separation Rate = 20 in/min

* > 20% inclusion

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-55-09

ASTM D 6392/4437
ANALYST: KM/CR

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	63	<10	SE	FTB	44	75	> 50	FTB	53
	2A	66	<10	SE	FTB					
	3A	66	<10	SE	FTB		76	> 50	FTB	
	4A	60	<10	SE	FTB					
	5A	72	<10	SE	FTB		74	> 50	FTB	
DS-6	**MEAN:**	**65**								
	1B	76	<10	SE	FTB		64	> 50	FTB	
	2B	73	<10	SE	FTB					
	3B	78	<10	SE	FTB		72	> 50	FTB	
	4B	74	<10	SE	FTB					
	5B	74	<10	SE	FTB					
	MEAN:	**75**				**MEAN:**	**72**			
	1A	69	<10	SE	FTB	44	81	> 50	FTB	53
	2A	70	<10	SE	FTB					
	3A	75	<10	SE	FTB		80	> 50	FTB	
	4A	77	<10	SE	FTB					
	5A	76	<10	SE	FTB		80	> 50	FTB	
DS-7	**MEAN:**	**73**								
	1B	61	<10	SE	FTB		79	> 50	FTB	
	2B	70	<10	SE	FTB					
	3B	56	<10	SE	FTB		81	> 50	FTB	
	4B	58	<10	SE	FTB					
	5B	60	<10	SE	FTB					
	MEAN:	**61**				**MEAN:**	**80**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-55-09

ASTM D 6392/4437
ANALYST: KM/CR

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	67	<10	SE	FTB	44	76	> 50	FTB	53
	2A	68	<10	SE	FTB					
	3A	68	<10	SE	FTB		84	> 50	FTB	
	4A	69	<10	SE	FTB					
	5A	68	<10	SE	FTB		86	> 50	FTB	
DS-8	**MEAN:**	**68**								
	1B	82	<10	SE	FTB		84	> 50	FTB	
	2B	77	<10	SE	FTB					
	3B	70	<10	SE	FTB		82	> 50	FTB	
	4B	67	<10	SE	FTB					
	5B	69	<10	SE	FTB					
	MEAN:	**73**				**MEAN:**	**82**			
	1A	70	<10	SE	FTB	44	81	> 50	FTB	53
	2A	67	<10	SE	FTB					
	3A	66	<10	SE	FTB		76	> 50	FTB	
	4A	67	<10	SE	FTB					
	5A	68	<10	SE	FTB		83	> 50	FTB	
DS-9	**MEAN:**	**68**								
	1B	68	<10	SE	FTB		79	> 50	FTB	
	2B	71	<10	SE	FTB					
	3B	68	<10	SE	FTB		85	> 50	FTB	
	4B	79	<10	SE	FTB					
	5B	79	<10	SE	FTB					
	MEAN:	**73**				**MEAN:**	**81**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-55-09

ASTM D 6392/4437
ANALYST: KM/CR

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	65	<10	SE	FTB	44	80	> 50	FTB	53
	2A	71	<10	SE	FTB					
	3A	65	<10	SE	FTB		82	> 50	FTB	
	4A	64	<10	SE	FTB					
	5A	66	<10	SE	FTB		82	> 50	FTB	
DS-10	**MEAN:**	**66**								
	1B	62	<10	SE	FTB		89	> 50	FTB	
	2B	75	<10	SE	FTB					
	3B	65	<10	SE	FTB		89	> 50	FTB	
	4B	75	<10	SE	FTB					
	5B	62	<10	SE	FTB					
	MEAN:	**68**				**MEAN:**	**84**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-59-06

ASTM D 6392/4437
ANALYST: JTO

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	68	<10	SE	FTB	44	76	> 50	FTB	53
	2A	59	<10	SE	FTB					
	3A	66	<10	SE	FTB		80	> 50	FTB	
	4A	62	<10	SE	FTB					
	5A	59	<10	SE	FTB		83	> 50	FTB	
DS-11	**MEAN:**	**63**								
	1B	72	<10	SE	FTB		72	> 50	FTB	
	2B	76	<10	SE	FTB					
	3B	69	<10	SE	FTB		84	> 50	FTB	
	4B	67	<10	SE	FTB					
	5B	70	<10	SE	FTB					
	MEAN:	**71**				**MEAN:**	**79**			
	1A	57	<10	SE	FTB	44	80	> 50	FTB	53
	2A	56	<10	SE	FTB					
	3A	55	<10	SE	FTB		82	> 50	FTB	
	4A	59	<10	SE	FTB					
	5A	61	<10	SE	FTB		83	> 50	FTB	
DS-12	**MEAN:**	**58**								
	1B	66	<10	SE	FTB		82	> 50	FTB	
	2B	77	<10	SE	FTB					
	3B	77	<10	SE	FTB		80	> 50	FTB	
	4B	76	<10	SE	FTB					
	5B	80	<10	SE	FTB					
	MEAN:	**75**				**MEAN:**	**81**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-59-06

ASTM D 6392/4437
ANALYST: JTO

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	81	<10	SE	FTB	44	80	> 50	FTB	53
	2A	80	<10	SE	FTB					
	3A	79	<10	SE	FTB		78	> 50	FTB	
	4A	86	<10	SE	FTB					
	5A	81	<10	SE	FTB		80	> 50	FTB	
DS-13	**MEAN:**	**81**								
	1B	71	<10	SE	FTB		79	> 50	FTB	
	2B	70	<10	SE	FTB					
	3B	72	<10	SE	FTB		80	> 50	FTB	
	4B	72	<10	SE	FTB					
	5B	71	<10	SE	FTB					
	MEAN:	**71**				**MEAN:**	**79**			
	1A	73	<10	SE	FTB	44	83	> 50	FTB	53
	2A	71	<10	SE	FTB					
	3A	70	<10	SE	FTB		78	> 50	FTB	
	4A	76	<10	SE	FTB					
	5A	67	<10	SE	FTB		79	> 50	FTB	
DS-14	**MEAN:**	**71**								
	1B	78	<10	SE	FTB		78	> 50	FTB	
	2B	72	<10	SE	FTB					
	3B	74	<10	SE	FTB		80	> 50	FTB	
	4B	80	<10	SE	FTB					
	5B	79	<10	SE	FTB					
	MEAN:	**77**				**MEAN:**	**80**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-59-06

ASTM D 6392/4437
ANALYST: JTO

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	79	<10	SE	FTB	44	81	> 50	FTB	53
	2A	77	<10	SE	FTB					
	3A	77	<10	SE	FTB		80	> 50	FTB	
	4A	80	20	AD-BRK	FTB					
	5A	89	<10	SE	FTB		81	> 50	FTB	
DS-15	**MEAN:**	**80**								
	1B	59	<10	SE	FTB		80	> 50	FTB	
	2B	64	<10	SE	FTB					
	3B	69	<10	SE	FTB		79	> 50	FTB	
	4B	73	<10	SE	FTB					
	5B	54	<10	SE	FTB					
	MEAN:	**64**				**MEAN:**	**80**			
	1A	72	<10	SE	FTB	44	82	> 50	FTB	53
	2A	67	<10	SE	FTB					
	3A	68	<10	SE	FTB		81	> 50	FTB	
	4A	73	<10	SE	FTB					
	5A	71	<10	SE	FTB		84	> 50	FTB	
DS-16	**MEAN:**	**70**								
	1B	70	<10	SE	FTB		83	> 50	FTB	
	2B	68	<10	SE	FTB					
	3B	73	<10	SE	FTB		84	> 50	FTB	
	4B	75	<10	SE	FTB					
	5B	72	<10	SE	FTB					
	MEAN:	**72**				**MEAN:**	**83**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-59-06

ASTM D 6392/4437
ANALYST: JTO

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	82	<10	SE	FTB	44	80	> 50	FTB	53
	2A	58	20	AD-BRK	FTB					
	3A	79	<10	SE	FTB		82	> 50	FTB	
	4A	77	<10	SE	FTB					
	5A	78	<10	SE	FTB		82	> 50	FTB	
DS-17B5	**MEAN:**	**75**								
	1B	73	<10	SE	FTB		74	> 50	FTB	
	2B	57	100	AD	NON-FTB					
	3B	73	20	AD-BRK	FTB		81	> 50	FTB	
	4B	70	20	AD-BRK	FTB					
	5B	69	60	AD-BRK	FTB					
	MEAN:	**68**				**MEAN:**	**80**			
	1A	64	<10	SE	FTB	44	81	> 50	FTB	53
	2A	60	100	AD	NON-FTB					
	3A	56	<10	SE	FTB		81	> 50	FTB	
	4A	61	<10	SE	FTB					
	5A	48	50	AD-BRK	FTB		81	> 50	FTB	
DS-18	**MEAN:**	**58**								
	1B	73	<10	SE	FTB		81	> 50	FTB	
	2B	68	<10	SE	FTB					
	3B	74	<10	SE	FTB		82	> 50	FTB	
	4B	77	<10	SE	FTB					
	5B	70	<10	SE	FTB					
	MEAN:	**72**				**MEAN:**	**81**			

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TRI/ENVIRONMENTAL, INC.
A Texas Research International Company

QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-61-01

ASTM D 6392/4437
ANALYST: MPP/JTO

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	63	<10	SE	FTB	44	91	> 50	FTB	53
	2A	65	<10	SE	FTB					
	3A	64	<10	SE	FTB		90	> 50	FTB	
	4A	64	<10	SE	FTB					
	5A	65	<10	SE	FTB		89	> 50	FTB	
DS-17B7	**MEAN:**	**64**								
	1B	86	<10	SE	FTB		91	> 50	FTB	
	2B	84	<10	SE	FTB					
	3B	83	<10	SE	FTB		92	> 50	FTB	
	4B	81	<10	SE	FTB					
	5B	83	<10	SE	FTB					
	MEAN:	**83**				**MEAN:**	**91**			
	1A	64	<10	SE	FTB	44	90	> 50	FTB	53
	2A	65	<10	SE	FTB					
	3A	63	<10	SE	FTB		91	> 50	FTB	
	4A	64	<10	SE	FTB					
	5A	61	<10	SE	FTB		90	> 50	FTB	
DS-18A1	**MEAN:**	**63**								
	1B	80	<10	SE	FTB		94	> 50	FTB	
	2B	83	<10	SE	FTB					
	3B	83	<10	SE	FTB		83	> 50	FTB	
	4B	81	<10	SE	FTB					
	5B	83	<10	SE	FTB					
	MEAN:	**82**				**MEAN:**	**90**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-60-07

ASTM D 6392/4437
ANALYST: KKA

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
DS-17B6	1A	85	40	AD-BRK	FTB	44	91	> 50	FTB	53
	2A	91	<10	SE	FTB					
	3A	85	20	AD-BRK	FTB		93	> 50	FTB	
	4A	92	<10	SE	FTB					
	5A	101	<10	SE	FTB		92	> 50	FTB	
	MEAN:	**91**								
	1B	90	<10	SE	FTB		97	> 50	FTB	
	2B	89	<10	SE	FTB					
	3B	90	<10	SE	FTB		94	> 50	FTB	
	4B	90	<10	SE	FTB					
	5B	92	<10	SE	FTB					
	MEAN:	**90**				**MEAN:**	**93**			
DS-18A	1A	94	<10	SE	FTB	44	98	> 50	FTB	53
	2A	90	<10	SE	FTB					
	3A	84	20	AD-BRK	FTB		92	> 50	FTB	
	4A	93	<10	SE	FTB					
	5A	93	20	AD-BRK	FTB		97	> 50	FTB	
	MEAN:	**91**								
	1B	90	<10	SE	FTB		93	> 50	FTB	
	2B	88	<10	SE	FTB					
	3B	89	<10	SE	FTB		99	> 50	FTB	
	4B	92	<10	SE	FTB					
	5B	94	<10	SE	FTB					
	MEAN:	**91**				**MEAN:**	**96**			

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-60-07

ASTM D 6392/4437
ANALYST: KKA

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	69	<10	SIP	FTB	44	93	> 50	FTB	53
	2A	69	<10	SIP	FTB					
	3A	67	<10	SIP	FTB		93	> 50	FTB	
	4A	73	<10	SIP	FTB					
	5A	71	<10	SIP	FTB		94	> 50	FTB	
DS-18B	**MEAN:**	**70**								
	1B	87	<10	SE	FTB		95	> 50	FTB	
	2B	85	<10	SE	FTB					
	3B	84	<10	SE	FTB		96	> 50	FTB	
	4B	89	<10	SE	FTB					
	5B	92	<10	SE	FTB					
	MEAN:	**87**				**MEAN:**	**94**			
	1A	82	<10	SE	FTB	44	94	> 50	FTB	53
	2A	86	<10	SE	FTB					
	3A	87	<10	SE	FTB		94	> 50	FTB	
	4A	81	<10	SE	FTB					
	5A	81	<10	SE	FTB		93	> 50	FTB	
DS-20A	**MEAN:**	**83**								
	1B	67	<10	SIP	FTB		94	> 50	FTB	
	2B	65	<10	SIP	FTB					
	3B	66	<10	SIP	FTB		94	> 50	FTB	
	4B	65	<10	SIP	FTB					
	5B	69	<10	SIP	FTB					
	MEAN:	**66**				**MEAN:**	**94**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-59-06

ASTM D 6392/4437
ANALYST: JTO

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	69	<10	SE	FTB	44	81	> 50	FTB	53
	2A	71	<10	SE	FTB					
	3A	72	<10	SE	FTB		79	> 50	FTB	
	4A	75	<10	SE	FTB					
	5A	74	<10	SE	FTB		82	> 50	FTB	
DS-19	**MEAN:**	**72**								
	1B	75	<10	SE	FTB		71	> 50	FTB	
	2B	71	<10	SE	FTB					
	3B	74	<10	SE	FTB		80	> 50	FTB	
	4B	77	<10	SE	FTB					
	5B	76	<10	SE	FTB					
	MEAN:	**75**				**MEAN:**	**79**			
	1A	63	<10	SE	FTB	44	78	> 50	FTB	53
	2A	62	<10	SE	FTB					
	3A	57	15	AD-BRK	FTB		79	> 50	FTB	
	4A	59	20	AD-BRK	FTB					
	5A	50	20	AD-BRK	FTB		80	> 50	FTB	
DS-20	**MEAN:**	**58**								
	1B	73	<10	SE	FTB		80	> 50	FTB	
	2B	75	<10	SE	FTB					
	3B	75	<10	SE	FTB		81	> 50	FTB	
	4B	74	<10	SE	FTB					
	5B	75	20	AD-BRK	FTB					
	MEAN:	**74**				**MEAN:**	**80**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-60-07

ASTM D 6392/4437
ANALYST: KKA

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	70	<10	SIP	FTB	44	93	> 50	FTB	53
	2A	66	<10	SIP	FTB					
	3A	66	<10	SIP	FTB		93	> 50	FTB	
	4A	71	<10	SIP	FTB					
	5A	70	<10	SIP	FTB		93	> 50	FTB	
DS-20B	**MEAN:**	**69**								
	1B	86	<10	SE	FTB		93	> 50	FTB	
	2B	83	<10	SE	FTB					
	3B	84	<10	SE	FTB		93	> 50	FTB	
	4B	88	<10	SE	FTB					
	5B	87	<10	SE	FTB					
	MEAN:	**86**				**MEAN:**	**93**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-59-06

ASTM D 6392/4437
ANALYST: JTO

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	82	<10	SE	FTB	44	85	> 50	FTB	53
	2A	81	<10	SE	FTB					
	3A	81	<10	SE	FTB		84	> 50	FTB	
	4A	80	<10	SE	FTB					
	5A	81	<10	SE	FTB		85	> 50	FTB	
DS-21	**MEAN:**	**81**								
	1B	75	<10	SE	FTB		82	> 50	FTB	
	2B	68	<10	SE	FTB					
	3B	64	<10	SE	FTB		84	> 50	FTB	
	4B	71	<10	SE	FTB					
	5B	63	<10	SE	FTB					
	MEAN:	**68**				**MEAN:**	**84**			
	1A	79	<10	SE	FTB	44	83	> 50	FTB	53
	2A	77	<10	SE	FTB					
	3A	77	<10	SE	FTB		83	> 50	FTB	
	4A	78	<10	SE	FTB					
	5A	74	<10	SE	FTB		82	> 50	FTB	
DS-22	**MEAN:**	**77**								
	1B	76	<10	SE	FTB		83	> 50	FTB	
	2B	75	<10	SE	FTB					
	3B	75	<10	SE	FTB		84	> 50	FTB	
	4B	76	<10	SE	FTB					
	5B	77	<10	SE	FTB					
	MEAN:	**76**				**MEAN:**	**83**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: HEAT FUSION WELD
TRI LOG #: E2193-59-06

ASTM D 6392/4437
ANALYST: JTO

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1A	62	<10	SE	FTB	44	81	> 50	FTB	53
	2A	59	<10	SE	FTB					
	3A	64	<10	SE	FTB		77	> 50	FTB	
	4A	67	<10	SE	FTB					
	5A	66	<10	SE	FTB		79	> 50	FTB	
DS-23	**MEAN:**	**64**								
	1B	75	<10	SE	FTB		80	> 50	FTB	
	2B	73	<10	SE	FTB					
	3B	73	<10	SE	FTB		81	> 50	FTB	
	4B	75	<10	SE	FTB					
	5B	77	<10	SE	FTB					
	MEAN:	**75**				**MEAN:**	**80**			

NR: Not Requested

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QUALITY ASSURANCE TESTING
GEOMEMBRANE SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: URS CONSTRUCTION SERVICES
CONTACT: MR. GORDON CHIN
PROJECT: DUPONT EDGEMOOR

MATERIAL: LLDPE
SEAM TYPE: SINGLE EXTRUSION WELD
TRI LOG #: E2193-60-03

ASTM D 6392/4437
ANALYST: MPP

		PEEL EVALUATION					SHEAR EVALUATION			
SAMPLE NUMBER	SPECIMEN NUMBER	MAXIMUM TENSION (lb/in)	PEEL INCURSION (%)	LOCUS OF FAILURE	NSF 54 FAILURE MODE	PROJ. SPEC. (lb/in)	MAXIMUM TENSION (lb/in)	ELONG. @ BREAK (%)	NSF 54 FAILURE MODE	PROJECT SPEC. (lb/in)
	1	94	<10	SE	FTB	44	90	> 50	FTB	53
	2	98	<10	SE	FTB					
	3	91	<10	SE	FTB		90	> 50	FTB	
	4	93	<10	SE	FTB					
	5	91	<10	SE	FTB		92	> 50	FTB	
DS-24	**MEAN:**	**93**								
							91	> 50	FTB	
							89	> 50	FTB	
						MEAN:	**90**			

NR: Not Requested

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-03
LAB ID NO.: L03156-03-01
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-6

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	62.4	FTB-SE1	<10
2	59.5	FTB-SE1	<10
3	62.1	FTB-SE1	<10
4	62.8	FTB-SE1	<10
5	61.7	FTB-SE1	<10
AVERAGE	**61.7**		
STD. DEV.	1.29		
INSIDE TRACK (WELD "B")			
1	67.6	FTB-SE1	<10
2	67.1	FTB-SE1	<10
3	66.9	FTB-SE1	<10
4	67.0	FTB-SE1	<10
5	67.2	FTB-SE1	<10
AVERAGE	**67.2**		
STD. DEV.	0.27		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	69.5	FTB-SE1
2	65.9	FTB-SE1
3	70.1	FTB-SE1
4	70.4	FTB-SE1
5	70.6	FTB-SE1
AVERAGE	**69.3**	
STD. DEV.	1.95	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-03
LAB ID NO.: L03156-03-02
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-7

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	63.8	FTB-SE1	<10
2	65.7	FTB-SE1	<10
3	66.0	FTB-SE1	<10
4	65.8	FTB-SE1	<10
5	65.9	FTB-SE1	<10
AVERAGE	**65.4**		
STD. DEV.	0.92		
INSIDE TRACK (WELD "B")			
1	55.6	FTB-SE1	<10
2	60.1	FTB-SE1	<10
3	59.1	FTB-SE1	<10
4	64.0	FTB-SE1	<10
5	63.0	FTB-SE1	<10
AVERAGE	**60.4**		
STD. DEV.	3.34		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	68.7	FTB-SE1
2	67.6	FTB-SE1
3	67.2	FTB-SE1
4	67.3	FTB-SE1
5	65.8	FTB-SE1
AVERAGE	**67.3**	
STD. DEV.	1.04	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-03
LAB ID NO.: L03156-03-03
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-8

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	65.0	FTB-SE1	<10
2	65.7	FTB-SE1	<10
3	64.1	FTB-SE1	<10
4	63.8	FTB-SE1	<10
5	65.7	FTB-SE1	<10
AVERAGE	**64.9**		
STD. DEV.	0.88		
INSIDE TRACK (WELD "B")			
1	65.5	FTB-SE1	<10
2	64.9	FTB-SE1	<10
3	65.7	FTB-SE1	<10
4	66.5	FTB-SE1	<10
5	66.1	FTB-SE1	<10
AVERAGE	**65.7**		
STD. DEV.	0.61		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	69.1	FTB-SE1
2	69.8	FTB-SE1
3	70.0	FTB-SE1
4	69.8	FTB-SE1
5	69.9	FTB-SE1
AVERAGE	**69.7**	
STD. DEV.	0.36	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-03
LAB ID NO.: L03156-03-04
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-9

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	68.7	FTB-SE1	<10
2	62.1	FTB-SE1	<10
3	61.0	FTB-SE1	<10
4	63.9	FTB-SE1	<10
5	62.5	FTB-SE1	<10
AVERAGE	**63.6**		
STD. DEV.	3.01		
INSIDE TRACK (WELD "B")			
1	67.2	FTB-SE1	<10
2	66.6	FTB-SE1	<10
3	65.6	FTB-SE1	<10
4	64.4	FTB-SE1	<10
5	69.7	FTB-SE1	<10
AVERAGE	**66.7**		
STD. DEV.	1.98		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	70.9	FTB-SE1
2	70.4	FTB-SE1
3	69.8	FTB-SE1
4	67.9	FTB-SE1
5	69.3	FTB-SE1
AVERAGE	**69.7**	
STD. DEV.	1.15	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-03
LAB ID NO.: L03156-03-05
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-10

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	61.0	FTB-SE1	<10
2	62.2	FTB-SE1	<10
3	62.2	FTB-SE1	<10
4	61.6	FTB-SE1	<10
5	60.3	FTB-SE1	<10
AVERAGE	**61.5**		
STD. DEV.	0.82		
INSIDE TRACK (WELD "B")			
1	66.0	FTB-SE1	<10
2	64.5	FTB-SE1	<10
3	66.4	FTB-SE1	<10
4	66.3	FTB-SE1	<10
5	66.9	FTB-SE1	<10
AVERAGE	**66.0**		
STD. DEV.	0.91		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	69.9	FTB-SE1
2	69.3	FTB-SE1
3	70.3	FTB-SE1
4	69.7	FTB-SE1
5	70.7	FTB-SE1
AVERAGE	**70.0**	
STD. DEV.	0.54	

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..... GEOTECHNICAL, GEOENVIRONMENTAL, AND GEOSYNTHETIC LABORATORIES

LABORATORY TEST REPORT

February 3, 2004

Mr. James Whitty
URS Diamond Group / DuPont CRG
Barley Mill Plaza, Bldg 27-2306
4417 Lancaster Pike
Wilmington, DE 19805

Project No.: L03156-04...06

GAI-LAP
Initials: MJ #: 14-41
Date: 2-3-04

RE: DESTRUCTIVE SEAM TEST RESULTS
40-MIL LLDPE GEOMEMBRANE
DuPONT EDGE MOOR SURFACE IMPOUNDMENT CAP
PROJECT NO.: 1898358

Transmitted herein are the results of the peel and shear tests performed for URS Corporation as directed by Mr. Eric Bryan on the following seam samples submitted:

Submitted	Project No.	Material	Samples	Sample No.s
1-5-04	L03156-04	Seams	13	DS-11...23
1-6-04	L03156-05	Seams	5	DS-24...28
1-8-04	L03156-06	Seams	7	DS-17B6, 17B7, 18A, 18B, 20A, 20B

We are pleased to be of service and trust that our efforts have contributed to the success of your project. Should you have any questions, please do not hesitate to call.

Respectfully submitted,

Richard S. Lacey, P.E.
Laboratory Director

attachments: 25 Data Pages

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INTEGRITY IN TESTING

CAVEAT

The tests were performed in general accordance with the procedures referenced on the data tables as well as industry practice on test specimens believed to be representative of the samples submitted. The test results are indicative only of the specimens that were actually evaluated. There were no seam sample remnants.

Geotechnics has no direct knowledge of the origin of the samples submitted, implies no position with regard to the disposition of the test results, i.e. pass/fail, and makes no claims as to the suitability of the material for its intended end use.

The test data and all associated project information provided shall be held in confidence and disclosed to other parties not directly involved with the project only with the authorization of the Client and Geotechnics.

The test data transmitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics.

PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-01
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-11

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	67.1	FTB-SE1	<10
2	67.3	FTB-SE1	<10
3	66.4	FTB-SE1	<10
4	68.2	FTB-SE1	<10
5	66.5	FTB-SE1	<10
AVERAGE	**67.1**		
STD. DEV.	0.72		
INSIDE TRACK (WELD "B")			
1	60.8	FTB-SE1	<10
2	66.6	FTB-SE1	<10
3	62.7	FTB-SE1	<10
4	65.5	FTB-SE1	<10
5	56.0	FTB-SE1	<10
AVERAGE	**62.3**		
STD. DEV.	4.21		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	72.9	FTB-SE1
2	73.7	FTB-SE1
3	72.7	FTB-SE1
4	73.1	FTB-SE1
5	73.1	FTB-SE1
AVERAGE	**73.1**	
STD. DEV.	0.37	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-02
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-12

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	65.2	FTB-SE1	<10
2	61.2	FTB-SE1	<10
3	66.9	FTB-SE1	<10
4	67.8	FTB-SE1	<10
5	68.0	FTB-SE1	<10
AVERAGE	**65.8**		
STD. DEV.	2.81		
INSIDE TRACK (WELD "B")			
1	60.3	FTB-SE1	<10
2	59.2	FTB-SE1	<10
3	58.5	FTB-SE1	<10
4	59.5	FTB-SE1	<10
5	58.7	FTB-SE1	<10
AVERAGE	**59.2**		
STD. DEV.	0.71		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	70.9	FTB-SE1
2	70.6	FTB-SE1
3	70.8	FTB-SE1
4	71.3	FTB-SE1
5	71.3	FTB-SE1
AVERAGE	**71.0**	
STD. DEV.	0.31	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-03
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-13

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	61.3	FTB-SE1	<10
2	64.3	FTB-SE1	<10
3	60.6	FTB-SE1	<10
4	63.1	FTB-SE1	<10
5	61.1	FTB-SE1	<10
AVERAGE	**62.1**		
STD. DEV.	1.56		
INSIDE TRACK (WELD "B")			
1	64.0	FTB-SE1	<10
2	63.4	FTB-SE1	<10
3	55.7	FTB-SE1	<10
4	56.0	FTB-SE1	<10
5	64.7	FTB-SE1	<10
AVERAGE	**60.8**		
STD. DEV.	4.51		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	62.4	FTB-SE1
2	62.9	FTB-SE1
3	60.6	FTB-SE1
4	65.4	FTB-SE1
5	63.9	FTB-SE1
AVERAGE	**63.0**	
STD. DEV.	1.78	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-04
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-14

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	65.0	FTB-SE1	<10
2	64.7	FTB-SE1	<10
3	63.9	FTB-SE1	<10
4	65.4	FTB-SE1	<10
5	50.1	FTB-SE1	<10
AVERAGE	**61.8**		
STD. DEV.	6.57		
INSIDE TRACK (WELD "B")			
1	57.9	FTB-SE1	<10
2	64.1	FTB-SE1	<10
3	63.7	FTB-SE1	<10
4	66.2	FTB-SE1	<10
5	65.4	FTB-SE1	<10
AVERAGE	**63.5**		
STD. DEV.	3.27		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	65.7	FTB-SE1
2	65.4	FTB-SE1
3	64.0	FTB-SE1
4	65.3	FTB-SE1
5	65.1	FTB-SE1
AVERAGE	**65.1**	
STD. DEV.	0.65	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-05
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-15

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	59.6	FTB-SE1	<10
2	60.0	FTB-SE1	<10
3	57.0	FTB-SE1	<10
4	54.9	FTB-SE1	<10
5	61.7	FTB-SE1	<10
AVERAGE	**58.6**		
STD. DEV.	2.68		
INSIDE TRACK (WELD "B")			
1	61.1	FTB-SE1	<10
2	63.2	FTB-SE1	<10
3	61.9	FTB-SE1	<10
4	61.0	FTB-SE1	<10
5	57.6	FTB-SE1	<10
AVERAGE	**61.0**		
STD. DEV.	2.07		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	63.0	FTB-SE1
2	62.9	FTB-SE1
3	64.0	FTB-SE1
4	61.2	FTB-SE1
5	64.4	FTB-SE1
AVERAGE	**63.1**	
STD. DEV.	1.24	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-06
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-16

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	61.4	FTB-SE1	<10
2	67.9	FTB-SE1	<10
3	63.3	FTB-SE1	<10
4	58.5	FTB-SE1	<10
5	60.2	FTB-SE1	<10
AVERAGE	**62.3**		
STD. DEV.	3.61		
INSIDE TRACK (WELD "B")			
1	59.8	FTB-SE1	<10
2	59.3	FTB-SE1	<10
3	63.4	FTB-SE1	<10
4	64.8	FTB-SE1	<10
5	61.4	FTB-SE1	<10
AVERAGE	**61.7**		
STD. DEV.	2.34		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	71.0	FTB-SE1
2	71.2	FTB-SE1
3	71.3	FTB-SE1
4	70.6	FTB-SE1
5	70.6	FTB-SE1
AVERAGE	**70.9**	
STD. DEV.	0.33	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-07
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-17

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	63.1	FTB-SE1	<10
2	63.4	FTB-SE1	<10
3	59.0	FTB-SE1	<10
4	63.9	FTB-SE1	<10
5	63.8	FTB-SE1	<10
AVERAGE	**62.6**		
STD. DEV.	2.06		
INSIDE TRACK (WELD "B")			
1	67.5	FTB-SE1	<10
2	66.2	FTB-SE1	<10
3	65.3	FTB-SE1	<10
4	67.2	FTB-SE1	<10
5	65.9	FTB-SE1	<10
AVERAGE	**66.4**		
STD. DEV.	0.91		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	67.8	FTB-SE1
2	66.8	FTB-SE1
3	68.8	FTB-SE1
4	69.4	FTB-SE1
5	69.4	FTB-SE1
AVERAGE	**68.4**	
STD. DEV.	1.13	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-06
LAB ID NO.: L03156-06-01
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-17-B6

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	75.5	FTB-SE1	<10
2	76.9	FTB-SE1	<10
3	78.1	FTB-SE1	<10
4	76.9	FTB-SE1	<10
5	76.8	FTB-SE1	<10
AVERAGE	**76.8**		
STD. DEV.	0.92		
INSIDE TRACK (WELD "B")			
1	76.4	FTB-SE1	<10
2	63.0	FTB-SE1	<10
3	70.2	FTB-SE1	<10
4	75.4	FTB-SE1	<10
5	59.2	FTB-SE1	<10
AVERAGE	**68.8**		
STD. DEV.	7.57		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	74.9	FTB-SE1
2	74.1	FTB-SE1
3	76.2	FTB-SE1
4		
5		
AVERAGE	**75.1**	
STD. DEV.	1.06	

*Sample to short for a total of 5 shears

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-06
LAB ID NO.: L03156-06-02
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-17-B7

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	73.2	FTB-SE1	<10
2	74.5	FTB-SE1	<10
3	74.1	FTB-SE1	<10
4	73.0	FTB-SE1	<10
5	73.2	FTB-SE1	<10
AVERAGE	**73.6**		
STD. DEV.	0.66		
INSIDE TRACK (WELD "B")			
1	61.6	FTB-SE1	<10
2	62.3	FTB-SE1	<10
3	61.9	FTB-SE1	<10
4	62.0	FTB-SE1	<10
5	63.9	FTB-SE1	<10
AVERAGE	**62.3**		
STD. DEV.	0.91		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	74.8	FTB-SE1
2	74.1	FTB-SE1
3	74.6	FTB-SE1
4	74.7	FTB-SE1
5	75.5	FTB-SE1
AVERAGE	**74.7**	
STD. DEV.	0.50	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-08
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-18

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	56.8	FTB-SE1	<10
2	66.4	FTB-SE1	<10
3	66.2	FTB-SE1	<10
4	65.1	FTB-SE1	<10
5	65.4	FTB-SE1	<10
AVERAGE	**64.0**		
STD. DEV.	4.05		
INSIDE TRACK (WELD "B")			
1	50.2	FTB-SE1	<10
2	48.2	FTB-AD-BRK	75
3	51.3	FTB-SE1	<10
4	51.2	FTB-SE1	<10
5	50.4	FTB-SE1	<10
AVERAGE	**50.3**		
STD. DEV.	1.25		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	69.3	FTB-SE1
2	69.4	FTB-SE1
3	69.8	FTB-SE1
4	69.7	FTB-SE1
5	68.4	FTB-SE1
AVERAGE	**69.3**	
STD. DEV.	0.55	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-06
LAB ID NO.: L03156-06-04
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-18A

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	75.2	FTB-SE1	<10
2	75.3	FTB-SE1	<10
3	74.1	FTB-SE1	<10
4	75.8	FTB-SE1	<10
5	75.2	FTB-SE1	<10
AVERAGE	**75.1**		
STD. DEV.	0.62		
INSIDE TRACK (WELD "B")			
1	75.1	FTB-SE1	<10
2	75.3	FTB-SE1	<10
3	74.7	FTB-SE1	<10
4	76.1	FTB-SE1	<10
5	75.0	FTB-SE1	<10
AVERAGE	**75.2**		
STD. DEV.	0.53		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	76.5	FTB-SE1
2	75.3	FTB-SE1
3	74.9	FTB-SE1
4	74.5	FTB-SE1
5	76.2	FTB-SE1
AVERAGE	**75.5**	
STD. DEV.	0.85	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-06
LAB ID NO.: L03156-06-03
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-18-A1

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	76.1	FTB-SE1	<10
2	74.3	FTB-SE1	<10
3	73.1	FTB-SE1	<10
4	76.2	FTB-SE1	<10
5	76.6	FTB-SE1	<10
AVERAGE	**75.3**		
STD. DEV.	1.50		
INSIDE TRACK (WELD "B")			
1	61.8	FTB-SE1	<10
2	62.2	FTB-SE1	<10
3	64.4	FTB-SE1	<10
4	61.9	FTB-SE1	<10
5	62.6	FTB-SE1	<10
AVERAGE	**62.6**		
STD. DEV.	1.06		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	75.0	FTB-SE1
2	75.3	FTB-SE1
3	76.1	FTB-SE1
4	76.5	FTB-SE1
5	76.2	FTB-SE1
AVERAGE	**75.8**	
STD. DEV.	0.64	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-06
LAB ID NO.: L03156-06-05
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-18B

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	74.9	FTB-SE1	<10
2	61.9	FTB-SE1	<10
3	61.6	FTB-SE1	<10
4	63.9	FTB-SE1	<10
5	65.5	FTB-SE1	<10
AVERAGE	**65.6**		
STD. DEV.	5.46		
INSIDE TRACK (WELD "B")			
1	64.9	FTB-SE1	<10
2	73.4	FTB-SE1	<10
3	77.2	FTB-SE1	<10
4	73.3	FTB-SE1	<10
5	77.9	FTB-SE1	<10
AVERAGE	**73.3**		
STD. DEV.	5.17		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	76.2	FTB-SE1
2	76.7	FTB-SE1
3	76.3	FTB-SE1
4		
5		
AVERAGE	**76.4**	
STD. DEV.	0.26	

*Sample to short for 5 shears

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-09
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-19

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	64.8	FTB-SE1	<10
2	66.0	FTB-SE1	<10
3	65.8	FTB-SE1	<10
4	64.5	FTB-SE1	<10
5	64.6	FTB-SE1	<10
AVERAGE	**65.1**		
STD. DEV.	0.71		
INSIDE TRACK (WELD "B")			
1	58.4	FTB-SE1	<10
2	64.6	FTB-SE1	<10
3	57.3	FTB-SE1	<10
4	61.3	FTB-SE1	<10
5	64.7	FTB-SE1	<10
AVERAGE	**61.3**		
STD. DEV.	3.42		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	67.7	FTB-SE1
2	63.9	FTB-SE1
3	69.5	FTB-SE1
4	70.3	FTB-SE1
5	69.2	FTB-SE1
AVERAGE	**68.1**	
STD. DEV.	2.54	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-10
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-20

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	66.8	FTB-SE1	<10
2	66.3	FTB-SE1	<10
3	64.6	FTB-SE1	<10
4	65.6	FTB-SE1	<10
5	64.1	FTB-SE1	<10
AVERAGE	**65.5**		
STD. DEV.	1.13		
INSIDE TRACK (WELD "B")			
1	60.7	FTB-SE1	<10
2	47.2	FTB-SE1	<10
3	62.5	FTB-SE1	<10
4	50.5	FTB-SE1	<10
5	49.2	FTB-SE1	<10
AVERAGE	**54.0**		
STD. DEV.	7.05		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	72.0	FTB-SE1
2	71.9	FTB-SE1
3	71.5	FTB-SE1
4	71.6	FTB-SE1
5	72.8	FTB-SE1
AVERAGE	**72.0**	
STD. DEV.	0.51	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-06
LAB ID NO.: L03156-06-06
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-20A

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	62.1	FTB-SE1	<10
2	55.3	FTB-SE1	<10
3	57.2	FTB-SE1	<10
4	62.7	FTB-AD-BRK	80
5	65.3	FTB-SE1	<10
AVERAGE	**60.5**		
STD. DEV.	4.13		
INSIDE TRACK (WELD "B")			
1	75.9	FTB-SE1	<10
2	75.8	FTB-SE1	<10
3	74.9	FTB-SE1	<10
4	75.0	FTB-SE1	<10
5	75.9	FTB-SE1	<10
AVERAGE	**75.5**		
STD. DEV.	0.50		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	76.9	FTB-SE1
2	77.4	FTB-SE1
3		
4		
5		
AVERAGE	**77.2**	
STD. DEV.	0.35	

*Sample to short for 5 shera

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-06
LAB ID NO.: L03156-06-07
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-20B

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	65.2	FTB-SE1	<10
2	77.2	FTB-SE1	<10
3	77.4	FTB-SE1	<10
4	75.7	FTB-SE1	<10
5	69.4	FTB-SE1	<10
AVERAGE	**73.0**		
STD. DEV.	5.43		
INSIDE TRACK (WELD "B")			
1	75.0	FTB-SE1	<10
2	74.9	FTB-SE1	<10
3	73.6	FTB-SE1	<10
4	75.2	FTB-SE1	<10
5	76.4	FTB-SE1	<10
AVERAGE	**75.0**		
STD. DEV.	1.00		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	72.6	FTB-SE1
2	74.9	FTB-SE1
3		
4		
5		
AVERAGE	**73.8**	
STD. DEV.	1.63	

*Sample to short for 5 shears

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PEEL AND SHEAR TEST RESULTS
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ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-11
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-21

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	58.5	FTB-SE1	<10
2	72.3	FTB-SE1	<10
3	48.4	FTB-SE1	<10
4	72.7	FTB-SE1	<10
5	55.5	FTB-SE1	<10
AVERAGE	**61.5**		
STD. DEV.	10.71		
INSIDE TRACK (WELD "B")			
1	70.3	FTB-SE1	<10
2	69.1	FTB-SE1	<10
3	69.4	FTB-SE1	<10
4	68.4	FTB-SE1	<10
5	69.8	FTB-SE1	<10
AVERAGE	**69.4**		
STD. DEV.	0.72		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	76.5	FTB-SE1
2	74.4	FTB-SE1
3	74.6	FTB-SE1
4	74.1	FTB-SE1
5	75.6	FTB-SE1
AVERAGE	**75.0**	
STD. DEV.	0.99	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING
ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-12
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-22

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	65.2	FTB-SE1	<10
2	66.4	FTB-SE1	<10
3	65.3	FTB-SE1	<10
4	55.5	FTB-SE1	<10
5	66.0	FTB-SE1	<10
AVERAGE	**63.7**		
STD. DEV.	4.60		
INSIDE TRACK (WELD "B")			
1	63.9	FTB-SE1	<10
2	65.1	FTB-SE1	<10
3	59.9	FTB-SE1	<10
4	64.2	FTB-SE1	<10
5	64.0	FTB-SE1	<10
AVERAGE	**63.4**		
STD. DEV.	2.02		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	65.8	FTB-SE1
2	64.3	FTB-SE1
3	64.7	FTB-SE1
4	65.3	FTB-SE1
5	65.7	FTB-SE1
AVERAGE	**65.2**	
STD. DEV.	0.65	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

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INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-04
LAB ID NO.: L03156-04-13
MATERIAL: 40-MIL LLDPE
SEAM TYPE: DOUBLE FUSION

SAMPLE I.D.: DS-23

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
OUTSIDE TRACK (WELD "A")			
1	62.7	FTB-SE1	<10
2	60.6	FTB-SE1	<10
3	60.6	FTB-SE1	<10
4	60.4	FTB-SE1	<10
5	62.7	FTB-SE1	<10
AVERAGE	**61.4**		
STD. DEV.	1.19		
INSIDE TRACK (WELD "B")			
1	52.9	FTB-SE1	<10
2	54.3	FTB-SE1	<10
3	61.2	FTB-SE1	<10
4	63.3	FTB-SE1	<10
5	61.9	FTB-SE1	<10
AVERAGE	**58.7**		
STD. DEV.	4.76		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	62.9	FTB-SE1
2	62.3	FTB-SE1
3	65.3	FTB-SE1
4	65.0	FTB-SE1
5	64.4	FTB-SE1
AVERAGE	**64.0**	
STD. DEV.	1.32	

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PEEL AND SHEAR TEST RESULTS
DESTRUCTIVE SEAM TESTING

ASTM D 6392 & 4437 w/NSF 54

geotechnics
INTEGRITY IN TESTING

CLIENT: URS DIAMOND
CLIENT PROJECT: DUPONT EDGEMOOR
PROJECT NO.: L03156-05
LAB ID NO.: L03156-05-01
MATERIAL: 40-MIL LLDPE
SEAM TYPE: EXTRUSION

SAMPLE I.D.: DS-24

PEEL ADHESION

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE	PEEL INCURSION (%)
1	77.2	FTB-SE3	<10
2	77.0	FTB-SE3	<10
3	80.9	FTB-SE3	<10
4	79.7	FTB-SE3	<10
5	75.1	FTB-SE3	<10
AVERAGE	**78.0**		
STD. DEV.	2.31		

BONDED SEAM (SHEAR) STRENGTH

REPLICATE No.	PEAK LOAD (lbs/in)	EPA BREAK CLASSIFICATION CODE
1	79.2	FTB-SE1
2	82.3	FTB-SE1
3	79.7	FTB-SE1
4	89.2	FTB-SE1
5	90.2	FTB-SE1
AVERAGE	**84.1**	
STD. DEV.	5.24	

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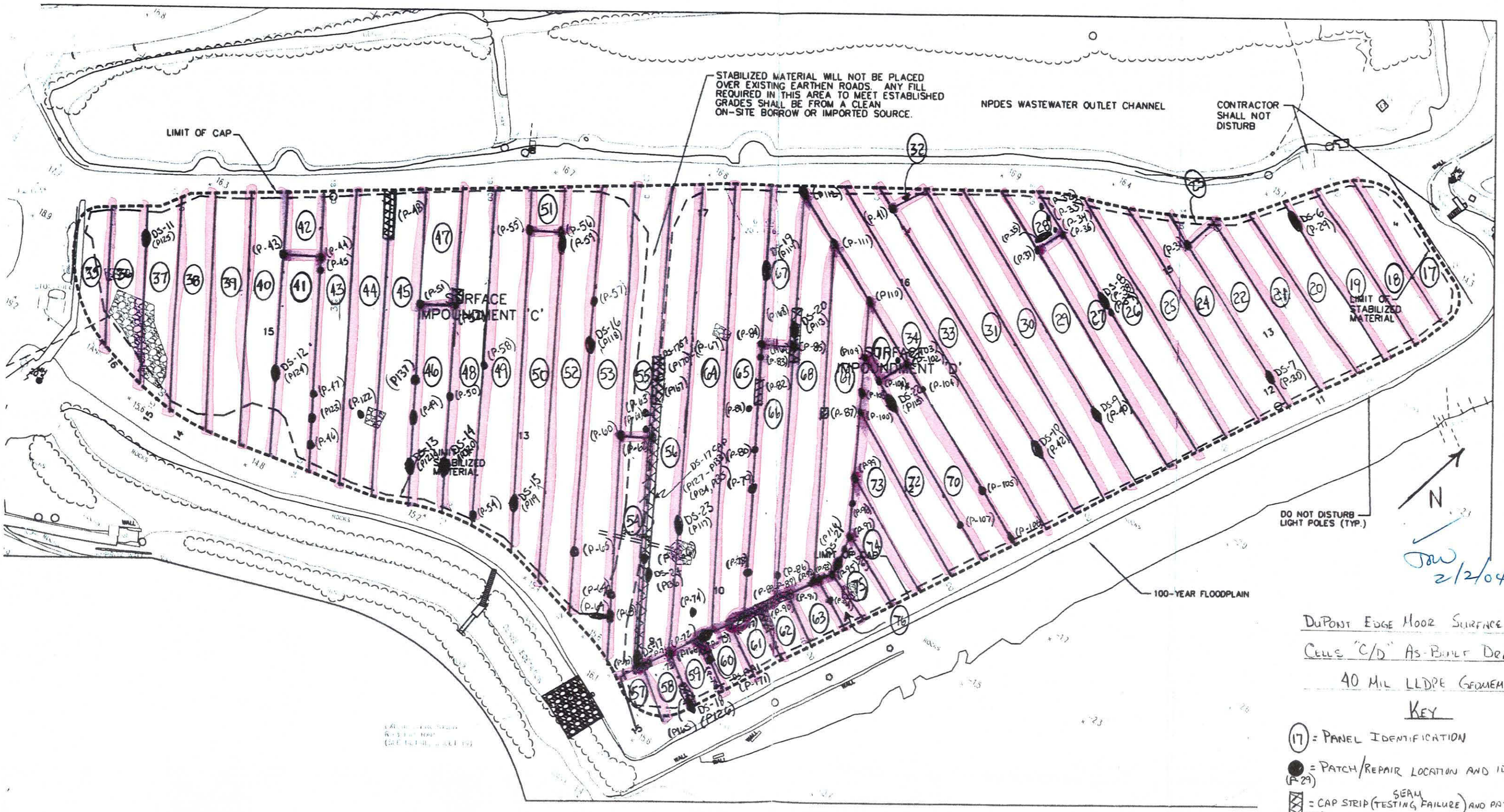
24 x 36

30 SCALE



DuPont Edge Moor Surface Impoun

Cells "C/D" As-Built Drawing

40 Mil LLDPE Geomembrane

Key

(17) = Panel Identification

● (P-29) = Patch/Repair Location and Identifica

▨ (P18) = Cap Strip (Seam Testing, Failure) and Patch Identifi

● DS-6 = Destructive Seam Sample Locatio

1" = 60'